2019-2028 Comprehensive Reliability Plan

A Report from the
New York Independent
System Operator

Final Report
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Executive Summary

This Comprehensive Reliability Plan (CRP) concludes that the New York State Bulk Power Transmission Facilities will meet all applicable Reliability Criteria over the 2019 through 2028 study period. The CRP completes the 2018-2019 cycle of the NYISO Reliability Planning Process.

The NYISO initiated the CRP after the NYISO Board approved the 2018 Reliability Needs Assessment (RNA) in October 2018. The 2018 RNA assessed the resource adequacy and transmission security of the New York State Bulk Power Transmission Facilities from 2019 through 2028. The final 2018 RNA identified no Reliability Needs.

While the NYISO concludes that long-term reliability needs have been satisfied in this cycle of the Reliability Planning Process, the margin to maintain reliability could narrow or be eliminated over the ten-year study period based upon changes in assumptions. Potential risk factors, such as generator unavailability, generator deactivations, external control area capacity sales, delay in proposed resource additions or transmission plans, or higher load levels, could potentially lead to transmission security or resource adequacy violations.

These risks are mitigated by the fact that the NYISO's markets are designed to send appropriate price signals for new market entry of resources that may assist in maintaining reliability. In addition, the potential risks and resource needs identified in the scenario analyses in the 2018 RNA may be resolved by new capacity resources coming into service, construction of additional transmission facilities, and/or increased energy efficiency, distributed energy resources, and demand response.

Importantly, a number of recent state policies and initiatives, along with various Department of Environmental Conservation (DEC) rulemakings are underway that have the potential to significantly change the generation resource mix in the New York Control Area. These include the Clean Energy Standard, the Offshore Wind Master Plan, the Large-Scale Renewable Program, and the Zero Emission Credits Program for the James A. FitzPatrick, R.E Ginna and Nine Mile Point nuclear power plants. The NYISO will continue to monitor these and other developments to determine whether changing system resources and conditions could impact the reliability of the New York bulk electric grid.

This CRP includes, for information, an 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 (NO_X) emissions from simple cycle and regenerative combustion turbines (Peaker Rule[1]).

[1] The rulemaking is still in progress at this time; therefore, the scenario is based on assumptions, and it is for information only.

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).[2] The first implementation phase in 2023 would affect approximately 2,200 MW, with an additional 1,100 MW of units affected in 2025. For this scenario, the remaining coal plants in New York State are assumed to be retired based upon the DEC's rule setting carbon dioxide emission requirements for existing fossil-fueled generators. This assessment is provided to assist market participants and policy makers with understanding the potential reliability impacts if the affected generators deactivate. The NYISO will continue to monitor the DEC rulemaking processes and will further consider any implications to system reliability in the 2020 Reliability Needs Assessment. The results, as prepared in collaboration with Con Edison and PSEG Long Island, identify potential system deficiencies as detailed in the body of this report; key observations are summarized below.

If all of the generators affected by the peaker rule were to deactivate without the addition of replacement resources or system reinforcements, the transmission system would be unable to reliably serve the forecasted load within specific pockets in New York City and Long Island, as well as across Southeast New York. Starting in 2023 with the first implementation phase of the rule, pockets in New York City would be deficient of supply for up to 14 hours in a given day at a peak amount of 240 MW. Pockets in Long Island would be deficient by 320 MW for up to 15 hours in a given day. With full implementation of the peaker rule assumed in 2025, the New York bulk power system as a whole would significantly exceed the threshold of one loss of load event in ten years due to a supply deficiency of at least 700 MW in Southeast New York. At the same time, the Con Edison and Long Island local system deficiencies would increase to a total of 660 MW in New York City and 620 MW in Long Island.

Additionally, system operations reliability issues would arise related to the potential deactivation of the affected peaking generators. These include limited black start and system restoration capability, difficulty scheduling maintenance outages, degraded system voltage performance, and a greater level of resource commitment and dispatch within the New York City and Long Island load pockets.

The deficiencies could potentially be met by a number of combinations of solutions including generation, transmission, and demand-side (*e.g.,* energy efficiency, demand response) measures. Any solution or combination of solutions would need to address the peak megawatt deficiency as well as the total megawatt-hour deficiency over the specified period (*i.e.*, up to 14 hours in New York City and 15 hours in Long Island). However, due to the loss of load events projected in Southeast New York, local transmission upgrades within New York City and Long Island alone would not fully address the

[2] As compared with the CRP base case assumptions.

deficiencies. Replacement resources would be required to resolve the identified reliability deficiencies. At the same time, any solutions located solely outside the load pockets identified by Con Edison and PSEG Long Island would not fully resolve the needs on their own, as the local deficiencies would not be addressed. Solutions would need to resolve the identified deficiencies for both the peak amounts and for the durations specified.

Finally, 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 solutions to address any Reliability Needs identified through that process. For generators affected by the peaker rule, the NYISO could enter into Reliability Must Run agreements with specific generators to continue to operate for a two-year period, with a possible two-year extension, 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 Reliability Planning Process will begin in 2020, 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 based on updated assumptions, and will review the status of the risk factors discussed in this CRP, together with other reliability issues.

Introduction

The 2018 Reliability Needs Assessment (RNA) is the first step of the NYISO's 2018-2019 Reliability Planning Process (RPP). This Comprehensive Reliability Plan (CRP) follows the 2018 RNA and completes the 2018-2019 cycle of the Reliability Planning Process. The 2018 RNA was approved by the NYISO Board of Directors in October 2018.

Using the 2018 RNA Base Case developed in accordance with the NYISO's procedures, the RNA assessed both the resource adequacy and transmission security of the New York State Bulk Power Transmission Facilities (BPTF) from year 2019 through 2028, the "Study Period" of this 2018 Reliability Planning Process.

This report summarizes the findings of the Reliability Planning Process and sets forth the NYISO's 2019-2028 Comprehensive Reliability Plan.

Reliability Planning Process Findings for 2019-2028

The Reliability Planning Process (*i.e.*, collectively the RNA and the CRP) findings and risk factors for 2019-2028 are summarized below.

Finding One – Resource Adequacy

There are sufficient resources in the RNA and CRP[3] base cases to meet the resource adequacy criterion for the entire ten-year Study Period. The needs will be revisited in subsequent cycles of the Reliability Planning Process.

The CRP base cases were updated to capture status changes since the RNA Base Case (captured in Figure 18).

Finding Two – Transmission Security

There are no Reliability Needs identified in the RNA or CRP base cases as result of this assessment.

As an initial step to the 2018 RNA, the NYISO provided preliminary results to stakeholders and sought any material updates that could address the preliminary Reliability Needs. Preliminary evaluations identified a transmission security Reliability Need on a BPTF facility in eastern Long Island (*i.e.,* the Brookhaven to Edwards Ave. 138 kV line). PSEG Long Island subsequently proposed terminal upgrades at the Brookhaven 138 kV Substation, (to be in-service by June 2019), which resolved the overload. Additionally, thermal overloads were identified for 2019 in National Grid and Orange & Rockland service territories. These transmission owners will address the overloads with local transmission upgrades that were previously identified in the 2018 Gold Book (also listed in Figure 17), and will use interim operating procedures to maintain the security of the system until the local transmission upgrades are placed in-service. Details of these 2019 thermal overloads and the associated local transmission upgrades are provided in the 2018 RNA. Therefore, no Reliability Needs were ultimately identified in the 2018 RNA.

The status of the local transmission owner plans will continue to be monitored by the NYISO.

Finding Three – Plan Risk Factors and Highlights of Potential Developments

Findings One and Two reflect the base case assumptions, which were set in accordance with NYISO's procedures. There are, however, risk factors that could adversely affect the implementation of the plan and hence system reliability over the ten-year planning horizon. If any of these factors materialize, the NYISO will assess the potential impacts and, if necessary, perform an evaluation to determine whether the NYISO should solicit solutions under the Generation Deactivation Process or Gap Solution process, as required.

[3] Updates from the RNA to the CRP cases are in Figure 18

The risk factors include:

1. **Changes to System Resources**

Substantial uncertainties exist in the next ten years that will impact the system resources. These uncertainties include, but are not limited to:

a) The base cases include approximately 1,600 MW of assumed generation additions in various planning stages, and approximately 1,150 MW of assumed deactivations (see **Appendix C** for details). If expected capacity resources do not materialize, the New York resource adequacy margin (as measured by comparison with the loss of load expectation criterion of 0.1 days per year) will decrease.

b) If additional generating units become unavailable or deactivate beyond those units already contemplated in the 2018 RNA (listed in the **Appendix C** of this report), the reliability of the New York Control Area (NYCA) could be adversely affected. The NYISO recognizes that there are numerous risk factors related to the continued financial viability, compliance with emissions requirements, and operation of aging generating units. Depending on the units affected, the NYISO may need to take actions through its Generation Deactivation Process to maintain reliability. The scenarios performed as part of the RNA indicated that the deactivation of generators could lead to reliability needs.

   To further inform stakeholders of such potential future reliability needs, the NYISO evaluated the reliability impacts of a proposed DEC rule to limit emissions from approximately 3,300 MW (nameplate) of peaking units, which are mostly located in New York City and Long Island. The findings are described in detail in the "**Peaker Rule Scenario**" section.

c) Capacity resources could decide to offer into markets in other regions and, therefore, some of the capability of those resources may not be available to the NYCA. Accordingly, the NYISO will continue to monitor imports, exports, generation and other infrastructure.

d) There are a number of public policy transmission developments in progress, which if they materialize, will increase the system capability to transport power:

   - The Western NY Public Policy Transmission Project (the Empire State Line Proposal 1), to be developed by NextEra Energy Transmission New York, Inc., was selected by the NYISO Board in October 2017 and is included in the 2018 RNA Base Case. This project includes a new 345 kV circuit and phase angle regulator (PAR) that will alleviate constraints in the Niagara area. The planned in-service date for this project is Summer 2022.

- The solutions to the AC Transmission Public Policy Transmission Needs were not reflected in the 2018 RNA base case, as the Public Policy Transmission Planning Process evaluation was ongoing when the study was conducted. As part of the NYISO's Public Policy Transmission Planning Process, the New York State Public Service Commission (PSC) identified the need to expand the state's AC transmission capability to deliver additional power from generating facilities located in upstate New York, including important renewable resources, to the population centers located downstate. To provide additional capability to move power from upstate to downstate, the PSC identified the AC Transmission Public Policy Transmission Needs to increase transfer capability from central to eastern New York by at least 350 MW ("Segment A") and from the Albany region through the Hudson Valley region by at least 900 MW ("Segment B"). On April 8, 2019, the NYISO Board of Directors selected the Double-Circuit project (T027) proposed jointly by North America Transmission and the New York Power Authority as the more efficient or cost-effective transmission solution to address Segment A. The Board also selected the New York Energy Solution project (T019) proposed jointly by Niagara Mohawk Power Corporation d/b/a National Grid and the New York Transco, LLC as the more efficient or cost-effective transmission solution to address Segment B. The anticipated in-service date for Projects T027 and T019 is December 2023.
- The NYISO initiated the 2018-2019 Public Policy Transmission Planning Process cycle on August 1, 2018 by issuing a solicitation for proposed transmission needs driven by Public Policy Requirements. Following the NYISO's submittal of the proposals to the PSC, the NYISO filed comments, stating that additional transmission will be needed in order to achieve the various goals of the State's Clean Energy Standard. If the PSC determines that there is a need for transmission, the NYISO will solicit projects from developers to fulfill that need.

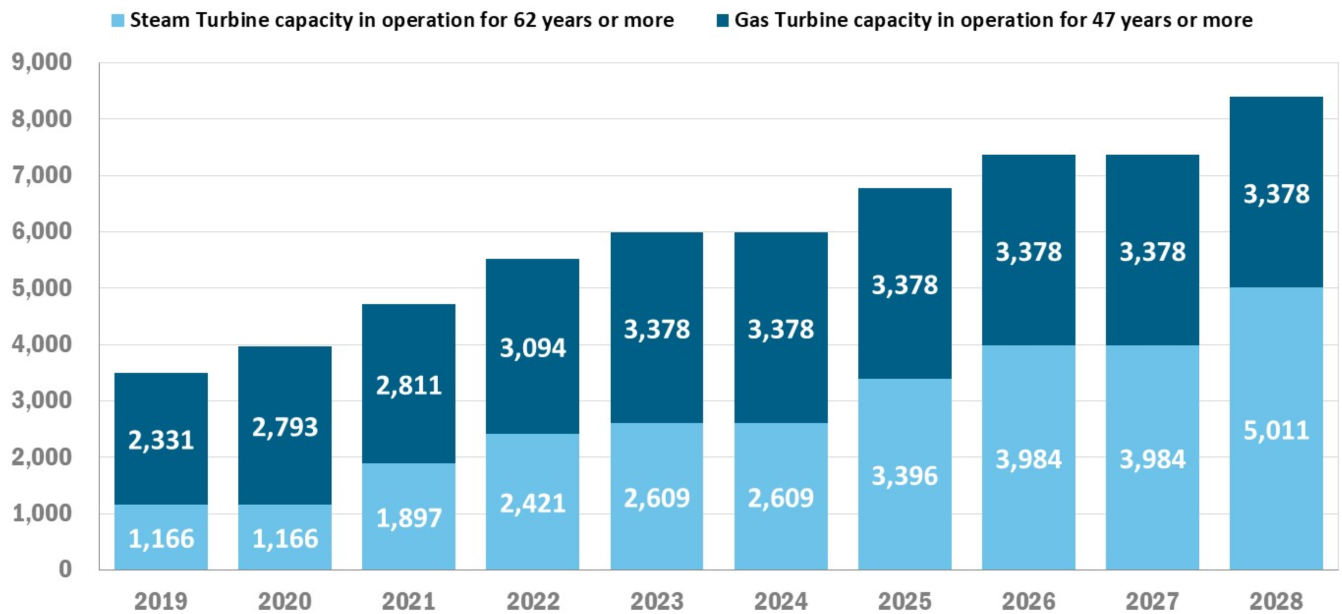
2. Completion of Local Transmission Owner Plans

The local transmission owner plans (LTPs) are an important part of the overall Comprehensive System Planning Process and the findings of this CRP. The NYISO will continue to track the timely entry into service of projects that have been identified to relieve reliability violations (*e.g.*, Clay-Pannell 345 kV upgrades, Oakdale 345 kV transformer and substation upgrades, Lovett 345kV/138kV station, Clay-Teall 115 kV and Clay-Dewitt 115 kV lines reconductoring).

3. Changes to System Performance

As generators age and experience more frequent and longer duration outages, the costs to maintain the assets increase. This may drive aging generation into retirement. A growing amount of New York's gas-turbine and fossil fuel-fired steam-turbine capacity is reaching an age at which, nationally, a vast majority of similar capacity has been deactivated. As shown in Figure 1, by 2028 more than 8,300 MW of gas-turbine and steam-turbine based capacity in New York will reach an age beyond which 95% of these types of capacity have deactivated.

Figure 1: Cumulative NYCA Nameplate Capacity MW Past the Age When 95% of Similar Units Have Retired



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

4. Changes to System Load Level

In conducting a scenario with a topline load forecast approximately 3,100 MW higher than the baseline forecast, the NYISO found that the loss of load expectation (LOLE) would be at or above 0.1 days per year starting in 2025. As a result, a higher-than-forecasted load level could expose the system to potential reliability issues, necessitating interim operating procedures up to and including measures such as load shedding in some localized areas of the state. However, based upon the 2018 forecast, the peak demand trends in New York are forecasted to experience the lowest rate of annual growth in the history of the NYISO. The NYISO also forecasts that, as forecast in 2018, statewide energy use — reflecting the effects from increased energy efficiency and customer-based distributed energy resources (DERs) — will decrease from current levels over the ten-year planning horizon.

In the past decade, energy provided by the bulk grid has decreased, while energy production from DERs, such as solar, has increased. These DERs are beginning to displace energy that was traditionally supplied by conventional generation through the regional electricity grid, and the energy provided by many DERs is not continuous, but intermittent, and less visible to the NYISO markets and operations. Also, included in the NYISO's 2018 data is a forecast of the cumulative impacts of electric vehicles on energy usage and peak demand. Electric vehicles are forecasted to increase peak demand on the system absent incentives for consumers to charge vehicles off-peak.

The NYISO will continue to report on energy usage and peak demand trends in its annual Load and Capacity Data Report ("Gold Book").

5. Natural Gas Coordination

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.

6. Federal, State, and Local Environmental Regulations

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 of the bulk system. The purpose of this section is to review the status of regulatory programs and their potential grid impacts. The impactful regulatory programs — each at various points in the development and implementation — are summarized on the next page.

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

Peaker Rule Scenario

The New York State Department of Environmental Conservation (DEC) has initiated a process to develop a regulation to limit nitrogen oxide (NO_X) emissions from simple cycle and regenerative combustion turbines ("peaking units"). In June 2018, the DEC posted a "Stakeholder Draft" outlining a proposed rule prior to initiating formal rulemaking (the "Peaker Rule[4]"). On February 27, 2019 the DEC formally issued the proposed rule for comment. The proposed rule would establish new emission limits that would become effective May 1, 2025, while beginning May 1, 2023 the current averaging rules would cease and individual units would be required to meet a NO_X emission rate of 100 ppm during the ozone season. Based on available emission data, these limits could affect approximately 3,300 MW (nameplate) of peaking units, almost entirely located in New York City and Long Island. The proposed first implementation phase in 2023 could affect approximately 2,200 MW, with an additional 1,100 MW of units potentially affected in 2025. In anticipation of DEC's formal rulemaking, the NYISO initiated a study in coordination with Con Edison and PSEG Long Island to assess potential reliability impacts of such a rule. The objective of this scenario is to identify potential reliability issues that may result if all affected generators were to deactivate without replacement, and to describe the nature of those reliability issues to inform market participants who may consider possible market-based solutions. As part of this scenario the remaining coal plants in New York State are also assumed to be retired based upon the DEC's proposed rule setting carbon dioxide emission requirements for existing fossil-fueled generators.[5]

Figure 2 below summarizes the amount of generation assumed to be retired for purposes of this scenario relative to the base case.

Figure 2: Peaker Rule Scenario – Assumed Zonal MW Removal

		Removed in 2023 & 2024 *(starting 2021 for coal)*			Additional MW removed starting 2025 (throughout the study period)			Total Removed by 2025		
		Name Plate	ICAP	DMNC	Name Plate	ICAP	DMNC	Name Plate	ICAP	DMNC
Coal	Zone A & C	810	840	840	0	0	0	810	840	840
Peaking Units	Zones A-I	132	107	107	0	0	0	132	107	107
	Zone J	1,066	841	846	692	582	585	1,758	1,423	1,431
	Zone K	1,039	960	968	406	389	389	1,445	1,349	1,357
							Total (including Coal)	4,145	3,719	3,735
							Total Peaking Units Only	3,335	2,879	2,895

The NYISO, Con Edison, and PSEG Long Island collaborated in evaluating the potential reliability

4 https://www.dec.ny.gov/docs/air_pdf/scctdraft.pdf

5 https://www.dec.ny.gov/regulations/113501.html

impacts of this scenario. As described in the following sections, Con Edison and PSEG Long Island each evaluated the transmission security and operational impacts in their service territory, and NYISO evaluated the transmission security and resource adequacy of the bulk system, utilizing the Con Edison and PSEG Long Island findings as input. For the NYISO assessments, statewide coincident peak load values are used. For the Con Edison and PSEG Long Island assessments, non-coincident peak loads are used, as determined by Con Edison and PSEG Long Island for each load pocket/transmission load area (TLA).

Con Edison Assessment

The transmission security criteria violations observed in the Con Edison service territory are primarily due to deficiencies that are observed in the Astoria East/Corona 138 kV TLA and the Greenwood/Fox Hills 138 kV TLA.

Figure 3 shows the high-level topology of the Astoria East/Corona 138 kV TLA. The boundary feeders for this TLA include the feeders from the Hell Gate, Astoria Annex, Rainey, and Jamaica substations.

Figure 3: Astoria East / Corona 138 kV TLA

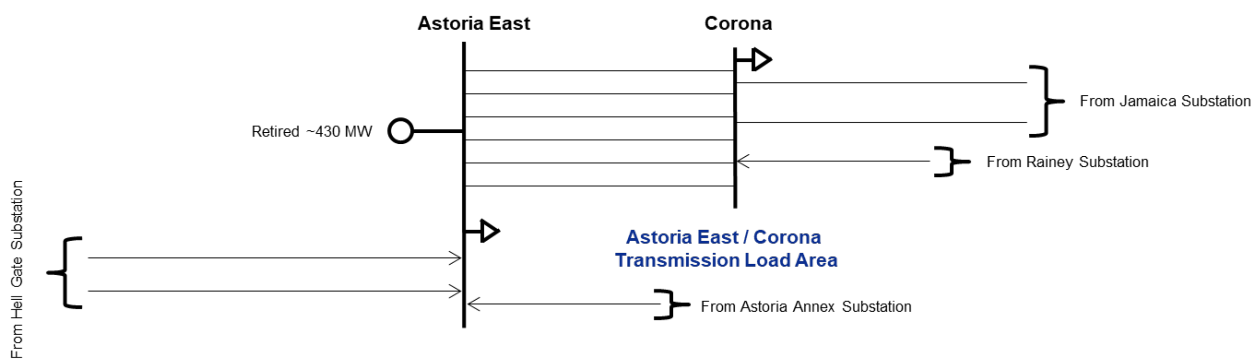
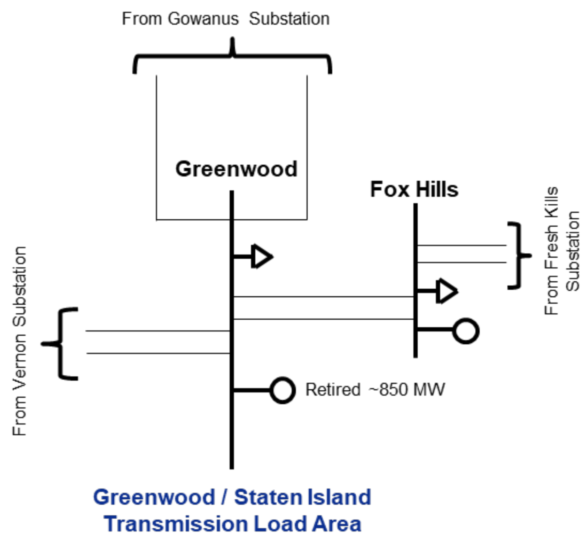


Figure 4 shows the high-level topology for the Greenwood/Fox Hills 138 kV TLA. The boundary feeders for this TLA include the feeders from the Vernon, Gowanus, and Fresh Kills substations.

Figure 4: Greenwood / Fox Hills 138 kV TLA



Year 2023

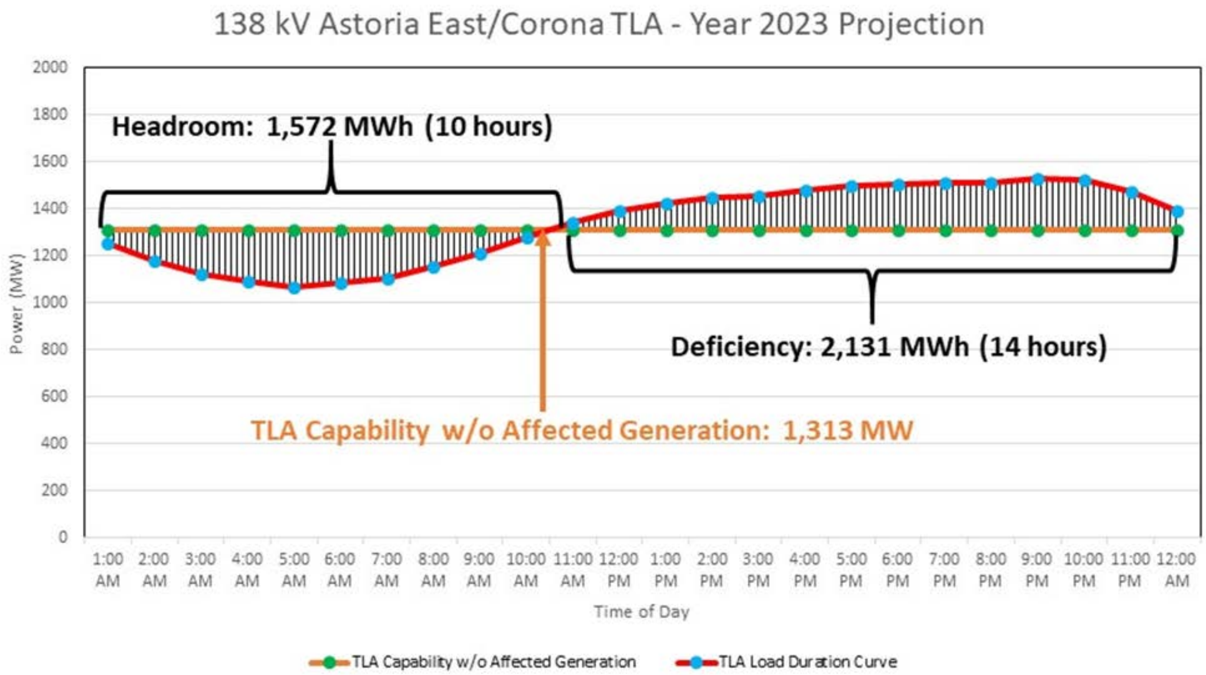
In 2023, thermal overloads are observed on the Astoria East/Corona 138 kV TLA boundary feeders, which are designed to a second contingency (N-1-1-0) based on the applicable Con Edison local design criteria.

As shown in Figure 5, the Astoria East/Corona 138 kV TLA does not peak with the coincident system peak[6]. The maximum observed deficiency (*i.e.*, compensatory MW) within this TLA is approximately 220 MW considering utilization of all available phase angle regulator (PAR) controls. Based on the load duration curve (which is derived based upon historical data) and the capability of the TLA, the TLA may be deficient by 2,131 MWh over a period of 14 hours on a given day.

In 2023, the East 75th area station is also observed to have a deficiency of about 20 MW under contingency conditions on the distribution system.

[6] The Gold Book assumes that the NYCA summer peak occurs from 4 p.m. to 5 p.m.

Figure 5: Astoria East/Corona TLA Load Duration Curve

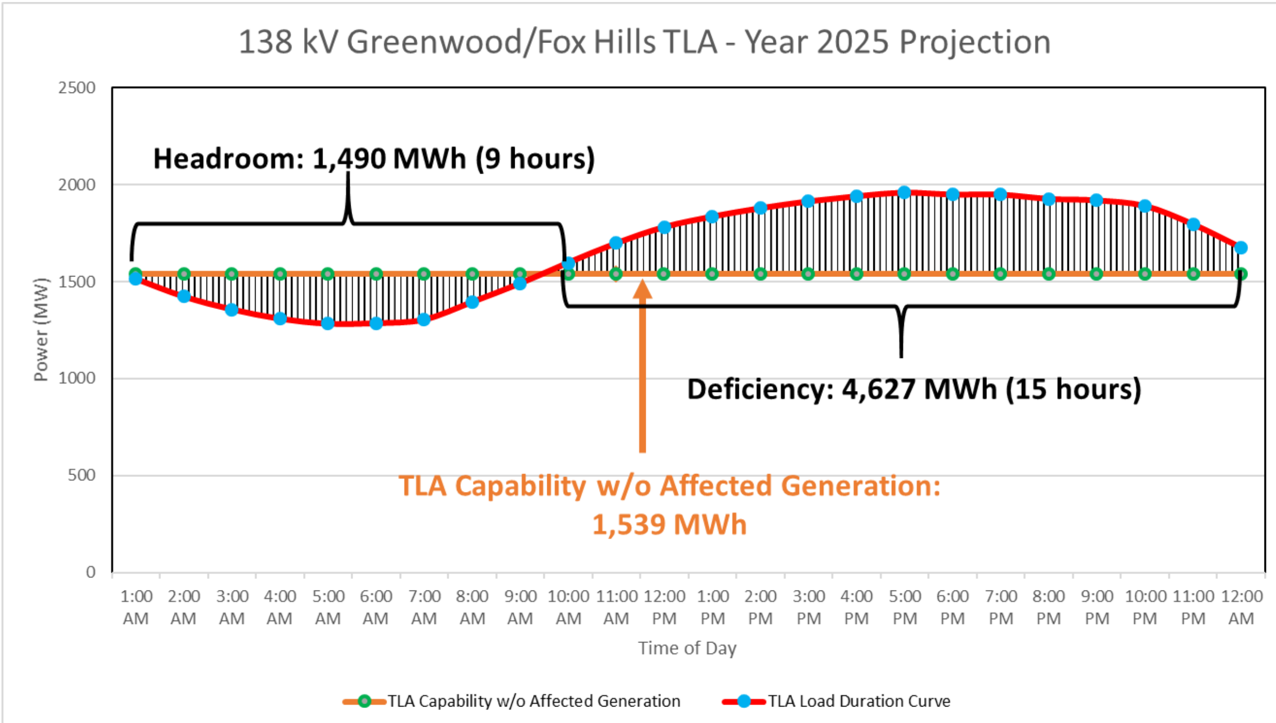


Year 2025

In 2025, no additional generation is removed from the Astoria East/Corona 138 kV TLA or East 75th area station. Therefore, the deficiency of about 220 MW for the Astoria East/Corona 138 kV TLA continues to be observed as well as the East 75th area station deficiency of about 20 MW. Due to the magnitude of the generation removed within the Greenwood/Fox Hills TLA, this TLA is observed to have a deficiency of about 160 MW under normal conditions (N-0). Under contingency conditions (N-1 and N-1-1), BPTF elements (including the Goethals – Gowanus 345 kV feeders 25 and 26 and Fresh Kills 345/138 kV transformers TA1 and TB1) that are upstream of the TLA are also observed to be overloaded. The resulting total deficiency for the Greenwood/Fox Hills TLA is approximately 420 MW.

As shown in Figure 6, the Greenwood/Fox Hills TLA peaks near the coincident system peak. The maximum observed deficiency within this TLA is approximately 420 MW considering utilization of all available PAR controls. Based on the load duration curve and the capability of the TLA, the TLA may be deficient by 4,627 MWh over a period of 15 hours on a given day.

Figure 6: Greenwood/Fox Hills TLA Load Duration Curve



System Operations Impact

Sufficient 10-minute reserve is essential for Con Edison to meet the applicable operations criteria. The current reliability rules allow for the Con Edison underground transmission system circuits to be operated for Normal Transfers (*i.e.,* day-to-day operation) to their Short Term Emergency (STE) ratings. This capability is dependent on being able to reduce the loading on a circuit to its Long Term Emergency (LTE) rating within 15 minutes through the use of operating reserve and PAR adjustments, and not causing any other facility to be loaded beyond its LTE rating.

As such, if resources that replace the affected units are not capable of providing 10-minute operating reserve, there is an increased likelihood that the underground transmission system circuits would need to be secured pre-contingency to LTE ratings rather than to STE. A result of operating to LTE ratings would be a greater level of resource commitment and dispatch within the load pocket for a significant amount of hours through the year. In addition, the ability to grant multiple maintenance outages of transmission facilities and/or generation resources during off-peak periods would become more challenging.

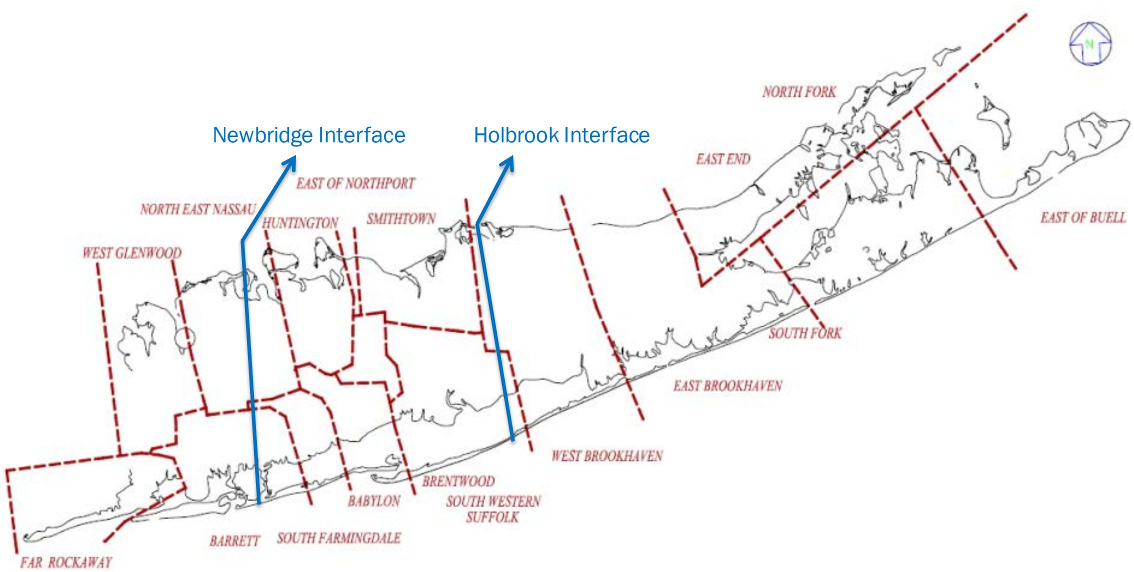
Regarding the thunderstorm watch procedure, to the extent the resources are not replaced with resources capable of providing 10 or 30-minute operating reserves, it will be more challenging to redispatch the system in real-time to meet the more restrictive reliability criteria applied during thunderstorms. This criterion requires that Con Edison operate its system as if the first contingency has already occurred on its northern transmission system when thunderstorms are within one hour of the system or are actually being experienced. A greater level of commitment may be required to ensure sufficient resources within the Con Edison system can respond in real-time for the duration of the storms. The Thunderstorm Watch procedure would be unaffected by the deactivations under all in-service scenario.

The deactivations would not have a consequential impact on the Con Edison system restoration plan and loss of gas/minimum oil burn (LOG/MOB) program.

PSEG Long Island Assessment

Figure 7 provides a high level view of the Long Island load pockets. Units affected by the Peaker Rule are located throughout the Long Island system ranging from Western Nassau to the East End of Long Island.

Figure 7: PSEG Long Island Load Pockets and Interfaces



Year 2023

In 2023, the most severe thermal overloads observed occur when the South Western Suffolk and East End load pockets are at non-coincident peak load.

Figure 23 in Appendix D summarizes the 2023 thermal overloads observed in Long Island. The highest observed loadings mostly occur when the East End load pocket is at its non-coincident peak load. This impact results from the decrease in generation east of Holbrook Interface forcing power transfer from the west into the eastern part of the system. Because of this large transfer, the highest overload observed occurs when the system loses a large amount of capacity feeding the east (*e.g.*, double circuit contingencies). In 2023, the total compensatory MW needed to resolve the Long Island system deficiency during peak conditions is approximately 320 MW. For this assessment, the assumed compensatory MW resources have a power factor of 0.95 leading and lagging. With the assumed reactive power injection from these sources, no voltage criteria violations are observed.

Year 2025

In 2025, the most severe N-1 thermal transmission security violations are observed when the South Western Suffolk and East End, load pockets are at non-coincident peak load. In addition, the most severe thermal transmission security violations in the Barrett area are observed while simulating N-1-1 events at LIPA system coincident peak load.

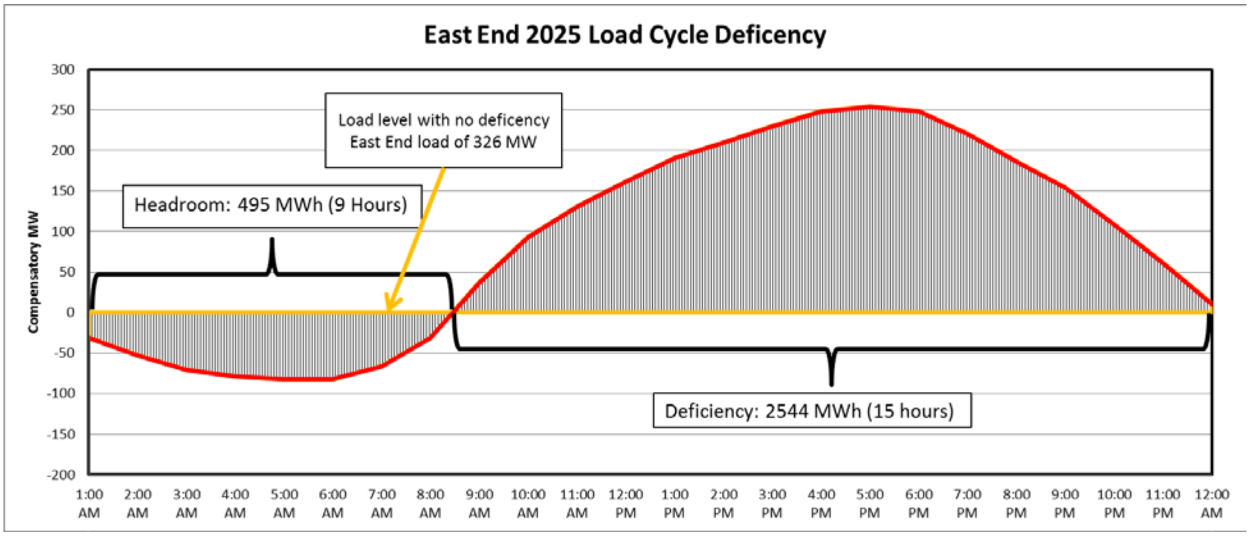
Figure 24 in Appendix D provides a summary of the 2025 thermal overloads observed in Long Island. The transmission security results indicate additional thermal overloads on several BPTF transmission circuits associated with the Y49 and Y50 ties due to the lack of on-island generation in the LIPA transmission system. With a loss of either Y49 or Y50 as the first level contingency, the system will experience a thermal rating violation on the remaining line (or other elements in series with these lines) due to the lack of on-island generation in LIPA.

In 2025, the total compensatory MW needed to resolve all observed thermal overloads under peak conditions in Long Island is approximately 620 MW. For this assessment, the assumed compensatory MW sources have a power factor of 0.95 leading and lagging. With the assumed reactive power injection from these sources, no voltage criteria violations are observed.

The deficiencies across the island can be broken up into three separate areas based upon the N-1 and N-1-1 compensatory MW needs: East End, East of Holbrook and Barrett. The East End, Southwest Suffolk, and Barrett load pockets required the most compensatory MW to resolve the observed transmission security violations. The load curves shown below identify the headroom and deficiency capability for Long Island. The load curves depict the overloads observed in the 2025 analysis and the compensatory MW sources used to quantify the deficiency.

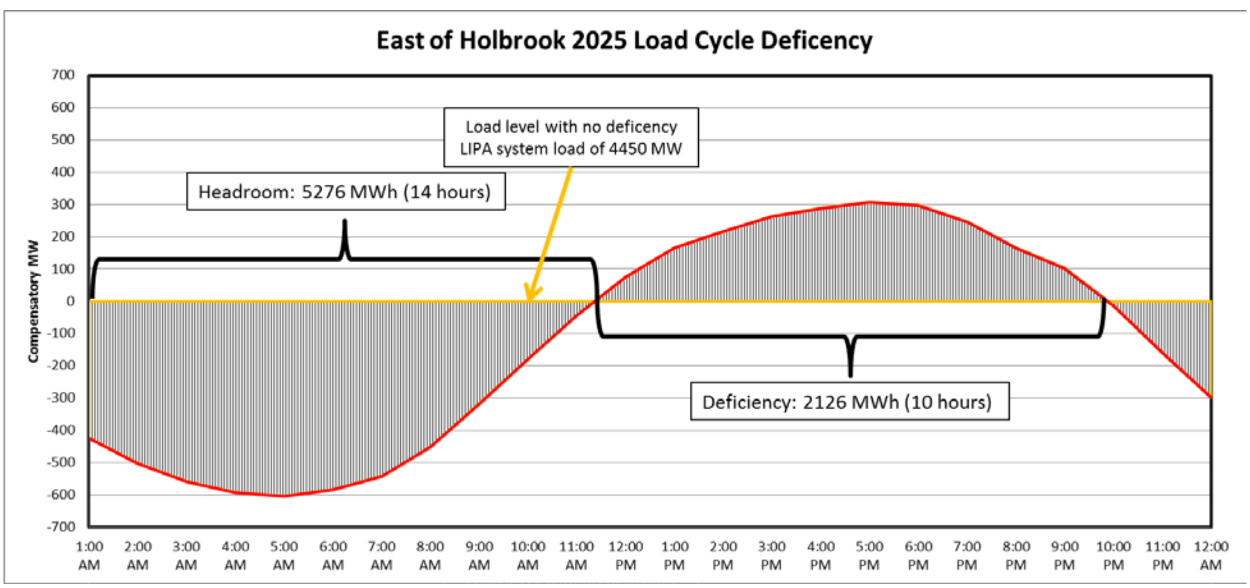
The East End load curve is based on the 2018 actual pocket load broken down by hour and scaled up to the forecasted 2025 pocket non-coincident load. To find the load level with no deficiency in the East End non-coincident base case, the LIPA load is reduced until there are no violations and the East End pocket load level is recorded. The East End is unique in that it peaks at a different time than the rest of the system. Because of this, the East End has its own load curve based on pocket load while the rest of the Long Island system can use the system load curve. As a result, the East End compensatory MW would be required for about 15 hours and supply 2,544 MWh of energy, with a peak deficiency of 250 MW. The East End load pocket load duration curve is shown in Figure 8.

Figure 8: East End Load Pocket Load Duration Curve



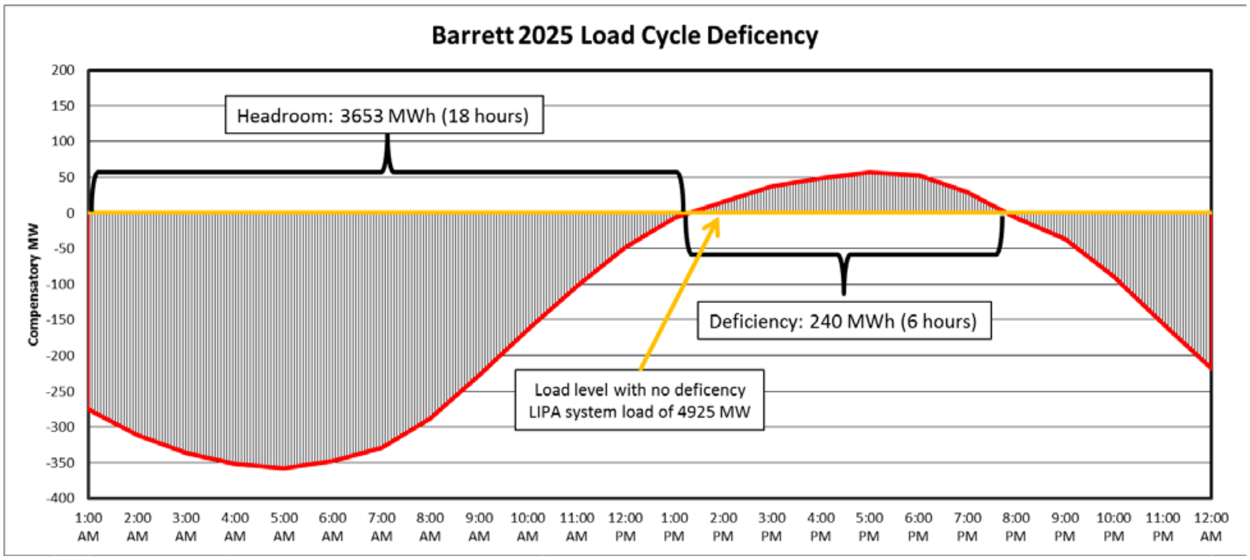
The East of Holbrook load curve was developed in a manner similar to the East End load curve discussed above. The observed deficiency east of the Holbrook Interface (excluding the deficiency for the East End load pocket discussed above), shown in Figure 9, requires compensatory MW for about 10 hours and supply 2,126 MWh of energy. The peak deficiency observed for East of Holbrook is 310 MW.

Figure 9: South Western Suffolk (East of Holbrook) Load Duration Curve



The deficiency in Barrett is local to the Barrett load pocket. As shown in Figure 10, the Barrett compensatory MW would be required for about 6 hours and supply 240 MWh of energy, with a peak deficiency of 60 MW.

Figure 10: Barrett Load Pocket Load Duration Curve



System Operations Impact

System Restoration Plan Impact

Peaking units are an integral part of the LIPA system restoration plan. The potential impacts of deactivating these units include:

1. Loss of all black start units identified in the LIPA System Restoration plan reviewed by NYISO.
2. Loss of auxiliary power generators (APG).
3. Loss of emergency units for National Grid liquefied natural gas plant.
4. Loss of all dead bus capable units, used for local load pick-up. These are units capable of being started and closing into a dead bus via onsite operator actions.
5. The near-complete loss of 10-minute and 30-minute quick start resources would delay the restoration of customer load on Long Island. This is true whether or not another local black start unit is identified.
6. The approximately 1,400 MW of 10 and 30-minute combustion turbines provides the majority of the capacity to pick-up customer load within the first hours of a black out. Without these

resources, PSEG Long Island would have limited load pick up capability until the return of base load steam or combined cycle units or the NYCA restoration plan reaching the LIPA control area.

Operational Flexibility

System operators work to secure the system before and after a fault. In order to do so, they rely on the 10 and 30-minute combustion turbines to provide dispatch flexibility. Potential impacts of the loss of these resources without replacement include:

1. Reduced operational flexibility to secure for post-contingency LTE violations within 15 or 30 minutes.
2. Increase in commitment of units unable to respond within 10 or 30 minutes. These units will need to be committed and dispatched for a significant amount of hours throughout the year to secure pre-contingency to LTE ratings.
3. Increased constraints on allowing emergency maintenance outages of base-load generating units during peak periods due to the need to have 10 and 30-minute reserves to address possible deficiencies.
4. Loss of fuel diversity that combustion turbines provide during gas system events, including locally-stored fuel and dual-fuel generators.

2025 Off-Peak Maintenance Outage Analysis

For the N-1-1 analysis of off-peak periods, the maintenance outage of a generator, transmission circuit, or transformer followed by securing for single element and stuck breaker contingencies was evaluated. This analysis monitored LIPA bulk electric system (BES) and non-BES elements. The analysis shows that there are 38 BES and 21 non-BES circuits simulated as first level maintenance outages that may cause an overload on the LIPA non-BES system.

In the 2025 off-peak case, as a result of simulating a maintenance condition followed by an N-1 event, there are no observed thermal overloads on BES elements but 22 non-BES thermal overloads occur. Additionally, there are no observed BES voltage violations, however non-BES voltage violations are observed.

Loss of Gas Impact

PSEG Long Island secures pre-contingency for loss of gas supply to the Northport Power Station to prevent uncontrolled loss of load due to voltage collapse. The loss of gas supply will result in LTE and Normal operating limit exceedances. The existing operating plan requires the dispatch of 10-minute combustion turbines to secure the LTE overloads. Should the Northport Power Station have a loss of gas supply, the dynamic reactive support system (DRSS) voltage control devices respond to avoid voltage collapse; however, additional generating units must be online within 20 minutes to provide additional reactive power support to secure the system voltage. The dispatch of 30-minute units is necessary to resolve the Normal rating overloads, in addition to correcting any net interchange increases due to the loss of gas supply. Depending on the pre–contingency system load and generation dispatch, reductions to the Con Edison wheel may also be necessary to secure Y50 from Normal rating overloads.

The deactivation of the affected simple-cycle units would render the system unable to secure for these thermal violations post-contingency and recover system voltage to pre-contingency limits, and would require additional use of oil at the Northport site to secure the system pre-contingency.

TVR Impact

Transient voltage recovery (TVR) is broken into two separate sections on the LIPA system, East of Holbrook and East End. In accordance with PSEG-LI planning criteria, bus voltages must recover to 0.9 per unit of nominal voltage within one second of the clearing of any fault and remain continuously above 0.9 per unit of the nominal voltage, excluding reoccurrence of a fault within this one-second period. The loss of the reactive power capability of the affected simple-cycle units would have a detrimental impact on securing the system for TVR criteria.

All of the East End units are required to be dispatched regardless of the status of DRSS and dynamic reactive power compensation system devices located at Canal and East Hampton substations. Removal of any units will increase the amount of time that under voltage load shedding (UVLS) schemes are armed to ensure that the system voltage will not collapse. East of Holbrook TVR dispatch can still be maintained with affected units removed, but it relies on the East End TVR dispatch assuming all units are available. No additional units would be available for dispatch to make up for the reduced East End TVR dispatch.

Other Potential Issues

Several generators affected by the Peaker Rule are located on the low side of a 69/13.8 kV transformer in their respective substations, potentially impacting the distribution transformers. Retirement of these generators may require upgrades in the substation to increase the capacity of the transformers feeding the 13.8 kV systems. This may consist of a new 69/13.8 kV step-down transformer or replacement of the existing transformers.

Retirement of a generation resource and the associated generator step-up transformers (GSUs) can potentially:

- Impact short circuit currents that ultimately impact protective relaying systems/relay settings due to lower fault currents.
- Impact short circuit current levels which can subsequently modify or increase the "coupling" between other generators and nearby high voltage direct current (HVDC) transmission facilities (sub-synchronous torsional interaction for example).
- Impact system grounding such that the ratings of existing lightning arresters may be inadequate.

It is not known if GSUs would be retired with the affected generators; this assessment did not assess the impact of retirement of the associated GSUs or any of the associated issues identified above.

Bulk Power Transmission Security

With the assumed reduction in generation resources in the Con Edison and Long Island service territories, the NYISO's analysis identified additional thermal overloads on the BPTF in 2025 in Southeast New York (*i.e.*, SENY), as listed in Figure 11. The overloads listed below would be resolved with the addition of the AC Transmission Public Policy projects.

Figure 11: Additional SENY Overloads

Circuit	Thermal Criteria Violation Type
Buchanan 345/138 kV (TA5)	N-1-1
Lovett 345/115 kV	N-1-1
Lovett – Buchanan South (Y88) 345 kV	N-1-1
Ladentown – Lovett (Y88) 345 kV	N-1-1
Athens – Pleasant Valley (91) 345 kV	N-1-1
Leeds – Pleasant Valley (92) 345 kV	N-1-1

Resource Adequacy

The NYISO conducted this resource adequacy scenario analysis using the updated CRP Base Case as the starting point (*i.e.,* the 2018 RNA[7] Base Cases updated to capture status changes, highlighted in Figure

[7] https://www.nyiso.com/documents/20142/2248793/2018-Reliability-Needs-Assessment.pdf/c17f6a4a-6d22-26ee-9e28-4715af52d3c7

18 in Appendix C). Figure 2 shows the total amount of generation assumed to be affected by the DEC Peaker Rule for the purpose of this scenario, along with the removal of the last coal plants.

The loss of load expectation (LOLE) results for various cases are summarized in the Figure 12.

Figure 12: NYCA LOLE Results (days/year)

NYCA Coincident Peak Load	Study Year	CRP Base	Peaker Scenario	Peaker Scenario + AC Transmission	Peaker Case + Local Compensatory MW
32,857	2019	0.01	0.01	0.01	0.01
32,629	2020	0.00	0.00	0.00	0.00
32,451	2021	0.01	0.01	0.01	0.01
32,339	2022	0.01	0.01	0.01	0.01
32,284	2023	0.01	0.09	0.09	0.04
32,276	2024	0.01	0.09	0.07	0.04
32,299	2025	0.01	0.33	0.21	0.04
32,343	2026	0.01	0.36	0.23	0.04
32,403	2027	0.01	0.36	0.24	0.04
32,469	2028	0.01	0.38	0.26	0.06

While the CRP base cases are well under the LOLE criterion of one event in ten years (0.1 days/year), the Peaker Rule scenario cases come very close (less than 50 MW away) to exceeding the criterion in 2023 when the initial stage of affected generators are removed. Once the additional affected generators are removed in 2025, the criterion is significantly exceeded. When modeling the effects of the AC Transmission Public Policy Projects (T027 and T019) scheduled to be in-service in December 2023, the NYCA LOLE decreases, but remains well above the 0.1 days/year criterion starting in 2025.

The last column in Figure 12 reflects the NYCA LOLE results assuming the local deficiencies identified by Con Edison and PSEG Long Island are addressed with replacement generation or additional load reduction in the amount of 640 MW in Zone J and 620 MW in Zone K. The results show that the NYCA LOLE is well below the criterion with such local solutions in place.

While not reflected in the table, an additional simulation was performed assuming that all transmission interface constraints through Southeast New York into Zones J and K were alleviated. The results demonstrate that alleviating the transmission constraints in these corridors would only marginally bring the NYCA LOLE to the 0.1 criterion, and such transmission interface upgrades would not address the local load pocket deficiencies identified in Zones J and K.

Compensatory megawatt (MW) analysis was performed to quantify the shortfall (or alternatively, the margin) of power by year and by zone, or combination of zones. Compensatory MW amounts are determined by adding generic perfect-capacity[8] resources to zones to address the shortfall; 50 MW block additions were used for this exercise to estimate the amount of resources generally needed within a given zone (or combination of zones) in order to bring the NYCA LOLE back just below the reliability criterion of 0.1 days/year. The compensatory MW additions are not intended to represent specific solutions, as the impact of specific solutions can depend on the type of the solution and its location on the grid. Resource needs could potentially be met by combinations of solutions including generation, transmission, and demand-side reductions (*e.g.*, energy efficiency and demand response).

Figure 13 below shows the compensatory MW when added all in one zone at a time, under two cases:

1. The Peaker Rule scenario: Under this scenario, 1,100 compensatory MW in Zone J would bring the LOLE just below the criterion in 2028, while no amount of compensatory MW in any other single zone would lower the LOLE below its criterion.
2. The Peaker Rule scenario with the AC Transmission Public Policy projects: Under this simulation, either 850 MW in Zone J or 950 MW in Zone K would bring the NYCA LOLE to just below the 0.1 days/year criterion by 2028, while no other single zone could address the LOLE deficiency.

Figure 13: Peaker Scenario Zonal Compensatory MW

Study Year	Peaker Scenario NYCA LOLE	Zone A	Zone B	Zone C	Zone D	Zone E	Zone F	Zone G	Zone H	Zone I	Zone J	Zone K
2023	0.09	-250	-250	-300	-300	-300	-300	-300	-50	-50	-50	-50
2024	0.09	-200	-200	-250	-250	-250	-250	-250	-50	-50	-50	-50
2025	0.33	∞	∞	∞	∞	∞	∞	∞	1,150	1,150	850	∞
2026	0.36	∞	∞	∞	∞	∞	∞	∞	1,200	1,200	900	∞
2027	0.36	∞	∞	∞	∞	∞	∞	∞	1,250	1,250	900	∞
2028	0.38	∞	∞	∞	∞	∞	∞	∞	∞	∞	1,100	∞

Study Year	Peaker Scenario + AC Transmission NYCA LOLE	Zone A	Zone B	Zone C	Zone D	Zone E	Zone F	Zone G	Zone H	Zone I	Zone J	Zone K
2023	0.09	-250	-250	-300	-300	-300	-300	-300	-50	-50	-50	-50
2024	0.07	-650	-650	-950	-950	-950	-950	-950	-350	-350	-300	-250
2025	0.21	∞	∞	∞	∞	∞	∞	∞	950	950	600	550
2026	0.23	∞	∞	∞	∞	∞	∞	∞	1,050	1,050	650	600
2027	0.24	∞	∞	∞	∞	∞	∞	∞	1,150	1,150	650	650
2028	0.26	∞	∞	∞	∞	∞	∞	∞	∞	∞	850	950

Figure 14 below shows different combinations of minimum compensatory MW between Zones J and K: one for the Peaker Rule scenario, and one for that scenario with the AC Transmission Public Policy projects.

[8] Perfect capacity is capacity that is not derated (*e.g.*, due to ambient temperature or unit unavailability), not subject to energy durations limitations, and not tested for transmission security or interface impacts. Actual resources may need to be larger in order to achieve the same impact as perfect-capacity resources.

For example, when placing 50% of the compensatory MW in Zone J and 50% in Zone K, a total of 1,000 MW would be needed in 2028 to bring the NYCA LOLE just below its criterion; with the AC Transmission, a total of 700 MW would have similar effects.

Figure 14: Examples of Compensatory MW Combinations (between Zones J and K)

Study Year	Peaker Scenario NYCA LOLE	100% J	75% J	25% K	Total	50% J	50% K	Total	25% J	75% K	Total	100% K
2025	0.33	850	600	200	800	400	400	800	250	650	900	∞
2026	0.36	900	600	200	800	400	400	800	250	700	950	∞
2027	0.36	900	600	200	800	400	400	800	250	700	950	∞
2028	0.38	1,100	750	250	1,000	500	500	1,000	300	850	1,150	∞

Study Year	Peaker Scenario + AC Transmission NYCA LOLE	100% J	75% J	25% K	Total	50% J	50% K	Total	25% J	75% K	Total	100% K
2025	0.21	600	400	150	550	250	250	500	150	400	550	550
2026	0.23	650	450	150	600	300	300	600	150	450	600	600
2027	0.24	650	450	150	600	300	300	600	150	450	600	650
2028	0.26	850	550	200	750	350	350	700	200	550	750	950

Peaker Rule Scenario Conclusions

If all of the generators affected by the Peaker Rule were to deactivate without the addition of replacement resources or system reinforcements, the transmission system would be unable to reliably serve the forecasted load within specific pockets in New York City and Long Island, as well as across Southeast New York. Starting in 2023 with the first implementation phase of the rule, pockets in New York City would be deficient of supply for up to 14 hours in a given day at a peak amount of 240 MW, while pockets in Long Island would be deficient 320 MW possibly for 15 hours in a given day. With full implementation of the Peaker Rule assumed in 2025, the New York system as a whole would significantly exceed the probability of one loss of load event in ten years due to a supply deficiency of at least 700 MW in Southeast New York. At the same time, the Con Edison and Long Island local system deficiencies increase to a total of 660 MW in New York City and 620 MW in Long Island.

Additionally, system operations reliability issues would arise related to the potential deactivation of the generators affected by the Peaker Rule. These include limited black start and system restoration capability, difficulty scheduling maintenance outages, degraded system voltage performance, and a greater level of resource commitment and dispatch within the New York City and Long Island load pockets. The NYISO, Con Edison, and PSEG Long Island system operations departments worked collaboratively to identify the aforementioned concerns.

The deficiencies could potentially be met by a number of combinations of solutions including generation, transmission, and demand-side (*e.g.,* energy efficiency and demand response) measures. However, due to the loss of load events projected in Southeast New York, local transmission upgrades within New York City and Long Island alone would not fully address the deficiencies. Therefore, replacement resources would be required to resolve the identified reliability deficiencies. At the same time, any solutions located solely outside the load pockets identified by Con Edison and PSEG Long Island would not fully resolve the needs on their own, as the local deficiencies would not be addressed. Solutions would need to resolve the identified deficiencies for both the peak amounts and for the durations specified.

2019-2028 CRP Recommended Actions

The 2019-2028 Comprehensive Reliability Plan contains the following recommended actions:

Monitor and Track Potential New Developments

The energy industry is in transition. Economic conditions, governmental programs and environmental regulations are changing quickly, resulting in financial stresses that may lead to the loss of resources or, alternatively, that could positively affect system conditions. New market-based generation and transmission projects under study in the NYISO's interconnection process could increase the reliability margin of the electric system in the long term, if such capacity comes into service during the Study Period. The NYISO will monitor and track these developments and consider their potential impacts on future system reliability. The NYISO will administer its Generator Deactivation Process if it receives a Generator Deactivation Notice, and, if necessary, seek solutions. In addition, if a threat to reliability appears to be imminent, the NYISO may request solutions outside of the normal planning cycle, in accordance with its tariffs and procedures.

Monitor and Track Transmission Owner Plans

To provide for the long-term reliability of the system and minimize reliance on interim operating procedures, the Transmission Owners need to complete the projects identified in their Local Transmission Owner Plans on schedule and as planned. It is important that the local transmission projects that are identified in this CRP to maintain reliability be sited and constructed on a timely basis. The NYISO will continue to monitor the completion of the identified projects and the progress of local transmission projects as they relate to the Reliability Needs initially identified in the RNA.

Continue Coordination with the New York State Public Service Commission

The NYISO will continue to coordinate its system planning activities with the PSC, particularly as part of the Public Policy Transmission Planning Process that is addressing transmission needs in Western New York, Mohawk Valley, and Hudson Valley transmission corridors, as part of the NYISO's overall Comprehensive System Planning Process. If the PSC determines that there is a public policy requirement driving the need for transmission, the NYISO will solicit projects from developers to fulfill that need.

In addition, the State of New York is presently considering expanding and extending a variety of clean energy programs that are designed to increase deployment of energy efficiency, renewable generation and DERs. Existing energy efficiency, codes and standards, distributed generation and solar (behind-the-meter) program initiatives are reflected in the load forecast and resources modeled in this CRP. However, there are new initiatives that have not been implemented yet or recognized in this Reliability Planning Process cycle that could positively affect bulk power system reliability. The NYISO will continue to monitor and participate in other planning activities including, but not limited to, PSC proceedings considering Reforming the Energy Vision (REV), Offshore Wind Standard and procurements, Renewable Energy Credits (RECs), Zero Emission Credits (ZECs), distributed energy resources (DERs), energy storage resources, energy efficiency, and individual proceedings on generation deactivation and repowering.

Monitor Changes That Could Impact Risk Factors

The NYISO actively monitors and addresses the potential impacts of known risk factors. The NYISO also tracks the impact that new market-based generation projects under study in the NYISO's interconnection process could have on the NYISO's long-term capacity margin during the ten-year Study Period.

As discussed in this report, the NYISO has also performed a scenario simulating deactivations of simple cycle combustion turbines that could be impacted by the DEC's draft Peaker Rule and the remaining coal plants affected by the DEC proposed rule on carbon dioxide emissions from existing generators. The NYISO will continue to monitor the progress of DEC emission rules and their impacts on New York resources. The NYISO's 2020-2021 cycle of the Reliability Planning Process will consider any generator compliance plans for the Peaker Rule[9] to establish the baseline system conditions for the 2021-2030 planning horizon. Also, the NYISO will assess the reliability impact of proposed deactivations in response to complete Generator Deactivation Notices it receives in the Generation Deactivation Process.

9 https://www.dec.ny.gov/regulations/116131.html

Reliability Planning Process Conclusions

This 2019-2028 Comprehensive Reliability Plan sets forth the NYISO findings that, under the conditions studied in the 2018 RNA and as summarized in **Appendix C** of this report, the planned New York State Bulk Power Transmission Facilities will meet all applicable Reliability Criteria over the 2019 through 2028 study period.

This report highlights a number of risks to the ten-year reliability plan that the NYISO actively tracks, which include narrowing capacity margins that make long-term bulk system reliability vulnerable to reductions in available resources, or any failure to timely implement Transmission Owners' Local Transmission Owner Plans.

This CRP examined a scenario where a proposed New York State Department of Environmental Conservation (DEC) regulation to limit Nitrogen Oxide (NO_X) emissions from simple cycle combustion turbines (peaking units, or peakers) was approved and implemented. The regulation would impact certain peaking units starting in 2023 and affect potentially over 3,300 MW (nameplate) of peaking units by 2025. Since this regulation would mostly impact New York City and Long Island, the NYISO collaborated with Con Edison and PSEG Long Island to provide information regarding the impacts on their non-BPTF facilities and any operational issues. The results of this scenario showed that if all the affected generators were to deactivate, there would be significant deficiencies on the bulk and non-bulk systems if replacement solutions are not implemented, such as new generation, transmission upgrades, and/or load reduction. Additionally, Con Edison and PSEG Long Island identified several operational concerns with the loss of the peaking units.

Finally, 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 solutions to address any Reliability Needs identified through that process. For generators affected by the Peaker Rule, the NYISO could enter into Reliability Must Run agreements with specific generators to continue to operate for a two-year period, with a possible two-year extension, 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 Reliability Planning Process, will begin in 2020, 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 based on updated assumptions, and will review the status of the risk factors discussed in this CRP, together with other reliability issues.

Appendix A – Reliability Planning Process

This appendix presents an overview of the NYISO's Reliability Planning Process. A detailed discussion of the Reliability Planning Process, including applicable Reliability Criteria, is contained in NYISO Manual entitled: *Reliability Planning Process Manual*, which is posted on the NYISO's website[10].

The NYISO Reliability Planning Process is an integral part of the NYISO's overall Comprehensive System Planning Process (CSPP). The CSPP is comprised of four components:

1. Local Transmission System Planning Process (LTPP),
2. Reliability Planning Process (RPP),
3. Congestion Assessment and Resource Integration Study (CARIS), and
4. Public Policy Transmission Planning Process (PPTPP).

As part of the LTPP, each Transmission Owner performs transmission security studies for their BPTF in their transmission areas according to all applicable criteria. Links to the Local Transmission Owner Plans (LTPs) can be found on the NYISO's website[11]. The LTPP provides inputs for the Reliability Planning Process.

During the Reliability Planning Process, the NYISO conducts the Reliability Needs Assessment (RNA) and Comprehensive Reliability Plan (CRP). The RNA evaluates the adequacy and security of the BPTFs over a ten-year Study Period. In identifying resource adequacy needs, the NYISO identifies the amount of resources in megawatts (MW, known as "compensatory MW") and the locations in which they are needed to meet those needs.

Following approval of the RNA by its Board of Directors, the NYISO initiates the next step, which starts by requesting LTP updates from the Transmission Owners. As part of this step, the NYISO will consider updates to the LTPs and, if necessary, solicit market-based solutions, regulated backstop solutions, and alternative regulated solutions to the identified Reliability Needs. If not resolved by the updates to the LTPs, the NYISO then proceeds to assess the viability and sufficiency of each of the possible solutions, leading to the development of the Comprehensive Reliability Plan (CRP).

The CRP documents the solutions determined to be viable and sufficient to meet the identified

[10] Link to RPP Manual: https://www.nyiso.com/documents/20142/2924447/rpp_mnl.pdf/85b28e6b-16b0-0ce7-60f3-c2291733acea

[11] Link to LTPP: https://www.nyiso.com/documents/20142/3632262/Local-Transmission-Owner-Planning-Process-LTPP.pdf/025b47f1-d90a-94e3-8eba-c21e7a6131aa

Reliability Needs. The NYISO ranks any regulated transmission solutions submitted for the Board to consider for selection of the more efficient or cost effective transmission project. If built, the selected transmission project would be eligible for cost allocation and recovery under the NYISO's tariff.

There are two different aspects to analyzing the BPTF's reliability in the RNA: adequacy and security. Adequacy is a planning and probabilistic concept. A system is adequate if the probability of having sufficient transmission and generation to meet expected demand is equal to or less than the system's standard, which is expressed as a loss of load expectation (LOLE). The New York State bulk power system is planned to meet an LOLE that, at any given point in time, is less than or equal to an involuntary load disconnection that is not more frequent than once in every 10 years, or 0.1 days per year. This requirement forms the basis of New York's installed reserve margin (IRM) resource adequacy requirement.

Security is an operating and deterministic concept. This means that possible events are identified as having significant adverse reliability consequences. The system is planned and operated so that the system can continue to serve load even if these events occur. Security requirements are sometimes referred to as N-1 or N-1-1. N is the number of system components. An N-1 requirement means that the system can withstand single disturbance events (*e.g.*, generator, bus section, transmission circuit, breaker failure, double-circuit tower) without violating thermal, voltage and stability limits or before resulting in unplanned loss of service to consumers. An N-1-1 requirement means that the Reliability Criteria apply after any critical element such as a generator, a transmission circuit, a transformer, series or shunt compensating device, or a high voltage direct current (HVDC) pole has already been lost. Generation and power flows can be adjusted by the use of 10-minute operating reserve, phase angle regulator control, and HVDC control. Following such adjustments, a second single disturbance is analyzed.

The Reliability Planning Process is anchored in the market-based philosophy of the NYISO and its Market Participants, which posits that market solutions should be the preferred choice to meet the identified Reliability Needs reported in the RNA. In the CRP, the reliability of the BPTFs is assessed and solutions to Reliability Needs evaluated in accordance with existing Reliability Criteria of the North American Electric Reliability Corporation (NERC), the Northeast Power Coordinating Council, Inc. (NPCC), and the New York State Reliability Council (NYSRC) as they may change from time to time. These criteria and a description of the nature of long-term bulk power system planning are described in detail in the Reliability Planning Process Manual, and are briefly summarized below.

In the event that market-based solutions do not materialize to meet a Reliability Need in a timely manner, the NYISO designates the Responsible TO or Responsible TOs or developer of an alternative regulated solution to proceed with a regulated solution in order to maintain system reliability. Under the

Reliability Planning Process, the NYISO also has an affirmative obligation to report historic congestion across the transmission system. In addition, the draft RNA is provided to the Market Monitoring Unit (MMU) for review and consideration of whether market rules changes are necessary to address an identified failure, if any, in one of the NYISO's competitive markets. If a market failure is identified as the reason for the lack of market-based solutions to a Reliability Need, the NYISO will explore appropriate changes in its market rules with its stakeholders and the MMU. The Reliability Planning Process does not substitute for the planning that each TO conducts to maintain the reliability of its own bulk and non-bulk power systems.

The NYISO does not license or construct projects to respond to identified Reliability Needs reported in the RNA. The ultimate approval of those projects lies with regulatory agencies such as the Federal Energy Regulatory Commission (FERC), the New York State Public Service Commission (NYPSC), environmental permitting agencies, and local governments. The NYISO monitors the progress and continued viability of proposed market and regulated projects to meet identified Reliability Needs, and reports its findings to the Board.

The CRP also provides inputs for the second component of the CSPP, which is NYISO's economic planning process known as the Congestion Analysis and Resource Integration Study (CARIS). CARIS Phase 1 examines congestion on the New York bulk power system and the costs and benefits of alternatives to alleviate that congestion. During CARIS Phase 2, the NYISO evaluates specific transmission project proposals for regulated cost recovery.

The third component of the CSPP is the Public Policy Transmission Planning Process. Under this component, interested entities propose, and the NYPSC identifies, transmission needs driven by Public Policy Requirements. The NYISO then requests that interested entities submit proposed solutions to the Public Policy Transmission Need(s) identified by the NYPSC. The NYISO evaluates the viability and sufficiency of the proposed solutions to satisfy the identified Public Policy Transmission Need. Upon confirmation by the NYPSC that a need for a transmission solution still exists, the NYISO then evaluates and may select the more efficient or cost-effective transmission solution to the identified need. The NYISO develops the Public Policy Transmission Planning Report containing its findings regarding the proposed solutions. This report is reviewed by NYISO stakeholders and the NYISO's Market Monitoring Unit, and is approved by the Board of Directors.

In concert with these four components, interregional planning is conducted with NYISO's neighboring control areas in the United States and Canada under the Northeastern ISO/RTO Planning Coordination Protocol. The NYISO participates in interregional planning and may consider Interregional Transmission

Projects in its regional planning processes.

Figure 15 below summarizes the CSPP and Figure 16 summarizes the Reliability Planning Process.

Figure 15: NYISO's Comprehensive System Planning Process (CSPP)

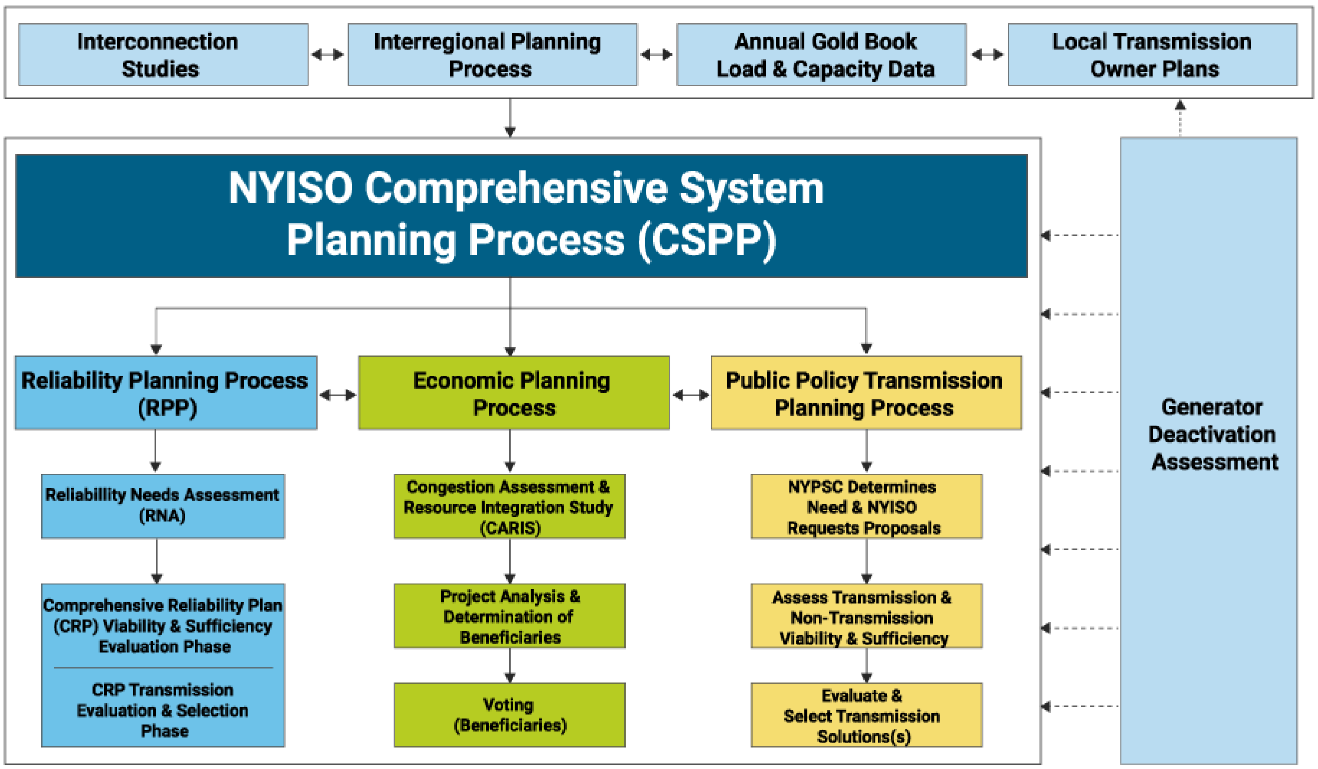
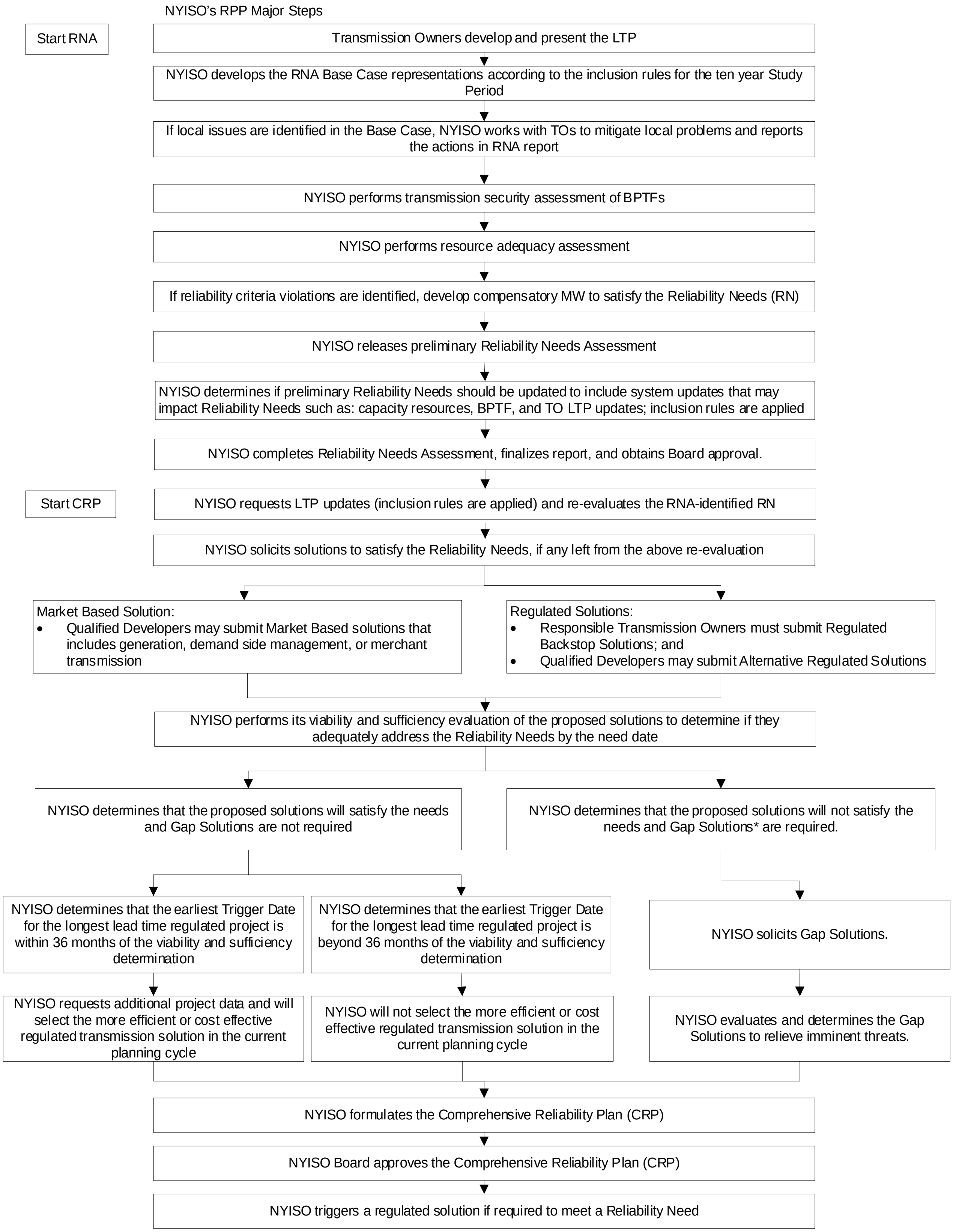


Figure 16: NYISO Reliability Planning Process



Notes:
* If an immediate threat to the reliability of the power system is identified, a Gap Solution outside of the normal RPP cycle may be requested by the NYISO Board.

Appendix B – Status of Tracked Market-Based Solutions & TOs' Plans

Figure 17: Current Status of Tracked Market- Based Solutions & TOs' Plans

Queue #	Project	Submitted	Zone	Original I/S Date	Proposal Type	Target I/S	Included in the 2018 RNA Final Base Case	Included in the 2018 CRP Base Case
339	RGE Station 255	CRP2012	B	N/A	TO Plan	W2020	Yes	Yes
N/A	National Grid Clay-Teall #10 115kV	CRP2012	C	N/A	TO Plan	W2020	Yes	Yes
N/A	NYSEG Terminal upgrades, on Stolle Road-Gardenville 230 kV Line #66	RNA 2016	A	2019	TO Plan	I/S	Yes	Yes
N/A	RGE Terminal upgrades, on Clay-Pannell PC1 and PC2 345 kV lines.	RNA 2016	C	2019	TO Plan	S2019	Yes	Yes
N/A	NYSEG Oakdale 345/115 kV 3rd transformer and substation reconfiguration.	CRP 2016	C	2021	TO Plan	W2021	Yes	Yes
N/A	National Grid Clay-Dewitt #3 115kV	CRP 2014	C	2017	TO Plan	W2020	Yes	Yes
N/A	Orange and Rockland West Haverstraw 345/138 kV transformer addition	RNA 2018	G	S2021	TO Plan	S2021	Yes	Yes
N/A	Brookhaven to Edwards Ave 138 kV line ratings increase, addressing the overload in Eastern Long Island from Y2028	RNA 2018	K	2019	TO Plan	S2019	Yes	Yes

Notes: S- Summer, W- Winter

Appendix C – Summary of the 2018-2019 RPP Major Assumptions

Figure 18: Summary of Changes from the 2018 RNA Base Case to the CRP Base Case

Changes from the 2018 RNA to 2018 CRP Base Case	Zone	ΔMW *(DMNC)*	Notes
Add back Pilgrim I and II	K	+90	Rescission of GDA Notice (Nov 2018)
Remove Cayuga II	C	-140	ICAP Ineligible Forced Outage as of 7/1/2018
Add back Selkirk I and II	F	+360	Rescission of GDA Notice (Dec 2018)
ConEdison's B3402 & C3403 345 kV cables out of service	J	-	Long-term unavailability
By-pass the Series Reactors on 71, 72, M51, M52 for summer (with Y49, 41, 42, SR in service)	J	-	After Indian Point 2 and 3 Deactivations (2020 and 2021)
J to K (Jamaica ties) emergency limit represented in the MARS topology changed from 235 MW to 320 MW	J to K	+85*	Due to addition of Rainey-Corona 345/138 kV PAR; target I/S summer 2019

DMNC: Dependable Maximum Net Generating Capability

*85 MW is increase in transfer limit on Jamaica ties

Figure 19: NYCA Peak Load and Resource Ratios 2019 through 2028 in the CRP Base Case

Year		2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
		Peak Load (MW) -Gold Book 2018 NYCA Baseline									
	NYCA*	32,857	32,629	32,451	32,339	32,284	32,276	32,299	32,343	32,403	32,469
	Zone J*	11,474	11,410	11,363	11,336	11,328	11,335	11,350	11,372	11,399	11,429
	Zone K*	5,323	5,278	5,246	5,231	5,229	5,237	5,251	5,268	5,287	5,306
	Zone G-J*	15,815	15,715	15,639	15,594	15,574	15,576	15,591	15,616	15,648	15,685
		Resources (MW)									
NYCA	Capacity**	39,605	39,733	38,714	38,714	38,714	38,714	38,714	38,714	38,714	38,714
	Net Purchases & Sales	1,279	1,785	1,800	1,942	1,942	1,942	1,942	1,942	1,942	1,942
	SCR	1,219	1,219	1,219	1,219	1,219	1,219	1,219	1,219	1,219	1,219
	Total Resources	42,103	42,737	41,733	41,875	41,875	41,875	41,875	41,875	41,875	41,875
	Capacity/Load Ratio	120.5%	121.8%	119.3%	119.7%	119.9%	119.9%	119.9%	119.7%	119.5%	119.2%
	Cap+NetPurch/Load Ratio	124.4%	127.2%	124.8%	125.7%	125.9%	126.0%	125.9%	125.7%	125.5%	125.2%
	Cap+NetPurch+SCR/Load Ratio	128.1%	131.0%	128.6%	129.5%	129.7%	129.7%	129.6%	129.5%	129.2%	129.0%
Zone J	Capacity**	9,562	9,562	9,562	9,562	9,562	9,562	9,562	9,562	9,562	9,562
	Cap+UDR+SCR/Load Ratio	95.2%	95.8%	96.2%	96.4%	96.5%	96.4%	96.3%	96.1%	95.9%	95.6%
Zone K	Capacity**	5,310	5,310	5,310	5,310	5,310	5,310	5,310	5,310	5,310	5,310
	Cap+UDR+SCR/Load Ratio	119.3%	120.3%	121.0%	121.4%	121.4%	121.2%	120.9%	120.5%	120.1%	119.6%
Zone G-J	Capacity**	15,371	15,373	14,354	14,354	14,354	14,354	14,354	14,354	14,354	14,354
	Cap+UDR+SCR/Load Ratio	106.4%	107.0%	101.1%	101.3%	101.5%	101.5%	101.4%	101.2%	101.0%	100.8%

*NYCA load values represent baseline coincident summer peak demand. Zones J and K load values represent non-coincident summer peak demand. Aggregate Zones G-J values represent G-J coincident peak, which is non-coincident with NYCA.

**NYCA Capacity values include resources electrically internal to NYCA, additions, re-ratings, and retirements (including proposed retirements and mothballs). Capacity values reflect the lesser of CRIS and DMNC values. NYCA resources include the net purchases and sales as per the Gold Book. Zonal totals reflect the awarded UDRs for those capacity zones.

Note: The above table include the following changes from 2018 RNA:

1. Deactivated Cayuga II
2. Added back Pilgrim I and II
3. Added back Selkirk I and II

Figure 20: Generation Additions Included in the 2018 RNA and CRP Base Cases

Queue #	Project Name	Zone	CRIS Request	SP MW	Interconnection Status	Included in RNA 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 4
SDU	Leeds-Hurley SDU	System Deliverability Upgrades (SDU)	n/a	n/a	SDU triggered for construction in CY11	Study Year 2
Proposed Generation Additions						
251	CPV Valley Energy Center[1]	G	680.0	677.6	CY11	Study Year 1
349	Taylor Biomass	G	19.0	19.0	CY11	Study Year 3
395	Copenhagen Wind	E	79.9	79.9	CY15	Study Year 1
403	Bethlehem Energy Center Uprate	F	78.1	72.0	CY15	Study Year 1
387	Cassadaga Wind	A	126.0	126.0	CY17	Study Year 2
421	Arkwright Summit	A	78.4	78.0	CY17	Study Year 1
444	Cricket Valley Energy Center II	G	1020.0	1020.0	CY17	Study Year 2
461	East River 1 Uprate	J	n/a	2.0	CY17	Study Year 1
462	East River 2 Uprate	J	n/a	2.0	CY17	Study Year 1
467	Shoreham Solar	K	24.9	25.0	CY17	Study Year 1
510	Bayonne Energy Center II	J	120.4	120.4	CY17	Study Year 1
511	Ogdensburg	E	79.0	79.0	CY17	Study Year 1
N/A	Nine Mile Point 2	C	63.4	63.4	CY17 (CRIS only)	Study Year 1
N/A	East River 6	J	8.0	N/A	CY17 (CRIS only)	Study Year 1
		MW additions from 2016 RNA	1,598	1,588		
		Total MW gen. additions	2,377	2,364		

Also included in the 2016 RNA

Figure 21: 2018 RNA Base Case - Generation Deactivations Assumptions

Owner/Operator	Plant Name	Zone	CRIS	2018 RNA Base Case	2016 RNA Base Case
Helix Ravenswood LLC	Ravenswood 04	J	15.2	out	out
	Ravenswood 05	J	15.7	out	out
	Ravenswood 06	J	16.7	out	out
International Paper Company	Ticonderoga	F	7.6	part of the SCR program	in
Niagara Generation LLC	Niagara Bio-Gen	A	50.5	out	out
NRG Power Marketing LLC	Dunkirk 2	A	97.2	out	out
	Huntley 67	A	196.5	out	out
	Huntley 68	A	198.0	out	out
	Astoria GT 05	J	16.0	out	out
	Astoria GT 07	J	15.5	out	out
	Astoria GT 08	J	15.3	out	out
	Astoria GT 10	J	24.9	out	out
	Astoria GT 11	J	23.6	out	out
	Astoria GT 12	J	22.7	out	out
	Astoria GT 13	J	24.0	out	out
ReEnergy Black River LLC	Chateaugay Power	D	18.6	out	out
Binghamton BOP, LLC	Binghamton	C	43.8	out	in
Helix Ravenswood, LLC	Ravenswood 09	J	21.7	out	in
Entergy Nuclear Power Marketing, LLC	Indian Point 2	H	1027.0	out	in
	Indian Point 3	H	1040.0	out	in
Selkirk Cogen Partners, LP	Selkirk 1	F	82.1	out*	in
	Selkirk 2	F	291.3		
J- Power USA Generation, LP Edgewood Energy, LLC	PPL Pilgrim ST GT1	K	45.6	out**	in
	PPL Pilgrim ST GT2	K	46.2		
Helix Ravenswood, LLC	Ravenswood 2-1	J	40.4	out	in
	Ravenswood 2-2	J	37.6		
	Ravenswood 2-3	J	39.2		
	Ravenswood 2-4	J	39.8		
	Ravenswood 3-1	J	40.5		
	Ravenswood 3-2	J	38.1		
	Ravenswood 3-4	J	35.8		
Lyonsdale Biomass, LLC	Lyonsdale (Burrows)	E	20.2	out	in
R.E. Ginna Nuclear Power Plant, LLC	Ginna	B	582.0	in	out
Cayuga Operating Company, LLC	Cayuga 1	C	154.1	in	out
	Cayuga 2	C	154.7	in***	out
Entergy Nuclear Power Marketing LLC	Fitzpatrick 1	C	858.9	in	out
change in status	Changes in deactivations since 2016 RPP		1,147		
	Total 2018 RNA MW assumed as deactivated		3,647		

Notes: Generation Status Changes initiated after the 2018 RNA:

*Selkirk 1, 2: Deactivation Notice subsequently rescinded by owner (captured in the CRP base case)

**Pilgrim GT 1, 2: Deactivation Notice subsequently rescinded by owner (captured in the CRP base case)

***Cayuga II: IIFO as of July 2018 (captured in the CRP base case)

Figure 22: Firm Transmission Plans Included in 2018 RNA Base Case (230 kV and above*)

Transmission Owner	Terminals		Line Length in Miles	Expected In-Service Date/Yr		Nominal Voltage in kV		# of Circuits	Thermal Ratings*		Project Description / Conductor Size
				Prior to	Year	Operating	Design		Summer	Winter	
Firm Plans (5) (Included in FERC 715 Base Case) *(listed here 230 kV and above only)*											
CHGE	Hurley Avenue	Leeds	Series Compensation	S	2020	345	345	1	2336	2866	21% Compensation
ConEd	East 13th Street	East 13th Street	Reconfiguration	In-Service	2017	345	345		N/A	N/A	Reconfiguration(xfrmr 12 - xfmr 13)
ConEd	East 13th Street	East 13th Street	Reconfiguration	In-Service	2018	345	345		N/A	N/A	Reconfiguration(xfmr 14 - xfmr 15)
ConEd	East 13th Street	East 13th Street	xfmr	S	2019	345	345		N/A	N/A	Replacing xmfr 10 and xmfr 11
ConEd	Gowanus	Gowanus	xfmr	S	2019	345	345		N/A	N/A	Replacing xfmr T2
ConEd	East 13th Street	East 13th Street	Reconfiguration	S	2019	345	345		N/A	N/A	Reconfiguration (xmfr 10 - xmfr 11)
ConEd	Rainey	Corona	xfmr/Phase shifter	S	2019	345/138	345/138	1	268 MVA	320 MVA	xmfr/ Phase shifter
NGRID	Edic	Edic	xfmr	In-Service	2017	345/115	345/115	2	505MVA	603MVA	Add Transformer for MVEdge (TR#5&#6)
NGRID	Eastover Road	Eastover Road	xfmr #2	In-Service	2018	230/115	230/115	1	381MVA	466MVA	New/2nd 230/115kV Transformer
NGRID	Elm St	Elm St	xfmr	S	2018	230/23	230/23	1	118MVA	133MVA	Add a fourth 230/23kV transformer
NGRID	Gardenville 230kV	Gardenville 115kV	xfmr	S	2021	230/115	230/115	-	347 MVA	422 MVA	Replacement of 230/115kV TB#4 stepdown with larger unit
NGRID	Porter	Porter	-	S	2022	230	230		N/A	N/A	Porter 230kV BPS upgrades
NYPA	Coopers Corners	Rock Tavern	-46.1	In-Service	2017	345	345	1	3072	3768	New Dolson Avenue Ring Bus Station for CPV Valley project
NYPA	Coopers Corners	Dolson Avenue	32.21	In-Service	2017	345	345	1	3000	3000	New Dolson Avenue Ring Bus Station for CPV Valley project
NYPA	Dolson Avenue	Rock Tavern	13.89	In-Service	2017	345	345	1	3000	3000	New Dolson Avenue Ring Bus Station for CPV Valley project
NYPA	Cumberland Head	Gordon Landing	1.63	In-Service	2017	115	230	1	1147	1404	Replacement of PV-20 Submarine Cable
NYPA	Marcy 765	Marcy 345	xfmr	W	2018	765/345	765/345	1	1488 MVA	1793 MVA	Install the Marcy Auto Transformer 1(AT1) spare phase to Marcy AT2
NYPA	Niagara	Rochester	-70.2	W	2020	345	345	1	2177	2662	2-795 ACSR
NYPA	Somerset	Rochester	-44	W	2020	345	345	1	2177	2662	2-795 ACSR

Notes: * - Thermal Ratings in Amperes, except where labeled otherwise; xfmr – transformer; S- Summer Peak Period; W- Winter Peak Period

Transmission Owner	Terminals		Line Length in Miles	Expected In-Service Date/Yr		Nominal Voltage in kV		# of ckts	Thermal Ratings		Project Description / Conductor Size
				Prior to	Year	Operating	Design		Summer	Winter	
<u>Firm Plans (5) (Included in FERC 715 Base Case) *(listed here 230 kV and above only)*</u>											
NYPA	Niagara	Station 255 (New Station)	66.4	W	2020	345	345	1	2177	2662	2-795 ACSR
NYSEG	Wethersfield	South Perry	11.5	S	2018	230	230	1	1080	1310	795 ACSR
NYSEG	South Perry	South Perry	xfmr	S	2018	230/115	230/115	1	246 MVA	291 MVA	Transformer
NYSEG	Watercure Road	Watercure Road	xfmr	W	2019	345/230	345/230	1	426 MVA	494 MVA	Transformer #2 and Station Reconfiguration
NYSEG	Gardenville	Gardenville	xfmr	W	2019	230/115	230/115	1	316 MVA	370 MVA	NYSEG Transformer #3 and Station Reconfiguration
NYSEG	Oakdale 345	Oakdale 115	xfmr	W	2021	345/115	345/115/34.5	1	494MVA	527 MVA	Transformer #3 and Station Reconfiguration
NYSEG	Fraser	Fraser	xfmr	W	2021	345/115	345/115	1	305 MVA	364 MVA	Transformer #2 and Station Reconfiguration
NYSEG	Coopers Corners	Coopers Corners	xfmr	S	2022	345/115	345/115	1	232 MVA	270 MVA	Transformer #3 and Station Reconfiguration
NYSEG	Wood Street	Wood Street	xfmr	S	2022	345/115	345/115	1	327 MVA	378 MVA	Transformer #3
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	5.5	S	2021	345	345	1	3000	3211	2-2493 ACAR
O & R/ConEd	Lovett 345 kV Station (New Station)	Buchanan	4	S	2021	345	345	1	3000	3211	2-2493 ACAR
O & R	Lovett 345 kV Station (New Station)	Lovett	xfmr	S	2021	345/138	345/138	1	562 MVA	562 MVA	Transformer
RGE	Station 122 (Station upgrade)	Station 122 (Station upgrade)	xfmr	In-Service	In- Service	345/115	345/115	3	494 MVA	527 MVA	Transformer Replacement and Station Reconfiguration (GRTA)
RGE	Station 80	Station 80	-	In-Service	In- Service	345	345				Station 80 Reconfiguration (GRTA)
RGE	Station 122-Pannell-PC1	Station 122-Pannell-PC1 and PC2		S	2019	345	345	1	1314 MVA-LTE	1314 MVA-LTE	Relay Replacement
RGE	Station 255 (New Station)	Rochester	3.8	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
RGE	Station 255 (New Station)	Station 255 (New Station)	xfmr	W	2020	345/115	345/115	2	400 MVA	450 MVA	Transformer

Note: A complete list is located in the 2018 RNA Report, Appendix D.

Appendix D – Summary of PSEG Long Island Peaker Rule Scenario

Figure 23: Summary of Year 2023 PSEG Long Island Transmission Security Violations

Circuit	Thermal Criteria Violation Type	Load Pocket
Wildwood-Riverhead (890) 138 kV	N-1 & N-1-1	East End
Canal-Riverhead (910) 138 kV	N-1 & N-1-1	East End
Edwards Ave-Riverhead (893) 138 kV	N-1 & N-1-1	East End
Brookhaven-Edwards Ave (864) 138 kV	N-1-1	East End
Elwood-Pulaski (670) 69 kV	N-1	East End
Brookhaven-Moriches (854) 69 kV	N-1	East End
South Manor-Eastport (884) 69 kV	N-1	East End
South Manor-Moriches (855) 69 kV	N-1	East End
Jamesport-Peconic (889) 69 kV	N-1	East End
Peconic-Southold (957) 69 kV	N-1	East End
Southold-Buell (958) 69 kV	N-1	East End
Bridgehampton-Southampton (886) 69 kV	N-1	East End
Canal-Deerfield (972) 69 kV	N-1	East End
Canal-Southampton (893) 69 kV	N-1	East End
Canal-Southampton (973) 69 kV	N-1	East End
Canal-Tiana (963) 69 kV	N-1	East End
Canal-Tiana (966) 69 kV	N-1	East End
Riverhead-Tiana (962) 69 kV	N-1	East End
Riverhead-Tiana (961) 69 kV	N-1	East End
Great River-Watson (774) 69 kV	N-1	South Western Suffolk

Figure 24: Summary of Year 2025 PSEG Long Island Transmission Security Violations

Circuit	Thermal Criteria Violation Type	Load Pocket
Freeport - Newbridge (461) 138 kV	N-1-1	Barrett
Valley Stream-East Garden City (262) 138 kV	N-1 & N-1-1	Barrett
Wildwood-Riverhead (890) 138 kV	N-1 & N-1-1	East End
Canal-Riverhead (910) 138 kV	N-1 & N-1-1	East End
Brookhaven-Edwards Ave (864) 138 kV	N-1 & N-1-1	East End
Edwards Ave-Riverhead (893) 138 kV	N-1 & N-1-1	East End
Brookhaven-Sills Road (887) 138 kV	N-1	East End
Brookhaven-Sills Road (874) 138 kV	N-1	East End
Bridgehampton-Deerfield (965) 69 kV	N-1	East End
Canal-Deerfield (972) 69 kV	N-1	East End
Deerfield-Southampton (974) 69 kV	N-1	East End
Bridgehampton-Buell (968) 69 kV	N-1	East End
Bridgehampton-East Hampton (969) 69 kV	N-1	East End
Bridgehampton-Deerfield (975) 69 kV	N-1	East End
Canal-Southampton (973) 69 kV	N-1	East End
Jamesport-Peconic (889) 69 kV	N-1	East End
Peconic-Southold (957) 69 kV	N-1	East End
Southold-Buell (958) 69 kV	N-1	East End
Brookhaven-Moriches (854) 69 kV	N-1	East End
South Manor-Moriches (855) 69 kV	N-1	East End
South Manor-Eastport (884) 69 kV	N-1	East End
Holbrook-West Bus (888) 138 kV	N-1	East End
Medford-West Yaphank (840) 69 kV	N-1	East End
Medford-Holbrook (842) 69 kV	N-1	East End
Holtsville GT-L.N.G. Plant (852) 69 kV	N-1	East End

Circuit	Thermal Criteria Violation Type	Load Pocket
Holtsville-West Yaphank (853) 69 kV	N-1	East End
Mount Sinai-Port Jefferson (881) 69 kV	N-1	East End
Eastport-Suffolk Air (952) 69 kV	N-1	East End
Riverhead-Tiana (961) 69 kV	N-1	East End
Riverhead-Tiana (962) 69 kV	N-1	East End
Canal-Tiana (963) 69 kV	N-1	East End
Canal-Tiana (966) 69 kV	N-1	East End
Canal-Southampton (893) 69 kV	N-1	East End
Holbrook-Holtsville GT (866) 69 kV	N-1	East End
Happague-Pilgrim PAR (871) 138 kV	N-1	East End
Hauppauge-C.ISLIP (889) 138 kV	N-1	East End
Elwood-Pulaski (670) 69 kV	N-1	East End
Deposit-Indian Head (675) 69 kV	N-1	East End
Deposit-Pulaski (676) 69 kV	N-1	East End
Brightwater-Watson (772) 69 kV	N-1	East End
Pilgrim PAR-Pilgrim () Pilgrim PAR kV	N-1	East End
Northport-Pilgrim (677) 138 kV	N-1	East End
Jamesport-Riverhead (956) 69 kV	N-1	East End
Bridgehampton-Southampton (886) 69 kV	N-1	East End
Northport - Pilgrim (677) 138 kV	N-1-1	Northport
Northport - Pilgrim (672) 138 kV	N-1-1	Northport
Northport - Pilgrim (679) 138 kV	N-1-1	Northport
Babylon-West Babylon (766) 69 kV	N-1	South Western Suffolk
Brentwood-West Brentwood (763) 69 kV	N-1	South Western Suffolk
Great River-Watson (774) 69 kV	N-1	South Western Suffolk
Berry Street-South Farmingdale (654) 69 kV	N-1	South Western Suffolk

Circuit	Thermal Criteria Violation Type	Load Pocket
Pilgrim-Brentwood (660) 69 kV	N-1	South Western Suffolk
Shore Road 345/138 Bank #1	N-1-1	West Glenwood
Shore Road 345/138 Bank #2	N-1-1	West Glenwood
E.G.C. 345 kV P.A.R. #1	N-1-1	West Glenwood
E.G.C. 345 kV P.A.R. #2	N-1-1	West Glenwood
Glenwood South-Shore Road (365) 138 kV	N-1-1	West Glenwood
Glenwood North-Shore Road (366) 138 kV	N-1-1	West Glenwood
Glenwood GT-Glenwood North (366) 138 kV	N-1-1	West Glenwood
Glenwood GT-Roslyn (364) 138 kV	N-1-1	West Glenwood
East Garden City-Roslyn (362) 138 kV	N-1-1	West Glenwood
Carle Place-Glenwood South (363) 138 kV	N-1-1	West Glenwood
Dunwoodie-Shore Road (Y50) 345 kV	N-1-1	West Glenwood
East Garden City-Hempstead Harbor (Y49) 345 kV	N-1-1	West Glenwood
Carle Place-East Garden City (361) 138 kV	N-1-1	West Glenwood
Pilgrim - Hauppauge (871) 138 kV	N-1-1	Southwest Suffolk
Elwood - Greenlawn (673) 138 kV	N-1-1	Huntington