Short-Term Assessment of Reliability: 2023 Quarter 2

A Report by the
New York Independent System Operator

July 14, 2023

Table of Contents

Executive Summary

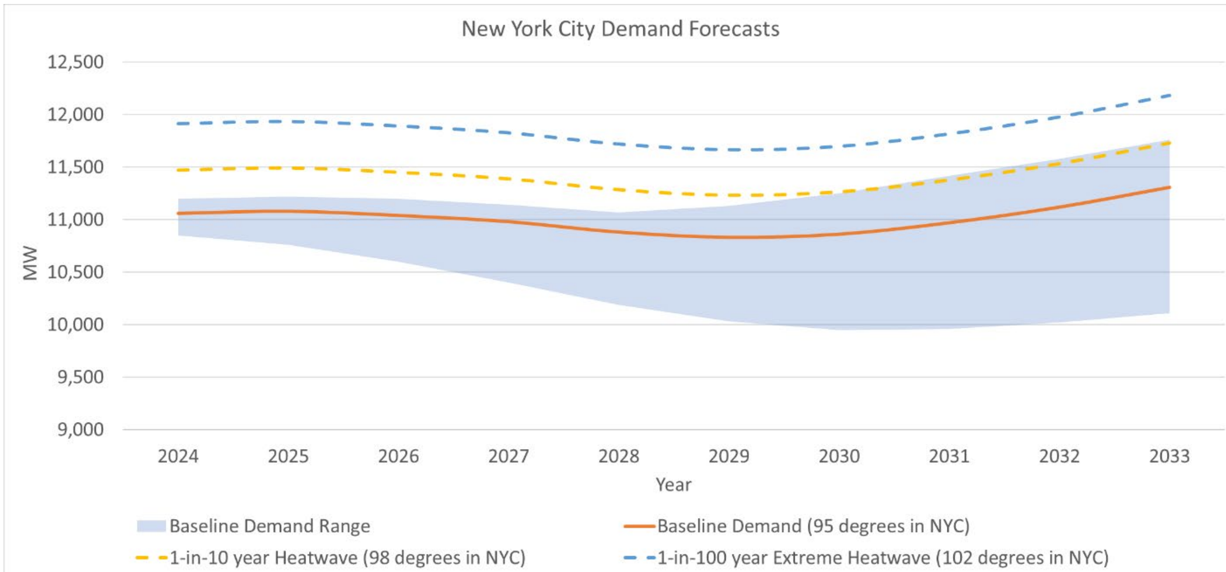
This report sets forth the 2023 Quarter 2 Short-Term Assessment of Reliability ("STAR") findings for the five-year study period of April 15, 2023, through April 15, 2028, considering forecasts of peak power demand, planned upgrades to the transmission system, and changes to the generation mix over the next five years.

This assessment finds a reliability need beginning in summer 2025 within New York City primarily driven by a combination of forecasted increases in peak demand and the assumed unavailability of certain generation in New York City affected by the "Peaker Rule."[1] Combustion turbines known as "peakers" typically operate to maintain bulk power system reliability during the most stressful operating conditions, such as periods of peak electricity demand. As of May 1, 2023, 1,027 MW of affected peakers have deactivated or limited their operation. An additional 590 MW of peakers are expected to become unavailable beginning May 1, 2025, all of which are in New York City. With the additional peakers unavailable, the bulk power transmission system will not be able to securely and reliably serve the forecasted demand in New York City (Zone J). Specifically, the New York City zone is deficient by as much as 446 MW for a duration of nine hours on the peak day during expected weather conditions when accounting for forecasted economic growth and policy-driven increases in demand.

The reliability need is based on a deficient transmission security margin that accounts for expected generator availability, transmission limitations, and updated demand forecasts using data published in the 2023 Load & Capacity Data Report ("Gold Book"). The transmission security margin represents the balance between demand for electricity and the power supply available from generation and transmission to serve that demand. This assessment recognizes that there is uncertainty in the demand forecast due to uncertainties in key assumptions including population and economic growth, the proliferation of energy efficiency, the installation of behind-the-meter renewable energy resources, and electric vehicle adoption and charging patterns. These risks are accounted for in the transmission security margin calculations by incorporating the lower and higher bounds as a range of forecasted conditions during expected weather, specified in the Gold Book as the policy scenario forecasts. The lower and higher demand policy scenario forecasts reflect achievement of policy targets through alternative pathways and assume the same weather factors as the baseline demand forecast.

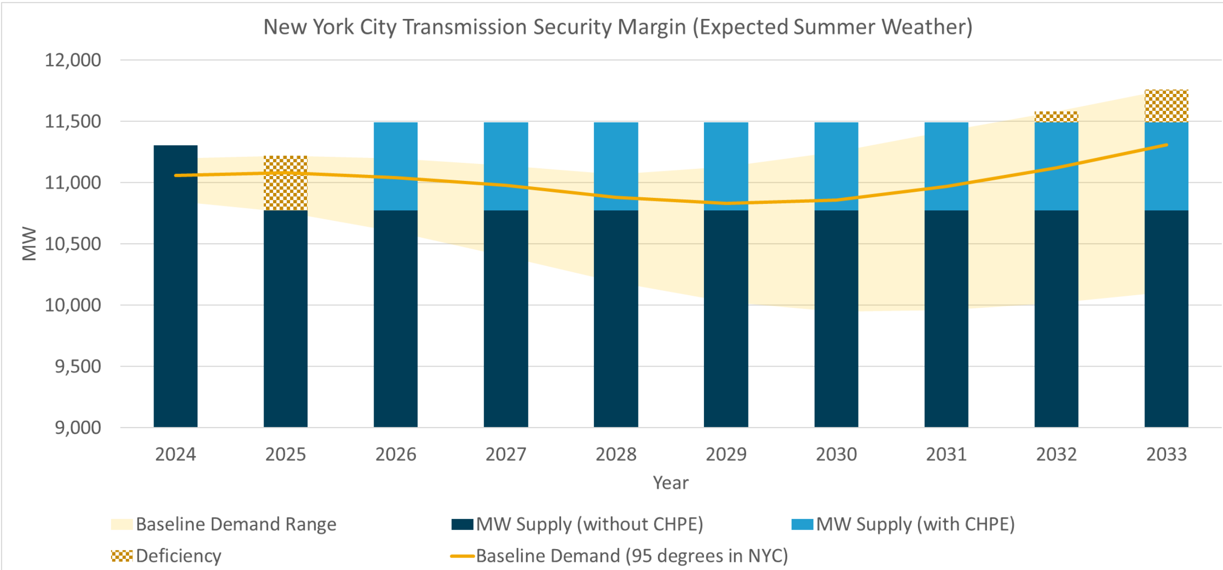
---

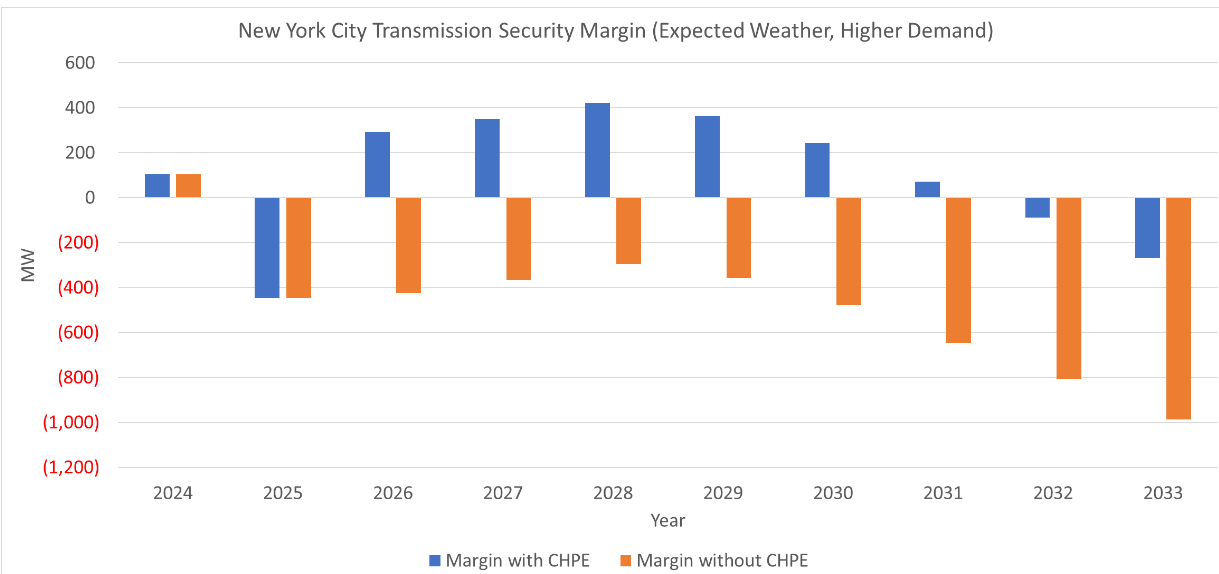
[1] In 2019, the New York State Department of Environmental Conservation adopted a regulation to limit nitrogen oxides (NOx) emissions from simple-cycle combustion turbines, referred to as the "Peaker Rule" (https://www.dec.ny.gov/regulations/116131.html)



Under the baseline forecast for coincident summer peak demand, the New York City transmission security margin would be deficient by 306 MW in 2025 for a duration of 7 hours. However, accounting for uncertainties in key demand forecast assumptions, the higher bound of expected demand under baseline weather conditions (95 degrees Fahrenheit) in 2025 results in a deficiency of 446 MW over 9 hours. The deficiency would be significantly greater if New York City experiences a heatwave (98 degrees Fahrenheit) or an extreme heatwave (102 degrees Fahrenheit).

Overall, the New York City transmission security margin is expected to improve in 2026 if the Champlain Hudson Power Express (CHPE) connection from Hydro Quebec to New York City enters service on schedule in spring 2026, but the margin gradually erodes through time thereafter as expected demand for electricity grows. Beyond 2025, the forecasted reliability margins within New York City may not be sufficient if (i) the CHPE project experiences a significant delay, (ii) additional power plants become unavailable, or (iii) demand significantly exceeds current forecasts. Without the CHPE project in service or other offsetting changes or solutions, the reliability margins continue to be deficient for the ten-year planning horizon. In addition, while CHPE is expected to contribute to reliability in the summer, the facility is not expected to provide any capacity in the winter.





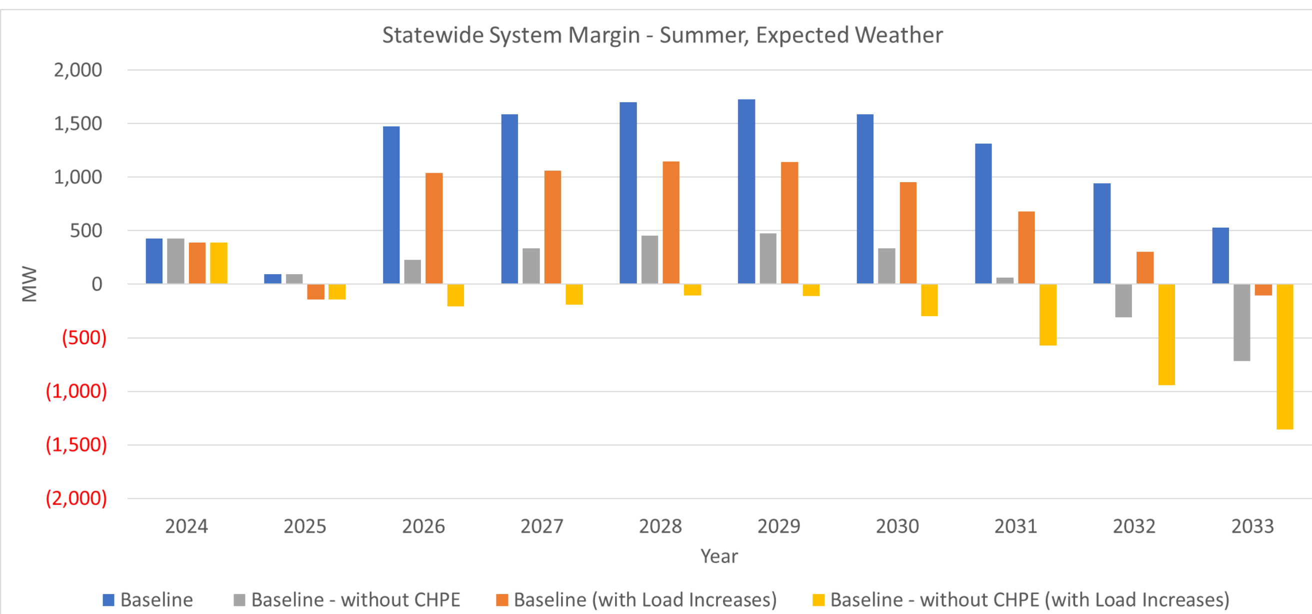
In addition to New York City, this assessment also evaluated the transmission security margins for the statewide system as well as Lower Hudson Valley and Long Island localities. For these localities, the planned Bulk Power Transmission Facilities ("BPTF") through the study period are within applicable reliability criteria based on the baseline summer coincident peak demand forecast with expected weather and with the planned projects meeting their proposed in-service dates. The NYISO assessed the resource adequacy of the overall system and found no resource adequacy reliability needs.

The short-term need observed in 2025 is a Near-Term Reliability Need. As a result, solutions will be solicited, evaluated, and addressed in accordance with the NYISO Short-Term Reliability Process. The need arises within the Con Edison Transmission District; therefore, Con Edison is the Responsible Transmission

Owner for developing a regulated solution.[2]

Central Hudson identified transmission security issues in its transmission district on its non-BPTF system. These are primarily driven by the assumed unavailability of certain generation in its district affected by the Peaker Rule. Given that those generators have not yet provided complete Generator Deactivation Notices to the NYISO, the local non-BPTF criteria violations identified by Central Hudson are being provided for information but were not assessed to identify possible Generator Deactivation Reliability Needs at this time.

As an informational scenario, this STAR includes an evaluation of the impact of additional large load interconnection projects primarily in western and central New York. The anticipated increases to the demand forecast due to these large loads in 2025 is 764 MW which results in a corresponding reduction to the available margin, such that in 2025 the statewide system margin is projected to be deficient of 145 MW. By 2033, additional large loads increase the demand by 1,224 MW which results in a corresponding deficient margin of 104 MW. If CHPE does not begin operation, the statewide system margin is projected to be deficient for all years 2025 through 2033 when considering the additional large loads. The 2023 Quarter 3 STAR will include these load projects and the associated system margin impacts. The solution to the New York City reliability need identified in this STAR may also address the statewide system margin concern.



The wholesale electricity markets administered by the NYISO are an important tool to help mitigate

[2] See OATT Section 38.3.6.

these risks. The markets are designed, and continue to evolve and adapt, to send appropriate price signals for new market entry and the retention of resources that assist in maintaining reliability. The potential risks and resource needs identified in the NYISO's analyses may be resolved by new capacity resources coming into service, construction of additional transmission facilities, and/or increased energy efficiency and integration of demand-side resources. The NYISO is tracking the progression of many projects that may contribute to grid reliability, including numerous offshore wind facilities that have not yet met the inclusion rules for reliability assessments. The NYISO will continue to monitor these resources and other developments to determine whether changing system resources and conditions could impact the reliability of the New York bulk electric grid.

As generators that are subject to the DEC's Peaker Rule submit their Generator Deactivation Notices, the NYISO and the responsible Transmission Owners will continue to evaluate in future STARs whether Generator Deactivation Reliability Needs arise from the deactivation of Initiating Generators.[3]

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

Purpose

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

The first step in the STRP is the Short-Term Assessment of Reliability ("STAR"). STARs are performed quarterly to proactively address reliability needs that may arise within five years ("Short-Term Reliability Needs")[4] due to various changes to the grid such as generator deactivations, revised transmission plans, and updated demand forecasts. Transmission Owners also assess the impact of generator deactivations on their local systems. A Short-Term Reliability Need that is observed within the first three years of the study period constitutes a "Near-Term Reliability Need."[5] Should a Near-Term Reliability Need be identified in a STAR, the NYISO solicits and selects the solution to address the need. If a need arises beyond the first three years of the study period, the NYISO may choose to address the need within the STRP or, if time permits, through the long-term Reliability Planning Process.

This STAR report sets forth the 2023 Quarter 2 findings for the study period from the STAR Start Date (April 15, 2023) through April 15, 2028. The NYISO assessed the potential reliability impacts to the Bulk Power Transmission Facilities ("BPTF") considering system changes, including the availability of resources and the status of transmission plans in accordance with the NYISO Reliability Planning Process Manual.[6]

Assumptions

The NYISO evaluated the study period using the most recent Reliability Planning Process base case and data available as of April 14, 2023 (*i.e.,* the day before the April 15, 2023 Q2 STAR start date). In accordance with the base case inclusion rules,[7] generation and transmission projects are added to the base case if they have met significant milestones such that there is a reasonable expectation of timely completion of the project. A summary of key projects is provided in Appendix C. The NYISO is tracking the

---

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

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

[6] NYISO Reliability Planning Process Manual, July 11, 2022. *See:* https://www.nyiso.com/documents/20142/2924447/rpp_mnl.pdf

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

progress of many projects that may contribute to grid reliability, including numerous offshore wind facilities that have not yet met the inclusion rules for reliability assessments. These additional tracked projects are listed in the *2023 Gold Book* and in Appendix D of the 2022 RNA.

This assessment used the major assumptions included in the 2022 RNA, along with several updates to key study assumptions which are provided below. Consistent with the obligations under its tariffs, the NYISO provided information to stakeholders on the modeling assumptions employed in this assessment. Details regarding the study assumptions were reviewed with stakeholders at the joint Electric System Planning Working Group ("ESPWG")/Transmission Planning Advisory Subcommittee ("TPAS") meeting on April 25, 2023. The meeting materials are posted on the NYISO's website.[8]

Generation Assumptions

Generator Deactivation Notices

There are no new generator deactivation notices to assess in the 2023 Quarter 2 STAR. A list of all generator deactivations, including those evaluated in prior STARs, is provided in Appendix C. The posting of generator deactivation notices for retirement, mothball outage, or ICAP ineligible forced outage are available on the NYISO's website under the Short-Term Reliability Process.[9]

[8] https://www.nyiso.com/documents/20142/37171876/2023%20Q2%20STAR%20Key%20Study%20Assumptions%20vFinal.pdf/

[9] See https://www.nyiso.com/short-term-reliability-process then Generator Deactivation Notices/Planned Retirement Notices or Generator Deactivation Notices/IIFO Notifications

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

In 2019, the New York State Department of Environmental Conservation ("DEC") adopted a regulation to limit nitrogen oxides (NOx) emissions from simple-cycle combustion turbines (referred to as the "Peaker Rule").[10] Combustion turbines known as "peakers" typically operate to maintain bulk power system reliability during the most stressful operating conditions, such as periods of peak electricity demand. The Peaker Rule impacts turbines located mainly in the lower Hudson Valley, New York City and Long Island. Many of these units also maintain transmission security by supplying energy within certain areas of the grid referred to as "load pockets." Load pockets represent transmission-constrained geographic areas where a portion of electrical demand can only be served by local generators due to transmission limitations that occur during certain operating conditions.

The Peaker Rule provides a phased reduction in emission limits, in 2023 and 2025, during the ozone season (May 1-September 30) and allows several options for achieving compliance with the new lower limits applicable during the ozone season. The rule required peaking unit owners to submit compliance plans to the DEC in March 2020. Compliance plans submitted to the DEC were provided to the NYISO for assessment and inclusion in the Reliability Planning Process base case. Considering all peaker unit compliance plans, approximately 1,600 MW of peaker generation capability would be unavailable during the summer by 2025 to comply with the emissions requirements. A subset of those generators are unavailable starting in 2023. As of May 1, 2023, 1,027 MW of affected peakers have deactivated or limited their operations. An additional 590 MW of peakers are expected to become unavailable beginning May 1, 2025, all of which are in New York City. Remaining peaker units have stated either that they comply with the emission limits as currently operated, or proposed equipment upgrades to achieve the emissions limits.

A list of peaker generation removals is provided in Figure 1. Peaker generators that have already completed a Generator Deactivation Notice or entered an IIFO are indicated in the table. Additionally, the table notes the STAR study or other assessments where these generators have been evaluated once a generator completed its generator deactivation notice or entered into an IIFO.

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

[10] DEC Peaker Rule

Study assumptions for this STAR are derived from the 2022 RNA, except for the changes to generation assumptions specified below.

Figure 1: Status Changes Due to DEC Peaker Rule

Owner/Operator	Station	Zone	Nameplate (MW)	CRIS (MW) (1)		Capability (MW) (1)		Status Change Date (2)	STAR Evaluation or Other Assessment
				Summer	Winter	Summer	Winter		
National Grid	West Babylon 4 (6) (7)	K	52.4	49.0	64.0	41.2	63.4	12/12/2020 (R)	Other
National Grid	Glenwood GT 01 (4) (7)	K	16.0	14.6	19.1	13.0	15.3	2/28/2021 (R)	2020 Q3
Helix Ravenswood, LLC	Ravenswood 11	J	25.0	20.2	25.7	16.1	22.4	12/1/2021 (IIFO)	2022 Q1
Helix Ravenswood, LLC	Ravenswood 01	J	18.6	8.8	11.5	7.7	11.1	1/1/2022 (IIFO)	2022 Q1
Astoria Generating Company, L.P.	Gowanus 1-1 through 1-8	J	160.0	138.7	181.1	133.1	182.2	11/1/2022 (R)	2022 Q2
Astoria Generating Company, L.P.	Gowanus 4-1 through 4-8	J	160.0	140.1	182.9	138.8	183.4	11/1/2022 (R)	2022 Q2
Consolidated Edison Co. of NY, Inc.	Hudson Ave 3	J	16.3	16.0	20.9	12.3	15.6	11/1/2022 (R)	2022 Q2
Consolidated Edison Co. of NY, Inc.	Hudson Ave 5	J	16.3	15.1	19.7	15.3	18.6	11/1/2022 (R)	2022 Q2
Central Hudson Gas & Elec. Corp.	Coxsackie GT (8)	G	21.6	21.6	26.0	19.0	23.6	5/1/2023	
Central Hudson Gas & Elec. Corp.	South Cairo (8)	G	21.6	19.8	25.9	18.7	23.1	5/1/2023	
Consolidated Edison Co. of NY, Inc.	74 St. GT 1 & 2 (10)	J	37.0	39.1	49.2	37.8	43.6	5/1/2023	2022 Q2
Astoria Generating Company, L.P.	Astoria GT 01	J	16.0	15.7	20.5	13.4	19.1	5/1/2023	2022 Q4
NRG Power Marketing, LLC	Astoria GT 2-1, 2-2, 2-3, 2-4	J	186.0	165.8	204.1	138.0	184.2	5/1/2023 (R)	2022 Q2
NRG Power Marketing, LLC	Astoria GT 3-1, 3-2, 3-3, 3-4	J	186.0	170.7	210.0	139.1	180.4	5/1/2023 (R)	2022 Q2
NRG Power Marketing, LLC	Astoria GT 4-1, 4-2, 4-3, 4-4	J	186.0	167.9	206.7	138.5	178.6	5/1/2023 (R)	2022 Q2
Helix Ravenswood, LLC	Ravenswood 10	J	25.0	21.2	27.0	16.1	20.3	5/1/2023 (R)	2022 Q3
National Grid	Glenwood GT 03 (3) (4)	K	55.0	54.7	71.5	49.9	67.2	5/1/2023	
National Grid	Northport GT (9)	K	16.0	13.8	18.0	8.3	12.7	5/1/2023	
National Grid	Port Jefferson GT 01 (9)	K	16.0	14.1	18.4	13.0	15.3	5/1/2023	
National Grid	Shoreham 1 (3) (4)	K	52.9	48.9	63.9	41.3	61.4	5/1/2023	
National Grid	Shoreham 2 (3) (4)	K	18.6	18.5	23.5	16.5	20.3	5/1/2023	
Consolidated Edison Co. of NY, Inc.	59 St. GT 1	J	17.1	15.4	20.1	13.1	18.8	5/1/2025	
NRG Power Marketing, LLC	Arthur Kill GT 1	J	20.0	16.5	21.6	12.3	15.8	5/1/2025	
Astoria Generating Company, L.P.	Gowanus 2-1 through 2-8 (5)	J	160.0	152.8	199.6	142.1	182.0	5/1/2025	
Astoria Generating Company, L.P.	Gowanus 3-1 through 3-8 (5)	J	160.0	146.8	191.7	136.9	179.9	5/1/2025	
Astoria Generating Company, L.P.	Narrows 1-1 through 2-8 (5)	J	352.0	309.1	403.6	285.9	369.2	5/1/2025	
	Prior to Summer 2022		112.0	92.6	120.3	78.0	112.2		
	Prior to Summer 2023		1,190.3	1,081.7	1,369.3	949.1	1,249.6		
	Prior to Summer 2025		709.1	640.6	836.6	590.3	765.7		
	Total		2,011.4	1,814.9	2,326.2	1,617.4	2,127.5		

Notes

1. MW values are from the 2023 Load and Capacity Data Report

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

3. Generator changed DEC peaker rule compliance plan as compared to the 2020 RNA and all STARs prior to 2021 Q3

4. Long Island Power Authority (LIPA) has submitted notifications to the DEC per part 227-3 of the peaker rule stating that these units are needed for reliability allowing these units to operate until at least May 1, 2025. Due to the future nature of these units being operated only as designated by the operator as an emergency operating procedure the NYISO will continue to plan for these units be unavailable starting May 2023

5. These units have indicated they will be out-of-service during the ozone season (May through September) in their compliance plans in response to the DEC peaker rule.

6. This unit was evaluated in a stand-alone generator deactivation assessment prior to the creation of the Short-Term Reliability Process

7. Unit operating as a load modifier

8. Central Hudson submitted notification to the DEC per part 227-3 of the peaker rule stating these units are needed for reliability. The most recent LTP update from Central Hudson notes the planned retirement of South Cairo and Coxsakie generators in December 2024. https://www.nyiso.com/documents/20142/26630522/Local-Transmission-Plan-2021.pdf/

9. On May 24, 2023 National Grid notified the New York State Public Service Commission that these units have been classified as black-start only units.

10. Unit no longer subject to NYISO dispatch and is used for local reliability only

Generator Return-to-Service

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

Generator Additions

There are no generation additions beyond those included in the 2022 RNA. However, North Country ESR (Q#0769, Zone D), Grissom Solar (Q#0682, Zone F), Janis Solar (Q#0768, Zone C), and Number 3 Wind (Q#0531, Zone E) went into service in the first quarter of 2023. A list of generator additions, including updates to planned commercial operation dates as included in the 2022 RNA, is provided in Appendix C.

Demand Assumptions

The NYISO used the baseline demand forecasts for this assessment consistent with the 2023 Gold Book incorporating the following load projects in the NYISO interconnection queue: Q#0580 – WNY STAMP, Q#0776 – Greenidge Load, Q#0849 – Somerset Load, Q#0850 – Cayuga Load, and Q#0979 – North Country Data Center (load increase). Several large load queue projects were not included in this assessment but were included in the 2023 Gold Book forecasts, including the Micron New York semiconductor manufacturing (Q#1536) and Air Products and Chemicals (Q#1446). These load loads are planned to be captured in the 2023 Q3 STAR. As an informational scenario, this STAR includes an evaluation of the impact of additional large load interconnection projects primarily in western and central New York on the statewide transmission security margin. The combined zonal totals for the large loads included in this assessment is provided in Appendix C.

Within this STAR the transmission security margin assessment recognizes that there is uncertainty in the demand forecast due to uncertainties in key assumptions including population and economic growth, the proliferation of energy efficiency, the installation of behind-the-meter renewable energy resources, and electric vehicle adoption and charging patterns. These risks are accounted for in the transmission security margin calculations by incorporating the lower and higher bounds as a range of forecasted conditions during expected weather, specified in the Gold Book as the policy scenario forecasts. The lower and higher demand policy scenario forecasts reflect achievement of policy targets through alternative pathways and assume the same weather factors as the baseline demand forecast.

Transmission Assumptions

Existing Transmission

The transmission assumptions utilized in this assessment are similar to those used for the 2022 RNA.

Compared to the prior STAR there are two outages with delayed return-to-service dates and three additional transmission outages. Figure 2 shows the changes in existing transmission outage assumptions compared to the prior STAR.

Figure 2: Changes to Existing Transmission Facilities Modeled Out-of-Service

From	To	kV	ID	Out-of-Service Through	
				Prior STAR	Current STAR
Moses	Moses	230/115	AT2	3/2023	5/2023
Moses	St. Lawrence	230	L34P	09/2023	11/2023
E. 13th Street	E. 13th Street	345/69	BK17	N/A	12/2023
Cobble NM	Cobble NY	115	BK1	N/A	12/2023
Elm	Elm	230/23	TR3	N/A	12/2023

A complete list of existing transmission facilities that are modeled as out-of-service for this assessment is also provided in Appendix C.

Proposed Transmission

There are no other changes to proposed transmission assumptions beyond those included in the 2022 RNA. Details of the proposed transmission assumptions included in the RNA are provided in Appendix C.

Findings

Grid reliability is determined by assessing transmission security and resource adequacy. Transmission security is the ability of the electric system to withstand disturbances such as electric short circuits or unanticipated loss of system elements without involuntarily disconnecting firm load. Resource adequacy is the ability of electric systems to supply the aggregate electrical demand and energy requirements of customers, accounting for scheduled and reasonably expected unscheduled outages of system elements.

Starting with the 2022 RNA and included in subsequent STARs (including this STAR), enhancements to the application of reliability rules were employed for both transmission security and resource adequacy:

- For transmission security, to represent that not all generation will be available at any given time, a derating factor is applied to thermal units. Additionally, intermittent, weather dependent generation is dispatched according to its expected availability coincident with the represented system condition. The enhancements also include the ability to identify BPTF reliability needs in instances where the transmission security margin for a constrained area of the system is less than zero MW.
- For resource adequacy, to ensure that some level of operating reserves is maintained, the Emergency Operating Procedure (EOP) step will retain 350 MW of operating reserves at the time of a load shedding event.

As explained below, this assessment finds that reliability criteria would not be met for the BPTF throughout the five-year study period under the assumed and forecasted base case system conditions.

Resource Adequacy Assessments

Resource adequacy is the ability of the electric system to supply the aggregate electrical demand and energy requirements of the firm load at all times, considering scheduled and reasonably expected unscheduled outages of system elements. The NYISO performs resource adequacy assessments on a probabilistic basis to capture the random nature of system element outages. If a system has sufficient transmission and generation, the probability of an unplanned disconnection of firm load is equal to or less than the system's standard, which is expressed as a loss of load expectation (LOLE). Consistent with the NPCC and NYSRC criterion, 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 firm load disconnection that is not more frequent than once in every 10 years, or 0.1 event days per year.

This assessment finds that the planned system through the study period meets the resource adequacy criterion. Details about the resource adequacy study assumptions are provided in Appendix D.

Transmission Security Assessments

Transmission security is the ability of the power system to withstand disturbances, such as electric short circuits or unanticipated loss of system elements, and continue to supply and deliver electricity. The analysis for the transmission security assessment is conducted in accordance with NERC Reliability Standards, NPCC Transmission Design Criteria, and the NYSRC Reliability Rules. Transmission security is assessed deterministically with potential disturbances being applied without concern for the likelihood of the disturbance in the assessment. These disturbances (single-element and multiple-element contingencies) are categorized as the design criteria contingencies, which are explicitly defined in the reliability criteria. The impacts resulting from applying these design criteria contingencies are assessed to determine whether thermal loading, voltage or stability violations will occur. In addition, the NYISO performs a short circuit analysis to determine if the system can clear faulted facilities reliably under short circuit conditions. The NYISO's "Guideline for Fault Current Assessment"[11] describes the methodology for that analysis.

Transmission security analysis includes the assessment of various combinations of credible system conditions intended to stress the system. As transmission security analysis is deterministic, these various credible combinations of system conditions are evaluated throughout the study period to identify reliability needs. Intermittent generation is represented based on expected output during the modeled system conditions.[12]

Transmission security margins are included in this assessment to identify plausible changes in conditions or assumptions that might adversely impact the reliability of the system. The transmission security margin is the ability to meet load plus losses and system reserve (*i.e.*, total capacity requirement) using NYCA generation, interchange, and including temperature-based generation derates (total resources). This assessment is performed using a deterministic approach through powerflow simulations combined with post-processing spreadsheet-based calculations. [13] For this evaluation, a BPTF reliability need is identified when the margin is less than zero under expected weather, normal transfer criteria. For the purposes of identifying reliability needs on the BPTF using transmission security margin calculations, thermal generation MW capability is considered available based on NERC five-year class averages for the relevant type of unit.[14] Derates for thermal generation are included due to the aging fleet without

[11] Attachment I of Transmission, Expansion, and Interconnection Manual.

[12] The RNA assumptions matrix is posted under the July 1, 2022 TPAS/ESPWG meeting materials, which is available at here, and also in Appendix D.

[13] At its June 23, 2022, meeting, the NYISO Operating Committee approved revisions to the Reliability Planning Process Manual that reflect the use of transmission security margins and other enhancements.

[14] The NERC five-year class average EFORd data is available here.

expected replacement, while the share of intermittent, weather dependent, generation is growing.

Figure 3 shows the NERC five-year class-average outage rate for combined cycle, gas turbine, fossil steam turbine, and jet engine generators. Figure 4 shows the impact of the thermal derates on the total resources available statewide, as well as the Lower Hudson Valley, New York City, and Long Island localities. Reductions in thermal derates over time are driven by the assumed generator deactivations in this assessment.

Figure 3: NERC Five-Year Class Average Outage Rate

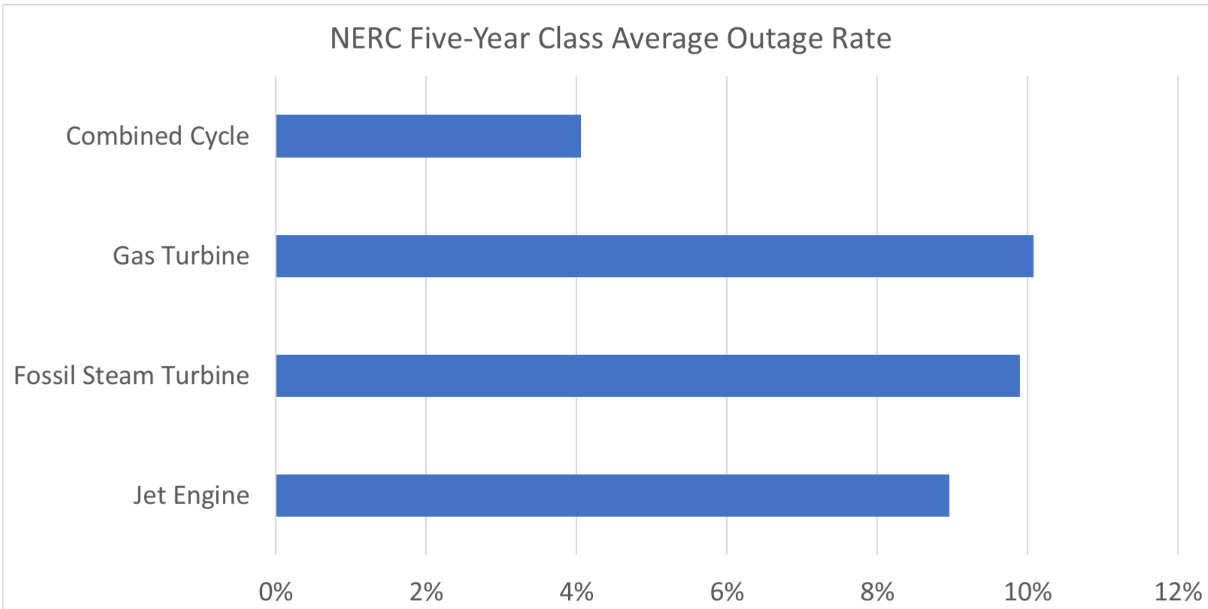
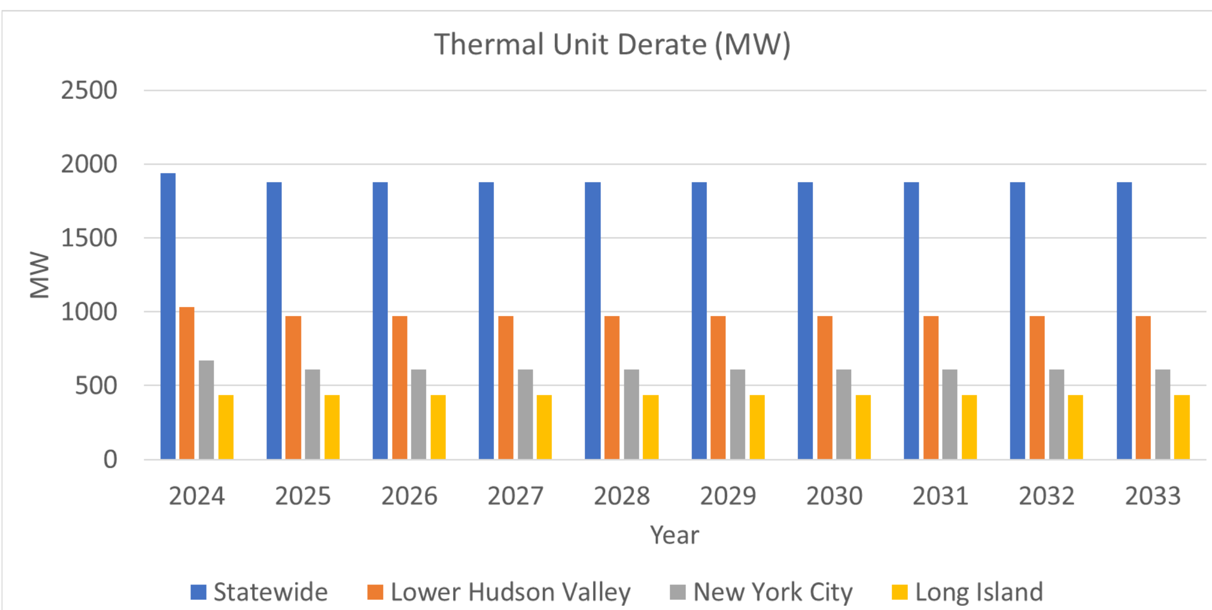


Figure 4: Thermal Unit Derate (MW) for New York



For the transmission security margin assessment, margins are evaluated for the statewide system margin, as well as Lower Hudson Valley, New York City, and Long Island localities. In this evaluation, a BPTF reliability need is identified when the margin is less than zero under expected weather, normal transfer criteria conditions. Additional details regarding the impact of heatwaves, cold snaps, and other system conditions are provided in Appendix E for informational purposes.

The NYISO performed a transmission security assessment of the BPTF and identified a reliability need in the New York City locality, as described further in the following sections.

Steady State Assessment

In the NYISO's evaluation of the BPTF, thermal overloads are observed on the National Grid Clay-Woodard (#17) 115 kV transmission line (specifically the Clay-Euclid segment of the line). This issue was first observed in the 2021 Quarter 3 STAR.[15] At the October 1, 2021 joint ESPWG/TPAS meeting, National Grid presented an LTP update to install a 3% series reactor at the Woodard 115 kV substation on the Clay-Woodard 115 kV line.[16] This series reactor is planned to be in service by December 31, 2023. As discussed in the 2021 Quarter 3 STAR, National Grid will utilize an interim operating procedure to address this overload until the permanent series reactor is placed in service. After incorporating National Grid's LTP update and described interim operating procedure, the NYISO did not observe any thermal criteria violations.

A potential steady-state transmission security violation was identified for the study period under expected winter peak conditions. No other steady-state transmission security related needs were observed under other system conditions, including daytime light load conditions, which captured a high penetration of behind-the-meter solar resources.

The identified transmission security issue is a low-voltage violation at the Porter 115 kV bus following various contingency combinations resulting in the loss of both Edic-to-Porter 345/115 kV transformers under expected winter peak conditions. The low-voltage violation at the Porter 115 kV bus is observed starting in winter 2025-26 due to (i) the retirement of the two Porter 230/115 kV buses, which is planned to occur that winter with the Smart Path Connect Project (interconnection queue #Q1125), and (ii) the increasing demand in Zone E observed in winter. The evaluation did not observe the low-voltage violation at the Porter 115 kV bus under summer peak demand conditions because the demand forecast for Zone E is higher in winter than in summer. Since the low-voltage violation that is observed at the Porter 115 kV

---

15 https://www.nyiso.com/documents/20142/16004172/2021-Q3-STAR-Report-vFinal2.pdf/

16 https://www.nyiso.com/documents/20142/25058472/03_National%20Grid%20NY%20Local%20Transmission%20Plan%20Update%2010-2021.pdf/

bus occur due to the planned changes with the interconnection of the Smart Path Connect Project (Q#1125), this issue will be addressed through the NYISO's interconnection process.[17]

Dynamics Assessment

No BPTF dynamic criteria violations were observed for this assessment. Additionally, no dynamic stability related non-BPTF generator deactivation reliability needs were observed for this assessment.

Short Circuit Assessment

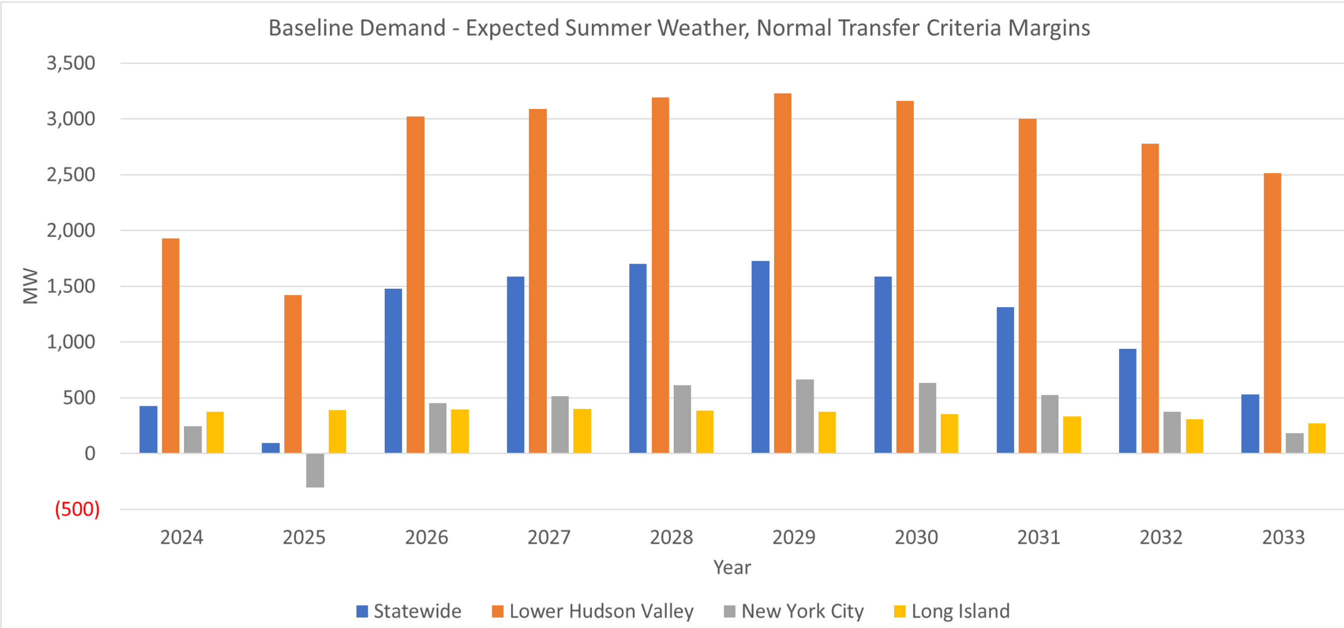
No BPTF short-circuit criteria violations were observed in this assessment. Additionally, no short-circuit non-BPTF generator deactivation reliability needs were observed in this assessment.

Transmission Security Margin Assessment

For the transmission security margin assessment, "tipping points" are evaluated for the statewide system margin and for the Lower Hudson Valley, New York City, and Long Island localities. In the Lower Hudson Valley and Long Island localities, the BPTF system is designed to remain reliable in the event of two non-simultaneous outages (N-1-1). In the Con Edison service territory, the 345 kV transmission system and specific portions of the 138 kV transmission system are designed to remain reliable and return to normal ratings after the occurrence of two non-simultaneous outages (N-1-1-0). Figure 6 provides a summary of the margins under expected summer weather, normal transfer criteria conditions. While the margins are sufficient statewide (as well as in the Lower Hudson Valley and Long Island localities), the margin within New York City is deficient by as much as 446 MW for a duration of nine hours on the peak day during expected weather conditions when accounting for forecasted economic growth and policy-driven increases in demand. With the planned addition of CHPE, there is an increase in the observed margin beginning summer 2026. The margin changes in each year between 2026 and 2033 are due to changes in the demand forecast. By 2033, the margin within New York City reduces to just under 200 MW.

[17] On March 2, 2023, the NYISO reported to TPAS that a developer-initiated modification request for the Q#1125 project is not material and, therefore, permitted under the Transmission Interconnection Procedures (here). The requested modifications are intended to address low-voltage violations due to the proposed interconnection of the project, which include: (1) a hybrid break (*e.g.*, two breakers in-series in a single breaker position) at the new bay in the Edic 345 kV of the project substation to accommodate the project and (2) only partially retiring the Porter 230 kV substation instead of retiring the entire substation (*e.g.*, keeping the existing Edic 345/230 kV transformer, Edic-Porter 230 kV transmission line (#17), and two Porter 230/115 kV transformers).

Figure 5: Summary of Expected Summer Weather, Normal Transfer Criteria Margins



Within the Con Edison Transmission District, the 345 kV transmission system along with specific portions of the 138 kV transmission system are designed to criteria to address the occurrence of two non-simultaneous contingencies and a return to normal (N-1-1-0). Design criteria N-1-1-0 combinations include various combinations of the loss of generation and transmission facilities. As the system changes, the limiting contingency combination may also change (see Appendix E for examples). For summers 2023, 2024, and 2025, the Con Edison 345 kV transmission system is most limiting for the combined loss of Ravenswood 3 followed by the loss of the Mott Haven – Rainey 345 kV (Q12) transmission line (N-1-1-0). Starting in summer 2026, the limiting contingency combination changes to the loss of CHPE followed by the loss of Ravenswood 3.

Under the baseline forecast for coincident summer peak demand, the New York City transmission security margin would be deficient by 306 MW in 2025 for a duration of 7 hours. However, accounting for uncertainties in key demand forecast assumptions, the higher bound of expected demand under baseline weather conditions (95 degrees Fahrenheit) in 2025 results in a deficiency of 446 MW over 9 hours. The deficiency would be significantly greater if New York City experiences a heatwave (98 degrees Fahrenheit) or an extreme heatwave (102 degrees Fahrenheit). The deficient margin is primarily due to the increased demand forecasts within New York City combined with the planned unavailability of simple-cycle combustion turbines to comply with the DEC's Peaker Rule in 2025. Prior reliability assessments, including the 2022 RNA and subsequent STARs, identified that the reliability margins within New York City would not be sufficient if, among other reasons, the forecasted demand increased by as little as 60

MW in 2025. When comparing the baseline summer coincident peak demand forecast found for New York City (Zone J) in the 2022 Gold Book to that included in the 2023 Gold Book, the forecast increased by 294 MW. Additionally, decreased summer capabilities of generators within the area and increased generator forced outage rates also contribute to the deficiency.

This assessment recognizes that there is uncertainty in the demand forecast driven by uncertainties in key assumptions such as population and economic growth, energy efficiency, the installation of behind-the-meter renewable energy resources, and electric vehicle adoption and charging patterns. These risks are considered in the transmission security margin calculations by incorporating the lower and higher bounds as a range of forecasted conditions during expected weather, specified in the Gold Book as the policy scenario forecasts. The lower and higher demand policy scenarios reflect achievement of policy targets through alternative pathways and assume the same weather factors as the baseline demand forecast. Figure 6 shows the range of baseline forecast along with the demand for heatwave and extreme heatwave conditions. Figure 7 provides a summary of the difference between the lower and higher demand policy scenarios as compared to the baseline demand forecast published in the 2023 Gold Book.

Figure 6: New York City Demand Forecasts

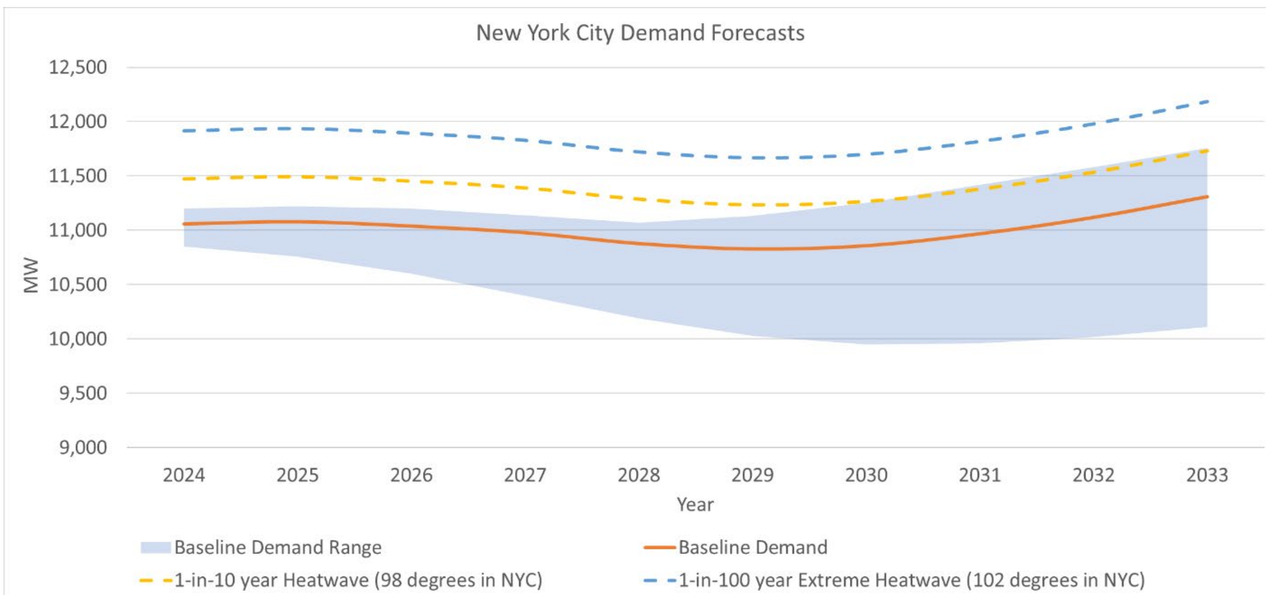
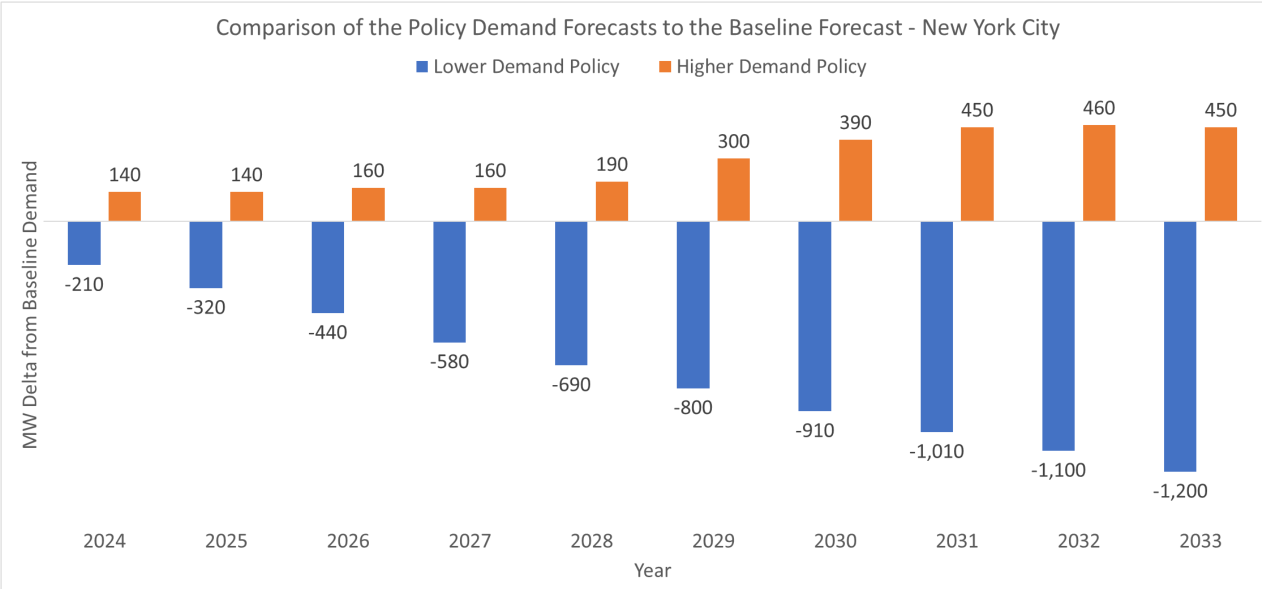


Figure 7: Impact of Lower and Higher Demand Policy Scenarios on Baseline New York City Demand Forecast



As shown in Figure 7, for the lower policy scenario, the summer peak demand in 2025 is 320 MW lower than that of the baseline forecast, resulting in the potential for a sufficient transmission security margin of 14 MW (see Figure 8). For the higher policy scenario, the summer peak demand forecast in 2025 is 140 MW higher than the baseline forecast (see Figure 7) resulting in a transmission security margin deficiency of 446 MW. As shown in Figure 9 the deficiency is anticipated to last nine hours.

Regardless of the demand forecast, the New York City transmission security margin improves in 2026 with the anticipated addition of the Champlain Hudson Power Express (CHPE) connection from Hydro Quebec to New York City. However, the margin gradually erodes following CHPE's addition as the baseline demand grows in New York City. For the higher demand policy scenario by 2032, the margin is deficient by 88 MW, which grows to a deficiency of 268 MW by 2033.

Beyond 2025, the reliability margins within New York City may also not be sufficient for the baseline forecast or higher demand policy scenario if (i) the CHPE project experiences a significant delay, or (ii) additional power plants become unavailable, or (iii) demand significantly exceeds current forecasts. For the baseline or higher policy scenario, the reliability margins continue to be deficient for the ten-year planning horizon without the CHPE project in service or other offsetting changes or solutions. In addition, while CHPE will contribute to reliability in the summer, the facility is not expected to provide any capacity in the winter. Depending on the solutions received in response to the NYISO's solicitation for solutions to address this reliability need, some generation affected by DEC's Peaker Rule may need to remain in service until CHPE or other permanent solutions are completed to maintain a reliable grid.

Figure 8: New York City Transmission Security Margins for Expected Weather (With and Without CHPE)

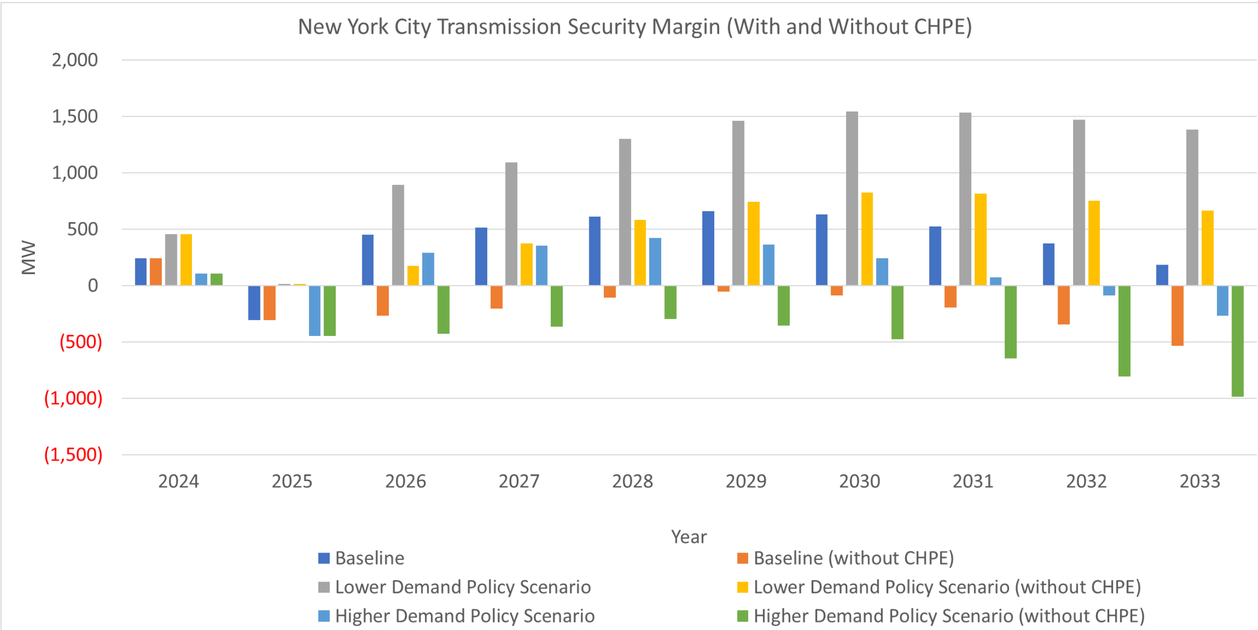
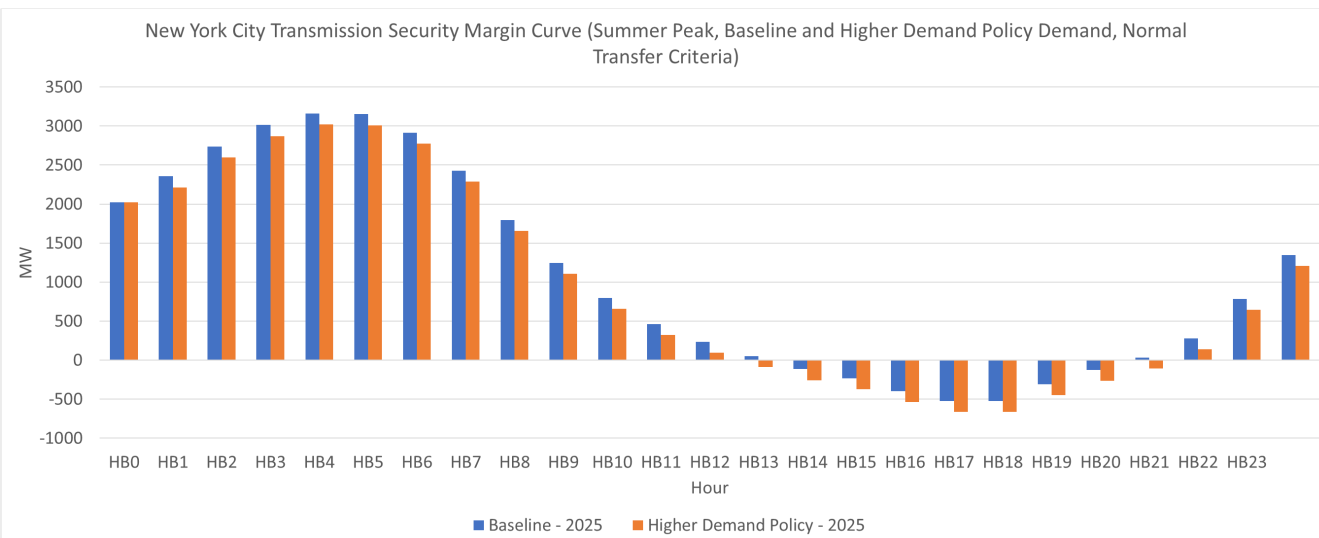
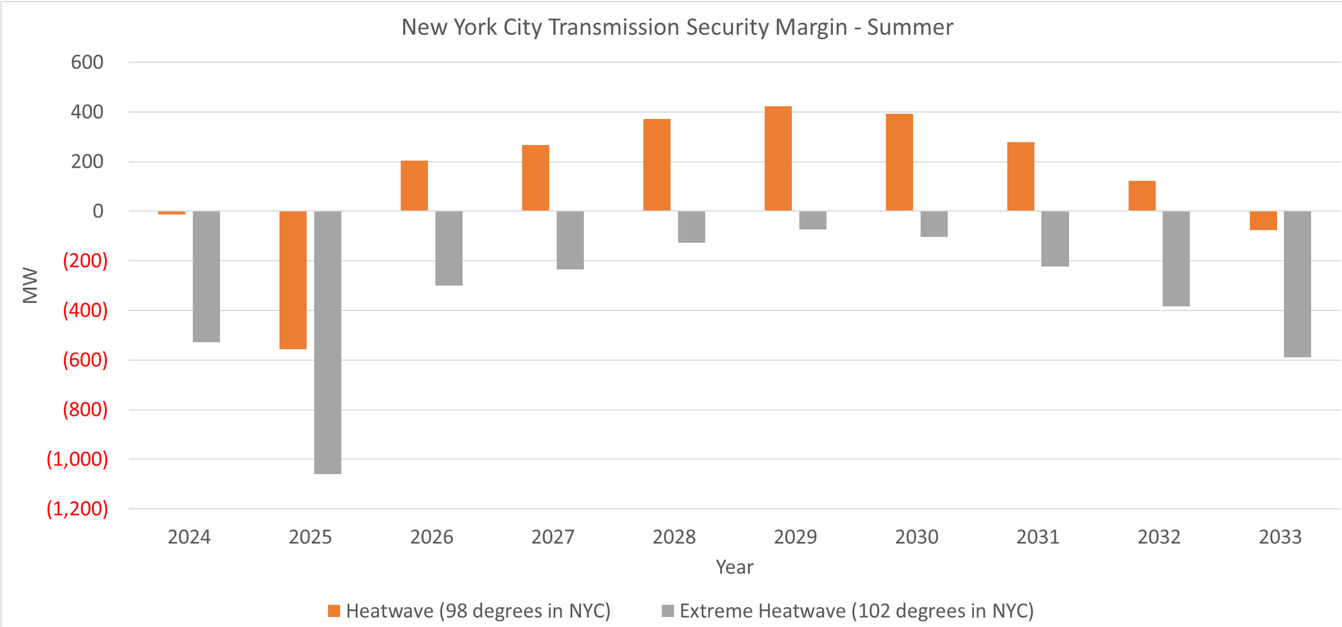


Figure 9: New York City Transmission Security Margin Hourly Curve



Potential heatwaves of various degrees also pose risks throughout the next ten years, especially in 2025, with a deficiency of 555 MW during a heatwave. As shown in Figure 10, with the CHPE project in service by 2026 the transmission security margin under a heatwave is sufficient through 2032. By 2033, under a heatwave the margin is again deficient by 75 MW. Under an extreme heatwave the margin is deficient for all years with the largest deficiency observed in 2025 at 1,060 MW. In addition, while CHPE will contribute to reliability in the summer, the facility is not expected to provide any capacity in the winter.

Figure 10: New York City Transmission Security Margin for Heatwaves and Extreme Heatwaves



The NYISO, in consultation with Con Edison, reviewed whether the adoption of alternative operating procedures or updates to Con Edison's Local Transmission Owner Plan could address the identified Near-Term Reliability Need identified in this STAR.[18] The review did not identify alternative operating procedures or updates to Con Edison's Local Transmission Owner Plan.

Additional details regarding the margin calculations are provided in Appendix E. Appendix E also shows impact on the margin of heatwaves, cold snaps, and other system conditions for informational purposes.

Additional Transmission Owner Local Criteria Assessments (For Information Only)

As described in the following sections, Central Hudson identified transmission security issues in their service territories on their non-BPTF systems, as recorded in prior STAR reports. The local non-BPTF criteria violations identified below are not Generator Deactivation Reliability Needs and are provided for information only.[19]

Central Hudson Assessment

Central Hudson currently owns and operates two 25 MVA (nameplate) combustion turbines that are subject to DEC's Peaker Rule, namely the Coxsackie and South Cairo generators. Both generators provide

[18] *See* OATT 38.3.5.2

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

local substation reserve capacity for transformer outages and post-contingency voltage support for the Westerlo transmission loop. Without these generators, there is no reserve capability for local transformer outages and the Westerlo loop is voltage constrained. These transmission security issues, first identified in the 2020 Quarter 3 STAR, arise on non-BPTF facilities beginning in 2023 and continuing through 2025. At the October 25, 2021, joint ESPWG/TPAS meeting, Central Hudson updated its LTP to resolve the Westerlo transmission loop voltage issue.[20] The LTP includes the installation of a STATCOM and capacitor bank at the South Cairo and Freehold substations with the facilities to be in service by December 2024.

[20] https://www.nyiso.com/documents/20142/25620932/02 Central Hudson Local Transmission Plan.pdf/

Impact of Potential Large Load Projects on the Statewide System Margin (For Information Only)

As an informational scenario, this STAR includes an evaluation of the impact of additional large load interconnection projects primarily in western and central New York on the statewide transmission security margin. This informational scenario provides the aggregate impact of these loads through the ten-year planning horizon. The additional large loads included in this assessment are the Micron New York semiconductor manufacturing (Q#1536), the Air Products and Chemicals (Q#1446), and other load changes not captured in this STAR but included in the 2023 Gold Book. The 2023 Quarter 3 STAR will include these load project and forecast changes.

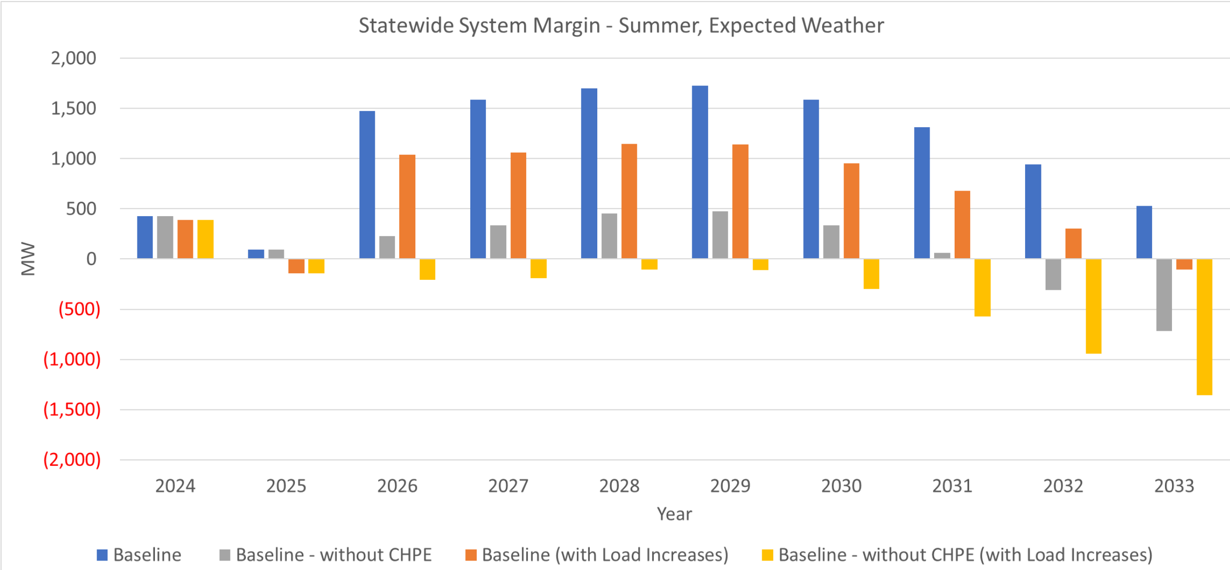
Figure 11: Large Load Scenario Forecast

Informational Scenario: Interconnecting Large Loads Forecast - Summer Peak Demand by Zone - MW

Year	A	B	C	D	E	F	G	H	I	J	K	NYCA
2023	95	0	0	166	0	0	0	0	0	0	0	261
2024	110	151	50	169	37	0	0	0	0	0	0	517
2025	130	175	240	169	50	0	0	0	0	0	0	764
2026	150	200	430	169	55	0	0	0	0	0	0	1,004
2027	170	200	480	213	55	0	0	0	0	0	0	1,118
2028	170	200	480	241	55	0	0	0	0	0	0	1,146
2029	170	200	480	269	55	0	0	0	0	0	0	1,174
2030	170	200	530	269	55	0	0	0	0	0	0	1,224
2031	170	200	530	269	55	0	0	0	0	0	0	1,224
2032	170	200	530	269	55	0	0	0	0	0	0	1,224
2033	170	200	530	269	55	0	0	0	0	0	0	1,224

The anticipated increases to the demand forecast reduce the available margins in all years. With the increased demand forecast in 2025, the statewide system margin is projected to be deficient by 145 MW. Based on the overall trend of the demand forecast, the margin again becomes sufficient in 2026 with the addition of CHPE and remaining sufficient through 2032. In 2033, the statewide system margin is deficient by 104 MW. With the additional load projects and without CHPE in-service in summer 2026, the statewide system margin is projected to be deficient for all years 2025 through 2033. The solution to the New York City transmission security reliability need identified in this STAR, depending on its specifics, may also address the statewide system margin concern.

Figure 12: Large Load Impact on Statewide System Margin



Conclusions

This assessment finds a reliability need beginning in summer 2025 in New York City primarily driven by a combination of forecasted increases in peak demand and the assumed unavailability of certain generation in New York City affected by the "Peaker Rule." The reliability need is a deficiency in the transmission security margin that accounts for expected generator availability, transmission limitations, and updated demand forecasts using data published in the 2023 Gold Book. Specifically, the New York City zone is deficient by as much as 446 MW for a duration of nine hours on the peak day during expected weather conditions (95 degrees Fahrenheit) when accounting for forecasted economic growth and policy-driven increases in demand. The deficiency would be significantly greater if New York City experiences a heatwave (98 degrees Fahrenheit) or an extreme heatwave (102 degrees Fahrenheit).

Overall, the New York City transmission security margin is expected to improve in 2026 if the CHPE connection from Hydro Quebec to New York City enters service on schedule in spring 2026, but the margin gradually erodes through time thereafter as expected demand for electricity grows. Beyond 2025, the forecasted reliability margins within New York City may not be sufficient if (i) the CHPE project experiences a significant delay, (ii) additional power plants become unavailable, or (iii) demand significantly exceeds current forecasts. Without the CHPE project in service or other offsetting changes or solutions, the reliability margins continue to be deficient for the ten-year planning horizon. In addition, while CHPE is expected to contribute to reliability in the summer, the facility is not expected to provide any capacity in the winter.

The informational scenario evaluation of demand forecasts demonstrates that NYCA statewide system margin would be deficient in year 2025 by nearly 150 MW with the inclusion of future large loads Micron New York semiconductor manufacturing (Q#1536), Air Products and Chemicals (Q#1446), and other load changes not captured in this STAR but that were included in the 2023 Gold Book. Based on the findings of the informational scenario in this STAR, it is anticipated that the 2023 Quarter 3 STAR will identify a statewide system margin deficiency in year 2025. However, this will be influenced by potential future generator projects that meet the Reliability Planning Process base case inclusion rules. Further, the solution adopted to resolve the need identified in this STAR, depending on its specifics, may address the statewide system margin deficiency as well.

Next Steps

The short-term need observed in 2025 is a Near-Term Reliability Need. Solutions to this need will be solicited, evaluated, and addressed in accordance with the NYISO Short-Term Reliability Process. The need arises within the Con Edison Transmission District; therefore, Con Edison is the Responsible Transmission Owner for a regulated solution.

Beginning in August 2023, the NYISO will solicit market-based solutions to the reliability need. Developers may offer supply or demand-side solutions, which may include generation, storage, and/or new participation in programs that act to reduce demand on the grid. Parties will have 60 days from the issuance of the NYISO's solicitation to propose solutions.

In October and November 2023, after the solicitation window has closed, the NYISO will evaluate the submitted proposals to determine if they are viable and sufficient. If proposed solutions are not viable or sufficient to meet the identified reliability need, interim solutions must be in place to keep the grid reliable. One potential outcome could include relying on generators that are subject to the DEC's Peaker Rule to remain in operation until a permanent solution is in place. The DEC's Peaker Rule anticipated this scenario when it authorized the NYISO to designate certain units to remain in operation beyond 2025 on an as-needed basis for reliability. Based on findings from its Short-Term Reliability Process, the NYISO may designate certain units, in sufficient quantity, to remain in operation for an additional two years (until May 1, 2027) with the potential of an additional two-year extension (to May 1 2029) if a permanent solution that is needed to maintain reliability has been selected but is not yet online. The NYISO would only temporarily retain peakers as a last-step approach if it does not expect solutions to be in place by the time the identified reliability need is expected in 2025.

Appendix A: List of Short-Term Reliability Needs

This assessment finds a reliability need beginning in summer 2025 within New York City primarily driven by a combination of forecasted increases in peak demand and the assumed unavailability of certain generation in New York City affected by the "Peaker Rule."[21]. Specifically, the New York City zone is deficient by as much as 446 MW for a duration of nine hours on the peak day during expected weather conditions when accounting for forecasted economic growth and policy-driven increases in demand. The reliability need is based on a deficient transmission security margin in the New York City locality that accounts for expected generator availability, transmission limitations, and updated demand forecasts using data published in the 2023 Load & Capacity Data Report ("Gold Book").

Appendix B: Short-Term Reliability Process Solution List

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

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

[21] In 2019, the New York State Department of Environmental Conservation adopted a regulation to limit nitrogen oxides (NOx) emissions from simple-cycle combustion turbines, referred to as the "Peaker Rule" (https://www.dec.ny.gov/regulations/116131.html)

Appendix C: Summary of Study Assumptions

This assessment used the major assumptions included in the 2022 RNA, with the key updates as noted below. Consistent with the NYISO's obligations under its tariffs, the NYISO provided information to stakeholders on the modeling assumptions employed in this assessment. Details regarding the study assumptions were reviewed with stakeholders at the April 25, 2023, joint Electric System Planning Working Group ("ESPWG")/Transmission Planning Advisory Subcommittee ("TPAS") meeting. The meeting materials are posted on the NYISO's website.[22] The figures below summarize the changes to generation, load, and transmission.

Generation Assumptions

Figure 13: Completed Generator Deactivations

Owner/ Operator	Plant Name	Zone	Nameplate (MW)	CRIS (MW)		Capability (MW)		Status	Deactivation Date (2)	STAR Evaluation (3)
				Summer	Winter	Summer	Winter			
International Paper Company	Ticonderoga (1)	F	9.0	7.6	7.5	9.5	9.8	I	5/1/2017	-
Helix Ravenswood, LLC	Ravenswood 2-4	J	42.9	39.8	50.6	30.7	41.6	I	4/1/2018	-
	Ravenswood 3-1	J	42.9	40.5	51.5	31.9	40.8	I	4/1/2018	-
	Ravenswood 3-2	J	42.9	38.1	48.5	29.4	40.3	I	4/1/2018	-
	Ravenswood 3-4	J	42.9	35.8	45.5	31.2	40.8	I	4/1/2018	-
Exelon Generation Company LLC	Monroe Livingston	B	2.4	2.4	2.4	2.4	2.4	R	9/1/2019	-
Innovative Energy Systems, Inc.	Steuben County LF	C	3.2	3.2	3.2	3.2	3.2	R	9/1/2019	-
Consolidated Edison Co. of NY, Inc	Hudson Ave 4	J	16.3	13.9	18.2	14.0	16.3	R	9/10/2019	-
New York State Elec. & Gas Corp.	Auburn - State St	C	7.4	5.8	6.2	4.1	7.3	R	10/1/2019	-
Somerset Operating Company, LLC	Somerset	A	655.1	686.5	686.5	676.4	684.4	R	3/12/2020	-
Entergy Nuclear Power Marketing, LLC	Indian Point 2	H	1,299.0	1,026.5	1,026.5	1,011.5	1,029.4	R	4/30/2020	-
Cayuga Operating Company, LLC	Cayuga 1	C	155.3	154.1	154.1	151.0	152.0	R	6/4/2020	-
Albany Energy, LLC	Albany LFGE	F	5.6	4.5	4.5	5.6	5.6	I	7/1/2020	2020 Q3
Entergy Nuclear Power Marketing, LLC	Indian Point 3	H	1,012.0	1,040.4	1,040.4	1,036.3	1,038.3	R	4/30/2021	-
Helix Ravenswood, LLC	Ravenswood GT 11	J	25.0	20.2	25.7	16.1	22.4	I	12/1/2021	2022 Q1
Helix Ravenswood, LLC	Ravenswood GT 1	J	18.6	8.8	11.5	7.7	11.1	I	1/1/2022	2022 Q1
Exelon Generation Company LLC	Madison County LF	E	1.6	1.6	1.6	1.6	1.6	I	4/1/2022	2022 Q2
Nassau Energy, LLC	Trigen CC	K	55.0	51.6	60.1	38.5	51.0	R	7/15/2022	2022 Q2
Consolidated Edison Co. of NY, Inc.	Hudson Ave 3	J	16.3	16.0	20.9	12.3	15.6	R	11/1/2022	2022 Q2
Consolidated Edison Co. of NY, Inc.	Hudson Ave 5	J	16.3	15.1	19.7	15.3	18.6	R	11/1/2022	2022 Q2
Astoria Generating Company, L.P.	Gowanus 1-1 through 1-8	J	160.0	138.7	181.1	133.1	182.2	R	11/1/2022	2022 Q2
Astoria Generating Company, L.P.	Gowanus 4-1 through 4-8	J	160.0	140.1	182.9	138.8	183.4	R	11/1/2022	2022 Q2
NRG Power Marketing LLC	Astoria GT 2-1	J	46.5	41.2	50.7	34.9	46.5	R	5/1/2023	2022 Q2
NRG Power Marketing LLC	Astoria GT 2-2	J	46.5	42.4	52.2	34.3	45.6	R	5/1/2023	2022 Q2
NRG Power Marketing LLC	Astoria GT 2-3	J	46.5	41.2	50.7	36.3	46.7	R	5/1/2023	2022 Q2
NRG Power Marketing LLC	Astoria GT 2-4	J	46.5	41.0	50.5	32.5	45.4	R	5/1/2023	2022 Q2
NRG Power Marketing LLC	Astoria GT 3-1	J	46.5	41.2	50.7	34.6	45.0	R	5/1/2023	2022 Q2
NRG Power Marketing LLC	Astoria GT 3-2	J	46.5	43.5	53.5	35.7	45.3	R	5/1/2023	2022 Q2
NRG Power Marketing LLC	Astoria GT 3-3	J	46.5	43.0	52.9	33.9	44.6	R	5/1/2023	2022 Q2
NRG Power Marketing LLC	Astoria GT 3-4	J	46.5	43.0	52.9	34.9	45.5	R	5/1/2023	2022 Q2
NRG Power Marketing LLC	Astoria GT 4-1	J	46.5	42.6	52.4	33.6	43.8	R	5/1/2023	2022 Q2
NRG Power Marketing LLC	Astoria GT 4-2	J	46.5	41.4	51.0	34.3	44.3	R	5/1/2023	2022 Q2
NRG Power Marketing LLC	Astoria GT 4-3	J	46.5	41.1	50.6	35.4	46.4	R	5/1/2023	2022 Q2
NRG Power Marketing LLC	Astoria GT 4-4	J	46.5	42.8	52.7	35.2	44.1	R	5/1/2023	2022 Q2
Helix Ravenswood, LLC	Ravenswood 10	J	25.0	21.2	27.0	16.1	20.3	R	5/1/2023	2022 Q3
		Total	4,372.7	4,016.8	4,296.9	3,832.3	4,161.6			

Notes
(1) Part of SCR program
(2) This table only includes units that have entered into IIFO or have completed the generator deactivation process.
(3) "-" denotes that the generator deactivation was assessed prior to the creation of the short-term reliability process

[22] https://www.nyiso.com/documents/20142/37171876/2023%20Q2%20STAR%20Key%20Study%20Assumptions%20vFinal.pdf/

Figure 14: Proposed Generator Deactivations

Owner/ Operator	Plant Name (1)	Zone	Nameplate (MW)	CRIS (MW)		Capability (MW)		Status	Deactivation date (2)	STAR Evaluation
				Summer	Winter	Summer	Winter			
Consolidated Edison Co. of NY, Inc.	74 St. GT 1 & 2	J	37	39.1	49.2	39.3	45.2	R	5/1/2023	2022 Q2
Eastern Generation, LLC	Astoria GT 01	J	16	15.7	20.5	13.6	19.0	R	5/1/2023	2022 Q4
		Total	53	54.8	69.7	52.9	64.2			

Notes
(1) This table includes units that have proposed to Retire or enter Mothball Outage and have a completed generator deactivation notice but have yet to complete
(2) Date in which the generator proposed Retire (R) or enter Mothball Outage (MO)

Figure 15: Generator Additions

NYISO Interconnection Queue #	Project Name/(Owner)	Zone	Point of Interconnection	Type	COD or I/S Date	Summer Peak MW	Notes
758	Independence GS1 to GS4 {Dynegy Marketing and Trade, LLC)	C	Scriba 345 kV	Gas	I/S	9.0	3
396	Baron Winds (Baron Winds, LLC)	C	Hillside - Meyer 230kV	W	I/S	238.4	2, 4
422	Eight Point Wind Energy Center (NextEra Energy Resources, LLC)	C	Bennett 115kV	W	I/S	101.8	2
775	Puckett Solar (Puckett Solar, LLC)	C	Chenango Forks Substation 34.5kV	S	I/S	20	1
731	Branscomb Solar (Branscomb Solar, LLC)	F	Battenkill - Eastover 115kV	S	I/S	20	1
748	Regan Solar (Regan Solar, LLC)	F	Market Hill - Johnstown 69kV	S	I/S	20	1
678	Calverton Solar Energy Center (LI Solar Generation, LLC)	K	Edwards Substation 138kV	S	I/S	22.9	2
769	North Country Energy Storage (New York Power Authority)	D	Willis 115kV	ES	I/S	20	
768	Janis Solar (Janis Solar LLC)	C	Willet 34.5kV	S	I/S	20	1
682	Grissom Solar (Grissom Solar, LLC)	F	Ephratah - Florida 115kV	S	I/S	20	1
531	Number 3 Wind Energy (Invenergy Wind Development LLC)	E	Taylorville - Boonville 115kV	W	I/S	103.9	2
759	KCE NY6	A	Gardenville - Bethlehem Steel Wind 115kV	ES	04/2022	20	1
670	Skyline Solar (SunEast Skyline Solar LLC)	E	Campus Rd - Clinton 46kV	S	04/2022	20	1
807	Hilltop Solar (SunEast Hilltop Solar LLC)	F	Eastover - Schaghticoke 115kV	S	07/2022	20	
734	Ticonderoga Solar (ELP Ticonderoga Solar LLC)	F	ELP Ticonderoga Solar LLC	S	08/2022	20	1
735	ELP Stillwater Solar (ELP Stillwater Solar LLC)	F	Luther Forest - Mohican 115kV	S	09/2022	20	
666	Martin Solar (Martin Solar LLC)	A	Arcade - Five Mile 115kV	S	10/2022	20	1
667	Bakerstand Solar (Bakerstand Solar LLC)	A	Machias - Maplehurst 34.5kV	S	10/2022	20	1

NYISO Interconnection Queue #	Project Name/(Owner)	Zone	Point of Interconnection	Type	COD or I/S Date	Summer Peak MW	Notes
579	Bluestone Wind (Bluestone Wind, LLC)	E	Afton - Stilesville 115kV	W	10/2022	111.8	2
565	Tayandenega Solar (Tayandenega Solar, LLC)	F	St. Johnsville - Inghams 115kV	S	10/2022	20	1
505	Ball Hill Wind (Ball Hill Wind Energy, LLC)	A	Dunkirk - Gardenville 230kV	W	11/2022	100.0	2
721	Excelsior Energy Center (Excelsior Energy Center, LLC)	B	N. Rochester - Niagara 345 kV	S	11/2022	280.0	2
618	High River Solar (High River Energy Center, LLC)	F	Inghams - Rotterdam 115kV	S	11/2022	90.0	2
619	East Point Solar (East Point Energy Center, LLC)	F	Cobleskill - Marshville 69kV	S	11/2022	50.0	2
564	Rock District Solar (Rock District Solar, LLC)	F	Sharon - Cobleskill 69kV	S	12/2022	20	1
570	Albany County 1 (Hecate Energy Albany 1 LLC)	F	Long Lane - Lafarge 115kV	S	12/2022	20	1
598	Albany County 2 (Hecate Energy Albany 2 LLC)	F	Long Lane - Lafarge 115kV	S	12/2022	20	1
638	Pattersonville (Pattersonville Solar Facility, LLC)	F	Rotterdam - Meco 115kV	S	12/2022	20	1
730	Darby Solar (Darby Solar, LLC)	F	Mohican - Schaghticoke 115kV	S	12/2022	20	1
572	Greene County 1 (Hecate Energy Greene 1 LLC)	G	Coxsackie - North Catskill 69kV	S	01/2023	20	1
573	Greene County 2 (Hecate Energy Greene 2 LLC)	G	Coxsackie Substation 13.8kV	S	03/2023	10	1
592	Niagara Solar (Duke Energy Renewables Solar, LLC)	B	Bennington 34.5kV Substation	S	05/2023	20	
584	Dog Corners Solar (SED NY Holdings LLC)	C	Aurora Substation 34.5kV	S	05/2023	20	1
590	Scipio Solar (Duke Energy Renewables Solar, LLC)	C	Scipio 34.5kV Substation	S	05/2023	18	
545	Sky High Solar (Sky High Solar, LLC)	C	Tilden -Tully Center 115kV	S	06/2023	20	1
586	Watkins Road Solar (SED NY Holdings LLC)	E	Watkins Rd - Ilion 115kV	S	06/2023	20	1
581	Hills Solar (SunEast Hills Solar LLC)	E	Fairfield - Inghams 115kV	S	08/2023	20	

NYISO Interconnection Queue #	Project Name/(Owner)	Zone	Point of Interconnection	Type	COD or I/S Date	Summer Peak MW	Notes
612	South Fork Wind Farm (South Fork Wind, LLC)	K	East Hampton 69kV	OSW	08/2023	96.0	2
695	South Fork Wind Farm II (South Fork Wind, LLC)	K	East Hampton 69kV	OSW	08/2023	40.0	2
637	Flint Mine Solar (Flint Mine Solar LLC)	G	LaFarge - Pleasant Valley 115kV, Feura Bush - North Catskill 115kV	S	09/2023	100.0	2
848	Fairway Solar (SunEast Fairway Solar LLC.)	E	McIntyre - Colton 115kV	S	10/2023	20	
617	Watkins Glen Solar Watkins Glen Energy Center, LLC	C	Bath - Montour Falls 115kV	S	11/2023	50.0	2
720	Trelina Solar Energy Center (Trelina Solar Energy Center, LLC)	C	Border City - Station 168 115 KV	S	11/2023	80.0	2
855	NY13 Solar (Bald Mountain Solar LLC)	F	Mohican - Schaghticoke 115kV	S	11/2023	20	
495	Mohawk Solar (Mohawk Solar LLC)	F	St. Johnsville - Marshville 115kV	W	11/2024	90.5	2

Notes

(1) Only these proposed small generators obtained Capacity Resource Interconnection Service (CRIS) and therefore are modeled for the resource adequacy Base Cases.

(2) All proposed large generators obtained or are assumed to obtain both Energy Resource Interconnection Service (ERIS) and CRIS and are modeled both in transmission security and resource adequacy Base Cases, unless otherwise noted as "ERIS only," in which case they are modeled only for the transmission security assessments.

(3) Large generator, ERIS only

(4) Only Part 1 of this generator is in service (119.2 MW). The remaining MW is planned to be in service by December 2023.

Demand Assumptions

The 2023 Quarter 2 STAR uses the baseline summer coincident peak demand forecasts for the study years consistent with the 2023 Gold Book with the following load projects in the NYISO interconnection queue: Q0580 – WNY STAMP, Q0776 – Greenidge Load, Q0849 – Somerset Load, Q0850 – Cayuga Load, and Q0979 – North Country Data Center (load increase). The large loads included in the 2023 Gold Book demand forecasts that were not included this assessment are the Micron New York semiconductor manufacturing (Q#1536), Air Products and Chemicals (Q#1446), and other large load changes not captured with a queue project.

Figure 16: Interconnecting Large Loads Forecast

Interconnecting Large Loads Forecast - Summer Peak Demand by Zone - MW

Year	A	B	C	D	E	F	G	H	I	J	K	NYCA
2023	95	0	0	166	0	0	0	0	0	0	0	261
2024	110	151	50	169	0	0	0	0	0	0	0	480
2025	130	175	50	169	0	0	0	0	0	0	0	524
2026	150	200	50	169	0	0	0	0	0	0	0	569
2027	170	200	50	169	0	0	0	0	0	0	0	589
2028	170	200	50	169	0	0	0	0	0	0	0	589
2029	170	200	50	169	0	0	0	0	0	0	0	589
2030	170	200	50	169	0	0	0	0	0	0	0	589
2031	170	200	50	169	0	0	0	0	0	0	0	589
2032	170	200	50	169	0	0	0	0	0	0	0	589
2033	170	200	50	169	0	0	0	0	0	0	0	589

Transmission Assumptions

The study assumptions for existing transmission facilities that are modeled as out-of-service are listed in Figure 17. Figure 18 shows the Con Edison series reactor status utilized in the 2022 RNA as well as for this STAR. There are no changes to the Con Edison series reactor assumptions in this STAR compared to the 2022 RNA. Figure 19 provides a summary of the Transmission Interconnection Procedures (TIP) projects and the Transmission Owner Local Transmission Plans (LTPs) as listed in the 2022 Gold Book that are included in the 2022 RNA, as well as this STAR.[23] Figure 20 provides additional updates to National Grid's LTP that were not included in the 2022 Gold Book. These LTP projects were presented to stakeholders at the March 24, 2022 joint ESPWG/TPAS meeting.[24] Figure 21 lists additional non-LTP projects that were not included in the 2022 Gold Book but were included in the 2022 RNA.

[23] While the 2023 Gold Book forecasts were able to be included in this assessment, updates to transmission plans documented in Section 7 of the 2023 Gold Book were not included. These are planned to be included beginning in the 2023 Quarter 3 STAR, consistent with the general timeframe for conducting STARs and publication of the annual Gold Book.

[24] https://www.nyiso.com/documents/20142/29418084/03%202022%20Q1STAR%20LTP%20Update%20Nat%20Grid.pdf/

Figure 17: Existing Transmission Facilities Modeled Out-of-Service

From	To	kV	ID	Out-of-Service Through	
				Prior STAR	Current STAR
Marion	Farragut	345	B3402	Long-Term	
Marion	Farragut	345	C3403	Long-Term	
Plattsburg (1)	Plattsburg	230/115	AT1	12/2022	4/2023
Moses	Moses	230/115	AT2	3/2023	5/2023
Moses	St. Lawrence	230	L34P	N/A	09/2023
Sprain Brook	East Garden City	345	Y49	10/1/2022 through 5/31/2023	
Stolle Rd	Stolle Rd	115	T11-52	N/A	12/2023
E. 13th Street	E. 13th Street	345/69	BK17	N/A	12/2023
Cobble NM	Cobble NY	115	BK1	N/A	12/2023
Elm	Elm	230/23	TR3	N/A	12/2023

Notes

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

Figure 18: Con Edison Proposed Series Reactor Status

Terminals		ID	kV	Prior to Summer 2023	Starting Summer 2023
Dunwoodie	Mott Haven	71	345	By-Passed	In-Service
Dunwoodie	Mott Haven	72	345	By-Passed	In-Service
Sprainbrook	W. 49th Street	M51	345	By-Passed	In-Service
Sprainbrook	W. 49th Street	M52	345	By-Passed	In-Service
Farragut	Gowanus	41	345	In-Service	By-Passed
Farragut	Gowanus	42	345	In-Service	By-Passed
Sprainbrook	East Garden City	Y49	345	In-Service	By-Passed

Figure 19: Firm Transmission Plans (from the 2022 Load and Capacity Data Report Section VII)

[Project Queue Position] / Project Notes	Transmission Owner	Terminals		Line Length in Miles (1)	Expected In-Service Date/Yr Prior to		Nominal Voltage in kV		# of ckts	Thermal Ratings		Project Description / Conductor Size	Class Year / Type of Construction
							Operating	Design		Summer	Winter		
TIP Projects (19) (included in FERC 715 Base Case)													
[430]	National Grid	Dennison	Alcoa	3	In service	2021	115	115	1	1513	1851	954 ACSR. Alcoa-Dennison Line #12.	OH
545A	NextEra Energy Transmission NY	Dysinger (New Station)	East Stolle (New Station)	20	S	2022	345	345	1	1356 MVA	1612 MVA	Western NY - Empire State Line Project	OH
545A	NextEra Energy Transmission NY	Dysinger (New Station)	Dysinger (New Station)	PAR	S	2022	345	345	1	700 MVA	700 MVA	Western NY - Empire State Line Project	
556	LSP/NGRID	Porter	Rotterdam	-71.8	S	2022	230	230	1	1066	1284	AC Transmission Project Segment A/1-795 ACSR/1-1431 ACSR/2-954 ACSS	
556	LSP/NGRID	Porter	Rotterdam	-72.1	S	2022	230	230	1	1066	1284	AC Transmission Project Segment A/1-795 ACSR/1-1431 ACSR/2-954 ACSS	
556	LSP/NGRID	Edic	New Scotland	-83.5	S	2022	345	345	1	2190	2718	AC Transmission Project Segment A/2-795 ACSR	
556	NGRID	Rotterdam	New Scotland	-18.1	S	2022	115	230	1	1212	1284	AC Transmission Project Segment A/1-1033.5 ACSR/1-1192.5 ACSR	
556	LSP/NGRID	Edic	Gordon Rd (New Station)	68.7	S	2022	345	345	1	3410	3709	AC Transmission Project Segment A/2-795 ACSR/2-954 ACSS	
556	LSP/NGRID	Gordon Rd (New Station)	New Scotland	24.9	S	2022	345	345	1	2190	2718	AC Transmission Project Segment A/2-795 ACSR/2-954 ACSS	
556	LSP	Gordon Rd (New Station)	Rotterdam	transformer	S	2022	345/230	345/230	2	478 MVA	478 MVA	AC Transmission Project Segment A	
556	LSP/NGRID	Gordon Rd (New Station)	New Scotland	-24.9	S	2023	345	345	1	2190	2718	AC Transmission Project Segment A/2-795 ACSR/2-954 ACSS	
556	LSP	Gordon Rd (New Station)	Princetown (New Station)	5.3	S	2023	345	345	1	3410	3709	AC Transmission Project Segment A/2-954 ACSS	
556	LSP	Princetown (New Station)	New Scotland	20.1	S	2023	345	345	2	3410	3709	AC Transmission Project Segment A/2-954 ACSS	
556	LSP/NGRID	Princetown (New Station)	New Scotland	19.8	S	2023	345	345	1	2190	2718	AC Transmission Project Segment A/2-795 ACSR	

[Project Queue Position] / Project Notes	Transmission Owner	Terminals		Line Length in Miles (1)	Expected In-Service Date/Yr Prior to		Nominal Voltage in kV		# of	Thermal Ratings		Project Description / Conductor Size	Class Year / Type of Construction
							Operating	Design	ckts	Summer	Winter		
556	LSP/NYPA/NGRID	Edic	Princetown (New Station)	67.0	W	2023	345	345	2	3410	3709	AC Transmission Project Segment A/2-954 ACSS	
556	NYPA	Edic	Marcy	1.4	W	2023	345	345	1	3150	3750	AC Transmission Project Segment A; Terminal Equipment Upgrades to existing line	
556	NGRID	Rotterdam	Rotterdam	remove substation	S	2029	230	230	N/A	N/A	N/A	Rotterdam 230kV Substation Retirement	
556	NGRID	Rotterdam	Eastover Rd	-23.8	S	2029	230	230	1	1114	1284	Rotterdam 230kV Substation Retirement, reconnect existing line	
556	LSP	Gordon Rd (New Station)	Rotterdam	remove transformer	S	2029	345/230	345/230	2	478 MVA	478 MVA	Rotterdam 230kV Substation Retirement	
556	NGRID	Gordon Rd (New Station)	Eastover Rd	23.8	S	2029	230	230	1	1114	1284	Rotterdam 230kV Substation Retirement; reconnect existing line	
556	LSP	Gordon Rd (New Station)	Gordon Rd (New Station)	transformer	S	2029	345/230	345/230	1	478 MVA	478 MVA	Rotterdam 230kV Substation Retirement, reconnect transformer to existing line	
556	LSP	Gordon Rd (New Station)	Rotterdam	transformer	S	2029	345/115	345/115	2	650 MVA	650 MVA	Rotterdam 230kV Substation Retirement	
543	NGRID	Greenbush	Hudson	-26.4	W	2023	115	115	1	648	800	AC Transmission Project Segment B	
543	NGRID	Hudson	Pleasant Valley	-39.2	W	2023	115	115	1	648	800	AC Transmission Project Segment B	
543	NGRID	Schodack	Churchtown	-26.7	W	2023	115	115	1	937	1141	AC Transmission Project Segment B	
543	NGRID	Churchtown	Pleasant Valley	-32.2	W	2023	115	115	1	806	978	AC Transmission Project Segment B	
543	NGRID	Milan	Pleasant Valley	-16.8	W	2023	115	115	1	806	978	AC Transmission Project Segment B	
543	NGRID	Lafarge	Pleasant Valley	-60.4	W	2023	115	115	1	584	708	AC Transmission Project Segment B	
543	NGRID	North Catskill	Milan	-23.9	W	2023	115	115	1	937	1141	AC Transmission Project Segment B	
543	O&R	Shoemaker, Middle	Sugarloaf, Chester	-12.0	W	2023	138	138	1	1098	1312	AC Transmission Project Segment B	
543	NGRID	New Scotland	Alps	-30.6	W	2023	345	765	1	2015	2140	AC Transmission Project Segment B	

[Project Queue Position] / Project Notes	Transmission Owner	Terminals		Line Length in Miles (1)	Expected In-Service Date/Yr Prior to		Nominal Voltage in kV		# of	Thermal Ratings		Project Description / Conductor Size	Class Year / Type of Constructio n
							Operating	Design	ckt s	Summer	Winter		
543	New York Transco	Hudson	Churchtown	7.4	W	2023	115	115	1	648	798	AC Transmission Project Segment B	
543	New York Transco	Churchtown	Pleasant Valley	32.2	W	2023	115	115	1	623	733	AC Transmission Project Segment B	
543	NGRID	Lafarge	Churchtown	28.2	W	2023	115	115	1	582	708	AC Transmission Project Segment B	
543	NGRID	North Catskill	Churchtown	8.4	W	2023	115	115	1	648	848	AC Transmission Project Segment B	
543	New York Transco	Knickerbocker (New Station)	Pleasant Valley	55.1	W	2023	345	345	1	3836	4097	AC Transmission Project Segment B	
543	New York Transco	Knickerbocker (New Station)	Knickerbocker (New Station)	series capacitor	W	2023	345	345	1	3836	4097	AC Transmission Project Segment B	
543	NGRID	Knickerbocker (New Station)	New Scotland	12.4	W	2023	345	345	1	2381	3099	AC Transmission Project Segment B	
543	NGRID	Knickerbocker (New Station)	Alps	18.1	W	2023	345	345	1	2552	3134	AC Transmission Project Segment B	
543	New York Transco	Rock Tavern	Sugarloaf	12.0	W	2023	115	115	1	1647	2018	AC Transmission Project Segment B; 1-1590 ACSR	OH
543	New York Transco	Sugarloaf	Sugarloaf	Transformer	W	2023	138/115	138/115	---	1652	1652	AC Transmission Project Segment B	
543	New York Transco	Van Wagner (New Station)	---	Cap Bank	W	2023	345	345	---	N/A	N/A	AC Transmission Project Segment B	
543	NGRID	Athens	Pleasant Valley	-39.39	W	2023	345	345	1	2228	2718	Loop Line into new Van Wagner Substation/2-795 ACSR	OH
543	NGRID	Leeds	Pleasant Valley	-39.34	W	2023	345	345	1	2228	2718	Loop Line into new Van Wagner Substation/2-795 ACSR	OH
543	NGRID	Athens	Van Wagner (New Station)	38.65	W	2023	345	345	1	2228	2718	Loop Line into new Van Wagner Substation/2-795 ACSR	OH
543	NGRID	Leeds	Van Wagner (New Station)	38.63	W	2023	345	345	1	2228	2718	Loop Line into new Van Wagner Substation/2-795 ACSR	OH
543	New York Transco	Van Wagner (New Station)	Pleasant Valley	0.71	W	2023	345	345	1	3861	4087	Loop Line into new Van Wagner Substation/Reconducto r w/2-795 ACSS	OH
543	New York Transco	Van Wagner (New Station)	Pleasant Valley	0.71	W	2023	345	345	1	3861	4087	Loop Line into new Van Wagner	OH

[Project Queue Position] / Project Notes	Transmission Owner	Terminals		Line Length in Miles (1)	Expected In-Service Date/Yr Prior to		Nominal Voltage in kV		# of ckts	Thermal Ratings		Project Description / Conductor Size	Class Year / Type of Construction
							Operating	Design		Summer	Winter		
												Substation/Reconductor w/2-795 ACSS	
543	New York Transco	Dover (New Station)	Dover (New Station)	Phase Shifter	W	2023	345	345	---	2510	2510	Loop Line 398 into new substation and install 2 x 750 MVAr PARs	---
543	ConEd	Cricket Valley	CT State Line	-3.46	W	2023	345	345	1	2220	2700	Loop Line into new Dover Substation/2-795 ACSS	OH
543	ConEd	Cricket Valley	Dover (New Station)	0.30	W	2023	345	345	1	2220	2700	Loop Line into new Dover Substation/2-795 ACSS	OH
543	ConEd	Dover (New Station)	CT State Line	3.13	W	2023	345	345	1	2220	2700	Loop Line into new Dover Substation/2-795 ACSS	OH
1125	NYPA	Edic	Marcy	1.4	W	2025	345	345	1	4030	4880	SPCP Terminal Equipment Upgrades to existing line	
1125	NYPA	Moses	Haverstock	2	W	2025	230	230	3	1089	1330	SPCP: Existing Moses - Adirondack (MA1), Moses - Adirondack (MA2), and Moses - Willis (MW2) 230 kV Lines to Haverstock Substation. 1 – 795 kcmil ACSR 26/7 "Drake"	
1125	NYPA	Moses	Moses	SUB	W	2025	230	230	N/A	N/A	N/A	SPCP: Terminal Upgrades at Moses 230 kV Substation and Transformer T3 and MW-2 breaker positions interchanged	
1125	NYPA	Haverstock 230 kV	Haverstock 345 kV	xfmr	W	2025	230/345	230/345	3	753	753	SPCP: Haverstock 230/345 kV xfmr-1, xfmr-2 and xfmr-3. Given Amp Ratings are for High Voltage side of xfmr.	
1125	NYPA	Haverstock	Haverstock	SUB	W	2025	345	345	N/A	N/A	N/A	SPCP: Haverstock 345 kV Substation. New Shunt Capacitor Banks.	

[Project Queue Position] / Project Notes	Transmission Owner	Terminals		Line Length in Miles (1)	Expected In-Service Date/Yr Prior to		Nominal Voltage in kV		# of ckts	Thermal Ratings		Project Description / Conductor Size	Class Year / Type of Construction
							Operating	Design		Summer	Winter		
1125	NYPA	Haverstock	Adirondack	83.7	W	2025	345	345	2	2177	2663	SPCP: Existing Moses - Adirondack (MA1), Moses - Adirondack (MA2) 230kV lines to Haverstock Substation. Creating new Haverstock to Adirondack (HA1) and Haverstock to Adirondack (HA2) 345kV lines. 2 – 795 kcmil ACSR 26/7 “Drake”	
1125	NYPA	Adirondack 115 kV	Adirondack 345 kV	xfmr	W	2025	115/345	115/345	1	192	221	SPCP: Adirondack 115/345 kV xfmr. Given Amp Ratings are for High Voltage side of xfmr.	
1125	NYPA	Adirondack	Adirondack	SUB	W	2025	345	345	N/A	N/A	N/A	SPCP: Adirondack 345 kV Substation. New Shunt Capacitor Banks. New Shunt Reactor Banks.	
1125	NYPA	Haverstock	Willis	34.99	W	2025	345	345	2	3119	3660	SPCP: Existing Moses - Willis (MW1) and Moses - Willis (MW2) 230 kV Lines diverted to Haverstock Substation. Creating Haverstock - Willis (HW1) and Haverstock - Willis (HW1) 345 kV Lines. 2 – 795 kcmil ACSS 26/7 “Drake”	
1125	NYPA	Willis 345 kV	Willis 230 kV	xfmr	W	2025	345/230	345/230	2	2259	2259	SPCP: Willis 345/230 kV xfmr-1 and xfmr-2. Given Amp Ratings are for High Voltage side.	
1125	NYPA	Willis	Willis	SUB	W	2025	230	230	N/A	N/A	N/A	SPCP: New Willis 345 kV Substation. New Shunt Capacitor Bank.	

[Project Queue Position] / Project Notes	Transmission Owner	Terminals		Line Length in Miles (1)	Expected In-Service Date/Yr Prior to		Nominal Voltage in kV		# of	Thermal Ratings		Project Description / Conductor Size	Class Year / Type of Constructio n
							Operating	Design	ckt s	Summer	Winter		
1125	NYPA	Willis	Patnode	8.65	W	2025	230	230	2	2078	2440	SPCP: Two Willis - Patnode 230 kV Lines. 1 – 1272 kcmil ACSS 45/7 "Bittern"	
1125	NYPA	Willis	Ryan	6.59	W	2025	230	230	2	2078	2440	SPCP: Two Willis - Ryan 230 kV Lines. 1 – 1272 kcmil ACSS 45/7 "Bittern"	
1125	NYPA	Ryan	Ryan	SUB	W	2025	230	230	N/A	N/A	N/A	SPCP: Terminal Upgrades at Ryan 230 kV Substation.	
1125	NYPA	Patnode	Patnode	SUB	W	2025	230	230	N/A	N/A	N/A	SPCP: Terminal Upgrades at Patnode 230 kV Substation.	
1125	NYPA	Willis (Existing)	Willis (New)	0.4	W	2025	230	230	2	2078	2440	SPCP: Two Willis (existing) - Willis (New) 230 kV Lines. 1 – 1272 kcmil ACSS 45/7 "Bittern"	
1125	NYPA/NGRID	Adirondack	Austin Road	11.6	W	2025	345	345	1	3119	3660	SPCP: Adirondack - Austin Road Circuit-1 345 kV Line. 2 – 795 kcmil ACSS 26/7 "Drake"	
1125	NYPA/NGRID	Adirondack	Marcy	52.6	W	2025	345	345	1	3119	3660	SPCP: Adirondack - Marcy Circuit-1 345 kV Line. 2 – 795 kcmil ACSS 26/7 "Drake"	
1125	NGRID	Austin Road	Edic	42.5	W	2025	345	345	1	3119	3660	SPCP: Austin Road -Edic Circuit-1 345 kV Line. 2 – 795 kcmil ACSS 26/7 "Drake"	
1125	NGRID	Rector Road	Austin Road	1	W	2025	230	230	1	1089	1330	SPCP: Rector Road - Austin Road Circuit-1 230 kV Line. 1 – 795 kcmil ACSR 26/7 "Drake"	
1125	NGRID	Austin Road 230 kV	Austin Road 345 kV	Transformer	W	2025	230/345	230/345	1	753	753	SPCP: Austin Road 230/345 kV xfmr. Given Amp Ratings are for	

[Project Queue Position] / Project Notes	Transmission Owner	Terminals		Line Length in Miles (1)	Expected In-Service Date/Yr Prior to		Nominal Voltage in kV		# of ckts	Thermal Ratings		Project Description / Conductor Size	Class Year / Type of Construction
							Operating	Design	ckts	Summer	Winter		
												High Voltage side of xfmr.	
1125	NGRID	Austin Road	Austin Road	Substation	W	2025	345	345	N/A	N/A	N/A	SPCP: Austin Road 345 kV Substation.	
1125	NGRID	Edic	Edic	Substation	W	2025	345	345	N/A	N/A	N/A	SPCP: Terminal Upgrades at Edic 345 kV Substation. New Shunt Capacitor Bank.	
1125	NGRID	Edic 345kV	Edic 230kV	Transformer	W	2025	345/230	345/230	1	N/A	N/A	SCSP: Remove Existing Transformer #2 345/230kV	
1125	NYPA	Marcy	Marcy	SUB	W	2025	345	345	N/A	N/A	N/A	SPCP: Terminal Upgrades at Marcy 345 kV Substation.	
1125	NGRID	Chases Lake	Chases Lake	Substation	W	2025	230	230	N/A	N/A	N/A	SPCP: Retire 230kV Substation.	
1125	NYPA	Moses	Massena	Series Reactor	W	2025	230	230	2	3840	4560	SPCP: Install Series Reactors on Moses - Massena 230 kV Lines	
1125	NYPA	Moses	Adirondack	-85.7	W	2025	230	230	2	N/A	N/A	SPCP: Retire Existing Moses - Adirondack MA1 and MA2 230 kV Lines	
1125	NYPA	Moses	Willis	-36.99	W	2025	230	230	2	N/A	N/A	SPCP: Retire Existing Moses - Willis MW1 and MW2 230 kV Line	
1125	NGRID	Adirondack	Porter	-54.41	W	2025	230	230	1	N/A	N/A	SPCP: Retire Existing Adirondack - Porter 230 kV Line	
1125	NGRID	Adirondack	Chases Lake	-11.05	W	2025	230	230	1	N/A	N/A	SPCP: Retire Existing Adirondack - Chases Lake 230 kV Line	
1125	NGRID	Chases Lake	Porter	-43.46	W	2025	230	230	1	N/A	N/A	SPCP: Retire Existing Chases Lake - Porter 230 kV Line	
1125	NYPA	Willis	Patnode	-8.65	W	2025	230	230	1	N/A	N/A	SPCP: Retire Existing Willis - Patnode WPN1 230 kV Line.	
1125	NYPA	Willis	Ryan	-6.59	W	2025	230	230	1	N/A	N/A	SPCP: Retire Existing Willis - Ryan WRY2 230 kV Line.	

[Project Queue Position] / Project Notes	Transmission Owner	Terminals		Line Length in Miles (1)	Expected In-Service Date/Yr Prior to		Nominal Voltage in kV		# of ckts	Thermal Ratings		Project Description / Conductor Size	Class Year / Type of Construction
							Operating	Design		Summer	Winter		
1125	NGRID	Edic	Porter	-0.39	W	2025	230	230	1	N/A	N/A	SPCP: Retire Existing Edic-Porter #17 230kV Line	
1125	NGRID	Porter	Porter	Transformers	W	2025	230/115	230/115	2	N/A	N/A	SCSP: Remove Existing Transformers #1&2 230kV/115kV	
1125	NGRID	Porter	Porter	Substation	W	2025	230	230	N/A	N/A	N/A	SPCP: Retire Porter 230kV substation	
Firm Plans (5) (included in FERC 715 Base Case)													
3	CHGE	North Catskill	North Catskill	xfmr	In-Service	2021	115/69	115/69	1	560	726	Replace Transformer 5	-
14	CHGE	Hurley Avenue	Leeds	Static synchronous series compensator	W	2022	345	345	1	2336	2866	21% Compensation	-
	CHGE	Rock Tavern	Sugarloaf	12.10	W	2023	115	115	1	N/A	N/A	Retire SL Line	OH
	CHGE	Kerhonkson	Kerhonkson	xfmr	W	2023	115/69	115/69	1	564	728	Add Transformer 3	-
	CHGE	Kerhonkson	Kerhonkson	xfmr	W	2023	115/69	115/69	1	564	728	Add Transformer 4	-
	CHGE	Sugarloaf	NY/NJ State Line	10.30	W	2024	115	115	2	N/A	N/A	Retire SD/SJ Lines	OH
11	CHGE	St. Pool	High Falls	5.69	W	2024	115	115	1	1010	1245	1-795 ACSR	OH
11	CHGE	High Falls	Kerhonkson	10.03	W	2024	115	115	1	1010	1245	1-795 ACSR	OH
11	CHGE	Modena	Galeville	4.62	W	2024	115	115	1	1010	1245	1-795 ACSR	OH
11	CHGE	Galeville	Kerhonkson	8.96	W	2024	115	115	1	1010	1245	1-795 ACSR	OH
11	CHGE	Hurley Ave	Saugerties	11.50	W	2025	69	115	1	1114	1359	1-795 ACSR	OH
11	CHGE	Saugerties	North Catskill	12.46	W	2024	69	115	1	1114	1359	1-795 ACSR	OH
6	CHGE	Knapps Corners	Spackenkill	2.36	W	2024	115	115	1	1280	1563	1-1033 ACSR	OH
	ConEd	Hudson Ave East	New Vinegar Hill Distribution	xfmrs/PARs/Feeders	S	2022	138/27	138/27		N/A	N/A	New Vinegar Hill Distribution Switching Station	UG

[Project Queue Position] / Project Notes	Transmission Owner	Terminals		Line Length in Miles (1)	Expected In-Service Date/Yr Prior to		Nominal Voltage in kV		# of	Thermal Ratings		Project Description / Conductor Size	Class Year / Type of Constructio n
							Operating	Design	ckt s	Summer	Winter		
			Switching Station										
	ConEd	Rainey	Rainey	xfmr	S	2023	345	345		N/A	N/A	Replacing xfmr 3W	-
	ConEd	Rainey	Corona	xfmr/PAR/Feeder	S	2023	345/138	345/138		N/A	N/A	New second PAR regulated feeder	UG
	ConEd	Gowanus	Greenwood	xfmr/PAR/Feeder	S	2025	345/138	345/138		N/A	N/A	New PAR regulated feeder	UG
	ConEd	Goethals	Fox Hills	xfmr/PAR/Feeder	S	2025	345/138	345/138		N/A	N/A	New PAR regulated feeder	UG
	ConEd	Buchanan North	Buchanan North	Reconfiguration	S	2025	345	345		N/A	N/A	Reconfiguration (bus work related to decommissioning of Indian Point 2)	-
	ConEd	Mott Haven	Parkview	-	S	2026	345/138/1 3	345/138/13		N/A	N/A	Spare 345/138 kV xfmr at Mott Haven and a spare 138/13.8 kV xfmr at Parkview	UG
6/7/3	LIPA	Amagansett	Montauk	-13.00	In-Service	2021	23	23	1	577	657	750 kcmil CU	UG
6/7/3	LIPA	Amagansett	Navy Road	12.74	In-Service	2021	23	23	1	577	657	750 kcmil CU	UG
6/7/3	LIPA	Navy Road	Montauk	0.26	In-Service	2021	23	23	1	577	657	750 kcmil CU	UG
9/3	LIPA	Riverhead	Wildwood	10.63	In-Service	2021	138	138	1	1355	1436	1192ACSR	
13/3	LIPA	Riverhead	Canal	15.89	In-Service	2021	138	138	1	945	945	2368 KCMIL (1200 mm^2) Copper XLPE	
3	LIPA	Barrett	Barrett	-	In-Service	2021	34.5	34.5	1	N/A	N/A	Barrett 34.5kV Bus Tie Reconfiguration	-
	LIPA	Round Swamp	Round Swamp	-	S	2022	69	69		N/A	N/A	New Round Swamp Road substation	
	LIPA	Round Swamp	Plainview	1.93	S	2022	69	69	1	1217	1217	2500kcmil XLPE	UG
	LIPA	Round Swamp	Ruland Rd	3.81	S	2022	69	69	1	1217	1217	2500kcmil XLPE	UG
3	NGRID	Oswego	Oswego	-	In-Service	2020	115	115		N/A	N/A	Rebuild of Oswego 115kV Station	
6/3	NGRID	Clay	Dewitt	10.24	In-Service	2021	115	115	1	220MVA	268MVA	Reconductor 4/0 CU to 795ACSR	OH

[Project Queue Position] / Project Notes	Transmission Owner	Terminals		Line Length in Miles (1)	Expected In-Service Date/Yr Prior to		Nominal Voltage in kV		# of	Thermal Ratings		Project Description / Conductor Size	Class Year / Type of Constructio n
							Operating	Design	ckt s	Summer	Winter		
6/3	NGRID	Clay	Teall	12.75	In-Service	2021	115	115	1	220 MVA	268MVA	Reconductor 4/0 CU to 795ACSR	OH
3	NGRID	Gardenville 230kV	Gardenville 115kV	xfmr	In-Service	2021	230/115	230/115	-	347 MVA	422 MVA	Replacement of 230/115kV TB#3 stepdown with larger unit	
3	NGRID	Huntley 115kV	Huntley 115kV	-	In-Service	2021	115	115	-	N/A	N/A	Rebuild of Huntley 115kV Station	
3	NGRID	Mortimer	Mortimer	xfmr	In-Service	2021	115	115		50MVA	50MVA	Replace Mortimer 115/69kV Transformer	
3	NGRID	Royal Ave	Royal Ave	-	In-Service	2021	115/13.2	115/13.2	-	-	-	Install new 115-13.2 kV distribution substation in Niagara Falls (Royal Ave)	-
3	NGRID	Niagara	Packard	3.4	In-Service	2021	115	115	1	344MVA	449MVA	Replace 3.4 miles of 192 line	OH
	NGRID	Volney	Clay	-	S	2022	115	115	1	1200 MVA	1474 MVA	Replace Terminal Equipment Line #6	OH
	NGRID	Mountain	Lockport	0.08	S	2022	115	115	2	174MVA	199MVA	Mountain-Lockport 103/104 Bypass	OH
	NGRID	South Oswego	Indeck (#6)	-	S	2022	115	115	1	-	-	Install High Speed Clearing on Line #6	
	NGRID	Porter	Porter	-	S	2022	230	230		N/A	N/A	Porter 230kV upgrades	
	NGRID	Watertown	Watertown		S	2022	115	115		N/A	N/A	New Distribution Station at Watertown	
	NGRID	Golah	Golah	xfmr	S	2022	69	69		50MVA	50MVA	Replace Golah 69/34.5kV Transformer	
	NGRID	Niagara	Packard	3.7	S	2022	115	115	1	344MVA	449MVA	Replace 3.7 miles of 191 line	OH
	NGRID	Wolf Rd	Menands	1.34	S	2022	115	115	1	182 MVA	222 MVA	Reconductor 1.34 miles betw Wolf Rd- Everett tap (per EHI)	OH
	NGRID	Volney	Clay	-	S	2022	115	115	1	1200 MVA	1474 MVA	Replace Terminal Equipment Line #6	OH
	NGRID	Dunkirk	Dunkirk	-	S	2022	115	115	-	-	-	Rebuild Dunkirk Station/ Asset Separation.	
	NGRID	Lockport	Mortimer	56.5	W	2022	115	115	3	-	-	Replace Cables Lockport-Mortimer #111, 113, 114	

[Project Queue Position] / Project Notes	Transmission Owner	Terminals		Line Length in Miles (1)	Expected In-Service Date/Yr Prior to		Nominal Voltage in kV		# of	Thermal Ratings		Project Description / Conductor Size	Class Year / Type of Construction
							Operating	Design	ckts	Summer	Winter		
6	NGRID	Niagara	Packard	3.7	W	2022	115	115	2	344MVA	449MVA	Replace 3.7 miles of 193 and 194 lines	OH
	NGRID	Gardenville	Big Tree	6.3	W	2022	115	115	1	221MVA	221MVA	Gardenville-Arcade #151 Loop-in-and-out of NYSEG Big Tree	OH
	NGRID	Big Tree	Arcade	28.6	W	2022	115	115	1	129MVA	156MVA	Gardenville-Arcade #151 Loop-in-and-out of NYSEG Big Tree	OH
	NGRID	Seneca	Seneca	xfmr	W	2022	115/22	115/22		40MVA	40MVA	Seneca #5 xfmr asset replacement	
	NGRID	Batavia	Batavia		W	2022	115	115				Batavia replace five OCB's	
	NGRID	Kensington Terminal	Kensington Terminal	-	W	2022	115/23	115/23	-	50MVA	50MVA	Replace TR4 and TR5	
	NGRID	Taylorville	Boonville	-	W	2022	115	115	1	584	708	Replace Station connections	
	NGRID	Taylorville	Boonville	-	W	2022	115	115	1	584	708	Replace Station connections	
	NGRID	Taylorville	Browns Falls	-	W	2022	115	115	1	569	708	Replace Station connections	
	NGRID	Taylorville	Browns Falls	-	W	2022	115	115	1	584	702	Replace Station connections	
	NGRID	Batavia	Batavia		W	2022	115	115				Batavia replace five OCB's.	
	NGRID	Albany Steam	Albany Steam	-	W	2022	115	115				Replace NG's 115kV Breakers.	
	NGRID	Mountain	Lockport		S	2023	115	115	2	847	1000	Reinsulating Mountain-Lockport 103/104	
	NGRID	Maplewood	Menands	3	S	2023	115	115	1	220 MVA	239 MVA	Reconductor approx 3 miles of 115kV Maplewood – Menands #19	
	NGRID	Maplewood	Reynolds	3	S	2023	115	115	1	217 MVA	265 MVA	Reconductor approx 3 miles of 115kV Maplewood – Reynolds Road #31	
	NGRID	Elm St	Elm St	-	S	2023	230/23	230/23	-	118MVA	133MVA	Replace TR2 as failure	
	NGRID	Ridge	Ridge		S	2023				N/A	N/A	Ridge substation 34.5kV rebuild	

[Project Queue Position] / Project Notes	Transmission Owner	Terminals		Line Length in Miles (1)	Expected In-Service Date/Yr Prior to		Nominal Voltage in kV		# of ckts	Thermal Ratings		Project Description / Conductor Size	Class Year / Type of Construction
							Operating	Design		Summer	Winter		
	NGRID	Colton	Browns Falls	-	S	2023	115	115	1	629	764	Flat Rock station (mid-line) upgrades	
	NGRID	Mountain	Lockport		S	2023	115	115	2	847	1000	Reinsulating Mountain-Lockport 103/104. .	
	NGRID	Clay	Woodard		W	2023	115	115	1			Add 10.5mH reactor on line #17.	OH
	NGRID/NYSEG	Mortimer	Station 56		W	2023	115	115	1	649	788	Mortimer-Pannell #24 Loop in-and-out of NYSEG's Station 56	
	NGRID	Clay	Woodard		W	2023	115	115	1			Add 10.5mH reactor on line #17.	OH
	NGRID	Cortland	Clarks Corners	0.2	S	2024	115	115	1	147MVA	170MVA	Replace 0.2 miles of 1(716) line and series equipment	OH
	NGRID	Homer Hill	Homer Hill	-	S	2024	115	115	-	116MVA	141MVA	Homer Hill Replace five OCB	
	NGRID	Packard	Huntley	9.1	W	2024	115	115	1	262MVA	275MVA	Walck-Huntley #133, Packard-Huntley #130 Reconductor	OH
	NGRID	Walck	Huntley	9.1	W	2024	115	115	1	262MVA	275MVA	Walck-Huntley #133, Packard-Huntley #130 Reconductor	OH
	NGRID	Station 56	Pannell		W	2024	115	115	1	649	788	Mortimer-Pannell #24 Loop in-and-out of NYSEG's Station 56	
	NGRID	Clay	Wetzel	3.7	W	2024	115	115	1	220 MVA	220 MVA	Add a breaker at Clay and build approximately 2000 feet of 115kV to create radial line	
	NGRID	Golah	Golah		S	2025				N/A	N/A	Golah substation rebuild	
	NGRID	Malone	Malone	-	S	2025	115	115	-	753	753	Install PAR on Malone - Willis line 1-910	
	NGRID	Oswego	Oswego	-	S	2026	345	345		N/A	N/A	Rebuild of Oswego 345kV Station (asset separation).	
6	NGRID	Gardenville	Dunkirk	20.5	S	2026	115	115	2	1105	1346	Replace 20.5 miles of 141 and 142 lines	OH
	NGRID	Niagara	Gardenville	26.3	S	2026	115	115	1	275MVA	350MVA	Packard-Erie / Niagara-Gardenville Reconfiguration	OH

[Project Queue Position] / Project Notes	Transmission Owner	Terminals		Line Length in Miles (1)	Expected In-Service Date/Yr Prior to		Nominal Voltage in kV		# of	Thermal Ratings		Project Description / Conductor Size	Class Year / Type of Construction
							Operating	Design	ckts	Summer	Winter		
	NGRID	Packard	Gardenville	28.2	S	2026	115	115	2	168MVA	211 MVA	Packard-Gardenville Reactors, Packard-Erie / Niagara-Gardenville Reconfiguration	OH
	NGRID/NYSEG	Erie St	Gardenville	5.5	S	2026	115	115	1	139MVA	179MVA	Packard-Erie / Niagara-Gardenville Reconfiguration, Gardenville add breakers	OH
	NGRID	Lockport	Batavia	20	S	2026	115	115	1	646	784	Rebuild 20 miles of Lockport-Batavia 112	
	NGRID	Packard	Packard		S	2026	115	115				Packard replace three OCB's	
	NGRID	Oswego	Oswego	-	S	2026	345	345		N/A	N/A	Rebuild of Oswego 345kV Station (asset separation).	
	NGRID	Rotterdam	Rotterdam	-	S	2026	115/69	115/69	-	67	76	Rebuild Rotterdam 69kV substation and add a 2nd 115/69kV Transformer	-
	NGRID	Rotterdam	Schoharie	0.93	S	2026	69	115	1	77	93	Rebuild 0.93mi double circuit Rotterdam-Schoharie / Schenectady International-Rotterdam	OH
	NGRID	Schenectady International	Rotterdam	0.93	S	2026	69	115	1	69	84	Rebuild 0.93mi double circuit Rotterdam-Schoharie / Schenectady International-Rotterdam	OH
	NGRID	Tar Hill	Tar Hill		S	2026	115	115				New station to replace Lighthouse Hill.	
	NGRID	Inghams	Inghams	-	S	2026	115	115				Rebuild Inghams station, including rebuilding the PAR	
	NGRID	Huntley	Lockport	1.2	W	2026	115	115	2	747	934	Rebuild 1.2 miles of (2) single circuit taps on Huntley-Lockport 36/37 at Ayer Rd	

[Project Queue Position] / Project Notes	Transmission Owner	Terminals		Line Length in Miles (1)	Expected In-Service Date/Yr Prior to		Nominal Voltage in kV		# of	Thermal Ratings		Project Description / Conductor Size	Class Year / Type of Construction
							Operating	Design	ckts	Summer	Winter		
	NGRID	Oneida	Oneida	-	W	2026	115	115				115kV Oneida Station Rebuild & add Cap bank.	
	NGRID	Brockport	Brockport	3.5	S	2027	115	115	2	648	650	Refurbish 111/113 3.5 mile single circuit taps to Brockport Station.	
	NGRID	Brockport	Brockport	3.5	S	2027	115	115	2	648	650	Refurbish 111/113 3.5 mile single circuit taps to Brockport Station.	
	NGRID	Pannell	Geneva		W	2027	115	115	2	755	940	Critical Road crossings replace on Pannell-Geneva 4/4A	
	NGRID	Mortimer	Golah	9.7	W	2027	115	115	1	657	797	Refurbish 9.7 miles Single Circuit Wood H-Frames on Mortimer-Golah 110	
	NGRID	Lockport	Lockport		W	2027				N/A	N/A	Rebuild of Lockport Substation and control house	
	NGRID	Pannell	Geneva		W	2027	115	115	2	755	940	Critical Road crossings replace on Pannell-Geneva 4/4A.	
	NGRID	Mortimer	Golah	9.7	W	2027	115	115	1	657	797	Refurbish 9.7 miles Single Circuit Wood H-Frames on Mortimer-Golah 110.	
	NGRID	Mortimer	Mortimer	-	W	2027	115	115		N/A	N/A	Second 115kV Bus Tie Breaker at Mortimer Station	
	NGRID	Mortimer	Pannell	15.7	S	2028	115	115	2	221MVA	270MVA	Reconductor existing Mortimer – Pannell 24 and 25 lines with 795 ACSR	
	NGRID	SE Batavia	Golah	27.8	W	2028	115	115	1	648	846	Refurbish 27.8 miles Single Circuit Wood H-Frames on SE Batavia-Golah 119	
	NGRID	SE Batavia	Golah	27.8	W	2028	115	115	1	648	846	Refurbish 27.8 miles Single Circuit Wood H-Frames on SE Batavia-Golah 119.	

[Project Queue Position] / Project Notes	Transmission Owner	Terminals		Line Length in Miles (1)	Expected In-Service Date/Yr Prior to		Nominal Voltage in kV		# of	Thermal Ratings		Project Description / Conductor Size	Class Year / Type of Construction
							Operating	Design	ckts	Summer	Winter		
	NGRID	Gardenville	Homer Hill	37.5	S	2031	115	115	2	649	788	Refurbish 37.5 miles double circuit Gardenville-Homer Hill 151/152l	
	NGRID	Gardenville	Homer Hill	37.5	S	2031	115	115	2	649	788	Refurbish 37.5 miles double circuit Gardenville-Homer Hill 151/152l	
	NGRID	Huntley	Gardenville	23.4	W	2031	115	115	2	731	887	Refurbish 23.4 miles double circuit on Huntley-Gardenville 38/39.	
	NGRID	Huntley	Gardenville	23.4	W	2031	115	115	2	731	887	Refurbish 23.4 miles double circuit on Huntley-Gardenville 38/39.	
3	NYPA	East Garden City	East Garden City	Shunt Reactor	In-Service	2021	345	345	1	N/A	N/A	Swap with the spare unit	
580	NYPA/NGRID	STAMP	STAMP	Substation	W	2023	345/115	345/115		500 MVA	500 MVA	Load Interconnection.	
566/6	NYPA	Moses	Adirondack	78	S	2023	230	345	2	1088	1329	Replace 78 miles of both Moses-Adirondack 1&2	
	NYPA	Moses	Moses	Circuit Breakers Replacements	W	2025	115/230	115/230		N/A	N/A	St. Lawrence Breaker Replacement 115 and 230 kV	
3	NYSEG	Willet	Willet	xfmr	In-Service	2021	115/34.5	115/34.5	1	39 MVA	44 MVA	Transformer #2	-
	NYSEG	Big Tree Road	Big Tree Road	Rebuild	W	2022	115	115				Station Rebuild	
	NYSEG	Wood Street	Wood Street	xfmr	W	2022	345/115	345/115	1	327 MVA	378 MVA	Transformer #3	-
	NYSEG	Coddington	E. Ithaca (to Coddington)	8.07	S	2024	115	115	1	307 MVA	307 MVA	665 ACCR	OH
	NYSEG	Fraser	Fraser	xfmr	S	2024	345/115	345/115	1	305 MVA	364 MVA	Transformer #2 and Station Reconfiguration	-
	NYSEG	Fraser 115	Fraser 115	Rebuild	S	2024	115	115		N/A	N/A	Station Rebuild to 4 bay BAAH	-
	NYSEG	Delhi	Delhi	Removal	S	2024	115	115		N/A	N/A	Remove 115 substation and terminate existing lines to Fraser 115 (short distance)	

[Project Queue Position] / Project Notes	Transmission Owner	Terminals		Line Length in Miles (1)	Expected In-Service Date/Yr Prior to		Nominal Voltage in kV		# of	Thermal Ratings		Project Description / Conductor Size	Class Year / Type of Construction
							Operating	Design	ckts	Summer	Winter		
	NYSEG	Erie Street Rebuild	Erie Street Rebuild	Rebuild	S	2026	115	115				Station Rebuild	
	NYSEG	Gardenville	Gardenville	xfmr	S	2026	230/115	230/115	1	316 MVA	370 MVA	NYSEG Transformer #3 and Station Reconfiguration	-
	NYSEG	Meyer	Meyer	xfmr	W	2026	115/34.5	115/34.5	2	59.2MVA	66.9MVA	Transformer #2	-
7	O & R/ConEd	Ladentown	Buchanan	-9.5	S	2023	345	345	1	3000	3211	2-2493 ACAR	
7	O & R/ConEd	Ladentown	Lovett 345 kV Station (New Station)	5.5	S	2023	345	345	1	3000	3211	2-2493 ACAR	
7	O & R/ConEd	Lovett 345 kV Station (New Station)	Buchanan	4	S	2024	345	345	1	3000	3211	2-2493 ACAR	
	O & R	Lovett 345 kV Station (New Station)	Lovett	xfmr	S	2024	345/138	345/138	1	562 MVA	562 MVA	Transformer	
3	RGE	Station 262	Station 23	1.46	In-Service	2021	115	115	1	2008	2008	Underground Cable	
3	RGE	Station 33	Station 262	2.97	In-Service	2021	115	115	1	2008	2008	Underground Cable	
3	RGE	Station 262	Station 262	xfmr	In-Service	2018	115/34.5	115/34.5	1	58.8MVA	58.8MVA	Transformer	-
7	RGE	Station 168	Mortimer (NG Trunk #2)	26.4	W	2023	115	115	1	145 MVA	176 MVA	Station 168 Reinforcement Project	OH
7	RGE	Station 168	Elbridge (NG Trunk # 6)	45.5	W	2023	115	115	1	145 MVA	176 MVA	Station 168 Reinforcement Project	OH
	RGE	Station 127	Station 127	xfmr	W	2024	115/34.5	115/34.5	1	75MVA	75MVA	Transformer #2	-
	RGE	Station 418	Station 48	7.6	S	2026	115	115	1	175 MVA	225 MVA	New 115kV Line	OH
	RGE	Station 33	Station 251 (Upgrade Line #942)		S	2026	115	115	1	400MVA	400MVA	Line Upgrade	
	RGE	Station 33	Station 251 (Upgrade Line #943)		S	2026	115	115	1	400MVA	400MVA	Line Upgrade	
	RGE	Station 82	Station 251 (Upgrade Line #902)		S	2028	115	115	1	400MVA	400MVA	Line Upgrade	

[Project Queue Position] / Project Notes	Transmission Owner	Terminals		Line Length in Miles (1)	Expected In-Service Date/Yr Prior to		Nominal Voltage in kV		# of	Thermal Ratings		Project Description / Conductor Size	Class Year / Type of Construction
							Operating	Design	ckts	Summer	Winter		
	RGE	Mortimer	Station 251 (Upgrade Line #901)	1.00	S	2028	115	115	1	400MVA	400MVA	Line Upgrade	

Notes

Number	Note
1	Line Length Miles: Negative values indicate removal of Existing Circuit being tapped
2	S = Summer Peak Period W = Winter Peak Period
3	Equipment (Transformers & Capacitor Banks) is retained on this list for one year after it goes in In-Service, and then it is deleted. A Transmission Line is reflected in Table VI, when it goes In-Service
4	Thermal Ratings in Amperes, except where labeled otherwise
5	Firm projects are those which have been reported by TOs as being sufficiently firm, and either (i) have an Operating Committee approved System Impact Study (if applicable) and, for projects subject to Article VII, have a determination from New York Public Service Commission that the Article VII application is in compliance with Public Service Law § 122, or (ii) is under construction and is scheduled to be in-service prior to June 1 of the current year.
6	Reconductoring of Existing Line
7	Segmentation of Existing Circuit
8	Deleted
9	Upgrade of existing 69 kV to 138 kV operation
10	Deleted
11	Upgrade of existing 69 kV to 115 kV operation
12	Deleted
13	Contingent on future generation resources
14	This transmission upgrade was identified as a System Deliverability Upgrade (SDU) in the Class Year 2011 Study process required to make certain interconnection projects fully deliverable in the Rest of State Capacity Region. Upon the completion of Class Year 2011, the security posted for the SDU constituted greater than 60% of the total estimated costs for the SDUs and thereby "triggered" the SDU for construction.
15	The Class Year Transmission Project, Q#631, includes an elective System Upgrade Facility, an Astoria-Rainey 345kV cable. The Class Year Transmission Project, Q#887, is a 250 MW uprate of Q#631 project.
16	Deleted
17	Deleted
18	This project has a System Reliability Impact Study that has been approved by the NYISO Operating Committee, and therefore is a potential candidate to enter the next Open Class Year study
19	These transmission projects are included in the FERC 715 Report models. Please see FERC 715 report for an explanation of the inclusion criteria.
20	Deleted

Figure 20: Updates to Local Transmission Plans Not Included in 2022 Load and Capacity Data Report

From Bus	To Bus	ID	Voltage (kV)	Project Description	Planned In-Service Date
Lockport	Mortimer	103/104	115	Reconductor/Reconfigure 4 spans of Lockport/Mortimer 103/104	8/2022
Lockport	Lockport	R264	115	Install R264 at Lockport for Line 108 and operate as alternate breaker for Line 108 at Lockport	1/2023

Figure 21: Additional Non-LTP Transmission Projects Included in RNA Base Case Not Listed in 2022 Load and Capacity Data Report

NYISO Interconnection Queue #	Project Name/(Owner)	Zone	Point of Interconnection	Type	COD or I/S Date	Summer Peak MW
631	NS Power Express	J	Hertel 735 kV (Quebec) - Astoria Annex 345 kV (NYC)	HVDC Transmission	5/2026	1,000
887	CH Uprate					250

Appendix D: Resource Adequacy Assumptions

2023 Q2 STAR MARS Assumptions Matrix

#	Parameter	2022 RNA (2022 Gold Book) Study Period: y4 (2026)-y10 (2032)	2022 Q3, Q4 STAR and 2023 Q1, Q2 STAR (2022 Gold Book, 2022 RNA Base Cases + key updates) Study Period: Q3, Q4: y1 (2023)-y5 (2027) *2023 Q1, Q2:* y1 (2024)-y5 (2028)
Key Assumptions and Reports			
1	Links to Key Assumptions Presentations and Final Reports	Nov 15, 2022: NYISO Board approval and final 2022 RNA posting. 2022 RNA Report link 2022 RNA Appendix link	April 25, 2023 ESPWG: 2023 Q2 STAR Key Assumptions January 24 2023 ESPWG: 2023 Q1 STAR Key Assumptions January 24 2023 ESPWG: 2023 Q1 STAR Key Assumptions July 26, 2022 ESPWG: Q3 STAR Key Assumptions October 25, 2022 ESPWG: Q4 STAR Key Assumptions STAR Reports, Notices: https://www.nyiso.com/short-term-reliability-process

#	Parameter	2022 RNA (2022 Gold Book) Study Period: y4 (2026)-y10 (2032)	2022 Q3, Q4 STAR and 2023 Q1, Q2 STAR (2022 Gold Book, 2022 RNA Base Cases + key updates) Study Period: Q3, Q4: y1 (2023)-y5 (2027) *2023 Q1, Q2:* y1 (2024)-y5 (2028)
Load Parameters			
1	**Peak** Load Forecast	Adjusted 2022 Gold Book NYCA baseline peak load forecast. It includes five large loads from the NYISO interconnection queue, with forecasted impacts. Baseline load represents coincident summer peak demand and includes the reductions due to projected energy efficiency programs, building codes and standards, BtM storage impacts at peak, distributed energy resources and BtM solar photovoltaic resources; it also reflects expected impacts (increases) from projected electric vehicle usage and electrification. The GB 2022 baseline peak load forecast includes the impact (reduction) of behind-the-meter (BtM) solar at the time of NYCA peak. For the BtM Solar adjustment, gross load forecasts that include the impact of the BtM generation will be used for the 2022 RNA, as provided by the Demand Forecasting Team which then allows for a discrete modeling of the BtM solar resources using 5 years of inverter data.	Same method, updated to the 2023 Gold Book [link]
2	Load **Shapes** (Multiple Load Shapes)	**New Load Shapes** *(see March 24 LFTF/ESPWG):* Used Multiple Load Shape MARS Feature 8,760-hour historical gross load shapes were used as base shapes for LFU bins: Load Bins 1 and 2: 2013 Load Bins 3 and 4: 2018 Load Bins 5 to 7: 2017 Historical load shapes are adjusted to meet zonal (as well as G-J) coincident and non-coincident peak forecasts (summer and winter), while maintaining the energy targets. For the BtM Solar discrete modeling, gross load forecasts that include the impact of the BtM generation are used (additional details under the BtM Solar category below).	Same

#	Parameter	2022 RNA (2022 Gold Book) Study Period: y4 (2026)-y10 (2032)	2022 Q3, Q4 STAR and 2023 Q1, Q2 STAR (2022 Gold Book, 2022 RNA Base Cases + key updates) Study Period: Q3, Q4: y1 (2023)-y5 (2027) *2023 Q1, Q2:* y1 (2024)-y5 (2028)
3	Load Forecast Uncertainty (LFU) The LFU model captures the impacts of weather conditions on future loads.	2022 LFU Updated via Load Forecast Task Force (LFTF) process. Updated LFU values, *(as presented at the April 21, 2022 LFTF [link])*	Same
Generation Parameters			
1	**Existing** Generating Unit Capacities *(e.g., thermal units, large hydro)*	2022 Gold Book values: Summer is min of (DMNC, CRIS). Winter is min of (DMNC, CRIS). Adjusted for RNA inclusion rules application.	Same
2	**Proposed New Units Inclusion** Determination	2022 Gold Book with Inclusion Rules applied *See April 26, 2022 TPAS/ESPWG*	Same method, see applicable STAR Key Assumptions presentation
3	Retirement, Mothballed Units, IIFO	2022 Gold Book with Inclusion Rules applied *See April 26, 2022 TPAS/ESPWG*	Same method, see applicable STAR Key Assumptions presentation
4	Forced and Partial Outage Rates *(e.g., thermal units, large hydro)*	Five-year (2017-2021) GADS data for each unit represented. Those units with less than five years – use representative data. Transition Rates representing the Equivalent Forced Outage Rates (EFORd) during demand periods over the most recent five-year period. For new units or units that are in service for less than three years, NERC 5-year class average EFORd data are used.	Same
5	Planned Outages	Based on schedules received by the NYISO and adjusted for history	Same
6	Fixed and Unplanned Maintenance	Scheduled maintenance from Operations. Unplanned maintenance based on GADS data average maintenance time – average time in weeks is modeled.	Same

#	Parameter	2022 RNA (2022 Gold Book) Study Period: y4 (2026)-y10 (2032)	2022 Q3, Q4 STAR and 2023 Q1, Q2 STAR (2022 Gold Book, 2022 RNA Base Cases + key updates) Study Period: Q3, Q4: y1 (2023)-y5 (2027) *2023 Q1, Q2:* y1 (2024)-y5 (2028)
7	Summer Maintenance	None	Same
8	Combustion Turbine Derates	Derate based on temperature correction curves Thermal derates are based on a ratio of peak load before LFU is applied and LFU applied load. For new units: used data for a unit of same type in same zone, or neighboring zone data.	Same
8	Existing Landfill Gas (LFG) Plants	Actual hourly plant output over the last 5 years. Program randomly selects an LFG shape of hourly production over the last 5 years for each model replication. Probabilistic model is incorporated based on five years of input shapes, with one shape per replication randomly selected in the Monte Carlo process.	Same
9	Existing **Wind** Units (>5 years of data)	Actual hourly plant output over the last 5 years (2017-2021). Probabilistic model is incorporated based on five years of input shapes with one shape per replication being randomly selected in Monte Carlo process.	Same
10	Existing **Wind** Units (<5 years of data)	For existing data, the available actual hourly plant output is used. For missing data, the nameplate normalized average of units in the same load zone is scaled by the unit's nameplate rating.	Same
11a	Proposed **Land based Wind** Units	Inclusion Rules Applied to determine the generator status. The nameplate normalized average of units in the same load zone is scaled by the unit's nameplate rating.	Same
11b	Proposed **Offshore Wind** Units	Inclusion Rules Applied to determine the generator status. Power curves based on 2008-2012 NREL from 3 different sites: NY Harbor, LI Shore, LI East, and GE updates of the NREL curves reflecting derates.	Same

#	Parameter	2022 RNA (2022 Gold Book) Study Period: y4 (2026)-y10 (2032)	2022 Q3, Q4 STAR and 2023 Q1, Q2 STAR (2022 Gold Book, 2022 RNA Base Cases + key updates) Study Period: Q3, Q4: y1 (2023)-y5 (2027) *2023 Q1, Q2:* y1 (2024)-y5 (2028)
12a	Existing **Utility-scale Solar Resources**	Inclusion Rules Applied to determine the generator status. Probabilistic model chooses from the production data output shapes covering the last 5 years. One shape per replication is randomly selected in Monte Carlo process.	Same
12b	Proposed **Utility-scale Solar Resources**	Inclusion Rules Applied to determine the generator status. The nameplate normalized average of units in the same load zone is scaled by the unit's nameplate rating.	Same
13	Projected **BtM Solar Resources**	**Supply side:** Five years of 8,760 hourly MW profiles based on sampled inverter data The MARS random shape mechanism is used: one 8,760 hourly shape (of five) is randomly picked for each replication year. Similar with the past planning modeling and aligns with the method used for wind, utility solar, landfill gas, and run-of-river facilities. **Load side:** Gross load forecasts will be used for the 2022 RNA, as provided by the forecasting group.	Same
14	Existing **BTM-NG Program**	These are former load modifiers to sell capacity into the ICAP market. Modeled as cogen type 1 (or type 2 as applicable) unit in MARS. Unit capacity set to CRIS value, load modeled with weekly pattern that can change monthly.	Same

#	Parameter	2022 RNA (2022 Gold Book) Study Period: y4 (2026)-y10 (2032)	2022 Q3, Q4 STAR and 2023 Q1, Q2 STAR (2022 Gold Book, 2022 RNA Base Cases + key updates) Study Period: Q3, Q4: y1 (2023)-y5 (2027) *2023 Q1, Q2:* y1 (2024)-y5 (2028)
15	Existing **Small Hydro** Resources (*e.g.*, run-of-river)	Actual hourly plant output over the past 5 years period. Program randomly selects a hydro shape of hourly production over the 5-year window for each model replication. The randomly selected shape is multiplied by their current nameplate rating.	Same
16	Existing **Large Hydro**	Probabilistic Model based on 5 years of GADS data. Transition Rates representing the Equivalent Forced Outage Rates (EFORd) during demand periods over the most recent five-year period. Methodology consistent with thermal unit transition rates.	Same
17	Proposed front-of-meter **Battery Storage**	GE MARS ES model is used. Units are given a maximum capacity, maximum stored energy, and a dispatch window.	Same
18	Existing Energy Limited Resources (**ELRs)**	New method: GE developed MARS functionality to be used for ELRs. Resource output is aligned with the NYISO's peak load window when most loss-of-load events are expected to occur.	Same
Transaction – Imports/ Exports			
1	Capacity Purchases	Grandfathered Rights and other awarded long-term rights Modeled using MARS explicit contracts feature.	Same

#	Parameter	2022 RNA (2022 Gold Book) Study Period: y4 (2026)-y10 (2032)	2022 Q3, Q4 STAR and 2023 Q1, Q2 STAR (2022 Gold Book, 2022 RNA Base Cases + key updates) Study Period: Q3, Q4: y1 (2023)-y5 (2027) *2023 Q1, Q2:* y1 (2024)-y5 (2028)
2	Capacity Sales	These are long-term contracts filed with FERC. Modeled using MARS explicit contracts feature. Contracts sold from ROS (Zones: A-F). ROS ties to external pool are derated by sales MW amount	Same
3	FCM Sales	Model sales for known years Modeled using MARS explicit contracts feature. Contracts sold from ROS (Zones: A-F). ROS ties to external pool are derated by sales MW amount	Same
4	UDRs	Updated with most recent elections/awards information (VFT, HTP, Neptune, CSC) Added CHPE HTP (from Hydro Quebec into Zone J) at 1250 MW (summer) starting 2026	Same
5	External Deliverability Rights (EDRs)	**Cedars Uprate 80 MW**. Increased the HQ to D by 80 MW. Note: The Cedar bubble has been removed and its corresponding MW was reflected in HQ to D limit.	Same
6	Wheel-Through Contract	**300 MW HQ through NYISO to ISO-NE.** Modeled as firm contract. Reduced the transfer limit from HQ to NYISO by 300 MW and increased the transfer limit from NYISO to ISO-NE by 300 MW.	Same
MARS Topology: a simplified bubble-and-pipe representation of the transmission system			

#	Parameter	2022 RNA (2022 Gold Book) Study Period: y4 (2026)-y10 (2032)	2022 Q3, Q4 STAR and 2023 Q1, Q2 STAR (2022 Gold Book, 2022 RNA Base Cases + key updates) Study Period: Q3, Q4: y1 (2023)-y5 (2027) *2023 Q1, Q2:* y1 (2024)-y5 (2028)
1	Interface Limits	Developed by review of previous studies and specific analysis during the RNA study process.	Same
2	New Transmission	Based on TO- provided firm plans (via Gold Book 2020 process) and proposed merchant transmission; inclusion rules applied.	Same
3	AC Cable Forced Outage Rates	All existing cable transition rates updated with data received from ConEd and PSEG-LIPA to reflect most recent five-year history.	Same
4	UDR unavailability	Five-year history of forced outages	Same
5	Other	Topology changes summary, as compared with the 2021 -2030 CRP MARS topology: 1. Dysinger East and Group A limits decreased to reflect Large Loads in western NY (as forecasted in the 2022 Gold Book Table I-14 [link] 2. West Central reverse emergency thermal limits increased mainly due to a rating increase on a limiting element – also as identified in the 2022 Operating Study 3. Ontario – NY updated per input from Ontario ISO 4. Added 1,250 MW (May through October) related with the HVDC from Quebec to New York City (Champlain Hudson project) starting 2026 5. Updated Long Island limits per PSEG-Long Island's input 6. Updated UPNY-ConEd to align with around 300 MW smaller delta associated in the 2021 Operations UPNY-ConEd Voltage Study with the status of the M51, M52, 71, 72 Series Rectors (assumed in service for this RNA)	Same

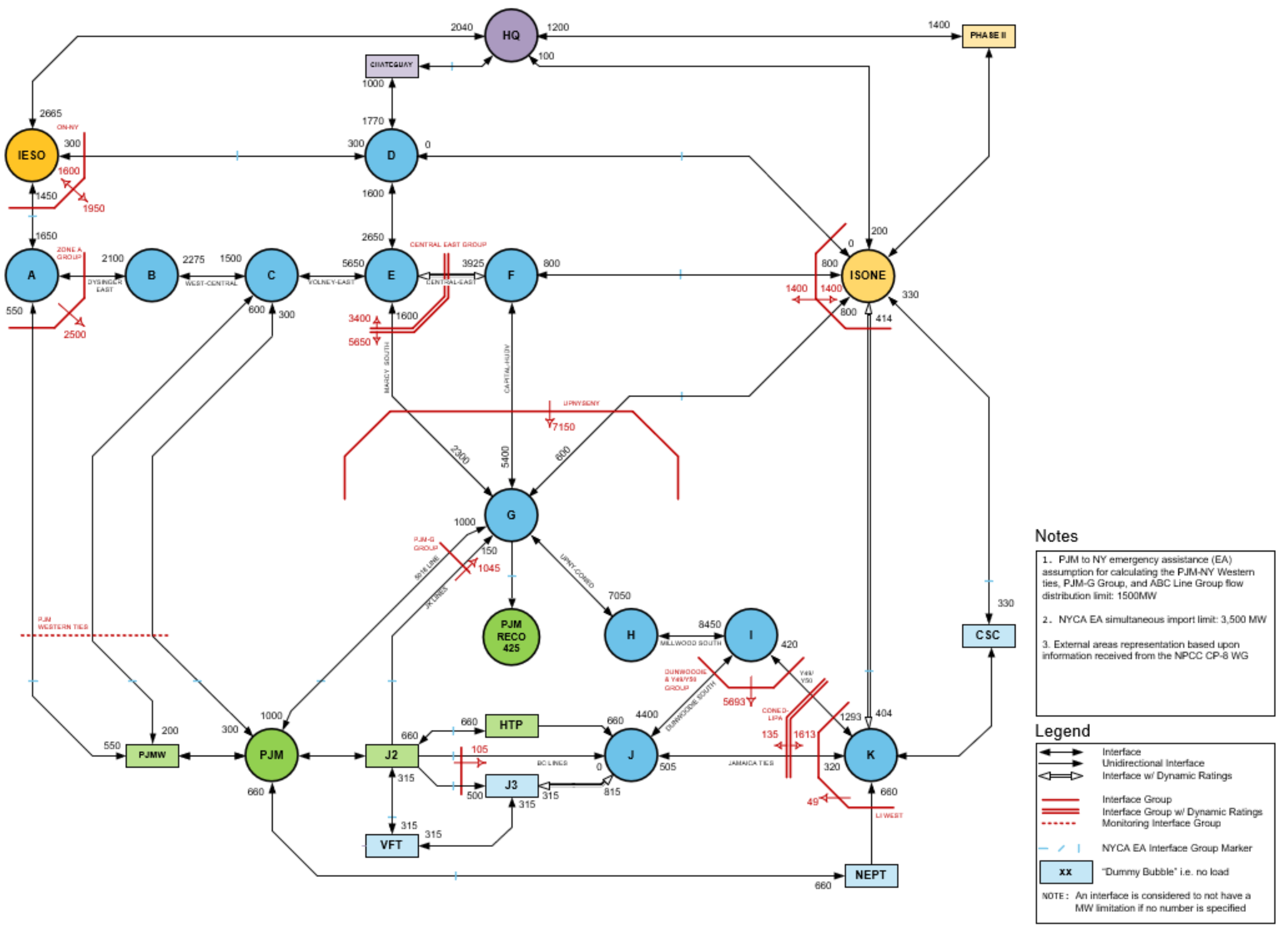
#	Parameter	2022 RNA (2022 Gold Book) Study Period: y4 (2026)-y10 (2032)	2022 Q3, Q4 STAR and 2023 Q1, Q2 STAR (2022 Gold Book, 2022 RNA Base Cases + key updates) Study Period: Q3, Q4: y1 (2023)-y5 (2027) *2023 Q1, Q2:* y1 (2024)-y5 (2028)
Emergency Operating Procedures (EOPs): • Special Case Resources (SCRs) (Load and Generator) • 5% Manual Voltage Reduction • 30-Minute Operating Reserve to Zero • 5% Remote Controlled Voltage Reduction • Voluntary Load Curtailment • Public Appeals • Emergency Assistance from External Areas • 10-Minute Operating Reserve to Zero			
1	Special Case Resources (SCR)	SCRs sold for the program discounted to historic availability (“effective capacity”). Monthly variation based on historical experience. Summer values calculated from the latest available July registrations (July 2022 SCR enrollment) held constant for all years of study. Modeling 15 calls/year. Generation and load zonal MW are combined into one step.	Same
2	EDRP Resources	Not modeled: the values are less than 2 MW.	Same
3	Operating Reserves	655 MW 30-min reserve to zero 960 MW 10-min reserve to zero Note: the 10-min reserve modeling method is updated per NYISO’s recommendation (approved at the May 4, 2022 NYSRC ICS [link]) to maintain (or no longer deplete/use) 350 MW of the 1,310 MW 10-min operating reserve at the applicable EOP step. Therefore, the 10-min operating reserve MARS EOP step will use, as needed each MARS replication: 960 MW (=1,310 MW–350 MW)	Same
4	Other EOPs *e.g., manual voltage reduction, voltage curtailments, public appeals, external assistance, as listed above*	Based on TO information, measured data, and NYISO forecasts. Used 2022 elections, as available	Same

#	Parameter	2022 RNA (2022 Gold Book) Study Period: y4 (2026)-y10 (2032)	2022 Q3, Q4 STAR and 2023 Q1, Q2 STAR (2022 Gold Book, 2022 RNA Base Cases + key updates) Study Period: Q3, Q4: y1 (2023)-y5 (2027) *2023 Q1, Q2:* y1 (2024)-y5 (2028)
External Control Areas • The top three summer peak load days of an external Control Area is modeled as coincident with the NYCA top three peak load days. • Load and capacity fixed through the study years. • EOPs are not represented for the external Control Area capacity models. • External Areas adjusted to be between 0.1 and 0.15 days/year LOLE • Implemented a statewide emergency assistance (from the neighboring systems) limit of 3500 MW			
1	PJM	Simplified model: The 5 PJM MARS areas (bubbles) were consolidated into one starting 2020 RNA	Same
2	ISONE	Simplified model: The 8 ISO-NE MARS areas (bubbles) were consolidated into one starting 2020 RNA	Same
3	HQ	As per RNA Procedure External model (load, capacity, topology) provided by PJM/NPCC CP-8 WG. LOLE of pool adjusted to be between 0.10 and 0.15 days per year by adjusting capacity pro-rata in all areas.	
4	IESO	As per RNA procedure external model (load, capacity, topology) provided by PJM/NPCC CP-8 WG. LOLE of pool adjusted to be between 0.10 and 0.15 days per year by adjusting capacity pro-rata in all areas.	Same
5	Reserve Sharing	All NPCC Control Areas indicate that they will share reserves **equally** among all members before sharing with PJM.	Same
6	NYCA Emergency Assistance Limit	Implemented a statewide limit of **3,500 MW**	Same
Miscellaneous			

#	Parameter	2022 RNA (2022 Gold Book) Study Period: y4 (2026)-y10 (2032)	2022 Q3, Q4 STAR and 2023 Q1, Q2 STAR (2022 Gold Book, 2022 RNA Base Cases + key updates) Study Period: Q3, Q4: y1 (2023)-y5 (2027) *2023 Q1, Q2:* y1 (2024)-y5 (2028)
1	MARS Model Version	4.10.2035	Same

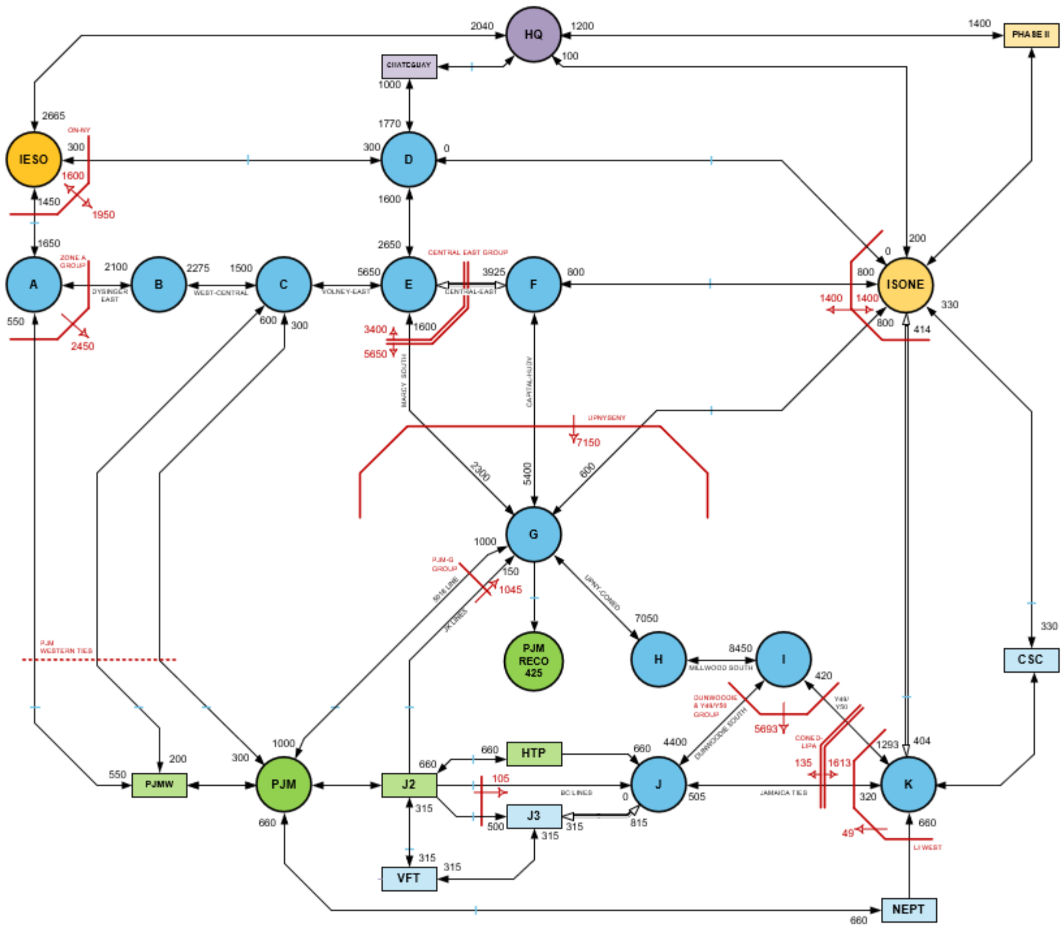
Resource Adequacy Topology from the 2022 Reliability Needs Assessment[25]

MARS Topology Study Year 2024



[25] This is the MARS topology used for 2022 Reliability Needs Assessment studies and is not fully re-evaluated for each quarterly STAR.

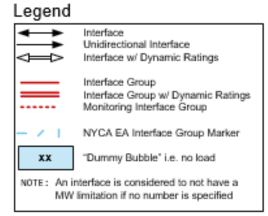
MARS Topology Study Year 2025



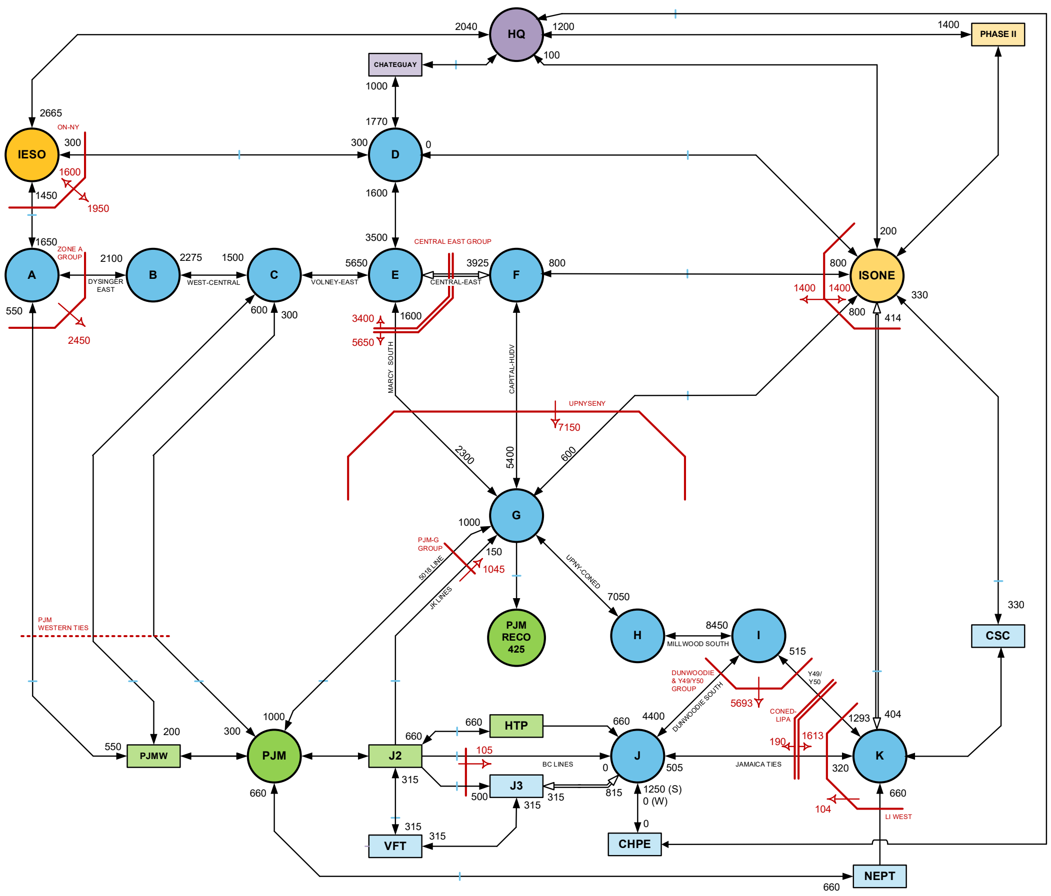
Notes

1. PJM to NY emergency assistance (EA) assumption for calculating the PJM-NY Western ties, PJM-G Group, and ABC Line Group flow distribution limit: 1500MW
2. NYCA EA simultaneous import limit: 3,500 MW
3. External areas representation based upon information received from the NPCC CP-8 WG

Legend



MARS Topology Study Year 2026-2033



Notes

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

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

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

Legend

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

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

Appendix E: Transmission Security Margins (Tipping Points)

Introduction

The purpose of this assessment is to identify plausible changes in conditions or assumptions that might adversely impact the reliability of the system. This assessment is performed using input from the 2023 Load and Capacity Data Report (Gold Book) and the projects that meet the 2022 RNA base case inclusion rules with consideration of updates for the quarterly Short-Term Reliability Process.

This assessment is derived from discussions with stakeholders at the May 5, 2022[26] and May 23, 2022[27] joint meetings of the Transmission Planning Advisory Subcommittee and the Electric System Planning Working Group, seeking several enhancements to the reliability planning practices. The proposed changes to reliability planning practices included: (1) modeling intermittent resources according to their expected availability coincident with the represented system condition, (2) accounting for the availability of thermal generation based on NERC class average five-year outage rate data in transmission security assessments, and (3) the ability to identify reliability needs through powerflow simulations combined with post-processing spreadsheet-based calculations of transmission security margins (a.k.a. "tipping points") within the Lower Hudson Valley (Zones G-J), New York City (Zone J), and Long Island (Zone K) localities, as well as other enhancements to reliability planning practices.[13] At its June 23, 2022, meeting, the Operating Committee approved revisions to the Reliability Planning Process Manual that reflect these enhancements. For this assessment, the margins are evaluated statewide as well as Lower Hudson Valley, New York City, and Long Island localities.

A BPTF reliability need is identified when the transmission security margin under expected weather conditions in the Lower Hudson Valley, New York City, and Long Island localities is less than zero or when the statewide system margin is less than zero. Additional details regarding the impact of heatwave, extreme heatwave, or other scenario conditions are provided for informational purposes.

[26] https://www.nyiso.com/documents/20142/30451285/08_Reliability_Practices_TPAS-ESPWG_2022-05-05.pdf/

[27] https://www.nyiso.com/documents/20142/30860639/04%20Response%20to%20SHQuestions%20and%20Feedback%20on%202022%20RNA%202022%20Quarter%202%20STAR.pdf/

New York Control Area (NYCA) Statewide System Margins

The statewide system margin for the New York Control Area is evaluated under baseline expected summer peak demand forecasts, which includes expected weather for summer and winter conditions with normal transfer criteria. Under current applicable reliability rules and procedures, a Reliability Need would be identified when the statewide margin is negative for the base case assumptions (*i.e.*, baseline summer peak coincident peak ("summer peak") demand, expected weather, normal transfer criteria). The statewide system margin is the ability to meet the forecasted demand and largest loss-of-source contingency (*i.e.,* total capacity requirement) against the NYCA generation (including derates) and external area interchange. The NYCA generation (from line-item A) is comprised of the existing generation plus additions of future generation resources that meet the reliability planning process base case inclusion rules less the removal of deactivating generation and peaker units. Consistent with current transmission planning practices for transmission security, the NYISO assumed the following for the summer capability period: (1) land-based wind generation is assumed at a 5% of nameplate output and off-shore wind is assumed at 10% of nameplate output, (2) run-of-river hydro is reduced consistent with its average capacity factor, and (3) wholesale solar generation is dispatched based on the ratio of behind-the-meter solar generation ("BtM-PV") BtM solar nameplate capacity and BtM-PV peak reductions stated in the 2023 Gold Book. For the winter capability period: (1) land-based wind generation is assumed at 10% of nameplate output and off-shore wind is 15% of nameplate output, (2) run-of-river hydro is reduced consistent with its average capacity factor, and (3) wholesale solar generation is dispatched at 0 MW for winter peak. Derates for thermal resources based on their NERC five-year class average EFORd are also included.[28] Additionally, the NYCA generation includes the Oswego export limit with all lines in service.

Transmission security analysis represents discrete snapshots in time of various credible combinations of system conditions. When reliability needs are identified, only the magnitude of the need is identified (*e.g.*, a thermal overload expressed in terms of percentage of the applicable rating) under the studied system conditions. Additional details are required to fully describe the nature of the need, such as evaluating the hourly demand shape and its impact on the need. For example, in the 2020 Reliability Needs Assessment,[29] there is information detailing various contingency combinations resulting in thermal overloads within New York City (*see, e.g.*, 2020 RNA Figure 26). To fully describe the nature of these needs, demand-duration shapes were developed for the areas in which needs were observed (*see, e.g.*, 2020 RNA Figure 27).

To describe the nature of the statewide system margins under expected summer peak, heatwave, and

[28] NERC five-year class average EFORd data
[29] 2020 Reliability Needs Assessment

extreme heatwave conditions more fully, demand shapes are developed to reflect the expected behavior of the demand over 24 hours on the summer peak day for the 10-year study horizon. Details of the demand shapes are provided later in this appendix. For this assessment, demand shapes were not developed past 2033 and have only been developed for the summer condition.

Baseline peak forecasts and demand shapes assume expected (approximately average) peak day weather. The heatwave and extreme heatwave conditions are defined by the 90th and 99th percentile summer peak forecasts documented in the Gold Book, respectively. The baseline and percentile summer peak forecasts utilize a cumulative temperature and humidity index, which reflects a weighted average of weather conditions on the peak day and the two preceding days and is based on the historical distribution of peak-day weather. The peak demand forecasts incorporate the projected impacts of increasing temperature trends throughout the forecast horizon. In general, a heatwave (1-in-10-year or 90/10) has a statewide average maximum temperature of 95 degrees Fahrenheit. An extreme heatwave (1-in-100-year or 99/1) has a statewide average maximum temperature of 98 degrees Fahrenheit.

As shown in **Figure 22**, under summer peak demand with expected weather with normal transfer criteria, the statewide system margin (line-item I) ranges between 428 MW in 2024 to 531 MW in 2033. The annual fluctuations are driven by the decreases in NYCA generation (line-item A) and in the demand forecast (line-item F). The NYISO performed an additional sensitivity evaluation for informational purposes shown in **Figure 22**, representing the impact of maintaining the full operating reserve within the NYCA (line-item K) on the statewide system margin. The statewide system margin with full operating reserve is deficient in the first few years (2023 through 2025) under summer peak conditions until the Champlain Hudson Power Express (CHPE) project enters service by summer 2026.[30] The margins again become deficient beginning in 2032 by 369 MW, which worsens to 779 MW by 2033.

Utilizing the demand shapes for the baseline summer peak demand day with expected weather (**Figure 91**), the statewide system margin for each hour utilizing normal transfer criteria is shown in **Figure 23**. The statewide system margin for each hour is created by using the demand forecast for each hour in the margin calculation (*e.g.*, **Figure 22** line-item F) with additional adjustments in NYCA generation to account for the appropriate derate for solar generation and energy limited resources in each hour (*e.g.*, **Figure 22** line-item B). All other values in the margin calculations are held constant. A graphical representation of the hourly margin for years 2024, 2025, 2028, and 2033 is shown in **Figure 24**. These years are selected due to the DEC Peaker Rule impacts in 2025 along with the year 5 representation (2028) and the last year of the ten-year study horizon for the reliability planning process. For all years in the 10-year study horizon, there

[30] The CHPE project is currently planned to enter service in May 2026.

are no observed deficiencies considering the statewide coincident peak day demand shape.

It is possible for other combinations of events, such as a 1-in-10-year heatwave[31] ("heatwave") or 1-in-100-year extreme heatwave[32] ("extreme heatwave") to result in a deficient statewide system margin. **Figure 25** shows the statewide system margin for heatwave condition under the assumption that the system is using emergency transfer criteria. Although system transmission security is not currently designed under these conditions, **Figure 25** shows that insufficient margin exists for in the first few years (2024 and 2025) under summer peak conditions until the CHPE project is in service (line-item J). In 2024, the system is deficient by 745 MW, which worsens to 1,062 MW in 2025. The larger deficiency is primarily due to the reduction in NYCA generation along with demand growth. In 2026, with CHPE in service, the margin returns positive to 327 MW. However, by 2032 the margin again becomes deficient at 237 MW and worsens to a deficiency of 667 MW by 2033. Additionally, **Figure 25** also shows the statewide system margin with full operating reserve under heatwave conditions (line-item L). Under this sensitivity there is insufficient margin for all study years.

Utilizing the demand shape for the 1-in-10-year heatwave (**Figure 97**), the statewide system margin for each hour utilizing emergency transfer criteria is shown in **Figure 26**. Under the 1-in-10-year heatwave conditions, the deficiency for the 1-in-10-year heatwave peak day in 2024, shown in **Figure 25** at the statewide coincident peak hour, is 1,062 MW. **Figure 26** shows that the system is deficient in nine hours with a total deficiency in the 24-hour period of 8,033 MWh. For years 2026 through 2030, the margin curve for each hour remains sufficient. **Figure 27** provides a graphical representation of the statewide system margin curve for heatwave conditions for the heatwave peak day in summers 2024, 2025, 2028, and 2033.

For the statewide system margin in a 1-in-100-year extreme heatwave, **Figure 28** shows that there is insufficient statewide system margin as early as 2024 by 2,453 MW (line-item J). The margin improves in summer 2026 with CHPE in service; however, the margin remains deficient for the entire study period. In 2026, the deficiency is 1,359 MW. By 2033, the deficiency worsens to 2,396 MW. These issues are exacerbated with consideration of full operating reserve (line-item L).

Utilizing the demand shape for the 1-in-100-year extreme heatwave (**Figure 102**), the statewide system margin for each hour utilizing emergency transfer criteria is shown in **Figure 29**. Under the 1-in-100-year extreme heatwave conditions, the deficiency for the extreme heatwave day in summer 2025 shown in **Figure 28** as 2,756 MW is seen over 12 hours (23,840 MWh). With the in-service status of CHPE

[31] The load forecast utilized for the heatwave condition is the 90th percentile (or 90/10) expected load forecast.
[32] The load forecast utilized for the extreme heatwave condition is the 99th percentile (or 99/1) expected load forecast.

by summer 2026, the deficiency observed for the extreme heatwave day in summer 2026 improves to eight hours (8,897 MWh). By 2033, the extreme heatwave days deficiency extends to nine hours (13,321 MWh). **Figure 30** provides a graphical representation of the statewide system margin curve for heatwave conditions for the peak day in years 2024, 2025, 2028, and 2033.

Figure 31 shows the statewide system margin under winter peak demand and expected weather, using normal transfer criteria. For winter peak, the statewide system margin ranges from 9,668 MW in winter 2024-25 to 1,676 MW in winter 2033-34 (line-item J). Under the additional sensitivity evaluation of maintaining the full operating reserve in the NYCA shown in **Figure 31**, all years are also shown to be sufficient.

Cold snap and extreme cold snap conditions are defined by the 90th and 99th percentile winter peak forecasts, respectively, which are documented in the 2023 Gold Book. The baseline and percentile winter peak forecasts utilize the historical distribution of winter peak day temperature. In general, a cold snap (1-in-10-year or 90/10) reflects a statewide daily average temperature of 5 degrees Fahrenheit. An extreme cold snap (1-in-100-year or 99/1) reflects a statewide daily average temperature of -2 degrees Fahrenheit.

Figure 32 shows the statewide system margin in a 1-in-10-year cold snap ("cold snap") utilizing emergency transfer criteria.[33] Under this condition, the margin is sufficient for all study years (line-item J) and ranges from 9,132 MW in winter 2024-25 to 805 MW in winter 2033-34. Additionally, **Figure 32** shows the statewide system margin with full operating reserve, which is also sufficient for all study years until 2033-34 which is deficient by 505 MW.

Figure 33 shows the statewide system margin in a 1-in-100-year extreme cold snap ("extreme cold snap") utilizing emergency transfer criteria.[34] Under this condition the margin is sufficient for all study years (line-item J) until winter 2033-34 which is deficient by 1,572 MW. Additionally, **Figure 33** shows the statewide system margin with full operating reserve which is also sufficient for all study years (line-item L) through winter 2031-32. In winter 2032-33, the margin is deficient by 1,267 MW and worsens to 2,882 MW in the following winter.

Figure 34 provides a summary of the summer peak statewide system margins under expected weather, heatwave, and extreme heatwave conditions. **Figure 35** provides a summary of the winter peak statewide system margins under expected weather, cold snap, and extreme cold snap conditions.

---

[33] The load forecast utilized for the cold snap condition is the winter 90th percentile (or 90/10) expected load forecast.
[34] The load forecast utilized for the extreme cold snap condition is the winter 99th percentile (or 99/1) expected load forecast.

Figure 22: Statewide System Margin (Summer Peak - Expected Weather, Normal Transfer Criteria)

Line	Item	Summer Peak - Baseline Expected Summer Weather, Normal Transfer Criteria (MW)									
		2024	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**
A	NYCA Generation (1)	38,041	38,266	38,266	38,266	38,266	38,266	38,266	38,266	38,266	38,266
B	NYCA Generation Derates (2)	(5,903)	(6,554)	(6,568)	(6,581)	(6,594)	(6,607)	(6,607)	(6,621)	(6,634)	(6,634)
C	Temperature Based Generation Derates	0	0	0	0	0	0	0	0	0	0
D	External Area Interchanges (3)	1,844	1,844	3,094	3,094	3,094	3,094	3,094	3,094	3,094	3,094
E	**Total Resources (A+B+C+D)**	33,981	33,555	34,792	34,779	34,766	34,752	34,752	34,739	34,726	34,726
F	Demand Forecast (5)	(32,243)	(32,150)	(32,005)	(31,881)	(31,753)	(31,715)	(31,855)	(32,115)	(32,475)	(32,885)
G	Largest Loss-of-Source Contingency	(1,310)	(1,310)	(1,310)	(1,310)	(1,310)	(1,310)	(1,310)	(1,310)	(1,310)	(1,310)
H	**Total Capability Requirement (F+G)**	(33,553)	(33,460)	(33,315)	(33,191)	(33,063)	(33,025)	(33,165)	(33,425)	(33,785)	(34,195)
I	**Statewide System Margin (E+H)**	428	95	1,477	1,588	1,703	1,727	1,587	1,314	941	531
J	Operating Reserve	(1,310)	(1,310)	(1,310)	(1,310)	(1,310)	(1,310)	(1,310)	(1,310)	(1,310)	(1,310)
K	**Statewide System Margin with Full Operating Reserve (I+J) (4)**	(882)	(1,215)	167	278	393	417	277	4	(369)	(779)

Notes:

1. Reflects the 2023 Gold Book existing summer capacity plus projected additions and deactivations.
2. Reflects the derates for generating resources. For this evaluation land-based wind generation is assumed to have a capability of 5% of the total nameplate, off-shore wind at 10% of the total nameplate, solar generation is based on the ratio of solar PV nameplate capacity (2023 Gold Book Table I-9a) and solar PV peak reductions (2023 Gold Book Table I-9c). Derates for run-of-river hydro are included as well as the Oswego Export limit for all lines in-service. Includes derates for thermal resources based on NERC five-year class average EFORd data published August 2022 (https://www.nerc.com/pa/RAPA/gads/Pages/Reports.aspx).
3. Interchanges are based on ERAG MMWG values.
4. For informational purposes.
5. Reflects the final 10-year peak forecasts presented to stakeholders at the April 5, 2023 LFTF/ESPWG with adjustments for large load queue projects included in this STAR (Q0580 – WNY STAMP, Q0776 – Greenidge, Q0849 – Somerset, Q0580 – Cayuga, Q0979 – North Country Data Center).

Figure 23: Statewide System Margin (Hourly) (Summer Peak - Expected Weather, Normal Transfer Criteria)

Summer Peak - Baseline Expected Summer Weather, Normal Transfer Criteria (MW)										
Statewide System Margin										
Hour	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
HB0	6,296	5,735	7,078	7,147	7,216	7,232	7,139	6,951	6,702	6,438
HB1	6,300	5,757	7,115	7,198	7,277	7,309	7,238	7,078	6,862	6,633
HB2	7,118	6,589	7,956	8,047	8,134	8,180	8,125	7,986	7,795	7,595
HB3	7,561	7,041	8,414	8,510	8,604	8,656	8,615	8,488	8,314	8,130
HB4	7,525	7,004	8,379	8,478	8,575	8,633	8,597	8,477	8,309	8,133
HB5	6,859	6,331	7,702	7,801	7,898	7,954	7,913	7,786	7,607	7,422
HB6	5,675	5,179	6,566	6,682	6,796	6,864	6,824	6,694	6,509	6,312
HB7	5,392	5,031	6,497	6,687	6,868	6,985	6,978	6,873	6,706	6,524
HB8	4,555	4,422	6,012	6,314	6,590	6,785	6,832	6,769	6,642	6,493
HB9	3,865	3,971	5,695	6,122	6,504	6,785	6,901	6,896	6,822	6,721
HB10	2,921	3,210	5,039	5,564	6,033	6,387	6,559	6,604	6,572	6,517
HB11	2,105	2,504	4,399	4,985	5,512	5,913	6,124	6,202	6,203	6,178
HB12	1,493	1,929	3,847	4,454	5,005	5,421	5,641	5,727	5,734	5,718
HB13	678	1,082	2,987	3,586	4,128	4,538	4,749	4,825	4,820	4,797
HB14	999	1,341	3,217	3,551	4,072	4,463	3,855	3,913	3,895	3,854
HB15	598	808	2,609	3,110	3,572	3,910	3,574	3,582	3,511	3,421
HB16	984	396	1,493	1,881	2,243	2,492	2,550	2,478	2,322	2,153
HB17	428	111	1,633	1,873	2,107	2,237	2,197	2,032	1,783	1,516
HB18	555	95	1,477	1,588	1,703	1,727	1,587	1,314	954	588
HB19	365	326	1,642	1,690	1,749	1,728	1,539	1,235	941	531
HB20	820	165	2,044	2,311	2,357	2,328	2,137	1,838	1,451	1,045
HB21	1,116	473	1,771	1,806	1,854	1,830	2,128	1,842	1,474	1,085
HB22	2,239	1,617	2,926	2,967	3,017	2,998	3,640	3,376	3,036	2,676
HB23	3,960	3,366	4,689	4,743	4,803	4,801	4,672	4,443	4,144	3,828

Figure 24: Statewide System Margin Hourly Curve (Summer Peak - Expected Weather, Normal Transfer Criteria)

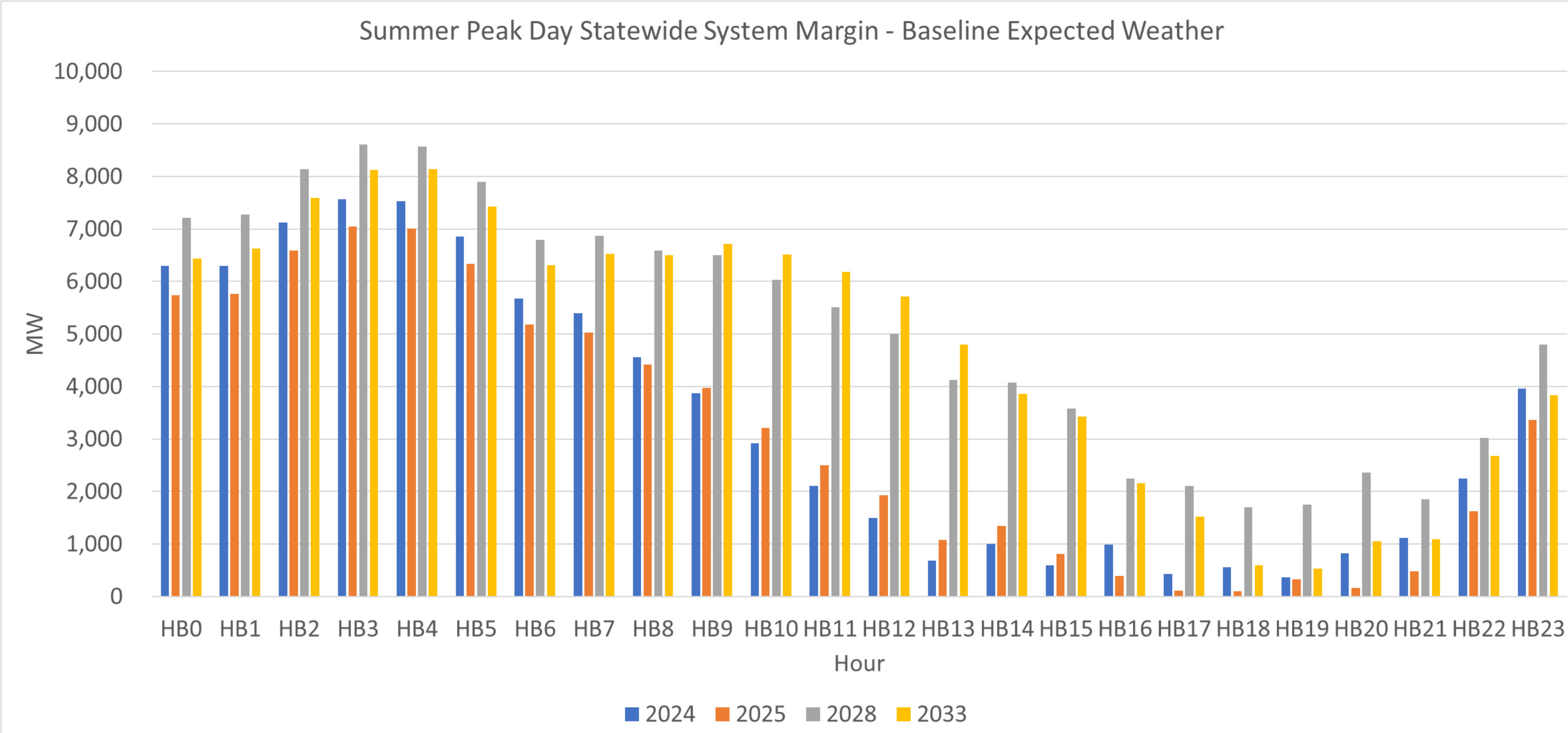


Figure 25: Statewide System Margin (1-in-10-Year Heatwave, Emergency Transfer Criteria)

Line	Item	Summer Peak - 1-in-10-Year Heatwave, Emergency Transfer Criteria (MW)									
		2024	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**
A	NYCA Generation (1)	38,041	38,266	38,266	38,266	38,266	38,266	38,266	38,266	38,266	38,266
B	NYCA Generation Derates (2)	(5,903)	(6,554)	(6,568)	(6,581)	(6,594)	(6,607)	(6,607)	(6,621)	(6,634)	(6,634)
C	Temperature Based Generation Derates	(185)	(176)	(176)	(176)	(176)	(176)	(176)	(176)	(176)	(176)
D	External Area Interchanges (3)	1,844	1,844	3,094	3,094	3,094	3,094	3,094	3,094	3,094	3,094
E	SCRs (4), (5)	860	860	860	860	860	860	860	860	860	860
F	**Total Resources (A+B+C+D+E)**	34,657	34,240	35,477	35,463	35,450	35,437	35,437	35,424	35,410	35,410
G	Demand Forecast (6)	(34,091)	(33,992)	(33,839)	(33,708)	(33,572)	(33,534)	(33,682)	(33,958)	(34,338)	(34,768)
H	Largest Loss-of-Source Contingency	(1,310)	(1,310)	(1,310)	(1,310)	(1,310)	(1,310)	(1,310)	(1,310)	(1,310)	(1,310)
I	**Total Capability Requirement (G+H)**	(35,401)	(35,302)	(35,149)	(35,018)	(34,882)	(34,844)	(34,992)	(35,268)	(35,648)	(36,078)
J	**Statewide System Margin (F+I)**	(745)	(1,062)	327	445	568	593	445	156	(237)	(667)
K	Operating Reserve	(1,310)	(1,310)	(1,310)	(1,310)	(1,310)	(1,310)	(1,310)	(1,310)	(1,310)	(1,310)
L	**Statewide System Margin with Full Operating Reserve (J+K)**	(2,055)	(2,372)	(983)	(865)	(742)	(717)	(865)	(1,154)	(1,547)	(1,977)

Notes:

1. Reflects the 2023 Gold Book existing summer capacity plus projected additions and deactivations.
2. Reflects the derates for generating resources. For this evaluation land-based wind generation is assumed to have a capability of 5% of the total nameplate, off-shore wind at 10% of the total nameplate, solar generation is based on the ratio of solar PV nameplate capacity (2023 Gold Book Table I-9a) and solar PV peak reductions (2023 Gold Book Table I-9c). Derates for run-of-river hydro are included as well as the Oswego Export limit for all lines in-service. Includes derates for thermal resources based on NERC five-year class average EFORd data published August 2022 (https://www.nerc.com/pa/RAPA/gads/Pages/Reports.aspx).
3. Interchanges are based on ERAG MMWG values.
4. SCRs are not applied for transmission security analysis of normal operations, but are included for emergency operations.
5. Includes a derate of 364 MW for SCRs.
6. Reflects the final 10-year peak forecasts presented to stakeholders at the April 5, 2023 LFTF/ESPWG with adjustments for large load queue projects included in this STAR (Q0580 – WNY STAMP, Q0776 – Greenidge, Q0849 – Somerset, Q0580 – Cayuga, Q0979 – North Country Data Center).

Figure 26: Statewide System Margin (Hourly) (1-in-10-Year Heatwave, Emergency Transfer Criteria)

Summer Peak - Heatwave, Emergency Transfer Criteria (MW)										
Statewide System Margin										
Hour	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
HB0	4,025	3,540	4,846	4,863	4,887	4,864	4,764	4,572	4,325	4,052
HB1	4,086	3,609	4,928	4,963	5,006	5,006	4,930	4,766	4,551	4,311
HB2	4,928	4,459	5,786	5,833	5,890	5,908	5,850	5,708	5,516	5,302
HB3	5,419	4,955	6,288	6,342	6,408	6,436	6,392	6,262	6,086	5,888
HB4	5,492	5,028	6,364	6,420	6,490	6,523	6,484	6,361	6,191	6,001
HB5	4,935	4,471	5,802	5,855	5,919	5,946	5,901	5,771	5,592	5,394
HB6	3,834	3,407	4,753	4,815	4,886	4,915	4,865	4,728	4,540	4,328
HB7	3,534	3,246	4,665	4,785	4,903	4,964	4,935	4,811	4,631	4,423
HB8	2,636	2,571	4,101	4,316	4,507	4,624	4,634	4,535	4,375	4,180
HB9	1,856	2,022	3,673	3,993	4,270	4,455	4,514	4,454	4,329	4,162
HB10	933	1,281	3,026	3,429	3,776	4,016	4,118	4,094	3,997	3,859
HB11	333	790	2,594	3,051	3,442	3,718	3,850	3,851	3,778	3,661
HB12	(236)	237	2,049	2,526	2,958	3,264	3,406	3,411	3,337	3,216
HB13	(935)	(510)	1,274	1,746	2,192	2,508	2,646	2,643	2,554	2,418
HB14	(812)	(464)	1,277	1,493	1,942	2,260	1,587	1,572	1,466	1,310
HB15	(1,447)	(1,245)	414	807	1,226	1,513	1,123	1,067	914	709
HB16	(280)	(884)	66	362	711	77	97	(25)	(251)	(527)
HB17	(745)	(1,062)	327	488	717	836	773	576	276	(75)
HB18	(414)	(863)	400	445	568	593	445	156	(237)	(667)
HB19	(552)	(575)	629	622	699	689	503	192	(124)	(586)
HB20	(819)	(1,437)	348	558	605	1,433	1,244	940	541	96
HB21	(402)	(993)	227	203	235	194	489	200	(176)	(594)
HB22	878	318	1,563	1,546	1,569	1,524	2,162	1,894	1,551	1,168
HB23	2,811	2,287	3,561	3,560	3,581	3,544	3,410	3,176	2,878	2,546

Figure 27: Statewide System Margin Hourly Curve (1-in-10-Year Heatwave, Emergency Transfer Criteria)

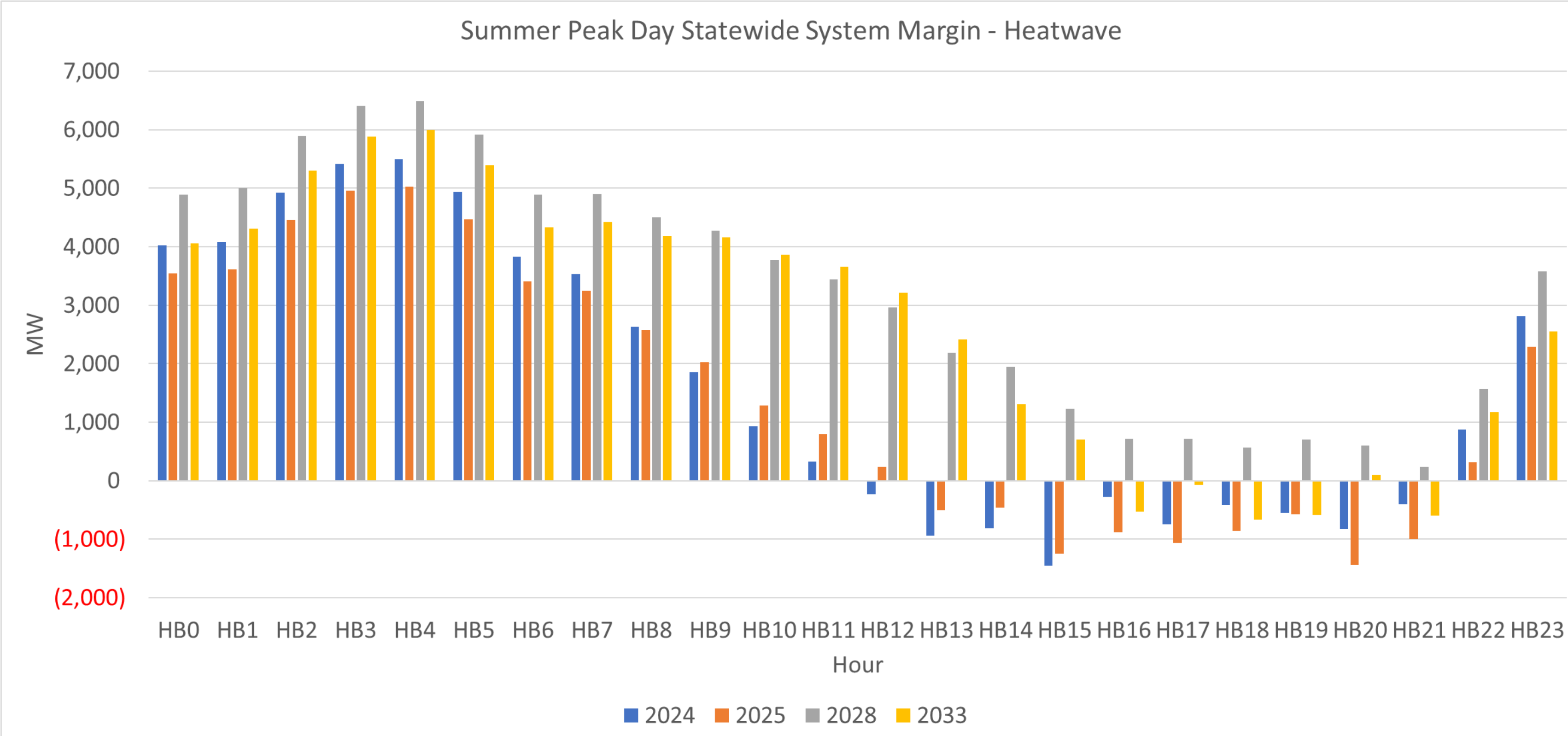


Figure 28: Statewide System Margin (1-in-100-Year Extreme Heatwave, Emergency Transfer Criteria)

Line	Item	Summer Peak - 1-in-100-Year Extreme Heatwave, Emergency Transfer Criteria (MW)									
		2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
A	NYCA Generation (1)	38,041	38,266	38,266	38,266	38,266	38,266	38,266	38,266	38,266	38,266
B	NYCA Generation Derates (2)	(5,903)	(6,554)	(6,568)	(6,581)	(6,594)	(6,607)	(6,607)	(6,621)	(6,634)	(6,634)
C	Temperature Based Generation Derates	(389)	(370)	(370)	(370)	(370)	(370)	(370)	(370)	(370)	(370)
D	External Area Interchanges (3)	1,844	1,844	3,094	3,094	3,094	3,094	3,094	3,094	3,094	3,094
E	SCRs (4), (5)	860	860	860	860	860	860	860	860	860	860
F	**Total Resources (A+B+C+D+E)**	34,453	34,045	35,282	35,269	35,256	35,243	35,243	35,229	35,216	35,216
G	Demand Forecast (6)	(35,596)	(35,491)	(35,332)	(35,195)	(35,056)	(35,017)	(35,173)	(35,459)	(35,851)	(36,303)
H	Largest Loss-of-Source Contingency	(1,310)	(1,310)	(1,310)	(1,310)	(1,310)	(1,310)	(1,310)	(1,310)	(1,310)	(1,310)
I	**Total Capability Requirement (G+H)**	(36,906)	(36,801)	(36,642)	(36,505)	(36,366)	(36,327)	(36,483)	(36,769)	(37,161)	(37,613)
J	**Statewide System Margin (F+I)**	(2,453)	(2,756)	(1,359)	(1,236)	(1,110)	(1,085)	(1,240)	(1,539)	(1,945)	(2,396)
K	Operating Reserve	(1,310)	(1,310)	(1,310)	(1,310)	(1,310)	(1,310)	(1,310)	(1,310)	(1,310)	(1,310)
L	**Statewide System Margin with Full Operating Reserve (J+K)**	(3,763)	(4,066)	(2,669)	(2,546)	(2,420)	(2,395)	(2,550)	(2,849)	(3,255)	(3,706)

Notes:

1. Reflects the 2023 Gold Book existing summer capacity plus projected additions and deactivations.
2. Reflects the derates for generating resources. For this evaluation land-based wind generation is assumed to have a capability of 5% of the total nameplate, off-shore wind at 10% of the total nameplate, solar generation is based on the ratio of solar PV nameplate capacity (2023 Gold Book Table I-9a) and solar PV peak reductions (2023 Gold Book Table I-9c). Derates for run-of-river hydro are included as well as the Oswego Export limit for all lines in-service. Includes derates for thermal resources based on NERC five-year class average EFORd data published August 2022 (https://www.nerc.com/pa/RAPA/gads/Pages/Reports.aspx).
3. Interchanges are based on ERAG MMWG values.
4. SCRs are not applied for transmission security analysis of normal operations, but are included for emergency operations.
5. Includes a derate of 364 MW for SCRs.
6. Reflects the final 10-year peak forecasts presented to stakeholders at the April 5, 2023 LFTF/ESPWG with adjustments for large load queue projects included in this STAR (Q0580 – WNY STAMP, Q0776 – Greenidge, Q0849 – Somerset, Q0580 – Cayuga, Q0979 – North Country Data Center).

Figure 29: Statewide System Margin (Hourly) (1-in-100-Year Extreme Heatwave, Emergency Transfer Criteria)

Summer Peak - 1-in-100-Year Extreme Heatwave, Emergency Transfer Criteria (MW)										
Statewide System Margin										
Hour	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
HB0	3,070	2,602	3,915	3,938	3,964	3,942	3,839	3,642	3,390	3,106
HB1	3,131	2,671	3,998	4,038	4,083	4,083	4,005	3,836	3,615	3,365
HB2	3,973	3,521	4,856	4,908	4,967	4,985	4,925	4,778	4,580	4,356
HB3	4,464	4,017	5,358	5,417	5,485	5,513	5,467	5,332	5,150	4,942
HB4	4,537	4,090	5,434	5,495	5,567	5,600	5,559	5,431	5,255	5,055
HB5	3,980	3,533	4,872	4,929	4,997	5,024	4,976	4,841	4,656	4,448
HB6	2,879	2,469	3,822	3,890	3,963	3,993	3,940	3,798	3,604	3,382
HB7	2,579	2,308	3,734	3,860	3,980	4,041	4,010	3,881	3,695	3,477
HB8	1,681	1,633	3,171	3,390	3,585	3,702	3,709	3,605	3,439	3,234
HB9	901	1,084	2,742	3,068	3,347	3,532	3,589	3,524	3,393	3,216
HB10	(22)	343	2,095	2,504	2,853	3,094	3,193	3,164	3,061	2,913
HB11	(622)	(148)	1,664	2,126	2,519	2,795	2,925	2,921	2,842	2,715
HB12	(1,342)	(852)	967	1,449	1,884	2,190	2,329	2,329	2,246	2,113
HB13	(2,191)	(1,750)	41	519	967	1,283	1,417	1,408	1,309	1,158
HB14	(2,219)	(1,856)	(108)	114	567	885	207	183	67	(106)
HB15	(3,004)	(2,787)	(1,121)	(722)	(301)	(13)	(410)	(475)	(640)	(864)
HB16	(1,988)	(2,578)	(1,621)	(1,319)	(967)	(1,601)	(1,588)	(1,720)	(1,959)	(2,256)
HB17	(2,453)	(2,756)	(1,359)	(1,193)	(961)	(842)	(912)	(1,119)	(1,432)	(1,804)
HB18	(2,122)	(2,557)	(1,286)	(1,236)	(1,110)	(1,085)	(1,240)	(1,539)	(1,945)	(2,396)
HB19	(2,260)	(2,269)	(1,057)	(1,060)	(978)	(988)	(1,182)	(1,503)	(1,832)	(2,315)
HB20	(2,376)	(2,980)	(1,187)	(971)	(922)	(93)	(289)	(602)	(1,013)	(1,477)
HB21	(1,809)	(2,385)	(1,158)	(1,176)	(1,141)	(1,181)	(891)	(1,189)	(1,574)	(2,010)
HB22	(378)	(922)	330	319	344	300	933	659	307	(92)
HB23	1,705	1,198	2,479	2,483	2,507	2,471	2,333	2,094	1,788	1,443

Figure 30: Statewide System Margin Hourly Curve (1-in-100-Year Extreme Heatwave, Emergency Transfer Criteria)

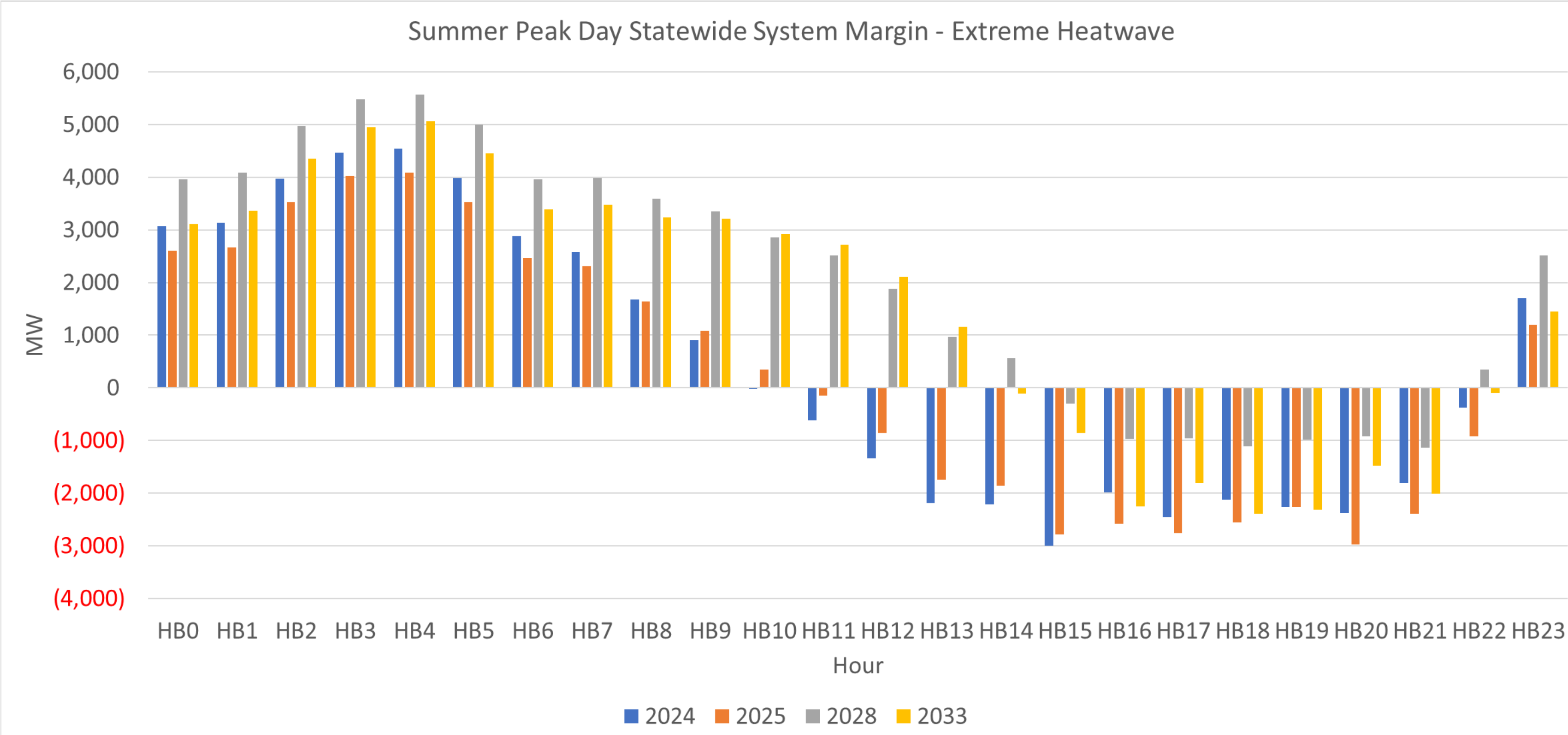


Figure 31: Statewide System Margin (Winter Peak - Expected Weather, Normal Transfer Criteria)

Line	Item	Winter Peak - Baseline Expected Winter Weather, Normal Transfer Criteria (MW)									
		2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34
A	NYCA Generation (1)	40,941	41,226	41,226	41,226	41,226	41,226	41,226	41,226	41,226	41,226
B	NYCA Generation Derates (2)	(6,846)	(7,163)	(7,163)	(7,163)	(7,163)	(7,163)	(7,163)	(7,163)	(7,163)	(7,163)
C	Temperature Based Generation Derates	0	0	0	0	0	0	0	0	0	0
D	External Area Interchanges (3)	1,268	1,268	1,268	1,268	1,268	1,268	1,268	1,268	1,268	1,268
E	**Total Resources (A+B+C+D)**	35,363	35,331	35,331	35,331	35,331	35,331	35,331	35,331	35,331	35,331
F	Demand Forecast (5)	(24,385)	(24,755)	(25,235)	(25,771)	(26,433)	(27,305)	(28,335)	(29,525)	(30,895)	(32,345)
G	Largest Loss-of-Source Contingency	(1,310)	(1,310)	(1,310)	(1,310)	(1,310)	(1,310)	(1,310)	(1,310)	(1,310)	(1,310)
H	**Total Capability Requirement (F+G)**	(25,695)	(26,065)	(26,545)	(27,081)	(27,743)	(28,615)	(29,645)	(30,835)	(32,205)	(33,655)
I	**Statewide System Margin (E+H)**	9,668	9,266	8,786	8,250	7,588	6,716	5,686	4,496	3,126	1,676
J	Operating Reserve	(1,310)	(1,310)	(1,310)	(1,310)	(1,310)	(1,310)	(1,310)	(1,310)	(1,310)	(1,310)
K	**Statewide System Margin with Full Operating Reserve (I+J) (4)**	8,358	7,956	7,476	6,940	6,278	5,406	4,376	3,186	1,816	366

Notes:

1. Reflects the 2023 Gold Book existing winter capacity plus projected additions and deactivations.
2. Reflects the derates for generating resources. For this evaluation land-based wind generation is assumed to have a capability of 10% of the total nameplate, off-shore wind at 15% of the total nameplate, solar generation is based on the ratio of solar PV nameplate capacity (2023 Gold Book Table I-9a) and solar PV peak reductions (2023 Gold Book Table I-9c). For winter the expected solar PV output at peak is 0 MW. Derates for run-of-river hydro are included as well as the Oswego Export limit for all lines in-service. Includes derates for thermal resources based on NERC five-year class average EFORd data published August 2022 (https://www.nerc.com/pa/RAPA/gads/Pages/Reports.aspx).
3. Interchanges are based on ERAG MMWG values.
4. For informational purposes.
5. Reflects the final 10-year peak forecasts presented to stakeholders at the April 5, 2023 LFTF/ESPWG with adjustments for large load queue projects included in this STAR (Q0580 – WNY STAMP, Q0776 – Greenidge, Q0849 – Somerset, Q0580 – Cayuga, Q0979 – North Country Data Center).

Figure 32: Statewide System Margin (1-in-10-Year Cold Snap, Emergency Transfer Criteria)

Line	Item	Winter Peak - 1-in-10-Year Cold Snap, Emergency Transfer Criteria (MW)									
		2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34
A	NYCA Generation (1)	40,941	41,226	41,226	41,226	41,226	41,226	41,226	41,226	41,226	41,226
B	NYCA Generation Derates (2)	(6,846)	(7,163)	(7,163)	(7,163)	(7,163)	(7,163)	(7,163)	(7,163)	(7,163)	(7,163)
C	Temperature Based Generation Derates	0	0	0	0	0	0	0	0	0	0
D	External Area Interchanges (3)	1,268	1,268	1,268	1,268	1,268	1,268	1,268	1,268	1,268	1,268
E	SCRs (4), (5)	486	486	486	486	486	486	486	486	486	486
F	**Total Resources (A+B+C+D+E)**	35,849	35,817	35,817	35,817	35,817	35,817	35,817	35,817	35,817	35,817
G	Demand Forecast (6)	(25,407)	(25,794)	(26,294)	(26,853)	(27,542)	(28,450)	(29,523)	(30,764)	(32,192)	(33,702)
H	Largest Loss-of-Source Contingency	(1,310)	(1,310)	(1,310)	(1,310)	(1,310)	(1,310)	(1,310)	(1,310)	(1,310)	(1,310)
I	**Total Capability Requirement (G+H)**	(26,717)	(27,104)	(27,604)	(28,163)	(28,852)	(29,760)	(30,833)	(32,074)	(33,502)	(35,012)
J	**Statewide System Margin (F+I)**	9,132	8,714	8,214	7,654	6,965	6,057	4,984	3,743	2,315	805
K	Operating Reserve	(1,310)	(1,310)	(1,310)	(1,310)	(1,310)	(1,310)	(1,310)	(1,310)	(1,310)	(1,310)
L	**Statewide System Margin with Full Operating Reserve (J+K)**	7,822	7,404	6,904	6,344	5,655	4,747	3,674	2,433	1,005	(505)

Notes:

1. Reflects the 2023 Gold Book existing winter capacity plus projected additions and deactivations.
2. Reflects the derates for generating resources. For this evaluation land-based wind generation is assumed to have a capability of 10% of the total nameplate, off-shore wind at 15% of the total nameplate, solar generation is based on the ratio of solar PV nameplate capacity (2023 Gold Book Table I-9a) and solar PV peak reductions (2023 Gold Book Table I-9c). For winter the expected solar PV output at peak is 0 MW. Derates for run-of-river hydro are included as well as the Oswego Export limit for all lines in-service. Includes derates for thermal resources based on NERC five-year class average EFORd data published August 2022 (https://www.nerc.com/pa/RAPA/gads/Pages/Reports.aspx).
3. Interchanges are based on ERAG MMWG values.
4. SCRs are not applied for transmission security analysis of normal operations, but are included for emergency operations.
5. Includes a derate of 211 MW for SCRs.
6. Reflects the final 10-year peak forecasts presented to stakeholders at the April 5, 2023 LFTF/ESPWG with adjustments for large load queue projects included in this STAR (Q0580 – WNY STAMP, Q0776 – Greenidge, Q0849 – Somerset, Q0580 – Cayuga, Q0979 – North Country Data Center).

Figure 33: Statewide System Margin (1-in-100-Year Extreme Cold Snap, Emergency Transfer Criteria)

Line	Item	Winter Peak - 1-in-100-Year Extreme Cold Snap, Emergency Transfer Criteria (MW)									
		2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34
A	NYCA Generation (1)	40,941	41,226	41,226	41,226	41,226	41,226	41,226	41,226	41,226	41,226
B	NYCA Generation Derates (2)	(6,846)	(7,163)	(7,163)	(7,163)	(7,163)	(7,163)	(7,163)	(7,163)	(7,163)	(7,163)
C	Temperature Based Generation Derates	0	1	2	3	4	5	6	7	8	9
D	External Area Interchanges (3)	1,268	1,268	1,268	1,268	1,268	1,268	1,268	1,268	1,268	1,268
E	SCRs (4), (5)	486	486	486	486	486	486	486	486	486	486
F	**Total Resources (A+B+C+D+E)**	35,849	35,818	35,819	35,820	35,821	35,822	35,823	35,824	35,825	35,826
G	Demand Forecast (6)	(27,208)	(27,619)	(28,156)	(28,754)	(29,493)	(30,467)	(31,615)	(32,945)	(34,473)	(36,088)
H	Largest Loss-of-Source Contingency	(1,310)	(1,310)	(1,310)	(1,310)	(1,310)	(1,310)	(1,310)	(1,310)	(1,310)	(1,310)
I	**Total Capability Requirement (G+H)**	(28,518)	(28,929)	(29,466)	(30,064)	(30,803)	(31,777)	(32,925)	(34,255)	(35,783)	(37,398)
J	**Statewide System Margin (F+I)**	7,330	6,889	6,353	5,756	5,019	4,045	2,899	1,570	43	(1,572)
K	Operating Reserve	(1,310)	(1,310)	(1,310)	(1,310)	(1,310)	(1,310)	(1,310)	(1,310)	(1,310)	(1,310)
L	**Statewide System Margin with Full Operating Reserve (J+K)**	6,020	5,579	5,043	4,446	3,709	2,735	1,589	260	(1,267)	(2,882)

Notes:

1. Reflects the 2023 Gold Book existing winter capacity plus projected additions and deactivations.
2. Reflects the derates for generating resources. For this evaluation land-based wind generation is assumed to have a capability of 10% of the total nameplate, off-shore wind at 15% of the total nameplate, solar generation is based on the ratio of solar PV nameplate capacity (2023 Gold Book Table I-9a) and solar PV peak reductions (2023 Gold Book Table I-9c). For winter the expected solar PV output at peak is 0 MW. Derates for run-of-river hydro are included as well as the Oswego Export limit for all lines in-service. Includes derates for thermal resources based on NERC five-year class average EFORd data published August 2022 (https://www.nerc.com/pa/RAPA/gads/Pages/Reports.aspx).
3. Interchanges are based on ERAG MMWG values.
4. SCRs are not applied for transmission security analysis of normal operations, but are included for emergency operations.
5. Includes a derate of 211 MW for SCRs.
6. Reflects the final 10-year peak forecasts presented to stakeholders at the April 5, 2023 LFTF/ESPWG with adjustments for large load queue projects included in this STAR (Q0580 – WNY STAMP, Q0776 – Greenidge, Q0849 – Somerset, Q0580 – Cayuga, Q0979 – North Country Data Center).

Figure 34: Summary of Statewide System Margin – Summer

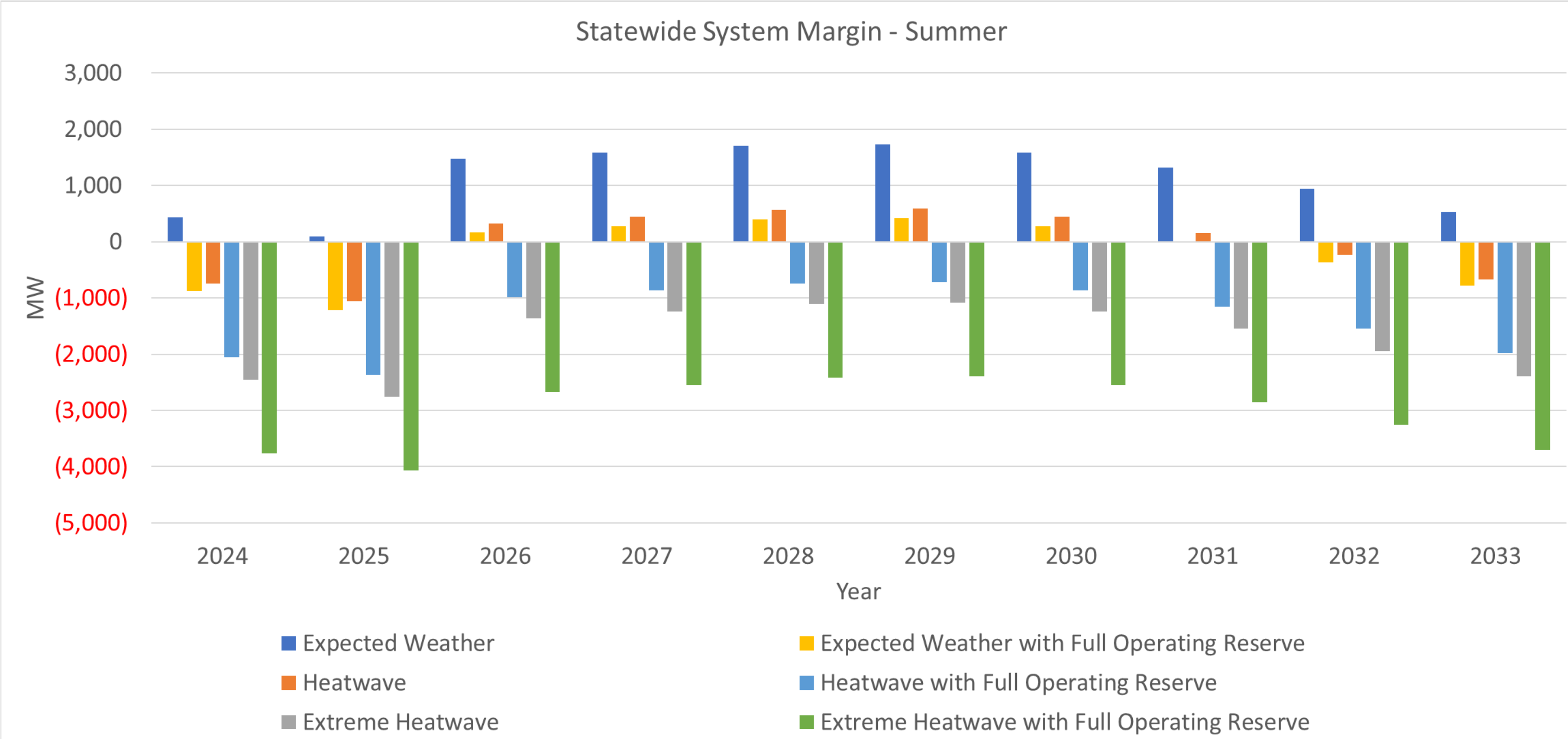
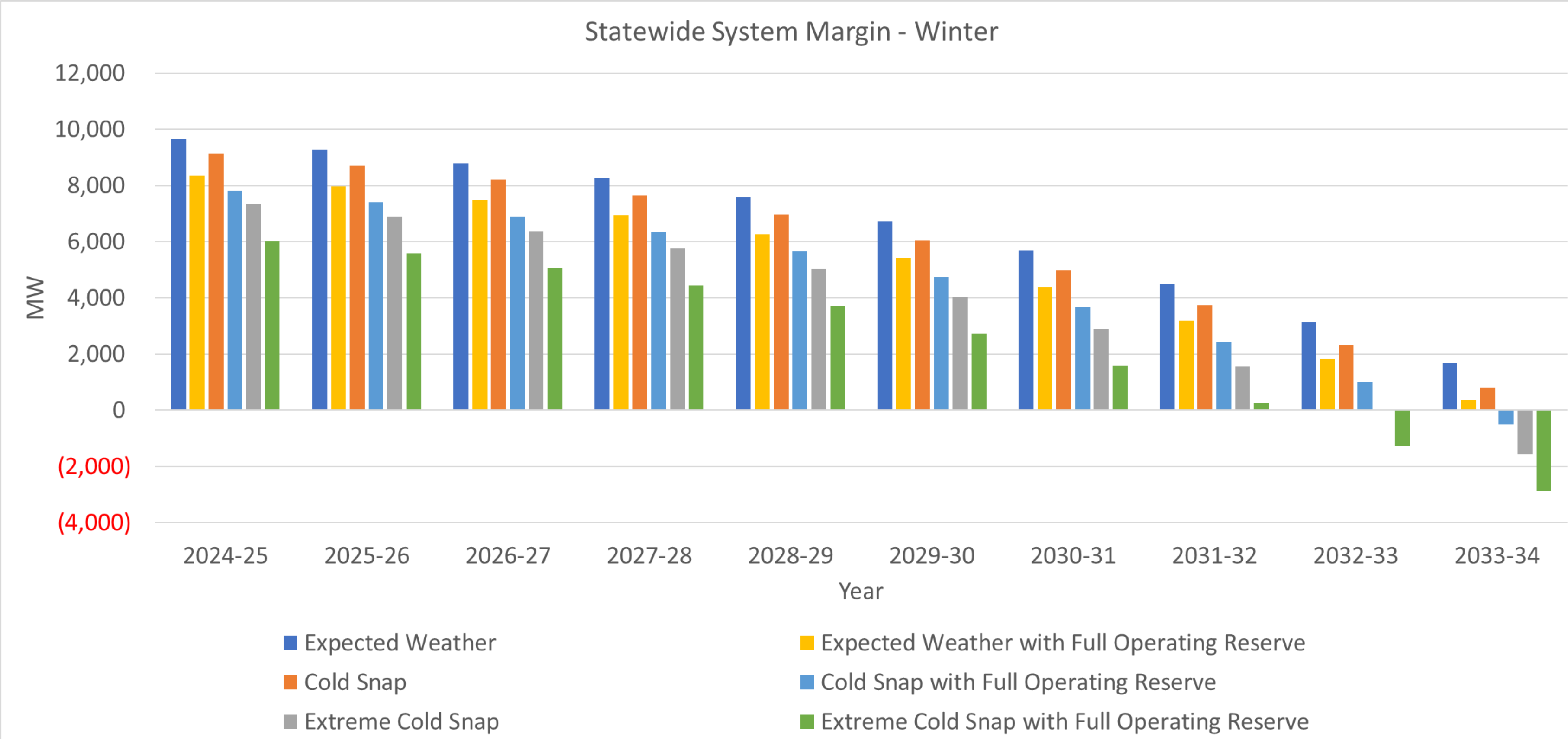


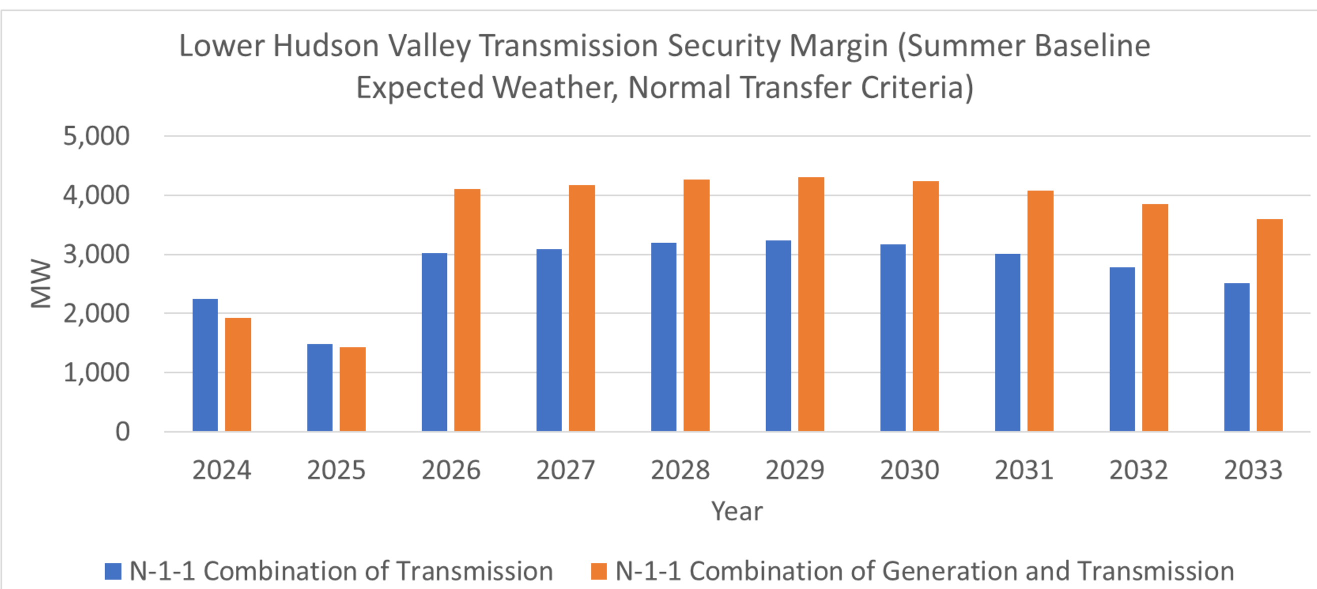
Figure 35: Summary of Statewide System Margin – Winter



Lower Hudson Valley (Zones G-J) Transmission Security Margins

The Lower Hudson Valley, or southeastern New York (SENY) region, is comprised of Zones G-J and includes the electrical connections to the RECO load in PJM. To determine the transmission security margin for this area, the most limiting combination of two non-simultaneous contingency events (N-1-1) to the transmission security margin was determined. Design criteria N-1-1 combinations include various combinations of losses of generation and transmission. As the system changes the limiting contingency combination may also change. **Figure 36** shows how the summer transmission security margin changes through time in consideration of the planned transmission system changes which impact the most limiting contingency combination for the year being evaluated. In summer 2024 the most limiting contingency combination to the transmission security margin under peak demand conditions is the loss of Ravenswood 3 followed by the loss of Pleasant Valley-Wood St. 345 kV (F30/F31). Starting in summer 2026, the limiting contingency combination changes to the loss of Knickerbocker – Pleasant Valley 345 kV followed by the loss of Athens-Van Wagner 345 kV and one of the Athens gas/steam combinations. The limiting contingency combination for winter also changes through time in consideration of the planned transmission system changes. Starting in winter 2024-25 and for the remainder of the 10-year study horizon, the limiting contingency combination is the loss of Ravenswood 3 followed by the loss of Pleasant Valley-Wood St. 345 kV (F30/F31).

Figure 36: Lower Hudson Valley Transmission Security Margin (Summer Baseline Peak Forecast – Expected Weather)



As transmission security analysis represents discrete snapshots in time of various credible combinations of system conditions, only the magnitude of a reliability need can be identified under those system conditions. Additional details are required to fully describe the nature of the need, such as evaluating the hourly demand shape and its impact on the need. To describe the nature of the Lower Hudson Valley transmission security margin, demand shapes are developed the Zone G, H, I, and J components of the statewide demand shape. Details of the demand shapes are provided later in this appendix. For this assessment, demand shapes were not developed past 2033 and are limited to the summer conditions.

Figure 37 shows the calculation of the Lower Hudson Valley transmission security margin for the statewide coincident summer peak demand hour with expected weather and with normal transfer criteria. The Lower Hudson Valley transmission security margin is sufficient for the 10-year horizon (line-item O). The transmission security margin coincident with the statewide system peak ranges from 1,930 MW in summer 2024 to 2,515 MW in summer 2033. Considering the summer baseline peak demand transmission security margin, the lower Hudson Valley would require several additional outages beyond design criteria to have a deficient transmission security margin.

The demand shapes for the Lower Hudson Valley show the contributions of Zones G, H, I, (Figure 93) and J (Figure 94) towards the statewide shape (which represents the statewide coincident peak) for each hour of the day. Utilizing the demand shapes for the baseline summer peak day with expected weather, the Lower Hudson Valley transmission security margin for each hour utilizing normal transfer criteria is shown in **Figure 38**. The Lower Hudson Valley transmission security margin for each hour is created by using the demand forecast for each hour in the margin calculation (*i.e.*, **Figure 37** line-item A) with additional adjustments to account for the appropriate derate for solar generation and energy limited resources in each hour (*i.e.*, **Figure 37** line-item K). All other values in the margin calculations are held constant. A graphical representation of the hourly margin for the Lower Hudson Valley for the peak day in years 2024, 2025, 2028, and 2033 is provided in **Figure 39**. For all years in the 10-year study horizon, the assessment did not observe deficiencies considering the demand shapes under expected demand, normal transfer criteria for the Lower Hudson Valley.

It is possible for other combinations of events, such as a 1-in-10-year heatwave or 1-in-100-year extreme heatwave, to result in a deficient transmission security margin. **Figure 40** shows that the Lower Hudson Valley transmission security margin for the statewide coincident peak hour under the 1-in-10-year heatwave condition with the assumption that the system is using emergency transfer criteria. The transmission security margin under 1-in-10-year heatwave condition is sufficient for all years. The margin ranges from 2,217 MW in summer 2024 to 2,705 MW in summer 2033. The demand shapes for the Lower Hudson Valley under heatwave conditions are shown in **Figure 99** (Zones G, H, and I) and **Figure 100**

(Zone J). Utilizing the Lower Hudson Valley demand-duration heatwave shapes, the transmission security margin for each hour utilizing emergency transfer criteria is shown in **Figure 41**. For all years in the 10-year horizon, there are no observed transmission security margin deficiencies considering the heatwave demand duration shapes for the Lower Hudson Valley with emergency transfer criteria. A graphical representation of the hourly margin for the Lower Hudson Valley for the peak day in years 2024, 2025, 2028, and 2033 heatwave, emergency transfer criteria conditions is provided in **Figure 42**.

Under a 1-in-100-year extreme heatwave, which also assumes the use of emergency transfer criteria, the margin is sufficient at the statewide coincident peak hour. **Figure 43** shows that the margin is sufficient and ranges from 1,488 MW in summer 2024 to 1,968 MW in summer 2033. The demand shapes for the Lower Hudson Valley under extreme heatwave conditions are shown in **Figure 104** (Zones G, H, I, and J) and **Figure 105** (Zone J). Utilizing the Lower Hudson Valley demand-duration extreme heatwave shapes, the transmission security margin for each hour utilizing emergency transfer criteria is shown in **Figure 44**. **Figure 45** provides a graphical representation of the hourly transmission security margin for the peak day in years 2024, 2025, 2028, and 2033.

Figure 46 shows the Lower Hudson Valley transmission security margin under winter peak demand with expected weather. For winter peak, the margin is sufficient for all years and ranges from 7,683 MW in winter 2024-25 to 4,481 MW in winter 2033-34 (line-item O). Considering the winter baseline peak demand transmission security margin, multiple outages in the lower Hudson Valley would be required to show a deficient transmission security margin.

Figure 47 shows the Lower Hudson Valley transmission security margin in a 1-in-10-year cold snap with emergency transfer criteria. Under this condition, the margin is sufficient for all study years and ranges from 8,142 MW in winter 2024-25 to 4,807 MW in winter 2033-33 (line-item P). The 1-in-100-year extreme cold snap shown in **Figure 48** (also assuming emergency transfer criteria) shows sufficient margin for all study years ranging from 7,357 MW in winter 2024-25 to 3,789 in winter 2033-34 (line-item P).

Figure 49 provides are summary of the summer peak Lower Hudson Valley transmission security margins under expected summer weather, heatwave, and extreme heatwave conditions. **Figure 50** provides a summary of the winter peak Lower Hudson Valley transmission security margins under expected winter weather, cold snap, and extreme cold snap conditions.

Figure 37: Lower Hudson Valley Transmission Security Margin (Summer Peak – Expected Weather, Normal Transfer Criteria)

Summer Peak - Baseline Expected Weather, Normal Transfer Criteria (MW)											
Line	**Item**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**
A	G-J Demand Forecast (4)	(15,214)	(15,206)	(15,140)	(15,074)	(14,971)	(14,931)	(14,998)	(15,160)	(15,378)	(15,642)
B	RECO Demand	(389)	(389)	(389)	(387)	(387)	(387)	(387)	(387)	(388)	(388)
C	**Total Demand (A+B)**	(15,603)	(15,595)	(15,529)	(15,461)	(15,358)	(15,318)	(15,385)	(15,547)	(15,766)	(16,030)
D	UPNY-SENY Limit (3)	5,725	5,725	5,025	5,025	5,025	5,025	5,025	5,025	5,025	5,025
E	ABC PARs to J	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)
F	K - SENY	95	95	95	95	95	95	95	95	95	95
G	**Total SENY AC Import (D+E+F)**	5,809	5,809	5,109	5,109	5,109	5,109	5,109	5,109	5,109	5,109
H	Loss of Source Contingency	(987)	(987)	0	0	0	0	0	0	0	0
I	**Resource Need (C+G+H)**	(10,781)	(10,773)	(10,420)	(10,352)	(10,249)	(10,209)	(10,276)	(10,438)	(10,657)	(10,921)
J	G-J Generation (1)	13,481	12,991	12,991	12,991	12,991	12,991	12,991	12,991	12,991	12,991
K	G-J Generation Derates (2)	(1,086)	(1,110)	(1,113)	(1,114)	(1,115)	(1,116)	(1,118)	(1,118)	(1,119)	(1,120)
L	Temperature Based Generation Derates	0	0	0	0	0	0	0	0	0	0
M	Net ICAP External Imports	315	315	1,565	1,565	1,565	1,565	1,565	1,565	1,565	1,565
N	**Total Resources Available (J+K+L+M)**	12,711	12,196	13,444	13,442	13,441	13,440	13,438	13,438	13,437	13,436
O	**Transmission Security Margin (I+N)**	1,930	1,423	3,024	3,090	3,192	3,231	3,162	3,000	2,780	2,515

Notes:

1. Reflects the 2023 Gold Book existing summer capacity plus projected additions and deactivations.
2. Reflects the derates for generating resources. For this evaluation land-based wind generation is assumed to have a capability of 5% of the total nameplate, off-shore wind at 10% of the total nameplate, solar generation is based on the ratio of solar PV nameplate capacity (2023 Gold Book Table I-9a) and solar PV peak reductions (2023 Gold Book Table I-9c). Derates for run-of-river hydro are included as well as the Oswego Export limit for all lines in-service. Includes derates for thermal resources based on NERC five-year class average EFORd data published August 2022 (https://www.nerc.com/pa/RAPA/gads/Pages/Reports.aspx).
3. Limits for 2024 and 2025 are based on the summer peak 2025 representations evaluated in the post-2020 RNA updates. Limits for 2026 through 2033 are based on the summer peak 2032 represenations evalauted in the 2022 RNA.
4. Reflects the final 10-year peak forecasts presented to stakeholders at the April 5, 2023 LFTF/ESPWG with adjustments for large load queue projects included in this STAR (Q0580 – WNY STAMP, Q0776 – Greenidge, Q0849 – Somerset, Q0580 – Cayuga, Q0979 – North Country Data Center).

Figure 38: Lower Hudson Valley Transmission Security Margin (Hourly) (Summer Peak – Expected Weather, Normal Transfer Criteria)

Summer Peak - Baseline Expected Summer Weather, Normal Transfer Criteria (MW)										
G-J Transmission Security Margin										
Hour	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
HB0	6,166	5,462	7,035	7,074	7,146	7,174	7,127	7,008	6,736	6,550
HB1	6,712	6,020	7,592	7,636	7,710	7,742	7,702	7,596	7,345	7,178
HB2	7,101	6,416	7,991	8,034	8,109	8,145	8,109	8,016	7,779	7,628
HB3	7,330	6,648	8,223	8,269	8,342	8,380	8,351	8,256	8,032	7,884
HB4	7,345	6,662	8,237	8,282	8,356	8,394	8,366	8,273	8,049	7,903
HB5	7,054	6,366	7,938	7,982	8,055	8,090	8,057	7,961	7,721	7,567
HB6	6,453	5,756	7,336	7,385	7,464	7,504	7,468	7,364	7,109	6,944
HB7	5,642	4,953	6,552	6,625	6,728	6,781	6,754	6,653	6,392	6,223
HB8	4,969	4,302	5,926	6,034	6,166	6,243	6,233	6,142	5,888	5,726
HB9	4,388	3,747	5,403	5,549	5,714	5,815	5,826	5,752	5,508	5,360
HB10	3,876	3,254	4,936	5,109	5,300	5,426	5,449	5,390	5,153	5,020
HB11	3,474	2,864	4,562	4,754	4,965	5,105	5,142	5,089	4,862	4,735
HB12	3,127	2,525	4,227	4,428	4,647	4,793	4,835	4,783	4,553	4,432
HB13	2,789	2,179	3,884	4,084	4,302	4,447	4,487	4,435	4,197	4,072
HB14	2,556	1,936	3,641	3,833	4,047	4,188	4,222	4,164	3,917	3,786
HB15	2,262	1,619	3,309	3,484	3,683	3,809	3,828	3,753	3,484	3,333
HB16	2,014	1,342	3,008	3,152	3,325	3,425	3,418	3,316	3,011	2,830
HB17	1,930	1,216	2,848	2,954	3,094	3,164	3,127	2,995	2,706	2,489
HB18	2,150	1,415	3,022	3,090	3,192	3,231	3,162	3,000	2,630	2,378
HB19	2,428	1,676	3,261	3,306	3,388	3,412	3,328	3,152	2,771	2,507
HB20	2,701	1,949	3,526	3,567	3,645	3,665	3,581	3,406	3,031	2,768
HB21	3,143	2,395	3,970	4,010	4,088	4,108	4,029	3,859	3,495	3,239
HB22	3,935	3,196	4,770	4,810	4,884	4,905	4,833	4,675	4,333	4,093
HB23	4,785	4,060	5,633	5,675	5,750	5,775	5,715	5,577	5,262	5,047

Figure 39: Lower Hudson Valley Transmission Security Margin Hourly Curve (Summer Peak – Expected Weather, Normal Transfer Criteria)

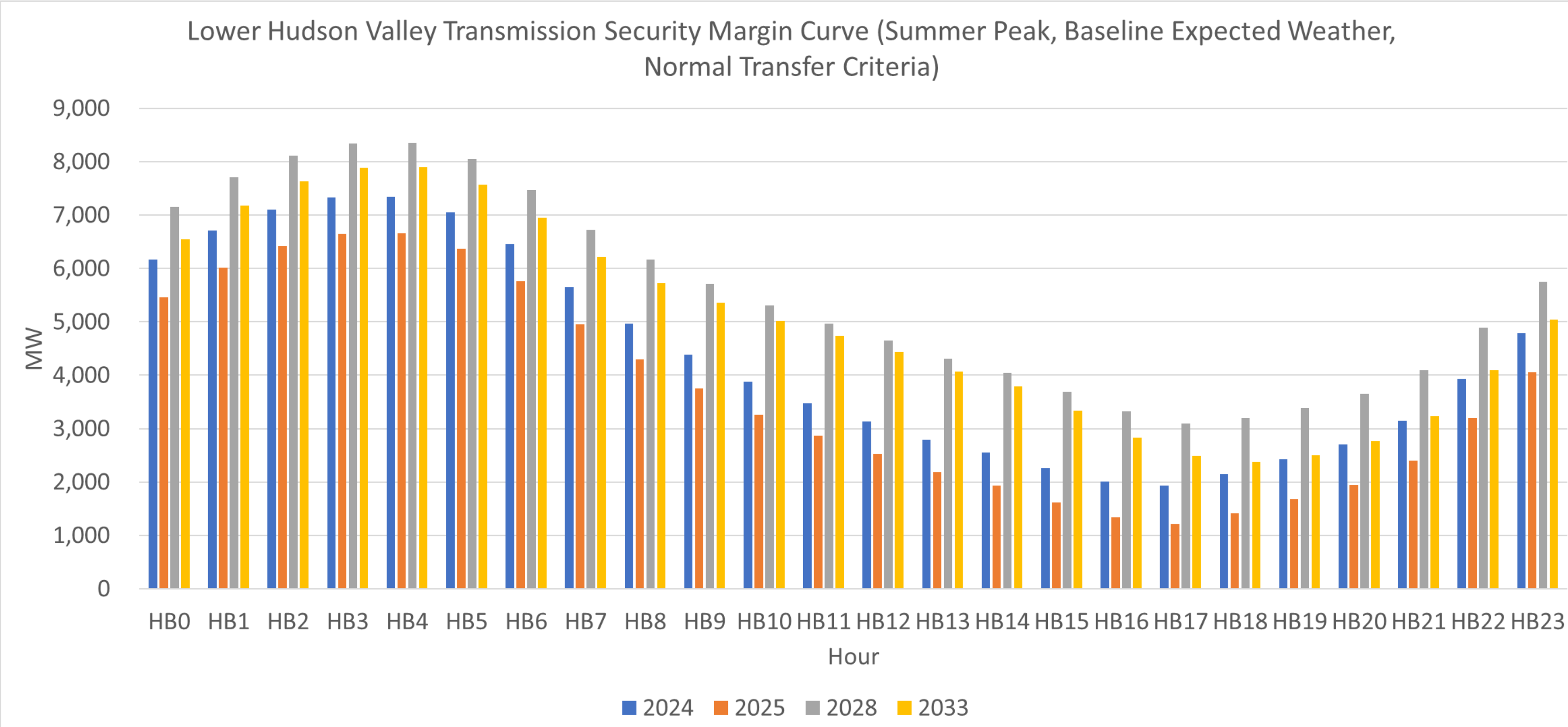


Figure 40: Lower Hudson Valley Transmission Security Margin (1-in-10-Year Heatwave, Emergency Transfer Criteria)

Summer Peak - 1-in-10-Year Heatwave, Emergency Transfer Criteria (MW)											
Line	**Item**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**
A	G-J Demand Forecast (6)	(15,859)	(15,850)	(15,781)	(15,712)	(15,605)	(15,564)	(15,634)	(15,803)	(16,032)	(16,306)
B	RECO Demand	(412)	(412)	(412)	(410)	(410)	(410)	(410)	(410)	(411)	(411)
C	**Total Demand (A+B)**	(16,271)	(16,262)	(16,193)	(16,122)	(16,015)	(15,974)	(16,044)	(16,213)	(16,443)	(16,717)
D	UPNY-SENY Limit (5)	5,450	5,450	5,650	5,650	5,650	5,650	5,650	5,650	5,650	5,650
E	ABC PARs to J	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)
F	K - SENY	155	155	155	155	155	155	155	155	155	155
G	**Total SENY AC Import (D+E+F)**	5,594	5,594	5,794	5,794	5,794	5,794	5,794	5,794	5,794	5,794
H	Loss of Source Contingency	0	0	0	0	0	0	0	0	0	0
I	**Resource Need (C+G+H)**	(10,677)	(10,668)	(10,399)	(10,328)	(10,221)	(10,180)	(10,250)	(10,419)	(10,649)	(10,923)
J	G-J Generation (1)	13,481	12,991	12,991	12,991	12,991	12,991	12,991	12,991	12,991	12,991
K	G-J Generation Derates (2)	(1,086)	(1,110)	(1,113)	(1,114)	(1,115)	(1,116)	(1,118)	(1,118)	(1,119)	(1,120)
L	Temperature Based Generation Derates	(87)	(78)	(78)	(78)	(78)	(78)	(78)	(78)	(78)	(78)
M	Net ICAP External Imports	315	315	1,565	1,565	1,565	1,565	1,565	1,565	1,565	1,565
N	SCRs (3), (4)	271	271	271	271	271	271	271	271	271	271
O	**Total Resources Available (J+K+L+M+N)**	12,895	12,389	13,636	13,635	13,634	13,633	13,631	13,631	13,630	13,629
P	**Transmission Security Margin (I+O)**	2,217	1,721	3,237	3,307	3,413	3,452	3,381	3,212	2,981	2,705

Notes:

1. Reflects the 2023 Gold Book existing summer capacity plus projected additions and deactivations.
2. Reflects the derates for generating resources. For this evaluation land-based wind generation is assumed to have a capability of 5% of the total nameplate, off-shore wind at 10% of the total nameplate, solar generation is based on the ratio of solar PV nameplate capacity (2023 Gold Book Table I-9a) and solar PV peak reductions (2023 Gold Book Table I-9c). Derates for run-of-river hydro are included as well as the Oswego Export limit for all lines in-service. Includes derates for thermal resources based on NERC five-year class average EFORd data published August 2022 (https://www.nerc.com/pa/RAPA/gads/Pages/Reports.aspx).
3. SCRs are not applied for transmission security analysis of normal operations, but are included for emergency operations.
4. Includes a derate of 226 MW for SCRs.
5. Limits for 2024 and 2025 are based on the summer peak 2025 representations evaluated in the post-2020 RNA updates. Limits for 2026 through 2032 are based on the summer peak 2033 represenations evalauted in the 2022 RNA.
6. Reflects the final 10-year peak forecasts presented to stakeholders at the April 5, 2023 LFTF/ESPWG with adjustments for large load queue projects included in this STAR (Q0580 – WNY

Figure 41: Lower Hudson Valley Transmission Security Margin (Hourly) (1-in-10-Year Heatwave, Emergency Transfer Criteria)

Summer Peak - Heatwave, Emergency Transfer Criteria (MW)										
G-J Transmission Security Margin										
Hour	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
HB0	5,959	5,397	6,885	6,770	6,823	6,836	6,786	6,664	6,461	6,272
HB1	6,530	5,977	7,463	7,354	7,414	7,433	7,391	7,282	7,100	6,928
HB2	6,931	6,382	7,871	7,762	7,825	7,850	7,813	7,717	7,549	7,391
HB3	7,185	6,636	8,125	8,020	8,082	8,111	8,080	7,982	7,826	7,672
HB4	7,254	6,705	8,194	8,087	8,150	8,178	8,148	8,052	7,897	7,745
HB5	7,014	6,465	7,948	7,839	7,898	7,921	7,885	7,786	7,616	7,456
HB6	6,450	5,892	7,383	7,274	7,334	7,357	7,315	7,206	7,020	6,848
HB7	5,624	5,074	6,579	6,485	6,559	6,585	6,546	6,434	6,236	6,054
HB8	4,916	4,382	5,903	5,834	5,925	5,963	5,933	5,821	5,618	5,431
HB9	4,284	3,770	5,314	5,271	5,382	5,433	5,412	5,307	5,101	4,916
HB10	3,781	3,282	4,845	4,820	4,946	5,012	4,995	4,896	4,688	4,509
HB11	3,483	2,998	4,573	4,562	4,701	4,774	4,767	4,669	4,468	4,290
HB12	3,159	2,671	4,242	4,241	4,396	4,483	4,481	4,383	4,175	3,996
HB13	2,901	2,423	3,995	3,968	4,134	4,229	4,228	4,133	3,934	3,750
HB14	2,599	2,123	3,694	3,637	3,811	3,913	3,911	3,812	3,618	3,429
HB15	2,485	2,003	3,559	3,195	3,370	3,468	3,458	3,347	3,151	2,943
HB16	2,228	1,738	3,276	3,133	3,298	3,386	3,359	3,231	3,023	2,522
HB17	2,217	1,721	3,237	3,039	3,176	3,241	3,193	3,095	2,886	2,635
HB18	2,542	2,033	3,534	3,307	3,413	3,452	3,381	3,212	2,981	2,705
HB19	2,576	2,054	3,808	3,563	3,655	3,685	3,603	3,425	3,189	2,909
HB20	2,888	2,353	3,833	3,609	3,689	3,709	3,626	3,450	3,208	3,206
HB21	3,361	2,814	4,294	4,095	4,167	4,180	4,101	3,929	3,685	3,421
HB22	4,199	3,643	5,125	4,952	5,014	5,024	4,951	4,791	4,555	4,310
HB23	5,122	4,563	6,046	5,902	5,959	5,968	5,905	5,766	5,544	5,326

Figure 42: Lower Hudson Valley Transmission Security Margin Hourly Curve (1-in-10-Year Heatwave, Emergency Transfer Criteria)

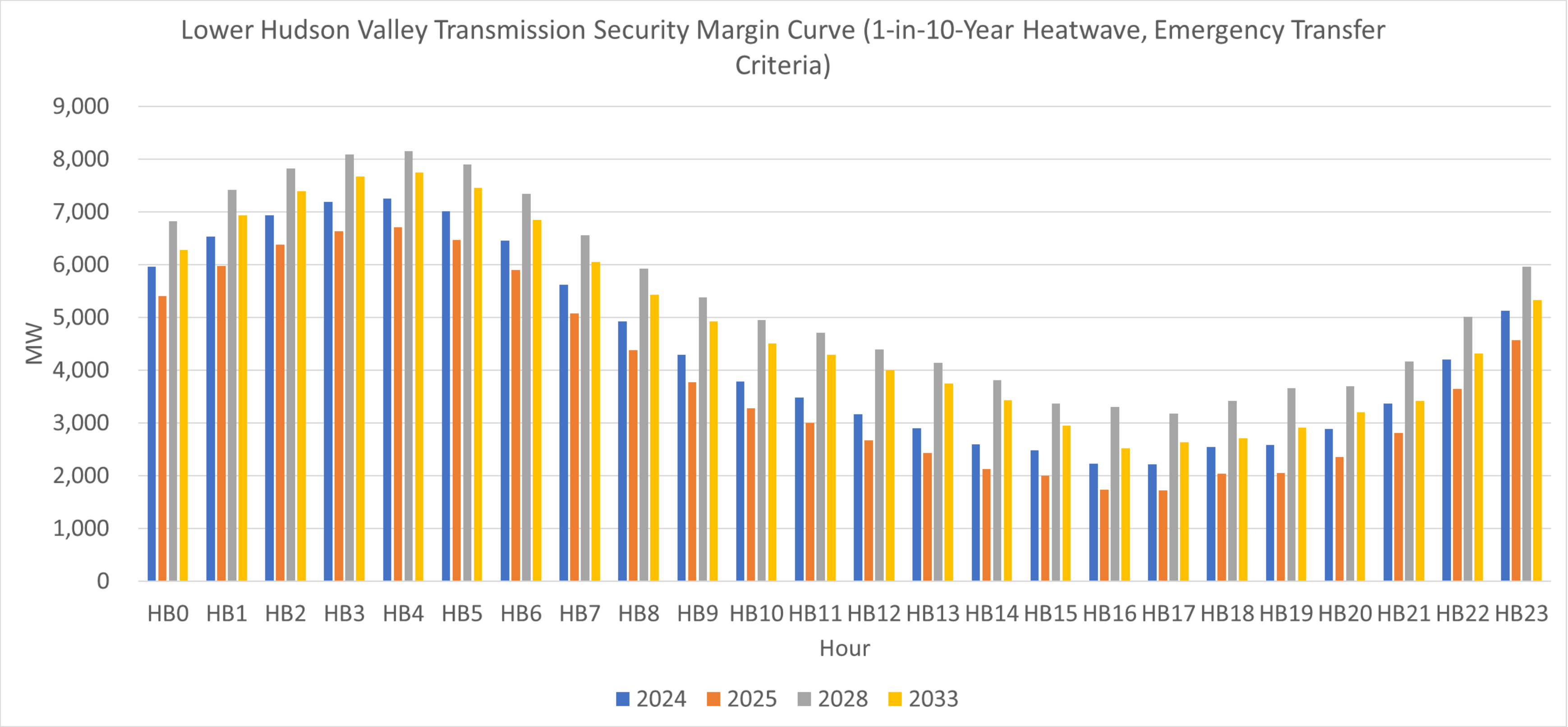


Figure 43: Lower Hudson Valley Transmission Security Margin (1-in-100-Year Extreme Heatwave, Emergency Transfer Criteria)

Summer Peak - 1-in-100-Year Extreme Heatwave, Emergency Transfer Criteria (MW)											
Line	**Item**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**
A	G-J Demand Forecast (6)	(16,476)	(16,467)	(16,395)	(16,323)	(16,212)	(16,170)	(16,243)	(16,419)	(16,655)	(16,941)
B	RECO Demand	(429)	(429)	(429)	(426)	(426)	(426)	(426)	(426)	(427)	(427)
C	**Total Demand (A+B)**	(16,905)	(16,896)	(16,824)	(16,749)	(16,638)	(16,596)	(16,669)	(16,845)	(17,082)	(17,368)
D	UPNY-SENY Limit (5)	5,450	5,450	5,650	5,650	5,650	5,650	5,650	5,650	5,650	5,650
E	ABC PARs to J	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)
F	K - SENY	155	155	155	155	155	155	155	155	155	155
G	**Total SENY AC Import (D+E+F)**	5,594	5,594	5,794	5,794	5,794	5,794	5,794	5,794	5,794	5,794
H	Loss of Source Contingency	0	0	0	0	0	0	0	0	0	0
I	**Resource Need (C+G+H)**	(11,311)	(11,302)	(11,030)	(10,955)	(10,844)	(10,802)	(10,875)	(11,051)	(11,288)	(11,574)
J	G-J Generation (1)	13,481	12,991	12,991	12,991	12,991	12,991	12,991	12,991	12,991	12,991
K	G-J Generation Derates (2)	(1,086)	(1,110)	(1,113)	(1,114)	(1,115)	(1,116)	(1,118)	(1,118)	(1,119)	(1,120)
L	Temperature Based Generation Derates	(183)	(164)	(164)	(164)	(164)	(164)	(164)	(164)	(164)	(164)
M	Net ICAP External Imports	315	315	1,565	1,565	1,565	1,565	1,565	1,565	1,565	1,565
N	SCRs (3), (4)	271	271	271	271	271	271	271	271	271	271
O	**Total Resources Available (J+K+L+M+N)**	12,798	12,302	13,550	13,549	13,547	13,546	13,545	13,545	13,543	13,542
P	**Transmission Security Margin (I+O)**	1,488	1,001	2,520	2,593	2,703	2,744	2,669	2,493	2,255	1,968

Notes:

1. Reflects the 2023 Gold Book existing summer capacity plus projected additions and deactivations.
2. Reflects the derates for generating resources. For this evaluation land-based wind generation is assumed to have a capability of 5% of the total nameplate, off-shore wind at 10% of the total nameplate, solar generation is based on the ratio of solar PV nameplate capacity (2023 Gold Book Table I-9a) and solar PV peak reductions (2023 Gold Book Table I-9c). Derates for run-of-river hydro are included as well as the Oswego Export limit for all lines in-service. Includes derates for thermal resources based on NERC five-year class average EFORd data published August 2022 (https://www.nerc.com/pa/RAPA/gads/Pages/Reports.aspx).
3. SCRs are not applied for transmission security analysis of normal operations, but are included for emergency operations.
4. Includes a derate of 226 MW for SCRs.
5. Limits for 2024 and 2025 are based on the summer peak 2025 representations evaluated in the post-2020 RNA updates. Limits for 2026 through 2032 are based on the summer peak 2033 represenations evalauted in the 2022 RNA.
6. Reflects the final 10-year peak forecasts presented to stakeholders at the April 5, 2023 LFTF/ESPWG with adjustments for large load queue projects included in this STAR (Q0580 – WNY STAMP, Q0776 – Greenidge, Q0849 – Somerset, Q0580 – Cayuga, Q0979 – North Country Data Center).

Figure 44: Lower Hudson Valley Transmission Security Margin (Hourly) (1-in-100-Year Extreme Heatwave, Emergency Transfer Criteria)

Summer Peak - 1-in-100-Year Extreme Heatwave, Emergency Transfer Criteria (MW)										
G-J Transmission Security Margin										
Hour	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
HB0	5,539	4,988	6,479	6,359	6,415	6,428	6,377	6,251	6,046	5,849
HB1	6,111	5,569	7,056	6,943	7,005	7,025	6,982	6,869	6,684	6,506
HB2	6,512	5,973	7,464	7,351	7,417	7,442	7,404	7,304	7,132	6,968
HB3	6,766	6,228	7,719	7,610	7,674	7,703	7,672	7,569	7,410	7,249
HB4	6,836	6,298	7,789	7,678	7,743	7,771	7,741	7,640	7,482	7,322
HB5	6,597	6,060	7,545	7,431	7,493	7,516	7,479	7,376	7,202	7,035
HB6	6,032	5,484	6,976	6,865	6,926	6,949	6,906	6,793	6,603	6,424
HB7	5,203	4,663	6,168	6,070	6,145	6,172	6,131	6,014	5,812	5,623
HB8	4,491	3,965	5,487	5,412	5,504	5,541	5,509	5,392	5,185	4,991
HB9	3,856	3,349	4,892	4,843	4,954	5,004	4,981	4,870	4,660	4,467
HB10	3,353	2,860	4,421	4,390	4,516	4,580	4,561	4,456	4,242	4,054
HB11	3,056	2,575	4,148	4,130	4,269	4,340	4,330	4,226	4,020	3,833
HB12	2,658	2,175	3,743	3,734	3,889	3,974	3,968	3,863	3,648	3,459
HB13	2,341	1,865	3,434	3,400	3,564	3,657	3,652	3,550	3,343	3,147
HB14	1,975	1,504	3,072	3,006	3,180	3,279	3,273	3,166	2,964	2,761
HB15	1,799	1,322	2,878	2,503	2,677	2,774	2,758	2,639	2,434	2,212
HB16	1,484	1,000	2,537	2,388	2,554	2,641	2,609	2,472	2,255	1,739
HB17	1,488	1,001	2,520	2,313	2,453	2,518	2,465	2,360	2,146	1,881
HB18	1,821	1,324	2,829	2,593	2,703	2,744	2,669	2,493	2,255	1,968
HB19	1,858	1,348	3,108	2,855	2,951	2,983	2,898	2,713	2,471	2,179
HB20	2,228	1,706	3,190	2,962	3,045	3,066	2,981	2,799	2,551	2,536
HB21	2,758	2,223	3,709	3,503	3,578	3,593	3,511	3,334	3,085	2,812
HB22	3,653	3,111	4,595	4,418	4,482	4,493	4,417	4,254	4,014	3,759
HB23	4,635	4,087	5,572	5,425	5,484	5,494	5,430	5,287	5,060	4,835

Figure 45: Lower Hudson Valley Transmission Security Margin Hourly Curve (1-in-100-Year Extreme Heatwave, Emergency Transfer Criteria)

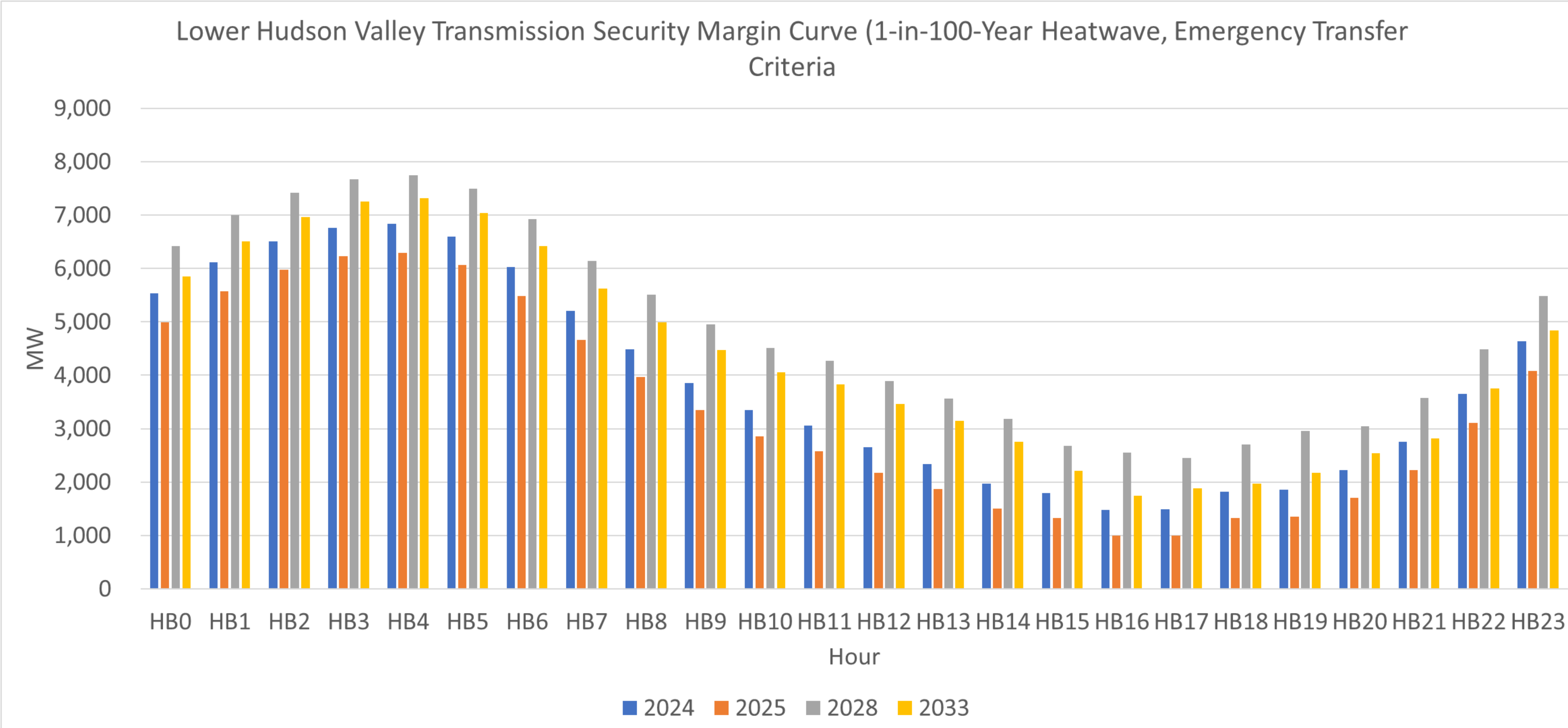


Figure 46: Lower Hudson Valley Transmission Security Margin (Winter Peak – Expected Weather, Normal Transfer Criteria)

Winter Peak - Baseline Expected Weather, Normal Transfer Criteria (MW)											
Line	**Item**	**2024-25**	**2025-26**	**2026-27**	**2027-28**	**2028-29**	**2029-30**	**2030-31**	**2031-32**	**2032-33**	**2033-34**
A	G-J Demand Forecast (5)	(10,500)	(10,596)	(10,779)	(10,969)	(11,220)	(11,568)	(11,986)	(12,483)	(13,055)	(13,659)
B	RECO Demand	(229)	(229)	(229)	(234)	(234)	(234)	(234)	(234)	(240)	(240)
C	**Total Demand (A+B)**	(10,729)	(10,825)	(11,008)	(11,203)	(11,454)	(11,802)	(12,220)	(12,717)	(13,295)	(13,899)
D	UPNY-SENY Limit (3), (4)	5,725	5,725	5,725	5,725	5,725	5,725	5,725	5,725	5,725	5,725
E	ABC PARs to J	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)
F	K - SENY (4)	95	95	95	95	95	95	95	95	95	95
G	**Total SENY AC Import (D+E+F)**	5,809	5,809	5,809	5,809	5,809	5,809	5,809	5,809	5,809	5,809
H	Loss of Source Contingency	(968)	(968)	(968)	(968)	(968)	(968)	(968)	(968)	(968)	(968)
I	**Resource Need (C+G+H)**	(5,888)	(5,984)	(6,167)	(6,362)	(6,613)	(6,961)	(7,379)	(7,876)	(8,454)	(9,058)
J	G-J Generation (1)	14,510	14,475	14,475	14,475	14,475	14,475	14,475	14,475	14,475	14,475
K	G-J Generation Derates (2)	(1,253)	(1,250)	(1,250)	(1,250)	(1,250)	(1,250)	(1,250)	(1,250)	(1,250)	(1,250)
L	Temperature Based Generation Derates	0	0	0	0	0	0	0	0	0	0
M	Net ICAP External Imports	315	315	315	315	315	315	315	315	315	315
N	**Total Resources Available (J+K+L+M)**	13,571	13,540	13,540	13,540	13,540	13,540	13,540	13,540	13,540	13,540
O	**Transmission Security Margin (I+N)**	7,683	7,555	7,372	7,177	6,926	6,578	6,160	5,663	5,085	4,481

Notes:

1. Reflects the 2023 Gold Book existing winter capacity plus projected additions and deactivations.
2. Reflects the derates for generating resources. For this evaluation land-based wind generation is assumed to have a capability of 10% of the total nameplate, off-shore wind at 15% of the total nameplate, solar generation is based on the ratio of solar PV nameplate capacity (2023 Gold Book Table I-9a) and solar PV peak reductions (2023 Gold Book Table I-9c). For winter the expected solar PV output at peak is 0 MW. Derates for run-of-river hydro are included as well as the Oswego Export limit for all lines in-service. Includes derates for thermal resources based on NERC five-year class average EFORd data published August 2022 (https://www.nerc.com/pa/RAPA/gads/Pages/Reports.aspx).
3. Limits for 2024 and 2025 are based on the summer peak 2025 representations evaluated in the post-2020 RNA updates. Limits for 2026 through 2033 are based also based on the summer peak 2025 representations evaluated in the post-2020 RNA analysis which does not include the impact of CHPE.
4. As a conservative winter peak assumption these limits utilize the summer values.
5. Reflects the final 10-year peak forecasts presented to stakeholders at the April 5, 2023 LFTF/ESPWG with adjustments for large load queue projects included in this STAR (Q0580 – WNY STAMP, Q0776 – Greenidge, Q0849 – Somerset, Q0580 – Cayuga, Q0979 – North Country Data Center).

Figure 47: Lower Hudson Valley Transmission Security Margin (1-in-10-Year Cold Snap, Emergency Transfer Criteria)

Winter Peak - 1-in-10-Year Cold Snap, Emergency Transfer Criteria (MW)											
Line	**Item**	**2024-25**	**2025-26**	**2026-27**	**2027-28**	**2028-29**	**2029-30**	**2030-31**	**2031-32**	**2032-33**	**2033-34**
A	G-J Demand Forecast (7)	(10,940)	(11,041)	(11,231)	(11,430)	(11,691)	(12,054)	(12,489)	(13,008)	(13,603)	(14,232)
B	RECO Demand	(243)	(243)	(243)	(248)	(248)	(248)	(248)	(248)	(254)	(254)
C	**Total Demand (A+B)**	(11,183)	(11,284)	(11,474)	(11,678)	(11,939)	(12,302)	(12,737)	(13,256)	(13,857)	(14,486)
D	UPNY-SENY Limit (5), (6)	5,450	5,450	5,450	5,450	5,450	5,450	5,450	5,450	5,450	5,450
E	ABC PARs to J	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)
F	K - SENY (6)	155	155	155	155	155	155	155	155	155	155
G	**Total SENY AC Import (D+E+F)**	5,594	5,594	5,594	5,594	5,594	5,594	5,594	5,594	5,594	5,594
H	Loss of Source Contingency	0	0	0	0	0	0	0	0	0	0
I	**Resource Need (C+G+H)**	(5,589)	(5,690)	(5,880)	(6,084)	(6,345)	(6,708)	(7,143)	(7,662)	(8,263)	(8,892)
J	G-J Generation (1)	14,510	14,475	14,475	14,475	14,475	14,475	14,475	14,475	14,475	14,475
K	G-J Generation Derates (2)	(1,253)	(1,250)	(1,250)	(1,250)	(1,250)	(1,250)	(1,250)	(1,250)	(1,250)	(1,250)
L	Temperature Based Generation Derates	0	0	0	0	0	0	0	0	0	0
M	Net ICAP External Imports	315	315	315	315	315	315	315	315	315	315
N	SCRs (3), (4)	160	160	160	160	160	160	160	160	160	160
O	**Total Resources Available (J+K+L+M+N)**	13,731	13,700	13,700	13,700	13,700	13,700	13,700	13,700	13,700	13,700
P	**Transmission Security Margin (I+O)**	8,142	8,010	7,820	7,616	7,355	6,992	6,557	6,038	5,436	4,807

Notes:

1. Reflects the 2023 Gold Book existing winter capacity plus projected additions and deactivations.
2. Reflects the derates for generating resources. For this evaluation land-based wind generation is assumed to have a capability of 10% of the total nameplate, off-shore wind at 15% of the total nameplate, solar generation is based on the ratio of solar PV nameplate capacity (2023 Gold Book Table I-9a) and solar PV peak reductions (2023 Gold Book Table I-9c). For winter the expected solar PV output at peak is 0 MW. Derates for run-of-river hydro are included as well as the Oswego Export limit for all lines in-service. Includes derates for thermal resources based on NERC five-year class average EFORd data published August 2022 (https://www.nerc.com/pa/RAPA/gads/Pages/Reports.aspx).
3. SCRs are not applied for transmission security analysis of normal operations, but are included for emergency operations.
4. Includes a derate of 133 MW for SCRs.
5. Limits for 2024 and 2025 are based on the summer peak 2025 representations evaluated in the post-2020 RNA updates. Limits for 2026 through 2033 are based also based on the summer peak 2025 representations evaluated in the post-2020 RNA analysis which does not include the impact of CHPE.
6. As a conservative winter peak assumption these limits utilize the summer values.
7. Reflects the final 10-year peak forecasts presented to stakeholders at the April 5, 2023 LFTF/ESPWG with adjustments for large load queue projects included in this STAR (Q0580 – WNY STAMP, Q0776 – Greenidge, Q0849 – Somerset, Q0580 – Cayuga, Q0979 – North Country Data Center).

Figure 48: Lower Hudson Valley Transmission Security Margin (1-in-100-year Extreme Cold Snap, Emergency Transfer Criteria)

Winter Peak - 1-in-100-Year Extreme Cold Snap, Emergency Transfer Criteria (MW)											
Line	**Item**	**2024-25**	**2025-26**	**2026-27**	**2027-28**	**2028-29**	**2029-30**	**2030-31**	**2031-32**	**2032-33**	**2033-34**
A	G-J Demand Forecast (7)	(11,716)	(11,822)	(12,027)	(12,239)	(12,519)	(12,907)	(13,373)	(13,929)	(14,567)	(15,240)
B	RECO Demand	(252)	(252)	(252)	(258)	(258)	(258)	(258)	(258)	(264)	(264)
C	**Total Demand (A+B)**	(11,968)	(12,074)	(12,279)	(12,497)	(12,777)	(13,165)	(13,631)	(14,187)	(14,831)	(15,504)
D	UPNY-SENY Limit (5), (6)	5,450	5,450	5,450	5,450	5,450	5,450	5,450	5,450	5,450	5,450
E	ABC PARs to J	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)
F	K - SENY (6)	155	155	155	155	155	155	155	155	155	155
G	**Total SENY AC Import (D+E+F)**	5,594	5,594	5,594	5,594	5,594	5,594	5,594	5,594	5,594	5,594
H	Loss of Source Contingency	0	0	0	0	0	0	0	0	0	0
I	**Resource Need (C+G+H)**	(6,374)	(6,480)	(6,685)	(6,903)	(7,183)	(7,571)	(8,037)	(8,593)	(9,237)	(9,910)
J	G-J Generation (1)	14,510	14,475	14,475	14,475	14,475	14,475	14,475	14,475	14,475	14,475
K	G-J Generation Derates (2)	(1,253)	(1,250)	(1,250)	(1,250)	(1,250)	(1,250)	(1,250)	(1,250)	(1,250)	(1,250)
L	Temperature Based Generation Derates	0	0	0	0	0	0	0	0	0	0
M	Net ICAP External Imports	315	315	315	315	315	315	315	315	315	315
N	SCRs (3), (4)	160	160	160	160	160	160	160	160	160	160
O	**Total Resources Available (J+K+L+M+N)**	13,731	13,700	13,700	13,700	13,700	13,700	13,700	13,700	13,700	13,700
P	**Transmission Security Margin (I+O)**	7,357	7,219	7,014	6,797	6,517	6,129	5,663	5,107	4,462	3,789

Notes:

1. Reflects the 2023 Gold Book existing winter capacity plus projected additions and deactivations.
2. Reflects the derates for generating resources. For this evaluation land-based wind generation is assumed to have a capability of 10% of the total nameplate, off-shore wind at 15% of the total nameplate, solar generation is based on the ratio of solar PV nameplate capacity (2023 Gold Book Table I-9a) and solar PV peak reductions (2023 Gold Book Table I-9c). For winter the expected solar PV output at peak is 0 MW. Derates for run-of-river hydro are included as well as the Oswego Export limit for all lines in-service. Includes derates for thermal resources based on NERC five-year class average EFORd data published August 2022 (https://www.nerc.com/pa/RAPA/gads/Pages/Reports.aspx).
3. SCRs are not applied for transmission security analysis of normal operations, but are included for emergency operations.
4. Includes a derate of 133 MW for SCRs.
5. Limits for 2024 and 2025 are based on the summer peak 2025 representations evaluated in the post-2020 RNA updates. Limits for 2026 through 2033 are based also based on the summer peak 2025 representations evaluated in the post-2020 RNA analysis which does not include the impact of CHPE.
6. As a conservative winter peak assumption these limits utilize the summer values.
7. Reflects the final 10-year peak forecasts presented to stakeholders at the April 5, 2023 LFTF/ESPWG with adjustments for large load queue projects included in this STAR (Q0580 – WNY STAMP, Q0776 – Greenidge, Q0849 – Somerset, Q0580 – Cayuga, Q0979 – North Country Data Center).

Figure 49: Summary of Lower Hudson Valley Summer Transmission Security Margin – Summer

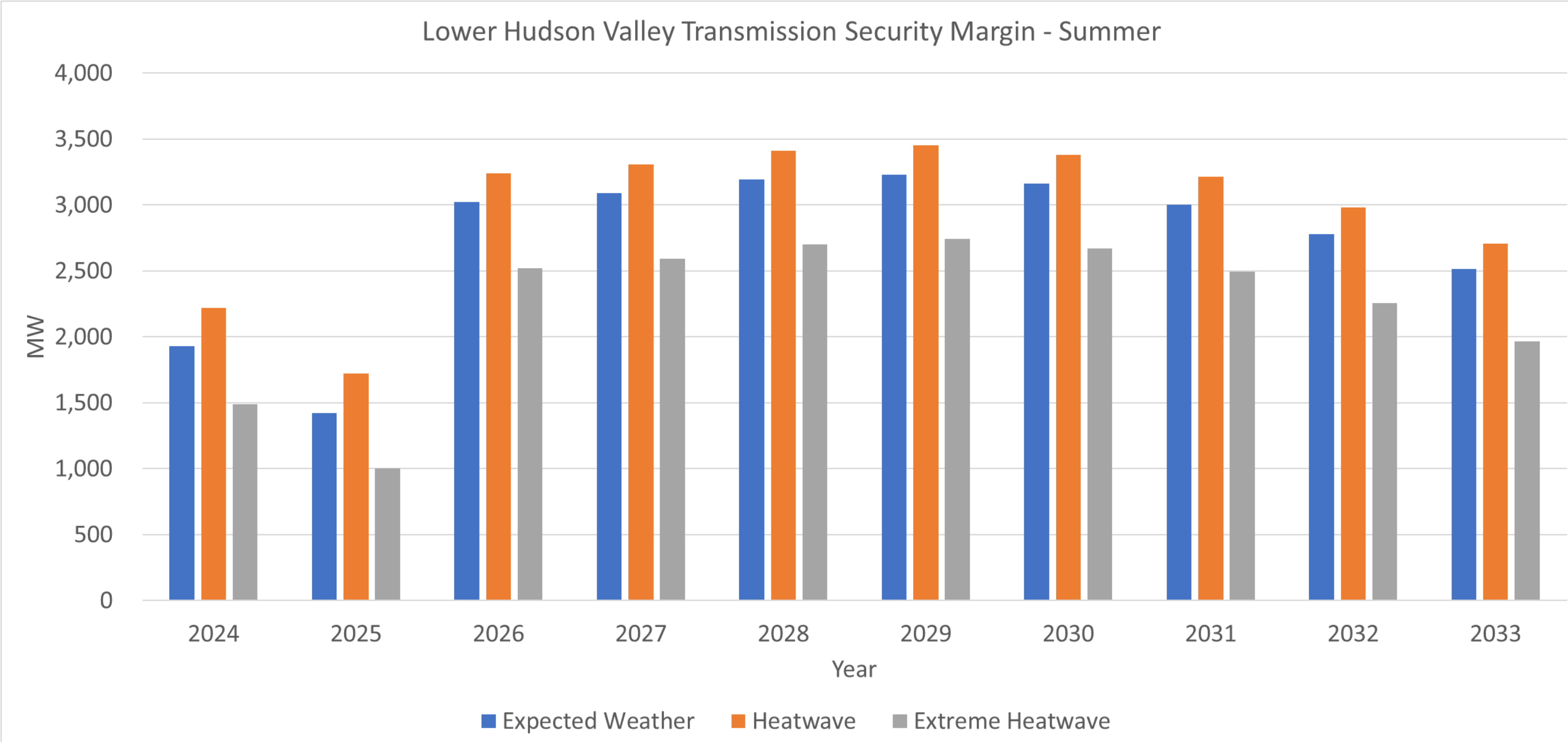
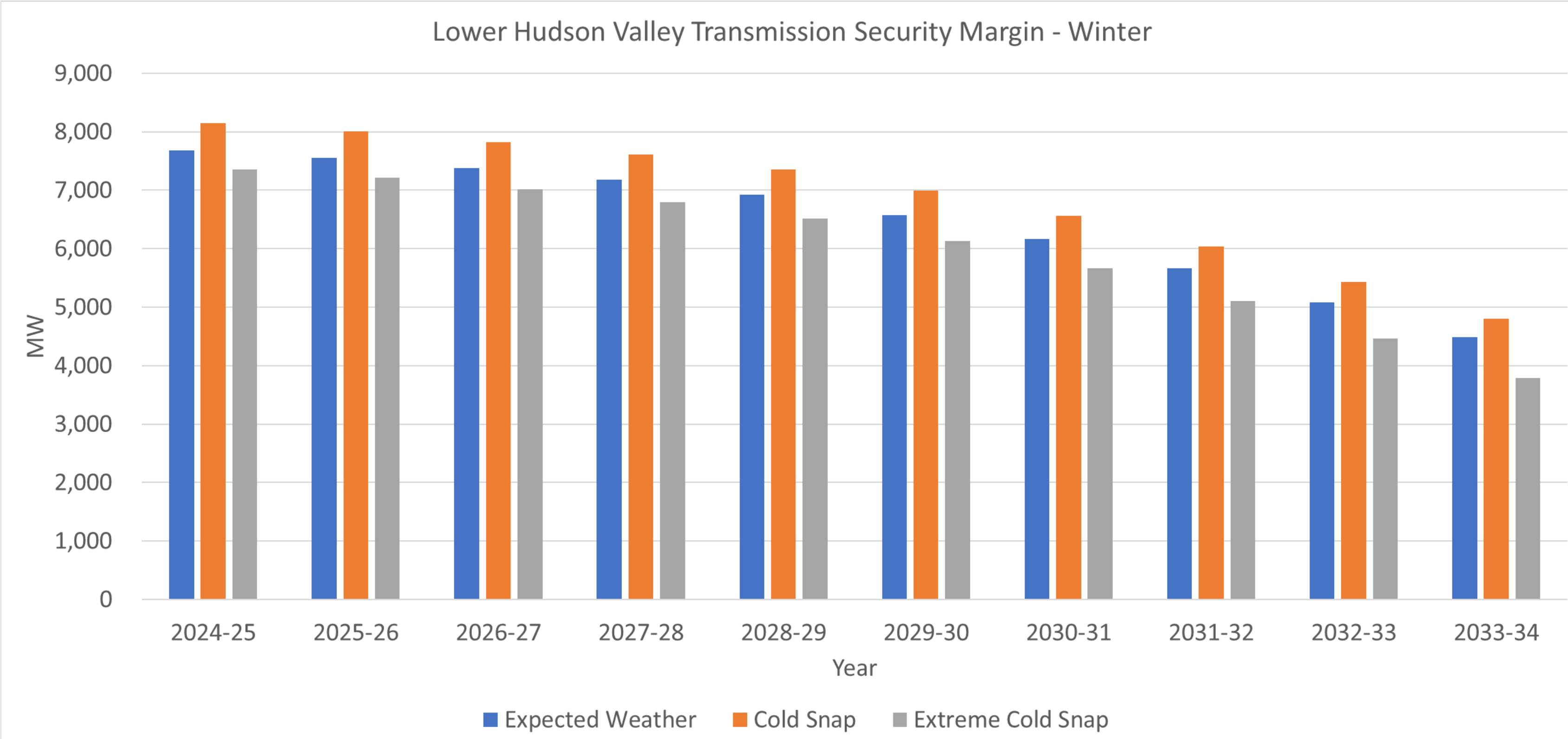


Figure 50: Summary of Lower Hudson Valley Summer Transmission Security Margin – Winter



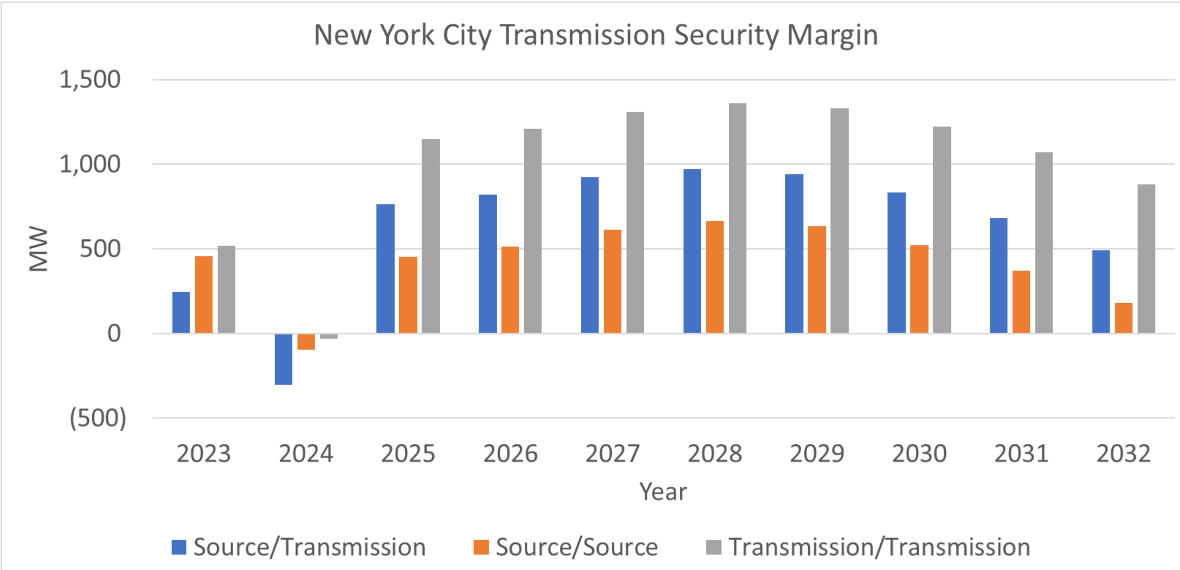
New York City (Zone J) Transmission Security Margins

Within the Con Edison service territory, the 345 kV transmission system along with specific portions of the 138 kV transmission system are designed for the occurrence of two non-simultaneous contingencies and a return to normal (N-1-1-0).[35] Design criteria N-1-1-0 combinations include various combinations of the loss of generation and transmission facilities. As the system changes, the limiting contingency combination may also change.

Figure 51 shows how the summer transmission security margin changes through time based on planned transmission system changes and the impact on the most limiting contingency combination for the year being evaluated. In summers 2024 and 2025, the Con Edison 345 kV transmission system is most limiting for the combined loss of Ravenswood 3 followed by the loss of Mott Haven – Rainey 345 kV (Q12) (N-1-1-0). Starting in summer 2026, the most limiting contingency combination to the Con Edison 345 kV transmission system changes to the loss of CHPE followed by the loss of Ravenswood 3. Other contingency combinations result in changing the power flowing into Zone J from other NYCA zones. For example, in considering the possible combinations of N-1-1-0 events, these can include a mix of generation and transmission, two transmission events, or two generation events. **Figure 51** shows the transmission security margin for the contingency combinations of: Ravenswood 3 and Mott Haven — Rainey (Q12) 345 kV, Ravenswood 3, and Bayonne Energy Center (for years 2024 and 2025) or CHPE and Ravenswood 3 (years 2026 through 2033), and Sprain Brook-W. 49th St. 345 kV (M51 and M52). As seen in **Figure 51**, the interface flow with the lowest value (3,191 MW for the loss of M51/M52) does not result in the smallest transmission security margin. The limiting contingency combination for all winters is the loss of Ravenswood 3 followed by the loss of Mott Haven – Rainey 345 kV (Q12). This is due to the assumption that following the in-service status of CHPE by summer 2026, its schedule is 0 MW for the winter seasons.

[35] Con Edison, TP-7100-18 Transmission Planning Criteria, dated August 2019.

Figure 51: Impact of Contingency Combination on Zone J Transmission Security Margin



As transmission security analysis represents discrete snapshots in time of various credible combinations of system conditions, only the magnitude of a reliability need can be identified under those system conditions. Additional details are required to fully describe the nature of the need such as evaluating the hourly demand shape and its impact on the need. To describe the nature of the New York City transmission security margin, demand shapes are developed for the Zone J component of the statewide demand shape. Details of the demand shapes are provided later in this appendix. For this assessment, demand shapes are not developed past 2033 and only developed for the summer conditions.

Figure 55 shows the calculation of the New York City transmission security margin for the statewide coincident summer peak demand hour with expected weather and with normal transfer criteria. The New York City transmission security margin coincident with the statewide system peak ranges from 244 MW in summer 2024 to 182 MW by summer 2033 with year 2025 have a deficient margin of 306 MW (line-item L). Additionally, Figure 55 shows the impact on the transmission security margin with the higher demand policy forecast. Regardless of the demand forecast under expected weather and normal transfer criteria, the New York City transmission security margin improves in 2026 with the anticipated addition of the CHPE connection from Hydro Quebec to New York City. However, the margin gradually erodes following CHPE's addition as the baseline demand grows in New York City. With the higher demand policy forecast, the margin in 2025 is deficient by 446 MW. For the higher demand policy forecast by 2032, the margin is deficient by 88 MW worsening to a deficiency of 268 MW by 2033 (line-item N).

The demand shapes for New York City show the contribution of Zone J (**Figure 94**) towards the statewide shape (which represents the statewide coincident peak) for each hour of the day. Utilizing the demand shape for the expected weather summer peak day, the New York City transmission security margin for each hour is shown in **Figure 59**. The hourly margin is created by using the demand forecast for each hour in the margin calculation (*i.e.*, **Figure 55** line-item A) with additional adjustments to account for the appropriate derate for solar generation and energy limited resources in each hour (*i.e.*, **Figure 55** line-item H). All other values in the margin calculations are held constant. For all years in the 10-year study horizon, **Figure 59** shows that in 2025 the margin is deficient over seven hours (2,221 MWh). However, the Zone J demand during the system peak day does not necessarily peak during the same hour as the NYCA as a whole. In summer 2025, the Zone J peak hour is 17, while the statewide peak is hour 18. As such, the New York City transmission security margin under a non-statewide coincident peak hour for summer 2025 is a deficiency of 524 MW. For all other years, the margin is sufficient. However, by 2033 the hourly margin within New York city is as narrow as 9 MW during a non-coincident peak hour. A graphical representation of the New York City transmission security margin curve for summer peak expected weather for the peak day in years 2024, 2025, 2028, and 2033 is provided **Figure 60**. **Figure 57** provides a summary of the results for the baseline demand transmission security margin with CHPE in service by summer 2026.

This assessment recognizes there is uncertainty in the demand forecast driven by uncertainties in key assumptions, such as population and economic growth, energy efficiency, the installation of behind-the-meter renewable energy resources, and electric vehicle adoption and charging patterns. These risks can be considered in the transmission security margin calculations through the use of the lower and higher policy scenarios published in the 2023 Gold Book. Both the lower and higher demand policy forecasts reflect achievement of all state policy targets through alternative pathways and assume the same weather factors as the baseline demand forecast. Figure 52 provides a summary of the New York City demand forecasts from the 2023 Gold Book. The range of the demand forecast for both the lower and higher demand policy forecasts as compared to the baseline demand forecast within New York City is also provided in Figure 53. Based on the lower demand policy forecast, the transmission security in New York City is only narrowly sufficient in 2025 at 14 MW. However, the higher demand policy forecast shows that the transmission security margin in New York City could be deficient by up to 446 MW (**Figure 55**, line-item N). For the higher demand policy forecast, the transmission security margin is sufficient following the inclusion of CHPE in year 2026; however, the transmission security margin becomes deficient again in year 2032 by 88 MW worsening to 268 MW by 2033. **Figure 61** provides the hourly transmission security margin with the higher demand policy forecast. As shown in **Figure 62**, the margin with the higher demand policy forecast is deficient for 9 hours.

Figure 52: Summary of New York City Summer Demand Forecasts

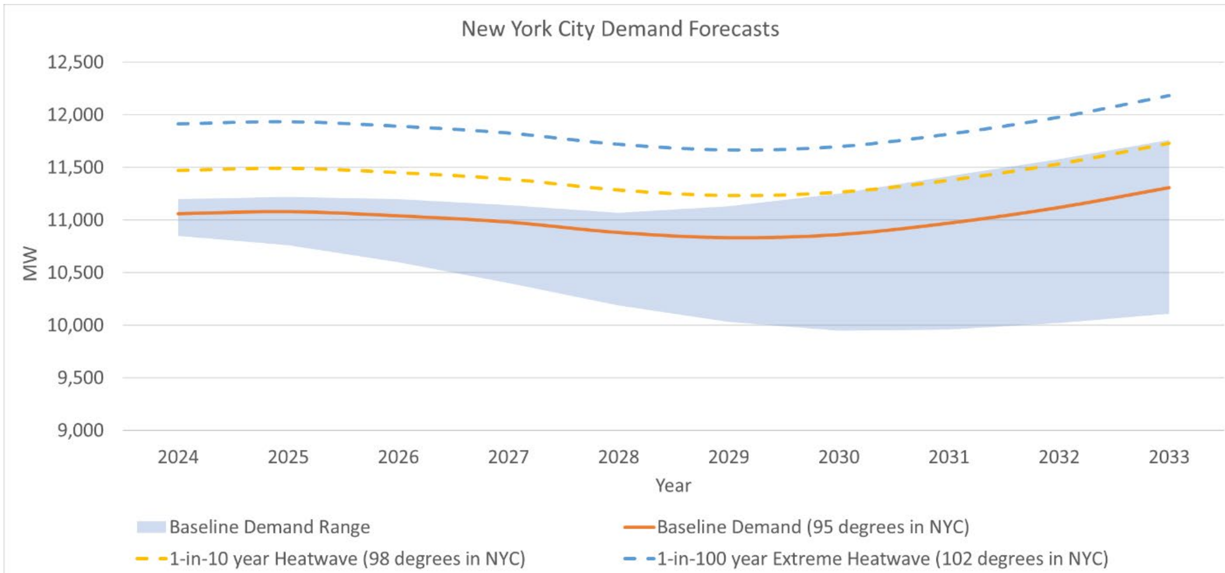
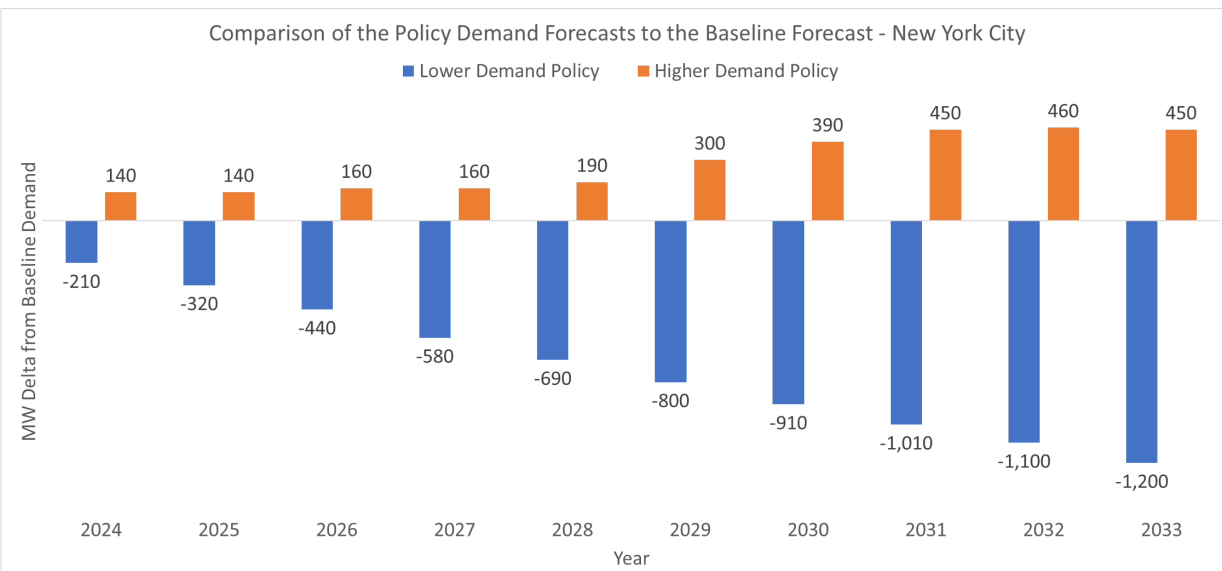
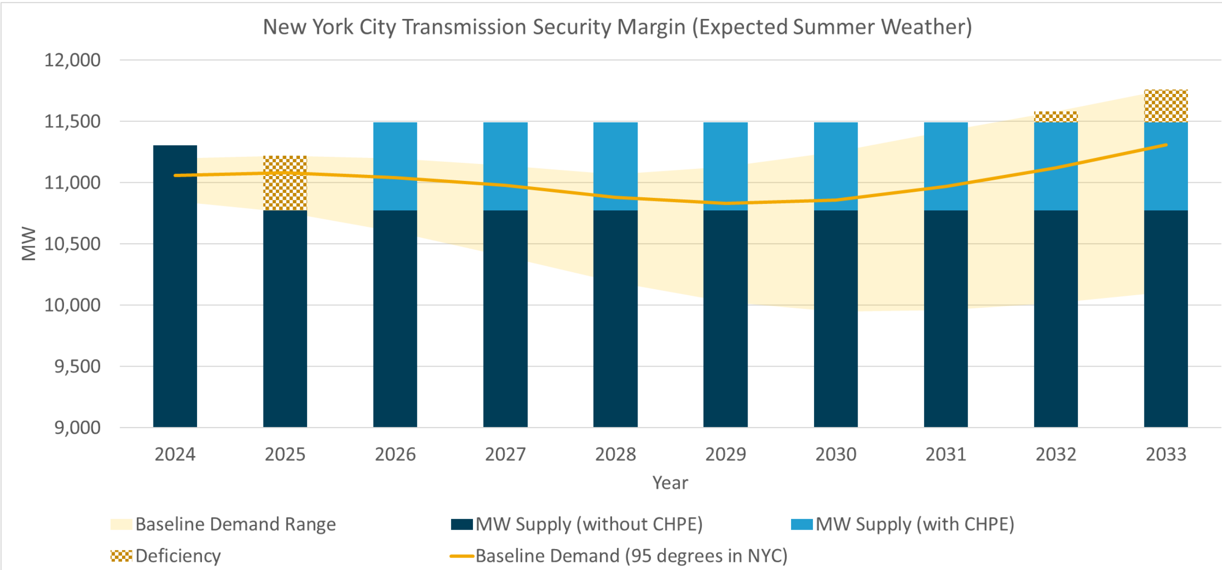


Figure 53: Summary of New York City Summer Coincident Peak Demand Range



Overall, the New York City transmission security margin improves in 2026 when it is planned to CHPE enter service (currently scheduled in spring 2026). However, the margin gradually erodes through time as demand grows. As shown in Figure 54, the forecasted reliability margins within New York City may also not be sufficient beyond 2025 if (i) the CHPE project experiences a significant delay or (ii) additional power plants become unavailable, or (iii) demand significantly exceeds current forecasts. For the baseline or higher demand policy forecast, the reliability margins continue to be deficient for the ten-year planning horizon without the CHPE project in service or other offsetting changes or solutions. In addition, while CHPE will contribute to reliability in the summer, the facility is not expected to provide any capacity in the winter. The details of the margin calculations without CHPE are provided in **Figure 56** with a graphical summary provided in **Figure 58**.

Figure 54: New York City Transmission Security Margin (Expected Weather, with and Without CHPE)



It is possible for other combinations of events, such as 1-in-10-year heatwaves and 1-in-100-year extreme heatwaves, to result in a deficient transmission security margin. **Figure 63** shows the New York City transmission security margin for the statewide coincident peak hour under the 1-in-10-year heatwave condition with the assumption that the system is using emergency transfer criteria. As seen in **Figure 63**, the margin is deficient for summers 2024, 2025, and 2033; however, the margin is sufficient beginning in 2026 through 2032 due to the inclusion of CHPE as well as the demand forecast (line-item M). The demand shapes for Zone J under a heatwave is provided in Figure 100. Utilizing the New York City demand-duration heatwave shape, the transmission security margin for each hour utilizing emergency transfer criteria is shown in **Figure 64**. As shown in **Figure 64**, the deficiency in summer 2025 is observed over 11 hours (3,910 MWh). While **Figure 63** does not show the system to be deficient in year 2032, as seen in **Figure 64**, the demand shape results in a four-hour deficiency (288 MWh). In 2033, the MWh deficiency is observed over seven hours (1,250 MWh). **Figure 65** provides a graphical representation of the New York City transmission security margin curve for the 1-in-10-year heatwave for the peak day in years 2024, 2025, 2028, and 2033.

The 1-in-100-year extreme heatwave transmission security margin in **Figure 66** shows that the transmission security margin is deficient for all years in the 10-year horizon (line-item M). As shown in **Figure 67**, the minimum deficiency for any year is projected to be over seven hours in year 2026 (1,260 MWh) with a maximum deficiency of 12 hours in year 2033 (5,936 MWh). **Figure 68** provides a graphical representation of the New York City transmission security margin curve for the 1-in-100-year extreme heatwave for the peak day in years 2024, 2025, 2028, and 2033.

Figure 69 shows the New York City transmission security margin under winter peak demand with expected weather conditions and with normal transfer criteria. For winter peak, the margins are sufficient for all years and range from 4,363 MW in winter 2024-25 to 2,183 in winter 2033-34 (line-item L). Considering the winter baseline peak demand transmission security margin, multiple outages in New York City would be required to show a deficient transmission security margin.

Figure 70 shows the New York City transmission security margin in a 1-in-10-year cold snap with emergency transfer criteria. Under this condition the margins are sufficient for all years and ranges from 4,174 MW in winter 2024-25 to 1,903 MW in winter 2033-34. Similarly, **Figure 71** shows the New York City transmission security margins for the 1-in-100-year extreme cold snap with emergency transfer criteria. The margin under this condition is sufficient for all years and ranges from 3,615 MW in winter 2024-25 to 1,185 MW in winter 2033-34.

Figure 72 provides a summary of the summer peak New York City transmission security margins under expected summer weather, heatwave, and extreme heatwave conditions. **Figure 73** provides a summary of the winter peak New York City transmission security margins under expected winter weather, cold snap, and extreme cold snap conditions.

Figure 55: New York City Transmission Security Margin (Summer Peak – Expected Weather, Normal Transfer Criteria with CHPE)

Summer Peak - Baseline Expected Weather, Normal Transfer Criteria (MW)											
Line	**Item**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**
A	**Zone J Demand Forecast (4)**	(11,060)	(11,080)	(11,040)	(10,980)	(10,880)	(10,830)	(10,860)	(10,970)	(11,120)	(11,310)
B	I+K to J (3)	3,904	3,904	4,622	4,622	4,622	4,622	4,622	4,622	4,622	4,622
C	ABC PARs to J	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)
D	**Total J AC Import (B+C)**	3,893	3,893	4,611	4,611	4,611	4,611	4,611	4,611	4,611	4,611
E	Loss of Source Contingency	(987)	(987)	(2,237)	(2,237)	(2,237)	(2,237)	(2,237)	(2,237)	(2,237)	(2,237)
F	**Resource Need (A+D+E)**	(8,154)	(8,174)	(8,666)	(8,606)	(8,506)	(8,456)	(8,486)	(8,596)	(8,746)	(8,936)
G	J Generation (1)	8,749	8,159	8,159	8,159	8,159	8,159	8,159	8,159	8,159	8,159
H	J Generation Derates (2)	(665)	(605)	(605)	(605)	(605)	(605)	(605)	(605)	(605)	(605)
I	Temperature Based Generation Derates	0	0	0	0	0	0	0	0	0	0
J	Net ICAP External Imports	315	315	1,565	1,565	1,565	1,565	1,565	1,565	1,565	1,565
K	**Total Resources Available (G+H+I+J)**	8,399	7,868	9,118	9,118	9,118	9,118	9,118	9,118	9,118	9,118
L	**Baseline Transmission Security Margin (F+K)**	244	(306)	452	512	612	662	632	522	372	182
M	Higher Policy Demand Impact	(140)	(140)	(160)	(160)	(190)	(300)	(390)	(450)	(460)	(450)
N	**Higher Policy Transmission Security Margin (L+M)**	104	(446)	292	352	422	362	242	72	(88)	(268)

Notes:

1. Reflects the 2023 Gold Book existing summer capacity plus projected additions and deactivations.
2. Reflects the derates for generating resources. For this evaluation land-based wind generation is assumed to have a capability of 5% of the total nameplate, off-shore wind at 10% of the total nameplate, solar generation is based on the ratio of solar PV nameplate capacity (2023 Gold Book Table I-9a) and solar PV peak reductions (2023 Gold Book Table I-9c). Derates for run-of-river hydro are included as well as the Oswego Export limit for all lines in-service. Includes derates for thermal resources based on NERC five-year class average EFORd data published August 2022 (https://www.nerc.com/pa/RAPA/gads/Pages/Reports.aspx).
3. Limits for 2024 and 2025 are based on the summer peak 2025 representations evaluated in the post-2020 RNA updates. Limits for 2026 through 2033 are based on the summer peak 2032 represenations evalauted in the 2022 RNA.
4. Reflects the final 10-year peak forecasts presented to stakeholders at the April 5, 2023 LFTF/ESPWG with adjustments for large load queue projects included in this STAR (Q0580 – WNY STAMP, Q0776 – Greenidge, Q0849 – Somerset, Q0580 – Cayuga, Q0979 – North Country Data Center).

Figure 56: New York City Transmission Security Margin (Summer Peak – Expected Weather, Normal Transfer Criteria without CHPE)

Summer Peak - Baseline Expected Weather, Normal Transfer Criteria (MW)											
Line	**Item**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**
A	**Zone J Demand Forecast (4)**	(11,060)	(11,080)	(11,040)	(10,980)	(10,880)	(10,830)	(10,860)	(10,970)	(11,120)	(11,310)
B	I+K to J (3)	3,904	3,904	3,904	3,904	3,904	3,904	3,904	3,904	3,904	3,904
C	ABC PARs to J	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)
D	**Total J AC Import (B+C)**	3,893	3,893	3,893	3,893	3,893	3,893	3,893	3,893	3,893	3,893
E	Loss of Source Contingency	(987)	(987)	(987)	(987)	(987)	(987)	(987)	(987)	(987)	(987)
F	**Resource Need (A+D+E)**	(8,154)	(8,174)	(8,134)	(8,074)	(7,974)	(7,924)	(7,954)	(8,064)	(8,214)	(8,404)
G	J Generation (1)	8,749	8,159	8,159	8,159	8,159	8,159	8,159	8,159	8,159	8,159
H	J Generation Derates (2)	(665)	(605)	(605)	(605)	(605)	(605)	(605)	(605)	(605)	(605)
I	Temperature Based Generation Derates	0	0	0	0	0	0	0	0	0	0
J	Net ICAP External Imports	315	315	315	315	315	315	315	315	315	315
K	**Total Resources Available (G+H+I+J)**	8,399	7,868	7,868	7,868	7,868	7,868	7,868	7,868	7,868	7,868
L	**Transmission Security Margin (F+K)**	244	(306)	(266)	(206)	(106)	(56)	(86)	(196)	(346)	(536)
M	Higher Policy Demand Impact	(140)	(140)	(160)	(160)	(190)	(300)	(390)	(450)	(460)	(450)
N	**Higher Policy Transmission Security Margin (L+M)**	104	(446)	(426)	(366)	(296)	(356)	(476)	(646)	(806)	(986)

Notes:

1. Reflects the 2023 Gold Book existing summer capacity plus projected additions and deactivations.
2. Reflects the derates for generating resources. For this evaluation land-based wind generation is assumed to have a capability of 5% of the total nameplate, off-shore wind at 10% of the total nameplate, solar generation is based on the ratio of solar PV nameplate capacity (2023 Gold Book Table I-9a) and solar PV peak reductions (2023 Gold Book Table I-9c). Derates for run-of-river hydro are included as well as the Oswego Export limit for all lines in-service. Includes derates for thermal resources based on NERC five-year class average EFORd data published August 2022 (https://www.nerc.com/pa/RAPA/gads/Pages/Reports.aspx).
3. Limits for 2024 and 2025 are based on the summer peak 2025 representations evaluated in the post-2020 RNA updates. Limits for 2026 through 2032 are based on the summer peak 2032 represenations evalauted in the 2022 RNA.
4. Reflects the final 10-year peak forecasts presented to stakeholders at the April 5, 2023 LFTF/ESPWG with adjustments for large load queue projects included in this STAR (Q0580 – WNY STAMP, Q0776 – Greenidge, Q0849 – Somerset, Q0580 – Cayuga, Q0979 – North Country Data Center).

Figure 57: Summary of New York City Summer Transmission Security Margin Demand Policy Impact – Summer (with CHPE)

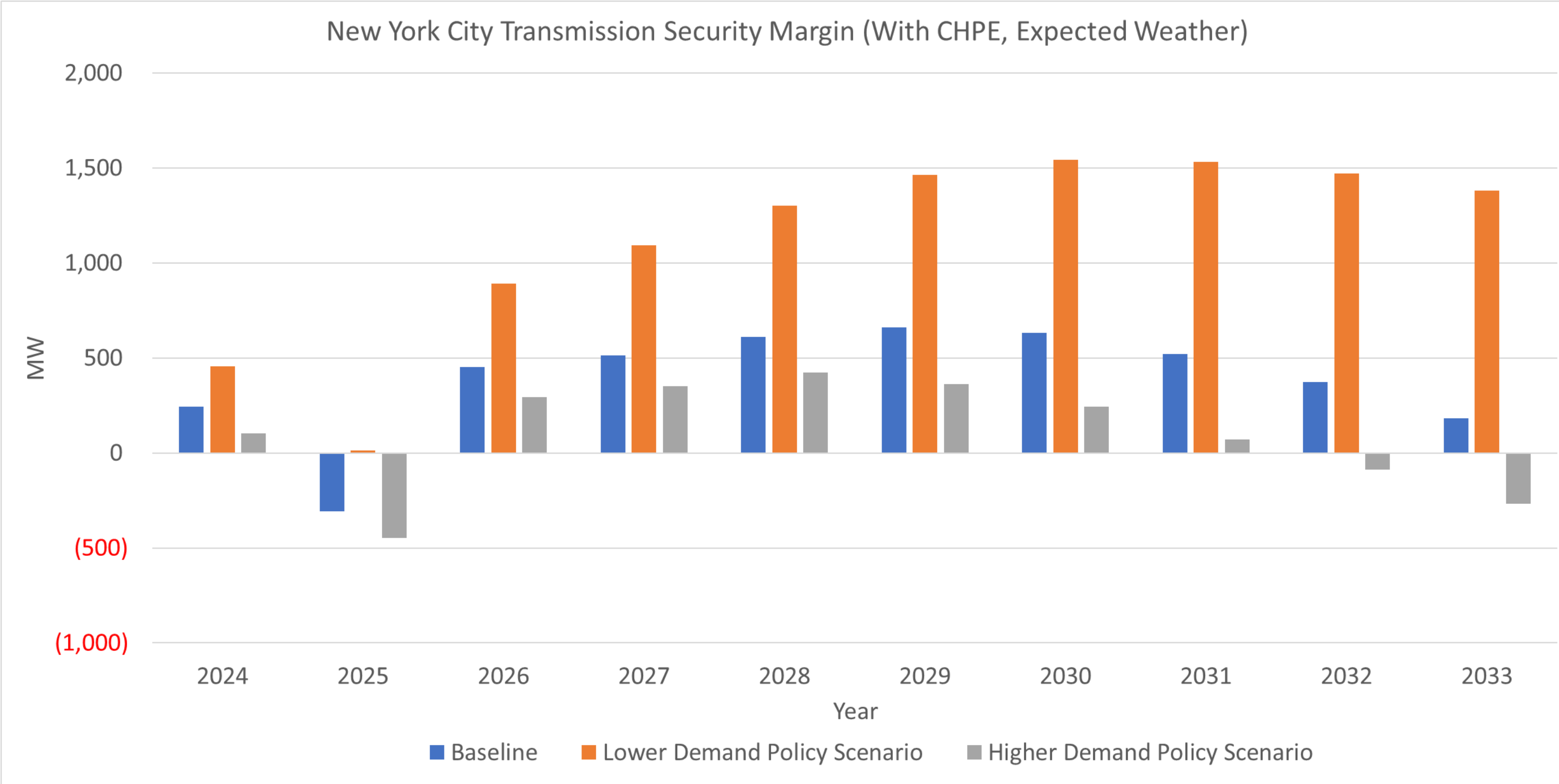


Figure 58: Summary of New York City Summer Transmission Security Margin Demand Policy Impact – Summer (without CHPE)

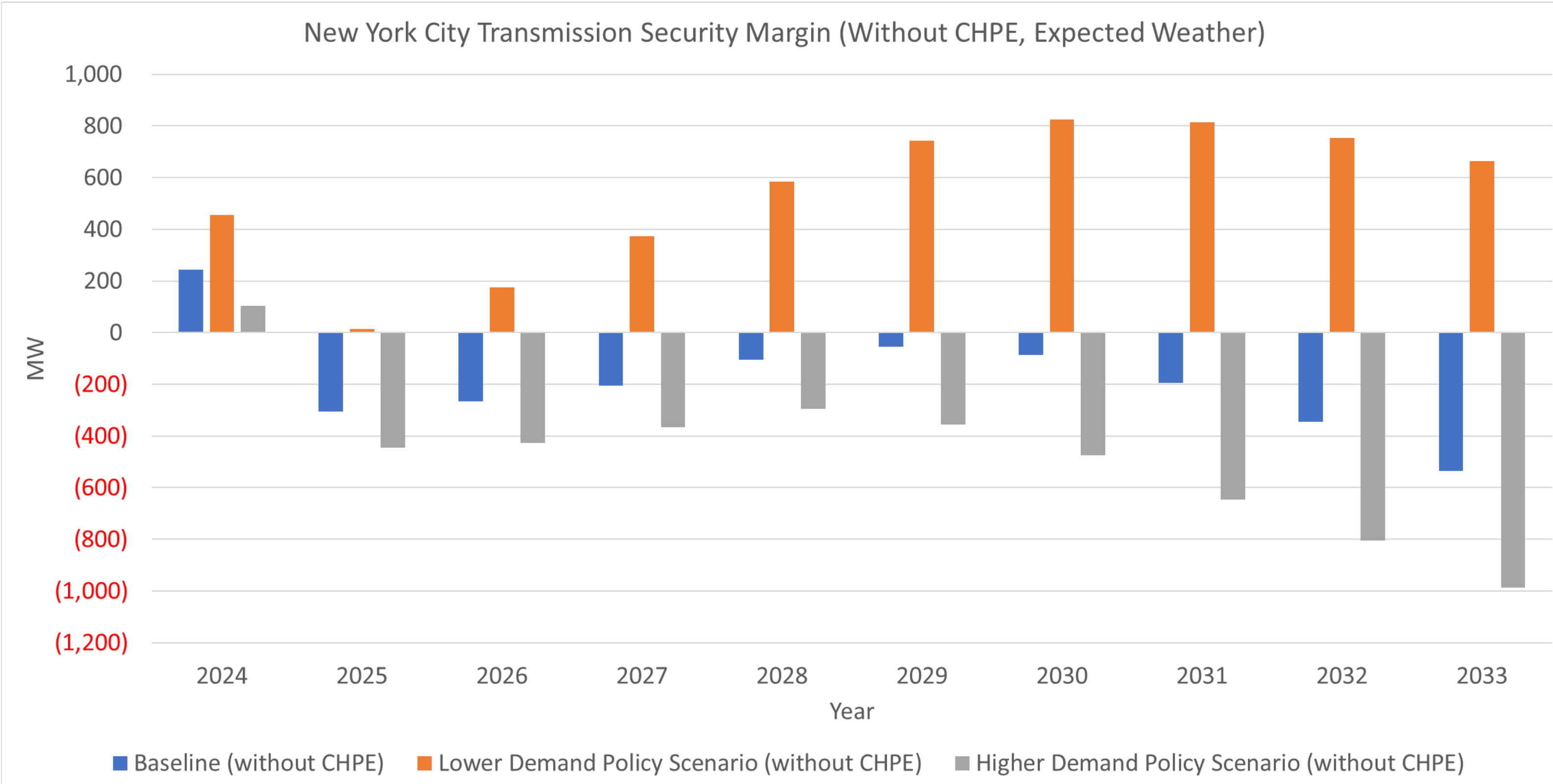


Figure 59: New York City Transmission Security Margin (Hourly) (Summer Peak – Baseline Demand Expected Weather, Normal Transfer Criteria)

Summer Peak - Baseline Expected Summer Weather, Normal Transfer Criteria (MW)										
J Transmission Security Margin										
Hour	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
HB0	3,072	2,355	3,100	3,142	3,219	3,258	3,238	3,157	2,950	2,812
HB1	3,444	2,738	3,482	3,528	3,603	3,644	3,628	3,555	3,363	3,237
HB2	3,710	3,012	3,757	3,800	3,876	3,918	3,905	3,839	3,655	3,540
HB3	3,856	3,161	3,907	3,951	4,024	4,068	4,057	3,990	3,814	3,700
HB4	3,847	3,151	3,896	3,940	4,013	4,056	4,044	3,978	3,801	3,687
HB5	3,615	2,912	3,655	3,696	3,768	3,809	3,793	3,722	3,532	3,410
HB6	3,143	2,428	3,174	3,218	3,294	3,335	3,317	3,239	3,035	2,902
HB7	2,520	1,796	2,550	2,606	2,694	2,744	2,729	2,649	2,437	2,298
HB8	1,972	1,244	2,010	2,081	2,185	2,245	2,240	2,165	1,951	1,815
HB9	1,528	800	1,580	1,669	1,788	1,860	1,863	1,796	1,585	1,453
HB10	1,194	463	1,254	1,356	1,486	1,569	1,577	1,516	1,306	1,181
HB11	967	235	1,032	1,142	1,283	1,372	1,388	1,329	1,123	1,000
HB12	782	51	850	965	1,110	1,203	1,222	1,164	956	837
HB13	620	(116)	685	800	946	1,039	1,058	1,001	789	667
HB14	511	(230)	573	685	830	923	939	878	663	538
HB15	352	(398)	399	505	644	731	740	672	444	310
HB16	237	(522)	264	357	486	563	560	478	231	81
HB17	244	(524)	247	325	440	504	488	391	177	9
HB18	466	(306)	452	512	612	662	632	522	246	62
HB19	647	(126)	624	675	765	808	769	653	372	182
HB20	803	32	779	828	915	955	917	801	524	335
HB21	1,044	278	1,024	1,070	1,157	1,197	1,160	1,047	776	589
HB22	1,540	786	1,531	1,576	1,660	1,698	1,665	1,559	1,303	1,128
HB23	2,086	1,347	2,092	2,138	2,219	2,260	2,234	2,140	1,902	1,744

Figure 60: New York City Transmission Security Margin Hourly Curve (Summer Peak – Expected Weather, Normal Transfer Criteria)

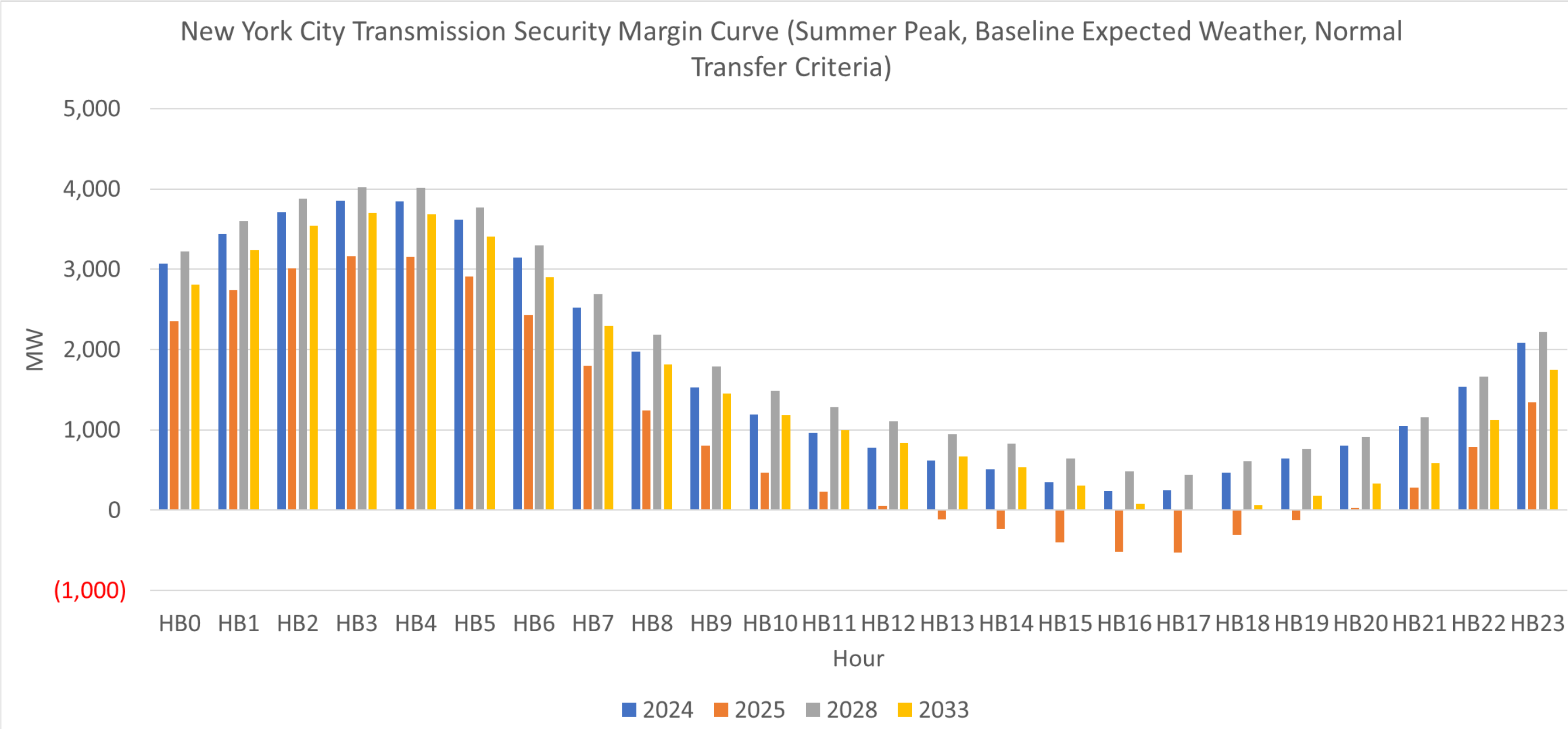


Figure 61: New York City Transmission Security Margin (Hourly) (Summer Peak – Higher Policy with Expected Weather, Normal Transfer Criteria)

Summer Peak - Higher Policy with Expected Summer Weather, Normal Transfer Criteria (MW)										
J Transmission Security Margin										
Hour	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
HB0	2,932	2,215	2,940	2,982	3,029	2,958	2,848	2,707	2,490	2,362
HB1	3,304	2,598	3,322	3,368	3,413	3,344	3,238	3,105	2,903	2,787
HB2	3,570	2,872	3,597	3,640	3,686	3,618	3,515	3,389	3,195	3,090
HB3	3,716	3,021	3,747	3,791	3,834	3,768	3,667	3,540	3,354	3,250
HB4	3,707	3,011	3,736	3,780	3,823	3,756	3,654	3,528	3,341	3,237
HB5	3,475	2,772	3,495	3,536	3,578	3,509	3,403	3,272	3,072	2,960
HB6	3,003	2,288	3,014	3,058	3,104	3,035	2,927	2,789	2,575	2,452
HB7	2,380	1,656	2,390	2,446	2,504	2,444	2,339	2,199	1,977	1,848
HB8	1,832	1,104	1,850	1,921	1,995	1,945	1,850	1,715	1,491	1,365
HB9	1,388	660	1,420	1,509	1,598	1,560	1,473	1,346	1,125	1,003
HB10	1,054	323	1,094	1,196	1,296	1,269	1,187	1,066	846	731
HB11	827	95	872	982	1,093	1,072	998	879	663	550
HB12	642	(89)	690	805	920	903	832	714	496	387
HB13	480	(256)	525	640	756	739	668	551	329	217
HB14	371	(370)	413	525	640	623	549	428	203	88
HB15	212	(538)	239	345	454	431	350	222	(16)	(140)
HB16	97	(662)	104	197	296	263	170	28	(229)	(369)
HB17	104	(664)	87	165	250	204	98	(59)	(283)	(441)
HB18	326	(446)	292	352	422	362	242	72	(214)	(388)
HB19	507	(266)	464	515	575	508	379	203	(88)	(268)
HB20	663	(108)	619	668	725	655	527	351	64	(115)
HB21	904	138	864	910	967	897	770	597	316	139
HB22	1,400	646	1,371	1,416	1,470	1,398	1,275	1,109	843	678
HB23	1,946	1,207	1,932	1,978	2,029	1,960	1,844	1,690	1,442	1,294

Figure 62: New York City Transmission Security Margin Hourly Curve (Summer Peak – Baseline and Higher Policy Demand, Normal Transfer Criteria)

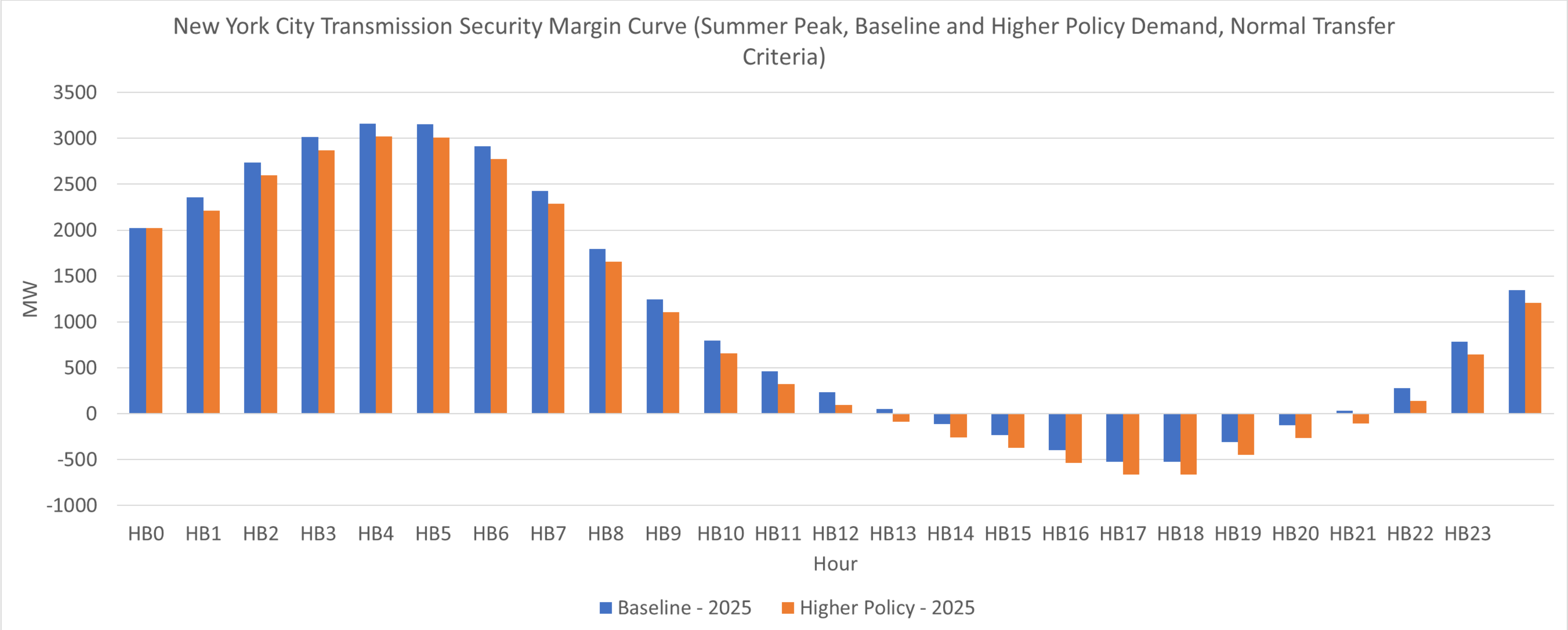


Figure 63: New York City Transmission Security Margin (1-in-10-Year Heatwave, Emergency Transfer Criteria)

Summer Peak - 1-in-10-Year Heatwave, Emergency Transfer Criteria (MW)											
Line	**Item**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**
A	**Zone J Demand Forecast (6)**	(11,473)	(11,494)	(11,452)	(11,390)	(11,286)	(11,234)	(11,265)	(11,379)	(11,535)	(11,732)
B	I+K to J (5)	3,904	3,904	4,622	4,622	4,622	4,622	4,622	4,622	4,622	4,622
C	ABC PARs to J	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)
D	**Total J Import (B+C)**	3,893	3,893	4,611	4,611	4,611	4,611	4,611	4,611	4,611	4,611
E	Loss of Source Contingency	(987)	(987)	(2,237)	(2,237)	(2,237)	(2,237)	(2,237)	(2,237)	(2,237)	(2,237)
F	**Resource Need (A+D+E)**	(8,567)	(8,588)	(9,078)	(9,016)	(8,912)	(8,860)	(8,891)	(9,005)	(9,161)	(9,358)
G	J Generation (1)	8,749	8,159	8,159	8,159	8,159	8,159	8,159	8,159	8,159	8,159
H	J Generation Derates (2)	(665)	(605)	(605)	(605)	(605)	(605)	(605)	(605)	(605)	(605)
I	Temperature Based Generation Derates	(64)	(55)	(55)	(55)	(55)	(55)	(55)	(55)	(55)	(55)
J	Net ICAP External Imports	315	315	1,565	1,565	1,565	1,565	1,565	1,565	1,565	1,565
K	SCRs (3), (4)	219	219	219	219	219	219	219	219	219	219
L	**Total Resources Available (G+H+I+J+K)**	8,554	8,033	9,283	9,283	9,283	9,283	9,283	9,283	9,283	9,283
M	**Transmission Security Margin (F+L)**	(13)	(555)	205	267	371	423	392	278	122	(75)

Notes:

1. Reflects the 2023 Gold Book existing summer capacity plus projected additions and deactivations.
2. Reflects the derates for generating resources. For this evaluation land-based wind generation is assumed to have a capability of 5% of the total nameplate, off-shore wind at 10% of the total nameplate, solar generation is based on the ratio of solar PV nameplate capacity (2023 Gold Book Table I-9a) and solar PV peak reductions (2023 Gold Book Table I-9c). Derates for run-of-river hydro are included as well as the Oswego Export limit for all lines in-service. Includes derates for thermal resources based on NERC five-year class average EFORd data published August 2022 (https://www.nerc.com/pa/RAPA/gads/Pages/Reports.aspx).
3. SCRs are not applied for transmission security analysis of normal operations, but are included for emergency operations.
4. Includes a derate of 198 MW for SCRs.
5. Limits for 2024 and 2025 are based on the summer peak 2025 representations evaluated in the post-2020 RNA updates. Limits for 2026 through 2033 are based on the summer peak 2032 represenations evalauted in the 2022 RNA.
6. Reflects the final 10-year peak forecasts presented to stakeholders at the April 5, 2023 LFTF/ESPWG with adjustments for large load queue projects included in this STAR (Q0580 – WNY STAMP, Q0776 – Greenidge, Q0849 – Somerset, Q0580 – Cayuga, Q0979 – North Country Data Center).

Figure 64: New York City Transmission Security Margin (Hourly) (1-in-10-Year Heatwave, Emergency Transfer Criteria)

Summer Peak - Heatwave, Emergency Transfer Criteria (MW)										
J Transmission Security Margin										
Hour	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
HB0	2,382	1,801	2,553	2,441	2,506	2,535	2,515	2,432	2,285	2,146
HB1	2,770	2,198	2,947	2,840	2,906	2,939	2,924	2,849	2,716	2,588
HB2	3,042	2,476	3,226	3,117	3,186	3,221	3,209	3,141	3,016	2,897
HB3	3,204	2,640	3,390	3,283	3,349	3,387	3,377	3,308	3,190	3,073
HB4	3,234	2,670	3,419	3,311	3,377	3,414	3,402	3,334	3,216	3,098
HB5	3,042	2,472	3,219	3,107	3,170	3,202	3,186	3,113	2,982	2,856
HB6	2,596	2,016	2,765	2,652	2,715	2,743	2,722	2,640	2,495	2,357
HB7	1,961	1,373	2,125	2,017	2,082	2,113	2,090	2,001	1,842	1,694
HB8	1,384	786	1,543	1,441	1,512	1,542	1,523	1,431	1,260	1,106
HB9	902	298	1,061	966	1,042	1,075	1,054	961	783	622
HB10	578	(31)	737	648	726	761	738	644	460	298
HB11	436	(174)	598	513	597	633	615	520	337	173
HB12	272	(344)	424	345	439	486	471	376	188	24
HB13	180	(421)	348	245	350	403	392	301	124	(44)
HB14	247	(342)	429	79	192	255	243	151	(16)	(186)
HB15	30	(550)	219	60	179	244	232	137	(27)	(203)
HB16	(83)	(649)	114	(77)	46	114	97	(4)	(166)	(352)
HB17	(13)	(555)	205	(21)	92	153	130	72	(78)	(269)
HB18	69	(471)	284	267	371	423	392	278	122	(75)
HB19	269	(269)	481	239	337	387	350	234	78	(121)
HB20	445	(106)	643	426	515	556	521	405	243	48
HB21	699	134	884	690	773	809	773	660	491	302
HB22	1,220	648	1,396	1,229	1,304	1,335	1,302	1,196	1,031	854
HB23	1,812	1,236	1,984	1,845	1,913	1,943	1,917	1,822	1,663	1,504

Figure 65: New York City Transmission Security Margin Hourly Curve (1-in-10-Year Heatwave, Emergency Transfer Criteria)

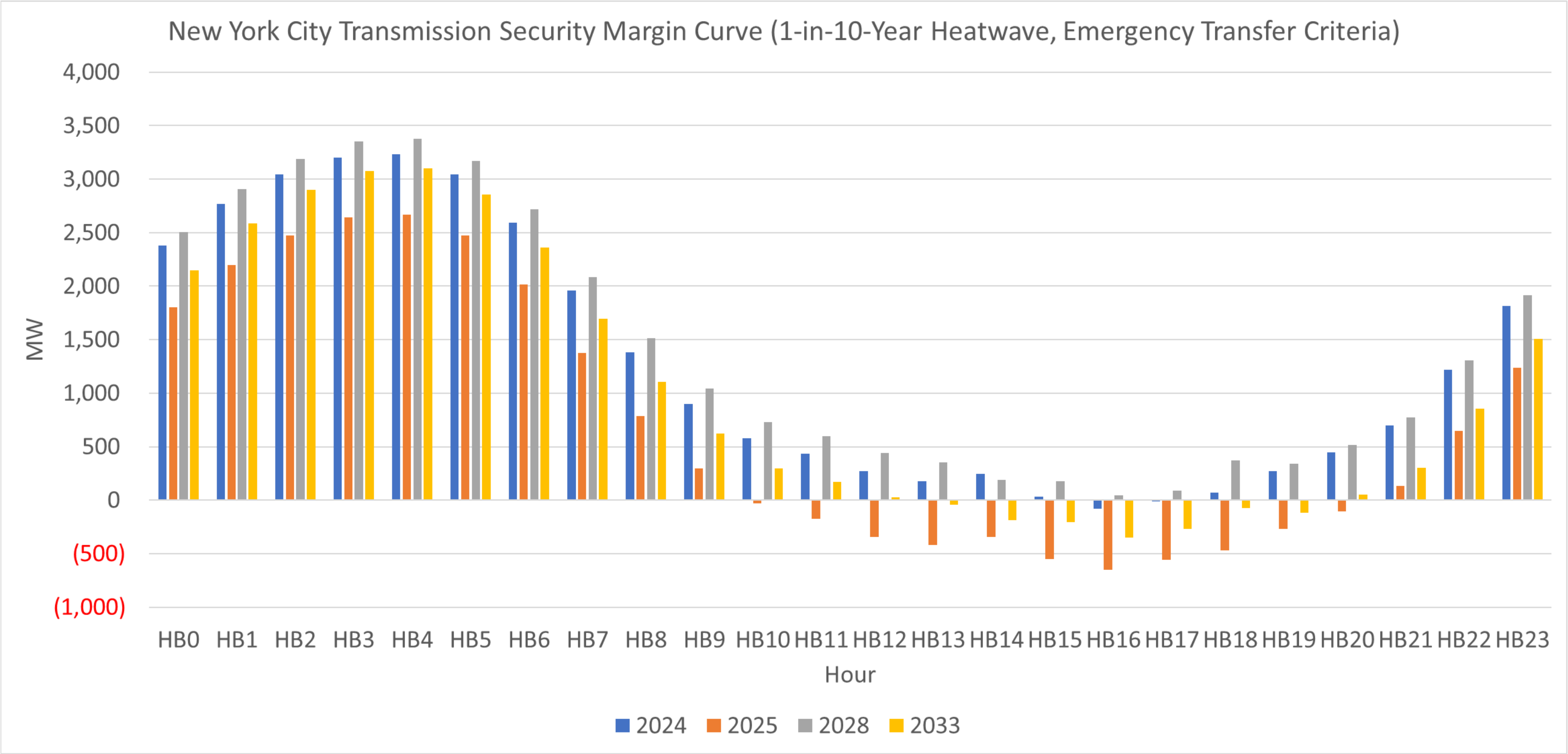


Figure 66: New York City Transmission Security Margin (1-in-100-Year Extreme Heatwave, Emergency Transfer Criteria)

Summer Peak - 1-in-100-Year Extreme Heatwave, Emergency Transfer Criteria (MW)											
Line	**Item**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**
A	**Zone J Demand Forecast (6)**	(11,916)	(11,937)	(11,894)	(11,829)	(11,722)	(11,668)	(11,700)	(11,819)	(11,980)	(12,185)
B	I+K to J (5)	3,904	3,904	4,622	4,622	4,622	4,622	4,622	4,622	4,622	4,622
C	ABC PARs to J	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)
D	**Total J Import (B+C)**	3,893	3,893	4,611	4,611	4,611	4,611	4,611	4,611	4,611	4,611
E	Loss of Source Contingency	(987)	(987)	(2,237)	(2,237)	(2,237)	(2,237)	(2,237)	(2,237)	(2,237)	(2,237)
F	**Resource Need (A+D+E)**	(9,010)	(9,031)	(9,520)	(9,455)	(9,348)	(9,294)	(9,326)	(9,445)	(9,606)	(9,811)
G	J Generation (1)	8,749	8,159	8,159	8,159	8,159	8,159	8,159	8,159	8,159	8,159
H	J Generation Derates (2)	(665)	(605)	(605)	(605)	(605)	(605)	(605)	(605)	(605)	(605)
I	Temperature Based Generation Derates	(135)	(116)	(116)	(116)	(116)	(116)	(116)	(116)	(116)	(116)
J	Net ICAP External Imports	315	315	1,565	1,565	1,565	1,565	1,565	1,565	1,565	1,565
K	SCRs (3), (4)	219	219	219	219	219	219	219	219	219	219
L	**Total Resources Available (G+H+I+J+K)**	8,483	7,971	9,221	9,221	9,221	9,221	9,221	9,221	9,221	9,221
M	**Transmission Security Margin (F+L)**	(527)	(1,060)	(299)	(234)	(127)	(73)	(105)	(224)	(385)	(590)

Notes:

1. Reflects the 2023 Gold Book existing summer capacity plus projected additions and deactivations.
2. Reflects the derates for generating resources. For this evaluation land-based wind generation is assumed to have a capability of 5% of the total nameplate, off-shore wind at 10% of the total nameplate, solar generation is based on the ratio of solar PV nameplate capacity (2023 Gold Book Table I-9a) and solar PV peak reductions (2023 Gold Book Table I-9c). Derates for run-of-river hydro are included as well as the Oswego Export limit for all lines in-service. Includes derates for thermal resources based on NERC five-year class average EFORd data published August 2022 (https://www.nerc.com/pa/RAPA/gads/Pages/Reports.aspx).
3. SCRs are not applied for transmission security analysis of normal operations, but are included for emergency operations.
4. Includes a derate of 198 MW for SCRs.
5. Limits for 2024 and 2025 are based on the summer peak 2025 representations evaluated in the post-2020 RNA updates. Limits for 2026 through 2033 are based on the summer peak 2032 represenations evalauted in the 2022 RNA.
6. Reflects the final 10-year peak forecasts presented to stakeholders at the April 5, 2023 LFTF/ESPWG with adjustments for large load queue projects included in this STAR (Q0580 – WNY STAMP, Q0776 – Greenidge, Q0849 – Somerset, Q0580 – Cayuga, Q0979 – North Country Data Center).

Figure 67: New York City Transmission Security Margin (Hourly) (1-in-100-Year Extreme Heatwave, Emergency Transfer Criteria)

Summer Peak - 1-in-100-Year Extreme Heatwave, Emergency Transfer Criteria (MW)										
J Transmission Security Margin										
Hour	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
HB0	2,081	1,512	2,267	2,151	2,218	2,248	2,226	2,142	1,992	1,849
HB1	2,468	1,907	2,659	2,548	2,617	2,650	2,633	2,557	2,421	2,289
HB2	2,739	2,185	2,937	2,824	2,895	2,931	2,917	2,848	2,719	2,597
HB3	2,900	2,348	3,101	2,990	3,058	3,097	3,085	3,014	2,893	2,771
HB4	2,931	2,378	3,130	3,018	3,086	3,123	3,110	3,040	2,918	2,796
HB5	2,738	2,181	2,930	2,813	2,878	2,911	2,893	2,818	2,683	2,554
HB6	2,291	1,723	2,474	2,357	2,421	2,450	2,427	2,343	2,193	2,051
HB7	1,654	1,076	1,830	1,716	1,783	1,814	1,788	1,697	1,534	1,381
HB8	1,074	485	1,242	1,134	1,206	1,236	1,213	1,119	944	784
HB9	590	(6)	756	654	730	761	737	641	458	292
HB10	267	(335)	431	334	412	445	418	321	132	(37)
HB11	127	(476)	293	201	284	318	296	197	8	(162)
HB12	(89)	(700)	65	(22)	71	115	96	(4)	(199)	(371)
HB13	(224)	(820)	(53)	(167)	(63)	(11)	(27)	(124)	(308)	(485)
HB14	(199)	(786)	(17)	(376)	(264)	(204)	(219)	(319)	(493)	(673)
HB15	(460)	(1,035)	(269)	(439)	(320)	(256)	(274)	(375)	(547)	(733)
HB16	(611)	(1,172)	(409)	(611)	(488)	(420)	(441)	(549)	(718)	(914)
HB17	(527)	(1,060)	(299)	(535)	(420)	(358)	(384)	(447)	(601)	(801)
HB18	(438)	(964)	(206)	(234)	(127)	(73)	(105)	(224)	(385)	(590)
HB19	(237)	(761)	(7)	(257)	(155)	(103)	(141)	(261)	(422)	(628)
HB20	(20)	(558)	195	(29)	63	107	70	(50)	(216)	(417)
HB21	271	(280)	473	272	359	397	360	244	71	(124)
HB22	830	271	1,022	849	928	961	927	818	649	467
HB23	1,461	898	1,649	1,505	1,576	1,608	1,581	1,484	1,321	1,158

Figure 68: New York City Transmission Security Margin Hourly Curve (1-in-100-Year Extreme Heatwave, Emergency Transfer Criteria)

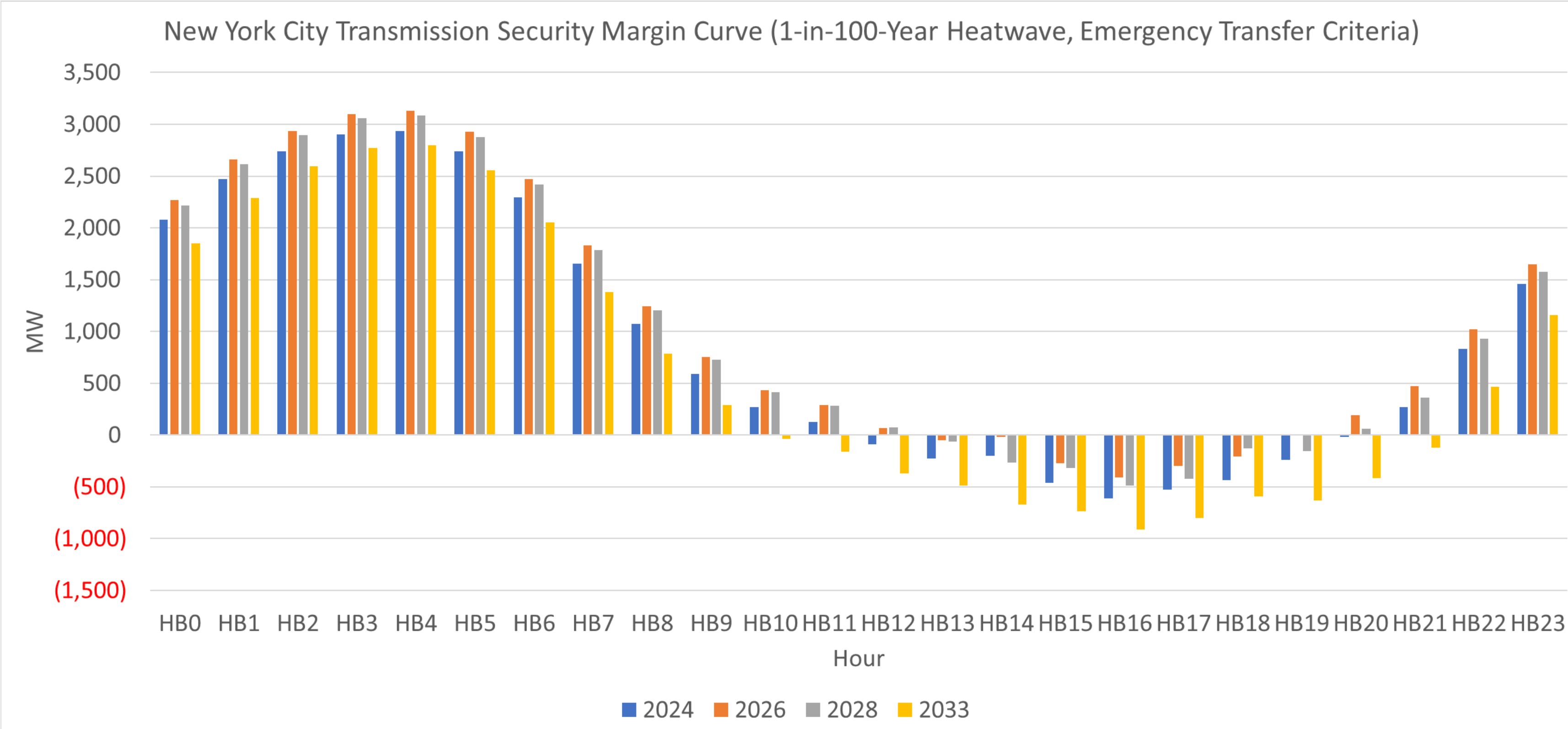


Figure 69: New York City Transmission Security Margin (Winter Peak – Expected Weather, Normal Transfer Criteria)

Winter Peak - Baseline Expected Weather, Normal Transfer Criteria (MW)											
Line	**Item**	**2024-25**	**2025-26**	**2026-27**	**2027-28**	**2028-29**	**2029-30**	**2030-31**	**2031-32**	**2032-33**	**2033-34**
A	**Zone J Demand Forecast (5)**	(7,580)	(7,670)	(7,790)	(7,920)	(8,080)	(8,310)	(8,590)	(8,930)	(9,320)	(9,730)
B	I+K to J (3), (4)	3,904	3,904	3,904	3,904	3,904	3,904	3,904	3,904	3,904	3,904
C	ABC PARs to J	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)
D	**Total J AC Import (B+C)**	3,893	3,893	3,893	3,893	3,893	3,893	3,893	3,893	3,893	3,893
E	Loss of Source Contingency	(968)	(968)	(968)	(968)	(968)	(968)	(968)	(968)	(968)	(968)
F	**Resource Need (A+D+E)**	(4,655)	(4,745)	(4,865)	(4,995)	(5,155)	(5,385)	(5,665)	(6,005)	(6,395)	(6,805)
G	J Generation (1)	9,414	9,379	9,379	9,379	9,379	9,379	9,379	9,379	9,379	9,379
H	J Generation Derates (2)	(710)	(706)	(706)	(706)	(706)	(706)	(706)	(706)	(706)	(706)
I	Temperature Based Generation Derates	0	0	0	0	0	0	0	0	0	0
J	Net ICAP External Imports	315	315	315	315	315	315	315	315	315	315
K	**Total Resources Available (G+H+I+J)**	9,019	8,988	8,988	8,988	8,988	8,988	8,988	8,988	8,988	8,988
L	**Transmission Security Margin (F+K)**	4,363	4,243	4,123	3,993	3,833	3,603	3,323	2,983	2,593	2,183

Notes:

1. Reflects the 2023 Gold Book existing winter capacity plus projected additions and deactivations.
2. Reflects the derates for generating resources. For this evaluation land-based wind generation is assumed to have a capability of 10% of the total nameplate, off-shore wind at 15% of the total nameplate, solar generation is based on the ratio of solar PV nameplate capacity (2023 Gold Book Table I-9a) and solar PV peak reductions (2023 Gold Book Table I-9c). For winter the expected solar PV output at peak is 0 MW. Derates for run-of-river hydro are included as well as the Oswego Export limit for all lines in-service. Includes derates for thermal resources based on NERC five-year class average EFORd data published August 2022 (https://www.nerc.com/pa/RAPA/gads/Pages/Reports.aspx).
3. Limits for 2024 and 2025 are based on the summer peak 2025 representations evaluated in the post-2020 RNA updates. Limits for 2026 through 2033 are based also based on the summer peak 2025 representations evaluated in the post-2020 RNA analysis which does not include the impact of CHPE.
4. As a conservative winter peak assumption these limits utilize the summer values.
5. Reflects the final 10-year peak forecasts presented to stakeholders at the April 5, 2023 LFTF/ESPWG with adjustments for large load queue projects included in this STAR (Q0580 – WNY STAMP, Q0776 – Greenidge, Q0849 – Somerset, Q0580 – Cayuga, Q0979 – North Country Data Center).

Figure 70: New York City Transmission Security Margin (1-in-10-Year Cold Snap, Emergency Transfer Criteria)

Winter Peak - 1-in-10-Year Cold Snap, Emergency Transfer Criteria (MW)											
Line	**Item**	**2024-25**	**2025-26**	**2026-27**	**2027-28**	**2028-29**	**2029-30**	**2030-31**	**2031-32**	**2032-33**	**2033-34**
A	**Zone J Demand Forecast (7)**	(7,898)	(7,992)	(8,117)	(8,252)	(8,419)	(8,659)	(8,950)	(9,305)	(9,711)	(10,138)
B	I+K to J (5), (6)	3,904	3,904	3,904	3,904	3,904	3,904	3,904	3,904	3,904	3,904
C	ABC PARs to J	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)
D	**Total J Import (B+C)**	3,893	3,893	3,893	3,893	3,893	3,893	3,893	3,893	3,893	3,893
E	Loss of Source Contingency	(968)	(968)	(968)	(968)	(968)	(968)	(968)	(968)	(968)	(968)
F	**Resource Need (A+D+E)**	(4,973)	(5,067)	(5,192)	(5,327)	(5,494)	(5,734)	(6,025)	(6,380)	(6,786)	(7,213)
G	J Generation (1)	9,414	9,379	9,379	9,379	9,379	9,379	9,379	9,379	9,379	9,379
H	J Generation Derates (2)	(710)	(706)	(706)	(706)	(706)	(706)	(706)	(706)	(706)	(706)
I	Temperature Based Generation Derates	0	0	0	0	0	0	0	0	0	0
J	Net ICAP External Imports	315	315	315	315	315	315	315	315	315	315
K	SCRs (3), (4)	128	128	128	128	128	128	128	128	128	128
L	**Total Resources Available (G+H+I+J+K)**	9,147	9,116	9,116	9,116	9,116	9,116	9,116	9,116	9,116	9,116
M	**Transmission Security Margin (F+L)**	4,174	4,049	3,924	3,789	3,622	3,382	3,091	2,736	2,330	1,903

Notes:

1. Reflects the 2023 Gold Book existing winter capacity plus projected additions and deactivations.
2. Reflects the derates for generating resources. For this evaluation land-based wind generation is assumed to have a capability of 10% of the total nameplate, off-shore wind at 15% of the total nameplate, solar generation is based on the ratio of solar PV nameplate capacity (2023 Gold Book Table I-9a) and solar PV peak reductions (2023 Gold Book Table I-9c). For winter the expected solar PV output at peak is 0 MW. Derates for run-of-river hydro are included as well as the Oswego Export limit for all lines in-service. Includes derates for thermal resources based on NERC five-year class average EFORd data published August 2022 (https://www.nerc.com/pa/RAPA/gads/Pages/Reports.aspx).
3. SCRs are not applied for transmission security analysis of normal operations, but are included for emergency operations.
4. Includes a derate of 116 MW for SCRs.
5. Limits for 2024 and 2025 are based on the summer peak 2025 representations evaluated in the post-2020 RNA updates. Limits for 2026 through 2033 are based also based on the summer peak 2025 representations evaluated in the post-2020 RNA analysis which does not include the impact of CHPE.
6. As a conservative winter peak assumption these limits utilize the summer values.
7. Reflects the final 10-year peak forecasts presented to stakeholders at the April 5, 2023 LFTF/ESPWG with adjustments for large load queue projects included in this STAR (Q0580 – WNY STAMP, Q0776 – Greenidge, Q0849 – Somerset, Q0580 – Cayuga, Q0979 – North Country Data Center).

Figure 71: New York City Transmission Security Margin (1-in-100-year Extreme Cold Snap, Emergency Transfer Criteria)

Winter Peak - 1-in-100-Year Extreme Cold Snap, Emergency Transfer Criteria (MW)											
Line	**Item**	**2024-25**	**2025-26**	**2026-27**	**2027-28**	**2028-29**	**2029-30**	**2030-31**	**2031-32**	**2032-33**	**2033-34**
A	**Zone J Demand Forecast (7)**	(8,457)	(8,558)	(8,692)	(8,837)	(9,015)	(9,272)	(9,584)	(9,964)	(10,399)	(10,856)
B	I+K to J (5), (6)	3,904	3,904	3,904	3,904	3,904	3,904	3,904	3,904	3,904	3,904
C	ABC PARs to J	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)
D	**Total J Import (B+C)**	3,893	3,893	3,893	3,893	3,893	3,893	3,893	3,893	3,893	3,893
E	Loss of Source Contingency	(968)	(968)	(968)	(968)	(968)	(968)	(968)	(968)	(968)	(968)
F	**Resource Need (A+D+E)**	(5,532)	(5,633)	(5,767)	(5,912)	(6,090)	(6,347)	(6,659)	(7,039)	(7,474)	(7,931)
G	J Generation (1)	9,414	9,379	9,379	9,379	9,379	9,379	9,379	9,379	9,379	9,379
H	J Generation Derates (2)	(710)	(706)	(706)	(706)	(706)	(706)	(706)	(706)	(706)	(706)
I	Temperature Based Generation Derates	0	0	0	0	0	0	0	0	0	0
J	Net ICAP External Imports	315	315	315	315	315	315	315	315	315	315
K	SCRs (3), (4)	128	128	128	128	128	128	128	128	128	128
L	**Total Resources Available (G+H+I+J+K)**	9,147	9,116	9,116	9,116	9,116	9,116	9,116	9,116	9,116	9,116
M	**Transmission Security Margin (F+L)**	3,615	3,483	3,349	3,204	3,026	2,769	2,457	2,077	1,642	1,185

Notes:

1. Reflects the 2023 Gold Book existing winter capacity plus projected additions and deactivations.
2. Reflects the derates for generating resources. For this evaluation land-based wind generation is assumed to have a capability of 10% of the total nameplate, off-shore wind at 15% of the total nameplate, solar generation is based on the ratio of solar PV nameplate capacity (2023 Gold Book Table I-9a) and solar PV peak reductions (2023 Gold Book Table I-9c). For winter the expected solar PV output at peak is 0 MW. Derates for run-of-river hydro are included as well as the Oswego Export limit for all lines in-service. Includes derates for thermal resources based on NERC five-year class average EFORd data published August 2022 (https://www.nerc.com/pa/RAPA/gads/Pages/Reports.aspx).
3. SCRs are not applied for transmission security analysis of normal operations, but are included for emergency operations.
4. Includes a derate of 116 MW for SCRs.
5. Limits for 2024 and 2025 are based on the summer peak 2025 representations evaluated in the post-2020 RNA updates. Limits for 2026 through 2033 are based also based on the summer peak 2025 representations evaluated in the post-2020 RNA analysis which does not include the impact of CHPE.
6. As a conservative winter peak assumption these limits utilize the summer values.
7. Reflects the final 10-year peak forecasts presented to stakeholders at the April 5, 2023 LFTF/ESPWG with adjustments for large load queue projects included in this STAR (Q0580 – WNY STAMP, Q0776 – Greenidge, Q0849 – Somerset, Q0580 – Cayuga, Q0979 – North Country Data Center).

Figure 72: Summary of New York City Summer Transmission Security Margin – Summer

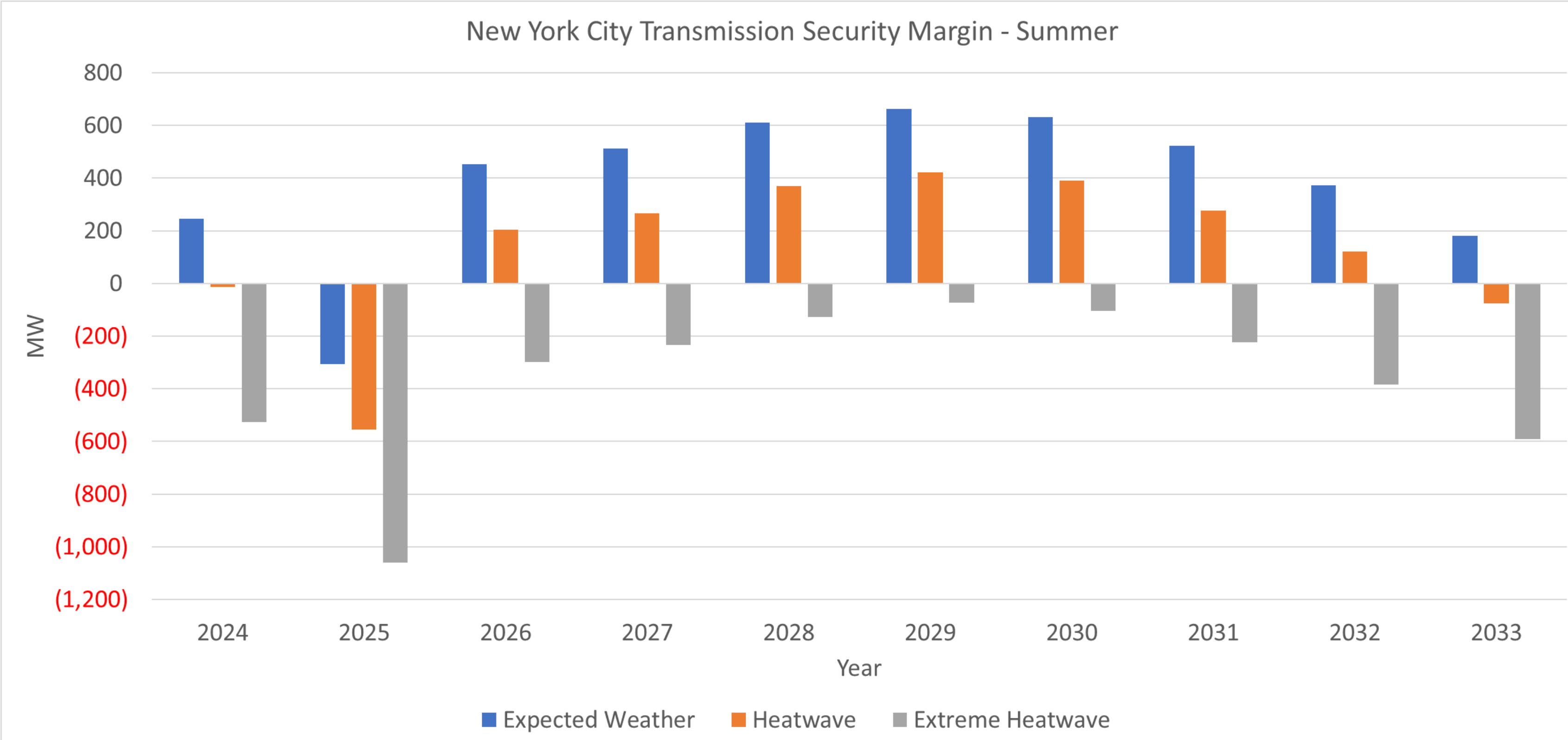
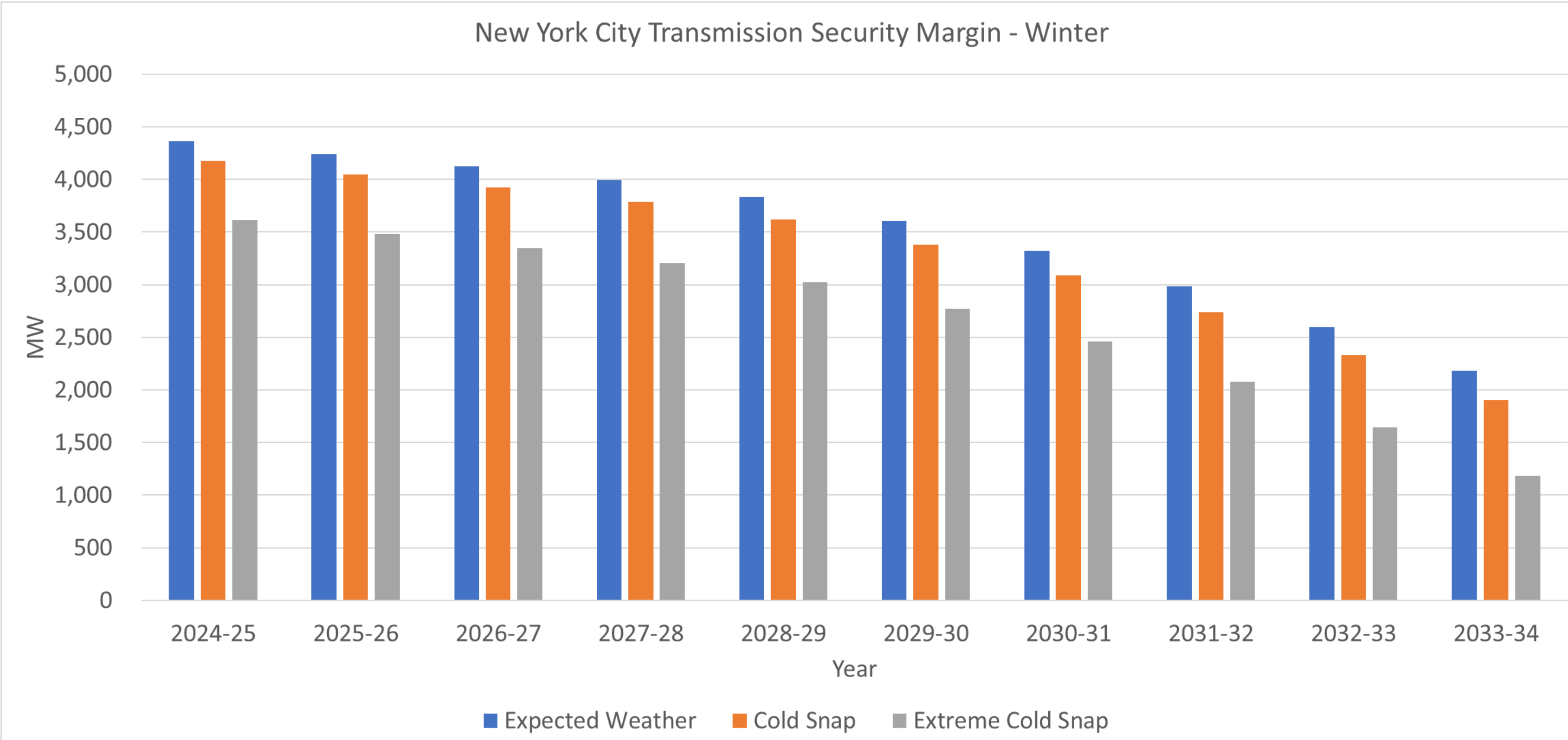


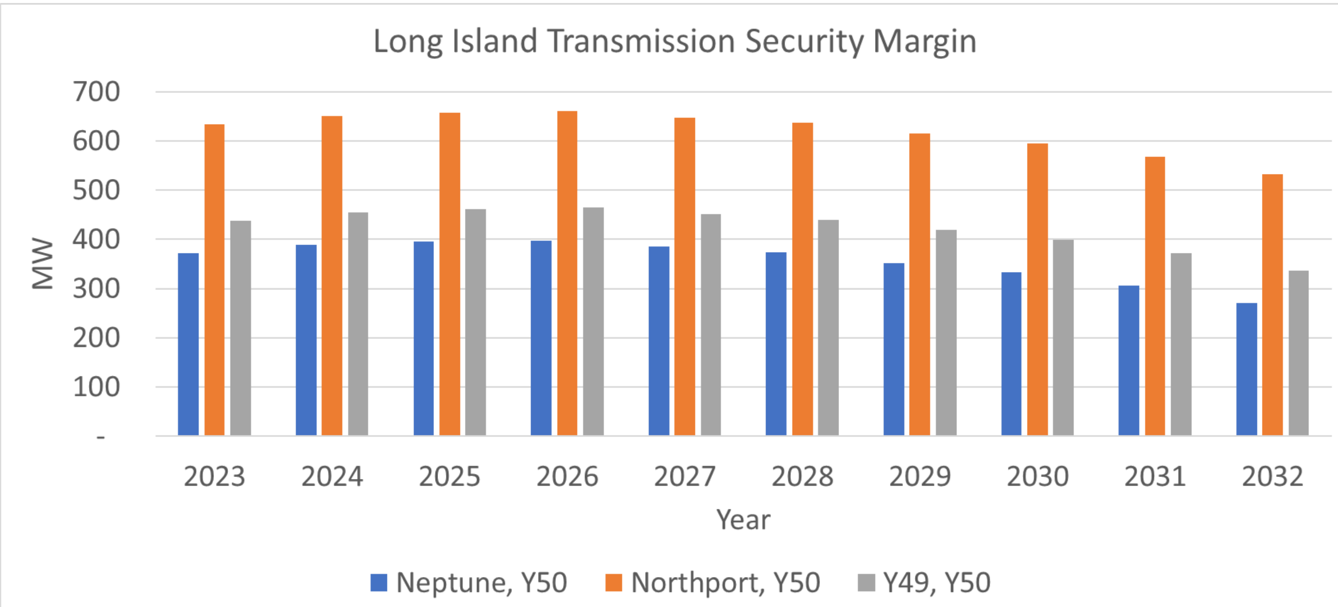
Figure 73: Summary of New York City Summer Transmission Security Margin – Winter



Long Island (Zone K) Transmission Security Margins

Within the PSEG Long Island service territory, the BPTF system (primarily comprised of 138 kV transmission) is designed for N-1-1. As shown in **Figure 74,** the most limiting N-1-1 combination for the transmission security margin under normal conditions is the outage of Neptune HVDC (660 MW) followed by securing for the loss of Dunwoodie — Shore Road 345 kV (Y50) for all evaluated years.

Figure 74: Impact of Contingency Combination on Zone K Transmission Security Margin



As transmission security analysis represents discrete snapshots in time of various credible combinations of system conditions, only the magnitude of a reliability need can be identified under those system conditions. Additional details are required to fully describe the nature of the need, such as evaluating the hourly demand shape and its impact on the need. To describe the nature of the Long Island transmission security margin, demand shapes are developed for the Zone K component of the statewide demand shape. Details of the demand shapes are provided later in this appendix. For this assessment, demand shapes were not developed past 2033 and have only been developed for the summer conditions.

Figure 75 shows the calculation of the Long Island transmission security margin for the statewide coincident summer peak demand hour with expected weather and with normal transfer criteria. The Long Island transmission security margin ranges from 372 MW in summer 2024 to 270 MW in summer 2033 (see line-item L). The demand shapes for Long Island show the contribution of Zone K (**Figure 96**) towards the statewide shape (which represents the statewide coincident peak) for each hour of the day. Utilizing the demand shape for the expected weather summer peak day, the Long Island transmission security margin for each hour is shown in **Figure 76**. The hourly margin is created by using the demand forecast for each hour in the margin calculation (*i.e.*, placing each hour into **Figure 75** line-item A) with additional adjustments to account for the appropriate derate for solar generation and energy limited resources in each hour (*i.e.*, **Figure 75** line-item H). All other values in the margin calculations are held constant. For all years in the 10-year study horizon, **Figure 76** shows that there are no observed deficiencies considering the demand shapes under expected demand and normal transfer criteria for Long Island. A graphical representation of the Long Island transmission security margin cure for summer peak expected weather, normal transfer criteria for the peak day in years 2024, 2025, 2028 and 2033 is shown in **Figure 77**.

It is possible for other combinations of events such as 1-in-10-year heatwaves and 1-in-100-year extreme heatwaves to have a deficient transmission security margin. **Figure 78** shows the Long Island transmission security margin for the statewide coincident peak hour under the 1-in-10-year heatwave condition with the assumption that the system is using emergency transfer criteria. As seen in **Figure 78**, the system is sufficient under these conditions within the 10-year study horizon and ranges from 574 MW in summer 2024 to 464 MW in summer 2033 (*see* line-item M). The demand shapes for Zone K under heatwave conditions is provided in **Figure 101**. Additionally, the hourly margin in **Figure 79** show that for each hour of the heatwave day the margin is sufficient. A graphical representation of the Long Island transmission security margins for the 1-in-10-year heatwave day with emergency transfer criteria for the peak day in years 2024, 2025, 2028 and 2033 is shown in **Figure 80**.

The 1-in-100-year extreme heatwave transmission security margin is shown in **Figure 81**. These margins assume that the system is using emergency transfer criteria. Under this condition, the margin is sufficient for all years in the 10-year study horizon and ranges from 211 MW in summer 2024 to 94 MW in summer 2033 (*see* line-item M). Additionally, the hourly margin in **Figure 82** shows that for each hour the margin is sufficient for the extreme heatwave day. The demand shapes for Zone K under an extreme heatwave is provided in **Figure 106**. A graphical representation of the Long Island transmission security margins for the 1-in-100-year extreme heatwave day with emergency transfer criteria for the peak day in years 2024, 2025, 2028, and 2033 is shown in **Figure 83**.

Figure 84 shows the Long Island transmission security margin under winter peak demand and expected weather conditions. For winter peak, the margin ranges from 2,489 MW in winter 2024-25 to 1,006 MW in winter 2033-34. Considering the winter baseline peak demand transmission security margin, multiple outages in Long Island would be required to have a deficient margin.

Figure 85 shows Long Island transmission security margin in a 1-in-10-year cold snap. Under this system condition the transmission security margins for all years are sufficient and range from 2,980 MW in winter 2024-25 to 1,435 MW in winter 2033-34. Similarly, **Figure 86** shows the transmission security margins for Long Island with a 1-in-100-year extreme cold snap (with emergency transfer criteria) is sufficient with the margin ranging from 2,736 MW in winter 2024-25 to 1,082 MW in winter 2033-34.

Figure 87 provides a summary of the summer peak Long Island transmission security margins under expected summer weather, heatwave, and extreme heatwave conditions. **Figure 88** provides a summary of the winter peak Long Island transmission security margins under expected winter weather, cold snap, and extreme cold snap conditions.

Figure 75: Long Island Transmission Security Margin (Summer Peak – Expected Weather, Normal Transfer Criteria)

Summer Peak - Baseline Expected Weather, Normal Transfer Criteria (MW)											
Line	**Item**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**
A	**Zone K Demand Forecast (3)**	(4,967)	(4,950)	(4,942)	(4,938)	(4,950)	(4,961)	(4,982)	(5,002)	(5,028)	(5,063)
B	I+J to K	929	929	929	929	929	929	929	929	929	929
C	New England Import (NNC)	0	0	0	0	0	0	0	0	0	0
D	**Total K AC Import (B+C)**	929	929	929	929	929	929	929	929	929	929
E	Loss of Source Contingency	(660)	(660)	(660)	(660)	(660)	(660)	(660)	(660)	(660)	(660)
F	**Resource Need (A+D+E)**	(4,698)	(4,681)	(4,673)	(4,669)	(4,681)	(4,692)	(4,713)	(4,733)	(4,759)	(4,794)
G	K Generation (1)	5,013	5,013	5,013	5,013	5,013	5,013	5,013	5,013	5,013	5,013
H	K Generation Derates (2)	(603)	(604)	(605)	(606)	(606)	(607)	(607)	(607)	(608)	(608)
I	Temperature Based Generation Derates	0	0	0	0	0	0	0	0	0	0
J	Net ICAP External Imports	660	660	660	660	660	660	660	660	660	660
K	**Total Resources Available (H+I+J)**	5,070	5,069	5,068	5,067	5,066	5,066	5,065	5,065	5,065	5,064
L	**Transmission Security Margin (F+K)**	372	388	395	398	385	374	352	332	306	270

Notes:
1. Reflects the 2023 Gold Book existing summer capacity plus projected additions and deactivations.
2. Reflects the derates for generating resources. For this evaluation land-based wind generation is assumed to have a capability of 5% of the total nameplate, off-shore wind at 10% of the total nameplate, solar generation is based on the ratio of solar PV nameplate capacity (2023 Gold Book Table I-9a) and solar PV peak reductions (2023 Gold Book Table I-9c). Derates for run-of-river hydro are included as well as the Oswego Export limit for all lines in-service. Includes derates for thermal resources based on NERC five-year class average EFORd data published August 2022 (https://www.nerc.com/pa/RAPA/gads/Pages/Reports.aspx).
3. Reflects the final 10-year peak forecasts presented to stakeholders at the April 5, 2023 LFTF/ESPWG with adjustments for large load queue projects included in this STAR (Q0580 – WNY STAMP, Q0776 – Greenidge, Q0849 – Somerset, Q0580 – Cayuga, Q0979 – North Country Data Center).

Figure 76: Long Island Transmission Security Margin (Hourly) (Summer Peak – Expected Weather, Normal Transfer Criteria)

Summer Peak - Baseline Expected Summer Weather, Normal Transfer Criteria (MW)										
K Transmission Security Margin										
Hour	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
HB0	2,267	2,225	2,225	2,219	2,206	2,193	2,176	2,159	2,070	2,049
HB1	2,477	2,441	2,440	2,437	2,426	2,417	2,403	2,389	2,308	2,292
HB2	2,625	2,590	2,591	2,589	2,579	2,572	2,561	2,549	2,477	2,463
HB3	2,708	2,674	2,675	2,674	2,666	2,662	2,653	2,643	2,574	2,563
HB4	2,715	2,684	2,685	2,685	2,678	2,673	2,666	2,658	2,590	2,581
HB5	2,651	2,619	2,621	2,620	2,614	2,609	2,601	2,594	2,524	2,515
HB6	2,525	2,493	2,496	2,497	2,493	2,489	2,481	2,475	2,402	2,393
HB7	2,274	2,239	2,250	2,263	2,265	2,268	2,267	2,265	2,190	2,185
HB8	1,982	1,945	1,966	1,996	2,012	2,027	2,031	2,035	1,962	1,961
HB9	1,695	1,660	1,694	1,743	1,772	1,799	1,816	1,828	1,761	1,767
HB10	1,404	1,369	1,414	1,476	1,519	1,558	1,581	1,602	1,539	1,555
HB11	1,142	1,107	1,160	1,231	1,282	1,328	1,359	1,387	1,324	1,346
HB12	938	902	957	1,032	1,086	1,134	1,166	1,196	1,131	1,156
HB13	758	719	774	847	899	946	978	1,007	937	962
HB14	623	583	635	705	754	798	827	854	780	802
HB15	535	489	535	596	637	671	692	712	626	643
HB16	417	367	402	445	469	492	501	509	407	411
HB17	372	313	334	357	363	370	364	358	240	229
HB18	451	388	395	398	385	374	352	332	226	197
HB19	613	548	549	541	519	499	471	442	306	270
HB20	792	730	727	717	695	674	643	616	479	445
HB21	1,024	966	962	952	931	912	884	858	728	696
HB22	1,398	1,345	1,342	1,333	1,312	1,295	1,269	1,246	1,126	1,095
HB23	1,770	1,723	1,721	1,713	1,696	1,681	1,658	1,638	1,532	1,506

Figure 77: Long Island Transmission Security Margin Hourly Curve (Summer Peak – Expected Weather, Normal Transfer Criteria)

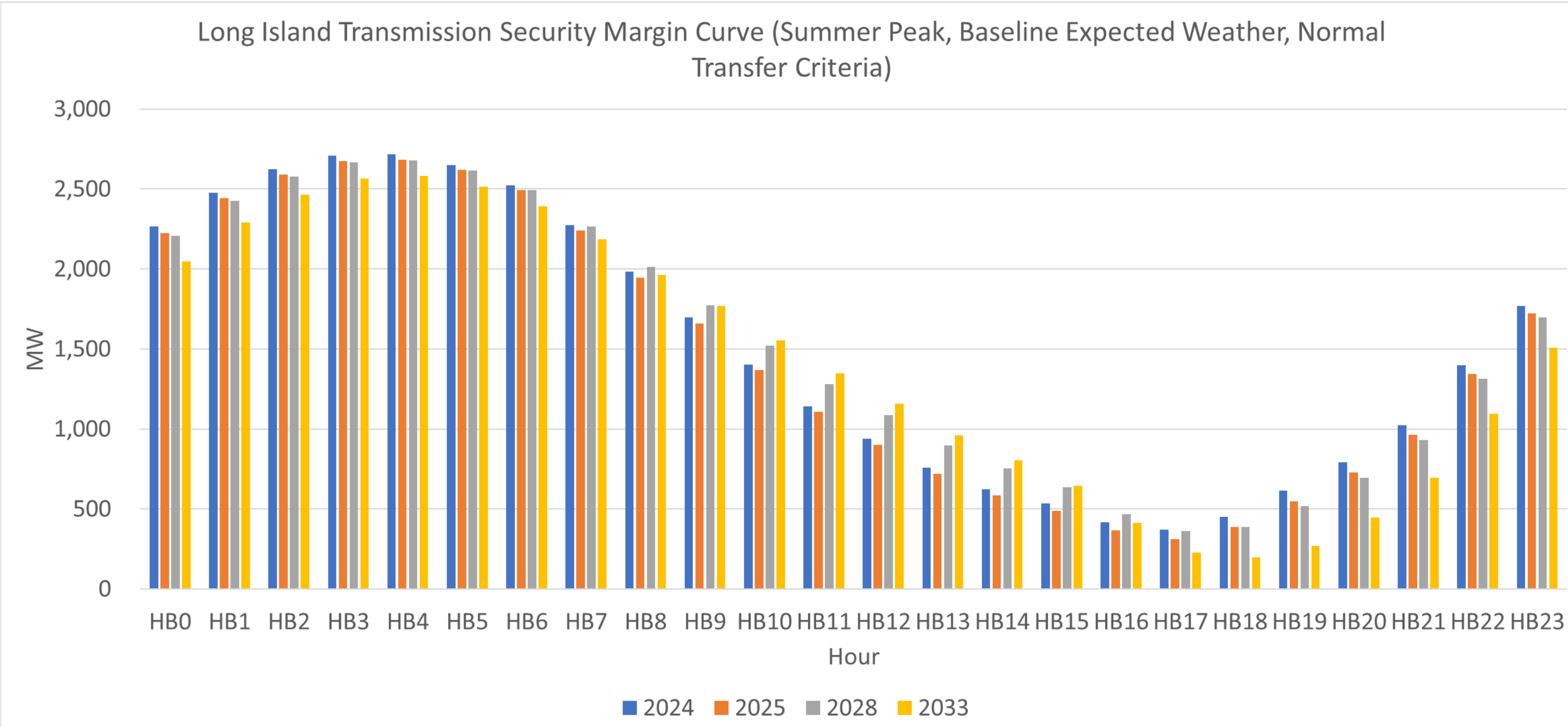


Figure 78: Long Island Transmission Security Margin (1-in-10-Year Heatwave, Emergency Transfer Criteria)

Summer Peak - 1-in-10-Year Heatwave, Emergency Transfer Criteria (MW)											
Line	**Item**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**
A	**Zone K Demand Forecast (5)**	(5,369)	(5,350)	(5,342)	(5,338)	(5,350)	(5,362)	(5,385)	(5,407)	(5,435)	(5,473)
B	I+J to K	887	887	887	887	887	887	887	887	887	887
C	New England Import (NNC)	0	0	0	0	0	0	0	0	0	0
D	**Total K AC Import (B+C)**	887	887	887	887	887	887	887	887	887	887
E	Loss of Source Contingency	0	0	0	0	0	0	0	0	0	0
F	**Resource Need (A+D+E)**	(4,482)	(4,463)	(4,455)	(4,451)	(4,463)	(4,475)	(4,498)	(4,520)	(4,548)	(4,586)
G	K Generation (1)	5,013	5,013	5,013	5,013	5,013	5,013	5,013	5,013	5,013	5,013
H	K Generation Derates (2)	(603)	(604)	(605)	(606)	(606)	(607)	(607)	(607)	(608)	(608)
I	Temperature Based Generation Derates	(32)	(32)	(32)	(32)	(32)	(32)	(32)	(32)	(32)	(32)
J	Net ICAP External Imports	660	660	660	660	660	660	660	660	660	660
K	SCRs (3), (4)	18	18	18	18	18	18	18	18	18	18
L	**Total Resources Available (G+H+I+J+K)**	5,056	5,055	5,054	5,053	5,053	5,052	5,052	5,052	5,051	5,050
M	**Transmission Security Margin (F+L)**	574	592	599	602	590	577	554	532	503	464

Notes:

1. Reflects the 2023 Gold Book existing summer capacity plus projected additions and deactivations.
2. Reflects the derates for generating resources. For this evaluation land-based wind generation is assumed to have a capability of 5% of the total nameplate, off-shore wind at 10% of the total nameplate, solar generation is based on the ratio of solar PV nameplate capacity (2023 Gold Book Table I-9a) and solar PV peak reductions (2023 Gold Book Table I-9c). Derates for run-of-river hydro are included as well as the Oswego Export limit for all lines in-service. Includes derates for thermal resources based on NERC five-year class average EFORd data published August 2022 (https://www.nerc.com/pa/RAPA/gads/Pages/Reports.aspx).
3. SCRs are not applied for transmission security analysis of normal operations, but are included for emergency operations.
4. Includes a derate of 16 MW for SCRs.
5. Reflects the final 10-year peak forecasts presented to stakeholders at the April 5, 2023 LFTF/ESPWG with adjustments for large load queue projects included in this STAR (Q0580 – WNY STAMP, Q0776 – Greenidge, Q0849 – Somerset, Q0580 – Cayuga, Q0979 – North Country Data Center).

Figure 79: Long Island Transmission Security Margin (Hourly) (1-in-10-Year Heatwave, Emergency Transfer Criteria)

Summer Peak - Heatwave, Emergency Transfer Criteria (MW)										
K Transmission Security Margin										
Hour	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
HB0	2,520	2,526	2,524	2,465	2,445	2,425	2,407	2,389	2,338	2,316
HB1	2,742	2,753	2,751	2,695	2,678	2,663	2,649	2,634	2,591	2,574
HB2	2,897	2,908	2,908	2,854	2,838	2,827	2,815	2,802	2,768	2,753
HB3	2,989	3,000	3,000	2,947	2,934	2,926	2,917	2,906	2,875	2,862
HB4	3,011	3,026	3,025	2,974	2,962	2,952	2,945	2,936	2,907	2,896
HB5	2,962	2,976	2,977	2,924	2,913	2,903	2,894	2,887	2,856	2,845
HB6	2,848	2,863	2,864	2,812	2,802	2,792	2,783	2,776	2,741	2,731
HB7	2,590	2,602	2,610	2,568	2,561	2,556	2,552	2,547	2,509	2,502
HB8	2,280	2,289	2,304	2,277	2,280	2,284	2,282	2,282	2,242	2,236
HB9	1,970	1,979	2,004	1,993	2,005	2,017	2,027	2,031	1,995	1,992
HB10	1,672	1,679	1,713	1,712	1,735	1,756	1,768	1,780	1,745	1,750
HB11	1,433	1,441	1,481	1,486	1,514	1,540	1,559	1,576	1,539	1,548
HB12	1,231	1,234	1,274	1,282	1,315	1,345	1,365	1,382	1,342	1,352
HB13	1,054	1,061	1,098	1,096	1,130	1,162	1,182	1,199	1,162	1,170
HB14	875	886	920	907	942	973	992	1,007	974	978
HB15	757	768	795	766	781	806	818	828	792	792
HB16	615	630	647	594	613	631	635	635	593	580
HB17	574	592	599	519	522	527	516	506	460	436
HB18	688	704	700	602	590	577	554	532	503	464
HB19	845	860	852	745	742	723	695	664	607	562
HB20	1,060	1,073	1,063	963	939	917	886	858	792	752
HB21	1,323	1,336	1,326	1,234	1,209	1,188	1,158	1,132	1,066	1,030
HB22	1,736	1,746	1,739	1,658	1,632	1,610	1,583	1,559	1,496	1,461
HB23	2,153	2,162	2,156	2,086	2,062	2,043	2,018	1,997	1,940	1,911

Figure 80: Long Island Transmission Security Margin Hourly Curve (1-in-10-Year Heatwave, Emergency Transfer Criteria)

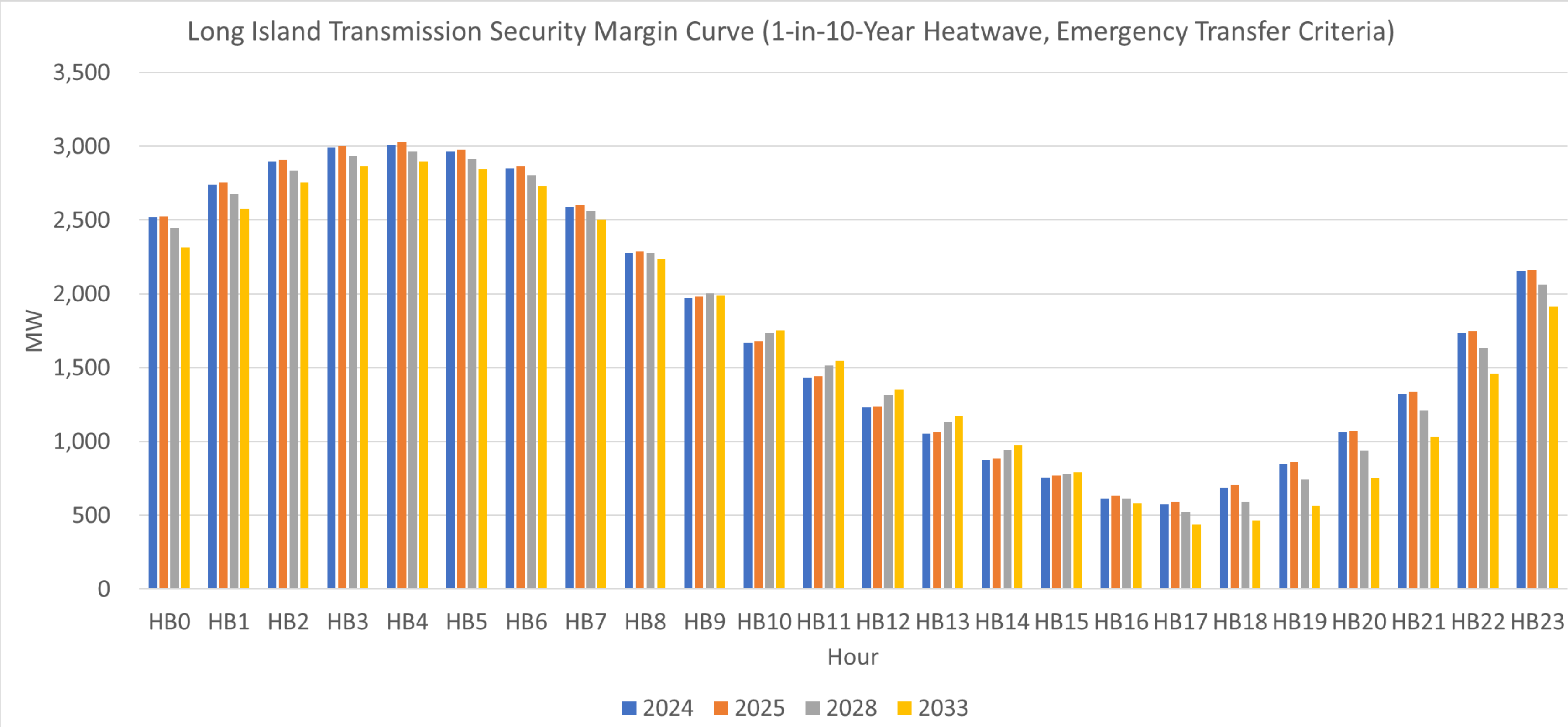


Figure 81: Long Island Transmission Security Margin (1-in-100-Year Extreme Heatwave, Emergency Transfer Criteria)

Summer Peak - 1-in-100-Year Extreme Heatwave, Emergency Transfer Criteria (MW)											
Line	**Item**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**
A	**Zone K Demand Forecast (5)**	(5,696)	(5,677)	(5,668)	(5,663)	(5,677)	(5,690)	(5,714)	(5,737)	(5,766)	(5,807)
B	I+J to K	887	887	887	887	887	887	887	887	887	887
C	New England Import (NNC)	0	0	0	0	0	0	0	0	0	0
D	**Total K AC Import (B+C)**	887	887	887	887	887	887	887	887	887	887
E	Loss of Source Contingency	0	0	0	0	0	0	0	0	0	0
F	**Resource Need (A+D+E)**	(4,809)	(4,790)	(4,781)	(4,776)	(4,790)	(4,803)	(4,827)	(4,850)	(4,879)	(4,920)
G	K Generation (1)	5,013	5,013	5,013	5,013	5,013	5,013	5,013	5,013	5,013	5,013
H	K Generation Derates (2)	(603)	(604)	(605)	(606)	(606)	(607)	(607)	(607)	(608)	(608)
I	Temperature Based Generation Derates	(68)	(68)	(68)	(68)	(68)	(68)	(68)	(68)	(68)	(68)
J	Net ICAP External Imports	660	660	660	660	660	660	660	660	660	660
K	SCRs (3), (4)	18	18	18	18	18	18	18	18	18	18
L	**Total Resources Available (G+H+I+J+K)**	5,020	5,019	5,018	5,017	5,017	5,016	5,016	5,016	5,015	5,014
M	**Transmission Security Margin (F+L)**	211	229	237	241	227	213	189	166	136	94

Notes:

1. Reflects the 2023 Gold Book existing summer capacity plus projected additions and deactivations.
2. Reflects the derates for generating resources. For this evaluation land-based wind generation is assumed to have a capability of 5% of the total nameplate, off-shore wind at 10% of the total nameplate, solar generation is based on the ratio of solar PV nameplate capacity (2023 Gold Book Table I-9a) and solar PV peak reductions (2023 Gold Book Table I-9c). Derates for run-of-river hydro are included as well as the Oswego Export limit for all lines in-service. Includes derates for thermal resources based on NERC five-year class average EFORd data published August 2022 (https://www.nerc.com/pa/RAPA/gads/Pages/Reports.aspx).
3. SCRs are not applied for transmission security analysis of normal operations, but are included for emergency operations.
4. Includes a derate of 16 MW for SCRs.
5. Reflects the final 10-year peak forecasts presented to stakeholders at the April 5, 2023 LFTF/ESPWG with adjustments for large load queue projects included in this STAR (Q0580 – WNY STAMP, Q0776 – Greenidge, Q0849 – Somerset, Q0580 – Cayuga, Q0979 – North Country Data Center).

Figure 82: Long Island Transmission Security Margin (Hourly) (1-in-100-Year Extreme Heatwave, Emergency Transfer Criteria)

Summer Peak - 1-in-100-Year Extreme Heatwave, Emergency Transfer Criteria (MW)										
K Transmission Security Margin										
Hour	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
HB0	2,338	2,343	2,343	2,282	2,261	2,241	2,222	2,204	2,152	2,130
HB1	2,562	2,573	2,571	2,514	2,496	2,481	2,466	2,450	2,407	2,389
HB2	2,719	2,729	2,730	2,674	2,658	2,646	2,634	2,620	2,586	2,570
HB3	2,812	2,822	2,823	2,769	2,755	2,746	2,736	2,725	2,694	2,680
HB4	2,834	2,848	2,848	2,795	2,783	2,773	2,765	2,756	2,726	2,715
HB5	2,785	2,800	2,801	2,746	2,735	2,725	2,715	2,707	2,676	2,665
HB6	2,672	2,687	2,689	2,635	2,624	2,614	2,604	2,597	2,562	2,551
HB7	2,412	2,423	2,432	2,389	2,381	2,375	2,371	2,366	2,328	2,319
HB8	2,098	2,105	2,121	2,092	2,095	2,098	2,097	2,096	2,056	2,048
HB9	1,784	1,790	1,816	1,803	1,815	1,827	1,835	1,840	1,803	1,799
HB10	1,481	1,486	1,521	1,517	1,539	1,560	1,572	1,583	1,547	1,552
HB11	1,238	1,243	1,284	1,287	1,315	1,340	1,358	1,375	1,337	1,345
HB12	1,011	1,011	1,051	1,057	1,090	1,119	1,138	1,155	1,113	1,122
HB13	800	804	842	836	870	900	920	936	897	903
HB14	587	594	628	612	646	677	694	709	673	676
HB15	435	443	455	422	453	477	487	498	458	456
HB16	260	274	292	235	253	270	271	271	226	213
HB17	211	229	237	153	155	159	147	136	88	62
HB18	328	345	343	241	227	213	189	166	136	94
HB19	489	506	518	406	385	364	335	304	243	197
HB20	739	754	746	642	617	594	561	533	465	424
HB21	1,038	1,050	1,042	948	922	899	869	843	774	736
HB22	1,486	1,496	1,490	1,406	1,379	1,357	1,329	1,305	1,239	1,204
HB23	1,936	1,945	1,942	1,868	1,844	1,823	1,798	1,777	1,719	1,688

Figure 83: Long Island Transmission Security Margin Hourly Curve (1-in-100-Year Extreme Heatwave, Emergency Transfer Criteria)

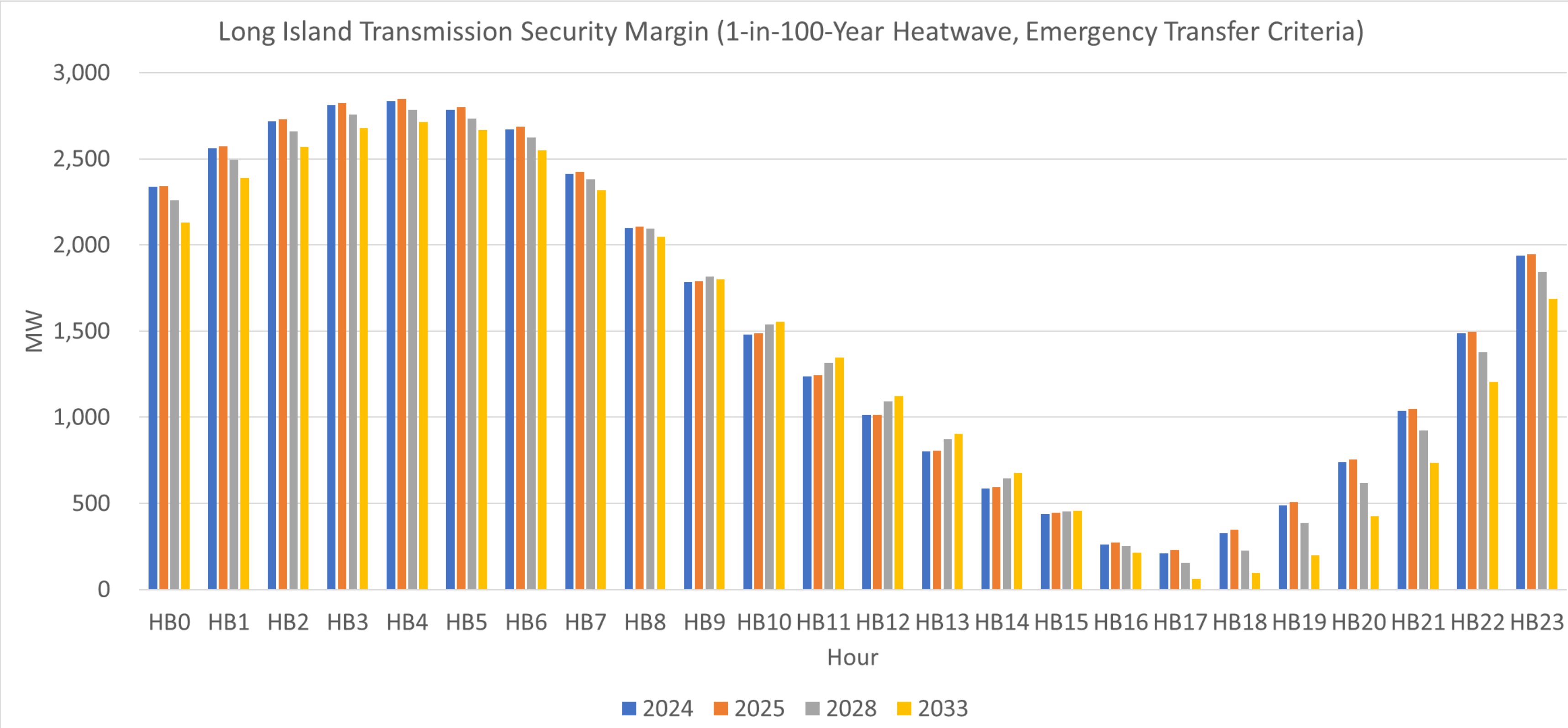


Figure 84: Long Island Transmission Security Margin (Winter Peak – Expected Weather, Normal Transfer Criteria)

Winter Peak - Baseline Expected Weather, Normal Transfer Criteria (MW)											
Line	**Item**	**2024-25**	**2025-26**	**2026-27**	**2027-28**	**2028-29**	**2029-30**	**2030-31**	**2031-32**	**2032-33**	**2033-34**
A	**Zone K Demand Forecast (5)**	(3,301)	(3,388)	(3,495)	(3,609)	(3,744)	(3,908)	(4,093)	(4,300)	(4,536)	(4,783)
B	I+J to K (3), (4)	929	929	929	929	929	929	929	929	929	929
C	New England Import (NNC)	0	0	0	0	0	0	0	0	0	0
D	**Total K AC Import (B+C)**	929	929	929	929	929	929	929	929	929	929
E	Loss of Source Contingency	(660)	(660)	(660)	(660)	(660)	(660)	(660)	(660)	(660)	(660)
F	**Resource Need (A+D+E)**	(3,032)	(3,119)	(3,226)	(3,340)	(3,475)	(3,639)	(3,824)	(4,031)	(4,267)	(4,514)
G	K Generation (1)	5,509	5,509	5,509	5,509	5,509	5,509	5,509	5,509	5,509	5,509
H	K Generation Derates (2)	(648)	(648)	(648)	(648)	(648)	(648)	(648)	(648)	(648)	(648)
I	Temperature Based Generation Derates	0	0	0	0	0	0	0	0	0	0
J	Net ICAP External Imports	660	660	660	660	660	660	660	660	660	660
K	**Total Resources Available (G+H+I+J)**	5,521	5,521	5,521	5,521	5,521	5,521	5,521	5,521	5,521	5,521
L	**Transmission Security Margin (F+K)**	2,489	2,402	2,295	2,181	2,046	1,881	1,696	1,489	1,254	1,006

Notes:

1. Reflects the 2023 Gold Book existing winter capacity plus projected additions and deactivations.
2. Reflects the derates for generating resources. For this evaluation land-based wind generation is assumed to have a capability of 10% of the total nameplate, off-shore wind at 15% of the total nameplate, solar generation is based on the ratio of solar PV nameplate capacity (2023 Gold Book Table I-9a) and solar PV peak reductions (2023 Gold Book Table I-9c). For winter the expected solar PV output at peak is 0 MW. Derates for run-of-river hydro are included as well as the Oswego Export limit for all lines in-service. Includes derates for thermal resources based on NERC five-year class average EFORd data published August 2022 (https://www.nerc.com/pa/RAPA/gads/Pages/Reports.aspx).
3. Limits for 2024 and 2025 are based on the summer peak 2025 representations evaluated in the post-2020 RNA updates. Limits for 2026 through 2032 are based also based on the summer peak 2025 representations evaluated in the post-2020 RNA analysis which does not include the impact of CHPE.
4. As a conservative winter peak assumption these limits utilize the summer values.
5. Reflects the final 10-year peak forecasts presented to stakeholders at the April 5, 2023 LTFT/ESPWG with adjustments for large load queue projects included in this STAR (Q0580 – WNY STAMP, Q0776 – Greenidge, Q0849 – Somerset, Q0580 – Cayuga, Q0979 – North Country Data Center).

Figure 85: Long Island Transmission Security Margin (1-in-10-Year Cold Snap, Emergency Transfer Criteria)

Winter Peak - 1-in-10-Year Cold Snap, Emergency Transfer Criteria (MW)											
Line	**Item**	**2024-25**	**2025-26**	**2026-27**	**2027-28**	**2028-29**	**2029-30**	**2030-31**	**2031-32**	**2032-33**	**2033-34**
A	**Zone K Demand Forecast (7)**	(3,439)	(3,530)	(3,641)	(3,760)	(3,901)	(4,072)	(4,265)	(4,481)	(4,726)	(4,984)
B	I+J to K (5), (6)	887	887	887	887	887	887	887	887	887	887
C	New England Import (NNC)	0	0	0	0	0	0	0	0	0	0
D	**Total K AC Import (B+C)**	887	887	887	887	887	887	887	887	887	887
E	Loss of Source Contingency	0	0	0	0	0	0	0	0	0	0
F	**Resource Need (A+D+E)**	(2,552)	(2,643)	(2,754)	(2,873)	(3,014)	(3,185)	(3,378)	(3,594)	(3,839)	(4,097)
G	K Generation (1)	5,509	5,509	5,509	5,509	5,509	5,509	5,509	5,509	5,509	5,509
H	K Generation Derates (2)	(648)	(648)	(648)	(648)	(648)	(648)	(648)	(648)	(648)	(648)
I	Temperature Based Generation Derates	0	0	0	0	0	0	0	0	0	0
J	Net ICAP External Imports	660	660	660	660	660	660	660	660	660	660
K	SCRs (3), (4)	12	12	12	12	12	12	12	12	12	12
L	**Total Resources Available (G+H+I+J+K)**	5,532	5,532	5,532	5,532	5,532	5,532	5,532	5,532	5,532	5,532
M	**Transmission Security Margin (F+L)**	2,980	2,889	2,778	2,659	2,518	2,347	2,154	1,938	1,693	1,435

Notes:

1. Reflects the 2023 Gold Book existing winter capacity plus projected additions and deactivations.
2. Reflects the derates for generating resources. For this evaluation land-based wind generation is assumed to have a capability of 10% of the total nameplate, off-shore wind at 15% of the total nameplate, solar generation is based on the ratio of solar PV nameplate capacity (2023 Gold Book Table I-9a) and solar PV peak reductions (2023 Gold Book Table I-9c). For winter the expected solar PV output at peak is 0 MW. Derates for run-of-river hydro are included as well as the Oswego Export limit for all lines in-service. Includes derates for thermal resources based on NERC five-year class average EFORd data published August 2022 (https://www.nerc.com/pa/RAPA/gads/Pages/Reports.aspx).
3. SCRs are not applied for transmission security analysis of normal operations, but are included for emergency operations.
4. Includes a derate of 10 MW for SCRs.
5. Limits for 2024 and 2025 are based on the summer peak 2025 representations evaluated in the post-2020 RNA updates. Limits for 2026 through 2032 are based also based on the summer peak 2025 representations evaluated in the post-2020 RNA analysis which does not include the impact of CHPE.
6. As a conservative winter peak assumption these limits utilize the summer values.
7. Reflects the final 10-year peak forecasts presented to stakeholders at the April 5, 2023 LFTF/ESPWG with adjustments for large load queue projects included in this STAR (Q0580 – WNY STAMP, Q0776 – Greenidge, Q0849 – Somerset, Q0580 – Cayuga, Q0979 – North Country Data Center).

Figure 86: Long Island Transmission Security Margin (1-in-100-year Extreme Cold Snap, Emergency Transfer Criteria)

Winter Peak - 1-in-100-Year Extreme Cold Snap, Emergency Transfer Criteria (MW)											
Line	Item	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34
A	**Zone K Demand Forecast (7)**	(3,683)	(3,780)	(3,899)	(4,027)	(4,177)	(4,361)	(4,567)	(4,798)	(5,061)	(5,337)
B	I+J to K (5), (6)	887	887	887	887	887	887	887	887	887	887
C	New England Import (NNC)	0	0	0	0	0	0	0	0	0	0
D	**Total K AC Import (B+C)**	887	887	887	887	887	887	887	887	887	887
E	Loss of Source Contingency	0	0	0	0	0	0	0	0	0	0
F	**Resource Need (A+D+E)**	(2,796)	(2,893)	(3,012)	(3,140)	(3,290)	(3,474)	(3,680)	(3,911)	(4,174)	(4,450)
G	K Generation (1)	5,509	5,509	5,509	5,509	5,509	5,509	5,509	5,509	5,509	5,509
H	K Generation Derates (2)	(648)	(648)	(648)	(648)	(648)	(648)	(648)	(648)	(648)	(648)
I	Temperature Based Generation Derates	0	0	0	0	0	0	0	0	0	0
J	Net ICAP External Imports	660	660	660	660	660	660	660	660	660	660
K	SCRs (3), (4)	12	12	12	12	12	12	12	12	12	12
L	**Total Resources Available (G+H+I+J+K)**	5,532	5,532	5,532	5,532	5,532	5,532	5,532	5,532	5,532	5,532
M	**Transmission Security Margin (F+L)**	2,736	2,639	2,520	2,392	2,242	2,058	1,852	1,621	1,358	1,082

Notes:

1. Reflects the 2023 Gold Book existing winter capacity plus projected additions and deactivations.
2. Reflects the derates for generating resources. For this evaluation land-based wind generation is assumed to have a capability of 10% of the total nameplate, off-shore wind at 15% of the total nameplate, solar generation is based on the ratio of solar PV nameplate capacity (2023 Gold Book Table I-9a) and solar PV peak reductions (2023 Gold Book Table I-9c). For winter the expected solar PV output at peak is 0 MW. Derates for run-of-river hydro are included as well as the Oswego Export limit for all lines in-service. Includes derates for thermal resources based on NERC five-year class average EFORd data published August 2022 (https://www.nerc.com/pa/RAPA/gads/Pages/Reports.aspx).
3. SCRs are not applied for transmission security analysis of normal operations, but are included for emergency operations.
4. Includes a derate of 10 MW for SCRs.
5. Limits for 2024 and 2025 are based on the summer peak 2025 representations evaluated in the post-2020 RNA updates. Limits for 2026 through 2032 are based also based on the summer peak 2025 representations evaluated in the post-2020 RNA analysis which does not include the impact of CHPE.
6. As a conservative winter peak assumption these limits utilize the summer values.
7. Reflects the final 10-year peak forecasts presented to stakeholders at the April 5, 2023 LFTF/ESPWG with adjustments for large load queue projects included in this STAR (Q0580 – WNY STAMP, Q0776 – Greenidge, Q0849 – Somerset, Q0580 – Cayuga, Q0979 – North Country Data Center).

Figure 87: Summary of Long Island Summer Transmission Security Margin – Summer

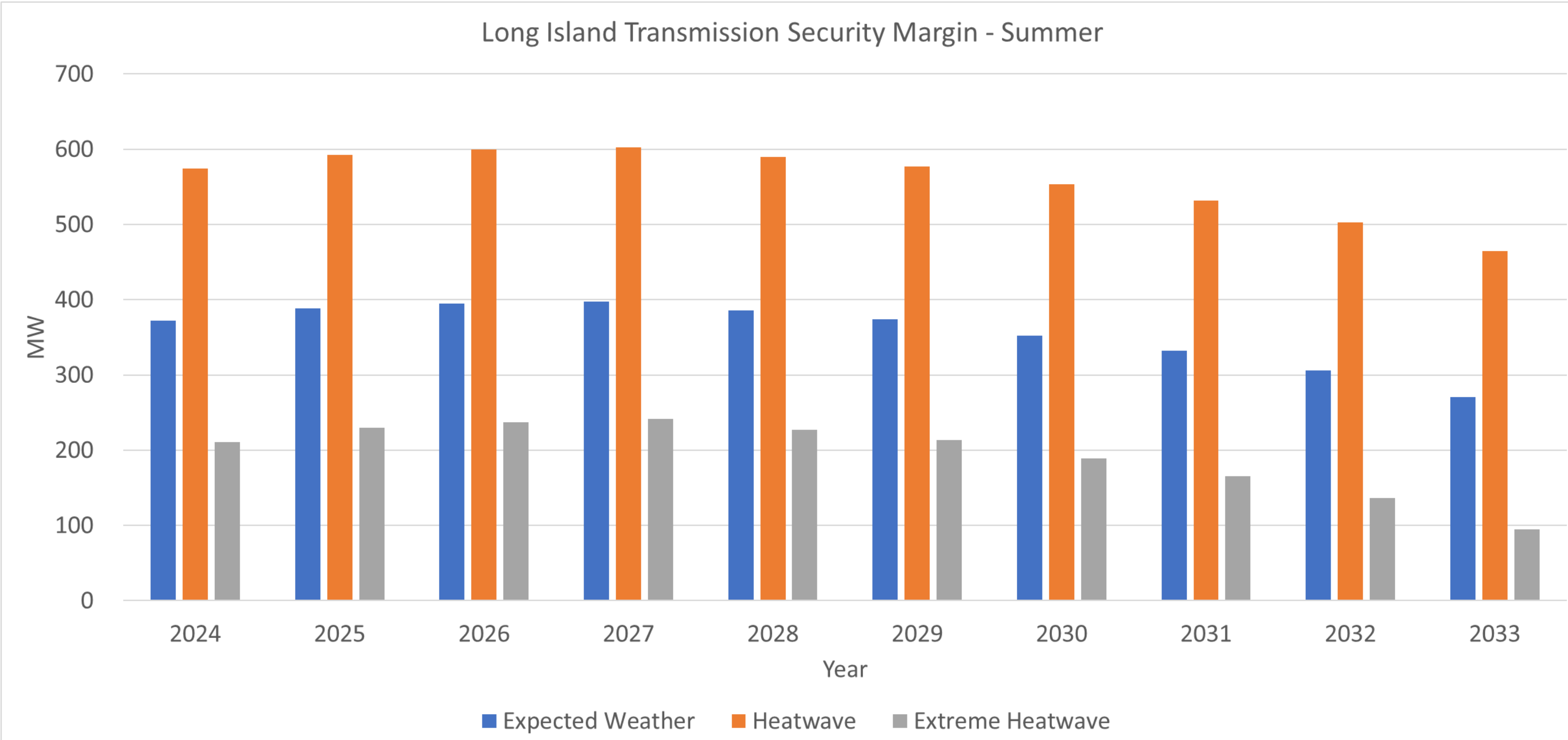


Figure 88: Summary of Long Island Summer Transmission Security Margin – Winter

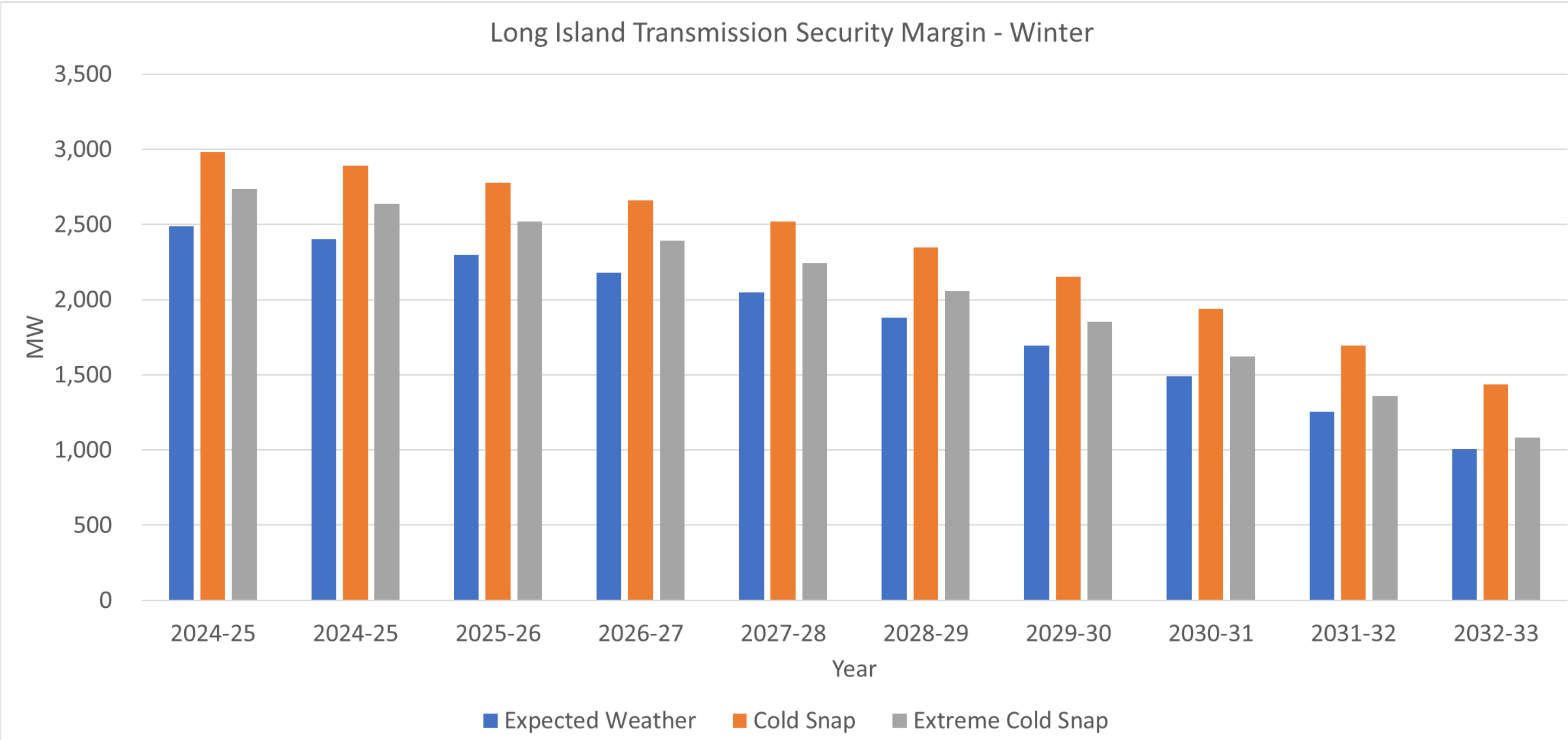
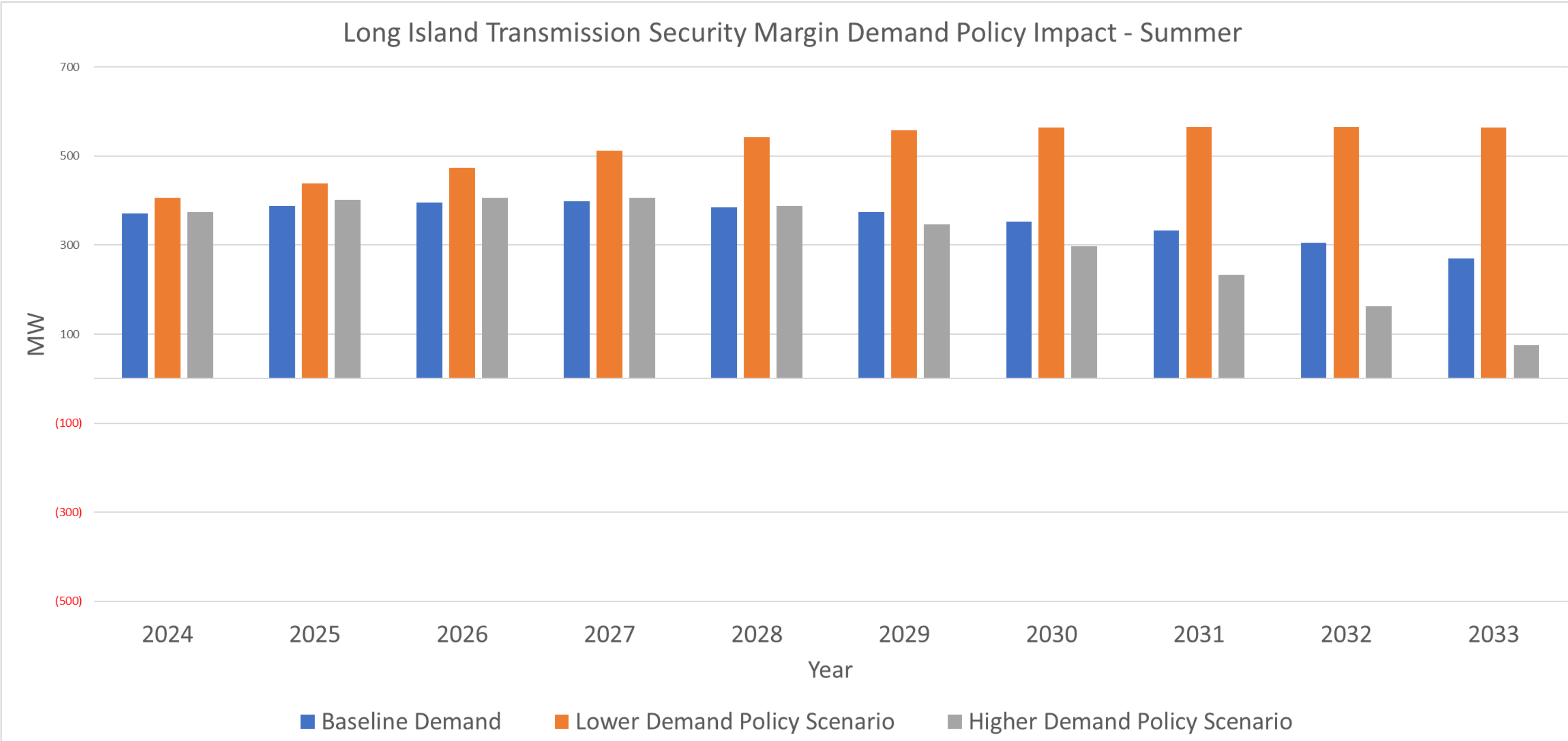


Figure 89: Summary of Long Island Summer Transmission Security Margin Demand Policy Impact – Summer



Demand Shape Details for Transmission Security Margins

As part of the 2023 Gold Book, representative demand shapes for the NYCA summer high demand day were produced.[36] For the transmission security margin analysis, the shapes are adjusted to match the Gold Book coincident peak forecasts. These shapes reflect the current observed base demand shape, using the average demand shape of high demand days from recent summers. The shapes also incorporate the evolving and increasing impacts of BtM-PV, electric vehicle charging, and building electrification on summer hourly loads. For the statewide coincident summer peak, the system peaks later in the day over the ten-year horizon.

The contribution of the hourly shapes from Zones A-F, GHI, J, and K as a fraction of the overall NYCA shape are calculated from the same sample of historical summer high demand days used to calculate the NYCA shape. For the localities, the BtM-PV, electric vehicle, and electrification shape impacts for each locality are based on their share of the expected penetration for each technology. Similar processes were utilized to create the 1-in-10-year heatwave and 1-in-100-year extreme heatwave shapes.

As seen in **Figure 90**, the demand shapes show a changing peak hour in Zones A-F, GHI, J, and K from 2024 through the 10-year horizon in 2033. For instance, the peak hour in A-F changes from HB18 in 2024 to HB 19 in 2033. In reality, zones will often peak on different hours during the same high summer demand day and will not be fully coincident with the NYCA peak hour itself.

[36] The 2023 Long-Term Forecast Load Shape Projections are available here.

Figure 90: NYCA Expected Weather Summer Peak Demand shape

	A-F		GHI		J		K		NYCA	
Hour	**2024**	**2033**	**2024**	**2033**	**2024**	**2033**	**2024**	**2033**	**2024**	**2033**
HB0	9,247	8,987	2,740	2,916	8,232	8,680	3,062	3,280	23,281	23,863
HB1	8,831	8,496	2,566	2,713	7,860	8,255	2,852	3,037	22,109	22,501
HB2	8,550	8,155	2,443	2,566	7,594	7,952	2,704	2,866	21,291	21,539
HB3	8,419	7,976	2,360	2,470	7,448	7,792	2,621	2,766	20,848	21,004
HB4	8,477	8,010	2,336	2,438	7,457	7,805	2,614	2,748	20,884	21,001
HB5	8,788	8,320	2,396	2,498	7,689	8,082	2,678	2,814	21,551	21,714
HB6	9,260	8,715	2,525	2,617	8,161	8,590	2,806	2,938	22,752	22,860
HB7	9,698	8,845	2,716	2,746	8,784	9,194	3,062	3,151	24,260	23,936
HB8	9,946	8,615	2,845	2,778	9,332	9,677	3,362	3,383	25,485	24,453
HB9	10,084	8,231	2,987	2,801	9,776	10,039	3,657	3,585	26,504	24,656
HB10	10,286	8,010	3,168	2,884	10,110	10,311	3,954	3,803	27,518	25,008
HB11	10,474	7,931	3,345	2,997	10,337	10,492	4,220	4,016	28,376	25,436
HB12	10,694	8,072	3,508	3,140	10,522	10,655	4,425	4,207	29,149	26,074
HB13	10,983	8,423	3,683	3,327	10,684	10,825	4,604	4,400	29,954	26,975
HB14	11,167	8,739	3,806	3,478	10,793	10,954	4,737	4,558	30,503	27,729
HB15	11,387	9,279	3,939	3,693	10,952	11,182	4,821	4,713	31,099	28,867
HB16	11,741	10,155	4,068	3,953	11,067	11,411	4,932	4,938	31,808	30,457
HB17	12,062	11,142	4,154	4,193	11,060	11,483	4,967	5,108	32,243	31,926
HB18	12,237	11,913	4,153	4,349	10,838	11,430	4,888	5,136	32,116	32,828
HB19	12,199	12,180	4,054	4,332	10,657	11,310	4,717	5,063	31,627	32,885
HB20	11,947	11,978	3,936	4,221	10,501	11,157	4,537	4,884	30,921	32,240
HB21	11,501	11,491	3,735	4,004	10,260	10,903	4,305	4,633	29,801	31,031
HB22	10,744	10,678	3,439	3,689	9,764	10,364	3,931	4,234	27,878	28,965
HB23	9,945	9,791	3,135	3,351	9,218	9,748	3,559	3,823	25,857	26,713

Figure 91 shows the demand shapes for the expected weather summer peak conditions. The statewide behavior can be broken down further into groups of zones. **Figure 92** shows the Zones A-F component of the NYCA expected weather forecast for the summer peak day. As seen in **Figure 92,** the demand continues to flatten in the zones in the early morning hours and shifts the peak to later in the day over each year with increased penetrations of BtM-PV.[37] Figure 93shows the Zones G-I component of the NYCA expected weather forecast for the summer peak day. As seen in **Figure 93,** the increased BtM-PV results in a slight flattening of the demand and a shifting of the peak hour.[38] **Figure 94** shows the Zone J component of the NYCA expected weather forecast for the summer peak day. As seen in **Figure 94,** the BtM-PV primarily reduces the demand from year to

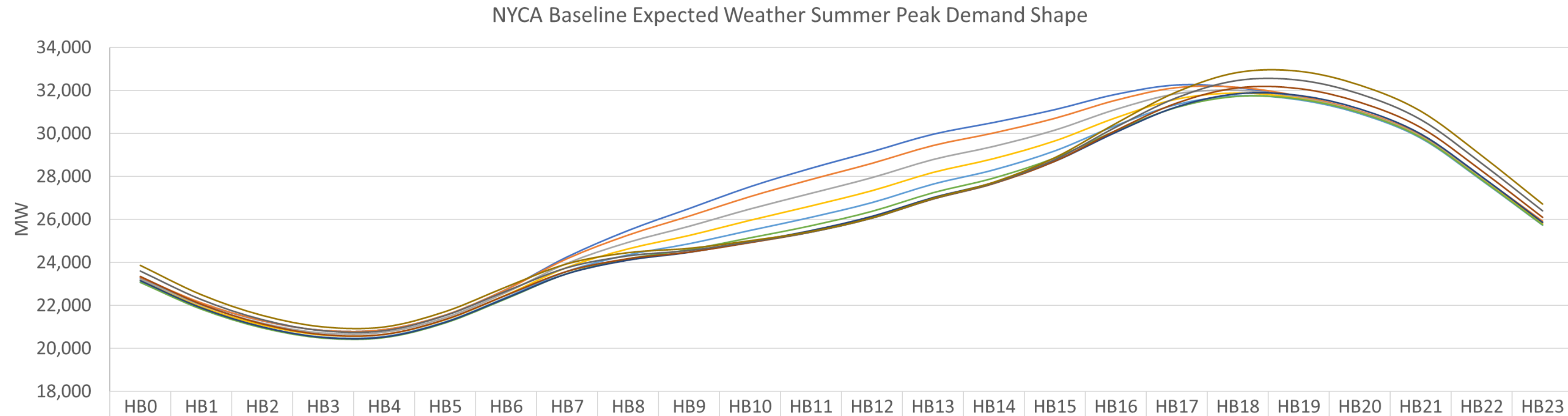
[37]From Table I-9a in the 2023 Load and Capacity Data report, in 2024 Zones A-F has 3,830 MW (nameplate) of the 6,186 MW of BtM-PV (nameplate) statewide (approximately 62% of the statewide BtM-PV). In 2033, the forecast for BtM-PV in Zones A-F increases to 6,781 MW (nameplate) of the 10,936 MW (nameplate) of the BtM-PV statewide (approximately 62% of the statewide BtM-PV).
[38]In 2024, Zones G-I has 955 MW (nameplate) of the 6,186 MW (nameplate) of BtM-PV statewide (approximately 15% of the statewide BtM-PV). In 2033, the forecast for BtM-PV in Zones G-I increases to 1,745 MW (nameplate) (approximately 16% of the statewide BtM-PV).

year but has negligible impact on the shifting of the peak hour.[39] **Figure 96** shows the Zone K component of the NYCA expected weather forecast for the summer peak day. As seen in **Figure 96,** BtM-PV has some impact on the Zone K shape over time.[40] Similar shapes were developed for the heatwave (Figure 97 through **Figure 101**) and extreme heatwave conditions (**Figure 102** through **Figure 106**).

[39]In 2024, Zone J has 476 MW (nameplate) of the 6,186 MW of BtM-PV (nameplate) statewide (approximately 8% of the statewide BtM-PV). In 2033, the forecast for BtM-PV in Zone J increases to 858 MW (nameplate) (approximately 8% of the statewide BtM-PV in Zone J).

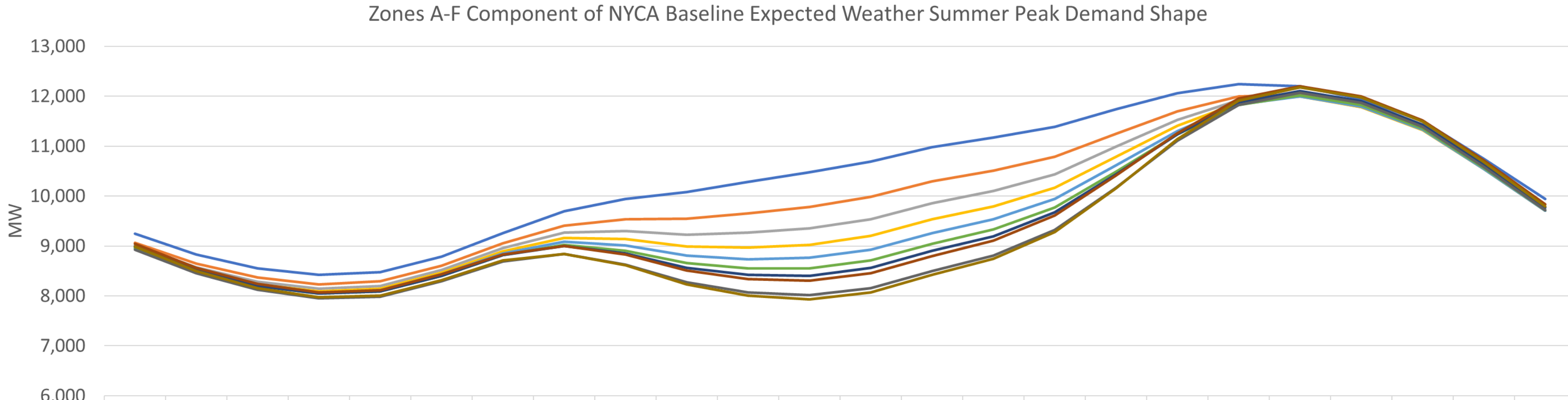
[40] In 2024, Zone K has 925 MW (nameplate) of the 6,186 MW of BtM-PV (nameplate) statewide (approximately 15% of the statewide BtM-PV). In 2033, the forecast for BtM-PV in Zone K increases to 1,552 MW (nameplate) (approximately 14% of the statewide BtM-PV in Zone K).

Figure 91: NYCA Baseline Expected Weather Summer Peak Demand Shape



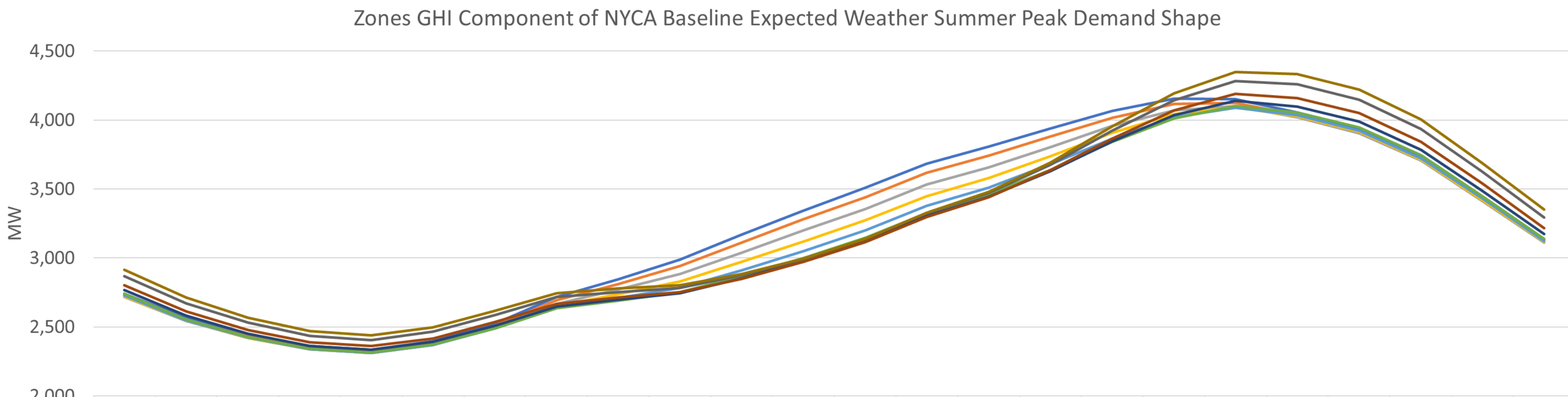
	HB0	HB1	HB2	HB3	HB4	HB5	HB6	HB7	HB8	HB9	HB10	HB11	HB12	HB13	HB14	HB15	HB16	HB17	HB18	HB19	HB20	HB21	HB22	HB23
Y2024	23,281	22,109	21,291	20,848	20,884	21,551	22,752	24,260	25,485	26,504	27,518	28,376	29,149	29,954	30,503	31,099	31,808	32,243	32,116	31,627	30,921	29,801	27,878	25,857
Y2025	23,316	22,127	21,295	20,843	20,880	21,555	22,743	24,179	25,274	26,156	27,065	27,860	28,613	29,440	30,027	30,705	31,547	32,134	32,150	31,742	31,051	29,918	27,974	25,925
Y2026	23,223	22,019	21,178	20,720	20,755	21,434	22,606	23,963	24,934	25,682	26,486	27,215	27,945	28,785	29,401	30,154	31,117	31,849	32,005	31,676	31,006	29,870	27,915	25,852
Y2027	23,154	21,936	21,087	20,624	20,656	21,335	22,490	23,773	24,632	25,255	25,961	26,629	27,338	28,186	28,832	29,653	30,729	31,596	31,881	31,628	30,974	29,835	27,874	25,798
Y2028	23,085	21,857	21,000	20,530	20,559	21,238	22,376	23,592	24,356	24,873	25,492	26,102	26,787	27,644	28,311	29,191	30,367	31,349	31,753	31,569	30,928	29,787	27,824	25,738
Y2029	23,069	21,825	20,954	20,478	20,501	21,182	22,308	23,475	24,161	24,592	25,138	25,701	26,371	27,234	27,920	28,853	30,118	31,205	31,715	31,590	30,957	29,811	27,843	25,740
Y2030	23,162	21,896	21,009	20,519	20,537	21,223	22,348	23,482	24,114	24,476	24,966	25,490	26,151	27,023	27,728	28,714	30,060	31,245	31,855	31,779	31,148	29,988	28,001	25,869
Y2031	23,350	22,056	21,148	20,646	20,657	21,350	22,478	23,587	24,177	24,481	24,921	25,412	26,065	26,947	27,670	28,706	30,132	31,410	32,115	32,083	31,447	30,274	28,265	26,098
Y2032	23,599	22,272	21,339	20,820	20,825	21,529	22,663	23,754	24,304	24,555	24,953	25,411	26,058	26,952	27,688	28,777	30,288	31,659	32,462	32,475	31,834	30,642	28,605	26,397
Y2033	23,863	22,501	21,539	21,004	21,001	21,714	22,860	23,936	24,453	24,656	25,008	25,436	26,074	26,975	27,729	28,867	30,457	31,926	32,828	32,885	32,240	31,031	28,965	26,713

Figure 92: Zones A-F Component of NYCA Baseline Expected Weather Summer Peak Demand Shape



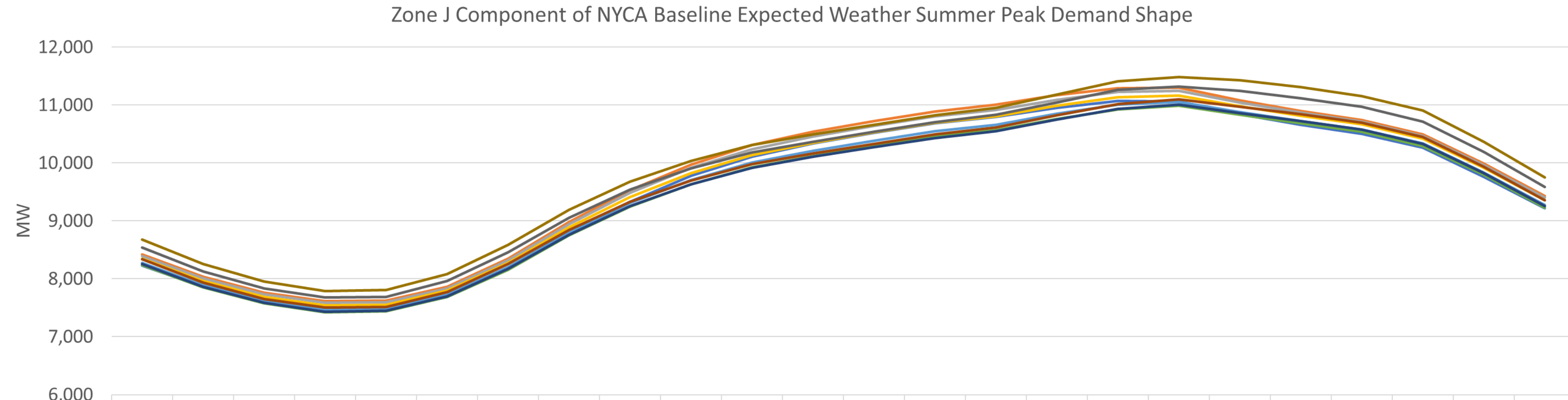
	HB0	HB1	HB2	HB3	HB4	HB5	HB6	HB7	HB8	HB9	HB10	HB11	HB12	HB13	HB14	HB15	HB16	HB17	HB18	HB19	HB20	HB21	HB22	HB23
Y2024	9,247	8,831	8,550	8,419	8,477	8,788	9,260	9,698	9,946	10,084	10,286	10,474	10,694	10,983	11,167	11,387	11,741	12,062	12,237	12,199	11,947	11,501	10,744	9,945
Y2025	9,066	8,651	8,364	8,228	8,289	8,603	9,049	9,411	9,534	9,549	9,653	9,783	9,988	10,290	10,506	10,787	11,251	11,696	11,994	12,025	11,793	11,342	10,578	9,771
Y2026	9,009	8,577	8,286	8,144	8,203	8,518	8,957	9,267	9,302	9,228	9,264	9,352	9,540	9,858	10,100	10,435	10,985	11,530	11,923	12,008	11,785	11,328	10,553	9,732
Y2027	8,971	8,533	8,234	8,091	8,147	8,460	8,889	9,161	9,136	8,994	8,972	9,027	9,207	9,530	9,791	10,168	10,782	11,404	11,869	11,995	11,782	11,321	10,541	9,710
Y2028	8,961	8,517	8,212	8,062	8,117	8,430	8,850	9,085	9,008	8,806	8,737	8,762	8,929	9,258	9,533	9,946	10,617	11,303	11,832	11,996	11,792	11,330	10,544	9,708
Y2029	8,960	8,508	8,195	8,044	8,092	8,404	8,818	9,024	8,905	8,653	8,548	8,547	8,707	9,040	9,327	9,768	10,491	11,236	11,823	12,021	11,820	11,355	10,567	9,720
Y2030	8,989	8,525	8,203	8,047	8,093	8,404	8,814	9,003	8,852	8,565	8,422	8,404	8,561	8,901	9,198	9,669	10,435	11,233	11,875	12,098	11,896	11,425	10,627	9,766
Y2031	9,041	8,565	8,237	8,069	8,112	8,428	8,834	9,005	8,828	8,508	8,339	8,301	8,453	8,802	9,109	9,606	10,413	11,260	11,953	12,197	11,993	11,515	10,710	9,837
Y2032	8,930	8,450	8,120	7,951	7,989	8,298	8,692	8,837	8,629	8,272	8,072	8,011	8,152	8,500	8,807	9,323	10,163	11,103	11,826	12,069	11,869	11,390	10,589	9,716
Y2033	8,987	8,496	8,155	7,976	8,010	8,320	8,715	8,845	8,615	8,231	8,010	7,931	8,072	8,423	8,739	9,279	10,155	11,142	11,913	12,180	11,978	11,491	10,678	9,791

Figure 93: Zones GHI Component of NYCA Baseline Expected Weather Summer Peak Demand Shape



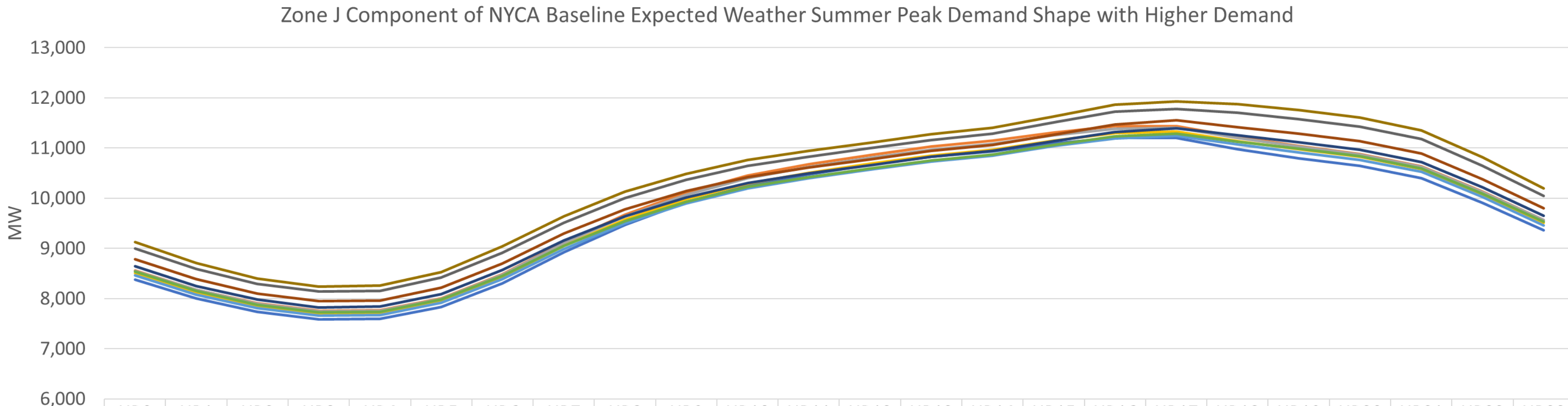
	HB0	HB1	HB2	HB3	HB4	HB5	HB6	HB7	HB8	HB9	HB10	HB11	HB12	HB13	HB14	HB15	HB16	HB17	HB18	HB19	HB20	HB21	HB22	HB23
Y2024	2,740	2,566	2,443	2,360	2,336	2,396	2,525	2,716	2,845	2,987	3,168	3,345	3,508	3,683	3,806	3,939	4,068	4,154	4,153	4,054	3,936	3,735	3,439	3,135
Y2025	2,727	2,552	2,430	2,347	2,323	2,380	2,510	2,693	2,811	2,941	3,112	3,283	3,441	3,617	3,740	3,879	4,018	4,115	4,126	4,035	3,917	3,717	3,424	3,121
Y2026	2,718	2,543	2,419	2,337	2,312	2,371	2,496	2,668	2,772	2,884	3,040	3,201	3,357	3,532	3,657	3,805	3,957	4,071	4,100	4,019	3,906	3,707	3,414	3,112
Y2027	2,723	2,547	2,421	2,337	2,313	2,370	2,493	2,653	2,737	2,829	2,971	3,121	3,273	3,449	3,579	3,738	3,908	4,045	4,094	4,027	3,916	3,715	3,421	3,118
Y2028	2,728	2,548	2,422	2,337	2,312	2,369	2,490	2,638	2,709	2,783	2,910	3,051	3,199	3,377	3,510	3,678	3,864	4,020	4,091	4,035	3,925	3,724	3,431	3,124
Y2029	2,739	2,557	2,428	2,343	2,317	2,375	2,491	2,635	2,692	2,754	2,867	3,000	3,146	3,325	3,462	3,639	3,841	4,014	4,101	4,054	3,945	3,744	3,448	3,140
Y2030	2,766	2,581	2,451	2,361	2,333	2,392	2,509	2,647	2,697	2,746	2,852	2,979	3,123	3,304	3,444	3,629	3,845	4,035	4,138	4,099	3,991	3,786	3,487	3,174
Y2031	2,804	2,614	2,478	2,389	2,360	2,417	2,535	2,668	2,713	2,753	2,850	2,973	3,117	3,299	3,441	3,636	3,865	4,070	4,190	4,159	4,050	3,843	3,539	3,218
Y2032	2,868	2,672	2,530	2,436	2,406	2,466	2,585	2,716	2,752	2,785	2,876	2,993	3,138	3,324	3,472	3,676	3,922	4,144	4,282	4,258	4,147	3,935	3,624	3,294
Y2033	2,916	2,713	2,566	2,470	2,438	2,498	2,617	2,746	2,778	2,801	2,884	2,997	3,140	3,327	3,478	3,693	3,953	4,193	4,349	4,332	4,221	4,004	3,689	3,351

Figure 94: Zone J Component of NYCA Baseline Expected Weather Summer Peak Demand Shape



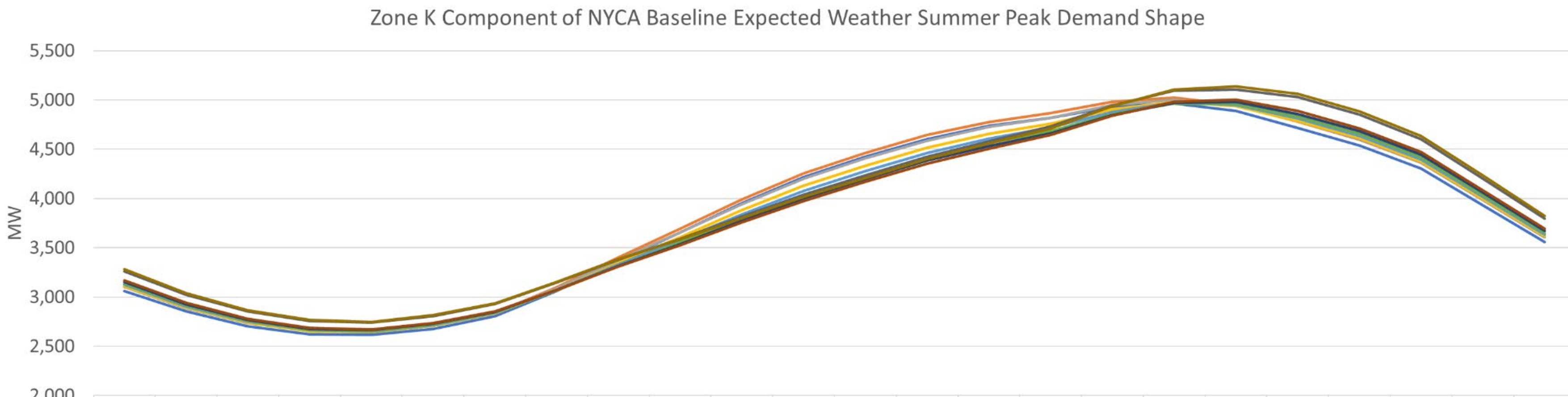
	HB0	HB1	HB2	HB3	HB4	HB5	HB6	HB7	HB8	HB9	HB10	HB11	HB12	HB13	HB14	HB15	HB16	HB17	HB18	HB19	HB20	HB21	HB22	HB23
Y2024	8,232	7,860	7,594	7,448	7,457	7,689	8,161	8,784	9,332	9,776	10,110	10,337	10,522	10,684	10,793	10,952	11,067	11,060	10,838	10,657	10,501	10,260	9,764	9,218
Y2025	8,419	8,036	7,762	7,613	7,623	7,862	8,346	8,978	9,530	9,974	10,311	10,539	10,723	10,890	11,004	11,172	11,296	11,298	11,080	10,900	10,742	10,496	9,988	9,427
Y2026	8,392	8,010	7,735	7,585	7,596	7,837	8,318	8,942	9,482	9,912	10,238	10,460	10,642	10,807	10,919	11,093	11,228	11,245	11,040	10,868	10,713	10,468	9,961	9,400
Y2027	8,350	7,964	7,692	7,541	7,552	7,796	8,274	8,886	9,411	9,823	10,136	10,350	10,527	10,692	10,807	10,987	11,135	11,167	10,980	10,817	10,664	10,422	9,916	9,354
Y2028	8,273	7,889	7,616	7,468	7,479	7,724	8,198	8,798	9,307	9,704	10,006	10,209	10,382	10,546	10,662	10,848	11,006	11,052	10,880	10,727	10,577	10,335	9,832	9,273
Y2029	8,234	7,848	7,574	7,424	7,436	7,683	8,157	8,748	9,247	9,632	9,923	10,120	10,289	10,453	10,569	10,761	10,929	10,988	10,830	10,684	10,537	10,295	9,794	9,232
Y2030	8,254	7,864	7,587	7,435	7,448	7,699	8,175	8,763	9,252	9,629	9,915	10,104	10,270	10,434	10,553	10,752	10,932	11,004	10,860	10,723	10,575	10,332	9,827	9,258
Y2031	8,335	7,937	7,653	7,502	7,514	7,770	8,253	8,843	9,327	9,696	9,976	10,163	10,328	10,491	10,614	10,820	11,014	11,101	10,970	10,839	10,691	10,445	9,933	9,352
Y2032	8,542	8,129	7,837	7,678	7,691	7,960	8,457	9,055	9,541	9,907	10,186	10,369	10,536	10,703	10,829	11,048	11,261	11,315	11,246	11,120	10,968	10,716	10,189	9,590
Y2033	8,680	8,255	7,952	7,792	7,805	8,082	8,590	9,194	9,677	10,039	10,311	10,492	10,655	10,825	10,954	11,182	11,411	11,483	11,430	11,310	11,157	10,903	10,364	9,748

Figure 95: Zone J Component of NYCA Higher Policy Expected Weather Summer Peak Demand Shape



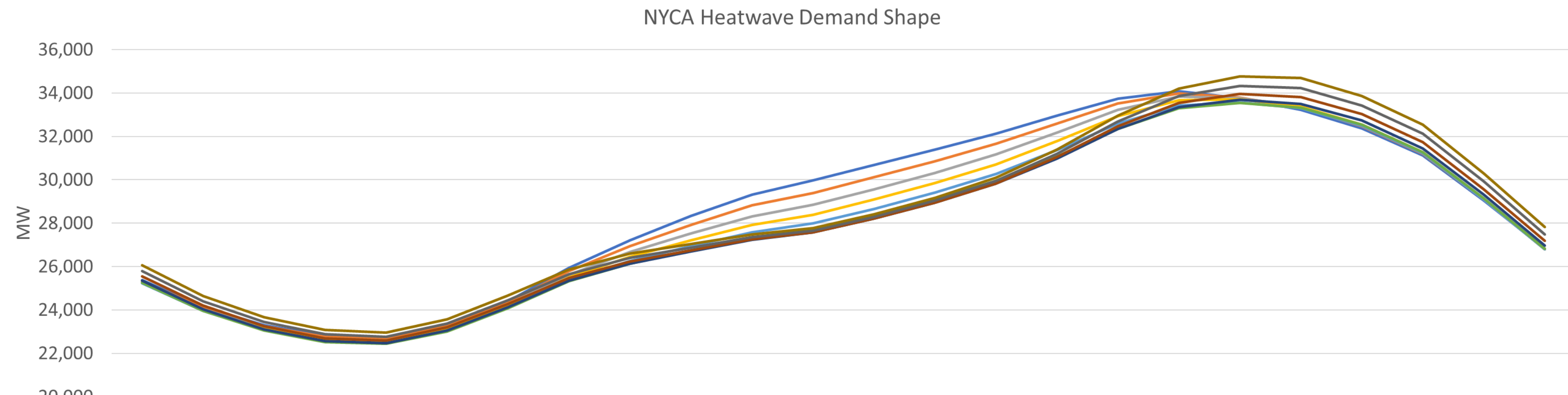
	HB0	HB1	HB2	HB3	HB4	HB5	HB6	HB7	HB8	HB9	HB10	HB11	HB12	HB13	HB14	HB15	HB16	HB17	HB18	HB19	HB20	HB21	HB22	HB23
Y2024	8,372	8,000	7,734	7,588	7,597	7,829	8,301	8,924	9,472	9,916	10,250	10,477	10,662	10,824	10,933	11,092	11,207	11,200	10,978	10,797	10,641	10,400	9,904	9,358
Y2025	8,559	8,176	7,902	7,753	7,763	8,002	8,486	9,118	9,670	10,114	10,451	10,679	10,863	11,030	11,144	11,312	11,436	11,438	11,220	11,040	10,882	10,636	10,128	9,567
Y2026	8,552	8,170	7,895	7,745	7,756	7,997	8,478	9,102	9,642	10,072	10,398	10,620	10,802	10,967	11,079	11,253	11,388	11,405	11,200	11,028	10,873	10,628	10,121	9,560
Y2027	8,510	8,124	7,852	7,701	7,712	7,956	8,434	9,046	9,571	9,983	10,296	10,510	10,687	10,852	10,967	11,147	11,295	11,327	11,140	10,977	10,824	10,582	10,076	9,514
Y2028	8,463	8,079	7,806	7,658	7,669	7,914	8,388	8,988	9,497	9,894	10,196	10,399	10,572	10,736	10,852	11,038	11,196	11,242	11,070	10,917	10,767	10,525	10,022	9,463
Y2029	8,534	8,148	7,874	7,724	7,736	7,983	8,457	9,048	9,547	9,932	10,223	10,420	10,589	10,753	10,869	11,061	11,229	11,288	11,130	10,984	10,837	10,595	10,094	9,532
Y2030	8,644	8,254	7,977	7,825	7,838	8,089	8,565	9,153	9,642	10,019	10,305	10,494	10,660	10,824	10,943	11,142	11,322	11,394	11,250	11,113	10,965	10,722	10,217	9,648
Y2031	8,785	8,387	8,103	7,952	7,964	8,220	8,703	9,293	9,777	10,146	10,426	10,613	10,778	10,941	11,064	11,270	11,464	11,551	11,420	11,289	11,141	10,895	10,383	9,802
Y2032	9,002	8,589	8,297	8,138	8,151	8,420	8,917	9,515	10,001	10,367	10,646	10,829	10,996	11,163	11,289	11,508	11,721	11,775	11,706	11,580	11,428	11,176	10,649	10,050
Y2033	9,130	8,705	8,402	8,242	8,255	8,532	9,040	9,644	10,127	10,489	10,761	10,942	11,105	11,275	11,404	11,632	11,861	11,933	11,880	11,760	11,607	11,353	10,814	10,198

Figure 96: Zone K Component of NYCA Baseline Expected Weather Summer Peak Demand shape



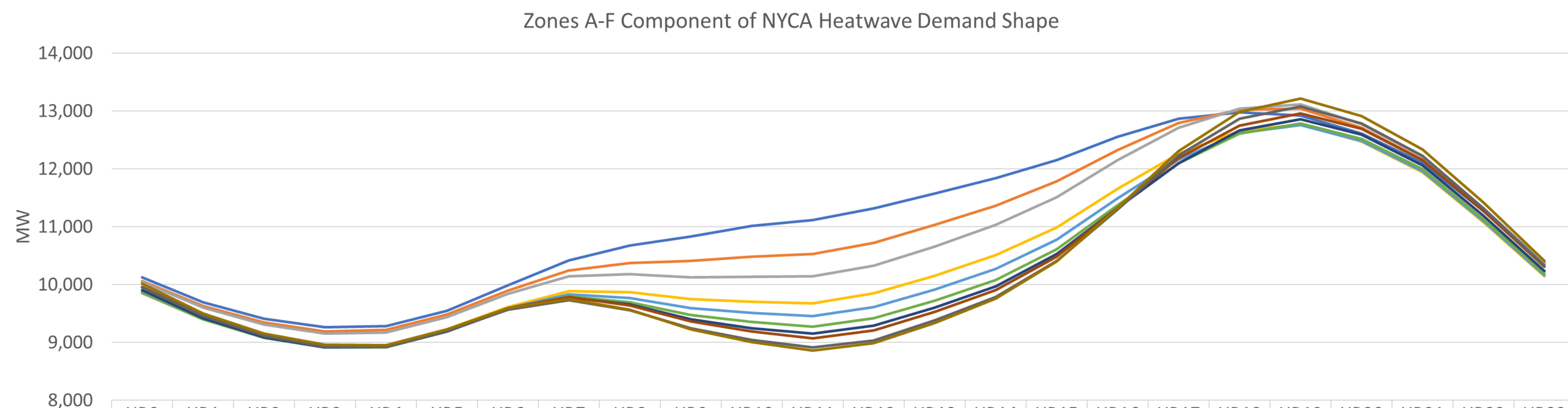
	HB0	HB1	HB2	HB3	HB4	HB5	HB6	HB7	HB8	HB9	HB10	HB11	HB12	HB13	HB14	HB15	HB16	HB17	HB18	HB19	HB20	HB21	HB22	HB23
Y2024	3,062	2,852	2,704	2,621	2,614	2,678	2,806	3,062	3,362	3,657	3,954	4,220	4,425	4,604	4,737	4,821	4,932	4,967	4,888	4,717	4,537	4,305	3,931	3,559
Y2025	3,104	2,888	2,739	2,655	2,645	2,710	2,838	3,097	3,399	3,692	3,989	4,255	4,461	4,643	4,777	4,867	4,982	5,025	4,950	4,782	4,599	4,363	3,984	3,606
Y2026	3,104	2,889	2,738	2,654	2,644	2,708	2,835	3,086	3,378	3,658	3,944	4,202	4,406	4,588	4,725	4,821	4,947	5,003	4,942	4,781	4,602	4,367	3,987	3,608
Y2027	3,110	2,892	2,740	2,655	2,644	2,709	2,834	3,073	3,348	3,609	3,882	4,131	4,331	4,515	4,655	4,760	4,904	4,980	4,938	4,789	4,612	4,377	3,996	3,616
Y2028	3,123	2,903	2,750	2,663	2,651	2,715	2,838	3,071	3,332	3,580	3,839	4,080	4,277	4,463	4,606	4,719	4,880	4,974	4,950	4,811	4,634	4,398	4,017	3,633
Y2029	3,136	2,912	2,757	2,667	2,656	2,720	2,842	3,068	3,317	3,553	3,800	4,034	4,229	4,416	4,562	4,685	4,857	4,967	4,961	4,831	4,655	4,417	4,034	3,648
Y2030	3,153	2,926	2,768	2,676	2,663	2,728	2,850	3,069	3,313	3,536	3,777	4,003	4,197	4,384	4,533	4,664	4,848	4,973	4,982	4,859	4,686	4,445	4,060	3,671
Y2031	3,170	2,940	2,780	2,686	2,671	2,735	2,856	3,071	3,309	3,524	3,756	3,975	4,167	4,355	4,506	4,644	4,840	4,979	5,002	4,888	4,713	4,471	4,083	3,691
Y2032	3,259	3,021	2,852	2,755	2,739	2,805	2,929	3,146	3,382	3,591	3,819	4,038	4,232	4,425	4,580	4,730	4,942	5,097	5,108	5,028	4,850	4,601	4,203	3,797
Y2033	3,280	3,037	2,866	2,766	2,748	2,814	2,938	3,151	3,383	3,585	3,803	4,016	4,207	4,400	4,558	4,713	4,938	5,108	5,136	5,063	4,884	4,633	4,234	3,823

Figure 97: NYCA Heatwave Demand Shape



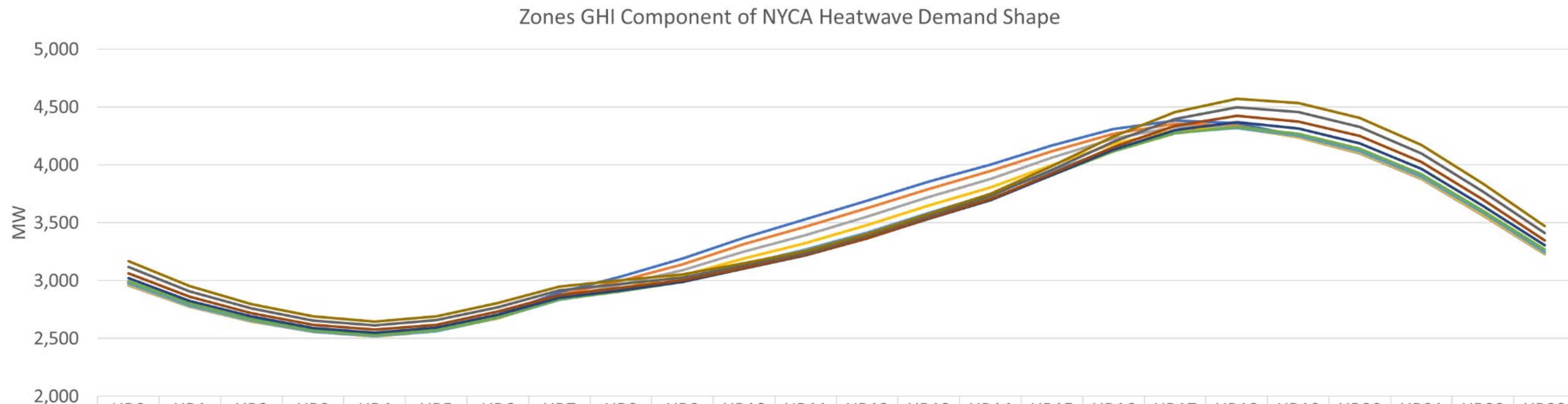
	HB0	HB1	HB2	HB3	HB4	HB5	HB6	HB7	HB8	HB9	HB10	HB11	HB12	HB13	HB14	HB15	HB16	HB17	HB18	HB19	HB20	HB21	HB22	HB23
Y2024	25,366	24,138	23,296	22,805	22,732	23,290	24,408	25,932	27,218	28,328	29,321	29,963	30,692	31,382	32,128	32,958	33,747	34,091	33,760	33,218	32,374	31,133	29,053	26,820
Y2025	25,336	24,099	23,249	22,753	22,680	23,240	24,340	25,788	26,950	27,929	28,819	29,398	30,129	30,856	31,657	32,582	33,512	33,992	33,793	33,328	32,478	31,209	29,098	26,829
Y2026	25,279	24,029	23,171	22,669	22,593	23,158	24,243	25,619	26,669	27,528	28,323	28,843	29,567	30,322	31,165	32,173	33,228	33,839	33,766	33,373	32,526	31,238	29,102	26,804
Y2027	25,262	23,995	23,125	22,616	22,538	23,106	24,181	25,499	26,455	27,208	27,920	28,387	29,090	29,850	30,714	31,780	32,932	33,665	33,708	33,381	32,551	31,262	29,119	26,805
Y2028	25,238	23,952	23,068	22,550	22,468	23,041	24,110	25,381	26,263	26,931	27,573	27,996	28,658	29,404	30,265	31,361	32,583	33,423	33,572	33,303	32,504	31,230	29,096	26,784
Y2029	25,261	23,952	23,050	22,522	22,435	23,014	24,081	25,320	26,146	26,746	27,333	27,720	28,352	29,088	29,947	31,074	32,357	33,291	33,534	33,313	32,536	31,271	29,141	26,821
Y2030	25,361	24,028	23,108	22,566	22,474	23,060	24,131	25,349	26,137	26,687	27,231	27,588	28,210	28,950	29,821	30,989	32,337	33,354	33,682	33,500	32,726	31,451	29,303	26,955
Y2031	25,553	24,192	23,250	22,696	22,597	23,190	24,268	25,473	26,236	26,747	27,255	27,587	28,205	28,953	29,836	31,045	32,459	33,551	33,958	33,811	33,030	31,740	29,571	27,189
Y2032	25,800	24,407	23,442	22,872	22,767	23,369	24,456	25,653	26,396	26,872	27,352	27,660	28,279	29,042	29,942	31,198	32,685	33,851	34,338	34,225	33,429	32,116	29,914	27,487
Y2033	26,073	24,647	23,656	23,070	22,957	23,567	24,668	25,861	26,591	27,039	27,490	27,777	28,400	29,178	30,098	31,403	32,961	34,202	34,768	34,687	33,874	32,534	30,297	27,819

Figure 98: Zones A-F Component of NYCA Heatwave Demand Shape



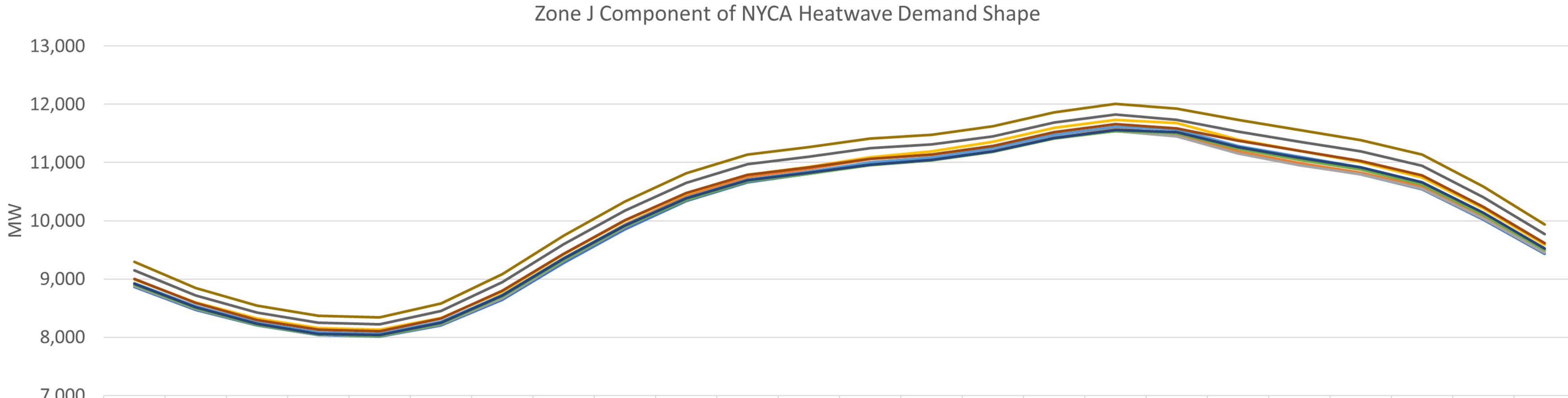
	HB0	HB1	HB2	HB3	HB4	HB5	HB6	HB7	HB8	HB9	HB10	HB11	HB12	HB13	HB14	HB15	HB16	HB17	HB18	HB19	HB20	HB21	HB22	HB23
Y2024	10,130	9,695	9,409	9,264	9,282	9,551	9,988	10,420	10,676	10,831	11,014	11,113	11,314	11,571	11,838	12,155	12,555	12,863	12,973	12,922	12,607	12,102	11,273	10,380
Y2025	10,065	9,635	9,345	9,195	9,217	9,487	9,895	10,247	10,377	10,407	10,488	10,532	10,725	11,035	11,368	11,782	12,330	12,792	13,025	13,044	12,710	12,165	11,293	10,360
Y2026	10,044	9,599	9,306	9,150	9,168	9,439	9,840	10,141	10,182	10,125	10,139	10,142	10,324	10,660	11,031	11,506	12,151	12,716	13,042	13,114	12,778	12,214	11,322	10,362
Y2027	9,851	9,398	9,095	8,937	8,953	9,223	9,615	9,883	9,870	9,749	9,708	9,678	9,852	10,157	10,508	10,988	11,657	12,262	12,658	12,768	12,477	11,945	11,083	10,147
Y2028	9,860	9,398	9,085	8,920	8,934	9,206	9,594	9,832	9,772	9,595	9,510	9,454	9,608	9,911	10,268	10,776	11,492	12,160	12,617	12,761	12,486	11,960	11,096	10,159
Y2029	9,876	9,402	9,081	8,913	8,919	9,192	9,578	9,792	9,697	9,473	9,357	9,277	9,419	9,722	10,083	10,612	11,372	12,098	12,608	12,782	12,516	11,993	11,129	10,186
Y2030	9,908	9,422	9,090	8,917	8,921	9,193	9,577	9,778	9,656	9,403	9,250	9,157	9,295	9,603	9,974	10,529	11,329	12,102	12,663	12,859	12,592	12,064	11,191	10,232
Y2031	9,960	9,462	9,123	8,938	8,939	9,217	9,598	9,785	9,643	9,362	9,187	9,075	9,209	9,528	9,905	10,484	11,323	12,191	12,748	12,961	12,692	12,155	11,275	10,306
Y2032	9,954	9,453	9,114	8,928	8,926	9,196	9,566	9,730	9,561	9,246	9,042	8,911	9,036	9,382	9,785	10,406	11,300	12,237	12,871	13,079	12,784	12,222	11,320	10,326
Y2033	10,016	9,504	9,155	8,959	8,953	9,223	9,596	9,749	9,563	9,225	9,006	8,859	8,988	9,342	9,756	10,403	11,332	12,313	12,989	13,217	12,916	12,340	11,423	10,411

Figure 99: Zones GHI Component of NYCA Heatwave Demand Shape



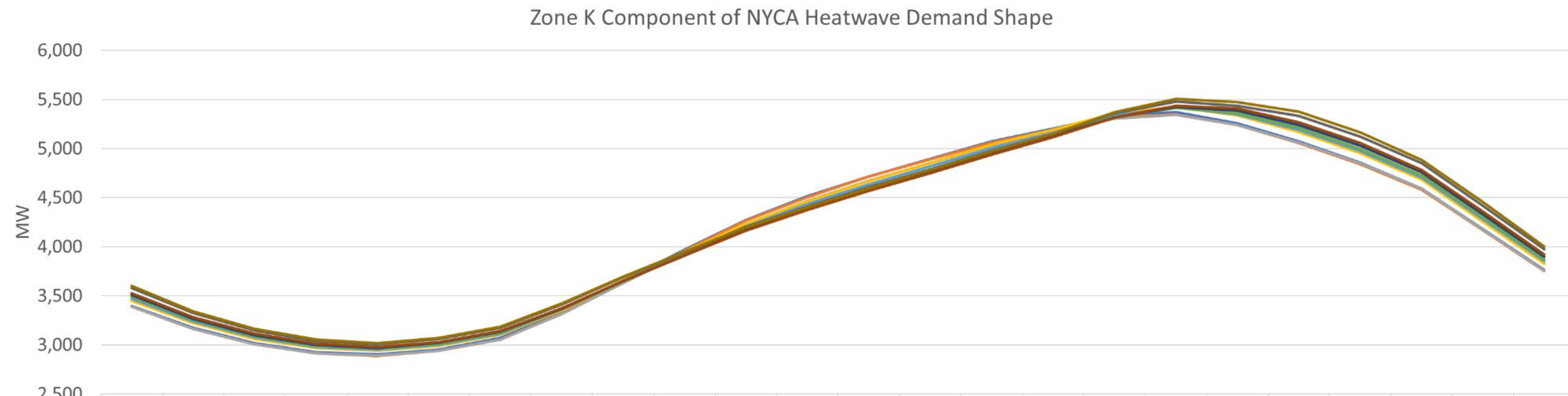
	HB0	HB1	HB2	HB3	HB4	HB5	HB6	HB7	HB8	HB9	HB10	HB11	HB12	HB13	HB14	HB15	HB16	HB17	HB18	HB19	HB20	HB21	HB22	HB23
Y2024	2,982	2,799	2,670	2,578	2,539	2,587	2,706	2,900	3,035	3,190	3,372	3,530	3,691	3,856	4,005	4,170	4,311	4,386	4,360	4,253	4,116	3,897	3,580	3,249
Y2025	2,964	2,781	2,654	2,564	2,525	2,567	2,688	2,875	2,999	3,142	3,316	3,466	3,626	3,794	3,947	4,119	4,271	4,356	4,340	4,240	4,101	3,880	3,565	3,233
Y2026	2,960	2,776	2,647	2,557	2,517	2,563	2,678	2,854	2,967	3,093	3,253	3,395	3,555	3,723	3,879	4,064	4,228	4,329	4,330	4,239	4,102	3,882	3,563	3,230
Y2027	2,965	2,780	2,649	2,557	2,518	2,562	2,676	2,842	2,936	3,043	3,191	3,323	3,479	3,649	3,808	4,001	4,182	4,303	4,322	4,244	4,111	3,889	3,571	3,237
Y2028	2,977	2,786	2,655	2,561	2,521	2,566	2,679	2,833	2,916	3,008	3,143	3,268	3,418	3,588	3,747	3,945	4,140	4,279	4,319	4,250	4,120	3,900	3,584	3,248
Y2029	2,993	2,800	2,665	2,570	2,530	2,575	2,684	2,838	2,908	2,990	3,112	3,231	3,378	3,546	3,708	3,912	4,120	4,275	4,330	4,270	4,141	3,923	3,605	3,269
Y2030	3,023	2,827	2,690	2,591	2,548	2,595	2,705	2,854	2,919	2,990	3,106	3,220	3,365	3,536	3,698	3,910	4,130	4,300	4,369	4,315	4,189	3,966	3,645	3,306
Y2031	3,062	2,861	2,718	2,620	2,576	2,621	2,732	2,877	2,939	3,002	3,111	3,223	3,368	3,540	3,705	3,926	4,157	4,340	4,424	4,377	4,249	4,025	3,699	3,350
Y2032	3,117	2,909	2,760	2,657	2,612	2,659	2,772	2,915	2,970	3,029	3,134	3,240	3,387	3,561	3,731	3,957	4,202	4,398	4,497	4,456	4,328	4,099	3,769	3,412
Y2033	3,167	2,953	2,799	2,694	2,646	2,693	2,806	2,949	3,003	3,053	3,151	3,254	3,402	3,577	3,750	3,989	4,247	4,458	4,574	4,537	4,406	4,174	3,837	3,471

Figure 100: Zone J Component of NYCA Heatwave Demand Shape



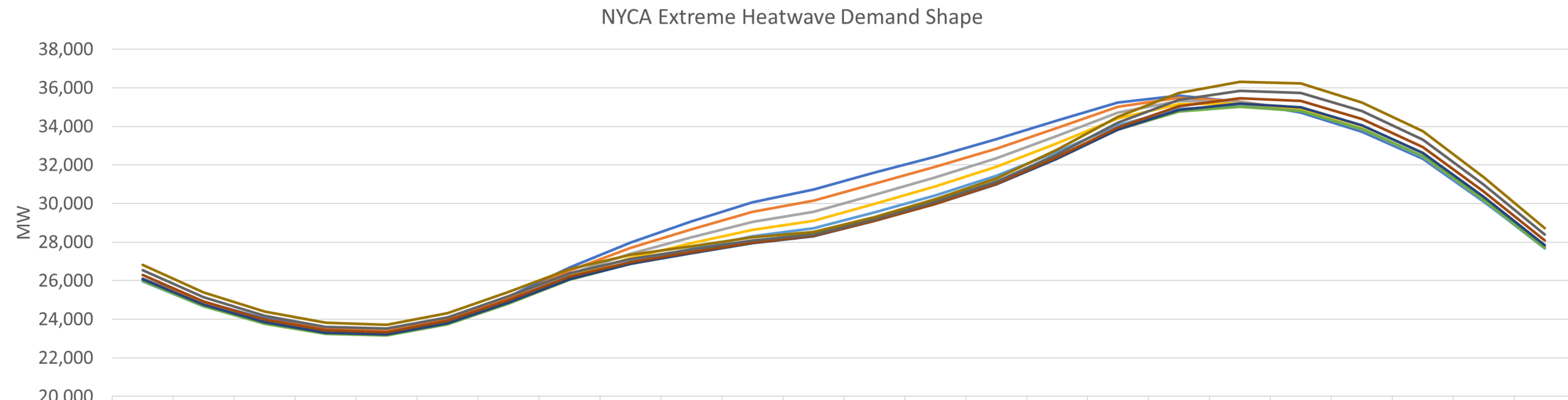
	HB0	HB1	HB2	HB3	HB4	HB5	HB6	HB7	HB8	HB9	HB10	HB11	HB12	HB13	HB14	HB15	HB16	HB17	HB18	HB19	HB20	HB21	HB22	HB23
Y2024	8,859	8,471	8,199	8,037	8,007	8,199	8,645	9,280	9,857	10,339	10,663	10,805	10,969	11,061	11,213	11,430	11,543	11,473	11,172	10,972	10,796	10,542	10,021	9,429
Y2025	8,918	8,521	8,243	8,079	8,049	8,247	8,703	9,346	9,933	10,421	10,750	10,893	11,063	11,140	11,281	11,489	11,588	11,494	11,190	10,988	10,825	10,585	10,071	9,483
Y2026	8,884	8,490	8,211	8,047	8,018	8,218	8,672	9,312	9,894	10,376	10,700	10,839	11,013	11,089	11,228	11,438	11,543	11,452	11,153	10,956	10,794	10,553	10,041	9,453
Y2027	8,996	8,597	8,320	8,154	8,126	8,330	8,785	9,420	9,996	10,471	10,789	10,924	11,092	11,192	11,358	11,597	11,734	11,678	11,390	11,198	11,011	10,747	10,208	9,592
Y2028	8,931	8,531	8,251	8,088	8,060	8,267	8,722	9,355	9,925	10,395	10,711	10,840	10,998	11,087	11,245	11,478	11,611	11,565	11,286	11,100	10,922	10,664	10,133	9,524
Y2029	8,902	8,498	8,216	8,050	8,023	8,235	8,694	9,324	9,895	10,362	10,676	10,804	10,951	11,034	11,182	11,413	11,543	11,504	11,234	11,050	10,881	10,628	10,102	9,494
Y2030	8,922	8,513	8,228	8,060	8,035	8,251	8,715	9,347	9,914	10,383	10,699	10,822	10,966	11,045	11,194	11,425	11,560	11,527	11,265	11,087	10,916	10,664	10,135	9,520
Y2031	9,005	8,588	8,296	8,129	8,103	8,324	8,797	9,436	10,006	10,476	10,793	10,917	11,061	11,136	11,286	11,520	11,661	11,585	11,379	11,203	11,032	10,777	10,241	9,615
Y2032	9,152	8,721	8,421	8,247	8,221	8,455	8,942	9,595	10,177	10,654	10,977	11,100	11,249	11,313	11,453	11,684	11,823	11,735	11,535	11,359	11,194	10,946	10,406	9,774
Y2033	9,291	8,849	8,540	8,364	8,339	8,581	9,080	9,743	10,331	10,815	11,139	11,264	11,413	11,481	11,623	11,860	12,009	11,926	11,732	11,558	11,389	11,135	10,583	9,933

Figure 101: Zone K Component of NYCA Heatwave Demand Shape



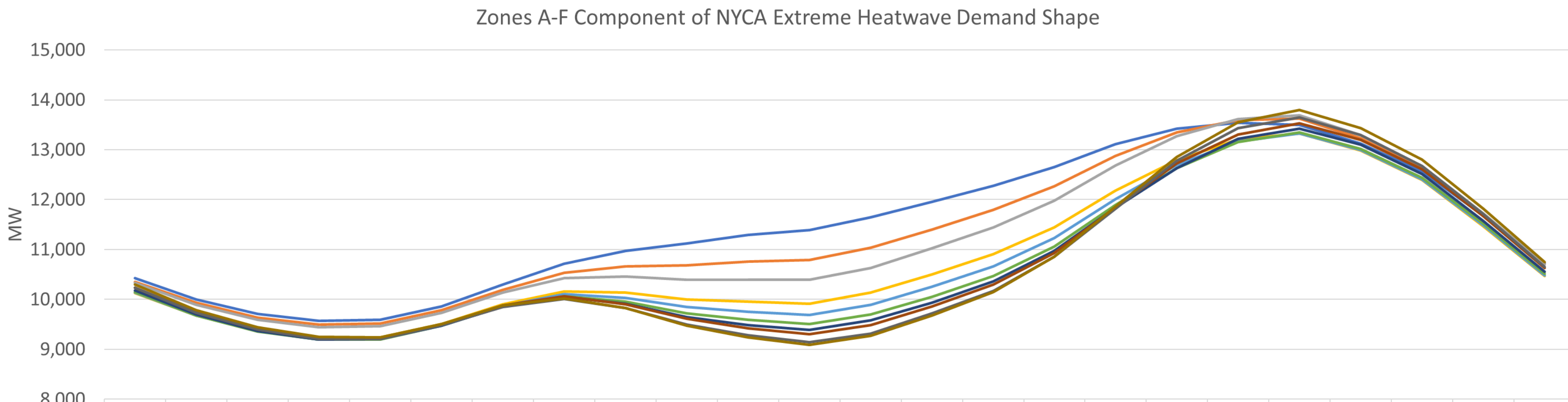
	HB0	HB1	HB2	HB3	HB4	HB5	HB6	HB7	HB8	HB9	HB10	HB11	HB12	HB13	HB14	HB15	HB16	HB17	HB18	HB19	HB20	HB21	HB22	HB23
Y2024	3,395	3,173	3,018	2,926	2,904	2,953	3,069	3,332	3,650	3,968	4,272	4,515	4,718	4,894	5,072	5,203	5,338	5,369	5,255	5,071	4,855	4,592	4,179	3,762
Y2025	3,389	3,162	3,007	2,915	2,889	2,939	3,054	3,320	3,641	3,959	4,265	4,507	4,715	4,887	5,061	5,192	5,323	5,350	5,238	5,056	4,842	4,579	4,169	3,753
Y2026	3,391	3,164	3,007	2,915	2,890	2,938	3,053	3,312	3,626	3,934	4,231	4,467	4,675	4,850	5,027	5,165	5,306	5,342	5,241	5,064	4,852	4,589	4,176	3,759
Y2027	3,450	3,220	3,061	2,968	2,941	2,991	3,105	3,354	3,653	3,945	4,232	4,462	4,667	4,852	5,040	5,194	5,359	5,422	5,338	5,171	4,952	4,681	4,257	3,829
Y2028	3,470	3,237	3,077	2,981	2,953	3,002	3,115	3,361	3,650	3,933	4,209	4,434	4,634	4,818	5,005	5,162	5,340	5,419	5,350	5,192	4,976	4,706	4,283	3,853
Y2029	3,490	3,252	3,088	2,989	2,963	3,012	3,125	3,366	3,646	3,921	4,188	4,408	4,604	4,786	4,974	5,137	5,322	5,414	5,362	5,211	4,998	4,727	4,305	3,872
Y2030	3,508	3,266	3,100	2,998	2,970	3,021	3,134	3,370	3,648	3,911	4,176	4,389	4,584	4,766	4,955	5,125	5,318	5,425	5,385	5,239	5,029	4,757	4,332	3,897
Y2031	3,526	3,281	3,113	3,009	2,979	3,028	3,141	3,375	3,648	3,907	4,164	4,372	4,567	4,749	4,940	5,115	5,318	5,435	5,407	5,270	5,057	4,783	4,356	3,918
Y2032	3,577	3,324	3,147	3,040	3,008	3,059	3,176	3,413	3,688	3,943	4,199	4,409	4,607	4,786	4,973	5,151	5,360	5,481	5,435	5,331	5,123	4,849	4,419	3,975
Y2033	3,599	3,341	3,162	3,053	3,019	3,070	3,186	3,420	3,694	3,946	4,194	4,400	4,597	4,778	4,969	5,151	5,373	5,505	5,473	5,375	5,163	4,885	4,454	4,004

Figure 102: NYCA Extreme Heatwave Demand Shape



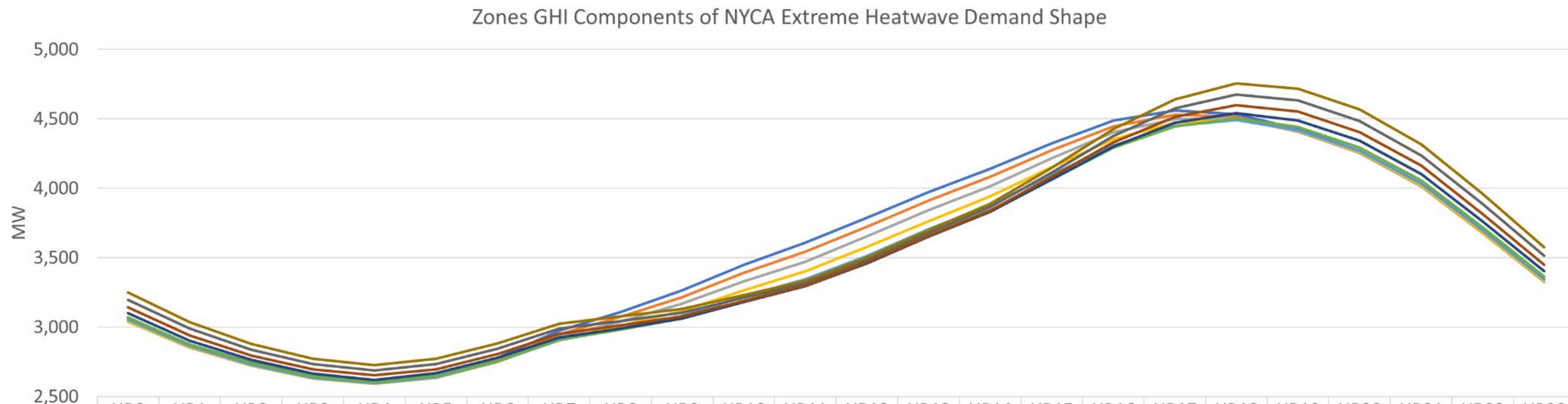
	HB0	HB1	HB2	HB3	HB4	HB5	HB6	HB7	HB8	HB9	HB10	HB11	HB12	HB13	HB14	HB15	HB16	HB17	HB18	HB19	HB20	HB21	HB22	HB23
Y2024	26,118	24,890	24,048	23,557	23,484	24,042	25,160	26,684	27,970	29,080	30,073	30,715	31,595	32,435	33,332	34,312	35,252	35,596	35,265	34,723	33,728	32,337	30,106	27,723
Y2025	26,079	24,842	23,992	23,496	23,423	23,983	25,083	26,531	27,693	28,672	29,562	30,141	31,023	31,901	32,854	33,930	35,011	35,491	35,292	34,827	33,826	32,406	30,143	27,723
Y2026	26,016	24,766	23,908	23,406	23,330	23,895	24,980	26,356	27,406	28,265	29,060	29,580	30,455	31,361	32,356	33,514	34,721	35,332	35,259	34,866	33,867	32,429	30,141	27,692
Y2027	25,993	24,726	23,856	23,347	23,269	23,837	24,912	26,230	27,186	27,939	28,651	29,118	29,973	30,883	31,899	33,115	34,419	35,152	35,195	34,868	33,886	32,447	30,152	27,688
Y2028	25,967	24,681	23,797	23,279	23,197	23,770	24,839	26,110	26,992	27,660	28,302	28,725	29,538	30,435	31,447	32,694	34,067	34,907	35,056	34,787	33,837	32,412	30,127	27,664
Y2029	25,989	24,680	23,778	23,250	23,163	23,742	24,809	26,048	26,874	27,474	28,061	28,448	29,231	30,118	31,128	32,406	33,840	34,774	35,017	34,796	33,868	32,452	30,171	27,700
Y2030	26,092	24,759	23,839	23,297	23,205	23,791	24,862	26,080	26,868	27,418	27,962	28,319	29,093	29,985	31,007	32,328	33,828	34,845	35,173	34,991	34,065	32,637	30,338	27,838
Y2031	26,289	24,928	23,986	23,432	23,333	23,926	25,004	26,209	26,972	27,483	27,991	28,323	29,093	29,994	31,031	32,393	33,960	35,052	35,459	35,312	34,378	32,935	30,612	28,077
Y2032	26,541	25,148	24,183	23,613	23,508	24,110	25,197	26,394	27,137	27,613	28,093	28,401	29,175	30,092	31,146	32,557	34,198	35,364	35,851	35,738	34,788	33,320	30,964	28,383
Y2033	26,825	25,399	24,408	23,822	23,709	24,319	25,420	26,613	27,343	27,791	28,242	28,529	29,309	30,244	31,320	32,782	34,496	35,737	36,303	36,222	35,253	33,756	31,363	28,728

Figure 103: Zones A-F Component of NYCA Extreme Heatwave Demand Shape



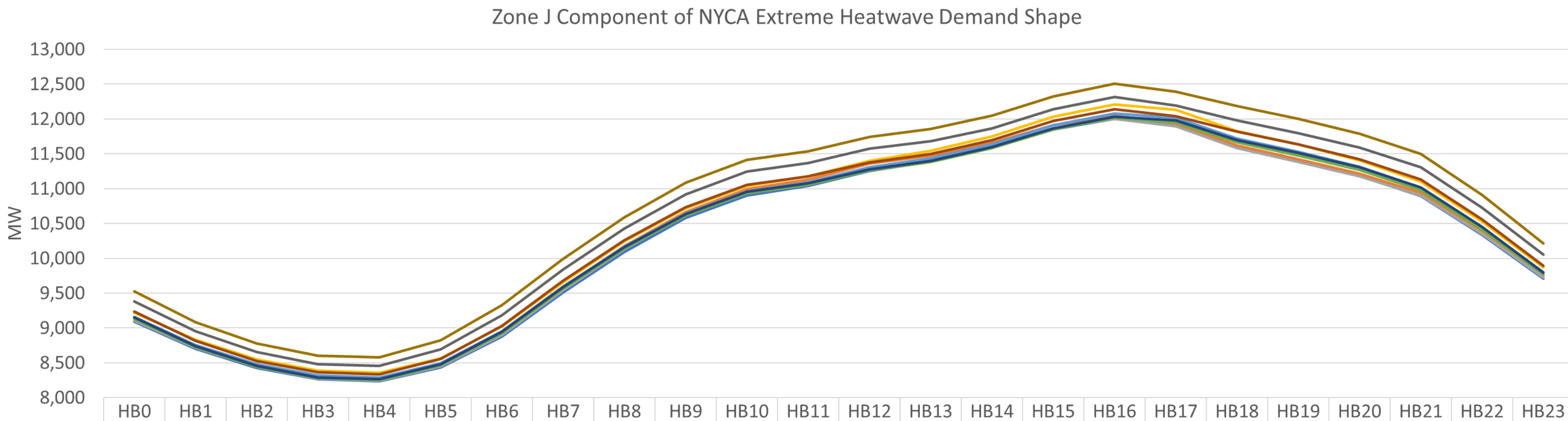
	HB0	HB1	HB2	HB3	HB4	HB5	HB6	HB7	HB8	HB9	HB10	HB11	HB12	HB13	HB14	HB15	HB16	HB17	HB18	HB19	HB20	HB21	HB22	HB23
Y2024	10,428	9,996	9,712	9,568	9,587	9,857	10,294	10,721	10,969	11,118	11,295	11,391	11,645	11,958	12,279	12,649	13,109	13,424	13,545	13,501	13,128	12,566	11,678	10,727
Y2025	10,355	9,929	9,639	9,491	9,514	9,787	10,193	10,538	10,658	10,679	10,755	10,793	11,039	11,404	11,793	12,262	12,874	13,347	13,595	13,622	13,231	12,624	11,695	10,700
Y2026	10,333	9,888	9,597	9,443	9,462	9,735	10,134	10,427	10,459	10,391	10,399	10,396	10,629	11,021	11,447	11,981	12,689	13,269	13,612	13,694	13,298	12,675	11,721	10,701
Y2027	10,127	9,676	9,374	9,219	9,235	9,506	9,898	10,158	10,133	10,001	9,952	9,917	10,142	10,501	10,906	11,443	12,178	12,796	13,209	13,329	12,982	12,391	11,469	10,474
Y2028	10,136	9,675	9,365	9,201	9,216	9,490	9,875	10,105	10,034	9,845	9,751	9,691	9,895	10,251	10,662	11,227	12,010	12,693	13,167	13,323	12,991	12,405	11,481	10,485
Y2029	10,151	9,679	9,359	9,192	9,200	9,475	9,858	10,064	9,956	9,721	9,595	9,510	9,702	10,057	10,473	11,060	11,887	12,629	13,157	13,343	13,020	12,437	11,514	10,510
Y2030	10,184	9,700	9,370	9,198	9,204	9,477	9,858	10,051	9,917	9,650	9,489	9,389	9,577	9,939	10,363	10,976	11,844	12,635	13,216	13,424	13,099	12,510	11,577	10,559
Y2031	10,237	9,740	9,403	9,219	9,222	9,501	9,880	10,058	9,903	9,609	9,424	9,306	9,489	9,862	10,295	10,933	11,839	12,726	13,303	13,529	13,202	12,605	11,664	10,634
Y2032	10,233	9,733	9,395	9,211	9,210	9,481	9,849	10,004	9,822	9,493	9,278	9,141	9,315	9,715	10,173	10,853	11,816	12,777	13,430	13,649	13,297	12,673	11,711	10,656
Y2033	10,298	9,788	9,440	9,245	9,240	9,512	9,882	10,025	9,826	9,474	9,244	9,090	9,269	9,677	10,147	10,854	11,856	12,859	13,555	13,796	13,436	12,798	11,820	10,745

Figure 104: Zones GHI Component of NYCA Extreme Heatwave Demand Shape



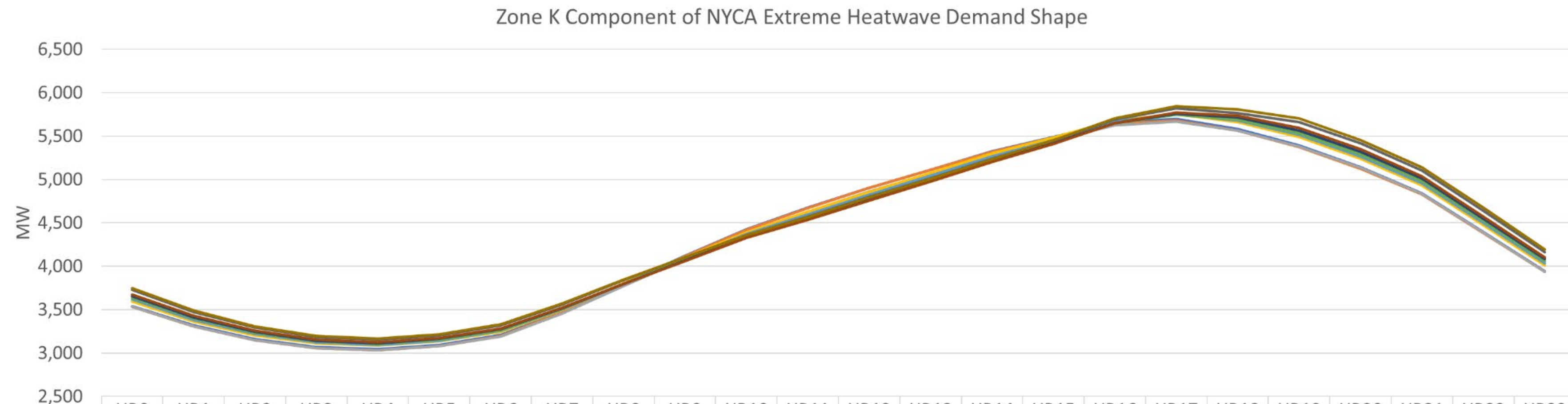
	HB0	HB1	HB2	HB3	HB4	HB5	HB6	HB7	HB8	HB9	HB10	HB11	HB12	HB13	HB14	HB15	HB16	HB17	HB18	HB19	HB20	HB21	HB22	HB23
Y2024	3,061	2,876	2,746	2,653	2,614	2,660	2,779	2,974	3,110	3,265	3,449	3,608	3,790	3,972	4,141	4,325	4,486	4,560	4,534	4,425	4,271	4,032	3,696	3,345
Y2025	3,042	2,856	2,730	2,638	2,598	2,640	2,761	2,948	3,073	3,217	3,392	3,545	3,724	3,911	4,081	4,275	4,445	4,530	4,514	4,412	4,254	4,015	3,678	3,329
Y2026	3,038	2,853	2,723	2,632	2,591	2,636	2,752	2,929	3,040	3,168	3,329	3,473	3,653	3,841	4,014	4,217	4,403	4,501	4,503	4,409	4,255	4,014	3,677	3,327
Y2027	3,044	2,857	2,725	2,632	2,592	2,635	2,749	2,915	3,009	3,117	3,266	3,401	3,577	3,763	3,942	4,153	4,353	4,474	4,494	4,414	4,262	4,021	3,683	3,332
Y2028	3,055	2,864	2,730	2,636	2,595	2,638	2,752	2,907	2,989	3,082	3,218	3,345	3,515	3,703	3,880	4,098	4,310	4,449	4,490	4,420	4,271	4,033	3,698	3,344
Y2029	3,072	2,877	2,741	2,646	2,604	2,648	2,758	2,911	2,982	3,063	3,187	3,308	3,474	3,662	3,841	4,065	4,291	4,446	4,502	4,440	4,294	4,056	3,720	3,366
Y2030	3,101	2,903	2,765	2,665	2,621	2,667	2,778	2,926	2,991	3,062	3,179	3,296	3,461	3,651	3,832	4,063	4,302	4,473	4,543	4,487	4,342	4,101	3,762	3,403
Y2031	3,143	2,940	2,796	2,697	2,652	2,695	2,807	2,952	3,014	3,077	3,187	3,301	3,466	3,656	3,839	4,081	4,331	4,515	4,600	4,552	4,404	4,162	3,816	3,449
Y2032	3,197	2,988	2,838	2,734	2,687	2,733	2,846	2,990	3,045	3,103	3,210	3,317	3,485	3,678	3,866	4,113	4,378	4,574	4,675	4,632	4,485	4,237	3,886	3,512
Y2033	3,251	3,034	2,880	2,773	2,725	2,771	2,883	3,026	3,079	3,130	3,229	3,334	3,502	3,697	3,889	4,149	4,427	4,639	4,756	4,718	4,569	4,315	3,959	3,574

Figure 105: Zone J Component of NYCA Extreme Heatwave Demand Shape



	HB0	HB1	HB2	HB3	HB4	HB5	HB6	HB7	HB8	HB9	HB10	HB11	HB12	HB13	HB14	HB15	HB16	HB17	HB18	HB19	HB20	HB21	HB22	HB23
Y2024	9,088	8,701	8,430	8,269	8,238	8,431	8,878	9,515	10,095	10,579	10,902	11,042	11,258	11,393	11,588	11,849	12,000	11,916	11,607	11,406	11,189	10,898	10,339	9,708
Y2025	9,146	8,751	8,473	8,310	8,280	8,477	8,935	9,582	10,173	10,664	10,993	11,134	11,358	11,478	11,663	11,912	12,049	11,937	11,622	11,419	11,216	10,938	10,387	9,760
Y2026	9,109	8,717	8,439	8,275	8,246	8,446	8,902	9,546	10,134	10,620	10,945	11,083	11,311	11,429	11,612	11,864	12,004	11,894	11,582	11,383	11,181	10,903	10,354	9,727
Y2027	9,225	8,828	8,552	8,386	8,358	8,563	9,019	9,660	10,242	10,722	11,042	11,175	11,398	11,543	11,752	12,034	12,206	12,130	11,829	11,633	11,405	11,104	10,527	9,871
Y2028	9,158	8,759	8,481	8,318	8,290	8,498	8,955	9,593	10,170	10,646	10,964	11,092	11,305	11,439	11,640	11,915	12,083	12,015	11,722	11,531	11,313	11,017	10,448	9,800
Y2029	9,128	8,726	8,445	8,279	8,253	8,465	8,926	9,562	10,140	10,615	10,931	11,058	11,261	11,387	11,580	11,851	12,015	11,953	11,668	11,479	11,269	10,979	10,415	9,768
Y2030	9,150	8,743	8,459	8,291	8,266	8,483	8,949	9,588	10,163	10,639	10,958	11,080	11,280	11,403	11,595	11,869	12,036	11,979	11,700	11,517	11,306	11,016	10,449	9,795
Y2031	9,234	8,819	8,528	8,362	8,336	8,558	9,033	9,679	10,257	10,735	11,055	11,179	11,380	11,500	11,695	11,970	12,144	12,042	11,819	11,637	11,426	11,132	10,558	9,892
Y2032	9,384	8,955	8,657	8,483	8,458	8,693	9,183	9,842	10,432	10,918	11,244	11,368	11,575	11,684	11,869	12,142	12,313	12,196	11,980	11,798	11,592	11,305	10,727	10,055
Y2033	9,527	9,087	8,779	8,605	8,580	8,822	9,325	9,995	10,592	11,084	11,413	11,538	11,747	11,861	12,049	12,328	12,509	12,396	12,185	12,004	11,793	11,500	10,909	10,218

Figure 106: Zone K Component of NYCA Extreme Heatwave Demand Shape



	HB0	HB1	HB2	HB3	HB4	HB5	HB6	HB7	HB8	HB9	HB10	HB11	HB12	HB13	HB14	HB15	HB16	HB17	HB18	HB19	HB20	HB21	HB22	HB23
Y2024	3,541	3,317	3,160	3,067	3,045	3,094	3,209	3,474	3,796	4,118	4,427	4,674	4,902	5,112	5,324	5,489	5,657	5,696	5,579	5,391	5,140	4,841	4,393	3,943
Y2025	3,536	3,306	3,150	3,057	3,031	3,079	3,194	3,463	3,789	4,112	4,422	4,669	4,902	5,108	5,317	5,481	5,643	5,677	5,561	5,374	5,125	4,829	4,383	3,934
Y2026	3,536	3,308	3,149	3,056	3,031	3,078	3,192	3,454	3,773	4,086	4,387	4,628	4,862	5,070	5,283	5,452	5,625	5,668	5,562	5,380	5,133	4,837	4,389	3,937
Y2027	3,597	3,365	3,205	3,110	3,084	3,133	3,246	3,497	3,802	4,099	4,391	4,625	4,856	5,076	5,299	5,485	5,682	5,752	5,663	5,492	5,237	4,931	4,473	4,011
Y2028	3,618	3,383	3,221	3,124	3,096	3,144	3,257	3,505	3,799	4,087	4,369	4,597	4,823	5,042	5,265	5,454	5,664	5,750	5,677	5,513	5,262	4,957	4,500	4,035
Y2029	3,638	3,398	3,233	3,133	3,106	3,154	3,267	3,511	3,796	4,075	4,348	4,572	4,794	5,012	5,234	5,430	5,647	5,746	5,690	5,534	5,285	4,980	4,522	4,056
Y2030	3,657	3,413	3,245	3,143	3,114	3,164	3,277	3,515	3,797	4,067	4,336	4,554	4,775	4,992	5,217	5,420	5,646	5,758	5,714	5,563	5,318	5,010	4,550	4,081
Y2031	3,675	3,429	3,259	3,154	3,123	3,172	3,284	3,520	3,798	4,062	4,325	4,537	4,758	4,976	5,202	5,409	5,646	5,769	5,737	5,594	5,346	5,036	4,574	4,102
Y2032	3,727	3,472	3,293	3,185	3,153	3,203	3,319	3,558	3,838	4,099	4,361	4,575	4,800	5,015	5,238	5,449	5,691	5,817	5,766	5,659	5,414	5,105	4,640	4,160
Y2033	3,749	3,490	3,309	3,199	3,164	3,214	3,330	3,567	3,846	4,103	4,356	4,567	4,791	5,009	5,235	5,451	5,704	5,843	5,807	5,704	5,455	5,143	4,675	4,191