New York ISO
Independent System Operator

DRAFT FOR DISCUSSION

NYISO Operating Study Winter 2023-2024

A Report by the
New York Independent System Operator

November 2023

Table of Contents

Executive Summary

This study is conducted as a seasonal review of the projected thermal transfer capability for the Winter 2023-24 capability period. The study evaluates the projected internal and external thermal transfer capabilities for the forecasted load and dispatch conditions studied. The evaluated limits are shown in Tables 1 through 5. Differences in the evaluated internal interface limits from Winter 2022-23 to Winter 2023-24 are shown in Figure 1 on page 11. Internal limits have changed due to the network alterations in the New York Control Area (NYCA) and modeling assumptions. Dysinger East thermal transfer limit has decreased by 400 MW mainly due to the change in schedule of the Dysinger PAR from 100 MW in the Winter 2022-23 period to 400 MW for the Winter 2023-24 period. Total East thermal transfer limit increased by 1525 MW due to the modeling of Segment A & B projects. Central East thermal transfer limit increased by 1825 MW due to the modeling of Segment A & B projects. UPNY-ConEd thermal transfer limit decreased 525 MW due to the modeling of Pleasant Valley – Wood Street (F31) 345 kV & Wood Street – Millwood (W81) 345 kV lines as out-of-service. ConEd-LIPA thermal transfer limit increased to 675 MW due to the Sprainbrook – East Garden City (Y49) 345 kV line returning in-service. Moses South thermal transfer limit decreased by 850 MW due to the modeling of Adirondack – Porter (12) 230 kV, Moses-Willis (MW1) 230 kV, and Willis-Patnode (WPN-1) 230 kV lines as out-of-service. Differences in the evaluated external interface limits from Winter 2022-2023 to Winter 2023-2024 are shown in Figure 2 on page 14. The ISO-NE – NYISO thermal transfer limit decreased by 225 MW due to the Sprainbrook – East Garden City (Y49) 345 kV line returning in-service. The NYISO – PJM thermal transfer limit increased by 250 MW due to the redistribution of flows due to changes in PJM dispatch. The PJM – NYISO thermal transfer limit increased by 75 MW due to the redistribution of flows due to Segment A & B project. The NYISO – IESO thermal transfer limit decreased by 100 MW due to the change in schedule of the Dysinger PAR from 100 MW in the Winter 2022-23 period to 400 MW for the Winter 2023-24 period. The IESO – NYISO thermal transfer limit increased by 75 MW due to the change in schedule of the Dysinger PAR from 100 MW in the Winter 2022-23 period to 400 MW for the Winter 2023-24 period.

INTRODUCTION

The following report, prepared by the Operating Studies Task Force (OSTF) at the direction and with the guidance of the System Operations Advisory Subcommittee (SOAS), highlights the thermal analysis evaluation for the Winter 2023-2024 capability period. This analysis indicates that, for the Winter 2023-2024 capability period, the New York interconnected bulk power system can be operated reliably in accordance with the New York State Reliability Council Reliability Rules and the NYISO System Operating Procedures.

Thermal transfer limits cited in this report are based on the forecasted load and dispatch assumptions and are intended as a guide to system operation. Changes in generation dispatch or load patterns that significantly change pre-contingency line loadings may change limiting contingencies or limiting facilities, resulting in higher or lower interface transfer capabilities.

System Operators should monitor the critical facilities noted in the included tables along with other limiting conditions while maintaining bulk power system transfers within secure operating limits.

PURPOSE

The purpose of the study is to determine:

- The total transfer capabilities (TTC) between NYISO and adjacent areas including IESO, PJM and ISO-NE for normal conditions in the summer/winter periods. The TTC is calculated based on NERC TPL-001-4 Category P1 and P2 contingencies and a set of selected Category P4, P5 and P7 contingencies.
- The TTC between NYISO and adjacent areas including IESO, PJM and ISO-NE for emergency conditions in the summer/winter periods. The TTC is calculated based on NERC TPL-001-4 Category P1 and P2 contingencies.

System Operating Limit (SOL) Methodology

The NYSRC Reliability Rules provide the documented methodology for use in developing System Operating Limits (SOLs) within the NYISO Reliability Coordinator Area. NYSRC Reliability Rules require compliance with all North American Electric Reliability Corporation (NERC) Standards and Northeast Power Coordinating Council (NPCC) Standards and Criteria. NYSRC Rule C.1, Tables C-1 and C-2 address the contingencies to be evaluated and the performance

requirements to be applied. Rule C.1 also incorporates by reference Attachment H, NYISO Transmission Planning Guideline #3-1, "Guideline for Stability Analysis and Determination of Stability-Based Transfer Limits" of the NYISO Transmission Expansion and Interconnection Manual.

STUDY PARTICIPANTS

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SYSTEM REPRESENTATION AND BASE STUDY ASSUMPTIONS

System Representation

The representation was developed from the NYISO Data Bank and assumes the forecast winter coincident peak load of 24,220 MW. The other NPCC Balancing Areas and adjacent Regional representations were obtained from the RFC-NPCC Winter 2023-2024 Reliability Assessment power flow base case and have been updated to reflect the Winter 2023-2024 capability period. The base case model includes:

- The NYISO Transmission Operator area
- All Transmission Operator areas contiguous with NYISO
- All system elements modeled as in-service
- All generation represented
- Phase shifters in the regulating mode in accordance with the NYISO Available Transfer Capability Implementation Document (ATCID)
- The NYISO Load Forecast
- Transmission Facility additions and retirements
- Generation Facility additions and retirements
- Remedial Action Scheme (RAS) models where currently existing or projected for implementation within the studied time horizon.
- Series compensation for each line at the expected operating level unless specified otherwise in the ATCID.
- Facility Ratings as provided by the Transmission Owner and Generator Owner

Generation Resource Changes

The status and dispatch level of generation represented in this analysis is a reasonable expectation based on the information available at the time of the study. Those modeling assumptions incorporate known unit outage status. The inter-Area schedules represented in the study base case are summarized in Appendix A. The following table shows generation deactivations and additions since the Winter 2022-23 capability period:

Deactivations	
74th St. GT 1 & 2 (Local Reliability Only)	-37 MW
Ravenswood GT 10	-25 MW
Ravenswood 01	-19 MW
Astoria GT Houses 2, 3, & 4	-558 MW
Total Retirements	**-639 MW**
Additions	
South Fork Wind I & II	136 MW
East Point Solar	50 MW
Homer Solar Energy Center	90 MW
Puckett Solar	20 MW
Regan Solar	20 MW
Grissom Solar	20 MW
Total Additions	**336 MW**

Transmission Facilities Changes

Significant facility changes since the Winter 2022-23 capability period include:

- Segment A Princetown Station
- Segment B Knickerbocker Station
- Segment B Van Wagner Station
- Corona – Rainey (R5W) 138 kV PAR
- Corona – Rainey (36188) 138kV line
- Rainey (5W) 345/138 kV Transformer
- Sprainbrook – East Garden City (Y49) 345 kV modeled in-service
- Eastview – Grassland (38W52) 138 kV line returned in-service
- Eastview – Elmsford (38W34) 138 kV line returned in-service
- Moses (AT2) 230/115 kV transformer returned in-service
- Moses – Adirondack (MA1) 230 kV line returned in-service
- East 13th Street (BK17) 345/69 kV transformer modeled out-of-service
- East 13th Street (TR4) 138/69 kV transformer modeled out-of-service
- Pleasant Valley – Wood Street (F31) 345 kV line modeled out-of-service
- Wood Street – Millwood (W81) 345 kV line modeled out-of-service
- West 49th Street (TR4) 345/138/ kV Transformer modeled out-of-service

- Fraser SVC modeled out-of-service
- Adirondack – Porter (12) 230kV line modeled out-of-service
- Willis – Patnode (WPN-1) 230 kV line modeled out-of-service
- Moses– Willis (MW1) 230 kV line modeled out-of-service

The Segment A project includes a Princetown 345 kV station, and Segment B project includes Knickerbocker 345 kV substation, and Van Wagner 345 kV substation. The Princetown substation interconnects with the Gordon Road 345 kV substation via the 361 and 362 lines, New Scotland 345 kV substation via the 55, 371 and 372 lines, and Edic 345 kV substation via Double-Circuit Tower lines 351 & 352. Gordon Road connects to Marcy station via the 14 line as well as to Rotterdam 230 kV via the 30 and 31 lines. The Knickerbocker 345 kV substation interconnects with New Scotland 345 kV substation, Alps 345 kV substation via the 2 line and Pleasant Valley 345 kV substation via the new Y57 line as well as to New Scotland via the 6 line. The Knickerbocker station will feature a variable Series Compensation on Knickerbocker to Pleasant Valley (Y57) 345 kV line. Van Wagner station will interconnect with Athens 345 kV substation, Leeds 345 kV substation, a Double-Circuit Tower connection to Pleasant Valley 345 kV substation.

System Representation

The Siemens PTI PSS™E and PowerGEM's Transmission Adequacy and Reliability Assessment "TARA" software packages were used to calculate the thermal limits based on Normal and Emergency Transfer Criteria as defined in the NYSRC Reliability Rules. The thermal transfer limits presented have been determined for all transmission facilities scheduled in-service during the Winter 2023-2024 period.

The schedules used in the base case power flow for this analysis assumed a net flow of 0 MW from Public Service Electric & Gas (PSE&G) to Consolidated Edison via the PAR transformers controlling the Hudson – Farragut and Linden – Goethals interconnections, and 0 MW on the South Mahwah – Waldwick circuits from Consolidated Edison to PSE&G, controlled by the PARs at Waldwick. The Hopatcong – Ramapo (5018) 500 kV circuit is scheduled to 202 MW from PJM to New York. The four Ontario – Michigan PARs are modeled in-service and scheduled to a 0 MW transfer. These schedules are consistent with the scenarios developed in the RFC-NPCC Inter-Regional Reliability Assessment for Winter 2023-2024, and the MMWG Winter 2023-2024 power flow base cases. The Dysinger – East Stolle Rd. PAR is scheduled to 400 MW from Dysinger to East Stolle Rd. The series reactors on the Sprain Brook – East Garden City (Y49) 345 kV cable, Farragut –

Gowanus (41 and 42) 345 kV cables, Packard – Sawyer (77 and 78) 230 kV feeders, as well as the E. 179th St. – Hell Gate (15055) 138 kV feeder are in-service in the base case. The series reactors on the Dunwoodie – Mott Haven (71 and 72) and the Sprain Brook – W. 49th St. (M51 and M52) 345 kV are by-passed. The series capacitors on the Marcy – Coopers Corners (UCC2-41) 345 kV, the Edic – Fraser (EF24-40) 345 kV, and the Fraser – Coopers Corners (33) 345 kV and the Knickerbocker to Pleasant Valley (Y57) 345 kV lines are by-passed in the base case.

Smart Wire SmartValve, a modular static synchronous series compensator is installed at the Hurley 345 kV substation on the Leeds – Hurley (301) 345 kV line. This device injects voltage in quadrature with the line current to synthesize a capacitive or inductive reactance. The device is expected to be operated in capacitive reactance mode and will be changed as deemed necessary by the NYISO.

The NYISO Niagara generation was modeled using a 50-50 split on the 230 kV and 115 kV generators. The total output for the Niagara facility was modeled at 2,100 MW. The Ontario Beck generation was modeled at an output of 1,300 MW.

DISCUSSION

Resource Assessment

Load and Capacity Assessment

The forecast peak demand for the Winter 2023-2024 capability period is 24,220 MW[1]. This forecast is approximately 851 MW (3.64%) higher than the forecast of 23,369 MW for the Winter 2022-23 capability period, and 1,518 MW (6.27%) lower than the all-time New York Control Area (NYCA) seasonal peak of 25,738 MW, which occurred on January 7, 2014.

The Installed Capacity (ICAP) requirement for the Winter capability period is 38,458 MW based on the NYSRC 20.0% Installed Reserve Margin (IRM) requirement for the 2023 Capability Year. NYCA generation capacity for Winter 2023-2024 is 39,667 MW, and net external capacity purchases of 1,588 MW have been secured for the Winter period. The combined capacity resources represent a 70.3% margin above the forecast peak demand of 24,220 MW. These values were taken from the 2023 Load & Capacity Data report produced by the NYISO and updated with known

[1] Forecast Coincident Peak Demand (50th percentile baseline forecast)

changes at the time of this writing.

The equivalent forced outage rate is 3.79%, and includes forced outages and de-ratings based on historical performance of all generation in the NYCA. For Winter 2022-23, the equivalent forced outage rate assumed was 4.05%.

Cross-State Interfaces

Transfer Limit Analysis

This report summarizes the results of thermal transfer limit analyses performed on power system representation modeling the forecast peak load conditions for Winter 2023-2024. Normal and emergency thermal limits were calculated according to Normal and Emergency Transfer Criteria definitions in the NYSRC Reliability Rules. For this assessment period the most severe single generation contingency is Nine Mile Point 2 at 1,310 MW. Facility ratings applied in the analysis were from the online MW ratings in the EMS, and are detailed in Appendix D.

Figure 1 presents a comparison of the Winter 2023-2024 thermal transfer limits to Winter 2022-23 thermal transfer limits. Changes in these limits from previous years are due to changes in the base case load flow generation and load patterns that result in different pre-contingency line loadings, changes in limiting contingencies, changes in circuit ratings, or line status. Appendix H presents a summary comparison of Cross-State thermal transfer limits between Winter 2023-2024 and 2022-2023, with limiting element/contingency descriptions. Significant differences in these thermal transfer limits are discussed below.

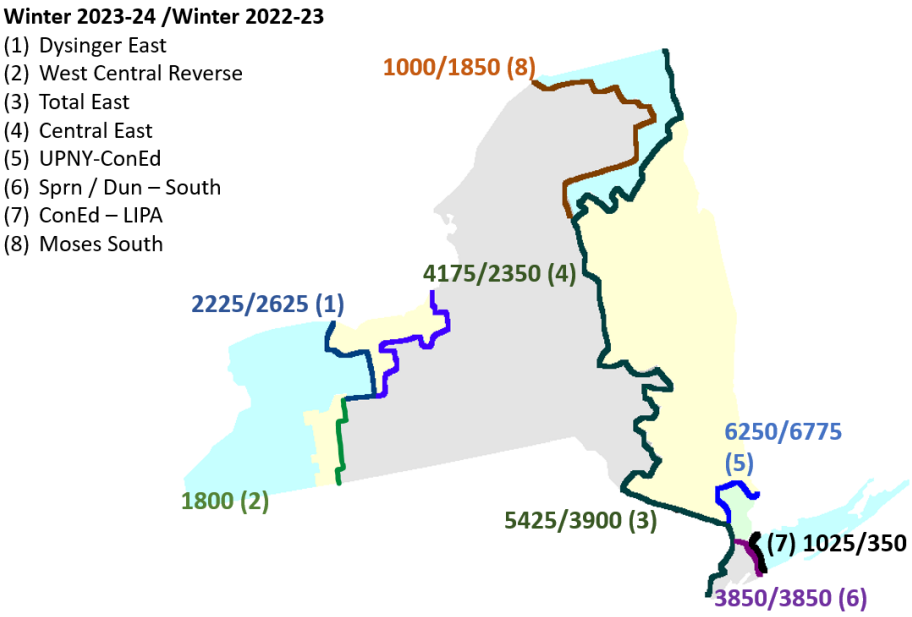

Figure 1 – Cross-State Thermal Transfer Limits

Dysinger East interface thermal transfer limit decreased by 400 MW. This is mainly due to the change in schedule of the Dysinger PAR from 100 MW in Winter 2022-23 period to 400 MW in Winter 2023-24.

Total East interface thermal transfer limit increased by 1525 MW. This is mainly due to the modeling of Segment A & B project.

Central East interface thermal transfer limit increased by 1825 MW. This is mainly due to the modeling of Segment A & B project.

UPNY-ConEd interface thermal transfer limit decreased by 525 MW This is mainly due to the modeling of Pleasant Valley – Wood Street (F31) 345 kV and Wood Street – Millwood (W81) 345 kV lines out-of-service.

ConEd-LIPA interface thermal transfer limit increased by 675 MW. This is mainly due to the return of Sprainbrook – East Garden City (Y49) 345 kV line to in-service.

Moses South interface thermal transfer limit decreased by 850 MW. This is mainly due to the modeling of Adirondack – Porter (12) 230 kV, Moses – Willis (MW1) 230 kV, and Willis – Patnode (WPN-1) 230 kV lines out-of-service.

West Woodbourne Transformer

The Total-East interface may be limited at significantly lower transfer levels for certain contingencies that result in overloading of the West Woodbourne 115/69 kV transformer. Should the West Woodbourne tie be the limiting facility, it may be removed from service to allow higher Total-East transfers. Over-current relays are installed at West Woodbourne and Honk Falls to protect for contingency overloads.

ConEd – LIPA Transfer Analysis

Normal transfer capabilities were determined using the base case generation dispatch and PAR settings as described in Appendix B. Emergency limits are dispatch dependent, and can vary based on generation and load patterns in the LIPA system.

For emergency transfer capability analysis, the PARs controlling the LIPA import were adjusted to allow for maximum transfer capability into LIPA:

ConEd – LIPA PAR Settings

	Normal	Emergency
Jamaica – Lake Success 138 kV	-200 MW	80 MW
Jamaica – Valley Stream 138 kV	-100 MW	240 MW
Sprain Brook – E. Garden City 345 kV	637 MW	637 MW

ISO-NE – LIPA PAR Settings

Norwalk Harbor – Northport 138 kV	100 MW	286 MW

The PAR schedules referenced above and the ConEd - LIPA transfer assessment assume the following loss factors and oil circulation modes in determination of the facility ratings for the 345 kV cables:

- Y49 has a 70% loss factor in slow oil circulation mode.
- Y50 has a 70% loss factor in rapid circulation mode.

Emergency Transfer via the 138 kV PAR-controlled Jamaica ties between ConEdison and LIPA

Con Edison and LIPA have determined possible emergency transfer levels via the Jamaica - Valley Stream (901) 138 kV and Jamaica - Lake Success (903) 138 kV PAR-controlled ties that could be used to transfer emergency power between the two entities during peak conditions. The emergency transfer levels were calculated in both directions, for system peak load conditions with

all transmission lines in-service and all generation available at full capacity.

ConEd to LIPA emergency assistance

Based on load flow analysis performed by Con Edison, Con Edison anticipates being able to supply a total flow up to 320 MW of emergency transfer from Con Edison to Long Island, if requested, via the ties for the coming Winter season.

LIPA to ConEd emergency assistance

LIPA anticipates being able to supply a total flow up to 497 MW of emergency transfer from Long Island to Con Edison, if requested, via the ties under ideal conditions (i.e. all lines and generation in-service, imports via Neptune, Norwalk Harbor to Northport Cable - NNC and Cross Sound Cable - CSC).

Transfer Limits for Outage Conditions

Transfer limits for scheduled outage conditions are determined by the NYISO Scheduling and Market Operations groups. The NYISO Real-Time Dispatch system monitors the EHV transmission continuously to maintain the secure operation of the interconnected EHV system.

Transient Stability and Voltage transfer Limits

The interface transfer limits shown in "SUMMARY OF RESULTS – THERMAL TRANSFER LIMIT ANALYSIS" section are the results of a thermal transfer limit analysis only. Transient stability and voltage interface transfer limits for all lines in-service and line outage conditions are summarized and available through the NYISO website located under "Interface Limits & Op Studies" at the following link

https://www.nyiso.com/reports-information

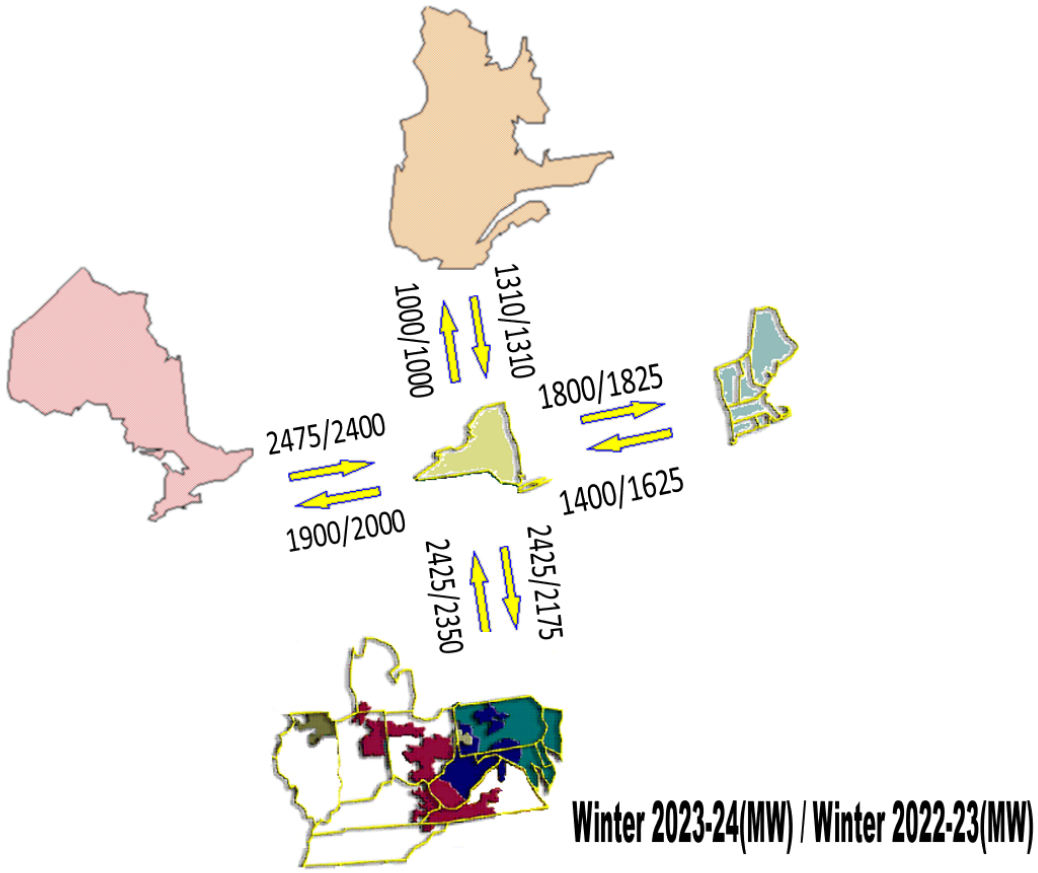

Figure 2 – Inter-Area Thermal Transfer Capabilities[2]

ISO-NE – NYISO interface thermal transfer limit decreased by 225 MW. This is mainly due to the return of Sprainbrook – East Garden City (Y49) 345 kV line to in-service.

NYISO – PJM interface thermal transfer limit increased by 250 MW. This is mainly due to the change in dispatch assumption of PJM.

PJM – NYISO interface thermal transfer limit increased 75 MW. This is mainly due to the redistribution of flows due to the Segment A & B project.

IESO – NYISO thermal transfer limit increased by 75 MW. This is mainly due to the change in schedule of the Dysinger PAR.

NYISO – IESO thermal transfer limit decreased by 100 MW. This is mainly due to the change in

[2] TE-NY transfer capabilities shown in Figure 2 are not thermal transfer limits; for more information see page 18

schedule of the Dysinger PAR.

Thermal transfer limits between New York and adjacent Balancing Areas also are determined in this analysis. These transfer limits supplement, but do not change, existing internal operating limits. There may be facilities internal to each system that may reduce the transfer limits between Balancing Areas. Reductions due to these situations are considered to be the responsibility of the respective reliability authority. Some of these potential limitations are indicated in the summary tables by "Reliability Coordinating Facility" limits, which supplement the "Direct Tie" limits between the Balancing Areas. Transfer conditions within and between neighboring Balancing Areas can have a significant effect on inter- and intra-Area transfer limits. Coordination between Balancing Areas is necessary to provide optimal transfer while maintaining the reliability and security of the interconnected systems.

New York – New England Analysis

New England Transmission/Capacity Additions

Transmission

For the Winter 2023-2024 study period, there are no major projects coming into service that will significantly impact the New York – New England transmission capability.

Capacity

In the New England Control Area, from December through March 2024, no major generation additions are anticipated. Approximately 193 MW of Solar Photovoltaic, 62 MW of Gas Turbines, 9 MWs of Steam Turbines, 33 MWs of Hydro, and 111 MW of Battery Alternative Energy Resources are anticipated to become commercial by the end of March 2024.

Thermal Transfer Limit Analysis

The transfer limits between the NYISO and ISO New England for normal and emergency transfer criteria are summarized in Tables 2.a and 2.b.

Cross-Sound Cable

The Cross-Sound Cable (CSC) is an HVDC merchant transmission facility connecting the New Haven Harbor 345 kV (United Illuminating, ISO-NE) station and Shoreham 138 kV (LIPA, NYISO) station. It has a design capacity of 330 MW. This facility is not metered as part of the NYISO – ISO-NE interface, and HVDC transfers are independent of transfers between the NYISO and ISO-NE.

Smithfield – Salisbury 69 kV

CHG&E and Eversource will normally operate the Smithfield - Salisbury 69 kV (FV/690) line closed. The maximum allowable flow on this line is 31 MVA based on limitations in the Eversource 69 kV system. When the ISO-NE to NYISO transfer is greater than approximately 400 MW, the line will be opened due to post contingency limits within the Eversource system. The FV/690 line has directional over-current protection that will trip the FV/690 line in the event of an overload when the flow is into ISO-NE. No protection exists to trip the FV/690 line in the event of an overload when the flow is into NYISO.

Northport – Norwalk Harbor Cable Flow

Flow on the NNC Norwalk Harbor to Northport facility is controlled by PAR transformer at Northport. As system conditions vary, the scheduled flow on the NNC may be used to optimize transfer capability between the Balancing Areas. The thermal transfer limits are presented in Table 2 for different PAR schedule assumptions on the Northport – Norwalk Harbor interconnection.

Whitehall – Blissville 115 kV

The PAR transformer on the K7 line at the VELCO Blissville substation will control pre-contingency flow between the respective stations. For the analyses, the pre-contingency schedule is 25 MW from Blissville (ISO-NE) to Whitehall (NYISO). The scheduled flow may be adjusted to protect the National Grid local 115 kV transmission south of Whitehall for 345 kV contingency events in southern Vermont pursuant to joint operating procedure developed by VELCO, National Grid, ISO-NE and NYISO.

Plattsburgh – Sand Bar 115 kV (i.e. PV20)

The PAR transformer on the PV20 line at the VELCO Sand Bar substation was modeled holding a pre-contingency flow of approximately 100 MW on the PV20 tie. This modeling assumption was premised upon common operating understandings between ISO-NE and the NYISO given local operating practice on the Moses – Willis – Plattsburgh 230 kV transmission corridor. ISO-NE's analysis examined and considered New England system limitations given this modeling assumption and did not examine generation dispatch or system performance on the New York side of the PV20 tie.

New York - PJM Analysis

Thermal Transfer Limit Analysis

The transfer limits for the NYISO – PJM and PJM – NYISO interfaces are summarized in Tables 3a and 3b respectively of the "SUMMARY OF RESULTS – THERMAL TRANSFER LIMIT ANALYSIS" section of this report. The Marion-Farragut 345 kV B and C cables are expected to remain open and the Waldwick E, F, O and Goethals A paths are expected to deliver a percentage of the scheduled interchange as referenced in the NYISO-PJM JOA. The Hopatcong – Ramapo 500 kV (5018) circuit is scheduled in accordance with the "TCC Market PJM -NYISO Interconnection Scheduling Protocol", February 28th, 2020.

Opening of PJM - New York 115 kV Ties as Required

The normal criteria thermal transfer limits presented in "SUMMARY OF RESULTS – THERMAL TRANSFER LIMIT ANALYSIS" section were determined for an all lines in-service condition. The 115 kV interconnections between First Energy East and New York (Warren – Falconer, North Waverly – East Sayre, and Laurel Lake – Westover) may be opened in accordance with NYISO and PJM Operating Procedures provided that this action does not cause unacceptable impact on local reliability in either system. Over-current protection is installed on the Warren - Falconer and the North Waverly – East Sayre 115 kV circuits; either of these circuits would trip by relay action for an actual overload condition. This North Waverly-East Sayre scheme is expected to be designated as a RAS in the future and hence the line could be expected to be operated as in-service more often. There is no overload protection on the Laurel Lake - Westover circuit, but it may be opened by operator action if there is an actual or post-contingency overload condition. However, opening the Laurel Lake – Westover tie could potentially cause local thermal and pre- and post-contingency voltage violations for the 34.5 kV distribution system within First Energy East transmission zone. Sensitivity analysis performed indicated that the thermal and voltage conditions were exacerbated for conditions that modeled high simultaneous interface flows from NY to PJM and NY to Ontario.

DC Ties

Neptune DC tie is expected to be available. Hudson Transmission Project (HTP) DC tie is expected to be available.

Variable Frequency Transformer (VFT) Tie

The Variable Frequency Transformer Tie is a transmission facility connecting the Linden 230 kV (PSEG, PJM) to Linden 345 kV (ConEd, NYISO). For the Winter 2023-2024, Linden VFT will have 330 MW non-firm withdrawal right and 300 MW firm injection rights into PJM market.

Ontario – New York Analysis

Thermal Transfer Limit Analysis

The thermal transfer limits between the NYISO and Ontario's Independent Electricity System Operator (IESO) Balancing Areas for normal and emergency transfer criteria are presented in tables 4 and 5. The NYISO Niagara generation was modeled at an output of 2,100 MW.

The Ontario – New York ties at St. Lawrence, L33P and L34P PARs were controlling to 0 MW in all four scenarios. The interconnection flow limit across these ties is 300 MW, as presented in Table B3 "Interconnection Flow Limits" from the document "Reliability Outlook Tables" available at:

https://www.ieso.ca/-/media/Files/IESO/Document-Library/planning-forecasts/reliability-outlook/ReliabilityOutlookTables_2022Mar.ashx

Transient Stability Limitations

Transient stability limits for the NYISO - IESO interconnection are reported in "NYPP-OH TRANSIENT STABILITY TESTING REPORT on DIRECT TIE TRANSFER CAPABILITY - OCTOBER 1993" available at:

https://www.nyiso.com/documents/20142/3694079/NYPP-OH_1993-2.pdf/2e21484a-22cf-739a-7a10-69dfd69f5d58

Ontario – Michigan PARs

All of the PARs on the four transmission lines interconnecting Ontario and Michigan are in-service and regulating. For this study, the PARs were scheduled to regulate at 0 MW.

Impact of the Queenston Flow West (QFW) Interface on the New York to Ontario Transfer Limit

The QFW interface is defined as the sum of the power flows through the 230 kV circuits out of Beck. QFW is the algebraic sum of the following:

- Total generation in the Niagara zone of Ontario including the units at the Beck #1, #2 & Pump Generating Stations, Thorold and Decew Falls GS
- The total load in the zone
- The import from New York

For a given QFW limit, the import capability from New York depends on the generation dispatch and the load in the Niagara zone. The Ontario Niagara generation is set to 1,300 MW. The import capability from New York can be increased by decreasing generation in the Ontario Niagara zone contingent on water and tourism regulations, increasing demand in the Ontario Niagara zone,

or both.

TransÉnergie–New York Interface

Thermal transfer limits between TransÉnergie (Hydro-Quebec) and New York are not analyzed as part of this study. Respecting the NYSRC and NYISO operating reserve requirements, the maximum allowable delivery into the NYCA from TransÉnergie on the Chateauguay – Massena (MSC-7040) 765 kV tie is 1310 MW. However in real-time the total flow is limited to 1800 MW; the additional flow is a "wheel-through" transaction to another Balancing Authority Area. Maximum delivery from NYCA to Quebec on the 7040 line is 1000 MW.

The Dennison Scheduled Line represents a 115 kV dual-circuit transmission line that interconnects the New York Control Area to the Hydro-Quebec Control Area at the Dennison Substation, near Massena, NY. The Dennison Line has a nominal north to south capacity of 279 MW in winter, into New York, and a nominal south to north capacity of 100 MW into Quebec.

SUMMARY OF RESULTS – THERMAL TRANSFER LIMIT ANALYSIS

Table 1 – NYISO CROSS STATE INTERFACE THERMAL TRANSFER LIMITS

- Table 1.a
    a. Dysinger East
    b. West Central Reverse
    c. UPNY – SENY
    d. UPNY – ConEd
    e. Sprain Brook – Dunwoodie So.
    f. ConEd – LIPA Transfer Capability
- Table 1.b – MSC-7040 Flow Sensitivity
    a. Central East
    b. Total East
    c. Moses South

Table 2.a – NYISO to ISO-NE INTERFACE THERMAL TRANSFER LIMITS

- Northport-Norwalk Flow Sensitivity
- Cricket Valley Energy Center I/S and O/S

Table 2.b – ISO-NE to NYISO INTERFACE THERMAL TRANSFER LIMITS

- Northport-Norwalk Flow Sensitivity
- Cricket Valley Energy Center I/S and O/S

Table 3.a – NYISO to PJM INTERFACE THERMAL TRANSFER LIMITS

- 3-115 kV Ties I/S and O/S
- Hudson – Farragut (B3402) 345 kV and Marion – Farragut (C3403) 345 kV lines and associated PARs I/S and O/S

Table 3.b – PJM to NYISO INTERFACE THERMAL TRANSFER LIMITS

- 3-115 kV Ties I/S and O/S
- Hudson – Farragut (B3402) 345 kV and Marion – Farragut (C3403) 345 kV lines and associated PARs I/S and O/S

Table 4 – IESO to NYISO INTERFACE THERMAL TRANSFER LIMITS

Table 5 – NYISO to IESO INTERFACE THERMAL TRANSFER LIMITS

TABLE 1.a – NYISO CROSS-STATE INTERFACE THERMAL TRANSFER LIMITS - WINTER 2023-24

ALL LINES IN-SERVICE

	Dysinger East	West Central Reverse	UPNY - ConEd	UPNY - SENY	Sprain Brook Dunwoodie - So.	ConEd – LIPA
NORMAL	2225 MW (1)	1800 MW (5)	6250 MW (11)	4200 MW (7)	3850 MW (3)	1025 MW (9)
EMERGENCY	2300 MW (2)	2475 MW (6)	8175 MW (8)	5675 MW (8)	4175 MW (4)	1425 MW (10)

	LIMITING ELEMENT	RATING			LIMITING CONTINGENCY
(1)	Niagara – Dysinger (ND1) 345 kV	@LTE$_{3,4}$	1745 MW	L/O	Niagara – Dysinger (ND2) 345 kV
(2)	Niagara – Dysinger (ND1) 345 kV	@STE	1793 MW	L/O	Niagara – Dysinger (ND2) 345 kV
(3)	Dunwoodie – Mott Haven (71) 345 kV	@MTE$_1$	1083 MW	L/O	Dunwoodie – Mott Haven (72) 345 kV Mott Haven 345/138 kV Transformer
(4)	Dunwoodie – Mott Haven (71) 345 kV	@NORM	741 MW		Pre-Contingency Loading
(5)	Clay – Pannell (1) 345 kV	@LTE	1315 MW	L/O	Clay – Pannell (2) 345 kV Clay – Edic (2-15) 345 kV
(6)	Clay – Pannell (2) 345 kV	@STE	1673 MW	L/O	Pannell – Clay (1)
(7)	Pleasant Valley – Wood Street (F30) 345 kV	@LTE	2384 MW	L/O	East Fishkill – Wood Street (F38 & F39) 345kV
(8)	Coopers Corner –Middletown Tap (CCRT34) 345 kV	@STE	1801 MW	L/O	Dolson Ave – Rock Tavern (DART44) 345 kV
(9)	Dunwoodie – Shore Rd. (Y50) 345 kV	@LTE$_2$	977 MW$_2$	L/O	Sprainbrook – East Garden City (Y49) 345kV
(10)	Newbridge – Locust Grove (558) 138 kV	@NORM	664 MW		Pre-Contingency Loading
(11)	Ladentown – Buchanan (Y88) 345 kV	@LTE	2015 MW	L/O	Buchanan – Ramapo (Y94) 345kV

Note

1: The rating used for cable circuits during SCUC reliability analysis is the average of the LTE and STE rating (MTE Rating).
2: LIPA rating for Y50 circuit is based on 70 % loss factor and rapid oil circulation.
3: Dysinger East limit used the NYSRC Rules Exception No. 13 – Post Contingency Flows on Niagara Project Facilities
4: The Dysinger – E. Stolle PAR controller schedule has direct impact on the Dysinger East limit.

TABLE 1.b – NYISO CROSS-STATE INTERFACE THERMAL TRANSFER LIMITS - WINTER 2023-24

ALL LINES IN-SERVICE

	7040 FLOW HQ->NY 600 MW	7040 FLOW 0 MW	7040 FLOW NY->HQ 600 MW
Central East			
NORMAL	4175 MW (6)	4175 MW (6)	4625 MW (6)
EMERGENCY	4775 MW (7)	4750 MW (7)	4775 MW (7)
Total East			
NORMAL	5425 MW (1)	5400 MW (1)	4850 MW (1)
EMERGENCY	5900 MW (5)	5875 MW (5)	5375 MW (5)
Moses South			
NORMAL	1000 MW (2)	950 MW (2)	425 MW (2)
EMERGENCY	1050 MW (4)	1000 MW (4)	550 MW (3)

	LIMITING ELEMENT	RATING			LIMITING CONTINGENCY
(1)	Roseton – East Fishkill (RFK305)	@LTE	2772 MW	L/O	Ladentown – Buchanan (Y88) 345 kV Ramapo – Buchanan (Y94) 345 kV Buchanan (BKTA5) 345/138 kV Transformer
(2)	Chases Lake – Porter (11) 230 kV	@LTE	564 MW	L/O	Moses – Massena (MMS1 & MMS2) 345 kV
(3)	Chases Lake – Porter (11) 230 kV	@STE	586 MW	L/O	Marcy – Massena (MSU1) 765 MW Massena – Chateaguay (7040) 765 MW
(4)	Chases Lake – Porter (11) 230 kV	@STE	586 MW	L/O	Marcy – Massena (MSU1)765 kV
(5)	Coopers Corners – Middletown TAP (CCRT34) 345 kV	@STE	1801 MW	L/O	Dolson Ave – Rock Tavern (DART44) 345 kV
(6)	Gordon Road – Rotterdam (30) 230 kV	@LTE	688 MW	L/O	Gordon Road – Princetown 345 kV (371) Gordon Road (31) 345/230 kV Transformer
(7)	New Scotland – Leeds (93) 345 kV	@STE	1912 MW	L/O	New Scotland – Leeds (94) 345 kV

Note

1: Moses South limit used the NYSRC Rules Exception No. 10 – Post Contingency Flows on Marcy AT1 Transformer
2: Moses South limit used the NYSRC Rules Exception No. 12 – Post Contingency Flows on Marcy AT2 Transformer

TABLE 2.a – NYISO to ISO-NE INTERFACE THERMAL TRANSFER LIMITS - WINTER 2023-24

ALL LINES IN-SERVICE

	DIRECT TIE	NYISO FACILITY$_3$	ISO-NE FACILITY	DIRECT TIE	NYISO FACILITY$_3$	ISO-NE FACILITY
	Cricket Valley Energy Center Out-of-service			Cricket Valley Energy Center in-service (1105 MW)		
Northport –Norwalk 0MW						
NORMAL	2700 MW (1)	5725 MW (5)	2850 MW (3)	2500 MW (1)	5975 MW (5)	2650 MW (3)
EMERGENCY	2825 MW (2)	5875 MW (6)	3400 MW (4)	2650 MW (2)	6125 MW (6)	3100 MW (4)
Northport –Norwalk 100MW						
NORMAL	2500 MW (2)	5675 MW (5)	2900 MW (3)	2225 MW (2)	5925 MW (5)	2700 MW (3)
EMERGENCY	2500 MW (2)	5825 MW (6)	3450 MW (4)	2225 MW (2)	6075 MW (6)	3200 MW (4)
Northport –Norwalk 200 MW						
NORMAL	1975 MW (2)	5625 MW (5)	2950 MW (3)	1800 MW (2)	5875 MW (5)	2750 MW (3)
EMERGENCY	1975 MW (2)	5775 MW (6)	3500 MW (4)	1800 MW (2)	6025 MW (6)	3350 MW (4)

	LIMITING ELEMENT	RATING		LIMITING CONTINGENCY
(1)	Long Mountain – Cricket Valley (398) 345 kV	@LTE 1935 MW	L/O	Millstone G3 24.0 kV Sandbar OMS RAS
(2)	Northport – Norwalk Harbor (NNC) 138 kV	@STE 569 MW	L/O	Long Mountain – Cricket Valley (398) 345 kV Smith Field – Salisbury (690) 69 kV
(3)	Norwalk Junction – Archers Lane (3403D) 345 kV	@LTE 922 MW	L/O	Long Mountain – Frost Bridge (352) 345 kV
(4)	Norwalk Junction – Archers Lane (3403D) 345 kV	@NORM 1823 MW		Pre-Contingency Loading
(5)	North Troy – Hoosick (5) 115 kV	@STE 317 MW	L/O	Northfield Mount – Berkshire (312) 345 kV Berkshire – Alps (393) 345 kV Northfield 345/13.8/13.8 kV Transformer
(6)	North Troy – Hoosick (5) 115 kV	@STE 317 MW	L/O	Berkshire – Alps (393) 345 kV

NOTE

1: The Northport – Norwalk Harbor (NNC) flow is positive in the direction of transfer

2: The Northport – Norwalk Harbor (NNC) line is no longer part of the New York – New England Interface Definition

3: Internal Non-Secured Limit: Limit to secure internal transmission elements that are not secured with pricing in the NYISO markets (typically 115 kV)

TABLE 2.b – ISO-NE to NYISO INTERFACE THERMAL LIMITS - WINTER 2023-24

ALL LINES IN-SERVICE

	DIRECT TIE	NYISO FACILITY$_3$	ISO-NE FACILITY	DIRECT TIE	NYISO FACILITY$_3$	ISO-NE FACILITY
	Cricket Valley Energy Center Out-of-service			Cricket Valley Energy Center in-service (1105 MW)		
	Norwalk –Northport @ 0 MW					
NORMAL	2375 MW (1)	2075 MW (3)	1550 MW (4)	2600 MW (1)	2425 MW (6)	1850 MW (4)
EMERGENCY	2375 MW (2)	2075 MW (3)	2450 MW (5)	2600 MW (2)	2425 MW (6)	2600 MW (5)
	Norwalk –Northport @ 100 MW					
NORMAL	1875 MW (1)	2725 MW (6)	1600 MW (4)	2100 MW (1)	2375 MW (6)	1900 MW (4)
EMERGENCY	1875 MW (2)	2725 MW (6)	2500 MW (5)	2100 MW (2)	2375 MW (6)	2700 MW (5)
	Norwalk–Northport @ 200 MW					
NORMAL	1400 MW (1)	2675 MW (6)	1650 MW (4)	1600 MW (1)	2325 MW (6)	1950 MW (4)
EMERGENCY	1400 MW (2)	2675 MW (6)	2550 MW (5)	1600 MW (2)	2325 MW (6)	2850 MW (5)

	LIMITING ELEMENT	RATING		LIMITING CONTINGENCY
(1)	Northport – Norwalk Harbor (NNC) 138 kV	@LTE 569 MW	L/O	Long Mountain – Cricket Valley (398) 345 kV Smith Field – Salisbury (690) 69 kV
(2)	Northport – Norwalk Harbor (NNC) 138 kV	@STE 569 MW	L/O	Long Mountain – Cricket Valley (398) 345 kV Smith Field – Salisbury (690) 69 kV
(3)	Reynolds Road 345/115 kV Transformer	@STE 699 MW	L/O	New Scotland – Alps (2) 345 kV
(4)	Norwalk Junction – Archers Lane (3403D) 345 kV	@LTE 922 MW	L/O	Long Mountain – Frost Bridge (352) 345 kV
(5)	Norwalk Junction – Archers Lane (3403D) 345 kV	@NORM 1823 MW		Pre-Contingency Loading
(6)	Reynolds Road 345/115 kV Transformer	@STE 699 MW	L/O	Alps – Knickerbocker (6) 345 kV

NOTE

1: The Northport – Norwalk Harbor (NNC) flow is positive in the direction of transfer
2: The Northport – Norwalk Harbor (NNC) line is no longer part of the New England – New York Interface Definition
3: Internal Non-Secured Limit: Limit to secure internal transmission elements that are not secured with pricing in the NYISO markets (typically 115 kV)

TABLE 3.a – NYISO to PJM INTERFACE THERMAL TRANSFER LIMITS - WINTER 2023-24

ALL LINES IN-SERVICE

	DIRECT TIE	NYISO FACILITY[3]	PJM FACILITY	DIRECT TIE	NYISO FACILITY	PJM FACILITY
	B&C PARs In-Service			B&C PARs Out-Of-Service		
NORMAL	2275 MW (7)	2525 MW (2)[3]	2875 MW (9)	1900 MW (1)	2300 MW (2)[3]	2675 MW (9)
3-115-O/S	2650 MW (3)	2875 MW (2)[3]	2525 MW (4)	2425 MW (3)	2625 MW (2)[3]	3600 MW (8)
EMERGENCY	2300 MW (1)	2900 MW (5)[3]	2875 MW (9)	2075 MW (1)	2675 MW (5)[3]	2675 MW (9)
3-115-O/S	2850 MW (6)	2875 MW (2)[3]	2525 MW (4)	2625 MW (6)	2850 MW (5)[3]	3600 MW (8)

	LIMITING ELEMENT	RATING		LIMITING CONTINGENCY
(1)	East Sayre – North Waverly (956) 115 kV	@STE	147 MW	L/O East Towanda – Hillside (70) 230 kV
(2)	Oakdale Transformer (BK2) 345kV/115kV	@STE	597 MW	L/O Oakdale – Watercure (31) 345kV
(3)	East Towanda – Hillside (70) 230 kV	@LTE	594 MW	L/O Mainesburg – Watercure (30) 345 kV
(4)	East Towanda – North Meshoppen (1057) 115 kV	@STE	257 MW	L/O Canyon – East Towanda (CAN-EAS) 230 kV
(5)	Oakdale – North Endicott (938) 115kV	@STE	175 MW	L/O Oakdale – Watercure (31) 345kV
(6)	East Towanda – Hillside (70) 230 kV	@STE	670 MW	L/O Mainesburg – Watercure (30) 345 kV
(7)	East Sayre – North Waverly (956) 115 kV	@STE	147 MW	L/O East Towanda – Hillside (70) 230 kV Hillside 115/69 kV
(8)	Mainseburg – Evert Drive (EVE-MAI) 115 kV	@STE	307 MW	L/O Hillside – East Towanda (70) 230 kV
(9)	Tiffany – Laurel Lake (LAU-TIF) 115 kV	@NORM	205 MW	Pre-contingency Loading

NOTE

1: Emergency Transfer Capability Limits may have required line outages as described in the New York - PJM Analysis section.

2: PAR schedules have been adjusted in the direction of transfer.

3: Internal Non-Secured Limit: Limit to secure internal transmission elements that are not secured with pricing in the NYISO markets (typically 115 kV)

TABLE 3.b – PJM to NYISO INTERFACE THERMAL TRANSFER LIMITS – Winter 2023-24

ALL LINES IN-SERVICE

	DIRECT TIE	NYISO FACILITY	PJM FACILITY	DIRECT TIE	NYISO FACILITY$_3$	PJM FACILITY
	B&C PARs In-Service			B&C PARs Out-Of-Service		
NORMAL	2125 MW (1)	2650 MW (2)$_3$	2825 MW (10)	2151 MW (1)	2650 MW (2)$_3$	2850 MW (10)
3-115-O/S	2575 MW (3)	2925 MW (9)$_3$	3700 MW (4)	2425 MW (3)	2800 MW (9)$_3$	3550 MW (4)
EMERGENCY	2300 MW (6)	2875 MW (5)$_3$	2875 MW (11)	2300 MW (6)	2875 MW (5)$_3$	2900 MW (11)
3-115-O/S	2750 MW (7)	3050 MW (5)$_3$	3700 MW (8)	2625 MW (7)	2925 MW (5)$_3$	3550 MW (8)

	LIMITING ELEMENT	RATING		LIMITING CONTINGENCY
(1)	North Waverly – East Sayre (956) 115 kV	@STE	147 MW	L/O	Hillside – East Towanda (70) 230 kV Hillside – Watercure (69) 230 kV Hillside (BK3) 230/115 kV Transformer
(2)	North Waverly – Lounsberry (962) 115 kV	@STE	167 MW	L/O	Watercure – Oakdale (31) 345 kV Clarks Corners – Oakdale (36) 345kV
(3)	Hillside – East Towanda (70) 230 kV	@LTE	594 MW	L/O	Watercure – Mainseburg (30) 115kV
(4)	Everett Drive – Mainesburg (EVE-MAI) 115 kV	@STE	307 MW	L/O	Hillside – East Towanda (70) 230 kV Hillside – Stoney Ridge (72) 230 kV
(5)	Gridle Rd. – Stolle Rd. (706) 115 kV	@STE	239 MW	L/O	Five Mile (BK1) 345/115kV Transformer
(6)	North Waverly – East Sayre (956) 115 kV	@STE	147 MW	L/O	Hillside – East Towanda (70) 230 kV
(7)	Hillside – East Towanda (70) 230 kV	@STE	670 MW	L/O	Watercure – Mainseburg (30) 115kV
(8)	Everett Drive – Mainesburg 115 kV	@STE	307 MW	L/O	Hillside – East Towanda (70) 230 kV
(9)	Oakdale 230/115 kV (BK1)	@STE	398 MW	L/O	Oakdale – Clarks Corners (36) 345 kV Watercure – Oakdale (31) 345 kV
(10)	Lenox – North Meshoppen (1090) 115 kV	@STE	202 MW	L/O	Oakdale – Clarks Corners (36) 345 kV Watercure – Oakdale (31) 345 kV
(11)	Lenox – North Meshoppen (1090) 115 kV	@STE	202 MW	L/O	Hillside – East Towanda (70) 230 kV

NOTE

1: Emergency Transfer Capability Limits may have required line outages as described in New York – PJM Analysis Section.
2: PAR schedules have been adjusted in the direction of transfer.
3: Internal Non-Secured Limit: Limit to secure internal transmission elements that are not secured with pricing in the NYISO markets.

TABLE 4 – IESO to NYISO INTERFACE THERMAL TRANSFER LIMITS - WINTER 2023-24

ALL LINES IN-SERVICE

	DIRECT TIE	NYISO FACILITY[2]	IESO FACILITY[1]
NORMAL	2475 MW (1)	3375 MW (3) [2]	4450 MW (4)
EMERGENCY	3075 MW (2)	3375 MW (3) [2]	5300 MW (5)

	LIMITING ELEMENT	RATING		LIMITING CONTINGENCY
(1)	Beck - Niagara (PA27) 230 kV	@LTE 540 MW	L/O	Beck - Niagara (PA301) 345 kV
(2)	Beck - Niagara (PA27) 230 kV	@STE 685 MW	L/O	Beck - Niagara (PA301) 345 kV
(3)	Sleight Road - Clyde (971) 115 kV	@STE 143 MW	L/O	Pannell Rd - Clay (PC2) 345 kV Clay (T1) 345/115 kV
(4)	Mt Hope – Allanburg (Q30M) 230kV	@LTE 426 MW	L/O	Beck – Middleport (Q26M) 230 kV Beck – Middleport (Q35M) 230 kV
(5)	Mt Hope – Allanburg (Q30M) 230kV	@STE 450 MW	L/O	Beck – Middleport (Q26M) 230 kV

Note

1: Ontario - NYISO limit used the NYSRC Rules Exception No. 13 – Post Contingency Flows on Niagara Project Facilities

2: Internal Non-Secured Limit: Limit to secure internal transmission elements that are not secured with pricing in the NYISO markets (typically 115 kV).

TABLE 5 – NYISO to IESO INTERFACE THERMAL TRANSFER LIMITS – WINTER 2023-24

ALL LINES IN-SERVICE

	DIRECT TIE	NYISO FACILITY[2]	IESO FACILITY[1]
NORMAL	1900 MW (1)	3250 MW (2) [2]	1525 MW (4)
EMERGENCY	2300 MW (3)	3275 MW (6) [2]	2225 MW (5)

	LIMITING ELEMENT	RATING		LIMITING CONTINGENCY
(1)	Beck – Niagara (PA27) 230 kV	@LTE 540 MW	L/O	Beck - Niagara (PA301) 345 kV
(2)	Bennett – Palmiter Rd. (932) 115 kV	@STE 111 MW	L/O	Stolle Rd – Gardenville (66) 230 kV Stolle Rd – Sheldon (67) 230 kV Stolle Rd – Robinson Rd (65) 230 kV
(3)	Beck – Niagara (PA27) 230 kV	@NORM 685 MW		Pre-Contingency loading
(4)	Beck – Hannon (Q24) 230 kV	@STE 552 MW	L/O	Beck – Middleport (Q25M) 230 kV Beck – Middleport (Q29HM) 230 kV
(5)	Beck – Hannon (Q24) 230kV	@STE 602MW	L/O	Beck – Hannon (Q29HM) 230kV
(6)	Bennett – Palmiter Rd. (932) 115 kV	@STE 111 MW	L/O	Stolle Rd – Sheldon (67) 230 kV

Note

1: This limit can be increased by reducing generation or increasing demand in the Niagara zone of Ontario contingent on water and tourism regulations. See Ontario – New York Analysis for discussion.

2: Internal Non-Secured Limit: Limit to secure internal transmission elements that are not secured with pricing in the NYISO markets (typically 115 kV).

3: This limit can be increased by adjusting the PAR schedule on the Dysinger – East Stolle Rd (DES-1) 345 kV line, reducing the flows into East Stolle Rd. 345 kV substation.