



# **NYISO Operating Study Summer 2021**

**A Report by the  
New York Independent System Operator**

May 2021

## Table of Contents

<b>EXECUTIVE SUMMARY .....</b>	<b>4</b>
<b>INTRODUCTION.....</b>	<b>5</b>
<b>PURPOSE .....</b>	<b>5</b>
<b>SYSTEM OPERATING LIMIT (SOL) METHODOLOGY .....</b>	<b>5</b>
<b>STUDY PARTICIPANTS .....</b>	<b>6</b>
<b>SYSTEM REPRESENTATION AND BASE STUDY ASSUMPTIONS.....</b>	<b>6</b>
System Representation .....	6
<i>Generation Resource Changes .....</i>	<i>7</i>
<i>Transmission Facilities Changes.....</i>	<i>7</i>
System Representation .....	8
<b>DISCUSSION .....</b>	<b>9</b>
Resource Assessment .....	9
<i>Load and Capacity Assessment.....</i>	<i>9</i>
Cross-State Interfaces .....	9
<i>Transfer Limit Analysis.....</i>	<i>9</i>
<i>Athens SPS.....</i>	<i>11</i>
<i>West Woodbourne Transformer .....</i>	<i>11</i>
<i>ConEd – LIPA Transfer Analysis.....</i>	<i>11</i>
<i>Transfer Limits for Outage Conditions .....</i>	<i>12</i>
<i>Transient Stability and Voltage transfer Limits.....</i>	<i>12</i>
Thermal Transfer Capabilities with Adjacent Balancing Areas .....	13
<i>New York – New England Analysis.....</i>	<i>14</i>
<i>New York - PJM Analysis .....</i>	<i>15</i>
<i>Ontario – New York Analysis.....</i>	<i>16</i>
<i>TransÉnergie–New York Interface.....</i>	<i>17</i>
<b>SUMMARY OF RESULTS – THERMAL TRANSFER LIMIT ANALYSIS .....</b>	<b>19</b>
TABLE 1.a – NYISO CROSS-STATE INTERFACE THERMAL TRANSFER LIMITS - SUMMER 2021 ALL LINES I/S .....	20
TABLE 1.b – NYISO CROSS-STATE INTERFACE THERMAL TRANSFER LIMITS - SUMMER 2021 ALL LINES I/S .....	21
TABLE 2.a – NYISO to ISO-NE INTERFACE THERMAL TRANSFER LIMITS - SUMMER 2021.....	22
ALL LINES I/S .....	22

TABLE 2.b – ISO-NE to NYISO INTERFACE THERMAL TRANSFER LIMITS - SUMMER 2021.....	23
ALL LINES I/S .....	23
TABLE 3.a – NYISO to PJM INTERFACE THERMAL TRANSFER LIMITS - SUMMER 2021 .....	24
ALL LINES I/S .....	24
TABLE 3.b – PJM to NYISO INTERFACE THERMAL TRANSFER LIMITS - SUMMER 2021 .....	25
ALL LINES I/S .....	25
TABLE 4 – IESO to NYISO INTERFACE THERMAL TRANSFER LIMITS - SUMMER 2021.....	26
ALL LINES I/S .....	26
TABLE 5 – NYISO to IESO INTERFACE THERMAL TRANSFER LIMITS – SUMMER 2021 .....	27
ALL LINES I/S .....	27

## Executive Summary

This study is conducted as a seasonal review of the projected thermal transfer capability for the Summer 2021 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 Summer 2020 to Summer 2021 are shown in Figure 1 on page 10. Internal interfaces have changed due to the network alterations in the New York Control Area (NYCA) and modeling assumptions. Dysinger East limit increased to 1050 MW because of the addition of the new Station 255 (Henrietta) 345 kV substation and the redistribution of flows throughout the NYCA system due to the retirement of Indian Point 3. Total East limit decreased to 3175 MW because of the combined effects of modeling the Porter – Rotterdam (30) 230 kV line out-of-service and the redistribution of flows throughout the NYCA system due to the retirement of Indian Point 3. UPNY-ConEd limit increased to 6850 MW, mainly due to the redistribution of flows throughout the NYCA system due to the retirement of Indian Point 3. Dunwoodie South limit decreased to 4100 MW due to modeling the ConEd series reactors located on the M51, M52, 71 and 72 lines in bypass mode. Differences in the evaluated external interface limits from Summer 2020 to Summer 2021 are shown in Figure 2 on page 13. PJM to NY transfer limit increased to 2275 MW, mainly due to the increase in the Hillside – East Towanda (70) 230 kV LTE rating.

## 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 Summer 2021 capability period. This analysis indicates that, for the Summer 2021 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

First	Last	Company	First	Last	Company
Hoa	Fu	PSEG Long Island*	Robert	Golen	NYISO
Nicholas	Culpepper	PSEG Long Island*	Kyle	Ardolino	NYISO
Anie	Philip	PSEG Long Island*	Harris	Miller	NYISO
Robert	Eisenhuth	PSEG Long Island*	Mohammed	Hossain	NYPA
Umair	Hanif	PSEG Long Island*	Brent	Blanchard	NYPA
Muhammad	Ibraheem	PSEG Long Island*	Robert	Reese	NYPA
Craig	Laffey	PSEG Long Island*	Frank	Grimaldi	NYPA
Rahul	Pandit	PSEG Long Island*	Roletto	Mangonon	O&R
John	Hastings	National Grid	Eric	Remolona	O&R
Jeffery	Maher	National Grid	Ruby	Chan	Central Hudson
Richard	Wilbur	National Grid	Richard	Wright	Central Hudson
Daniel	Head	ConEd	Jack	DiOdoardo	Central Hudson
Mohammed	Rahman	ConEd	Leen	Almadani	Central Hudson
Stephan	Dubissette	ConEd	Isen	Widjaja	IESO
Brian	Gordon	NYSEG	Christopher	Reali	IESO
Robert	King	NYSEG	Farid	Chagla	IESO
Astrid	Bejarano	NYSEG	Dean	LaForest	ISO-NE
Robert	Dropkins	PJM	Joseph	Koltz	ISO-NE
Todd	Bickel	PJM	Chris	Aquino	ISO-NE

\*Agent for LIPA

## SYSTEM REPRESENTATION AND BASE STUDY ASSUMPTIONS

### System Representation

The representation was developed from the NYISO Data Bank and assumes the forecast summer coincident peak load of 32,327 MW. The other NPCC Balancing Areas and adjacent Regional representations were obtained from the RFC-NPCC Summer 2021 Reliability Assessment power flow base case and have been updated to reflect the Summer 2021 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 Summer 2020 capability period:

#### **Deactivations**

Glenwood GT01 (BTM)	-16 MW
West Babylon 4 (BTM)	-52 MW
Indian Point 3	-1012 MW
<b>Total Retirements</b>	<b>-1080 MW</b>

#### **Additions**

Cassadaga Wind (Name Plate)	126 MW
Roaring Brook Wind (Name Plate)	80 MW
<b>Total Additions</b>	<b>206 MW</b>

#### **Transmission Facilities Changes**

Significant facility changes since the Summer 2020 capability period include:

- Porter – Rotterdam (30) 230 kV line out-of-service
- Newbridge 345/138 kV Transformer out-of-service
- Rochester Area Reinforcement Project addition

The Rochester Area Reinforcement Project consists of a new 345/115 kV substation, Station 255 (Henrietta). The new 345 kV substation intersected the existing Somerset – Rochester (SR1-39) 345 kV and Niagara – Rochester (NR2) 345 kV lines near Rochester. An additional 345 kV line was constructed from Station 255 (Henrietta) 345 kV to Rochester 345 kV and two 345/115 kV transformers tie the 345 kV substation to the 115 kV network.

### **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 Summer 2021 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 150 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 Summer 2021, and the MMWG Summer 2020 power flow base cases. The series reactors on the Farragut – Gowanus (41 and 42) 345 kV, the Packard – Sawyer (77 and 78) 230 kV, the E. 179th St. – Hell Gate (15055) 138 kV circuits and the Sprain Brook – East Garden City (Y49) 345 kV cable are in-service in the base case. The series reactors on the Sprain Brook – W. 49th St. (M51 and M52) 345 kV and the Dunwoodie – Mott Haven (71 and 72) 345 kV are bypassed. 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 circuits are in-service in the base case.

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 Niagara generation was modeled at an output of 1,300 MW.



## DISCUSSION

### Resource Assessment

#### Load and Capacity Assessment

The forecast peak demand for the Summer 2021 capability period is 32,327 MW<sup>1</sup>. This forecast is approximately 31 MW (0.1%) greater than the forecast of 32,296 MW for the Summer 2020 capability period, and 1,629 MW (4.79%) lower than the all-time New York Control Area (NYCA) seasonal peak of 33,956 MW, which occurred on July 19, 2013.

The Installed Capacity (ICAP) requirement for the Summer capability period is 39,019 MW based on the NYSRC 20.7% Installed Reserve Margin (IRM) requirement for the 2021 Capability Year. NYCA generation capacity for Summer 2021 is 37,785 MW, and net external capacity purchases of 2,087 MW have been secured for the Summer period. The combined capacity resources represent a 23.3% margin above the forecast peak demand of 32,327 MW. These values were taken from the 2021 Load & Capacity Data report produced by the NYISO.

The equivalent forced outage rate is 4.28%, and includes forced outages and de-ratings based on historical performance of all generation in the NYCA. For Summer 2020, the equivalent forced outage rate assumed was 4.6%.

### Cross-State Interfaces

#### Transfer Limit Analysis

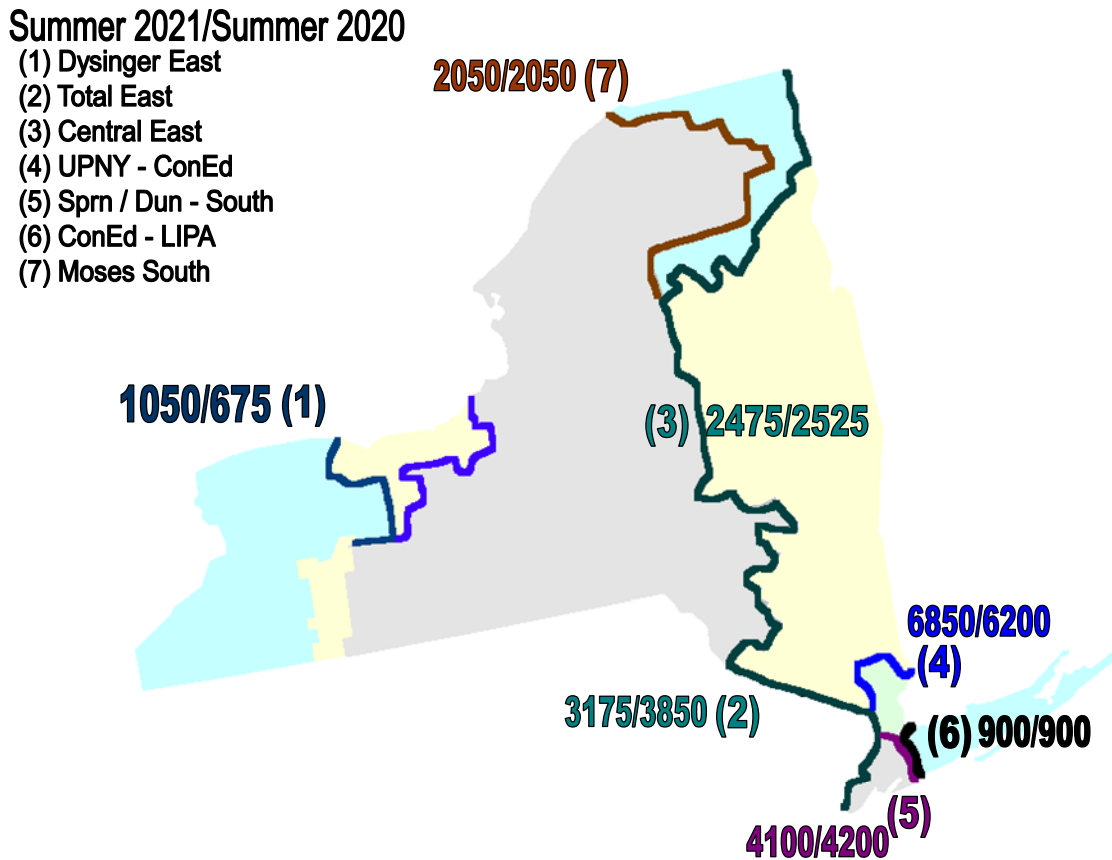
This report summarizes the results of thermal transfer limit analyses performed on power system representation modeling the forecast peak load conditions for Summer 2021. Normal and emergency thermal limits were calculated according to Normal and Emergency Transfer Criteria definitions in the NYSRC Reliability 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 Summer 2021 thermal transfer limits to Summer 2020 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

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<sup>1</sup> Forecast Coincident Peak Demand (50th percentile baseline forecast)

summary comparison of Cross-State thermal transfer limits between summer 2021 and 2020, 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 increased by 375 MW. This is mainly due to the addition of the new Station 255 (Henrietta) 345 kV substation and the redistribution of flows throughout the NYCA system due to the retirement of Indian Point 3.

**Total East** interface thermal transfer limit decreased 675 MW. This is mainly due to the combined effects of modeling the Porter – Rotterdam (30) 230 kV line out-of-service and the redistribution of flows throughout the NYCA system due to the retirement of Indian Point 3.

**UPNY-ConEd** interface thermal transfer limit has increased 650 MW. This is mainly due to the redistribution of flows throughout the NYCA system due to the retirement of Indian Point 3.

**Dunwoodie South** interface thermal transfer limit has decreased 100 MW. This is due to modeling the ConEd series reactors located on the M51, M52, 71 and 72 lines in bypass mode.

### Athens SPS

In 2008, a Special Protection System (SPS) went in-service impacting the thermal constraint on the Leeds to Pleasant Valley 345 kV transmission corridor. The SPS is designed to reject generation at the Athens combined-cycle plant if either the Leeds to Pleasant Valley 345 kV (92) circuit or the Athens to Pleasant Valley 345 kV (91) circuit are out-of-service and the flow on the remaining circuit is above the LTE rating. Generation at Athens will be tripped until the flow is below the LTE rating, the out-of-service circuit recloses, or the remaining circuit trips. This SPS is expected to be active when there is generation on-line at the Athens station, and will allow the NYCA transmission system to be secured to the STE rating of the 91 line for the loss of the 92 line, and vice-versa, for normal operating conditions. The SPS increases the normal thermal limit to match the emergency thermal limit across the UPNY-ConEd operating interface when the 91 or 92 is the limiting circuit. The Table 1 “Emergency” limit for the UPNY-ConEd interface can be interpreted as the “Normal” limit, when the Athens SPS is active.

### 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 dependant, 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	115 MW
Jamaica – Valley Stream 138 kV	-100 MW	120 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
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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 analysis of historical conditions performed by LIPA and Con Edison, Con Edison anticipates being able to supply a total flow up to 312 MW of emergency transfer from Con Edison to Long Island, if requested, via the ties.

#### **LIPA to ConEd emergency assistance**

LIPA anticipates being able to supply a total flow up to 505 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.

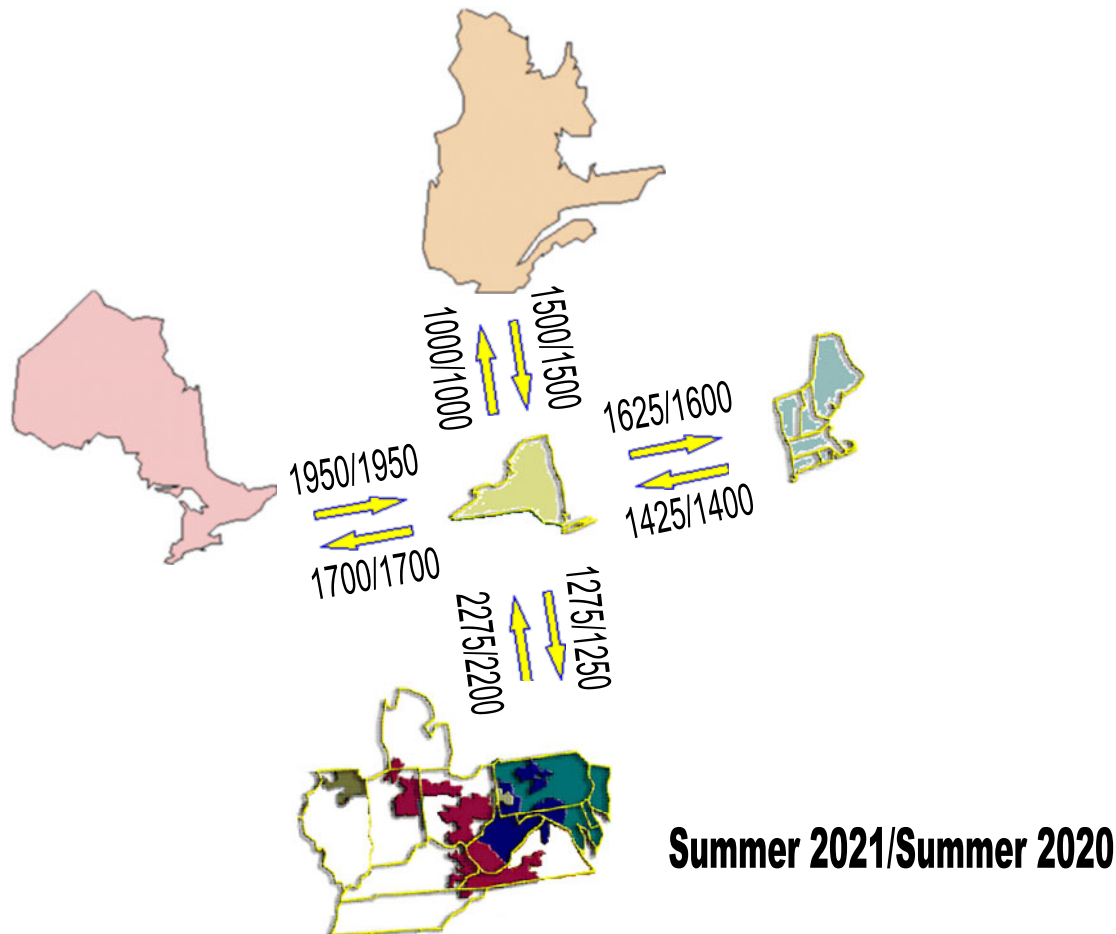
#### **Transient Stability and Voltage transfer Limits**

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>

**Thermal Transfer Capabilities with Adjacent Balancing Areas**



**Figure 2 – Inter-Area Thermal Transfer Capabilities<sup>2</sup>**

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

<sup>2</sup> TE-NY transfer capabilities shown in Figure 2 are not thermal transfer limits; for more information see page 17

Balancing Areas is necessary to provide optimal transfer while maintaining the reliability and security of the interconnected systems.

**PJM – NYISO** interface thermal transfer limit increased 75 MW. This is mainly due to the increase in the Hillside – East Towanda (70) 230 kV LTE rating.

#### **New York – New England Analysis**

##### **New England Transmission/Capacity Additions**

##### **Transmission**

For the Summer 2021 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 April through September 2021, no major generation additions are anticipated. Approximately 173 MW of solar photovoltaic, 8 MW of hydro, 15 MW of Wind, and 20 MW of battery alternative energy resources are anticipated to become commercial by the end of September 2021. Bridgeport Harbor 3 is anticipated to be retired June 1<sup>st</sup> 2021.

##### **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 summer 2020, 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 PAR is modeled out-of-service and L34P was 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\\_2021Mar.ashx](https://www.nyiso.com/documents/20142/3694079/NYPP-OH_1993-2.pdf/2e21484a-22cf-739a-7a10-69dfd69f5d58)

#### **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](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

On August 30, 2019 the Niagara Reinforcement Project was completed. This project increases the summertime transfer capability out of the Niagara Zone (i.e., the zone where some of the New York-Ontario tie lines interconnect) to the rest of Ontario by up to 800 MW.

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 190 MW in summer, 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. UPNY – SENY
  - c. UPNY – ConEd
  - d. Sprain Brook – Dunwoodie So.
  - e. 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 - SUMMER 2021**  
**ALL LINES I/S**

	Dysinger East	UPNY – SENY <sub>1</sub>	UPNY - ConEd <sub>1</sub>	Sprain Brook Dunwoodie - So.	ConEd – LIPA Transfer Capability
<b>NORMAL</b>	1050 (1)	4550 (3)	6850 (3)	4100 (5)	900 (7)
<b>EMERGENCY</b>	1725 (2)	5175 (4)	7525 (4)	4200 (6)	1525 (8)

	LIMITING ELEMENT		RATING		LIMITING CONTINGENCY
(1)	Niagara – Packard (61) 230 kV	@STE <sub>4</sub>	846 MW	L/O	Niagara – Packard (62) 230 kV Beck – Packard (BP76) 230 kV
(2)	Walck Rd - Huntley (133) 115 kV	@STE	206 MW	L/O	Packard – Huntley (130) 115 kV
(3)	Leeds – Pleasant Valley (92) 345 kV	@LTE	1538 MW	L/O	Athens – Pleasant Valley (91) 345 kV
(4)	Coopers Corners – Middletown TAP (CCRT34) 345 kV	@STE	1793 MW	L/O	Dolson Ave – Rock Tavern (DART44) 345 kV
(5)	Dunwoodie – Mott Haven (71) 345 kV	@MTE <sub>2</sub>	1066 MW	L/O	(SB:MOTT345_7) Dunwoodie – Mott Haven (72) 345 kV Mott Haven 345/138 kV Transformer TR9
(6)	Dunwoodie – Mott Haven (71) 345 kV	@NORM	707 MW		Pre-Contingency Loading
(7)	Dunwoodie – Shore Rd. (Y50) 345 kV	@LTE	916 MW <sub>3</sub>	L/O	(SB:SPRA345_RNS2) Sprain Brook – East Garden City (Y49) 345 kV Sprain Brook – Academy (M29) 345 kV
(8)	Dunwoodie – Shore Rd. (Y50) 345 kV	@NORM	656 MW <sub>3</sub>		Pre-Contingency Loading

**Note**

- 1: See Cross-State Interfaces Section for discussion on Athens SPS
- 2: The rating used for cable circuits during SCUC reliability analysis is the average of the LTE and STE rating (MTE Rating).
- 3: LIPA rating for Y50 circuit is based on 70% loss factor and rapid oil circulation.
- 4: Dysinger East limit used the NYSRC Rules Exception No. 13 – Post Contingency Flows on Niagara Project Facilities

**TABLE 1.b – NYISO CROSS-STATE INTERFACE THERMAL TRANSFER LIMITS - SUMMER 2021**
**ALL LINES I/S**

	MSC-7040 FLOW 800 MW	MSC-7040 FLOW 1310 MW	MSC-7040 FLOW 1600 MW
<b>CENTRAL EAST</b>			
NORMAL	2475 (1)	2475 (1)	2475 (1)
EMERGENCY	2650 (2)	2650 (2)	2650 (2)
<b>TOTAL EAST</b>			
NORMAL	3150 (3)	3175 (3)	3175 (3)
EMERGENCY	3625 (4)	3650 (4)	3650 (4)
<b>MOSES SOUTH<sub>1,2</sub></b>			
NORMAL	1600 (7)	2050 (5)	2275 (5)
EMERGENCY	1800 (8)	2550 (6)	2700 (9)

<b>LIMITING ELEMENT</b>		<b>RATING</b>		<b>LIMITING CONTINGENCY</b>	
(1)	Porter – Rotterdam (31) 230 kV	@LTE	505 MW	L/O	Marcy – Fraser Annex (UCC2-41) 345 kV (Series Capacitor) Edic – Fraser (EF24-40) 345 kV (Series Capacitor)
(2)	Fraser – Coopers Corners (33) 345 kV	@STE	1793 MW	L/O	Marcy – Fraser Annex (UCC2-41) 345 kV (Series Capacitor)
(3)	Dolson Ave – Rock Tavern (DART44) 345 kV	@LTE	1852 MW	L/O	Rock Tavern – Middletown TAP (CCRT34) 345 kV Coopers Corners – Middletown TAP (CCRT34) 345 kV Roseton – Rock Tavern (311) 345 kV Middletown 345/138 kV Transformer
(4)	Coopers Corners – Middletown TAP (CCRT34) 345 kV	@STE	1793 MW	L/O	Dolson Ave – Rock Tavern (DART44) 345 kV
(5)	Moses – Adirondack (MA1) 230 kV	@LTE	386 MW	L/O	Chateaugay – Massena (MSC-7040) 765 kV Massena – Marcy (MSU1) 765 kV and TransÉnergie delivery
(6)	Flat Rock – Browns Falls (2) 115 kV	@STE	135 MW	L/O	Browns Falls – Higley (1) 115 kV
(7)	Moses – Adirondack (MA1) 230 kV	@LTE	386 MW	L/O	Moses 230/115 kV Transformer AT4 Moses Gen 17-20 13.8 kV Moses 230 kV Bus tie
(8)	Moses – Adirondack (MA1) 230 kV	@STE	440 MW	L/O	Moses 230 kV Bus tie
(9)	Browns Falls – Higley (1) 115 kV	@STE	135 MW	L/O	Flat Rock – Browns Falls (2) 115 kV

**Note**

1: Moses South limit used the NYSRC Rules Exception No. 10 – Post Contingency Flows on Marcy AT-1 Transformer

2: Moses South limit used the NYSRC Rules Exception No. 12 – Post Contingency Flows on Marcy Transformer T2

**TABLE 2.a – NYISO to ISO-NE INTERFACE THERMAL TRANSFER LIMITS - SUMMER 2021**
**ALL LINES I/S**

DIRECT TIE		NYISO FACILITY	ISO-NE FACILITY	DIRECT TIE		NYISO FACILITY	ISO-NE FACILITY
Cricket Valley Energy Center Out of Service				Cricket Valley Energy Center in Service (1095 MW)			
<b>Northport –Norwalk 0MW</b>							
<b>NORMAL</b>	2400 (1)	2825 (3)	3150 (6)	2225 (1)	2975 (3)	2950 (6)	
<b>EMERGENCY</b>	2575 (2)	2825 (3)	3600 (7)	2400 (2)	2975 (3)	3400 (7)	
<b>Northport –Norwalk 100MW</b>							
<b>NORMAL</b>	2200 (4)	2775 (3)	3150 (6)	2025 (4)	2925 (3)	2950 (6)	
<b>EMERGENCY</b>	2350 (5)	2775 (3)	3650 (7)	2175 (5)	2925 (3)	3450 (7)	
<b>Northport –Norwalk 200 MW</b>							
<b>NORMAL</b>	1800 (4)	2725 (3)	3200 (6)	1625 (4)	2875 (3)	3000 (6)	
<b>EMERGENCY</b>	1925 (5)	2725 (3)	3700 (7)	1750 (5)	2875 (3)	3500 (7)	
LIMITING ELEMENT			RATING		LIMITING CONTINGENCY		
(1)	Cricket Valley – Long Mountain (398) 345 kV		@LTE	1786 MW	L/O	Milestone G3 24.0 kV	
(2)	Cricket Valley – Long Mountain (398) 345 kV		@NORM	1260 MW		Pre-Contingency Loading	
(3)	Wyantskill – Reynolds Road (13-988) 115 kV		@STE	237 MW	L/O	Berkshire – Alps (393) 345 kV	
(4)	Northport – Norwalk Harbor (NNC) 138 kV		@LTE	518 MW	L/O	Cricket Valley – Long Mountain (398) 345 kV Salisbury – Smithfield (690) 69 kV	
(5)	Northport – Norwalk Harbor (NNC) 138 kV		@STE	532 MW	L/O	Cricket Valley – Long Mountain (398) 345 kV	
(6)	Long Mountain – Frost Bridge (352) 345 kV		@LTE	1226 MW	L/O	Long Mountain – Plumtree (321) 345kV	
(7)	Long Mountain – Frost Bridge (352) 345 kV		@STE	1430 MW	L/O	Long Mountain – Plumtree (321) 345kV	

**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

**TABLE 2.b – ISO-NE to NYISO INTERFACE THERMAL TRANSFER LIMITS - SUMMER 2021**
**ALL LINES I/S**

	DIRECT TIE	NYISO FACILITY	ISO-NE FACILITY	DIRECT TIE	NYISO FACILITY	ISO-NE FACILITY
	Cricket Valley Energy Center Out of Service			Cricket Valley Energy Center in Service (1095 MW)		
<b>Norwalk –Northport @ 0 MW</b>						
<b>NORMAL</b>	2225 (1)		1600 (4)	2425 (1)		1700 (4)
<b>EMERGENCY</b>	2225 (1)		1750 (6)	2425 (1)		1850 (6)
<b>Norwalk –Northport @ 100 MW</b>						
<b>NORMAL</b>	1900 (2)		1650 (6)	2050 (5)		1750 (6)
<b>EMERGENCY</b>	1950 (3)		1650 (6)	2175 (3)		1750 (6)
<b>Norwalk–Northport @ 200 MW</b>						
<b>NORMAL</b>	1425 (2)		1500 (6)	1575 (5)		1600 (6)
<b>EMERGENCY</b>	1475 (3)		1500 (6)	1700 (3)		1600 (6)

	LIMITING ELEMENT	RATING	LIMITING CONTINGENCY
(1)	Cricket Valley – Long Mountain (398) 345 kV	@NORM 1260 MW	Pre-Contingency Loading
(2)	Northport – Norwalk Harbor (NNC) 138 kV	@LTE 518 MW	L/O Cricket Valley – Long Mountain (398) 345 kV
(3)	Northport – Norwalk Harbor (NNC) 138 kV	@STE 532 MW	L/O Cricket Valley – Long Mountain (398) 345 kV
(4)	Norwalk Junction – Archers Lane (3403D) 345 kV	@LTE 850 MW	L/O Long Mountain – Frost Bridge (352) 345 kV
(5)	Northport – Norwalk Harbor (NNC) 138 kV	@LTE 518 MW	L/O Cricket Valley – Long Mountain (398) 345 kV Cricket Valley ST3&GT3
(6)	Singer – Norwalk (3921) 345 kV	@NORM 600 MW	Pre-Contingency Loading

**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

**TABLE 3.a – NYISO to PJM INTERFACE THERMAL TRANSFER LIMITS - SUMMER 2021**
**ALL LINES I/S**

	DIRECT TIE	NYISO FACILITY	PJM FACILITY	DIRECT TIE	NYISO FACILITY	PJM FACILITY
	B&C PARs In-Service			B&C PARs Out-Of-Service		
	Normal					
<b>NORMAL</b>	1250 (1)	1275 (2) <sub>3</sub>	1500 (7)	1125 (1)	1150 (2) <sub>3</sub>	1350 (7)
<b>3-115-O/S</b>	1975 (5)	1275 (3) <sub>3</sub>	975 (7)	1850 (5)	1150 (3) <sub>3</sub>	850 (7)
<b>EMERGENCY</b>	1250 (1)	1525 (4) <sub>3</sub>	1500 (7)	1125 (1)	1425 (4) <sub>3</sub>	1350 (7)
<b>3-115-O/S</b>	2175 (6)	1500 (4) <sub>3</sub>	975 (7)	2050 (6)	1375 (4) <sub>3</sub>	850 (7)

	LIMITING ELEMENT	RATING		LIMITING CONTINGENCY
(1)	Westover – Laurel Lake (952) 115 kV	@NORM 108 MW		Pre-Contingency Loading
(2)	Delhi – Delhi Tap (951) 115 kV	@STE 164 MW	L/O	Fraser – Coopers Corners (33) 345 kV (Series Capacitor) Oakdale – Fraser (32) 345 kV
(3)	Montour Falls – Coddington Road (982) 115 kV	@LTE 144 MW	L/O	Watercure – Oakdale (31) 345kV Clarks Corners – Oakdale (36) 345kV
(4)	Montour Falls – Coddington Road (982) 115 kV	@STE 144 MW	L/O	Clarks Corners – Oakdale (36) 345kV
(5)	Hillside – East Towanda (70) 230 kV	@LTE 549 MW	L/O	Watercure – Mainesburg (30) 345kV
(6)	Hillside – East Towanda (70) 230 kV	@STE 630 MW	L/O	Watercure – Mainesburg (30) 345kV
(7)	East Towanda – North Meshoppen 115 kV	@STE 157 MW	L/O	Canyon – East Towanda 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 3.b – PJM to NYISO INTERFACE THERMAL TRANSFER LIMITS - SUMMER 2021**
**ALL LINES I/S**

	DIRECT TIE	NYISO FACILITY	PJM FACILITY	DIRECT TIE	NYISO FACILITY	PJM FACILITY
	B&C PARs In-Service			B&C PARs Out-Of-Service		
	Normal					
<b>NORMAL</b>	1425 (1)	2200 (2) <sub>3</sub>	1800 (3)	1250 (1)	2025 (2) <sub>3</sub>	1600 (3)
<b>3-115-O/S</b>	2275 (4)	2900 (2) <sub>3</sub>	3300 (5)	2025 (4)	2650 (2) <sub>3</sub>	3025 (5)
<b>EMERGENCY</b>	1725 (8)	2550 (6) <sub>3</sub>	2075 (7)	1525 (8)	2375 (6) <sub>3</sub>	1875 (7)
<b>3-115-O/S</b>	2450 (9)	3275 (6) <sub>3</sub>	3300 (5)	2175 (9)	3050 (6) <sub>3</sub>	3025 (5)
	LIMITING ELEMENT		RATING		LIMITING CONTINGENCY	
(1)	North Waverly – East Sayre (956) 115 kV		@STE 143 MW	L/O	Hillside – East Towanda (70) 230 kV Hillside – Watercure (69) 230 kV Hillside 230/115 kV Transformer	
(2)	North Waverly – Lounsberry 115 kV		@STE 143 MW	L/O	Watercure – Oakdale (31) 345 kV Clarks Corners – Oakdale (36) 345kV	
(3)	Towanda – East Sayre 115 kV		@STE 237 MW	L/O	Hillside – East Towanda (70) 230 kV Hillside – Watercure (69) 230 kV Hillside 230/115 kV Transformer	
(4)	Hillside – East Towanda (70) 230 kV		@LTE 549 MW	L/O	Canyon – East Towanda 230 kV North Meshoppen – Canyon 230 kV North Meshoppen 230/115 kV Transformer	
(5)	Everett Drive – Mainesburg 115 kV		@STE 276 MW	L/O	Hillside – East Towanda (70) 230 kV	
(6)	North Waverly – Lounsberry 115 kV		@STE 143 MW	L/O	Watercure – Oakdale (31) 345 kV	
(7)	Towanda – East Sayre 115 kV		@STE 237 MW	L/O	Hillside – East Towanda (70) 230 kV	
(8)	North Waverly – East Sayre (956) 115 kV		@STE 143 MW	L/O	Hillside – East Towanda (70) 230 kV	
(9)	Hillside – East Towanda (70) 230 kV		@NORM 630 MW		Pre-Contingency Loading	

**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 - SUMMER 2021**
**ALL LINES I/S**

	<b>DIRECT TIE</b>	<b>NYISO FACILITY</b>	<b>IESO FACILITY</b>
<b>NORMAL</b>	1950 (1)	2600 (3) <sub>2</sub>	3025 (4)
<b>EMERGENCY</b>	2350 (2)	2625 (5) <sub>2</sub>	3875 (6)

<b>LIMITING ELEMENT</b>		<b>RATING</b>			<b>LIMITING CONTINGENCY</b>
(1)	Beck – Niagara (PA27) 230 kV	@LTE	460 MW	L/O	Beck – Niagara (PA301) 345 kV
(2)	Beck – Niagara (PA27) 230 kV	@STE	558 MW	L/O	Beck – Niagara (PA301) 345 kV
(3)	Hinman – Harris Radiator (908) 115 kV	@STE	306 MW	L/O	Robinson Road – Stolle Road (65) 230 kV Stolle Road – High Sheldon (67) 230 kV Gardenville – Stolle Road (66) 230 kV
(4)	Beck – Neale (J25) 220 kV	@LTE	415 MW	L/O	Beck – Hannon (Q24HM) 220 kV Beck – Neale (Q23BM) 220 kV
(5)	Hinman – Harris Radiator (908) 115 kV	@STE	306 MW	L/O	Robinson Road – Stolle Road (65) 230 kV
(6)	Allanburg – Mount Hope (Q30) 220 kV	@NORM	320 MW		Pre-Contingency Loading

**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.

**TABLE 5 – NYISO to IESO INTERFACE THERMAL TRANSFER LIMITS – SUMMER 2021**  
**ALL LINES I/S**

	<b>DIRECT TIE</b>	<b>NYISO FACILITY</b>	<b>IESO FACILITY<sub>1</sub></b>
<b>NORMAL</b>	1700 (1)		1325 (2)
<b>EMERGENCY</b>	2100 (3)		1750 (4)

	<b>LIMITING ELEMENT</b>	<b>RATING</b>	<b>LIMITING CONTINGENCY</b>
(1)	Beck – Niagara (PA27) 230 kV	@LTE 460 MW L/O	Beck – Niagara (PA301) 345 kV Beck GS15 13.8 kV
(2)	Beck – Hannon (Q24HM) 220 kV	@LTE 480 MW L/O	Middleport – Beach - Carluke (Q25BM) 220 kV Beck – Middleport – Beach (Q29HM) 220 kV
(3)	Beck – Niagara (PA27) 230 kV	@NORM 400 MW	Pre-Contingency Loading
(4)	Beck – Hannon (Q24HM) 220 kV	@NORM 403 MW	Pre-Contingency Loading

**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.