NYISO Operating Study Winter 2018-19

A Report by the
New York Independent System Operator

November 2018

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Executive Summary

This study is conducted as a seasonal review of the projected thermal transfer capability for the winter 2018-19 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 2018-19 to winter 2017-18 are shown on page 10. Internal interfaces have changed due to network alterations in the New York Control Area (NYCA) and modeling assumptions. The Dysinger-East limit decreased by 400 MW, mainly due to the modeling of Dunkirk – South Ripley (68) 230 kV, Warren – Falconer (171) 115 kV and Andover – Palmeter (932) 115 kV lines in-service. The Total-East limit decreased by 500 MW, mainly due to redistribution of flows in the Hudson area due to modeling of CPV Valley generations. The Central East limit increased by 175 MW, mainly due to modeling of JMC Selkirk units and Marcy South Series compensation out-of-service. The UPNY-ConEd limit decreased by 400 MW, mainly due to redistribution of flows in the Hudson area due to modeling of CPV generation in service and Marcy South Series compensation out-of-service. The Dunwoodie south limit increased by 150 MW, mainly due to modeling of E13th-Farragut (48) 345 kV, and E13th Street 345/138 kV transformers 10 and 11 out-of-service. These circuits are scheduled to be out-of-service for maintenance during winter 2018-19 period. Differences in the evaluated external interface limits from winter 2018-19 to winter 2017-18 are shown on page 14. External interfaces have changed due to network alterations in the New York Control Area (NYCA) and modeling assumptions. New York to PJM transfer limit increased by 75 MW due to the modeling of the Dunkirk – South Ripley (68) 230 kV line in-service. New York to New England transfer limit increased by 175 MW. This is mainly due to modeling of generation dispatch at New England's two pumped storage generations stations and two new generators in Connecticut.

INTRODUCTION

The following report, prepared by the Operating Studies Task Force (OSTF) at the direction and guidance of the System Operations Advisory Subcommittee (SOAS), highlights the thermal analysis evaluation for the winter 2018-19 capability period. This analysis indicates that, for the winter 2018-19 capability period, the New York interconnected bulk power system can be operated reliably in accordance with the New York State Reliability Council (NYSRC) Reliability Rules for Planning and Operating the New York State Power System and the NYISO System Operating Procedures.

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 used to develop 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 addresses the contingencies to be evaluated and the performance requirements to be applied. Rule C.1 also incorporates the NYISO Stability Limit Guideline – Refer to 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
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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 2018-19 coincident peak load of 24,269 MW. The other NPCC Balancing Areas and adjacent Regional representations were obtained from the RFC-NPCC winter 2018-19 Reliability Assessment power flow base case and has been updated to reflect the winter 2018-19 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 2017-18 capability period:

Deactivations	
Ravenswood GT9	-25 MW
Ravenswood GTs	-300 MW
Selkirk I&II	-446 MW
Cayuga 2	-150 MW
Total Retirements	**-921 MW**
Additions	
Arthur Kill Cogen	11 MW
Shoreham Solar	25 MW
Bethlehem EC (Uprate)	72 MW
Arkwright Summit Wind	78 MW
Copenhagen wind	80 MW
Bayonne EC II	132 MW
CPV Valley	820 MW
Total Additions	**1218 MW**

Transmission Facilities Changes

Significant facility changes since the winter 2017-18 capability period include:

- Modeling the Dunkirk – South Ripley (68) 230 kV line in-service
- Modeling the Warren – Falconer (171) 115 kV line in-service
- Modeling the Farragut – East 13th Street (45) 345 kV line in-service
- Modeling the West 49th Street – East 13th Street (M54) 345 kV line in-service

- Modeling the East 13th Street 345/138 kV transformers 14 and 15 in-service
- Modeling the Moses – Reynolds (MR3) 115 kV line out-of-service
- Modeling the St. Lawrence – Moses (l33P)230 kV out-of-service
- Modeling the Astoria Annex – E13th Street (Q35M) 345 kV out-of-service
- Modeling the E13th Street – Farragut (48) 345 kV out-of-service
- Modeling the East 13th Street 345/138 kV transformers 10 and 11 out-of-service
- Modeling the Wood Street – Pleasantville (Y87) 345 kV out-of-service
- Modeling the Gowanus – Greenwood (42231) 138 kV PAR out-of-service
- Modeling the Gowanus 138A/138B PAR out-of-service
- Modeling the Rainey – Farragut (61) 345 kV out-of-service
- Addition of the South Perry 230 kV substation

South Perry is being added on the 230 kV Wethersfield – Meyer (85/87) line.

System Representation

The Siemens PTI PSS™MUST and PSS™E software packages were used to calculate the thermal limits based on Normal and Emergency Transfer Criteria defined in the NYSRC Reliability Rules. The thermal transfer limits presented have been determined for all transmission facilities scheduled in service during the winter 2018-19 period.

The schedules used in the base case power flow for this analysis assumed a net flow of 400 MW from Public Service Electric & Gas (PSE&G) to Consolidated Edison via the PAR transformers controlling the Hudson – Farragut and Linden – Goethals interconnections, and 400 MW on the South Mahwah – Waldwick circuits from Consolidated Edison to PSE&G, controlled by the PARs at Waldwick. The Hopatcong – Ramapo 500 kV (5018) circuit is scheduled in accordance with the "TCC Market PJM -NYISO Interconnection Scheduling Protocol", August 8th, 2017. For the winter 2018-19 base case, the schedule for the tie is 225 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 2018-19, and the MMWG winter 2018-19 power flow base cases. 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), 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 cables are out-of-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.

DISCUSSION

Resource Assessment

Load and Capacity Assessment

The forecast peak demand for the winter 2018-19 capability period is 24,269 MW[1]. This forecast is approximately 4 MW (0.016%) higher than the forecast of 24,265 MW for the winter 2017-18 capability period, and 1,469 MW (5.70%) lower than the all-time New York Control Area (NYCA) seasonal peak of 25,738 MW, which occurred on January 07, 2014.

The Installed Capacity (ICAP) requirement for the winter period is 28,681 MW based on the NYSRC 18.2% Installed Reserve Margin (IRM) requirement for the 2018 Capability Year. NYCA generation capacity for winter 2018-19 is 41,539 MW, and net external capacity purchases of 1,519 MW have been secured for the winter period. The combined capacity resources represent an 77.42% margin above the forecast peak demand of 24,269 MW. These values were taken from the 2018 Load & Capacity Data report produced by the NYISO, located at:

http://www.nyiso.com/public/webdocs/markets_operations/services/planning/Documents_and_Resources/Planning_Data_and_Reference_Docs/Data_and_Reference_Docs/2018-Load-Capacity-Data-Report-Gold-Book.pdf

The equivalent forced outage rate is 4.9%, and includes forced outages and de-ratings based on historical performance of all generation in the NYCA. For winter 2017-18, the equivalent forced outage rate assumed was 4.83%.

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 2018-19. Normal and emergency thermal limits were calculated according to Normal and Emergency Transfer Criteria

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

definitions in the NYSRC Reliability Rules. 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 2018-19 thermal transfer limits to winter 2017-18 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, or changes in circuit ratings, or line status. Appendix H presents a summary comparison of Cross-State thermal transfer limits between winter 2018-19 and 2017-18, with limiting element/contingency descriptions. Significant differences in these thermal transfer limits are discussed below.

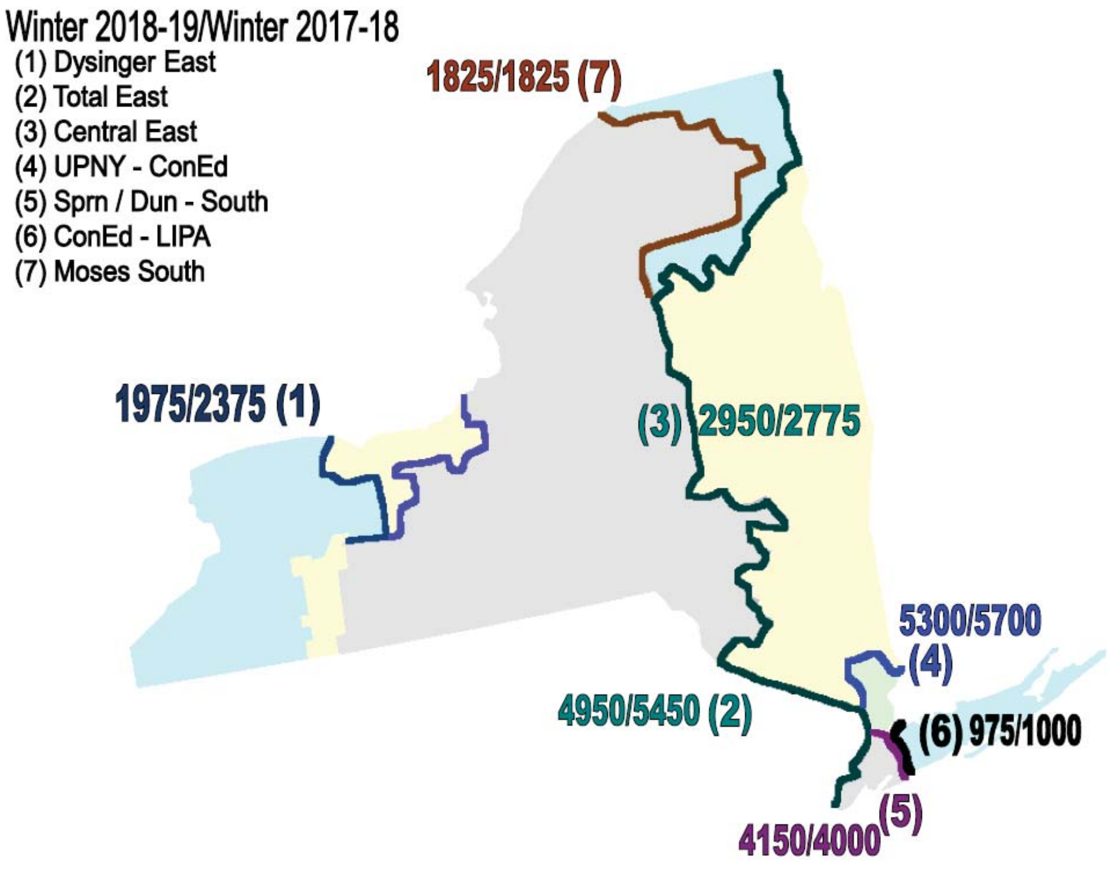

Figure 1 – Cross-State Thermal Transfer Limits

Dysinger East interface thermal transfer limit decreased by 400 MW. This is mainly due to the modeling of Dunkirk – South Ripley (68) 230 kV, Warren – Falconer (171) 115 kV lines and Andover – Palmeter (932) 115 kV in-service.

Total East interface thermal transfer limit decreased by 500 MW. This is mainly due modeling of CPV generation in service at 675 MW.

Central East interface thermal transfer limit increased by 175 MW. This is mainly due to modeling of JMC Selkirk units and Marcy South Series compensation out-of-service.

UPNY-ConEd interface thermal transfer limit has decreased by 400MW. This is mainly due to redistribution of flows in the Hudson area due to modeling of CPV generation in service and Marcy South Series compensation out-of-service.

Sprain Brook – Dunwoodie South interface thermal transfer limit has increased by 150MW. This is mainly due to modeling of E13th-Farragut (48) 345 kV, E13th Street 345/138 kV transformers 10 and 11 out-of-service. These circuits are scheduled to be out-of-service for maintenance during winter 2018-19 period.

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.

Sensitivity Testing

The thermal limits presented in Section 6 were determined using the base conditions and schedules. The effects of various intra- and inter-Area transfers or generation patterns in the system are presented in Appendix G. Certain graphs indicate that there may not be a measurable sensitivity to the specific variable condition (winter peak load), or the sensitivity may occur at transfer levels above other transfer constraints (e.g., voltage or transient stability limitations). This analysis demonstrates how the particular constraint (thermal transfer limits) may respond to different conditions.

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	115 MW
Jamaica – Valley Stream 138 kV	-100 MW	120 MW
Sprain Brook – E. Garden City 345 kV	693 MW	693 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 for 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 235 MW of emergency transfer from Con Edison to Long Island, if requested, via the ties.

LIPA to ConEd emergency assistance

LIPA anticipated 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, NNC and 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 Section 6 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 at:

http://www.nyiso.com/public/markets_operations/market_data/reports_info/index.jsp

Thermal Transfer Capabilities with Adjacent Balancing Areas

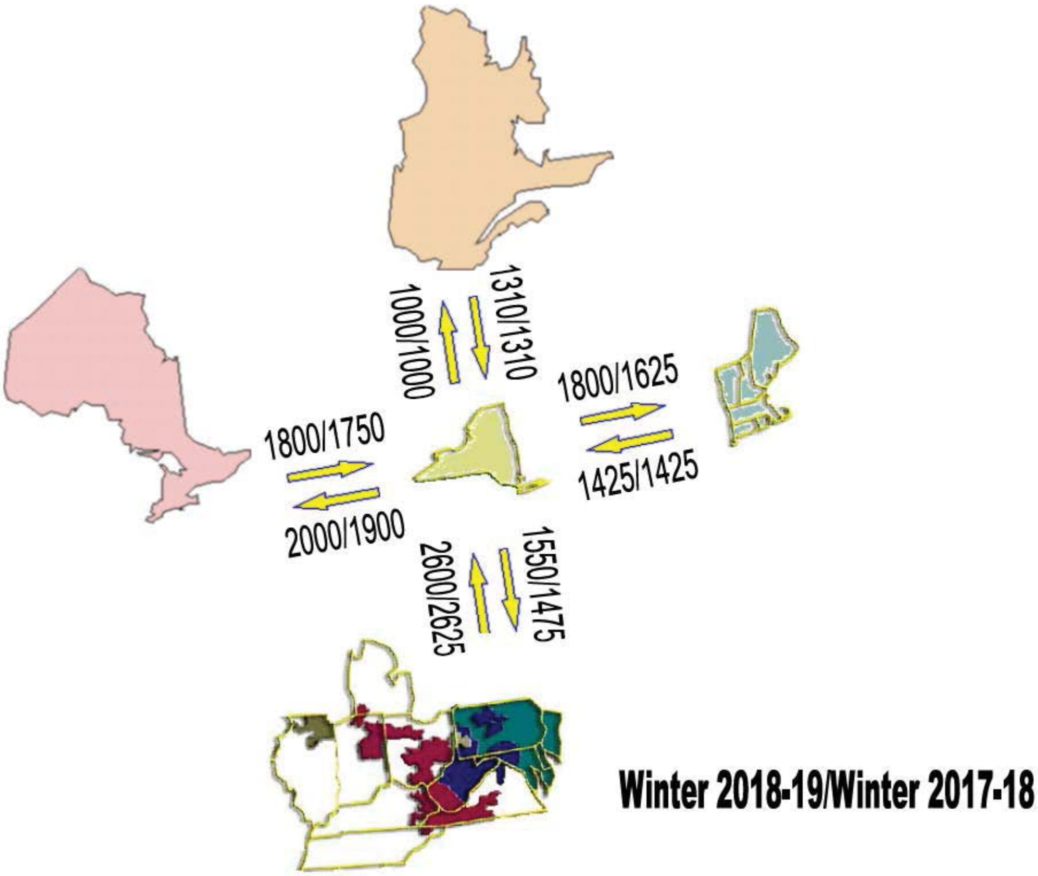

Figure 2 – Inter-Area Thermal Transfer Capabilities[2]

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.

[2] TE-NY transfer capabilities shown in Figure 2 are not thermal transfer limits; for more information see Section 5.3.D

New York – PJM interface thermal transfer limit increased by 75 MW. This is mainly due to the modeling of the Dunkirk – South Ripley (68) 230 kV line in-service.

New York – New England interface thermal transfer limit increased by 175 MW. This is mainly due to modeling of generation dispatch at New England's two pumped storage generations stations and two new generators in Connecticut.

New York – New England Analysis

New England Transmission/Capacity Additions

Transmission

For the winter 2018-19 study period, there are no major projects coming into service that will significantly impact the New York – New England transmission capability. Notable transmission upgrades that have been completed or will be complete by January 2019 include commissioning of the ring bus configuration at Pootatuck 115 kV substation and reconductoring of the 8809A&B 115 kV transmission lines. These transmission improvements are associated with the ongoing Southwest Connecticut (SWCT) transmission project.

The Pootatuck 115 kV substation located west of New Haven, Connecticut provides additional 115 kV transmission infrastructure comprised of four 115 kV transmission lines. The substation entered its final state on 09/29/2018. The completion of the Pootatuck substation did not impact the New York – New England transmission capability.

Capacity

In the New England Control Area, from December 2018 through March 2019, one major generation addition is anticipated. West Medway Jets 4 & 5 (WMJ4&5) each exhibit a combustion turbine natural gas configuration interconnecting into the Medway 115 kV substation located in Medway, MA. These generators each have an anticipated capacity of 100 MW or 200 MW total. Approximately 100 MW of solar photovoltaic alternative energy resources are also anticipated to become commercial by the end of March 2019. Additional alternative energy resources include 22 MW of hydro, 20 MW of wind, and 9 MW of biomass generation. There are no significant generator retirements anticipated from December 2018 through March 2019.

Thermal Transfer Limit Analysis

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

Cross-Sound Cable

The Cross-Sound Cable 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 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 operate the Smithfield - Salisbury 69 kV (FV/690) line normally 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 a phase angle-regulating (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. Exhibits in Appendix G graphically demonstrate the optimization of transfer capability by regulating the flow on the Northport-Norwalk Harbor tie.

Whitehall – Blissville 115 kV

The phase angle regulating transformer on the K7 line at the VELCO Blissville substation will control pre-contingency flow between the respective stations. VELCO, National Grid, ISO-NE and NYISO developed a joint operating procedure. 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.

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

The phase angle regulating 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 New York - PJM interface are summarized in Section 6, Table 3. The phase angle regulating transformers controlling the Hopatcong – Ramapo 5018 500 kV circuit are used to maintain flow at the normal rating of the Ramapo 500/345 kV transformer.

Dunkirk-South Ripley (68) 230 kV Tie

The NYISO and PJM have developed an operating document that allows operation of the Dunkirk-South Ripley line to maintain reliability in both the PJM and NYISO systems. Dunkirk-South Ripley 68 230 kV line is modeled as a closed facility for winter 2018-19.

As part of the Lackawanna Energy Center generation interconnection interregional study, NYISO planning group has requested a series reactor to be installed at Erie East on the Erie East-South Ripley 230 kV in order to allow the plant to reach a full output. NYISO and PJM expect that the Dunkirk-South Ripley-Erie East path will be returned back to service once the Erie East series reactor is in-service. The Erie East reactor installation activities are currently scheduled to be completed December 7th 2018.

Oxbow-North Meshoppen 230 kV line re-build

Oxbow-North Meshoppen 230 kV line will be out-of-service from October 15, 2018 until May 17, 2019, resulting in heavy loading on the East Towanda-Hillside 230 kV tie line. Winter 2018-19 study has identified both actual and contingency overload on the East Towanda-Hillside 230 kV for loss of East Towanda- Scotch Hollow-Grover-Marshall 230 kV line. There are market to market agreements in place that could be used to alleviate this constraint, but some modifications to the existing rules are needed to address the East Towanda-Hillside 230 kV tie line. The NYISO and PJM have requested a temporary waiver to the NYISO/PJM Joint Operating Agreement ("JOA") from FERC to allow PJM to re-dispatch to secure the East Towanda-Hillside line while NYISO and PJM pursue improvements to their JOA to address the identified concern.

Opening of PJM - New York 115 kV Ties as Required

The normal criteria thermal transfer limits presented in Section 6 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 an 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. 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 systems within New York. 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 at full capability, 660 MW, for winter 2018-19. Neptune DC tie is a transmission facility connecting Raritan River 230 kV (First Energy East, PJM) to Duffy Avenue 345 kV (LIPA, NYISO). Back to Back AC-DC-AC Hudson Transmission Project (HTP) tie is expected to be available at full capability, 660 MW, for winter 2018-19. HTP is a transmission tie connecting Bergen 230 kV (PSEG, PJM) to the West 49th street station at (ConEd, NYISO).

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 2018-19, Linden VFT will have 330 MW non-firm withdrawal right and 300 MW firm injection rights into PJM market. Linden VFT is modeled as injecting 315 MW into NYSIO for the winter 2018-19 study.

Elimination of ConEdison – PJM Wheel and Implementation of 400 MW Operational Base Flow

As of May 1st, 2017 a new protocol has been implemented to set desired flow on the Hopatcong-Ramapo (5018) 500 kV, Ramapo-Waldwick K and J 345 kV, Linden-Goethals A 230 kV, Marion-Farragut C 345 kV and Hudson-Farragut B 345 kV lines, based on the scheduled PJM-NYSIO AC interchange and RECO load. The change was implemented due to ConEd request to terminate non-confirming wheeling service that has been historically modeled as a fixed 1,000 MW flow from NYSIO to PJM over the JK interface and from PJM to NYSIO over the ABC interface.

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 Ontario – New York ties at St. Lawrence, L33P and L34P, were controlling to 0 MW in all four scenarios. The interconnection flow limit across these ties is 300 MW, as presented in Table 4.3 "Interconnection Flow Limits" from the document "Ontario Transmission System" available at:

http://www.ieso.ca/-/media/files/ieso/document-library/planning-forecasts/18-month-outlook/onttxsystem_2017jun.pdf

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:

http://www.nyiso.com/public/webdocs/market_data/reports_info/operating_studies/NOH-1/NYPP-OH_1993.PDF

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 1500 MW. The import capability from New York can be increased by decreasing generation in the Ontario Niagara zone, 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 limited to 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 Line has a nominal north to south capacity of 199 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 LIMITS

- Table 1.a
    a. Dysinger East
    b. UPNY – ConEd
    c. Sprain Brook – Dunwoodie So.
    d. 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

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

- Northport-Norwalk Flow Sensitivity

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

- Dunkirk-South Ripley (68) 230 kV I/S and O/S
- 115 kV NY-PJM Ties I/S and O/S

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

- Dunkirk-South Ripley (68) 230 kV I/S and O/S
- 115 kV NY-PJM Ties I/S and O/S

Table 4 – IESO to NYISO INTERFACE THERMAL TRANSFER LIMITS

- Dunkirk-South Ripley (68) 230 kV I/S and O/S

Table 5 – NYISO to IESO INTERFACE THERMAL TRANSFER LIMITS

- Dunkirk-South Ripley (68) 230 kV I/S and O/S

TABLE 1.a – NYISO CROSS-STATE INTERFACE THERMAL TRANSFER LIMITS - WINTER 2018-19

ALL LINES I/S

	Dysinger East	UPNY - ConEd[1]	Sprain Brook Dunwoodie - So.	ConEd – LIPA Transfer Capability
NORMAL	1975 (1)	5300 (3)	4150 (5)	975 (7)
EMERGENCY	2700 (2)	5375 (4)	4350 (6)	1650 (8)

	LIMITING ELEMENT	RATING			LIMITING CONTINGENCY
(1)	Niagara – Packard (61) 230 kV	@STE[4]	949 MW	L/O	Niagara – Packard (62) 230 kV Beck – Packard (BP76) 230 kV
(2)	Niagara 230/115 kV Transformer	@STE	288 MW	L/O	Niagara – Robinson Rd. (64) 230 kV
(3)	Leeds – Pleasant Valley (92) 345 kV	@LTE	1783 MW	L/O	Athens – Pleasant Valley (91) 345 kV
(4)	Coopers Corner –Middletown Tap (CCRT34) 345 kV	@STE	1793 MW	L/O	Rock Tavern – Dolson Ave. (DART-44) 345 kV
(5)	Dunwoodie – Mott Haven (71) 345 kV	@MTE[2]	1083 MW	L/O	Dunwoodie – Mott Haven (72) 345 kV
(6)	Dunwoodie – Mott Haven (71) 345 kV	@NORM	741 MW		Pre-Contingency Loading
(7)	Dunwoodie – Shore Rd. (Y50) 345 kV	@LTE	977 MW[3]	L/O	(SB RNS2 @ Sprain Brook 345 kV) Sprain Brook – East Garden City (Y49) 345 kV Sprain Brook – Academy (M29) 345 kV
(8)	Dunwoodie – Shore Rd. (Y50) 345 kV	@NORM	741 MW[3]		Pre-Contingency Loading

Note

1: See Section 5.2.B 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 - WINTER 2018-19

ALL LINES I/S

	MSC-7040 FLOW HQ->NY 600 MW	MSC-7040 FLOW 0 MW	MSC-7040 FLOW NY->HQ 600 MW
CENTRAL EAST			
NORMAL	2950 (1)	2950 (1)	2925 (1)
EMERGENCY	3325 (2)	3300 (2)	3275 (2)
TOTAL EAST			
NORMAL	4975 (3)	4950 (3)	4925 (3)
EMERGENCY	4975 (4)	4950 (4)	4925 (4)
MOSES SOUTH[1,2]			
NORMAL	2275 (8)	1825 (5)	1100 (9)
EMERGENCY	3100 (6)	2525 (7)	1800 (7)

	LIMITING ELEMENT	RATING			LIMITING CONTINGENCY
(1)	New Scotland - Leeds (93) 345 kV	@LTE	1692 MW	L/O	New Scotland - Leeds (94) 345 kV
(2)	New Scotland - Leeds (93) 345 kV	@STE	1912 MW	L/O	New Scotland - Leeds (94) 345 kV
(3)	Coopers Corners – Middletown TAP (CMT34) 345 kV	@LTE	1793 MW	L/O	Rock Tavern – Dolson Ave. (DART-44) 345 kV
(4)	Coopers Corners – Middletown TAP (CMT34) 345 kV	@STE	1793 MW	L/O	Rock Tavern – Dolson Ave. (DART-44) 345 kV
(5)	Adirondack – Porter (AP12) 230 kV	@LTE	478 MW	L/O	Moses–Massena (MMS-1) 230 kV Moses–Massena (MMS-2) 230 kV
(6)	Browns Falls – Taylorville (4) 115 kV	@STE	152 MW	L/O	Browns Falls – Taylorville (3) 115 kV
(7)	Moses–Massena (MMS-1) 230 kV	@LTE	1593 MW	L/O	Moses–Massena (MMS-2) 230 kV
(8)	Adirondack – Porter (AP12) 230 kV	@LTE	478 MW	L/O	Chateauguay–Massena (MSC-7040) 765 kV Massena – Marcy (MSU1) 765 kV and TransÉnergie delivery
(9)	Moses – St_Lawrence_L34P 230 kV	@LTE	490 MW	L/O	Chateauguay–Massena (MSC-7040) 765 kV Massena – Marcy (MSU1) 765 kV and TransÉnergie delivery

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 - WINTER 2018-19 ALL LINES I/S

New York to New England	DIRECT TIE	NYISO FACILITY	ISO-NE FACILITY
		Northport –Norwalk 100 MW	
NORMAL	1825 (1)	2750 (3)	3025 (6)
EMERGENCY	2200 (2)	3525 (4)	3025 (6)
		Northport –Norwalk 0 MW	
NORMAL	1800 (1)	2775 (3)	3050 (6)
EMERGENCY	2350 (5)	3550 (4)	3050 (6)

	LIMITING ELEMENT	RATING			LIMITING CONTINGENCY
(1)	Pleasant Valley – Long Mountain (398) 345 kV	@LTE	1549 MW	L/O	Alps – Berkshire (393) 345 kV Berkshire – Northfield Mount (312) 345 kV Northfield Mount – Vernon (381) 345 kV Berkshire 345/115 kV Transformer
(2)	Northport – Norwalk Harbor (NNC) 138 kV	@STE	569 MW	L/O	Pleasant Valley – Long Mountain (398) 345 kV
(3)	Alps-N.Scotland (2) 345kV	@LTE	1410 MW	L/O	Pleasant Valley – Long Mountain (398) 345 kV
(4)	Alps-N.Scotland (2) 345kV	@STE	1792 MW	L/O	Pleasant Valley – Long Mountain (398) 345 kV
(5)	Pleasant Valley – Long Mountain (398) 345 kV	@STE	1796 MW	L/O	Millstone G3 24.0 kV
(6)	Norwalk Junction – Archers Lane (3403D) 345 kV	@LTE	922 MW	L/O	Long Mountain – Frost Bridge (352) 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

TABLE 2.b – ISO-NE to NYISO INTERFACE THERMAL LIMITS - WINTER 2017-18 ALL LINES I/S

New England to New York	DIRECT TIE	NYISO FACILITY	ISO-NE FACILITY
		Norwalk –Northport @ 0 MW	
NORMAL	1975 (1)		1475 (4)
EMERGENCY	2250 (2)		1475 (4)
		Norwalk –Northport @ 100 MW	
NORMAL	1975 (3)		1500 (4)
EMERGENCY	1975 (2)		1500 (4)
		Norwalk–Northport @ 200 MW	
NORMAL	1425 (3)		1500 (4)
EMERGENCY	1425 (2)		1500 (4)

	LIMITING ELEMENT	RATING			LIMITING CONTINGENCY
(1)	Pleasant Valley – Long Mountain (398) 345 kV	@LTE	1549 MW	L/O	Alps – Berkshire (393) 345 kV Berkshire – Northfield Mount (312) 345 kV Northfield Mount – Vernon (381) 345 kV Berkshire 345/115 kV Transformer
(2)	Northport – Norwalk Harbor (NNC) 138 kV	@STE	569 MW	L/O	Pleasant Valley – Long Mountain (398) 345 kV
(3)	Northport – Norwalk Harbor (NNC) 138 kV	@LTE	518 MW	L/O	Pleasant Valley – Long Mountain (398) 345 kV Pleasant Valley – East Fishkill (F37) 345 kV
(4)	Norwalk Junction – Archers Lane (3403D) 345 kV	@LTE	922 MW	L/O	Long Mountain – Frost Bridge (352) 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

TABLE 3.a – NYISO to PJM INTERFACE THERMAL TRANSFER LIMITS - WINTER 2018-19 ALL LINES I/S

	DIRECT TIE	NYISO FACILITY		PJM FACILITY[1]
Dunkirk – South Ripley (68) 230 kV Out-of-service				
NORMAL	1200(1)	2775(5)[3]	1600(4)[4]	2025(12)
3-115kV OS	2525(8)	2750(7)[3]	1575(4)[4]	2050(14)
EMERGENCY	1200(1)	3450(2)[3]	1625(6)[4]	2025(13)
3-115kV OS	2650(3)	3100(2)[3]	1625(6)[4]	2100(13)
Dunkirk-South Ripley (68) 230 kV In-Service				
NORMAL	1525(1)	2450(10)[3]	1350(11)[4]	2350(15)
3-115kV OS	2700(8)	2525(5)[3]	1550(11)[4]	2050(14)
EMERGENCY	1525(1)	3225(17)[3]	1650(6)[4]	2425(16)
3-115kV OS	2825(3)	3250(18)[3]	1650(6)[4]	2125(13)

	LIMITING ELEMENT	RATING			LIMITING CONTINGENCY
(1)	Falconer – Warren (171) 115 kV	@STE	141 MW	L/O	Pierce brook 345/230 kV Transformer
(2)	Oakdale – Watercure (31) 345 kV	@STE	1076 MW	L/O	Five Mile – Pierce Brook (37) 345 kV
(3)	Mainesburg – Watercure (30) 345 kV	@STE	927 MW	L/O	Hillside – East Towanda (70) 230 kV
(4)	Montor Falls – Coddington Road (982) 115kV	@STE	162 MW	L/O	Oakdale – Watercure (31) 345 kV Clarks Corners – Oakdale (36) 345 kV
(5)	Packard – Sawyer (77) 230 kV	@LTE	747 MW	L/O	Packard – Sawyer (78) 230 kV Niagara – Packard (61) 230 kV Packard 230/115 kV Transformer
(6)	Montor Falls – Coddington Road (982) 115kV	@STE	162 MW	L/O	Clarks Corners – Oakdale (36) 345 kV
(7)	Clarks Corners – Oakdale (36) 345 kV	@LTE	1410 MW	L/O	Fraser – Coopers Corners (33) 345 kV Marcy – Coopers Corners (UCC2-41) 345 kV
(8)	Hillside – East Towanda (70) 230 kV	@LTE	564 MW	L/O	Mainesburg – Watercure (30) 345 kV
(9)	Towanda – North Meshoppen 115 kV	@STE	172 MW	L/O	Canyon – East Towanda 230 kV
(10)	Packard – Sawyer (77) 230 kV	@LTE	747 MW	L/O	Packard – Sawyer (78) 230 kV
(11)	Gardenville – Cloverbank (142) 115 kV	@STE	123MW	L/O	Gardenville – Dunkirk (73) 230 kV Gardenville – Dunkirk (74) 230 kV
(12)	Shade GP – Roxbury (26) 115 kV	@STE	160 MW	L/O	Lewistown – Juniata (2015) 230 kV Lewistown – Raytown (2027) 230 kV Lewistown 230/115 kV Transformer
(13)	Shade GP – Roxbury (26) 115 kV	@STE	160 MW	L/O	Lewistown – Juniata (2015) 230 kV
(14)	Shade GP – Roxbury (26) 115 kV	@STE	160 MW	L/O	Lewistown – Juniata (2015) 230 kV Juniata 500/230 kV Transformer

(15)	Lewistown – Raytown (2027) 230 kV	@STE	225 MW	L/O	Lewistown – Juniata (2015) 230 kV Juniata 500/230 kV Transformer
(16)	Lewistown – Raytown (2027) 230 kV	@STE	225 MW	L/O	Lewistown – Juniata (2015) 230 kV
(17)	Packard – Sawyer (77) 230 kV	@STE	836 MW	L/O	Packard – Sawyer (78) 230 kV
(18)	Oakdale – Watercure (71) 230 kV	@STE	440 MW	L/O	Oakdale – Watercure (31) 345 kV

NOTE

1: Emergency Transfer Capability Limits may have required line outages as described in Section 5.3.B.
2: PAR schedules have been adjusted in the direction of transfer.
3: Internal Secured Limit: Limit to secure internal transmission elements that are secured with pricing in the NYISO markets (typically 230 kV and above)
4: 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 2018-19 ALL LINES I/S

	DIRECT TIE	NYISO FACILITY		PJM FACILITY[1]
Dunkirk-South Ripley (68) 230 kV Out-of-Service				
NORMAL	1700(1)	3475(3) [3]	2925(6) [4]	2200(9)
3-115kV OS	2550(7)	3150(3) [3]	3175(14) [4]	2875(11)
EMERGENCY	1850(2)	3625(13) [3]	3175(5) [4]	2225(10)
3-115kV OS	2900(15)	3375(4) [3]	3175(12) [4]	2875(11)
Dunkirk-South Ripley (68) 230 kV In-Service				
NORMAL	1650 (1)	3525 (3) [3]	2950 (6) [4]	2025 (9)
3-115kV OS	2600 (7)	3175 (3) [3]	3200 (12) [4]	2925 (11)
EMERGENCY	1825 (2)	3700 (13) [3]	3200 (5) [4]	2225 (10)
3-115kV OS	2950 (15)	3425 (4) [3]	3200(12) [4]	2925(11)

	LIMITING ELEMENT	RATING			LIMITING CONTINGENCY
(1)	North Waverly – East Sayre 115 kV	@STE	147 MW	L/O	Hillside – East Towanda (70) 230 kV Hillside – Watercure (69) 230 kV Hillside 230/115 kV Transformer
(2)	North Waverly – East Sayre 115 kV	@STE	147 MW	L/O	Hillside – East Towanda (70) 230 kV
(3)	Watercure – Oakdale (71) 230 kV	@LTE	435 MW	L/O	Watercure – Oakdale (31) 345 kV Oakdale – Clarks Corner (36) 345 kV
(4)	Watercure – Oakdale (71) 230 kV	@STE	440 MW	L/O	Watercure – Oakdale (31) 345 kV
(5)	North Waverly – Lounsberry 115 kV	@STE	167 MW	L/O	Watercure – Oakdale (31) 345 kV
(6)	North Waverly – Lounsberry 115 kV	@STE	167 MW	L/O	Watercure – Oakdale (31) 345 kV Oakdale – Clarks Corner (36) 345 kV
(7)	Hillside – East Towanda (70) 230 kV	@LTE	564 MW	L/O	Watercure – Mainesburg (30) 345 kV
(8)	Hillside – East Towanda (70) 230 kV	@STE	670 MW	L/O	Watercure – Mainesburg (30) 345 kV
(9)	Towanda – East Sayre 115 kV	@STE	226 MW	L/O	Hillside – East Towanda (70) 230 kV Hillside – Watercure (69) 230 kV Hillside 230/115 kV Transformer
(10)	Towanda – East Sayre 115 kV	@STE	131 MW	L/O	Hillside – East Towanda (70) 230 kV
(11)	Everett Drive – Mainesburg 115 kV	@STE	245 MW	L/O	Hillside – East Towanda (70) 230 kV
(12)	Montor Falls – Coddington Road (982) 115kV	@STE	162 MW	L/O	Watercure – Oakdale (31) 345 kV
(13)	Watercure 345/230 kV Transformer	@STE	600 MW	L/O	Watercure – Oakdale (31) 345 kV

(14)	Montor Falls – Coddington Road (982) 115kV	@STE	162 MW	L/O	Watercure – Oakdale (31) 345 kV Oakdale 345/115 kV Transformer
(15)	Watercure – Mainesburg (30) 345 kV	@STE	927 MW	L/O	Hillside – East Towanda (70) 230 kV

NOTE

1: Emergency Transfer Capability Limits may have required line outages as described in Section 5.3.B.
2: PAR schedules have been adjusted in the direction of transfer.
3: Internal Secured Limit: Limit to secure internal transmission elements that are secured with pricing in the NYISO markets (typically 230 kV and above)
4: Internal Non-Secured Limit: Limit to secure internal transmission elements that are not secured with pricing in the NYISO markets (typically 115 kV)

TABLE 4 – IESO to NYISO INTERFACE THERMAL TRANSFER LIMITS - WINTER 2018-19 ALL LINES I/S

	DIRECT TIE	NYISO FACILITY			IESO FACILITY[1]
Dunkirk-South Ripley (68) 230 kV & Warren-Falconer (171) 115 kV Out-of-Service					
NORMAL	2300 (1)	1675(2) [2]	1800(3) [3]	2175(9) [4]	3150 (4)
EMERGENCY	2825(5)	3100(6) [2]	2200(7) [4]	2200(7) [4]	3675(8)
Dunkirk-South Ripley (68) 230 kV & Warren-Falconer (171) 115 kV In-Service					
NORMAL	2275 (1)	1475(2) [2]	1750(3) [3]	2200(9) [4]	3150 (4)
EMERGENCY	2800 (5)	2750(6) [2]	2225(7) [4]	2225(7) [4]	3675 (8)

	LIMITING ELEMENT	RATING			LIMITING CONTINGENCY
(1)	Beck – Niagara (PA27) 230 kV	@LTE	540 MW	L/O	Beck – Niagara (PA 302) 345 kV
(2)	Niagara – Packard (61) 230 kV	@STE[1]	949 MW	L/O	Niagara – Packard (62) 230 kV Beck – Packard (BP76) 230 kV
(3)	Niagara 230/115 kV Transformer (T1)	@STE	288 MW	L/O	Packard – Sawyer (77) 230 kV Sawyer – Huntley (77) 230 kV Packard – Sawyer (78) 230 kV Sawyer – Huntley (78) 230 kV Sawyer 230/23 kV Transformers
(4)	Allanburg – Mount Hope (Q30M) 230 kV	@LTE	449 MW	L/O	Beck – Allanburg (Q35M) 230 kV Beck – Allanburg (Q26M) 230 kV
(5)	Beck – Niagara (PA27) 230 kV	@NORM	480 MW		Pre-Contingency Loading
(6)	Packard – Sawyer (77) 230 kV	@STE	836 MW	L/O	Packard – Sawyer (78) 230 kV
(7)	Hinman – Harris Radiator (908) 115kV	@STE	306 MW	L/O	Robinson Road – Stolle Road (65) 230 kV
(8)	Allanburg – Mount Hope (Q30M) 230 kV	@NORM	389 MW	L/O	Pre-Contingency Loading
(9)	Hinman – Harris Radiator (908) 115kV	@STE	306 MW	L/O	Robinson Road – Stolle Road (65) 230 kV Gardenville – Stolle Road (66) 230 kV Stolle Road – High Sheldon (67) 230 kV

Note

1: Ontario - NYISO limit used the NYSRC Rules Exception No. 13 – Post Contingency Flows on Niagara Project Facilities
2: Internal Secured Limit: Limit to secure internal transmission elements that are secured with pricing in the NYISO markets (typically 230 kV and above)
3: This constraint will be part of the 115 kV circuits that will be secured in the market in near future.
4: Internal Secured Limit: Limit to secure internal transmission elements that are secured with pricing in the NYISO markets (typically 230 kV and above)

TABLE 5 – NYISO to IESO INTERFACE THERMAL TRANSFER LIMITS – WINTER 2018-19 ALL LINES I/S

	DIRECT TIE	NYISO FACILITY	IESO FACILITY1
Dunkirk-South Ripley (68) 230 kV & Warren-Falconer (171) 115 kV Out-of-Service			
NORMAL	2025(1)		1350(2)
EMERGENCY	2675(3)		2000(4)
Dunkirk-South Ripley (68) 230 kV & Warren-Falconer (171) 115 kV In-Service			
NORMAL	2000(1)		1350(2)
EMERGENCY	2575(5)		2000(4)

	LIMITING ELEMENT	RATING			LIMITING CONTINGENCY
(1)	Beck – Niagara (PA27) 230 kV	@LTE	540 MW	L/O	Beck – Niagara (PA 301) 345 kV Beck – Allanburg (Q28A) 230 kV Beck #2 units 19 & 20 + Thorold GS
(2)	Beck – Hannon (Q29HM) 230 kV	@LTE	553 MW	L/O	Beck – Middleport – Carluke (Q25BM) 230 kV Beck – Middleport – Beach (Q29HM) 230 kV
(3)	Beck – Niagara (PA27) 230 kV	@STE	685 MW	L/O	Beck – Niagara (PA 302) 345 kV
(4)	Allanburg – Mount Hope (Q30M) 230 kV	@STE	449 MW		Beck – Hannon (Q29HM) 230 kV
(5)	Beck – Niagara (PA27) 230 kV	@NORM	480 MW	L/O	Pre-Contingency Loading

Note

1: This limit can be increased by reducing generation or increasing demand in the Niagara zone of Ontario. See Section 5.3.C.d. for discussion.