NEW YORK INDEPENDENT SYSTEM OPERATOR
10 Krey Boulevard ♦ Rensselaer, NY 12144

February 14, 2014

Honorable Kathleen H. Burgess
Secretary
State of New York Public Service Commission
Three Empire State Plaza, 19th Floor
Albany, New York 12223-1350

Subject:

Case 13-E-0488 - In the Matter of Alternating Current Transmission Upgrades – Comparative Proceeding.

Case 13-T-0454 - Application of North America Transmission.

Case 13-T-0455 - Application of NextEra Energy Transmission New York – Marcy to Pleasant Valley Project.

Case 13-T-0456 - Application of NextEra Energy Transmission New York – Oakdale to Fraser Project.

Case 13-T-0461 - Application of Boundless Energy NE.

Dear Secretary Burgess:

Submitted for filing herewith in the above-entitled proceedings is the "NYSPSC AC Transmission Upgrades Screening-Level Analysis Summary" prepared by the New York Independent System Operator.

Please contact me at (518) 356-6220 or at cpatka@nyiso.com if you have any questions or concerns.

Very truly yours,

/s/ Carl F. Patka
Carl F. Patka
Assistant General Counsel

February 14, 2013

State of New York
Public Service Commission

Case 13-E-0488 - In the Matter of Alternating Current Transmission Upgrades – Comparative Proceeding.

Case 13-T-0454 - Application of North America Transmission.

Case 13-T-0455 - Application of NextEra Energy Transmission New York – Marcy to Pleasant Valley Project.

Case 13-T-0456 - Application of NextEra Energy Transmission New York – Oakdale to Fraser Project.

Case 13-T-0461 - Application of Boundless Energy NE.

NYSPSC AC Transmission Upgrades Proceedings
Screening-Level Analysis Summary

The New York Independent System Operator (NYISO), as requested by the New York State Public Service Commission (NYSPSC), has performed an initial screening-level analysis of the incremental transfer capability that would be provided by each of the electric transmission projects for which an application has been submitted in the matter of Alternating Current Transmission Upgrades (13-E-0488).

Specifically, the NYISO has performed transfer analysis to determine if portfolios of transmission proposals would accomplish the goal of increasing the N-1-1 transfer capability by 1,000 MW at the UPNY-SENY interface along with an increase in transfer capability across the Central-East interface. More detailed review of the electrical characteristics and impacts of the transmission projects can occur later in these proceedings when the projects' details are fully described.

The NYISO evaluated four portfolios: North America Transmission (Case No. 13-T-0454), NextEra Energy Transmission New York (Case Nos. 13-T-0455 and 13-T-0456), New York Transmission Owners (Case No. 13-M-0457), and Boundless Energy NE (Case No. 13-T-0461). The evaluations include thermal and voltage power flow analysis using a system representation of the year 2018 summer peak, consistent with the scope of analysis (Attachment A).

N-1-1 Southeast New York (SENY) Surplus:

Each portfolio is evaluated for transmission security criteria established by the North American Electric Reliability Corporations (NERC), the Northeast Power Coordinating Council (NPCC), and the New York State Reliability Council (NYSRC) (N-1-1 contingency analysis) with results reported in terms of Southeast New York (SENY) surplus in MW. SENY is defined as NYISO Zones G through J. Zones G, H and I make up the lower Hudson Valley. Zone J is New York City. A surplus means that the amount of generation within, plus transmission transfer capability into, SENY is greater than the load plus system losses that must be served in

SENY. The increase in surplus caused by each portfolio represents the increase in transfer capability across the UPNY-SENY interface.

The N-1-1 SENY surplus evaluation of each transmission portfolio is performed by developing a case such that the generation capability in Zones G – J is maximized while respecting transmission constraints and maintaining schedules with neighboring systems. Long Island exports into Zones G – J are also maximized while respecting transfer capability limitations. PJM exports into Zones G – J across controllable tie lines are maintained at their planned schedules. The summation of this supply capability (maximized generation capability, Long Island export capability, and PJM exports) is less than the total load plus system losses in Zones G – J. Therefore the remaining load balance in Zones G – J is served from transfers across the UPNY-SENY interface. For the purpose of this analysis to measure the surplus in the SENY area, a representative load is modeled at the Sprainbrook 345 kV bus on the interface between Zones I and J and is increased until a thermal limit on any transmission element is reached. The amount of load that can be modeled at the Sprainbrook bus while securing the system for constraints represents the surplus capability in the SENY area. This analysis is performed for the base case and the project cases; the difference in the Sprainbrook representative load between these cases represents the increase in transfer capability into the SENY area.

The following table shows the SENY surplus for each portfolio of transmission projects.

	2018 SENY Surplus (MW)	***Portfolio Impact (MW)***
Base Case	1143	**-**
NAT	2560	**1417**
NextEra	2567	**1424**
NYTOs	2986	**1843**
Boundless	1685	**542**

N-1 Thermal Transfer Limits:

The N-1 thermal transfer limit evaluation of each portfolio is performed for normal transfer criteria in accordance with the NYISO Planning Transfer Capability methodology (Attachment B). The interfaces evaluated are: Central East, Total East, UPNY-SENY, New York-New England, and New England-New York. The details of the transfer limit analysis for each portfolio are provided in the following pages.

The linear thermal transfer limit analysis is not intended to determine the maximum transfer capability, but to evaluate the transfer limit of each portfolio on a consistent basis. Thermal transfer limits are sensitive to the base case load and generation conditions, generation selection utilized to create the transfers, phase angle regulator (PAR) schedules, and inter-area power transfers.

The table below summarizes the range of Central East and Total East transfer limit impacts for each portfolio. The transfer limit impacts reported in the summary table are based on thermal limitations; to the extent that voltage may be more limiting, additional reactive compensation may be necessary to realize the full benefit of the portfolio. Further details of the Central East and Total East transfer limits are provided in the following pages.

The historical limiting element of the Central East interface thermal transfer limit is a New Scotland – Leeds 345 kV line, which is directly in series with Central East. The proposed projects may relieve the transfer limit constraint on the historical limiting elements; however, constraints along the Marcy South corridor may limit Central East transfer capability with the proposed projects. Therefore a range of impacts on Central East is reported, including and excluding Marcy South limitations.

The Total East interface thermal transfer limit is heavily influenced by the dispatch of the CPV Valley generation project, which is planned to interconnect in Zone G to the Coopers Corners – Rock Tavern 345 kV line. The CPV Valley project is scheduled to enter service in 2016 and is dispatched at full output in the base cases. A range of impacts on Total East is also reported, reflecting the impacts of CPV Valley being dispatched at zero and full output.

	Central East Portfolio Impact Range (MW) (1)	Total East Portfolio Impact Range (MW) (2)
North America Transmission	-125 to 500	-75 to 100
NextEra	700 to 1500	700 to 800
NYTO	25 to 1725	150 to 825
Boundless	-325 to 200	-400 to -300

1. Central East range due to inclusion and exclusion of Marcy South limitations
2. Total East range due to the planned CPV Valley generation project being dispatched at zero and full output

North America Transmission (NAT) Transmission Portfolio

Portfolio components:

- Edic – Fraser 345 kV with series compensation
- New Scotland – Leeds – Pleasant Valley 345 kV

Analysis Results

The NAT portfolio increases the N-1-1 UPNY-SENY transfer capability by 1417 MW.

The NAT portfolio increases the Central East interface transfer capability only when considering the elements in series with Central East. This increase is due to the additional transmission in series with Central East proposed by the NAT portfolio. The NAT portfolio decreases Central East transfer capability when considering the constraint on the Fraser – Coopers Corners 345 kV line, but transfers across the Total East interface increase by 100 MW. This is due to the NAT portfolio both alleviating the New Scotland – Leeds limitation and redirecting some power flows to the Marcy South corridor, which includes the limiting Fraser – Coopers Corners line.

The NAT portfolio increases the N-1 UPNY-SENY interface transfer capability; with CPV Valley out-of-service the positive impact is even greater since CPV Valley aggravates the post-project limiting constraint. The new Leeds – Pleasant Valley 345 kV line is included in the UPNY-SENY interface definition.

The NAT portfolio does not result in a voltage limitation on UPNY-SENY. Central East is voltage limited only when considering the elements in series with Central East. Reactive compensation may be necessary to realize the full benefit of the NAT portfolio.

NAT Portfolio N-1-1 SENY Surplus

	2018 SENY Surplus (MW)	***Portfolio Impact (MW)***
Base Case	1143 (1)	-
NAT	2560 (2)	**1417**

1. Leeds – Pleasant Valley 345 kV for loss of Roseton – E .Fishkill 345 kV followed by Athens – Pleasant Valley 345 kV
2. Leeds – Pleasant Valley 345 kV for loss of Leeds – Pleasant Valley 345 kV (NAT) followed by Athens – Pleasant Valley 345 kV

NAT Portfolio N-1 Thermal and Voltage Transfer Limits

	Baseline		North America Transmission		
	Thermal	Voltage	Thermal		Voltage
	Limit	Limit	Limit	**Impact**	Limit
Central East	2700 (1)	2925 (V1)	2575 (6)	**-125**	2925 (V1)
			3200 (10)(B)	**500**	
Total East	5825 (1)		5925 (6)	**100**	
	5750 (6)(C)		5675 (6)(C)	**-75**	
UPNY-SENY	4725 (2)	6025 (V2)	5875 (9)	**475**	6250 (V3)
	5400 (3)(A)				
	4950 (2)(C)	6500 (V2)(C)	6200 (6)(C)	**575**	
	5625 (3)(A)(C)				
UPNY-ConEd		4925 (V2)			5125 (V3)
New York – New England	1275 (4)		1175 (7)	**-100**	
New England – New York	1925 (5)		2000 (8)	**75**	

1. **New Scotland (Bus 77)-Leeds 345** at 1538 MW LTE rating for L/O New Scotland (Bus 99)-Leeds 345
2. **Leeds-Pleasant Valley 345** at 1538 MW LTE rating for L/O Athens-Pleasant Valley 345
3. **Leeds-Pleasant Valley 345** at 1724 MW STE rating for L/O Athens-Pleasant Valley 345
4. **Long Mountain-Pleasant Valley 345** at 1382 MW LTE rating for L/O Northfield-Berkshire 345, Berkshire-Alps 345, Berkshire 345/115, and Northfield Units 3 and 4
5. **Norwalk Junction-Archers Lane 345** at 850 MW LTE rating for L/O Frost Bridge-Long Mountain 345
6. **Fraser-Coopers Corners 345** at 1404 MW LTE rating for L/O Marcy-Coopers Corners 345 and Porter-Rotterdam 230
7. **Long Mountain-Pleasant Valley 345** at 1382 MW LTE rating for L/O Millstone Unit #3
8. **Reynolds 345/115** at 562 MW LTE rating for L/O New Scotland Bus 77
9. **Rock Tavern-Ramapo 345** at 1990 MW LTE rating for L/O Roseton-E. Fishkill 345 and Hurley 345 series compensation
10. **Marcy-New Scotland 345** at 1650 MW LTE rating for L/O Edic-New Scotland 345, Edic-Porter 345/230, and Edic-Porter 345/115

(A) Used Reliability Rules Exception Reference No. 23 – Generation Rejection at Athens
(B) Central East Transfer limit using a limiting element in series with the Central East Interface elements
(C) CPV Valley out-of-service

V1. Marcy 345 for pre-contingency low limit
V2. 95% of PV curve nose occurs for L/O CPV Valley-Rock Tavern 345 and Coopers Corners-Rock Tavern 345
V3. Pleasant Valley 345 bus voltage post-contingency low limit for L/O CPV Valley-Rock Tavern 345 and Coopers Corners-Rock Tavern 345

NextEra Transmission Portfolio

Portfolio components:

- Marcy – New Scotland 345 kV
- New Scotland – Leeds – Pleasant Valley 345 kV
- Oakdale – Fraser 345 kV

Analysis Results

The NextEra portfolio increases the N-1-1 UPNY-SENY transfer capability by 1424 MW.

The NextEra portfolio increases the Central East and Total East interface transfer capabilities. The increase in transfer capability is due to the additional transmission in series with Central East proposed by the NextEra portfolio. The new Marcy – New Scotland 345 kV line is included in the Central East and Total East interface definitions.

The NextEra portfolio increases the N-1 UPNY-SENY interface transfer capability; with CPV Valley out-of-service the positive impact is even greater since CPV Valley aggravates the post-project limiting constraint. The new Leeds – Pleasant Valley 345 kV line is included in the UPNY-SENY interface definition.

The NextEra portfolio does not result in a voltage limitation on UPNY-SENY when CPV Valley is in-service, but UPNY-SENY is voltage limited with CPV Valley out-of-service. Central East is also voltage limited. Reactive compensation may be necessary to realize the full benefit of the NextEra portfolio.

NextEra Portfolio N-1-1 SENY Surplus

	2018 SENY Surplus (MW)	***Portfolio Impact (MW)***
Base Case	1143 (1)	-
NextEra	2567 (2)	**1424**

1. Leeds – Pleasant Valley 345 kV for loss of Roseton - E.Fishkill 345 kV followed by Athens – Pleasant Valley 345 kV
2. Leeds – Pleasant Valley 345 kV for loss of Leeds – Pleasant Valley 345 kV (NextEra) followed by Athens – Pleasant Valley 345 kV

NextEra Portfolio N-1 Thermal and Voltage Transfer Limits

	Baseline		NextEra		
	Thermal	Voltage	Thermal		Voltage
	Limit	Limit	Limit	**Impact**	Limit
Central East	2700 (1)	2925 (V1)	3400 (6)	**700**	3300 (V1)
			4200 (10)(B)	**1500**	
Total East	5825 (1)		6625 (6)	**800**	
	5750 (6)(C)		6450 (6)(C)	**700**	
UPNY-SENY	4725 (2)	6025 (V2)	6125 (8)	**725**	6225 (V3)
	5400 (3)(A)				
	4950 (2)(C)	6500 (V2)(C)	7000 (9)(C)	**1375**	6675 (V3)(C)
	5625 (3)(A)(C)		7025 (6)(A)(C)	**1400**	
UPNY-ConEd		4925 (V2)			5125 (V3)
New York – New England	1275 (4)		1175 (4)	**-100**	
New England – New York	1925 (5)		1975 (7)	**50**	

1. **New Scotland (Bus 77)-Leeds 345** at 1538 MW LTE rating for L/O New Scotland (Bus 99)-Leeds 345
2. **Leeds-Pleasant Valley 345** at 1538 MW LTE rating for L/O Athens-Pleasant Valley 345
3. **Leeds-Pleasant Valley 345** at 1724 MW STE rating for L/O Athens-Pleasant Valley 345
4. **Long Mountain-Pleasant Valley 345** at 1382 MW LTE rating for L/O Northfield-Berkshire 345, Berkshire-Alps 345, Berkshire 345/115, and Northfield Units 3 and 4
5. **Norwalk Junction-Archers Lane 345** at 850 MW LTE rating for L/O Frost Bridge-Long Mountain 345
6. **Fraser-Coopers Corners 345** at 1404 MW LTE rating for L/O Marcy-Coopers Corners 345 and Porter-Rotterdam 230
7. **Reynolds 345/115** at 562 MW LTE rating for L/O Edic-New Scotland 345 and New Scotland-Alps 345
8. **Rock Tavern-Ramapo 345** at 1990 MW LTE rating for L/O Roseton-E. Fishkill 345 and Hurley 345 series compensation
9. **Leeds-Pleasant Valley 345** at 1538 MW LTE rating for L/O Leeds-Pleasant Valley 345
10. **Edic-New Scotland 345** at 1538 MW LTE rating for L/O Edic-Marcy 345 and Volney-Marcy 345

(A) Used Reliability Rules Exception Reference No. 23 – Generation Rejection at Athens
(B) Central East Transfer limit using a limiting element in series with the Central East Interface elements
(C) CPV Valley out-of-service

V1. Marcy 345 for pre-contingency low limit
V2. 95% of PV curve nose occurs for L/O CPV Valley-Rock Tavern 345 and Coopers Corners-Rock Tavern 345
V3. Pleasant Valley 345 for pre-contingency low limit

New York Transmission Owners (NYTOs) Portfolio

Portfolio components:

- Edic – Knickerbocker 345 kV
- Tie existing Edic – New Scotland #14 345 kV line into Princetown 345 kV, Princetown 345/230 kV, Princetown – Rotterdam 230 kV, retire Porter – Rotterdam 230 kV
- Knickerbocker – Pleasant Valley 345 kV
- Churchtown 115 kV substation
- Marcy South Series Compensation and Fraser – Coopers reconductoring
- Rock Tavern – Sugarloaf – Ramapo 345 kV and new Sugarloaf 345/138 kV
- Oakdale – Fraser 345 kV

Analysis Results

The NYTOs portfolio increases the N-1-1 UPNY-SENY transfer capability by 1843 MW.

The NYTOs portfolio increases the Central East and Total East interface transfer capabilities. The increase in transfer capability is due to the additional transmission in series with Central East proposed by the NYTOs portfolio. The new Edic – Knickerbocker 345 kV line is included in the Central East and Total East interface definitions.

The NYTOs portfolio increases the N-1 UPNY-SENY interface transfer capability; with CPV Valley out-of-service the positive impact is even greater because CPV Valley aggravates the post-project limiting constraint with the NYTOs portfolio. The new Knickerbocker – Pleasant Valley 345 kV line is included in the UPNY-SENY interface definition.

The NYTOs portfolio does not result in a voltage limitation on UPNY-SENY when CPV Valley is in-service, but UPNY-SENY is voltage limited with CPV Valley out-of-service. Central East is voltage limited only when considering the elements in series with Central East. Reactive compensation may be necessary to realize the full benefit of the NYTOs portfolio.

NYTOs Portfolio N-1-1 SENY Surplus

	2018 SENY Surplus (MW)	***Portfolio Impact (MW)***
Base Case	1143 (1)	-
NYTO	2986 (2)	**1843**

1. Leeds – Pleasant Valley 345 kV for loss of Roseton - E. Fishkill 345 kV followed by Athens – Pleasant Valley 345 kV
2. Leeds – Pleasant Valley 345 kV for loss of Athens – Pleasant Valley 345 kV followed by CPV Valley – Rock Tavern 345 kV and Coopers Corners – Rock Tavern 345 kV

NYTOs Portfolio N-1 Thermal and Voltage Transfer Limits

	Baseline		NYTOs		
	Thermal	Voltage	Thermal		Voltage
	Limit	Limit	Limit	**Impact**	Limit
Central East	2700 (1)	2925 (V1)	2725 (6)	**25**	3225 (V1)
			4425 (10)(B)	**1725**	
Total East	5825 (1)		5975 (6)	**150**	
	5750 (9)(C)		6575 (9)(C)	**825**	
UPNY-SENY	4725 (2)	6025 (V2)	5625 (6)	**225**	6525 (V3)
	5400 (3)(A)				
	4950 (2)(C)	6500 (V2)(C)	7025 (2)(C)	**1400**	6825 (V3)(C)
	5625 (3)(A)(C)		7375 (8)(A)(C)	**1750**	
UPNY-ConEd		4925 (V2)			5400 (V3)
New York – New England	1275 (4)		1150 (4)	**-125**	
New England – New York	1925 (5)		1875 (7)	**-50**	

1. **New Scotland (Bus 77)-Leeds 345** at 1538 MW LTE rating for L/O New Scotland (Bus 99)-Leeds 345
2. **Leeds-Pleasant Valley 345** at 1538 MW LTE rating for L/O Athens-Pleasant Valley 345
3. **Leeds-Pleasant Valley 345** at 1724 MW STE rating for L/O Athens-Pleasant Valley 345
4. **Long Mountain-Pleasant Valley 345** at 1382 MW LTE rating for L/O Northfield-Berkshire 345, Berkshire-Alps 345, Berkshire 345/115, and Northfield Units 3 and 4
5. **Norwalk Junction-Archers Lane 345** at 850 MW LTE rating for L/O Frost Bridge-Long Mountain 345
6. **CPV Valley-Rock Tavern 345** at 1793 MW LTE rating for L/O Coopers Corners-Middletown-Rock Tavern 345, Middletown 345/138, and Rock Tavern-Roseton 345
7. **Reynolds 345/115** at 562 MW LTE rating for L/O Edic-Knickerbocker 345 and Knickerbocker-Alps 345
8. **Fraser-Coopers Corners 345** at 1721 MW LTE rating for L/O Marcy-Coopers Corners 345
9. **Fraser-Coopers Corners 345** at 1404 MW LTE rating for L/O Marcy-Coopers Corners 345 and Porter-Rotterdam 230
10. **Edic-Princetown 345** at 1538 MW LTE rating for L/O Sandy Pond HVdc

(A) Used Reliability Rules Exception Reference No. 23 – Generation Rejection at Athens
(B) Central East Transfer limit using a limiting element in series with the Central East Interface elements
(C) CPV Valley out-of-service

V1. Marcy 345 for pre-contingency low limit
V2. 95% of PV curve nose occurs for L/O CPV Valley-Rock Tavern 345 and Coopers Corners-Rock Tavern 345
V3. Pleasant Valley 345 for pre-contingency low limit

Boundless Portfolio

Portfolio components:

- Leeds – Hurley 345 kV reconductoring of existing circuit
- 40% series compensation added to Leeds – Hurley 345 kV
- 40% series compensation added to Hurley – Roseton 345 kV
- Roseton – E.Fishkill 345 kV two new underground circuits
- Tie existing Pleasant Valley – Wood St. 345 kV lines into expanded E.Fishkill 345 kV substation
- 35% series compensation added to Marcy – Coopers Corners 345 kV
- 0.5% series reactors added to each New Scotland – Leeds 345 kV circuits

Analysis Results

The Boundless portfolio increases the N-1-1 UPNY-SENY transfer capability by 542 MW.

The Boundless portfolio decreases Central East and Total East transfer capability due to a constraint on the Marcy – Coopers Corners 345 kV line. When considering the elements in series with Central East, the Boundless portfolio increases Central East by 200 MW.

The Boundless portfolio increases the N-1 UPNY-SENY interface transfer capability; CPV Valley in-service increases the opposing flow on the limiting constraint, causing a slightly greater increase from the portfolio.

The Boundless portfolio does not result in a voltage limitation on UPNY-SENY. Central East is voltage limited when considering the elements in series with Central East. Reactive compensation may be necessary to realize the full benefit of the Boundless portfolio.

Boundless Portfolio N-1-1 SENY Surplus

	2018 SENY Surplus (MW)	***Portfolio Impact (MW)***
Base Case	1143	**-**
Boundless	1685	**542**

1. Leeds – Pleasant Valley 345 kV for loss of Roseton - E.Fishkill 345 kV followed by Athens – Pleasant Valley 345 kV
2. Leeds – Pleasant Valley 345 kV for loss of Leeds – Hurley 345 kV (Boundless) followed by Athens – Pleasant Valley 345 kV

Boundless Portfolio N-1 Thermal and Voltage Transfer Limits

	Baseline		Boundless		
	Thermal	Voltage	Thermal		Voltage
	Limit	Limit	Limit	**Impact**	Limit
Central East	2700 (1)	2925 (V1)	2375 (6)	**-325**	2850 (V1)
			2900 (8)(B)	**200**	
Total East	5825 (1)		5525 (6)	**-300**	
	5750 (9)(C)		5350 (6)(C)	**-400**	
UPNY-SENY	4725 (2)	6025 (V2)	5650 (7)	**250**	6400 (V3)
	5400 (3)(A)				
	4950 (2)(C)	6500 (V2)(C)	5800 (6)(C)	**175**	
	5625 (3)(A)(C)				
UPNY-ConEd		4925 (V2)			5250 (V3)
New York – New England	1275 (4)		1250 (4)	**-25**	
New England – New York	1925 (5)		1950 (5)	**25**	

1. **New Scotland (Bus 77)-Leeds 345** at 1538 MW LTE rating for L/O New Scotland (Bus 99)-Leeds 345
2. **Leeds-Pleasant Valley 345** at 1538 MW LTE rating for L/O Athens-Pleasant Valley 345
3. **Leeds-Pleasant Valley 345** at 1724 MW STE rating for L/O Athens-Pleasant Valley 345
4. **Long Mountain-Pleasant Valley 345** at 1382 MW LTE rating for L/O Northfield-Berkshire 345, Berkshire-Alps 345, Berkshire 345/115, and Northfield Units 3 and 4
5. **Norwalk Junction-Archers Lane 345** at 850 MW LTE rating for L/O Frost Bridge-Long Mountain 345
6. **Marcy-Coopers Corners 345** at 1345 MW LTE rating for L/O Oakdale-Fraser 345 and Fraser-Coopers Corners 345
7. **CPV Valley-Rock Tavern 345** at 1793 MW LTE rating for L/O Coopers Corners-Middletown-Rock Tavern 345, Middletown 345/138, and Coopers Corners 345/115
8. **Marcy-New Scotland (Bus 99) 345** at 1650 MW LTE rating for L/O Edic-Fraser 345 and Marcy-Coopers Corners 345
9. **Fraser-Coopers Corners 345** at 1404 MW LTE rating for L/O Marcy-Coopers Corners 345 and Porter-Rotterdam 230

(A) Used Reliability Rules Exception Reference No. 23 – Generation Rejection at Athens
(B) Central East Transfer limit using a limiting element in series with the Central East Interface elements
(C) CPV Valley out-of-service

V1. Marcy 345 for pre-contingency low limit
V2. 95% of PV curve nose occurs for L/O CPV Valley-Rock Tavern 345 and Coopers Corners-Rock Tavern 345
V3. Pleasant Valley 345 for pre-contingency low limit

Attachment A

Scope of Analysis

Scope of Analysis for the NYSPSC Energy Highway AC Transmission Upgrades (13-E-0488)

Objective: Perform transfer analysis to determine if portfolios of project proposals would accomplish the goal of increasing the N-1-1 transfer capability by 1,000 MW at the UPNY/SENY interface along with an increase in transfer capability across the Central-East interface.

Modeling Year: 2018

Base Case:

- 2013 FERC 715 50/50 summer peak case for year 2018, consistent with the NYISO Interconnection Process base case
  - Class Year 2011 projects in-service (Berrians I&II, CPV Valley, Leeds-Hurley series compensation, Taylor Biomass)
  - Dunkirk out-of-service; local reliability upgrades in-service.
  - Cayuga in-service to represent future generation.
  - Indian Point in-service without the Transmission Owner Transmission Solutions (TOTS) to represent baseline system conditions.
  - 600 MW of additional wind projects, in locations per the NYISO Interconnection Queue, to represent a certain level of achievement of the Renewable Portfolio Standard (RPS)

Portfolios of Projects:

- North America Transmission
  (PSC Case No. 13-T-0454) (NYISO Queue: 391, 414)
  - Edic – Fraser 345 kV with series compensation
  - New Scotland – Leeds – Pleasant Valley 345 kV
- NextEra
  (PSC Case No. 13-T-0455, 13-T-0456) (NYISO Queue: 405, 418)
  - Marcy – New Scotland 345 kV
  - New Scotland – Leeds – Pleasant Valley 345 kV
  - Oakdale – Fraser 345 kV
- NYTOs
  (PSC Case No. 13-M-0457) (NYISO Queue: 368, 380, 410, 412)
  - Edic – Knickerbocker 345 kV
  - Tie existing Edic – New Scotland #14 345 kV line into Princetown 345 kV, Princetown 345/230 kV, Princetown – Rotterdam 230 kV, retire Porter – Rotterdam 230 kV
  - Knickerbocker – Pleasant Valley 345 kV
  - Churchtown 115 kV substation
  - Marcy South Series Compensation and Fraser – Coopers reconductoring
  - Rock Tavern – Sugarloaf – Ramapo 345 kV and new Sugarloaf 345/138 kV
  - Oakdale – Fraser 345 kV

- Boundless
  (PSC Case No. 13-T-0461) (NYISO Queue: 424)
  - Leeds – Hurley 345 kV reconductoring of existing circuit
  - 40% series compensation added to Leeds – Hurley 345 kV
  - 40% series compensation added to Hurley – Roseton 345 kV
  - Roseton – E.Fishkill 345 kV two new underground circuits
  - Tie existing Pleasant Valley – Wood St. 345 kV lines into expanded E.Fishkill 345 kV substation
  - 35% series compensation added to Marcy – Coopers Corners 345 kV
  - 0.5% series reactors added to each New Scotland – Leeds 345 kV circuits

Analysis

- Power Flow
  1. Each Portfolio will be evaluated for impacts to normal transfer criteria N-1 thermal transfer limits on Central East/Total East, UPNY-SENY, and NE-NY using linear power flow simulations in accordance with the NYISO Methodology for Assessment of Transfer Capability in the Near-Term Transmission Planning Horizon.
  2. Each Portfolio will be evaluated for impacts to voltage transfer limits on Central East and UPNY-ConEd interfaces using power flow simulations.
  3. Each Portfolio will be evaluated for transmission security criteria (N-1-1) using linear power flow simulations. Results will be reported in terms of SENY surplus or deficiency as measured at the Sprainbrook bus.

As part of the N-1-1 analysis, individual N-1 cases will be created by removing a critical generator, transmission circuit, transformer, series or shunt compensating device, or HVdc pole from the base case. A set of corrective actions will be developed with the objective of eliminating violations in the post-contingency cases for each N-1 case, such that there would be no post-contingency thermal or voltage violations on the New York State Bulk Power Transmission Facilities (BPTFs). Next, N-1-1 contingency analysis will be performed by modeling critical facility outages followed by testing of NPCC and NYSRC Design Criteria contingencies and monitoring applicable limits of the BPTFs in accordance with NYSRC Reliability Rules. All results will assume that all generation resources, and where available, phase angle regulator and HVDC controls have been utilized in the pre-contingency case ("N") and/or between the first and second contingencies ("-1") as appropriate to mitigate potential violations.

DATA REQUIRED FOR POWERFLOW MODELING

The following data is required to model each portfolio. The NYISO may request additional data as necessary to accurately model the proposed projects.

AC Transmission

For each new or modified circuit, provide:

- From Bus, To Bus: Substations at which the circuit terminates
- Base kV: Nominal operating voltage in kV
- R, X: Line impedance in per unit on 100 MVA system base
- B: Total line charging susceptance in per unit on 100 MVA system base
- Normal rating: Summer peak 24 hour thermal rating in MVA
- LTE rating: Summer peak 4 hour long term emergency thermal rating in MVA
- STE rating: Summer peak 15 minute short term emergency thermal rating in MVA
- Common tower: Identify all other circuits that will share common towers with the circuit

Series Compensation

For each new series capacitor, provide:

- Circuit: Identify circuit to be compensated
- Location: Specify location of series compensation (e.g., which end of the circuit)
- X: Percentage compensation of the line
- Normal rating: Summer peak 24 hour thermal rating in MVA
- LTE rating: Summer peak 4 hour long term emergency thermal rating in MVA
- STE rating: Summer peak 15 minute short term emergency thermal rating in MVA

Transformers

For each new or modified transformer, provide:

- From Bus, To Bus: Substations at which the transformer terminates
- Voltage ratio: Nominal operating high side and low side voltages in kV
- R, X: Transformer impedance in per unit on 100 MVA system base
- Control Type: Fixed tap or voltage control
- Fixed Taps: Tap positions available
- Vmax, Vmin: Upper and lower voltage limits at the controlled bus
- Normal rating: Summer peak 24 hour thermal rating in MVA
- LTE rating: Summer peak 4 hour long term emergency thermal rating in MVA
- STE rating: Summer peak 15 minute short term emergency thermal rating in MVA

Substations

For each new substation, provide a breaker diagram depicting the connection of each element to the substation and corresponding breaker locations.

For each modified substation (e.g., new line connecting to existing substation) provide a breaker diagram depicting the connection of each element to the substation and corresponding breaker locations, OR provide a detailed description as to the modifications to the substation. Specifically identify other circuits in breaker positions adjacent to new or modified circuits.

Attachment B

NYISO Planning Transfer Capability Methodology

Methodology for Assessment of Transfer Capability in the Near-Term Transmission Planning Horizon

(NERC Standard FAC-013-2)

May 20, 2013

Document Revision History

Version	Revision	Reviewed By	Date
0	Initial Version	Henry Chao, VP SRP	3/29/2013
1	Sections 1, 3.4, & 4 revised	Henry Chao, VP SRP	5/20/2013

TABLE OF CONTENTS

1. Introduction

The New York Independent System Operator (NYISO) conducts an annual Area Transmission Review (ATR) as an assessment of the reliability of the planned New York State Bulk Electric System (BES) in accordance with established North American Electric Reliability Corporation (NERC) Reliability Standards. This document describes the methodology used by the NYISO to perform an annual assessment of Planning Transfer Capability (PTC) in the Near-Term Transmission Planning Horizon (PTC methodology).

Transfer Capability is defined by NERC as the measure of the ability of interconnected electric systems to move or transfer power in a reliable manner from one area to another over all transmission lines (or paths) between those areas under specified system conditions. The units of transfer capability are in terms of electric power, generally expressed in megawatts (MW). The transfer capability from "Area A" to "Area B" is not generally equal to the transfer capability from "Area B" to "Area A."[1]

PTC is determined by the NYISO in its role as Planning Coordinator in accordance with NERC standard FAC-013-2, "Assessment of Transfer Capability for the Near-Term Transmission Planning Horizon", and is not directly related to calculations of Total Transfer Capability (TTC) or Available Transfer Capability (ATC).

The PTC assessment is not intended to determine the optimized maximum transfer capability. PTC may be sensitive to various factors including, but not limited to, base case load and generation conditions, phase angle regulator (PAR) schedules, and inter-area transfers. These sensitivities are not considered in determining PTC as no attempts are made to obtain the ideal shift pattern for maximum transfer capability.

[1] Glossary of Terms Used in NERC Reliability Standards (http://www.nerc.com/files/Glossary_of_Terms.pdf)

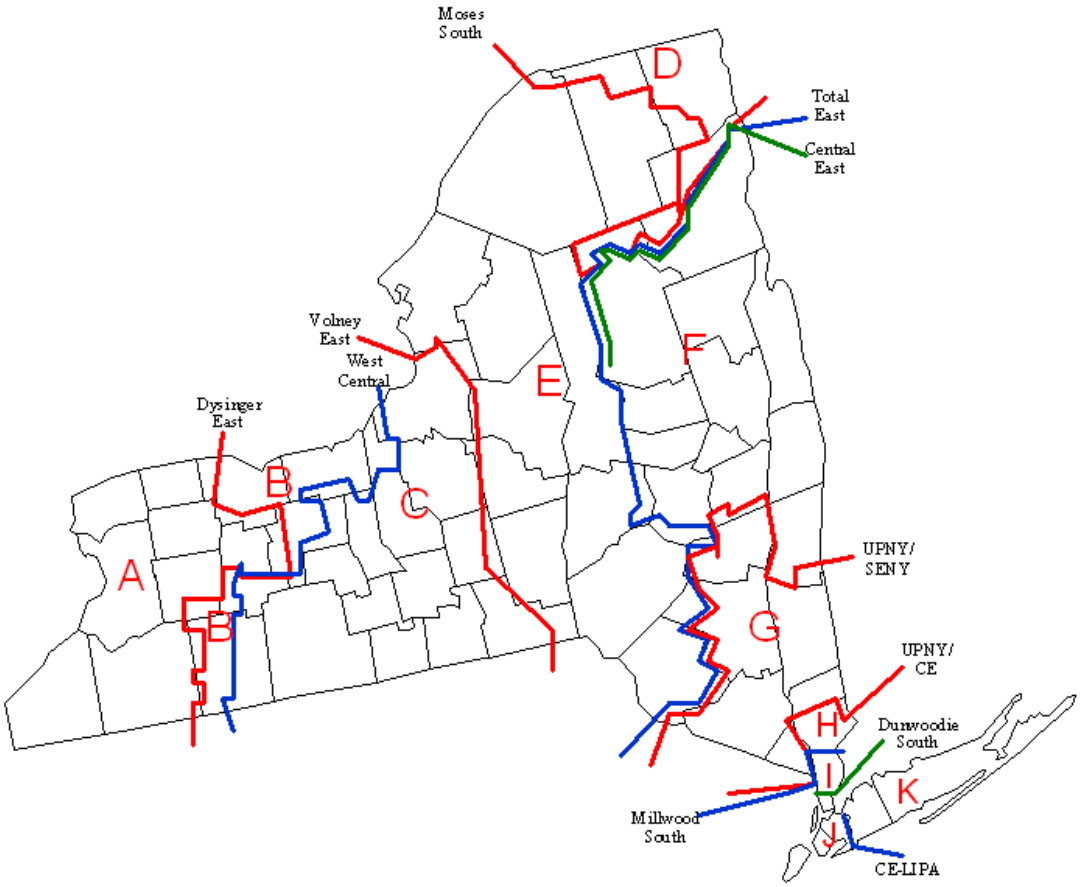
2. Transfer Selection and Criteria

2.1. Transfer Selection

The ATR monitors and evaluates eleven major interfaces between zones within the New York Control Area (NYCA): Dysinger East, West Central, Volney East, Moses South, Central East, Total East, UPNY-SENY, UPNY-ConEd, Millwood South, Sprain Brook – Dunwoodie South, and LIPA Import. Additionally the ATR monitors and evaluates interfaces between the NYISO and all neighboring control areas: Ontario (IESO), Hydro-Quebec, ISO-New England, and PJM.

Figure 1 geographically depicts the NYCA interfaces and load zones.

Figure 1 NYCA Interfaces and Load Zones



2.2. Criteria

The ATR assessment respects known planning horizon System Operating Limits (SOLs). In accordance with NERC standard FAC-010, the NYISO's SOL Methodology is defined in the Northeast Power Coordinating Council (NPCC) Directory #1 – Design and Operation of the Bulk Power System.

The Near-Term Transmission Planning Horizon is defined by NERC as the transmission planning period that covers Year One through five.[2] The ATR assesses the system condition in year five.

The assumptions and criteria applied by the NYISO to perform the PTC assessment are consistent with the following NYISO planning and operation practices:

- NYISO Transmission Expansion and Interconnection Manual
    - Attachment F, NYISO Transmission Planning Guidelines #1-1, Guideline for System Reliability Impact Studies; Section 2.4.2 Impact on System Performance and Transfer Limits (Thermal, Voltage, and Stability)
    - Attachment G, NYISO Transmission Planning Guidelines #2-1, Guideline for Voltage Analysis and Determination of Voltage-Based Transfer Limits
    - Attachment H, NYISO Transmission Planning Guidelines #3-1, Guideline for Stability Analysis and Determination of Stability-Based Transfer Limits
- NYISO Transmission and Dispatching Operations Manual
    - Section 4.2.8 Procedure of Potential Overloads on Non-ISO Secured Facilities regarding post-contingency overloads leading to cascading outages

The assumptions and criteria applied by the NYISO to perform the PTC assessment are also consistent with the following regional and state reliability criteria and rules:

- NPCC Directory #1 – Design and Operation of the Bulk Power System describes the transmission Design Criteria applicable to each Balancing Area within the NPCC Region;
- New York State Reliability Council (NYSRC) Reliability Rules for planning and operating the New York State Bulk Power System regarding PTC assessment in accordance with Normal Transfer Criteria (NTC) and Emergency Transfer Criteria (ETC)

[2] Glossary of Terms Used in NERC Reliability Standards (http://www.nerc.com/files/Glossary_of_Terms.pdf)

3. Assumptions

3.1. Generation Dispatch

The system generation representation for the NYCA in year five, including but not limited to long term planned generation outages, additions and retirements, is consistent with the current NYISO FERC Form No. 715 filing and "Load and Capacity Data" report.

For the PTC assessments, a uniform dispatch is employed in Zones A through I. Generation in Zones J and K is dispatched based on historical output. All generating units in Zones A through I are placed in-service at an equal percentage of each unit's maximum capacity (P_{max}), except for the following:

- Wind generation is dispatched at 10% and 30% of its nameplate value for summer and winter study periods, respectively;
- Nuclear generation is dispatched at its Dependable Maximum Net Capability (DMNC) tested value;
- Run-of-river hydro is dispatched based on historical output.

Generation is re-dispatched to respect the most constraining planning horizon SOL in the NYCA; currently this is UPNY-SENY. To accomplish this, generation dispatch in Zones A through F is decreased uniformly while generation is re-dispatched in the following order:

1. Zones G through I (excluding wind, nuclear and run-of-river hydro) are increased uniformly, typically resulting in generation in Zones G through I dispatched to its P_{max} (provided the dispatch does not cause any SOL violations);
2. Zone J is increased based on historical summer dispatch respecting local SOLs;
3. Zone K is increased based on historical summer dispatch respecting local SOLs.

After the most constraining planning horizon SOL is satisfied, remaining generation in Zones G through J is increased while generation in Zone K is decreased to maximize flows from Zone I to Zone K. This step is to simplify the evaluation of the Sprain Brook – Dunwoodie South PTC.

The methodology described above recognizes how different interfaces are limited due to the composite of the generation and its locations in the system. Major changes to the generation or the transmission system would warrant reevaluation of the current methodology.

3.2. Transmission System Topology

The transmission system topology for the NYCA in year five, including but not limited to long term planned transmission outages, additions and retirements, is consistent with the current NYISO FERC Form No. 715 filing and "Load and Capacity Data" report.

3.3. System Demand

The PTC assessments are performed using a year five baseline statewide coincident summer peak case. The load forecast and model used in PTC assessments are consistent with the current NYISO FERC Form No. 715 filing and "Load and Capacity Data" report.

3.4. Projected Transmission Uses

The interchange schedule with external systems modeled in the PTC assessments is determined by the Eastern Interconnection Reliability Assessment Group Multi-Area Modeling Working Group (ERAG MMWG) and consistent with the current FERC Form No. 715 filing. PAR schedules are consistent with the current NYISO FERC Form No. 715 filing; any changes to those schedules will be documented in the PTC assessment. There are no firm transfers within the NYCA.

3.5. Parallel Path

The system representation explicitly models tie-lines between NYCA and all neighboring Areas (ISO-NE, IESO, PJM, and Hydro-Quebec); therefore, there is no loop flow adjustment required for PTC assessments. Any parallel path impacts on inter-regional and intra-regional interfaces are captured in the simulation results.

3.6. Contingencies

Contingency selection for assessments of PTC is provided in:

- NERC TPL Standard Table 1
- NPCC Directory #1
- NYSRC Reliability Rules Table A

3.7. Monitored Facilities

NYCA Bulk Electric System elements will be monitored when conducting an assessment of PTC.

4. Description of Transfers Performed

Generation resources are adjusted to allow for equal participation of aggregated generators in the generation shift to calculate the PTC. Generation in the source zones is increased uniformly while generation in the sink area is decreased uniformly. Nuclear, wind, and run-of-river hydro units are excluded from generation shifts. PTC may be sensitive to various factors including, but not limited to, base case load and generation conditions, PAR schedules, and inter-area transfers. These sensitivities are not considered in determining PTC as no attempts are made to obtain the ideal shift pattern for maximum transfer capability.

Thermal analysis will be performed for all intra-area interfaces. Voltage and stability analysis may be performed if deemed necessary based on known planning horizon SOLs. The following sources and sinks are typically used for each given intra-area interface:

Intra-area Interface	Source Zone(s)	Sink Zone(s)
Dysinger East	IESO – A	G – I
West Central	IESO – B	G – I
Volney East	IESO – C	G – I
Moses South	D	G – I
Central East/Total East	IESO – E	G – I
UPNY-SENY	IESO – F	J
UPNY-ConEd	IESO – G	J
Sprain Brook – Dunwoodie South	IESO – G	J
LIPA Import	A – G	K

Thermal analysis will be performed for all inter-area interfaces. The following sources and sinks are typically used for each given inter-area interface:

Inter-area Interface	Source Area/ Zone(s)	Sink Area/ Zone(s)
IESO-NY	IESO	Central (C) 60% Capital (F) 25% Hudson (G) 5% NYC (J) 10%
NY-IESO	Central (C) 60% Capital (F) 40%	IESO
PJM-NY	PJM	A – G 90% I – J 10%
NY-PJM	A – G 90% I – J 10%	PJM
NE-NY	NE_SOUTH[3] 50% NE_NORTH[3] 50%	Capital (F) 35% NYC (J) 65%
NY-NE	Capital (F) 40% NYC (J) 60%	NE_SOUTH[3] 50% NE_NORTH[3] 50%

[3] From the DBYYYY_ne.sub file

5. Distribution and Notification of Methodology Document

5.1. Methodology Distribution

The issuance of the original or revised versions of this document will include an email notification for the following entities:

- Each Planning Coordinator (PC) adjacent to NYCA
- Each Transmission Planner (TP) within NYCA

Any functional entity with a reliability-related need for this methodology document may submit a written request for it to the NYISO (market_services@nyiso.com). If the request is approved, the NYISO will distribute this methodology document within 30 calendar days of receiving that written request.

5.2. Response to Methodology Comments

The NYISO will provide a documented response within 45 calendar days if any of the previously identified recipients of the methodology document provides documented concerns with the methodology document. Documented concerns should be written and submitted to the NYISO (market_services@nyiso.com). The documented response from the NYISO will indicate whether a change will be made to the methodology document and, if no change will be made to the methodology document, the reason why.

6. Frequency of Assessment

In accordance with FAC-013-2 Requirement R4, during each calendar year the NYISO will conduct simulations and document an assessment based on those simulations in accordance with this Planning Transfer Capability Methodology for at least one year in the Near-Term Transmission Planning Horizon.

7. Distribution of Assessment Report Results

7.1. Assessment Report Distribution and Response to Comments

Once an assessment is finalized, the documented Planning Transfer Capability assessment results shall be made available on the NYISO public website within 45 calendar days.

7.2. Response to Data Requests

Any functional entity with a reliability related need for the documented Planning Transfer Capability assessment may submit a written request to the NYISO (market_services@nyiso.com) for data to support the assessment results. If the request is approved, the NYISO shall provide such data to that entity within 45 calendar days of receipt of the request. The provision of such data shall be subject to NYISO policies and procedures regarding the disclosure of confidential or sensitive information.

8. Appendix A (NERC Standard Mapping Table)

Table 1: NERC FAC-013-2 Standard Mapping Table

Requirement	Text of Requirement	Methodology Section
R1.	Each Planning Coordinator shall have a documented methodology it uses to perform an annual assessment of Transfer Capability in the Near-Term Transmission Planning Horizon (Transfer Capability methodology). The Transfer Capability methodology shall include, at a minimum, the following information:	See Below
R1.1.	Criteria for the selection of the transfers to be assessed.	2.1
R1.2.	A statement that the assessment shall respect known System Operating Limits (SOLs).	2.2
R1.3.	A statement that the assumptions and criteria used to perform the assessment are consistent with the Planning Coordinator's planning practices.	2.2
R1.4.	A description of how each of the following assumptions and criteria used in performing the assessment are addressed:	See Below
R1.4.1.	Generation dispatch, including but not limited to long term planned outages, additions and retirements.	3.1
R1.4.2.	Transmission system topology, including but not limited to long term planned Transmission outages, additions, and retirements.	3.2
R1.4.3.	System demand.	3.3
R1.4.4.	Current approved and projected Transmission uses.	3.4
R1.4.5.	Parallel path (loop flow) adjustments.	3.5
R1.4.6.	Contingencies	3.6
R1.4.7.	Monitored Facilities.	3.7
R1.5.	A description of how simulations of transfers are performed through the adjustment of generation, Load or both.	4
R2.	Each Planning Coordinator shall issue its Transfer Capability methodology, and any revisions to the Transfer Capability methodology, to the following entities subject to the following:	See Below
R2.1.	Distribute to the following prior to the effectiveness of such revisions:	5.1
R2.1.1.	Each Planning Coordinator adjacent to the Planning Coordinator's Planning Coordinator area or overlapping the Planning Coordinator's area.	5.1
R2.1.2.	Each Transmission Planner within the Planning Coordinator's Planning Coordinator area.	5.1
R2.2.	Distribute to each functional entity that has a reliability-related need for the Transfer Capability methodology and submits a request for that methodology within 30 calendar days of receiving that written request.	5.1

Requirement	Text of Requirement	Methodology Section
R3.	If a recipient of the Transfer Capability methodology provides documented concerns with the methodology, the Planning Coordinator shall provide a documented response to that recipient within 45 calendar days of receipt of those comments. The response shall indicate whether a change will be made to the Transfer Capability methodology and, if no change will be made to that Transfer Capability methodology, the reason why.	5.2
R4.	During each calendar year, each Planning Coordinator shall conduct simulations and document an assessment based on those simulations in accordance with its Transfer Capability methodology for at least one year in the Near-Term Transmission Planning Horizon.	6
R5.	Each Planning Coordinator shall make the documented Transfer Capability assessment results available within 45 calendar days of the completion of the assessment to the recipients of its Transfer Capability methodology pursuant to Requirement R2, Parts 2.1 and Part 2.2. However, if a functional entity that has a reliability related need for the results of the annual assessment of the Transfer Capabilities makes a written request for such an assessment after the completion of the assessment, the Planning Coordinator shall make the documented Transfer Capability assessment results available to that entity within 45 calendar days of receipt of the request	7.1
R6.	If a recipient of a documented Transfer Capability assessment requests data to support the assessment results, the Planning Coordinator shall provide such data to that entity within 45 calendar days of receipt of the request. The provision of such data shall be subject to the legal and regulatory obligations of the Planning Coordinator's area regarding the disclosure of confidential and/or sensitive information.	7.2