October 1, 2018

Mr. Zachary G. Smith, Vice President, System and Resource Planning
New York Independent System Operator
10 Krey Boulevard
Rensselaer, NY 12144

Sent Via Email

RE: NextEra Energy New York Comments Regarding Needs Required for the 2018-2019 Transmission Planning Cycle

Dear Mr. Smith:

NextEra Energy Transmission New York ("NEETNY") is pleased to offer these comments in response to the New York Independent System Operator's ("NYISO") August 1, 2018 Request for Proposed Transmission Needs Being Driven by Public Policy Requirements for the 2018-2019 Transmission Planning Cycle pursuant to Section 31.4.2 of Attachment Y to the NYISO's Open Access Transmission Tariff ("OATT"). NEETNY respectfully requests that NYISO consider Public Policy Transmission Needs ("PPTN") to facilitate renewable generation required for New York to meet the Clean Energy Standard ("CES").

On August 1, 2016, the New York Public Service Commission ("PSC") issued an Order adopting the CES, New York's primary policy initiative to promote the development of new renewable energy resources in New York.[1] The CES has established a goal whereby 50 percent of New York's electricity consumption is to be generated by renewable resources by 2030. According to NYISO, this will require the addition of nearly 9,400 MW of new renewable capacity. Based on NEETNY's analyses, New York will need to develop substantial new bulk power transmission to reliably and efficiently enable renewable generation to meet the CES.

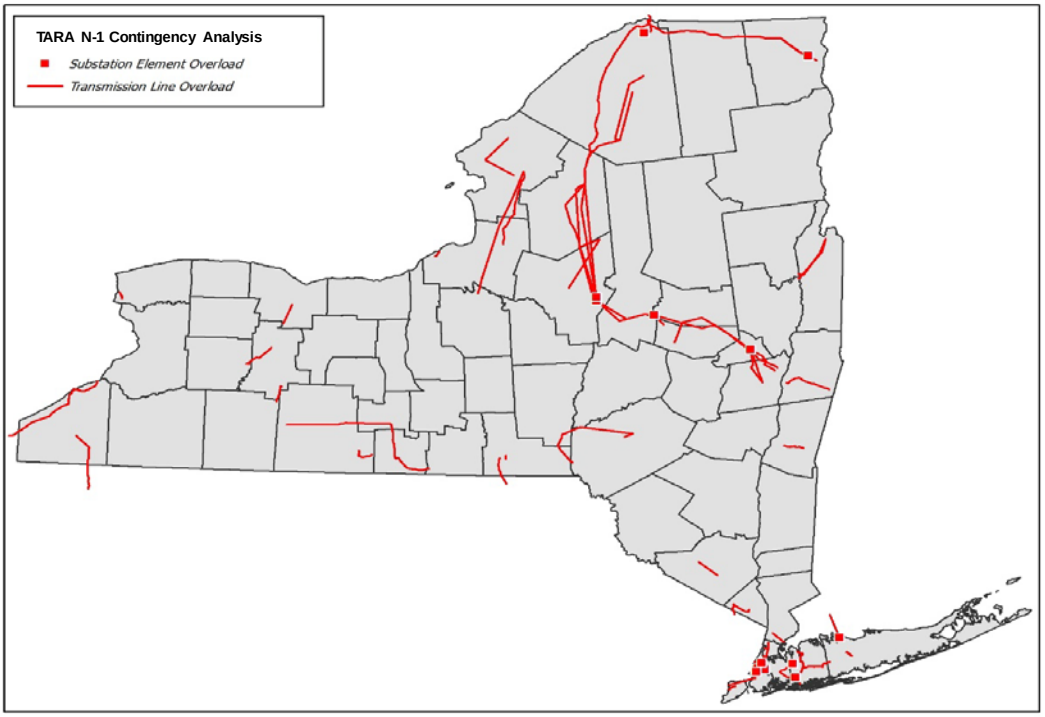
I. Analyses Studying the Impacts of New Renewable Generation Resources

On July 27th, NYISO presented the results of an N-1 contingency analysis ("the NYISO Analysis") to stakeholders, identifying potential transmission needs to enable renewable resources required by the CES. The analysis identified numerous transmission lines that would be thermally overloaded, as well as identified significant loop flows through the PJM system. However, the NYISO Analysis did not take into account any impacts to interface limits, market congestion, and challenges to system and market operations. Therefore, NEETNY has conducted studies to determine the impact CES-driven renewables will have on interface limits and market congestion.

[1] Case 15-E-0302, Proceeding on Motion of the Commission to Implement a Large-Scale Renewable Program and a Clean Energy Standard; Case 16-E-0270, Petition of Constellation Energy Nuclear Group LLC; R.E. Ginna Nuclear Power Plant, LLC; and Nine Mile Point Nuclear Station, LLC to Initiate a Proceeding to Establish the Facility Costs for the R.E. Ginna and Nine Mile Point Nuclear Power Plants, August 1, 2016 Decision.

NEETNY studied the powerflow impacts that new CES-driven renewable resources will have on the grid using PowerGEM's TARA software ("TARA Analysis").[2] The reliability analysis was broken into two phases, with phase one running an N-1 contingency analysis for 2030 summer peak and light load conditions. The generation and load assumptions were based on the same assumptions used in the NYISO Analysis. The TARA Analysis showed that interconnecting large amounts of renewable generation resources will result in a large number of thermal overloads. While NYISO's Large Facility Interconnection Process ("LFIP") will address system upgrades required of new generators connecting to the grid, it will only address system upgrades in incremental steps when generators reach the latter stages of the LFIP. The end result of such a "piece-meal" approach would discourage the development of new renewable generation and result in higher overall transmission costs. Therefore, the PSC and NYISO should consider several PPTNs to effectively address thermal issues associated with the interconnection of significant amounts of new renewable generation. Figure 1 provides an overview of the thermal overloads identified.

Figure 1: Thermal Overloads



The second phase of the reliability analysis studied the impact new renewables would have on existing interface limits. Using the same cases created for the contingency analysis, NEETNY found that, in many instances, the integration of new renewables would decrease existing interface limits. NYISO's LFIP may address reliability issues, but it does not adequately address impacts to NYISO

[2] The TARA Analysis used generation and load level assumptions provided in the NYISO Analysis, using a 2028 model. In addition to that, the Empire State Line project was assumed in-service, an AC Transmission PPTN project was assumed in-service for both Segments A and B, as well as NYPA's Moses-Adirondack 230 kV rebuild, and Indian Point assumed to be retired.

interface limits.[3] If the reduction of interface limits is not addressed through a PPTN, the grid will have less operational flexibility and experience significant amounts of congestion. Table 1 shows the impacts new renewable generation will have on existing interface limits.

Table 1: Impacts to Interface Limits

Interface	Change in Interface Limit (MW) [4]	% Change [5]
Dysinger East (Open)	-919	-37%
Volney East (Open)	-165	-4%
West Central (Open)	-884	-81%
Moses South (Open)	-783	-31%
Central East	220	6%
UPNY-SENY (Open)	-490	-9%
UPNY-ConEd (Open)	374	7%
Dunwoodie South (Open)	-289	-8%

NEETNY also studied wholesale market impacts that new renewable generation resources required by CES will have on the grid using General Electric's Multi Area Production Simulation software ("MAPS Analysis").[6] The MAPS Analysis studied impacts for a 2030 study year, used the same transmission topology as the TARA Analysis, applied 2017 CARIS assumptions, and modified generation and load assumptions according to the NYISO Analysis. Demand Congestion[7] values were monitored to determine which constraints were congested. These constraints were then grouped into corridors, and different analyses looked at the impacts of relaxing the constraints so that they were no longer congested.[8] By relaxing different corridors at a time, NEETNY was able to confirm that addressing one or two corridors will simply push the congestion to a different point on the system, and that it will ultimately be necessary to address all major corridors to fully integrate renewable generation required by the CES.

The MAPS Analysis also confirms significant congestion is expected when interface limits are decreased. The MAPS Analysis also shows that, even if interface limits did not decrease due to the addition of new renewable generation resources, significant congestion is still anticipated. In other words, there is a need to address degradation of existing interface limits and a need to further increase the existing interface limits to adequately address congestion to accommodate the new renewable generation. The Demand Congestion values shown in Tables 2 and 3 below extrapolated

[3] According to NYISO's LFIP, generators participating in the energy market are only required generators to maintain external interface limits (i.e. interfaces with PJM, ISO-NE, etc) and not internal interface limits such as Central East or UPNY-SENY.
[4] A negative value means that the interconnection of new renewable generation lowers the interface limit.
[5] Ibid.
[6] The MAPS Analysis used generation and load level assumptions provided in the NYISO Analysis, using a 2028 model. In addition to that, the Empire State Line project was assumed in-service, an AC Transmission PPTN project was assumed in-service for both Segments A and B, as well as NYPA's Moses-Adirondack 230 kV rebuild. 2017 CARIS assumptions were utilized, with Indian Point assumed to be retired.
[7] Per NYISO, Demand Congestion is a measure of the congestion component of the LBMP and its impact on New York Control Area loads.
[8] Relaxing the constraint was achieved by increasing the limits of the constraints.

over 20 years to match the same timeframe analyzed in NYISO's Public Policy Transmission Planning Process ("PPTPP").[9]

Table 2: Demand Congestion due to a decrease in Interface Limits[10]

Interface	Single year Demand Congestion ($MM)	20 Year Demand Congestion ($MM)
Dysinger East (Open)	$27	$329
Moses South (Open)	$355	$4,378
Central East[11]	$1,346	$16,577
UPNY-SENY (Open)[12]	$61	$751
UPNY-ConEd (Open)[13]	$54	$664
Dunwoodie South (Open)[14]	$25	$313

Table 3: Demand Congestion using Interface Limits defined in 2017 CARIS Study

Interface	Single year Demand Congestion ($MM)	20 Year Demand Congestion ($MM)
Dysinger East (Open)	$12	$144
Moses South (Open)	$147	$1,812
Central East[15]	$1,347	$16,601
UPNY-SENY (Open)[16]	$13	$163
UPNY-ConEd (Open)[17]	$62	$769
Dunwoodie South (Open)[18]	$14	$175

II. Public Policy Transmission Needs

A PPTN is necessary to facilitate the efficient, reliable, and cost-effective connection and operation of renewable resources on the grid. Based on the results of the NYISO Analysis, TARA Analysis, and MAPS Analysis, NEETNY has identified five key corridors that will have reliability, operability, and congestion issues: The Dysinger East Corridor, the Northern New York Corridor, the West Central New York Corridor, the Central East Corridor, and the Southern New York Corridor. The PSC should consider identifying PPTNs that will address the reliability, operability, and congestion issues in each of these corridors.

[9] A 20-year net present value was calculated assuming 2% escalation and 7% discount factor.
[10] Interface limits were decreased from the 2017 CARIS limits by applying the % change calculated through the TARA Analysis.
[11] Assumes that the Dysinger East and Moses South interfaces and related constraints are relaxed.
[12] Assumes that the Dysinger East, Moses South, Central East interfaces and related constraints are relaxed.
[13] Ibid.
[14] Ibid.
[15] Assumes that the Dysinger East and Moses South interfaces and related constraints are relaxed.
[16] Assumes that the Dysinger East, Moses South, Central East interfaces and related constraints are relaxed.
[17] Ibid.
[18] Ibid.

A. Dysinger East Corridor

New transmission is needed to increase the Dysinger East interface by 900 MW to offset the decrease in interface limits resulting from the interconnection of new renewable resources. In addition to restoring the interface to its original capabilities, an incremental 900 MW of transfer capability above the original limits for the Dysinger East interface is necessary to adequately address Demand Congestion. In addition, thermal overloads identified by the NYISO Analysis and TARA Analysis can also be addressed as part of the same PPTN. In order to assist the state in achieving the CES renewable energy goals, new transmission is needed to address the following issues:

- Based on the TARA Analysis and MAPS Analysis, Dysinger East interface limits will decrease by 36% resulting in $329 million of Demand Congestion over 20 years.
- Based on the MAPS Analysis, even after restoring the interface to its original limits, Dysinger East will experience $144 million of Demand Congestion over 20 years.
- Based on the NYISO Analysis, more than 600 MW of renewable capacity will be curtailed in Zone A during summer peak conditions.[19]
- Based on the NYISO Analysis and TARA Analysis, thermal overloads appear on 115 kV lines that will limit both existing and new renewable capacity.
- Based on NYISO's and NEETNY's analysis, there will be increased loop flows into PJM which will reduce operational flexibility.

B. West Central New York Corridor

New transmission is needed to increase the West Central interface by 900 MW to offset the decrease in interface limits resulting from the interconnection of new renewable resources. In addition, thermal overloads identified by the NYISO Analysis and TARA Analysis can also be addressed as part of the same PPTN. In order to assist the state in achieving the CES renewable energy goals, new transmission is needed to address the following issues:

- Based on the TARA Analysis, the West Central interface limits will decrease by 81%, resulting in decreased operability of the transmission system.
- Based on the NYISO Analysis, more than 1100 MW of renewable capacity will be curtailed in Zones B and C during light load conditions.[20]
- Based on the NYISO Analysis and TARA Analysis, thermal overloads appear on the 115 kV lines that will limit both existing and new renewable capacity.
- Based on NYISO's and NEETNY's analysis, there will be increased loop flows into PJM which will reduce operational flexibility.

C. Northern New York Corridor

New transmission is needed to increase the Moses South interface by 900 MW to offset the decrease in interface limits resulting from the interconnection of new renewable resources. In addition to restoring the interface to its original capabilities, an incremental 900 MW of transfer capability above the original limits for the Moses South interface is necessary to adequately address Demand

[19] NYISO ESPWG/TPAS July 27th Presentation, pg. 28.
[20] NYISO ESPWG/TPAS July 27th Presentation, pg. 28.

Congestion. In addition, thermal overloads and operability identified by the NYISO Analysis and TARA Analysis can also be addressed as part of the same PPTN. In order to assist the state in achieving the CES renewable energy goals, new transmission is needed to address the following issues:

- Based on the TARA Analysis and MAPS Analysis, Moses South interface limits will decrease by 31%, resulting in $4.3 billion of Demand Congestion on the Moses South interface over 20 years.
- Based on the MAPS Analysis, even after restoring the Moses South interface to its original limits, approximately $1.8 billion of Demand Congestion will remain on the Moses South interface over 20 years.
- Based on the NYISO Analysis, more than 800 MW of renewable capacity would be curtailed in Zone D during summer peak and light load conditions.[21]
- Based on the NYISO Analysis and TARA Analysis, thermal overloads appear on 115 kV and 230 kV lines that will limit both existing and new renewable capacity.

D. Central East Corridor

New transmission is needed to increase the Total East and Central East interface limits by at least 3000 MW to adequately address Demand Congestion. In addition, thermal overloads identified by the NYISO Analysis and TARA Analysis should also be addressed as part of the PPTN. In order to assist the state in achieving the CES renewable energy goals, new transmission is needed to address the following issues:

- Based on the MAPS Analysis, even with the selection of a transmission solution for the AC Transmission PPTN, approximately $16.6 billion of Demand Congestion will remain on the Central East and Total East interfaces over 20 years[22].
- Based on the NYISO Analysis, more than 800 MW of renewable capacity would be curtailed in Zones E and F combined during summer peak and light load conditions.[23]
- Based on the NYISO Analysis and TARA Analysis, thermal overloads appear on 115 kV lines that will limit both existing and new renewable capacity.[24]

Although NYISO is still in the process of selecting a project for the AC Transmission PPTN, the project ultimately selected will only be capable of providing up to 800 MW of incremental transfer capability across the Central East Interface. The assumptions used in the NYISO Analysis shows that nearly 5000 MW of new renewable generation is expected in upstate New York[25]. As a result, even with the selection of a solution for the AC Transmission PPTN, additional transmission is necessary to relieve congestion across the Central East Interface.

[21] NYISO ESPWG/TPAS July 27th Presentation, pg. 28.
[22] Demand Congestion values assumes that the Dysinger East and Moses South interfaces and related constraints are relaxed. This causes power to flow more freely to the next major constraint, Central East Interface.
[23] NYISO ESPWG/TPAS July 27th Presentation, pg. 28.
[24] Ibid.
[25] NYISO's July 27th Presentation, page 12, for Zones A-E.

E. Southern New York Corridor

New transmission is also needed to increase the UPNY-SENY and Dunwoodie South interfaces by 500 MW to offset the decrease in interface limits due to the interconnection of new renewable resources upstate. In addition to restoring the interface to its original limits, an incremental 1000 MW of transfer capability above the original limits across the UPNY-SENY, UPNY-CONED, and Dunwoodie South interfaces is necessary to adequately address Demand Congestion. In addition, thermal overloads identified by NYISO in their analysis should also be addressed as part of the PPTN. In order to assist the state in achieving the CES renewable energy goals, new transmission is needed to address the following issues:

- Based on TARA Analysis and MAPS Analysis, UPNY-SENY and Dunwoodie South interface limits will decrease by 9% and 8%, respectively, resulting in $1.7 billion of demand congestion over 20 years.[26]
- Based on the MAPS Analysis, even after restoring the UPNY-SENY and Dunwoodie South interfaces to their original limits, approximately $1.1 billion of demand congestion will remain across the UPNY-SENY, UPNY-CONED, and Dunwoodie South interfaces over 20 years[27].
- Based on NYISO's analysis, more than 400 MW of renewable capacity would be curtailed in Zone F during summer peak and light load conditions.[28]

As congestion is relieved upstate, renewable energy will flow downstate where the majority of New York's load resides. Without transmission expansion along the UPNY-SENY, UPNY-CONED, and Dunwoodie South interfaces, the "last mile" transmission constraints can impede New York's ability to meet its CES goal.

III. Evaluation Criteria

NEETNY continues to believe that cost containment will provide significant benefits for New York customers. The PSC should require the NYISO to evaluate voluntary cost contained proposals, which should include developing a defined methodology for evaluating cost contained proposals, as a key evaluation criterion in any future Public Policy Transmission Need.

IV. Conclusion

There will be significant reliability, operability and congestion issues caused by the interconnection of new renewable generation resources to meet the CES. Based on the MAPS Analysis, the most heavily constrained corridors are the Central East and the Northern New York corridors with Demand Congestion measuring in the billions. Addressing both of these corridors is necessary to enable renewable generation resources. However, addressing only these two corridors will be insufficient to fully enable integration of new renewables because of remaining reliability, operational, and congestion issues in the Dysinger East, West Central, and Southern New York corridors. All five corridors should be addressed so that the required renewable generation resources

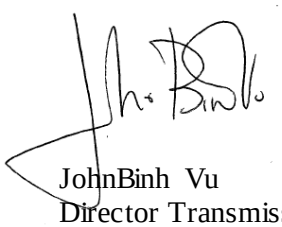
[26] Demand Congestion values assumes that the Dysinger East, Moses South, Central East interfaces and related constraints are relaxed. This causes power to flow more freely to the next major constraints at UPNY-SENY, UPNY-CONED and Dunwoodie South.
[27] Assumes a transmission solution for Segment B from the AC Transmission PPTN is in-service.
[28] NYISO ESPWG/TPAS July 27th Presentation, pg. 28.

can interconnect to the grid reliably and efficiently by 2030. However, NEETNY understands there are limited resources to run multiple PPTPPs, and suggests the following prioritization to address the needs in a staged-approach:

1. The Northern New York Corridor and the Central East Corridor need should be addressed first due to the amount of congestion and reliability issues anticipated along those corridors. Since there may be interaction or synergies between a solution for the Northern New York Corridor and a solution for the Central East Corridor, there should be consideration for a multi-segment process similar to AC Transmission PPTN where there was a distinct Segment A and Segment B.
2. The Dysinger East Corridor and the Southern New York Corridor should be given the next priority since these corridors will have reliability concerns and lower interface limits that will result in operational and congestion issues. NEETNY suggests that NYISO could solicit a transmission solution for both corridors at the same time because a solution addressing the Dysinger East Corridor is less likely to impact a solution addressing the Southern New York Corridor, given the geographical and electrical separation.
3. Finally, the West Central New York Corridor should be given the lowest priority, but still considered a necessary PPTN. The reliability issues, potential for curtailment, operational issues and reduced interface limits make this need just as important as the other corridors to enable renewable generation to meet the CES.

Thank you for including the NEETNY identified public policy transmission needs in your submission to the PSC. Please feel free to contact me if you have any questions with respect to these recommendations. As a preeminent transmission developer in North America, we look forward to working with NYISO and other stakeholders in helping New York to achieve the CES goal.

Sincerely,



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