

**STATE OF NEW YORK
PUBLIC SERVICE COMMISSION**

Case No. 18-E-0623 – *In the Matter of New York Independent System Operator, Inc.'s Proposed Public Policy Transmission Needs for Consideration for 2018.*

Comments of the New York Independent System Operator, Inc.

I. Introduction

The New York Independent System Operator, Inc. (“NYISO”) respectfully submits these comments in the above-captioned proceeding. These comments are prepared in response to the New York State Public Service Commission’s (“Commission” or “NYSPC”) Notice of Proposed Rulemaking in “Proposed Public Policy Transmission Needs/Public Policy Requirements, as Defined Under the NYISO Tariff” (I.D. No. PSC-41-16-00014-P) that was published in the New York State Register dated November 21, 2018 (“November 21 Notice”).

The NYISO continues to support the implementation of the Clean Energy Standard (“CES”).¹ In order to achieve this objective, the State of New York will need additional transmission capacity to deliver renewable resources from upstate New York generation pockets to consumers throughout New York. Moreover, the development of wind resources off the Long Island coast to meet the Commission’s Offshore Wind Standard² could drive the need for an offshore transmission backbone in order to facilitate the delivery of offshore wind resources to the New York electric grid via Long Island and New York City. Should the Commission identify a need for an offshore transmission backbone, the NYISO supports conducting

¹ See generally, Case No. 15-E-0302, *et al.*, *Proceeding on Motion of the Commission to Implement a Large-Scale Renewable Program and a Clean Energy Standard*, Order Adopting a Clean Energy Standard (Aug. 1, 2016); *id.*, Order Providing Clarifications (Nov. 17, 2016).

² See generally, Case No. 18-E-0071, *Matter of Offshore Wind Energy*, Order Establishing Offshore Wind Standard and Framework for Phase 1 Procurement (Jul. 12, 2018).

additional analysis as part of its baseline assessment in the Public Policy Transmission Planning Process (“Public Policy Process”) to inform prospective developers of possible constraints on interconnection points to Long Island and New York City prior to the NYISO’s solicitation for proposed solutions. Given the multi-year lead time necessary for transmission development in New York, the NYISO supports the Commission finding the need for transmission to achieve the CES to be addressed in the Public Policy Process.³

II. Background

A. Process for Identifying Public Policy Transmission Needs

The Public Policy Process is one of the planning components under the NYISO’s Comprehensive System Planning Process (“CSPP”) that complies with the Federal Energy Regulatory Commission’s regional transmission planning requirements under Order No. 1000.⁴ The first step in the Public Policy Process involves the identification of transmission needs related to the New York State Bulk Power Transmission Facilities driven by Public Policy Requirements for which the NYISO should solicit and evaluate solutions. In every two-year planning cycle, the NYISO solicits interested parties to submit proposed Public Policy Requirements that drive transmission needs for consideration by the Commission. The NYISO then posts all submittals on its website and submits them to the Commission, along with

³ Capitalized terms not otherwise defined in this document are defined by Attachment Y to the NYISO Open Access Transmission Tariff (“OATT”) and otherwise in the OATT and Market Administration and Control Area Services Tariff.

⁴ See *New York Indep. Sys. Operator, Inc.*, Letter Order, Docket Nos. ER13-102-012, -013, -014 (Jun. 5, 2018); *New York Indep. Sys. Operator, Inc.*, Order on Compliance Filing, 162 FERC ¶ 61,107 (Feb. 15, 2018); *New York Indep. Sys. Op., Inc.*, Order on Compliance Filing, 156 FERC ¶ 61,162 (Sep. 7, 2016); *New York Indep. Sys. Operator, Inc.*, Order on Compliance Filing, 155 FERC ¶ 61,037 (Apr. 18, 2016); *New York Indep. Sys. Operator, Inc.*, Order on Compliance Filing, 153 FERC ¶ 61,341 (Dec. 23, 2015); *New York Indep. Sys. Operator, Inc.*, Order on Compliance Filing, 151 FERC ¶ 61,040 (Apr. 16, 2015); *New York Indep. Sys. Operator, Inc.*, Order on Compliance Filing, 148 FERC ¶ 61,044 (Jul. 17, 2014); *New York Indep. Sys. Operator, Inc.*, Order on Compliance Filing, 143 FERC ¶ 61,059 (Apr. 18, 2013).

transmission needs and criteria proposed by the NYISO, if any.⁵ In accordance with the NYISO's tariff and its own procedures, the Commission determines whether there are Public Policy Transmission Needs for which the NYISO should solicit transmission solutions as proposed in the submittals or pursuant to the Commission's own finding.⁶

B. Previous Public Policy Process Cycles

In the NYISO's first Public Policy Process cycle beginning in 2014, the Commission identified two Public Policy Transmission Needs calling for increased transmission capability in Western New York ("Western New York Transmission Need") and across the Central East and UPNY/SENY interfaces in the Mohawk and Hudson Valleys ("AC Transmission Needs").⁷ The Western New York Transmission Need is currently under development by the selected developer, and the NYISO is in the final stages of selecting two projects to satisfy the AC Transmission Needs. The Public Policy Transmission Needs identified by the Commission for the Western New York Transmission Need and the AC Transmission Needs are anticipated to increase the potential for the transmission system to deliver energy from renewable resources to load centers based upon the existing fleet of renewable generators.

In the 2016–2017 cycle of the Public Policy Process, the NYISO received and submitted to the Commission twelve proposals that identified the CES, which requires 50% of the State's electric energy to come from renewable resources by 2030 ("50% by 30"), as a primary driver of

⁵ See Section 31.4.2 of the OATT.

⁶ Case No. 14-E-0068, *Matter of Policies and Procedures Regarding Transmission Planning for Public Policy Purposes*, Policy Statement On Transmission Planning For Public Policy Purposes (Aug. 15, 2014), at p 3.

⁷ Case No. 14-E-0454, *Matter of New York Independent System Operator, Inc.'s Proposed Public Policy Transmission Needs for Consideration*, Order Addressing Public Policy Requirements for Transmission Planning Purposes (Jul. 20, 2015) ("Western NY Need Order"); Case No. 12-T-0502, *et al.*, *Proceeding on Motion of the Commission to Examine Alternating Current Transmission Upgrades*, Order Finding Transmission Needs Driven by Public Policy Requirements (Dec.17, 2015) ("AC Transmission Needs Order").

the need for new transmission facilities in New York. At the time, the NYISO commented to the Commission that achieving the CES will require additional transmission capacity beyond the Western New York and AC Transmission needs to deliver renewable resources from upstate to downstate New York and potentially for offshore wind.⁸ In March 2018, the Commission determined that additional work was needed before identifying and referring to the NYISO any need for transmission driven by a Public Policy Requirement and elected to wait for the 2018–2019 cycle of the NYISO’s Public Policy Process to review more up-to-date information and studies.⁹

C. 2018–2019 Public Policy Process Cycle

The NYISO initiated a third cycle of the Public Policy Process on August 1, 2018 by inviting stakeholders and interested parties to submit proposed transmission needs that they believe are being driven by Public Policy Requirements, and for which the NYISO should solicit and evaluate solutions.¹⁰ The NYISO received fifteen submittals (“2018 Submittals”) proposed by: (i) Anbaric Development Partners LLC, (ii) Avangrid Networks, Inc., (iii) H.Q. Energy Services (U.S.) Inc., (iv) Invenergy LLC, (v) ITC New York Development, LLC, (vi) LS Power Grid New York, LLC, (vii) NextEra Energy Transmission New York, (viii) New York Transco LLC, (ix) The City of New York, (x) The New York Power Authority (“NYPA”), (xi) Indicated

⁸ Case No. 16-E-0588, *In the Matter of New York Independent System Operator, Inc.’s Proposed Public Policy Transmission Needs for Consideration for 2016*, Comments of the New York Independent System Operator, Inc. (Dec. 5, 2016).

⁹ Case No. 16-E-0558, *Matter of New York Independent System Operator, Inc.’s Proposed Public Policy Transmission Needs for Consideration for 2016*, Order Addressing Public Policy Requirements for Transmission Planning Purposes (Mar. 16, 2018), at p 23 (declining to identify and refer any Public Policy Transmission Needs to the NYISO for the 2016–2017 Public Policy Process cycle).

¹⁰ See Request for Proposed Transmission Needs Being Driven by Public Policy Requirements for the 2018–2019 Transmission Planning Cycle (Aug. 1, 2018), available at <https://www.nyiso.com/documents/20142/1406936/2018-19-PPTPP-Needs-Solicitation-Letter.pdf>

New York Transmission Owners,¹¹ (xii) PowerBridge, LLC, (xiii) PPL Translink, (xiv) PSEG Long Island, and (xv) Transource Energy, LLC.¹² All fifteen submissions identified the CES as a Public Policy Requirement driving proposed transmission needs, and many of the submissions encouraged the Commission to act now in order to meet the State’s renewable energy goals. As further described below, the two broad categories of proposed transmission needs relate to delivery of renewable resources from constrained regions within upstate New York to statewide load and delivery of offshore wind into the grid via Long Island and New York City.

The NYISO filed the 2018 Submittals with the Commission’s Secretary on October 10, 2018.¹³ On November 21, 2018, the Commission published a notice in the New York State Register soliciting public comments on whether the Commission should identify any Public Policy Requirement or transmission needs driven by a Public Policy Requirement based upon the submitted proposals.¹⁴

III. The NYISO’s Interest and Position in this Proceeding

The NYISO is an independent not-for-profit entity that is responsible for the reliable operation of the bulk power transmission system in New York State, planning for that bulk power transmission system’s continued reliability, and administering competitive wholesale

¹¹ For purposes of the 2018 Submittals, the Indicated New York Transmission Owners include Central Hudson Gas & Electric Corporation (“Central Hudson”); Consolidated Edison Company of New York, Inc.; Niagara Mohawk Power Corporation d/b/a National Grid; New York Power Authority; New York State Electric & Gas Corporation (“NYSEG”); Orange & Rockland Utilities, Inc.; and Rochester Gas & Electric Corporation.

¹² The NYISO posted the Submittals on its website under “Public Policy Documents/Proposed Needs/2018” at the following location: <https://www.nyiso.com/cspp>

¹³ See Case No. 18-E-0623, *In the Matter of New York Independent System Operator, Inc.’s Proposed Public Policy Transmission Needs for Consideration for 2018*, Filing of Proposed Public Policy Transmission Needs (October 10, 2018). In accordance with Section 31.4.2.3 of the OATT, the NYISO filed with the Chair of the Long Island Power Authority Board of Trustees the following submittals that would potentially require a physical modification to facilities in the Long Island Transmission District: (i) Anbaric Development Partners LLC, (ii) the City of New York, (iii) LS Power Grid New York, LLC, (iv) NextEra Energy Transmission of New York, (v) The New York Power Authority, (vi) Indicated New York Transmission Owners, and (vii) PSEG Long Island.

¹⁴ See November 21 Notice.

electricity markets. Based on those responsibilities, the NYISO has a substantive and direct interest in the outcome of this proceeding. The NYISO has no financial interest in the Commission's rulings or in the construction of new transmission infrastructure. It has no affiliation with the Commission, any transmission project sponsor, or any other interested entity.

IV. Comments

A. The NYISO Supports Identification of a Need for Additional Transmission to Fulfill the CES by Delivering Renewable Energy from Upstate and Northern New York Resources to Statewide Load

Over the last two Public Policy Process cycles, the NYISO has commented on the importance of transmission facilities to deliver renewable resources from the constrained upstate and northern New York regions to customers statewide.¹⁵ Most of New York's renewable energy capability is located in upstate and northern New York, including the Capital District region. Even with the Western New York Transmission Need and AC Transmission Needs initiatives already underway, additional transmission capability is needed to deliver energy from renewable resources to New York consumers in order to achieve New York's environmental and energy policies.

As noted in the 2018 Submittals, expansion of the New York State Transmission System in the St. Lawrence to Marcy corridor would afford opportunities for renewable resources to provide additional output onto the high-voltage system that would be delivered to statewide consumers. The New York Transmission Owners point out that bottling of renewable resources

¹⁵ See, e.g., Case No. 14-E-0454, *et al.*, *Matter of New York Indep. Sys. Operator, Inc.'s Proposed Public Policy Transmission Needs for Consideration*, Comments of the New York Independent System Operator, Inc. (Dec. 29, 2014), at p 9; *id.*, Comments of the New York Independent System Operator, Inc. (May 21, 2015), at p 7; *id.*, Letter of President & CEO Stephen G. Whitley to Hon. Audrey Zibelman, Chair (Jun. 4, 2015), at pp 4–5; Case No. 16-E-0588, *In the Matter of New York Indep. Sys. Operator, Inc.'s Proposed Public Policy Transmission Needs for Consideration for 2016*, Comments of the New York Independent System Operator, Inc. (Dec. 5, 2016).

is already occurring on the Moses South transfer path and will only be exacerbated by future growth of renewables in the northern New York region.¹⁶ NYPA states that the most immediate transmission need is for increased transmission capacity on key corridors into and throughout northern New York in order to open access to upstate renewable generation, such as the simultaneous deliverability of the full output of NYPA's St. Lawrence Facility, current wind resources, future wind and solar resources, and renewable imports from Canada.¹⁷

Based on the NYISO's 2018 "Public Policy Transmission Needs Study: Transmission Constrained Renewable Generation Pockets Study," the 2017 Congestion Assessment and Resource Integration Studies, and 2018 NYISO operating history, the NYISO supports the Commission finding a Public Policy Transmission Need for transmission expansion to unbottle existing renewable generation in upstate New York and to accommodate the additional renewable generation that would be required to achieve the CES.

The necessary transmission infrastructure to deliver capacity and energy will depend on, in part, the resource mix and geographic distribution of the new renewable generation, as those factors can dramatically change power flows across the bulk power transmission system. Given the existing and projected location of renewable resources, significant additional renewable energy will have to move east and south across the State to serve customers and will likely further constrain already congested interfaces. In order to maximize the yearly average load served by renewable generation, cross-state energy transfers will actually increase—even as statewide load is decreasing—due to the fact that more renewable generation is available to serve the downstate load. As the penetration of renewable resources in the upstate regions exceeds the

¹⁶ Indicated New York Transmission Owners Submission, Proposed Public Policy Requirements (Oct. 1, 2018), at p 5.

¹⁷ New York Power Authority Submission, Proposed Public Policy Requirements (Oct. 1, 2018), at pp 7–11.

load in those same regions, additional energy transfers from those renewable resources to downstate load centers are necessary.

1. The 2018 Transmission Constrained Renewable Generation Pockets Study Supports the Need for Additional Transmission Capability Due to Curtailment of Existing and Future Renewable Resources

At the request of the New York State Department of Public Service (“DPS”) Staff, the NYISO conducted the “Public Policy Transmission Needs Study: Transmission Constrained Renewable Generation Pockets Study” (“Renewable Generation Pocket Study”) in 2018 to identify whether there are transmission constrained renewable generation pockets in New York.¹⁸ The study results support the need for additional transmission capability to transmit the full output of renewable resources in the identified generation pockets to New York load areas.

In the study, the NYISO performed a screening assessment of transmission constraints on the bulk transmission system under summer peak and light load conditions, including consideration of local transmission system contingency events in the service territories of National Grid, NYSEG and Central Hudson. Each case was evaluated with a mix of existing, planned, and additional renewable generation to achieve “50 x 30.”¹⁹ The renewable generation was assumed to be at 100% output for all generation types, including hydro, solar, land-based wind, and offshore wind in order to identify the transmission constraints that may occur when renewable resources are fully utilized. The potential impact of the 2,400 MW offshore wind goal was not assessed in this study. Based on these assumptions, the NYISO identified generation pockets in which transmission lines may overload as a result of the modeled renewable resource

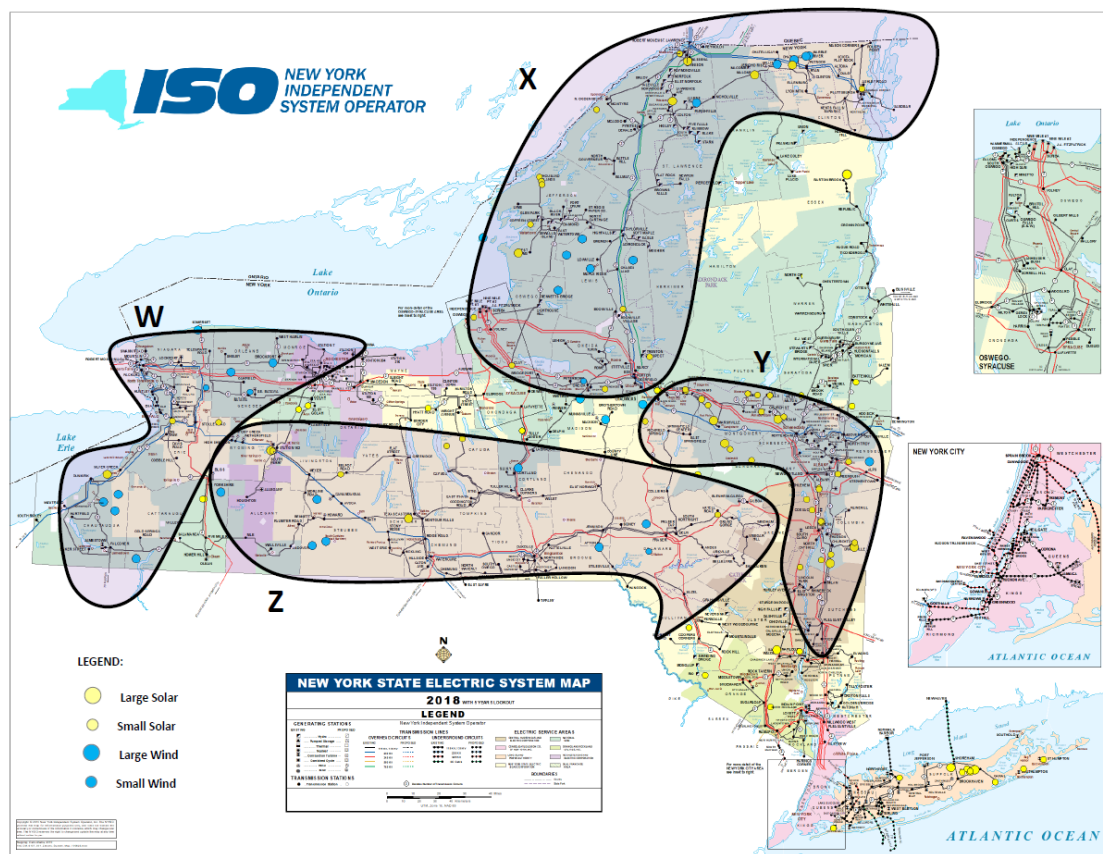
¹⁸ The full assessment is attached and can also be viewed at the following link: https://www.nyiso.com/documents/20142/2176070/PPTN_genpockets_ESPWG_20180727.pdf/27ba1fee-59ed-6602-02ba-1cc7ad8ffa60.

¹⁹ Understanding that there are multiple combinations of resources that could fulfill the CES objective, the NYISO analyzed the injection assumptions provided by DPS Staff. Notably, the analyzed combination represents one possible scenario of how additional renewable resources could be added to the system.

injections, as well as the levels of curtailments of renewable generation that would be required to mitigate these overloads. The resulting constraints were geographically grouped into pockets to identify the transmission constrained renewable generation.

The study results indicate that under both summer peak load and light load conditions, the addition of significant amounts of renewable generation constrains the New York transmission system at the bulk power transmission facility level (generally 200 kV and above), as well as the underlying lower voltage transmission system. Under these conditions and without increased transmission capability to move energy out of these generation pockets (depicted in Figure 1 below), a substantial amount of the additional renewable resources would need to be curtailed at various times to prevent overloading transmission facilities.

Figure 1: Potential Renewable Generation Pockets



The required curtailments indicate the potential of significant bottling of the additional renewable resources. Based on the study assumptions, in order to unbottle the potentially curtailed renewable generation, increased transmission capability would be needed in the following estimated amounts: 25–125 MW in Pocket “W” on the Western New York 115 kV system, 975–1,050 MW for Pocket “X” on the Northern New York 230 kV and 115 kV systems, 400–500 MW in Pocket “Y” on Eastern New York 115 kV systems, and 875–925 MW in Pocket “Z” on the Southern Tier 345 kV and 115 kV systems. While certain constraints were observed only on the underlying lower-voltage transmission system, increased transmission capability at the bulk power transmission facility level could help to address or alleviate the potential constraints.

2. The 2017 NYISO Congestion Assessment and Resource Integration Study Supports the Need for Additional Transmission Capability Due to the Curtailment of Existing and Future Renewable Resources

The NYISO’s 2017 Congestion Assessment and Resource Integration Studies (“CARIS”), released in April 2018, provides several insights into the potential value of additional transmission capability across the New York Control Area (“NYCA”).²⁰ This CARIS study assessed projected congestion patterns in the NYCA under several scenarios; the most informative of which was the System Resource Shift (“SRS”) Case. The NYISO specifically constructed the SRS Case to inform stakeholders as to future impediments to achieving certain public policy goals, such as the CES. This case modeled a set of load and generation assumptions required for 50% of New York’s load to be served by renewable resources and incorporated reasonable projections of transmission expansion, such as transmission facilities

²⁰ The 2017 CARIS Phase I is available at the following link: <https://www.nyiso.com/documents/20142/2226108/2017-CARIS2017-Report-FINAL.pdf/7d228b1b-eb5a-8288-370d-1d4d07bc5168>.

that would address Public Policy Transmission Needs previously identified by the Commission.²¹

Study results from the SRS Case identified two specific indicators that insufficient transmission could restrict a large-scale buildup of renewable generation in New York State. First, the 2017 CARIS reported high levels of demand congestion across the NYCA. Demand congestion—a function of wholesale spot price differentials between regions in New York—is one indicator that lower-priced renewable generation would be bottled in upstate New York. Second, the study observed in the SRS Case a pattern of congestion when analyzing the curtailment of approximately one TWh per year of solar and wind generation due to transmission constraints (commonly referred to as “spillage”).

However, the spillage of renewable solar and wind resources in the SRS Case is due to constraints on the bulk power transmission system and does not capture the transmission limitations that may be present on the lower-voltage transmission system (*e.g.*, the 115 kV transmission system in upstate New York).²² The identified spillage should, therefore, be considered a lower bound, and the potential curtailment of renewable solar and wind resources could only be exacerbated should the congestion on the lower-voltage transmission system be added to the congestion model.

3. 2018 Operating History Demonstrates that Existing Wind Resources Have Not Been Fully Utilized

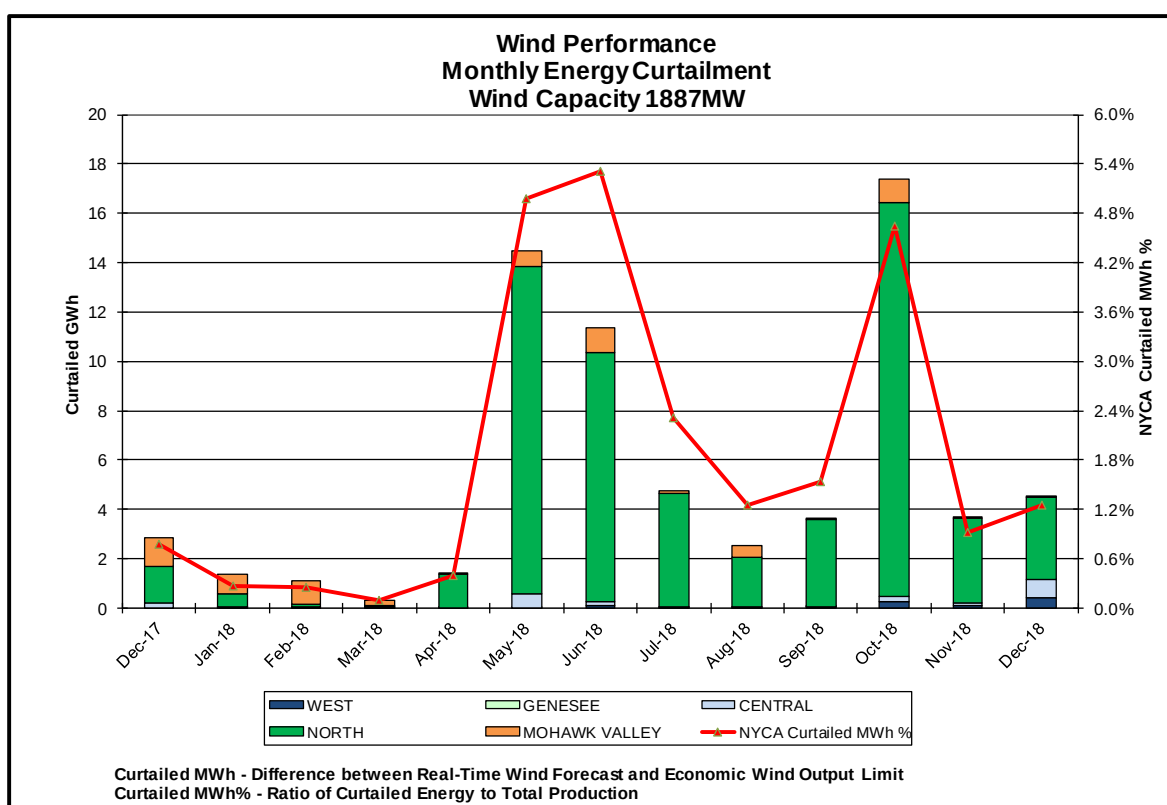
In addition to the above-discussed studies that demonstrate a need for increased transmission to unbottle existing and future renewable resources, the NYISO’s operating history

²¹ See generally, Western NY Need Order; AC Transmission Needs Order.

²² The impact of such transmission constraints on the lower voltage systems was more fully analyzed in the Generation Pocket study.

further supports such a need due to the high curtailment of wind generating facilities in northern New York. In operating the New York State Transmission System, generation may have to be occasionally curtailed due to system constraints in order to maintain grid operational reliability. Moreover, factors such as actual wind speed and transmission facility outages could impact the amount of energy output from the wind generators being delivered to the loads. Based on the NYISO's operating experience, there were high levels of wind curtailment in the northern New York in May, June, and October of 2018. These curtailments were coincident with transmission outages in upstate New York. Figure 2 summarizes the percentage and GWh from the existing wind generation that were curtailed based on geographic location in New York State.

Figure 2: 2018 Monthly Energy Curtailment of Wind



These statistics indicate that the existing wind generation, particularly in northern New York, could be more fully utilized. The transmission constraints leading to the high levels of

curtailment are closely correlated to the constraints in Pocket “X” identified in the Renewable Generation Pockets Study, and further support the need for increased transmission capability in order to fully utilize the existing renewable resources.

B. Further Analysis is Required by the NYISO in the Public Policy Process if the Commission Identifies a Public Policy Transmission Need for an Offshore Transmission Backbone

The State of New York has established an Offshore Wind Master Plan calling for construction of offshore wind to help meet the CES.²³ As stated above, the NYISO supports the implementation of the CES, which will include a potential resource mix of solar, land-based wind, and offshore wind. Several of the 2018 Submittals recommend that the Commission find a Public Policy Transmission Need for a transmission backbone to deliver offshore wind to Long Island and New York City. If the Commission, as a part of achieving the CES, identifies a need for an offshore transmission backbone, the NYISO’s Public Policy Process would allow the development of creative and innovative transmission solutions and, if selected, be eligible for cost allocation and recovery under the NYISO’s tariffs.

In 2017, the NYISO conducted a technical feasibility assessment, at the request of DPS Staff, to evaluate the feasibility of a potential injection of up to 2,400 MW of offshore wind into New York City and Long Island by examining thermal bulk power transmission security.²⁴ From that assessment, the NYISO concluded that while it may be feasible, there are many other issues to be studied in order to implement offshore wind, such as other combinations of injection

²³ New York State Energy Research & Development Authority, New York State Offshore Wind Master Plan, available at <https://www.nyserda.ny.gov/All-Programs/Programs/Offshore-Wind/Offshore-Wind-in-New-York-State-Overview/NYS-Offshore-Wind-Master-Plan>.

²⁴ New York Indep. Sys. Operator, Inc., Offshore Wind Injection Assessment (Dec. 1, 2017), available at <https://www.nyiso.com/documents/20142/1400973/OSW.pdf/c2ec9086-ea7b-f01c-66d6-ff4446a566fc>.

points that may also be feasible, as well as the optimal locations or number of injection points needed for achieving the desired injection of offshore wind.²⁵ Commenters in the 2018 Submittals and in other proceedings recommended additional studies before the Commission identifies an offshore transmission backbone as a Public Policy Transmission Need.²⁶ However, any additional assessment of the nature of transmission needs for offshore wind should be done in the context of the NYISO's Public Policy Process as a part of its baseline assessment prior to the NYISO soliciting proposed solutions.

C. The NYISO Supports Identification of a Transmission Need to Achieve the CES Objectives in the 2018–2019 Public Policy Process Cycle to Allow for the Timely Development of Transmission Facilities

Establishing a Public Policy Transmission Need in this planning cycle for increased transmission capability to move renewable energy out of constrained renewable generation pockets in upstate New York is recommended due to the long lead time needed for transmission planning, siting, and development.²⁷ Considering the time that it takes to get transmission built and in service and that the deadline to satisfy the CES requirement lies less than 15 years away, the NYISO supports the Commission finding the need for transmission to achieve the CES in the 2018–2019 Public Policy Process cycle.

²⁵ *Id.*

²⁶ See, e.g., PSEG Long Island Submission, Proposed Public Policy Requirements (Oct. 1, 2018); Case No. 18-E-0071, *Matter of Offshore Wind Energy*, Comments of Anbaric Development Partners, LLC (Nov. 2, 2018), at pp 2, 8–9 (In response to the Commission's technical conference on Phase 2 of the Offshore Wind Procurement related to the optimal configurations for large-scale offshore wind development, Anbaric Development Partners, LLC commented that "the Planning Process must identify clear goals and metrics around which the means for integrating offshore wind into the state's transmission system can be designed and achieved"); *id.*, Comments of LIPA (Nov. 2, 2018), at pp 2–3. See generally, Case No. 18-E-0071, *Matter of Offshore Wind Energy*, Order Establishing Offshore Wind Standard and Framework for Phase I Procurement (Jul. 12, 2018), at pp 57–58.

²⁷ North America Transmission, Proposed Public Policy Requirements (Sep. 30, 2016), at p 3.

D. The Commission Should Identify Public Policy Transmission Needs that Allow Developers to Propose Creative and Innovative Solutions

The NYISO does not believe that the Commission's finding of a Public Policy Requirement or Public Policy Transmission Need should specify a need for a particular transmission solution. Rather, consistent with the structure of the NYISO's Public Policy Process, the Commission should determine the need for transmission at a higher level and allow developers to propose their own projects to fulfill the need for transmission.²⁸ This would allow the greatest potential for creative and innovative solutions to satisfy the identified need, for the NYISO's selection of the more efficient or cost-effective Public Policy Transmission Project eligible for regional cost allocation and cost recovery under its tariffs, and for eventual siting under Article VII of the Public Service Law by the Commission.

V. Conclusion

For the foregoing reasons, the NYISO supports the Commission identifying a Public Policy Transmission Need between transmission constrained generation pockets upstate and downstate load centers and encourages the Commission to do so in the current planning cycle.

Respectfully submitted,

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January 22, 2019

²⁸ See Section 31.4.3 of the OATT.

Public Policy Transmission Needs Study: Transmission Constrained Renewable Generation Pockets

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July 27, 2018, KCC

DRAFT – FOR DISCUSSION PURPOSES ONLY

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Overview

- **The first step in the Public Policy Transmission Planning Process involves the identification of transmission needs driven by Public Policy Requirements for which the NYISO should solicit and evaluate transmission solutions.**
 - A Public Policy Requirement is a federal, state or local law or regulation, including an order of the New York State Public Service Commission issued after public notice and comment, that drives the need for transmission in New York State.
- **On August 1, 2018 the NYISO will initiate its Public Policy Transmission Planning Process for the 2018-2019 transmission planning cycle by issuing a solicitation to Market Participants and all interested parties over a 60-day period to submit to the NYISO their proposals on Public Policy Requirements that may drive to Public Policy Transmission Needs.**

Overview

- This assessment was conducted by the NYISO pursuant to a request by the New York State Department of Public Service (DPS), and is intended to provide some insights on possible public policy transmission needs.
- NYISO conducted a transmission constraint assessment related to the significant injection of renewable generation resources into various locations in the New York Control Area (“NYCA”) to satisfy the 50-by-30 goal of the State’s Clean Energy Standard (“CES”).
- Two “snapshot” conditions were evaluated as representative of expected common operating states in a given year. The goal of this assessment is to identify if transmission upgrades may be needed to facilitate achievement of CES.

Considerations Outside the Scope of Assessment

- This is NOT an interconnection study. System and substation specific upgrades will be identified based on project proposals in the interconnection process.
- The assessment did not review:
 - i. N-1-1 contingencies,
 - ii. voltage or stability impacts,
 - iii. year-round deliverability of energy or capacity to loads,
 - iv. impact to the New York system reserve margin

Proposed Assumptions and Methodology

Study Methodology

- Conduct screening analysis on the system with projected renewable resource additions to satisfy the CES 50-by-30 goal. The results from N-1 contingency analysis were used to identify the potential thermal constraints on the NYCA transmission system 115 kV and above.
- Contingencies on the BPTF statewide were analyzed, along with the local transmission system contingencies in the service territories of National Grid, NYSEG and Central Hudson. Local circuit switching was not considered as a measure to relieve local transmission constraints.
- The generation pockets with overloaded transmission lines resulting from renewable generation injections were identified, as well as the MW levels of curtailments of the renewable generation that would be required to mitigate these overloads.

Study Methodology (cont.)

- Two projected load conditions for year 2028 were developed and analyzed to provide a probable outcome. The resulting constraints serve as indicative potential transmission bottlenecks.
- The transmission security assessment, including N-0 and N-1 thermal analysis, was performed using the PowerGEM TARA software. Monitored elements included all 115 kV and above facilities in the service territories of National Grid, NYSEG/RGE, and Central Hudson.
- N-1 analysis was performed using the optimization feature of TARA to identify potential curtailment of renewable resources.
- The thermal violations were grouped into “pockets” to identify the transmission constrained renewable generation.

Assumptions

- **Transmission upgrades:** The bulk power transmission system was updated to include the following projects:
 - NextEra Western New York PPTN project
 - Generic AC Transmission PPTN projects: generic projects that increase the transfer limits of Central East by 350 MW and UPNY-SENY by 900 MW
 - NYPA's proposed rebuild of Moses-Adirondack 230 kV circuits.
- **Projected renewable resource addition:** Resources were added to satisfy CES at the direction of DPS. The MW amount of each resource type, such as grid-connected solar and wind, and the zonal allocations are included in the next slide.
- **Increased net imports from Ontario by 454 MW to satisfy CES, also provided by DPS.**

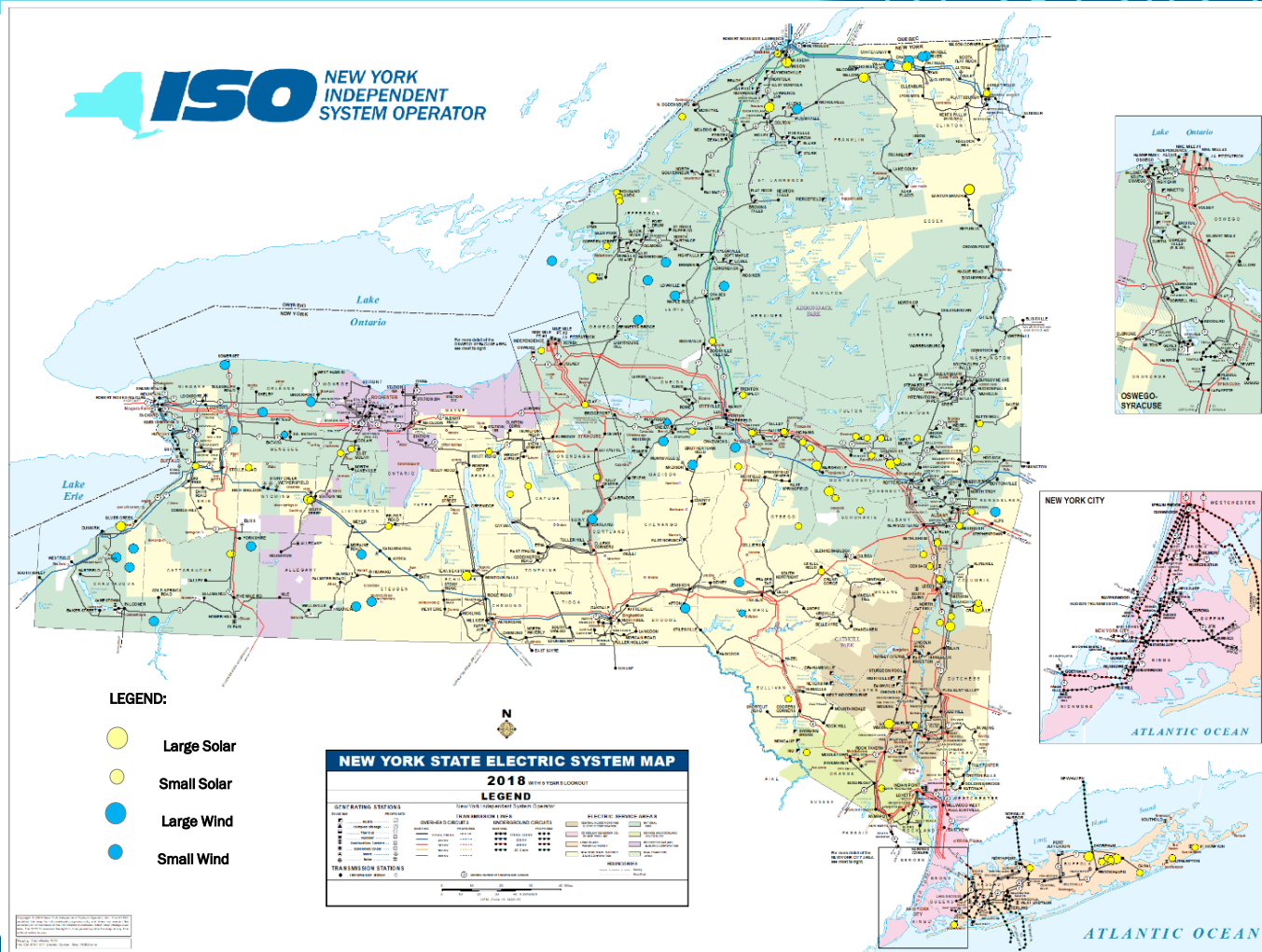
Assumptions re: Additional Renewables

Zone	Land based wind (MW)	Solar (MW)	Off-shore Wind (MW)	Total Addition (MW)
A	1,645	213	-	1,858
B	-	102	-	102
C	958	186	-	1,144
D	325	170	-	495
E	835	700	-	1,535
F	120	1,000	-	1,120
G	-	400	-	400
H	-	6	-	6
I	-	0	-	-
J/K	-	-	2,400	2,400
K	-	328	-	328
Total	3,883	3,105	2,400	9,388

Note: There are multiple combinations of resources that could fulfill the CES. The combination analyzed in this assessment represents one possible approach. This total addition includes firm/planned renewables.

Assumptions: Points of Interconnection

- Utilized NYISO's interconnection queue to identify interconnection points and distribution of generation installations
- Injection points are assumed to be the closest existing substations
- Study assumptions:
 - Solar: 71 sites, injecting at various voltage levels from 115 kV - 34.5 kV, rating between 140 MW and 6 MW
 - Land-based wind: 23 sites, injecting at various voltage levels from 345 kV - 46 kV, rating between 275 MW and 26 MW
 - Off-shore wind: 2 sites, injecting at 345 kV (zone J) and 138 kV (Zone K), each one rated at 1,200 MW



Generation Assumptions

Zone	Existing and Firm Renewables (MW)				Additional Renewables (MW)			Total Renewables (MW)
	Hydro	Wind	PV	Total	Wind	PV	Total ⁽¹⁾	
A	2,439	343	0	2782	1,058	214	1,273	4,054
B	53	6	0	59	390	48	438	497
C	90	665	0	755	995	288	1,283	2,038
D	912	678	0	1590	324	430	746	2,262
E	372	521	0	893	789	389	1,176	2,069
F	246	0	0	246	120	1,150	1,298	1,544
G	85	0	0	85	0	264	264	348
H	0	0	0	0	0	0	0	0
I	0	0	0	0	0	0	0	0
J	0	0	0	0	1,200	0	1,200	1,200
K	0	0	51	51	1,200	327	1,527	1,578
Total	4,197 ⁽²⁾	2,213	51	6467	6,077	3,110	9,205	15,590

1. Total addition to the 2028 power flow case: The MW numbers for Zones A, B and C vary to account for 1) the wind farms not in-service yet but already included in the case, and 2) points of injection.
2. Pumped storage facilities can be either generating or pumping, so the capacity was added separately.

Assumptions: Generation Dispatch

- In consultation with the DPS staff, the NYISO staff compiled and recommended a list of frequently-committed units that would unlikely be displaced by renewable generation. These units include the existing renewable generating units, nuclear units (except Indian Point Energy Center which was assumed deactivated in the analysis), and several steam and combined cycle plants.

Assumptions: Frequently Committed Generators

- Units committed based on NYISO operating experience as the starting point
 - Peak load: historical August peak hours
 - Light load: historical March loads @~20,000 MW during the day
- Dispatch: Pmax based on the 2018 DMNC, Pmin based on 30% for combined cycle plants and 20% for steam stations

Assumptions: Load Conditions

- Two load conditions were developed to represent possible system conditions and load-generation balance: summer peak load and summer light load conditions.
 - More severe transmission constraints could occur when the NYCA load is very high, or they might occur when the NYCA load is lower but combined with higher renewable generation (during windy and sunny days), and the transmission facilities are at lower summer ratings to transfer power
 - Summer peak load: approximately 33,300 MW load including losses
 - 2018 NYISO forecast for 2028 plus additional losses resulting from transferring power from upstate to downstate
 - Summer light load: approximately 20,000 MW load including losses

Assumptions: Summer Light Load Conditions

- Summer ratings for transmission facilities
- Load Profile:
 - NYISO operating experience as the starting point
 - NYISO surveyed sunny and windy days in early summer
 - Load duration curves for summer 2014 and 2017 were developed to identify midpoint: NYCA load was approximately 18,000 MW or higher for 50% of the summer hours
 - Zonal load distribution on May 1, 2018 at HR 14 was used as a proxy for scaling up and down

Assumptions: Resource – Load Balance

		Summer Peak	Summer Light
Load	NYCA load+losses	33,294	20,048
Resources for NYCA consumption	Total Renewables	15,594	15,594
	Pmin from frequently committed units	7,499	5,729
	Import from NE	0	-1,400
	Import from ONT	454	-484
	Import from HQ	1,110	0
	Import from PJM	162	0
	HTP	0	0
	Neptune HVDC	660	0
	Pumping Units	0	0
	Resources - Load (MW) ^{note}	-7,815	-609

Note:

- positive total MW balance implies a surplus of generation, and negative numbers implies frequently committed units would be dispatched above Pmin.

Study cases

- **Summer Peak Cases, total NYCA load at ~33,300 MW:**
 - Case A: Reference FERC 2028 summer peak case with the transmission upgrades. All 6,467 MW of existing (in the case) baseline renewable generation was set at their full output
 - Case B: Similar to Case A, but with all future additional renewable generation added and set at full output
- **Summer Light Load Cases, total NYCA load at ~20,000 MW:**
 - Case C: Similar to Case A, with existing baseline renewable generation but with a summer light load profile
 - Case D: Similar to Case B, with all future additional renewable generation added but a summer light load profile

Results and Discussion

Baseline N-1 Thermal Assessment: Firm/Existing Renewables at full output

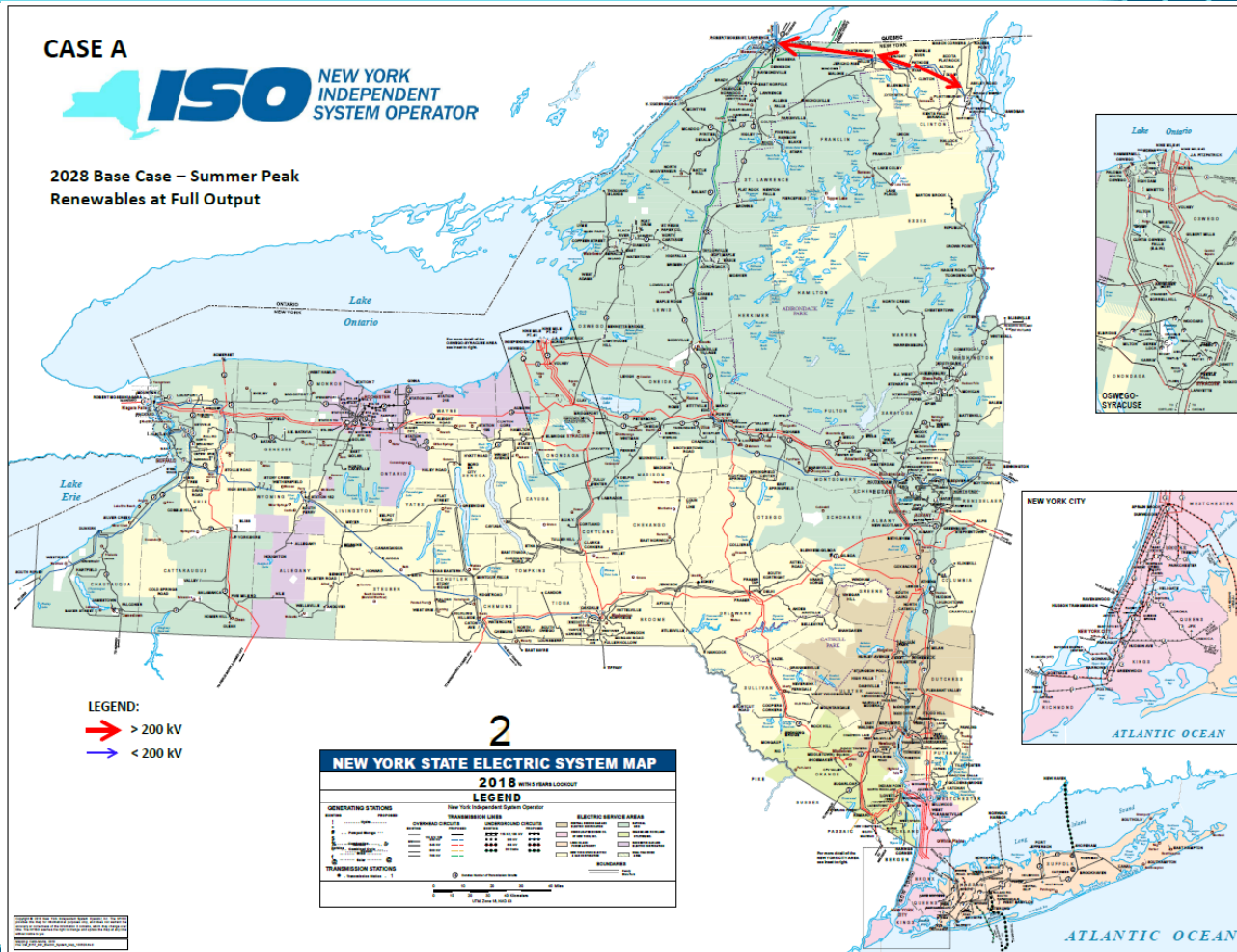
Case A – Summer peak case with baseline renewables at full output: (N-0)/(N-1) was performed, and no curtailment of existing baseline renewables was allowed. Certain 230 kV lines in Zone D (North zone) were found to be overloaded in the vicinity of high wind generation. The identification of these transmission constraints is consistent with NYISO's current operating experience.

Case C – Summer light load case with baseline renewables at full output: (N-0)/(N-1) was performed, and no curtailment of existing baseline renewables was allowed. Some 230 and 115 kV lines in Zone D and Zone E were overloaded. The identification of these transmission constraints is consistent with NYISO's current operating experience.

CASE A



2028 Base Case – Summer Peak
Renewables at Full Output



CASE C

ISO NEW YORK INDEPENDENT SYSTEM OPERATOR

**2028 Base Case – Summer Light Load
Renewables at Full Output**

LEGEND:
→ > 200 kV
→ < 200 kV

Note: Constraints not previously observed in the studied peak load conditions are highlighted in yellow.

NEW YORK STATE ELECTRIC SYSTEM MAP
2018 WINTER YEAR LOADS
LEGEND

GENERATING STATIONS		TRANSMISSION LINES		ELECTRIC SERVICE AREAS	
Type	Capacity	Voltage	Length	Area	Population
Nuclear	1,000 MW	1,000 MW	1,000 MW	1,000 MW	1,000 MW
Fossil	1,000 MW	1,000 MW	1,000 MW	1,000 MW	1,000 MW
Hydro	1,000 MW	1,000 MW	1,000 MW	1,000 MW	1,000 MW
Solar	1,000 MW	1,000 MW	1,000 MW	1,000 MW	1,000 MW
Wind	1,000 MW	1,000 MW	1,000 MW	1,000 MW	1,000 MW
Biomass	1,000 MW	1,000 MW	1,000 MW	1,000 MW	1,000 MW
Geothermal	1,000 MW	1,000 MW	1,000 MW	1,000 MW	1,000 MW
Small Hydro	1,000 MW	1,000 MW	1,000 MW	1,000 MW	1,000 MW
Other	1,000 MW	1,000 MW	1,000 MW	1,000 MW	1,000 MW

CES N-1 Thermal Assessment: Additional Renewables at Full Output

Case B – Summer peak case with baseline and additional renewables at full output: Numerous thermal violations were identified through the state for both N-0 and N-1 conditions. Heavy loop flows through PJM from Zone A to Zone C were observed.

Case D – Summer light load case with baseline and additional renewables at full output: Numerous thermal violations were identified through the state under N-0 and N-1 conditions. The constraints were largely similar to the ones observed in peak load cases. Heavy loop flows through PJM from Zone A to Zone C were also observed.

Curtailment Analysis

- Renewable generation, both existing and additional, was curtailed to relieve thermal violations. This analysis focuses on unbottling constraints in the study area.
 - The potential system impacts of injecting the assumed amounts of off-shore wind in Zones J and K were not further analyzed.
- The MW of additional renewables that had to be curtailed at a zonal level during summer peak and light load conditions are shown in the next slide.

Curtailment Analysis (cont.)

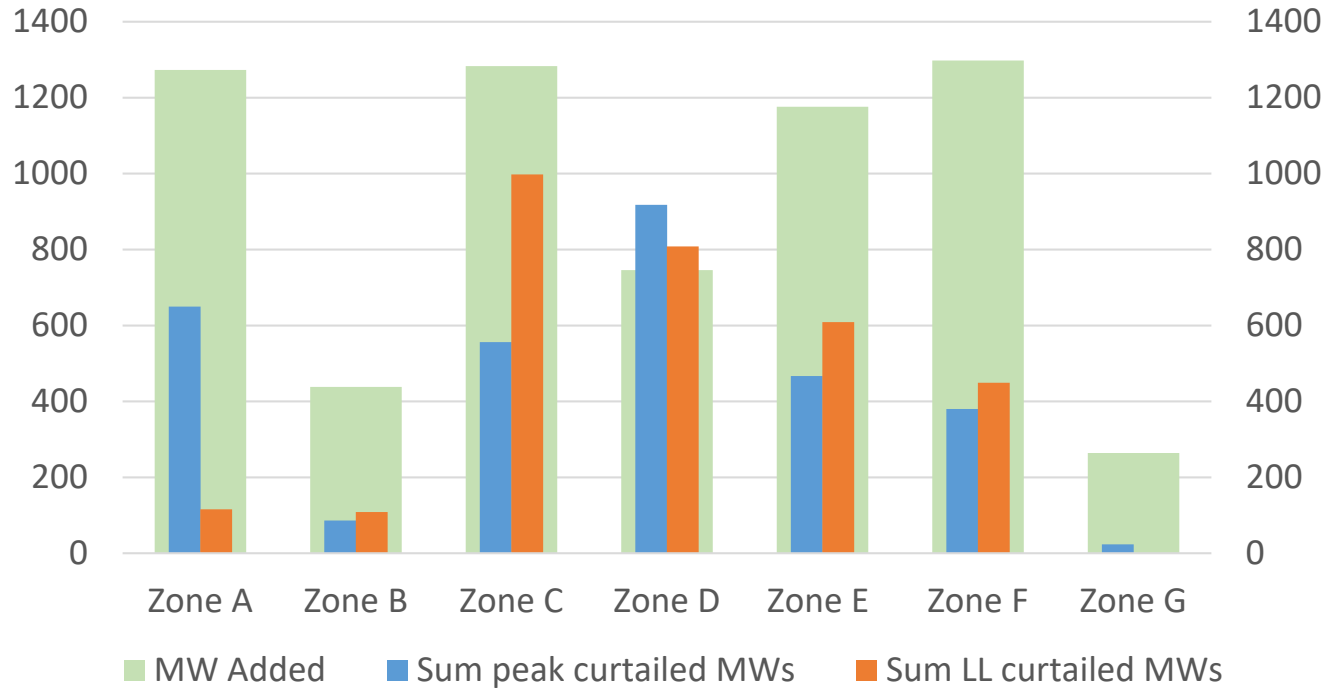
- Groups of overloads (“pockets”) were found from study scenarios with renewable generation turned on at their maximum outputs. These overloads were organized into groups:
 - Pocket W: Western NY Overloads
 - Niagara – Rochester (115 kV)
 - PJM-NY AC Ties (115 kV)
 - Niagara – Gardenville – Stolle Rd (115 kV)
 - Pocket X: Northern NY Overloads
 - Zone D Wind Generation Corridor (230 & 115 kV)
 - North to South Moses South Transfer path (230 & 115 kV)
 - Jefferson & Lewis Counties (115 kV)
 - Pocket Y: Eastern NY Overloads
 - Mohawk Valley Corridor (115 kV)
 - Hudson Valley Corridor (115 kV)
 - Pocket Z: Southern Tier Overloads
 - Finger Lakes Region Wind & Solar (115 kV)
 - Southern Tier Transmission Corridor (345 & 115 kV)



Potential unbottling of curtailed renewable generation

Pocket	Description	Renewable Generation Unbottling Range (MW)
W	Western NY 115 kV	25 - 125
X'	Northern NY 230 kV Only	400 - 425
X	Northern NY 230 and 115 kV	975 - 1,050
Y	Eastern NY 115 kV	400 - 500
Z	Southern Tier 345 and 115 kV	875 - 925
W + Z	Western + Southern Tier	1,000 - 1,150

Renewables - MW added vs. MW curtailed



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Conclusions

- The study reveals that under both the studied summer peak and summer light load conditions, the addition of significant amounts of renewable generation causes stresses and certain violations on the NY transmission system at both the backbone (> 200 kV) as well as the underlying (100 – 200 kV) system.
- Under the studied “snapshot” system conditions, a substantial amount of additional renewable generation in these zones may need to be curtailed to prevent overloading transmission facilities.
- The study indicates a need for transmission upgrades in order to transmit the full power from the renewable generation pockets to NYCA load to achieve the CES.

Questions?

We are here to help. Let us know if we can add anything.

The Mission of the New York Independent System Operator, in collaboration with its stakeholders, is to serve the public interest and provide benefits to consumers by:

- Maintaining and enhancing regional reliability
- Operating open, fair and competitive wholesale electricity markets
- Planning the power system for the future
- Providing factual information to policy makers, stakeholders and investors in the power system



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CERTIFICATE OF SERVICE

I hereby certify that I have this day served the foregoing document upon each person designated on the official service list compiled by the Secretary in this proceeding.

Dated at Rensselaer, NY this 22nd day of January 2019.

/s/ John C. Cutting

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