Attachment B

Exhibit No. LSPG-NY-100

UNITED `STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

LS POWER GRID NEW YORK CORPORATION I	**)** **)**	**Docket No. ER20-___-000**

DIRECT TESTIMONY AND EXHIBITS
OF
LAWRENCE WILLICK

EXHIBITS

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I. INTRODUCTION AND EXPERIENCE

Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A. My name is Lawrence Willick. My business address is 16150 Main Circle Drive, Suite 310, St. Louis, Missouri 63017.

Q. WITH WHAT ENTITY ARE YOU EMPLOYED?

A. I am employed as Senior Vice President with LS Power Development, LLC ("LSP Development"), the general partner and manager of LS Power Associates, L.P. ("LS Power"), which is an indirect owner of LS Power Grid New York Corporation I ("LSPG-NY" or "Company").

Q. ON WHOSE BEHALF ARE YOU TESTIFYING IN THIS PROCEEDING?

A. I am testifying on behalf of LSPG-NY.

Q. PLEASE SUMMARIZE YOUR EDUCATIONAL BACKGROUND, PROFESSIONAL QUALIFICATIONS, AND BUSINESS EXPERIENCE.

A. I earned a Bachelor of Science in Engineering, summa cum laude, and a Masters in Business Administration, with honors, both from Tulane University. Since 1996, I have been employed within the LS Power organization in various positions. I have over 25 years of experience in the electric power industry, much of which has been dedicated to the green-field development of electric power transmission infrastructure. I have been involved in the project financing of four generation facilities representing over 2,500 MW and over $1 billion in capital investment and five transmission facilities representing over $1 billion in capital investment.

Q. WHAT ARE YOUR PRINCIPAL AREAS OF RESPONSIBILITY?

A. I provide management supervision of LS Power's transmission development efforts, which includes oversight of operating transmission facilities and other facilities in various stages of implementation.

I participate in management of two LS Power transmission companies that have facilities in operation, Cross Texas Transmission, LLC ("Cross Texas") and One Nevada Transmission Line ("ON Line"). Cross Texas is a fully operational utility within ERCOT with a primary and back-up control center in Austin, Texas, and rates approved by the Public Utility Commission of Texas. Cross Texas' system consists of 290 miles of 345 kilovolt transmission lines in Texas, including associated substations and related facilities. Great Basin Transmission South, LLC owns 75% of ON Line, a 235-mile 500 kilovolt transmission line in operation in Nevada.

I also have oversight responsibilities within three companies, Silver Run Electric, LLC, DesertLink, LLC, and Republic Transmission, LLC, which have been designated to develop, construct, operate and maintain high-voltage facilities by various Independent System Operators/Regional Transmission Operators ("RTOs") which I will discuss later.

Finally, I support several other LS Power transmission companies which are pursuing early stage transmission project proposals in other parts of the United States.

Q. HAVE YOU PREVIOUSLY FILED TESTIMONY BEFORE A REGULATORY BODY?

A. Yes. I have filed testimony before state regulatory commissions in Colorado, Georgia, Indiana, North Carolina, South Carolina, Texas, Utah, and Wisconsin and before the Federal Energy Regulatory Commission ("FERC" or "Commission").

II. PURPOSE OF TESTIMONY

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?

A. The purpose of my testimony is to provide an overview of LSPG-NY's filing for approval of a transmission formula rate and formula rate protocols as well as certain incentive rate treatment.

My testimony (i) describes LSPG-NY and its affiliates; (ii) describes the background related to a variety of New York state initiatives, as developed through several New York Public Service Commission ("NYPSC") dockets, which led the NYISO to seek proposals for development of projects to address identified public policy needs; and (iii) NYISO's selection of LSPG-NY and the New York Power Authority to construct, finance, own, and maintain the Project (the "Project" is described in the testimony of Casey Carroll, exhibit LSPG-NY-200). In addition, my testimony addresses LSPG-NY's request for: a) an RTO participation incentive as an Independent Transmission Company ("ITC"); b) a 50 basis point return on equity addition based upon the risks and challenges of the Project; and c) a performance based rate to implement the

80/20 Cost Containment; all subject to the overall return on equity being within the zone of reasonableness.

Q. OTHER THAN YOUR DIRECT TESTIMONY, ARE YOU SPONSORING ANY EXHIBITS?

A. Yes. I am including as exhibits to my testimony the following:

- **LSPG-NY-101** – LSPG-NY Organizational Chart;
- **LSPG-NY-102** – a map showing operational transmission facilities owned by LS Power affiliates of LSPG-NY;
- **LSPG-NY-103** – New York Public Service Commission Order Finding Transmission Needs Driven by Public Policy Requirements;
- **LSPG-NY-104** – NYISO AC Transmission Public Policy Transmission Needs Project Solicitation Letter;
- **LSPG-NY-105** – NYISO AC Transmission Public Policy Transmission Need Viability & Sufficiency Assessment;
- **LSPG-NY-106** - New York Public Service Commission Order Addressing Public Policy Transmission Need for AC Transmission Upgrades;
- **LSPG-NY-107** - NYISO AC Transmission PPTP Report.

Q. WHAT IS THE PURPOSE OF THIS FILING?

A. In this proceeding, LSPG-NY is seeking Commission approval of a transmission formula rate and formula rate protocols. In addition LSPG-NY seeks Commission approval of transmission incentive rate treatment for: (1) capitalization of certain costs that would not otherwise be capitalized; (2) use of a hypothetical capital structure consisting of 47% debt and 53% equity until the Project achieves full commercial operation; (3) a 50 basis point adder to LSPG-NY's return on equity ("ROE") for participating in a Regional

Transmission Organization ("RTO") as an ITC, subject to the resulting ROE being within the zone of reasonableness; (4) a 50 basis point adder to LSPG-NY's ROE for the risks and challenges of the Project, subject to the resulting ROE being within the zone of reasonableness; and (5) a performance based rate adder to implement the 80/20 Cost Containment.

Q. ARE OTHER WITNESSES SUBMITTING TESTIMONY IN SUPPORT OF THIS APPLICATION?

A. Yes:

- Mr. Casey Carroll describes the Project and the process for development and construction of the Project including the permitting and construction risks and challenges.
- Mr. Cameron Tajvar (i) explains how LSPG-NY is currently funded and will be funded in the future, including LSPG-NY's targeted credit profile; (ii) describes the financial risks facing LSPG-NY as a non-incumbent transmission owner; (iii) explains why LSPG-NY qualifies for the Hypothetical Capital Structure Incentive; and (iv) supports the cost of debt and incentive ROE adder that are included in the proposed Formula Rate Template.
- Mr. Joseph L. Myers describes the accounting matters related to LSPG-NY, including the treatment of affiliate costs, and the basis for the incentive rate request for regulatory asset treatment of prudently incurred costs not capitalized.
- Mr. Chris Nagle with MCR Performance Solutions describes the features of LSPG-NY's proposed formula rate template and protocols.
- Mr. Dane Watson with Alliance Consulting Group supports the proposed depreciation rates.

- Mr. Robert B. Hevert with Navigant establishes the appropriate base rate of return on equity for LSPG-NY.

III. DESCRIPTION OF THE COMPANY

Q. PLEASE DESCRIBE LSPG-NY.

A. LS Power Grid New York Corporation I (f/k/a North America Transmission Corporation) is a transmission-only company whose business is to develop, own, and operate transmission facilities in the NYISO region. LSPG-NY is a corporation organized under the law of the State of New York.

Q. PLEASE DESCRIBE LSPG-NY'S RELATIONSHIP TO LS POWER.

A. Exhibit No. LSPG-NY-101 is an organizational chart showing how LS Power is organized and how LSPG-NY fits within the broader LS Power organization. LS Power has subsidiaries engaged in transmission development and transmission planning to help increase reliability, reduce transmission constraints, and/or deliver renewable resources. Other indirect subsidiaries of LS Power have developed over 600 miles of high voltage transmission facilities. In addition, affiliates of LS Power have been involved in the development, construction, or operation of over 39,000 MW of generation resources in the United States. Exhibit No. LSPG-NY-102 is a map showing operational transmission facilities owned by affiliates of LSPG-NY.

Q. PLEASE DESCRIBE THE OWNERSHIP STRUCTURE OF LSPG-NY AS IT RELATES TO THE OTHER LS POWER ENTITIES.

A. LS Power Grid New York Corporation I is wholly owned by LS Power Grid New York Holdings, LLC, which is wholly owned by LSP Transmission Holdings, LLC, which in turn is wholly owned by LSP Generation IV, LLC.

All of the membership interests of LSP Generation IV, LLC are owned by LS Power. LS Power is a Delaware limited partnership that is wholly owned by certain private individuals and entities. LSP Development is the general partner of LS Power.

Other transmission owner or development interests of LS Power are affiliates of LSPG-NY. Great Basin Transmission South, LLC, is the co-owner of the One Nevada Transmission Line ("ON Line"), a 500 kV transmission line in Nevada. Cross Texas Transmission, LLC, is a public utility in Texas subject to the jurisdiction of the Texas Public Utility Commission with an approximately 300 mile 345 kV high-voltage transmission system registered as a Transmission Service Provider in Electric Reliability Council Of Texas. DesertLink, LLC was selected by the California Independent System Operator Corporation as the approved sponsor of the Harry Allen to Eldorado 500 kV transmission project. Silver Run Electric, LLC (successor to Northeast Transmission Development, LLC), was selected by PJM Interconnection, L.L.C. to be the developer of competitively bid portions of a transmission project in New Jersey and Delaware. Republic Transmission, LLC was selected by the Midcontinent Independent System Operator, Inc. to develop and own the competitively bid Duff to Coleman project in Indiana and Kentucky.

Through other affiliates, LS Power is actively engaged in transmission development across the country by participating in regional planning processes that competitively select transmission developers.

Q. PLEASE DESCRIBE THE NEW YORK POWER AUTHORITY AND ITS ROLE IN THE PROJECT.

A. The New York Power Authority is a division of the State of New York and since 1931 has been working to generate and transmit electricity in New York in a safe, environmentally responsible manner. NYPA owns and operates 1400 miles of transmission in New York, more than one-third of the major transmission lines in New York State, helping to form the backbone of the statewide grid for electric power.

LSPG-NY and NYPA jointly sponsored several proposals in the NYISO process, including the Project, in a way that built on the strengths of each party. LS Power will be responsible for permitting and development of the Project. NYPA has an ability to purchase an ownership interest in standalone pieces of the Project. Each party is responsible to finance its own ownership share and recover its costs under its own rates.

Q. ARE THERE BENEFITS OF LSPG-NY AS A TRANSMISSION-ONLY COMPANY FOCUSED ON PROJECTS IN NYISO?

A. LSPG-NY serves as a transmission-only company through which to develop, finance, construct, own, and maintain regionally planned transmission assets. LSPG-NY is engaged solely in the business of developing transmission solutions and delivering cost-effective transmission projects in the NYISO. With a strategic focus on competitively solicited transmission projects, LSPG-NY has the ability to structure and separately finance transmission projects with an appropriate risk profile for the investment community.

Q. DOES LSPG-NY OWN OR OPERATE ANY TRANSMISSION FACILITIES TODAY?

A. No.

IV. THE HISTORY LEADING TO NYISO'S SOLICITATION OF PROJECTS TO ADDRESS IDENTIFIED PUBLIC POLICY NEEDS

Q. WHAT IS THE HISTORY OF THE PROJECT?

A. The Project resulted from several iterations of solicitations by entities in New York. Starting with the New York Energy Highway Initiative in 2012, there have been five invitations for developers to submit projects for consideration to address energy needs in the State. After review of each round of submittals, product definitions and requirements have been further refined, up to the recommendation of the Project by the NYISO in the Public Policy Transmission Process under its OATT.

Q. PLEASE DESCRIBE THE NEW YORK ENERGY HIGHWAY INITIATIVE

A. The New York Energy Highway initiative began with New York Governor Andrew M. Cuomo's January 2012 State of the State Address[1] which included several proposals to address many of the energy challenges facing the state of New York. Governor Cuomo appointed the New York Energy Highway Task Force ("Task Force"), and the Task Force issued a Request for Information for developers of all types of energy projects.[2] Over 85 entities submitted responses to the Request for Information,[3] and after reviewing the submittals the Task Force published the New York Energy Highway Blue Print ("Blue Print") in October 2012.[4] The Blue Print recommended over a dozen actions for state agencies to advance a number of key energy goals.

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1 https://www.ny.gov/programs/2012-state-state-address

2 http://www.nyenergyhighway.com/Content/pdf/EH_RFI_Brochure_2012.pdf

3 Links to the proposals can be found at the following url: http://www.nyenergyhighway.com/Process.html

4 http://www.nyenergyhighway.com/PDFs/BluePrint/EHBPPT/

Q. WAS THE NYPSC ONE OF THE AGENCIES FOR WHICH ACTION WAS RECOMMENDED?

A. Yes. In response to the Blue Print recommendations, in November 2012 the NYPSC started several proceedings, including Case 12-T-0502, a proceeding to examine alternating current transmission upgrades.[5]

Q. WHAT WAS THE RESPONSE TO THE NYPSC'S INITATION OF CASE 12-T-0502?

A. The November 2012 Order Instituting Proceeding in Case 12-T-0502 requested that transmission developers file Statements of Intent regarding alternating current transmission upgrades by January 25, 2013.[6] Six developers submitted Statements of Intent for multiple projects, including transmission and non-transmission alternatives. After review of the Statements of Intent, in April 2013 the NYPSC issued an Order Establishing Procedures for Joint Review Under Article VII of the Public Service Law and Approving Rule Changes which requested initial Part A Article VII applications from transmission developers by October 1, 2013.[7] The April 2013 order also required the Department of Public Service staff to issue a straw proposal on the process including alternatives for risk sharing.

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5 Case 12-T-0502 Proceeding on Motion to Examine Alternating Current Transmission Upgrades, Order Instituting Proceeding, November, 30, 2012 can be found at: http://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId={0B06F3A1-3B60-4B2E-9943-91F649F5FA1F}

6 *Id*. p. 3.

7 Case 12-T-0503 Proceeding Motion to Examine Alternating Current Transmission Upgrades, Order Establishing Procedures for Joint Review Under Article VII of the Public Service Law and Approving Rule Change, April 22, 2013. http://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId={E46159F0-FBD2-4D91-BEAD-24492E289DE1}

Q. DID DEVELOPERS SUBMIT PART A ARTICLE VII APPICATIONS CONSISTENT WITH THE APRIL 2013 ORDER?

A. Yes. Before October 1, 2013, four developers submitted Part A applications, most of which identified multiple alternative transmission improvements.[8] These improvements targeted Central East and UPNY-SENY and included primarily alternatives in new rights-of-way. Significant public comment was received,[9] and several public meetings were held in the project area. A major theme of the comments was opposition to establishing new rights-of-way, as well as opposition to new transmission structures that could be significantly taller than existing structures.[10] In response to these comments, in February 2014 the NYPSC effectively placed the proceeding on hold.[11] After additional proceedings and consideration of comments, in December 2014 the NYPSC issued an Order Establishing Modified Procedures for Comparative Evaluation requesting that developers modify proposals to fit in existing rights-of-way to the greatest extent possible

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[8] Proposals from the Company were assigned Case No. 13-T-0454. Proposals from NextEra Energy were assigned Cases No. 13-T-0455 and 13-T-0456. Proposals from the New York Transmission Owners as a group were assigned Case 13-M-0457. Proposals from Boundless Energy were assigned Case No. 13-T-0461.

[9] Comments were submitted in several methods. Formal comments could be filed in the proceeding, and extensive formal comments were filed by several parties. In addition, public comments could be submitted by U.S. Mail or on-line directly on the NYPSC website. The New York Public Service Document Management System identifies 3,153 comments submitted in this manner under Case 13-E-0488 In the Matter of Alternating Current Transmission Upgrades – Comparative Proceeding. In addition, between 149 to 221 individual comments were submitted in each of the individual cases.

[10] Of the thousands of public comments in Case No. 13-E-0488, over 1,600 were submitted in the period between the submittal of the Part A applications in October 2013 and February 2014.

[11] Case No. 12-T-0502 et. al., Order Authorizing Modifications of the Process to Allow for Consideration of Alternative Proposals, Feb. 21, 2014. http://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId={B7FC0936-8A18-4FEA-9256-7865B6836103}

and to submit additional information in January through March 2015.[12] A comparative analysis of alternatives was conducted during 2015 based on the 2015 submittals, and a detailed report and motion was developed by the Department of Public Service Staff.[13] Technical conferences were held regarding the DPS comparative analysis in October 2015. This comparative analysis also considered non-transmission alternatives.

Q. DID THE DEPARTMENT OF PUBLIC SERVICE STAFF ISSUE THE STRAW PROPOSAL?

A. Yes. The July 2013 straw proposal outlined several elements of the process including identifying several risk-sharing methods, and recommending a specific method whereby costs greater than the developer's estimated costs would be shared 80% to the account of ratepayers and 20% to the account of developers ("80/20 Cost Containment").[14] The recommendation also provided that cost savings be shared in the same 80/20 Cost Containment manner, with 20% of savings under the estimate to be included in ratebase, to align developer's incentives with ratepayers with respect to minimizing costs.

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12 Case No. 12-T-0502 et. al., Order Establishing Modified Procedures for Comparative Evaluation, Dec. 16, 2014. http://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId={3EA80EB0-B14E-4A25-AF03-460BBA132F76}

13 Trial Staff Report can be found at http://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId={544AFDD0-DE30-40BD-B09F-7EC768F3A10C}; Trial Staff Motion can be found at: http://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId={ACA1683B-87B8-412E-9D02-98080B5327A6}

14 http://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId={C94C97CC-99B0-430E-B54C-6803CDD55C1D}

Q. HOW DID THE NYPSC PROCESS RELATE TO NYISO TRANSMISSION PLANNING?

A. During the course of Case 12-T-0502 before the NYPSC, the NYISO was modifying its Open Access Transmission Tariff to meet the requirements of FERC Order No. 1000. On August 1, 2014, NYISO initiated the first step in its first Order No. 1000 compliant public policy transmission planning process, requesting stakeholders to submit proposed transmission needs driven by public policy requirements before September 30, 2014.[15] Several entities referenced the needs identified in Case 12-T-0502 as potential public policy transmission needs. On October 3, 2014, consistent with its public policy transmission planning process, NYISO submitted the stakeholder comments to the NYPSC.[16]

Q. DID THE NYPSC FIND TRANSMISSION NEEDS DRIVEN BY PUBLIC POLICY?

A. Yes. On December 17, 2015, based on the record in Case 12-T-0502, including the detailed comparative analysis, and based on the comments related to public policy transmission needs, the NYPSC issued the Order Finding Transmission Needs Driven by Public Policy Requirements ("December 2015 Order"). *See* Exhibit LSPG-NY-103. The December 2015 Order initiated the NYISO Public Policy Planning Process for AC Transmission Upgrades and defined several key considerations for the NYISO

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15 https://www.nyiso.com/documents/20142/1406936/Public%20Policy%20Needs%20Solicitation%20Letter_2014-08-01.pdf/5d6295b2-9184-570f-62a9-93b01c186cdb.

16 *See* October 3, 2014 filings in Case 14-E-0454 In the Matter of New York Independent System Operator, Inc.'s Proposed Public Policy Transmission Needs for Consideration http://documents.dps.ny.gov/public/MatterManagement/CaseMaster.aspx?MatterCaseNo=14-e-0454&submit=Search

solicitation. The December 2015 Order recognized benefits of the proposed upgrades including: "1) enhancing system reliability, flexibility, and efficiency; 2) reducing environmental and health impacts; 3) increasing diversity in supply; 4) promoting job growth and the development of new efficient generation resources upstate; and, 5) mitigating reliability problems that may arise with expected generator retirements."[17] The December 2015 Order directed NYISO to conduct solicitations for proposals designed to provide a minimum of 350 MW of Central East transfer capacity ("Segment A") and designed to provide a minimum of 900 MW of UPNY/SENY transfer capacity ("Segment B"). The December 2015 Order identified other requirements and evaluation criteria such as upgrades to existing infrastructure, minimizing acquisition of new non-utility rights-of-way, and required developers to submit proposals that included 80/20 Cost Containment.

Q. DID LSPG-NY PARTICIPATE IN THE ENERGY HIGHWAY AND OTHER INITATIVES YOU DESCRIBED?

A. Yes. LSPG-NY (while it was known as North America Transmission) actively participated throughout the New York Energy Highway process. LSPG-NY submitted a response to the April 2012 Task Force Request for Information. LSPG-NY submitted a Statement of Intent in Case 12-T-0502 on January 2013.[18] LSPG-NY submitted a Part A Applications under Article VII in Case 12-T-0502 (See Case No. 13-T-0454)[19] and

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17 Exhibit LSPG-NY-103 at 11-12.

18 http://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId={9B80255B-1C6E-4D9E-B465-EF8F25122B88}

19 http://documents.dps.ny.gov/public/MatterManagement/CaseMaster.aspx?MatterCaseNo=13-t-0454

submitted revised proposals within existing rights-of-way and additional information in January to March 2015.[20] LSPG-NY also actively provided comments on the proposed process throughout Case 12-T-0502 and submitted comments in response to the request for stakeholders to identify public policy transmission needs. In recognition of the value of its participation in the process, the New York Public Service Commission directed LSPG-NY to submit a proposal for Segment B in the NYISO process.[21]

V. DESCRIPTION OF NYISO'S COMPETITIVE PROCESS

Q: DESCRIBE NYISO'S COMPETITIVE PROCESS TO ADDRESS THE PUBLIC POLICY TRANSMISSION NEEDS

A: Upon issuance of the December 17, 2015 Order, NYISO began its Public Policy Transmission Planning Process under Section 31.4 of Attachment Y of its Open Access Transmission Tariff. The NYISO established power flow study cases and reviewed the sufficiency and evaluation criteria at the February 5, 2016 Electric System Planning Working Group/Transmission Planning Advisory Subcommittee meeting and made the study cases available to interested developers.[22]

On February 29, 2016 NYISO issued the AC Transmission Public Policy Transmission Needs Project Solicitation ("NYISO Solicitation"), attached as Exhibit No. LSPG-NY-104. The Solicitation identified the needs, defined proposal submission requirements, set forth sufficiency criteria as well as evaluation criteria, all in accordance with the December 2015 NYPSC Order. Proposals were required to be submitted on or

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[20] *Id.*

[21] Exhibit LSP-NY-104 at 69.

[22] https://www.nyiso.com/documents/20142/1392585/03_AC%20Transmission_PPTN.pdf

prior to April 29, 2016. The NYISO process accepted and reviewed transmission and non-transmission alternatives.

LSPG-NY and NYPA jointly submitted six proposals, four Segment A proposals and two Segment B proposals. NYISO identified that 16 project proposals were received, including transmission and non-transmission alternatives. NYISO reviewed the 16 proposals against the minimum criteria, determining that 13 proposals were viable and sufficient, including all six of the jointly submitted LSPG-NY/NYPA proposals.[23] NYISO filed the Viability and Sufficiency Assessment at the NYPSC in October 2016. NYISO confirmed that all viable and sufficient proposals complied with the 80/20 Cost Containment requirement.

Q. DID THE NYPSC DETERMINE THAT THE PUBLIC POLICY TRANSMISSION NEED REMAINED AND SHOULD BE ADDRESSED?

A. Yes. On January 24, 2017, the NYPSC issued an order confirming the AC Transmission Public Policy Transmission Need, attached as Exhibit No. LSPG-NY-106. In the January 2017 Order the NYPSC found:

> The Commission agrees that persistent congestion on the Central East and UPNY/SENY interfaces continues to contribute to higher energy costs for downstate customers and to limit the accessibility of renewable resources located upstate. As discussed by several commenters, the recently adopted Clean Energy Standard (CES), which will require 50% of the state's load to be served by renewable resources by 2030, further heightens the public policy need for transmission constraint relief and cross-state power flows. The CES will undoubtedly require significant increases in renewable generation capacity with the majority of that additional capacity likely to be located in the northern and western regions of the state. The increased transmission capacity will allow these

[23] AC Transmission Public Policy Transmission Need Viability & Sufficiency Assessment, attached as Exhibit No. LSPG-NY-105 at 12-14

> resources to deliver their energy to downstate load centers and avoid being curtailed. . .
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> The Commission agrees that new 345 kV electric transmission upgrades should be fully evaluated by the NYISO for purposes of addressing the persistent congestion across the Central East and UPNY/SENY portions of the transmission system. The additional transmission capacity to move power from upstate to downstate New York should provide various economic and public policy benefits.[24]

The January 2017 Order directed NYISO to complete its detailed evaluation of proposals to address the identified public policy need.

Q. DESCRIBE THE RESULTS OF NYISO'S EVALUATION.

A. NYISO presented the results of its evaluation of proposals beginning in March 2018, leading up to the NYISO Board of Directors ("Board") Decision on April 8, 2019. NYISO posted initial results, including independent cost estimates, on March 30, 2018.[25] NYISO reviewed this information and responded to initial comments in two meetings with all developers in April 2018. The schedule and results, including responses to comments, were presented to the NYISO's Electric System Planning Working Group (ESPWG) and Transmission Planning Advisory Subcommittee (TPAS) over eight meetings from April 2018 to March 2019. The draft report, including recommendation and incorporation of responses to stakeholder comments were presented in June to the Business Issue Committee and Management Committee for advisory votes, and to the

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24 Id. at 18-19.

25 https://www.nyiso.com/documents/20142/1390750/AC_Transmission_Preliminary_Results_03302018.pdf/f7b396b3-7452-fae7-8060-a42fe7fc96db

Operating Committee for information only. The NYISO board considered and reviewed the Draft Report over several meetings from July to December. On December 27, 2018, NYISO posted the AC Transmission Public Policy Transmission Planning Report Addendum ("Report Addendum"). The Report Addendum was the subject of additional stakeholder review and comment, and the Board made its final decision on April 8, 2019, attached as Exhibit No. LSPG-NY-107. The Board decision selected the joint LSPG-NY/NYPA proposal for the Project to address the Segment A facilities.

VI. PROJECT BENEFITS

Q. HOW WERE THE BENEFITS OF THE PROECT DETERMINED?

A. The NYPSC identified many benefits of addressing the public policy transmission need in its orders and the NYISO made independent assessments of the various benefits specifically of the Project.

Q. WHAT BENEFITS DID NYPSC FIND?

A. The NYPSC Order that addressed the continued need for the public policy proposals under evaluation found that the proposals, including the joint LSPG-NY/NYPA proposals, provide many benefits including congestion relief, improved system resilience, replace aging infrastructure, and emissions reduction by enabling new renewable generation. The NYPSC Order states:

> [Department of Public Service] Trial Staff asserts that its analysis demonstrates that the identified portfolio of projects will reduce transmission congestion so that large amounts of power can be transmitted to regions of New York where it is most needed; reduce production costs through congestion relief; reduce capacity resource costs; improve market competition and liquidity; enhance system reliability, flexibility, and efficiency; improve preparedness for and mitigation of impacts of generator retirements; enhance resiliency/storm hardening; avoid refurbishment costs of aging

> transmission; take better advantage of existing fuel diversity; increase diversity in supply, including additional renewable resources; promote job growth and the development of new efficient generation resources Upstate; reduce environmental and health impacts through reductions in less efficient electric generation; reduce costs of meeting renewable resource standards; increase tax receipts from increased infrastructure investment; enhance planning and operational flexibility; obtain synergies with other future transmission projects; and relieve gas transportation constraints. [26]

Q. HAS CONGESTION BEEN A CONSISTENT PROBLEM IN NEW YORK?

A. Yes, congestion within New York State, particularly on Central East, is well documented. It has been studied and identified in multiple areas of New York State transmission planning and operating history. In fact, the first NYISO Market Advisor report covered the year 2000 states "The most significant transmission constraint in the State is the Central-East Interface that limits the power that may flow from Western New York, PJM and Canada to Eastern New York and New England. This single interface is responsible for the majority of the congestion costs produced in the New York market and is likely the most economically significant transmission interface in the Northeast."[27] The congestion costs for the Central-East transmission constraint for 2000 were identified to be more than $1 billion.[28]

The NYISO conducts economic planning over a biennial cycle in its Congestion Assessment and Resource Integration Study ("CARIS") process. For each CARIS report

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26 Exhibit LSPG-NY-103 at 13.

27 New York Market Advisor Annual Report on The New York Electric Markets for Calendar Year 2000 https://www.nyiso.com/documents/20142/2925831/patton_2000annualreport_withpresentation.pdf/b435b72b-3f85-6b7a-3cea-3310ed80fa45 at v.

28 *Id*. at 6.

since economic planning began the Central East interface has been identified as an element of one of the top three congested flowgates in New York.[29] The most recent CARIS cycle identifies Central East as the top congested flowgate, with the historic Demand$ Congestion on Central East being identified as over $4 billion in the 5 year period from 2012 to 2016, representing over 64% of the total Demand$ Congestion in the state.[30] In addition to studying Central East alone, the 2017 CARIS report studied Central East+UPNY/SENY.

Q. HAVE THERE BEEN OTHER REPORTS ANALYZING CONGESTION

A. Yes. The New York independent market monitor has also reported significant Central East congestion in operations, including in the most recent NYISO Market Monitor Report (for 2018) which found that, "[s]imilar to prior years, the largest share of

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29 2009 Congestion Assessment and Resource Integration Study https://www.nyiso.com/documents/20142/2226242/CARIS_Final_Report_1-19-10.pdf/b94d3365-6d27-07c1-cdf4-a12290aeeaec

2011 Congestion Assessment and Resource Integration Study https://www.nyiso.com/documents/20142/2226242/2011_CARIS_Final_Report__3-20-12.pdf/3e931dd5-1828-0bf2-3318-8d9768ab1adf
2013 Congestion Assessment and Resource Integration Study https://www.nyiso.com/documents/20142/2226108/2013_CARIS_Final_Report.pdf/a9f0c012-a718-0a1d-c8cf-64b0831ee792

2015 Congestion Assessment and Resource Integration Study https://www.nyiso.com/documents/20142/2226108/2015_CARIS_Report_FINAL.pdf/aed4d064-72d5-667c-f628-999b382bb4bc

2017 Congestion Assessment and Resource Integration Study https://www.nyiso.com/documents/20142/2226108/2017-CARIS2017-Report-FINAL.pdf/7d228b1b-eb5a-8288-370d-1d4d07bc5168 ("2017 CARIS").

30 2017 CARIS, at 43. *See* CARIS reports for a definition of Demand$ Congestion, which is not necessarily the same as the cost of congestion to ratepayers but a measure of the relative difference in the price of electricity across a congested flowgate.

congestion values accrued on the Central-East interface, which accounted for 32 percent of congestion value in the day-ahead market and 25 percent in the real-time market in 2018."[31] Similarly, the Market Monitor found in the 2017 State of the Market Report that, "[t]he largest share of congestion values accrued on the Central-East interface, which accounted for 41 percent of congestion value in the day-ahead market and 31 percent in the real-time market in 2017."[32] Central East was congested over 50% of the hours on a day-ahead basis.[33]

Q. HOW DOES THE PROJECT RELIEVE THIS HISTORICAL CONGESTION?

A. The AC Transmission Public Policy Transmission Planning Report ("Public Policy Transmission Planning Report") presents NYISO's specific analysis of congestion relief provided by the Project. NYISO conducted a 20-year production cost analysis of proposal groupings for a baseline scenario as well as several sensitivities including high natural gas forecast, low natural gas forecast, and a Clean Energy Standard scenario.[34] For all cases, the Selected Portfolio (which includes the Project for Segment A and Project T019 for Segment B) provided among the highest decrease in total Demand Congestion. For the Baseline analysis, the Selected Portfolio was identified as providing $2.576 billion in decrease in Demand$ Congestion on a net present value basis in 2018$. For the CES Scenario, the Selected Portfolio was identified as providing $9.633 billion in

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31 https://www.nyiso.com/documents/20142/2223763/2018-State-of-the-Market-Report.pdf/b5bd2213-9fe2-b0e7-a422-d4071b3d014b?t=1557344025932 at A-67.

32 https://www.nyiso.com/documents/20142/2926481/NYISO-2017-SOM-Report-5-07-2018_final.pdf/ae21cb52-c698-a875-6f96-9d77d3c0dc05 at A-63.

33 *Id*. at 9.

34 *See* Exhibit LSPG-NY-107 at 71 and Report Addendum at 21.

Demand$ Congestion on a net present value basis in 2018 $.[35] This translates into production cost savings of $368 million on a net present value basis in 2018 $ for the base case, and $1.191 billion in the CES Scenario.[36]

Q. WAS GRID RESILIENCY A CONSIDERATION IN THE PUBLIC POLICY NEED?

A. Yes, the resiliency of the New York State transmission network was a key consideration of the New York Energy Highway beginning with the Task Force Blueprint in 2012. New York State officials were concerned with the ability to maintain reliability in the event of the retirement of downstate baseload generators, specifically the Indian Point Energy Center. In fact at the same time the AC Transmission Proceeding was initiated, the NYPSC also issued an Order Instituting Proceeding and Soliciting Indian Point Contingency Plan in Case 12-E-0503. The 2012 Reliability Needs Assessment studied the potential retirement of Indian Point and identified reliability violations with the retirement of Indian Point without further action.[37] Other downstate generating units were also identified as being at risk of retirement. The New York State transmission system was also tested by Hurricane Sandy in October 2012, with local service outages as a result of transmission line and local generating units being forced out of service. Therefore the need for a resilient transmission system was a key consideration when the NYPSC issued the Order Instituting the AC Transmission Proceeding in November 2012.

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35 *Id*. at 76.

36 *Id*. at 71 and Report Addendum at 22.

37 https://www.nyiso.com/documents/20142/3657944/2012_RNA_Final_Report_9-18-12_PDF.pdf/0dac54f6-e42b-1f49-c37a-d3dbfcd82a59 at 42-43.

Q. HOW DOES THE PROJECT ADDRESS THESE RESILIENCY CONCERNS?

A. The Project increases the system resiliency through the addition of several bulk power system elements. Two new 345 kV circuits are added across the Central East Interface. The addition of the Princetown station enhances resiliency by providing a connection of several high voltage lines in the area, significantly decreasing the consequence of an outage of any single line segment. Finally, the addition of significant new transfer capacity allows for additional distribution of power to where it is needed in the event of an outage of a major generating facility or transmission lines due to a storm or other system events. These benefits generally are identified in subsequent orders, such as in the December 2015 Order, stating that the contemplated transmission improvements will "enhance system reliability, flexibility, and efficiency; improve preparedness for and mitigation of impacts of generator retirements; enhance resiliency/storm hardening; …and relieve gas transportation constraints."[38] The specific resiliency benefits of the Project relative to alternatives is identified in the operability analysis performed by NYISO staff in the AC Transmission process. The N-1-1 system performance was superior for the Project and the Project was rated highest of the top tier projects for operability.[39]

Q. DOES THE PROJECT ADDRESS A RECOGNIZED ISSUE WITH AGING INFRASTRUCTURE IN NEW YORK?

A. Yes. The New York State Transmission Assessment and Reliability Study ("STARS") Report in April 2012 identified a significant amount of New York state transmission

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[38] Exhibit LSPG-NY-103 at 13.

[39] Exhibit LSPG-NY-107 at 64-69.

facilities requiring replacement due to condition, including the Porter to Rotterdam 230 kV facilities and the 115 kV transmission facilities between Greenbush and Pleasant Valley.[40] The Department of Public Service staff report identified a significant amount of avoided cost that would be required to replace these facilities with facilities of the same voltage.[41] By replacing these facilities with facilities of a higher voltage it increases the capacity of the corridor without significant incremental construction activity. The December 2015 Order recognized these benefits and required consideration of aging infrastructure as a criterion in the analysis. "Some of the facilities are aging and will shortly need to be rebuilt in place."[42] NYISO Staff identified the replacement of aging infrastructure with an avoided replacement cost of $839 million as a benefit of all proposals, and therefore not a distinguishing factor.[43]

Q. DID NEW YORK CONSIDER FUEL DIVERSITY AND ENHANCING USE OF RENEWABLE RESOURCES AS AN IMPORTANT FACTOR IN THE PUBLIC POLICY NEED?

A. Yes. Several of the benefits identified in the December 2015 Order relate to emission reductions: "take better advantage of existing fuel diversity; increase diversity in supply, including additional renewable resources; promote job growth and the development of new efficient generation resources Upstate; reduce environmental and health impacts

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40 New York State Transmission Assessment and Reliability Study, Apr. 30, 2012, at 32-36 https://www.nyiso.com/documents/20142/1398242/Phase_2_Final_Report_4_30_2012.pdf

41 Trial Staff Report at 82-84, http://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId={544AFDD0-DE30-40BD-B09F-7EC768F3A10C}.

42 Exhibit LSPG-NY-103 at 30.

43 Exhibit LSPG-NY-107 at 51.

through reductions in less efficient electric generation; reduce costs of meeting renewable resource standards . . ..”[44] The NYPSC recognizes that transmission improvements will result in both more efficient dispatch of existing resources and provide for the addition of new renewable resources.

While the Order Adopting a Clean Energy Standard (“CES”) was not issued until August 1, 2016, after the December 17, 2015 Order Adopting an AC Transmission Public Policy Transmission Need, the carbon reducing goals were included in the State Energy Plan,[45] and there was an expectation that some form of clean energy standard would be adopted. The NYPSC recognized that the transmission expansion would be needed to meet these goals. The August 2016 CES Order established a renewable energy goal to have 50% of New York’s electricity from renewable sources by 2030.[46]

Requirements for transmission upgrades, such as the Project, to meet public policy goals on carbon reduction have also been identified by other New York stakeholders. For example, in a presentation made to the Integrating Public Policy Task Force by the City of New York, it is noted that transmission upgrades such as the Project are necessary to meet the State’s carbon reduction goals.[47] Another IPPTF stakeholder presentation by Daymark Energy Advisors on behalf of the New York Department of

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[44] Exhibit LSPG-NY-103 at 66-67.

[45] The 2015 New York State Energy Plan can be found at https://energyplan.ny.gov/Plans/2015.

[46] http://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId={44C5D5B8-14C3-4F32-8399-F5487D6D8FE8}.

[47] Recommendations for the Integrating Public Policy Task Force by the City of New York, February 5, 2018 at slide 4 https://www.nyiso.com/documents/20142/1408068/NYC%20IPPTF%20Presentation_020518.pdf/34358746-347f-2a0a-b686-10cfabb25c57.

State Utility Intervention Unit quantifies the impact of transmission upgrades, such as the Project, in meeting the CES.[48]

Q. HOW DOES THE PROJECT ADDRESS THESE GOALS?

A. The ability for the Selected Portfolio, including the Project, to help meet the CES is clearly identified in the Public Policy Transmission Planning Report. The Selected Portfolio provides significantly improved performance in terms of Central East and UPNY/SENY energy flows in the CES scenario,[49] and significant carbon emission reductions in the CES scenario of 10.7 million tons.[50]

Q. DOES THE PROJECT PROVIDE ANY CAPACITY MARKET BENEFITS?

A. Yes. The Public Policy Transmission Planning Report identifies capacity market benefits from the Selected Portfolio, in addition to the production cost savings and congestion relief discussed above. The capacity market benefit arises from several impacts of the transmission system expansion on the ability of generation throughout the state to meet local capacity requirements. By increasing the emergency transfer limits across several key interfaces, there is capacity procurement savings due to factors including a reduction in the capacity required to meet the loss of load expectance requirement (as a result of reduced system losses) and also the required location of capacity needed to meet the

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48 Evaluating Mechanisms to Meet Public Policy Goals presentation by Daymark Energy Advisors https://www.nyiso.com/documents/20142/1404028/Evaluating%20Mechanisms%20to%20Meet%20Public%20Policy%20Goals.pdf/5d8146f3-9705-2360-a5ee-caebeb01fd54.

49 Exhibit LSP-NY-107 at 70.

50 *Id*. at 76.

LOLE requirement. NYISO estimates this benefit to in the range of $744 million to $1,936 million on a net present value basis in 2018.[51]

VII. SUPPORT FOR REQUESTED INCENTIVES

Q. WHAT TYPES OF THE RISKS AND CHALLENGES DOES THE PROJECT FACE?

A. The project faces a variety of risks and challenges, including regulatory risks and challenges, construction risks and challenges as described by Mr. Carroll and financial risks and challenges as described by Mr. Tajvar. In addition, as described above, consistent with the NYPSC direction, the Project will be subject to the 80/20 Cost Containment.

Q. EXPLAIN THE PREMISE BEHIND THE 80/20 COST CONTAINMENT.

A. Under the 80/20 Cost Containment, project developers and ratepayers share the risk of cost overruns related to "Eligible Project Costs" that exceed a cost cap and share the savings if Eligible Project Costs are below a predefined cap.

Q. HOW ARE ELIGIBLE PROJECT COSTS DEFINED?

A. "Eligible Project Costs" are all the costs to place the Project in-service excluding Unforseeable Costs and costs associated with operations and maintenance provided that Unforseeable Costs in an amount up to 5% of the Cost Cap shall be considered an Eligible Project Cost. "Unforseeable Costs" are costs: (i) associated with material modifications to the scope of work that result from an NYPSC order, negotiations or settlement agreements in an NYPSC process, or imposed by any other governmental agency; (ii) associated with changes in applicable laws and regulations or interpretations

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51 Report Addendum at 38.

thereof by governmental agencies; or (iii) as a result of orders of courts or action or inaction by governmental agencies; or (iv) related to destruction, damage, interruption, suspension, or interference of or with the Project caused by landslides, lightning, earthquakes, hurricanes, tornadoes, typhoons, severe weather, fires, explosions, floods, epidemic, acts of public enemy, acts or threats of terrorism, wars, blockades, riots, rebellions, sabotage, vandalism, insurrections, environmental contamination or damage not caused by LSPG-NY, strike, labor disruption, or civil disturbances.

Q. EXPLAIN THE "COST CAP" FOR THE PROJECT.

A. For the purpose of LSPG-NY's implementation of the 80/20 Cost Containment proposal, the Cost Cap applies if Eligible Project Costs are in excess of the Cost Cap. In the event Eligible Project Costs are below a certain level, the Adjusted Cost Cap applies. The difference between the Cost Cap and the Adjusted Cost Cap is the amount of contingency assumed, which is consistent with the approach identified in the FERC rate settlements of other participants in the AC Transmission process.

The Cost Cap consists of the sum of: (i) $626,762,363 (representing the cost estimate developed by NYISO's independent consultant during the evaluation, with a 30% contingency, but excluding Segment A Third Party Costs in 2017 dollars) multiplied by LSPG-NY's percentage ownership share of the Project multiplied by a fraction where the numerator is the Handy-Whitman Index for Electric Utility Construction – Total Transmission Plant in the North Atlantic Region for January 2022 and the denominator is the Handy-Whitman Index for Electric Utility Construction – Total Transmission Plant in the North Atlantic Region for January 2017; (ii) Segment A Third Party Costs multiplied by LSPG-NY's percentage ownership share of the Project; and (iii) LSPG-NY AFUDC.

"Segment A Third Party Costs" as used here are costs that result from: (i) NYISO modifications to the Project or NYISO requirements including interconnection costs and upgrades resulting from the NYISO interconnection process; (ii) real estate-related costs incurred in any lease arrangements, purchase, easement, or license related to acquisition of rights-of-way, or access to rights-of-way; and (iii) other costs incurred as a result of action or inaction by incumbent Transmission Owners. Contingency in the amount of 30% was used because that is the amount of contingency assumed by NYISO's independent consultant in the evaluation, based on the amount of contingency assumed by the New York State Department of Public Service trial staff in the AC Transmission process. In fact, the December 2015 Order directed bidders to provide raw cost estimates and for the NYISO to apply a uniform amount of contingency across all proposals.[52] The regional Handy-Whitman Index is used to account for escalation of the cost estimate from the time to better reflect the actual changes in industry costs, which could be higher or lower than general inflation.

The "Adjusted Cost Cap" consists of the sum of: (i) $626,762,363 divided by 1.3, and multiplied by 1.05 (to account for a different amount of contingency to be applied for the incentive rate adder) multiplied by LSPG-NY's percentage ownership share of the Project multiplied by a fraction where the numerator is the Handy-Whitman Index for

52 *See* Exhibit LSPG-NY103 at 47; see also, page 2 of Attachment B: The percentage rates applied to account for contingencies and revenue requirement should all be treated uniformly across all estimates so that those factors are not manipulated by the bidders to confuse or artificially skew the results. The selection process shall not use the percentage rates applied to account for contingencies and revenue requirement as a distinguishing factor between bids. For the purposes of bids, all developers should account for contingencies and revenue requirement at the percentage rates provided in the Trial Staff report as a placeholder for the actual rates.

Electric Utility Construction – Total Transmission Plant in the North Atlantic Region for January 2022 and the denominator is the Handy-Whitman Index for Electric Utility Construction – Total Transmission Plant in the North Atlantic Region for January 2017; (ii) Segment A Third Party Costs multiplied by LSPG-NY's percentage ownership share of the Project; and (iii) LSPG-NY AFUDC.

Q. HOW IS LSPG-NY PROPOSING TO IMPLEMENT THE 80/20 COST CONTAINMENT?

A. LSPG-NY's formula rate template incorporates the 80/20 Cost Containment in a similar manner that it was incorporated in the rates of the other bidders that participated in the process with rates on file at the Commission. If LSPG-NY's Eligible Project Costs exceed the Cost Cap then LSPG-NY will receive no return on equity for 20% of the Eligible Project Costs that exceed the Cost Cap and will recover no incentive ROE adders on the remaining 80% of the Eligible Project Costs that exceed the Cost Cap. LSPG-NY will recover the depreciation and debt costs on its share of all Eligible Project Costs. If LSPG-NY's Eligible Project Costs are below the Adjusted Cost Cap then LSPG-NY will share in the savings through a sliding scale ROE adder based on the table below.

Actual Costs Below Adjusted Cost Cap	ROE Adder
0% to <=5%	0.05%
>5% to <=10%	0.17%
>10% to <=15%	0.30%
>15% to <=20%	0.45%
>20% to <=25%	0.62%
>25%	0.71%

Q. DOES THE PROJECT RELIEVE CHRONIC OR SEVERE CONGESTION WITH DEMONSTRATED COST IMPACTS TO CONSUMERS?

A. Yes, as described above, the chronic and severe grid congestion on the Central East interface has been present the entire time the NYISO has operated markets.[53]

Q. DOES THE PROJECT UNLOCK CONSTRAINED GENERATION RESOURCES?

A. Yes. The Project, as part of the Selected Portfolio, also will unlock location constrained generation – specifically existing hydropower, wind generation and proposed solar generation. Existing and new wind and proposed solar generation is also location constrained and has limited access to wholesale electricity markets without the Selected Portfolio.[54]

Q. WHAT HAS LSPG-NY DONE TO MINIMIZE RISKS INSTEAD OF SEEKING AN INCENTIVE ROE ADDER?

A. LSPG-NY has taken many steps to minimize the risks and challenges presented by the Project as those risks and challenges are discussed above. LSPG-NY follows best practices in project development. This includes incorporating many features into the project design intended to minimize the impacts of the Project. For example, the Project definition evolved over the course of the NYPSC process to remain entirely in existing utility rights-of-way to lessen opposition to the extent feasible. LSPG-NY also took many steps to design the Project in a way to minimize physical and visual impacts. LSPG-NY has also undertaken significant public outreach and has implemented a Public Involvement Plan for the Project.

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53 *See infra* at 20-21.

54 *See infra* at 26-28.

The Commission's Supplemental Policy Statement on incentive rates also identifies joint ownership arrangements as a measure to mitigate siting and environmental risks, and diversifying financial risks across multiple owners. LSPG-NY has taken this risk mitigation measure. LSPG-NY jointly proposed the Project with the NYPA. Under this arrangement, NYPA has an option to purchase a minority share of the project. The overall Project will be jointly owned with NYPA, assuming NYPA exercises its option, with LSPG-NY and NYPA each being 100% owner of standalone pieces of the Project. The arrangement with NYPA combines the significant in-state experience and history of an incumbent state power authority with the national competitive transmission development experience of LS Power. This joint ownership arrangement has been structured to take advantage of the relative strengths of each entity. LSPG-NY has the primary responsibility for project development and construction management. NYPA has the primary responsibility for project operations and maintenance for all portions of the project, regardless of ownership. Each entity will be responsible to fund and finance its pro-rata share of the Project. The joint ownership arrangement helps to mitigate siting and environmental risks and diversify financial risks across multiple owners.

Q. WERE ALTERNATIVES TO THE PROJECT CONSIDERED?

A. As discussed above, the Project resulted from the evolution of a project definition resulting from five different sets of submittals to the NYPSC and NYISO from LSPG-NY and other competing developers, including: (i) May 2012 Request for Information responses to the New York State Energy Highway Task Force; (ii) January 2013 Statements of Intent to the New York NYPSC; (iii) October 2013 Part A Article VII Submittals to the New York NYPSC; (iv) January 2015 revised Part A Article VII

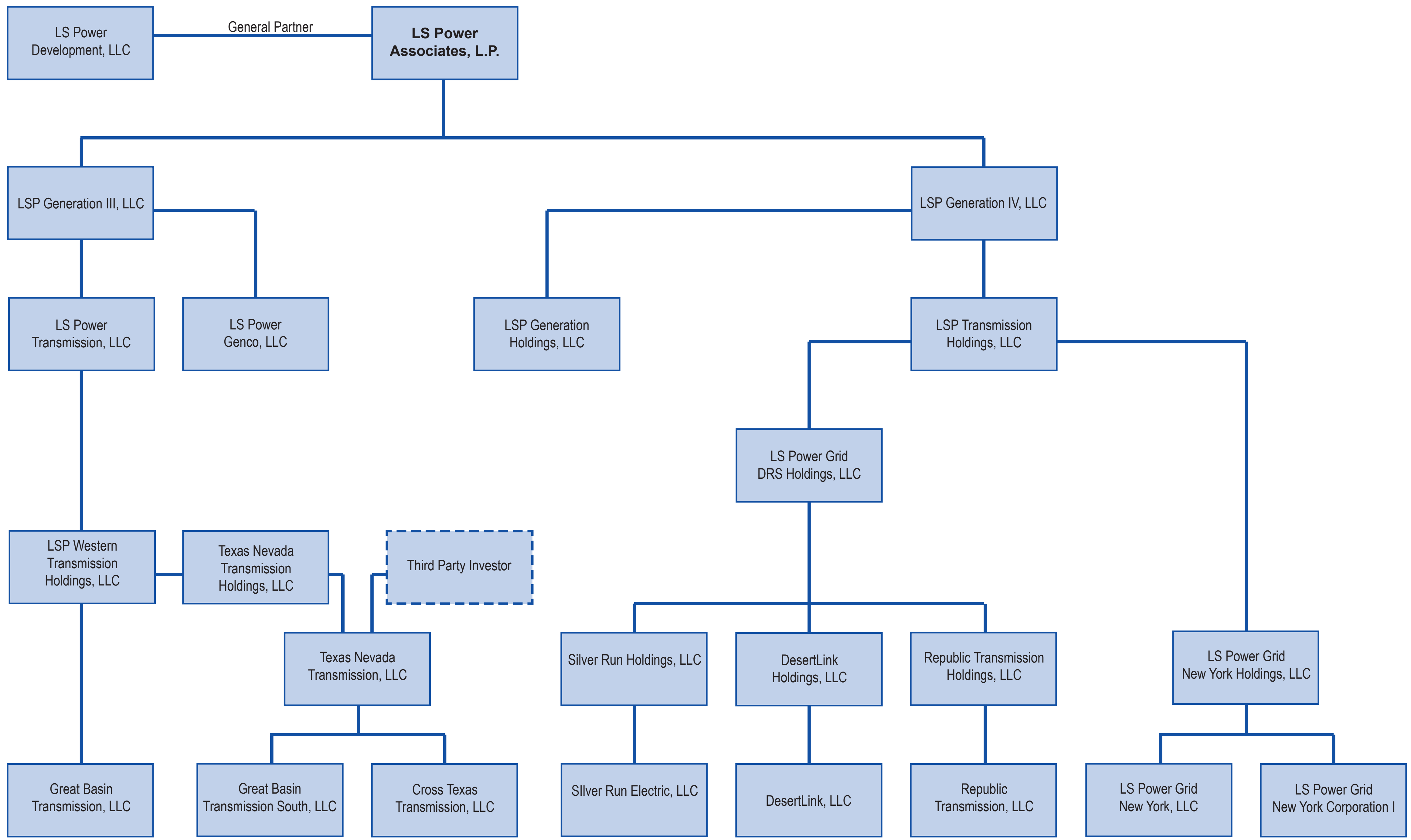
Submittals to the New York NYPSC; and (v) April 2016 proposals to the NYISO in response to the Public Policy Transmission Need solicitation. After each of these submittals, alternatives were considered and evaluated prior to moving to the next stage. The Energy Highway Task Force, NYPSC, and NYISO process each also included consideration of non-transmission alternatives.

The NYISO process is an Order No. 890 and Order No. 1000 compliant transmission process that provides the opportunity for projects to be compared against other transmission as well as non-transmission alternatives. The NYISO Public Policy Transmission Planning Report identifies the Project as the more efficient or cost-effective Project.

Q. DOES THIS CONCLUDE YOUR TESTIMONY?

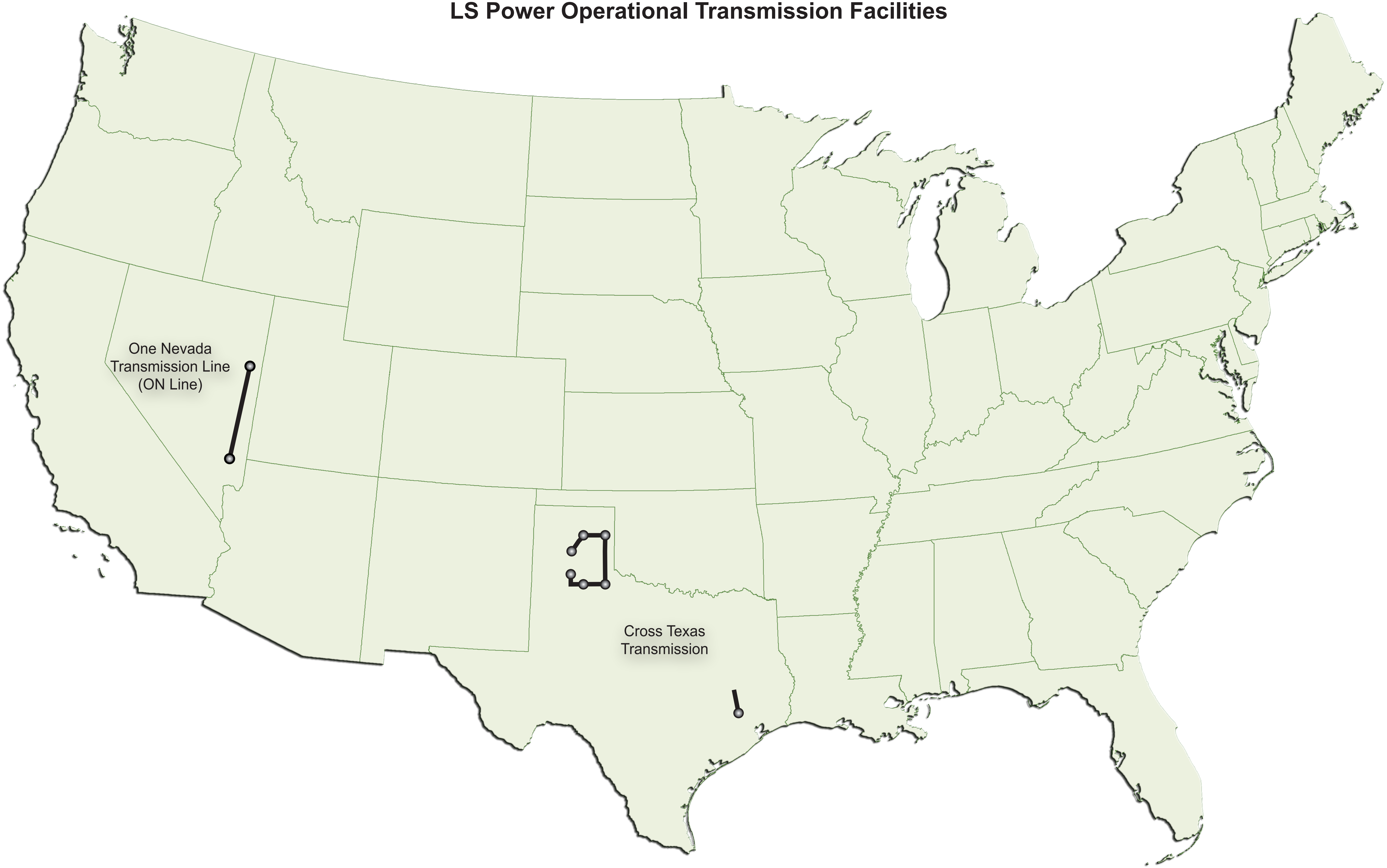
A. Yes.

Exhibit No. LSPG-NY-101



Note: Simplified organizational chart to show key relationships

Exhibit No. LSPG-NY-102
LS Power Operational Transmission Facilities



STATE OF NEW YORK
PUBLIC SERVICE COMMISSION

At a session of the Public Service Commission held in the City of Albany on December 17, 2015

COMMISSIONERS PRESENT:

Audrey Zibelman, Chair
Patricia L. Acampora
Gregg C. Sayre
Diane X. Burman

CASE 12-T-0502 - Proceeding on Motion of the Commission to Examine Alternating Current Transmission Upgrades.

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

CASE 13-T-0454 - Application of North America Transmission Corporation and North America Transmission, LLC for a Certificate of Environmental Compatibility and Public Need Pursuant to Article VII of the Public Service Law for an Alternating Current Transmission Upgrade Project Consisting of an Edic to Fraser 345 kV Transmission Line and a New Scotland to Leeds to Pleasant Valley 345 kV Transmission Line.

CASE 13-T-0455 - Part A Application of NextEra Energy Transmission New York, Inc. for a Certificate of Environmental Compatibility and Public Need Pursuant to Article VII of the Public Service Law for the Marcy to Pleasant Valley Project.

CASE 13-T-0456 - The Part A Application of NextEra Energy Transmission New York, Inc. for a Certificate of Environmental Compatibility and Public Need Pursuant to Article VII for the Oakdale to Fraser Project.

CASE 13-M-0457 - Application of New York Transmission Owners Pursuant to Article VII for Authority to Construct and Operate Electric Transmission Facilities in Multiple Counties in New York State.

CASE 13-T-0461 - Application of Boundless Energy NE, LLC for a Certificate of Environmental Compatibility and Public Need Pursuant to Article VII for Leeds Path West Project.

CASE 14-E-0454 - In the Matter of New York Independent System Operator, Inc.'s Proposed Public Policy Transmission Needs for Consideration.

ORDER FINDING TRANSMISSION NEEDS DRIVEN
BY PUBLIC POLICY REQUIREMENTS

(Issued and Effective December 17, 2015)

BY THE COMMISSION:

INTRODUCTION

The first seven above-captioned proceedings constitute the "AC Transmission" proceedings, a number of proceedings initiated for the Public Service Commission (Commission) to consider potential actions to address long-standing concerns that there is insufficient transmission capacity between upstate power generation sources and downstate consumers on New York's alternating current (AC) bulk electric transmission system. The eighth above-captioned proceeding was initiated for the Commission to fulfill its role on behalf of the State of New York pursuant to the Public Policy Transmission Planning Process regulated by the Federal Energy Regulatory Commission (FERC) to identify transmission needs driven by public policy requirements. As these matters are interrelated, they are being heard and considered by the Commission on a common record.

In this order, the Commission finds and determines that there is a transmission need driven by Public Policy Requirements for new 345 kV major electric transmission facilities to cross the Central East and UPNY/SENY interfaces to provide additional transmission capacity to move power from upstate to downstate. Those transmission interfaces have been persistently congested and such congestion contributes significantly to higher energy costs and reliability concerns, whereas increasing the transfer capability of those sections of the transmission system could produce a number of valuable benefits for New York.

This finding will trigger a solicitation and review of transmission and other solutions by the New York Independent System Operator (NYISO) with the potential for selected transmission developers to obtain cost recovery for their development and construction costs from the beneficiaries of the transmission upgrades through the NYISO tariff mechanism regulated by FERC. As part of the NYISO Public Policy Transmission Planning Process, the Commission will be required to take future action to decide, after the NYISO has completed its viability and sufficiency analysis, whether a transmission solution should continue to be analyzed by the NYISO. Ultimately, if transmission solutions are selected in the NYISO/FERC process, the Commission will also have to decide, after further process including public statement hearings, whether to grant Public Service Law, Article VII major electric transmission facility siting certificates for the selected solutions.

LEGAL AUTHORITY AND BACKGROUND

Pursuant to the federalism principles of our system of government, the Federal Energy Regulatory Commission (FERC) and the States share the power to regulate bulk electric transmission facilities. FERC regulates the rates that can be charged for the use of the interstate bulk electric transmission system (Federal power to regulate interstate commerce), which includes deciding issues of cost allowance and cost allocation. The States generally regulate the siting of new major electric transmission facilities in their jurisdictions, and the States and not FERC establish public policies. This Federal-State interplay means that for a new major transmission facility to be built or operated, it may require both a Federal approval as to cost recovery, and State approvals as to siting and public policy.

The New York Independent System Operator (NYISO) periodically conducts a four-part Comprehensive System Planning Process (CSPP) pursuant to the regulatory authority of FERC. The requirements of each part of the planning process are contained in Attachment Y of the NYISO's Open Access Transmission Tariff (NYISO Tariff) approved by FERC. The four components of the planning process are as follows: (1) Local Transmission Planning Process (LTPP); (2) Reliability Planning Process (RPP); (3) Congestion Assessment and Resource Integration Study (CARIS); and (4) Public Policy Transmission Planning Process.[1] This order involves the fourth component of the Comprehensive System Planning Process, the Public Policy Transmission Planning Process.

The Public Policy Transmission Planning Process (PPTPP) supports the FERC Order No. 1000 directive requiring public utility transmission providers to consider transmission needs driven by public policy requirements established by state or federal laws or regulations. Its main importance is that it provides a vehicle for cost recovery for the entity that

[1] The LTPP includes identification and evaluation of solutions to local transmission needs identified by local Transmission Owners (TOs). The RPP includes an assessment of the reliability of the New York bulk power system through a Reliability Needs Assessment (RNA) and a Comprehensive Reliability Plan (CRP) to satisfy any identified reliability needs. The CARIS process is an economic assessment of congestion on the New York bulk power system, the costs and benefits of generic alternatives to alleviate that congestion, and of specific transmission project proposals.

constructs and operates a needed transmission solution. The PPTPP consists of four main steps: (1) the identification of Public Policy Transmission Needs; (2) the proposal of solutions to identified Public Policy Transmission Needs; (3) the evaluation of the viability and sufficiency of proposed transmission and non-transmission solutions to a Public Policy Transmission Need; and (4) the evaluation and selection of the more efficient or cost effective Public Policy Transmission Project to satisfy a Public Policy Transmission Need.

A Public Policy Requirement is defined in the tariff as a federal or state law or regulation, including a Public Service Commission rulemaking order adopted after public notice and comment under state law,[2] which drives the need for transmission.[3] Under New York State law, such a rulemaking order by the Public Service Commission can be either of general or particular applicability.[4]

In the first main step, regarding identification, the NYISO solicits proposals for Public Policy Transmission Needs, and the Public Service Commission role is to consider the proposals in order to identify the Public Policy Transmission Needs and also to determine for which of those the NYISO should solicit solutions. The NYISO Tariff provides that:

> [the Commission] shall issue a written statement that identifies the relevant Public Policy Requirements driving transmission needs and explains why it has identified the Public Policy Transmission Needs for which transmission solutions will be requested by the ISO. The statement shall also explain why transmission solutions to other suggested transmission needs should not be requested. The [Commission's]

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[2] New York Independent System Operator, Inc., 143 FERC ¶ 61,059 (2013), p.60 [See Docket No. ER13-102-000, Order on Compliance Filing (issued April 18, 2013)].

[3] NYISO OATT, Attachment Y, §31.1.1.

[4] N.Y.S.A.P.A. § 102(2)(a)(ii)(McKinney 2015).

> statement may also provide additional criteria for the evaluation of transmission solutions and non-transmission projects, and the type of analyses that it will request from the ISO.[5]

This order is part of that first main step. It constitutes the preliminary State public policy approval called for in the NYISO Tariff by the Commission identifying a Public Policy Transmission Need for which the NYISO should solicit solutions.

Subsequent to the identification of a Public Policy Transmission Need, the NYISO solicits proposed solutions, and Developers submit Public Policy Transmission Projects and Other Public Policy Projects to satisfy the identified Public Policy Transmission Needs. All submissions, regardless of project type, are evaluated for their viability and sufficiency to meet the Public Policy Transmission Needs. Upon a confirmation by the Public Service Commission that a need for a transmission solution still exists, the NYISO then evaluates the proposed regulated Public Policy Transmission Projects that have satisfied the viability and sufficiency requirements and ranks them based on the quality of their satisfaction of numerous metrics. Based on this evaluation, the NYISO may select the more efficient or cost effective regulated Public Policy Transmission Project to satisfy any Public Policy Transmission Need. A selected project is eligible for cost recovery and cost allocation under the NYISO Tariff, in a manner to be determined by FERC. As described above, any selected Public Policy Transmission Project will likely also need separate State approvals as to siting before it may be built or operated.

[5] NYISO OATT, Attachment Y, §31.4.2.1.

NOTICE OF PROPOSED RULE MAKING

Pursuant to the State Administrative Procedure Act (SAPA) §202(1), a Notice of Proposed Rulemaking was published in the State Register on October 7, 2015 [SAPA No. 12-T-0502SP5] regarding whether a need for new 345 kV major electric transmission facilities to cross the Central East and UPNY/SENY interfaces to provide additional transmission capacity to move power from upstate to downstate New York is driven by Public Policy Requirements. The time for submission of comments pursuant to the Notice expired on November 23, 2015. Moreover, the Secretary issued an additional notice on September 23, 2015 soliciting comments and establishing a deadline of November 6, 2015 for initial comments, and November 23, 2015 for reply comments. The SAPA notice described above was issued subsequent to an earlier SAPA notice that was published in the State Register on November 12, 2014.[6] While the earlier SAPA notice covered the topic of the October 7, 2015 SAPA notice on a broader basis, it also covered two other categories of potential Public Policy Transmission Needs (i.e., Western New York congestion relief, and various other environmental and system-related needs), all of which were submitted to the Commission by the NYISO on October 3, 2014, in response to a NYISO Public Policy Transmission Planning Process solicitation. By an order issued on July 20, 2015, the Commission decided to defer consideration of whether to identify the transmission congestion that exists at the Central East and UPNY/SENY electrical interfaces as a Public Policy Requirement until certain analyses in the AC Transmission proceedings were complete and could be

[6] Comments under that notice were due December 29, 2014.

considered.[7] Those analyses resulted in the more specific definition of the transmission need now described in the October 7, 2015 SAPA notice. The relevant comments received pursuant to all of the notices described above are addressed below. In addition, a significant number of public comments have been received throughout the course of these proceedings. The public comments are generally reflected in the party comments and the Commission is greatly appreciative of the efforts taken to inform the Commission.

PROCEDURAL BACKGROUND

On August 1, 2014, the NYISO commenced its Public Policy Transmission Planning Process specified under the NYISO Tariff by requesting interested entities to identify any potential transmission needs that may be driven by a Public Policy Requirement (Public Policy Transmission Needs). On October 3, 2014, the NYISO filed, for the Commission's consideration, the proposed Public Policy Transmission Needs it received from eight entities. The proposals cover three broad categories, including those related to (a) the Commission's AC Transmission proceedings; (b) Western New York congestion relief; and (c) various other environmental and system-related needs. As mentioned above, by an order issued on July 20, 2015, the Commission decided to defer consideration of whether to identify the transmission congestion that exists at the Central East and UPNY/SENY electrical interfaces as a Public Policy Requirement until certain analyses in the AC Transmission proceedings were complete and could be considered.

[7] Case 14-E-0454, New York Independent System Operator, Inc. - Public Policy Transmission Needs, Order Addressing Public Policy Requirements for Transmission Planning Purposes (issued July 20, 2015), p.30 [Commissioner Burman concurring].

The Commission had previously initiated the AC Transmission proceedings to consider whether to address the persistent transmission congestion that exists at the Central East and Upstate New York/Southeast New York (UPNY/SENY) electrical interfaces. The Commission sought proposals from transmission owners and other developers proposing projects to increase transmission transfer capacity by approximately 1,000 MW as recommended by the Governor's Energy Highway Task Force. After an initial round of proposals were received that raised environmental siting concerns, the Commission called for revised proposals that would better utilize existing rights-of-way and better match the scale of proposed transmission structures to be in keeping with existing facilities already in the landscape. The Commission's directive was consistent with Governor Cuomo's declaration in the 2014 State of the State Address that the State must encourage utilities and transmission developers to build wholly within existing transmission corridors, where possible, in order to minimize impacts and responsibly site projects in a way that is responsive to the concerns of local communities.

Twenty two revised proposals were received from four entities: North America Transmission LLC and North America Transmission Corporation (NAT), the New York Transmission Owners (NYTOs),[8] NextEra Energy Transmission New York, Inc. (NextEra), and Boundless Energy NE, LLC (Boundless) (collectively, the Applicants). Many of the revised proposals included significant revisions to address environmental compatibility issues. Thereafter, the Commission directed Trial Staff, with the

[8] The NYTOs include Central Hudson Gas & Electric Corporation, Consolidated Edison Company of New York, Inc., New York Power Authority, New York State Electric & Gas Corporation, Niagara Mohawk Power Corporation, Orange and Rockland Utilities, Inc., and Rochester Gas and Electric Corporation respectively.

assistance of the NYISO, to undertake a comparative evaluation of the project proposals. The comparative evaluation study required significant computer modeling of power flows, electric generation production cost benefits, and electric generation capacity cost benefits and resulted in benefit cost analyses. In addition, each project was analyzed as to its specific environmental impacts. At the request of the Hudson Valley Smart Energy Coalition (HVSEC) and others, the study also included an analysis of alternatives to a transmission facility to address the issue of whether there is sufficient public need for a transmission solution as a matter of public policy.

An initial result of that analysis was the Trial Staff Interim Report dated July 6, 2015, which addressed primarily the issues of environmental compatibility and beneficial electric system impacts on the Central East and Upstate New York/Southeast New York (UPNY/SENY) electrical interfaces. On June 12, 2015, it had been announced in the press that the planned 720 MW CPV Valley generation facility had obtained its financing and would be proceeding to construction. This significant change in the New York bulk electric system required Trial Staff to update its power flow, production cost benefit, and capacity cost benefit studies to reflect the change. Therefore, it was necessary for the projects to be further studied considering the effects of the planned 720 MW CPV Valley generating facility.

Pending that revised analysis, Trial Staff issued the Interim Report of its findings, and the parties to the AC Transmission proceedings met in a Technical Conference to review the findings and exchange further information. The initial Technical Conference focused primarily on issues of environmental compatibility and cost. HVSEC also presented its environmental compatibility findings at the Technical Conference.

On September 22, 2015, Trial Staff issued its Final Report and a companion Motion recommending that the Commission find that there is a transmission need driven by Public Policy Requirements for new 345 kV major electric transmission facilities to cross the Central East and UPNY/SENY interfaces to provide additional transmission capacity to move power from upstate to downstate. The Trial Staff report included a comprehensive comparative analysis of the twenty-two project proposals which was used to identify the best proposals in a winnowing process using relative environmental impact, electric system impact (including modeling by the NYISO), and benefit and cost data and analysis (provided in the “Brattle Report” produced for the NYISO and Trial Staff attached to the Final Report).

Again the parties to the AC Transmission proceedings met in a Technical Conference to review the findings and exchange further information. The second Technical Conference focused primarily on issues of benefits, costs, and overall need. HVSEC also presented its peak load and congestion forecast findings at the Technical Conference.

TRANSMISSION NEED DRIVEN BY PUBLIC POLICY REQUIREMENTS

In the order instituting Case 12-T-0502, the Commission explained that the transmission corridors that include the Central East and UPNY/SENY electrical interfaces were persistently congested and contributing to higher energy costs and reliability concerns. The Commission recognized that upgrades to those sections of the transmission system could produce various benefits for New York, including: 1) enhancing system reliability, flexibility, and efficiency; 2) reducing environmental and health impacts; 3) increasing diversity in supply; 4) promoting job growth and the development of new efficient generation resources upstate; and, 5) mitigating reliability problems that may arise with expected generator retirements.[9]

Trial Staff in its Motion recommends that the Commission should find and determine that there is a transmission need driven by Public Policy Requirements as described in the Trial Staff Final Report for a portfolio of 345 kV transmission projects to reconfigure and upgrade transmission facilities from the Edic or Marcy substations to the New Scotland substation with a tie-in to the Rotterdam substation, and from a new Knickerbocker substation to the Pleasant Valley substation (with upgrades at the Greenbush substation). This portfolio included the concept most succinctly defined by Project P11 in the Trial Staff Interim and Final Reports. Three developers identified portfolios of projects and alternatives that are readily comparable (NYTOs P6 and P11; NAT P5; and NextEra P17 and 19c), and that Staff recommended advance to the next levels of review. Trial Staff recommends that these comparable facilities, locations and routes are most promising from an electric system benefit perspective, and are significantly more environmentally compatible primarily because they are designed to use existing rights-of-way, and generally replace existing facilities with new facilities while largely avoiding significant new intrusions into existing communities, landscapes and important farmland resources. Trial Staff concluded that the identified portfolio of projects beneficially balance the issues of transfer

[9] Case 12-T-0502, Alternating Current Transmission Upgrades, Order Instituting Proceeding (issued November 30, 2012), pp. 1-2.

capability; cost; electric system impacts; emissions and production cost impacts; need to acquire additional rights-of-way; the application of innovative technologies; environmental compatibility; and visual impacts. Trial Staff asserts that its analysis demonstrates that the identified portfolio of projects will reduce transmission congestion so that large amounts of power can be transmitted to regions of New York where it is most needed; reduce production costs through congestion relief; reduce capacity resource costs; improve market competition and liquidity; enhance system reliability, flexibility, and efficiency; improve preparedness for and mitigation of impacts of generator retirements; enhance resiliency/storm hardening; avoid refurbishment costs of aging transmission; take better advantage of existing fuel diversity; increase diversity in supply, including additional renewable resources; promote job growth and the development of new efficient generation resources Upstate; reduce environmental and health impacts through reductions in less efficient electric generation; reduce costs of meeting renewable resource standards; increase tax receipts from increased infrastructure investment; enhance planning and operational flexibility; obtain synergies with other future transmission projects; and relieve gas transportation constraints.

Trial Staff also reviewed non-transmission alternatives including the alternatives of constructing a new generation facility and the possibility of promoting a targeted level of customer-driven energy efficiency and demand reduction benefits associated with the Reforming the Energy Vision (REV) initiative. The results of Trial Staff's generation alternative analysis shows that adding a 1,320-MW combined cycle natural gas facility where the plant could be dispatched to meet the needs in SENY would not be cost-effective or a better alternative for ratepayers. The results of Trial Staff's REV alternative analysis shows that adding 1,200 MW of Distributed REV resources among Zones G-J (SENY area) would cost approximately $2.63 billion with measure lives between 10 and 25 years and would have an approximate benefit/cost ratio of 1.2 that is nearly identical to the benefit/cost ratio for the portfolio of transmission projects identified by Trial Staff as the preferred solution. Trial Staff concluded that REV type measures complement the transmission solutions proposed, but do not address many of the transmission specific benefits that have been identified for the transmission solutions.

The NYISO points to the annual publication of *Power Trends 2014*, which it asserts highlights the need to update the transmission system. The NYISO maintains that New York’s transmission infrastructure is aging and needs to be upgraded and replaced, and that transmission upgrades would bring many necessary and important benefits.

The NYTOs provide support for their proposal to designate the Commission’s AC Transmission Upgrades proceedings as a Public Policy Requirement that is driving the need for transmission improvements. Their comments point to existing studies and findings which they believe show a clear need for AC transmission improvements to address the public policy goals established by the Commission’s AC Transmission Upgrades proceedings and the Governor’s Energy Highway Blueprint. The NYTOs point to multiple benefits of AC transmission upgrades across the UPNY/SENY and Central East interfaces, including congestion relief, improved reliability through replacement of aging infrastructure, environmental benefits through the ability to dispatch cleaner resources, a more flexible transmission system capable of withstanding various contingencies, transmission system resiliency, fuel resource diversity, and economic development benefits.

The NYTOs focus on system efficiency and congestion relief and point to the NYISO’s 2013 Congestion Assessment and Resource Integration Study (CARIS), which shows that system congestion can cost ratepayers between $500 million and $2.5 billion annually. Even with the recent downtrend in congestion cost over the past few years due to a slow economy and an abundance of natural gas resources, the NYTOs note that the NYISO is projecting that congestion costs will increase to over $900 million by 2020.[10]

Further, the NYTOs argue that a robust transmission system allows the flexibility to address contingencies that may occur as a result of generation retirements, and could avoid costly and uneconomic gap solutions and reliability contracts. With adequate transmission, the NYTOs contend, generators that have become uneconomic or obsolete would be permitted to retire without adverse reliability or economic impacts.

Boundless Energy NE, LLC (Boundless) points to several statements and determinations made by the Energy Highway Initiative Task Force, and by the Commission, which they maintain supports the need for additional transmission capacity in the State. Boundless notes the difference between transmission and non-transmission solutions, suggesting that allowing non-transmission solution options to supplant the transmission solutions under consideration in the AC Transmission Upgrades proceedings would introduce regulatory issues.

West Point Partners, LLC (West Point Partners) endorses Public Policy Requirements to relieve congestion between upstate and downstate New York, ease limitations on

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[10] NYISO 2013 CARIS, p.49.

developing upstate renewable resources, provide access to lower cost and cleaner energy for downstate energy users, improve resource diversity, and enhance the flexibility of the system to address major contingencies such as the possible retirement of Indian Point. It points to the Commission's proceedings addressing the AC Transmission Upgrades and Indian Point Reliability Contingency Plan, and the 2014 Draft State Energy Plan as establishing Public Policy Requirements. It also notes that the NYISO has urged new investment in transmission and generation to maintain system reliability and reduce costs, which in turn would provide access to renewable resources, upgrade aging infrastructure, and provide greater operational flexibility.

Entergy[11] opposes proposals related to the New York Energy Highway Blueprint. Entergy maintains that the Blueprint has not been adopted as a rule of general applicability by any New York State agency, and thus cannot constitute a regulation promulgated under SAPA in the form of a Commission order, and therefore does not meet the definition of a Public Policy Requirement under the NYISO Tariff.

Scenic Hudson, Inc. (Scenic Hudson) opposes the designation of the AC Transmission proceedings as a Public Policy Requirement for three main reasons. First, Scenic Hudson contends that there is no established law, regulation, or order establishing relief of congestion on the UPNY/SENY and Central East interfaces. They suggest that the only apparent source identifying congestion relief as a policy goal is the New York Energy Highway Blueprint, which recommends transmission upgrades capable of providing approximately 1,000 MW of additional transfer capacity between upstate and downstate. However,

[11] Entergy Nuclear Fitzpatrick, LLC, Entergy Nuclear Indian Point 2, LLC, Entergy Nuclear Indian Point 3, LLC, and Entergy Nuclear Operations, Inc. (collectively, "Entergy ').

Scenic Hudson does not believe the Energy Highway Blueprint qualifies as a law or regulation and therefore cannot be the basis for designating a Public Policy Requirement. Second, Scenic Hudson argues that transmission projects which increase transfer capability across UPNY/SENY and Central East will not produce congestion reduction benefits that justify their costs. Scenic Hudson points to the NYISO’s 2013 CARIS, which projects congestion across the UPNY/SENY and Central East interfaces will decline over the 10-year planning horizon, and that the costs of a generic transmission solution will not be economically beneficial. Lastly, Scenic Hudson points to countervailing public policies that would be negatively impacted by construction of transmission projects to relieve congestion in the Hudson River and Hudson Valley region. Scenic Hudson notes several federal and State policies which promote environmental protection and conservation of this region, including the Hudson River Estuary Management Plan, the New York State Open Space Plan, the Mid-Hudson Regional Economic Development Council Strategic Plan, and the New York State Department of State Coastal Management Plan. The Town of Milan/Farmers and Friends for Livingston/Town of Pleasant Valley (Milan/Pleasant Valley) and Farmers and Families for Claverack supports the comments submitted by Scenic Hudson. Columbia Land Conservancy similarly supports Scenic Hudson’s comments and also notes its involvement in the New York State Open Space Conservation Plan, the Hudson River Estuary Action Agenda, and the Capital Region Economic Development Council’s Strategic Plan, as public policy agendas whose activities would be jeopardized by building new transmission projects in the proposed corridors.

According to Hudson Valley Smart Energy Coalition (HVSEC), the NYISO’s Final Report on the 2014 Comprehensive Reliability Plan, dated July 21, 2015, demonstrates that there is no reliability concern over the next ten years; consequently, it argues there is no reliability justification for new transmission lines in the Hudson Valley. HVSEC argues that the degree of congestion has been coming down (except for the last two winters due to the Polar Vortex) and that Staff’s analysis failed to address this. It also claims the congestion analysis in the Brattle Report is flawed because it fails to assume an increase in the gas supply network leading to predicted congestion rents in 2019 and 2024 along the Central East and New Scotland-Pleasant Valley constrained paths of over $300 million, which is twice as high as the historical average. It further argues that the Brattle Report, the 2013 Congestion Assessment and Resource Integration Study, and draft 2015 CARIS predict declining congestion. In addition, it notes that the 2013 CARIS report indicates congestion costs are declining. Based on these reports, HVSEC argues that transmission and generation solutions do not come close to a benefit/cost of greater than 1.0, and so are ineligible for regulated cost recovery.

Trial Staff reported that there has historically been significant congestion across the Central East interface (between western New York and the Hudson Valley), and Brattle and the NYISO forecast this congestion to continue. London Economics International, LLC (LEI), on behalf of HVSEC, prepared a forward-looking market study of energy and capacity prices, for the years 2016-2034. LEI used its proprietary simulation model, POOLMod, to project regional electric energy prices, Locational Based Market Prices (LBMPs) and zonal Installed Capacity (ICAP) prices. LEI’s forecast analysis relied on NYISO’s 2015 Gold Book demand forecasts; considered how the generation fleet would evolve based on modeled market dynamics; derived three future price paths for delivered natural gas prices. Two of these futures assume pipeline expansions and capacity to occur due to market forces. LEI states that the focus on natural gas is because of the large percentage of generators within the NYCA that rely on natural gas as their fuel, and the price of natural gas has a strong impact on electricity price levels and the market value of transmission congestion. LEI did not directly assess or otherwise evaluate the potential market impacts of any of the proposed AC transmission projects under review. Given its assumptions and inputs and resulting computer simulations, LEI concluded that under all three of its gas scenarios, congestion across Central East and UPNY/SENY interfaces is forecast to decline as a result of a lower difference in locational gas prices between eastern and western New York. According to LEI, the declining trend is stronger in those scenarios where the natural gas price difference between eastern and western New York is smallest. Other drivers for the decline in congestion include the entry of new generating resources in eastern New York, especially the lower Hudson Valley and New York City. Retirements of western New York generation also contribute to the lower congestion level when compared to recent years.

In reply, Trial Staff notes that the contrary forecast by LEI is based on LEI's assumption of new gas pipeline construction in the Hudson Valley and Trial Staff observes that LEI fails to explain who would pay for all the new gas pipelines LEI assumes.

NYTOs urge that no weight be given to the LEI analysis. NYTOs assert that several areas of LEI’s study are questionable, and understate the level of congestion and associated congestion cost. These include:

1 LEI analyzed infrastructure using speculative expansion of infrastructure that causes the problem to appear solved when it is not solved;

2. LEI presented a few cases and failed to provide an expected or probability weighted case. This is a variance with previous LEI analysis and is a fatal flaw in its approach;

3. LEI presented unrealistic gas price differentials. Not even the warmest winter ever had this low a price differential;

4. LEI failed to sufficiently document long term pipeline expansion and hence the assumptions regarding pipelines are unrealistic;

5. LEI’s new power plant builds are another example of speculative infrastructure projects; and

6. LEI’s CO2 assumptions are unreasonably low. They give no weight to the recently finalized Environmental Protection Agency *Clean Power Plan*.

NAT urges that the LEI Report is based on flawed assumptions regarding new downstate generation supply and natural gas supply in the state. In fact, the assumptions on which the LEI Report are based contradict assumptions used by LEI in other analyses conducted with respect to the New York markets. Because the LEI Report is based on flawed assumptions, NAT argues that its conclusions should not be relied upon by the Commission. According to NAT, among the flawed assumptions is the unrealistic assumption of 1,250 MW for new generation capacity in NYISO zones J and K before 2021. NAT goes on to state that it is highly speculative to assume that a new generation facility will enter service in this relatively short time period given the many constraints and challenges of siting generation within the downstate load pocket, such as limited real estate, air quality issues and lengthy permitting processes. Another flawed assumption in the LEI Report identified by NAT is that there will be an equalization of natural gas prices between eastern and western New York. NAT believes it is highly speculative that the persistent difference in gas prices between eastern and western New York will simply just disappear. A conclusion that the delivered natural gas price would equalize assumes both significant new natural gas pipeline capacity and that the incremental shipping cost on this new natural gas pipeline capacity would be zero. Moreover, LEI does not appear to have used the same assumptions in at least one other study it conducted with respect to New York markets. The assumptions in the LEI Report prepared on behalf of HVSEC are not consistent with the report completed by LEI on behalf the Champlain Hudson Power Express (CHPE) project. The CHPE project, similar to the goals of this proceeding to increase the UPNY/SENY interface, proposes to add approximately 1,000 MW of new capacity to NYISO Zone J. The LEI report prepared on behalf of the CHPE project identified an average of over $800 million per year in energy savings from an additional 1,000 MW of new transmission capacity which is in stark contrast to the report LEI prepared in this proceeding. In addition, the LEI report on behalf of CHPE identifies many other benefits of new transmission capacity such as impacts on capacity markets, reduction in market power, renewable policy benefits, decreased system losses, and improved system reliability.

HVSEC argues that new transmission will not facilitate additional renewable resources, including wind, but rather will increase emissions and increase generation from coal-burning plants. HVSEC also claims the greatest demand in New York is closest to the area with the greatest capacity for offshore wind power. Because the federal government has identified an area off Long Island for development of offshore wind farms as an area to increase the amount of renewable energy in the next decade, HVSEC claims new transmission is not needed to meet the State’s renewable energy goals. In addition, HVSEC argues that the transmission projects will not help increase existing or proposed upstate wind resources because the constraints on these resources are a result of constraints on the local 115 kV transmission system, not the UPNY/SENY or Central East interfaces.

HVSEC cites the 2015 Gold Book to show that historic trends in peak demand and peak load growth for the downstate region (Zones G to K) are declining. HVSEC also cites a report prepared for it by Gidon Eshel, Ph.D., a geophysicist and applied mathematician by training, a Senior Scientist at Northwest Research Associates and a Bard College environmental physics research professor, entitled "Hudson Valley Transmission Line Plan: Updated Analysis of Need & Alternatives," which criticizes the NYISO for projections that systematically overestimate future downstate peak load, and concludes that no additional transmission capacity into the downstate region is needed. According to Dr. Eshel, there are more than sufficient transmission and generation projects available, even assuming Indian Point retires, to serve in the unlikely event demand increases. Therefore, HVSEC argues, building unnecessary transmission infrastructure makes no sense. Dr. Eshel goes on to state that reducing congestion is not wise and asserts that it is fundamental that congestion is an asset, not a liability. He further asserts that congestion raises power prices for a few hours on a few afternoons a year.

In its comments NYISO maintains that its forecasting methodologies are consistent with well-established industry practices that have been proven effective and appropriate through widespread application. According to the NYISO, Dr. Eshel’s arguments to the contrary provide no sound basis to change the proven methods employed by the NYISO and the utility industry as a whole.

Dr. Eshel argues that because of the amount of projects listed in NYISO's interconnection queue for new generation projects no need exists for the proposed transmission upgrades even after discounting by 45%-50% for completion rates of projects. NAT in its comments points out that Dr. Eshel's generation supply forecast assumes an unrealistic completion rate of generation in the NYISO queue. Significantly, the analysis contained in the Eshel Report, according to NAT, is based on the flawed assumption that completion rates of proposed queued generation is in the range of 45% to 50%. NAT asserts the best available information regarding completion rates of queued generation proves the assumed completion rates to be extremely optimistic. In the Eshel Report, the assumed completion rates of resources in the queue are approximately four times greater than the historic completion rate of 11.6%. The NYISO queue indicates fifteen (15) different values for status progressing from scoping meeting, various impact studies, interconnection agreement, construction, and completion. NAT also points out how generation interconnection requests progress through the PJM queue, similar to that of the NYISO, for a large number of requests (289,742 MW) with a completion rate of 11%.

HVSEC also argues that the Brattle Report included more benefits than are typically considered in evaluating transmission projects in order to calculate a benefit/cost ratio of over 1.0 for the P11 Project. According to HVSEC, the REV alternative provides all the benefits relied upon by the Brattle Report other than avoided refurbishment costs, which is the largest benefit metric for the P11 Project. It argues that the Brattle Report overstates this benefit category and fails to provide evidence that the new AC transmission would provide any deferral of refurbishment. Consequently, HVSEC claims the refurbishment benefit should not be given anywhere near equal weight as production cost savings in the Benefit/Cost analysis.

HVSEC argues the REV solution is superior to the AC transmission solutions in almost every metric and has an identical benefit/cost ratio – 1.2 to the P11 Project. HVSEC also claims that REV performs comparably, if not better than, the transmission projects in the category of non-quantified benefits, including: job creation; system reliability and offsetting potential retirements in SENY; the need for future transmission projects; market benefits; and storm resiliency. The only non-quantified benefits the transmission projects have that differ from REV's benefits are synergies with other future transmission projects and maximizing future capacity options on existing ROW, which HVSEC claims are tenuous benefits.

According to HVSEC, REV has significantly more environmental benefits than any of the transmission projects. It claims the REV alternative reduces emissions more than ten times more than the highest-reducing transmission project and reduces New York's carbon footprint more than any of the transmission projects. Furthermore, HVSEC argues the P11 Project will cause NOX emissions from coal to increase from the base case by approximately 118 tons in 2019 and by approximately 52 tons in 2024, resulting in a direct conflict with New York's energy goals and policies. In addition, HVSEC claims that, in contrast to the Staff's recommendation to proceed with a transmission project that would increase emissions, REV is more consistent with the 2015 State Energy Plan's goal to reduce greenhouse gas emissions and generate 50 percent of its electricity from renewable energy sources by 2030.

Discussion

Electricity prices depend in part on the ability of generating facilities to delivery their energy into the NYISO location-based market zones that have the greatest demand. Congestion results when there is a lack of sufficient electric transmission capacity to deliver all available power and historically has resulted in higher prices in New York City and the Hudson Valley because available upstate generators have not had a sufficient path to deliver the additional power. According to Trial Staff, NYISO, the Brattle Group, the electric utility companies, the other potential developers and others, if transmission is not built, the trend and costs of congestion will continue. Alternatively, HVSEC and others assert that a transmission solution is not needed and is not the only or best option to pursue.

The positions of the parties reveal two very different approaches to the future energy system in New York. The transmission approach looks to a system that uses existing resources in the western and northern part of the State, new wind resources, and a larger transmission backbone to supply power to the downstate region. The less populous northern and western parts of the State have traditionally been home to central station power plants that are less expensive to build upstate than downstate, and now wind generation facilities that are relied on to meet power needs. However, the lack of transmission infrastructure means that for too many hours throughout the year, and not just during the summer peaks, this power cannot reach downstate customers, which means they must continue to rely on older, less efficient and dirtier units to meet their power needs. In the alternative, the downstate customers would need to build new downstate generating facilities that are significantly more expensive than upstate facilities. As these parties point out, the result is higher prices and less ability to take advantage of new wind resources and promote fuel diversity, including reducing GHG emissions.

The alternative posited by LEI (including Dr. Eshel's assertions) presents a much different approach to development of the electric system, and one that the Commission finds to be inconsistent with New York public policy. Under this alternative view, the future electric needs of New Yorkers in the downstate region can be met by extensive build out of significant additional gas infrastructure (new gas pipelines and generating facilities) along with actions to manage demand (demand reduction being a key objective of REV). According to LEI, the combination of new gas plant fueled by low cost natural gas and load reductions through extensive deployment of distributed energy resources (DER) will reduce prices through the region and consequently, with less need for imports from the west and north, will reduce congestion. While new gas facilities will undoubtedly be part of the future energy landscape, the holistic view offered by LEI is unrealistic, and is therefore rejected.

REV is intended to achieve State policy goals of fostering a reliable, cost effective and environmentally sound power sector through actions that drive system wide efficiency at the supply, bulk power and demand sides of the power system. The future envisioned by REV is that distributed energy resources deployed locally will help customers become efficient and dynamic electric users. These new customer resources will also be able to be used to more effectively balance increased investments in wind and solar resources that are deployed remotely. Additionally, the Commission recognizes that large scale central generation, including our safe upstate nuclear facilities that are in their licensed periods, can continue to be operated and new investments can be made to compliment the distributed resources. Stated another way, while there is no doubt that we can all become better environmental and economic stewards by becoming more efficient energy consumers and using energy more efficiently, the Commission also recognizes that in its entirety the optimal system design will be met by a balance of central station and distributed resources and that this balance will be found by markets that accurately value resources and public policies that stress the importance of building an electric system that reduces waste and decreases rather than increases reliance on fossil fuels.

Without question, having a strong transmission backbone that can respond to and balance a much more diverse and dynamic fuel and usage mix is core to this vision. Consequently the Commission rejects as inapposite to the State's policy a view of the system where the downstate region is denied the benefits of lower cost and renewable generation from upstate and is asked to rely only on fossil fueled electric infrastructure.

The LEI view suffers from a number of other weaknesses that were pointed out in the record. LEI asserts that investments in new infrastructure will be made, but its assertion is based on speculation and not on identified actors that have either specific plans or financial backing to make such investments. LEI's view also fails to account for local opposition and siting issues that might defeat the plans of such an investor. In contrast, the electric transmission facilities under consideration here have already passed through an initial vetting for environmental compatibility, are proposed by known entities that will be vetted by the NYISO for their viability and capability to follow through on their plans, and the NYISO Tariff provides a certain path for recovery of costs by any investor. LEI's view also fails to give sufficient recognition to the value of fuel diversity. While natural gas is an important component of New York's energy future, the current market structure which focuses almost exclusively on price will drive all market decisions towards that one fuel type unless measures are taken to also recognize the real long-term values of fuel diversity and fuel types with fewer negative air emissions. LEI also fails to give account for the need to replace aging transmission infrastructure and the value to the State of maximizing the use of existing assets. It would not be very efficient or sensible to open new rights-of-way for new infrastructure when you are already going to be rebuilding existing infrastructure in place and could have avoided the new infrastructure and rights-of-way by merely upgrading the capacity of the existing infrastructure as part of the rebuild.

VISUAL IMPACT ON THE HUDSON VALLEY

The Commission has gone to great lengths in these proceedings to ensure that land use impacts and visual impacts will be minimized, not just in the Hudson Valley, but throughout the project areas. When the initial submittals appeared to cause more of such impacts than necessary, the Commission took an unprecedented approach and sent all of the developers back to the drawing board to improve their submissions. In addition, after the revised projects were submitted, Trial Staff was directed by the Commission to do a comprehensive comparative evaluation of the projects which resulted in a substantial winnowing out of all the projects that proposed establishing new or widening existing transmission rights-of-way. These measures have significantly lessened the impact of the remaining projects on the visual landscape of the Hudson Valley.

HVSEC is concerned that the proposed Segment B facilities will cause negative visual impacts in the Segment B corridor in the Hudson Valley, which could be avoided if Trial Staff’s proposal is rejected. HVSEC urges that the Hudson River and its valley have nationally important historical, cultural, ecological and aesthetic values that deserve special protection. Assemblywoman Didi Barrett raises similar concerns that the proposed towers would put Dutchess County's tourism and Columbia County's agricultural industries at risk. The Town of Pleasant Valley, host of the key regional transmission hub/substation, calls the existing substation a visual blight in its community and believes that Pleasant Valley residents have already endured too much.

Discussion

The Commission agrees that the Hudson River and the broader Hudson River Valley region have nationally important historical, cultural, ecological and aesthetic values that should be protected. The location of Segment B of Staff's recommended solution is no closer to the banks of the Hudson River than one and one half miles at any point, and for half of its length it is no closer than five miles. The topography is such that the facilities in question here would not present significant visual impacts at locations on the Hudson River. In addition, the facilities in question would not approach or cross the Hudson River. The Commission is fully satisfied that the proposed Segment B facilities would have absolutely no negative visual impact whatsoever on users of the Hudson River itself. Furthermore, visual impacts on resources within the Hudson Valley region will be minimized by utilizing existing electric transmission corridors to replace existing facilities with new facilities.

Many proposals have been put forth in these proceedings. Some would require the opening of new rights-of-way for overhead transmission lines. Some would require the widening of existing rights-of-way for new overhead transmission lines. One developer, Boundless, proposed some underground segments, including an underground crossing of the Hudson River, but even the Boundless projects would have required reconductoring construction work along many miles of existing transmission rights-of-way in the Hudson Valley, many of those miles through the same communities that have raised concerns. The Boundless proposals ultimately proved to be inefficient and therefore infeasible in relation to the remaining proposals. The Segment B facilities proposed by Trial Staff would not require either the opening of new rights-of-way or the widening of existing rights-of-way for new overhead transmission lines. Clearly the opening of new rights-of-way would have a more significant visual impact than the reuse of existing rights-of-way.

The greater Hudson Valley is not an undisturbed wilderness. It is a working landscape that includes homes, farms and forests, but it also includes major industrial and commercial facilities, villages, cities, and infrastructure including highways, railroads, and some very significant electric substations and overhead transmission lines. The Segment B transmission corridor already contains a substantial number of overhead electric transmission lines that serve an important function and will have to remain in place for the foreseeable future. Some of the facilities are aging and will shortly need to be rebuilt in place. Accordingly, the Segment B corridor is going to be disturbed by new construction in the near future. One of the questions here is whether the existing facilities should be rebuilt in kind, or whether they should be upgraded in capacity as part of the rebuilding process so as to avoid having to build even more powerlines through the Hudson Valley.

The following sample cross section diagrams taken from the record simulate the visual difference between the existing conditions and the proposed conditions.[12] The locations of the cross sections provide a fair representation of all of the conditions in Columbia and Dutchess counties. The first four compare the NYTOs projects where existing 80 to 85 foot lattice structures would be replaced by 90 to 100 foot steel monopole structures. For the sake of brevity, the fifth diagram is a single sample of the NextEra projects where existing 80 to 85 foot lattice structures would be replaced by 105 foot concrete monopole structures. The sixth diagram shows only the 80 foot two-pole horizontal structure proposed by NAT. NAT unfortunately did not provide comprehensive cross sections for all conditions. NAT has not committed to whether its structures would be made of steel, concrete, or a combination of the two. It should also be noted that in many locations some of the visual clutter would be reduced as two existing structures would be removed and replaced by a single, but possibly taller, structure.

[12] Note: the grayed out structures shown are to be removed.

Diagram One - NYTOs
Rensselaer and Northern Columbia Counties

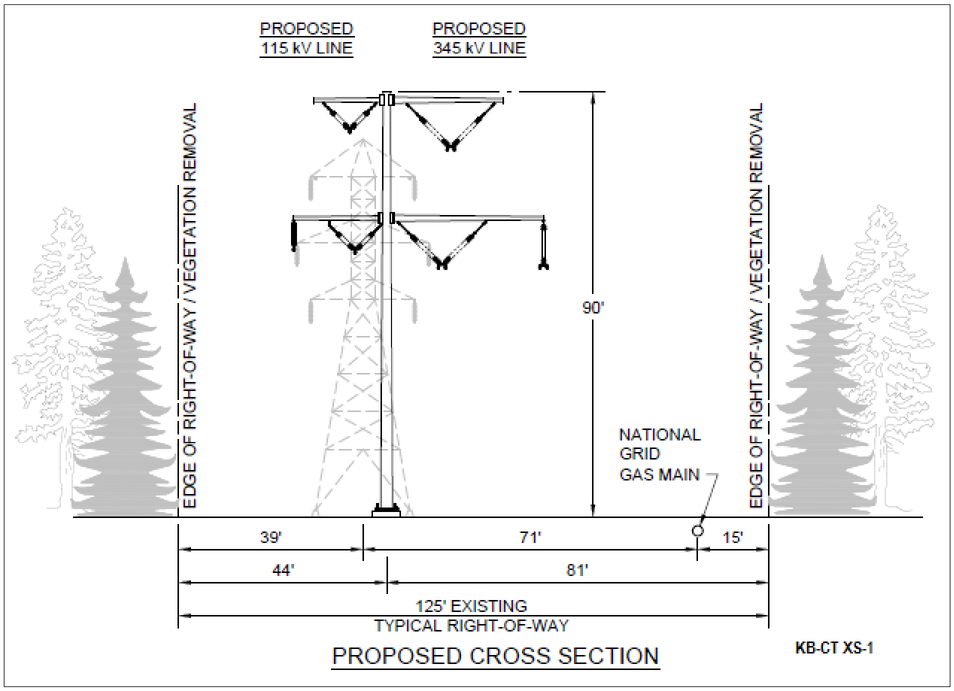


Diagram Two - NYTOs
Central Columbia County

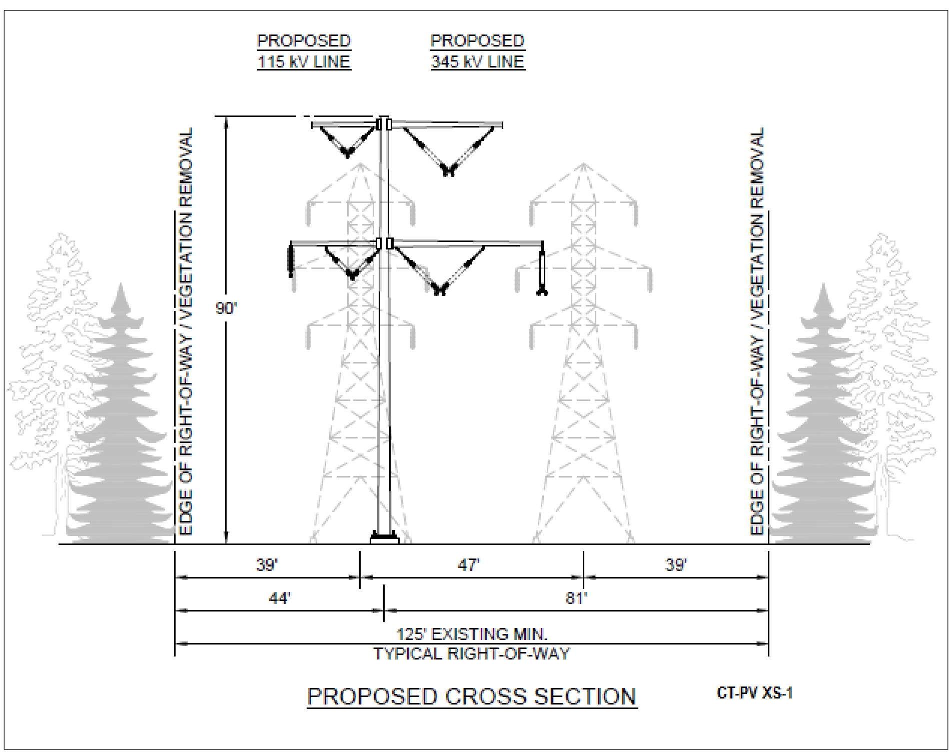


Diagram Three - NYTOs
Town of Milan, Dutchess County

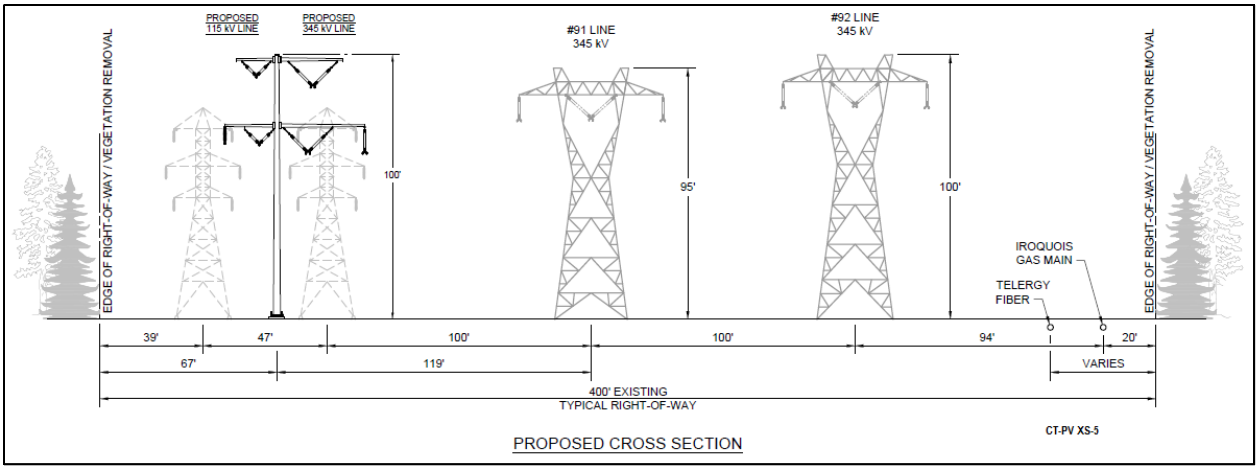


Diagram Four - NYTOs
Pleasant Valley, Dutchess County

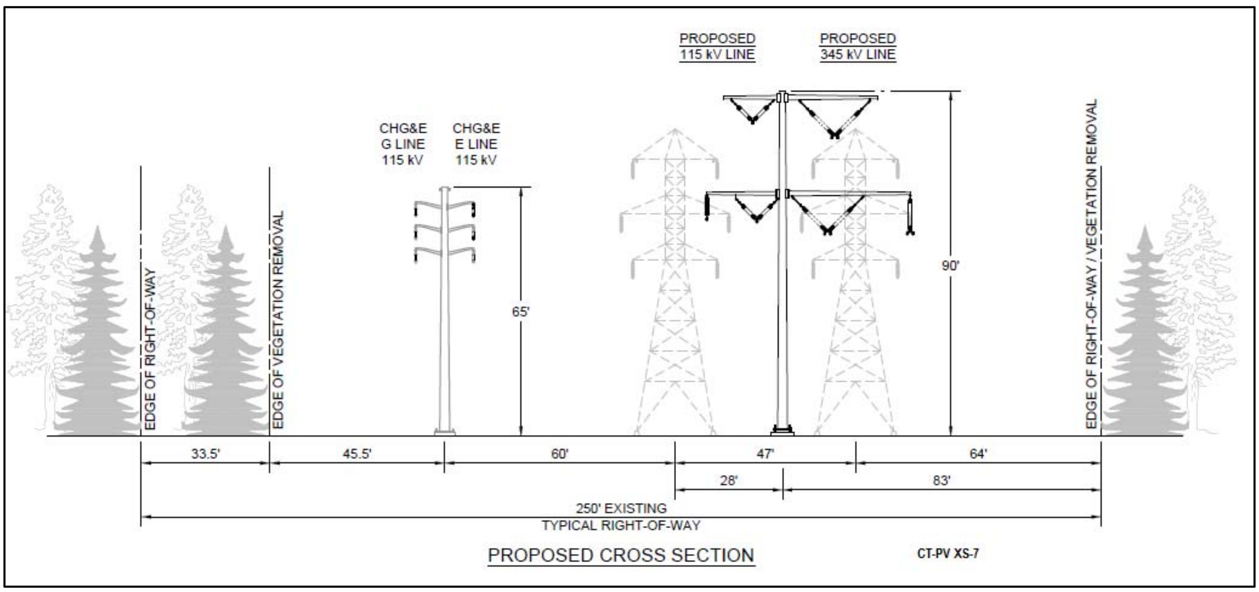


Diagram Five - NextEra
Columbia County

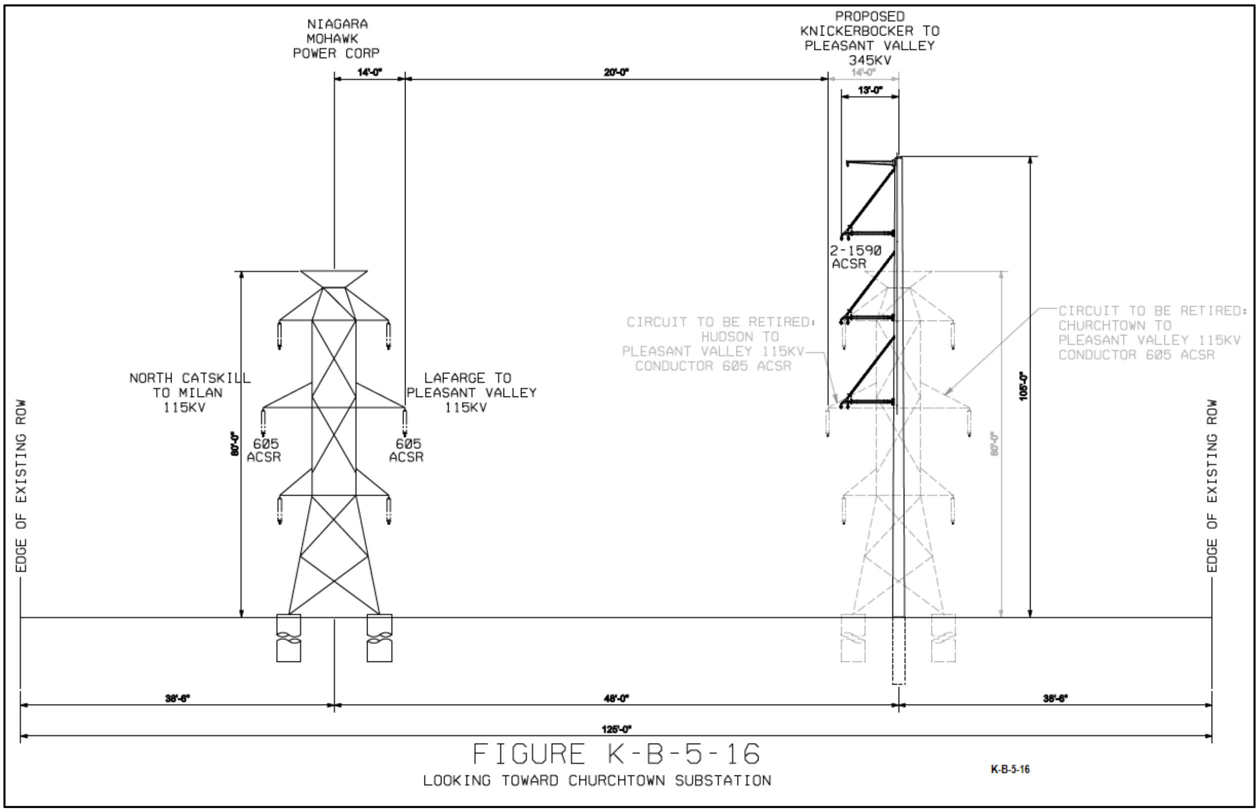
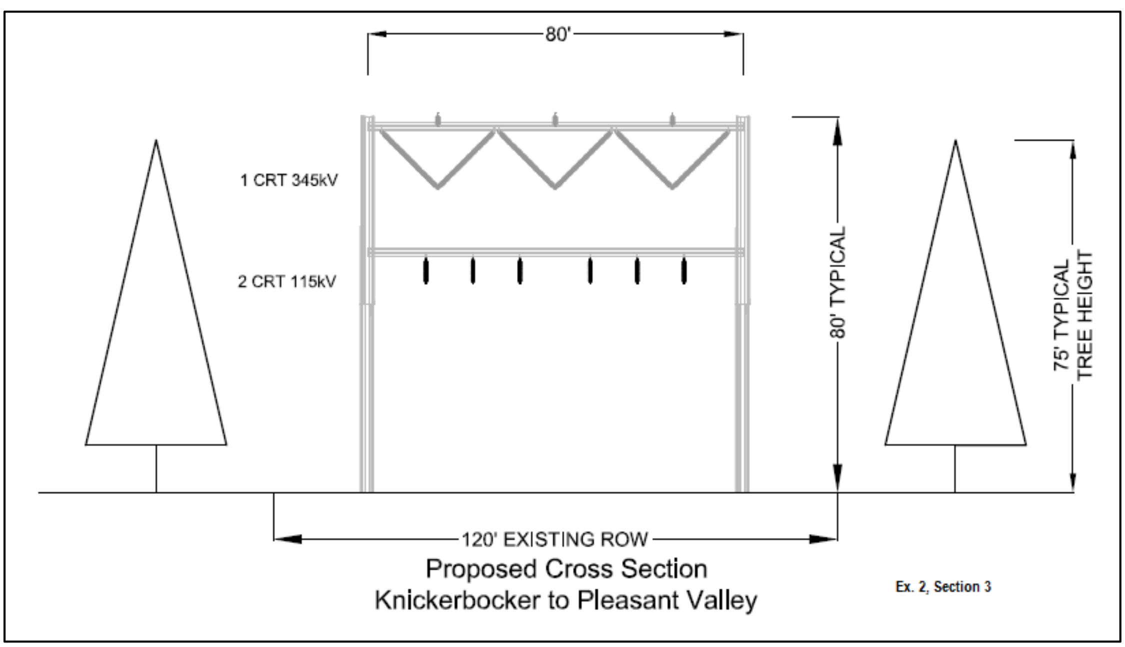


Diagram Six - NAT
Columbia County



The Commission has seriously considered all the concerns that were raised and has examined the cross section diagrams. It is the Commission's conclusion that the potential for increased height of tower structures as presented here will result in a deqree of increased visibility, but that the potential increment of increase (between zero and twenty five feet) will not create an adverse impact of a regional nature that would significantly impair the physical visual character of the Hudson Valley and its communities.

A change in structure types and structure heights of the types contemplated may have local, site specific visual impacts. During the Part B Article VII process where it will be possible to look at details including individual structure locations and heights, alternative designs, and mitigation opportunities, the Commission and Staff will assess the degree to which any of the necessary changes result in visible changes in the landscape. The Commission and Staff will work with the developers, local farmers, landowners and other stakeholders to minimize the visual and other impacts of structures, and the Commission throughout these proceedings will continue to encourage the applicants to further minimize the heights of their proposed structures to the degree possible consistent with safety regulations as to conductor clearances.

The Commission also notes that it finds it understandable that the Town of Pleasant Valley would feel challenged by the plethora of transmission proposals seeking to connect into the Pleasant Valley substation in both these and other proceedings. In these proceedings alone there were 19 such proposals in five different corridors. The Commission's action in this order is responsive by reducing the 19 proposals down to three very similar proposals on a single pre-existing corridor. The Commission will also be requesting that the proposals that in the Commission's view are non-viable be withdrawn, in part to give relief and finality to communities like the Town of Pleasant Valley.

OTHER ENVIRONMENTAL IMPACTS

The minimization of environmental impacts due to construction activities is a key responsibility of the Commission in reviewing proposed major electric transmission facilities. Staff has considerable experience and expertise regarding such issues, and regularly goes to great lengths through on-site surveys, landowner discussions, and resource agency consultations to identify all resource constraints. The Commission regularly imposes numerous specific conditions on construction practices and Staff actively monitors all construction activities.

HVSEC identified a number of "priority sites" of environmental concern along the Segment B corridor that could be potentially adversely affected by construction of the Segment B facilities. Even though no new expansion of the existing rights-of-way are contemplated, HVSEC argues that construction activities can result in temporary and permanent negative environmental impacts along the proposed route that may harm ecological communities and spread invasive species. In addition, HVSEC argues construction along the Segment B corridor could impact a number of historic resources. Trial Staff's environmental analysis was remarkably similar in result to that of HVSEC and similarly identified areas that will be of concern during any construction.

Discussion

The Commission welcomes the additional review conducted by HVSEC and is gratified that the HVSEC and Trial Staff environmental experts made findings that support each others’ analysis, which lends credence to the efficacy of Trial Staff's comparative evaluation. The affected rights-of-way are areas that have already been highly disturbed by past construction activities. None of the resource concerns identified are so extraordinary that they could not be appropriately addressed through implementation of a well-designed Environmental Management and Construction Plan (EM&CP) as the Commission typically requires for major electric transmission facilities. However, the Commission will be looking to improve on past construction methods for these rights-of-way as it is likely that current standards are more protective of the environment than when the existing facilities were constructed. EM&CP issues will be further addressed in the follow-on Part B Article VII siting process.

EVALUATION CRITERIA AND SPECIFIC ANALYSES

The NYISO Open Access Transmission Tariff[13] provides that in issuing a written statement identifying transmission needs driven by Public Policy Requirements, the Commission's statement may also provide additional criteria for the evaluation of transmission solutions and non-transmission solutions, and may also identify the type of analyses that the Commission will request from the NYISO for the NYISO to use in evaluating potential solutions. The NYISO will independently evaluate each solution – transmission, generation, demand response, or a combination of these resource types – to measure the degree to which the proposed solution satisfies the need, including the evaluation criteria provided by the Commission.[14]

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[13] NYISO Open Access Transmission Tariff, Attachment Y, §31.4.2.1.

[14] NYISO Open Access Transmission Tariff, Attachment Y, §31.4.6.4.

Trial Staff proposed that the Commission's statement should establish evaluation criteria and specific analyses for the NYISO to undertake in reviewing transmission solutions to ensure that any selected solution avoids the opening of new transmission rights-of-way and also avoids a new crossing of the Hudson River by a power line as is intended by the identification by Trial Staff of a specific portfolio of projects. LIPA proposed evaluation criteria including a minimum 900 MW increase in power transfer capability across the UPNY/SENY interface; avoidance of a decrease in power transfer capability across the Central East interface; core environmental protections including utilization of existing right-of-ways or paralleling existing infrastructure as important avoidance or minimization measures; and a minimum 1.0 benefit/cost ratio. NYTOs also proposed evaluation criteria including that the project should already have begun the Article VII process (affects schedule for completion); not cross the Hudson River; be built entirely within currently existing rights of way; increase transfer capabilities over both the UPNY/SENY and Central East interfaces; enable the avoidance of future transmission refurbishment costs and result in upgrades to aging infrastructure; be built by a developer with significant experience with managing major transmission projects on an interconnected AC transmission system, including outage management capabilities; be able to obtain all necessary permits in the necessary course; and have a positive impact on the community, such as whether the project will reduce the total number of structures in a community from the number that exist today.

NAT proposed evaluation criteria including a recognition that the applicants that filed Article VII, Part A applications in 2013, and amended them in 2015, have a better ability to meet a required in-service date; that although 80/20 sharing of cost risk should be required of all applicants, that differing risk mitigation options should be allowed and evaluated as part of the cost criteria; and that the different revenue requirements of the applicants be evaluated as part of the cost criteria. NAT requests that the weighting of the different criteria should be identified (weight of environmental factors against other factors), including a clarification of how "innovation and technology" is to be weighted. NAT also requests that when costs are evaluated, that the scope of costs used be identical for all projects including the cost of right-of-way acquisition (which NAT asserts also has a cost for the NYTOs).

NextEra requests that all applicants identify their proposed cost risk mitigation sharing percentages for evaluation. NextEra also requests that the Commission identify the intended in-service year for the facilities.

Boundless raises a concern that Trial Staff did not recognize the contribution of the Transmission Owner Transmission Solutions (TOTS) Projects towards increasing the transfer capability across the UPNY/SENY interface. Boundless cites information that it claims estimates the TOTS contribution at 450 MW therefore Boundless argues that the 1,000 MW target should be reduced to 550 MW. The amount of the target is important to Boundless because its projects are estimated to provide transfer capability increases of 687 MW and 605 MW respectively across the UPNY/SENY interface, whereas the other projects likely under consideration range from 918 MW to 1,136 MW. Boundless claims that any use of Central East transfer capability as a criterion is unfair and illegal. To resolve Central East issues, Boundless suggests that the Commission sequence its review and first separately compare

Central East projects, and then after selecting a Central East project, then compare UPNY/SENY projects as if the Central East project were already in place. Boundless also asserts that its proposal to install a line beneath the Hudson River does not have environmental impacts that are as significant as a new overhead crossing, therefore its Hudson River crossing does not provide a reasoned basis for project selection.

Trial Staff, in its assessment of relative impacts on "Major River Corridors", provided significant analysis and consideration of impacts to these corridors, and the Hudson River corridor in particular. Staff ranked proposals with either no new Hudson River crossing, or river crossings limited to reconductoring on existing towers as "low" in terms of environmental impact; in-kind replacement of existing transmission towers on the Hudson River, and drilled underground crossings of the Hudson River at or near Schodack Island or at Roseton[15] as "medium"; and new crossings of the Hudson River at new locations or where forest clearing is required, or drilled underground crossings of the Hudson River at Athens-Greenport or Lloyd-Poughkeepsie as having relatively "high" impacts. The latter locations were deemed "high" because they may cross important fisheries or habitat areas, or the overhead facility approaches to the underground crossing will be within or directly visible from designated Scenic Areas of Statewide Significance (SASS). Some of these locations would involve potential conflicts with Local Waterfront Revitalization Programs and Coastal Area criteria. Trial Staff noted that impacts to be expected from horizontal directional drilling (HDD) activities include potential drilling fluid leaks or "frac-outs" and clearing for staging areas for construction equipment and HDD drill entrance and exit pits. Additionally,

[15] The Hudson River crossing at Roseton is proposed by Boundless.

Trial Staff noted that noise to the surrounding community can be expected during HDD operations.[16]

Environmental Impact Criteria

Trial Staff's report demonstrates that the transmission need can be met in a cost effective manner without having to resort to the acquisition of new permanent transmission rights-of-way[17] or to any crossing of the Hudson River with a powerline. There remains a need for land acquisition for substations or substation expansions, and although that need will be compact and highly localized, it should also be minimized. There is broad public support for minimizing the impacts of any new powerline by requiring the use of only existing rights-of-way and for avoiding impacts on the Hudson River. Only Boundless takes issue with the idea of avoiding a Hudson River crossing because its proposals rely on a crossing under the bed of the Hudson River. Having considered the record described above, the Commission finds that Boundless is not persuasive in its arguments that its Hudson River

[16] In its reply comments, Trial Staff states that Boundless did not previously indicate any pipe-type, oil-filled, cable with a forced cooling system for its underground proposal and that Boundless now proposes installation of a forced cooling system for the underground cables to improve their capability. Trial Staff asserts that if oil-filled cables had been indicated, it would have requested additional information regarding the cooling system design, nature of coolant material and environmental assessment of impacts related to leakage, spills, or catastrophic system failure; and likely would have recommended consideration of solid dielectric cables as an alternative.

[17] It will not be clear until a later phase whether there will be a need for de minimus exceptions, additional permanent access roads, or temporary construction access roads and lay-down areas for vehicles or equipment, etc. The impacts of such are generally minor, often temporary in nature, and can be managed and minimized through the Commission's Environmental Management and Construction Plan (EM&CP) process.

crossing should have been rated as having a "low" impact in relation to other river crossing methods, particularly since the recommended project portfolios avoid construction of any new or modified Hudson River crossing, either overhead or underground. In addition, the Boundless proposals have other shortcomings that do not hinge on the environmental impacts of its Hudson River crossing such that the exclusion of the Boundless projects as potential solutions would not interfere with obtaining the best overall transmission solution. The Commission has heard the concerns of the many stakeholders that plead that the impacts of any new transmission line be minimized, and is pleased that in this instance it is possible to provide a solution without the acquisition of new permanent transmission rights-of-way or any crossing of the Hudson River with a new transmission line. The comparative evaluation in these proceedings has been generally beneficial, but in this regard it has been invaluable. The Commission will state evaluation criteria to ensure that any transmission solution not include the acquisition of new permanent transmission rights-of-way or any crossing of the Hudson River with a powerline.

The Commission is sympathetic to the suggestion of the NYTOs that projects have a positive impact on the community by reducing the total number of structures in a community from the number that exists today. At this stage, however, the NYISO would not have sufficient information to determine such impacts and the Commission does not want to convert the NYISO process into a siting process. Those matters will be further addressed by the Commission in the Article VII siting cases after the Part B construction information is filed. Similarly, structure heights are often dependant on specific decisions as to structure location and span length which are often influenced by the consideration of site-specific impacts to natural resources, agricultural practices, and visual impacts. As to structure heights, the Commission will not mandate criteria to be applied by the NYISO, but all proposers of transmission solutions should be aware as they prepare their submissions that minimization of structure heights will be an important issue in the siting review process so applicants should be careful to not lock themselves into designs that could not later be approved. All applicants are encouraged to minimize the heights of the proposed structures while keeping them within the context of their 2015 proposals. In making this statement, the Commission is not in any way suggesting that it would be suitable for applicants to appropriate the structure designs of other applicants.

The NYISO tariff-setting process does not allow for the concept of assigning numerical weights to different categories of factors, as did the Trial Staff report. By establishing threshold environmental and other criteria and a specific definition of the transmission need, the Commission is ensuring that environmental factors and other factors are receiving due weight in the overall evaluation of transmission solutions.

Electric System Impact Criteria

As noted earlier, the Commission had sought project proposals that would increase the transmission transfer capability of the UPNY/SENY interface by approximately 1,000 MW. Boundless overstates the impacts of the TOTS projects on the normal transfer capability of the UPNY/SENY interface. For example, the most significant of the three TOTS projects in terms of scope and cost is designed to improve transfers between Linden, New Jersey, Staten Island and Brooklyn; it is not targeted to improve the UPNY/SENY interface. Also, the Boundless reference to a 450 MW increase attributable to the

TOTS projects is misplaced. The 450 MW increase in the reference is an increase in emergency transfer capability for the purposes of a Reliability Needs Assessment (RNA), not normal transfer capability. RNA transmission topology limits are derived using emergency transfer criteria and not normal transfer criteria.[18] Under emergency transfer criteria higher transfer limits are allowed as compared to normal transfer criteria, as clearly illustrated by Figure 11 of Trial Staff's Report. Further, the RNA emergency limits are used for resource adequacy and installed capacity assessments and not used in the production cost model, the model used for assessing congestion and production costs. In addition, the benefit cost analysis demonstrates that projects that don't create at least 900 MW of increased transfer capability at UPNY/SENY either create very little in the way of increased transfer capability (NYTOs projects: P7 = 352 MW; P12 = 432 MW), or provide only a medium level of capacity increase and are not cost effective (Boundless projects: P20 = 687 MW, BC Ratio = 0.7; P21 = 605 MW, BC Ratio = 0.7). By setting a cutoff at 900 MW, the NYISO will be able to concentrate on solutions that are both highly impactful and cost-effective. The Commission will require that no transmission solution shall be selected for Segment B that provides less than a 900 MW increase in normal transfer capability (NTC) across the UPNY/SENY interface.

Despite the contents of the Order Instituting Proceeding[19] that identified both the Central East and UPNY/SENY

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[18] 2014 Reliability Needs Assessment, New York Independent System Operator Final Report (September 16, 2014), at p. D-12.

[19] The corridor [source of persistent congestion] includes . . . two major electrical interfaces (i.e., groups of circuits) that are often referred to as "Central East" and "UPNY/SENY." See, Case 12-T-0502, Alternating Current Transmission Upgrades, Order Instituting Proceeding (issued November 30, 2012), p. 1.

interfaces as being the subject of these proceedings, Boundless appears to have missed the importance of the Central East interface. As a result, the Boundless projects do not attempt to improve transfer capability across the Central East interface.[20] The proposals of the other project applicants all included options that attempted to address congestion at the Central East interface. The Commission is not persuaded by the Boundless fairness or legal arguments. As to fairness, it is obvious from the submissions by the other applicants that the importance of the Central East interface should have been as apparent to Boundless as it was to the other participants. Similarly, the legal argument is fully misplaced.[21] The Boundless suggestion that the Commission sequence its review, select a Central East project, and then compare UPNY/SENY projects as if the Central East project were already in place appears to be an opportunistic attempt to improve the Boundless UPNY/SENY ratings by artificially increasing the congestion at UPNY/SENY, but it fails to accept the reality that it would not make sense to invest in an upstream project without first eliminating downstream congestion. A project that merely moves the congestion point without increasing ultimate downstream power delivery would not be sensible. In fact, given the segmentation approach, the Commission believes it is important to ensure that the evaluation criteria not allow for the implementation of an upstream project without a downstream

[20] They actually degrade the Central East transfer capability by 25 MW.

[21] The Boundless legal argument hinges on the citation of a judicial decision regarding contract law, whereas here the Commission is not entering into any contracts. Any Commission decision in these proceedings will hinge on the statutory requirements of the Public Service Law as to required Article VII findings and determinations and/or on the requirements stated in the NYISO Open Access Transmission Tariff.

project, and has stated criteria accordingly. The Commission will require that no transmission solution shall be selected for Segment A that provides less than a 350 MW increase in normal transfer capability (NTC) across the Central East interface.

Trial Staff was asked to evaluate "innovation and technology" aspects in the comparative evaluation process. Trial Staff's report demonstrates that the innovation claimed by the applicants (except structure types and heights) is already reflected in the powerflow results and environmental rankings. For example, the use of a more efficient conductor technology in a project is reflected in enhanced powerflow results for the project. Nothing in the comments has persuaded the Commission that such innovations should get additional credit. The value of the increased powerflow is the appropriate measure of the value of the innovation because that is the value that will be realized by the beneficiaries of the transmission facility. Assigning additional credit would be inefficient.

Cost Criteria

The NYISO Open Access Transmission Tariff already requires the NYISO to consider cost efficiency issues in its evaluation of solutions. The Commission expects that in evaluating project costs, the NYISO would put all of the proposed transmission solutions on a comparable basis as to the scope of costs, but at NAT's request the Commission will state that criterion so that there is no question as to the matter. In that regard, all parties including NYTOs must provide an estimate of their right-of-way or other real property acquisition costs. The Commission also agrees with the NYTOs that the evaluation should favor projects that avoid future transmission refurbishment costs.

Trial Staff's analysis of the cost estimates submitted to date in these proceedings indicates that most of the developers omitted essential elements from their estimates. Staff also identified that many applicants did not understand New York's practices as to matting and related practices to protect soils from compaction. These omissions resulted in inaccurate cost estimates and are further exacerbated by the NYISO's recent identification of additional unanticipated upgrades to the Rock Tavern Substation and the Shoemaker to Sugarloaf transmission line that are needed to ensure the full value of the proposed transmission solutions but were not included in the developer's estimates. Given these facts, it is not reasonable to use the developer's original estimates as a base cost. Instead, the NYISO in its evaluation should obtain and use revised cost estimates from the developers that match the comprehensive approach established by Trial Staff. The percentage rates applied to account for contingencies and revenue requirement should all be treated uniformly across all estimates so that those factors are not manipulated by the bidders to confuse or artificially skew the results. Rather, the NYISO should evaluate the costs based on raw construction costs. In calling for revised cost estimates, the Commission is not abandoning the benefits of the estimates that were already made. A criterion will be included that caps future cost bids at the level estimated by Trial Staff for the applicant's project unless the applicant can demonstrate to the NYISO that upward estimates are necessary to correct errors or omissions made by Trial Staff for the components that were added or adjusted by Trial Staff.

The benefit-cost analysis prepared by Trial Staff demonstrates that upgrades to aging infrastructure could contribute significantly to the benefits of any transmission solution. Therefore, the Commission agrees with the NYTOs that the selection process for transmission solutions should favor solutions that result in upgrades to aging infrastructure.

In the absence of a cost-containment incentive mechanism, FERC practice is to generally allow full recovery through the NYISO Open Access Transmission Tariff of any prudently incurred costs that exceed the developer's original estimate. The Commission already ruled in these proceedings on what incentive would be appropriate to ensure accurate cost estimates.[22] If actual costs come in above a bid, the developer should bear 20% of the cost over-runs, while ratepayers should bear 80% of those costs. If actual costs come in below a bid, then the developer should retain 20% of the savings. Furthermore, if the developer seeks incentives from FERC above the base return-on-equity otherwise approved by FERC, then the developer should not receive any incentives above the base return-on-equity on any cost overruns over the bid price. The bid price would therefore cap the costs that may be proposed to FERC for incentives.

The Commission cannot predict at this time whether FERC will accept the Commission's preference for a cost-containment incentive mechanism. The Commission also is not privy to the bidding strategies of the potential developers. Those facts raise a concern that it may be very difficult to fairly compare bids if the bids are based on different models of risk. For example, if two competing projects appear to offer equivalent value, but one offers a lower bid subject to the recovery of all actual costs, and the other offers a higher bid, but the costs are firm, it may be difficult to choose a winner. The Commission is dedicated to a process that will ensure equity

[22] Case 12-T-0502, et al., Alternating Current Transmission Upgrades, Order Establishing Modified Procedures for Comparative Evaluation (issued December 16, 2014), p. 44.

and a fair comparison. Bids should be sought from all developers in the alternative assuming both the FERC ordinary full recovery regime and the Commission's cost-overrun-sharing incentive regime. The Commission believes that this additional information as to risk assumption will be of assistance and may be crucial to discerning between close bids.

Developer Qualifications

The Commission endorses the view that demonstration of financial and operational experience is crucial for the selection of the developer of this type of project because the transmission facility will become an important integrated component of the backbone AC transmission system. While the developer may be an entrepreneur rather than an incumbent utility company, the project itself is not in the nature of a merchant project because the intended beneficiaries of the project will be relying significantly on its successful completion. The NYISO Open Access Transmission Tariff already requires a robust evaluation of developer qualifications such that adding additional criteria about developer experience or ability to obtain permits is unnecessary. In making this determination, the Commission is not inviting developers that have not already participated in these AC Transmission proceedings to submit "copycat" transmission solutions that opportunistically incorporate the work product of the original participants.

In-service Year

Ideally, the new facilities would be in service prior to the summer capability period of 2019. From the Commission's point of view, it is desirable to realize the in-service year as soon as is practicable. But it is difficult for the Commission to identify the intended in-service year of the facilities because, among other reasons, the Commission does not have control of the timing of the NYISO Open Access Transmission Tariff process and the congested nature of the existing facilities to be rebuilt is such that any construction needs to be timed pursuant to a careful plan to minimize reliability risk and the cost of outages. In preparing the solicitation of solutions, the NYISO should consider whether it could apply its expertise and knowledge of the bulk electric system, its tariff process and the Commission's Article VII siting process[23] and establish summer 2019 as the intended in-service year, or another intended in-service year upon which the proposed solutions could be evaluated.

Definition of the Need as Two Segments

The City of New York supports the idea that the definition of the transmission need not predetermine the entity that will provide the solution such that the forces of competition will tend to make the solution more cost efficient. NYTOs argue that not selecting the NYTOs Project P11 at this time and allowing other developers to modify their projects to match the two segments of Project P11 is arbitrary and chilling to the idea of competition. NYTOs also raise concerns that creating two segments will increase the costs by increasing the number of system studies needed, could increase contractor costs, and will increase risks that outage avoidance will not be properly coordinated and that developers may make premature requests for outages to gain advantage.

The Commission is not ready to select the NYTOs' Project P11 as the best solution because of the significant disparity in cost between the higher costs estimated by NYTOs

[23] The Article VII proceedings should proceed in an expeditious manner taking full advantage of the robust record that has already been compiled in these proceedings, to be supplemented by the Part B filings which primarily relate to location-specific siting issues.

and the lower costs estimated by the other developers for essentially the same work. In the Commission's view, those costs need to be further tested and the best way to do that, as pointed out by the City of New York, is through competition. The Commission's cost concerns are material, and therefore not arbitrary, whereas the minor project modifications necessary for the developers to put their projects on a comparable basis so as to maximize competition are not material. In furtherance of the principle that competition will lead to the most efficient costs, the Commission adopts the segment approach proposed by Trial Staff so as to maximize competition and cost efficiency.

COST ALLOCATION AND RECOVERY METHODOLOGY

Under the NYISO tariff, if the Public Policy Requirement that results in the construction of a transmission project prescribes the use of a particular cost allocation and recovery methodology, then the NYISO shall file that methodology with the Federal Energy Regulatory Commission (FERC), although, such filing does not deprive the developer of the project of any rights it may have under Section 205 of the Federal Power Act to submit filings proposing any other cost allocation methodology to FERC.[24] The Commission already addressed what cost allocation methodology it would prescribe in these proceedings and adopted a "beneficiaries pay" approach for allocating costs, whereby those that derive the benefits of a project should bear the costs.[25] In application, the Commission adopted an approach whereby 75% of project costs are allocated to the economic beneficiaries of reduced congestion, while the other 25% of the

[24] NYISO Open Access Transmission Tariff, Attachment Y, §31.5.5.4.1.

[25] Case 12-T-0502, et al., AC Transmission Proceedings, Order Establishing Modified Procedures for Comparative Evaluation (issued December 16, 2014) pp. 40-42.

costs are allocated to all customers on a load-ratio share. This will result in approximately 90% of the project costs being allocated to customers in the downstate region, and about 10% to upstate customers. This allocation reflects that the primary benefit of the project will be reduced congestion into downstate load areas, but also recognizes that some benefits accrue to upstate customers in the form of increased reliability and reduced operational costs.

While parties that dispute they are beneficiaries, or that they are assigned a reasonable portion of the costs, would be able to raise their objections before FERC, the Commission notes that the Long Island Power Authority (LIPA) in its comments raised several concerns about the cost allocation methodology. LIPA's major concern is that a one-size-fits-all approach to cost allocation among downstate entities may not be appropriate as LIPA believes that not all downstate entities are similarly situated and that Long Island does not receive benefits in proportion to other downstate areas. LIPA asks that the Commission ensure that the NYISO apply a more granular analysis of the benefits of these proposed projects among downstate entities. Resolution of LIPA's concern will be a FERC matter, but the Commission agrees that a more granular analysis would be beneficial and perhaps more equitable. Therefore, the NYISO will be asked to incorporate such an analysis into the cost allocation methodology. The NYISO should apply its expertise in designing the more granular analysis to be performed.

LIPA also raises a peripheral concern that is not subsumed in the discussion above. LIPA asserts that the benefits of avoided refurbishment costs only accrue to the parties that would otherwise pay for such refurbishment. The Commission takes that to mean that LIPA believes that National

Grid ratepayers are the only ones that benefit from the avoided refurbishment of the transmission lines affected by the instant decisions. The Commission does not agree with LIPA's logic. The existing Edic/Marcy to New Scotland, and North Greenbush/Knickerbocker to Pleasant Valley transmission lines serve primarily the bulk system and as a corridor to transmit power from upstate generators for the benefit of downstate consumers. One of the reasons these lines have not been upgraded to date is because they do not sufficiently benefit National Grid's retail customers such that National Grid could justify the investment. FERC's Order No. 1000 and the AC Transmission proceedings are intended to address such a situation where the entity developing particular infrastructure is not the primary beneficiary. That is why FERC provides for a cost allocation and recovery mechanism whereby the developer of the upgrade can be compensated by the beneficiaries. Accordingly, the benefits of avoided refurbishment costs accrue to all the beneficiaries of the facility, regardless of who owns the lines. Therefore, no adjustment in cost allocation is to be made to the prescribed cost allocation and recovery methodology adopted herein on the basis that the current owner will avoid future refurbishment costs.

MISCELLANEOUS ISSUES

Value of Avoided Refurbishment Costs

Boundless asserts that DPS Trial Staff significantly exaggerated the avoided refurbishment costs for Project P11, while failing to credit any avoided refurbishment costs for the Boundless projects. Boundless asserts that Trial Staff's methodology should have chosen the lowest of available estimates of the cost of refurbishment, and should have applied efficiency factors to significantly reduce the cost estimates when two circuits are adjacent. Boundless estimates that its adjustments would reduce the benefit/cost ratio for Project P11 from 1.20 to 1.15, or if other lower industry data was used, it would most probably drop below 1.0. Boundless does not provide an estimate of how much additional refurbishment credit to the Boundless projects would be needed to improve the 0.7 benefit cost ratios calculated for the two Boundless Projects P20 and P21.

The Trial Staff methodology, established in consultation with the consultant Brattle, appears to be reasonable and to have been fairly applied across all the projects. Each applicant could propose tweaks in the methodology that would tend to favor their own projects in relation to others, but the Commission is satisfied that Trial Staff followed its charge and has provided an independent and objective comparative evaluation of all the projects using reasonable assumptions. Trial Staff did in fact give Boundless Project P20 $157 million in avoided transmission cost credit, and Boundless Project P21 $76 million in avoided transmission cost credit.[26] Both credits were due to operation and maintenance costs that would be avoided due to the proposed reconductoring of the Leeds to Hurley Avenue, Leeds to Pleasant Valley, and CPV to and Rock Tavern lines, as appropriate to the project.

Boundless' question as to why it did not get refurbishment credit for reconductoring was addressed in the Trial Staff report at Brattle Slide 115. The information Trial Staff had and used as an assumption is that the lines in question were not slated for future reconductoring as a refurbishment, therefore reconductoring does not avoid a planned refurbishment. In any event, Boundless has not persuaded the Commission that the issues raised by Boundless would change the

[26] See Brattle Slide 111 attached to the Trial Staff report.

ultimate result were they to be modeled differently or more favorably to Boundless.

Potential NY-NE Powerflow Upgrade Costs

Boundless raises a concern that construction of a new Knickerbocker substation on a circuit leading to New England may result in what Boundless characterizes as an unexplored system upgrade cost element, possibly a significant cost element, that would not apply to the Boundless project, but would apply to others. As Boundless notes, the topic is expected to be examined in the System Reliability Impact Study (SRIS) for any project proposing such a substation. Boundless seeks a delay for that issue to be investigated.

The NYISO will resolve that issue in due course. At this point the concern raised by Boundless is speculative and the Commission is not persuaded that a process delay is necessary or in the public interest.

Project Modifications

Boundless criticizes project modifications proposed by Trial Staff as being in violation of a Commission directive that no substantial modifications in developers' project would be permitted after January 7, 2015. Yet Boundless was also the beneficiary of some of such modifications and now seeks approval of additional modifications to its projects.

The Commission finds that the modifications identified by Trial Staff were practical responses to the study results made in the interest of keeping the projects functional and cost efficient with as little negative impact as possible on the competitive process. The Commission's ban on modifications was intended to achieve finality and to prevent copycat ideas by developers that add no value. The ban was not directed at Trial Staff. In keeping with the ban, and in the interests of fairness, the Commission will not entertain other modifications sought at this time by the developers.

Cost Recovery of Development Costs

The NYISO Open Access Tariff provides the developer of any selected transmission solution with full recovery of all costs to develop the transmission facility, assuming they are reasonably incurred.[27] The tariff does not appear to provide any recovery for the cost of developing alternative proposals that are ultimately not selected, with one exception. To ensure that there will be a response to the NYISO's solicitation of transmission solutions, the Commission may identify and request appropriate transmission owners or other developers to propose a transmission solution. Costs incurred by a transmission owner or other developer in preparing a proposed transmission solution in response to a request by the Commission will be recoverable.[28] The scope of costs that will be recoverable pursuant to the tariff will be determined by either the NYISO or FERC as the tariff has been established pursuant to FERC jurisdiction.

NextEra raises a concern that the NYISO's interpretation of the tariff may be unfair and too restrictive to encourage competition given the unusual procedural interplay between the commencement of these proceedings and the finalization of the Public Policy Requirements process when the cost recovery provisions became known. NextEra asks the

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[27] Such cost recovery will include reasonable costs incurred, by the Transmission Owner or Other Developer, to provide a more detailed study or cost estimate for such project at the request of the NYPSC, and to prepare the application required to comply with New York Public Service Law Article VII, or any successor statute or any other applicable permits, and to seek other necessary authorizations. NYISO Open Access Transmission Tariff, Attachment Y, §31.5.6.5.

[28] NYISO Open Access Transmission Tariff, Attachment Y, §31.4.3.1. Recovery occurs under §31.5.6 of the tariff.

Commission to recommend to the NYISO that all costs incurred after August 13, 2014 should be eligible for recovery, and that the scope of cost recovery encourage further modifications consistent with the Trial Staff recommendations and any modifications that could be made to further reduce environmental impacts, improve electrical performance, or reduce costs. Boundless believes that its projects meet the goals the Commission initially announced; therefore it requests that Boundless and all developers be permitted to recover all development costs expended to date.

The Commission does not recommend that all developers be permitted to recover development costs expended to date, or that the costs of unsuccessful proposals be recovered except as provided in the tariff when the Commission has requested the developer to prepare a proposed transmission solution for submission to the NYISO. Competition works best when the competitors have a real stake in the results. The Commission does not want to create a cottage industry of entrepreneur-expert application drafters that enter competitions primarily to recoup their expert fees. More to the point, it should be noted that some of the many proposals submitted in these proceedings were not well thought out as to environmental impacts or electric system impacts such that they unnecessarily added to the burden of the review process. The Commission does not want to reward the applicants for submitting proposals that had obvious flaws, were not sufficiently designed, or were overly-redundant of other proposals.

As to the scope of costs that should be recoverable when the Commission has specifically requested the transmission owner or other developer to prepare a proposed transmission solution for submission to the NYISO, the Commission offers the following recommendations to the NYISO. It would be difficult to establish a cut-off of recovery based on a specific date or event threshold. Each developer could make different arguments in that regard as to fairness as each has had different approaches and timelines as to preparation. What matters is the content, and not when it was prepared. In the Commission's view, the cost of creating any content that is necessary for submission to the NYISO under the tariff in support of the proposed transmission solution should be recoverable. It should not matter whether the content had been pre-prepared to satisfy some other purpose, such as the Part A filings made in these AC Transmission/Article VII cases. If the information is required or permitted by the NYISO tariff, the costs of preparation should be recoverable. Costs incurred for appearing and participating in the AC Transmission/Article VII cases, or in the preparation of alternatives that did not result in Commission requests to the transmission owner or other developer to prepare a proposed transmission solution for submission to the NYISO, may not be recoverable, in FERC's discretion. Finally, if the costs were already recouped in any manner in any other forum, no double-recovery of costs should be permitted.

Use of Utility Rights-of-Way by Non-utility Developers

The NYTOs currently have property rights (through their membership utility companies) to the essential rights-of-way under consideration for redevelopment in these proceedings. Their non-utility competitors in the comparative evaluation process and the future NYISO solicitation do not have such property rights. The NYISO Open Access Transmission Tariff requires the NYISO in evaluating transmission solutions to consider, among other things, the extent to which the developer of a proposed solution has the property rights, or ability to obtain the property rights, required to implement the solution.[29] Concerns are raised by NAT and NextEra that the Commission's preference for transmission solutions that use existing rights-of-way not be used in the NYISO evaluation to disqualify non-utility applicants because the non-utility applicants do not already have a property interest in the existing utility rights-of-way. They argue that such a disqualification would undermine the concept of a competitive solicitation as only the utility competitor could ever win. The NYTOs for their part note that NAT and NextEra (a) fail to describe their plan with respect to rights-of-way ownership or control in the future (e.g., single ownership, mixed ownership and/or easements, shared use agreement, etc.) and how that plan would affect rights-of-way responsibilities, access and utility use issues going forward; and (b) fail to demonstrate how the need to secure the real property would impact the schedules and cost estimates presented to date.

NAT and NextEra are correct that their outright disqualification based solely on current non-ownership of essential utility rights-of-way would undermine the concept of a competitive solicitation. The selection process should be administered by the NYISO in a way that preserves both of the Commission's policies relevant to this discussion: (1) competition; and (2) minimization of new rights-of-way.

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[29] The [NY]ISO will consider whether the Developer: (i) already possesses the rights of way necessary to implement the solution; (ii) has completed a transmission routing study, which (a) identifies a specific routing plan with alternatives, (b) includes a schedule indicating the timing for obtaining siting and permitting, and (c) provides specific attention to sensitive areas (e.g., wetlands, river crossings, protected areas, and schools); or (iii) has a specified a plan or approach for determining routing and acquiring property rights [NYISO Open Access Transmission Tariff, Attachment Y, §31.4.8.1.6].

However, the issues noted by the NYTOs and described above are also relevant and material. Incumbent utilities should offer competitors the same terms they offer Transco; there should be no bias shown to Transco.

All applicants should present the NYISO with robust information and a plan with respect to rights-of-way ownership or control in the future and how that plan would affect rights-of-way responsibilities, access and utility use issues going forward. All applicants should also address how the need to secure the real property would impact their construction schedules and cost estimates. The Commission does not expect the utility company owner of the rights-of-way to give away its ratepayer-funded property rights for free. Nor does the Commission expect the utility company owner to allow the use of utility rights-of-way without reasonable operating conditions. Instead, the Commission expects the utility company owner to bargain in good faith to reach an agreement with the developer of the transmission solution as to property access and compensation as it would for other linear project developers that seek to co-locate on utility property. The utility company owner is the steward of the property held for the benefit of its ratepayers, and the beneficiaries of the transmission solution should provide just compensation to the utility company ratepayers that funded the asset.

Withdrawal of Projects/Segments

Trial Staff urges the Commission to request the applicants to withdraw their projects and project segments which do not best meet the Commission's objectives and therefore have no expectation of public policy benefit and cost recovery. Trial Staff believes that withdrawal at this stage is in the public interest so as to not waste further effort on pursuing ideas that have no likelihood of future success; to provide certainty to affected landowners and municipalities facing potential impacts from transmission upgrades; and to allow for market certainty as the applicants seek cost recovery at the NYISO. NAT has offered that it is willing to comply with such a request by the Commission.[30] The County of Delaware and the Village of Athens both provided comments in support of Staff's proposal and request further that once a proposal is withdrawn, that it not be reinstated without adequate notice.

The Commission finds that Trial Staff's request will further the orderly progress of these proceedings. Ordering clauses will be provided to effectuate the proposal in an appropriate manner including adequate notice provisions.

Segment B Upgrades

In assisting Trial Staff by conducting power flow analyses, the NYISO determined that all projects, with the exception of those proposed by Boundless, trigger a contingency on the existing double circuit 69 kV line from the Shoemaker to Sugarloaf substations in Orange County, which must be resolved for any of the projects to produce a positive benefit. In other words, if the Shoemaker to Sugarloaf line is not upgraded, the transmission solutions would not be allowed to operate at full capacity. Similarly, the NYISO found a need for upgrades to the Rock Tavern Substation, also in Orange County, so that it could handle the higher line currents that will result as a consequence of the new Edic/Marcy to New Scotland; Princetown to Rotterdam and Knickerbocker to Pleasant Valley lines. Trial Staff proposes that any developer of the Knickerbocker-Pleasant Valley segment work with the utility companies that own the affected facilities to ensure that they are upgraded. NAT seeks clarification as to who would perform the additional work and how the costs would be treated for both cost recovery and for

[30] NAT's cooperation is appreciated.

bidding. NextEra similarly requests clarification. Both of them appear to agree that the utility companies should do the work. The New York State Department of Environmental Conservation (DEC) seeks assurances that any work proposed for the Shoemaker to Sugarloaf right-of-way will be carefully planned after conducting habitat surveys and considering the need for avoidance and mitigation measures.

Orange and Rockland Utilities, Inc. (O&R) is the owner of the Shoemaker to Sugarloaf facilities and should do the necessary upgrades to those facilities. Central Hudson Gas & Electric Corporation (Central Hudson) is the owner of the Rock Tavern Substation and should do the necessary upgrades to the substation. O&R and Central Hudson should be reimbursed by the developer of the Segment B transmission solution for their actual reasonable costs in performing the upgrades. The developer in turn should recover those costs as a pass-through from the beneficiaries of the Segment B transmission solution through the NYISO Open Access Transmission Tariff. The developer should not be subject to risk sharing incentives as to those pass-through costs, as the developer has no control over the costs. For the purposes of bids, all developers should include the upgrade costs in their bids at the same level, and the upgrade costs should not be used as a distinguishing factor between bids. The developers should use the estimates provided in the Trial Staff report as a placeholder for the actual costs.

PROCESS OBJECTIONS

Scope of Staff Report

HVSEC claims that the September 22, 2015 Staff Report improperly included analysis that was introduced for the first time in these proceedings, including: reliance on Public Policy Requirements to justify the need for the transmission lines; evaluation of non-transmission alternatives including the

Commission's REV initiative; a new power flow analysis of the impact of the CPV Valley Generating Facility; and the conclusion that the Rock Tavern Substation and the Shoemaker to Sugarloaf line need to be upgraded in the Knickerbocker-Pleasant Valley section of the P11 corridor. HVSEC argues that because this analysis was not introduced sooner in the proceeding, the record is incomplete. It also claims that it and other intervenor parties have been deprived of the opportunity to seek intervenor funding to evaluate Staff's analysis and meaningfully contribute to the record on these issues, and it requests that the Commission withhold a decision on Staff's motion while it seeks leave to apply for additional intervenor funding. HVSEC argues that the Commission did not intend for Staff to rely on Public Policy Requirements to justify its conclusion and that the Commission's December 16, 2014 Order expressly declared a PPR justification was not part of the present proceedings.

Discussion

Earlier in these proceedings, HVSEC requested that the Commission expand the scope of the comparative evaluation to include an overall analysis of need by Trial Staff. The Commission was fully responsive to the request and in the December 16, 2014 Order required Trial Staff to address overall need in its report. The schedule attached to the December 16, 2014 Order also shows that it was clearly intended that the Public Policy Requirements analysis would be done on a parallel path and on a common record. The various notices issued in these proceedings also support these facts. Now that Trial Staff has provided the analysis HVSEC requested, it is raising procedural objections. The Commission rejects these objections as not correct. The objections ring hollow as they appear to be motivated more by the result than the process. The parties have been aware since December 2014 that the overall need issue would be addressed. And with such knowledge, HVSEC commissioned two studies using intervenor funds[31] which it has argued for months prove that there is no overall need for the facilities. A large portion of HVSEC's efforts in these proceedings have been directed at the overall need issue and its experts, including its need experts, have been accommodated in all processes including the technical conferences. The parties have had ample opportunity to participate and further process is therefore unnecessary.

SAPA Notice

HVSEC argues that the October 7, 2015 SAPA Notice does not comply with the Commission's own procedures because the issuance of the notice did not occur within 45 days of the posting of public policy transmission need on the Commission's website. Rather, that posting occurred over one year before the Notice. HVSEC also argues that neither Staff's motion, nor the SAPA notice reference the Public Policy Transmission Planning Process (PPTPP) in NYISO's OATT.

Discussion

A SAPA notice was issued within 45 days of the posting of public policy transmission need on the Commission's website. After considering the comments submitted in response to that SAPA notice, the Commission decided to proceed to a decision on the Western New York issue, to decline to proceed on other proposals, and to defer a decision on the AC transmission issue until the Trial Staff report was issued. After the Trial Staff report was issued, a second SAPA notice was issued directed solely at the AC transmission issue. It is within the Commission's prerogative to make such pragmatic alterations to

[31] A total of $270,000 in intervenor funds was awarded to HVSEC for it to conduct studies in these proceedings.

the schedule in consideration of all the circumstances. HVSEC is incorrect as to the contents of the SAPA notice.

Process Shift to NYISO

According to HVSEC, if the Commission adopts Staff's recommendations, the process will shift to the NYISO to issue RFPs, to which any developer, not just those in this proceeding, may submit a response. HVSEC argues this would create an entirely new process not contemplated when this comparative proceeding was originally commenced, which would result in confusion and delays.

Discussion

HVSEC's concern about delays appears to be inconsistent with its other positions and process objections. The relationship to the Public Policy Transmission Planning Process has been apparent to all parties for some time. It is difficult to understand how HVSEC could make such a claim at this time.

System Reliability Impact Study (SRIS)

The Commission's desire to ensure that developers are able to demonstrate that they have the ability to proceed with their projects in a timely fashion resulted in the establishment of a deadline for providing notification that a System Reliability Impact Study (SRIS) was in progress pursuant to the tariff requirements of the NYISO. The deadline has been repeatedly extended in the face of practical realities that the sheer number of project proposals has been too large to justify separate studies for every project, and a desire by the Commission that the developers refine their project proposals to minimize environmental and landowner impacts. Issuance of the Trial Staff report approximately one week before the extended deadline further complicates the question because of the recent discovery of the necessary additional system upgrades identified in the report that were previously unknown to the parties, but may have an impact on the studies. Given these circumstances and the anticipated pending solicitation of transmission solutions by the NYISO, the Commission will suspend the application of the deadline and defer SRIS timing issues to the NYISO processes.

FINDINGS AND CONCLUSION

The Commission finds and determines that there is a transmission need driven by Public Policy Requirements as specifically described in Appendix A attached hereto. This transmission need driven by Public Policy Requirements shall be addressed by the NYISO by the solicitation and review of solutions, with the potential for the developers of any selected transmission solutions to obtain cost recovery for their development and construction costs from the beneficiaries of the new transmission facilities through the NYISO Tariff regulated by FERC. The relevant Public Policy Requirements driving such transmission needs are identified below.

The Commission hereby finds that having considered the extensive record in these proceedings, it is the public policy of the State of New York and the Public Service Commission: to reduce transmission congestion so that large amounts of power can be transmitted to regions of New York where it is most needed; to reduce production costs through congestion relief; reduce capacity resource costs; to improve market competition and liquidity; to enhance system reliability, flexibility, and efficiency; to improve preparedness for and mitigation of impacts of generator retirements; enhance resiliency/storm hardening; to avoid refurbishment costs of aging transmission; to take better advantage of existing fuel diversity; to increase diversity in supply, including additional renewable resources;

to promote job growth and the development of new efficient generation resources Upstate; to reduce environmental and health impacts through reductions in less efficient electric generation; to reduce costs of meeting renewable resource standards; to increase tax receipts from increased infrastructure investment; to enhance planning and operational flexibility; to obtain synergies with other future transmission projects; and to relieve gas transportation constraints, in the balanced and cost-effective manner that would be accomplished by the construction and operation of a portfolio of 345 kV transmission projects to reconfigure and upgrade transmission facilities from the Edic or Marcy substations to the New Scotland substation with a tie-in to the Rotterdam substation, and from a new Knickerbocker substation to the Pleasant Valley substation, with upgrades at the Greenbush substation, including also upgrades to the Rock Tavern substation, and the construction of a new double circuit 138 kV line from the Shoemaker to Sugarloaf substations (and as more specifically described in Appendix A attached hereto), and that such policies constitute Public Policy Requirements driving transmission needs.

The Commission also hereby finds that: the 2015 State Energy Plan, which contains adopted policies and long-range energy planning objectives and strategies, including fulfillment of the action items that constitute New York's Energy Highway Blueprint (implementation of a proposal to upgrade the transmission system being evaluated in the AC Transmission proceedings are one of the action items);[32] Section 6-104(1) of the Energy Law which requires the State Energy Planning Board to

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[32] New York State Energy Planning Board, The Energy to Lead: 2015 New York State Energy Plan (June 25, 2015), Volume 1, pp. 93-94.

adopt a State Energy Plan; and Section 6-104(5)(b) of the Energy Law which generally requires the Commission to make energy-related actions or decisions that are reasonably consistent with the policies and long-range energy planning objectives and strategies contained in the State Energy Plan; together constitute Public Policy Requirements driving transmission needs.

The above identification of Public Policy Requirements driving transmission needs are hereby identified both jointly, as both contributing to the same conclusion, and severally, as each finding providing an independent identification of Public Policy Requirements driving transmission needs.

The Commission orders:

1. The Commission finds and determines that there is a transmission need driven by Public Policy Requirements as described in the body of this order and as more specifically described in Appendix A attached hereto. This transmission need driven by Public Policy Requirements shall be addressed by the New York Independent System Operator, Inc. (NYISO) by the solicitation and review of solutions, with the potential for the developers of any selected transmission solutions to obtain cost recovery for their development and construction costs from the beneficiaries of the new transmission facilities through the NYISO Open Access Transmission Tariff regulated by the Federal Energy Regulatory Commission (FERC).

2. In conjunction with the above Public Policy Requirements determination, the Commission establishes evaluation criteria set forth in Appendix B attached hereto. The NYISO shall apply such criteria in evaluating transmission solutions to satisfy the identified transmission need.

3. In conjunction with the above Public Policy Requirements determination, the Commission identifies specific analyses, set forth in Appendix C attached hereto, for the NYISO to undertake in reviewing transmission solutions to satisfy the identified transmission need.

4. In conjunction with the above Public Policy Requirements determination, the Commission prescribes the use of the cost allocation and recovery methodology set forth in Appendix D attached hereto. The NYISO shall file the prescribed cost allocation and recovery methodology with FERC in the manner provided for in the NYISO Open Access Transmission Tariff.

5. In Case 13-T-0454, the applicant, North America Transmission Corporation and North America Transmission, LLC (NAT), is hereby requested to withdraw, effective on or before January 15, 2016, the following routes from further consideration in the proceeding (such withdrawals to be effective concurrently in Cases 12-T-0502 and 13-E-0488):

(a) Edic to Fraser (P1, P2, P3, P4, P5);

(b) New Scotland to Pleasant Valley (P1, P3);

(c) New Scotland to Pleasant Valley (Alt. 1/I-87)(P2); and

(d) New Scotland to Knickerbocker (P4, P5); and

(e) Knickerbocker to Pleasant Valley (P4).

6. NAT is hereby requested to propose to the NYISO NAT's Knickerbocker to Pleasant Valley (P5) transmission solution, coupled with the necessary add-on Rock Tavern Substation terminal upgrades and Shoemaker to Sugarloaf transmission line upgrades, such that NAT's costs incurred in preparing a proposed solution in response to this request will be recoverable under the NYISO tariff.

7. In Case 13-M-0457, the applicant, New York Transmission Owners (NYTOs), is hereby requested to withdraw, effective on or before January 15, 2016, the following

routes/equipment from further consideration in the proceeding (such withdrawals to be effective concurrently in Cases 12-T-0502 and 13-E-0488):

(a) Oakdale to Fraser (P10);

(b) Edic to New Scotland; Princetown to Rotterdam (P10, P12, P13, P14);

(c) New Scotland to Leeds (Reconductor) (P9, P12, P14);

(d) Leeds to Pleasant Valley (P9, P14);

(e) Leeds to Pleasant Valley (Reconductor)(P7, P12);

(f) Knickerbocker to Pleasant Valley (P10); and

(g) Hurley Avenue PARS (P8, P13)

8. NYTOs are hereby requested to propose to the NYISO NYTOs' Edic to New Scotland; Princetown to Rotterdam (P11) transmission solution such that NYTOs' costs incurred in preparing a proposed solution in response to the Commission's request will be recoverable under the NYISO tariff.

9. NYTOs are hereby requested to propose to the NYISO NYTOs' Knickerbocker to Pleasant Valley (P6, P11) transmission solution, coupled with the necessary add-on Rock Tavern Substation terminal upgrades and Shoemaker to Sugarloaf transmission line upgrades, such that NYTOs' costs incurred in preparing a proposed solution in response to the Commission's request will be recoverable under the NYISO tariff.

10. In Case 13-T-0456, the applicant, NextEra Energy Transmission New York (NextEra), is hereby requested to withdraw, effective on or before January 15, 2016, the entire application for the Oakdale to Fraser project (P19b) from further consideration in the proceeding (such withdrawals to be effective concurrently in Cases 12-T-0502 and 13-E-0488).

11. In Case 13-T-0455, the applicant, NextEra, is hereby requested to withdraw, effective on or before January 15, 2016, the following routes from further consideration in the

proceeding (such withdrawals to be effective concurrently in Cases 12-T-0502 and 13-E-0488):

(a) Edic to Pleasant Valley (P15);

(b) Marcy to New Scotland (P18);

(c) Marcy to Rotterdam (P16);

(d) New Scotland to Knickerbocker (P17);

(e) Greenbush to Pleasant Valley (P16, P18, P19a); and

(f) Greenbush to Knickerbocker (P17).

12. NextEra is hereby requested to propose to the NYISO NextEra's Marcy to New Scotland; Princetown to Rotterdam (P17) transmission solution such that NextEra's costs incurred in preparing a proposed solution in response to the Commission's request will be recoverable under the NYISO tariff.

13. NextEra is hereby requested to propose to the NYISO NextEra's Greenbush to Pleasant Valley (P17, P19c) transmission solution, coupled with the necessary add-on Rock Tavern Substation terminal upgrades and Shoemaker to Sugarloaf transmission line upgrades, such that NextEra's costs incurred in preparing a proposed solution in response to the Commission's request will be recoverable under the NYISO tariff.

14. In Case 13-T-0461, the applicant, Boundless Energy NE, LLC (Boundless), is hereby requested to withdraw, effective on or before January 15, 2016, the entire application for all its project segments from further consideration in the proceeding (such withdrawals to be effective concurrently in Cases 12-T-0502 and 13-E-0488). The project segments to be withdrawn include:

(a) Hurley Avenue to Leeds (Reconductor) (P20, P21);

(b) Leeds to Pleasant Valley (Reconductor) (P20);

(c) CPV Tap to Rock Tavern (Reconductor) (P20, P21); and

(d) Roseton to East Fishkill (Underground) (P20, P21).

15. Once an application, route, project segment or equipment is withdrawn from further consideration in a proceeding, it shall not be re-introduced into the proceeding except on notice in the manner provided in Public Service Law Section 122(2) for new applications.

16. The above requests by the Commission to withdraw an application, route, project segment or equipment from further consideration in a proceeding are to be effectuated by filing written withdrawal statements with the Commission.

17. Any applicant that decides not to comply with any of the above requests by the Commission to withdraw an application, route, project segment or equipment from further consideration in a proceeding by the date requested is hereby directed to file with the Commission on or before January 15, 2016, a written (a) explanation as to why the applicant has decided not to comply with any such request; and (b) a statement of the applicant's going-forward intent regarding consideration by the Commission of the affected application, route, project segment or equipment.

18. Unless the NYISO determines that the upgrades are not material to the accomplishment of the purposes of the Segment B transmission solution, Orange and Rockland Utilities, Inc. (O&R) as the owner of the Shoemaker to Sugarloaf facilities shall work with the developer of any selected transmission solution regarding Segment B and shall pursuant to a written agreement to be negotiated between the two, design, obtain approvals and perform the necessary upgrades to those facilities identified in this order and shall be reimbursed by the developer of the Segment B transmission solution for the actual reasonable costs to design, obtain approvals and perform the upgrades. The NYISO and DPS Staff shall be consulted by O&R as part of the design process. Nothing herein waives the need, if

any, for O&R to obtain an Article VII certificate or certificate amendment, or other approvals, prior to constructing such upgrades.

19. Unless the NYISO determines that the upgrades are not material to the accomplishment of the purposes of the Segment B transmission solution, Central Hudson Gas & Electric Corporation (Central Hudson) as the owner of the Rock Tavern Substation shall work with the developer of any selected transmission solution regarding Segment B and shall pursuant to a written agreement to be negotiated between the two, design, obtain approvals and perform the necessary upgrades to the substation identified in this order and shall be reimbursed by the developer of the Segment B transmission solution for the actual reasonable costs to design, obtain approvals and perform the upgrades. The NYISO and DPS Staff shall be consulted by Central Hudson as part of the design process. Nothing herein waives the need, if any, for Central Hudson to obtain an Article VII certificate or certificate amendment, or other approvals, prior to constructing such upgrades.

20. This order constitutes a rule adopted subject to and in accordance with the State Administrative Procedure Act.

21. This order in its entirety shall constitute the written statement of the Commission to be provided to the NYISO during the identification step of the NYISO Public Policy Transmission Planning Process described in the body of this order.

22. In the Secretary’s sole discretion, the deadlines set forth in this order may be extended. Any request for an extension must be in writing, must include a justification for the extension, and must be filed at least one day prior to the affected deadline.

23. These proceedings are continued.

By the Commission,

(SIGNED) KATHLEEN H. BURGESS
Secretary

TRANSMISSION NEED DRIVEN BY PUBLIC POLICY REQUIREMENTS

SEGMENT A

Edic/Marcy to New Scotland; Princetown to Rotterdam

Construction of a new 345 kV line from Edic or Marcy to New Scotland on existing right-of-way (primarily using Edic to Rotterdam right-of-way west of Princetown); construction of two new 345 kV lines or two new 230 kV lines from Princetown to Rotterdam on existing Edic to Rotterdam right-of-way; decommissioning of two 230 kV lines from Edic to Rotterdam; related switching or substation work at Edic or Marcy, Princetown, Rotterdam and New Scotland.

SEGMENT B

Knickerbocker to Pleasant Valley

Construction of a new double circuit 345 kV/115 kV line from Knickerbocker to Churchtown on existing Greenbush to Pleasant Valley right-of-way; construction of a new double circuit 345 kV/115 kV line or triple circuit 345 kV/115 kV/115 kV line from Churchtown to Pleasant Valley on existing Greenbush to Pleasant Valley right-of-way; decommissioning of a double-circuit 115 kV line from Knickerbocker to Churchtown; decommissioning of one or two double-circuit 115 kV lines from Knickerbocker to Pleasant Valley; construction of a new tap of the New Scotland-Alps 345 kV line and new Knickerbocker switching station; related switching or substation work at Greenbush, Knickerbocker, Churchtown and Pleasant Valley substations.

Upgrades to the Rock Tavern Substation

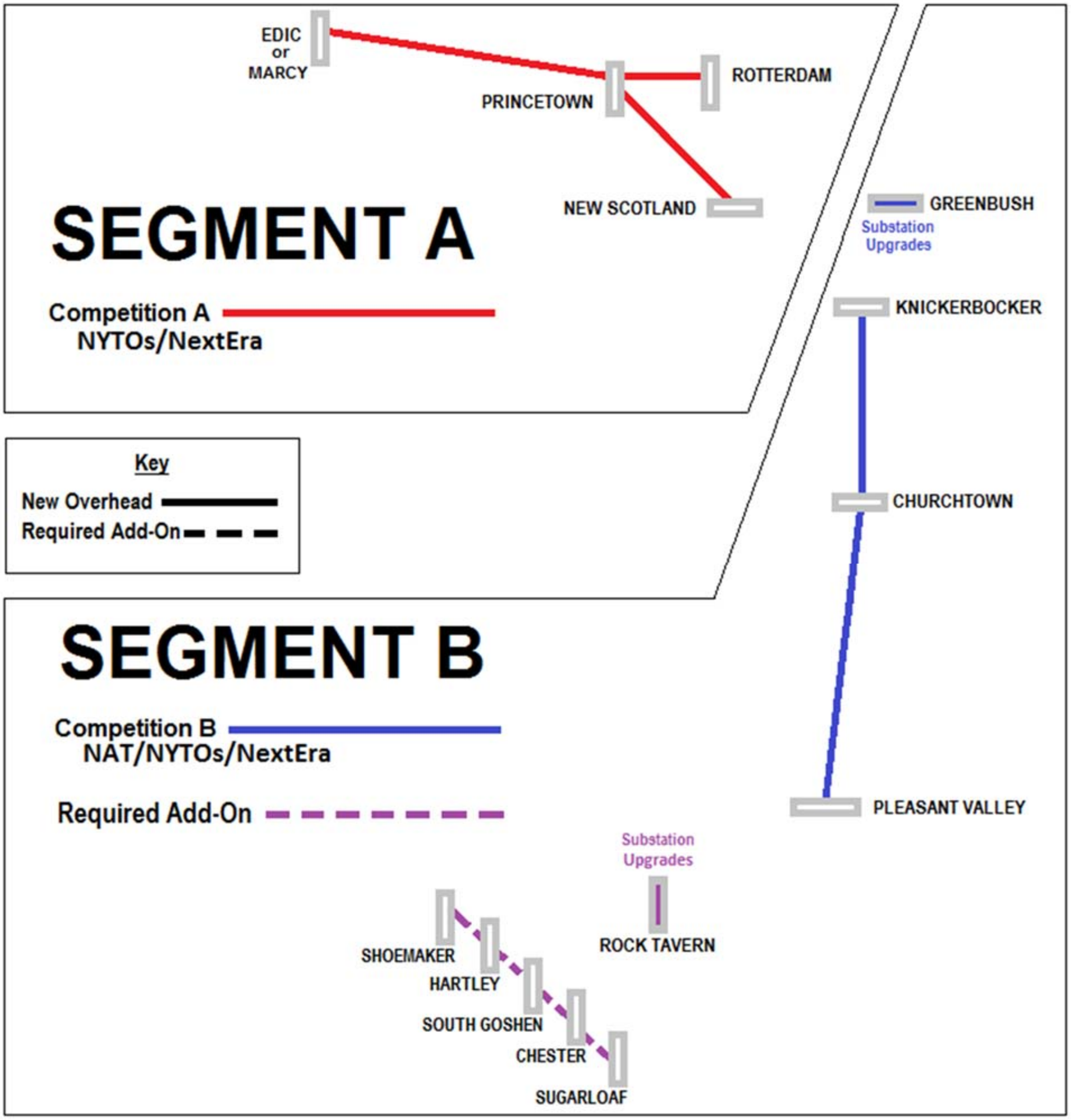
New line traps, relays, potential transformer upgrades, switch upgrades, system control upgrades and the installation of data acquisition measuring equipment and control wire needed to handle higher line currents that will result as a consequence of the new Edic/Marcy to New Scotland; Princetown to Rotterdam and Knickerbocker to Pleasant Valley lines.

Shoemaker to Sugarloaf

Construction of a new double circuit 138 kV line from Shoemaker to Sugarloaf on existing Shoemaker to Sugarloaf right-of-way; decommissioning of a double circuit 69 kV line from Shoemaker to Sugarloaf; related switching or substation work at Shoemaker, Hartley, South Goshen, Chester, and Sugarloaf.

Notes:
The need is for the entire portfolio, but the portfolio lends itself to segmentation such that transmission solutions should be solicited in a manner that allows applicants to propose solutions either by segment or on a combined portfolio basis, or in the alternative on both bases. Segment A depends upon Segment B being in place, so Segment A would not be constructed without certainty that Segment B would be constructed. Segment B depends upon certain specified add-ons being in place, so Segment B would not be constructed without certainty that the specified add-ons would be constructed.

SCHEMATIC LAYOUT OF SEGMENTS



APPENDIX B

EVALUATION CRITERIA

The New York Independent System Operator, Inc. (NYISO) shall apply the following additional criteria for the evaluation of transmission solutions and non-transmission projects:

1. No transmission solution shall be selected that requires the acquisition of new permanent transmission rights-of-way, except for de minimus acquisitions that cannot be avoided due to unique circumstances. For the purposes of this criterion, the transfer or lease of existing transmission right-of-way property or access rights from a current utility company owner to a developer of the transmission solution shall not be considered such an acquisition.

2. The selection process for transmission solutions shall favor transmission solutions that minimize the acquisition of property rights for new substations and substation expansions. For the purposes of this criterion, the transfer or lease of existing property rights from a current utility company owner to a developer of the transmission solution shall not be considered such an acquisition.

3. No transmission solution shall be selected that includes a crossing of the Hudson River, either overhead, underwater, in riverbed, or underground, or in any other way, by any component of the transmission facility.

4. No transmission solution shall be selected for Segment B that provides less than a 900 MW increase in normal transfer capability (NTC) across the UPNY/SENY interface pursuant to the methodology employed by the NYISO for the Trial Staff report in the AC Transmission proceedings.

5. No transmission solution shall be selected for Segment B that does not incorporate certain specified add-ons that would be constructed (i.e., upgrades to the Rock Tavern Substation; upgrades to the Shoemaker to Sugarloaf transmission lines), unless the NYISO determines that such add-ons, jointly or severally, are not material to the accomplishment of the purpose of the transmission solution for Segment B.

6. The selection process for transmission solutions for Segment B shall not use the costs of upgrades to the Rock Tavern Substation and upgrades to the Shoemaker to Sugarloaf transmission lines as a distinguishing factor between bids. The developers shall include the upgrade costs in their bids at the same level using the cost estimates for the upgrades provided in the Trial Staff report as a placeholder for the actual costs.

7. No transmission solution shall be selected for Segment A that provides less than a 350 MW increase in normal transfer capability (NTC) across the Central East interface pursuant to the methodology employed by the NYISO for the Trial Staff report in the AC Transmission proceedings.

8. No transmission solution shall be selected for Segment A unless a transmission solution is selected for Segment B.

9. No transmission solution shall be selected for Segment A except on condition that the transmission solution selected for Segment A shall not be implemented until there is reasonable certainty established in a manner to be determined by the NYISO that the transmission solution selected for Segment B will be implemented.

10. The selection process for transmission solutions shall favor transmission solutions that result in upgrades to aging infrastructure.

11. Project selection shall be competitive by segment, but synergies produced by being selected to provide both segments may be considered.

12. No transmission solution shall be selected unless the developer has submitted a cost estimate or bid that does not exceed the cost estimate at the level estimated by Trial Staff for the applicant's project unless the applicant can demonstrate to the NYISO that upward estimates are necessary to correct errors or omissions made by Trial Staff for the components that were added or adjusted by Trial Staff.

13. The selection process for Segment B shall not use the cost to do the necessary upgrades to the Shoemaker to Sugarloaf facilities and the Rock Tavern Substation as a distinguishing factor between bids. For the purposes of bids, all developers should include the upgrade costs in their bids at the same level, using the estimates provided in the Trial Staff report as a placeholder for the actual costs.

14. The percentage rates applied to account for contingencies and revenue requirement should all be treated uniformly across all estimates so that those factors are not manipulated by the bidders to confuse or artificially skew the results. The selection process shall not use the percentage rates applied to account for contingencies and revenue requirement as a distinguishing factor between bids. For the purposes of bids, all developers should account for contingencies and revenue requirement at the percentage rates provided in the Trial Staff report as a placeholder for the actual rates.

SPECIFIC ANALYSES

The New York Independent System Operator, Inc. (NYISO) shall undertake the following analyses (in addition to those already required by the tariff) for use in the evaluation of transmission solutions and non-transmission projects:

1. The NYISO shall apply its expertise and design a more granular cost allocation among downstate entities.

2. If possible in time for the solicitation of solutions, the NYISO shall apply its expertise and knowledge of the bulk electric system, its tariff process and the Commission's Article VII siting process and establish an intended in-service year against which the project schedules for the proposed solutions shall be evaluated.

3. In evaluating project costs, the NYISO shall identify the necessary project elements of each project and ensure that all of the proposed transmission solutions are evaluated on a comparable basis as to the scope of costs. As to each necessary project element identified by the NYISO, it shall evaluate the costs proposed by each applicant and provide an evaluation of the reasonableness of the costs and the potential for cost overruns.

4. In evaluating project costs, the NYISO shall require each proposer of a transmission solution to submit at least two project cost bids. This requirement shall not preclude the proposer from submitting other additional bids pursuant to other incentive regimes that might be proposed by them. The first required bid shall presume that all prudently incurred costs will be recovered and there will be no sharing of cost overruns by the developer. The second required bid shall reflect the following incentive regime to control costs:

    If actual costs come in above a bid, the developer shall bear 20% of the cost over-runs, while ratepayers shall bear 80% of those costs. If actual costs come in below a bid, then the developer should retain 20% of the savings. Furthermore, if the developer seeks incentives from FERC above the base return-on-equity otherwise approved by FERC, then the developer shall not receive any incentives above the base return-on-equity on any cost overruns over the bid price. The bid price would therefore cap the costs that may be proposed to FERC for incentives.

APPENDIX D

PRESCRIBED COST ALLOCATION AND RECOVERY METHODOLOGY

The New York Independent System Operator, Inc. (NYISO) shall file the following prescribed cost allocation and recovery methodology with the Federal Energy Regulatory Commission (FERC):

> The cost allocation and recovery methodology shall be based on a "beneficiaries pay" approach for allocating costs, whereby those that derive the benefits of a project shall bear the costs. In that regard, 75% of project costs are to be allocated to the economic beneficiaries of reduced congestion, while the other 25% of the project costs are to be allocated to all customers on a load-ratio share. The benefits of avoided refurbishment costs in this instance accrue to all the beneficiaries of the new transmission facility regardless of who owns the current transmission lines and therefore no adjustment in cost allocation is to be made on the basis that the current owners will avoid future refurbishment costs. To ensure equity based on the overriding principle that "beneficiaries pay", the NYISO shall apply its expertise and design a more granular cost allocation among downstate entities after first applying the methodology described above to determine the respective shares of upstate and downstate entities. For these purposes, upstate is defined as NYISO Locational Based Marginal Pricing (LBMP) Zones A-F, and downstate is defined as LBMP Zones G-K.
>
> For transmission solutions for Segment B, the costs of upgrades to the Rock Tavern Substation and upgrades to the Shoemaker to Sugarloaf transmission line are pass-through costs that shall not be subject to any risk sharing incentives as to those costs.

Note: This will result in approximately 90% of the project costs being allocated to customers in the downstate region, and about 10% to upstate customers. This allocation reflects that the primary benefit of the projects will be reduced congestion into downstate load areas, but also recognizes that some benefits accrue to upstate customers in the form of increased reliability and reduced operational costs.

TRIAL STAFF PROJECT COST ESTIMATES
BY DEVELOPER AND SEGMENT

NYTOs	Segment A	Unstated
NYTOs	Segment B	$631,056,714
NYTOs	Segment A + B	$1,188,796,308
NextEra	Segment A	Unstated
NextEra	Segment B	$460,855,417
NextEra	Segment A + B	$1,038,632,316
NAT	Segment B	$712,600,886

Note: No transmission solution shall be selected unless the developer has submitted a cost estimate or bid that does not exceed the cost estimate at the level estimated by Trial Staff for the applicant's project unless the applicant can demonstrate to the NYISO that upward estimates are necessary to correct errors or omissions made by Trial Staff for the components that were added or adjusted by Trial Staff.

10 Krey Boulevard ⬥ Rensselaer, NY 12144

AC TRANSMISSION PUBLIC POLICY TRANSMISSION NEEDS PROJECT SOLICITATION

Response due April 29, 2016

February 29, 2016

Dear NYISO Stakeholder or Interested Party:

With this letter, the NYISO solicits Public Policy Transmission Projects[1] and Other Public Policy Projects to address the AC Transmission Public Policy Transmission Needs for evaluation in the NYISO's Public Policy Transmission Planning Process.

I. AC Transmission Public Policy Transmission Needs

On August 1, 2014, the NYISO initiated its first Public Policy Transmission Planning Process by soliciting proposed transmission needs that stakeholders or interested parties believe are driven by Public Policy Requirements.[2] On October 3, 2014, the NYISO filed for consideration by the New York State Public Service Commission ("NYPSC") the proposed transmission needs it received from eight entities. On November 12, 2014, the NYPSC published the proposed needs in the State Register for comments in accordance with the State Administrative Procedure Act ("SAPA").[3] Following its receipt and review of comments, the NYPSC continued its efforts in the Alternating Current Transmission Upgrades comparative proceedings that culminated in the issuance of the Trial Staff Final Report by the New York State Department of Public Service on September 22, 2015 along with a companion motion recommending that the NYPSC find that there are transmission needs driven by Public Policy Requirements. On October 7, 2015, the NYPSC published a SAPA notice of proposed rulemaking for comments. Following the comment period, the NYPSC issued an order on December 17, 2015 ("NYPSC Order")[4] that identified numerous public policies that together constitute Public Policy Requirements driving transmission needs associated with the Central East and UPNY/SENY sections of the New York State Transmission System.[5]

[1] Capitalized terms in this letter refer to defined terms in Attachment Y of the NYISO's Open Access Transmission Tariff ("OATT") or the NYISO Public Policy Transmission Planning Manual.

[2] The requirements for the Public Policy Transmission Planning Process are set forth in Attachment Y of the OATT and the NYISO Public Policy Transmission Planning Process Manual.

[3] The AC Public Policy Transmission Need project solicitation in this letter is separate from, and concerns a solicitation for a solution to different Public Policy Transmission Needs than, the NYISO's solicitation on November 1, 2015 for solutions to address the Western New York Public Policy Transmission Need identified by the NYPSC in NYPSC Case No. 14-E-0454 – In the Matter of New York Independent System Operator, Inc.'s Proposed Public Policy Transmission Needs for Consideration, *Order Addressing Public Policy Requirements for Transmission Planning Process* (July 20, 2015).

[4] NYPSC 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* (December 17, 2015).

[5] *Id.* at 66-68.

The NYPSC referred the Central East and UPNY/SENY transmission needs (collectively named the "AC Transmission Public Policy Transmission Needs") to the NYISO for the solicitation and evaluation of potential solutions.[6] The NYPSC specifically described the transmission needs in Appendix A of the NYPSC Order, and established evaluation criteria in Appendix B of the NYPSC Order. Appendix A is attached for reference.

The NYISO made a presentation at a combined meeting of the Transmission Planning Advisory Subcommittee and Electric System Planning Working Group on February 5, 2016 to review the NYPSC's determination of a Public Policy Requirement and the nature of the resulting AC Transmission Public Policy Transmission Needs.[7] The NYISO has established sufficiency criteria in accordance with the criteria set forth by the NYPSC Order, and has developed baseline models and associated power flow results to aid interested parties in developing project proposals. The attached "Sufficiency Criteria and Additional Information" document derived from the criteria set forth by the NYPSC Order provides the details of the system models and criteria that the NYISO will apply to determine the sufficiency of each proposed Public Policy Transmission Project and Other Public Policy Project to satisfy the AC Transmission Public Policy Transmission Needs.

II. Project Submission Requirements

Pursuant to Section 31.4.3 of Attachment Y to the NYISO OATT,[8] the NYISO hereby solicits Public Policy Transmission Projects and Other Public Policy Projects (including, but not limited to, generation and demand-side resources) to address the AC Transmission Public Policy Transmission Needs. Developers, including Transmission Owners and Other Developers, must provide project information in accordance with OATT Section 31.4.5 and Section 3.3 of the Public Policy Transmission Planning Process Manual ("Manual").[9] This project information will be used by the NYISO to analyze proposed Public Policy Transmission Projects and Other Public Policy Projects in accordance with the criteria set forth in the NYISO's tariff and the sufficiency criteria set forth in the attached "Sufficiency Criteria and Additional Information" document. Specifically, a Developer proposing a Public Policy Transmission Project or an Other Public Policy Project must submit the project information required in Attachment B of the Manual for the NYISO to analyze the project's viability and sufficiency.[10] A Developer proposing a Public Policy Transmission Project must also submit the project information required in Attachment C of the Manual for the NYISO's project evaluation and selection, [11] as well as the additional information required by the NYPSC Order as described in the attached "Sufficiency Criteria and Additional Information" document.

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[6] *Id.* at p. 68.

[7] The NYISO presentation is posted on its website under meeting materials at the following link: http://www.nyiso.com/public/markets_operations/committees/meeting_materials/index.jsp?com=bic_espwg.

[8] On February 18, 2016, the NYISO made a filing pursuant to Section 205 of the Federal Power Act to make certain clarifying changes and additions to OATT Sections 31.1, 31.4 and 31.5 in preparation for conducting its Public Policy Transmission Planning Process, and requested an effective date of February 19, 2016 upon FERC acceptance. The tariff filing did not propose material changes to the project solicitation process set forth in Attachment Y of the OATT.

[9] The NYISO Public Policy Transmission Planning Process Manual is posted at: http://www.nyiso.com/public/webdocs/markets_operations/documents/Manuals_and_Guides/Manuals/Planning/M-36_Public%20Policy%20Manual_v1_0_Final.pdf.

[10] Attachment B to the Public Policy Transmission Planning Process Manual is posted at: http://www.nyiso.com/public/webdocs/markets_operations/documents/Manuals_and_Guides/Manuals/Planning/Child_Public_Policy_Manual/M-36_Public%20Policy_Att%20B_v2015-07-31_Final.pdf.

[11] Attachment C to the Public Policy Transmission Planning Process Manual is posted at: http://www.nyiso.com/public/webdocs/markets_operations/documents/Manuals_and_Guides/Manuals/Planning/Child_Public_Policy_Manual/M-36_Public%20Policy_Att%20C_v2015-07-31_Final.pdf.

A Developer proposing a Public Policy Transmission Project that is not yet qualified to submit transmission projects must submit a Developer Qualification Form on or before March 30, 2016, as required by Section 3.1 of the Manual (*see* OATT Sections 31.4.4.1 and 31.4.4.3.) The form can be found in Attachment A to the Manual. A Developer previously qualified to submit a transmission project must submit updates to its Developer qualification information in accordance with NYISO Technical Bulletin 232.[12] All submissions of Developer Qualification Forms and updates must be submitted to developerqualification@nyiso.com.

A Developer should submit its project proposal to the NYISO in the manner described below on or before April 29, 2016 to be evaluated in the NYISO's Public Policy Transmission Planning Process. Pursuant to Section 3.3.2 of the Manual (*see* OATT Section 31.4.4.4), a Developer of a Public Policy Transmission Project must also include with its submittal: (i) an executed study agreement, which can be found in Attachment E to the Manual,[13] (ii) a non-refundable application fee of $10,000, and (iii) a study deposit of $100,000.[14] Please contact NYISO Accounts Receivable (NYISOAccountsReceivable@nyiso.com) regarding submission of the application fee and study deposit.

A Developer is separately responsible for complying with applicable interconnection requirements, but is not required to satisfy these requirements by April 29, 2016. Pursuant to a FERC directive in the NYISO's Order No. 1000 proceeding, the NYISO is currently developing new Transmission Interconnection Procedures to be filed on March 22, 2016, which, when effective, will apply to proposed Public Policy Transmission Projects.[15] If the Developer has not already submitted its proposed Public Policy Transmission Project into the current interconnection or transmission expansion processes, the NYISO encourages the Developer to do so. The new Transmission Interconnection Procedures will include rules to transition proposed transmission projects from the existing interconnection and transmission expansion processes into the Transmission Interconnection Procedures.

[12] Technical Bulletin 232 is posted at: http://www.nyiso.com/public/webdocs/markets_operations/documents/Technical_Bulletins/Technical_Bulletins/Technical_Bulletins/TB-232.pdf.

[13] Attachment E to the Public Policy Transmission Planning Process Manual is posted at: http://www.nyiso.com/public/webdocs/markets_operations/documents/Manuals_and_Guides/Manuals/Planning/Child_Public_Policy_Manual/M-36_Public%20Policy_Att%20E_v2015-07-31_Final.pdf.

[14] These additional submission requirements do not apply to an Other Public Policy Project.

[15] *See New York Independent System Operator, Inc.*, Order Conditionally Accepting Tariff Revisions and Requiring Further Compliance, 153 FERC ¶ 61,341 at PP 67-73 (2015).

Proposed Public Policy Transmission Projects and Other Public Policy Projects must be sent electronically to: publicpolicyplanningmailbox@nyiso.com, including in the subject line "AC Transmission PPTN Project." Due to file size restrictions, e-mail attachments should not exceed 60 MB for any single e-mail. Any supplemental hard copy information that could not be sent via e-mail should be sent to Zach Smith, Director of Transmission Planning, at 10 Krey Boulevard, Rensselaer, New York 12144. Questions about the filing of project information or about the Public Policy Transmission Planning Process should be addressed to: publicpolicyplanningmailbox@nyiso.com.

Very truly yours,

Henry Chao
Vice President, System & Resource Planning

cc: Mr. Raj Addepalli – State of New York Department of Public Service

Attachments

<u>Attachment I</u>

NYPSC Order – Appendix A

APPENDIX A

TRANSMISSION NEED DRIVEN BY PUBLIC POLICY REQUIREMENTS

SEGMENT A

Edic/Marcy to New Scotland; Princetown to Rotterdam

Construction of a new 345 kV line from Edic or Marcy to New Scotland on existing right-of-way (primarily using Edic to Rotterdam right-of-way west of Princetown); construction of two new 345 kV lines or two new 230 kV lines from Princetown to Rotterdam on existing Edic to Rotterdam right-of-way; decommissioning of two 230 kV lines from Edic to Rotterdam; related switching or substation work at Edic or Marcy, Princetown, Rotterdam and New Scotland.

SEGMENT B

Knickerbocker to Pleasant Valley

Construction of a new double circuit 345 kV/115 kV line from Knickerbocker to Churchtown on existing Greenbush to Pleasant Valley right-of-way; construction of a new double circuit 345 kV/115 kV line or triple circuit 345 kV/115 kV/115 kV line from Churchtown to Pleasant Valley on existing Greenbush to Pleasant Valley right-of-way; decommissioning of a double-circuit 115 kV line from Knickerbocker to Churchtown; decommissioning of one or two double-circuit 115 kV lines from Knickerbocker to Pleasant Valley; construction of a new tap of the New Scotland-Alps 345 kV line and new Knickerbocker switching station; related switching or substation work at Greenbush, Knickerbocker, Churchtown and Pleasant Valley substations.

Upgrades to the Rock Tavern Substation

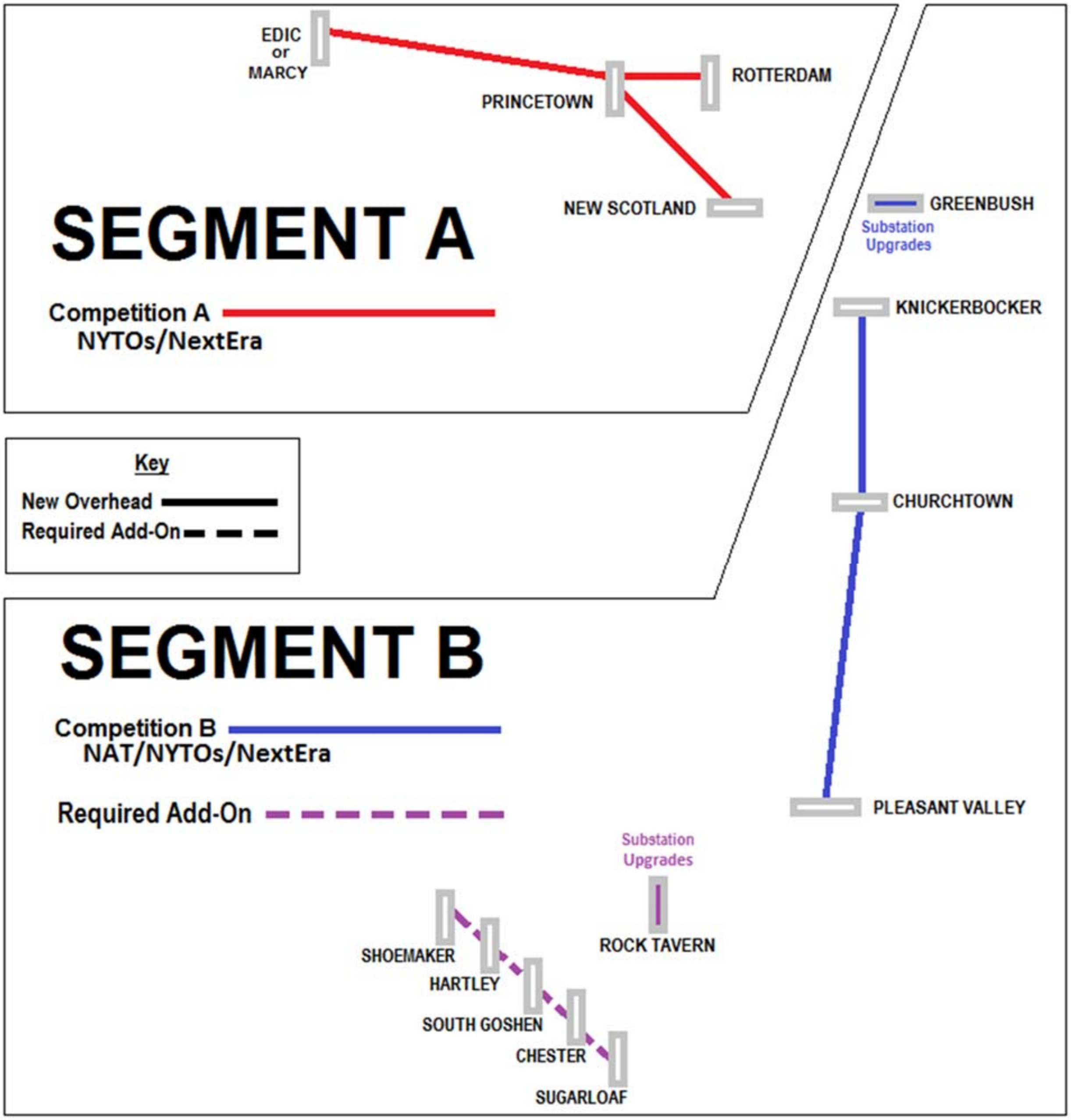
New line traps, relays, potential transformer upgrades, switch upgrades, system control upgrades and the installation of data acquisition measuring equipment and control wire needed to handle higher line currents that will result as a consequence of the new Edic/Marcy to New Scotland; Princetown to Rotterdam and Knickerbocker to Pleasant Valley lines.

Shoemaker to Sugarloaf

Construction of a new double circuit 138 kV line from Shoemaker to Sugarloaf on existing Shoemaker to Sugarloaf right-of-way; decommissioning of a double circuit 69 kV line from Shoemaker to Sugarloaf; related switching or substation work at Shoemaker, Hartley, South Goshen, Chester, and Sugarloaf.

Notes:
The need is for the entire portfolio, but the portfolio lends itself to segmentation such that transmission solutions should be solicited in a manner that allows applicants to propose solutions either by segment or on a combined portfolio basis, or in the alternative on both bases. Segment A depends upon Segment B being in place, so Segment A would not be constructed without certainty that Segment B would be constructed. Segment B depends upon certain specified add-ons being in place, so Segment B would not be constructed without certainty that the specified add-ons would be constructed.

SCHEMATIC LAYOUT OF SEGMENTS



<u>Attachment II</u>

Sufficiency Criteria and Additional Information

AC Transmission Public Policy Transmission Needs

Sufficiency Criteria and Additional Information

Sufficiency Criteria (Minimum Criteria)

In order to address the AC Transmission Public Policy Transmission Needs (PPTN) as identified by the NYPSC, a sufficient Public Policy Transmission Project or Other Public Policy Project shall meet, at a minimum, the following criteria:

- Proposed solutions to Segment A (Central East) must provide at least a 350 MW increase to the Central East interface transfer capability in accordance with Normal Transfer Criteria as defined by the New York State Reliability Council (NYSRC) Reliability Rules.
- Proposed solutions to Segment B (UPNY/SENY) must provide at least a 900 MW increase to the UPNY/SENY interface transfer capability in accordance with Normal Transfer Criteria as defined by the NYSRC Reliability Rules.

Additionally, a sufficient Public Policy Transmission Project shall meet, at a minimum, the following criteria stated in the NYPSC Order:

- Proposed solutions to Segment A (Central East) must include all project components included in Segment A as described in Appendix A of the NYPSC Order.
- Proposed solutions to Segment B (UPNY/SENY) must include all project components included in Segment B as described in Appendix A of the NYPSC Order.
- No acquisition of new permanent transmission rights-of-way, except for *de minimis* acquisitions that cannot be avoided due to unique circumstances. The transfer or lease of existing transmission right-of-way property or access rights from a current utility company owner to a Developer shall not be considered such an acquisition.
- No crossing of the Hudson River, either overhead, underwater, in riverbed, or underground, or in any other way by any component of the transmission facility.
- For those Public Policy Transmission Projects that were also evaluated in the NYPSC AC Transmission proceedings, the NYPSC Order states that the cost estimate must not exceed the level estimated by NYPSC Trial Staff for the project, unless the applicant can demonstrate that upward estimates are necessary to correct errors or omissions made by NYPSC Trial Staff for the components that were added or adjusted by NYPSC Trial Staff.[1]

[1] The NYISO will perform an independent evaluation of Public Policy Transmission Project costs for purposes of its evaluation and selection process under Section 31.4 of Attachment Y to the NYISO OATT. *See* OATT Attachment Y Section 31.4.8.

Transmission Evaluation Criteria

For the purposes of evaluation and selection of the more efficient or cost effective Public Policy Transmission Project to address the AC Transmission PPTN, the following criteria identified by the NYPSC Order will be applied in addition to the criteria and metrics defined by Section 31.4.8 of Attachment Y to the NYISO OATT:

- In lieu of establishing an intended in-service year against which project schedules would be evaluated, the NYISO will consider the proposed project schedule for each Public Policy Transmission Project in the evaluation of impacts to congestion and other applicable criteria over the study period. The NYISO will assume that project schedules begin January 1 of a given year following the NYISO's selection and NYPSC Article VII siting approval (*i.e.,* project schedules need not account for the timing of the NYISO or NYPSC processes).
- The selection process will favor Public Policy Transmission Projects that minimize the acquisition of property rights for new substations and substation expansions. For the purpose of this criterion, the transfer or lease of existing property rights from a current utility company owner to a Developer shall not be considered such an acquisition.
- No Public Policy Transmission Project shall be selected for Segment B that does not incorporate certain specified add-ons that would be constructed (*i.e.,* as specified in the NYPSC Order the upgrades to the Rock Tavern Substation and the upgrades to the Shoemaker to Sugarloaf transmission lines), unless the NYISO determines that such add-ons, jointly or severally, are not material to the accomplishment of the purpose a solution for Segment B.
- The selection process for transmission solutions for Segment B shall not use the costs of upgrades to the Rock Tavern Substation and upgrades to the Shoemaker to Sugarloaf transmission lines as a distinguishing factor between Public Policy Transmission Projects.
- No Public Policy Transmission Project shall be selected for Segment A unless a Public Policy Transmission Project is selected for Segment B.
- No Public Policy Transmission Project shall be selected for Segment A except on condition that the Public Policy Transmission Project selected for Segment A shall not be implemented until there is reasonable certainty established in a manner to be determined by the NYISO that the Public Policy Transmission Project selected for Segment B will be implemented.
- The selection process shall favor Public Policy Transmission Projects that result in upgrades to aging infrastructure.
- Project selection will be competitive by Segment (Segment A and Segment B), but synergies produced by selecting a single Developer to provide both segments may be considered.
- The selection process shall not use the percentage rates applied to account for contingencies and revenue requirement as a distinguishing factor between Public Policy Transmission Projects. The NYISO will evaluate costs based on raw construction costs to ensure that all of the proposed Public Policy Transmission Projects are evaluated on a comparable basis as to the scope of costs.

PPTN-specific Project Information

For each Public Policy Transmission Project, the Developer must submit at least two project cost estimates, as required by the NYPSC Order:

- The first required cost estimate shall presume that all prudently incurred costs will be recovered and there will be no sharing of cost overruns by the Developer.
- The second required cost estimate shall reflect an 80/20 incentive regime to control costs. The NYPSC Order stated its intent that if actual costs come in above a cost estimate, the Developer bears 20% of the cost over-runs, while ratepayers bear 80% of those costs. The NYPSC Order stated its intent that if actual costs come in below a cost estimate, then the Developer should retain 20% of the savings. Furthermore, if the Developer seeks incentives from FERC above the base return-on-equity otherwise approved by FERC, then the Developer shall not receive any incentives above the base return-on-equity on any cost overruns over the cost estimate. The NYPSC Order stated that the cost estimate would therefore cap the costs that may be proposed to FERC for incentives.[2]

Baseline Study Cases

The baseline study case for the AC Transmission PPTN will be the same system representation as that employed by the NYISO for the Trial Staff Final Report in the NYPSC AC Transmission proceedings. That case is based on the NYISO 2014 Comprehensive Reliability Plan base case system representation of 2019 summer peak load, modified to include the now-planned CPV Valley Energy Center generation plant and associated system deliverability upgrades.

The baseline study cases are available, subject to a Critical Energy Infrastructure Information (CEII) request: http://www.nyiso.com/public/webdocs/markets_operations/services/customer_relations/CEII_Request_Form/CEII_Request_Form_and_NDA_complete.pdf

Baseline Study Results

Baseline study results, as presented in the NYPSC AC Transmission proceedings, are publicly available on the NYISO website under Public Policy Documents at:

http://www.nyiso.com/public/markets_operations/services/planning/planning_studies/index.jsp

[2] The NYISO takes no position on the cost overrun and underrun provisions in the NYPSC Order, but notes that the NYISO's tariff states that FERC determines the scope of transmission costs that may be recovered under the NYISO's tariffs. *See* OATT Attachment Y Section 31.4.8.2.

AC Transmission
Public Policy Transmission Need
Viability & Sufficiency Assessment

A report from the New York Independent System Operator

October 27, 2016

Table of Contents

Executive Summary

The NYISO's Public Policy Transmission Planning Process implements the Federal Energy Regulatory Commission (FERC) Order No. 1000 directive requiring public utility transmission providers to consider in their planning processes transmission needs driven by Public Policy Requirements. The NYISO conducted this Viability and Sufficiency Assessment for the AC Transmission Public Policy Transmission Need to determine whether each proposal submitted by a Developer is complete, viable, and sufficient to satisfy the Public Policy Transmission Need.

The NYISO initiated its first Public Policy Transmission Planning Process by soliciting proposed transmission needs that stakeholders or interested parties believe are driven by Public Policy Requirements. The NYISO filed for consideration by the New York Public Service Commission (NYPSC) the proposed transmission needs and the NYPSC published the proposed needs for public comment pursuant to the State Administrative Procedure Act. NYISO Staff also provided technical support to the New York State Department of Public Service throughout 2014 and 2015, and appeared twice at technical conferences to present its power flow analyses to Developers and parties to the NYPSC AC Transmission proceedings. Upon considering the various comments submitted, the NYPSC issued an order that identified numerous public policies that together constitute Public Policy Requirements driving transmission needs associated with the Central East and UPNY/SENY sections of the New York State Transmission System (collectively named the "AC Transmission Public Policy Transmission Need").

The NYISO established sufficiency criteria in accordance with the criteria set forth by the NYPSC order. The NYISO created the baseline power flow study case and results used in the Trial Staff Final Report in the NYPSC's AC Transmission proceedings, and used that baseline powerflow to conduct its independent analysis of the viability and sufficiency of each proposed project.

The NYISO issued a solicitation for projects to address the AC Transmission Public Policy Transmission Need and received 16 proposals from six developers. The NYISO conducted a comparable analysis for each project in the same manner as it conducted the baseline analysis. Out of the 16 proposed projects, the NYISO identifies 13 viable and sufficient projects to address the AC Transmission Public Policy Transmission Need.

Under the PPTPP, the NYPSC reviews this Viability and Sufficiency Assessment and determines whether the NYISO should continue to evaluate and rank the viable and sufficient transmission solutions as part of the Public Policy Transmission Planning Report.

1. Introduction

The NYISO's regional planning process, known as the Comprehensive System Planning Process (CSPP), is comprised of four components: (1) the Local Transmission Owner Planning Process, (2) the Reliability Planning Process, (3) the Economic Planning Process, and (4) the Public Policy Transmission Planning Process (PPTPP).[1] The NYISO also conducts interregional planning with its neighboring control areas under the Northeast Coordinated System Planning Protocol. The PPTPP supports the FERC Order No. 1000 directive requiring public utility transmission providers to consider in their planning processes transmission needs driven by Public Policy Requirements ("Public Policy Transmission Needs"). Section 31.4 of Attachment Y of the NYISO Open Access Transmission Tariff (OATT, or the Tariff) describes the planning process that the NYISO, and all interested parties, shall follow to consider Public Policy Requirements[2] that drive the need for expansions or upgrades to Bulk Power Transmission Facilities (BPTFs).[3] Pursuant to the Tariff, the NYISO conducted this Viability and Sufficiency Assessment for the AC Transmission Public Policy Transmission Need to determine whether each Developer-submitted proposal is complete, viable, and sufficient to satisfy the identified need.

The PPTPP consists of four main steps: (1) the identification of Public Policy Transmission Needs, (2) the proposal of solutions to identified Public Policy Transmission Needs, (3) the evaluation of the viability and sufficiency of proposed transmission and non-transmission solutions to a Public Policy Transmission Need, and (4) upon confirmation of the transmission need by the NYPSC, the evaluation and selection of the more efficient or cost effective Public Policy Transmission Project to satisfy a Public Policy Transmission Need.

For each two-year CSPP cycle, the NYISO initiates the first step of the PPTPP after the draft Reliability Needs Assessment (RNA) results are released in the Reliability Planning Process. In the identification step, the NYISO solicits proposals for transmission needs driven by Public Policy Requirements, and the NYPSC, or Long Island Power Authority (LIPA), as applicable, considers the proposals in order to identify Public Policy Transmission Needs, and the NYPSC determines for which of those the NYISO should solicit solutions. Subsequent to the identification of Public Policy Transmission Needs, the NYISO solicits proposed solutions, and Developers submit Public Policy Transmission Projects and Other Public Policy Projects to satisfy the identified Public Policy Transmission Needs. All submissions, regardless of project type, are evaluated for their viability and sufficiency to meet the Public Policy Transmission Needs.

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[1] *See* OATT Attachment Y.

[2] A "Public Policy Requirement" is a federal or New York State statute or regulation, including a New York State Public Service Commission (NYPSC) order adopting a rule or regulation subject to and in accordance with the State Administrative Procedure Act, any successor statute, or any duly enacted law or regulation passed by a local governmental entity in New York State, that may relate to transmission planning on the BPTFs.

[3] The BPTFs include all of the facilities designated by the NYISO as a Bulk Power System (BPS) element as defined by the NYSRC and NPCC, as well as other transmission facilities that are relevant to planning the New York State transmission system. The current BPTF list is provided in Appendix B of the 2015 NYISO Area Transmission Review, posted at:
http://www.nyiso.com/public/webdocs/markets_operations/services/planning/Documents_and_Resources/Reliability-Compliance/2015%20CATR%20Appendix%20Files_non-CEII.zip

A Public Policy Transmission Project is a transmission project or a portfolio of transmission projects proposed by Developer(s) to satisfy an identified Public Policy Transmission Need and for which the Developer(s) seek to be selected by the NYISO for purposes of allocating and recovering the project's costs under the NYISO OATT.[4] An Other Public Policy Project is a non-transmission project or a portfolio of transmission and non-transmission projects proposed by a Developer to satisfy an identified Public Policy Transmission Need. An Other Public Policy Project may consist of transmission, generation, and/or demand-side projects.[5]

Following the NYISO's presentation of the Viability and Sufficiency Assessment, the NYPSC reviews the Viability and Sufficiency Assessment and issues an order explaining whether there continues to be the same transmission need driven by a Public Policy Requirement and, if so, that the NYISO should continue to evaluate transmission solutions to a Public Policy Transmission Need.[6] If the NYPSC concludes that non-transmission solutions should be pursued, the NYPSC will indicate in its order that either: (i) there is no longer a transmission need driven by a Public Policy Requirement that requires the NYISO's evaluation of potential transmission solutions, or (ii) the transmission need should be modified.

If the NYPSC concludes that there is no longer a transmission need driven by a Public Policy Requirement, the NYISO will not perform an evaluation, or make a selection of, a more efficient or cost-effective transmission solution for that planning cycle. If the NYPSC modifies the transmission need driven by a Public Policy Requirement, the NYISO will restart its Public Policy Transmission Planning Process as an out-of-cycle process. This out-of-cycle process will begin with the NYISO's solicitation of Public Policy Transmission Projects to address the modified Public Policy Transmission Need. The NYISO will evaluate the viability and sufficiency of the proposed Public Policy Transmission Projects. The NYISO will then proceed to evaluate the viable and sufficient Public Policy Transmission Projects for purposes of selecting the more efficient or cost-effective transmission solution to the modified Public Policy Transmission Need.

If the NYISO proceeds to the evaluation phase, the NYISO evaluates the proposed Public Policy Transmission Projects that have satisfied the viability and sufficiency requirements and ranks them based on the quality of their satisfaction of numerous metrics. Based on this evaluation, the NYISO may select the more efficient or cost-effective Public Policy Transmission Project to satisfy the Public Policy Transmission Need. A project selected as the more efficient or cost-effective solution is eligible for cost allocation and cost recovery under the NYISO OATT.[7] The assumptions, inputs, methodologies, and results of the NYISO's analysis are published in the Public Policy Transmission Planning Report.

[4] See OATT § 31.1.
[5] See OATT § 31.1.
[6] The focus of the NYPSC's review is upon whether there continues to be a need for transmission. Comments regarding the technical merits of this Viability and Sufficiency Assessment should be directed to the NYISO through its stakeholder process.
[7] See OATT § 31.5.

2. Summary of the Public Policy Transmission Need

On August 1, 2014, the NYISO initiated its first Public Policy Transmission Planning Process by soliciting proposed transmission needs that stakeholders or interested parties believe are driven by Public Policy Requirements. On October 3, 2014, the NYISO filed for consideration by the NYPSC the proposed transmission needs it received from eight entities. On November 12, 2014, the NYPSC published the proposed needs in the State Register in accordance with the State Administrative Procedure Act (SAPA) for comments. Following its receipt and review of comments, the NYPSC continued its efforts in the Alternating Current Transmission Upgrades comparative proceedings ("AC Transmission proceedings") that culminated in the issuance of the Trial Staff Final Report by the New York State Department of Public Service on September 22, 2015, along with a companion motion recommending that the NYPSC find that there are transmission needs driven by Public Policy Requirements. On October 7, 2015, the NYPSC published a SAPA notice of proposed rulemaking for public comment. Following the comment period, the NYPSC issued an order on December 17, 2015 ("NYPSC Order")[8] that identified numerous public policies that together constitute Public Policy Requirements driving transmission needs associated with the Central East and UPNY/SENY sections of the New York State Transmission System.[9] The NYPSC referred the Central East ("Segment A") and UPNY/SENY ("Segment B") transmission needs (collectively named the "AC Transmission Public Policy Transmission Need") to the NYISO for the solicitation and evaluation of potential solutions. Figure 1 depicts the two segments of the AC Transmission Public Policy Transmission Need. The NYPSC specifically described the two segments of the transmission need as follows:

SEGMENT A

Edic/Marcy to New Scotland; Princetown to Rotterdam

Construction of a new 345 kV line from Edic or Marcy to New Scotland on existing right-of-way (primarily using Edic to Rotterdam right-of-way west of Princetown); construction of two new 345 kV lines or two new 230 kV lines from Princetown to Rotterdam on existing Edic to Rotterdam right-of-way; decommissioning of two 230 kV lines from Edic to Rotterdam; related switching or substation work at Edic or Marcy, Princetown, Rotterdam and New Scotland.

SEGMENT B

Knickerbocker to Pleasant Valley

Construction of a new double circuit 345 kV/115 kV line from Knickerbocker to Churchtown on existing Greenbush to Pleasant Valley right-of-way; construction of a new double circuit 345 kV/115 kV line or triple circuit 345 kV/115 kV/115 kV line from Churchtown to Pleasant Valley on

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[8] NYPSC 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* (December 17, 2015).
[9] *Id.* at 66-68.

existing Greenbush to Pleasant Valley right-of-way; decommissioning of a double-circuit 115 kV line from Knickerbocker to Churchtown; decommissioning of one or two double-circuit 115 kV lines from Knickerbocker to Pleasant Valley; construction of a new tap of the New Scotland-Alps 345 kV line and new Knickerbocker switching station; related switching or substation work at Greenbush, Knickerbocker, Churchtown and Pleasant Valley substations.

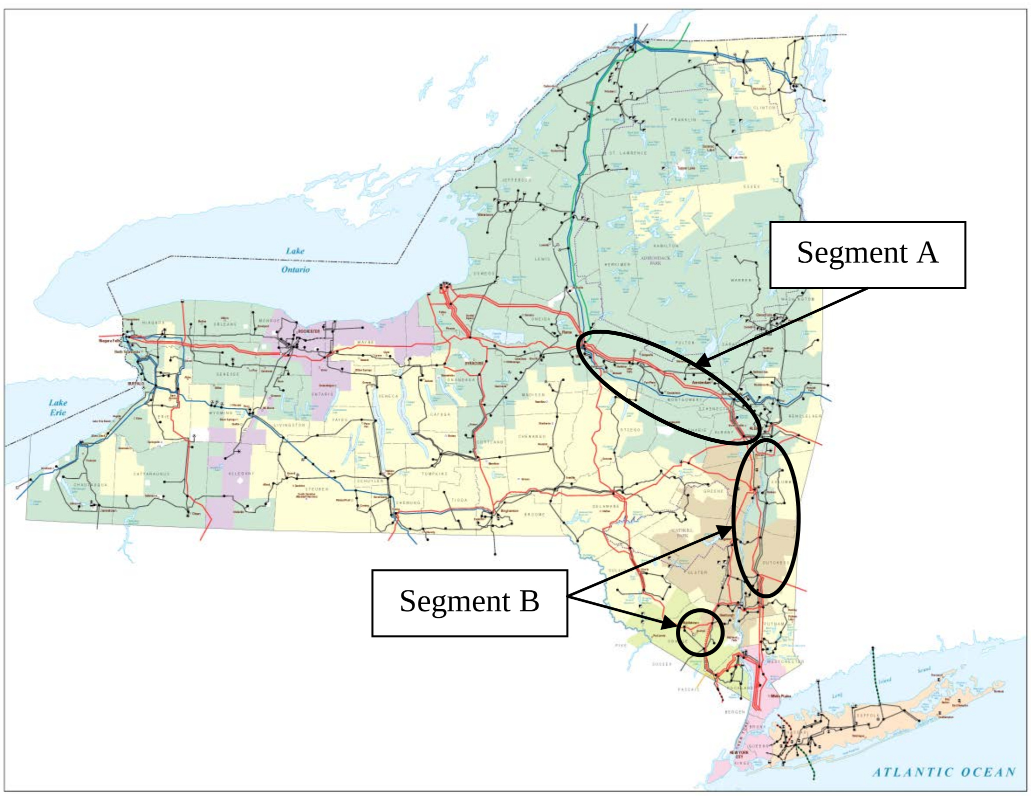
Upgrades to the Rock Tavern Substation

New line traps, relays, potential transformer upgrades, switch upgrades, system control upgrades and the installation of data acquisition measuring equipment and control wire needed to handle higher line currents that will result as a consequence of the new Edic/Marcy to New Scotland; Princetown to Rotterdam and Knickerbocker to Pleasant Valley lines.

Shoemaker to Sugarloaf

Construction of a new double circuit 138 kV line from Shoemaker to Sugarloaf on existing Shoemaker to Sugarloaf right-of-way; decommissioning of a double circuit 69 kV line from Shoemaker to Sugarloaf; related switching or substation work at Shoemaker, Hartley, South Goshen, Chester, and Sugarloaf.[10]

Figure 1: AC Transmission Public Policy Transmission Need



[10] NYPSC Order, Appendix A.

2.1. Sufficiency Criteria

The NYISO established sufficiency criteria in accordance with the criteria set forth by the NYPSC Order. The NYISO made a presentation at a combined meeting of the Transmission Planning Advisory Subcommittee and Electric System Planning Working Group on February 5, 2016 to review the NYPSC's determination of Public Policy Requirements, the nature of the resulting AC Transmission Public Policy Transmission Need, and the associated models and assumptions to be used in NYISO's evaluations.[11]

In order to address the AC Transmission Public Policy Transmission Need as identified by the NYPSC, a sufficient Public Policy Transmission Project or Other Public Policy Project shall meet, at a minimum, the following criteria:

- Proposed solutions to Segment A (Central East) must provide at least a 350 MW increase to the Central East interface transfer capability in accordance with Normal Transfer Criteria as defined by the New York State Reliability Council (NYSRC) Reliability Rules.
- Proposed solutions to Segment B (UPNY/SENY) must provide at least a 900 MW increase to the UPNY/SENY interface transfer capability in accordance with Normal Transfer Criteria as defined by the NYSRC Reliability Rules.

Additionally, a sufficient Public Policy Transmission Project shall meet, at a minimum, the following criteria stated in the NYPSC Order:

- Proposed solutions to Segment A (Central East) must include all project components included in Segment A as described in Appendix A of the NYPSC Order.
- Proposed solutions to Segment B (UPNY/SENY) must include all project components included in Segment B as described in Appendix A of the NYPSC Order.
- No acquisition of new permanent transmission rights-of-way, except for *de minimis* acquisitions that cannot be avoided due to unique circumstances. The transfer or lease of existing transmission rights-of-way property or access rights from a current utility company owner to a Developer shall not be considered such an acquisition.
- No crossing of the Hudson River, either overhead, underwater, in riverbed, or underground, or in any other way by any component of the transmission facility.
- For those Public Policy Transmission Projects that were also evaluated in the AC Transmission proceedings, the NYPSC Order states that the cost estimate must not exceed the level estimated by NYPSC Trial Staff for the project, unless the applicant can

[11] The NYISO presentation is posted on its website under meeting materials at the following link: http://www.nyiso.com/public/markets_operations/committees/meeting_materials/index.jsp?com=bic_espwg.

demonstrate that upward estimates are necessary to correct errors or omissions made by NYPSC Trial Staff for the components that were added or adjusted by NYPSC Trial Staff.

Appendix A of this report provides the details of the criteria that the NYISO applied to determine the sufficiency of each proposed Public Policy Transmission Project and Other Public Policy Project to satisfy the AC Transmission Public Policy Transmission Need.

2.2. Sufficiency Assessment Methodology

The process for developing the study cases for the Viability and Sufficiency Assessment is set forth in Section 4 of the NYISO Public Policy Transmission Planning Process Manual. Based on the sufficiency criteria set forth by the NYPSC Order, the NYISO determined that a power flow model is necessary to evaluate the transfer limits of the Central East and UPNY/SENY interfaces. The baseline power flow study case for the AC Transmission Public Policy Transmission Need is the same system representation that the NYISO employed for the Trial Staff Final Report in the AC Transmission proceedings. The NYISO built that case from the NYISO 2014 Comprehensive Reliability Plan base case system representation of the 2019 summer peak load, modified to include the now-planned CPV Valley Energy Center generation plant and associated system deliverability upgrades. The NYISO used that baseline powerflow to conduct its independent analysis of the viability and sufficiency of each proposed project.

The Central East interface represents transmission lines from Utica to Albany and a line from northern New York to Vermont. Central East is typically a voltage-constrained interface; therefore, the NYISO performed a voltage transfer analysis using the PowerGEM TARA software and in accordance with the NYISO Guideline for Voltage Analysis and Determination of Voltage-Based Transfer Limits.[12] To determine the voltage transfer limits, the NYISO created a set of power flow cases with increasing transfer levels by increasing generation upstream of the interface and decreasing generation downstream of the interface. As the transfer level across the interface was increased, the voltage-constrained transfer limit was determined to be the lower of: (1) the pre-contingency power flow at which the pre/post-contingency voltage falls below the voltage limit criteria, or (2) 95% of the pre-contingency power flow at the voltage collapse point, also known as the “tip of the nose” of the post-contingency power-voltage (PV) curve.[13]

The UPNY-SENY interface represents a collection of transmission lines on which power flows from Upstate New York to Southeast New York. UPNY-SENY is historically limited by the thermal capability of the individual transmission lines; therefore, thermal transfer analysis was performed for the interface in accordance with the Normal Transfer Criteria as defined by the NYSRC Reliability Rules. The NYISO used the Siemens PTI PSS® MUST program to perform the thermal transfer

[12] NYISO Transmission Expansion and Interconnection Manual, Attachment G, NYISO Transmission Planning Guideline #2-1
[13] The “tip of the nose” is the point of voltage collapse, which occurs when reactive capability supporting the transfer of real power is exhausted.

analysis. To determine the thermal transfer limits, the NYISO raised the power flow across the interface by uniformly increasing upstream generation and uniformly decreasing downstream generation. The thermal ratings of transmission lines were monitored while simulating design contingency events. This method provided a consistent measure of changes to interface transfer limits.

2.3. Baseline Results

The baseline power flow study case for the AC Transmission Public Policy Transmission Need used the same system representation as the NYISO employed for the Trial Staff Final Report in the AC Transmission proceedings. Accordingly, the baseline results are the same as those presented at the NYPSC's AC Transmission Technical Conference on October 8, 2015.[14]

The Central East baseline voltage transfer limit is 2,725 MW limited by voltage collapse for a common-tower loss of the Marcy – Coopers Corners and Edic – Fraser 345 kV lines (Lines 40 & 41).

The UPNY-SENY thermal transfer limit for the baseline is 5,113 MW limited by the post-contingency flow on the Leeds – Pleasant Valley 345 kV line reaching the long term emergency (LTE) rating for a common-tower loss of the CPV Valley – Rock Tavern and Coopers Corners – Rock Tavern 345 kV lines (Lines 34 & 42B). In the baseline, the Athens Special Protection System (SPS) is assumed to be in-service through June 2024 and out-of-service thereafter. The Athens SPS allows either of the Leeds – Pleasant Valley and Athens – Pleasant Valley 345 kV lines to be secured to its short term emergency (STE) rating following loss of the other parallel circuit if Athens generation can be dispatched down to reduce the flow to or below LTE ratings within 15 minutes. A 2013 agreement between National Grid and Athens states that the Athens SPS will remain in-service for ten years or until the construction of a permanent physical reinforcement is in place.[15] Based on the foregoing, in NYISO's evaluation of the proposed transmission solutions to Segment B, the Athens SPS was assumed to be retired as of the in-service date of the proposed transmission solutions.

[14] Power flow analysis for AC Transmission Proceedings is posted at http://www.nyiso.com/public/webdocs/markets_operations/services/planning/Planning_Studies/Public_Policy_Documents/AC_Transmission_PPTN/NYISO_AC_transmission_TechConf_2015-10-08v2.pdf

[15] A National Grid presentation describing the agreement is posted at: https://www.nyiso.com/public/webdocs/markets_operations/committees/bic_espwg/meeting_materials/2013-01-09/Athens%20%20SPS%20Update.pdf

3. Proposed Projects and Findings

On February 29, 2016, the NYISO issued a solicitation for Public Policy Transmission Projects and Other Public Policy Projects to address the AC Transmission Public Policy Transmission Need. Project proposals were due on or before April 29, 2016.[16] Following the issuance of the solicitation, the NYISO received numerous questions from interested Developers seeking clarification on the process and the AC Transmission Public Policy Transmission Need. The NYISO summarized the questions and provided responses in a public Frequently Asked Questions (FAQ) document first posted on March 30, 2016 and updated on April 13, 2016.[17]

As a result of the February 29, 2016 solicitation, the NYISO received 15 Public Policy Transmission Projects and one Other Public Policy Project. In accordance with Section 31.4.15 of the NYISO OATT, the NYISO maintains the confidentiality of each proposed solution except for certain basic information until the NYISO determines that the proposed solution is viable and sufficient and the Developer consents to the NYISO's inclusion of its proposed solution and disclosure of details of its project in the Public Policy Transmission Planning Report. Table 1 provides the publicly available information for each of the proposed projects considered.

Table 1: Proposed Projects

Developer	Project Name	Category	Type	Location	Size
National Grid / Transco	New York Energy Solution Seg. A	PPTP	AC Transmission	Segment A	N/A
National Grid / Transco	New York Energy Solution Seg. B	PPTP	AC Transmission	Segment B	N/A
NextEra Energy Transmission New York	Enterprise Line: Segment A	PPTP	AC Transmission	Segment A	N/A
NextEra Energy Transmission New York	Enterprise Line: Segment B	PPTP	AC Transmission	Segment B	N/A
NextEra Energy Transmission New York	Enterprise Line: Segment B-Alt	PPTP	AC Transmission	Segment B	N/A
North America Transmission / NYPA	Segment A +765 kV	PPTP	AC Transmission	Segment A	N/A
North America Transmission / NYPA	Segment A Base	PPTP	AC Transmission	Segment A	N/A
North America Transmission / NYPA	Segment A Double Circuit	PPTP	AC Transmission	Segment A	N/A
North America Transmission / NYPA	Segment A Enhanced	PPTP	AC Transmission	Segment A	N/A
North America Transmission / NYPA	Segment B Base	PPTP	AC Transmission	Segment B	N/A
North America Transmission / NYPA	Segment B Enhanced	PPTP	AC Transmission	Segment B	N/A
ITC New York Development	16NYPP1-1A AC Transmission	PPTP	AC Transmission	Segment A	N/A
ITC New York Development	16NYPP1-1B AC Transmission	PPTP	AC Transmission	Segment B	N/A
AvanGrid	Connect New York Recommended	PPTP	HVDC	Segments A and B	1000 MW
AvanGrid	Connect New York Alternative	PPTP	HVDC	Segments A and B	1000 MW
GlidePath	Distributed Generation Portfolio	OPPP	Generation	Orange, Ulster, Putnam, Greene, NY	112 MW

PPTP: Public Policy Transmission Project OPPP: Other Public Policy Project

The NYISO evaluated the viability and sufficiency of all 16 projects. A sufficient Public Policy Transmission Project or Other Public Policy Project shall increase Central East transfer limit by at least

[16] The AC Transmission Public Policy Transmission Need Project Solicitation is posted at: http://www.nyiso.com/public/webdocs/markets_operations/services/planning/Planning_Studies/Public_Policy_Documents/AC_Transmission_PPTN/AC_Transmission_PPTN_Solution_Solicitation_2016-02-29.pdf

[17] The AC Transmission Public Policy Transmission Need FAQ document is posted at: http://www.nyiso.com/public/webdocs/markets_operations/services/planning/Planning_Studies/Public_Policy_Documents/AC_Transmission_PPTN/AC-Transmission_PPTN_FAQ_2016-04-13.pdf

350 MW if proposed for Segment A, or increase UPNY-SENY transfer limit by at least 900 MW if proposed for Segment B, in accordance with Normal Transfer Criteria as defined by the NYSRC Reliability Rules. The NYISO conducted a comparable transfer limit analysis of each project in the same manner as the baseline analysis. As required by the NYPSC Order, Segment A depends upon Segment B being in place, so Segment A would not be constructed without certainty that Segment B would be constructed.[18] Therefore, to assess the sufficiency of Segment A proposals, the NYISO combined each Segment A project with each Developer's Segment B counterpart projects and performed transfer analysis for Central East on the combined cases.[19] If there was at least one combined case which increases the Central East transfer limit by at least 350 MW, the Segment A project meets this Central East sufficiency criterion.

Additionally, a sufficient Public Policy Transmission Project shall include all the Segment A or Segment B components as applicable, and meet the rights-of-way, river-crossing, and cost-estimate requirements as described in Section 2.1 of this report. Table 2 lists the findings for each proposed solution. Detailed results have been provided individually to each Developer that proposed a Public Policy Transmission Project or Other Public Policy Project for the AC Transmission Public Policy Transmission Need.

[18] NYPSC Order, Appendix A

[19] The NYISO did not analyze the viability and sufficiency of each Segment A with each Segment B provided by all Developers.

Table 2: Project Findings

Developer Name	Project Name	Segment	Includes All Segment A Components?	Includes All Segment B Components?	Meets ROW Acquisition Criterion Except For de minimis?	Meets Hudson River Crossing Criterion?	Meets Cost Estimate Criterion?	Central East Limit Increases 350+ MW ?	UPNY-SENY Limit Increases 900+ MW ?	Sufficient?
National Grid / Transco	New York Energy Solution Seg. A	A	Yes	N/A	Yes	Yes	Yes	Yes	N/A	Yes
NextEra Energy Transmission New York	Enterprise Line: Segment A	A	Yes	N/A	Yes	Yes	N/A	Yes	N/A	Yes
North America Transmission / NYPA	Segment A +765 kV	A	Yes	N/A	Yes	Yes	N/A	Yes	N/A	Yes
North America Transmission / NYPA	Segment A Base	A	Yes	N/A	Yes	Yes	N/A	Yes	N/A	Yes
North America Transmission / NYPA	Segment A Double Circuit	A	Yes	N/A	Yes	Yes	N/A	Yes	N/A	Yes
North America Transmission / NYPA	Segment A Enhanced	A	Yes	N/A	Yes	Yes	N/A	Yes	N/A	Yes
ITC New York Development	16NYPP1-1A AC Transmission	A	Yes	N/A	Yes	Yes	N/A	Yes	N/A	Yes
National Grid / Transco	New York Energy Solution Seg. B	B	N/A	Yes	Yes	Yes	Yes	N/A	Yes	Yes
NextEra Energy Transmission New York	Enterprise Line: Segment B	B	N/A	Yes	Yes	Yes	Yes	N/A	Yes	Yes
NextEra Energy Transmission New York	Enterprise Line: Segment B-Alt	B	N/A	Yes	Yes	Yes	Yes	N/A	Yes	Yes
North America Transmission / NYPA	Segment B Base	B	N/A	Yes	Yes	Yes	N/A	N/A	Yes	Yes
North America Transmission / NYPA	Segment B Enhanced	B	N/A	Yes	Yes	Yes	N/A	N/A	Yes	Yes
ITC New York Development	16NYPP1-1B AC Transmission	B	N/A	Yes	Yes	Yes	N/A	N/A	Yes	Yes
AvanGrid	Connect New York Recommended	A and B	No	No	Yes	No	N/A	Yes	No	No
AvanGrid	Connect New York Alternative	A and B	No	No	Yes	Yes	N/A	Yes	No	No
GlidePath	Distributed Generation Portfolio	N/A	N/A	N/A	N/A	N/A	N/A	No	No	No

4. Conclusions

The NYISO performed a comparable analysis of each proposed Public Policy Transmission Project and Other Public Policy Project to confirm that the proposed solution satisfies the AC Transmission Public Policy Transmission Need. The NYISO determined that the following projects meet the sufficiency criteria:

- National Grid / Transco – New York Energy Solution Segment A
- National Grid / Transco – New York Energy Solution Segment B
- NextEra Energy Transmission New York – Enterprise Line: Segment A
- NextEra Energy Transmission New York – Enterprise Line: Segment B
- NextEra Energy Transmission New York – Enterprise Line: Segment B Alt.
- North America Transmission / NYPA – Segment A + 765 kV
- North America Transmission / NYPA – Segment A Base
- North America Transmission / NYPA – Segment A Double Circuit
- North America Transmission / NYPA – Segment A Enhanced
- North America Transmission / NYPA – Segment B Base
- North America Transmission / NYPA – Segment B Enhanced
- ITC New York Development – 16NYPP1-1A AC Transmission
- ITC New York Development – 16NYPP1-1B AC Transmission

For each sufficient project, the Developer of the project is qualified to develop a transmission solution in accordance with Attachment Y of the OATT, the solution is technically practicable, and the Developer has an approach for acquiring any necessary rights-of-way, property, and facilities. Therefore, each sufficient project is also viable.

The NYPSC Order also requires that the Developer must submit at least two project cost estimates for Public Policy Transmission Projects. The first required cost estimate shall presume that all prudently incurred costs will be recovered. The second required cost estimate shall reflect an 80/20 incentive regime to control costs. Accordingly, each Public Policy Transmission Project provided at least two cost estimates.

5. Next Steps

The NYISO presented these results at the joint Electric System Planning Working Group (ESPWG) and Transmission Planning Advisory Subcommittee (TPAS) meeting on September 26, 2016. After the issuance of the final Viability and Sufficiency Assessment, the NYISO will submit the Viability and Sufficiency Assessment to the NYPSC for its review. It is expected that, following applicable public notice and comment procedures in accordance with SAPA, the NYPSC will issue an order explaining whether there continues to be a transmission need driven by a Public Policy Requirement and, if so, that the NYISO should continue to evaluate transmission solutions to the AC Transmission Public Policy Transmission Need.[20]

If the NYPSC concludes that transmission solutions should continue to be pursued to address the AC Transmission Public Policy Transmission Need, the NYISO will evaluate the Public Policy Transmission Projects, which were determined to be viable and sufficient and have elected to proceed, for purposes of selecting the more efficient or cost-effective Public Policy Transmission Project that is eligible for cost allocation and cost recovery under the NYISO's tariffs. The NYISO will rank these Public Policy Transmission Projects based on their satisfaction of the metrics set forth in the Tariff and in the NYPSC Order and document its findings in the AC Transmission Public Policy Transmission Planning Report.

[20] Within 15 Calendar Days following the NYPSC's issuance of an order indicating that the NYISO should proceed with its evaluation of transmission solutions to the Public Policy Transmission Needs, the Developer of a proposed Public Policy Transmission Project that the NYISO has determined is viable and sufficient must notify the NYISO whether it intends for its project to proceed to be evaluated for purposes of the NYISO's selection of the more efficient or cost-effective Public Policy Transmission Project to satisfy the AC Transmission Public Policy Transmission Needs. As part of this notification, the Developer must include its consent to the NYISO's disclosure of the details of its proposed Public Policy Transmission Project in the AC Transmission Public Policy Transmission Planning Report.

Appendix A – Sufficiency Criteria

AC Transmission Public Policy Transmission Needs

Sufficiency Criteria and Additional Information

Sufficiency Criteria (Minimum Criteria)

In order to address the AC Transmission Public Policy Transmission Needs (PPTN) as identified by the NYPSC, a sufficient Public Policy Transmission Project or Other Public Policy Project shall meet, at a minimum, the following criteria:

- Proposed solutions to Segment A (Central East) must provide at least a 350 MW increase to the Central East interface transfer capability in accordance with Normal Transfer Criteria as defined by the New York State Reliability Council (NYSRC) Reliability Rules.
- Proposed solutions to Segment B (UPNY/SENY) must provide at least a 900 MW increase to the UPNY/SENY interface transfer capability in accordance with Normal Transfer Criteria as defined by the NYSRC Reliability Rules.

Additionally, a sufficient Public Policy Transmission Project shall meet, at a minimum, the following criteria stated in the NYPSC Order:

- Proposed solutions to Segment A (Central East) must include all project components included in Segment A as described in Appendix A of the NYPSC Order.
- Proposed solutions to Segment B (UPNY/SENY) must include all project components included in Segment B as described in Appendix A of the NYPSC Order.
- No acquisition of new permanent transmission rights-of-way, except for *de minimis* acquisitions that cannot be avoided due to unique circumstances. The transfer or lease of existing transmission right-of-way property or access rights from a current utility company owner to a Developer shall not be considered such an acquisition.
- No crossing of the Hudson River, either overhead, underwater, in riverbed, or underground, or in any other way by any component of the transmission facility.
- For those Public Policy Transmission Projects that were also evaluated in the NYPSC AC Transmission proceedings, the NYPSC Order states that the cost estimate must not exceed the level estimated by NYPSC Trial Staff for the project, unless the applicant can demonstrate that upward estimates are necessary to correct errors or omissions made by NYPSC Trial Staff for the components that were added or adjusted by NYPSC Trial Staff.[1]

[1] The NYISO will perform an independent evaluation of Public Policy Transmission Project costs for purposes of its evaluation and selection process under Section 31.4 of Attachment Y to the NYISO OATT. *See* OATT Attachment Y Section 31.4.8.

Transmission Evaluation Criteria

For the purposes of evaluation and selection of the more efficient or cost effective Public Policy Transmission Project to address the AC Transmission PPTN, the following criteria identified by the NYPSC Order will be applied in addition to the criteria and metrics defined by Section 31.4.8 of Attachment Y to the NYISO OATT:

- In lieu of establishing an intended in-service year against which project schedules would be evaluated, the NYISO will consider the proposed project schedule for each Public Policy Transmission Project in the evaluation of impacts to congestion and other applicable criteria over the study period. The NYISO will assume that project schedules begin January 1 of a given year following the NYISO's selection and NYPSC Article VII siting approval (*i.e.,* project schedules need not account for the timing of the NYISO or NYPSC processes).
- The selection process will favor Public Policy Transmission Projects that minimize the acquisition of property rights for new substations and substation expansions. For the purpose of this criterion, the transfer or lease of existing property rights from a current utility company owner to a Developer shall not be considered such an acquisition.
- No Public Policy Transmission Project shall be selected for Segment B that does not incorporate certain specified add-ons that would be constructed (*i.e.,* as specified in the NYPSC Order the upgrades to the Rock Tavern Substation and the upgrades to the Shoemaker to Sugarloaf transmission lines), unless the NYISO determines that such add-ons, jointly or severally, are not material to the accomplishment of the purpose a solution for Segment B.
- The selection process for transmission solutions for Segment B shall not use the costs of upgrades to the Rock Tavern Substation and upgrades to the Shoemaker to Sugarloaf transmission lines as a distinguishing factor between Public Policy Transmission Projects.
- No Public Policy Transmission Project shall be selected for Segment A unless a Public Policy Transmission Project is selected for Segment B.
- No Public Policy Transmission Project shall be selected for Segment A except on condition that the Public Policy Transmission Project selected for Segment A shall not be implemented until there is reasonable certainty established in a manner to be determined by the NYISO that the Public Policy Transmission Project selected for Segment B will be implemented.
- The selection process shall favor Public Policy Transmission Projects that result in upgrades to aging infrastructure.
- Project selection will be competitive by Segment (Segment A and Segment B), but synergies produced by selecting a single Developer to provide both segments may be considered.
- The selection process shall not use the percentage rates applied to account for contingencies and revenue requirement as a distinguishing factor between Public Policy Transmission Projects. The NYISO will evaluate costs based on raw construction costs to ensure that all of the proposed Public Policy Transmission Projects are evaluated on a comparable basis as to the scope of costs.

PPTN-specific Project Information

For each Public Policy Transmission Project, the Developer must submit at least two project cost estimates, as required by the NYPSC Order:

- The first required cost estimate shall presume that all prudently incurred costs will be recovered and there will be no sharing of cost overruns by the Developer.
- The second required cost estimate shall reflect an 80/20 incentive regime to control costs. The NYPSC Order stated its intent that if actual costs come in above a cost estimate, the Developer bears 20% of the cost over-runs, while ratepayers bear 80% of those costs. The NYPSC Order stated its intent that if actual costs come in below a cost estimate, then the Developer should retain 20% of the savings. Furthermore, if the Developer seeks incentives from FERC above the base return-on-equity otherwise approved by FERC, then the Developer shall not receive any incentives above the base return-on-equity on any cost overruns over the cost estimate. The NYPSC Order stated that the cost estimate would therefore cap the costs that may be proposed to FERC for incentives.[2]

Baseline Study Cases

The baseline study case for the AC Transmission PPTN will be the same system representation as that employed by the NYISO for the Trial Staff Final Report in the NYPSC AC Transmission proceedings. That case is based on the NYISO 2014 Comprehensive Reliability Plan base case system representation of 2019 summer peak load, modified to include the now-planned CPV Valley Energy Center generation plant and associated system deliverability upgrades.

The baseline study cases are available, subject to a Critical Energy Infrastructure Information (CEII) request: http://www.nyiso.com/public/webdocs/markets_operations/services/customer_relations/CEII_Request_Form/CEII_Request_Form_and_NDA_complete.pdf

Baseline Study Results

Baseline study results, as presented in the NYPSC AC Transmission proceedings, are publicly available on the NYISO website under Public Policy Documents at:

http://www.nyiso.com/public/markets_operations/services/planning/planning_studies/index.jsp

[2] The NYISO takes no position on the cost overrun and underrun provisions in the NYPSC Order, but notes that the NYISO's tariff states that FERC determines the scope of transmission costs that may be recovered under the NYISO's tariffs. *See* OATT Attachment Y Section 31.4.8.2.

STATE OF NEW YORK
PUBLIC SERVICE COMMISSION

At a session of the Public Service Commission held in the City of Albany on January 24, 2017

COMMISSIONERS PRESENT:

Audrey Zibelman, Chair
Patricia L. Acampora
Gregg C. Sayre
Diane X. Burman

CASE 12-T-0502 - Proceeding on Motion of the Commission to Examine Alternating Current Transmission Upgrades.

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

CASE 13-T-0454 - Application of North America Transmission Corporation and North America Transmission, LLC for a Certificate of Environmental Compatibility and Public Need Pursuant to Article VII of the Public Service Law for an Alternating Current Transmission Upgrade Project Consisting of an Edic to Fraser 345 kV Transmission Line and a New Scotland to Leeds to Pleasant Valley 345 kV Transmission Line.

CASE 13-T-0455 - Part A Application of NextEra Energy Transmission New York, Inc. for a Certificate of Environmental Compatibility and Public Need Pursuant to Article VII of the Public Service Law for the Marcy to Pleasant Valley Project.

CASE 13-T-0456 - Part A Application of NextEra Energy Transmission New York, Inc. for a Certificate of Environmental Compatibility and Public Need Pursuant to Article VII for the Oakdale to Fraser Project.

CASE 13-T-0457 - Application of New York Transmission Owners Pursuant to Article VII for Authority to Construct and Operate Electric Transmission Facilities in Multiple Counties in New York State.

CASE 13-T-0461 - Application of Boundless Energy NE, LLC for a Certificate of Environmental Compatibility and Public Need Pursuant to Article VII for Leeds Path West Project.

CASE 14-E-0454 - In the Matter of New York Independent System Operator, Inc.'s Proposed Public Policy Transmission Needs for Consideration

ORDER ADDRESSING PUBLIC POLICY TRANSMISSION NEED
FOR AC TRANSMISSION UPGRADES

(Issued January 24, 2017)

BY THE COMMISSION:

INTRODUCTION

On December 17, 2015, the Commission issued an order finding that the need for certain upgrades across the Central East and Upstate New York (UPNY)/Southeast New York (SENY) portions of the AC transmission system were being driven by a Public Policy Requirement, as defined under the New York Independent System Operator, Inc.'s (NYISO) federally-approved Open Access Transmission Tariff (OATT).[1] Pursuant to the NYISO's OATT, any Public Policy Requirements identified by the Commission that may be driving the need for additional transmission facilities, referred to as Public Policy Transmission Needs (PPTNs), are forwarded to the NYISO to solicit potential solutions and to prepare a Viability and Sufficiency Assessment of the proposed projects.

As directed under the OATT, the NYISO issued a solicitation on February 29, 2016, seeking potential solutions to resolve the Public Policy Requirement identified by the

[1] Case 12-T-0502, Order Finding Transmission Needs driven by Public Policy Requirements (issued December 17, 2015) (December 2015 Order).

Commission. In response to the solicitation, the NYISO received proposals from six developers, which submitted a total of 16 projects. These projects included 15 transmission projects and one non-transmission proposal.

The NYISO filed the results of its Viability and Sufficiency Assessment on October 28, 2016 (Filing). The Filing also included the results of the NYISO's analysis of cost allocation methodologies that comport with the Commission-identified Public Policy Requirement. On November 16, 2016, a Notice of Proposed Rulemaking (Notice) was published regarding the Filing and inviting comments from interested entities.

In this order, the Commission considers the comments received in response to the Notice and finds that a PPTN continues to exist with respect to the Central East and UPNY/SENY AC transmission upgrades. Accordingly, the NYISO should proceed to a full evaluation and selection, as appropriate, of the more efficient or cost-effective transmission solution to meet the PPTN. Further, the Commission adopts the cost allocation methodology outlined in the NYISO's analysis for recovering the costs of the transmission upgrades, which the NYISO should file with the Federal Energy Regulatory Commission (FERC). The Commission will remain responsible for ensuring that any applicant seeking to site, construct, and operate these transmission facilities has obtained the requisite authorizations under the Public Service Law (PSL).

BACKGROUND

The Public Policy Transmission Planning Process

The NYISO's Public Policy Transmission Planning Process (PPTPP) was developed to comply with FERC's Order No. 1000, which required, in part, the development of a planning process for the consideration of public policy-driven transmission needs.[2] The NYISO's PPTPP consists of four main steps, which include: (1) the identification of Public Policy Requirements/PPTNs; (2) the solicitation of proposed solutions to identified PPTNs; (3) the evaluation of the viability and sufficiency of proposed transmission and non-transmission solutions to the PPTNs; and, (4) upon confirmation of the transmission need by the Commission, the evaluation and selection of the more efficient or cost-effective transmission project to satisfy the PPTN.[3]

The NYISO's PPTPP establishes the Commission's role in identifying any Public Policy Requirements, and confirming that such requirements continue to exist after reviewing the results of the NYISO's Viability and Sufficiency Analysis. The NYISO OATT defines a Public Policy Requirement as:

> [a] federal or New York State statute or regulation, including [an order issued by the Commission] adopting a rule or regulation subject to and in accordance with the State Administrative Procedure Act, any successor statute, or any duly enacted law or regulation passed by a local governmental entity in New York State, that may relate to transmission planning on the [Bulk Power Transmission Facilities].[4]

The Commission established the procedures for identifying any Public Policy Requirements and the process for carrying out its responsibilities in an August 2014 Policy

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[2] See, Docket No. RM10-23-000, Transmission Planning and Cost Allocation by Transmission Owning and Operating Public Utilities, Order No. 1000 (issued July 21, 2011), reh'g denied, Order No. 1000-A (issued May 17, 2012) reh'g denied, Order No. 1000-B (issued October 18, 2012).

[3] NYISO Public Policy Transmission Planning Process Manual; Section 1.2 (July 2015).

[4] NYISO OATT, Attachment Y, §31.1.1.

Statement.[5] Under the final step identified in the August 2014 Policy Statement, the Commission determines, after reviewing the NYISO's Viability and Sufficiency Assessment of any proposed solutions, whether a transmission solution should or should not be pursued further.

Assuming the Commission determines to pursue a transmission solution, the process specified under the NYISO OATT requires the NYISO to prepare fully detailed analyses. The NYISO then provides its full analyses in a Public Policy Transmission Planning Report, in which it may select the more efficient or cost-effective transmission solution to the identified PPTN, based on various metrics specified under its OATT.[6] The NYISO will also include, to the extent it is feasible, any criteria or analyses specified by the Commission or contained within the Public Policy Requirement. Transmission projects selected by the NYISO are eligible for cost allocation and recovery under the NYISO's OATT.

NYISO's Solicitation of Needs

On August 1, 2014, the NYISO initiated the first round of its PPTPP under its OATT by requesting interested entities to identify any potential transmission needs that may be driven by

[5] Case 14-E-0068, Policies and Procedures Regarding Transmission Planning for Public Policy Purposes, Policy Statement on Transmission Planning for Public Policy Purposes (issued August 15, 2014) (August 2014 Policy Statement).

[6] In determining which transmission solution is the more efficient or cost-effective, the NYISO considers several metrics, including: cost estimates, cost per MW ratio, expandability of the project, flexibility in operating the system (such as generation dispatch, access to operating reserves and ancillary services, or ability to remove transmission for maintenance), utilization of the system (such as interface flows or percent loading of facilities), a developer's property rights, potential construction delays, and impacts on NYISO-administered markets.

a Public Policy Requirement. Following its receipt of responses, the NYISO filed the proposed Public Policy Requirements for the Commission's consideration. While the Commission initially identified a PPTN to relieve transmission congestion in Western New York, the Commission noted that it was continuing to address the need for AC transmission upgrades across the Central East and UPNY/SENY interfaces.[7] The Commission's December 2015 Order ultimately found that relieving constraints across the Central East ("Segment A") and UPNY/SENY ("Segment B") portions of the transmission system (collectively, the AC Transmission PPTN) would advance numerous public policies. Accordingly, the AC Transmission PPTN was referred to the NYISO to solicit and evaluate potential solutions.

In referring the AC Transmission PPTN, the Commission described the two segments as:

> SEGMENT A:
> Edic/Marcy to New Scotland; Princetown to Rotterdam
> Construction of new 345 kV line from Edic or Marcy to New Scotland on existing right-of-way (primarily using Edic to Rotterdam right-of-way west of Princetown); construction of two new 345 kV lines or two new 230 kV lines from Princetown to Rotterdam on existing Edic to Rotterdam right-of-way; decommissioning of two 230 kV lines from Edic to Rotterdam; related switching or substation work at Edic or Marcy, Princetown, Rotterdam and New Scotland.
>
> SEGMENT B:
> Knickerbocker to Pleasant Valley
> Construction of a new double circuit 345 kV/115 kV line from Knickerbocker to Churchtown on existing Greenbush to Pleasant Valley right-of-way; construction of a new double circuit 345 kV/115 kV line or triple circuit 345 kV/115 kV/115 kV line from Churchtown to Pleasant Valley on existing Greenbush to Pleasant Valley right-of-way; decommissioning of a

[7] Case 14-E-0454, Order Addressing Public Policy Requirements for Transmission Planning Purposes (issued July 20, 2015), p. 30.

double-circuit 115 kV line from Knickerbocker to Churchtown; decommissioning of one or two double-circuit 115 kV lines from Knickerbocker to Pleasant Valley; construction of a new tap of the New-Scotland-Alps 345 kV line and new Knickerbocker switching station; related switching or substation work at Greenbush, Knickerbocker, Churchtown and Pleasant Valley substations.

Upgrades to the Rock Tavern Substation
New line traps, relays, potential transformer upgrades, switch upgrades, system control upgrades and the installation of data acquisition measuring equipment and control wire needed to handle higher line currents that will result as a consequence of the new Edic/Marcy to New Scotland; Princetown to Rotterdam and Knickerbocker to Pleasant Valley lines.

Shoemaker to Sugarloaf
Construction of a new double circuit 138 kV line from Shoemaker to Sugarloaf on exiting Shoemaker to Sugarloaf right-of-way; decommissioning of a double circuit 69 kV line from Shoemaker to Sugarloaf; related switching or substation work at Shoemaker, Hartley, South Goshen, Chester, and Sugarloaf.

In order to address the AC Transmission PPTN, the Commission established criteria that a sufficient project should meet. At a high level, the criteria established by the Commission required any proposed solution to Segment A (Central East) to provide a minimum 350 MW increase to the Central East interface transfer capability, while proposed solutions to Segment B (UPNY/SENY) must provide a minimum 900 MW increase to the UPNY/SENY interface transfer capability. Additionally, the Commission required the proposed solutions to not include additional acquisitions of new permanent rights-of-way or crossings of the Hudson River. The full details of the evaluation criteria were laid out in Appendix B of the December 2015 Order.

NYISO's Solicitation of Projects and Analysis

Based on the Commission's directives, the NYISO solicited potential solutions to address the identified AC Transmission PPTN on February 29 2016. In response to the solicitation, the NYISO received proposals from six developers, which proposed a total of 15 transmission projects and one non-transmission proposal. Based on the evaluation criteria established by the Commission, the NYISO prepared a Viability and Sufficiency Assessment for each of the proposed solutions and, following stakeholder review and comments, issued a report dated October 25, 2016.

The NYISO's Filing, on October 28, 2016, explains that it performed an analysis of the proposed solutions and concluded that four developers submitted 13 transmission projects that were viable and sufficient to solve the AC Transmission PPTN, including: 1) Niagara Mohawk Power Corporation d/b/a National Grid (National Grid)/New York Transco, LLC (NY Transco); 2) NextEra Energy Transmission New York (NextEra); 3) North America Transmission (NAT)/New York Power Authority (NYPA); and, 4) ITC New York Development. Two transmission projects and one non-transmission proposal submitted on behalf of two other developers were found to not be viable and sufficient (i.e., AvanGrid's two Connect New York high voltage direct current transmission projects, as well as GlidePath's Distributed Generation portfolio).[8]

In addition to conducting its Viability and Sufficiency Assessment, the NYISO also completed an analysis, at the request of the Commission, to consider a prescribed cost allocation methodology for the AC Transmission PPTN. Under the

[8] These three project proposals did not meet the criteria established by the Commission.

NYISO OATT, the Commission may identify a particular methodology for allocating the costs of transmission facilities to load serving entities under the OATT when it adopts a Public Policy Requirement. The OATT directs the NYISO to file any such methodology with FERC within 60 days.[9]

In the December 2015 Order, in conjunction with the identification of the AC Transmission PPTN, the Commission prescribed the following cost allocation methodology:

> The cost allocation and recover methodology shall be based on a "beneficiaries pay" approach for allocating costs, whereby those that derive the benefits of a project shall bear the costs. In that regard, 75% of project costs are to be allocated to the economic beneficiaries of the reduced congestion, while the other 25% of the project costs are to be allocated to all customers on a load ratio basis.[10]

The Commission went on to request that the NYISO take additional steps to refine the prescribed cost allocation methodology to ensure equity based on the "beneficiaries pay" principle and to design a more granular allocation which determines the respective shares of upstate and downstate entities.

Based on the Commission's directive, the NYISO proceeded to analyze the proposed cost allocation methodology. In order to assign 75% of the project costs based on the economic beneficiaries of reduced congestion, the NYISO followed, to a large extent, the same methodology it uses to allocate costs under its economic planning process, known as the Congestion Analysis and Resource Integration Study (CARIS). This methodology has been vetted through the NYISO's stakeholders and approved by FERC as just and reasonable for the allocation of costs for projects resulting in lower system

[9] NYISO OATT, Attachment Y, §§31.1.1 and 31.5.5.4.1.

[10] December 2015 Order, Appendix D.

congestion costs. This approach allocates costs to New York Control Area load zones based on the relative reduction in energy payments resulting from the addition of the proposed project to a production cost analysis model.[11] Utilizing the GE-MAPS database adopted by the Brattle Group in its work for the Commission in the AC Transmission proceedings in 2015, the NYISO conducted an illustrative analysis of the difference in zonal energy payments for each NYISO load zone between the base case and project case with both Segments A and B in service. The results of the illustrative analysis determined that, overall, 89.5% of the costs would be allocated to downstate zones (G-K) and 10.5% to upstate zones (A-F). This allocation is intended to reflect the expectation that the primary benefits of the upgrades will be reduced congestion into downstate load areas, while also recognizing that some benefits would accrue to upstate customers in the form of increased reliability and reduced operational costs.[12]

NOTICE OF PROPOSED RULE MAKING

Pursuant to the State Administrative Procedure Act (SAPA) §202(1), the Notice was published in the State Register on November 16, 2016 [SAPA No. 12-T-0502SP6]. The time for submission of comments pursuant to the Notice expired on January 3, 2017. In response to the Notice, various entities filed comments, including: (i) International Brotherhood of Electrical Workers Local 97 (IBEW Local 97); (ii) Consolidated Edison Company of New York, Inc. (Con Edison); (iii) the City of New

[11] The NYISO's recommended approach is based on relative reduction in energy payments without consideration of load served by generation owned by LSEs or bilateral contracts not linked to NYISO's energy prices.

[12] December 2015 Order, Appendix D

York (the City); (iv) National Grid; (v) NY Transco; (vi) Multiple Interveners; (vii) NYISO; (viii) New York Municipal Power Agency (NYMPA); (ix) NAT/NYPA; (x) the Long Island Power Authority (LIPA); and, (xi) NEET NY. These comments are addressed below.[13]

COMMENTS

IBEW Local 97

IBEW Local 97 supports the Commission continuing to find a PPTN for AC Transmission upgrades to address upstate to downstate transmission congestion, and that the NYISO should be directed to continue its evaluation and selection of the more efficient or cost-effective transmission project. IBEW Local 97 goes on to recommend that transmission projects should be selected based on many of the principles specified in the Commission's December 2015 Order identifying the AC Transmission Need, such as utilizing existing rights of way, as well as reducing the lengthy review period, eliminating need for new capacity zones, and providing additional renewable energy to downstate loads in response to the CES.

Con Edison

Con Edison argues that the Commission's proposed cost allocation methodology fails to meet FERC principles that costs of new transmission projects be allocated in a manner that is "at least roughly commensurate" with their benefits. They argue

[13] On January 17, 2017, late-filed comments were submitted on behalf of Columbia Land Conservancy, Farmers and Families for Claverack, Farmers and Families for Livingston, Town of Claverack, Town of Clinton, Town of Livingston, Town of Milan, and Walnut Grove Farm, LLC. These comments, which were filed after the deadline, are not considered herein. Regardless, these comments raise issues that the Commission has already considered.

that the proposed methodology allocates costs predominately based on projected energy market savings and ignores other key benefits of the AC transmission projects, such as capacity savings and reduction in costs of Renewable Energy Certificates and Zero Emission Certificates. Con Edison believes that energy market savings will constitute a relatively small share of the AC Projects' benefits. Con Edison states that adopting the proposed cost allocation methodology assigns the vast majority of the costs to Con Edison's customers when such costs should be more widely allocated, especially to Long Island. Con Edison requests that the Commission reject the proposed cost allocation methodology and adopt a method that more accurately reflects the benefits of the AC projects, including certain unaddressed benefits. Con Edison points to the NYISO's illustrative analysis (NYISO Electric System Planning Working Group presentation on October 13, 2016) and the benefit-cost analysis prepared by Brattle Group for the AC Proceeding in October 2015, to demonstrate such inequity in the benefits to costs allocated to Con Edison.

The City

The City suggests that persistent congestion continues to exist on the UPNY/SENY transmission interface, contributing to higher energy costs and reliability concerns for downstate consumers, as well as accessibility to renewable resources located upstate and neighboring regions. The City suggests that these conditions are no different than when the Commission instituted the proceeding in 2012. The City further notes that the Commission's adoption of the Clean Energy Standard has increased the public policy need for the AC Transmission projects, as most of the State's renewable capacity is located upstate of the UPNY/SENY interface, with significant load located below the interface. The City also cites policies it has adopted independently of the rest of the state which support a greater reliance on renewable resources for its energy needs. The City indicates it will require transmission expansion and alleviation of the UPNY/SENY constraint in order to access renewable capacity and achieve its policy goals and targets. For all of these reasons, the City submits that the Commission should find that there continues to be a PPTN for the AC Transmission Upgrades. Additionally, the City believes that the cost allocation methodology proposed by the Commission and the NYISO provides a reasonable and fair approach, which acknowledges that most of the benefits of these projects will flow to downstate customers while additional benefits will be seen statewide.

National Grid

National Grid supports a decision that a PPTN continues to exist for AC Transmission upgrades in the Central-East and UPNY/SENY sections of the New York transmission system and that the NYISO should continue with its evaluation of proposed solutions to address the PPTN. They suggest the bases for the Commission’s public policy findings in the December 17, 2015 Order continue to exist and there is a continued need for transmission solutions to address them. National Grid further suggests that relieving the congestion on the interfaces will help to achieve the recently adopted Clean Energy Standard targets.

In regards to the cost allocation methodology, National Grid believes the analysis presented by the NYISO is reasonable and achieves a “beneficiaries pay” result and is consistent with the FERC-approved tariff. National Grid also addresses the issue of cost containment, suggesting that, although cost is a critical factor in the evaluation and ranking of projects, the NYISO should not be directed to evaluate and rank projects based solely on cost or cost containment proposals. National Grid believes developers should have the opportunity and flexibility to structure cost containment proposals based on specific characteristics of their projects.

NY Transco

New York Transco recommends the Commission continue to find a PPTN for AC Transmission upgrades and that the NYISO should proceed with evaluation and selection of the most efficient and cost-effective transmission solution, indicating that the need to increase transmission capability across the Central East and UPNY/SENY interfaces remains. NY Transco suggests that the PPTN is crucially important to meeting the State’s energy policy goals, including the CES. NY Transco goes on to note that no non-transmission alternatives were identified in the NYISO’s viability and sufficiency assessment which met the criteria set forth by the Commission.

In regards to cost allocation, Transco suggests that the Commission consider all cost allocation comments received when determining if the methodology proposed to FERC will be appropriate and would result in the greatest possible level of support by participants and in the best interest of customers throughout the state. NY Transco also submitted comments on cost containment indicating that, although the NYISO public policy planning process does not require cost containment measures, NY Transco has submitted bids with cost-containment provisions, and if selected, would address its risk sharing proposals which ultimately need to be approved by FERC.

Multiple Interveners

Multiple Intervenors supports the Commission’s adoption of the cost allocation methodology and analysis conducted by the NYISO. They believe that the general cost allocation for transmission projects developed under Case 12-T-

0502 using a "beneficiaries pay" approach has already been decided and adopted by the Commission, and suggests that the NYISO's analysis of the allocation methodology of this methodology is all that is currently before the Commission. Multiple Intervenors also maintains that the NYISO's analysis is in all respects reasonable and should be adopted. Multiple Intervenors continues to believe that certain transmission projects proposed in these proceedings could result in higher energy prices in upstate regions of the state, and that it would be inequitable to require upstate customers to fund a material portion of the costs. Multiple Intervenors asserts that a 25% cost allocation based on statewide load-ratio share is more than sufficient to compensate for any experienced non-economic benefits related to the proposed transmission projects.

NYISO

The NYISO submits that there continues to be a transmission need driven by Public Policy Requirements identified in the AC Transmission proceedings, and that the proposed transmission expansion in the Central East and UPNY/SENY corridors of the State would provide a number of benefits to that State's power grid and New York customers. The NYISO has observed constraints over these interfaces which limit the capability and efficient operation of the Bulk Power Transmission Facilities and believes a transmission solution the AC Transmission Need continues to be necessary and will assist New York in achieving its energy policy objectives. NYISO points to its 2016 Power Trends report which discusses the State's aging infrastructure and the need to update the bulk electric system.

NYISO reiterates its previous comments that the implementation of a solution to the AC transmission Need will improve reliability and resiliency, provide greater operational flexibility, enhance competitive electric markets, and help to achieve important public policy objectives, such as increasing renewable resource capacity and accessibility. The NYISO also points the Brattle Group Report identifying benefits of electric transmission, which highlights that the "transmission grid is the backbone that supports all future policy changes in the electricity sector." The NYISO also believes that completing transmission upgrades for the Western New York Transmission Need and the AC Transmission Need will significantly increase the ability of the bulk electric system to dispatch and deliver renewable energy resources to loads and is a necessary step for the State in achieving the CES.

NYMPA

NYMPA supports the NYISO's cost allocation methodology. Specifically, NYMPA argues a beneficiary pays model where approximately 90% of the costs of the AC Transmission projects are allocated to downstate ratepayers, based on a 75% economic/25% load share methodology is appropriate because it properly follows Commission precedent in other PPTN cases and should continue to be applied in the instant case.

NAT and NYPA

NAT and NYPA filed joint comments, stating that the need for additional transmission capacity across the UPNY/SENY interface remains a valid public policy goal. NYPA and NAT further state that the need is, in some ways even more pronounced than it was in December 2015, specifically, the need to integrate renewable resources. They also state that the benefits put forward by the Commission in December 2015, namely relieving congestion, replacing aging infrastructure and capacity market benefits will still accrue as a result of continuing the PPTN process. Finally, NYPA and NAT state that there are no non-transmission alternatives capable of meeting this public policy need because an interface transfer capacity increase of 900 MW, as the Commission identified for UPNY/SENY, cannot be accomplished without the introduction of new transmission system elements.

LIPA

LIPA states in its comments that relieving congestion on the UPNY/SENY interface remains an important public policy goal and that the PPTN process should continue as a result. With respect to the NYISO's proposed cost allocation methodology, LIPA states that it supports the use of an economic benefits test for allocation of costs for the AC Transmission PPTN projects. However, they argue, the NYISO's "Approach 2" calculation fails to consider bilateral contract or generator ownership information. LIPA states that the exclusion of this portion of the CARIS methodology overstates the benefits that a zone may receive through lowering of energy prices because it ignores the extent to which the Load Serving Entities within a zone, such as LIPA, have long-term arrangements in place to limit their actual exposure to congestion. As a result, LIPA requests that the Commission "endorse and seek application of the benefits calculations" in the NYISO's "Approach 1."

NEET NY

NEET NY states that there is a continued public policy need for additional transmission capacity across the UPNY/SENY interface. Specifically, NEET NY argues that the recently adopted Clean Energy Standard will increase the need to move wind power from upstate to downstate New York. In addition, NEETNY states that addressing congestion on that interface remains a viable need and will lower energy costs for New York Customers. With respect to cost containment, NEET NY asks that the NYISO give significant consideration to cost containment measures contained in various bids to ensure that ratepayers are protected.

DISCUSSION

The Commission's responsibility at this stage in the planning process is to make a determination, based on the NYISO's Viability and Sufficiency Assessment, as to whether a solution to the previously-identified AC Transmission PPTN should continue to be analyzed by the NYISO, or whether a non-transmission solution should be pursued instead. In accordance with the NYISO OATT and the Commission's August 2014 Policy Statement, the Commission has reviewed the results of the NYISO's Viability and Sufficiency Assessment, as well as the comments received in response to the SAPA Notice. As discussed below, the Commission confirms that the record supports the NYISO proceeding to a full evaluation of the viable and sufficient transmission solutions. The Commission expects that the NYISO will select, for purposes of cost allocation and recovery under the OATT, the most cost-effective and efficient solution, and to seek FERC's approval of the cost allocation methodology adopted by the Commission as part of the Public Policy Requirement.

The AC Transmission PPTN

There was a consensus among commenters that the circumstances which led the Commission to identify the AC Transmission PPTN continue to exist. The Commission agrees that persistent congestion on the Central East and UPNY/SENY interfaces continues to contribute to higher energy costs for downstate customers and to limit the accessibility of renewable resources located upstate. As discussed by several commenters, the recently adopted Clean Energy Standard (CES), which will require 50% of the state's load to be served by renewable resources by 2030, further heightens the public policy need for transmission constraint relief and cross-state power flows.[14] The CES will undoubtedly require significant increases in renewable generation capacity with the majority of that additional capacity likely to be located in the northern and western regions of the state. The increased transmission capacity will allow these resources to deliver their energy to downstate load centers and avoid being curtailed.

Based on the NYISO's Viability and Sufficiency Assessment, there were no non-transmission alternatives available to solve the PPTN identified by the Commission. In accordance with the NYISO's assessment, various commenters urge the Commission to direct the NYISO to move forward with evaluation and selection of a transmission solution to meet this Public Policy Requirement. The Commission agrees that new 345 kV electric transmission upgrades should be fully evaluated by the NYISO for purposes of addressing the persistent congestion across the Central East and UPNY/SENY portions of the transmission system. The additional transmission capacity to move power from upstate to downstate New York should provide various economic and public policy benefits. Therefore, the Commission directs the NYISO to proceed to a full evaluation of the proposed transmission solutions deemed viable and sufficient.

Cost Allocation and Recovery Methodology

With regards to a cost allocation methodology, the Commission disagrees with Con Edison's contention that the NYISO's methodology fails to meet the "beneficiaries pay"

[14] Case 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 (issued August 1, 2016).

principle. Con Edison offers no evidence that the proposed cost allocation method is unfair or inaccurate, nor any case for what the value of “other benefits" relative to market savings might be, or why a 25% statewide allocation for these benefits is not roughly commensurate with benefits.

The Commission has previously addressed and adopted a cost allocation methodology for using a “beneficiaries pay” approach, whereby those that derive the benefits of a project should bear the costs.[15] The Commission has repeatedly found that there are numerous potential benefits of implementing the AC Transmission upgrades, and has supported an allocation whereby 75% of the costs are allocated to the economic beneficiaries of the projects and 25% of the costs are distributed based on a state-wide load ration share. The Commission continues to find that this 25% allocation compensates for the non-economic benefits that would be realized by all ratepayers.

The Commission also rejects LIPA’s suggestion that the calculation of energy price savings as part of any cost allocation for the AC Transmission Need must take into account the effect of bilateral contracts and generation ownership. The NYISO analyzed the allocations that would result from the relative reduction in energy payments, both with and without consideration of bilateral contracts and generation ownership information, and determined that the resulting allocation percentages by NYISO Zone were similar. As can be seen in the NYISO’s analysis in which it utilized available bilateral and self-generation data gathered in 2010/2011 to strictly follow the CARIS methodology, the allocation percentages for each

[15] Case 12-T-0502, et al., Order Establishing Modified Procedures for Comparative Evaluation (issued December 16, 2014), pp. 40-42.

approach are very similar. The NYISO further suggests that it would be a more complicated, time consuming approach to utilize the alternative methodology which would require updating confidential contract and owner documentation. Using the relative energy savings approach is less time consuming, equally accurate, and more transparent.

All other commenters support the Commission's proposed cost allocation methodology, as reflected in the NYISO's analysis. Further, as Multiple Intervenors indicates, such a cost allocation methodology for the AC Transmission Need was already established in prior orders, and the only subject open for discussion here is the NYISO's analysis of that methodology. The NYISO's CARIS-based methodology very closely aligns with the Commission's expectation stated in the December 2015 Order that following such a "beneficiaries pay" approach would result in approximately 90% of the project costs being allocated to customers in the downstate region, while roughly 10% would be assigned to upstate customers. The Commission therefore adopts the NYISO's analysis of the recommended cost allocation methodology as part of the AC Transmission Public Policy Requirement/PPTN.

Finally, the Commission reiterates that certain incentives are appropriate to ensure accurate cost estimates. As the Commission stated,

> [i]f actual costs come in above a bid, the developer should bear 20% of the cost over-runs, while ratepayers should bear 80% of those costs. If actual costs come in below a bid, then the developer should retain 20% of the savings. Furthermore, if the developer seeks incentives from FERC above the base return-on-equity otherwise approved by FERC, then the developer should not receive any incentives above the base return-on-equity on any cost overruns over the

> bid price. The bid price would therefore cap the costs that may be proposed to FERC for incentives.[16]

The Commission encourages developers to pursue these cost-containment incentives or comparable mechanisms before FERC to ensure that ratepayers retain the economic benefits of the NYISO's competitive transmission process and that the NYISO can select the most cost-effective or efficient solution.

CONCLUSION

The Commission finds that the NYISO should proceed to a full evaluation of the proposed transmission solutions deemed viable and sufficient for purposes of addressing the persistent congestion across the Central East and UPNY/SENY interfaces. Further, the NYISO should select, as appropriate, the more cost-effective or efficient transmission solution to address this AC Transmission PPTN. In addition, the Commission adopts the refined approach identified by the NYISO and discussed herein as the preferred cost allocation methodology associated with the Public Policy Requirement/AC Transmission PPTN.

The Commission orders:

1. The development of new 345 kV electric transmission facilities to cross the Central East and Upstate New York/Southeast New York interfaces, as described in the body of this order, shall be considered a Public Policy Requirement and Public Policy Transmission Need, as defined in the New York Independent System Operator, Inc.'s Open Access Transmission Tariff, and shall continue to be addressed by the NYISO's Public Policy Transmission Planning Process.

[16] December 2015 Order, p. 48.

2. The Commission prescribes the particular cost allocation and recovery methodology recommended in New York Independent System Operator, Inc.'s October 28, 2016 filing, and discussed in the body of this order, as part of the Commission's identification of the Public Policy Transmission Need.

3. These proceedings shall be continued, with the exception of Case 14-E-0454, which shall be closed.

By the Commission,

(SIGNED) KATHLEEN H. BURGESS
Secretary

AC Transmission Public Policy Transmission Plan

A Report from the New York Independent System Operator

April 8, 2019

NYISO BOARD OF DIRECTORS' DECISION

ON

APPROVAL OF AC TRANSMISSION PUBLIC POLICY TRANSMISSION PLANNING REPORT AND SELECTION OF PUBLIC POLICY TRANSMISSION PROJECTS

APRIL 8, 2019

EXECUTIVE SUMMARY

Today we select two transmission projects that will benefit New York State's electric consumers by enabling the delivery of environmentally desirable power required to meet state energy goals, relieving uneconomic congestion, and replacing aging infrastructure while enhancing New York State's already high standard of system reliability. Our action constitutes one of the most significant decisions by the Board of Directors ("Board") in the nearly twenty-year history of the New York Independent System Operator, Inc. ("NYISO").

We are making these selections in accordance with the requirements of the NYISO's Public Policy Transmission Planning Process ("Public Policy Process") located in Attachment Y of the NYISO's Open Access Transmission Tariff ("OATT"). Pursuant to this process, the NYISO is responsible for selecting the more efficient or cost-effective transmission solution from among competing projects to address a transmission need driven by a public policy requirement ("Public Policy Transmission Need") identified by the New York Public Service Commission ("NYPSC").

There have been no large-scale, high-voltage, alternating current ("AC") transmission facilities constructed in New York State in over thirty years. This has resulted in an aging and congested transmission infrastructure that cannot adequately accommodate the state's future energy goals, including the requirement that 50% of the state's load be served by renewable resources by 2030 and the additional goals currently being discussed in connection with New York State's Green New Deal. Both New York State and the NYPSC identified the need to expand the state's AC transmission capability to deliver additional power from generating facilities located in upstate New York, including important renewable resources, to the population centers located downstate. As part of the NYISO's initial Public Policy Process, the NYPSC identified the Public Policy Transmission Needs to increase Central East transfer capability by at least 350 MW ("Segment A") and UPNY/SENY transfer capability by at least 900 MW ("Segment B") to provide additional capability to move power from upstate to downstate New York (together, the "AC Transmission Needs").

NYISO staff solicited solutions to the AC Transmission Needs and received a number of well-developed, high-quality proposals. NYISO staff and its consultants performed detailed studies and analyses to determine which solutions were viable and sufficient to meet the identified needs and then evaluated their performance across a wide range of quantitative and qualitative metrics established in the OATT. NYISO staff detailed the results of their analyses and their recommendations for project ranking and selection in a Public Policy Transmission Planning Report for the AC Transmission Needs ("AC Transmission Report").

NYISO stakeholders and developers were provided numerous opportunities to review and provide input to NYISO staff and the Board concerning the AC Transmission Report and its conclusions. In addition, the NYISO's Market Monitoring Unit ("MMU") reviewed the projects recommended for selection to identify their impact on the NYISO-administered markets. The Board reviewed all of this input and performed its own independent review of the AC Transmission Report. The Board directed that NYISO staff perform certain additional studies and analyses and update the report and the recommendations for project ranking and selection accordingly. The modifications to the report were then subject to further review and comment by stakeholders, developers, and the MMU.

The Board arrived at its decision only after detailed review and deliberation concerning the AC Transmission Report, stakeholders' and developers' comments, and the analysis of the market impacts provided by the MMU. The OATT establishes the metrics that the NYISO considers in ranking projects and selecting the more efficient or cost-effective transmission solutions, but does not establish a specific formula or weighting of the metrics. Rather, we must use our independent judgment, informed by all the input we received, to evaluate the totality of each project's performance across all of the selection metrics. The Board carefully considered hundreds of pages of data, studies, and comments to determine the more efficient or cost-effective solutions for New York.

For the reasons outlined below, we approve the revised AC Transmission Report and its recommendations for project rankings and selections. Specifically, we select the Double-Circuit project (T027) proposed jointly by North America Transmission ("NAT") and the New York Power Authority ("NYPA") as the more efficient or cost-effective transmission solution to address Segment A of the AC Transmission Needs. We also select the New York Energy Solution project (T019) proposed jointly by Niagara Mohawk Power Corporation d/b/a National Grid ("National Grid") and the New York Transco, LLC ("Transco") as the more efficient or cost-effective transmission solution to address Segment B of the AC Transmission Needs. The anticipated in-service date for Projects T027 and T019 is December 2023. The estimated cost of the combined projects including a 30% contingency is $1,230 million. The developers of the selected projects may recover their project costs through the NYISO's OATT in rates accepted by the Federal Energy Regulatory Commission ("FERC" or "Commission").

BACKGROUND

AC Transmission Needs

The NYISO Public Policy Process was accepted by the Commission in accordance with Order No. 1000 as the means to address Public Policy Transmission Needs in New York. The AC Transmission Needs identified by the NYPSC drew upon extensive analysis performed by the NYISO and others concerning the benefits of expanding transmission capability to move power from upstate to downstate New York, including addressing persistent congestion, enabling the delivery of environmentally desirable power, enhancing system reliability, and replacing aging infrastructure.

In 2008, the NYISO and the New York Transmission Owners jointly began the State Transmission Assessment and Reliability Study ("STARS") to address aging transmission and generation infrastructure in New York and to identify cost-effective incremental transmission upgrades. The STARS findings informed Governor Andrew Cuomo's 2012 Energy Highway Blueprint, which called for the development of over 1,000 MW of new AC transmission upgrades to move power from upstate to downstate. As a result, in November 2012, the NYPSC initiated the "Examine Alternating Current Transmission Upgrades" proceeding, which highlighted the need to relieve congestion and replace aging infrastructure. In a series of NYPSC orders and technical conferences over the subsequent years, the NYPSC sought and evaluated, with the NYISO's assistance, proposals from transmission owners and other developers to increase transmission transfer capability.

On August 1, 2014, the NYISO commenced its first Public Policy Process cycle. The NYISO solicited and submitted to the NYPSC potential transmission needs. On December 17, 2015, the NYPSC issued an order identifying the AC Transmission Needs to provide additional transmission capacity to move power from upstate to downstate New York, which the NYPSC determined would produce a number of valuable benefits for New York. The NYPSC also requested that certain developers participating in its AC transmission proceeding submit their project proposals for consideration by the NYISO in the Public Policy Process.

NYISO Evaluation of Proposed Solutions and Draft AC Transmission Report

On February 29, 2016, the NYISO issued a solicitation for solutions to the AC Transmission Needs. Developers submitted sixteen projects. Of these, the NYISO determined that seven Segment A proposals and six Segment B proposals were viable and sufficient to address the AC Transmission Needs. On October 27, 2016, the NYISO issued the AC Transmission Viability and Sufficiency Assessment and filed it with the NYPSC for its consideration and action. On January 24, 2017, the NYPSC issued an order confirming the AC Transmission Needs and determining that the NYISO should evaluate and select transmission solutions.

NYISO staff, in coordination with its independent consultant, Substation Engineering Company ("SECO"), conducted a detailed evaluation and ranked each project based on its performance across the metrics established in Section 31.4.8.1 of the OATT. These quantitative and qualitative metrics include the project's capital cost, cost per MW, expandability, operability, performance, property rights and routing, schedule, metrics identified by the NYPSC (*e.g.*, replacement of aging infrastructure), and other metrics (*e.g.*, production cost savings, Location-Based Marginal Pricing ("LBMP") savings, Installed Capacity ("ICAP") savings, and emissions savings). NYISO staff used a number of scenarios and sensitivities to evaluate the proposed projects' performance across these metrics.

NYISO staff developed a draft AC Transmission Report that detailed the results of its analysis and proposed ranking of the projects. The draft report recommended selection of NAT/NYPA's Segment A Project T027 and their Segment B Project T029 as the more efficient or cost-effective transmission solutions. The report was reviewed with developers and then with stakeholders and developers in a series of joint Electric System Planning Working Group ("ESPWG") and Transmission Planning Advisory Subcommittee ("TPAS") meetings. The report was revised and clarified based on stakeholder and developer feedback. In addition, the MMU reviewed and evaluated the impact of the proposed projects on the NYISO-administered markets. The Business Issues Committee and Management Committee subsequently reviewed and recommended Board approval of the draft AC Transmission Report by affirmative advisory votes of 76.33% and 80.0%, respectively. Pursuant to Section 31.4.11.2 of the OATT, NYISO staff then submitted the draft AC Transmission Report to the Board on June 19, 2018, for its review and action.

Board Review and Revisions to Draft AC Transmission Report

The Board exercised its discretion under the ISO Agreement[1] to provide interested parties with the opportunity to submit comments and to make oral presentations for the Board's consideration prior to its taking action on the draft AC Transmission Report.[2] Based on the input received and the Board's independent review of the report, the Board directed NYISO staff to conduct certain additional studies and analyses. The Board then concluded that certain modifications should be made to the draft report.

The Board agreed with the draft AC Transmission Report recommendation that NAT/NYPA's Project T027 is the more efficient or cost-effective transmission solution for Segment A.[3] However, based on the additional studies and analyses, the Board concluded that the more efficient or cost-effective transmission solution for Segment B is National Grid/Transco's Project T019, rather than NAT/NYPA's Project T029.[4] The Board determined that Project T019 demonstrated superior performance across a broader range of metrics when compared to Project T029 and the other proposed Segment B projects, including, significantly, providing additional transfer capability across the UPNY/SENY transmission interface.[5]

Accordingly, the Board directed NYISO staff to revise the draft AC Transmission Report, including the project rankings and recommended selections. The modifications were reflected in an Addendum contained in the revised AC Transmission Report. As required by the OATT, the Board directed that the draft report be returned to the Management Committee for further

[1] ISO Agreement Section 5.07 ("The ISO Board also may review any matter, complaint, or Committee action on its own motion.")

[2] At its July 2018 meeting, the Board heard oral presentations concerning the draft AC Transmission Report by NAT/NYPA, National Grid/Transco, and NextEra. National Grid/Transco also provided additional written comments at the oral presentation.

[3] Project T027 includes a new 86-mile double-circuit line between the Edic and New Scotland 345 kV substations and the addition of a new Princetown 345 kV switchyard to connect to Rotterdam. The double-circuit line will use rights-of-way currently occupied by the Porter-Rotterdam 230 kV lines that will be decommissioned as part of the project.

[4] Project T019 includes, among other things, a new double-circuit 345/115 kV line from a new Knickerbocker 345 kV switching station to the existing Pleasant Valley Substation, including a rebuild of the Churchtown 115 kV switching station, an upgrade of the existing Pleasant Valley 345/115 kV Substation, and 50% series compensation on Knickerbocker to Pleasant Valley 345 kV line.

[5] The Board described its proposed modifications in its December 27, 2018, Summary of Proposed Modifications to Draft AC Transmission Public Policy Transmission Planning Report and Proposed Selections.

comments.[6] The Board is required to consider the Management Committee comments, including comments regarding the MMU's evaluation, prior to making a final determination concerning a revised report.

Additional Review and Input by Developers, Stakeholders, and MMU

Before providing the revised AC Transmission Report to the Management Committee, NYISO staff presented the revised report at two joint ESPWG/TPAS meetings to provide additional opportunities for stakeholders and developers to review and comment on the modifications. Following the initial stakeholder review of the revised draft report, the NYISO was informed of an impedance modeling error included in the NAT/NYPA and National Grid/Transco Segment B proposals that affected the calculated transfer capability of those projects. NAT/NYPA and National Grid/Transco each subsequently provided corrected data for their projects. The NYISO staff assessed the impact of the corrected impedance data on the transfer limit calculations and other affected metrics and then further revised the report to reflect the findings.

In addition, NYISO staff provided the revised draft report to the MMU to update its evaluation of the impact of the recommended projects on the NYISO-administered markets. The MMU concluded that, under a scenario that did not take into account state policy initiatives, the recommended projects would have a benefit-cost ratio of 0.74. However, with renewable resources such as wind and solar added upstate to meet the state Clean Energy Standard and expected generator retirements, the recommended projects would have a benefit-cost ratio well in excess of 1.0. The MMU also recognized that its assessment does not take account of certain unquantifiable benefits that would result from the projects.

At the February 27, 2019, Management Committee meeting, NYISO staff reviewed the revised AC Transmission Report with stakeholders and developers, and the MMU reviewed its evaluation of the report. Stakeholders and developers were permitted to provide comments on the revised draft report at the ESWPG/TPAS meetings and to provide comments to the Management Committee. These comments were submitted to the Board and publicly posted on the NYISO's website.[7] In addition, NAT/NYPA and National Grid/Transco made oral presentations concerning the revised draft report to the Board on March 18, 2019. NYISO staff and the Board reviewed and carefully considered this input.

BOARD DECISION

We appreciate the significant work that developers dedicated to developing and proposing their projects. The Board's extensive deliberations in this Public Policy Process reflect the quality of the proposals and the involvement of all of the developers in the stakeholder and Board processes. We also acknowledge the hard work performed by NYISO staff in administering the Public Policy Process for the AC Transmission Needs and the participation of the other stakeholders, the MMU, and the NYPSC, including the extensive time and resources they have dedicated and the valuable feedback they have provided.

[6] OATT Section 31.4.11.2.

[7] https://www.nyiso.com/management-committee-mc-?meetingDate=2019-02-27

Board Responsibilities

The Board is responsible in the Public Policy Process for reviewing and taking action on a Public Policy Transmission Planning Report, including the rankings of the proposed transmission solutions and the selection of the more efficient or cost-effective transmission solution to address a Public Policy Transmission Need.

The OATT does not establish a specific formula or weighting of metrics for the NYISO to identify the more efficient or cost-effective transmission project. It is important to understand that the NYISO's selection metrics may not equate to the least cost solution. Rather, the NYISO carefully assesses and ranks each proposed project's total performance across all of the numerous qualitative and quantitative metrics contained in the tariff using a range of scenarios and sensitivities. The NYISO then solicits and considers input from developers, stakeholders, and other interested parties concerning its analysis and recommendations and presents the results in the Public Policy Transmission Planning Report.

The Board then exercises its independent judgment in evaluating the report. The Board may approve the report or propose modifications, including determining not to select a project if warranted. If the Board modifies the report, it must review the Management Committee's comments concerning the modifications prior to making a final determination concerning the revised draft report.

Board Approval of AC Transmission Report, Project Ranking, and Project Selection

Based upon our review, consideration, and extensive deliberations concerning the AC Transmission Report, stakeholders' and developers' comments, and the MMU's market impact analysis, we approve the AC Transmission Report, its project rankings, and the selection of NAT/NYPA's Project T027 for Segment A and National Grid/Transco's Project T019 for Segment B. The developers of the selected projects may recover their project costs through the NYISO's OATT in rates accepted by FERC.

We agree with the conclusion of the AC Transmission Report that NAT/NYPA's Project T027 and National Grid/Transco's Project T019 are the more efficient or cost-effective transmission solutions to address the Segment A and Segment B AC Transmission Needs, respectively, based on their total performance across the various selection metrics.

Although Project T027 has higher costs relative to some other Segment A projects, it replaces the greatest amount of aging infrastructure among the Segment A projects and provides the highest Central East interface transfer capability among all of the 345 kV Segment A projects. Considering the proposed infrastructure replacements, Project T027 will not only add more efficient and cost-effective new transmission facilities, but will also obviate the need to incur a significant amount of transmission refurbishment costs. Additional benefits provided by Project T027's double-circuit 345 kV design include increased production cost savings, excellent operability and expandability, and a lower electromagnetic field compliance risk due to the double-circuit design.

Project T019 also has higher costs relative to certain Segment B projects, but demonstrates superior performance across a broad range of metrics. Importantly, Project T019 provides for additional transfer capability across the UPNY/SENY transfer interface, the primary objective of the transmission need. Project T019's greater transfer capability results in the lowest cost per MW ratio, highest production cost savings, greatest CO_2 reductions, and highest Installed Capacity savings of the Segment B projects. In addition, the series compensation component of the project provides performance benefits through greater operational flexibility and increased use of the UPNY/SENY interface. The project also has the most resilient foundation and structure design, resulting in significant benefits to the operability of the transmission system during extreme weather events.

Finally, the Board has concluded that selecting Projects T027 and T019 would not have an adverse impact on the competitiveness of the NYISO-administered markets. Rather, the addition of the selected transmission facilities will reduce persistent uneconomic transmission congestion and enhance wholesale market competition by providing additional infrastructure to permit resources located upstate to compete to fulfill customer needs in the NYISO-administered markets.

Assessment of Comments on AC Transmission Report

NAT/NYPA argue that we should instead select their Project T029 for Segment B. They assert that the combination of Projects T027+T029 is superior to Projects T027+T019 based on their assessment of certain quantitative measures, such as production cost savings and capacity savings, compared against the project cost estimates. We disagree. For the reasons discussed in the AC Transmission Report, Project T019 demonstrates superior performance across the range of both quantitative and qualitative metrics, including project transfer capability, operability, and total performance.

NAT/NYPA argue that Project T019 has a higher cost and has a greater risk of cost increases than Project T029. While cost is an important factor, neither FERC's Order No. 1000 nor the NYISO OATT require cost to be the overriding factor in determining the more efficient or cost-effective transmission solution. In this case, as detailed above, Project T019 does have higher estimated cost relative to certain Segment B projects, but it demonstrates superior performance across a broad range of metrics that warrants the project cost.

In addition, the NYISO accounted for the potential cost increase risks identified by NAT/NYPA in its evaluation of Project T019. The potential for subsynchronous resonance issues resulting from Project T019's use of series compensation will be addressed in the NYISO's interconnection process. The NYISO was not required to complete the interconnection studies prior to selection, but did give due consideration to the interconnection information available at the time of selection. The NYISO also performed additional analysis to evaluate the potential need for and cost of upgrades or mitigation measures related to Project T019's series compensation. This analysis indicated that the magnitude of any upgrades or mitigation measures that might be required would be well within the project's 30% cost contingency.

All Segment B projects will result in degradation of New York-to-New England transfers, so the cost estimates for all of the projects included a cost of $30M to address any network upgrade facilities that may be required. Issues concerning the visual impacts of the number and height of structures are most properly addressed in the NYPSC siting process. Finally, based on NYISO staff's and the MMU's review, the 475 MW increase in the SENY locational 30-minute reserve requirement associated with Project T019 is not expected to be impactful.

NAT/NYPA also assert that the NYISO inaccurately determined that Project T019 provides greater production cost savings because it did not model upgrades for terminal equipment for NAT/NYPA's Projects T029 and T030. Again, we disagree. The NYISO correctly modeled NAT/NYPA's projects. Unlike Project T019, the NAT/NYPA proposals did not specify terminal upgrades, and the data they provided clearly indicated the use of original ratings limited by terminal equipment.

NAT/NYPA argue that the production cost savings are mainly driven by the increase on Central East transfer capability provided by the Segment A project. However, it was necessary to evaluate the combined production cost benefits of both the Segment A and Segment B projects. The NYPSC's need determination contemplated that the AC Transmission Needs should only be addressed if both Segments A and B are built.[8] The congestion benefits provided by Segment A to Central East would be diminished if Segment B did not alleviate the downstream constraints associated with the UPNY/SENY interface.

We also reject NAT/NYPA's arguments concerning ICAP cost savings. Project T019 will provide 400 to 500 MW of greater transfer capability compared to the other Segment B projects. Accordingly, ICAP cost savings from Project T019 are greater than the other Segment B projects as demonstrated by the separate and distinct calculation methodologies employed by the NYISO and the MMU. NAT/NYPA's assertion that the NYISO should have re-run the ICAP cost savings calculation to correct for the impedance data error is unpersuasive because, while it is difficult to predict the precise amount of these future benefits, Project T019 would have relatively higher savings than the other Segment B projects in all cases due to Project T019's higher transfer capability.

Further, we do not agree with NAT/NYPA's argument that the NYISO acted inconsistent with its past practice in considering certain resilience benefits or that the resilience benefits for Project T019 are not substantiated. The NYISO appropriately considered resilience as a feature of Operability. Furthermore, the NYPSC's December 17, 2015, order establishing the AC Transmission Needs identified enhancing resilience/storm hardening as one of the benefits driving the transmission need. NAT/NYPA's comparison to the Western New York Public Policy Transmission Need and the wooden poles associated with the selected Empire State Line project is inapt because the NYPSC did not identify such benefits for the Western New York need. In addition, the NYISO reasonably concluded, with input from SECO, that Project T019 would provide greater resilience benefits than Project T029. Directly embedded pole foundations, such as those used by NAT/NYPA's Project T029, may be designed to withstand similar loads as drilled shaft concrete foundations, such as those used by Project T019. However, the NYISO staff and consultants reasonably determined that Project T019 provided the greater combined resilience benefits of heavy duty structures, drilled shaft concrete foundations, and a greater number of dead-

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[8] NYPSC Case No. 12-T-0502, *et al.*, *Order Finding Transmission Needs Driven by Public Policy Requirements* (December 17, 2015), Appendix B, at 2, Evaluation Criteria 8 and 9.

end structures. Furthermore, both Projects T019 and T029 include a longitudinal broken wire to be applied to the load cases. While Project T029 is designed to a slightly higher extreme wind case, the NYISO reasonably concluded that the higher ice loading combined with appropriate wind loading proposed by Project T019 would provide greater benefit.

NAT/NYPA argue that Project T019's series compensation level of 50% is not optimized for future system conditions. The NYISO staff and consultants, however, acted appropriately in performing their evaluation based on what developers proposed, rather than attempting to determine the optimized sizing for series compensation. NAT/NYPA also assert that series compensation can be added in the future to their Projects T029 and T030 to increase the transfer limits if needed. The NYISO, however, correctly assessed Projects T029 and T030 as proposed by NAT/NYPA, which did not include series compensation. The NYISO did consider the expandability of all proposed projects and determined that the proposed design of all three projects (*i.e.*, T019, T029 and T030) provides sufficient space at the Knickerbocker substation for future expansion, which could include series compensation or other facilities not yet considered.

NAT/NYPA also assert that some scenarios (*e.g.*, social cost of carbon) are inconsistent with other scenarios and should not be considered. In addition, several stakeholders, including the Independent Power Producers of New York, the City of New York, Multiple Intervenors, and NAT/NYPA question the NYISO's use of a "G-J Locality Elimination" sensitivity, arguing that it should not be considered as it is flawed and based on unreasonable assumptions. We do not agree. The NYISO's tariff permits it to evaluate the proposed Public Policy Transmission Projects under various system conditions, scenarios, and sensitivities. With regard to the G-J Locality Elimination scenario, the Addendum makes clear that the mere examination of this scenario should not be construed as advocating for or against the G- J locality nor a commentary on potential ICAP market rules for creating or eliminating localities. Instead, this potential scenario was one of many under which the performance of the proposed projects was evaluated, and it was not accorded significant weight in the Board's project selection decisions.

Hudson Valley residents[9] argue that we should re-examine the justification for selecting any AC Transmission Public Policy Transmission Project. They cite the MMU's benefit cost ratio ("B/C Ratio") of 0.74 for Project T019 in the baseline case and conclude that the Board should not select a project with a ratio of less than 1.0. Additionally, they argue that the MMU's higher B/C ratio of 1.52 in the CES+Retirement scenario is based on faulty assumptions, particularly the level of off-shore wind resources modeled, and should be discounted entirely. We find these arguments unpersuasive. Although the B/C Ratio provides important guidance, the Board considers the full range of quantitative and qualitative metrics in project selection, and is not limited to selecting a project only if it exceeds a B/C Ratio of 1.0. In addition, while there remains significant uncertainty concerning how New York's policy objectives will be met given evolving state policies and technological advances, the CES+Retirement scenario provides a reasonable outlook for considering how new transmission projects would perform under state policies they are designed to facilitate.

[9] Town of Clinton, Town of Milan, Milan Hall Farm, Walnut Grove Farm, Farmers and Families of Claverack, Farmers and Families for Livingston, Pamela Lovinger, and Town of Livingston.

Finally, various developers and stakeholders have identified elements of the Public Policy Process that may benefit from further enhancement or clarification to improve the efficiency and transparency of the process, including providing for additional consultation with the Board throughout the process. The Board is aware that the process has been lengthy and could benefit from further enhancements to improve efficiency and transparency. NYISO staff will review lessons learned through the AC Transmission Needs process with stakeholders and is separately performing an extensive review of the Comprehensive System Planning Process. We direct NYISO staff to consider the suggestions raised by stakeholders and developers as part of these reviews, and to keep the Board apprised of its progress.

# # #

AC Transmission Public Policy Transmission Planning Report Addendum

A Report by the
New York Independent System Operator

April 8, 2019

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Executive Summary for Addendum

NYISO staff submitted the draft AC Transmission Public Policy Transmission Planning Report ("Draft Report") to the NYISO Board of Directors ("Board") for its review and action. The Draft Report summarized NYISO staff's analysis and recommendations concerning proposed solutions to address the AC Transmission Public Policy Transmission Needs identified by the New York Public Service Commission ("PSC"), which includes the need to increase Central East transfer capability by at least 350 MW ("Segment A") and UPNY/SENY transfer capability by at least 900 MW ("Segment B").

In the Draft Report, NYISO staff recommended that the Board select as the more efficient or cost effective solution to address the AC Transmission Needs the Segment A project (T027) proposed jointly by North American Transmission ("NAT") and New York Power Authority ("NYPA") and the Segment B project (T029) also proposed by NAT and NYPA.

The Board provided interested parties with the opportunity to submit comments and to make oral presentations for the Board's consideration prior to its taking action concerning the Draft Report. Based on this input and the Board's independent review of the Draft Report, the Board directed NYISO staff to conduct certain additional studies and analyses.

The Board proposes to modify the Draft Report to reflect the results of the additional studies and analyses as well as the Board's conclusions regarding certain information provided in the Draft Report. These modifications are contained in this Addendum to the Draft Report ("Revised Report"). As described in the Board memorandum, the Board has determined that the more efficient or cost effective solution for Segment A is project T027. The Board also concluded that for Segment B, the more efficient or cost effective solution is project T019, which was jointly proposed by Niagara Mohawk Power Corporation d/b/a National Grid ("National Grid") and the New York Transco, LLC ("Transco"). Based on the estimated project schedules, the in-service date established for the purposes of the Development Agreements for the selected projects is December 2023.

After conducting additional analyses at the Board's request, considering the import of those analyses in conjunction with information in the Draft Report, NYISO staff supports the Board's project selections for both Segments A and B.

In accordance with the NYISO's tariff, the Revised Report will be returned to the Management Committee for further comment. Following the Board's consideration of these comments, the Board will make its final determination on the Revised Report and the selection of the Public Policy Transmission Projects to address the AC Transmission Needs.

A1. Transfer Limit Analysis

Transfer limit analysis evaluates the amount of power that can be transferred across a defined transmission interface while observing applicable reliability criteria. The results of transfer limit analysis are used in the evaluation of metrics such as Cost per MW, Operability, and Performance, as well as for determining ICAP benefits.

As described in Section 3.2.1 of the Draft Report, the NYISO evaluated the transfer limits of the UPNY/SENY interface based on the criteria set forth by the NYPSC Order for Segment B. The UPNY/SENY interface is critical to the New York State transmission system as it represents the collection of transmission lines on which all power flows from Upstate New York to Southeast New York. UPNY/SENY is historically limited by the thermal capability of the individual transmission lines; therefore, the NYISO performed various thermal transfer analysis.

The Board identified aspects of the transfer limit methodologies and results that warranted further scrutiny, and therefore requested additional analysis to assess whether and, if so, how alternate approaches should be factored in the selection process. This section describes additional transfer analysis based on the 2016 Reliability Planning Process power flow case with the updates detailed in Section 3.2.1 of the Draft Report.

Following the initial stakeholder review of the Revised Report, the NYISO was informed of a modeling error included in the NAT/NYPA and National Grid/Transco Segment B proposals. Specifically, the impedance data submitted for the New Scotland – Knickerbocker 345 kV line and the Knickerbocker – Alps 345 kV line was transposed for each project. NAT/NYPA and National Grid/Transco each provided corrected data for their respective projects. The NYISO assessed the impact of the impedance data correction on the calculated transfer limits and on affected metrics, as reflected in the following sections.

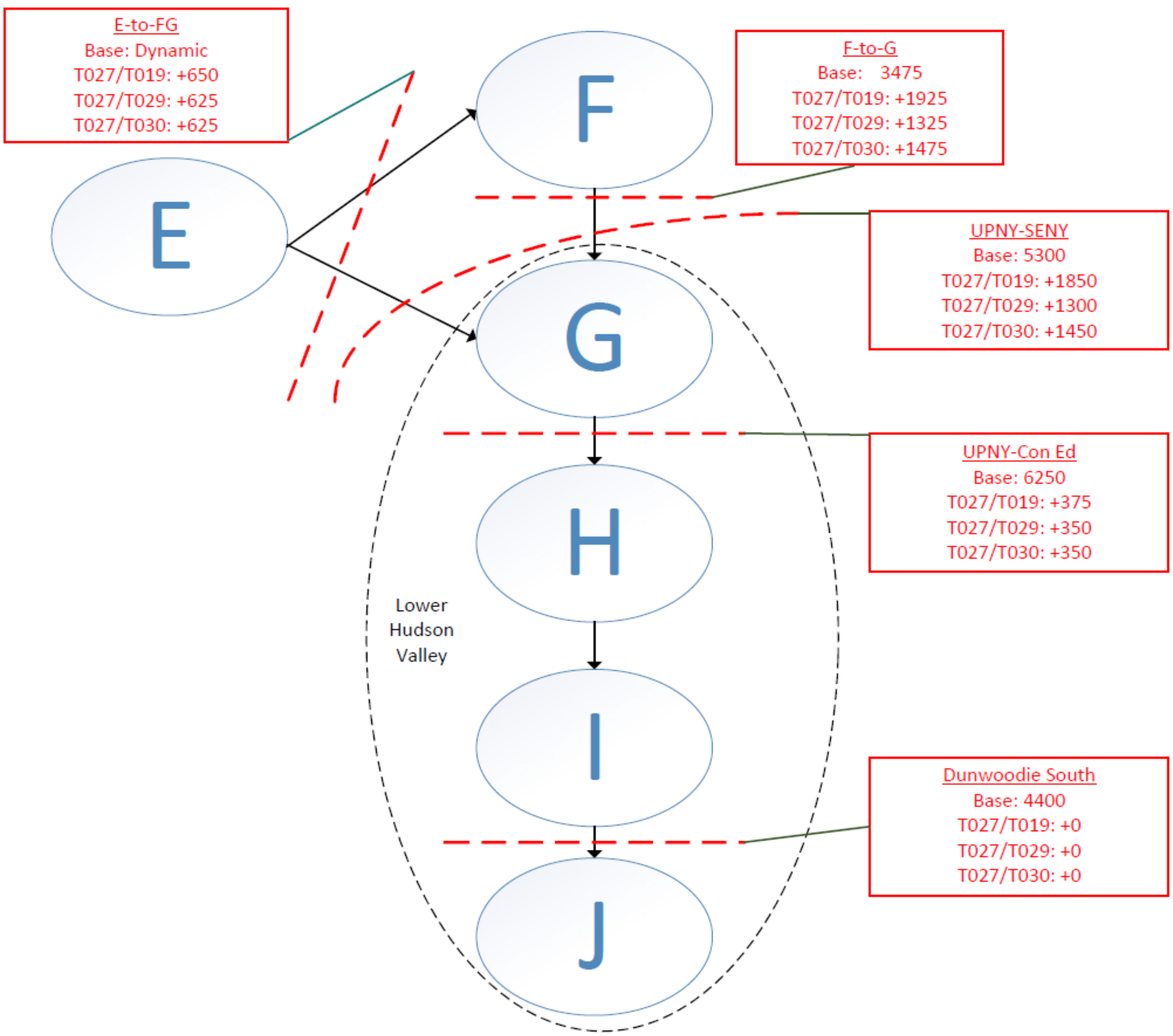
A1.1. UPNY/SENY Transfer Limits for N-1 Emergency Transfer Criteria

The calculation of Emergency Transfer Limits is necessary to support a number of the requests from the Board further described in this Addendum. Emergency Transfer Criteria are defined by the New York State Reliability Council to allow transfers to be increased up to higher short-term emergency (15-minute) ratings for post-contingency conditions. Emergency Transfer Criteria may be invoked in the event that adequate facilities are not available to supply firm load within Normal Transfer Criteria. The use of Emergency Transfer Criteria is critically important for the operation of the New York bulk power system in that it allows the transmission system to be operated to higher ratings during emergency or stressed system conditions in order to supply firm load and to avoid the need for load relief measures. Therefore, Emergency Transfer Criteria limits are utilized in resource adequacy analysis, including the evaluation of loss of load expectation (LOLE) for system planning and the calculation of the Installed Reserve Margin (IRM) and Locational Capacity Requirements (LCRs) for the capacity market.

Figure A-1 depicts the N-1 Emergency Transfer Criteria limits for the T019 project and the T029 project assuming that T027 is the project selected for Segment A. The limits reflect adjustments for the impedance data correction described in Section A1. Specifically, the correction impacted the UPNY/SENY limit. For T019, the incremental UPNY-SENY emergency transfer capability decreased from the previously calculated level of 2,100 MW to 1,850 MW. For T029, the data correction caused the incremental emergency transfer capability to increase from 1,150 MW to 1,300 MW. T030 provides an additional 150 MW of emergency transfer capability compared to T029, for a total incremental increase of 1,450 MW. These changes together reduce the emergency transfer differential between T019 and the other Segment B projects from 950 MW to a range of 400 MW to 550 MW.

The additional emergency transfer capability provided by the T019 project relative to the other Segment B projects constitutes a material benefit to the operability and performance of the transmission system and capacity savings for the market as described in Sections A3, A4, and A6 of this Addendum.

Figure A-1: Incremental UPNY/SENY N-1 Emergency Transfer Capability



* T027/T029 is representative of all other Segment B projects

A1.2. Alternate Dispatch Methodology to Determine Transfer Limits

Transfer limits can be highly sensitive to generation dispatch depending on the transmission project design. To derive the original incremental UPNY/SENY N-1-1 thermal transfer capability shown in Table 3-18 of the Draft Report, certain Capital Zone (Zone F) and Hudson Valley Zone (Zone G) generators were restricted to be dispatchable only within a small range.[1] This small range is to mimic the typical dispatch in resource adequacy reliability models.

As requested by the Board, the NYISO staff evaluated the impact of generation dispatch on the N-1-1 transfer capability by utilizing the dispatch methodology established for calculating transmission security-based floors used by the alternative Locality Capacity Requirement (LCR) optimization process. As part of the calculation of LCRs, a Transmission Security Limit (TSL) is calculated for the Zones G-J, the Zone J, and the Zone K localities to represent the N-1-1 transmission transfer capability into each locality. Each TSL is then used to calculate a percentage floor for each LCR. Each LCR floor is then input to the optimizer simulation to prevent the optimizer from reducing the capacity below adequate levels for each locality.

The assumptions for calculating the LCR TSLs recognize that: (1) in actual operations the NYISO can re-dispatch a reasonable amount of generation in support of increasing the transmission security limits, and (2) the NYISO should expect to meet transmission security limits by procuring the required amount of ICAP resources within each of the localities in order for the NYISO to be capable of operating the New York State transmission system in the Normal Transfer Criteria state.[2] As such, the following assumptions are used:

a) Individual generators are limited in re-dispatch between a minimum of 50% and a maximum of 100% of their Dependable Maximum Net Capability ("DMNC") value. The minimum DMNC value of 50% represents an average level of physical minimum generation levels.

b) All applicable NERC, NPCC, and NYSRC contingencies under N-1-1 design criteria for Normal Transfer Criteria are evaluated. The transfer level associated with the most limiting N-1-1 contingency combination is the TSL.

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[1] Athens: 970-1000 MW, Gilboa: 565-585 MW, Cricket Valley: 1010-1050 MW, CPV Valley: 650-680 MW, Danskammer: 200-230 MW, Roseton: 554-584 MW, and Bowline: 547-577 MW.

[2] Normal Transfer Criteria, as defined by the New York State Reliability Council, require that pre-contingency circuit loading is within normal (24-hour) ratings and post-contingency circuit loading is within applicable emergency (typically 4-hour) ratings for all design criteria contingencies. Design criteria contingencies include multiple-element contingencies such as stuck breakers and double-circuit towers.

A1.2.1. Revised UPNY/SENY Transfer Limits for Normal Transfer Criteria

Applying the Alternate Dispatch (LCR TSL) methodology, Table A-1 shows the UPNY/SENY Normal Transfer Criteria transfer limits under various outage conditions (N-1 and N-1-1) for the pre-project case and the post-project cases for each Segment B project in combination with the NAT/NYPA T027 Segment A project. The limits reflect adjustments for the impedance data correction described in Section A1. The UPNY/SENY TSL for each case is highlighted in red.

Table A-1: UPNY/SENY Normal Transfer Criteria Limits

Maintenance Outage	No Outage	CPV - Rock Tavern 345 kV Line	Marcy - Coopers Corners 345 kV Line	Roseton - East Fishkill 345 kV Line	Athens-Pleasant Valley 345 kV Line	Knickerbocker-Pleasant Valley 345 kV Line
Pre-Project	5,050	4,450	4,425	3,975	3,450	-
T027+T019	7,150	6,600	6,475	5,375	4,875	4,725
T027+T022	6,650	6,050	6,025	5,000	4,750	4,775
T027+T023	6,600	6,025	5,975	4,975	4,700	4,725
T027+T029	6,600	6,000	5,975	5,425	4,700	4,725
T027+T030	6,750	6,175	6,100	5,575	4,800	4,725
T027+T032	6,575	6,000	5,900	4,975	4,675	4,775

The Draft Report addresses the N-1-1 limits in Section 3.3.5.2 and in Table 3-18. The results shown above using the alternate dispatch methodology indicate that, for all projects, the minimum N-1-1 Normal Transfer Criteria limits for the UPNY/SENY interface range from 4,675 MW to 4,750 MW. These findings indicate that the UPNY/SENY N-1-1 Normal Transfer Criteria limits are not a distinguishing factor among the proposed projects. Section A2 further describes the cost-per-MW metric that utilizes the "no outage" (*i.e.,* N-1) results.

A1.2.2. Revised UPNY/SENY Transfer Limits for N-1-1 Emergency Transfer Criteria

Applying the Alternate Dispatch (LCR TSL) methodology, Table A-2 shows the UPNY/SENY N-1-1 Emergency Transfer Criteria transfer limits for the pre-project case and the post-project cases for each proposed Segment B project in combination with the NAT/NYPA T027 Segment A project. The limits reflect adjustments for the impedance data correction described in Section A1. The lowest limit for each project is highlighted in red.

Table A-2: UPNY/SENY Emergency Transfer Criteria N-1-1 Limits

Maintenance Outage	CPV - Rock Tavern 345 kV Line	Marcy - Coopers Corners 345 kV Line	Roseton - East Fishkill 345 kV Line	Athens-Pleasant Valley 345 kV Line	Knickerbocker-Pleasant Valley 345 kV Line
Pre-Project	4,850	5,025	4,500	3,900	-
T027+T019	7,125	6,950	6,950	5,650	5,425
T027+T022	6,725	6,450	6,150	5,375	5,475
T027+T023	6,725	6,400	6,100	5,350	5,425
T027+T029	6,725	6,400	6,100	5,350	5,425
T027+T030	6,850	6,550	6,275	5,500	5,425
T027+T032	6,700	6,400	6,125	5,300	5,475

The results indicate that, for all projects, the N-1-1 Emergency Transfer Criteria limits for the UPNY/SENY interface range from 5,300 MW to 5,425 MW using the alternate generation dispatch methodology. These findings indicate that the UPNY/SENY N-1-1 Emergency Transfer Criteria limits are not a distinguishing factor among the proposed projects.

A2. Cost per MW

As reflected in Section 3.3.3 of the Draft Report, the NYISO calculated the Cost per MW ratio metric by dividing the independent cost estimates, provided by the NYISO independent consultant Substation Engineering Company (SECO), for Segment B by the incremental MW value of transfer capability. Given the revised transfer limits calculated at the request of the Board, as discussed above, the NYISO staff recalculated the Cost per MW ratio metric. The incremental increase for UPNY/SENY is based on the revised "no outage" (N-1) Normal Transfer Criteria transfer limits described in Section A1.2.1 of this addendum.

Table A-3 reports the Cost per MW ($M/MW) ratio based on the updated transfer limits. The results reflect adjustments for the impedance data correction described in Section A1.

Table A-3: Cost per MW Ratio

Project	Segment B Independent Cost Estimate (2018 $M)	Incremental UPNY/SENY (MW)	**Cost per MW**
T027+T019	$479	2,100	**0.228**
T027+T022	$373	1,600	**0.233**
T027+T023	$424	1,550	**0.274**
T027+T029	$401	1,550	**0.259**
T027+T030	$419	1,700	**0.246**
T027+T032	$536	1,525	**0.351**

The results show that T019 has the lowest Cost per MW ratio of all the Segment B projects.

A3. Operability

As reflected in Section 3.3.5 of the Draft Report, the NYISO considered how the proposed Public Policy Transmission Projects affect flexibility in operating the system, such as dispatch of generation, access to operating reserves, access to ancillary services, or the ability to remove transmission facilities for maintenance. The NYISO also considered how the proposed projects may affect the cost of operating the system, such as how they may affect the need for operating generation out of merit for reliability needs, reduce the need to cycle generation, or provide more balance in the system to respond to system conditions that are more severe than design conditions.

The Board requested the NYISO staff to further examine how certain design aspects of the proposed projects could be beneficial to the future operation of the grid under more extreme conditions such as high impact storms or significant generation retirements that could otherwise strain the system. This section describes additional assessments of resilience, generator deactivations, and operating reserve.

A3.1. Resilience Benefits

The resilience of the electric power system is an important consideration in evaluating the operability of proposed transmission projects. FERC has proposed a working definition of resilience as "The ability to withstand and reduce the magnitude and/or duration of disruptive events, which includes the capability to anticipate, absorb, adapt to, and/or rapidly recover from such an event."

A meaningful measure of grid resilience is the ability of New York State's electric power system to withstand extreme storm events. The power system in New York is a collection of individual components that includes high voltage transmission lines, generation resources, and important substation equipment. The resilience of the New York State's power system is dependent, in part, on each individual facility component's ability to "withstand the disruptive event." It is sometimes difficult to clearly assess the resilience benefits of an individual facility component's system design, but it is reasonable to invest in incremental improvements above minimally accepted criteria in order to protect the system from the potential catastrophic events.

With a focus on New York State's transmission system resilience, there have been occurrences of extreme disruptive storm events, which have included hurricanes, tornados, windstorms, coastal flooding, and ice storms. As an example, an ice storm in January 1998 was particularly impactful, in which a series of storms swept across the northeastern part of North America, causing 770 transmission structures to collapse.[3] About 110,000 customers were affected in northeastern New York due to the loss of 230 kV and 115 kV lines in this area, and major tie lines with neighboring systems were lost for several weeks.

A3.1.1. Transmission Line Structural Design

SECO evaluated the transmission line structural design for all of the proposals relative to the ice and wind loading requirements defined by the National Electric Safety Code (NESC).[4]

All proposals meet minimum NESC standards, but the National Grid/Transco T019 Segment B proposal includes heavier duty structures mounted on drilled-shaft concrete foundations where other proposals use direct embedded poles with crushed rock backfill foundations for tangent pole applications (shown in Figure A-2 and Figure A-3). The concrete foundations of T019 cost approximately two and a half times as much compared to the direct embedded rock foundations, but provide greater resilience to significantly heavier wind and ice loadings. In addition, T019 utilizes more dead-end structures compared to the other Segment B proposals, with an average distance of approximately one mile between dead-end structures. This more resilient design would mitigate cascading structure failures if they occur.

Figure A-2: Drilled Shaft Construction

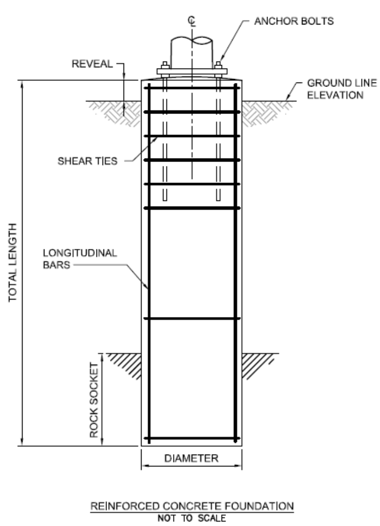
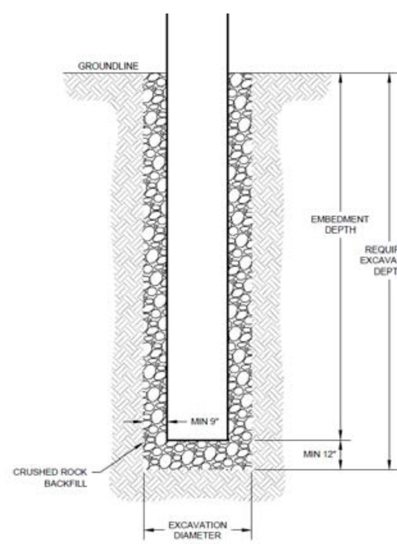


Figure A-3: Direct Embedded Pole Construction



[3] NERC 1998 System Disturbances Report: https://www.nerc.com/pa/rrm/ea/System%20Disturbance%20Reports%20DL/1998SystemDisturbance.pdf

[4] SECO Report Section 4.11.2.7

NextEra's T022/T023 project design proposes to install full length concrete poles as opposed to the multi-piece steel poles proposed by other developers. This design also provides greater resilience to ice loading, but the direct embedded foundations proposed by NextEra result in lesser resilience to wind than T019. There is also significantly more incremental work involved in the installation of full length concrete poles as opposed to multi-piece steel poles. For example, there would be additional labor required to rig and set concrete poles which could have length up to 135 feet and weigh up to 62,000 pounds. By contrast, steel poles are constructed in segments, typically with three segments no longer than 50 feet each, and weighing up to 16,000 pounds.

While the costs of the enhanced structures for projects T019 and T022/T023 are higher, it is important to appropriately recognize the incremental resilience benefit to withstand reasonable icing and wind events. The Board has concluded that this benefit should be more prominently reflected in the Operability metric and project ranking.

A3.1.2. Resilience Benefits of Increased Transmission Capability

The NYISO has long advocated that maintaining and improving transmission capability within New York State will improve the reliability and resilience of the transmission grid during stressed system conditions and disruptive events. Stressed conditions and disruptive events can occur because of many different factors; examples include extreme storm conditions (*e.g.*, Superstorm Sandy) which can result in a large number of bulk electric system transmission outages or during events when critical supply resources are forced out of service or otherwise unavailable (e.g. fuel shortage events).

Maintaining and improving electric transmission system capability is generally viewed as supportive of promoting grid resilience. In comments responsive to the FERC resilience docket, the NYISO stressed the importance of maintaining and protecting existing interconnections between neighboring systems, as well as continually assessing opportunities to improve interregional transaction coordination serves to bolster resilience throughout an interconnected region. These interconnections foster the opportunity to rely on a broader, more diverse set of resources to meet the overall needs of an interconnected region. The more diverse resource pool available through interregional interconnections provides both economic and resilience benefits, especially during stressed operating conditions such as sustained heat waves or cold snaps.

In New York, there are a limited number of transmission corridors available to build new transmission projects in support of improving the state's transmission capability. Given the limited potential for new transmission projects in the future, the additional emergency transfer capability provided by the T019 project would materially improve the transmission system into the Southeast New York area. The Board has concluded that the additional transfer capability provided by T019 should be reflected as a benefit in the Operability metric and in the project ranking.

A3.2. Ability to Accommodate Generator Deactivations

The Board requested further evaluation of how the increase in UPNY/SENY transfer capability resulting from the Segment B projects could accommodate additional generation deactivations within the Lower Hudson Valley, if they occur, while maintaining reliability. As part of each Reliability Needs Assessment, the NYISO performs a "zonal capacity at risk" scenario. The zonal capacity at risk assessment identifies a maximum level of capacity in megawatts that can be removed from a given zone without causing loss of load expectation (LOLE) reliability criterion violations.[5] A small megawatt amount is indicative of a transmission constrained zone that is reliant upon intra-zonal generation, while a large megawatt amount is indicative of a zone that has a significant import capability and/or significant surplus generation. Accordingly, the NYISO performed this analysis for the National Grid/Transco T019 project and the NAT/NYPA T029 project, each in combination with the NAT/NYPA T027 Segment A project, to determine for each project how much generation could deactivate within Zone G while maintaining reliability under the postulated future system conditions. The T029 project results are also representative of other Segment B projects with the exception of T019, though T030 would produce slightly higher results than T029 in the CES+Retirement scenario. Table A-4 summarizes the results, which reflect adjustments for the impedance data correction described in Section A1.

Table A-4: Maximum MW Capacity Removal from Zone G in 2030

Project	Baseline Case	CES+Retirement Scenario
T027+T019	1,400	2,750
T027+T029	1,400	2,250

Under both the baseline case and the CES+Retirement scenario system conditions, the UPNY/SENY interface is not a binding constraint before removal of generation, even without the AC Transmission projects. This means that the UPNY/SENY interface limit does not affect the resource adequacy of the system before removal of generation from Zone G. By comparison, the UPNY/ConEd interface is the most binding in the system for resource adequacy under all study conditions before

[5] The megawatt amounts are reported as "perfect capacity", which is capacity that is not derated (*e.g.*, due to ambient temperature or unit unavailability) and not tested for impacts to interface limits.

removal of generation. This means that the additional UPNY/ConEd transfer capability provided by each Segment B project is beneficial to the resource adequacy of the system. As discussed in Section A4, the Performance metric also recognizes the potential benefits of future system improvements that could be made to mitigate the impact of voltage limitations of the UPNY/ConEd interface.

For the baseline case, in which there are not significant generation projects added upstate, there is not enough surplus generation upstate to serve the Zone G load once 1,400 MW of generation is removed from Zone G. At that point, the LOLE violation occurs before the UPNY/SENY interface becomes binding. Therefore, no additional resource adequacy benefit for Zone G would be realized from additional UPNY/SENY transfer capability under baseline system conditions.

For the CES+Retirement scenario, there are three primary differences in system conditions compared to the baseline: (1) additional energy efficiency measures equating to a peak load decrease of approximately 2,300 MW statewide in 2030, (2) additional renewable generation primarily located upstate (see details in Table 3-4 of the Draft Report), and (3) the retirement of all coal generation and approximately 3,500 MW of older gas turbines in New York City and Long Island. Under these postulated system conditions, more capacity can be removed from Zone G compared with the baseline analysis because of the reduced peak load and additional renewables, particularly an additional 1,000 MW of utility-scale solar in Zone G. When removing capacity from Zone G with the AC Transmission projects in place, the UPNY/SENY interface begins to bind at a certain point because of the flow of power from the additional renewables upstate, and therefore additional UPNY/SENY transfer capability could be beneficial if a large number of generator retirements were to occur in Zone G.

In summary, an increase to the UPNY/SENY transfer limit does not provide an improvement in resource adequacy under the baseline system conditions which assumes no generation retirements occur, but such additional capability would be beneficial under the CES+Retirement scenario system conditions if Zone G generator retirements were to exceed approximately 2,250 MW. This analysis would indicate a benefit to the T019 project in a future scenario where the New York system is impacted by large upstate renewable additions and the potential for Zone G generation retirements. The Board concluded that this benefit should be reflected as a benefit in the Operability metric and in the project ranking.

A3.3. Impact on SENY 30-Minute Reserve Requirement

In calculating the revised transfer limits at the request of the Board, as discussed above, the potential impact of these transfer limits on the locational reserve requirement for Southeast New

York (SENY) was evaluated. For the calculation of the SENY locational reserve requirement, limits for the UPNY/SENY transfer capability need to be determined under both N-1-1 and N-1 criteria as follows:

a) For the N-1 criteria UPNY/SENY limit, all applicable NERC, NPCC, and NYSRC contingencies assuming Normal Transfer Criteria are used.

b) For the N-1-1 criteria UPNY/SENY limit, all applicable NERC, NPCC, and NYSRC contingencies assuming Emergency Transfer Criteria are used.

c) Individual generators are limited in re-dispatch between a minimum of 50% and a maximum of 100% of their DMNC value.

d) The difference between these N-1 and N-1-1 UPNY/SENY limits represents the expected level of locational operating reserves needed for the SENY locality that would have to be procured in the NYISO day-ahead and real-time energy and ancillary services markets.

This analysis was performed for the Segment B projects, each in combination with the NAT/NYPA T027 Segment A project, with the results shown in Table A-5. The results reflect adjustments for the impedance data correction described in Section A1.

Table A-5: SENY Reserve Requirement

Project	N-1 Normal	N-1-1 Emergency	Reserve Requirement
Pre-Project	5,050	3,900	1,150
T027+T019	7,150	5,425	1,725
T027+T022	6,650	5,375	1,275
T027+T023	6,600	5,350	1,250
T027+T029	6,600	5,350	1,250
T027+T030	6,750	5,425	1,325
T027+T032	6,575	5,300	1,275

The present-day Southeast New York (SENY) locational reserve requirement is 1,300 MW. The pre-project result from this analysis is 150 MW less, which can be attributed to various differences in the system model such as the addition of Cricket Valley and the retirement of the Athens special protection system.

The analysis demonstrates that every Segment B project would result in some level of increase in the SENY reserve requirement, but the National Grid/Transco T019 project would require approximately 475 MW of additional 30-minute reserves compared to other Segment B projects. The T019 project provides a higher normal transfer limit with all lines in (N-1) compared to the other projects, but maintains approximately the same emergency transfer limit under the critical outage (N-1-1), thus necessitating a greater amount of generation redispatch to transition from an N-1 normal state to an N-1-1 emergency state.

The New York Control Area total 30 minute reserve requirement of 2,620 MW would not change as a result of the transmission projects. Given that reserve suppliers located in SENY typically provide the majority of the New York Control Area reserve requirement of 2,620 MW, the 475 MW increase in SENY locational reserve requirement associated with the T019 project is not expected to be impactful.

A4. Performance

The Board requested NYISO staff investigate whether there are potential performance benefits associated with the series compensation capability included with T019. NYISO staff provided the Board with information related to how the proposed series compensation can provide certain operational benefits from improved utilization of the UPNY/SENY interface through NYISO actions directing the operational status of the series compensation. Specifically, the NYISO can direct the proposed series compensation to be switched in or out of service in response to reliability or market conditions.

The NYISO has realized similar performance benefits, both from a grid reliability and energy market operations perspective, by directing the operational status of the existing series compensation on the Marcy-South transmission corridor during certain transmission outage scenarios and during the different seasonal market operating conditions.

As an example, in the fall of 2017, the NYISO implemented operational actions using the operational control provided by the Marcy-South series compensation in response to observed seasonal market operating conditions:

a) During the Summer Capability Period, the Marcy-South Series Capacitors will normally remain in service to facilitate improved utilization of the New York transmission system. This action increases the UPNY/SENY transfer capability, which tends to reduce UPNY/SENY congestion that is typically more limiting than other transmission system constraints.

b) During the Winter Capability Period, the Marcy-South Series Capacitors will normally be out of service (bypassed) to facilitate improved utilization of the New York transmission system. This action increases the Central-East transfer capability, which tends to reduce Central-East congestion that is typically more limiting than other transmission system constraints.

While the NYISO does not expect to bypass the series compensation for T019 for long durations such as seasonal capability periods, the NYISO expects that operational benefits will be realized by the capability to control Segment B power flows by directing the operational status of the series compensation for T019 in a manner similar to the current use of the Marcy-South series compensation.

The improved controllability of UPNY/SENY power flows by the T019 project will allow the NYISO more flexibility in addressing grid reliability needs, and can result in improved utilization of the overall transmission system as compared to the other proposed projects. This operational capability is expected to result in lower overall energy costs and provide benefit to consumers during certain transmission outage conditions or under certain market operating conditions. Furthermore, the utilization of the UPNY/ConEd interface could be further increased if future system improvements mitigate the voltage limitations. Voltage limitations can potentially be addressed in a variety of ways without needing to build additional transmission lines.

The Board has concluded that T019's improved control of power flows and increased utilization of the UPNY/SENY interface should be reflected as a benefit in the Performance metric and in the project ranking.

A5. Production Cost

As reflected in Section 3.3.7 of the Draft Report, the NYISO calculated the system production cost savings that could be realized for the proposed projects. The savings for each project is calculated as the difference between the pre-project and post-project results over the duration of a project's study period. The study period begins with the estimated in-service date and extends 20 years. Entries with a dollar value are listed in 2018 millions of dollars. The discount rate used to calculate present value is 6.988% consistent with the 2017 CARIS Phase 1 database. The NYISO used scenarios to distinguish projects and to measure the robustness of project performance.

The Board requested additional production cost analysis to study the potential impact of incorporating carbon pricing in the NYISO's wholesale market on the relative cost effectiveness of Segment B projects.

A5.1. Social Cost of Carbon Sensitivity

The additional simulations were performed using the CES+Retirement case with CO_2 emissions priced at the social cost of carbon as defined by the New York State Department of Public Service (DPS). Each of the project proposals were modeled in combination with the NAT/NYPA T027 Segment A project. Two sets of simulations were conducted, one set for T019 because the project is electrically distinct from other Segment B projects, and the second set for T029 since it is electrically comparable to T022, T023, and T032.[6]

The methodology and carbon costs employed in this analysis mirror those being utilized in the carbon pricing market designs that are being discussed at NYISO's Integration Public Policy Task Force (IPPTF). As in the Brattle work for IPPTF, hourly external transactions (MWh) with neighboring control areas (*e.g.*, PJM, ISO-NE) from the relevant base case are frozen or locked in the social cost of carbon cases, consistent with NYISO's Carbon Pricing Straw Proposal. This treatment makes the economics of external generator dispatch and transactions unaffected by a carbon adder. Absent this treatment, there would be a material increase in imports because New York generation, with its market offers now including a carbon adder, would become appreciably more expensive than external resources.

[6] Simulations were not performed for T030 because in all CES+Retirement cases it underperforms T029 in production cost savings.

This “freezing of external transactions” was effected in the production cost modeling by running cases without the social cost of carbon and then locking the hourly interface flows (within a +/- 20 MW bandwidth) when running the case with the social cost of carbon. For example, for the CES+Retirement case, the NYISO ran the 20-year simulation and extracted the hourly interface flows. The NYISO then modeled these interface flows in its production cost simulation (allowing the flows to be 20 MW higher or lower), incorporated the social cost of carbon, and then re-ran the case.

The NYISO utilized the social cost of carbon assumed in the IPPTF analysis for study years 2023-2030, and escalated these values by four percent annually for study years 2031-2042. Table A-6 presents the assumed costs in $ per ton of CO_2:

Table A-6: Social Cost of Carbon Assumptions

Year	Social Cost of Carbon (nominal, $/ton)	Year	Social Cost of Carbon (nominal, $/ton)	Year	Social Cost of Carbon (nominal, $/ton)
2023	$52.74	2030	$69.32	2037	$91.22
2024	$55.07	2031	$72.09	2038	$94.87
2025	$57.48	2032	$74.98	2039	$98.66
2026	$59.96	2033	$77.98	2040	$102.61
2027	$62.52	2034	$81.09	2041	$106.71
2028	$65.17	2035	$84.34	2042	$110.98
2029	$66.54	2036	$87.71		

Total production costs for the New York Control Area (NYCA) consist of internal NYCA generation costs and the net cost of transactions with New York’s neighbors. Internal generation costs are comprised of fuel, variable operation and maintenance, start-up and emission allowance costs for SOx, NOx, and CO_2.[7]

Savings associated with carbon-related production costs were substantially higher for both T019 and T029 in the social cost of carbon case as one would expect due to the higher per-ton costs. However, as illustrated, these incremental savings were attenuated due to reduced savings in fuel and variable operation and maintenance costs for both T019 and T029. These off-setting effects can be attributed to changes in the pattern of inter-control area flows, and to differences in the New York commitment and dispatch between the original, RGGI-only cases and the social cost of carbon case.

The overall production cost savings for T019 increases by $111M as a result of including the

[7] SOx and NOx costs are negligible relative to the other components of production costs and are therefore not discussed further.

social cost of carbon. This includes a decrease of $221M in carbon-related costs, an increase of $73M in fuel and variable operation and maintenance, a decrease of $10M in start-up costs, and an increase of $47M in costs related to the net interchange with neighboring control areas.

The overall production cost savings for T029 increases by $71M as a result of including the social cost of carbon. This increase can be disaggregated into a decrease in carbon-related costs of $201M, an increase in fuel and variable operation and maintenance costs of $86M, an increase in start-up costs of $2M, and an increase in costs related to the net interchange of $42M.

Table A-7 summarizes the results for the original case and the social cost of carbon case. The results reflect adjustments for the impedance data correction described in Section A1.

Table A-7: Production Cost Savings

CES+ Retirement Scenario	Capital Costs	Original RGGI Program Only		Social Cost of Carbon Sensitivity	
		Production Cost Savings	Production Cost Savings / Capital Costs	Production Cost Savings	Production Cost Savings / Capital Costs
T027+T019	$1,230	$1,080	0.878	$1,191	0.968
T027+T022	$1,123	$1,076	0.958	$1,147	1.021
T027+T023	$1,174	$1,076	0.917	$1,147	0.977
T027+T029	$1,113	$1,076	0.967	$1,147	1.031
T027+T030	$1,131	$1,012	0.895	N/A	N/A
T027+T032	$1,286	$1,076	0.837	$1,147	0.892

In summary, this analysis shows that while there were incremental increases in the production cost savings for both studied projects (and by extension, all relevant Segment B projects), the inclusion of the social cost of carbon did not alter the comparative system costs of projects with regard to production cost savings to capital cost ratio.

A6. ICAP Benefits

The Board asked NYISO staff to update and conduct further analysis to evaluate whether particular projects are likely to produce additional Installed Capacity ("ICAP") cost savings relative to the other proposed projects. As more fully described in Section 3.3.8 of the Draft Report and summarized below, the original analysis relied upon the optimization tool developed by the NYISO to set optimal locational capacity requirements (LCRs) for use in its capacity markets. While the prior methodology to calculate ICAP benefits was not materially altered, the NYISO did incorporate additional constraints to the optimization (*i.e.*, transmission security limits) to more closely align the benefit estimation procedure with the optimization tool's use in NYISO's capacity market operations. Also, while the original analysis estimated and presented a range of benefits for a representative combination of Tier 1 and Tier 2 project combinations, this supplemental assessment constructed specific estimates for all Segment B projects in combination with the T027 Segment A proposal.

In addition, the NYISO performed this assessment for both a reference case in which all existing capacity localities are retained and a sensitivity in which the G-J locality is eliminated and a new H-J locality is created. It is important to understand that the assumptions and findings of the "G-J elimination" sensitivity should not be construed as advocating for or against the elimination of the G-J locality nor a commentary on potential ICAP market rules for eliminating localities. This sensitivity simply reports the estimated capacity benefits for all Segment B projects under a defined set of assumptions if the locality were to be eliminated once a proposed AC Transmission project enters into service.

Following completion of the further ICAP analysis, the NYISO was informed of a modeling error for projects T019, T029, and T030 as described in Section A1. Certain data inconsistencies were also identified as described in Section A6.2. As further described in this section, the data inconsistencies and the impedance error have an impact on the numerical calculations, but do not affect the ultimate conclusions for the ICAP benefit metric.

A6.1. Optimization Procedure for Estimating ICAP Benefits

The NYISO's optimization tool was accepted by FERC in 2018 to replace the TAN45 methodology for establishing LCRs for each locality in the NYISO's capacity market. It minimizes ICAP costs by iteratively adjusting the megawatt requirements for each of the capacity zones, while observing emergency transfer criteria interface limits, transmission security limits for each locality and the LOLE reliability criterion of 0.1 days per year, and pricing capacity using a set of Net CONE cost curves. The NYISO has leveraged the tool here in order to estimate how future ICAP costs may be impacted by the proposed transmission projects.

Other than the inclusion of the transmission security limits in the optimization tool, the actual benefit calculations mirror those used in the original analyses, including the use of the same Net CONE curves. For each project combination and sensitivity studied, the NYISO ran the optimizer simulations for four sample years (*i.e.,* 2025, 2030, 2035 and 2040) and calculated the annual capacity benefit as the pre-project costs less the post-project costs. A 20-year time-series of savings was then constructed using the simple average of the four savings values. Consistent with the Draft Report, the annual values were escalated by 1.92% to reflect growth in the Net CONE curves and then discounted by 6.988% to calculate a 20-year stream in 2018 dollars.

Consistent with the original analysis, the NYISO calculated the impact on ICAP costs using alternate assumptions on the clearing price. In one case, the clearing price is set at Net CONE beginning with the first year of the study period (2023) and extending through the end of the study period (2042). In the second case, clearing prices are assumed to more realistically gradually converge to Net CONE through the course of the study from current levels (approximately 33% of Net CONE in 2018).

The NYISO extended the prior capacity market analysis to study all Segment B projects in combination with the T027 Segment A project proposal. As a practical matter, all Segment B projects, other than T019, are electrically similar with regard to resource adequacy analysis. Therefore, the study work was limited to estimating the ICAP benefits for T027+T019 and T027+T029 which served as the proxy for all other Segment B projects.

A6.2. Transmission Security Limits

Transmission Security Limits (TSLs) can be viewed as hard floors for each locality's LCR and are modelled as additional constraints in the optimization to respect all applicable reliability planning criteria in setting the LCRs. The TSLs utilized in this estimation were calculated consistent with the LCR TSL process described in Section A1.2. The TSLs were used to establish the LCR floors for use in the optimization. For each locality and each year in the study case, the LCR floors (%) shown in Table A-8 were calculated as the locality megawatt limit as a percentage of the locality peak forecast load.

Table A-8: Transmission Security LCR Floors Used in the Optimization Tool

		Transmission Security Floors			
		J	K	GHIJ	HIJ
Base	2025	80.79%	103.65%	86.88%	68.95%
	2030	81.00%	103.86%	87.37%	70.02%
	2035	81.88%	104.08%	88.07%	71.25%
	2040	82.72%	104.28%	88.74%	72.42%
T019	2025	80.79%	103.65%	78.09%	60.85%
	2030	81.00%	103.86%	78.80%	62.13%
	2035	81.88%	104.08%	79.76%	63.60%
	2040	82.72%	104.28%	80.68%	65.00%
T029	2025	80.79%	103.65%	78.61%	59.84%
	2030	81.00%	103.86%	79.30%	61.15%
	2035	81.88%	104.08%	80.24%	62.64%
	2040	82.72%	104.28%	81.15%	64.07%

Following completion of the additional analysis, an inconsistency was identified in the EFORd values used in the calculation of the LCR floors for the G-J and J localities in years 2030, 2035 and 2040. This inconsistency resulted in the use of slightly lower floors in the optimizer tool. An inconsistency was also identified in the load values used in the calculation of the Transmission Security Floors for the K locality, which resulted in the use of slightly higher floors in the optimizer tool. The impacts of these corrections on the ICAP benefit findings are described in Section A6.3.

A6.3. Scenarios

In this extended analysis, the NYISO studied two scenarios: a baseline case, and a second case in which the capacity zones are reconstituted due to pending changes to the resource mix and the construction of the AC Transmission projects. The baseline case reflects the load, resource, and topology assumptions incorporated in the baseline case for the production cost analysis. This treatment is consistent with the assumptions used in the original ICAP benefit analysis.

There are two modifications in the second scenario. First, in the pre-project cases an H-J locality is created as UPNY/ConEd (G-to-H) emerges as a binding interface following the retirement of the Indian Point Energy Center. Secondly, in the post-project cases, the G-J locality is eliminated as UPNY/SENY no longer binds after the AC Transmission projects are placed in service. Given that Net CONE curves are not currently available for an H-J locality, the NYISO utilized the Net CONE for the G-J locality and adjusted the curves to reflect capacity available in the H-J locality.

Utilizing the optimization tool, the NYISO developed a range of ICAP benefit estimates for each of the Segment B projects in combination with the T027 proposal. These estimates do not account for the impedance data correction previously described. The estimated 20-year benefits in the "Existing Localities" scenario for T019 range from $744M to $1,040M compared to a range from $584M to $816M for all other Segment B projects. For the "G-J Elimination" scenario, the T019 benefits range between $1,385M and $1,936M compared to $1,327M and $1,856M for all other Segment B projects.

The inconsistencies in EFORd and load data described in Section A6.2 have a minor effect on the optimizer results. First, the EFORd and load data utilized in the MARS/Optimization tool were unaffected; only the LCR floors were affected by the inconsistencies. The inconsistency for J in the "Existing Localities" case did not impact the overall capacity benefit metric evaluation since the revised floors would not have been binding in the simulation. The inconsistency for G-J in the "Existing Localities" case did not impact the overall capacity benefit metric evaluation as the revised savings for T019 and T029 were impacted minimally, resulting in approximately $4M less incremental savings (<2% of the total incremental savings) for T029 relative to T019 over the 20-year evaluation period. The inconsistencies for the G-J and J localities in the "G-J Elimination" case did not impact the overall capacity benefit metric evaluation as the revised savings for T019 and T029 were impacted minimally, resulting in approximately $0.7M more incremental savings (<1% of the total incremental savings) for T029 relative to T019 over the 20-year evaluation period.

As described in Section A1.1, the impedance data correction provided to the NYISO for projects T019, T029, and T030 impacts the UPNY/SENY emergency transfer limits for those projects, resulting in a differential ranging from 400 MW to 550 MW greater transfer capability for T019 compared to the other Segment B projects rather than the previously calculated 950 MW. This reduced differential would have a corollary effect on the ICAP savings differential between the projects. Nevertheless, the additional increase of 400 MW to 550 MW to the interface that defines the G-J locality is significant, and therefore T019 still offers significantly greater capacity savings than the other Segment B projects. It is also important to note that the separate ICAP savings calculation performed by the Market Monitoring Unit (MMU) described in Section A6.4 is not affected by the impedance data correction. The MMU results, which also indicate significant savings from T019, will continue to be the lower bound of the ICAP savings metric.

A6.4. Market Monitoring Unit's Findings

The NYISO's MMU performed an independent assessment of the capacity benefits of the proposed AC Transmission projects. The MMU has provided a memorandum detailing its methodology and estimates (provided in Appendix G). In short, the MMU's methodology is distinct from the optimizer approach outlined above and is designed to capture two segments of capacity benefits for transmission projects: avoided investment costs and enhanced reliability benefits. The former is derived from the reduced compensatory megawatts required to maintain a reliable system (at 0.1 LOLE); and the latter is derived from the lower LOLE (less than 0.1) with the transmission project in place.

The MMU estimated 20-year capacity benefits, shown in Table A-9, for the T027+T019 and T027+T029 project combinations for both the baseline case and the CES+Retirement case as modeled in the NYISO's production cost analyses.[8] The MMU impacts are less than those developed utilizing the optimization tool and are particularly driven by the project's impacts on the UPNY/ConEd interface limits (rather than UPNY/SENY). The table below summarizes the MMU's results.

Table A-9: ICAP Savings from MMU Method

Case (20-year savings, 2018 $M)	T027+T019	T027+T029
Baseline Case	$237	$218
CES+Retirement Case	$592	$523

A6.5. Summary Conclusions

The NYISO developed a range of capacity benefit estimates for each of the Segment B projects in combination with the T027 proposal utilizing the modeling data originally provided by the developers of projects T019 and T029. For T019, the estimated benefits for the 20-year study period range from $744M to $1,936M; for all other Segment B projects, the estimated benefits range from $584M to $1,856M. Due to the changes in transfer limits resulting from the impedance data correction received after the analysis was complete, the estimates for T019 would be somewhat lower and the estimates for the other Segment B projects would be somewhat higher. The MMU's assessment yielded savings in range of $237M to $592M for T019, and $218M to $523M for all other Segment B projects.

Notwithstanding the impedance data correction, the additional increase of 400-550 MW of emergency transfer capability provided by T019 would be a significant benefit to the G-J locality.

[8] The MMU also estimated 45-year savings but for purposes of comparison, only the 20-year values are reported here.

Accordingly, T019 still offers greater capacity savings than all of the other Segment B projects. The MMU's assessment, which is unaffected by the impedance data correction, indicated additional ICAP savings associated with T019 ranging from $19M to $69M.

While it is difficult to predict the precise amount of these future benefits, under either the NYISO or the MMU methodology, the T019 project clearly produces the highest level of expected ICAP cost savings among the proposed Segment B projects. The Board has concluded that ICAP savings should be considered in the project ranking.

A7. Interconnection Studies

The Public Policy Transmission Planning Process considers the status and results of the interconnection studies in evaluating and selecting the more efficient or cost-effective project. All of the AC Transmission projects are currently under evaluation in the NYISO's Transmission Interconnection Procedures under Attachment P to the NYISO's tariff. The Board requested further investigation of two interconnection issues that were outstanding at the time the Draft Report was issued: potential subsynchronous resonance due to series compensation, and the feasibility of a Middletown transformer upgrade. This section describes updates to the two issues.

A7.1. Potential Subsynchronous Resonance Issue

Subsynchronous resonance (SSR) is a phenomenon that occurs between a series-compensated transmission line and the shaft system of a thermal generator unit. The series-compensated line can cause the network's natural frequencies to fall into the sub-synchronous frequency range (0-60 Hz) which can interact with the resonant frequencies of the turbine shaft system and cause serious damage to the turbine shaft. A generator that is connected near a highly series-compensated transmission line can be at considerable risk for undamped subsynchronous oscillations. A generator does not have to be radially connected to a series-compensated transmission line before SSR occurs, though the risk for generators in an interconnected network is typically less than in a radial system. The SSR phenomenon can be studied by performing frequency scanning of the network to calculate the driving point impedance, as seen from the neutral of the generator, and comparing the resonant frequencies with those of the turbine shaft system.

The National Grid/Transco T019 Segment B proposal introduces a potential risk of SSR that may be caused by interactions between the proposed 50% series compensation and nearby synchronous generators. As part of the System Impact Study conducted for T019 (NYISO Interconnection Queue #543) under Attachment P of the NYISO Open Access Transmission Tariff, Burns & McDonnell conducted an SSR screening study to identify any potential SSR problems that the proposed series capacitors may cause to nearby generators. A review of subsynchronous control interaction was not performed as a part of the screening study. While an initial draft of the screening study submitted by National Grid/Transco indicated that the proposed series compensation would not present a material SSR risk, the final screening study for the System Impact Study indicated that SSR could potentially be an issue. The study identified the potential for SSR between the Empire combined cycle plant (also known as Besicorp) and the project's Knickerbocker-Pleasant Valley series compensation. The Facilities Study for the project will include further screening analysis with other nearby generators and detailed electromagnetic transient studies of any potential resonant conditions. If potential resonant conditions are found, additional network upgrade facilities will also be identified in the Facilities Study.

The NYISO engaged ABB to independently develop and estimate costs for conceptual mitigation solutions to resolve the potential SSR issues identified in the Burns & McDonnell SSR screening study for the National Grid/Transco T019 Segment B project. The ABB report, included as Appendix B, documents a review of various mitigation measures and provides high-level cost estimates.

The NYISO requested ABB to evaluate five mitigation options under two scenarios: (1) SSR occurs only at the Empire plant, and (2) SSR occurs at Empire, Athens, and Cricket Valley plants. ABB estimates that if SSR mitigation is required only at the Empire plant, ABB estimates that costs for mitigations would range from $565,000 to $1,300,000. If SSR mitigation is required at Empire, Athens, and Cricket Valley, ABB estimates that costs would range from $1,860,000 to $4,875,000. ABB provides the pros and cons of each of the five mitigation options. ABB does not recommend and did not provide cost estimates for the option involving resonant blocking filters given that this option is not standard within the industry.

ABB notes that the risk for SSR and the nature of any potential SSR issue is inconclusive based on the current information. ABB also advises that before any mitigation option can be selected, additional analysis is necessary to confirm whether or not there is a risk of SSR and, if so, the precise nature of the SSR issue. Specifically, ABB identifies some concerns with regard to the risk of torsional interaction. Torsional interaction occurs when the effects of an electrical resonance properly align in frequency with a mechanical torsional mode of a machine. ABB states that the risk for torsional interaction is not limited to a radial connection between the machine and the series capacitor, but can occur anytime that the electrical damping becomes negative so long as 1) the mechanical mode aligns with the negative electrical damping; and 2) the electrical damping is sufficiently negative to overcome the mechanical damping. It is assumed that any additional studies to identify the potential for SSR associated with T019, and any necessary mitigation measures, will be addressed through the NYISO interconnection processes.

The ABB Report indicates that any potential SSR issue resulting from the series compensation associated with T019 can be mitigated in a cost effective manner. The need for, and design of, the appropriate mitigation measures will be determined during the remaining portion of the interconnection process and design phase for T019. Therefore, the Board has concluded that T019's series compensation and the potential associated risk of SSR should not negatively affect the project's ranking.

A7.2. Middletown Transformer

The NAT/NYPA T029 and T030 Segment B proposals include replacement of the existing Orange & Rockland Middletown 345/138 kV 562 MVA transformer with a larger 720 MVA transformer. As part of the System Impact Study conducted for T029 (NYISO Interconnection Queue #559) under Attachment P of the NYISO Open Access Transmission Tariff, Orange & Rockland conducted a physical feasibility analysis for the proposed Middletown transformer. O&R identified a potential need for additional Network Upgrade Facilities (NUFs) at the Middletown substation, the Middletown – Shoemaker 138 kV line, and Shoemaker 138 kV substation and raised concerns related to the space required for the proposed transformer, permitting, and outage coordination.

In response to O&R's concerns, SECO conducted a site visit with O&R at the Middletown substation on August 13, 2018 to perform an independent physical feasibility evaluation and environmental assessment of the proposed replacement of the Middletown transformer. SECO determined that the larger transformer would fit inside the Middletown substation, which is assessed to be capable of holding a transformer with a depth of up to 60 feet. Additional equipment at Middletown Substation will have to be replaced and/or relocated. SECO determined the installation of the proposed transformer is physically feasible without impacting the nearby wetlands.

The NUFs associated with the Middletown transformer replacement identified in the System Impact Study will be further evaluated in the Facilities Study and will be refined with respect to equipment, design detail and cost, as applicable.

As indicated in the transfer capability assessment, it was found that the UPNY/SENY N-1-1 Normal and Emergency Transmission Security Limits are not a distinguishing factor among the proposed Segment B projects. It was also found that the Middletown transformer would not provide significant incremental benefits under the studied outage conditions when considering the alternate generation dispatch methodology.

A8. Summary of Board Revisions

Transfer Capability Assessment:

- The Board views that the additional transfer capability provided by T019 constitutes a material benefit as compared to the other proposed projects which will allow for opportunities to leverage additional benefits from future upgrades to New York's transmission infrastructure.
- The additional transfer capability of the T019 project will materially improve the bulk power system's resilience, alleviate constraints between upstate resources and downstate load centers, and allow for greater operational flexibility as compared to the other proposed Segment B projects. The Board has concluded that the additional transfer capability provided by T019 should be reflected as a grid resilience benefit in the Operability metric.
- The Board requested further evaluation of how the Segment B projects could accommodate additional generation deactivations within Lower Hudson Valley if they occur while maintaining reliability because of the associated increase in UPNY/SENY transfer capability. This analysis indicates a significant benefit from the T019 project in a future scenario where the New York system is impacted by large upstate renewable additions and potential generation retirements.
- The Board has concluded that the increased transfer capability associated with the T019 project should be reflected as a material benefit in the Operability and Performance metrics as the project provides additional flexibility in operating the system under design and extreme conditions, and provides better utilization of the UPNY/SENY interface. With the best Cost per MW, T019 achieves this transfer capability more cost effectively than the other Segment B projects.

Installed Capacity Cost Savings Benefits:

- The Board views relative installed capacity cost savings as an appropriate consideration when comparing overall project performance and relative project ranking. While it is difficult to predict the precise amount of these future benefits, NYISO staff, along with the MMU, have each calculated a reasonable order of magnitude estimate of ICAP savings at the Board's request.

- While the estimated calculated savings differ, what is common across the NYISO and MMU methodologies and scenarios is that T019 consistently produces the highest level of ICAP cost savings among the proposed projects. This is a significant finding, which the Board concludes should be considered in the project ranking.

Grid Resilience Benefits:

- The T019 project foundations and structures are designed to specifications that exceed minimum engineering standards. While the cost associated with the enhanced structures is higher, the design provides incremental resilience benefits that are not provided by other proposed projects.

- The Board views the potential benefits of storm hardened transmission facility designs and the ability to withstand heavier ice accumulation loadings and limit cascading structure failures as providing meaningful resilience benefits as compared to the alternate proposed projects. The Board concludes that the incremental resilience benefit of the T019 structural design should be reflected more prominently in the Operability metric and in the project ranking.

Structure Heights:

- Considering the language provided in the PSC Order establishing the AC Transmission need, as well as an understanding of the Article VII siting process, the Board concludes that the PSC, not the NYISO, would address the visual impacts resulting from the number and height of structures used by Developers and that the PSC will determine how to modify projects to address these issues in Article VII siting proceedings.
- Accordingly, the Board has concluded that structure height, as a risk to project siting, should not be used to differentiate between project rankings.

Series Compensation Issues and Related Operational Benefits:

- The Board is satisfied that any potential SSR or related issues resulting from the series compensation can be mitigated in a cost effective manner. The need for, and design of, the appropriate mitigation measures will be determined during the remaining portion of the interconnection process and design phase for T019. Therefore, the Board concluded that the series compensation and the potential associated risk of SSR should not negatively affect T019's ranking.

- Additionally, the Board asked NYISO staff whether there are potential operational benefits associated with the series compensation capability included with T019. NYISO staff provided the Board with information related to how the proposed series compensation can provide certain operational benefits from improved utilization of the UPNY/SENY interface through NYISO actions directing the operational status of the series compensation. The Board has concluded that T019's improved control of Segment B power flows should be reflected as a benefit in the Performance metric.

Production Cost Analysis / Carbon Pricing Sensitivity:

- The Board requested additional production cost analysis to study the potential impact of incorporating carbon pricing in the NYISO's wholesale market on the relative cost effectiveness of Segment B projects.

- The analysis found that while there were increases in the production cost savings for all Segment B projects, the inclusion of the social cost of carbon did not alter the comparative ranking of projects with regard to production cost savings to capital cost ratio.

Middletown Transformer:

- In response to concerns voiced by the facility owner, the NYISO conducted site visits and additional analysis to determine that there were no appreciable barriers to accommodating the upgrade to the Middletown substation proposed by NAT/NYPA.
- Using the alternate dispatch methodology for the transfer limit analysis documented in this Addendum, it is found that the benefits provided by the proposed transformer upgrade are minimal and not a significant distinguishing factor among the Segment B projects.

Project Synergy and Diversity Considerations:

- The Draft Report included a synergy cost savings that might be realized if a single to developer conducted the work to build both segments. The conservative 5% was provided by the NYISO independent consultant (SECO) to represent shared common services. The Board asked NYISO staff and SECO to also consider whether having a diversity in project developers (*i.e.*, different developer for Segments A and B) could have benefits outside costs. SECO opined that having different developers for each segment could bring qualitative benefits, such as diversity of financing risks of the projects and the availability of additional resources to support project development.

- Subsequently, the Board has concluded that while cost savings may be realized from synergies of a common developer to Segments A and B, there are also diversity benefits that may be realized.

A9. Revised Ranking

Based on consideration of all the evaluation metrics for efficiency or cost effectiveness, and having given due weight to metrics according to input from the NYISO Board and subsequent conclusions reached by the Board, the NYISO has determined the following revised ranking of the Segment B projects.

Table A-10: Segment B Overall Ranking

Ranking	Project ID	Developer Name	Project Name
1	T019	National Grid / Transco	New York Energy Solution Seg. B
2	T029	North America Transmission / NYPA	Segment B Base
3	T023	NextEra Energy Transmission New York	Enterprise Line: Segment B-Alt
4	T022	NextEra Energy Transmission New York	Enterprise Line: Segment B
5	T030	North America Transmission / NYPA	Segment B Enhanced
6	T032	ITC New York Development	16NYPP1-1B AC Transmission

In consideration of the conclusions described in Section A8, T019 is ranked first among the Segment B projects. Based on the estimated project schedules, the in-service date established for the purposes of the Development Agreements for the selected Segment A and Segment B projects is December 2023. Critical comparisons of the Segment B projects and the resulting ranking are summarized below:

- T019 has the highest incremental UPNY/SENY transfer capability, resulting in the lowest cost per MW ratio, highest production cost savings, highest CO_2 emissions savings, and highest ICAP savings of the Segment B projects. The series compensation component of the project provides performance benefits through greater operational flexibility and utilization of the UPNY/SENY interface. The project also has the most resilient foundation and structure design resulting in significant benefits for the operability of the transmission system during extreme weather events.
- T029 is estimated to have the second-lowest capital costs among the Segment B projects. However, the project achieves less production cost savings than T019 and has a higher Cost per MW ratio. T029 also has a less resilient foundation and structure design than T019.
- T023's capital costs are estimated to be slightly more than T029 with comparable electrical performance and comparable replacement of aging infrastructure, therefore T023 is ranked lower than T029. T023 would retire additional aging lattice transmission

structures compared to T022 resulting in a more resilient design overall.

- T022 is estimated to have the lowest capital costs of the Segment B projects with comparable electrical performance as the other Segment B projects, with the exception of T019. However, T022 proposes the least amount of aging infrastructure replacement among Segment B projects.
- T030 is more expensive because of an additional conductor (triple-bundle rather than double-bundle), however the additional conductor actually results in less production cost savings in the CES+Retirement scenario while only achieving slightly greater emergency transfer capability compared to T029. As such, T030 has the lowest production cost savings of the Segment B projects and would not have materially higher ICAP savings.
- T032 is the most expensive Segment B project with numerous inherent siting risks in the design, as identified in the Draft Report, with no material incremental performance benefits. T032 has the lowest production cost benefit/cost ratio and the highest cost-per-MW ratio.

Additional Appendices

Appendix G – Market Monitoring Unit Memo Re: Estimating Capacity Benefits

Appendix H – ABB Subsynchronous Resonance Mitigation Cost Estimation Report

NYISO BOARD OF DIRECTORS' SUMMARY OF PROPOSED MODIFICATIONS TO DRAFT AC TRANSMISSION PUBLIC POLICY TRANSMISSION PLANNING REPORT AND PROPOSED SELECTIONS

December 27, 2018

INTRODUCTION

NYISO staff submitted the draft AC Transmission Public Policy Transmission Planning Report ("Draft Report") to the NYISO Board of Directors ("Board") on June 19, 2018 for its review and action. The Draft Report summarized NYISO staff's analysis and recommendations concerning proposed solutions to address the AC Transmission Public Policy Transmission Needs identified by the New York Public Service Commission ("PSC"), which include the need to increase Central East transfer capability by at least 350 MW ("Segment A") and UPNY/SENY transfer capability by at least 900 MW ("Segment B").

In the Draft Report, NYISO staff recommended that the Board select as the more efficient or cost effective solution to address the AC Transmission Needs the Segment A Project T027 proposed jointly by North American Transmission ("NAT") and New York Power Authority ("NYPA") and the Segment B Project T029 also proposed by NAT and NYPA.

The Board provided interested parties with the opportunity to submit comments and to make oral presentations for the Board's consideration prior to its taking action on the Draft Report. Based on this input and the Board's independent review of the Draft Report, the Board directed NYISO staff to conduct certain additional studies and analyses.

After careful consideration of the initial Draft Report, comments provided by interested parties, and the additional analyses performed by NYISO staff, the Board concludes that the more efficient or cost effective solution for Segment A is Project T027. The Board also concludes that the most efficient or cost effective solution for Segment B is Project T019, which was jointly proposed by Niagara Mohawk Power Corporation d/b/a National Grid ("National Grid") and the New York Transco, LLC ("Transco"). The Board has directed that the Draft Report be modified accordingly.

The additional analyses and the Board's conclusions are summarized below and are detailed in an Addendum to the Draft Report prepared by NYISO staff ("Revised Report"). In accordance with the NYISO's tariff, the Revised Report is being returned to the Management Committee for further review and comment. Following the Board's consideration of these comments, the Board will make its final determination on the Revised Report and the selection of the Public Policy Transmission Projects to address the AC Transmission Needs.

BACKGROUND

A. Board's Role in Approving Public Policy Transmission Planning Report and Selecting Public Policy Transmission Project

Section 31.4 of the NYISO's Open Access Transmission Tariff ("OATT") establishes the requirements for the NYISO's Public Policy Transmission Planning Process ("Public Policy Process") by which the NYISO addresses transmission needs that are driven by public policy requirements identified by the PSC. Pursuant to these requirements, NYISO staff develops a draft Public Policy Transmission Planning Report that sets forth its analyses and recommendations concerning proposed solutions to address a Public Policy Transmission Need. The draft report is submitted to the Electric System Planning Working Group ("ESPWG") and Transmission Planning Advisory Subcommittee ("TPAS") for stakeholders' review and comment and then forwarded to the Business Issues Committee and Management Committee for discussion and an advisory vote. Following the Management Committee vote, the draft report, with stakeholder input, is forwarded to the Board for its review and action.

The Board is ultimately responsible for selecting the more efficient or cost effective solution to address a Public Policy Transmission Need in accordance with the selection metrics established in the tariff. Section 31.4.11.2 of the OATT establishes the process for the Board's review and action on the Draft Report. Specifically, the "Board may approve the Public Policy Transmission Planning Report as submitted or propose modifications on its own motion, including a determination not to select a Public Policy Transmission Project to satisfy a Public Policy Transmission Need." If the Board proposes any changes to the report, "the revised report shall be returned to the Management Committee for comment." Furthermore, "[t]he Board shall not make a final determination on a revised report until it has reviewed the Management Committee comments, including comments regarding the Market Monitoring Unit's evaluation."

B. AC Transmission Process

In accordance with the OATT, NYISO staff developed the Draft Report, which summarized staff's analyses and recommendations based on its evaluation of proposed solutions to address the AC Transmission Public Policy Transmission Needs identified by the PSC. NYISO staff recommended as the more efficient or cost effective solutions to address the AC Transmission Needs (i) Segment A Project T027 proposed jointly by NAT/NYPA and (ii) Segment B Project T029 also proposed by NAT/NYPA.

NYISO staff reviewed the Draft Report with stakeholders at ESPWG/TPAS meetings and then forwarded the Draft Report first to the Business Issues Committee and then to the Management Committee for their review and advisory votes. On June 26, 2018, the Management Committee conducted an advisory vote on the Draft Report. The Management Committee approved the motion with 80% of the vote in favor (with abstentions) and Con Edison, National Grid, and Orange & Rockland voting against the motion.

NYISO staff then submitted the Draft Report to the Board for its review and action. Along with the Draft Report, NYISO staff provided the Board with the comments submitted by stakeholder and developers during the committee process. In addition, the Board invited stakeholders and developers to submit additional comments and to make oral presentations for the Board's consideration. At its July 2018 meeting, the Board heard oral presentations by NAT/NYPA, National Grid/Transco, and NextEra. National Grid/Transco also provided additional written comments at the oral presentations.

OVERVIEW OF MODIFICATIONS TO THE DRAFT REPORT

After careful consideration of the initial Draft Report, the comments and oral presentations provided by developers and stakeholders, and the additional analyses provided by NYISO staff, the Board has determined that certain changes are required to the Draft Report. The Board agrees that, as recommended in the initial Draft Report, the more efficient or cost effective solution for Segment A is Project T027. However, with respect to Segment B, the Board reaches a different conclusion than that recommended in the initial Draft Report.

The Board finds that the more efficient or cost effective transmission solution for Segment B is Project T019 rather than Project T029. The grounds for this conclusion are summarized below, and supporting data and analyses are included in the Addendum to the Revised Report.

Transfer Capability

In evaluating Segment B projects, the Board concludes that Project T019's additional transfer capability drives superior performance across a number of important selection metrics. As described in the Draft Report, transfer limits significantly impact metrics such as Cost-per-MW and Operability, as well as estimated Installed Capacity cost savings, among others. The Board directed NYISO staff to conduct additional analyses related to the calculation of transfer limits for each of the proposed projects and to evaluate the resulting impact on key metrics, as discussed below.

Project T019 provides significantly greater transfer capability across the Upstate New York to Southeast New York ("UPNY/SENY") transmission interface as compared to all other

Segment B projects. This additional transfer capability provides several important benefits, as described below.

Project T019 provides important benefits by alleviating, to a greater extent than any other Segment B project, constraints that limit the economic flow of power between upstate resources the downstate load centers. In addition, Project T019's incremental transfer capability across the UPNY/SENY transmission interface will significantly improve grid resilience grid during stressed system conditions and disruptive events. Further, the Project T019's superior transfer capability will provide for greater future operating flexibility, particularly for managing generator outages or retirements in the Lower Hudson Valley. This will improve grid resilience and support the continued evolution of New York's energy landscape.

The additional transfer capability provided by Project T019 will make the greatest use of the Segment B corridor now, and it will allow New York to realize even greater benefits under a variety of future system conditions. The Board concludes that the Performance metric should take into account the increased utilization of the Segment B corridor and the additional benefits that a project would provide in the future if downstream limitations are alleviated, which potentially could be achieved without significant additional transmission development.

Evaluating the transfer limits assuming all facilities in service (N-1), NYISO staff produced a supplemental calculation of the Cost-per-MW ratio, which is contained in the Addendum. Based on the independent cost estimates provided by the NYISO independent consultant Substation Engineering Company (SECO), for each project and the revised transfer limits, the recalculated results continue to show that Project T019 has the lowest Cost-per-MW ratio of all Segment B projects.

The Board requested further evaluation of the extent to which each of the Segment B projects could accommodate additional generation retirements within the Lower Hudson Valley, should they occur, while maintaining reliability. Project T019 performs best among Segment B projects in this analysis as a result of its greater transfer capability. Under certain scenarios examined, Project T019 would accommodate significant additional generation retirements from the Lower Hudson Valley as compared to other Segment B projects. The Board views this to be a significant benefit that should be recognized under the Operability metric and impact project ranking.

This aspect of the Board's rationale for selecting Project T019 for Segment B is similar to its rationale for selecting Project T027 for Segment A. The superior transfer capabilities of these projects provide significant benefits that exceed those offered by the other proposed projects. The Board concludes that it is critically important to maximize the transmission capacity of these important rights-of-way at this juncture, especially when considering that no major AC transmission infrastructure has been developed in New York in over 30 years.

Installed Capacity Cost Savings

In the Draft Report, estimated Installed Capacity cost savings were identified for purposes of supporting a Board decision to select a project, rather than to differentiate among specific projects. The Draft Report provided estimated capacity cost savings for projects in Tier 1 and 2. NYISO staff did not evaluate the capacity benefits for Project T019, however, as it was initially classified as a Tier 3 project.

The Board views relative Installed Capacity cost savings as an appropriate and important consideration, among others, when comparing overall project performance. The Board notes that Installed Capacity costs are identified as a potential selection metric in the NYISO tariff. Therefore, the Board asked NYISO staff to conduct further analysis evaluating whether particular Segment B projects, including T019, are likely to produce greater Installed Capacity cost savings relative to the other proposed projects.

The additional analysis indicates that Project T019's configuration provides the potential for materially greater Installed Capacity cost savings than the competing projects. While it is difficult to predict these future cost savings with precision, NYISO staff, with assistance from GE, calculated reasonable estimates using the "optimizer" tool accepted by FERC for purposes of calculating Locational Minimum Installed Capacity Requirements (LCRs). These estimates show that T019's incremental Installed Capacity savings range from $160 million to $224 million over 20 years as compared to other proposed projects. The NYISO's Market Monitoring Unit ("MMU"), Potomac Economics, developed an estimate using a different methodology indicating incremental Installed Capacity cost savings associated with T019 ranging from $19 million to $69 million. The MMU emphasized that its calculation methodology is sensitive to various assumptions and noted that the expected cost savings is likely to be higher.

While the estimates vary under different calculation methodologies and scenarios, Project T019 has been shown to consistently produce the highest level of Installed Capacity cost savings among the proposed Segment B projects. This is a significant finding that is important to consumers. The Board therefore concludes that it should be considered in the project ranking.

Resilience Benefits

Value of Structures that Exceed Minimum Standards

The foundations and structures proposed for Project T019 are designed to specifications that exceed minimum engineering standards. The Draft Report recognized that benefit under the Operability metric.

The Board asked NYISO staff to provide further information on how the design of these structures provides additional resilience benefits. These benefits include the ability of the towers to withstand a higher level of icing and wind storm events. The structures proposed by Project

T019 could potentially avoid, or mitigate the extent of, catastrophic tower collapses, including cascading structure failures, such as those experienced in the 1998 ice storm in northern New York. The Board is particularly cognizant of the importance of resilience and the need to prepare the electric grid for extreme weather events and other contingencies.

While the cost associated with the structures is higher, the design provides benefits that are not provided by any other proposed project. The Board concludes that the incremental benefit of this design should be recognized more prominently in the Operability metric and in the project ranking.

Value of Additional Transfer Capability

Improving transmission capability within New York State has the additional benefit of improving the resilience of the transmission grid during stressed system conditions and disruptive events. These events can occur because of many different factors; examples include extreme storm conditions which can result in a large number of bulk electric system transmission outages or during events when critical supply resources are forced out of service or otherwise unavailable.

Therefore, the Board has concluded that the resilience benefit of the additional transfer capability provided by Project T019 should be reflected in the Operability metric and in the project ranking.

Structure Height

The Draft Report considered structure height to differentiate among projects. The Board acknowledges that the risk of obtaining siting approval is an appropriate metric for the NYISO to consider in accordance with its tariff. However, the Board views structure height as a siting issue that is more appropriately addressed through the Article VII siting process.

This finding is consistent with statements made by the PSC in its Order finding a Public Policy Transmission Need. In its December 17, 2015 order establishing the AC Transmission Needs, the PSC stated that "[a]s to structure heights, the Commission will not mandate criteria to be applied by the NYISO . . . ." Instead, the PSC stated that "all proposers of transmission solutions should be aware as they prepare their submissions that minimization of structure heights will be an important issue in the siting review process so applicants should be careful not to lock themselves into designs that could not later be approved." Moreover, the PSC said that "a change in structure types and structure heights of the types contemplated may have local, site specific visual impacts" that would be addressed by the Commission and the Staff in the Article VII siting process. Finally, with respect to visual impacts from a reduction in the total number of structures used, the PSC determined that "the NYISO would not have sufficient information to determine such impacts and the Commission does not want to convert the NYISO process into a siting process. Those matters will be further addressed by the Commission in the Article VII siting cases."

Taken together, these statements are consistent with the view that the PSC, not the NYISO, should address the visual impacts resulting from the number and height of structures used by developers and that the PSC will determine whether to require modifications to address these issues in Article VII siting proceedings. Accordingly, the Board concludes that structure height as a risk to project siting should not be used to differentiate among projects.

Series Compensation

National Grid and Transco proposed a series compensation element as part of Project T019. The Draft Report identified a potential for subsynchronous resonance ("SSR") caused by the interaction of the proposed series compensation and nearby synchronous generators. The Draft Report indicated this to be a potential risk to project completion.

National Grid and Transco submitted an initial screening study that indicated that the proposed series compensation would not present a material SSR risk. However, a subsequent System Impact Study for T019 completed in the NYISO's interconnection process found that SSR potentially could be an issue.

In light of these preliminary study results and related stakeholder comments, the Board requested that NYISO staff conduct further analysis to examine potential mitigation measures for SSR risk and the estimated cost of such measures. NYISO staff engaged ABB to perform an independent assessment that concluded that potential SSR issues caused by the series compensation feature of T019 can be mitigated through cost effective upgrades. ABB identified a range of viable mitigation approaches, the most costly of which was approximately $5 million.

Based on the ABB assessment, the Board is satisfied that any potential SSR issues resulting from the series compensation can be adequately mitigated in a cost effective manner. The need for, and design of, the appropriate mitigation measures will be determined in the interconnection process and design phase for T019. The Board therefore concludes that series compensation and the potential for SSR should not negatively impact T019's ranking.

The Board also asked NYISO staff whether there are potential operational benefits associated with the series compensation capability of Project T019. NYISO staff advised that series compensation provides an improved level of control of Segment B power flows. Specifically, the NYISO can direct the proposed series compensation to be switched in or out of service in response to grid reliability needs or to provide for more efficient use of the New York State transmission system, which can result in lower overall energy market costs and provide benefit to consumers. The NYISO has realized similar operational benefits, both from a grid reliability and energy market administration perspective, by directing the switching of the existing series compensation on the Marcy-South transmission lines based on expected summer and winter seasonal congestion patterns. The Board concludes that this benefit should be reflected in the Operability metric for T019.

Production Cost Analysis / Carbon Pricing

In the Draft Report, Project T019 produced incremental production cost savings of $50M over Project T029. The Board asked NYISO staff to perform additional production cost analyses to evaluate the potential impact of incorporating carbon pricing in the NYISO's wholesale market on the relative cost-effectiveness of the proposed Segment B projects.

NYISO staff evaluated Segment A Project T027 in combination with the proposed Segment B projects under a carbon pricing scenario.[1] NYISO staff's analysis found that while there were increased production cost savings offered by all relevant Segment B projects, with Project T019 demonstrating a marginal $3M increase in production cost savings, the inclusion of the social cost of carbon did not alter the comparative ranking of projects with regard to production cost savings relative to capital cost.

Middletown Transformer

Project T029 and Project T030 included as part of their proposals the replacement of an existing transformer at Orange and Rockland's (O&R's) Middletown substation with a new transformer with higher ratings.

O&R expressed concerns over the physical feasibility of this upgrade. O&R also identified a potential need for additional Network Upgrade Facilities at the Middletown substation, the Middletown – Shoemaker 138 kV line, and Shoemaker 138 kV substation and raised concerns related to the space required for the proposed transformer, permitting, and outage coordination.

In response to O&R's concerns, the Board asked NYISO staff to conduct additional review on the feasibility issues surrounding the proposed transformer replacement. NYISO staff directed SECO to conduct a site visit to perform an independent physical feasibility evaluation and environmental assessment. O&R was present at the site visit. SECO determined that the larger transformer would fit in the existing available space in the Middletown substation. SECO also determined that the installation of the proposed transformer is physically feasible without impacting the nearby wetlands.

[1] Simulations were not performed for T030 (North America Transmission/NYPA) because in all CES cases it underperforms T029 in production cost savings.

SECO noted that additional equipment at Middletown Substation would have to be replaced and/or relocated. Any additional upgrades associated with the Middletown transformer replacement identified in the system impact study would have be further evaluated in the Facilities Study. This study would refine upgrades identified with respect to equipment, design detail and cost, as applicable. It was additionally found that the Middletown transformer would not provide significant incremental UPNY/SENY transfer capability benefits under transmission outage conditions when considering the alternate generation dispatch methodology described in the Addendum. On balance, the proposed Middletown transformer replacement was not a material factor in the Board's selection.

Synergy v. Diversity

The Draft Report considers the potential impact of cost savings in the event that the same developer constructs both Segment A and Segment B. This is consistent with the PSC Order that indicated that such savings "may be considered" in such event. NYISO staff sought input, reflected in the Draft Report, from its independent consultant on the categories of costs that may experience savings. Based on this data, NYISO used a value of 5% potential synergy savings.

The Board asked staff to consider whether having a *diversity* of project developers (*i.e.*, different developer for Segments A and B) could provide benefits unrelated to project costs. NYISO staff evaluated the issue and sought input from its consultant. While NYISO staff was unable to quantify a dollar value associated with diversity, NYISO's consultant indicated that having different developers for each segment could bring qualitative benefits, such as diversifying financing risks of the projects and increasing the availability of additional resources to support project development. The Board concludes that such qualitative benefits are relevant to the Board's selection.

Additional Observations

The Board notes the additional conclusions from the Draft Report:

- Project T019 produces the greatest incremental voltage transfer limits across the Central East and UPNY/Con Ed interfaces.
- Project T019 has the lowest UPNY/SENY Cost-per-MW.
- Project T019 produces the greatest baseline production cost savings.
- Project T019 produces the greatest production cost savings for the CES+Retirement scenario.
- Project T019 produces greater CO_2 reductions.
- Project T019 produces the greatest 20-year incremental energy flow across UPNY/SENY and Central East interfaces.

Conclusion and Next Steps

Based upon the additional analysis and due diligence and careful examination of various findings in the original Draft Report, the Board concludes that Project T019 demonstrates superior performance across a broader range of metrics when compared to T029 and all other Segment B projects. This superior performance warrants the estimated additional costs of Project T019 compared to other Segment B projects, and this Project T019 will best serve the interest of New York ratepayers.

The significant distinguishing factor among the proposed Segment B projects is Project T019's additional transfer capacity across the UPNY-SENY transmission interface, which drives superior performance across a number of important metrics. The Board finds this especially compelling in recognition that Segment B of the AC Transmission Public Policy Transmission Need was focused specifically on increasing the transfer capability of this critical transmission interface.

Therefore, the Board concludes that Project T019 is the more efficient and cost effective Segment B project. Final selection of the projects will only occur after stakeholders have had the opportunity to comment on the revised report and the Board has had the opportunity to consider those comments.

Over the past six months, the Board has considered inputs from a number of sources including the Draft Report; the developers' proposals; assessments by several independent consultants including GE, SECO, and ABB; oral and written stakeholder comments; and input from the independent MMU, Potomac Economics. The Board has diligently weighed these inputs against the various metrics set forth in the NYISO tariffs and exercised its judgment on a wide variety of engineering, operational, economic, and other issues. Recognizing the NYISO's dual roles as transmission system operator and wholesale market administrator, this Board's challenge is to select the more efficient or cost effective transmission projects to address New York State's public policy needs. Subject to consideration of further comments from stakeholders and the MMU, the Board has identified the two projects that will best serve the interests of New York's electric consumers well into the future.

Attached to this memo is the Revised Report. The Addendum to the Revised Report reflects the Board's proposed changes to the recommendations in the Draft Report and details the additional analysis described above. Pursuant to Section 31.4.11.2 of the OATT, the Revised Report will be returned to the Management Committee for further comment. Following the Board's consideration of these comments, the Board will make its final determination on the Revised Report and the selection of the Public Policy Transmission Projects to address the AC Transmission Needs.

# # #

AC Transmission Public Policy Transmission Planning Report

A Report by the
New York Independent System Operator

Initial Report
June 19, 2018

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Executive Summary

This report presents the results of the Public Policy Transmission Planning Process administered by the New York Independent System Operator (NYISO) for the AC Transmission Public Policy Transmission Needs. The New York State Public Service Commission (PSC) issued an order on December 17, 2015 identifying the AC Transmission Public Policy Transmission Needs. The following report represents the culmination of a multi-year joint effort by the NYISO, PSC, Developers, and stakeholders to address transmission needs associated with the Central East and Upstate New York/Southeast New York (UPNY/SENY) interfaces. The NYISO conducted extensive evaluations of the proposed viable and sufficient transmission projects and recommends the ranking and selection of the more efficient or cost-effective transmission solutions to the AC Transmission Public Policy Transmission Needs as described herein.

The NYISO commenced the Public Policy Transmission Planning Process for the first time by soliciting proposed transmission needs driven by Public Policy Requirements from NYISO's stakeholders and other interested parties. The NYISO filed the proposed transmission needs for consideration by the PSC, which, upon considering various comments submitted, issued an order that found significant benefits could be achieved by relieving the transmission constraints along the Central East and UPNY/SENY corridors. The PSC, therefore, adopted the AC Transmission Public Policy Transmission Needs ("AC Transmission Needs") specifically consisting of two segments: Segment A (Central East interface) and Segment B (UPNY/SENY interface). A key objective is to utilize existing rights-of-way to increase Central East transfer capability by at least 350 MW and UPNY/SENY transfer capability by at least 900 MW. Further details of the AC Transmission Needs are provided in Section 2.

The NYISO performed analysis to identify the specific transmission constraints in the transmission system in Central, Eastern, and Southeastern New York. Following review of the baseline analysis and discussions with stakeholders and prospective Developers, the NYISO issued a solicitation for solutions to address the AC Transmission Needs. The NYISO conducted the Viability and Sufficiency Assessment to address the needs, and identified thirteen viable and sufficient projects. Details of the proposed projects are provided in Section 3.

Following the PSC's review of the Viability and Sufficiency Assessment and consideration of public comments, the PSC issued an order confirming the AC Transmission Needs. Upon issuance of the order confirming the need for transmission, the NYISO immediately commenced a detailed evaluation of each viable and sufficient transmission proposal with the assistance of its independent consultant, Substation Engineering Company (SECO).

In determining which of the viable and sufficient proposed transmission projects are the more efficient or cost-effective solutions to satisfy the AC Transmission Needs, the NYISO considered the metrics set forth in the tariff and ranked each proposed project based on the its performance under these metrics. These metrics include capital costs, cost per MW, expandability, operability, performance, property rights and routing, risks to siting and operation, development schedule, and other metrics such as production cost savings, locational based marginal price (LBMP) savings, emissions savings, and congestion.

A core concept of the NYISO's evaluation and selection process is the use of an independent consultant to review each proposed project and apply a consistent methodology across all projects for establishing cost estimates, schedule estimates, and routing assessments. Utilizing detailed project information provided by the Developers, SECO developed independent capital cost and schedule estimates considering material and labor cost by equipment, engineering and design work, permitting, site acquisition, procurement and construction work, and commissioning needed for the proposed project. SECO's cost estimates for the proposed transmission projects range from $491 million to $863 million for Segment A projects and $373 million to $536 million for Segment B projects, with schedules ranging from 52 months to 55 months for Segment A projects and 47 months to 51 months for Segment B projects following the NYISO's selection.

As part of the AC Transmission proceedings, the PSC identified benefits from avoiding refurbishment costs by retiring aging transmission infrastructure and utilizing the right-of-way for new, upgraded transmission. In 2015, The Brattle Group estimated that, if no new transmission were built, the refurbishment of the Porter – Rotterdam 230 kV lines (Segment A corridor) and two 115 kV lines from Knickerbocker to Pleasant Valley (Segment B corridor) would cost $560 million and $279 million (both in 2015 $), or $839 million in total. The retirement of these aging transmission facilities is included in all project proposals. Therefore, the avoided refurbishment cost for these lines is not a distinguishing factor between projects, but should be recognized as a significant benefit provided by the selected projects.

A key objective of the AC Transmission Needs is to increase Central East and UPNY/SENY transfer capability. Each project's efficiency in achieving this objective is measured in a number of ways utilizing power flow and production cost simulations under a variety of system dispatches and conditions. To determine the cost effectiveness of each project, the NYISO compared these electrical results to SECO's independent capital cost estimate for each project. Further, the increased transfer capability and relief of these New York transmission constraints would result in production cost savings of as much as $337 million for the baseline system assumptions, and $1,129 million for the Clean Energy Standard (CES) + generation retirement scenario over the first 20 years of a project being in-service. The achieved savings may vary for each transmission project depending on the project design and system conditions in the future. The NYISO also assessed the potential capacity procurement savings that may be realized if the AC Transmission Needs are addressed. Although the NYISO continues to refine its capacity savings metric and did not use it to rank projects, the potential range of capacity savings of $550 to $850 million supports the recommendation for selection of a project to meet the transmission needs consistent with NYISO's competitive markets and the interests of consumers.

The NYISO also considers qualitative metrics such as expandability, operability, performance, and the risks associated with each project. The NYISO considered how the proposed projects affect flexibility in operating the system, such as dispatch of generation, access to operating reserves, access to ancillary services, and the ability to remove transmission for maintenance. Certain projects afford greater expandability opportunities through substation design and transmission line configurations, while other projects offer greater operability of the system through improved performance under outage conditions or better integration of facilities with the overall system.

A two-step process was used to rank the Segment A and Segment B projects, as detailed in Section 4. Projects in each segment were first analyzed individually, and then compared against each other to identify the major performance and risk differences as distinguishing factors. Metrics analyzed in this step include independent cost estimates, duration estimates, transfer capability, operability, expandability, property rights, replacement of aging infrastructure, and risks to project siting and operation. In the second step, the NYISO compared combinations of Segment A and Segment B projects based on consideration of all the evaluation metrics for efficiency or cost effectiveness. Cost savings were considered for synergies that may be realized for Segment A and Segment B projects proposed by the same developers. Improved system efficiency or cost effectiveness was also considered due to the combined electrical characteristics regardless of whether the projects are proposed by the same developers or not. The NYISO then used the combination to inform the numerical ranking in each Segment. **Table E-1** shows the project ranking in each Segment.

Table E-1: Overall Ranking

Segment	Ranking	Project ID	Developer Name	Project Name
A	1	T027	North America Transmission / NYPA	Segment A Double Circuits
	2	T028	North America Transmission / NYPA	Segment A Enhanced
	3	T018	National Grid / Transco	New York Energy Solution Seg. A
	4	T021	NextEra Energy Transmission New York	Enterprise Line: Segment A
	5	T031	ITC New York Development	16NYPP1-1A AC Transmission
	6	T026	North America Transmission / NYPA	Segment A Base
	7	T025	North America Transmission / NYPA	Segment A + 765 kV
B	1	T029	North America Transmission / NYPA	Segment B Base
	2	T030	North America Transmission / NYPA	Segment B Enhanced
	3	T022	NextEra Energy Transmission New York	Enterprise Line: Segment B
	4	T019	National Grid / Transco	New York Energy Solution Seg. B
	5	T023	NextEra Energy Transmission New York	Enterprise Line: Segment B-Alt
	6	T032	ITC New York Development	16NYPP1-1B AC Transmission

Based on consideration of all the evaluation metrics for efficiency or cost effectiveness, together with input from stakeholders and the New York State Department of Public Service (DPS), the NYISO staff recommends that the NYISO Board of Directors select the Segment A Double-Circuit proposal (T027) proposed jointly by North America Transmission/NYPA, and the Segment B Base proposal (T029) also proposed by North America Transmission/NYPA, as the more efficient or cost-effective transmission solutions to satisfy the AC Transmission Public Policy Transmission Needs. Figure E-1 shows the geographic map of T027 and T029.

Major components of T027 include a new 86-mile double-circuit line between the Edic and New Scotland 345 kV substations, and the addition of a new Princetown 345 kV switchyard to connect to Rotterdam. The double-circuit line will utilize rights-of-way currently occupied by the Porter-Rotterdam 230 kV lines that will be decommissioned as part of the project. The benefits provided by the double-circuit 345 kV design include significant increases in Central East transfer capability, increased production cost savings, and excellent operability and expandability. T027 also has lower electromagnetic field (EMF) risk due to the double-circuit design.

Figure E-1: Map of T027 and T029

Among all Segment A proposals, T027 proposes the highest total mileage of aging infrastructure replacement. Considering the infrastructure replacements proposed by T027, this project will not only add efficient and cost-effective new transmission facilities, but will also obviate the need for a significant amount of transmission refurbishment costs. Therefore, the overall quantitative and qualitative benefits of T027 warrant the higher cost of that project relative to some other Segment A proposals.

Major components of T029 include a new Knickerbocker 345 kV switching station on the existing New Scotland to Alps 345 kV line, and a new 345 kV line from Knickerbocker to Pleasant Valley. The project includes various modifications to the 115 kV system between Greenbush and Pleasant Valley to allow for use of existing rights-of-way to accommodate the 345 kV line. T029 has the second lowest cost of the Segment B projects and provides similar UPNY/SENY transfer capability and production cost savings, while demonstrating excellent operability. Moreover, T029 is assessed to have the lowest siting risk due to the lower increases in structure height compared to other projects; in fact, more than half of its new structures will be lower than existing structure heights along the right-of-way.

The combination of T027 and T029 is estimated to cost $856 million, taking into account a 5% discount for cost efficiency synergies of having a single developer for both projects. Assuming a 30% contingency factor of $257 million, the combined projects are estimated to cost $1,113 million. The projects are expected to provide combined production cost savings and capacity procurement savings in a range of $881 million to $1,979 million depending on future system conditions. Combining the production cost savings and ICAP savings for T027+T029, the savings over capital cost ratio is 0.8 to 1.1 for the baseline, and 1.5 to 1.8 for the CES + Retirement scenario. Moreover, the projects would also result in savings from avoided aging transmission refurbishment costs estimated to total $839 million.

Based on the project schedule for T027 and T029 estimated by SECO, the in-service date for the selected projects is April 2023 if there is no major delay in siting. Following the approval of this report and selection of the projects by the Board of Directors, the NYISO will tender Development Agreements to the Developers of the selected transmission projects.

1. The Public Policy Transmission Planning Process

The Public Policy Transmission Planning Process (PPTPP) is the newest component of the NYISO's Comprehensive System Planning Process and considers transmission needs driven by Public Policy Requirements in the local and regional transmission planning processes. The Public Policy Transmission Planning Process was developed in consultation with NYISO stakeholders and the New York State Public Service Commission (PSC), and was approved by the Federal Energy Regulatory Commission (FERC) under Order No. 1000.[1] At its core, the Public Policy Transmission Planning Process provides for the NYISO's evaluation and selection of transmission solutions to satisfy a transmission need driven by Public Policy Requirements. The process encourages both incumbent and non-incumbent transmission developers to propose projects in response to an identified need.

The NYISO is responsible for administering the Public Policy Transmission Planning Process in accordance with Attachment Y to its Open Access Transmission Tariff (OATT). Consistent with its obligations to regulate and oversee the electric industry under New York State law, the PSC has the primary responsibility for the identification of transmission needs driven by Public Policy Requirements.

A Public Policy Transmission Planning Process cycle typically commences every two years following the posting of the draft Reliability Needs Assessment study results, and consists of four core steps—(1) the identification of a Public Policy Transmission Need, (2) developers proposing solutions to satisfy the identified Public Policy Transmission Need, (3) an evaluation of the viability and sufficiency of the proposed Public Policy Transmission Projects and Other Public Policy Projects, and (4) a comparative evaluation of the viable and sufficient projects for the NYISO Board of Directors to select the more efficient or cost-effective Public Policy Transmission Project that satisfies the Public Policy Transmission Need, if the PSC confirms that there is a need for transmission. The selected Public Policy Transmission Project is eligible for cost allocation and cost recovery under the NYISO's tariffs.

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[1] *See New York Indep. Sys. Operator, Inc.*, Order on Compliance Filing, 143 FERC ¶ 61,059 (April 18, 2013); *New York Indep. Sys. Operator, Inc.*, Order on Compliance Filing, 148 FERC ¶ 61,044 (July 17, 2014); *New York Indep. Sys. Operator, Inc.,* Order on Compliance Filing, 151 FERC ¶ 61,040 (April 16, 2015); *New York Indep. Sys. Operator, Inc.,* Order on Compliance Filing, 155 FERC ¶ 61,037 (April 18, 2016); *New York Indep. Sys. Operator, Inc.*, Order on Compliance Filing, 162 FERC ¶ 61,107 (February 15, 2018). *See also New York Indep. Sys. Operator, Inc.*, Acceptance of Compliance Filings in Docket Nos. ER13-102-012, ER13-102-013 and ER13-102-014 (June 5, 2018)(granting final acceptance to NYISO regional planning compliance filings).

1.1 Identification of a Public Policy Transmission Need

For each cycle of the Public Policy Transmission Planning Process, the NYISO begins the process by inviting stakeholders and interested parties to submit proposed transmission needs driven by Public Policy Requirements. A Public Policy Requirement includes an existing federal, state, or local law or regulation, or a new legal requirement that the PSC establishes after public notice and comment under New York State law.

Following the submission of proposals, the NYISO posts all submittals on its website and provides those submissions, including any proposal from the NYISO, to the PSC. The NYISO separately provides any submission that proposes the identification of transmission needs driven by Public Policy Requirements within the Long Island Transmission District to the Long Island Power Authority (LIPA). The PSC and LIPA, as applicable, consider the proposals in order to identify any Public Policy Transmission Needs, and the PSC determines whether the NYISO should solicit solutions to any of the identified needs.

1.2 Solicitation for Proposed Solutions

After the PSC determines that a Public Policy Transmission Need or a transmission need solely within the Long Island Transmission District driven by a Public Policy Requirement should be evaluated and considered by the NYISO for selection and regional cost allocation, the NYISO solicits proposed solutions that Developers believe will satisfy the identified need. Developers have 60 days to propose their solutions and must provide specific Developer qualification and project information as detailed in Attachment Y to the OATT, the Public Policy Transmission Planning Process Manual, and the NYISO's solicitation.

Under the Public Policy Transmission Planning Process, proposed solutions fall into two categories—(i) Public Policy Transmission Projects and (ii) Other Public Policy Projects. A Public Policy Transmission Project is a transmission project or a portfolio of transmission projects proposed by a qualified Developer to satisfy an identified Public Policy Transmission Need and for which the Developer seeks to be selected by the NYISO for purposes of allocating and recovering the project's costs under the NYISO OATT. An Other Public Policy Project is a non-transmission project (*i.e.*, generation or demand-side projects) or a portfolio of transmission and non-transmission projects proposed by a Developer to satisfy an identified Public Policy Transmission Need. The NYISO will determine whether an Other Public Policy Project is viable and sufficient to meet a Public Policy Transmission Need. However, an Other Public Policy Project is not entitled to cost allocation and recovery under the NYISO OATT.

1.3 Evaluation for Viability and Sufficiency

In the first phase of analysis, the NYISO evaluates each proposed solution to the Public Policy Transmission Need to determine whether it is viable and sufficient. The NYISO assesses all resource types on a comparable basis within the same general timeframe. Under the viability evaluation, the NYISO considers a Developer's qualification and the project information data to determine whether the project is technically practicable, whether there is the ability to obtain the necessary rights-of-way within the required timeframe, and whether the Developer could complete the project within the required timeframe. Under the sufficiency evaluation, the NYISO evaluates the degree to which each proposed solution independently satisfies the Public Policy Transmission Need, including any specific criteria established by the PSC in its order identifying the need. After completing the viability and sufficiency evaluations, the NYISO presents the assessment to stakeholders, interested parties, and the PSC for review and comments.

Following the NYISO's presentation of the Viability and Sufficiency Assessment, the Public Policy Transmission Planning Process requires the PSC to review the assessment and issue an order. If the PSC concludes that there is no longer a transmission need driven by a Public Policy Requirement, the NYISO will not perform an evaluation, or make a selection of, a more efficient or cost-effective transmission solution for that planning cycle. If the PSC modifies the transmission need driven by a Public Policy Requirement, the NYISO will restart its Public Policy Transmission Planning Process as an out-of-cycle process. This out-of-cycle process begins with the NYISO's solicitation of Public Policy Transmission Projects to address the modified Public Policy Transmission Need. The NYISO evaluates the viability and sufficiency of the proposed Public Policy Transmission Projects. The NYISO then evaluates the viable and sufficient Public Policy Transmission Projects for purposes of selecting the more efficient or cost-effective transmission solution to the modified Public Policy Transmission Need.

1.4 Evaluation for Selection as the More Efficient or Cost-Effective Solution

Once the PSC determines that there continues to be a transmission need driven by a Public Policy Requirement, the NYISO evaluates the proposed Public Policy Transmission Projects. The NYISO only considers those Public Policy Transmission Projects that it determined to be viable and sufficient and that have provided the required notifications to proceed with the evaluation for selection as the more efficient or cost-effective solution to the identified need.

The NYISO's selection is based on the totality of its evaluation of the eligible projects using the pre-defined metrics set forth in Attachment Y of the OATT and others set by the PSC and/or in consultation with stakeholders. The NYISO uses the project information provided by the Developer at the start of the process, in addition to any other information available to the NYISO. In performing its evaluation, the NYISO and its an independent consultant, reviews the reasonableness and comprehensiveness of the information submitted by the Developer for each project that is eligible for selection to be measured against the specific evaluation metrics (*see* Section 3.2, below).

In determining which of the eligible proposed regulated Public Policy Transmission Projects is the more efficient or cost-effective solution to satisfy the Public Policy Transmission Need, the NYISO considers each project's total performance under all of the selection metrics. The NYISO may develop scenarios that modify certain assumptions to evaluate the proposed Public Policy Transmission Projects under differing system conditions. The NYISO considers and ranks each proposed solution based on its performance under the metrics. Based upon its evaluation of each viable and sufficient Public Policy Transmission Project, the NYISO staff recommends in the draft Public Policy Transmission Planning Report what project is the more efficient or cost-effective solution to satisfy the Public Policy Transmission Need, if any. After the draft report is reviewed through the collaborative governance process and by the Market Monitoring Unit, the NYISO Board of Directors may approve the report, including whether to select a Public Policy Transmission Project, or propose modifications.

1.5 Identifying a Cost Allocation Methodology for the Public Policy Transmission Need

Under the Public Policy Transmission Planning Process and consistent with FERC's directives under Order No. 1000, a regulated transmission project that is selected as the more efficient or cost-effective solution to satisfy an identified Public Policy Transmission Need will be eligible to receive cost allocation and recovery under the OATT. The Public Policy Transmission Planning Process contains an approved load ratio share cost allocation methodology, and a multi-step process for identifying any alternative methodology. This process is designed to provide flexibility in prescribing a methodology that would allocate the costs of a selected Public Policy Transmission Project consistent with the Public Policy Requirement driving the identified transmission need and roughly commensurate with the derived benefits. In allocating the costs of the selected Public Policy Transmission Project, the NYISO will use the default methodology under Attachment Y to the OATT or an alternative methodology proposed in this process and accepted by FERC. The cost allocation methodology eventually accepted by the Commission has no bearing on the NYISO's selection of the more efficient or cost-effective transmission project to meet the Public Policy Transmission Need.

2. AC Transmission Public Policy Transmission Needs

2.1 Identification of AC Transmission Public Policy Transmission Needs

The NYISO issued a letter on August 1, 2014, inviting stakeholders and interested parties to submit proposed transmission needs driven by Public Policy Requirements to the NYISO on or before September 30, 2014.[2] On October 3, 2014, the NYISO filed the proposed needs for consideration with the PSC.[3] These proposed needs had two common and recurring themes: (i) increase transfer capability between upstate and downstate, and (ii) mitigate transmission constraints in Western New York to facilitate full output from the Niagara hydroelectric power plant and imports from Ontario. The PSC issued notices soliciting public comments on the proposed needs on November 12, 2014, and numerous parties submitted comments.[4]

Prior to the NYISO's solicitation of proposed transmission needs driven by Public Policy Requirements, the PSC initiated the Alternating Current Transmission Upgrades proceedings to consider whether to address the persistent transmission congestion that exists at the Central East and Upstate New York/Southeast New York (UPNY/SENY) electrical interfaces on the New York State Transmission System.[5] In those proceedings, the PSC sought and received in January 2013 numerous proposed projects to address the PSC's public policy objective with the intent of increasing transfer capability by approximately 1,000 MW based upon the recommendation of the Governor's Energy Highway Task Force. In response to the 2014 State of the State Address encouraging utilities and transmission developer to build solely within existing rights-of-way corridors, the PSC afforded the opportunity for revisions to the proposals, and four entities proposed 22 revised proposals.

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[2] The NYISO's letter can be obtained at the following link: http://www.nyiso.com/public/markets_operations/services/planning/planning_studies/index.jsp.

[3] The proposed needs and the NYISO's submission of the needs can be obtained at the following link: http://documents.dps.ny.gov/public/MatterManagement/CaseMaster.aspx?MatterCaseNo=14-E-0454&submit=Search.

[4] The notices seeking comments were issued under PSC Case Nos. 12-T-0502, *et al*., and PSC Case No. 14-E-0454, and the comments can be obtained from the Department of Public Service website: http://www.dps.ny.gov/.

[5] The UPNY/SENY interface represents a collection of transmission on which power flows from upstate New York to southeast New York, and is comprised of: two 345 kV lines from Utica to south of the Catskills (commonly known as "Marcy South"); three 345 kV lines from Athens to Kingston and Pleasant Valley, in addition to underlying 115 kV lines (commonly known as "Leeds South"); and one 345 kV line from Connecticut to Pleasant Valley (commonly known as "Pleasant Valley-Long Mountain").

Following the PSC's receipt and review of comments in response to the NYISO's invitation for proposed transmission needs driven by Public Policy Requirements, the PSC continued its efforts in the Alternating Current Transmission Upgrades comparative proceedings and sought to coordinate its comparative evaluation of proposed projects with the NYISO's Public Policy Transmission Planning Process. During the period in which the PSC was considering comments, the PSC requested that the NYISO perform analysis of the 22 proposed projects proposed in the PSC's proceedings. On July 6, 2015, DPS posted the Trial Staff Interim Report with the initial results of the NYISO's evaluation, and the NYISO, on July 20, 2015, presented the initial results at a technical conference hosted by New York State Department of Public Service (DPS) in the Alternating Current Transmission Upgrades proceedings.

Thereafter, due to public information that the CPV Valley Energy Center—a 680 MW generation facility that would interconnect to the New York State Transmission System at Dolson Avenue Substation—received its financing and would commence construction, DPS requested the NYISO to update its analysis to consider the effects of the CPV Valley Energy Center. On September 22, 2015, DPS issued its Trial Staff Final Report, containing the results of the NYISO's analysis, and a companion motion recommending that the Commission find that there are transmission needs driven by Public Policy Requirements to move power from upstate to downstate over the Central East and UPNY/SENY interfaces.

Following presentation of the Trial Staff Final Report at a technical conference in October 2015, the PSC issued an order, on December 17, 2015, identifying numerous public policies[6] that, taken

[6] The PSC identified that, as it relates to the AC Transmission Needs, it is the public policy of the state to: reduce transmission congestion so that large amounts of power can be transmitted to regions of New York where it is most needed; to reduce production costs through congestion relief; reduce capacity resource costs; to improve market competition and liquidity; to enhance system reliability, flexibility, and efficiency; to improve preparedness for and mitigation of impacts of generator retirements; enhance resiliency/storm hardening; to avoid refurbishment costs of aging transmission; to take better advantage of existing fuel diversity; to increase diversity in supply, including additional renewable resources; to promote job growth and the development of new efficient generation resources Upstate; to reduce environmental and health impacts through reductions in less efficient electric generation; to reduce costs of meeting renewable resource standards; to increase tax receipts from increased infrastructure investment; to enhance planning and operational flexibility; to obtain synergies with other future transmission projects; and to relieve gas transportation constraints. December 2015 Order at pp 66-67. In addition, the Commission found that the 2015 State Energy Plan (containing the New York's Energy Highway Blueprint), Section 6-104(1) of the New York Energy Law that requires the State Energy Planning Board to adopt a State Energy Plan, and Section 6-104(5)(b) of the New York Energy Law constitute Public Policy Requirements. *See id.* at pp 67-68.

together, constitute Public Policy Requirements driving transmission needs associated with the Central East and UPNY/SENY interfaces on the New York State Transmission System (collectively, "AC Transmission Needs").[7] The PSC distinguished the transmission needs based on each affected system—*i.e.*, Central East (Segment A) and UPNY/SENY (Segment B), and described the transmission needs on the two segments as follows:

SEGMENT A

Edic/Marcy to New Scotland; Princetown to Rotterdam

Construction of a new 345 kV line from Edic or Marcy to New Scotland on existing right-of-way (primarily using Edic to Rotterdam right-of-way west of Princetown); construction of two new 345 kV lines or two new 230 kV lines from Princetown to Rotterdam on existing Edic to Rotterdam right-of-way; decommissioning of two 230 kV lines from Edic to Rotterdam; and related switching or substation work at Edic or Marcy, Princetown, Rotterdam and New Scotland.

SEGMENT B

Knickerbocker to Pleasant Valley

Construction of a new double circuit 345 kV/115 kV line from Knickerbocker to Churchtown on existing Greenbush to Pleasant Valley right-of-way; construction of a new double circuit 345 kV/115 kV line or triple circuit 345 kV/115 kV/115 kV line from Churchtown to Pleasant Valley on existing Greenbush to Pleasant Valley right-of-way; decommissioning of a double-circuit 115 kV line from Knickerbocker to Churchtown; decommissioning of one or two double-circuit 115 kV lines from Knickerbocker to Pleasant Valley; construction of a new tap of the New Scotland-Alps 345 kV line and new Knickerbocker switching station; and related switching or substation work at Greenbush, Knickerbocker, Churchtown and Pleasant Valley substations.

Upgrades to the Rock Tavern Substation Terminal Equipment

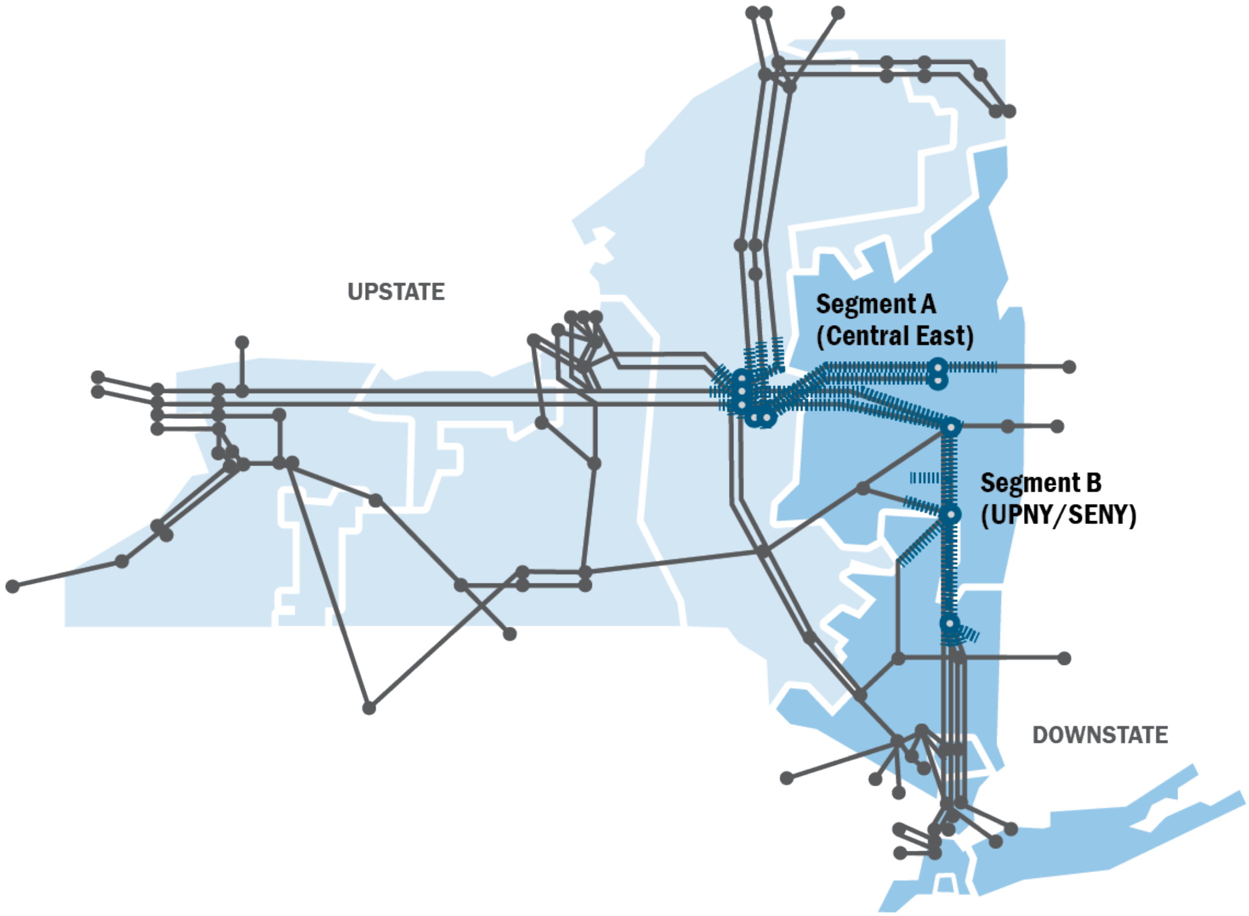
New line traps, relays, potential transformer upgrades, switch upgrades, system control upgrades and the installation of data acquisition measuring equipment and control wire needed to handle higher line currents that will result as a consequence of the new Edic/Marcy to New Scotland; Princetown to Rotterdam and Knickerbocker to Pleasant Valley lines.

[7] *See* December 2015 Order, at p 68 & Appendix A.

Shoemaker to Sugarloaf

Construction of a new double circuit 138 kV line from Shoemaker to Sugarloaf on existing Shoemaker to Sugarloaf right-of-way; decommissioning of a double circuit 69 kV line from Shoemaker to Sugarloaf; related switching or substation work at Shoemaker, Hartley, South Goshen, Chester, and Sugarloaf.[8]

Figure 2-1: AC Transmission Public Policy Transmission Needs



The PSC referred the AC Transmission Needs to the NYISO for solicitation and evaluation of proposed solutions under the NYISO's Public Policy Transmission Planning Process for potential selection in the regional transmission plan for purposes of cost allocation under the OATT. The PSC

[8] December 2015 Order, at Appendix A. With respect to the upgrades to the Rock Tavern substation terminal equipment and the Shoemaker-Sugarloaf facilities, the PSC stated that "all developers should include the upgrade costs in their bids at the same level, and the upgrade costs should not be used as a distinguishing factor between bids." *Id.* at p 62.

also prescribed specific evaluation criteria in Appendix B of the December Order, which are set forth in Appendix C of this report, for the NYISO to consider, to the extent feasible, in its evaluation and selection process.

In addition, the PSC identified that the cost allocation methodology for the AC Transmission Needs would be based on a "beneficiaries pay" approach that would allocate the 75 percent of the project costs to economic beneficiaries of reduced congestion and the remaining 25 percent of the project costs across the state based upon load-ratio share.[9] The PSC noted that this methodology will allocate approximately 90 percent of the transmission project's cost to ratepayers in the downstate region. The PSC requested the NYISO to apply its expertise and design a more granular cost allocation among downstate entities consistent with the prescribed methodology.

2.2 Development of Solutions

The NYISO made a presentation at a combined meeting of the Transmission Planning Advisory Subcommittee (TPAS) and Electric System Planning Working Group (ESPWG) on February 5, 2016 to review the PSC's December 2015 Order and the nature of the resulting AC Transmission Needs.[10] The NYISO then established sufficiency criteria in accordance with the criteria set by the PSC in its December 2015 Order, and made available baseline models and associated Power flow results to aid interested parties in developing project proposals.[11] The PSC specifically prescribed in its December 2015 Order that, in order for a proposed Public Policy Transmission Project or Other Public Policy Project to be considered sufficient by the NYISO, it must satisfy, at a minimum, the following criteria:

- Proposed solutions to Segment A (Central East) must provide at least a 350 MW increase to the Central East interface transfer capability in accordance with Normal Transfer Criteria as defined by the New York State Reliability Council (NYSRC) Reliability Rules.

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[9] *Id.* at p 69 & Appendix D.

[10] The NYISO presentation is posted on its website under meeting materials at the following link: http://www.nyiso.com/public/webdocs/markets_operations/committees/bic_espwg/meeting_materials/2016-02-05/03_AC%20Transmission_PPTN.pdf.

[11] The baseline study cases for the AC Transmission Needs were the same system representation used by the NYISO to perform the evaluation directed by DPS for the Trial Staff Final Report in the Alternating Current Transmission Upgrades proceedings. The baseline study cases were available to all developers, subject to satisfactorily completing a Critical Energy Infrastructure Information (CEII) request, and the base line results are publicly available on the NYISO website at: http://www.nyiso.com/public/markets_operations/services/planning/planning_studies/index.jsp

- Proposed solutions to Segment B (UPNY/SENY) must provide at least a 900 MW increase to the UPNY/SENY interface transfer capability in accordance with Normal Transfer Criteria as defined by the NYSRC Reliability Rules.

Additionally, a sufficient Public Policy Transmission Project must meet the following criteria, as set forth by the December 2015 Order:

- Proposed solutions to Segment A (Central East) must include all project components included in Segment A, as described in the December 2015 Order.
- Proposed solutions to Segment B (UPNY/SENY) must include all project components included in Segment B, as described in the December 2015 Order.
- No acquisition of new permanent transmission rights-of-way, except for *de minimis* acquisitions that cannot be avoided due to unique circumstances; however, the transfer or lease of existing transmission right-of-way property or access rights from a current utility company owner to a Developer shall not be considered such an acquisition.
- No crossing of the Hudson River, either overhead, underwater, in riverbed, or underground, or in any other way by any component of the transmission facility.
- For those Public Policy Transmission Projects that were also evaluated in the Alternating Current Transmission Upgrades proceedings, the December 2015 Order required that the cost estimate must not exceed the level estimated by the Trial Staff for the project, unless the developer can demonstrate that upward estimates are necessary to correct errors or omissions made by Trial Staff for the components that were added or adjusted by Trial Staff.

For each proposed Public Policy Transmission Project, the PSC required the sponsoring developer to submit at least two project cost estimates. The first cost estimate required the developer to presume that "all prudently incurred costs will be recovered and there will be no sharing of cost overruns."[12] The second cost estimate was required to reflect an 80/20 incentive regime, where if there are actual cost overruns, "the developer shall bear 20% of the cost over-runs, while ratepayers shall bear 80% of those costs[, but if] actual costs come in below a bid, then the developer should retain 20% of the savings," provided that the developer would not seek incentives

[12] December 2015 Order, at Appendix C.

from FERC above the base return-on-equity otherwise approved.[13]

On February 29, 2016, the NYISO issued a solicitation for proposed solutions of all types (transmission, generation, and demand side) to the AC Transmission Needs. Following the issuance of the solicitation, the NYISO received numerous questions from interested developers seeking clarification on the process and the AC Transmission Needs. The NYISO issued a public Frequently Asked Questions (FAQ) document on March 30, 2016, and updated it on April 13, 2016, summarizing the questions and providing responses.[14]

As a result of the solicitation, the NYISO received a total of 16 proposals consisting of both Public Policy Transmission Projects and an Other Public Policy Project. The list of the proposed projects submitted to the NYISO and considered in the Viability and Sufficiency Assessment are included in **Table 2-1**, below.

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[13] *Id.*

[14] The AC Transmission Public Policy Transmission Needs FAQ document is available at: http://www.nyiso.com/public/webdocs/markets_operations/services/planning/Planning_Studies/Public_Policy_Documents/AC_Transmission_PPTN/AC-Transmission_PPTN_FAQ_2016-04-13.pdf.

Table 2-1: Proposed Projects

Developer	Project Name	Project ID	Category	Type	Location (County/State)
National Grid/Transco	New York Energy Solution Segment A	T018	PPTP	AC	Segment A
National Grid/Transco	New York Energy Solution Segment A	T019	PPTP	AC	Segment B
NextEra Energy Transmission New York	Enterprise Line: Segment A	T021	PPTP	AC	Segment A
NextEra Energy Transmission New York	Enterprise Line: Segment B	T022	PPTP	AC	Segment B
NextEra Energy Transmission New York	Enterprise Line: Segment B-Alt	T023	PPTP	AC	Segment B
North America Transmission / NYPA	Segment A + 765 kV	T025	PPTP	AC	Segment A
North America Transmission / NYPA	Segment A Base	T026	PPTP	AC	Segment A
North America Transmission / NYPA	Segment A Double Circuit	T027	PPTP	AC	Segment A
North America Transmission / NYPA	Segment A Enhanced	T028	PPTP	AC	Segment A
North America Transmission / NYPA	Segment B Base	T029	PPTP	AC	Segment B
North America Transmission / NYPA	Segment B Enhanced	T030	PPTP	AC	Segment B
ITC New York Development	16NYPP1-1A AC Transmission	T031	PPTP	AC	Segment A
ITC New York Development	16NYPP1-1B AC Transmission	T032	PPTP	AC	Segment B
AvanGrid	Connect New York Recommended	T033	PPTP	HVDC	Segments A and B
AvanGrid	Connect New York Alternative	T034	PPTP	HVDC	Segments A and B
GlidePath	Distributed Generation Portfolio	OPP004	OPPP	Gen	Orange, Ulster, Putnam, Greene, NY
PPTP = Public Policy Transmission Project OPPP = Other Public Policy Project			Gen = Generation AC = Alternating Current Transmission HVDC = High-Voltage Direct Current Transmission		

2.3 Viability and Sufficiency Assessment

Through the second and third quarters of 2016, the NYISO assessed the viability and sufficiency of all proposed projects. In conducting its viability and sufficient assessment, the NYISO performed a comparable transfer limit analysis of each project in the same manner as the baseline analysis.[15] Consistent with the PSC's direction that Segment A proposals depend on a Segment B proposal being in place, the NYISO combined each Segment A proposal with each developer's Segment B counterpart proposal. If there was at least one combined case that increased the Central East transfer limit by at least 350 MW, the Segment A proposal met the Central East sufficiency criterion.

The NYISO presented a draft AC Transmission Public Policy Transmission Needs Viability and Sufficiency Assessment to stakeholders at the joint ESPWG/TPAS on September 26, 2016. After receiving and addressing comments from stakeholders, the NYISO posted on its website the final Viability and Sufficiency Assessment report on October 27, 2016 and filed the same at the PSC in Case No. 14-E-0454 and the Alternative Current Transmission Upgrades proceedings on October 28, 2016.[16] The assessment is included in this report as Appendix B.[17]

In the AC Transmission Public Policy Transmission Needs Viability and Sufficiency Assessment, the NYISO determined the following projects are viable and sufficient to satisfy the AC Transmission Needs:

T018: National Grid / Transco – New York Energy Solution Segment A

T019: National Grid / Transco – New York Energy Solution Segment B

T021: NextEra Energy Transmission New York – Enterprise Line: Segment A

T022: NextEra Energy Transmission New York – Enterprise Line: Segment B

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[15] On July 29, 2016, the NYISO notified stakeholders and interested parties that although it had acted diligently in administering the current process, it would extend the 2014 cycle of the Public Policy Transmission Planning Process beyond two years as permitted by the OATT. *See* OATT Section 31.4.1.

[16] The NYISO's filing can be obtained at the following link:

http://documents.dps.ny.gov/public/MatterManagement/CaseMaster.aspx?MatterCaseNo=12-t0502&submit=Search+by+Case+Number.

[17] The NYISO's "AC Transmission Public Policy Transmission Needs Viability and Sufficiency Assessment" can be obtained at the following link:

http://www.nyiso.com/public/markets_operations/services/planning/planning_studies/index.jsp.

T023: NextEra Energy Transmission New York – Enterprise Line: Segment B Alt.

T025: North America Transmission / NYPA – Segment A + 765 kV

T026: North America Transmission / NYPA – Segment A Base

T027: North America Transmission / NYPA – Segment A Double Circuit

T028: North America Transmission / NYPA – Segment A Enhanced

T029: North America Transmission / NYPA – Segment B Base

T030: North America Transmission / NYPA – Segment B Enhanced

T031: ITC New York Development – 16NYPP1-1A AC Transmission

T032: ITC New York Development – 16NYPP1-1B AC Transmission

Together with the AC Transmission Public Policy Transmission Needs Viability and Sufficiency Assessment, the NYISO filed a more granular cost allocation methodology consistent with the prescribed methodology set forth in the December 2015 Order for the PSC's consideration.

2.4 Confirmation of Need for Transmission

On January 24, 2017, following consideration of public comments, the PSC issued an order confirming the AC Transmission Needs.[18] The January 2017 Order stated that "[t]he Commission agrees that persistent congestion on the Central East and UPNY/SENY interfaces continues to contribute to higher energy costs for downstate customers and to limit the accessibility of renewable resources located upstate," and that the Clean Energy Standard (CES) "further heightens the public policy need for transmission constraint relief and cross-state power flows" allowing renewable resources to be delivered to downstate load centers.[19] Based on the "various economic and public policy benefits," the PSC directed the NYISO to proceed with its evaluation and selection of the proposed transmission solutions deemed viable and sufficient solution that will satisfy the AC Transmission Needs.

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[18] *Proceeding on Motion of the Commission to Examine Alternating Current Transmission Upgrades*, Order Addressing Public Policy Transmission Need for AC Transmission Upgrades, PSC Case Nos. 12-T-0502, *et al.*, (January 24, 2017) ("January 2017 Order").

[19] *Id.* at pp 18-19.

The January 2017 Order also adopted the NYISO's analysis of the recommended cost allocation methodology that the PSC identified as a part of the AC Transmission Public Policy Requirements/Public Policy Transmission Needs in its December 2015 Order.[20] In response to the PSC's adoption of the NYISO's recommended cost allocation methodology, the NYISO filed, and the FERC accepted, the AC Transmission Cost Allocation methodology.[21]

2.5 Local Transmission Plan Updates and PSC-Directed Upgrades

The PSC, in its December 2015 Order, ordered Orange and Rockland Utilities, Inc. (O&R) and Central Hudson Gas and Electric Corporation (Central Hudson) respectively to upgrade the Shoemaker to Sugarloaf 138 kV facilities and the terminal upgrades at Rock Tavern 345 kV Substation, as part of Segment B project proposals. In its order confirming the AC Transmission Needs, the PSC determined that the costs of the additional Segment B upgrades should not be a distinguishing factor among project proposals. Accordingly, the NYISO did not include, for each Segment B project, the cost for the additional upgrades for the purpose of evaluation and selection.

[20] *Id.* at p 21. The Commission also reiterated the appropriateness of certain incentives to ensure accurate cost estimates, and encouraged developers to pursue the cost-containment incentives before the Federal Energy Regulatory Commission (FERC) in their rates. *See id.*

[21] *See New York Indep. Sys. Operator, Inc.*, 161 FERC ¶ 61,160 (November 16, 2017). The AC Transmission Cost Allocation methodology is contained in Section 31.8 of Attachment Y to the OATT.

3. Evaluation for Selection of the More Efficient or Cost-Effective Solution

Upon issuance of the January 2017 Order confirming the need for transmission, the NYISO commenced a detailed evaluation of each viable and sufficient transmission proposal with the assistance of its independent consultant, Substation Engineering Company (SECO). This section of the report details the NYISO's evaluation and the results.

3.1 Overview of Proposed Viable and Sufficient Solutions

The NYISO determined that 13 transmission solutions are viable and sufficient. All proposed projects utilize the existing rights-of-way as required by the PSC order. The locations of the proposed projects are shown in Figure 2-1. A brief description and high-level diagram of each of the 13 viable and sufficient projects is provided below, while a detailed description of all project elements is provided in Appendix G of this study report.

3.1.1 Segment A Projects

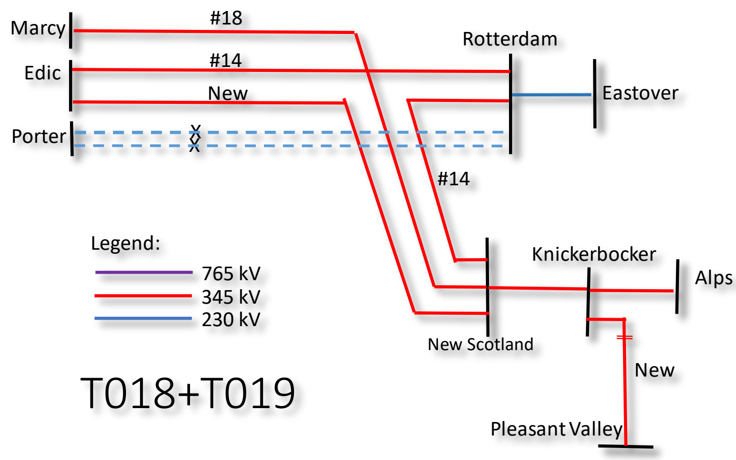
T018: National Grid/Transco - NYES Segment A

National Grid/Transco's NYES Segment A Proposal includes the following components:

- A new 345 kV line of approximately 87 miles from the existing Edic 345 kV substation to the existing New Scotland 345 kV substation. The New Scotland 345kV Substation will be upgraded and expanded
- Two new 345 kV lines of approximately five miles single-circuit looping the existing 345 kV Edic to New Scotland #14 line into and out of a new Rotterdam 345 kV Substation. The Rotterdam 230 kV substation will be retired
- Two new 345/115 kV autotransformers connecting the existing Rotterdam 115 kV switchyard to the new 345 kV switchyard
- One new 345/230 kV autotransformer connecting the existing 230 kV Rotterdam to Eastover Road #38 line to the new Rotterdam 345 kV switchyard
- One new 135 MVAR capacitor bank connected to the new Rotterdam 345 kV switchyard
- Decommission of the Porter to Rotterdam 230 kV lines #30 and #31

Figure 3-1 shows the one-line diagram of T018 (together with components of T019).

Figure 3-1: High-Level Diagram of T018+T019



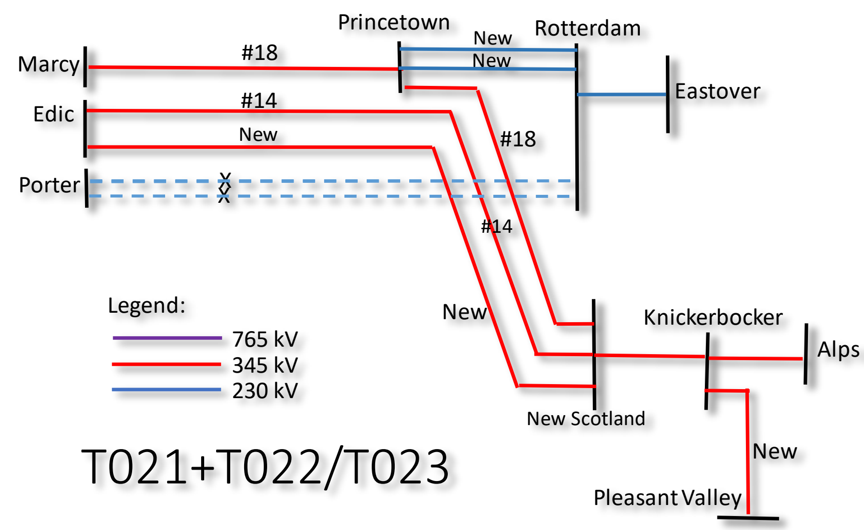
T021: NextEra - Enterprise Line Segment A

NextEra's Enterprise Segment A Proposal includes the following components:

- A new 345 kV line of approximately 86 miles (83.4 miles 345 kV line and 2.6 miles double circuit 345/115 kV line) from the existing Edic 345 kV substation to the existing New Scotland 345 kV substation
- Rebuild 2.6 miles of existing Rotterdam-New Scotland 115 kV line circuit #13
- A new breaker-and-a-half 345/230 kV Princetown Substation, located near the existing Rotterdam 230 kV substation. The substation will include two 345/230 kV auto-transformers
- Two new 345 kV circuits each approximately four miles in length to loop the existing Marcy – New Scotland 345 kV circuit #18 into Princetown 345/230 kV substation
- Two new one mile 230 kV lines from Princetown-Rotterdam
- Decommission of the Porter to Rotterdam 230 kV lines #30 and #31

Figure 3-2 shows the one-line diagram of T021 (together with components of T022/T023).

Figure 3-2: High-Level Diagram of T021+T022/T023



T025: NAT/NYPA - Segment A + 765 kV

The NAT/NYPA Segment A +765 kV Proposal consists of the following components:

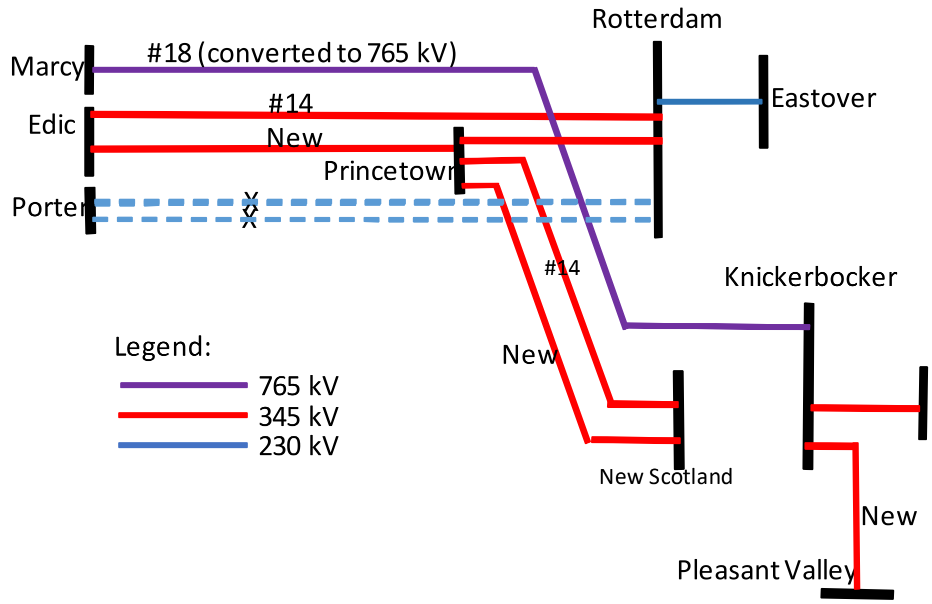
- A new 345 kV line of approximately 86 miles from the existing Edic 345 kV substation to the existing New Scotland 345 kV substation
- Two new 345 kV lines of approximately five miles single-circuit looping the existing 345 kV Edic to New Scotland #14 line into and out of a new Rotterdam 345 kV Substation. The Rotterdam 230 kV substation will be retired
- Two new 345/115 kV lower impedance transformers connecting the existing Rotterdam 115 kV switchyard to the new 345 kV switchyard. One new 345/230 kV transformer connecting the existing 230 kV Rotterdam to Eastover Road #38 line to the new Rotterdam 345 kV switchyard
- A new Princetown 345kV switchyard by tapping the newly proposed Edic-New Scotland lines and Rotterdam-New Scotland transmission lines
- Convert the Marcy – New Scotland and New Scotland – Knickerbocker 345 kV transmission lines to 765 kV operation as Marcy – Knickerbocker 765 kV (with no connection at New Scotland)
- Switching station or substation work at Knickerbocker with two new 2000 MVA 765/345 kV

transformers at Knickerbocker

- Terminal upgrades at Edic and Marcy 345 kV substations
- Decommission of the Porter to Rotterdam 230 kV lines #30 and #31

Figure 3-3 shows the one-line diagram of T025 (together with components of T029/T030).

Figure 3-3: High-Level Diagram of T025+T029/T030



T026: NAT/NYPA - Segment A Base

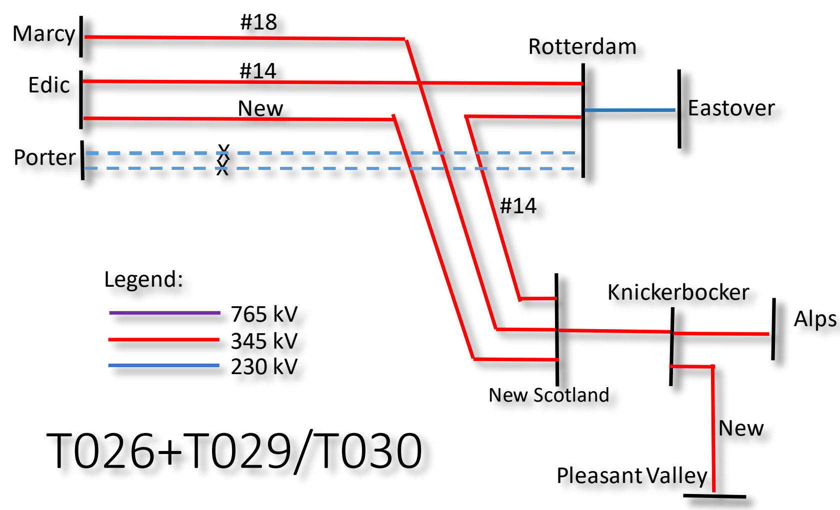
NAT/NYPA Segment A Base Proposal consists of the following components:

- A new 345 kV line of approximately 86 miles from the existing Edic 345 kV substation to the existing New Scotland 345 kV substation
- Two new 345 kV lines of approximately five miles single-circuit looping the existing 345 kV Edic to New Scotland #14 line into and out of a new Rotterdam 345 kV Substation. The Rotterdam 230 kV substation will be retired
- Two new 345/115 kV transformers connecting the existing Rotterdam 115 kV switchyard to the new 345 kV switchyard. One new 345/230 kV transformer connecting the existing 230 kV Rotterdam to Eastover Road #38 line to the new Rotterdam 345 kV switchyard

- Terminal upgrades at Edic and Marcy 345kV substations
- Decommission of the Porter to Rotterdam 230 kV lines #30 and #31

Figure 3-4 shows the one line diagram of T026 (together with components of T029/T030).

Figure 3-4: High-Level Diagram of T026+T029/T030



T027: NAT/NYPA - Segment A Double-Circuit

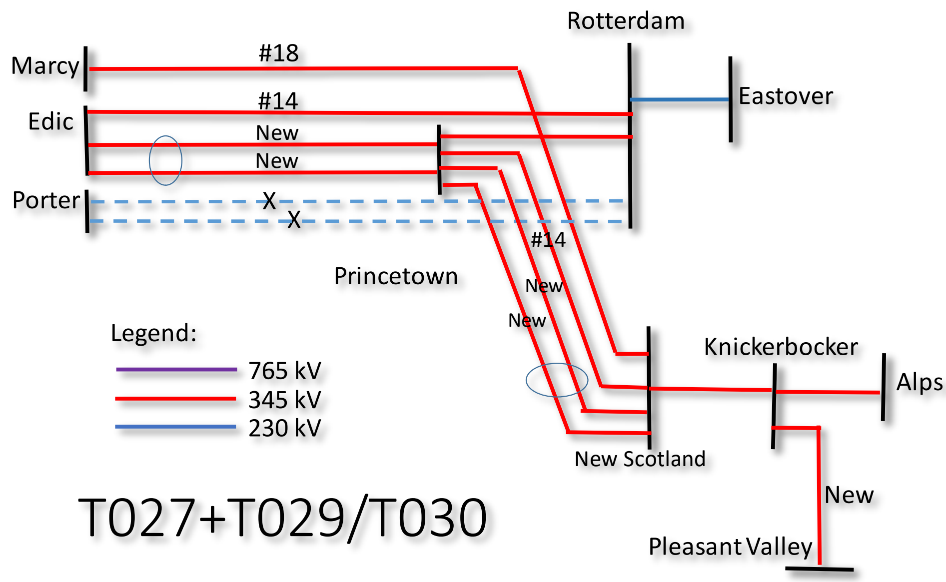
NAT/NYPA Segment A Double Circuit Proposal consists of the following components:

- A new 345 kV double circuit line of approximately 86 miles from the existing Edic 345 kV substation to the existing New Scotland 345 kV substation
- Two new 345 kV lines of approximately five miles single-circuit looping the existing 345 kV Edic to New Scotland #14 line into and out of a new Rotterdam 345 kV Substation. The Rotterdam 230 kV substation will be retired
- Two new 345/115 kV lower impedance transformers connecting the existing Rotterdam 115 kV switchyard to the new 345 kV switchyard. One new 345/230 kV transformer connecting the existing 230 kV Rotterdam to Eastover Road #38 line to the new Rotterdam 345 kV switchyard
- Rebuild approximately six miles of the Rotterdam to New Scotland 345 kV transmission line to accommodate the new double-circuit line beginning from Princetown junction
- Remove the Rotterdam to New Scotland 115 kV transmission line

- A new Princetown 345 kV switchyard by tapping the newly proposed Edic-New Scotland lines and Rotterdam-New Scotland transmission lines
- Terminal upgrades at Edic and Marcy 345 kV substations
- Decommission of the Porter to Rotterdam 230 kV lines #30 and #31

Figure 3-5 shows the one-line diagram for T027 (together with components of T029/T030).

Figure 3-5: High-Level Diagram of T027+T029/T030



T028: NAT/NYPA - Segment A Enhanced

The NAT/NYPA - Segment A Enhanced Proposal consists of the following components:

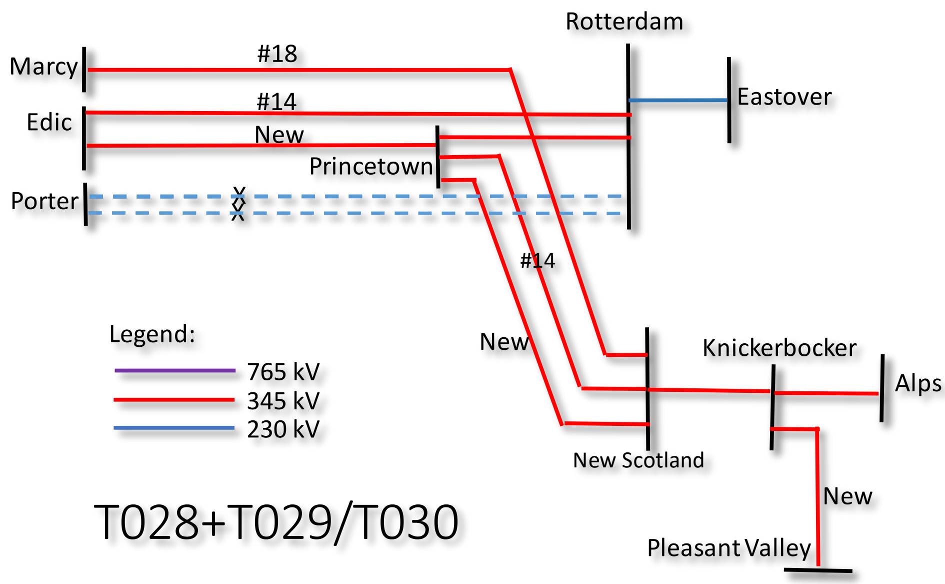
- A new 345 kV line of approximately 86 miles from the existing Edic 345 kV substation to the existing New Scotland 345 kV substation
- Two new 345 kV lines of approximately five miles single-circuit looping the existing 345 kV Edic to New Scotland #14 line into and out of a new Rotterdam 345 kV Substation. The Rotterdam 230 kV substation will be retired
- Two new 345/115 kV lower impedance transformers connecting the existing Rotterdam 115 kV switchyard to the new 345 kV switchyard. One new 345/230 kV transformer connecting the existing 230 kV Rotterdam to Eastover Road #38 line to the new Rotterdam 345 kV

switchyard

- A new Princetown 345 kV switchyard by tapping the newly proposed Edic-New Scotland lines and Rotterdam-New Scotland transmission lines
- Terminal upgrades at Edic and Marcy 345 kV substations
- Decommission of the Porter to Rotterdam 230 kV lines #30 and #31

Figure 3-6 shows the one-line diagram of T028 (together with components of T029/T030).

Figure 3-6: High-Level Diagram of T028+T029/T030



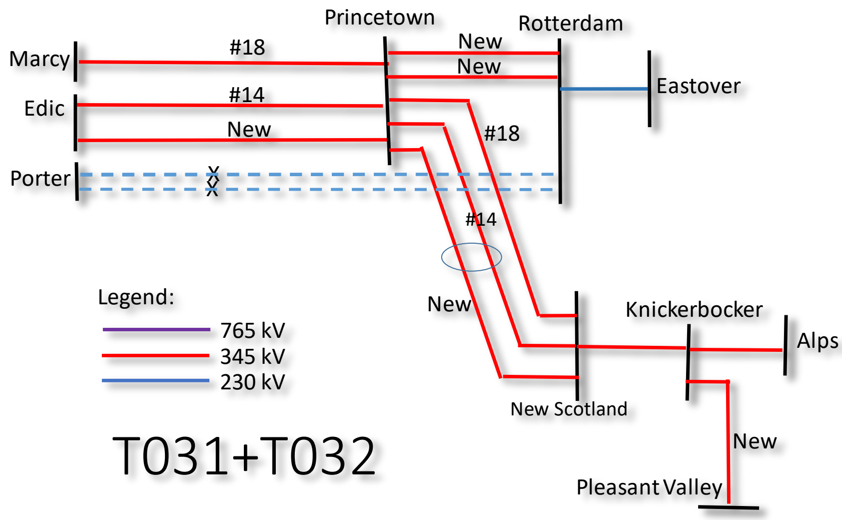
T031: ITC - 16NYPP1-1A AC Transmission Segment A

The ITC Segment A Proposal consists of the following components:

- A new Princetown 345 kV switching station tapping the existing Marcy to New Scotland 345 kV #18 line and Edic to New Scotland 345 kV #14 line
- A new Edic – Princetown – New Scotland 345 kV line, rebuilding line #14 between Princetown and New Scotland and sharing the common tower structures with the new line
- A new Rotterdam 345 kV substation with two new 345/230 kV transformers
- Two new Princetown to Rotterdam 345 kV lines of approximately 5.2 miles single circuit
- Decommission of the Porter to Rotterdam 230 kV lines #30 and #31.

Figure 3-7 shows the one-line diagram of T031 (together with components of T032).

Figure 3-7: High-Level Diagram of T031+T032



3.1.2 Segment B Projects

All Segment B projects include the common upgrades required by the PSC in its December 2015 Order, which ordered Orange and Rockland Utilities, Inc. (O&R) and Central Hudson Gas and Electric Corporation (Central Hudson) respectively to upgrade the Shoemaker to Sugarloaf 138 kV facilities and the terminal upgrades at Rock Tavern 345 kV Substation, as part of Segment B projects.

T019: National Grid/Transco - NYES Segment B

National Grid/Transco-NYES Segment B proposal consists of the following components:

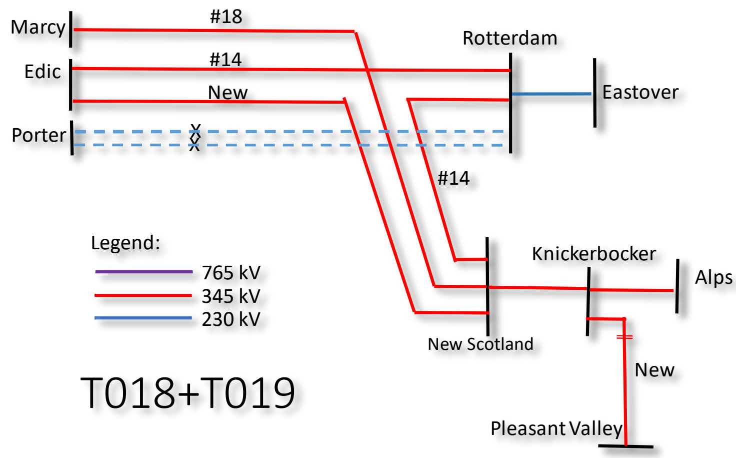
- A new double-circuit 345/115 kV line from a new Knickerbocker 345 kV Switching Station to the existing Pleasant Valley Substation, including a rebuild of the Churchtown 115 kV Switching Station and an upgrade of the existing Pleasant Valley 345/115 kV Substation, and 50% series compensation on Knickerbocker to Pleasant Valley 345 kV line
- Two new 135 MVAR 345 kV capacitor banks connected to the Pleasant Valley 345 kV Substation
- Terminal upgrades to the existing Roseton 345 kV Substation and Transition Station to upgrade the thermal ratings on the 345 kV Roseton to East Fishkill #305 line
- Terminal upgrades to the existing New Scotland 345 kV Substation to upgrade the thermal

ratings on the 345 kV New Scotland to Knickerbocker #2A line

- Retirement of aging infrastructure including multiple existing 115 kV lines between Greenbush 115 kV Substation and Pleasant Valley 115 kV Substation

Figure 3-8 shows the one-line diagram of T019 (together with components of T018).

Figure 3-8: High-Level Diagram of T018+T019



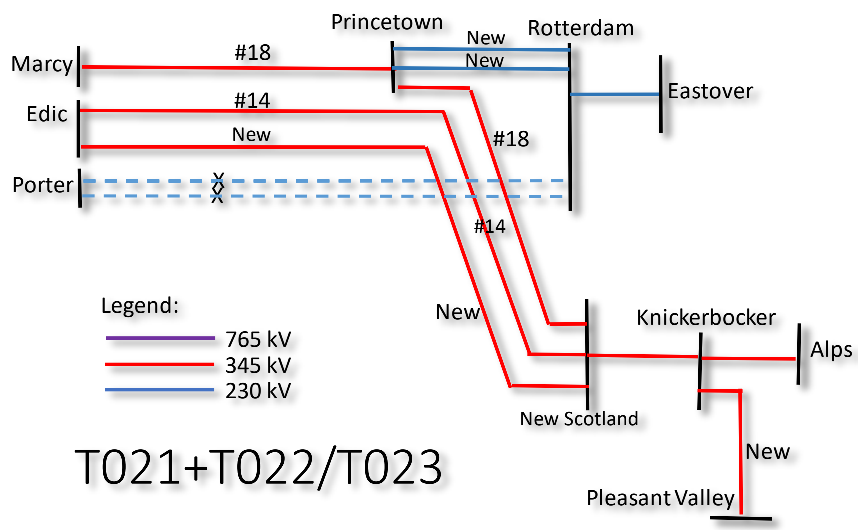
T022: NextEra - Enterprise Line Segment B

NextEra Enterprise Line Segment B proposal consists of the following components:

- Multiple retirements and reconfigurations on 115 kV lines between Greenbush – Pleasant Valley
- New Knickerbocker 345 kV Switchyard, approximately 13 miles southeast of New Scotland along the New Scotland - Alps 345 kV line
- Loop New Scotland - Alps 345 kV line circuit #2 into Knickerbocker Switchyard
- New North Churchtown 115 kV Switchyard, just north of NYSEG's existing Churchtown 115 kV switchyard
- A new 345 kV line from a new Knickerbocker 345 kV switching station to the existing Pleasant Valley 345 kV substation (double-circuit 345/115 kV line between Knickerbocker and Churchtown, and single–circuit 345 kV line between Churchtown and Pleasant Valley)

Figure 3-9 shows the one-line diagram of T022 (together with components of T021).

Figure 3-9: High-Level Diagram of T022



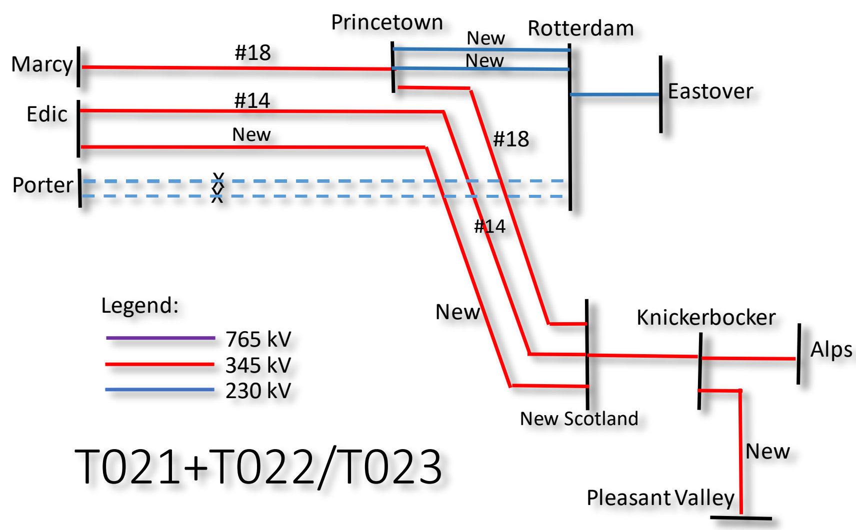
T023: NextEra - Enterprise Line Segment B-Alt

NextEra Enterprise Line Segment B-Alt proposal consists of the following components:

- Multiple retirements and reconfigurations on 115 kV lines between Greenbush – Pleasant Valley
- New Knickerbocker 345 kV Switchyard, approximately 13 miles southeast of New Scotland along the New Scotland - Alps 345 kV line
- Loop New Scotland - Alps 345 kV line circuit #2 into Knickerbocker Switchyard
- New North Churchtown 115 kV Switchyard, just north of NYSEG's existing Churchtown 115 kV switchyard
- A new double-circuit 345/115 kV line from a new Knickerbocker 345 kV switching station to the existing Pleasant Valley 345 kV substation

Figure 3-10 shows the one-line diagram of T023 (together with components of T021).

Figure 3-10: High-Level Diagram of T023



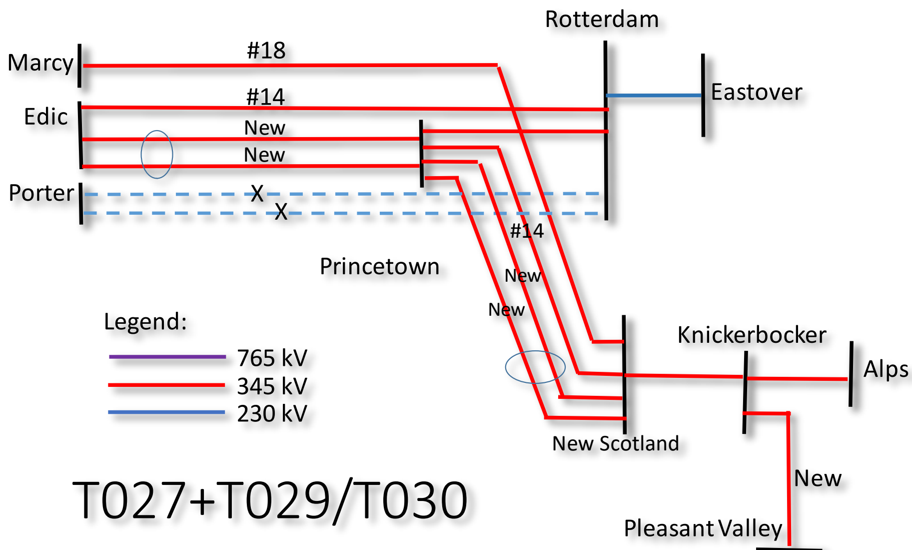
T029: NAT/NYPA - Segment B Base

NAT/NYPA Segment B Base Proposal consists of the following components:

- Multiple retirements and reconfigurations on 115 kV lines between Greenbush – Pleasant Valley
- A new 345 kV Knickerbocker switchyard along the New Scotland - Alps 345 kV line
- Loop the existing 345 kV New Scotland to Alps transmission line into Knickerbocker Switchyard
- A new double-circuit 345/115 kV line from a new Knickerbocker 345 kV switching station to Pleasant Valley 345 kV substation (double-bundled 345 kV line)
- A new Churchtown 115 kV substation
- Shoemaker – Shoemaker Tap – Middletown 345/138 kV transformer and 138 kV facilities upgrades

Figure 3-11 shows the one-line diagram of T029 (together with components of T027).

Figure 3-11: High-Level Diagram of T027+T029/T030

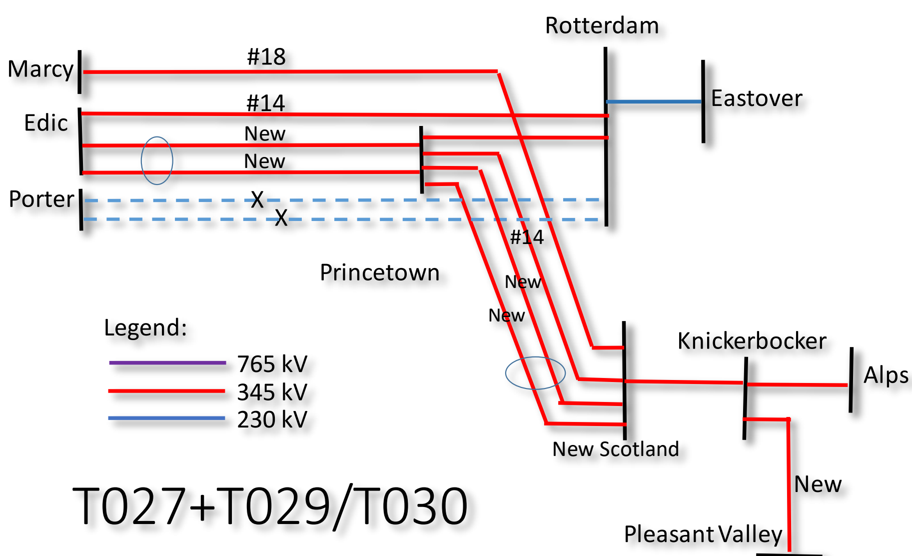


T030: NAT/NYPA - Segment B Enhanced

NAT/NYPA Segment B Enhanced Proposal consists of the components included with the Segment B Base Proposal with use of a triple bundle (instead of double bundle) conductor for the Knickerbocker – Pleasant Valley 345 kV transmission line.

Figure 3-12 shows the one-line diagram of T030 (together with components of T027).

Figure 3-12: High-Level Diagram of T027+T029/T030



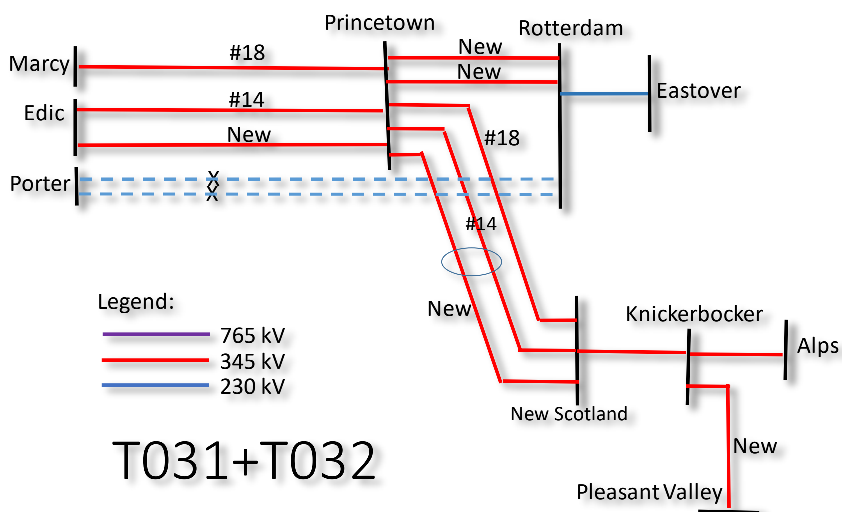
T032: ITC - 16NYPP1-1A AC Transmission Segment B

ITC Segment B Proposal consists of the following components:

- Multiple retirements and reconfigurations on 115 kV lines between Greenbush and Pleasant Valley
- A new Knickerbocker 345 kV Substation and a new Knickerbocker115 kV Substation by tapping the existing 345 kV New Scotland to Alps circuit and Greenbush to Pleasant Valley 115 kV lines respectively
- A new 345/115 kV double-circuit line from the Knickerbocker station to Churchtown station on existing Greenbush to Pleasant Valley right-of-way
- A new 345/115/115 kV triple-circuit line from Churchtown to Pleasant Valley on existing Greenbush to Pleasant Valley right-of-way

Figure 3-13 shows the one-line diagram of T032 (together with components of T031).

Figure 3-13: High-Level Diagram of T031+T032



3.1.3 Project Combinations

Consistent with the PSC's direction that no Public Policy Transmission Project shall be selected for Segment A unless a Public Policy Transmission Project is selected for Segment B, the NYISO combined each Segment A proposal with each developer's Segment B counterpart proposal. In order to evaluate a feasible number of possible combinations between Segment A and Segment B proposals, the NYISO developed combinations of projects that are representative of the electrical characteristics of all the proposed viable and sufficient transmission projects, as follows:

- Combining all Segment A and Segment B projects from the same developers, and
- Combining Segment A and Segment B projects from different developers based on combinations with similar electrical characteristics.

  Initial Segment A grouping:

  - Similar Segment A projects: T018, T021, T026, T028, T031
  - Segment A: T025
  - Segment A: T027

  Initial Segment B groupings:

  - Similar Segment B projects: T022, T023, T029, T030, T032
  - Segment B: T019

Table 3-1 shows the complete list of the representative combinations that were studied by the NYISO, and Table 3-2 shows how to apply the representative results to the combinations that were not explicitly studied.

Table 3-1: Representative Combinations

Combination ID	Representative Combination
1	T018+T019
2	T021+T022
3	T021+T023
4	T025+T019
5	T025+T029
6	T025+T030
7	T026+T029
8	T026+T030
9	T027+T019
10	T027+T029
11	T027+T030
12	T028+T029
13	T028+T030
14	T031+T032

Table 3-2: Representative Results Based on Combination ID

Representative Results for Central East Voltage Transfer and Production Cost Analysis

	T018	T021	T025	T026	T027	T028	T031
T019	1	3	4	7	9	12	14
T022	1	2	5	7	10	12	14
T023	1	3	5	7	10	12	14
T029	1	3	5	7	10	12	14
T030	1	3	6	8	11	13	14
T032	1	3	5	7	10	12	14

Representative Results for UPNY/SENY Thermal Transfer

	T018	T021	T025	T026	T027	T028	T031
T019	1	1	4	1	9	1	1
T022	2	2	5	2	10	2	2
T023	3	3	5	3	10	3	3
T029	7	7	5	7	10	12	12
T030	8	8	6	8	11	13	13
T032	14	14	5	14	10	14	14

3.2 Overview of Evaluation Assumptions

The process for the evaluation of solutions is described in the NYISO Public Policy Transmission Planning Process Manual, and evaluates the metrics set forth in the NYISO's tariff and, to the extent feasible, the criteria prescribed by the PSC. Notably, the NYISO's evaluation of Public Policy Transmission Projects differs from its evaluation of projects in its other planning processes because it can give varying levels of considerations to the baseline and the chosen scenarios based upon the nature of the proposed Public Policy Transmission Projects. In other words, certain projects may perform differently under normal operating conditions (*i.e.*, the baseline) and other potential operating conditions. Based upon the particulars of the Public Policy Transmission Need, the more efficient or cost-effective solution may be chosen based upon a scenario or a combination of scenarios and the baseline cases.

Three major types of analysis were conducted in evaluating quantitative metrics: transfer limit analysis, resource adequacy analysis, and production cost simulation. The study method, assumptions, and the metrics evaluated by the study method are described in the following sections. The results of these analyses are described in Section 3.3.

3.2.1 Transfer Limit Analysis

Transfer limit analysis evaluates the amount of power that can be transferred across an interface while observing applicable reliability criteria. The results of transfer limit analysis were used in the evaluation of metrics such as cost per MW, operability, and expandability. Based on the criteria set forth by the NYPSC Order, the NYISO determined that a power flow model is necessary to evaluate the transfer limits of the Central East and UPNY/SENY interfaces.

The Central East interface represents transmission lines from Utica to Albany and a line from northern New York to Vermont. Central East is typically a voltage-constrained interface; therefore, the NYISO performed a voltage transfer analysis using the PowerGEM TARA software and in accordance with the NYISO Guideline for Voltage Analysis and Determination of Voltage-Based Transfer Limits. To determine the voltage transfer limits, the NYISO created a set of power flow cases with increasing transfer levels by increasing generation upstream of the interface and decreasing generation downstream of the interface. As the transfer level across the interface was increased, the voltage-constrained transfer limit was determined to be the lower of: (1) the pre-contingency power flow at which the pre/post-contingency voltage falls below the voltage limit criteria, or (2) 95% of the pre-contingency power flow at the voltage collapse point, also known as the "tip of the nose" of the post-contingency power-voltage (PV) curve.

The UPNY/SENY interface represents a collection of transmission lines on which power flows from Upstate New York to Southeast New York. UPNY/SENY is historically limited by the thermal capability of the individual transmission lines; therefore, the NYISO performed the thermal transfer analysis for the interface in accordance with the Normal Transfer Criteria as defined by the New York State Reliability Council (NYSRC) Reliability Rules. The NYISO used the PowerGEM TARA program to perform the thermal transfer analysis. To determine the thermal transfer limits, the NYISO raised the power flow across the interface by uniformly increasing upstream generation and uniformly decreasing downstream generation. The long-term emergency (LTE) ratings of the BPTF were monitored while simulating design contingency events. During transfer analysis, the NYISO also monitored all 100 kV and above facilities that are not BPTF. Whenever the post contingency power flow on the non-BPTF exceeded short-term emergency (STE) ratings, the NYISO evaluated whether the loss of the non-BPTF would cause other facilities to be overloaded. If the affected facility's loss caused other non-BPTF to exceed their STE ratings or BPTF to exceed their LTE ratings (consistent with the NYSRC Reliability Rules and Exceptions), the NYISO determined a transfer limit that would allow the system to operate without the loss of multiple transmission facilities.

3.2.1.1 Baseline Transfer Analysis

For purposes of evaluating the proposed solutions, the NYISO performed a baseline transfer analysis starting with the power flow cases that were used in the 2016 Reliability Planning Process[22] (2016 RPP) base case system representation of 2026 summer peak load to determine the performance of the AC Transmission Public Policy Transmission Projects. These 2016 RPP power flow base cases were then updated with the latest information from the 2017 Load and Capacity Data Report. Some of these updates include generation additions such as Ginna, FitzPatrick, Cayuga, CPV Valley Energy Center, Cricket Valley Energy Center, Bayonne Energy Center II, and Bethlehem Energy Center Up-rate. Other updates include retirement of the Indian Point Energy Center Units No. 2 & 3 and inclusion of Empire State Line, which the NYISO selected to satisfy Western New York Public Policy Transmission Need. Generic upgrades were also included for the underlying Shoemaker - Sugarloaf area as directed by the PSC Order. The baseline transfer analysis scenario considered two

[22] The 2016 Reliability Needs Assessment is posted at: http://www.nyiso.com/public/webdocs/markets_operations/services/planning/Planning_Studies/Reliability_Planning_Studies/Reliability_Assessment_Documents/2016RNA_Final_Oct18_2016.pdf.

Roseton dispatches—one with Roseton dispatched at 100% of its capacity and another with Roseton dispatched at 85% of its capacity. The 2016 RPP base case modeled the Marcy South Series Compensation as in-service. The Hudson Transmission Project (HTP) was scheduled at 0 MW based on its cancellation of Firm Transmission Withdrawal Rights in PJM. Operational Base Flow (OBF) was not scheduled on the ABCJK PARs based on the expected expiration in October 2019.

3.2.1.2 Viability and Sufficiency Assessment Transfer Analysis

This report also included the transfer analysis performed during the Viability and Sufficiency Assessment in 2016. This transfer analysis was based on the power flow cases from the NYISO 2014 Reliability Planning Process base case system representation of the 2019 summer peak load, modified to include the CPV Valley Energy Center generation plant and associated System Deliverability Upgrades. Appendix B describes the detailed assumptions used in the Viability and Sufficiency Assessment.

3.2.2 Resource Adequacy Analysis

Resource adequacy is the ability of the electric systems to supply the aggregate electricity demand and energy requirements of the customers at all times, taking into account scheduled and unscheduled outages of system elements. The New York Control Area (NYCA) is planned to meet a Loss of Load Expectation (LOLE) that, at any given point in time, is less than or equal to an involuntary load disconnection that is not more frequent than once in every 10 years, or 0.1 events per year. The purpose of resource adequacy analysis for the AC Transmission Needs was not intended to identify any reliability needs, but to 1) make sure the MAPS database has enough resources in the comparative evaluation, and 2) set up the MARS database for the ICAP benefit analysis.

The NYISO performed a baseline resource adequacy evaluation of the NYCA for the AC Transmission Needs. The 2016 RPP base cases were used as a starting point and the NYCA load forecast was extended up to year 2046 to cover the study period. The generation and transmission assumptions were the same as those used by the NYISO in the baseline transfer analysis. Consistent with the MARS topology proposed for the 2018 RNA,[23] the pre-project UPNY-ConEd transfer limit was increased to 6,250 MW, and the pre-project UPNY/SENY topology was updated with dynamic limits. For comparative evaluation purpose, MARS topology was also developed for AC Transmission

[23] *See* 2018 RNA Preliminary Topology Presentation, http://www.nyiso.com/public/webdocs/markets_operations/committees/bic_espwg/meeting_materials/2018-03-13/2018RNA_Preliminary_Topology.pdf

projects based on transfer analysis.

LOLE analysis was also performed for a scenario modeling the Clean Energy Standard (CES) and retirement of aging generation (CES + Retirement). The assumptions used for this scenario are described in Section 3.2.3.2.3, and the MARS topology is the same that the NYISO used in the baseline resource adequacy analysis.

If any potential NYCA LOLE violations were identified in the analysis, compensatory MW were added to NYCA zones to resolve the LOLE violations. The compensatory MW amounts and locations were determined based on a review of binding interfaces and zonal LOLE levels in an iterative process to address the LOLE violations. The compensatory MWs were added over the study years, and Table 3-3 below shows the cumulative compensatory MW that needs to be added to satisfy the LOLE criterion of 0.1 events per year.

Table 3-3: Cumulative Compensatory MW by 2042

	Project	Zone C	Zone H	Zone J	Zone K	Total
Baseline	Pre-Project	-	500	550	350	1400
	Combinations involving T018, T025, or T027	250	250	450	350	1300
	Other Combinations	250	250	500	350	1350
CES+ Retirement	Pre-Project	-	-	1450	550	2000
	Combinations involving T018, T025, or T027	-	-	1150	550	1700
	Other Combinations	-	-	1250	550	1800

3.2.3 Production Cost Analysis

Production cost analysis evaluated the proposed Public Policy Transmission Projects and their impact on NYISO wholesale electricity markets. The results of production cost analysis were used in the evaluation of metrics such as production cost savings, production cost saving/project cost ratio, system CO_2 emission reduction, LBMP, load payment, and performance.

3.2.3.1 Baseline Analysis

The AC Transmission Needs production cost analysis baseline case was derived from the draft 2017 CARIS Phase 1 database.[24] Updates were made to the system while extensions were made for

[24] 2017 CARIS Phase 1 assumptions and results are posted at: http://www.nyiso.com/public/webdocs/markets_operations/committees/bic/meeting_materials/2018-03-15/2017_Report_CARIS2017_final_draft_031518_BIC.pdf.

increasing the range of the study period (2017 – 2046). At the November 17, 2017 ESPWG/TPAS meeting, the NYISO presented the starting database, updates, and extensions for the baseline production cost analysis.[25] The generation and transmission assumptions are the same as used in the power flow baseline.

Due to the longer study period of the AC Transmission baseline case, the load, fuel, and emissions forecasts were extended. While the fuel and emissions forecasts would affect the four-pool system in the Northeast (IESO, ISO-NE, NYISO, and PJM), the NYISO modeled the load forecast extensions only for the New York Control Area. Consistent with the CARIS methodology, the NYISO held external control area loads fixed to the 2026 level for 2027 through 2046. The baseline also modeled a national CO_2 program starting in 2027.

3.2.3.2. Scenario Analysis

At the November 17, 2017 ESPWG meeting, the NYISO solicited from stakeholders the potential scenarios for evaluating the AC Transmission Public Policy Transmission Projects. Based on stakeholder feedback, the NYISO developed scenarios by modifying the baseline assumptions to evaluate the robustness of the proposed Public Policy Transmission Projects according to the selection metrics and the impact on NYISO wholesale electricity markets. The following sections describe the scenarios that assist in understanding the overall performance of the projects under various conditions.

3.2.3.2.1. Scenario #1: National CO_2 removed

The baseline modeled a national CO_2 program starting from 2027. The NYISO developed Scenario #1, which assumes that a national CO_2 program is not in place.

3.2.3.2.2. Scenarios #2 and #3: High fuel and low fuel

The NYISO also developed high and low fuel costs for the baseline consistent with the fuel forecast methodology used in the CARIS process. Energy Information Administration's Annual Energy Outlook forecasts of the annual national delivered price were used to generate Low and High natural gas price forecasts for each region. Figure 3-14, Figure 3-15, and Figure 3-16 show the baseline, high, and low natural gas forecasts used in these scenarios.

[25] The meeting materials are posted at: http://www.nyiso.com/public/webdocs/markets_operations/committees/bic_espwg/meeting_materials/2017-11-17/AC_Transmission_Ph2_Assumptions.pdf.

Figure 3-14: Baseline Natural Gas Forecast

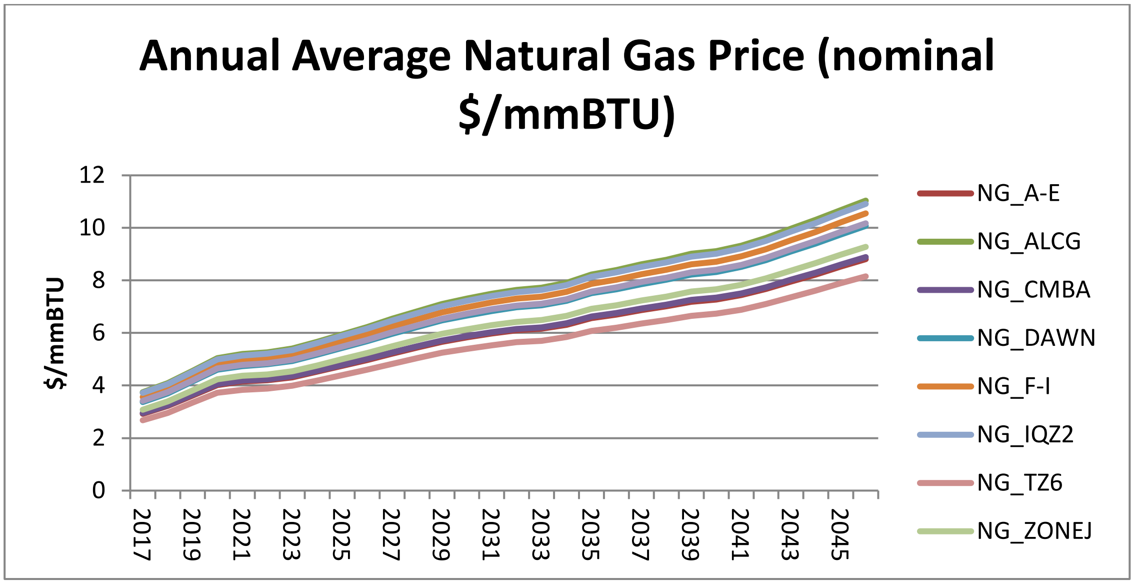


Figure 3-15: High Natural Gas Forecast

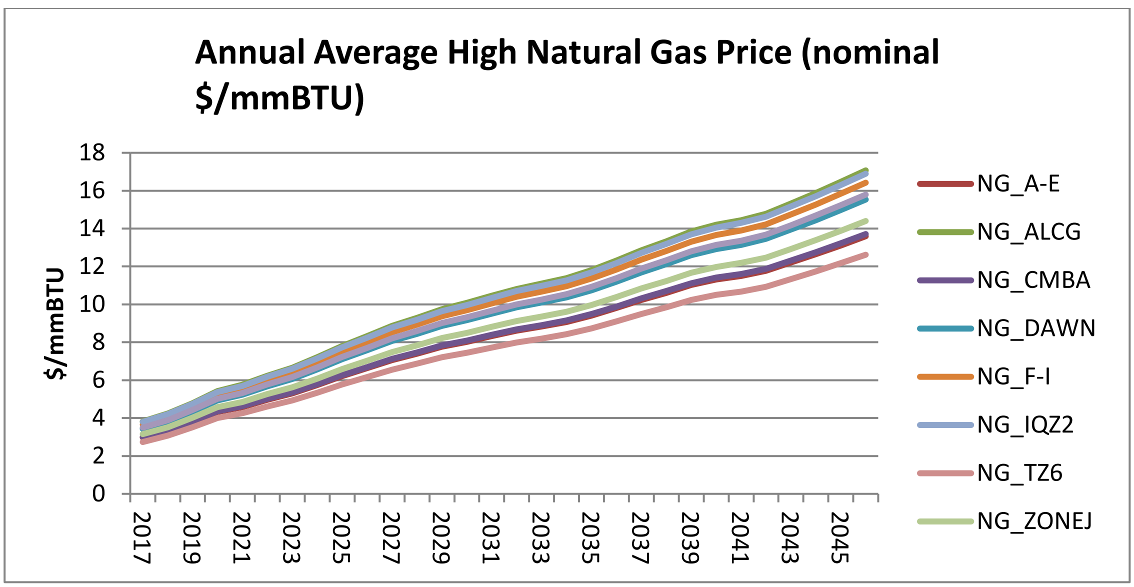
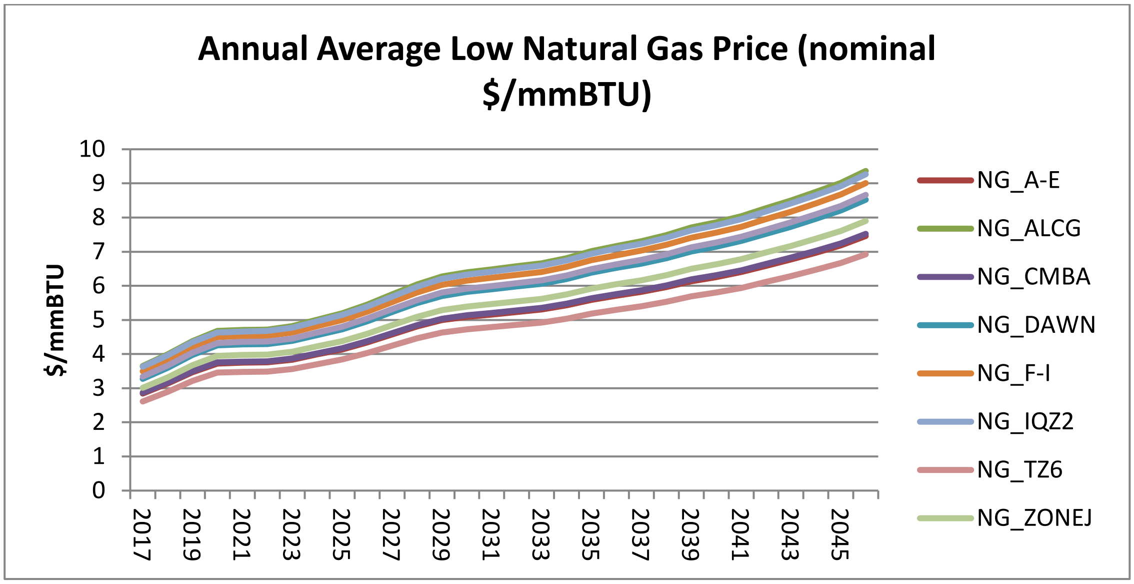


Figure 3-16: Low Natural Gas Forecast



3.2.3.2.3. Scenario #4: Clean Energy Standard (CES) with Aging Generation Retirements and National CO_2 removed

Scenario #4 assumes the integration of sufficient renewable generation and energy efficiency to meet the objectives of the Clean Energy Standard[26] along with the retirement of all New York coal units and approximately 3,500 MW of old GTs in NYC and Long Island (CES + Retirement). The NYISO also developed Scenario #4 assuming that a national CO_2 program is not in place. The renewable resource additions are captured in Table 3-4. Approximately 17 TWh of energy efficiency was modeled. With these assumptions, approximately 50% of New York's energy requirements were projected to be served by renewable resources.

[26] New York State Department of Public Service, Staff White Paper on Clean Energy Standard, PSC Case No. 15-E-0302 (January 25, 2016).

Table 3-4: Capacity of Zonal Renewable Generation added in Scenario #4 (MW)

Zone	Capacity (MW)	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	Total
Total	Land-Based Wind	-	-	73	473	317	522	346	293	285	615	657	91	780	106	4,558
	Utility-Scale Solar	-	-	-	-	462	570	-	-	1,821	1,227	338	2,930	1,241	2,893	11,482
	Offshore Wind	-	-	-	-	-	-	-	-	-	-	-	-	-	226	226
	Imports	-	-	-	-	-	258	258	-	-	-	-	-	-	-	516
Zone A	Land-Based Wind			73	367	109	47	252	86		190	79		30		1,233
	Utility-Scale Solar										108	153	732	871		1,864
	Offshore Wind															-
Zone B	Land-Based Wind															-
	Utility-Scale Solar														344	344
	Offshore Wind															-
Zone C	Land-Based Wind										59			210		269
	Utility-Scale Solar											185	1,219		2,429	3,833
	Offshore Wind															-
Zone D	Land-Based Wind															-
	Utility-Scale Solar													152		152
	Offshore Wind															-
Zone E	Land-Based Wind						162		112	245	284	553	91	429	106	1,982
	Utility-Scale Solar															-
	Offshore Wind															-
Zone F	Land-Based Wind				56	71	221	94	95	40	42	25		54		698
	Utility-Scale Solar					462	345			1,821	58		895			3,581
	Offshore Wind															-
Zone G	Land-Based Wind				50	40	92				40			57		279
	Utility-Scale Solar						143				565			218	120	1,046
	Offshore Wind															-
Zone H	Land-Based Wind															-
	Utility-Scale Solar						12									12
	Offshore Wind															-
Zone I	Land-Based Wind															-
	Utility-Scale Solar															-
	Offshore Wind															-
Zone J	Land-Based Wind															-
	Utility-Scale Solar															-
	Offshore Wind															-
Zone K	Land-Based Wind					97										97
	Utility-Scale Solar						70				496		84			650
	Offshore Wind														226	226
Imports	LBW Quebec															
	Ontario Utility Scale Solar															
	LBW Ontario						258	258								516
	LBW PJM															-
	PJM Utility Scale Solar															
Total		0	0	73	473	779	1,350	604	293	2,106	1,842	995	3,021	2,021	3,225	16,782

3.3 Evaluation Metrics

3.3.1 PSC Evaluation Criteria

For the purposes of evaluation and selection of the more efficient or cost-effective Public Policy Transmission Project(s) to address the AC Transmission Needs, the following criteria identified by the NYPSC Order will be applied in addition to the criteria and metrics defined by Section 31.4.8 of Attachment Y to the NYISO OATT:

Table 3-5: PSC Evaluation Criteria

PSC Criteria	Evaluation
In lieu of establishing an intended in-service year against which project schedules would be evaluated, the NYISO will consider the proposed project schedule for each Public Policy Transmission Project in the evaluation of impacts to congestion and other applicable criteria over the study period. The NYISO will assume that project schedules begin January 1 of a given year following the NYISO's selection and NYPSC Article VII siting approval (*i.e.,* project schedules need not account for the timing of the NYISO or NYPSC processes).	Considered in the Schedule metric
The selection process will favor Public Policy Transmission Projects that minimize the acquisition of property rights for new substations and substation expansions. For the purpose of this criterion, the transfer or lease of existing property rights from a current utility company owner to a Developer shall not be considered such an acquisition.	Considered in the Property Rights metric
No Public Policy Transmission Project shall be selected for Segment B that does not incorporate certain specified add-ons that would be constructed (*i.e.,* as specified in the NYPSC Order the upgrades to the Rock Tavern Substation and the upgrades to the Shoemaker to Sugarloaf transmission lines), unless the NYISO determines that such add-ons, jointly or severally, are not material to the accomplishment of the purpose of a solution for Segment B.	Considered in the selection process
The selection process for transmission solutions for Segment B shall not use the costs of upgrades to the Rock Tavern Substation and upgrades to the Shoemaker to Sugarloaf transmission lines as a distinguishing factor between Public Policy Transmission Projects.	Reflected in the capital cost estimates of all projects at the same amount
No Public Policy Transmission Project shall be selected for Segment A unless a Public Policy Transmission Project is selected for Segment B.	Combinations of Segment A and B projects considered in the selection process
No Public Policy Transmission Project shall be selected for Segment A except on condition that the Public Policy Transmission Project selected for Segment A shall not be implemented until there is reasonable certainty established in a manner to be determined by the NYISO that the Public Policy Transmission Project selected for Segment B will be implemented.	Combinations of Segment A and B projects considered in the selection process
The selection process shall favor Public Policy Transmission Projects that result in upgrades to aging infrastructure.	Evaluated as a separate metric
Project selection will be competitive by Segment (Segment A and Segment B), but synergies produced by selecting a single Developer to provide both segments may be considered.	Considered in the selection process as synergy savings from common developers of Segment A and B projects
The selection process shall not use the percentage rates applied to account for contingencies and revenue requirement as a distinguishing factor between Public Policy Transmission Projects. The NYISO will evaluate costs based on raw construction costs to ensure that all of the proposed Public Policy Transmission Projects are evaluated on a comparable basis as to the scope of costs.	Reflected in the capital cost estimates based on independently estimated raw construction costs

Aging infrastructure replacement is one of the major benefits stated in the 2015 PSC order. The Brattle Group estimated that, if no new transmission were built, the refurbishment of the Porter – Rotterdam 230 kV lines (Segment A corridor) and two 115 kV lines from Knickerbocker to Pleasant Valley (Segment B corridor) would cost $560 million and $279 million (both in 2015 $), or $839 million in total.[27] The retirement of these aging transmission facilities is included in all project proposals, therefore the avoided refurbishment cost for these lines is not a distinguishing factor between projects, but should be recognized as a significant benefit provided by the projects. As analyzed in Section 4.10 of Appendix D (SECO Report), all projects also proposed replacement of aging infrastructure in addition to the Porter – Rotterdam 230 kV lines and Knickerbocker to Pleasant Valley 115 kV lines. Among all Segment A proposals, T027 proposed the most replacement of aging infrastructure. All Segment B proposals replace similar mileage of aging transmission facilities except that T022 proposed to replace fewer 115 kV lines between Churchtown and Pleasant Valley.

3.3.2 Capital Cost Estimate

The NYISO and its independent consultant, SECO, evaluated each Developer's capital cost estimates for their proposed Public Policy Transmission Project for accuracy and reasonableness, and on a comparative basis with other proposed Public Policy Transmission Projects. Each Developer was required to submit detailed and credible estimates for the capital costs associated with the engineering, procurement, permitting, and construction of a proposed transmission solution. SECO reviewed all the information submitted by the Developers and formulated independent cost estimates for each project based on material and labor cost by equipment, engineering and design work, permitting, site acquisition, procurement and construction work, and commissioning needed for the proposed Public Policy Transmission Projects. Appendix D details the analysis performed by SECO. Consistent with the PSC's direction that the costs should be evaluated using raw construction costs on a comparable basis, the NYISO applied the same contingency rate to the independent consultant's capital cost estimates for all projects. Also, per the PSC's criterion that

[27] *See The Brattle Group Technical Conference Presentation*, Brattle Group, PSC Case Nos. 12-T-0502, *et al.* (October 14, 2015), available at http://documents.dps.ny.gov/public/MatterManagement/MatterFilingItem.aspx?FilingSeq=148569&MatterSeq=41268

the selection process for transmission solutions for Segment B not use the costs of upgrades to the Rock Tavern Substation and upgrades to the Shoemaker to Sugarloaf transmission lines as a distinguishing factor between Public Policy Transmission Projects, the NYISO and its independent consultant SECO excluded these costs from the cost estimates.

Table 3-6 summarizes SECO's overnight capital cost estimates for Segment A and Segment B projects in 2018 dollars with and without 30% contingency rate. The 30% contingency rate was used in the New York State Department of Public Service Trial Staff Final Report.[28] SECO reviewed it and agreed that the level of contingency is sufficient to account for unanticipated costs and estimating accuracy to forecast a reasonable worst case scenario for the development of the selected projects.

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[28] *See Comparative Evaluation of Alternating Current Transmission Upgrade Alternatives*, New York State Department of Public Service Trial Staff Final Report, PSC Case Nos. 12-T-0502, *et al.* (September 22, 2015).

Table 3-6: Independent Cost Estimate[29]

Segment	Project ID	Independent Cost Estimate: 2018 $M (w/ 30% contingency rate)	Independent Cost Estimate: 2018 $M (w/o 30% contingency rate)
A	T018	520	400
	T021	498	383
	T025	863	664
	T026	491	377
	T027	750	577
	T028	514	395
	T031	570	438
B	T019	479	369
	T022	373	287
	T023	424	326
	T029	422	324
	T030	441	339
	T032	536	412

The five percent synergy savings level is based on SECO's experience in developing transmission projects, and is calculated by evaluating the average cost of individual cost components of the projects and represents a conservative estimate of the cost savings a Developer could realize if awarded projects for both Segments. These individual cost components included items such as Labor & Equipment, Matting, Materials, Contractor Mobilization/Demobilization, Project Management, Field Construction Management and Inspection Staffing, Incumbent Utility Project Manager and Project Oversite, Site Facilities, Material Handling & Storage, Design Engineering, LiDAR, Geotech, Testing & Commissioning of T-Line and Equipment, Contractor Warranties, Legal Fees, and Contractor Markup (Overhead & Profit). Each of these items were assessed for economy of scale; utilization of resources, equipment and materials; duplication of services; and replication of engineering designs to estimate the potential savings.

Table 3-7 summarizes the cost estimates for all the Segment A and Segment B project combinations. The NYISO considered a five percent synergy in cost estimates if the same Developer were to develop both Segment A and Segment B projects. PSC's criteria allows for consideration of cost synergies if the same developer develops both Segment A and Segment B projects. The five

[29] At the time that this draft report was released, the System Impact Studies for all of the projects were still in progress. Preliminary Network Upgrade Facilities were included in the cost estimates, and the discussion is included in Section 3.3.12 Interconnection Studies.

percent synergy savings level is based on SECO's experience in developing transmission projects, and is calculated by evaluating the average cost of individual cost components of the projects and represents a conservative estimate of the cost savings a Developer could realize if awarded projects for both Segments. These individual cost components included items such as Labor & Equipment, Matting, Materials, Contractor Mobilization/Demobilization, Project Management, Field Construction Management and Inspection Staffing, Incumbent Utility Project Manager and Project Oversite, Site Facilities, Material Handling & Storage, Design Engineering, LiDAR, Geotech, Testing & Commissioning of T-Line and Equipment, Contractor Warranties, Legal Fees, and Contractor Markup (Overhead & Profit). Each of these items were assessed for economy of scale; utilization of resources, equipment and materials; duplication of services; and replication of engineering designs to estimate the potential savings.

Table 3-7: Independent Cost Estimate – Project Combinations

Developers	Project ID	Independent Cost Estimate: 2018 $M (w/ 30% contingency rate) (w/o synergies)	Independent Cost Estimate: 2018 $M (w/ 30% contingency rate) (w/ 5% synergies if same developers)
Same Developers	T018+T019		949
	T021+T022		827
	T021+T023		875
	T025+T029		1194
	T025+T030		1211
	T026+T029		867
	T026+T030		885
	T027+T029		1113
	T027+T030		1131
	T028+T029		889
	T028+T030		907
	T031+T032		1051
Different Developers	T021+T019	977	
	T025+T019	1309	
	T026+T019	970	
	T027+T019	1229	
	T028+T019	993	
	T031+T019	1049	
	T018+T022	893	
	T025+T022	1207	
	T026+T022	863	
	T027+T022	1123	
	T028+T022	887	
	T031+T022	943	
	T018+T023	944	
	T025+T023	1258	
	T026+T023	915	
	T027+T023	1174	
	T028+T023	938	
	T031+T023	994	
	T018+T029	942	
	T021+T029	919	
	T031+T029	992	
	T018+T030	961	
	T021+T030	938	
	T031+T030	1011	
	T018+T032	1056	
	T021+T032	1034	
	T025+T032	1360	
	T026+T032	1027	
	T027+T032	1286	
	T028+T032	1050	

3.3.3 Cost Per MW Ratio

The NYISO calculated the cost per MW ratio metric by dividing SECO's independent cost estimates by the MW value of transfer capability. For the purpose of calculating cost per MW based on transfer limits, the NYISO calculated the Central East voltage transfer limits and UPNY/SENY thermal transfer limits. The incremental increase for Central East is defined in terms of increases in voltage transfer capability because that interface is limited by voltage transfer limits. For UPNY/SENY, the incremental increase is defined in terms of increases in thermal transfer capability because that interface in limited by thermal transfer limits.

Table 3-8 and Table 3-9 summarize the baseline transfer results. The incremental increase for Central East is defined in terms of increases in voltage transfer capability because that interface is limited by voltage transfer limits. For UPNY/SENY, the incremental increase is defined in terms of increases in thermal transfer capability because that interface in limited by thermal transfer limits.

Table 3-8: Voltage Transfer across Central East

Project ID	Transfer Limit	Incremental
Pre-Project	2,575	-
T018+T019	3,000	425
T021+T022	2,925	350
T021+T023	2,925	350
T025+T019	3,875	1,300
T025+T029	3,700	1,125
T025+T030	3,775	1,200
T026+T029	2,850	275
T026+T030	2,850	275
T027+T019	3,450	875
T027+T029	3,400	825
T027+T030	3,400	825
T028+T029	2,975	400
T028+T030	2,900	325
T031+T032	2,975	400

Table 3-9: Thermal Transfer across UPNY/SENY

Project ID	Roseton at 100%			Roseton at 85%			Optimal Transfer Limit		
	Limit	Constraint	Delta	Limit	Constraint	Delta	Limit	Constraint	Delta
Pre-Project	4775	(1)	-	4825	(1)	-	5025	(1)	-
T018+T019	6375	(2)(A)	1600	6500	(2)(A)	1675	7000	(2)	1975
T021+T022	5975	(3)	1200	6350	(1)	1525	6525	(1)	1500
T021+T023	5975	(3)	1200	6300	(1)	1475	6475	(1)	1450
T025+T019	5825	(4)	1050	5825	(4)	1000	6175	(4)	1150
T025+T029	6600	(3)	1825	6950	(1)	2125	7250	(1)	2225
T025+T030	6700	(3)	1925	7100	(1)	2275	7350	(1)	2325
T026+T029	5925	(3)	1150	6225	(1)	1400	6425	(1)	1400
T026+T030	6000	(3)	1225	6375	(1)	1550	6550	(1)	1525
T027+T019	6525	(2)(A)	1750	6700	(2)(A)	1875	7125	(2)	2100
T027+T029	6125	(3)	1350	6150	(1)	1325	6350	(1)	1325
T027+T030	6175	(3)	1400	6300	(1)	1475	6475	(1)	1450
T028+T029	5950	(3)	1175	6250	(1)	1425	6450	(1)	1425
T028+T030	6025	(3)	1250	6400	(1)	1575	6575	(1)	1550
T031+T032	6000	(3)	1225	6325	(1)	1500	6500	(1)	1475

Notes:
(1) Leeds - Pleasant Valley at 1538 MW LTE rating for TE44:L/O ATHENS-PV 345 91
(2) Middletown Transformer at 707 MW STE rating for T:77&76
(3) Roseton - East Fishkill at 2676 MW LTE rating for T:77&76
(4) Knickerbocker Series Comp at 2308 MW LTE rating for T:34&44

(A) Limited by cascading test

Table 3-10 displays the cost per MW ($M/MW) ratio based on transfer limits. The table displays the proportional UPNY/SENY transfer limit with Roseton dispatched at 100% and 85% as well as the optimal UPNY/SENY transfer limit.

Table 3-10: Cost Per MW Ratio

Project ID	Segment A Independent Cost Estimate: 2018 $M	Segment B Independent Cost Estimate: 2018 $M	Cost/MW: incremental Central East Voltage Limit (N-1)		Cost/MW: incremental UPNY/SENY thermal Limit (N-1 NTC)					
					Roseton at 100%		Roseton at 85%		Optimized Transfer	
			Inc. MW	$M /MW	Inc. MW	$M /MW	Inc. MW	$M /MW	Inc. MW	$M /MW
T018+T019	494	455	425	1.16	1,600	0.28	1,675	0.27	1975	0.23
T021+T022	473	354	350	1.35	1,200	0.29	1,525	0.23	1500	0.23
T021+T023	473	403	350	1.35	1,200	0.34	1,475	0.27	1450	0.27
T025+T019	863	479	1,300	0.66	1,050	0.46	1,000	0.48	1150	0.41
T025+T029	820	401	1,125	0.73	1,825	0.22	2,125	0.19	2225	0.18
T025+T030	820	419	1,200	0.68	1,925	0.22	2,275	0.18	2325	0.18
T026+T029	466	401	275	1.69	1,150	0.35	1,400	0.29	1400	0.29
T026+T030	466	419	275	1.69	1,200	0.35	1,525	0.27	1525	0.27
T027+T019	750	479	875	0.86	1,750	0.27	1,875	0.26	2100	0.23
T027+T029	712	401	825	0.86	1,350	0.30	1,325	0.30	1325	0.30
T027+T030	712	419	825	0.86	1,400	0.30	1,475	0.28	1450	0.28
T028+T029	488	401	400	1.22	1,175	0.34	1,425	0.28	1425	0.28
T028+T030	488	419	325	1.50	1,250	0.33	1,575	0.27	1550	0.27
T031+T032	542	509	400	1.35	1,225	0.42	1,500	0.34	1475	0.35

3.3.4 Expandability

In assessing the expandability of the proposed projects, the NYISO considers the feasibility and ease of physically expanding a facility, which can include consideration of future opportunities to economically expand a facility and the likelihood of future transmission siting. Such consideration may include future modifications to increase equipment ratings of the proposed facilities, staging or phasing of future transmission development, or otherwise benefiting from the proposed facilities for future reliability or congestion relief purposes. The details are summarized in the following sections.

3.3.4.1 Physical Expandability

The NYISO contracted SECO as its independent consultant to perform the project expandability assessment to account for any possibilities of facilitating future transmission or substation expansion or generation interconnection as the result of the project proposals. SECO conducted evaluation of the expansion capability of the Developers' proposals by using the projects' information submitted by the Developers during the Viability and Sufficiency Assessment and additional information, specifically on expandability, provided by Developers in response to a request for additional information by the NYISO.

Applicable design approaches to enhance future expandability are limited in the AC Public Policy Transmission Projects since only the existing rights-of-way (ROW) can be utilized. Much of the existing transmission ROW will be fully utilized in construction of this project, but there remains is some opportunity for expansion.

Potential transmission expansion includes the following:

- All proposals for Segment A involve replacement of the existing Porter-Rotterdam 230 kV circuits #30 and #31 with a single Edic to New Scotland 345 kV line. This will provide space for future use of the existing ROW and may allow for the addition of another circuit from Edic/Porter to Princetown Junction within the existing ROW, based on current electrical clearance requirements. Any proposal to construct an additional circuit is subject to the applicable permitting and regulatory requirements, such as public acceptance of visual impact, EMF compliance, compatibility with existing gas facilities, and regulatory approvals.
    - For the base proposals, NextEra affords the most efficient use of the existing ROW by utilizing 100 foot single-pole delta structures. National Grid/Transco, NAT/NYPA and ITC propose using 65-85 foot H-pole structures, which requires the use of more space within the ROW. In all base proposals, there may be adequate space in the existing ROW remaining for an additional 345 kV line. However, a compact transmission line configuration may be required to fit a future 345 kV line in the remaining ROW.
    - All alternative proposals may also provide adequate space within the existing ROW for a future line. T027 utilizes all four existing circuit positions for the first 12 miles out of Edic.
    - During detailed engineering the placement of structures should be optimized to maximize the remaining ROW.
    - Refer to the Table 3-11 below for summary of the ROW requirements for each Developer's projects in the Edic to Princetown Junction corridor.

Table 3-11: ROW requirements in the Edic to Princetown Junction corridor

Segment-A							
Sector	**Corridor Width (ft.)**	**Developer**	**Proposal**	**Proposed Structure Configuration**	**ROW Reqd. (ft.)**	**ROW Corridor Remaining (ft.)**	**Remarks**
Edic SS to Prince-town Jct	200	NGRID/ Transco	T018	1 Ckt – 345kV H-pole Horizontal	120	80	Sufficient reserved ROW for expansion utilizing Compact Vertical Configuration
		NextEra	T021	1 Ckt – 345kV Single Pole Delta	80	120	Sufficient reserved ROW for expansion utilizing H-pole Horizontal Configuration
		NAT/NYPA	T026 & T028	1 Ckt – 345kV H-pole Horizontal	140	60	Sufficient reserved ROW for expansion utilizing Compact Vertical Configuration
		NAT/NYPA	T027	2 Ckt – 345kV Single Pole Vertical	105	95	Sufficient reserved ROW for expansion utilizing Single Pole Delta Configuration with exception of the first 12.6 miles out of Edic
		ITC	T031	1 Ckt – 345kV H-pole Horizontal	100	100	Sufficient reserved ROW for expansion utilizing Single Pole Delta Configuration

- The new Edic to New Scotland line for Segment A could be designed for double circuit capability similar to the NAT/NYPA T027 double circuit line proposal.
- Transmission lines could be constructed with higher ampacity conductor or re-conductored in the future.
- Most proposals provide for future expansion of substations or could be modified to provide for additional line terminals and transformers in the new substations.

Potential substation expansion for each Developer's specific proposal is discussed in Table 3-12.

Table 3-12: AC Transmission Projects Substation Expandability Analysis

Segment	Project ID	Substation Expandability
A	T018	At Rotterdam Substation, the 345 kV gas-insulated substation design provides one open 345 kV bay position and room for additional 345 kV bays. Design also provides ability to connect one additional 345 kV/115 kV transformer to support the local transmission system. Lastly, the design allows for the rebuilding of the 115 kV straight bus configuration into a breaker-and-a-half configuration.
	T021	NextEra is proposing a "Princetown" substation approximately two miles west of Rotterdam Substation on a new greenfield site. The design provides two open 345 kV bay positions and room on the property for adding bays. It maintains the existing and aging Rotterdam 230 kV yard intact.
	T025, T027, T028	At Rotterdam, rebuilding and relocating the 345 kV substation allows for the rebuilding of the 115 kV straight bus configuration into a breaker-and-a-half configuration. A new Princetown Substation is proposed at the junction of the 345 kV Edic-New Scotland line and the 230 kV Porter to Rotterdam lines. Due to the proximity to the neighboring properties, constructing or expanding the substation will be difficult. T025 also creates an open line terminal position at New Scotland substation.
	T026	At Rotterdam, rebuilding and relocating the 345 kV substation allows for the rebuilding of the 115 kV straight bus configuration into a breaker-and-a-half configuration. The proposed design for New Scotland provides the possibility of reconfiguring the substation as a breaker-and-a-half.
	T031	ITC's proposal does not provide any additional bays at Princetown or Rotterdam Substations. ITC's proposal maintains the existing and aging Rotterdam 230 kV yard intact. Additionally, physical limitations at these properties may preclude future expansions without purchasing additional property.
B	T019	At Knickerbocker Substation, the design provides one open 345 kV bay position. The Knickerbocker design also allows the 345 kV ring bus configuration to be converted to a breaker-and-a-half configuration with room on the property for adding bays. At Churchtown Substation, design provides one open 115 kV bay position. Additional breaker-and-a-half bays can be added in the future.
	T022, T023	At Knickerbocker Substation, the proposed design provides one open 345 kV bay position. The Knickerbocker design also allows the 345 kV ring bus configuration to be converted to a breaker-and-a-half configuration with room on the property for adding bays. At North Churchtown Substation, design provides one open 115 kV bay position with room on the property for adding bays. The southern-most bay could also be built out to a breaker-and-a-half configuration.
	T029, T030	The Developer proposes a new 115 kV breaker-and-a-half substation and eliminates the existing NYSEG Churchtown substation. The three-bay substation is proposed for south of the existing substation and north of Orchard Road. This location will permit future expansion of the proposed substation to the north. At Knickerbocker, the Developer's design allows the 345 kV ring bus configuration to be converted to a breaker-and-a-half configuration with room on the property for adding bays.
	T032	At Knickerbocker Substation, design provides one open 345 kV bay position and one open 115 kV bay position. Additionally, during detailed design, the ability to connect up to two 345 kV – 115 kV transformers to support the local transmission system could be provided.

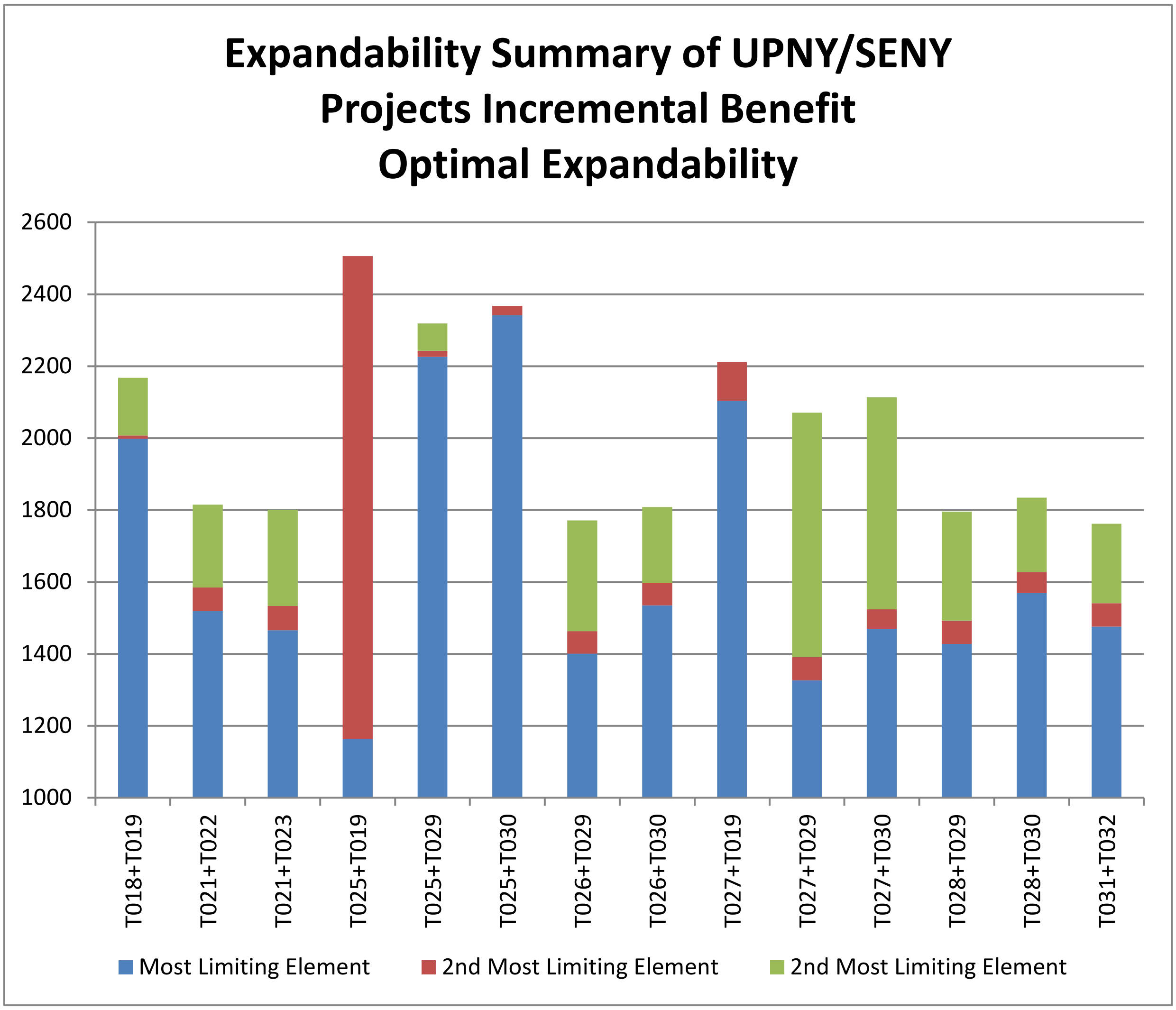
3.3.4.2 Electrical Expandability

This analysis focused on the potential incremental transfer limits of each proposed project if the limiting element or path is resolved by future additional transmission expansion.

The optimal N-1 UPNY/SENY transfer limits and the constraints summarized in Section 3.2.1.2 were analyzed to determine the most limiting element. To find the next most limiting element, the optimal N-1 transfer level was calculated again while excluding the most limiting monitored element. To find the next most limiting path, this process was repeated until a new limiting pathway was found. The incremental transfer capability between the transfer limits constrained by the most limiting element and the second most limiting element captures the electrical benefits of future modifications to increase equipment ratings of the most limiting facilities. Furthermore, if expansion can be made to the entire constraint path, the electrical benefits could be approximated by the incremental transfer capability. Based on the results of the transfer limit analysis, the NYISO determined the two transfer paths are: (i) the Marcy South path and (ii) the Leeds-Pleasant Valley corridor.

Figure 3-17 summarizes the potential benefits using Optimal N-1 Transfers. The blue portion of the bars represents the transfer limits based on the project proposal, the red portion represents the transfer limits if the most limiting constraint shown in Table 3-9 is resolved, and the green portion represents the transfer limits should the most limiting transfer path be resolved. The limiting path for combinations T018 + T019 and T027 + T019 would be the Marcy South path, while the other combinations would be the Leeds-Pleasant Valley corridor.

Figure 3-17: Electrical Expandability Analysis



3.3.4.3 Summary of Expandability Assessment

The NYISO used the assessment of incremental transfer limits as a proxy to determine the network strength and potential benefits if these project proposals could be expanded based on their substation designs. The project proposals that have substation designs with potentials to accommodate transmission expansion to significantly increase transfer limits are considered more favorable and are ranked as "Good". However, if the transfer limits could be increased or such increase could be handled more efficiently compared to other projects, those projects are ranked as "Excellent".

Table 3-13: Expandability Summary

Segment	Project ID	Project Components with the Potential for Expansion	Ranking
A	T018	Rotterdam Substation and ability to connect one additional 345 kV - 115 kV transformer at Rotterdam	Good
	T021	Princetown	Good
	T025	Rotterdam, New Scotland	Good
	T027	Rotterdam, New Scotland. Additionally, Double-circuit design tends to maximize the Central East transfer capability	Excellent
	T028	Rotterdam, New Scotland	Good
	T026	Rotterdam	Good
	T031	-	Good
B	T019	Knickerbocker, Churchtown	Good
	T022	Knickerbocker, Churchtown	Good
	T023	Knickerbocker, Churchtown	Good
	T029	Knickerbocker, Churchtown	Good
	T030	Knickerbocker, Churchtown	Good
	T032	Knickerbocker station and ability to connect two 345kV -115 kV transformers	Good

3.3.5 Operability

The NYISO considered how the proposed Public Policy Transmission Projects affect flexibility in operating the system, such as dispatch of generation, access to operating reserves, access to ancillary services, or the ability to remove transmission facilities for maintenance. The NYISO also considered how the proposed projects may affect the cost of operating the system, such as how they may affect the need for operating generation out of merit for reliability needs, reduce the need to cycle generation, or provide more balance in the system to respond to system conditions that are more severe than design conditions.

3.3.5.1 Substation Configuration Assessment

The operability of the proposals was evaluated by the NYISO and also by SECO. The following factors were considered in evaluating each of the proposals:

1. Level of integration: operational preference is for a project that would integrate with the existing New York State Transmission System to the maximum extent possible. For example,

a project using an existing right-of-way (ROW) should not bypass existing substations on the ROW except for reasons such as short circuit limitations, space limitations, and design perspective where a new substation is desirable.

2. Substation design configuration: operational preference is for substation designs in the following order: double-breaker-double-bus, a breaker-and-a-half, ring bus, main and transfer bus, sectionalized bus, and straight (single) bus.

3. Transfer capability under outage conditions: from an operations perspective, it is desirable for a project not to lose its improvement to transfer capability as a result of the loss of any transmission component.

In this assessment, the proposed projects have the greatest impact on the following three substations: Princetown 345 kV, Rotterdam 345 kV, and Knickerbocker 345 kV Substations. Based on the substation configuration, the findings and comparisons are summarized in Table 3-14 for Princetown 345 kV Substation, and Table 3-15 for Rotterdam 345 kV Substation, and Table 3-16 for Knickerbocker 345 kV Substation.

Table 3-14: Princetown 345 kV Substation Arrangement Comparison

<table>
<tr><th>Project ID</th><th># of new Lines</th><th># of new Transformers</th><th>Total new elements</th><th>Proposed Breaker Arrangement</th><th># of Breakers</th></tr>
<tr><td>T018</td><td colspan="5">No Princetown Substation proposed.</td></tr>
<tr><td rowspan="2">T021</td><td>2 – 345kV</td><td rowspan="2">2</td><td rowspan="2">6</td><td rowspan="2">Breaker & Half</td><td>7 – 345kV</td></tr>
<tr><td>2 – 230kV</td><td>6 – 230kV</td></tr>
<tr><td>T026</td><td colspan="5">No Princetown Substation proposed.</td></tr>
<tr><td>T025</td><td>4</td><td>0</td><td>4</td><td>Ring Bus</td><td>4</td></tr>
<tr><td>T027</td><td>6</td><td>0</td><td>6</td><td>Breaker & Half</td><td>9</td></tr>
<tr><td>T028</td><td>4</td><td>0</td><td>4</td><td>Ring Bus</td><td>4</td></tr>
<tr><td>T031</td><td>8</td><td>0</td><td>8</td><td>Breaker & Half</td><td>12</td></tr>
</table>

T021 and T031 offer a breaker-and-a-half configuration for Princetown Substation. T021 has three bays, and T031 has four bays. Potential issues with siting the Princetown substation are discussed in the Risk Analysis section of the report. Proposals T025 and T028, proposes a four-breaker ring-bus configuration for Princetown Substation. For T027, NAT/NYPA proposes a gas-insulated three-bay breaker-and-a-half configuration.

Table 3-15: Rotterdam 345 kV Substation Arrangement Comparison

Project ID	# of new Lines	# of new Transformers	Total new elements	Proposed Breaker Arrangement	# of Breakers
T018	2 – 345kV 1 – 230kV 2 – 115kV*	1 – 345kV-230kV 2 – 345kV-115kV	8	Breaker & Half (Gas-Insulated)	9 – 345kV 1 – 230kV
T021	No changes to Rotterdam proposed.				
T026	2 – 345kV 1 – 230kV 2 – 115kV*	1 – 345kV-230kV 2 – 345kV-115kV	8	Breaker & Half	8 – 345kV 1 – 230kV
T025	Same as T026				
T027	Same as T026				
T028	Same as T026				
T031	2 – 345kV	2 – 345kV-230kV	4	Sectionalized Bus	3 – 345kV 1 – 230kV
*These are tie lines to the existing 115 kV yard at Rotterdam.					

Proposals T018, T025, T026, T027 and T028 propose new 345 kV breaker-and-a-half substations at Rotterdam. These proposals also add two 345 kV-115 kV transformers and one 345 kV-230 kV transformer. T031 adds a 345 kV sectionalized bus yard to the north side of the existing Rotterdam 230 kV yard. T021 makes no changes to the existing Rotterdam bus arrangement.

Table 3-16: Knickerbocker 345 kV Substation Arrangement Comparison

Project ID	# of new Lines	# of new Transformers	Total new elements	Proposed Breaker Arrangement	# of Breakers
T019	3	0	3 (also includes Series Compensation)	Ring Bus (built for future Breaker & Half)	3
T022	3	0	3	Ring Bus (built for future Breaker & Half)	3
T023	Same as T022.				
T025	1 – 765kV 2 – 345kV	2	5	765kV – Ring Bus 345kV – Ring Bus	3 – 765kV 4 – 345kV
T029	3	0	3	Ring Bus (built for future Breaker & Half)	3
T030	Same as T029.				
T032	3 – 345kV 3 – 115kV	0	6	345kV - Ring Bus 115kV – Ring Bus	3 – 345kV 3 – 115kV

Except for combinations that include T025, all Developers propose a new Knickerbocker Substation with similar 345 kV ring bus arrangements. T019 includes Series Compensation on the line terminal to Pleasant Valley. T032 adds an independent 115 kV ring bus yard. T025 proposes a 765 kV ring bus yard and a 345 kV ring bus yard with two 765 kV – 345 kV transformers. T025 will also require the installation of a new 765 kV breaker and associated equipment at the Marcy Substation.

3.3.5.2 Benefits under Maintenance Conditions

These Central East voltage transfer limits were found after an N-1 outage of a major transmission line that would affect the Central East interface. These results are based on the 2016 RPP case with updates detailed in Section 3.2.1 and use the same methodology as the N-1 Central East voltage transfer analysis. Table 3-17 shows the N-1-1 results.

Table 3-17: Central East N-1-1 Voltage Transfer Capability

Project ID	Maintenance Outage	Transfer Limit	Delta
Pre-Project	Marcy-New Scotland 345 kV Line	1,861	-
T021+T022	Marcy-Princetown 345 kV Line	2,250	389
T025+T019	Marcy-Knickerbocker 765 kV Line	2,165	304
T025+T029	Marcy-Knickerbocker 765 kV Line	2,243	382
T027+T019	Marcy-New Scotland 345 kV Line	2,976	1,115
T027+T029	Marcy-New Scotland 345 kV Line	2,883	1,022
T031+T032	Marcy-Princetown 345 kV Line	2,400	539
T018+T019	Marcy-New Scotland 345 kV Line	2,285	424

The following thermal transfer analysis calculates the N-1 transfer capability under different system maintenance conditions by using optimal N-1-1 transfer limits. The N-1-1 transfer analysis optimally shifts generation from Ontario and Upstate New York and sinks it to the Lower Hudson Valley while securing New York elements to both their pre- and post-contingency ratings. When an overload cannot be mitigated, the optimal transfer limit is determined. Internal NYC PARs were optimized to mitigate local overloads.

Based on the 2016 RPP case with the updates detailed in Section 3.2.1, the Table 3-18 below shows the N-1-1 transfer limits.

Table 3-18: Incremental UPNY/SENY N-1-1 Thermal Transfer Capability

Maintenance Outage	No Outage	CPV - Rock Tavern 345 kV Line	Marcy - Coopers Corners 345 kV Line	Roseton - East Fishkill 345 kV Line	Athens-Pleasant Valley 345 kV Line
T018+T019	1998	2073	1856	660	1895
T021+T022	1519	1457	1466	449	1248
T021+T023	1466	1408	1418	439	1203
T025+T019	1163	1711	1456	1104	2034
T025+T029	2226	2149	2169	2117	1769
T025+T030	2342	2269	2178	2257	1881
T026+T029	1401	1340	1344	1360	1142
T026+T030	1535	1465	1470	1487	1260
T027+T019	2103	2027	1995	782	1419
T027+T029	1326	1299	1320	1331	1128
T027+T030	1470	1423	1455	1459	1233
T028+T029	1427	1367	1371	1383	1171
T028+T030	1569	1493	1501	1511	1290
T031+T032	1476	1418	1413	455	1217

3.3.5.3 Summary of Operability Assessment

The NYISO used the assessment of flexibility in operating the system to determine the operability, such as the ability to remove transmission for maintenance, or high transfer limit under N-1-1 contingency. **Table 3-19** shows the summary of the operability assessment.

Table 3-19: Operability Summary

Segment	Project ID	Substation and Transmission Configuration	Electrical Operability		Ranking
			UPNY/SENY N-1-1	Central East N-1-1	
A	T018	Breaker-and-a-half 345 kV Rotterdam substation, foundations and structures beyond NESC standard	N/A	Low	Good
	T021	Breaker-and-a-half 345 kV Princetown substation	N/A	Low	Good
	T025	Breaker-and-a-half 345 kV Rotterdam substation, ring-bus 345 kV Princetown substation	N/A	Low	Good
	T026	Breaker-and-a-half 345 kV Rotterdam substation	N/A	Low	Good
	T027	Breaker-and-a-half 345 kV Rotterdam substation, breaker-and-a-half 345 kV Princetown substation	N/A	Highest	Excellent
	T028	Breaker-and-a-half 345 kV Rotterdam substation, ring-bus 345 kV Princetown substation	N/A	Low	Good
	T031	Breaker-and-a-half Princetown substation looping in all 345 kV lines, straight-bus at Rotterdam substation, no bus reconfiguration at New Scotland, new tower contingency created south of Princetown	N/A	Low	Good
B	T019	Ring bus at Knickerbocker 345 kV substation , foundations and structures beyond NESC standard	-	N/A	Good
	T022	Ring bus at Knickerbocker 345 kV substation	-	N/A	Good
	T023	Ring bus at Knickerbocker 345 kV substation	-	N/A	Good
	T029	Ring bus at Knickerbocker 345 kV substation	Improved N-1-1 performance due to Middletown upgrades proposed	N/A	Excellent
	T030	Ring bus at Knickerbocker 345 kV substation	Improved N-1-1 performance due to Middletown upgrades proposed	N/A	Excellent
	T032	Ring bus at Knickerbocker 345 kV substation	-	N/A	Good

3.3.6 Performance

For the AC Transmission Needs, the performance metric is primarily concerned with maximizing energy transfer from upstate to downstate over the Central East and UPNY/SENY interfaces. Table 3-20 and Table 3-21 list the 20-year incremental energy flows across the Central East and UPNY/SENY interfaces for each of the projects compared to the pre-project case. The flows are from the MAPS Baseline and CES + Retirement without National CO_2 program cases.

Table 3-20: Baseline 20-year Incremental Energy (GWh)

Project ID	CENTRAL EAST	UPNY/SENY
T018+T019	28,721	27,500
T021+T022	26,420	24,699
T021+T023	26,050	24,058
T025+T019	89,669	40,642
T025+T029	72,646	27,889
T025+T030	76,301	29,734
T026+T029	23,081	15,115
T026+T030	23,806	15,905
T027+T019	61,551	40,089
T027+T029	55,818	27,524
T027+T030	56,664	28,546
T028+T029	26,361	18,984
T028+T030	26,114	19,485
T031+T032	25,775	31,841

Table 3-21: CES + Retirement without National CO2 20-year Incremental Energy (GWh)

Project ID	CENTRAL EAST	UPNY/SENY
T018+T019	52,543	34,444
T021+T022	46,260	32,657
T021+T023	45,841	32,024
T025+T019	149,696	57,394
T025+T029	128,379	46,939
T025+T030	134,174	49,003
T026+T029	38,377	22,467
T026+T030	38,812	23,187
T027+T019	104,019	47,535
T027+T029	96,623	36,942
T027+T030	96,878	38,166
T028+T029	49,548	25,394
T028+T030	44,079	24,472
T031+T032	46,711	26,718

3.3.7 Production Cost

The NYISO calculated the system production costs for the AC Transmission Public Policy Transmission Projects. Each entry in the following tables represents the differences between the pre-project and post-project over the duration of a project's study period. The study period begins with the in-service date proposed by the Developers and extends 20 years. Entries with a dollar value are listed in 2018 millions of dollars. The discount rate used to calculate present value is 6.988% consistent with the 2017 CARIS Phase 1 database. The NYISO used scenarios to distinguish projects and to measure the robustness of project performance. Blank entries mean that a certain scenario was not a distinguishing factor for that particular project. In general, a negative value (listed in red) is a more positive outcome for the various metrics (*i.e.,* the system benefits from the reduction in production cost, lower LBMPs, and reduced emissions).

Table 3-22 through Table 3-28 shows the various results associated with the production cost analysis for each proposal:

Table 3-22: NYCA Production Cost Saving in 2018 M$

Project ID	Baseline	National CO2 Removed	High Natural Gas	Low Natural Gas	CES + Retirement w/o National CO2
		Based off Baseline			
T018+T019	(236)	(268)	(391)	(182)	(830)
T021+T022	(199)	(223)	(329)	(159)	(714)
T021+T023	(196)				(707)
T025+T019	(513)	(555)			(1,492)
T025+T029	(437)	(517)	(815)	(343)	(1,417)
T025+T030	(457)				(1,461)
T026+T029	(190)				(626)
T026+T030	(195)				(615)
T027+T019	(368)				(1,179)
T027+T029	(331)	(373)	(603)	(255)	(1,129)
T027+T030	(337)				(1,108)
T028+T029	(221)				(840)
T028+T030	(205)				(704)
T031+T032	(206)	(242)	(336)	(168)	(570)

Table 3-23: Baseline 20-Year Average LBMP Change in 2018 $M

Project	West	Genesee	Central	North	Mohawk Valley	Capital	Hudson Valley	Millwood	Dunwoodie	NY City	Long Island
T018+T019	0.43	0.41	0.43	0.44	0.47	(0.02)	(0.07)	(0.15)	(0.19)	(0.16)	(0.12)
T021+T022	0.38	0.38	0.40	0.45	0.45	0.01	(0.08)	(0.17)	(0.20)	(0.16)	(0.13)
T021+T023	0.37	0.38	0.40	0.45	0.45	(0.00)	(0.08)	(0.17)	(0.20)	(0.16)	(0.13)
T025+T019	0.97	0.90	0.84	1.29	1.04	(0.31)	(0.13)	(0.24)	(0.26)	(0.22)	(0.16)
T025+T029	0.95	0.90	0.90	1.30	1.05	(0.28)	(0.12)	(0.24)	(0.26)	(0.21)	(0.17)
T025+T030	0.97	0.92	0.91	1.31	1.06	(0.30)	(0.14)	(0.25)	(0.28)	(0.23)	(0.18)
T026+T029	0.39	0.38	0.40	0.48	0.45	0.01	(0.02)	(0.10)	(0.14)	(0.10)	(0.08)
T026+T030	0.41	0.39	0.40	0.48	0.45	0.02	(0.02)	(0.10)	(0.14)	(0.10)	(0.09)
T027+T019	0.75	0.71	0.70	0.84	0.79	(0.26)	(0.19)	(0.29)	(0.32)	(0.27)	(0.20)
T027+T029	0.67	0.66	0.67	0.83	0.78	(0.28)	(0.16)	(0.26)	(0.29)	(0.24)	(0.18)
T027+T030	0.69	0.67	0.68	0.83	0.78	(0.27)	(0.16)	(0.26)	(0.29)	(0.24)	(0.18)
T028+T029	0.43	0.44	0.46	0.58	0.55	(0.13)	(0.08)	(0.17)	(0.20)	(0.16)	(0.12)
T028+T030	0.43	0.41	0.42	0.52	0.49	(0.09)	(0.08)	(0.17)	(0.20)	(0.16)	(0.12)
T031+T032	0.37	0.37	0.38	0.44	0.46	0.06	(0.16)	(0.27)	(0.30)	(0.25)	(0.19)

Table 3-24: CES + Retirement Without National CO2 20-Year Average LBMP Change in 2018 $M

Project	West	Genesee	Central	North	Mohawk Valley	Capital	Hudson Valley	Millwood	Dunwoodie	NY City	Long Island
T018+T019	1.65	1.89	1.96	2.43	2.24	(1.18)	(0.15)	(0.63)	(0.84)	(0.55)	(0.49)
T021+T022	1.41	1.60	1.66	2.04	1.92	(0.66)	(0.10)	(0.57)	(0.79)	(0.49)	(0.46)
T021+T023	1.39	1.60	1.65	2.06	1.92	(0.71)	(0.11)	(0.57)	(0.79)	(0.49)	(0.46)
T025+T019	3.09	3.58	3.58	4.80	4.06	(2.31)	(0.62)	(1.19)	(1.37)	(0.92)	(0.83)
T025+T029	2.94	3.42	3.47	4.64	3.92	(2.21)	(0.65)	(1.22)	(1.40)	(0.93)	(0.85)
T025+T030	3.05	3.55	3.60	4.82	4.06	(2.34)	(0.70)	(1.27)	(1.45)	(0.97)	(0.88)
T026+T029	1.26	1.41	1.47	1.74	1.70	(0.31)	0.02	(0.46)	(0.69)	(0.41)	(0.37)
T026+T030	1.25	1.38	1.44	1.69	1.66	(0.32)	0.02	(0.45)	(0.68)	(0.41)	(0.37)
T027+T019	2.40	2.78	2.83	3.63	3.21	(1.91)	(0.46)	(0.97)	(1.17)	(0.80)	(0.72)
T027+T029	2.27	2.67	2.74	3.56	3.15	(1.82)	(0.43)	(0.96)	(1.15)	(0.77)	(0.71)
T027+T030	2.25	2.63	2.69	3.50	3.09	(1.91)	(0.45)	(0.96)	(1.15)	(0.77)	(0.72)
T028+T029	1.58	1.85	1.94	2.44	2.26	(0.76)	(0.10)	(0.59)	(0.80)	(0.50)	(0.46)
T028+T030	1.38	1.55	1.61	1.95	1.87	(0.42)	(0.02)	(0.50)	(0.73)	(0.44)	(0.40)
T031+T032	1.38	1.59	1.68	2.08	2.02	(1.62)	(0.14)	(0.62)	(0.83)	(0.62)	(0.55)

Table 3-25: Baseline 20-Year Total Load Payment Change in 2018 $M

Project	West	Genesee	Central	North	Mohawk Valley	Capital	Hudson Valley	Millwood	Dunwoodie	NY City	Long Island
T018+T019	143	92	156	40	131	(16)	(42)	(11)	(32)	(238)	(77)
T021+T022	127	85	147	41	106	45	(7)	(12)	(33)	(234)	(78)
T021+T023	124	84	147	41	106	43	(7)	(11)	(32)	(232)	(78)
T025+T019	320	189	301	119	344	(128)	(110)	(16)	(42)	(305)	(93)
T025+T029	303	186	312	120	325	(111)	(24)	(15)	(40)	(282)	(93)
T025+T030	310	190	318	121	331	(117)	(45)	(16)	(42)	(301)	(97)
T026+T029	128	84	145	44	135	6	5	(7)	(23)	(163)	(55)
T026+T030	134	86	147	44	135	10	(2)	(7)	(23)	(165)	(56)
T027+T019	241	149	246	78	255	(125)	(74)	(19)	(49)	(358)	(108)
T027+T029	216	139	235	77	251	(131)	(28)	(17)	(43)	(319)	(100)
T027+T030	222	140	237	77	251	(130)	(37)	(17)	(45)	(323)	(98)
T028+T029	139	94	163	54	173	(57)	(8)	(11)	(31)	(227)	(71)
T028+T030	139	89	152	48	165	(47)	(16)	(11)	(31)	(231)	(74)
T031+T032	122	81	140	39	123	26	(24)	(18)	(44)	(326)	(103)

Table 3-26: CES + Retirement without National CO2 20-Year Total Load Payment Change in 2018 $M

Project	West	Genesee	Central	North	Mohawk Valley	Capital	Hudson Valley	Millwood	Dunwoodie	NY City	Long Island
T018+T019	496	359	609	215	339	(243)	(36)	(36)	(116)	(627)	(204)
T021+T022	429	310	522	181	286	(80)	(2)	(32)	(110)	(564)	(194)
T021+T023	424	309	521	182	287	(95)	(3)	(33)	(109)	(569)	(195)
T025+T019	903	649	1,083	425	652	(512)	(150)	(66)	(174)	(934)	(307)
T025+T029	856	620	1,048	411	623	(486)	(100)	(66)	(177)	(934)	(314)
T025+T030	885	642	1,085	428	643	(518)	(121)	(69)	(182)	(967)	(323)
T026+T029	387	277	469	154	273	(26)	19	(26)	(97)	(493)	(160)
T026+T030	385	272	460	150	268	(27)	13	(26)	(97)	(491)	(161)
T027+T019	705	509	861	322	509	(441)	(92)	(54)	(152)	(833)	(275)
T027+T029	665	489	832	316	500	(424)	(59)	(53)	(149)	(805)	(275)
T027+T030	660	481	815	310	490	(448)	(68)	(53)	(150)	(807)	(277)
T028+T029	473	351	603	217	361	(147)	1	(33)	(109)	(562)	(188)
T028+T030	419	301	510	173	309	(67)	8	(29)	(101)	(514)	(169)
T031+T032	413	299	520	184	303	(349)	1	(34)	(109)	(653)	(217)

Table 3-27: NYCA 20-Year Total Demand Congestion Change in 2018 M$

Project ID	Baseline	National CO2 Removed	High Natural Gas	Low Natural Gas	CES + Retirement w/o National CO2
		Based off Baseline			
T018+T019	(1,556)	(1,991)	(2,578)	(1,405)	(6,863)
T021+T022	(1,253)	(1,597)	(2,126)	(1,089)	(5,629)
T021+T023	(1,233)				(5,661)
T025+T019	(2,959)	(3,820)			(11,851)
T025+T029	(2,675)	(3,598)	(4,707)	(2,364)	(11,363)
T025+T030	(2,801)				(11,837)
T026+T029	(1,355)				(4,831)
T026+T030	(1,385)				(4,749)
T027+T019	(2,576)				(9,633)
T027+T029	(2,333)	(3,003)	(3,958)	(2,088)	(9,292)
T027+T030	(2,369)				(9,194)
T028+T029	(1,683)				(6,499)
T028+T030	(1,575)				(5,336)
T031+T032	(1,369)	(1,935)	(2,636)	(1,184)	(5,733)

Table 3-28: System 20-Year Total CO2 Emission Change (1000 tons)

Project ID	Baseline	National CO2 Removed	High Natural Gas	Low Natural Gas	CES + Retirement w/o National CO2
		Based off Baseline			
T018+T019	1,150	(2,476)	441	678	(4,686)
T021+T022	1,111	(1,285)	(240)	628	(7,298)
T021+T023	1,306				(8,235)
T025+T019	3,239	5,215			(15,416)
T025+T029	7,570	7,499	20,356	4,160	(11,656)
T025+T030	8,424				(11,524)
T026+T029	2,211				(6,231)
T026+T030	1,943				(6,908)
T027+T019	2,474				(10,661)
T027+T029	2,616	1,163	8,629	863	(9,429)
T027+T030	2,128				(10,184)
T028+T029	3,758				(4,056)
T028+T030	2,074				(5,901)
T031+T032	(1,724)	(6,475)	(4,868)	(2,621)	(8,814)

3.3.8 ICAP Benefits

The NYISO calculated a range of capacity procurement benefits for those proposals identified as Tier 1 and Tier 2 in the NYISO's initial tiered-ranking. The benefits identified capture the long-term impact on capacity procurement costs and, when summed with the production cost savings metric, provide the total market-based economic benefits of a project. However, given the ranges of benefits developed and the precision of the estimates, the NYISO did not deem it prudent to use the ICAP benefit as a factor in differentiating projects but rather as a means to demonstrate the overall value of the selecting projects to satisfy the AC Transmission Needs.

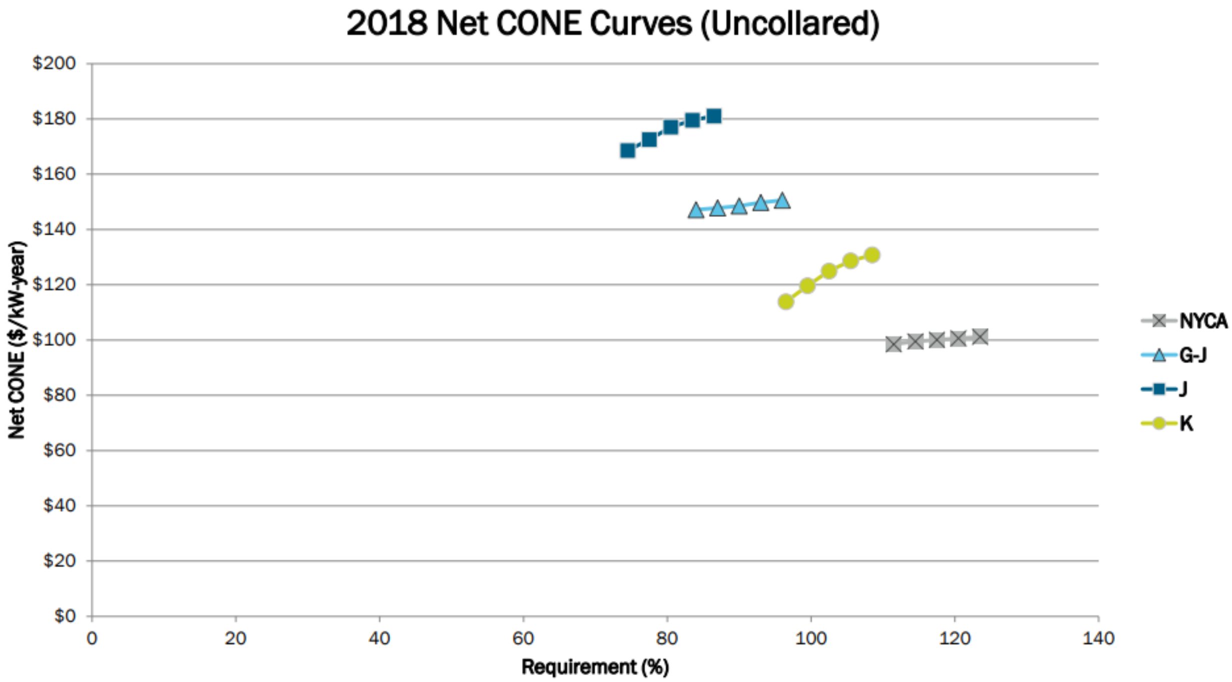
In order to develop the capacity benefits, the NYISO utilized a methodology to optimize statewide capacity procurement costs that mirrors the methodology recently approved by the NYISO's Management Committee and Board of Directors to optimize locational capacity requirements. This methodology minimizes procurement costs by removing capacity from upstate surplus zones (*i.e.,* Zones A, C, and D) and shifting capacity between the transmission-constrained zones (*i.e.,* Zones G-K) and upstate, observing all Emergency Transfer Criteria Interface Limits, which is consistent with the NYSRC Reliability Rules.[30] Capacity is then priced in each locality based on a set of Net Cost of New Entry (CONE) curves for each capacity region.

The Net CONE curves that the NYISO used in this evaluation were identical to those constructed in the NYISO's evaluation of the Alternative LCR methodology and reflect updates to the 2017 Net CONE Curves and Reference Points as shown in the Figure 3-18 below[31]:

[30] NYSRC Reliability Rules A.1 Establishing NYCA Installed Reserve Margin Requirements.

[31] Alternative Method for Determining LCRs presentation is posted at: http://www.nyiso.com/public/webdocs/markets_operations/committees/bic_icapwg/meeting_materials/2018-02-06/ICAPWG_2-06-18_AlternativeMethodsforLCRs_Final.pdf

Figure 3-18: 2018 Net CONE Curves



In order to calculate the change in "optimized" procurement costs between the pre-project and post-project cases, the NYISO determined the change in emergency transfer limits for key interfaces impacted by Tier 1 and Tier 2 projects through transfer limit analyses of representative project combinations. These analyses yielded the following increases in emergency transfer limits:

- For the UPNY/SENY interface, increases ranged from 1,150 MW to 1,400 MW
- For the Zone F to Zone G interface, increases ranged from 1,275 MW to 1,325 MW
- For the UPNY-Con Ed interface, increases ranged from 225 MW to 350 MW

The NYISO then utilized the optimization methodology to calculate a pre-project procurement costs and post-project procurement costs for sample years in the study period (*i.e.,* 2025, 2030, 2035, and 2040) for two cases to represent the range in increased emergency transfer limits. These pre- and post-projects results were utilized to calculate a range of impacts for each case, by year and by region (NYCA, Zones A-F, and Zones G-K). These results are as follows:

- NYCA annual savings ranged from $79M to $86M across the four study years and two cases studied, with an average savings of $80M
- Zones A-F annual increases were less than $9M, with an average increase of $4M
- Zones G-K annual savings ranged from $79M to $90M, with an average savings of $84M

Given the narrow range of annual savings values estimated, the NYISO opted to construct a 20-year time-series of annual savings values using the simple average of the four study years for each case. The annual values were escalated by 1.92% to reflect growth in Net CONE, based on the 2018/2019 escalator used to escalate the NYISO's Demand Curves, and discounted by 6.988% (as in the production cost savings metric) in order to calculate a stream of benefits in 2018 dollars.

One underlying assumption of the primary analysis is that capacity prices would converge to Net CONE beginning in 2023 (from approximately 33% of Net CONE in 2018). Recognizing that the pace at which the clearing prices approached Net CONE would be a key factor in estimating the ICAP benefit, the NYISO created an alternate calculation in which it was assumed that the capacity prices would gradually increase relative to Net CONE and converge to Net CONE by the end of the study period in 2042.

Using this optimization methodology and a range of model and analysis assumptions, the Net Present Value of Capacity Market procurement costs for the NYCA were estimated to decrease in the range of $550M to $850M for all combinations of Tier 1 and Tier 2 projects for the 20-year study period.

While the NYISO views these values as reasonable orders of magnitude estimates, the NYISO cautions that this assessment is a long-term planning analysis and is not intended to represent a forecast of future capacity requirements or prices. This is reinforced by the limited adjustments of Net CONE through this study period; applying a single escalation factor across all the Net CONE values for all localities; and not adjusting the net CONE curves for changes in Energy and Ancillary Services revenues or the gross CONE as could occur through time due to shifts in technology and market conditions.

In summary, the NYISO continues to develop its ICAP benefit metric methodology, and therefore, it did not use this metric to distinguish among projects. However, the range of $550M to $850M in ICAP savings supports the NYISO staff's recommendation that the Board of Directors approve this report recommending selection of transmission projects to meet the AC Transmission Needs as such selection would be consistent with the NYISO's markets and the interests of consumers.

3.3.9 Property Rights and Routing

For each project, the NYISO reviewed whether the Developer already possesses the right of way (ROW) necessary to implement the project or has specified a plan or approach for determining routing and acquiring property rights. In assessing the availability of real property rights for each proposed project, the NYISO relied on SECO, along with the knowledge of DPS and factual information provided by the Transmission Owners in the applicable Transmission Districts. The NYISO and SECO also reviewed, in consultation with the DPS, transmission routing studies provided by Developers that identified potential routing alternatives and land-use or environmentally sensitive areas, such as wetlands, agriculture, and residential areas.

SECO reviewed the Developers' property rights acquisition plans associated with the proposals using the Developers' projects information submitted in the Viability and Sufficiency Assessment process and responses provided by Developers to requests for additional information relating to property rights and transmission siting. Additionally, the NYISO and SECO consulted with a third-party consultant to understand the viability of Developer's property rights acquisition plans, and determined that there are no legal obstacles to incumbent and non-incumbent Developers obtaining the right to use existing ROWs and easements owned by incumbent utilities at commercially reasonable rates.

SECO found that the following items were common among all proposals in their property rights:

- All Developers propose to use existing ROW for their transmission facilities.
- Some additional real estate is required for new substation construction at Princetown Junction:
  - NextEra's project (T021) proposes a new Greenfield site located between Princetown Junction and Rotterdam, and has an option to purchase the real estate for the substation.
  - ITC's project (T031) proposes a larger substation at Princetown Junction compared to the substations proposed by other projects, and will require additional property acquisition.
- All Developers have completed preliminary routing of their proposed lines.
- All Developers have documented plans to obtain site control.

All of the non-incumbent Developers claim the following two common rights to assist in obtaining property:

- Developers cite the December 2015 Order to obtain access to the incumbent utility ROW. In that order, the PSC stated its expectation that incumbent transmission owners will act in a reasonable manner to negotiate access to and usage of their ROWs for the selected transmission project.
- If negotiations with the incumbent transmission owners or the private land owners are unsuccessful, Developers have asserted that under New York State Law, they would have or

obtain eminent domain authority after certification of a route by the PSC.

SECO also reviewed Developers' proposals for routing their transmission lines and substations to identify where new property rights would need to be acquired. SECO derived estimates for property from recent comparable sales and tax assessments in the town and county where the property would be located.

All Developers proposed to utilize existing incumbent transmission owner-owned property and ROW with the following exceptions:

- All proposals for Segment A will likely require the acquisition of easements to meet electric and magnetic field (EMF) guidelines in the Princetown Junction to New Scotland corridor. NAT/NYPA's T025 765 kV line conversion also requires additional easements to meet EMF guidelines.
- *De minimis* property rights may be required for construction laydown area and access, tree trimming or danger tree clearing.
- Development of a new substation at the Princetown Junction may require additional property or easements:
    - T018 and T026 do not include a substation at Princetown Junction.
    - T021 proposes to build the substation at Princetown Junction on a new Greenfield site for which they have obtained an option to acquire.
    - T031 proposes to tie all seven lines into a substation at Princetown Junction, which will require additional property.
    - T025, T027, and T028 propose smaller substations at Princetown Junction with four breaker ring bus arrangements or GIS equipment that may fit in the existing property. Although it appears that placing these stations on the site is possible, the review team has identified this as a potential risk that will need to be carefully considered and potentially mitigated during detailed engineering and licensing development.

PSC policy limits the electrical and magnetic fields that may be produced by a transmission line. The maximum limits at the edge of the right of way for the electrical field is 1.6 kilovolts per meter (kV/m)[32] and for the magnetic field is 200 milligauss (mG).[33] The existing transmission line corridor between Princetown Junction and New Scotland Substation is currently estimated to exceed PSC standards for EMF levels. Although the proposed designs may actually improve existing levels on this transmission corridor, current Article VII regulations will require that any project proposing upgrades on the corridor correct the exceedance to comply with current standards. Based on EMF calculations provided by Developers, there would still be EMF standard exceedances between Princetown and New Scotland for all Segment A projects. The calculations provided by the Developers are preliminary in nature and would have to be confirmed during detailed engineering design. After review meetings with the Developers and the stakeholders at ESPWG/TPAS, the NYISO requested SECo to complete an independent EMF study of T027. SECo completed a study utilizing PLSCadd software. Additionally, SECo's subcontractor, HMV Engineering, conducted a separate study using the EPRI EMF software. This study focused on the T027 proposal for the line segment between Princetown and New Scotland and calculated EMF levels at the three sections of the corridor where the ROW widths varied. The results of the independent studies indicated that the EMF levels for 13.4 miles of the line corridor are expected to exceed NYS PSC standards. Nevertheless, the updated EMF results indicate that compared with the other Segment A proposals, T027 requires the least additional easement (16.2 acres) to mitigate EMF impacts due to its double-circuit design.

During siting, these findings could require purchasing additional EMF easements from property owners along the ROW between Princetown and New Scotland. Table 3-29 and Table **3-30** show a summary of SECO's review of property rights acquisitions and the property requirements to mitigate EMF for all of the Segment A and Segment B proposals. A detailed analysis on property right analysis and routing can be found in Appendix D of this study report.

[32] The applicable electric field strength standards established by the PSC are set forth in Opinion No. 78-13 (issued June 19, 1978).

[33] The magnetic field standards established by the PSC are set forth in the PSC's Interim Policy Statement on Magnetic Fields, issued September 11, 1990. This statement also reaffirmed the electric field strength standards set in Opinion No. 78-13.

Table 3-29: Summary of Property Rights Acquisitions & Requirements – Segment A

<table>
<tr><th rowspan="3">Project ID</th><th rowspan="3">Summary of Property Rights Acquisition</th><th colspan="5">Substation Property Requirements</th><th rowspan="3">Ranking</th></tr>
<tr><th rowspan="2">Substation</th><th rowspan="2">County</th><th colspan="2">Owner</th><th rowspan="2">EMF Mitigation (Width in Feet)</th></tr>
<tr><th>Incumbent Utility (Acres)</th><th>Non-Utility (Acres)</th></tr>
<tr><td>T018</td><td>• NGrid completed routing study
• Project ROW is fee-owned by, or under the control (via easement or permit) of, NGrid.
• NGrid will transfer ownership of all assets to Transco.</td><td>Rotterdam Substation (Extension)</td><td>Schenectady</td><td>2.6</td><td>0</td><td>10</td><td>Good</td></tr>
<tr><td>T021</td><td>• NextEra has an option to purchase property for the proposed Princetown Substation.
• Would use existing ROW, owned by the incumbent utility.
• Has a well-documented plan to obtain property and site control</td><td>Princetown Substation (New)</td><td>Schenectady</td><td>0</td><td>24</td><td>10</td><td>Good</td></tr>
<tr><td rowspan="3">T025</td><td rowspan="3">• NAT/NYPA would use existing ROW, owned by the incumbent utility.
• Does not yet possess the required ROWs.
• Has a well-documented plan to obtain property and site control
• NYPA to lead negotiations with the NYTO’s in negotiating and obtaining easements.</td><td>Knickerbocker Substation (New)</td><td>Rensselaer</td><td>30</td><td>0</td><td rowspan="3">8 to 25</td><td rowspan="3">Fair</td></tr>
<tr><td>Princetown Substation (New)</td><td>Schenectady</td><td>3</td><td>0</td></tr>
<tr><td>Rotterdam Substation (New)</td><td>Schenectady</td><td>7.5</td><td>0</td></tr>
<tr><td>T026</td><td>Same as T025</td><td>Rotterdam Substation (New)</td><td>Schenectady</td><td>7.5</td><td>0</td><td>10</td><td>Good</td></tr>
<tr><td rowspan="3">T027</td><td rowspan="3">Same as T025</td><td>Edic Substation (Extension)</td><td>Oneida</td><td>1.3</td><td>0</td><td rowspan="3">10</td><td rowspan="3">Good</td></tr>
<tr><td>Princetown Substation (New)</td><td>Schenectady</td><td>3</td><td>0</td></tr>
<tr><td>Rotterdam Substation (New)</td><td>Schenectady</td><td>7.5</td><td>0</td></tr>
<tr><td rowspan="2">T028</td><td rowspan="2">Same as T025</td><td>Princetown Substation (New)</td><td>Schenectady</td><td>3</td><td>0</td><td rowspan="2">10</td><td rowspan="2">Good</td></tr>
<tr><td>Rotterdam Substation (New)</td><td>Schenectady</td><td>7.5</td><td>0</td></tr>
<tr><td rowspan="2">T031</td><td rowspan="2">• ITC would use existing ROW, owned by the incumbent utility.
• Would likely require additional property to construct the proposed Princetown Substation.
• Has a well-documented plan to obtain property and site control.</td><td>Princetown Substation (New)</td><td>Schenectady</td><td>5.5</td><td>2.6</td><td rowspan="2">10</td><td rowspan="2">Fair</td></tr>
<tr><td>Rotterdam Substation (Extension)</td><td>Schenectady</td><td>2.5</td><td>0</td></tr>
</table>

Table 3-30: Summary of Property Rights Acquisitions & Requirements – Segment B

Project ID	Summary of Property Rights Acquisition	Substation Property Requirements				EMF Mitigation (Width in Feet)	Ranking
		Substation	County	Owner: Incumbent Utility (Acres)	Owner: Non-Utility (Acres)		
T019	• NGrid completed routing study • Project ROW is fee-owned by, or under the control (via easement or permit) of, NGrid. • NGrid will transfer ownership of all assets to Transco.	Knickerbocker Substation (New)	Rensselaer	14	0	0	Good
		Churchtown Substation (Extension)	Columbia	11.4	0		
		Pleasant Valley Substation (Extension)	Dutches	1.4	0		
T022	• NextEra have an option to purchase property for the proposed Princetown Substation. • Would use existing ROW, owned by the incumbent utility. • Has a well-documented plan to obtain property and site control	Knickerbocker Substation (New)	Rensselaer	14	0	0	Good
		Churchtown Substation (Extension)	Columbia	5.5	0		
T023	Same as T022	Knickerbocker Substation (New)	Rensselaer	14	0	0	Good
		Churchtown Substation (Extension)	Columbia	5.5	0		
T029	• NAT/NYPA would use existing ROW, owned by the incumbent utility. • Does not yet possess the required ROWs. • Has a well-documented plan to obtain property and site control • NYPA to lead negotiations with the NYTO's in negotiating and obtaining easements.	Knickerbocker Substation (New)	Rensselaer	14	0	0	Good
		Churchtown Substation (Extension)	Columbia	11.4	0		
T030	Same as T029	Knickerbocker Substation (New)	Rensselaer	14	0	0	Good
		Churchtown Substation (Extension)	Columbia	11.4	0		
T032	• ITC would use existing ROW, owned by the incumbent utility. • Would likely require additional property to construct the proposed Princetown Substation. • Has a well-documented plan to obtain property and site control.	Knickerbocker Substation (New)	Rensselaer	20	0	0	Good
		Churchtown Substation (Extension)	Columbia	0.3	0		

3.3.10 Potential Construction Delay

The NYISO initially evaluated Developers' schedules for project completion as part of the Viability and Sufficiency Assessment to determine whether projects were feasible. During the evaluation stage, the NYISO conducted a more in-depth analysis of the project schedules of the viable and sufficient transmission projects to determine the accuracy of schedules provided to the NYISO and the likelihood of project delay. For this purpose, the NYISO used the more detailed engineering and design information as required by Section 31.4.8.1.7 of the OATT.

SECO evaluated the development schedules for each proposed Public Policy Transmission Project for potential construction delay. SECO focused on the proposed durations of the tasks in each Developer's project schedule. Based on this evaluation, SECO independently determined its own time estimates for each project schedule and compared it to the Developer's proposed project duration. SECO conducted this evaluation using its expertise and experience with transmission lines and substation projects in New York State and by using comparisons to actual projects that completed the Article VII process. Appendix D provides greater details on the evaluation of the project schedules.

Summary results of the evaluation of the project schedules are presented in Table 3-31. The independent minimum duration was calculated using what SECO determined to be the minimum duration for Article VII application preparation, the anticipated time for the Article VII approval process, ROW procurement where significant, and the anticipated time for construction of the project. The independent minimum duration is the best case and is shown for comparative purposes. The independent duration includes some float to the schedule to establish a reasonable schedule recognizing the potential for minor delays for the purpose of determining the in-service date once a project is selected. SECO recommended adding four (4) months to each minimum schedule to account for the following additional time requirements:

- Two months to the construction schedule for each proposal to account for typical slippage of construction activities (*i.e.,* potential weather events, delays if construction crews are needed to respond and provide storm support, unanticipated material and equipment issues, and inability to obtain outages on a timely basis); and
- Two months to the schedule for additional licensing and permitting activities between the PSC issuing the Article VII Certificate and the submittal of the Environmental Management & Construction Plan (EMCP) to account for possible delays in submitting the EMCP should the PSC require changes to the plan submitted in the application.

Table 3-31: Results of Evaluation of the Projects Schedules

Segment	Project ID	Independent Minimum Duration Estimate: Months	Independent Duration Estimate: Months
A	T018	48	52
	T021	48	52
	T025	50	54
	T026	48	52
	T027	51	55
	T028	48	52
	T031	48	52
B	T019	45	49
	T022	43	47
	T023	45	49
	T029	45	49
	T030	45	49
	T032	47	51

3.3.11 Potential Risks to Project Completion

SECO evaluated any potential risks associated with the individual proposals that might affect the project completion under the development schedules in addition to those identified by the developers in their proposals. The significant drivers to the individual project risks were:

- Article VII review approval process and potential environmental issues, including visual impact
- Procurement of major equipment
- Real Estate acquisition
- Construction
- Other risks to project siting or operation

Section 4.3 of the SECO report attached as Appendix D to this study report provides a detailed risk analysis for each proposal. It also shows all of the risks in common for all projects and also project specific risks that may distinguish each project from the other projects. Table 3-34 summarizes the significant risks associated with each project. T019, T025, T031, and T032 each have specific risks relative to other projects, as discussed below.

T019 introduced a potential subsynchronous resonance (SSR) risk to the operation of its facilities caused by interactions between the proposed 50% series compensation and nearby synchronous generators. Transient torque may be induced on the generators in the vicinity by system disturbances, and could lead to a catastrophic event that could damage the generator-turbine shaft. Diagnosing such events requires highly specialized expert knowledge and technology. To prevent catastrophic events that damage the generator shaft, special protection schemes can be designed and installed on the generators in the vicinity, if necessary. Such significant SSR risk can be assessed by screening and performing a frequency scan analysis; however, it is difficult to fully anticipate other potential impacts to generator operation and maintenance. In addition, the installation of the series compensation may require further sub-transient evaluation for voltage recovery to ensure enough interruption capacity from circuit breakers, and may require extensive relay and protection upgrades beyond the substations in the immediate vicinity.

T025, which proposes a 765 kV design, needs potential mitigation for clearance and corona issues and hardware replacement for insulation. Moreover, the 765 kV project introduces additional siting and permitting risks due to adding up to eight new large towers and larger conductors, creating potentially significant visual impact issues. Finally, increasing the operation of the existing and new facilities to 765 kV creates EMF compliance risks and operational risks to the power system that would be caused by the size of the electric contingency resulting from an outage of that size transmission facility.

Transmission line crossings and paralleling of natural gas pipelines may require grounding or other mitigation measures. Natural gas pipeline entities are increasingly aware of such issues and are demanding mitigation measures to be installed by transmission utilities. SECO identified rebuilding Rotterdam substation over existing gas pipelines as a risk for projects T025, T026, T027, T028, and T031. The risk mitigation measure could be relocating the gas pipelines near the Rotterdam substation within the existing property. While regulatory processes have to be followed to permit and implement the relocation, this was not considered as a major risk given that the relocation involves only a small segment of the pipelines. The cost associated with the gas pipeline relocation has been incorporated into the overall project cost estimates. Furthermore, T025, T026, T027, and T028 also proposed alternative locations for the Rotterdam substation, which would not require the relocation of the gas pipelines.

Because of the large footprint required for the Princetown Junction Substation in T031, it will need additional property acquisition since the proposed design will not fit within the existing National Grid ROW. The proposed substation is located close to existing homes and buildings, and the need to purchase additional property may result in delays associated with obtaining regulatory approvals and increased costs.

The triple-circuit design between Churchtown and Pleasant Valley substations in T032 makes the operation and maintenance complex. Specifically, future maintenance of the triple-circuit transmission circuits and associated structures may depend on the outage availability of all of the three circuits.

Typically, visual impacts are categorized as minor, moderate, or significant/major with regard to how project structures may be seen from sensitive receptors (*i.e.*, parks, trails, scenic roads, and historic sites) and overall community/neighborhood character. Visual assessments of the proposed transmission lines may also be required for the design and siting processes, which would include visual simulations and viewshed maps. Many factors affect the visibility and visual impact of the proposed lines, including surrounding vegetation, presence of existing lines, topography, land use, structure design, and the number of structures. If the line is determined to impact scenic resources or is not compatible with the character of the community, the line configuration could require modifications during final design to reduce the visual impact. The type of structure will affect its visibility with lattice-type towers having the highest potential visual impact. None of the Developers propose to construct lattice towers, and most of the structures being removed are lattice towers. All Developers have proposed the use of steel or concrete monopole and H frame structures. Since all of the proposed projects are essentially using the same existing ROW, with the exception of the 765 kV portion of T025 proposal, the remaining variable for evaluating potential visual impact is the structure height and number of structures. In its December 2015 Order, the PSC concluded that height increases of less than 25 feet over existing structures will not create an "adverse impact of a regional nature that would significantly impair the physical visual character of the Hudson Valley and its communities."[34] However, the construction of new structures, even with minimal increase in height, may result in siting challenges due to their potential local visual impact. The PSC determined that the local visual impacts will be addressed in the Article VII siting proceedings.[35]

Segment A: The height of the structure may increase its visibility and, therefore, potentially increase the visual impact. The following Table 3-32 summarize the estimated difference in height of the existing structures that would be removed and proposed structures for the Segment A projects. Green highlights in the table below represent there likely being no visual impact due to height of the

[34] December 2015 Order, at p 35.

[35] *See id.*

proposed structures. When structures are replaced, height increases over 10 feet are typically classified as "severe" visual impacts, absent a viewshed analysis.

If solely based upon the height increase comparison estimates above, T031 would have the least potential adverse visual impacts by a considerable margin, but it proposes to use more structures (65 more) than all other proposals, except T021, and thus the proposal is not preferable from the perspective of visual and agriculture impacts. T021 would have the greatest potential adverse visual impact in comparison to the other proposals with 99% of the structures having a height increase of more than 10 feet. In addition, T021 proposes the greatest number of structures. T025 would have the third lowest overall potential adverse visual impact based upon the table and method discussed above. However, the most significant potential adverse visual impacts for T025 results from the height increases for the 2.5 miles of the new 765 kV transmission structures.

Table 3-32: Number and Height of Structures for the Segment A Projects

	Number of Structures					
	T018	T021	T025	T026/T028	T027	T031
1. Less than 0 ft.	62	0	269	269	19	28
2. Same Ht.	9	0	7	7	11	581
3. From 0.1ft to 5 ft.	30	3	51	51	76	69
4. From 5.1 ft to 10 ft.	56	5	33	33	5	10
5. From 10.1 ft to 15 ft.	72	45	35	34	47	0
6. From 15.1 ft to 20 ft.	97	72	65	66	40	2
7. From 20.1 ft to 25 ft.	74	490	38	38	69	1
8. From 25.1 ft to 30 ft.	68	67	9	9	204	0
9. From 30.1 ft to 40 ft.	52	67	18	18	95	0
10. From 40.1 ft to 50 ft.	21	21	10	9	34	0
11. From 50.1 ft to 60 ft.	23	4	6	1	22	0
12. From 60.1 to 70 ft.	8	1	1	0	1	0
13. From 70.1 to 80 ft.	2	1	1	1	4	0
14. From 80.1 to 90 ft.	0	0	5	0	4	0
15. From 90.1 to 100 ft.	1	0	3	1	0	0
16. From 100.1 to 110 ft.	0	0	0	0	0	0
17. From 110.1 to 120 ft.	0	0	2	0	0	0
Total	575	776	553	537	631	691

	Percent of Structures					
	T018	T021	T025	T026/T028	T027	T031
1. Less than 0 ft.	10.8%	0.0%	48.6%	50.1%	3.0%	4.1%
2. Same Ht.	1.6%	0.0%	1.3%	1.3%	1.7%	84.1%
3. From 0.1ft to 5 ft.	5.2%	0.4%	9.2%	9.5%	12.0%	10.0%
4. From 5.1 ft to 10 ft.	9.7%	0.6%	6.0%	6.1%	0.8%	1.4%
5. From 10.1 ft to 15 ft.	12.5%	5.8%	6.3%	6.3%	7.4%	0.0%
6. From 15.1 ft to 20 ft.	16.9%	9.3%	11.8%	12.3%	6.3%	0.3%
7. From 20.1 ft to 25 ft.	12.9%	63.1%	6.9%	7.1%	10.9%	0.1%
8. From 25.1 ft to 30 ft.	11.8%	8.6%	1.6%	1.7%	32.3%	0.0%
9. From 30.1 ft to 40 ft.	9.0%	8.6%	3.3%	3.4%	15.1%	0.0%
10. From 40.1 ft to 50 ft.	3.7%	2.7%	1.8%	1.7%	5.4%	0.0%
11. From 50.1 ft to 60 ft.	4.0%	0.5%	1.1%	0.2%	3.5%	0.0%
12. From 60.1 to 70 ft.	1.4%	0.1%	0.2%	0.0%	0.2%	0.0%
13. From 70.1 to 80 ft.	0.3%	0.1%	0.2%	0.2%	0.6%	0.0%
14. From 80.1 to 90 ft.	0.0%	0.0%	0.9%	0.0%	0.6%	0.0%
15. From 90.1 to 100 ft.	0.2%	0.0%	0.5%	0.2%	0.0%	0.0%
16. From 100.1 to 110 ft.	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
17. From 110.1 to 120 ft.	0.0%	0.0%	0.4%	0.0%	0.0%	0.0%

Segment B: Table 3-33 below summarizes the estimated difference in height of existing structures that would be removed and proposed structures for Segment B projects. The comparison demonstrates the relative height differences for the proposed projects. Green highlights in the table below represent that there would likely be no visual impact due to height of the proposed structures.

When structures are replaced, height increases over 10 feet are typically classified as “severe” visual impacts, absent a viewshed analysis.

Table 3-33: Number and Height of Structures for the Segment B Projects

	Number of Structures				
	T019	**T022**	**T023**	**T029/T030**	**T032**
1. Less than 0 ft.	87	49	6	222	240
2. Same Ht.	3	1	2	77	6
3. From 0.1ft to 5 ft.	97	58	60	44	218
4. From 5.1 ft to 10 ft.	108	181	114	44	6
5. From 10.1 ft to 15 ft.	66	116	227	12	0
6. From 15.1 ft to 20 ft.	20	0	0	3	0
7. From 20.1 ft to 25 ft.	12	0	0	1	0
8. From 25.1 ft to 30 ft.	4	0	0	0	0
9. From 30.1 ft to 40 ft.	4	0	0	0	0
10. From 60.1 ft to 70 ft.	0	0	0	2	0
Total	401	405	409	405	470

	Percent of Structures				
	T019	**T022**	**T023**	**T029/T030**	**T032**
1. Less than 0 ft.	21.7%	12.1%	1.5%	54.8%	51.1%
2. Same Ht.	0.7%	0.2%	0.5%	19.0%	1.3%
3. From 0.1ft to 5 ft.	24.2%	14.3%	14.7%	10.9%	46.4%
4. From 5.1 ft to 10 ft.	26.9%	44.7%	27.9%	10.9%	1.3%
5. From 10.1 ft to 15 ft.	16.5%	28.6%	55.5%	3.0%	0.0%
6. From 15.1 ft to 20 ft.	5.0%	0.0%	0.0%	0.7%	0.0%
7. From 20.1 ft to 25 ft.	3.0%	0.0%	0.0%	0.2%	0.0%
8. From 25.1 ft to 30 ft.	1.0%	0.0%	0.0%	0.0%	0.0%
9. From 30.1 ft to 40 ft.	1.0%	0.0%	0.0%	0.0%	0.0%
10. From 60.1 ft to 70 ft.	0.0%	0.0%	0.0%	0.5%	0.0%

Based upon the estimates and criteria described above, T032 would have the least potential adverse visual impact due to structure height increases. However, it adds 61 (15%) more structures than any other proposed project, which could have other potential visual impacts. T029 and T030 would have the second least potential adverse visual impact with only 5% of the structures increasing in height by more than 10 feet and a reduction in the height of more than 50% of the structures.

Table 3-34: Summary of Risk analysis

Segment	Project ID	Risks			Risk Level
		Overall Visual Impact	Easement Needed to Mitigate EMF (Acres)	Other Risks Including Siting	
A	T018	Medium structure height increase	24	-	Medium
	T021	High structure height increase, more structures, less impact to agriculture due to monopoles	24	-	Medium
	T025	Low structure height increase	243	Potential mitigation for clearance and corona issues, hardware replacement for insulation, siting and permitting risks	High
	T026	Low structure height increase	24	-	High
	T027	High structure height increase, 6 miles of lattice tower removed, less impact to agriculture due to monopoles	16	-	Medium
	T028	Low structure height increase	24	-	Medium
	T031	Low structure height increase, more structures, more impact to agriculture, 20 miles of lattice tower removed	24	Property acquisition for Princetown substation	Medium
B	T019	Medium structure height increase	-	Risk due to 50% series compensation	High
	T022	Medium structure height increase	-	-	Medium
	T023	High structure height increase	-	-	High
	T029	Low structure height increase	-	-	Low
	T030	Low structure height increase	-	-	Low
	T032	Low structure height increase, more structures, more impact to agriculture, two-pole configuration with triple circuits	-	Operation and maintenance complexity due to triple-circuit design	High

The impact of this risk assessment is factored into the tiered ranking as described in Section 4.

3.3.12 Interconnection Studies

In addition, the Public Policy Transmission Planning Process considers the status and results of the interconnection studies in evaluating and selecting the more efficient or cost-effective project. All of the AC Transmission projects are currently under evaluation in their respective System Impact Studies in the NYISO's Transmission Interconnection Procedures under Attachment P to the NYISO's tariff. Table 3-35 shows the interconnection queue numbers for all the projects.

Table 3-35: Interconnection Queue

Segment	Project ID	Interconnection Queue #
A	T018	Q542
	T021	Q537
	T026	Q555
	T028	Q557
	T027	Q556
	T025	Q558
	T031	Q608
B	T019	Q543
	T022	Q538
	T023	Q539
	T029	Q559
	T030	Q414
	T032	Q609

The independent cost estimates include all the preliminary costs of the Network Upgrade Facilities identified or will likely be identified in the respective System Impact Studies. The preliminary System Impact Study results for T027 identified an N-1-1 overload on the Everett - Wolf Road 115 kV line, and proposed reconductoring of this line as a potential Network Upgrade Facility. Therefore, the independent cost estimate for T027 includes approximately $5 million representing the preliminary estimated cost for the Network Upgrade Facility. In addition, violations have been preliminarily identified related to transfer limit degradation from NYISO to ISO-NE for all Segment B projects. System Impact Studies identified potential Network Upgrade Facilities to address such violations. For the purpose of ranking and selection, the independent cost estimates for each Segment B project include a $30 million cost representing the potential Network Upgrade Facilities.[36] The detailed design and cost estimates for the Network Upgrade Facilities will be finalized in the Facilities Studies for the selected projects in accordance with the Transmission Interconnection Procedures.

Orange and Rockland Utilities, Inc., as the Connecting Transmission Owner, raised concerns

[36] Using the results from the System Impact Study for T027 as an example, the NYISO identified three options for potential NUFs to mitigate the New York – New England transfer limit degradation, with the preliminary cost estimates ranging from $30 million to $90 million dollars. These options would be the same for each Segment B project. For the purpose of the ranking and selection, the NYISO used the $30 million cost as a reasonable estimate considering the nature of the various options and the potential decrease in the preliminary cost estimates for some of the NUFs if Q#444 Cricket Valley Energy Center II is in service.

related to the Middletown 345 kV/115 kV transformer replacement proposed in T029 and T030. The NYISO and its independent consultant SECO investigated this issue, and determined that the current evaluation adequately addresses this issue. The Frequently Asked Questions ("FAQ") document provides the detail of the NYISO/SECO analysis. It is important to note that even if additional Network Upgrade Facilities were required to address this concern, it would not change the outcome of the NYISO's ranking and selection.

3.4 Consequences for Other Regions

In addition to its evaluation to identify the more efficient or cost-effective solution to the AC Transmission Needs, the NYISO also coordinates with neighboring regions to identify the consequences, if any, of the proposed transmission solutions on the neighboring regions using the respective planning criteria of such regions.

Through the NYISO's Transmission Interconnection Procedures and the associated System Impact Studies currently in progress, the NYISO is consulting with the ISO-NE concerning any potential impacts due to the proposed AC Transmission Needs Projects. Preliminary results from the System Impact Studies identified that each of the proposed Segment B projects potentially causes a negative impact on the export capability from the NYISO to ISO-NE. The proposed interconnection of the proposed Segment B projects, in conjunction with the proposed interconnection of Q#444 Cricket Valley Energy Center II, worsened the potential export capability degradation. Therefore, in accordance with the Transmission Interconnection Procedures, the necessary Network Upgrade Facilities were identified in the System Impact Study to mitigate these potential issues. The NYISO's independent cost estimates include the cost of mitigating the transfer limit degradation from NYISO to ISO-NE for all Segment B projects.

3.5 Impact on Wholesale Electricity Markets

The NYISO evaluates the impact of proposed viable and sufficient Public Policy Transmission Projects on its wholesale electricity markets, using economic metrics including change in production cost, congestion, and load payments.[37] Based on the transfer and production cost analysis results described in Sections 3.3.3 and 3.3.7, the proposed transmission projects all tend to increase the Central East and UPNY/SENY transfer capability and reduce congestion. Therefore, the NYISO staff has determined that the viable and sufficient Public Policy Transmission Projects proposed to address the AC Transmission Needs will have no adverse impact on the competitiveness of the New

[37] *See* OATT Sections 31.4.10 and 31.4.8.1.9.

York wholesale electricity markets. Rather, the transmission projects all tend to improve the competitiveness of the NYISO's markets by increasing system transfer capability, allowing more resources and suppliers to compete to serve loads. The review from the NYISO's Market Monitoring Unit is included in Appendix E.[38]

3.6 Evaluation of Interaction with Local Transmission Owner Plans

In its Public Policy Transmission Planning Process, the NYISO is required to review the Local Transmission Owner Plans (LTPs)[39] as they relate to the BPTF to determine whether any proposed regional Public Policy Transmission Project on the BTPF can (i) more efficiently or cost-effectively satisfy any local needs driven by a Public Policy Requirement identified in the LTPs, or (ii) might more efficiently or cost-effectively satisfy the identified regional Public Policy Transmission Needs than any local transmission solutions driven by Public Policy Requirements identified in the LTPs.

The Transmission Owners' current LTPs have not identified any needs driven by a Public Policy Requirement in New York State. Accordingly, the NYISO determined that there are no proposed regional Public Policy Transmission Projects that could more efficiently or cost-effectively satisfy a need driven by a Public Policy Requirement identified in an LTP. In the absence of any public policy needs in the LTPs, it is also not necessary for the NYISO to determine whether a regional transmission project would more efficiently or cost effectively satisfy such a transmission need on the BPTF than a local transmission solution.

[38] See OATT Section 31.4.11.1 ("[T]he draft report will be provided to the Market Monitoring Unit for its review and consideration").

[39] *See* Section 31.2.1.1.2.1 of the OATT.

4. Conclusions and Recommendations

In determining which of the proposed Public Policy Transmission Projects is the more efficient or cost-effective solution to satisfy the AC Transmission Needs, the NYISO staff considered each Public Policy Transmission Project's total performance under all of the selection metrics (described in Section 3 of this report), risks associated with each project, and inputs from Developers, stakeholders, and DPS. The evaluation includes scenarios that modify the assumptions to evaluate the proposed Public Policy Transmission Projects according to the selection metrics and the impact on the NYISO's wholesale electricity markets. This section describes the summary of project evaluations, ranking of projects, selection recommendation, and next steps.

4.1 Summary of Project Evaluations

The project evaluations are summarized in this section based on their individual performance. Below is a brief summary of the key design differences and the highlighted evaluation results for each of the seven Segment A projects. All Segment A projects retire the Porter to Rotterdam 230 kV lines as directed by the December 2015 Order, and since this component of the projects is not a distinguishing factor, it is not repeated in the summary below.

T018: National Grid/Transco - NYES Segment A

- Single Edic to New Scotland 345 kV line proposed on existing ROW, the existing Edic to New Scotland 345 kV line #14 looped into and out of a new Rotterdam 345 kV substation, capacitor bank at Rotterdam 345 kV substation
- The independent cost estimate is $520 million
- The independent duration estimate is 52 months
- Low Central East limit increase
- Good operability and expandability, and foundations and structures beyond NESC standard
- Easement needed to mitigate EMF violations

T021: NextEra - Enterprise Line Segment A

- Single Edic to New Scotland 345 kV line proposed on existing ROW, the existing Marcy to New Scotland 345 kV line #18 looped into and out of a new Princetown 345 kV substation, and additional non-utility property needed for Princetown substation but with an option to purchase
- The independent cost estimate is $498 million
- The independent duration estimate is 52 months
- Low Central East limit increase

- Good operability and expandability
- Easement needed to mitigate EMF violations

T025: NAT/NYPA - Segment A + 765 kV

- Single Edic to New Scotland 345 kV line proposed on existing ROW, existing 345 kV line between Marcy and Knickerbocker converted to 765 kV operation, the existing Edic to New Scotland 345 kV line #14 looped into and out of a new Princetown 345 kV substation, a new Princetown substation tapping the new line and line #14, and terminal upgrades at Marcy and Edit substations
- The independent cost estimate is the highest at $863 million
- The independent duration estimate is 54 months
- High Central East limit increase, but still low N-1-1 performance
- Good operability and expandability
- The most easement needed to mitigate EMF violations, and high risks to project completion associated with clearance, corona, insulation, and siting issues

T026: NAT/NYPA - Segment A Base

- Single Edic to New Scotland 345 kV line proposed on existing ROW, the existing Edic to New Scotland 345 kV line #14 looped into and out of a new Rotterdam 345 kV substation, and terminal upgrades at Marcy and Edit substations
- The independent cost estimate is the lowest at $491 million
- The independent duration estimate is 52 months
- Low Central East limit increase
- Good operability and expandability
- Easement needed to mitigate EMF violations

T027: NAT/NYPA - Segment A Double-Circuit

- Double-circuit Edic to New Scotland 345 kV line proposed on existing ROW, the existing Edic to New Scotland 345 kV line #14 looped into and out of a new Rotterdam 345 kV substation, a new Princetown substation tapping the new line and line #14, and terminal upgrades at Marcy and Edic substations
- The independent cost estimate is at $750 million
- The independent duration estimate is 55 months
- High Central East limit increase
- Excellent operability and expandability

- Least easement required to mitigate EMF violations
- Most aging infrastructure replacement

T028: NAT/NYPA - Segment A Enhanced

- Single Edic to New Scotland 345 kV line proposed on existing ROW, the existing Edic to New Scotland 345 kV line #14 looped into and out of a new Rotterdam 345 kV substation, a new Princetown substation tapping the new line and line #14, and terminal upgrades at Marcy and Edit substations
- The independent cost estimate is at $514 million
- The independent duration estimate is 52 months
- Low Central East limit increase
- Good operability and expandability
- Easement needed to mitigate EMF violations

T031: National Grid/Transco - NYES Segment A

- Single Edic to New Scotland 345 kV line proposed on existing ROW, a new Princetown substation tapping all 345 kV lines, common tower structures used for the new line and line #14 south of Princetown, two new Princetown to Rotterdam 345 kV lines proposed on existing ROW, and additional non-utility property needed for Princetown substation
- The independent cost estimate is $570 million
- The independent duration estimate is 52 months
- Low Central East limit increase
- Good operability and expandability
- Easement needed to mitigate EMF violations

All Segment B projects include the common upgrades required by the PSC in its December 2015 Order, which ordered Orange and Rockland Utilities, Inc. (O&R) and Central Hudson Gas and Electric Corporation (Central Hudson), respectively, to upgrade the Shoemaker to Sugarloaf 138 kV facilities and the terminal upgrades at Rock Tavern 345 kV Substation. These projects were not considered by the NYISO as a distinguishing factor in selecting among proposed projects. Below is a brief summary of the key design differences and the highlighted evaluation results for each of the six Segment B projects.

T019: National Grid/Transco - NYES Segment B

- Double-circuit Knickerbocker to Pleasant Valley 345/115 kV line proposed on existing ROW, 50% series compensation on the proposed 345 kV line, two capacitor banks proposed at Pleasant Valley, and terminal upgrades at Roseton and New Scotland substations
- The independent cost estimate is $479 million
- The independent duration estimate is 49 months
- High UPNY/SENY transfer limit increase due to series compensation
- Good operability and expandability, and foundations and structures beyond NESC standard
- Medium structure height increase, relay coordination due to series compensation, and risk of SSR and voltage rise mitigation due to series compensation

T022: NextEra - Enterprise Line Segment B

- Double-circuit Knickerbocker to Churchtown 345/115 kV line and single-circuit Churchtown to Pleasant Valley 345 kV line proposed on existing ROW, and a new Churchtown 115 kV substation proposed next to the existing one
- The independent cost estimate is the lowest at $373 million
- The independent duration estimate is 47 months
- Average UPNY/SENY transfer limit increase
- Good operability and expandability
- Medium structure height increase

T023: NextEra - Enterprise Line Segment B-Alt

- Double-circuit Knickerbocker to Pleasant Valley 345/115 kV line proposed on existing ROW, and a new Churchtown 115 kV substation proposed next to the existing one
- The independent cost estimate is $424 million
- The independent duration estimate is 49 months
- Average UPNY/SENY transfer limit increase
- Good operability and expandability
- High structure height increase

T029: NAT/NYPA - Segment B Base

- Double-circuit Knickerbocker to Pleasant Valley 345/115 kV line proposed on existing ROW, and Middletown upgrades proposed
- The independent cost estimate is $422 million
- The independent duration estimate is 49 months

- Average UPNY/SENY transfer limit increase
- Excellent operability and good expandability
- Lowest structure height increase, more than 50% of the structures with reduced height

T030: NAT/NYPA - Segment B Enhanced

- Double-circuit Knickerbocker to Pleasant Valley 345/115 kV line proposed on existing ROW with three-bundle conductors for the 345 kV line, and Middletown upgrades proposed
- The independent cost estimate is $441 million
- The independent duration estimate is 49 months
- Average UPNY/SENY transfer limit increase
- Excellent operability and good expandability
- Lowest structure height increase, more than 50% of the structures with reduced height

T032: ITC - 16NYPP1-1A AC Transmission Segment B

- Double-circuit Knickerbocker to Churchtown 345/115 kV line and triple-circuit Churchtown to Pleasant Valley 345 kV line proposed on existing ROW
- The independent cost estimate is the highest at $536 million
- The independent duration estimate is 51 months
- Average UPNY/SENY transfer limit increase
- Good operability and expandability
- Low structure height increase, but more structures used resulting in higher risk to siting due to potential visual and agricultural impacts

4.2 Ranking

A two-step process was used to rank the AC Transmission Public Policy Transmission Projects. Step 1 divided projects in each segment into three tiers based on their individual performance and risks. Step 2 ranked the projects numerically in each segment based on combination results.

4.2.1 Step 1: Tiered Ranking

Projects in each segment were first analyzed individually, and then compared against each other to identify the major performance and risk differences. Metrics analyzed in this step include independent cost estimates, duration estimates, transfer capability, operability, expandability, property rights, replacement of aging infrastructure, and risks. The remaining metrics were considered in Step 2.

Table 4-1 and Table 4-2 show the major performance and risk differences for Segment A and

Segment B projects, respectively. Both tables are color-coded such that the pros are highlighted in green and cons are highlighted in red. A dash used in the tables signifies that the project has an average performance. Based on the NYISO staff's consideration of these evaluation metrics, together with inputs from Developers, stakeholders, and DPS, the AC Transmission Public Policy Transmission Projects were divided into three tiers for each segment with Tier 1 being the most favorable and Tier 3 being the least favorable.

The objective of Segment A is to increase the Central East transfer capability by constructing new 345 kV transmission on the ROW made available through decommissioning the existing Porter to Rotterdam 230 kV lines. Compared with other Segment A projects, T027 significantly increases the Central East transfer capability, and results in excellent operability, expandability, and replacement of aging infrastructure, and require least easement to mitigate EMF issues due to the double-circuit design. Therefore, T027 was placed in Tier 1. In contrast, though T025 has the highest Central East incremental transfer capability and average performance on other metrics, it was placed in Tier 3 because of significant risks associated with this 765 kV project design as described in Section 3.3.11. T026 was also placed in Tier 3 due to its lowest Central East incremental transfer capability. The remaining projects were placed in Tier 2 due to relatively similar performance and risks.

All Segment B projects are electrically similar except for T019 with the proposed series compensation. As a result, the NYISO identified that the distinguishing factors among the Segment B projects are the structure heights and the number of structures due to the associated risks to obtaining the Article VII siting certificate based on potential adverse visual impacts to the Hudson Valley.[40] In order to quantify the difference in visual impacts among projects, SECO's evaluation compares the proposed structure topology provided by the Developers to the information of the existing structures provided by the current facility owner. The differences in the structure height and the number of towers are identified and then further compared between proposals.[41]

This analysis identified that more than 50% of the new tower structures proposed by T029 and T030 have a reduced height compared to existing structures. Therefore, T029 and T030 were placed in Tier 1 because of low structure height increase, excellent operability, and relatively low cost

[40] While the December 2015 Order encouraged new structures to have minimal increase in height, and determined that height increases of less than 25 feet over existing structures will not be considered to be an adverse visual impact on the regional basis, the construction of new structures even with minimal increase in height may result in greater siting challenges due to their visual impact. *See* December 2015 Order, at p 35.

[41] The final project design and visual impact identification and mitigation will be addressed by the PSC in the Public Service Law Article VII siting proceedings.

estimates. T022 was placed in Tier 2 because of medium structure height increase and relatively less aging infrastructure replacement. T019 was placed in Tier 3 because of its medium structure height increases and risks associated with the proposed series compensation. T023 was placed in Tier 3 because of its high structure height increases. Although T032 has low structure height increase, it was placed in Tier 3 since it adds more structures, increasing the siting risk due to potential visual and agricultural use impacts.

Table 4-1: Summary of Results for Segment A

Project ID	Independent Cost Estimate: 2018 $M	Independent Duration Estimate: Months	Incremental Central East Voltage Transfer Limit	Operability	Propriety Rights	Expandability	PSC Criterion: Replacement of Aging Infrastructure	Risks			Tiered Ranking
								Overall Visual Impact	Easement Needed to Mitigate EMF (acres)	Other Risks Including Siting	
T018	520	52	Low	Breaker-and-a-half 345 kV Rotterdam substation, foundations and structures beyond NESC standard, low N-1-1 performance	-	-	-	Medium structure height increase	24	-	2
T021	498	52	Low	Breaker-and-a-half 345 kV Princetown substation, low N-1-1 performance	Non-utility property needed for Princetown substation, but with an option to purchase	Property available to expand the Princetown substation	No upgrades at Rotterdam substation	High structure height increase, more structures, less impact to agriculture due to monopoles	24	-	2
T025	863	54	Highest	Breaker-and-a-half 345 kV Rotterdam substation, ring-bus 345 kV Princetown substation, low N-1-1 performance	-	-	-	Low structure height increase	243	Potential mitigation for clearance and corona issues, hardware replacement for insulation, siting, and permitting risks, and risk to system operations due to contingency size	3
T026	491	52	Lowest	Breaker-and-a-half 345 kV Rotterdam substation, low N-1-1 performance	-	-	-	Low structure height increase	24	-	3
T027	750	55	High	breaker-and-a-half 345 kV Rotterdam substation, breaker-and-a-half 345 kV Princetown substation, best N-1-1 performance	-	All projects allow one more 345 kV line to be added within existing ROW, but double-circuit design tends to maximize the Central East transfer capability	More replacement due to double-circuit design, rebuild of Edic - New Scotland 345 kV line #14 for 6.3 miles, terminal upgrades at Marcy and Edic 345 kV substations	High structure height increase, 6 miles of lattice tower removed, less impact to agriculture due to monopoles	16	-	1
T028	514	52	Low	breaker-and-a-half 345 kV Rotterdam substation, ring-bus 345 kV Princetown substation, low N-1-1 performance	-	-	-	Low structure height increase	24	-	2
T031	570	52	Low	Breaker-and-a-half Princetown substation looping in all 345 kV lines, straight-bus at Rotterdam substation, no bus reconfiguration at New Scotland, new tower contingency created south of Princetown, low N-1-1 performance	Non-utility property needed for Princetown substation	-	Rebuild of Edic - New Scotland 345 kV line #14 for 20 miles	Low structure height increase, more structures, more impact to agriculture, 20 miles of lattice tower removed	24	Property acquisition for Princetown substation	2

Table 4-2: Summary of Results for Segment B

Project ID	Independent Cost Estimate: 2018 $M	Independent Duration Estimate: Months	Incremental UPNY/SENY Thermal Transfer Limit	Operability	Propriety Rights	Expandability	PSC Criterion: Replacement of Aging Infrastructure	Risks		Tiered Ranking
								Overall Visual Impact	Other Risks Including Siting	
T019	479	49	Higher with series compensation, but similar to others if bypassed	Foundations and structures beyond NESC standard	-	-	Churchtown 115 kV substation rebuild, terminal upgrades at New Scotland and Roseton substations	Medium structure height increase	Risks of SSR, voltage rise mitigation, relay coordination due to 50% series compensation	3
T022	373	47	-		-	-	Less 115 kV upgrades between Churchtown and Pleasant Valley	Medium structure height increase	-	2
T023	424	49	-		-	-		High structure height increase	-	3
T029	422	49	-	Improved N-1-1 performance due to Middletown upgrades	-	-	Middletown upgrades, Churchtown 115 kV substation rebuild	Low structure height increase, reduced height for more than 50% of the structures	-	1
T030	441	49	-	Improved N-1-1 performance due to Middletown upgrades	-	-	Middletown upgrades, Churchtown 115 kV substation rebuild	Low structure height increase, reduced height for more than 50% of the structures	-	1
T032	536	51	-	-	-	Transformers could be added to connect the Knickerbocker 345kV and 115 kV switching stations	-	Low structure height increase, more structures, more impact to agriculture, two-pole configuration with triple circuits	Operation and maintenance complexity due to triple-circuit design	3

Notes:
1. With 30% contingency rate, without 5% synergy, and without cost for Rock Tavern and Shoemaker-Sugarloaf upgrades

4.2.2 Step 2: Individual Ranking

In Step 2, combinations of Segment A and Segment B projects were evaluated based on consideration of all the evaluation metrics for efficiency or cost effectiveness. Synergies of projects were identified in two factors: i) cost saving for both Segment A and Segment B projects proposed by the same Developer, and ii) the overall system efficiency or cost effectiveness based on the combined electrical characteristics, regardless of whether the projects are proposed by the same Developers or not. The combination results were then used to inform the numerical ranking in each Segment.

Table 4-3 provides a summary of Tier 1 and Tier 2 project combination results for each metric evaluated for the AC Transmission Needs.[42] The table is color-coded such that the best values are highlighted in green, average values are highlighted in yellow, and low values are highlighted in red. This table does not comprehensively summarize all evaluations documented in this report, but offers a high-level summary of the relative performance of each Tier 1 and Tier 2 project combination for each metric using the primary study assumptions. No single metric or set of assumptions acts as the single deciding factor in determining the more efficient or cost effective transmission solution.

Based on consideration of all the evaluation metrics for efficiency or cost effectiveness, together with inputs from stakeholders and DPS, the NYISO staff ranked the projects in each segment. The relative ranking was first developed by comparing project performance and risks in pairs, and then the differences were identified to distinguish the projects.

[42] Note that the combination for all possible pairs from the same Developers were evaluated and the results are included in Section 3, but in this section the results for Tier 3 projects were not summarized due to low performance and/or high risks.

Table 4-3: Summary of Evaluations

Project ID	Independent Cost Estimate: 2018 $M (1)	Independent Duration Estimate: Months (2)	UPNY/SENY Incremental Thermal Transfer Limit: MW (3)	Central East Incremental Voltage Transfer Limit: MW	UPNY/SENY Cost/MW: $M/MW (3)	Central East Cost/MW: $M/MW	Baseline Production Cost Savings: 2018 $M	Baseline Production Cost Savings /Capital Cost	CES Production Cost Savings: 2018 $M	CES Production Cost Savings /Capital Cost	System CO2 Emission Reduction: 1000 tons (4)	Performance: 20-Year Incremental Flow on UPNY/SENY + Central East: GWh (4)	Operability		Expandability		Property Rights		PSC Criterion: Aging Infrastructure		Tiered Ranking	
													Seg A	Seg B	Seg A	Seg B	Seg A	Seg B	Seg A	Seg B	Seg A	Seg B
T018+T022	893	52	1,519	425	0.25	1.22	236	0.26	830	0.93	4,686	86,987	Good	Good	Good	Good	Good	Good	Good	Fair	2	2
T018+T029	942	52	1,401	425	0.30	1.22	236	0.25	830	0.88	4,686	86,987	Good	Excellent	Good	Good	Good	Good	Good	Good	2	1
T018+T030	961	52	1,535	425	0.29	1.22	236	0.25	830	0.86	4,686	86,987	Good	Excellent	Good	Good	Good	Good	Good	Good	2	1
T021+T022	827	52	1,519	350	0.23	1.35	199	0.24	714	0.86	7,298	78,917	Good	Good	Good	Good	Good	Good	Good	Fair	2	2
T021+T029	919	52	1,401	350	0.30	1.42	196	0.21	707	0.77	8,235	77,865	Good	Excellent	Good	Good	Good	Good	Good	Good	2	1
T021+T030	938	52	1,535	350	0.29	1.42	196	0.21	707	0.75	8,235	77,865	Good	Excellent	Good	Good	Good	Good	Good	Good	2	1
T027+T022	1123	55	1,326	825	0.28	0.91	331	0.29	1129	1.01	9,429	133,565	Excellent	Good	Excellent	Good	Good	Good	Excellent	Fair	1	2
T027+T029	1113	55	1,326	825	0.30	0.86	331	0.30	1129	1.01	9,429	133,565	Excellent	Excellent	Excellent	Good	Good	Good	Excellent	Good	1	1
T027+T030	1131	55	1,470	825	0.28	0.86	337	0.30	1108	0.98	10,184	135,044	Excellent	Excellent	Excellent	Good	Good	Good	Excellent	Good	1	1
T028+T022	887	52	1,519	400	0.25	1.28	221	0.25	840	0.95	4,056	74,942	Good	Good	Good	Good	Good	Good	Good	Fair	2	2
T028+T029	889	52	1,427	400	0.28	1.22	221	0.25	840	0.94	4,056	74,942	Good	Excellent	Good	Good	Good	Good	Good	Good	2	1
T028+T030	907	52	1,569	325	0.27	1.50	205	0.23	704	0.78	5,901	68,551	Good	Excellent	Good	Good	Good	Good	Good	Good	2	1
T031+T022	943	52	1,519	400	0.25	1.43	206	0.22	570	0.60	8,814	73,429	Good	Good	Good	Good	Fair	Good	Excellent	Fair	2	2
T031+T029	992	52	1,427	400	0.30	1.43	206	0.21	570	0.57	8,814	73,429	Good	Excellent	Good	Good	Fair	Good	Excellent	Good	2	1
T031+T030	1011	52	1,569	400	0.28	1.43	206	0.20	570	0.56	8,814	73,429	Good	Excellent	Good	Good	Fair	Good	Excellent	Good	2	1

Notes:

1. With 30% contingency rate, with 5% synergy if from same developers, and without cost for Rock Tavern and Shoemaker-Sugarloaf upgrades
2. Max of Segment A and Segment B
3. UPNY/SENY N-1 optimized thermal transfer
4. CES + Retirement w/o National CO_2

Critical comparisons and the resulting ranking are summarized below for the Segment A projects:

- T027, as shown in Table 4-3, consistently performs best regardless of which Segment B project is paired with it. While T027 has the second highest cost among Segment A projects, the overall benefits provided by the double-circuit design warrant the cost. These benefits include a significant increase in Central East transfer capability, increased production cost savings, and excellent operability and expandability. T027 also requires the least easement to mitigate the EMF issues compared with other Segment A projects. In addition, T027 has the most aging infrastructure replacement. As a result, T027 was ranked highest among all Segment A projects.
- The combinations with either T028 or T018 for Segment A have similar performance in several metrics based on representative results. T028 includes the new Princetown 345 kV substation that better integrates the existing system and provides future expandability. Moreover, T028 includes terminal upgrades at the Edic and Marcy 345 kV substations, which help reduce congestion. T028 was ranked higher than T018 for these reasons.
- The three Segment A Tier 2 projects were compared against each other. T018 has several key features, such as including a capacitor bank, looping the existing Edic to New Scotland 345 kV line #14 into the Rotterdam GIS substation, which has three proposed transformers, and the foundations and structures proposed are beyond the minimum requirement of National Electrical Safety Code (NESC). In contrast, T021 loops the existing Marcy to New Scotland 345 kV line into the Princetown substation with two proposed transformers, which causes congestion under certain system conditions. Moreover, T021 does not propose to replace the aging infrastructure at the Rotterdam substation. T031 is the most expensive among the Segment A Tier 2 projects. While T031 provides a good increase in the Central East transfer capability, it creates an additional tower contingency south of Princetown. Compared with the combinations with T021, the combinations with T031 perform less efficiently in many metrics such as cost per MW. Furthermore, T031 requires additional non-utility property for Princetown substation due to its large footprint, which poses a siting risk. Therefore, T018 ranks better than T021, and T021 ranks better than T031.
- T026 is a Tier 3 project due to the least benefits of all Segment A projects, even though it is also the least expensive.

- T025 is a Tier 3 project with the highest cost. Although it greatly increases the Central East transfer capability, it has the highest risks due to the potential siting and operations risks associated with its 765 kV design. Therefore, it was given the lowest ranking among Segment A proposals.

Critical comparisons and the resulting ranking are summarized below for Segment B projects:

- T029 and T030, both Tier 1 projects, propose the lowest structure height increase and more than 50% of the new structures have a reduced height. Compared with other projects, they also have more replacement of aging infrastructure and better operability. Therefore, they were ranked higher among Segment B projects. The additional cost of the triple-bundle circuit proposed in T030 is less than the incremental production cost savings, and T030 is therefore less preferable. As a result, T029 was ranked higher than T030.
- T022, a Tier 2 project, is the least expensive Segment B project with medium structure height increases and relatively less aging infrastructure replacement. Therefore, it was ranked below T029 and T030.
- T023 and T019 are both Tier 3 projects. T023 has lower cost but comparatively more increases in structure height. T019 proposes medium structure height increase and stronger foundations and structures that exceed NESC standards, and also enables higher UPNY/SENY transfer capability. Accordingly, T019 was ranked higher than T023. However, as described in Section 3.3.11, this project poses risks of voltage rise, relay coordination, and subsynchronous resonance mitigation due to the proposed 50% series compensation.
- T032 is the most expensive Segment B project with numerous inherent siting risks in the design. These include additional structures with potential adverse visual and agricultural impacts, and operational and planning risk due to the triple circuit design. Accordingly, it was given the lowest ranking among Segment B proposals.

Taking all the metrics into consideration, the overall ranking of the projects in each segment is summarized in Table 4-4.

Table 4-4: Overall Ranking

Segment	Ranking	Project ID	Developer Name	Project Name
A	1	T027	North America Transmission / NYPA	Segment A Double Circuits
	2	T028	North America Transmission / NYPA	Segment A Enhanced
	3	T018	National Grid / Transco	New York Energy Solution Seg. A
	4	T021	NextEra Energy Transmission New York	Enterprise Line: Segment A
	5	T031	ITC New York Development	16NYPP1-1A AC Transmission
	6	T026	North America Transmission / NYPA	Segment A Base
	7	T025	North America Transmission / NYPA	Segment A + 765 kV
B	1	T029	North America Transmission / NYPA	Segment B Base
	2	T030	North America Transmission / NYPA	Segment B Enhanced
	3	T022	NextEra Energy Transmission New York	Enterprise Line: Segment B
	4	T019	National Grid / Transco	New York Energy Solution Seg. B
	5	T023	NextEra Energy Transmission New York	Enterprise Line: Segment B-Alt
	6	T032	ITC New York Development	16NYPP1-1B AC Transmission

4.3 Selection Recommendation

Based on consideration of all the evaluation metrics for efficiency or cost effectiveness, together with input from Developers, stakeholders, and DPS, the NYISO staff recommends that the Board of Directors selects NAT/NYPA's T027 Segment A Double-Circuit proposal and NAT/NYPA's T029 Segment B Base proposal as the more efficient or cost-effective transmission solutions to satisfy the AC Transmission Needs.

Compared with other projects, the overall benefits provided by the double-circuit design in T027 warrant the more-expensive cost. These benefits include significant increase in Central East transfer capability, increased production cost savings, and excellent operability and expandability. T027 also requires the least easement to mitigate EMF violations compared with other Segment A projects. T029 provides similar UPNY/SENY transfer incremental and production cost savings with the second lowest cost. T029 also demonstrates excellent operability. Moreover, T029 has the lowest siting risk due to the lower increases in structure height compared to other projects; in fact, more than half of its new structures will be lower than existing structure heights along the right-of-way.

Both T027 and T029 are proposed by the same Developer, NAT/NYPA, which will result in synergy cost savings when developing two projects simultaneously. The selection of T029 for

Segment B by itself will not likely result in significant production cost savings to relieve Central East congestions, but when combined with T027 for Segment A, the synergies of transmission projects lead to best overall performance across evaluation metrics. Therefore, the NYISO staff determined that T027 for Segment A and T029 for Segment B are the more efficient or cost effective transmission solutions to satisfy the AC Transmission Public Policy Transmission Needs.

The combination of T027 and T029 is estimated to cost $856 million, taking into account a 5% discount for cost efficiency synergies of having a single developer for both projects. Assuming a 30% contingency factor of $257 million, the combined projects are estimated to cost $1,113 million. The projects are expected to provide combined production cost savings and capacity procurement savings in a range of $881 million to $1,979 million depending on future system conditions. Combining the production cost savings and ICAP savings for T027+T029, the savings over capital cost ratio is 0.8 to 1.1 for the baseline, and 1.5 to 1.8 for the CES + Retirement scenario. Moreover, the projects would also result in savings from avoided aging transmission refurbishment costs estimated to total $839 million. Based on the project schedule estimated by SECO, the in-service date for the selected projects is April 2023, assuming that the preparation of an Article VII application will begin immediately following the approval of this report and the project selections by the NYISO Board of Directors.

4.4 Next Steps

Following the approval of this report by the NYISO Board of Directors, the NYISO will tender Development Agreements to the Developers of the selected transmission projects. The Development Agreements will reflect project milestone schedules under which the Developers of the selected projects will complete the interconnection process, apply for Article VII siting and other necessary permits and authorizations, enter into an Operating Agreement(s) with the NYISO, and bring the projects into service.

Appendices

Appendix A – Public Policy Transmission Planning Process Glossary

Appendix B – AC Transmission Public Policy Transmission Planning Need Viability and Sufficiency Assessment

Appendix C – Phase 2 Selection Assumptions

Appendix D – SECO Report

Appendix E – Market Monitoring Unit Report

Appendix F – Frequently Asked Questions

UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

LS POWER GRID NEW YORK CORPORATION I	))	Docket No. ER20-___-000

AFFIDAVIT

Lawrence Willick, being duly sworn, deposes and states: that the foregoing Direct Testimony and Exhibits of Lawrence Willick was prepared by me or under my direct supervision, and that the statements contained therein and the Exhibits attached thereto are true and correct to the best of my knowledge and belief.

Lawrence Willick

Subscribed and sworn before me this 16th day of December, 2019.

Mary K Acker
Mary Acker
Notary Public
My commission expires: 6/20/2020

MARY K. ACKER
Notary Public, Notary Seal
State of Missouri
St. Louis County
Commission # 12358063
My Commission Expires June 20, 2020