

Appendix A – AC Transmission Public Policy Planning Report Glossary

Term	Definition
Adequacy	Encompassing both generation and transmission, adequacy refers to the ability of the bulk power system to supply the aggregate requirements of consumers at all times, accounting for scheduled and unscheduled outages of system components.
Article VII	Article VII of the New York State Public Service Law for the siting of major electric transmission facilities in the State of New York.
Congestion Assessment and Resource Integration Study (CARIS)	The Congestion Assessment and Resource Integration Study for economic planning developed by the NYISO in consultation with the Market Participants and other interested parties pursuant to Section 31.3 of Attachment Y.
Comprehensive System Planning Process (CSPP)	The Comprehensive System Planning Process set forth in Attachment Y, and in the Interregional Planning Protocol, which covers reliability planning, economic planning, Public Policy Requirements planning, cost allocation and cost recovery, and the interregional planning process.
Congestion	Congestion on the transmission system results from physical limits on how much power transmission equipment can carry without exceeding thermal, voltage and/or stability limits determined to maintain system reliability.
Contingencies	Contingencies are individual electrical system events (including disturbances and equipment failures) that may occur under certain system conditions.
Developer	A person or entity, including a Transmission Owner, sponsoring or proposing a project pursuant to Attachment Y.

Term	Definition
Electric System Planning Work Group (ESPWG)	A NYISO governance working group for Market Participants designated to fulfill the planning functions assigned to it and that advises the NYISO Operating Committee. The ESPWG provides a forum for stakeholders, Market Participants, and all interested parties to provide input into the NYISO's Comprehensive System Planning Process (CSPP), the NYISO's response to FERC reliability-related Orders and other directives, other system planning activities, policies regarding cost allocation and recovery for regulated reliability, economic, and/or public policy projects, and related matters.
Federal Energy Regulatory Commission (FERC)	The federal energy regulatory agency within the U.S. Department of Energy that approves the NYISO's tariffs and regulates its operation of the bulk electricity grid, wholesale power markets, and planning and interconnection processes.
FERC 715	Annual report that is required by transmitting utilities operating grid facilities that are rated at or above 100 kilovolts. The report consists of transmission systems maps, a detailed description of transmission planning Reliability Criteria, detailed descriptions of transmission planning assessment practices, and detailed evaluation of anticipated system performance as measured against Reliability Criteria.
Installed Capacity (ICAP)	A Generator or Load facility that complies with the requirements in the Reliability Rules and is capable of supplying and/or reducing the demand for Energy in the NYCA for the purpose of ensuring that sufficient Energy and Capacity are available to meet the Reliability Rules. The Installed Capacity requirement, established by the New York State Reliability Council (NYSRC), includes a margin of reserve in accordance with the Reliability Rules.
Installed Reserve Margin (IRM)	The amount of installed electric generation capacity above 100% of the forecasted peak electric demand that is required to meet NYSRC resource adequacy criteria. Most studies in recent years have indicated a need for a 15-20% reserve margin for adequate reliability in the State of New York.
Interregional Planning Protocol	The Amended and Restated Northeastern ISO/RTO Planning Coordination Protocol, or any successor protocol.
Local Transmission Plan (LTP)	The Local Transmission Owner Plan, developed by each Transmission Owner, which describes its respective plans that may be under consideration or finalized for its own Transmission District.
Local Transmission Owner Planning Process (LTPP)	The first step in the Comprehensive System Planning Process (CSPP), under which transmission owners in New York's electricity markets provide their local transmission plans for consideration and comment by interested parties.

Term	Definition
Load and Capacity Report (Gold Book)	The annual NYISO survey of power demand and supply in New York State that is published pursuant to Article 6 of the Energy Law of New York State.
Loss of load expectation (LOLE)	LOLE establishes the amount of generation and demand-side resources needed—subject to the level of the availability of those resources, load uncertainty, available transmission system transfer capability and emergency operating procedures—to minimize the probability of an involuntary loss of firm electric load on the bulk electricity grid. The state’s bulk electricity grid is designed to meet an LOLE that is not greater than one occurrence of an involuntary load disconnection in 10 years, expressed mathematically as 0.1 days per year.
Market Monitoring Unit	A consulting or other professional services firm, or other similar entity, retained by the NYISO Board pursuant to ISO Services Tariff Section 30.4.6.8.1 of Attachment O – Market Monitoring Plan.
Market Participant	An entity, excluding the ISO, that produces, transmits, sells, and/or purchases for resale Capacity, Energy and Ancillary Services in the Wholesale Market. Market Participants include: Transmission Customers under the NYISO OATT, Customers under the NYISO Services Tariff, Power Exchanges, Transmission Owners, Primary Holders, LSEs, Suppliers and their designated agents. Market Participants also include entities buying or selling TCCs.
New York State Bulk Power Transmission Facility (BPTF)	The facilities identified as the New York State Bulk Power Transmission Facilities in the annual Area Transmission Review submitted to NPCC by the NYISO pursuant to NPCC requirements.
New York Control Area (NYCA)	The area under the electrical control of the NYISO. It includes the entire State of New York, and is divided into 11 zones.
New York State Department of Environmental Conservation (NYSDEC)	The agency that implements New York State environmental conservation law, with some programs also governed by federal law.
New York Independent System Operator (NYISO)	Formed in 1997 and commencing operations in 1999, the NYISO is a not-for-profit organization that manages New York’s bulk electricity grid a network of over 11,000 miles of high voltage lines that carry electricity throughout the state. The NYISO also oversees the state’s wholesale electricity markets. The organization is governed by an independent Board of Directors and a governance structure made up of committees with Market Participants and stakeholders as members.

Term	Definition
New York State Department of Public Service (DPS)	As defined in the New York Public Service Law, it serves as the staff for the New York State Public Service Commission.
New York State Public Service Commission (PSC)	The New York State Public Service Commission is the decision making body of the New York State Department of Public Service. The PSC regulates the state's electric, gas, steam, telecommunications, and water utilities and oversees the cable industry. The Commission has the responsibility for setting rates and ensuring that safe and adequate service is provided by New York's utilities. In addition, the Commission exercises jurisdiction over the siting of major gas and electric transmission facilities.
New York State Reliability Council (NYSRC)	A not-for-profit entity that develops, maintains, and, from time-to-time, updates the Reliability Rules which shall be complied with by the New York Independent System Operator (NYISO) and all entities engaging in electric transmission, ancillary services, and capacity and energy transactions on the New York State Power System.
North American Electric Reliability Corporation (NERC)	A not-for-profit organization that develops and enforces reliability standards; assesses reliability annually via 10-year and seasonal forecasts; monitors the bulk power system; and educates, trains, and certifies industry personnel. NERC is subject to oversight by the FERC and governmental authorities in Canada.
Northeast Power Coordinating Council (NPCC)	A not-for-profit corporation responsible for promoting and improving the reliability of the international, interconnected bulk power system in Northeastern North America.
Open Access Transmission Tariff (OATT)	Document of Rates, Terms and Conditions, regulated by the FERC, under which the NYISO provides transmission service. The OATT is a dynamic document to which revisions are made on a collaborative basis by the NYISO, New York's Electricity Market Stakeholders, and the FERC.
Order No. 1000	Order No. 1000 is a Final Rule that reforms the FERC electric transmission planning and cost allocation requirements for public utility transmission providers. The rule builds on the reforms of Order No. 890 and provides for transmission planning to meet transmission needs driven by Public Policy Requirements, interregional planning, opens transmission development for new transmission needs to non-incumbent developers, and provides for cost allocation and recovery of transmission upgrades.
Other Developer	Developer, other than a Transmission Owner, sponsoring or proposing to sponsor a regulated economic project, a Public Policy Transmission Project, an Other Public Policy Project, or a regulated solution to a Reliability Need.

Term	Definition
Other Public Policy Project	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.
Outage	The forced or scheduled removal of generating capacity or a transmission line from service.
Peak Demand	The maximum instantaneous power demand, measured in megawatts (MW), and also known as peak load, that is usually measured and averaged over an hourly interval.
Public Policy Transmission Planning Process	The process by which the NYISO solicits needs for transmission driven by Public Policy Requirements, evaluates all proposed Public Policy Transmission Projects and Other Public Policy Projects on a comparable basis, and selects the more efficient or cost effective Public Policy Transmission Project, if any, for eligibility for cost allocation under the NYISO Tariffs.
Public Policy Transmission Need	A transmission need that is driven by a Public Policy Requirement and identified by the PSC in the NYISO’s Public Policy Transmission Planning Process.
Public Policy Requirement	A federal or New York State statute or regulation, including a PSC 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.
Public Policy Transmission Project	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.
Reliability Criteria	The electric power system planning and operating policies, standards, criteria, guidelines, procedures, and rules promulgated by the North American Electric Reliability Corporation (NERC), Northeast Power Coordinating Council (NPCC), and the New York State Reliability Council (NYSRC), as they may be amended from time to time.
Reliability Need	A condition identified by the NYISO as a violation or potential violation of Reliability Criteria.
Reliability Needs Assessment (RNA)	A biennial study which evaluates the resource adequacy and transmission system adequacy and security of the New York bulk power system over a ten year Study Period. Through this evaluation, the NYISO identifies Reliability Needs in accordance with applicable Reliability Criteria.

Term	Definition
Reliability Planning Process (RPP)	The biennial process that includes evaluation of resource adequacy and transmission system security of the state’s bulk electricity grid over a 10-year period and evaluates solutions to meet those needs. The RPP consists of two studies: the RNA, which identifies potential problems, and the CRP, which evaluates specific solutions to those problems.
Reliability Rules	Those rules, standards, procedures and protocols developed and promulgated by the NYSRC, including Local Reliability Rules, in accordance with NERC, NPCC, FERC, PSC and NRC standards, rules and regulations, and other criteria and pursuant to the NYSRC Agreement.
State Environmental Quality Review Act (SEQRA)	New York State law requiring the sponsoring or approving governmental body to identify and mitigate the significant environmental impacts of the activity/project it is proposing or permitting.
Site Control	Documentation reasonably demonstrating: (1) ownership of, a leasehold interest in, or a right to develop a site or right of way for the purpose of constructing a proposed project; (2) an option to purchase or acquire a leasehold site or right of way for such purpose; or (3) an exclusivity or other business relationship between the Transmission Owner, or Other Developer, and the entity having the right to sell, lease, or grant the Transmission Owner, or Other Developer, the right to possess or occupy a site or right of way for such purpose.
Study Period	The time period evaluated for the Western New York Public Policy Transmission Need from 2016 through 2045.
Transfer Capability	The measure of the ability of interconnected electrical systems to reliably move or transfer power from one area to another over all transmission facilities (or paths) between those areas under specified system conditions.
Transmission Constraints	Limitations on the ability of a transmission system to transfer electricity during normal or emergency system conditions.
Transmission District	The geographic area in which a Transmission Owner, including LIPA, is obligated to serve Load, as well as the customers directly interconnected with the transmission facilities of the Power Authority of the State of New York.
Transmission Expansion and Interconnection Process	The NYISO’s processes under its Open Access Transmission Tariff (OATT) for parties to pursue construction and interconnection of new and materially modified generation, transmission, and load facilities to the New York State Transmission System or Distribution System.

Term	Definition
Transmission Owner (TO)	A public utility or authority that owns transmission facilities and provides Transmission Service under the NYISO's tariffs.
Transmission Planning Advisory Subcommittee (TPAS)	An identified group of Market Participants that advises the NYISO Operating Committee and provides support to the NYISO Staff in regard to transmission planning matters including transmission system reliability, expansion, and interconnection.
Viability and Sufficiency Assessment	The results of the NYISO's assessment of the viability and sufficiency of proposed solutions to a Public Policy Transmission need under Section 31.4.6 of the NYISO OATT.
Zone	One of the eleven regions in the NYCA connected to each other by identified transmission interfaces and designated as Load Zones A-K.



AC Transmission Public Policy Transmission Need Viability & Sufficiency Assessment

A report from the New York Independent System Operator

October 27, 2016

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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 Requirements² 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.

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-CEIL.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

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.

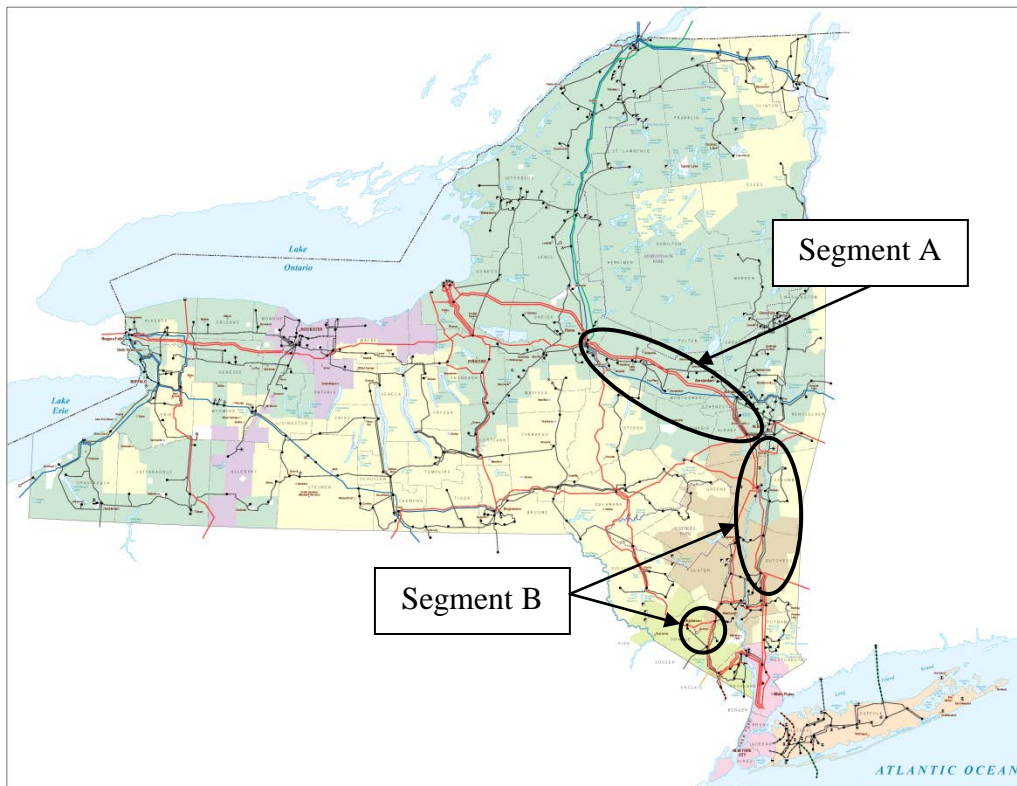
Upgrades to the Rock Tavern Substation

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_PP_TN/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_PP_TN/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_PP_TN/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.

AC Transmission PPTN: Phase 2 Assumptions

Dawei Fan

Supervisor, Public Policy and Interregional Planning

ESPGW

November 17, 2017



Agenda

- **Overview of AC Transmission Need**
- **Assumptions for Comparative Evaluation**
- **Next Steps**

Overview of AC Transmission Need

Public Policy Planning Process

■ Phase I: Identify Needs and Assess Solutions

- NYISO solicits transmission needs driven by Public Policy Requirements
- PSC identifies transmission needs and defines additional evaluation criteria
- NYISO solicits solutions (transmission, generation, or EE/DR)
- NYISO performs Viability and Sufficiency Assessment (VSA)
- PSC reviews assessment and confirms continued transmission need

■ Phase II: Transmission Evaluation and Selection

- NYISO staff evaluates viable and sufficient transmission solutions and recommends the more efficient or cost-effective solution
- Stakeholder review and advisory votes at BIC and MC
- NYISO Board may select a transmission solution for purposes of cost allocation and recovery under the NYISO Tariff

AC TRANSMISSION PPTN

- **Segment A (Central East)**
 - New Edic/Marcy to New Scotland 345 kV line
 - Decommission Porter to Rotterdam 230 kV lines
 - 230/345 kV connection to Rotterdam
- **Segment B (UPNY/SENY)**
 - New Knickerbocker to Pleasant Valley 345 kV line
 - Rock Tavern substation terminal upgrades
 - Shoemaker – Sugarloaf 138 kV line
- **See PSC Orders for full description**



Viability and Sufficient Transmission Projects

- **13 transmission projects are viable and sufficient**
 - 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

Assumptions for Comparative Evaluation

Overview

- Present assumptions for comparative evaluation
- Solicit feedback from stakeholders
- Evaluate all metrics required by the OATT
- The evaluation of Public Policy Transmission Projects differs from other planning processes because it can give varying levels of consideration to the baseline and the scenarios

Databases for Comparative Evaluation

- **Power flow:** used in metrics such as transfer limits, cost per MW, operability, and expandability
- **Resource adequacy:** used to analyze LOLE and ICAP benefit
- **Production cost:** used in metrics such as production cost savings, emission, LBMP, load payment, and performance
- **SECO databases:** used in metrics such as overnight capital cost, schedules, property rights, and expandability

Power Flow Analysis

- **Viability and Sufficiency Assessment: Phase 1 (Completed)**
 - 2014 Reliability Planning Process (RPP) base case representation of 2019 summer peak load
 - Updated to include CPV Valley Energy Center and associated System Deliverability Upgrades
- **Baseline Power Flow Analysis in Phase 2**
 - The same case as used in Phase 1

Power Flow Analysis

■ Scenario Power Flow Analysis in Phase 2

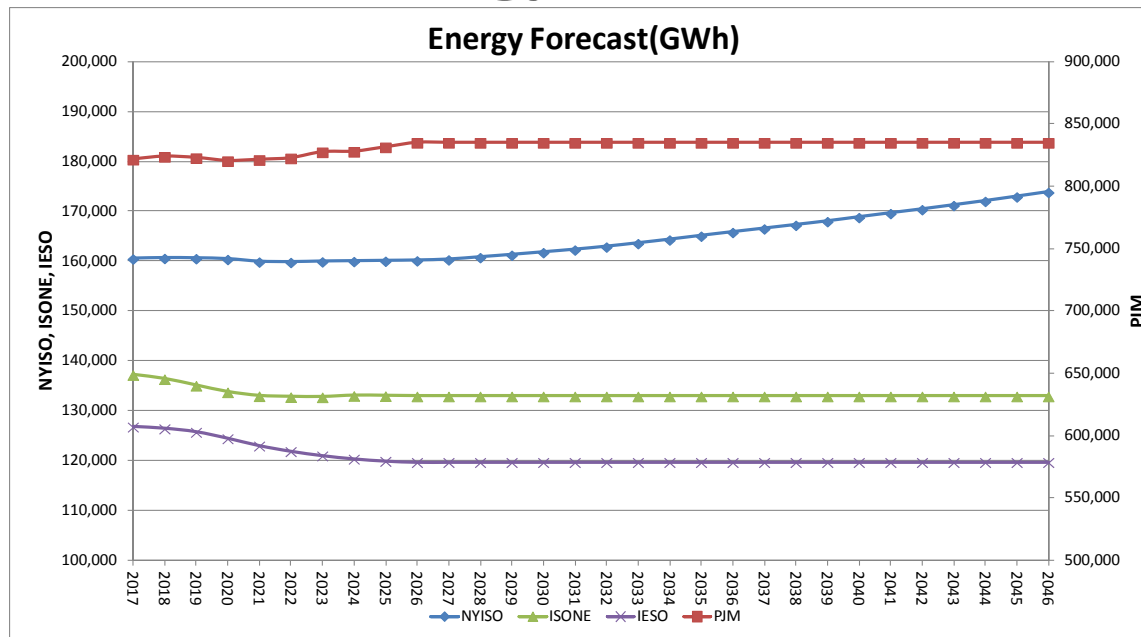
- Start with the 2016 RPP base case representation of 2026 summer peak load
- Updated based on 2017 Gold Book
- Generation:
 - Existing units no longer modeled as deactivated: Ginna, FitzPatrick, and Cayuga
 - Additions: CPV Valley Energy Center, Cricket Valley Energy Center, Bayonne Energy Center II, Greenidge #4, Jericho Rise, Bethlehem Energy Center Uprate, Cassadaga, Arkwright Summit, Eight Point, Shoreham Solar, and Ogdensburg
 - Deactivation: Auburn LFGE, Binghamton, Indian Point Energy Center Units No. 2 & 3
- Transmission:
 - Hudson Transmission Project scheduled at 0 MW
 - ABCJK PARs modeled based on PJM/NYISO JOA
 - Selected Western NY transmission project modeled as in service

Production Cost Database

■ Baseline

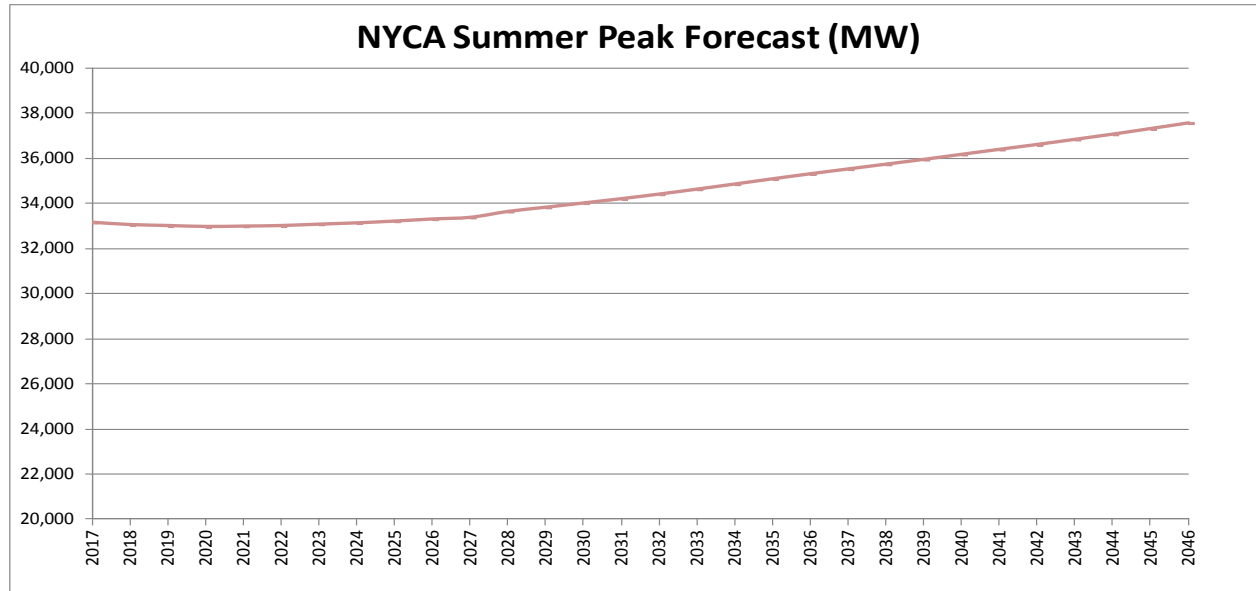
- Start with 2017 CARIS Phase 1 Base Case (2017–2026)
- Updates: Freeport in service, Binghamton out of service, and Indian Point Units No. 2 & 3 out of service
- Extensions: up to 2046
 - Load, fuel, and emission
 - Compensatory MW to maintain a reliable system, if needed

Load Forecast (Energy)

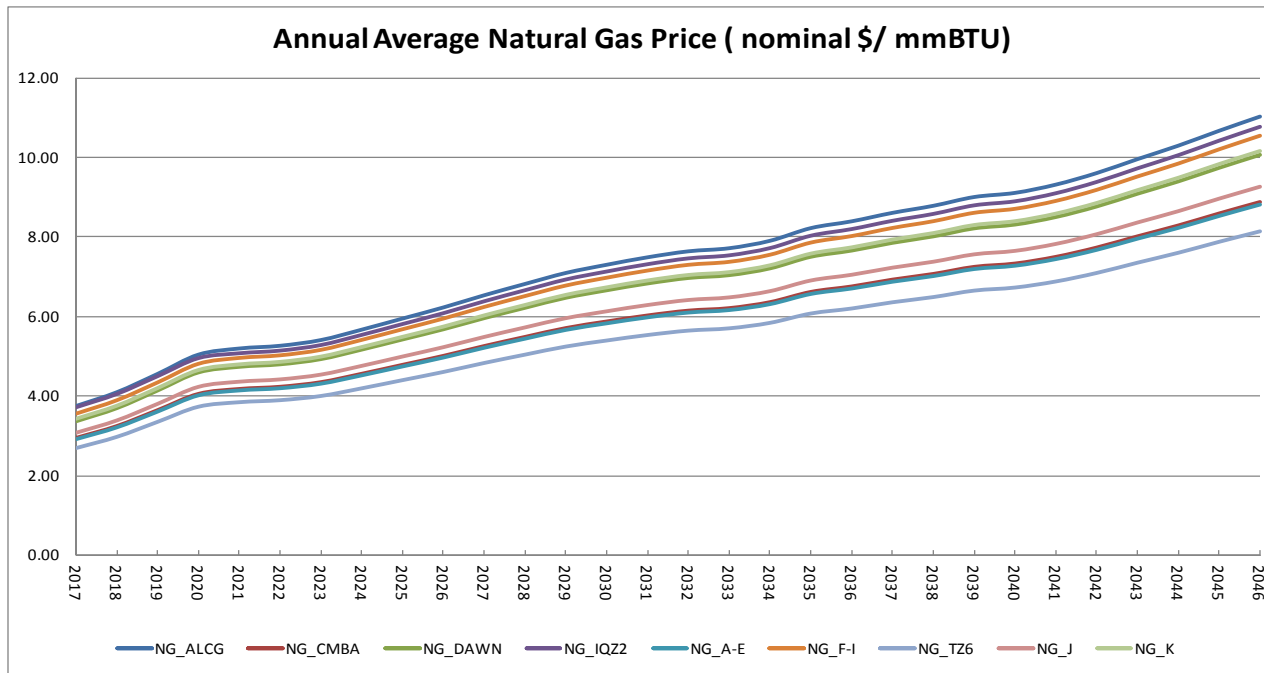


Note: External load frozen starting with the 10th year

Load Forecast (Peak Demand)

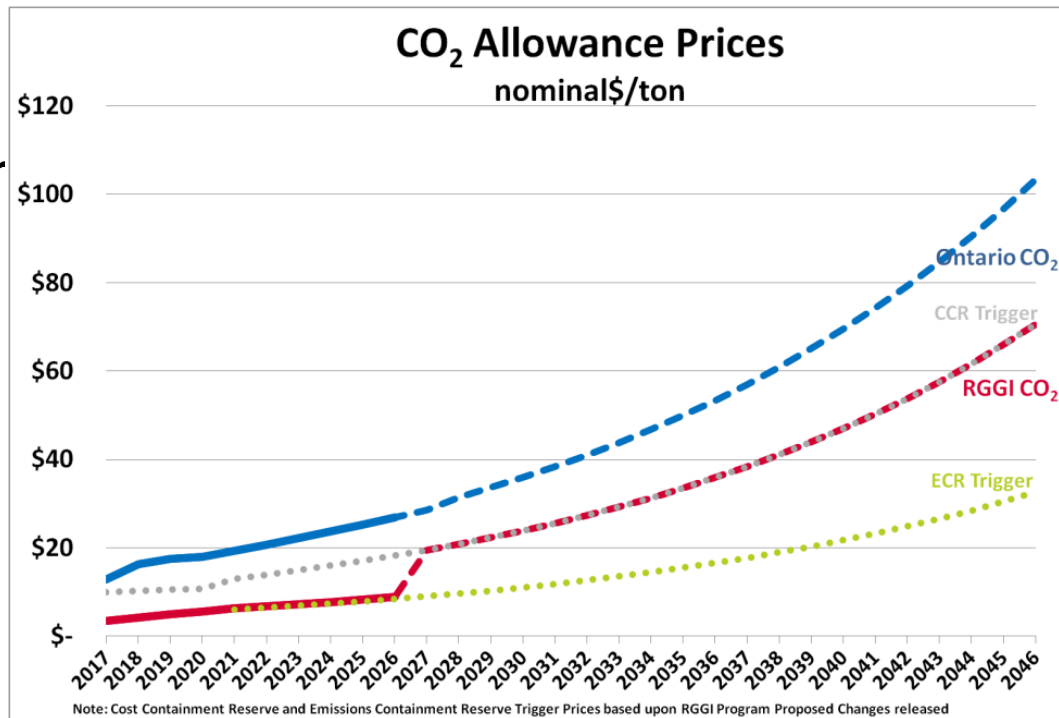


Natural Gas Price Forecast

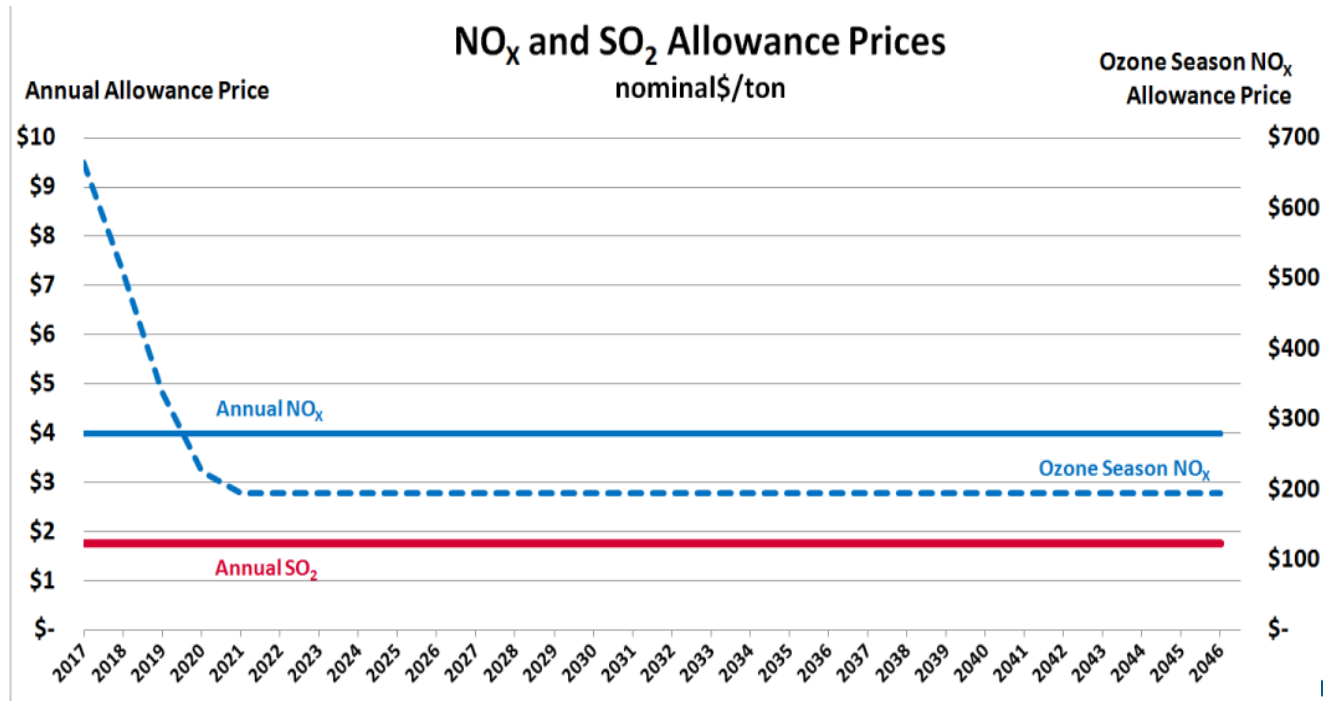


CO₂ Emission Price Forecast

- 2017 CARIS forecast used through 2026
- Price increase from soft floor to ceiling due to bank of surplus allowance reduced to zero in 2025, load growth, and decline in the allowance cap
- National CO₂ program assumed to start in 2027



NO_x and SO₂ Price Forecast



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Production Cost Database

■ Potential Scenarios

- Model Clean Energy Standard combined with retirement of aging generation
- No National CO₂ program
- High Natural Gas price
- Low Natural Gas price
- Low NYCA load forecast
- High NYCA load forecast

Resource Adequacy Analysis

- **Baseline:**
 - Start with 2016 RPP base case
 - Updated based on 2017 Gold Book, and load extended out to 2046
 - Generation:
 - Existing units no longer modeled as deactivated: Ginna, FitzPatrick, and Cayuga
 - Addition: CPV Valley Energy Center, Cricket Valley Energy Center, Bayonne Energy Center II, Greenidge #4, Jericho Rise, Bethlehem Energy Center Uprate, Cassadaga, Arkwright Summit, Eight Point, Shoreham Solar, and Ogdensburg
 - Deactivation: Auburn LFGE, Binghamton, and Indian Point Units No. 2 & 3
 - Transmission:
 - Hudson Transmission Project scheduled at 0 MW
 - Selected Western NY transmission project modeled as in service

Resource Adequacy Analysis

- Potential Scenarios:
 - Model Clean Energy Standard combined with retirement of aging generation

Next Steps

Next Steps

- Further questions and comments regarding AC Transmission Need assumptions and scenarios can be sent to PublicPolicyPlanningMailbox@nyiso.com as soon as possible, but no later than December 1, 2017.
- The NYISO tentatively plans to provide the draft results by the end of Q1 2018.

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

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



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Appendix F

Segment A Projects

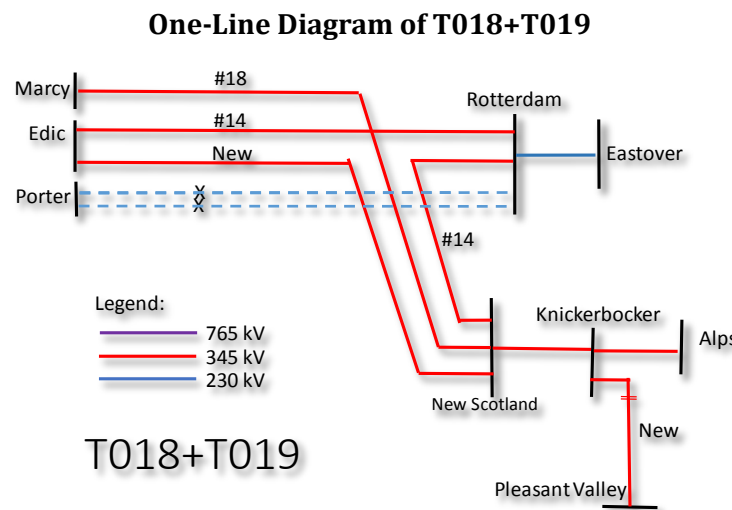
T018: National Grid/Transco - NYES Segment A

National Grid/Transco's NYES Segment A Proposal includes the following components:

- A new 345 kV line 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;
 - Edic-Princetown Junction (66.8 miles)
 - From Edic 345 kV Substation, remove approximately 12.6 miles of one set of 230 kV wires and insulators from one of the existing 345/230 kV double-circuit monopole structures and install one set of 345 kV wires and insulators to one of the monopole structures that contain the existing 345 kV Edic to Fraser #24-40 line
 - For approximately 48.8 miles, within the primary corridor, the two existing 230 kV H-frame structure lines will be removed and replaced with one new 345 kV line consisting predominately of H-frame structures. New 345 kV tubular steel monopole structures will be used intermittently throughout this segment for approximately 5.4 miles in total
 - 345 kV 2-954 kcmil 54/7 ACSS "Cardinal" conductor
 - Direct embedded poles and drilled shaft foundations
 - Princetown Junction-New Scotland (19.7 miles)
 - Remove 2.5 miles of existing 115 kV line
 - 10.9 miles of H-frame structures, 6.3 miles of monopole structures and 2.5 miles of 345/115 kV double-circuit monopole structures
 - 345 kV 2-954 kcmil 54/7 ACSS "Cardinal" conductor
 - 115 kV 954 kcmil 54/7 ACSS "Cardinal" conductor
 - Direct embedded poles and drilled shaft foundations
- Two new 345 kV compact monopole structure lines 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; and
- Retirement of the Porter to Rotterdam 230 kV lines #30 and #31.

Figure below shows the one-line diagram of T018 (together with components of T019).



T021: NextEra - Enterprise Line Segment A

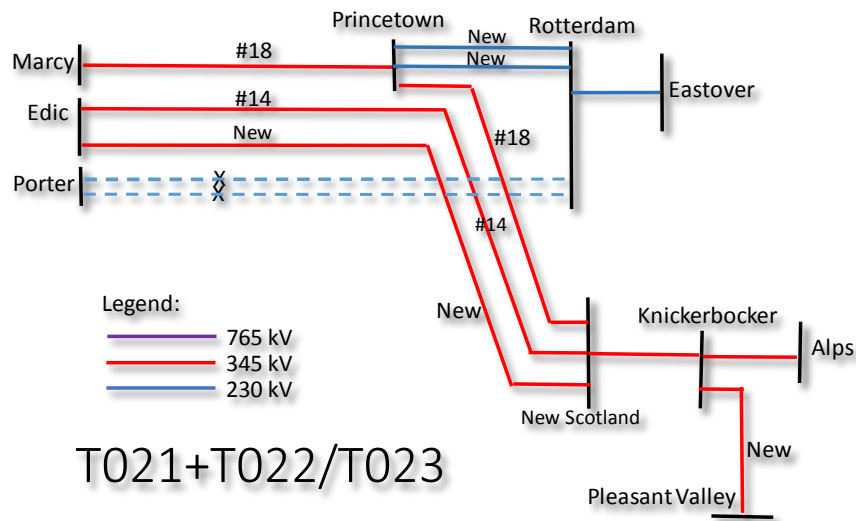
NextEra's Enterprise Segment A Proposal includes the following components:

- Retire 73 miles of the two Porter –Rotterdam 230 kV lines circuit #30.
- Retire 2.6 miles of the Rotterdam –New Scotland 11 kV line circuit #13.
- Construct a new breaker-and-a-half 345/230 kV Substation, Princetown, located near the existing Rotterdam 230 kV substation. The substation will include two 478 MVA 345/230 kV auto-transformers.
- Construct two 345 kV circuits each approximately 4 miles in length to loop the existing Marcy – New Scotland 345 kV circuit #18 into Princetown 345/230 kV substation, utilizing double bundled 1033 ACSS Curlew conductor.

- Construct two 1 mile 230 kV lines from Princetown – Rotterdam, utilizing 1033 ACSS Curlew conductor; both lines will utilize ROW made available by the retirements of the Porter – Rotterdam circuits #30 and #31.
- Construct a new 86 miles 345 kV line (83.4 miles 345 kV line and 2.6 miles double circuit 345/115 kV line) from Edic – New Scotland , utilizing double bundled, 1033 ACSS Curlew conductor:
 - The first 12.5 miles of the 345 kV line will reuse the existing New York Power Authority (NYPA) towers that were previously occupied by Porter – Rotterdam circuit #30. The existing conductor will be removed and replaced with the double bundled 1033 ACSS Curlew conductor.
 - The next 54 miles section will be constructed as a single circuit 345 kV line, and continue east within existing ROW previously occupied by Porter – Rotterdam circuit #30.
 - The new 345 kV line will then turn south and continue 19.5 miles towards New Scotland Substation, utilizing the corridor currently occupied by the 345 kV Edic – New Scotland and Marcy – New Scotland transmission lines. Due to ROW width constraints, a 2.6 miles portion of this section will be constructed as a double circuit 345/115 kV line and will replace the existing Rotterdam – New Scotland 115 kV line.
- Construct new Rotterdam – New Scotland 115 kV line.

Figure below shows the one-line diagram of T021 (together with components of T022/T023).

One-Line Diagram of T021+T022/T023



T021+T022/T023

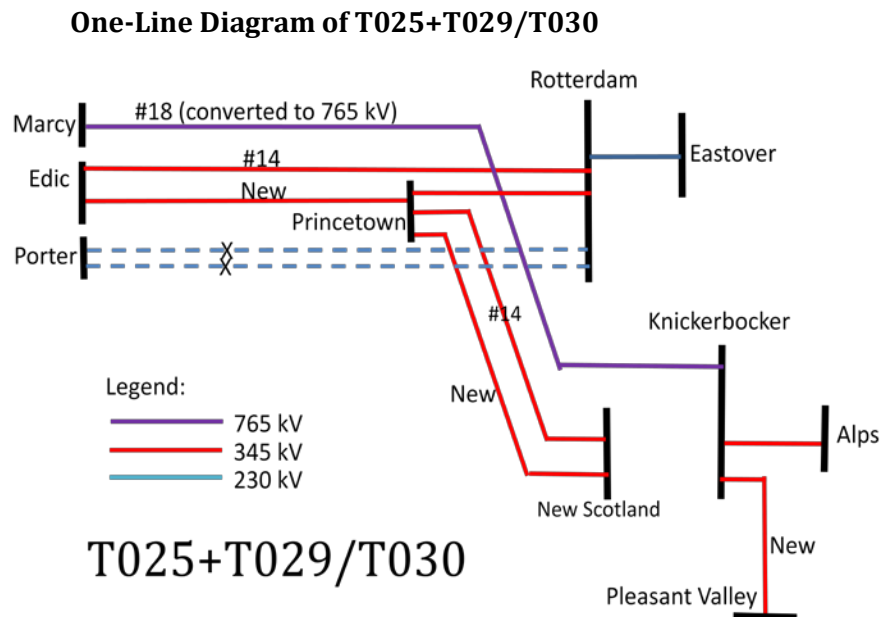
T025: NAT/NYPA - Segment A + 765 kV

The NAT/NYPA Segment A +765 kV Proposal consists of the following components:

- Removing the two 230 kV transmission circuits from Porter to Rotterdam from service (#30 and #31);
- Installing a new 345 kV circuit from Edic to New Scotland (approximately 86.3 miles) utilizing double bundled 954 ACSS Cardinal conductor, in the following manner, from west to east:
 - Approximately 0.3 miles from Edic to Porter in existing right-of-way;
 - Approximately 12.2 miles on existing NYPA owned Edic-Fraser 345 kV towers, on the position currently occupied by the existing Porter to Rotterdam 230 kV circuit #30;
 - Approximately 54.3 miles on new 345 kV single-circuit towers in the existing Porter to Rotterdam 230 kV right-of-way;
 - Approximately 10.5 miles on new 345 kV single-circuits towers in the existing Marcy-New Scotland and Edic-New Scotland 345 kV ROW;
 - Approximately 2.5 miles on new double circuit 345 kV/115 kV towers replacing the existing 115 kV Rotterdam-New Scotland 115 kV transmission line; and
 - An additional approximately 6.5 miles on new 345 kV single-circuits towers in the existing Marcy-New Scotland and Edic-New Scotland 345 kV ROW.

- Looping the existing 345 kV Edic-New Scotland (#14) line to Rotterdam, involving the construction of two 5-mile single-circuit 345 kV transmission line segments from the existing Edic-New Scotland 345 kV line to Rotterdam in the existing right-of-way currently occupied by the existing Porter to Rotterdam 230 kV Circuits #30 and #31 (10 circuit miles total). The looped #14 line will utilize double bundled 954 ACSS Cardinal conductor;
- Building a new 345 kV Rotterdam substation yard within the property of the existing Rotterdam substation, including a new 345/230 kV transformer and two new 345/115 kV transformers, and retiring the existing 230 kV Rotterdam substation yard;
- Other necessary upgrades to the Edic 345 kV substation, Marcy 345 kV substation, and New Scotland 345 kV substations to accommodate the new interconnections and re-terminate some lines terminating at New Scotland. Larger, lower impedance 345/115 kV transformers at the Rotterdam 345 kV substation
- Terminal upgrades at Edic and Marcy 345kV substations
- Breaking the newly proposed Edic-New Scotland lines, and Rotterdam-New Scotland transmission line (segmented after breaking the existing Edic-New Scotland #14 line) south of Princetown junction and connecting each into a new Princetown 345 kV switchyard.
- Conversion of the Marcy-New Scotland 345 kV transmission line and a portion of the New Scotland to Alps line between New Scotland and Knickerbocker to 765 kV operation, which involves:
 - Reterminating the Marcy 345 kV termination to the Marcy 765 kV yard and rebuilding approximately 1.3 miles of the line beginning at the Marcy 765 kV yard to 765 kV standards;
 - Building a new Knickerbocker 765 kV substation with 2 x 2000 MVA transformers connecting to the Knickerbocker 345 kV yard;
 - Rebuilding approximately 0.25 miles of the line at the New Scotland terminal to 765 kV standards, and adding approximately 0.4 miles of new 765 kV transmission line to connect the Marcy-New Scotland line to the New Scotland to Alps 345 kV line, which will be broken at Knickerbocker. The segment west of Knickerbocker (now to Marcy) will be converted to 765 kV operation and connected to a new Knickerbocker 765 kV substation yard. The segment east of Knickerbocker to Alps will be connected to the Knickerbocker 345 kV substation yard.

Figure below shows the one-line diagram of T025 (together with components of T029/T030).



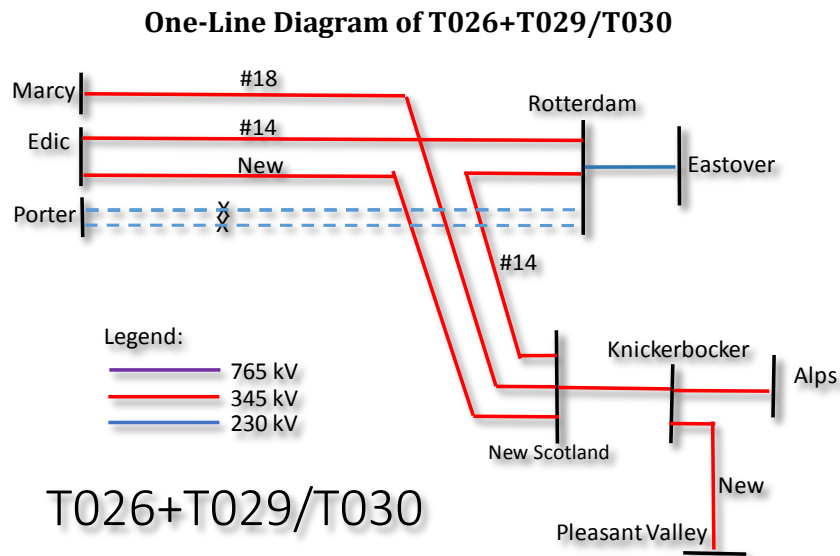
T026: NAT/NYPA - Segment A Base

NAT/NYPA Segment A Base Proposal consists of the following components:

- Removing the two 230 kV transmission circuits from Porter to Rotterdam from service (#30 and #31)
- Installing a new 345 kV circuit from Edic to New Scotland (approximately 86.3 miles) utilizing double bundled 954 ACSS Cardinal conductor, in the following manner, from west to east:
 - Approximately 0.3 miles from Edic to Porter in existing right-of-way;
 - Approximately 12.2 miles on existing NYPA owned Edic-Fraser 345 kV towers, on the position currently occupied by the existing Porter to Rotterdam 230 kV circuit #30;
 - Approximately 54.3 miles on new 345 kV single-circuit towers in the existing Porter to Rotterdam 230 kV right-of-way;
 - Approximately 10.5 miles on new 345 kV single-circuits towers in the existing Marcy-New Scotland and Edic-New Scotland 345 kV ROW;
 - Approximately 2.5 miles on new double circuit 345 kV/115 kV towers replacing the existing 115 kV Rotterdam-New Scotland 115 kV transmission line; and

- An additional approximately 6.5 miles on new 345 kV single-circuits towers in the existing Marcy-New Scotland and Edic-New Scotland 345 kV ROW.
- Looping the existing 345 kV Edic-New Scotland (#14) line to Rotterdam, involving the construction of two 5-mile single-circuit 345 kV transmission line segments from the existing Edic-New Scotland 345 kV line to Rotterdam in the existing right-of-way currently occupied by the existing Porter to Rotterdam 230 kV Circuits #30 and #31 (10 circuit miles total). The looped #14 line will utilize double bundled 954 ACSS Cardinal conductor;
- Building a new 345 kV Rotterdam substation yard within the property of the existing Rotterdam substation, including a new 345/230 kV transformer and two new 345/115 kV transformers, and retiring the existing 230 kV Rotterdam substation yard; and
- Other necessary upgrades to the Edic 345 kV substation, Marcy 345 kV substation, and New Scotland 345 kV substations to accommodate the new interconnections and reterminate some lines terminating at New Scotland.
- Terminal upgrades at Edic and Marcy 345kV substations

Figure below shows the one line diagram of T026 (together with components of T029/T030).



T027: NAT/NYPA - Segment A Double-Circuit

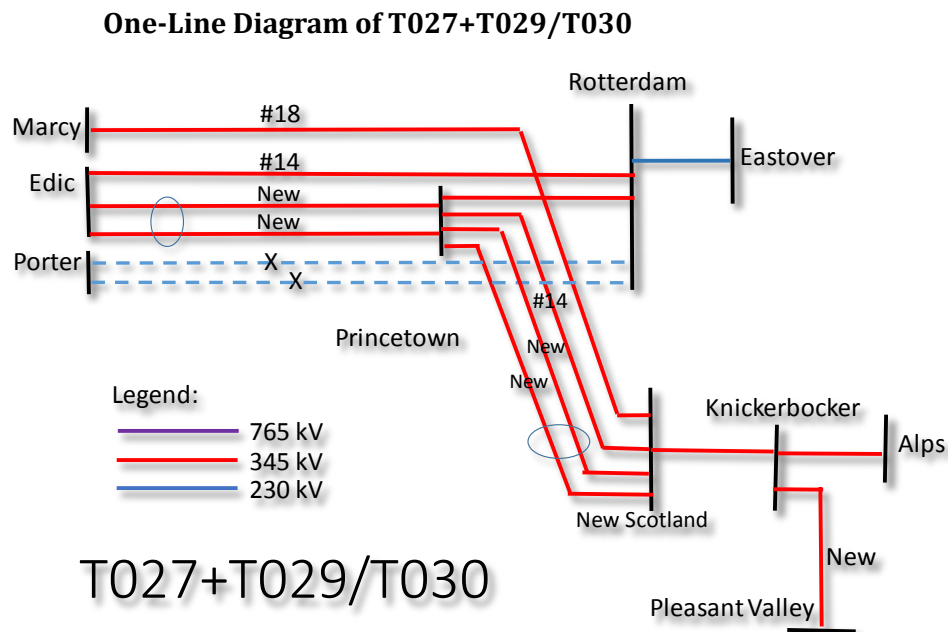
NAT/NYPA Segment A Double Circuit Proposal consists of the following components:

- Removing the two 230 kV transmission circuits from Porter to Rotterdam from service (#30 and #31)

- Installing a new 345 kV circuit from Edic to New Scotland (approximately 86.3 miles) utilizing double bundled 954 ACSS Cardinal conductor, in the following manner, from west to east:
 - Approximately 0.3 miles from Edic to Porter in existing right-of-way;
 - Approximately 12.2 miles on existing NYPA owned Edic-Fraser 345 kV towers, on the position currently occupied by the existing Porter to Rotterdam 230 kV circuit #30;
 - Approximately 54.3 miles on new double circuit 345 kV towers in the existing Porter to Rotterdam 230 kV right-of-way with 8.3 miles in two segments in single circuit towers (where the two right-of-ways diverge); and
 - Approximately 19.5 miles on new double-circuit 345 kV towers in the existing Marcy-New Scotland and Edic-New Scotland 345 kV ROW.
- Installing a new (second) 345 kV circuit from Edic to New Scotland (approximately 86.3 miles) utilizing double bundled 954 ACSS Cardinal conductor, in the following manner, from west to east:
 - Approximately 0.3 miles from Edic to Porter in existing right-of-way;
 - Approximately 12.2 miles on existing NYPA owned Marcy-Coopers Corner 345 kV towers, on the position currently occupied by the existing Porter to Rotterdam 230 kV circuit #31;
 - Approximately 54.7 miles on new double circuit 345 kV towers in the existing Porter to Rotterdam 230 kV right-of-way with 8.7 miles in two segments in single circuit towers (where the two right-of-ways diverge); and
 - Approximately 19.5 miles on new double-circuit 345 kV towers in the existing Marcy-New Scotland and Edic-New Scotland 345 kV ROW.
- Looping the existing 345 kV Edic-New Scotland (#14) line to Rotterdam, involving the construction of two 5-mile single-circuit 345 kV transmission line segments from the existing Edic-New Scotland 345 kV line to Rotterdam in the existing right-of-way currently occupied by the existing Porter to Rotterdam 230 kV Circuits #30 and #31 (10 circuit miles total). The looped #14 line will utilize double bundled 954 ACSS Cardinal conductor;
- Building a new 345 kV Rotterdam substation yard within the property of the existing Rotterdam substation, including a new 345/230 kV transformer and two new 345/115 kV transformers, and retiring the existing 230 kV Rotterdam substation yard;

- Removing and rebuilding approximately 6 miles of the Rotterdam to New Scotland 345 kV transmission line to accommodate the new double circuit line beginning at Princetown junction south;
- Removing the Rotterdam to New Scotland 115 kV transmission line; and
- Other necessary upgrades to the Edic 345 kV substation, Marcy 345 kV substation, and New Scotland 345 kV substations to accommodate the new interconnections and reterminate some lines terminating at New Scotland. Larger, lower impedance 345/115 kV transformers at the Rotterdam 345 kV substation; and
- Terminal upgrades at Edic and Marcy 345kV substations
- Breaking both newly proposed Edic-New Scotland lines, and Rotterdam-New Scotland transmission line (segmented after breaking the existing Edic-New Scotland #14 line) south of Princetown junction and connecting each into a new six position gas insulated Princetown 345 kV switchyard.

Figure below shows the one-line diagram for T027 (together with components of T029/T030).



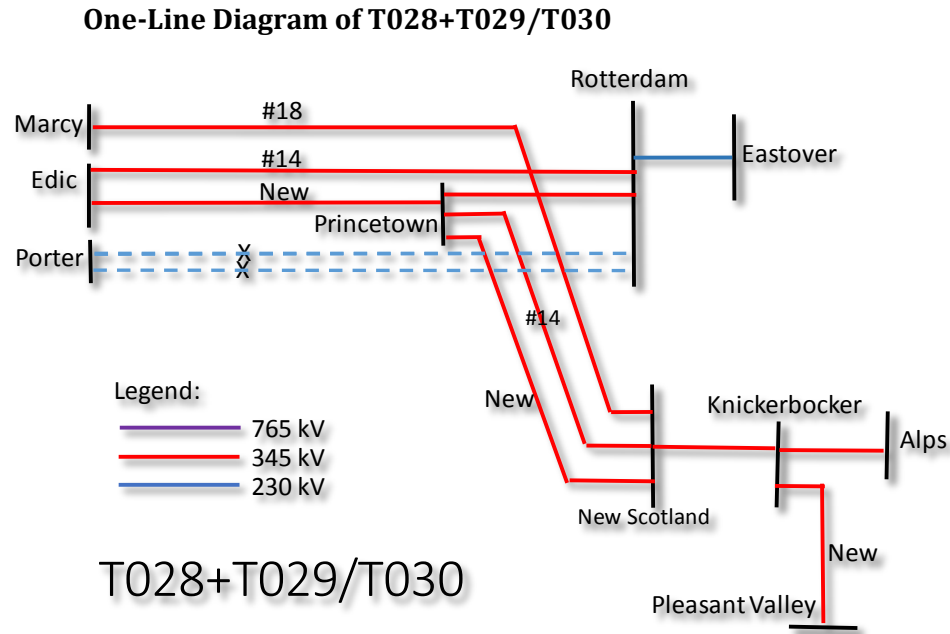
T028: NAT/NYPA - Segment A Enhanced

The NAT/NYPA - Segment A Enhanced Proposal consists of the following components:

- Removing the two 230 kV transmission circuits from Porter to Rotterdam from service (#30 and #31)
- Installing a new 345 kV circuit from Edic to New Scotland (approximately 86.3 miles) utilizing double bundled 954 ACSS Cardinal conductor, in the following manner, from west to east:
 - Approximately 0.3 miles from Edic to Porter in existing right-of-way;
 - Approximately 12.2 miles on existing NYPA owned Edic-Fraser 345 kV towers, on the position currently occupied by the existing Porter to Rotterdam 230 kV circuit #30;
 - Approximately 54.3 miles on new 345 kV single-circuit towers in the existing Porter to Rotterdam 230 kV right-of-way;
 - Approximately 10.5 miles on new 345 kV single-circuits towers in the existing Marcy-New Scotland and Edic-New Scotland 345 kV ROW;
 - Approximately 2.5 miles on new double circuit 345 kV/115 kV towers replacing the existing 115 kV Rotterdam-New Scotland 115 kV transmission line; and
 - An additional approximately 6.5 miles on new 345 kV single-circuits towers in the existing Marcy-New Scotland and Edic-New Scotland 345 kV ROW.
- Looping the existing 345 kV Edic-New Scotland (#14) line to Rotterdam, involving the construction of two 5-mile single-circuit 345 kV transmission line segments from the existing Edic-New Scotland 345 kV line to Rotterdam in the existing right-of-way currently occupied by the existing Porter to Rotterdam 230 kV Circuits #30 and #31 (10 circuit miles total). The looped #14 line will utilize double bundled 954 ACSS Cardinal conductor;
- Building a new 345 kV Rotterdam substation yard within the property of the existing Rotterdam substation, including a new 345/230 kV transformer and two new 345/115 kV transformers, and retiring the existing 230 kV Rotterdam substation yard; and
- Other necessary upgrades to the Edic 345 kV substation, Marcy 345 kV substation, and New Scotland 345 kV substations to accommodate the new interconnections and reterminate some lines terminating at New Scotland. Larger, lower impedance 345/115 kV transformers at the Rotterdam 345 kV substation; and

- Terminal upgrades at Edic and Marcy 345kV substations
- Breaking the newly proposed Edic-New Scotland and Rotterdam-New Scotland transmission line (segmented after breaking the existing Edic-New Scotland #14 line) south of Princetown junction and connecting each into a new air insulated Princetown 345 kV switchyard.

Figure below shows the one-line diagram of T028 (together with components of T029/T030).



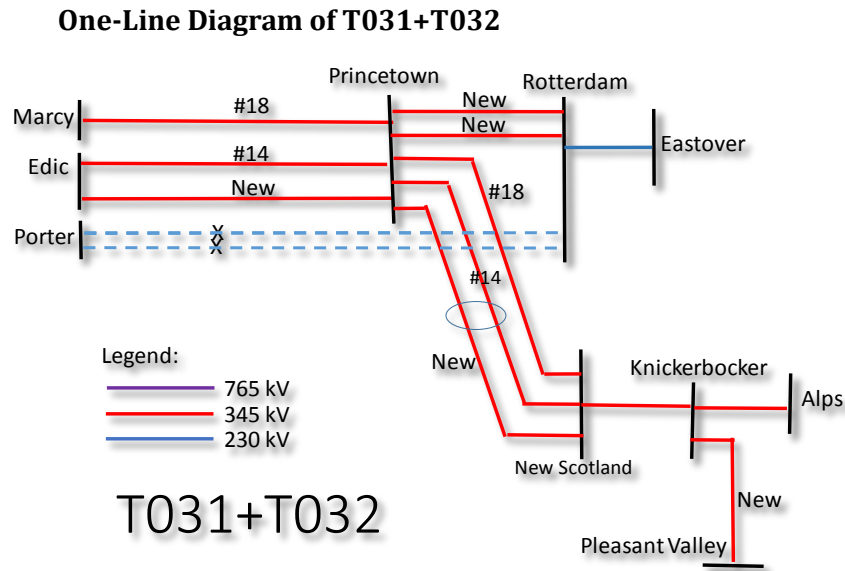
T031: ITC - 16NYPP1-1A AC Transmission Segment A

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
 - 345-kV Edic-Princetown; 67 miles; overhead, replace two (2) 230-kV circuits with a single 345-kV Edic - Princetown circuit
 - 345-kV Princetown-New Scotland #1; 19.6 miles; overhead, rebuild on double circuit structures
 - 345-kV Princetown-New Scotland #2; 19.6 miles; overhead, new circuit on double circuit structures

- A new Rotterdam 345 kV substation with two new 345/230 kV transformers
- Two new Princetown to Rotterdam 345 kV lines, 5.2 miles
- All 345kV upgrades use twin pair vertical bundle (2) 954 ACSR Cardinal conductors per phase
- Retirement of the Porter to Rotterdam 230 kV lines #30 and #31.

Figure below shows the one-line diagram of T031 (together with components of T032).



Segment B Projects

All Segment B projects include the common upgrades required by the PSC order: terminal upgrades at Rock Tavern and Coopers Corners substations, and Shoemaker – Sugarloaf upgrades

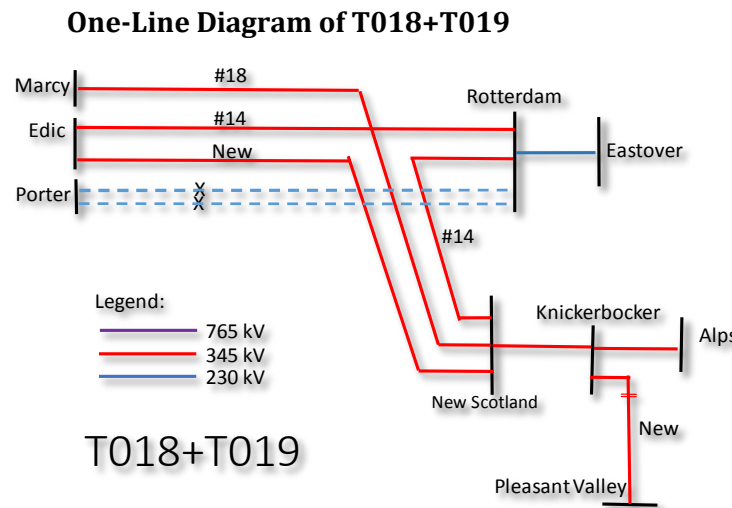
T019: National Grid/Transco - NYES Segment B

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 below shows the one-line diagram of T019 (together with components of T018).



T022: NextEra - Enterprise Line Segment B

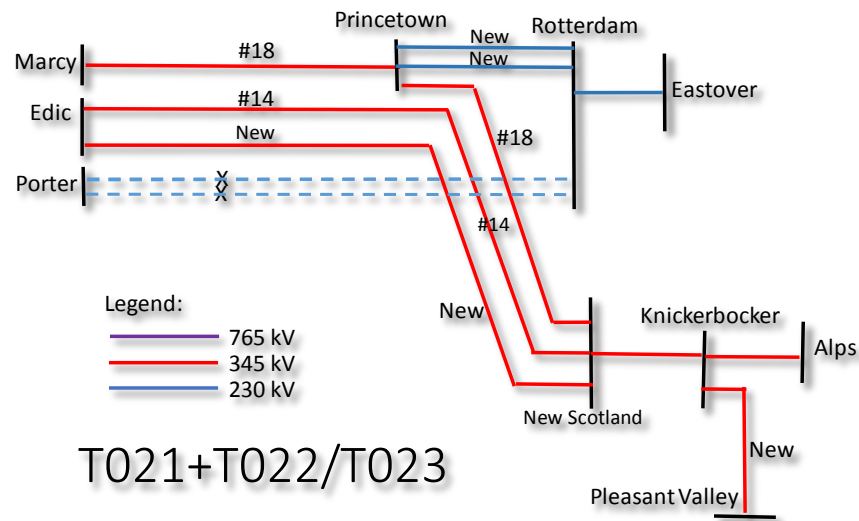
NextEra Enterprise Line Segment B proposal consists of the following components:

- Retire 22 miles of existing Greenbush – Pleasant Valley 115 kV circuits #12, #14, and #15, located between Knickerbocker Switchyard and North Churchtown Switchyard; these circuits comprise different sections of the same double circuit transmission line.
- Retire 32 miles of existing Lafarge –Pleasant Valley circuit #8 and North Catskill – Pleasant Valley 115 kV circuits #T7, #8, and #10, located between Churchtown Switchyard and Pleasant Valley Substation; these circuits comprise different sections of the same double circuit transmission line. Milan and Blue Stores Substations will be looped into the #12 and #13 lines respectively.
- Construct Knickerbocker Switchyard, a new 345 kV ring-bus, located within National Grid ROW, 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.
- Construct North Churchtown Switchyard , a new 115 kV ring-bus, ; located within NYSEG ROW, just north of NYSEG's existing Churchtown 115 kV switchyard:
 - Terminate North Catskill #T7, Lafarge #8, Milan #12, and Churchtown #14 115 kV lines into North Churchtown Switchyard.
- Construct new 54-mile 345 kV line from Knickerbocker – Pleasant Valley, utilizing double bundled, 1033 ACSS Curlew conductor:
 - The northernmost 22 miles of the project will be built on new double circuit 345/115 kV transmission structures located between Knickerbocker and Churchtown, utilizing ROW made available by the retirement of the 115 kV circuits #12, #14, and #15.
 - The southernmost 32 miles of the project will be built on new single circuit 345 kV transmission structures utilizing ROW made available by the retirement of the existing 115 kV circuits #T7, #8, and #10 located between Churchtown and Pleasant Valley.
- Construct new 22-mile 115 kV line located between Knickerbocker – North Churchtown , utilizing 795 ACSS Drake conductor:
 - All 22 miles of the project will be built on new 345/115 kV structures.
 - The line will tie to existing circuit #14 north of Knickerbocker.
 - The line will terminate at North Churchtown.
 - Valkin, Hudson, ADM Milling 115 kV feds will loop/tap into new 115 kV line.
 - Install a new sectionalizing, three-way 115 kV switch at ADM Milling

Figure below shows the one-line diagram of T022 (together with components of T021).

One-Line Diagram of T022



T023: NextEra - Enterprise Line Segment B-Alt

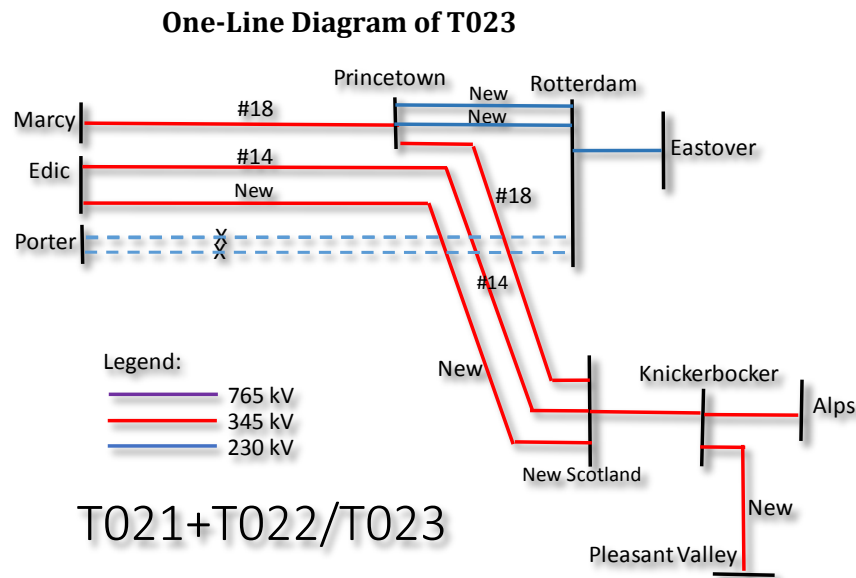
NextEra Enterprise Line Segment B-Alt proposal consists of the following components:

- Retire 54 miles of existing Greenbush – Pleasant Valley 115 kV circuits #12, #13, and #15, located between Knickerbocker Switchyard and North Churchtown Switchyard; these circuits comprise different sections of the same double circuit transmission line.
- Retire 32 miles of existing Lafarge-Pleasant Valley circuit #8 and North Catskill-Pleasant Valley 115 kV circuit #T7, #8 and #10, located between Churchtown Switchyard and Pleasant Valley Substation; these circuits comprise different sections of the same double circuit transmission line.
- Construct Knickerbocker Switchyard , a new 345 kV ring-bus, located within National Grid ROW, 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.
- Construct North Churchtown Switchyard, a new 115 kV ring-bus, located within NYSEG ROW, just north of NYSEG’s existing Churchtown 115 kV Switchyard:
 - Terminate North Catskill #T7, and Lafarge #8 115 kV lines into North Churchtown.
- Construct new 54 mile 345 kV line from Knickerbocker –Pleasant Valley, utilizing

double bundled , 1033 ACSS Curlew conductor:

- Line will be constructed on 345/115 kV structures utilizing ROW made available by the retirement of the existing 115 kV circuits #T7, #8, #10, #12, #13, #14, and #15 between Knickerbocker and Pleasant Valley.
- 345 kV line will terminate at Knickerbocker and Pleasant Valley.
- Construct new 54 mile 115 kV line from Knickerbocker – North Churchtown – Pleasant Valley, utilizing 795 ACSS Drake conductor:
 - Line will be constructed on 345/115 kV structures utilizing ROW made available by the retirement of the existing 115 kV circuits #T7, #8, #10, #12, #13, #14, and #15 between Knickerbocker and Pleasant Valley.
 - New 115 kV line will tie to existing circuit #14 north of Knickerbocker.
 - The 115 kV line will terminate at North Churchtown and Pleasant Valley.
 - Valkin, Hudson, ADM Milling, Blue Stores, and Milan 115 kV feeds will loop/tap into new 115 kV line.
 - Install a new sectionalizing, three-way 115 kV switch at ADM Milling.

Figure below shows the one-line diagram of T023 (together with components of T021).



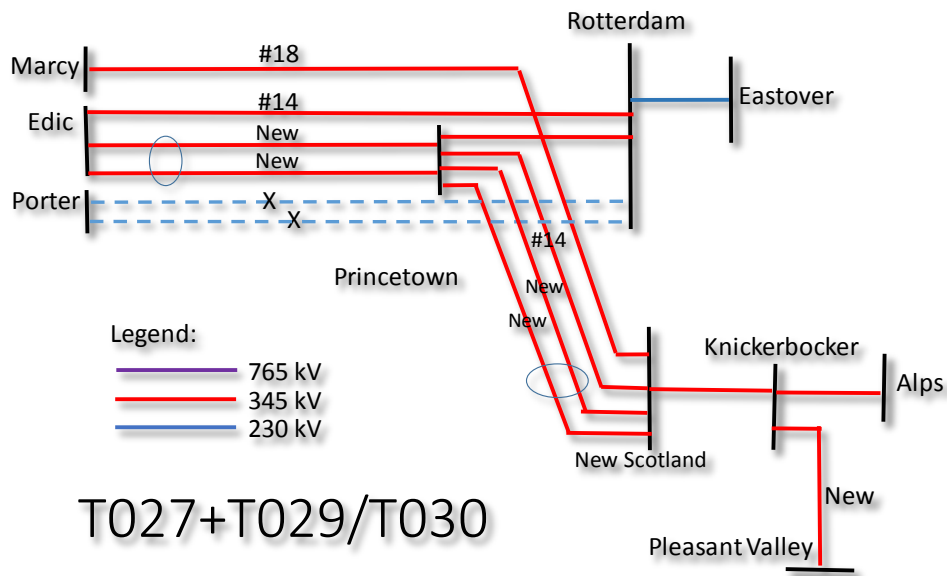
T029: NAT/NYPA - Segment B Base

NAT/NYPA Segment B Base Proposal consists of the following components:

- Removing the existing double circuit 115 kV transmission line towers between Knickerbockers and Pleasant Valley including the following existing 115 kV circuits: portion of Greenbush to Hudson (south of Knickerbocker); portion of Schodack to Churchtown (south of Knickerbocker); Hudson to Pleasant Valley; portion of Lafarge to Pleasant Valley (portion south of Churchtown); portion of North Catskill to Milan (south of Churchtown); and Milan to Pleasant Valley;
- Breaking the existing 345 kV New Scotland to Alps transmission line in the vicinity of the Knickerbocker switchyard, creating a New Scotland to Knickerbocker segment and a Knickerbocker to Alps segment;
- Constructing a new 345 kV Knickerbocker switchyard;
- Installing a double-circuit 345/115 kV transmission line Knickerbocker to Pleasant Valley in the right-of-way currently occupied by the above listed 115 kV transmission lines (approximately 54.2 miles). The 345 kV transmission line will be continuous from Knickerbocker to Pleasant Valley with double bundle 954 ACSS Cardinal conductor. The new 115 kV transmission line segments will be single 954 ACSS Cardinal conductor.
- Constructing a new Churchtown 115 kV substation.
- Replace the 115 kV system in the area removed as described above with the following 115 kV circuits: Schodack to Valkin to Hudson; Hudson to Churchtown; Churchtown to Lafarge; Churchtown to North Catskill; Churchtown to Blue Stores to Milan; and Milan to Pleasant Valley.
- Other necessary changes at the New Scotland, Alps, Pleasant Valley 345 kV substations to reflect the proposal and associated interconnections. Other changes at the Greenbush, Schodack, Fort Orange, Valkin, Hudson, Adm Milling, Churchtown, Lafarge, Buckley Corners, North Catskill, Blue Stores, Milan, and Pleasant Valley 115 kV substations to reflect the proposal and associated interconnections.
- Shoemaker – Shoemaker Tap – Middletown 345/138 kV and 138kV facilities upgrades.

Figure below shows the one-line diagram of T029 (together with components of T027).

One-Line Diagram of T027+T029/T030



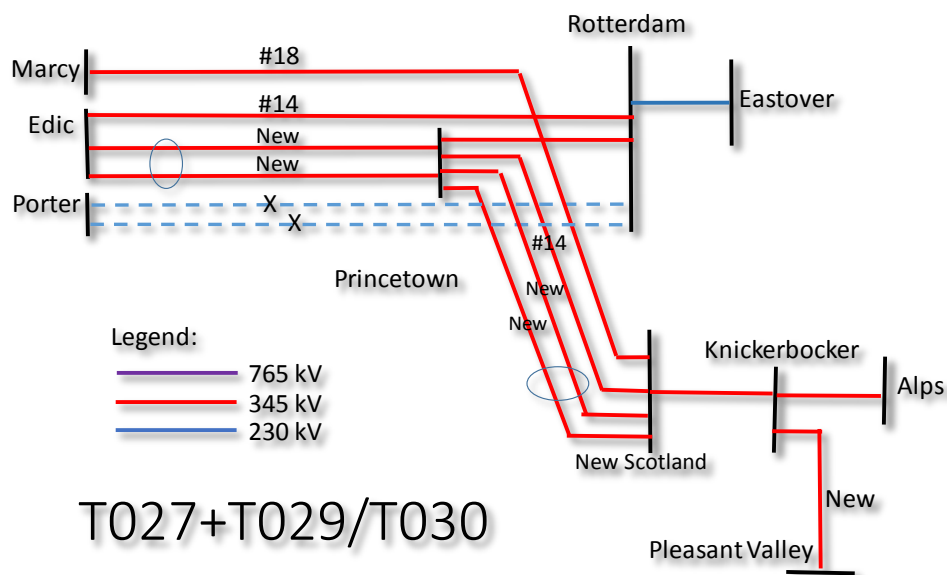
T027+T029/T030

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 below shows the one-line diagram of T030 (together with components of T027).

One-Line Diagram of T027+T029/T030



T027+T029/T030

T032: ITC - 16NYPP1-1A AC Transmission Segment B

ITC Segment B Proposal consists of the following components:

- One (1) new 345-kV-kV/115-kV double-circuit line from Knickerbocker station to Churchtown station on existing Greenbush to Pleasant Valley right-of-way;
- 345-kV/115-kV/115-kV triple-circuit line from Churchtown to Pleasant Valley on existing Greenbush to Pleasant Valley right-of-way;
- Decommission of the existing double-circuit line from Knickerbocker to Churchtown;
- Decommission of the existing 115-kV double-circuit line from Knickerbocker to Churchtown and two 115kV double-circuit lines from Churchtown to Pleasant Valley;
- New tap of the existing 345-kV New Scotland to Alps circuit and new Knickerbocker switching station;
- Associated cut-in or station upgrades at Greenbush, Hudson, New Scotland, Alps, North Catskill, LaFarge, Milan, Churchtown, and Pleasant Valley stations.

Figure below shows the one-line diagram of T032 (together with components of T031).

