2016 Comprehensive Reliability Plan

A report from the New York Independent System Operator

DRAFT REPORT

~~**FEBRUARY 17**~~**MARCH 2, 2017**

For March 7, 2017 ESPWG/TPAS

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Executive Summary

This 2016 Comprehensive Reliability Plan (CRP) concludes that the New York Control Area Bulk Power Transmission Facilities will meet all applicable Reliability Criteria over the 2017 through 2026 Study Period, and confirms that the initially identified Reliability Needs in the 2016 Reliability Needs Assessment (RNA) are resolved. The CRP completes the 2016 cycle of the NYISO Reliability Planning Process.

The NYISO initiated the CRP after the NYISO Board approved the 2016 RNA in October 2016. The RNA assessed the resource adequacy and transmission security of the New York Control Area ~~bulk power transmission system~~Bulk Power Transmission Facilities (BPTF) from 2017 through 2026~~ and~~. Utilizing the 2016 RNA base case assumptions, it identified two transmission security Reliability Needs beginning in 2017: the New York State Electric & Gas Corp. (NYSEG) Oakdale 345/115 kV transformer, and the Long Island Lighting Company d/b/a Long Island Power Authority (LIPA) East Garden City to Valley Stream 138 kV line. Subsequent to ~~the RNA~~ approval of the RNA and prior to the start of the CRP, NYSEG and LIPA updated their local transmission owner plans (LTPs), as described further in this report. The NYISO incorporated these updates into the 2016 CRP base case. With these updates, the NYISO concluded that the two Reliability Needs are eliminated, and there is no need to solicit solutions.

While the NYISO concludes that long-term reliability needs have been satisfied in this ~~2016~~cycle of the Reliability Planning Process ~~cycle~~, the margin to maintain reliability could narrow or be eliminated over the ten-year Study Period based upon changes in assumptions. Potential risk factors, such as generator unavailability, generator deactivations, external control area capacity sales, delay in the proposed additions, or higher load levels, could potentially lead to transmission security ~~violations~~ or resource adequacy ~~issues~~violations.

~~The~~These risks are mitigated by the fact that the NYISO's markets are designed to send appropriate price signals for new market entry of resources that may assist in maintaining reliability. In addition, the potential risks and resource needs identified in the scenario analyses in the 2016 RNA may be resolved by new capacity resources coming into service, construction of additional transmission facilities, and/or increased energy efficiency, distributed energy resources, and demand response.

The NYISO will continue to monitor the status of existing and expected ~~generators~~resources and the progress of Transmission Owner ~~local transmission plans~~LTPs through its quarterly monitoring program. In particular, the NYISO will closely

track the planned transmission projects that are included in the 2016 Comprehensive Reliability Plan~~, and~~.

In the ~~generators~~event that ~~have either indicated that they plan~~there is a potential loss of resources due to ~~return to service or to full capacity, but that have not yet done so. The~~a proposed generator retirement or mothballing, the NYISO will administer its ~~generator deactivation process~~Generator Deactivation Process for ~~generator deactivation notices~~Generator Deactivation Notices that it receives~~, and, if~~. If necessary, ~~trigger a solution~~the NYISO will seek solutions to address any Reliability Needs identified through that process. In addition, the NYISO may request solutions outside of its normal planning cycle if there appears to be an imminent threat to the reliability of the Bulk Power Transmission System arising from causes other than deactivating generation. ~~Finally, the next Reliability Planning Process will begin in January 2018. The 2018 RNA will provide an updated assessment of the Bulk Power Transmission Facilities and review the status of the risk factors discussed in this CRP and other reliability issues.~~

Finally, it is important to note that the NYISO continuously plans its system to address potential reliability needs. This fall the NYISO will begin preparing for the next Reliability Planning Process, which will begin in January 2018. The 2018 RNA will provide an updated reliability assessment of the New York Control Area Bulk Power Transmission Facilities based on updated assumptions and will review the status of the risk factors discussed in this CRP, together with other reliability issues.

Introduction

The 2016 Reliability Needs Assessment (RNA) is the first step of the NYISO Reliability Planning Process. The 2016 Comprehensive Reliability Plan (CRP) follows the 2016 RNA and completes the 2016 cycle of the Reliability Planning Process. The NYISO initiated the 2016 CRP after the NYISO Board of Directors approved the 2016 RNA in October 2016.

~~The 2016~~Using the 2016 RNA Base Case developed in accordance with the NYISO's procedures, the RNA assessed both the resource adequacy and transmission security of the New York Control Area (NYCA) ~~bulk power transmission system~~BPTF from year 2017 through 2026, the "Study Period" of this 2016 Reliability Planning Process. ~~The~~

As an initial step to the 2016 RNA, the NYISO provided preliminary results to stakeholders and sought any material updates that could address the preliminary Reliability Needs. The NYISO received and included in the RNA Base Case the following network updates, which led to the elimination of a number of initially identified Reliability Needs[1]:

1. NYSEG/RGE's terminal upgrades, now in service, increased the ratings on Stolle Road-Gardenville 230 kV Line #66, thus eliminating a post-contingency overload.
2. NYSEG/RGE's terminal upgrades, planned to be in service by 2019, increase the ratings on both Clay-Pannell PC1 and PC2 345 kV lines.

The 2016 RNA found no resource adequacy violations, but identified two transmission security Reliability Needs beginning in 2017: the New York State Electric & Gas Corp. (NYSEG) Oakdale 345/115 kV transformer, and the Long Island Lighting Company d/b/a Long Island Power Authority (LIPA) East Garden City to Valley Stream 138 kV line.

~~In~~Following completion of the 2016 RNA, and in response to NYISO's request for updates to Local Transmission Owner Plans that may impact the identified Reliability Needs, the NYISO received the following updates from ~~New York State Electric & Gas~~

[1] Reference - the 2016 RNA Final Report: http://www.nyiso.com/public/webdocs/markets_operations/services/planning/Planning_Studies/Reliability_Planning_Studies/Reliability_Assessment_Documents/2016RNA_Final_Oct18_2016.pdf

~~Corp (NYSEG) and Long Island Lighting Company d/b/a Long Island Power Authority (LIPA):~~NYSEG and LIPA:

1. NYSEG's Local Transmission Owner Plans address the Oakdale ~~related~~ Reliability Need by adding a third Oakdale 345/115 kV transformer and reconfiguring the Oakdale substation by 2021. Operating procedures will be utilized to maintain the security of the system until the Oakdale upgrades are in-service. These operating procedures include the use of any available special case resources, pre-planning for timely clearing of stuck breaker conditions and possible load shedding as needed up to 25 MW following the N-1-1 contingency during summer peak conditions.
2. LIPA's Local Transmission Owner Plans address the East Garden City to Valley Stream ~~related~~ Reliability Need by utilizing non-consequential load loss under N-1-1 conditions.

The NYISO incorporated these updates into the 2016 CRP base case. With these updates, the NYISO conclude~~d~~s that the two Reliability Needs are eliminated, and there is no need to solicit solutions under the 2016 Comprehensive Reliability Plan process.

This report summarizes the findings of the Reliability Planning Process and sets forth the ~~2016 CRP~~NYISO's 2016 Comprehensive Reliability Plan.

1. 2016 Reliability Planning Process Findings

The 2016 Reliability Planning Process (i.e., collectively the RNA and CRP) findings and risk factors are summarized below.

Finding One – Resource and Transmission Adequacy

There are sufficient resources in the RNA and CRP base case~~s~~ to meet the resource adequacy criterion for the entire ten-year Study Period. The needs will be revisited in subsequent cycles of the Reliability Planning Process ~~cycles~~.

Finding Two – Transmission Security

~~When~~While the 2016 RNA identified certain transmission security violations, with the Local Transmission Owner Plan (LTP) network updates ~~were considered (~~provided subsequent to the 2016 RNA process~~), the Bulk Power Transmission Facilities (~~, the BPTF~~)~~ met applicable

Reliability Criteria throughout the Study Period. Nevertheless, pending completion of NYSEG's Oakdale upgrades by 2021, the proposed operating procedures will be necessary under certain outage conditions to resolve potential overloads at NYSEG's Oakdale station ~~pending completion of the LTP upgrades.~~ following an N-1-1 contingency during summer peak conditions.

The return of Greenidge generation ~~will~~could also ~~relieve the overload~~ have a beneficial impact at Oakdale ~~until~~; however the ~~in-service date~~elimination of the Oakdale ~~project~~Reliability Need was not based on the status of the Greenidge plant.

~~During the 2016 Reliability Planning Process, the NYISO implemented a change that affected the ultimate findings of the final 2016 RNA. The NYISO provided preliminary results to stakeholders during the drafting of the report, and stakeholders were then able to provide substantive updates that could impact the results. The NYISO considered the following network updates, which led to the elimination of a number of initially identified Reliability Needs[2]:~~

3. ~~NYSEG/RGE's terminal upgrades, now in service, increased the ratings on Stolle Road-Gardenville 230 kV Line #66, thus eliminating a post-contingency overload.~~
4. ~~NYSEG/RGE's terminal upgrades, planned to be in service by 2019, increase the ratings on both Clay-Pannell PC1 and PC2 345 kV lines.~~

Finding Three – Plan Risk Factors and Highlights of Potential Developments

[2] ~~Reference – the 2016 RNA Final Report: http://www.nyiso.com/public/webdocs/markets_operations/services/planning/Planning_Studies/Reliability_Planning_Studies/Reliability_Assessment_Documents/2016RNA_Final_Oct18_2016.pdf~~

~~In addition to uncertainties in~~ Findings One and Two reflect the base case assumptions~~ identified in the 2016 RNA, there~~, which were set in accordance with NYISO's procedures. There are ~~other~~, however, risk factors that could adversely affect the implementation of the plan and hence system reliability over the ten-year planning horizon. If any of these ~~risks occur~~factors materialize, the NYISO will ~~evaluate~~assess the ~~impact, considering all other appropriate system changes,~~potential impacts and, if necessary, perform an evaluation to determine whether ~~a~~the NYISO should solicit solutions under the Generation Deactivation Process or Gap Solution ~~is needed to address an imminent threat to reliability before the next Reliability Planning Process can address it~~process, as appropriate.

~~These~~The risk factors~~, which require ongoing review and assessment,~~ include:

1. Changes to System Resources

Substantial uncertainties exist in the next ten years that will impact the system resources. These uncertainties include, but are not limited to:

a) The 2016 RNA and CRP base cases include over 1,000 MW of assumed generation additions in various planning stages, and over 3,100 MW of assumed deactivations (see **Appendix C** for details). If expected capacity resources do not materialize, the NYCA resource adequacy margin (as measured by comparison with the Loss of Load Expectation criterion of 0.1 days per year) will decrease.

b) Although ~~NYISO~~the 2016 RNA did not find any resource adequacy needs over the ten-year ~~period in the 2016 RNA~~Study Period, Entergy and Governor Cuomo have since announced that they have reached an agreement to close Indian Point 2 and 3 ~~in~~by 2020 and 2021, respectively. This is a significant development that will require further detailed analysis. The NYISO will address this issue through its Generator Deactivation Process when it receives a Generator Deactivation Notice for the Indian Point units, and through the 2018 RNA. NYISO will perform the appropriate analysis using the ~~best~~most up to date information ~~available at the time~~as required by its tariffs and procedures.

c) ~~The 2016 RNA/CRP base case included over 2,000 MW of assumed generation additions in various planning stages, and over 3,100 MW assumed~~

~~deactivations (see **Appendix C** for details). If expected capacity resources do not materialize, the NYCA resource adequacy margin (as measured by comparison with the Loss of Load Expectation criterion of 0.1 days per year) will decrease.~~

d) If additional generating units become unavailable or ~~retire~~deactivate beyond those units already contemplated in the 2016 RNA (~~also~~ listed in the **Appendix C** of this report), the reliability of the ~~New York Control Area (NYCA) bulk power system~~NYCA BPTF could be adversely affected. The NYISO recognizes that there are numerous risk factors related to the continued financial viability and operation of generating units. Depending on the units affected, the NYISO may need to take ~~swift~~ actions through its Generation Deactivation Process to maintain reliability. The ~~sensitivity and~~ scenarios performed as part of the RNA demonstrated that ~~retirements~~the deactivation of generators in particular areas of the ~~s~~State, including Western & Central New York, the Capital Region, and Southeast New York, could lead to resource adequacy needs, transmission security violations, and otherwise reduce transmission transfer capabilities.

e) In the 2016 RNA ~~Base Case~~and CRP base cases, the R.E. Ginna Nuclear Power plant and the FitzPatrick Nuclear Power plant ~~were~~are assumed ~~as deactivated based on information available at the time~~to be out of service (listed in **Appendix C**~~).~~) in accordance with NYISO procedures. Based upon updated information on the status of these units, it appears that ~~these units~~they may continue to operate for some period of time, which will contribute to an increase in the reliability margin of the system.

f) The New York State Public Service Commission (NYSPSC) has confirmed the existence of three Public Policy Transmission Needs: Western New York, AC Transmission Segment A (Central East), and AC Transmission Segment B (UPNY-SENY). The NYISO is presently evaluating the transmission proposals to select the more efficient or cost-effective solutions to these needs. The construction of additional transmission capacity in these areas would address existing transmission constraints and generally increase the reliability of the system.

~~f)~~g) Capacity resources could decide to offer into ~~other~~ markets in other regions and, therefore, some of the capability of those resources may not be available

to the NYCA. Accordingly, the NYISO will continue to monitor imports, exports, generation and other infrastructure.

2. Completion of Transmission Owner Local Transmission Owner Plans

The Transmission Owners' (TOs') local transmission owner plans (LTPs) are an important part of the overall ~~CRP process.~~Comprehensive System Planning Process and the findings of this 2016 CRP. The NYISO will continue to track the timely entry into service of those projects that have been identified to relieve reliability violations (*e.g.,* Clay – Pannell 345kV upgrades~~).~~ and Oakdale 345 kV transformer and substation upgrades).

3. Changes to System Performance

Certain generators are aging, which may lead to more frequent and longer outages as well as increasing costs ~~which, in turn,~~for those generators. This may drive more aging generation into retirement.

4. Changes to System Load Level

The "90/10" load forecast for the statewide coincident summer peak was on average approximately 2,400 MW higher than the baseline 50/50 forecast modeled in the 2016 RNA ~~Base Case. A~~base case. In conducting a scenario with a peak load level 1,500 MW higher than the 2016 RNA base case load assumptions, the NYISO found that the LOLE would be at or above 0.1 days per year starting in 2018. As a result, a higher-than-forecasted load level could expose the system to potential reliability issues, including greater levels of load shedding in the interim operating procedures in some localized areas of the state.

~~Also, a 1,500 MW load scenario above the 2016 RNA Base Case load assumptions led to a LOLE at or above the 0.1 days per year reliability criterion, starting 2018.~~

5. Natural Gas Coordination

New York's reliance on natural gas as the primary fuel for electric generation justifies continued vigilance regarding the status of the natural gas system. The NYISO is actively involved in ~~Natural Gas/ Electric Coordination~~natural gas/electric coordination efforts with New York State and ~~F~~federal regulators, ~~Pipelines, Generators, Local Distribution Companies~~pipeline owners, generator owners, local distribution companies, and neighboring ISOs and Regional Transmission Operators ("RTOs~~.~~"). FERC recently approved FERC Order No. 809, which

addresses gas nomination changes and Day-Ahead Electric schedule deadlines. FERC has also approved Order No. 787, which allows RTOs to communicate non-public information to pipelines and gas local distribution companies (LDCs) in order to maintain system reliability.

In addition to ~~these important~~the above-referenced FERC orders, the NYISO's efforts with respect to gas supply assurance focus on: (i) improving communication and coordination between the gas and electric sectors; (ii) annual, weekly and, when conditions warrant, *ad hoc* generator surveys of gas system and gas market participants to enhance awareness in the control room and provide electric system reliability benefits; and (iii) addressing the electric system reliability impact of the sudden catastrophic loss of gas.

6. Federal and State Environmental Regulations

Building on the 2016 RNA, which qualitatively reviewed the impacts of federal and state environmental regulations upon operation of the ~~Bulk Power Transmission Facilities~~BPTF, this 2016 CRP highlights the potential risks to system reliability posed by implementation of environmental regulations. While regulatory uncertainty at the federal level prevails, especially ~~for~~as it pertains to the ~~continuing~~pending litigation ~~su~~rega~~roun~~ding the Clean Power Plan[3], the ~~New York State Public Service Commission (NYSPSC)~~NYPSC has promulgated the Clean Energy Standard (CES). A primary element of the CES is the establishment of a long-term requirement for Load Serving Entities (LSEs) to purchase Zero Emission Credits ~~from economically challenged upstate~~(ZECs) generated by eligible nuclear ~~generators.~~facilities. For the first tranche of the program, beginning in April 2017, four nuclear facilities were identified as eligible. Further, the CES sets initial and overall levels of Renewable Energy Credit (REC) purchase requirements for LSEs from new renewable energy resources. The CES program is intended to ~~continually~~ increase the quantity of qualifying RECs required to be purchased until 50% of load is served by ~~Renewable Energy (RE)~~renewable energy resources in 2030. The New York State Energy Plan also calls for a 40% economy-wide reduction in CO_2 emissions. Such reductions ~~may~~ require shifting some portion of fuel consumption from the transportation and heating sectors to the bulk electric power system, potentially increasing electrical load requirements.

[3] The NYISO performed a Clean Power Plan Assessment, posted here: http://www.nyiso.com/public/webdocs/markets_operations/services/planning/Documents_and_Resources/Special_Studies/Special_Studies_Documents/Clean_Power_Plan_Assessment-Final_Report-December_2016.pdf

The regulatory programs with the largest potential impacts on the availability of resources needed to maintain reliability ~~impacts~~ are: (i) facility specific operational limitations; (ii) the revised Ozone National Ambient Air Quality Standard (NAAQS); (iii) the Clean Energy Standard~~;~~,, and (iv) the CO_2 emission cap to be selected through the 2016 Regional Greenhouse Gas Initiative (RGGI) Program Review Process.

2. 2016 CRP Recommended Actions

The 2016 Comprehensive Reliability Plan contains the following recommended actions:

1. Monitor and Track Potential New Developments

The energy industry is in transition. Economic conditions, governmental programs and environmental regulations are changing quickly, resulting in financial stresses that may lead to the loss of resources or, alternatively, that could positively affect system conditions. New market-based generation and transmission projects under study in the NYISO's interconnection process could increase the reliability margin in the long term, if such capacity comes into service during the ~~study period~~Study Period. The NYISO will monitor and track these ~~issues~~developments and consider their potential impacts on future system reliability. The NYISO will administer its Generator Deactivation Process if it receive~~d~~s a Generator Deactivation Notice~~. If~~, and, if necessary, seek solutions. In addition, if a threat to reliability appears to be imminent, the NYISO ~~determine whether to trigger a solution to timely address~~may request solutions outside of the ~~need before the next Reliability Planning Process~~normal planning cycle, in accordance with its ~~tariff~~tariffs and procedures.

2. Monitor and Track Transmission Owner Plans

~~The New York~~To provide for the long-term reliability of the system and minimize reliance on interim operating procedures in the western and central areas of New York, the TOs need to complete the projects identified in their LTPs on schedule and as planned. It is important that the local transmission projects that are identified in this CRP to maintain reliability be sited and constructed on a timely basis. ~~These projects should proceed to be developed so that they provide for long term system reliability and minimize reliance on interim operating procedures in the Western and Central areas of New York.~~ The NYISO will continue to monitor the completion of the identified projects and the progress of ~~those plans associated with~~ LTPs as they relate to the Reliability ~~n~~Needs initially identified in the RNA.

3. Continue Coordination with the New York State Public Service Commission (NYSPSC)

The NYISO will continue to coordinate its system planning activities with the NYPSC, such as the Public Policy Transmission Planning Process that is addressing transmission needs in Western New York ~~and in existing~~, Mohawk Valley, and

Hudson Valley transmission corridors, as part of its overall Comprehensive System Planning Process. In addition, the State of New York is presently considering expanding and extending a variety of clean energy programs that are designed to increase deployment of energy efficiency, renewable generation and distributed energy resources. Existing clean energy program initiatives are reflected in the load forecast and resources modeled in this CRP. However, new initiatives that have not been implemented yet could positively affect reliability, but are not explicitly recognized in the 2016 Reliability Planning Process ~~analyses~~. The NYISO will continue to monitor and participate in other planning activities including, but not limited to, NYSPSC proceedings considering "Reforming the Energy Vision (REV), the Public Policy Transmission Planning Process, Distributed Energy Resources, and individual proceedings on generation deactivation and repowering.

4. Monitor Changes that could Impact Risk Factors

The NYISO actively monitors and addresses the potential impacts of known risk factors. The NYISO also tracks the impact that new market-based generation projects under study in the NYISO's interconnection process could have on the NYISO's long-term capacity margin during the ten-year Study Period.

3. 2016 Reliability Planning Process Conclusions

This 2016 CRP sets forth the NYISO findings, that under the conditions studied in the 2016 RNA and as summarized in ~~the~~ Appendix C of this report, the planned NYCA system will result in the New York Bulk Power Transmission Facilities meeting all applicable Reliability Criteria over the 2017 through 2026 Study Period. This CRP highlights a number of risks to the ten-year reliability plan, which include narrowing capacity margins that make long-term ~~bulk power system~~BPTF reliability vulnerable to reduction in available resources, or any failure to timely implement Transmission Owners' Local Transmission Owner Plans.

Appendix A – Reliability Planning Process

This appendix presents an overview of the NYISO's Reliability Planning Process. A detailed discussion of the Reliability Planning Process, including applicable Reliability Criteria, is contained in NYISO Manual entitled: "Reliability Planning Process Manual," which is posted on the NYISO's website.

The NYISO Reliability Planning Process is an integral part of the NYISO's overall Comprehensive System Planning Process (CSPP). The CSPP is comprised of four components:

1. Local Transmission System Planning Process (LTPP),
2. Reliability Planning Process,
3. Congestion Assessment and Resource Integration Study (CARIS), and
4. Public Policy Transmission Planning Process.

As part of the LTPP, each Transmission Owner performs transmission security studies for their ~~Bulk Power Transmission Facilities (BPTFs)~~BPTF in their transmission areas according to all applicable criteria. Links to the Local Transmission ~~Owner's~~ Owner Plans ("LTPs") can be found on the NYISO's website~~4.~~.[5] The LTPP provides inputs for the Reliability Planning Process.

During the Reliability Planning Process, the NYISO conducts the Reliability Needs Assessment (RNA) and Comprehensive Reliability Plan (CRP). The RNA evaluates the adequacy and security of the ~~Bulk Power Transmission Facilities~~BPTFs over a ten-year study period. In identifying resource adequacy needs, the NYISO identifies the amount of resources in megawatts (MW, known as "compensatory MW") and the locations in which they are needed to meet those needs.

Following ~~NYISO Board~~ approval of the RNA by its Board of Directors, the NYISO initiates the next step, which starts by requesting ~~Local~~LTP updates from the Transmission ~~Owner Plans (LTPs) updates~~Owners. As part of this step, the NYISO will consider updates to the LTPs and, if necessary, solicit market-based solutions, regulated backstop solutions, and alternative regulated solutions to the identified Reliability Needs. ~~The~~If not resolved by the updates to the LTPs, the NYISO then proceeds to assess the viability and sufficiency of each of the possible solutions, leading to the development of the Comprehensive Reliability Plan (CRP).

~~The Comprehensive Reliability Plan~~The CRP provides documentation of the solutions determined to be viable and sufficient to meet the identified Reliability Needs. The NYISO ranks any regulated transmission solutions submitted for the Board to consider for selection of the more efficient or cost effective transmission project. If built, the selected transmission project would be eligible for cost allocation and recovery under the NYISO's tariff.

There are two different aspects to analyzing the ~~bulk power system's~~BPTF's reliability in the RNA: adequacy and security. Adequacy is a planning and probabilistic concept. A system is adequate if the probability of having sufficient transmission and generation to meet expected demand is equal to or less than the system's standard, which is expressed as a loss of load expectation (LOLE). The New York State bulk power

[4] ~~Link to LTPP: http://www.nyiso.com/public/markets_operations/services/planning/process/ltpp/index.jsp~~

[5] Link to LTPP: http://www.nyiso.com/public/markets_operations/services/planning/process/ltpp/index.jsp

system is planned to meet an LOLE that, at any given point in time, is less than or equal to an involuntary load disconnection that is not more frequent than once in every 10 years, or 0.1 days per year. This requirement forms the basis of New York's installed reserve margin (IRM) resource adequacy requirement.

Security is an operating and deterministic concept. This means that possible events are identified as having significant adverse reliability consequences. The system is planned and operated so that the system can continue to serve load even if these events occur. Security requirements are sometimes referred to as N-1 or N-1-1. N is the number of system components. An N-1 requirement means that the system can withstand single disturbance events (e.g., generator, bus section, transmission circuit, breaker failure, double-circuit tower) without violating thermal, voltage and stability limits or before resulting in unplanned loss of service to consumers. An N-1-1 requirement means that the Reliability Criteria apply after any critical element such as a generator, a transmission circuit, a transformer, series or shunt compensating device, or a high voltage direct current (HVDC) pole has already been lost. Generation and power flows can be adjusted by the use of 10-minute operating reserve, phase angle regulator control, and HVDC control. Following such adjustments a second single disturbance is analyzed.

The Reliability Planning Process is anchored in the market-based philosophy of the NYISO and its Market Participants, which posits that market solutions should be the preferred choice to meet the identified Reliability Needs reported in the RNA. In the CRP, the reliability of the ~~bulk power system~~BPTFs is assessed and solutions to Reliability Needs evaluated in accordance with existing Reliability Criteria of the North American Electric Reliability Corporation (NERC), the Northeast Power Coordinating Council, Inc. (NPCC), and the New York State Reliability Council (NYSRC) as they may change from time to time. These criteria and a description of the nature of long-term bulk power system planning are described in detail in the applicable planning manual, and are briefly summarized below.

In the event that market-based solutions do not materialize to meet a Reliability Need in a timely manner, the NYISO designates the Responsible TO or Responsible TOs or developer of an alternative regulated solution to proceed with a regulated solution in order to maintain system reliability. Under the Reliability Planning Process, the NYISO also has an affirmative obligation to report historic congestion across the transmission system. In addition, the draft RNA is provided to the Market Monitoring Unit for review and consideration of whether market rules changes are necessary to address an identified failure, if any, in one of the NYISO's competitive markets. If a market failure is

identified as the reason for the lack of market-based solutions to a Reliability Need, the NYISO will explore appropriate changes in its market rules with its stakeholders and ~~Independent~~the Market ~~Monitor~~Monitoring Unit. The Reliability Planning Process does not substitute for the planning that each TO conducts to maintain the reliability of its own bulk and non-bulk power systems.

The NYISO does not license or construct projects to respond to identified Reliability Needs reported in the RNA. The ultimate approval of those projects lies with regulatory agencies such as the Federal Energy Regulatory Commission ~~("~~("FERC"~~),~~), the New York State Public Service Commission (~~"~~NY~~S~~PSC~~"~~), environmental permitting agencies, and local governments. The NYISO monitors the progress and continued viability of proposed market and regulated projects to meet identified ~~needs~~Reliability Needs, and reports its findings to the Board.

The CRP also provides inputs for the second component of the CSPP, which is NYISO's economic planning process known as the Congestion Analysis and Resource Integration Study ("CARIS~~.~~"). CARIS Phase 1 examines congestion on the New York bulk power system and the costs and benefits of alternatives to alleviate that congestion. During CARIS Phase 2, the NYISO evaluates specific transmission project proposals for regulated cost recovery.

~~Another~~The third component of the CSPP is the Public Policy Transmission Planning Process. Under this component, interested entities propose, and the NY~~S~~PSC identifies, transmission needs driven by Public Policy Requirements. The NYISO then requests that interested entities submit proposed solutions to the Public Policy Transmission Need(s) identified by the NY~~S~~PSC. The NYISO evaluates the viability and sufficiency of the proposed solutions to satisfy the identified Public Policy Transmission Need. Upon confirmation by the NY~~S~~PSC that a need for a transmission solution still exists, the NYISO then evaluates and may select the more efficient or cost-effective transmission solution to the identified need. The NYISO develops the Public Policy Transmission Planning Report containing its findings regarding the proposed solutions. This report is reviewed by NYISO stakeholders and approved by the Board of Directors.

In concert with these four components, interregional planning is conducted with NYISO's neighboring control areas in the United States and Canada under the Northeastern ISO/RTO Planning Coordination Protocol. The NYISO participates in interregional planning and may consider Interregional Transmission Projects in its regional planning processes.

Figure ~~B~~A-1 below summarizes the CSPP and Figure ~~B~~A-2 summarizes the Reliability Planning Process.

Figure A-1: NYISO's Comprehensive System Planning Process (CSPP)

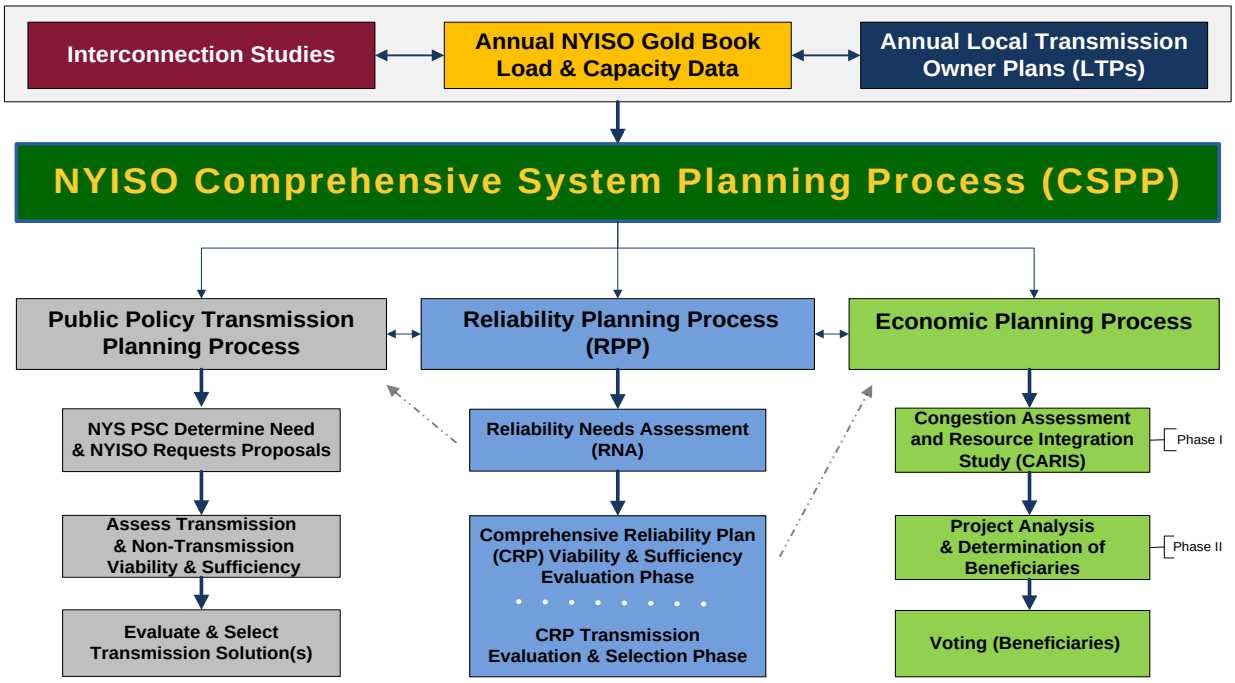
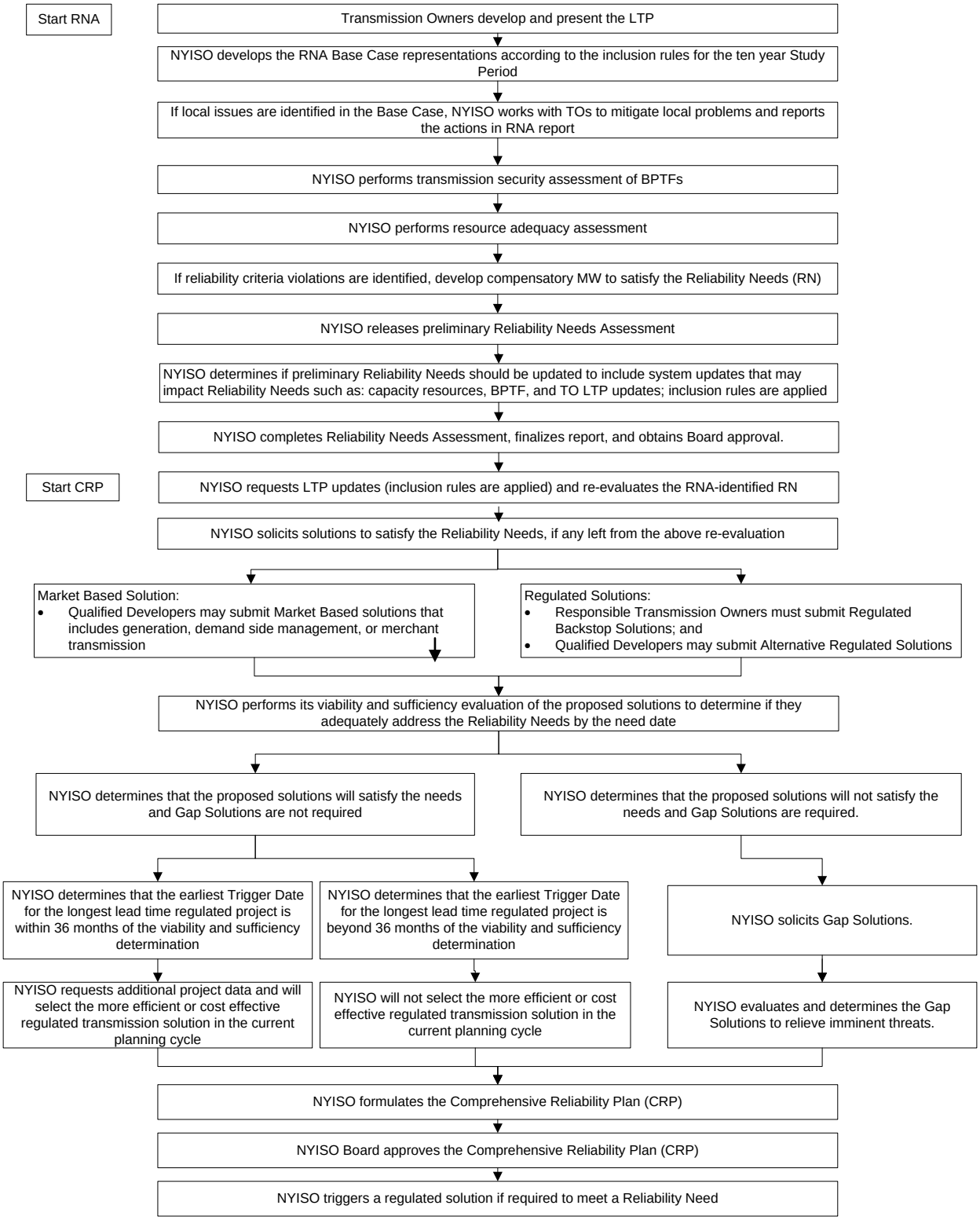


Figure A-2: NYISO Reliability Planning Process



Appendix B - Status of Tracked Market-Based Solutions & TOs' Plans

Table B-1: Current Status of Tracked Market-Based Solutions & TOs' Plans

Queue #	Project	Submitted	Zone	Original I/S Date	Proposal Type	Target I/S	Included in the 2016 RNA Base Case	Included in the 2016 CRP Base Case
339	Station 255	CRP 2012	B	-	TO Plan	Q4 2019-2020	Yes	Yes
N/A	Clay-Teall #10 115kV	CRP 2012	C	2016	TO Plan	Q4 2017	Yes	Yes
N/A	NYSEG/RGE's terminal upgrades, increasing the ratings on Stolle Road-Gardenville 230 kV Line #66, addressing a preliminary Reliability Need identified in preliminary ("1st pass") 2016 RNA	RNA 2016	A	2019	TO Plan	I/S	Yes	Yes
N/A	NYSEG/RGE's terminal upgrades, increasing the ratings on both Clay-Pannell PC1 and PC2 345 kV lines, addressing a preliminary Reliability Need identified in preliminary ("1st pass") 2016 RNA	RNA 2016	C	2019	TO Plan	2019	Yes	Yes
N/A	Oakdale 345/115 kV 3rd transformer and substation reconfiguration, addressing the Oakdale 345/115 kV Reliability Need identified in final 2016 RNA	CRP 2016 CRP 2014	C	2015	TO Plan	2021	No	Yes

Appendix C – Summary of the 2016 RNA and CRP Major Assumptions

Table C-1: Summary of Changes from the RNA Base Case to the CRP Base Case

Changes from the 2016 RNA to 2016 CRP Base Case	Owner	Target Date	Notes
Add 3rd Oakdale 345/115 kV transformer and Oakdale 345 kV station reconfiguration	NYSEG	2021	NYSEG LTP presented LTP at the Nov 7, 2016 ESPWG to address Oakdale 345/115 kV Reliability Need (RN) identified in the 2016 RNA, This, along with operational means to cover 2017-2021, eliminate the Oakdale RN
Add 106.3 MW Greenidge #4 in Zone C/NYSEG (Q#431)	Greenidge Generation	2017	Met base case inclusion rules
Add 77.7 MW Jericho Rise (Q397), Zone D /NYPA	Jericho Rise Wind Farm, LLC	2017	Entered service as of December 2016
Remove Auburn 2.1 MW LFGE, Zone C/NYSEG	Innovative Energy Systems, LLC	2017	Due to Deactivation Notice and Assessment
Remove 2x51MW Shoreham GT3 and 4, Zone K/LIPA	J-POWER USA Generation, L.P.	2017	Due to Deactivation Notice and Assessment

Table C-2: NYCA Peak Load and Resource Ratios 2017 through 2026

	Year	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Peak Load (MW) - Table I-2a GB 2016											
	NYCA*	33,363	33,404	33,477	33,501	33,555	33,650	33,748	33,833	33,926	34,056
	Zone J*	11,696	11,717	11,756	11,760	11,761	11,785	11,807	11,830	11,851	11,907
	Zone K*	5,381	5,354	5,348	5,340	5,370	5,414	5,464	5,501	5,550	5,595
	Zone G-J	16,181	16,206	16,251	16,255	16,260	16,292	16,324	16,357	16,387	16,459
Resources (MW)											
	Capacity**	36,867	37,644	37,644	37,644	37,644	37,644	37,644	37,644	37,644	37,644
	Net Purchases & Sales	1,849	1,584	1,593	2,255	2,255	2,255	2,255	2,255	2,255	2,255
	SCR	1,248	1,248	1,248	1,248	1,248	1,248	1,248	1,248	1,248	1,248
NYCA	Total Resources	**39,965**	**40,476**	**40,485**	**41,147**	**41,147**	**41,147**	**41,147**	**41,147**	**41,147**	**41,147**
	Capacity/Load Ratio	110.5%	112.7%	112.4%	112.4%	112.2%	111.9%	111.5%	111.3%	111.0%	110.5%
	Cap+NetPurch/Load Ratio	116.0%	117.4%	117.2%	119.1%	118.9%	118.6%	118.2%	117.9%	117.6%	117.2%
	Cap+NetPurch+SCR/Load Ratio	119.8%	121.2%	120.9%	122.8%	122.6%	122.3%	121.9%	121.6%	121.3%	120.8%
Zone J	Capacity**	9,554	9,554	9,554	9,554	9,554	9,554	9,554	9,554	9,554	9,554
	Cap+UDR+SCR/Load Ratio	93.3%	93.1%	92.8%	92.8%	92.8%	92.6%	92.4%	92.2%	92.1%	91.7%
Zone K	Capacity**	5,287	5,287	5,287	5,287	5,287	5,287	5,287	5,287	5,287	5,287
	Cap+UDR+SCR/Load Ratio	117.9%	118.5%	118.6%	118.8%	118.1%	117.2%	116.1%	115.3%	114.3%	113.4%
Zone G-J	Capacity**	14,659	15,356	15,356	15,356	15,356	15,356	15,356	15,356	15,356	15,356
	Cap+UDR+SCR/Load Ratio	99.5%	103.6%	103.3%	103.3%	103.3%	103.1%	102.9%	102.7%	102.5%	102.0%

*NYCA load values represent baseline coincident summer peak demand. Zones J and K load values represent non-coincident summer peak demand. Aggregate Zones G-J values represent G-J coincident peak, which is non-coincident with NYCA.

**NYCA Capacity values include resources electrically internal to NYCA, additions, reratings, and retirements (including proposed retirements and mothballs). Capacity values reflect the lesser of CRIS and DMNC values. NYCA resources include the net purchases and sales as per the Gold Book. Zonal totals include the awarded UDRs for those capacity zones as the actual MW are considered confidential.

Notes:

- SCR - Forecasted ICAP value based on 2016 Gold Book. This figure changed for the ~~F~~final RNA MARS ~~Base Case~~base case to 1,192 MW with the July auctions.
- Wind generator summer capacity is counted as 100% of nameplate rating.
- Behind-the-meter solar PV impacts are reflected back into the load levels shown for proper accounting.

Table C-~~2~~3: Generation Additions Included in the 2016 RNA Base Case

Project Name	**Zone**	**Requested CRIS MW**	**2016 RNA** *(1st year of ~~Base Case~~base case inclusion)*	**2014 CRP*** Status
CPV Valley Energy Center	G	680	2018	O/S
Taylor Biomass	G	19	2018	**I/S**
Copenhagen Wind	E	79.9	2018	O/S
East River 1 Uprate	J	12.1	2017	O/S
East River 1 Uprate	J	12.1	2017	O/S
Black Oak Wind	C	0	2017	O/S
Sithe Independence Uprate	C	43	2017	O/S
Marble River Wind	D	215.2	2017	O/S
HQ-US *(External CRIS Rights)*	E	20	2017	O/S
Stony Creek Uprate	C	5.9	2017	O/S
Bowline 2 Uprate	G	10	2017	O/S
	Total	**1,097**		
Additions from 2014 RNA		**1,078**		

* The 2014 RNA ~~Base Case~~base case was subsequently updated in the 2014 CRP; therefore the 2014 CRP ~~Base Case~~base case is used as the reference.
O/S: Out-of-Service; I/S: In-Service

Table C-~~3~~4: Additional Proposed Generation Projects from the 2016 Gold Book

QUEUE POS.	OWNER / OPERATOR	STATION UNIT	ZONE	DATE	REQUESTED CRIS (MW)[1]	CRIS[1] (MW)	SUMMER (MW)	UNIT TYPE	CLASS YEAR	Included in 2016 RNA/CRP
Completed Class Year Facilities Study										
349	Taylor Biomass Energy Mont., LLC	Taylor Biomass	G	2018/04	N/A	19.0	19	Solid Waste	2011	**yes**
251	CPV Valley, LLC	CPV Valley Energy Center	G	2017/10	N/A	680.0	677.6	Combined Cycle	2011	**yes**
197	PPM Roaring Brook, LLC / PPM	Roaring Brook Wind	E	2017/12	N/A	0.0	78	Wind Turbines	2008	no
Class Year 2015										
431	Greenidge Generation	Greenidge Unit #4	C	2016/09	106.3	TBD	106.3	Stream Turbine		No 2016 RNA Yes 2016 CRP
395	Copenhagen Wind Farm , LLC	Copenhagen Wind	E	2016/10	79.9	TBD	79.9	Wind Turbines		**yes**
397	EDP Renewables North America	Jericho Rise Wind	D	2017/07 I/S	77.7	TBD	77.7	Wind Turbines		No 2016 RNA Yes 2016 CRP
401	Caithness Long Island II, LLC	Caithness Long Island II	K	2019/05	744.0	TBD	744	Combined Cycle		no
Class Year 2015 CRIS-Only Requests										
	Marble River, LLC	Marble River Wind	D	N/A	215.2	TBD	N/A			**yes**
	HQ-US	HQ-US (External CRIS Rights)	E	N/A	20.0	TBD	N/A			**yes**
	ConEd	East River 1 Uprate	J	N/A	10.0	TBD	N/A			**yes**
	ConEd	East River 2 Uprate	J	N/A	10.0	TBD	N/A			**yes**
	Bowline	Bowline 2	G	N/A	10.0	TBD	N/A			**yes**
	East Coast Power, LLC	Linden Cogeneration Plant	J	N/A	35.5	TBD	N/A			no
	Astoria Energy	CC1 and CC2	J	N/A	27.8	TBD	N/A			no
	Stony Creek Energy, LLC	Stony Creek	C	N/A	5.9	TBD	N/A			**yes**
Future Class Year Candidates										
270	Wind Development Contract Co, LLC	Hounsfield Wind	E	TBD	TBD	TBD	244.8	Wind Turbines		no

QUEUE POS.	OWNER / OPERATOR	STATION UNIT	ZONE	DATE	REQUESTED CRIS (MW)[1]	CRIS[1] (MW)	SUMMER (MW)	UNIT TYPE	CLASS YEAR	Included in 2016 RNA/CRP
382	Astoria Generating Co.	South Pier Improvement	J	2016/06	TBD	TBD	91.2	Combustion Turbines		no
383	NRG Energy, Inc.	Bowline Gen. Station Unit #3	G	2016/06	TBD	TBD	775	Combined Cycle		no
440	Erie Power, LLC	Erie Power	A	2016/08	TBD	TBD	79.4	Combined Cycle		no
467	Invenergy Solar Development, LLC	Tallgrass Solar	K	2016/11	TBD	TBD	25	Solar		no
396	Baron Winds, LLC	Baron Winds	C	2016/12	TBD	TBD	300	Wind Turbines		no
361	US PowerGen Co.	Luyster Creek Energy	J	2017/06	TBD	TBD	401	Combined Cycle		no
372	Dry Lots Wind, LLC	Dry Lots Wind	E	2017/11	TBD	TBD	33	Wind Turbines		no
371	South Mountain Wind, LLC	South Mountain Wind	E	2017/12	TBD	TBD	18	Wind Turbines		no
276	Air Energie TCI, Inc.	Crown City Wind	C	2018/12	TBD	TBD	90	Wind Turbines		no
387	Cassadaga Wind, LLC	Cassadaga Wind	A	2018/12	TBD	TBD	126	Wind Turbines		no
444	Cricket Valley Energy Center, LLC	Cricket Valley Energy Center II	G	2019/08	TBD	TBD	1020	Combined Cycle		no
347	Franklin Wind Farm, LLC	Franklin Wind	E	2019/12	TBD	TBD	50.4	Wind Turbines		no
			Total proposed summer MW not included in 2016 RNA				3,254			

Table C-45: Additional Proposed Transmission Projects from the 2016 Gold Book

Merchant Queue Position	Developer	Terminals		Summer rating	Project Description /	Class Year	Included in 2016 RNA
Merchant Transmission Projects							
358	West Point Partners	Leeds 345kV	Buchanan North 345kV	1,000	-/+ 320kV Bipolar HVDC cable	TBD	no
305	Transmission Developers Inc.	Hertel 735kV (Quebec)	Astoria Annex 345kV	1,000	-/+ 320kV Bipolar HVDC cable	TBD	no
363	Poseidon Transmission 1, LLC	Deans 500kV (PJM)	Ruland Road 138kV	500	-/+ 200kV Monopole HVDC cable	TBD	no
			Total proposed summer MW not included in 2016 RNA	2,500			

Table C-~~5~~6: 2016 RNA Base Case - Generation Deactivations Assumptions

OWNER / OPERATOR	STATION UNIT	ZONE	CRIS	2016 RNA Status	2014 CRP Status
Erie Blvd. Hydro - Seneca Oswego	Seneca Oswego Fulton	C	0.7	O/S	O/S
Erie Blvd. Hydro - Seneca Oswego	Seneca Oswego Fulton	C	0.3	O/S	O/S
Long Island Power Authority	Montauk Units #2, #3,	K	6.0	O/S	O/S
NRG Power Marketing LLC	Dunkirk 2	A	**96.2**	**O/S**	I/S
NRG Power Marketing LLC	Dunkirk 3	A	**201.4**	**O/S**	I/S
NRG Power Marketing LLC	Dunkirk 4	A	**199.1**	**O/S**	I/S
ReEnergy Chateaugay LLC	Chateaugay Power	D	18.6	O/S	O/S
Rochester Gas and Electric Corp.	Station 9	B	15.8	O/S	O/S
Syracuse Energy Corporation	Syracuse Energy ST1	C	11.0	O/S	O/S
Syracuse Energy Corporation	Syracuse Energy ST2	C	58.9	O/S	O/S
TC Ravenswood, LLC	Ravenswood 07	J	16.5	O/S	O/S
TC Ravenswood, LLC	Ravenswood 3-3	J	37.7	O/S	O/S
Erie Blvd. Hydro - North Salmon	Hogansburg	D	**0.3**	**O/S**	I/S
Niagara Generation LLC	Niagara Bio-Gen	A	**50.5**	**O/S**	I/S
NRG Power Marketing LLC	Astoria GT 05	J	**16.0**	**O/S**	I/S
NRG Power Marketing LLC	Astoria GT 07	J	**15.5**	**O/S**	I/S
NRG Power Marketing LLC	Astoria GT 12	J	**22.7**	**O/S**	I/S
NRG Power Marketing LLC	Astoria GT 13	J	**24.0**	**O/S**	I/S
NRG Power Marketing LLC	Dunkirk 2	A	97.2	**O/S**	O/S starting May 2015
NRG Power Marketing LLC	Huntley 67	A	**196.5**	**O/S**	I/S
NRG Power Marketing LLC	Huntley 68	A	**198.0**	**O/S**	I/S
Cayuga Operating Company, LLC	Cayuga 1	C	154.1	O/S starting July 1, 2017	O/S starting July 1, 2017
Cayuga Operating Company, LLC	Cayuga 2	C	154.7	O/S starting July 1, 2017	O/S starting July 1, 2017
Entergy Nuclear FitzPatrick LLC	FitzPatrick 1	C	**858.9**	**O/S**	I/S
R.E. Ginna Nuclear Power Plant, LLC	Ginna	B	**582.0**	**O/S**	I/S
NRG Power Marketing LLC	Astoria GT 08	J	**15.3**	**O/S**	I/S
NRG Power Marketing LLC	Astoria GT 10	J	**24.9**	**O/S**	I/S
NRG Power Marketing LLC	Astoria GT 11	J	**23.6**	**O/S**	I/S
TC Ravenswood, LLC	Ravenswood 04	J	**15.2**	**O/S**	I/S
TC Ravenswood, LLC	Ravenswood 05	J	**15.7**	**O/S**	I/S
TC Ravenswood, LLC	Ravenswood 06	J	**16.7**	**O/S**	I/S
		Total	3,144		
	New deactivations from 2014 RNA		**2,573**		

Note: Additional Generation Deactivation Assessment completed after the 2016 RNA: Shoreham GT 3 and 4 (102 MW total).

Table C-~~6~~7: Major* Firm Transmission Plans included in 2016 RNA Base Case

Transmission Owner	Terminals		Line Length in Miles (1)	Expected In-Service Date/Yr Prior to (2)	Year	Nominal Voltage in kV Operating	Design	# of ckts	Thermal Ratings (4) Summer	Winter	Project Description / Conductor Size
ConEd	Rock Tavern	Sugarloaf	11.80	S	2016	345	345	1	1971 MVA	2390 MVA	2-1590 ACSR
ConEd	Goethals	Linden Co-Gen	-1.50	S	2016	345	345	1	2500	2500	Feeder Separation
ConEd	Goethals	Linden Co-Gen	1.50	S	2016	345	345	1	1250	1250	Feeder Separation
ConEd	Goethals	Linden Co-Gen	1.50	S	2016	345	345	1	1250	1250	Feeder Separation
ConEd	East 13th Street	East 13th Street	Reconfiguration	S	2016	345	345		N/A	N/A	Reconfiguration
NGRID	Huntley	Huntley	-	S	2016	230	230	1			Install two 100MVAR cap banks
NGRID	Packard	Huntley 77	-	S	2016	230	230	1			1.5% series reactor
NGRID	Packard	Huntley 78	-	S	2016	230	230	1			1.5% series reactor
NGRID	Packard	Huntley 77	-	S	2016	230	230	1	556 MVA	680 MVA	Conductor Clearance Upgrade to STE Rating
NGRID	Edic 345 kV	Edic 345 kV	Reconfiguration	W	2016	345	345	1	-	-	Create new bay by adding 2 new 345kV breakers, reconnect transformer
NGRID/NYSEG	Homer City	ive Mile Rd (New Statior	-151.11	S	2016	345	345	1	1013	1200	New Piercebook Station (First Energy)
NGRID/NYSEG	Homer City	Farmers Valley	120.00	S	2016	345	345	1	1013	1200	New Piercebook Station (First Energy)
NGRID/NYSEG	Farmers Valley	ive Mile Rd (New Statior	31.00	S	2016	345	345	1	1013	1200	New Piercebook Station (First Energy)
NYPA	Marcy	Coopers Corners	Series Comp	S	2016	345	345	1	1776 MVA	1793 MVA	Installation of Series Compensation on UCC2-41
NYPA	Edic	Fraser	Series Comp	S	2016	345	345	1	1793 MVA	1793 MVA	Installation of Series Compensation on EF24-40
NYPA	Fraser	Coopers Corners	Series Comp	S	2016	345	345	1	1494 MVA	1793 MVA	Installation of Series Compensation on FCC33
NYSEG	Fraser	Coopers Corners	21.80	S	2016	345	345	1	2500	3000	ACCR 1742-T9 Reconductor
O & R	Ramapo	Sugarloaf	16.00	S	2016	345	345	1	3030	3210	2-1590 ACSR
O & R	Sugarloaf	Sugarloaf	**xfmr**	S	2016	345/138	345/138	1	562 MVA	562 MVA	Transformer
ConEd	East 13th Street	East 13th Street	Reconfiguration	S	2017	345	345		N/A	N/A	Reconfiguration
NGRID	Eastover Road	Eastover Road	**xfmr #2**	S	2017	230/115	230/115	1	381MVA	466MVA	New/2nd 230-115 kV Transformer
NGRID	Edic	Edic	**xfmr**	S	2017	345/115	345/115	2	505MVA	603MVA	Add Transformer for MVEdge (TR#5&#6)
NYPA	Cumberland Head	Gordon Landing	1.63	W	2017	115	230	1	1147	1316	Replacement of PV-20 Submarine Cable
NYSEG	Gardenville	Gardenville	**xfmr**	S	2017	230/115	230/115	1	200 MVA	225 MVA	NYSEG Transformer #3 and Station Reconfiguration
RGE	Station 80	Station 80	-	S	2017	345	345				Station 80 Reconfiguration (GRTA)
RGE	Station 122 (Station upgrade)	tion 122 (Station upgra	**xfmr**	S	2017	345/115	345/115	3	494 MVA	527 MVA	Transformer Replacement and Station Reconfiguration (GRTA)
CHGE	Hurley Avenue	Leeds	Series Compensation	S	2018	345	345	1	2336	2866	21% Compensation
NYSEG	Watercure Road	Watercure Road	**xfmr**	S	2018	345/230	345/230	1	426 MVA	494 MVA	Transformer
O & R	North Rockland (New Station)	Lovett	xfmr	S	2018	345/138	345/138	1	562 MVA	562 MVA	Transformer
O & R/ConEd	Ladentown	Buchanan	-9.5	S	2018	345	345	1	3000	3211	2-2493 ACAR
O & R/ConEd	Ladentown	rth Rockland (New Stati	5.5	S	2018	345	345	1	3000	3211	2-2493 ACAR
O & R/ConEd	North Rockland (New Station)	Buchanan	4	S	2018	345	345	1	3000	3211	2-2493 ACAR
ConEd	Rainey	Corona	xfmr/Phase shifter	S	2019	345/138	345/138	1	268 MVA	320 MVA	xfmr/Phase shifter
NYPA	Niagara	Rochester	-70.20	W	2019	345	345	1	2177	2662	2-795 ACSR
NYPA	Niagara	Station 255 (New Station	66.40	W	2019	345	345	1	2177	2662	2-795 ACSR
NYPA	Station 255 (New Station)	Rochester	3.80	W	2019	345	345	1	2177	2662	2-795 ACSR
NYPA	Dysinger Tap	Rochester	-44.00	W	2019	345	345	1	2177	2662	2-795 ACSR
NYPA	Dysinger Tap	Station 255 (New Station	40.20	W	2019	345	345	1	2177	2662	2-795 ACSR
NYPA	Station 255 (New Station)	Rochester	3.80	W	2019	345	345	1	2177	2662	2-795 ACSR
RGE	Station 255 (New Station)	Rochester	3.80	W	2019	345	345	1	2177	2662	2-795 ACSR
RGE	Station 255 (New Station)	Station 255 (New Station	xfmr	W	2019	345/115	345/115	1	400 MVA	450 MVA	Transformer
RGE	Station 255 (New Station)	Station 255 (New Station	xfmr	W	2020	345/115	345/115	2	400 MVA	450 MVA	Transformer

* A complete list is located in the 2016 RNA, Appendix D:
http://www.nyiso.com/public/webdocs/markets_operations/services/planning/Planning_Studies/Reliability_Planning_Studies/Reliability_Assessment_Documents/2016RNA_Final_Oct18_2016.pdf