Comparative Evaluation of Alternating Current Transmission Upgrade Alternatives

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New York State Department of Public Service Trial Staff Interim Report

Cases 12-T-0502, 13-E-0488, 13-T-0454, 13-T-0455, 13-T-0456, 13-M-0457, and 13-T-0461

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EXECUTIVE SUMMARY

Background

The Public Service Commission initiated the AC Transmission proceedings to consider whether to address the persistent transmission congestion that exists at the Central East and Upstate New York/Southeast New York (UPNY/SENY) electrical interfaces. The Commission sought proposals from transmission owners and other developers proposing projects to increase the UPNY/SENY transfer capacity by approximately 1,000 MW. After an initial round of proposals was received that raised environmental siting concerns, the Commission called for revised proposals that would better utilize existing rights-of-way and better match the scale of proposed powerline structures to be in keeping with existing facilities already in the landscape.

Twenty one proposals were received from four entities: North America Transmission Corporation (NAT), the New York Transmission Owners (NYTOs),[1] NextEra Energy Transmission New York, Inc. (NextEra), and Boundless Energy NE, LLC (Boundless) (collectively, the Applicants). Thereafter, the Commission directed the Staff of the Department of Public Service (Trial Staff), with the assistance of the NYISO, to undertake a comparative evaluation of the project proposals. The comparative evaluation study is a complex undertaking requiring significant computer modeling of power flows, electric generation production cost benefits, and electric generation capacity cost benefits and is to result in a benefit cost

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

analysis for each project. In addition, each project is to be analyzed as to its specific environmental impacts. The study is also to include an analysis of alternatives to a transmission facility and to address the issue of whether there is sufficient public need for a transmission solution as a matter of public policy.

This Trial Staff Interim Report addresses primarily the issues of environmental compatibility and beneficial electric system impacts on the Central East and Upstate New York/Southeast New York (UPNY/SENY) electrical interfaces. The issuance of this Interim Report is expected to be a major step forward in narrowing the focus of the AC Transmission proceedings by recommending the elimination from further consideration of projects that have significant environmental compatibility issues in relation to the other projects, or that do not demonstrate sufficient electric system benefits as compared to the other proposals.

On June 12, 2015, it was announced that the planned 720 MW CPV Valley generation facility has closed on its financing and will be proceeding to construction. This significant change in the New York bulk electric system will require Trial Staff to update its power flow, production cost benefit, and capacity cost benefit studies to reflect the change. Therefore, this report is presented as an Interim Report. The remaining projects will be further studied considering the effects of the 720-MW CPV Valley facility in an update to the report. While considerable work is needed to do the further studies, since the modeling framework is already in place and the number of study projects Staff is recommending continue to be studied is being reduced, it is anticipated that the final report can be produced in an expedited fashion.

After the issuance of this interim Trial Staff report, the parties to the AC Transmission proceedings will meet in a Technical Conference to review the findings and exchange further information. Thereafter, the report will be updated to address new information, a second Technical Conference will be held, and then the matters described in the report will be put out for public comment, including notice in the State Register, and the Commission will receive and review the comments before taking any action.

Environmental Compatibility

Using data provided by the Applicants and supplemented by Trial Staff, a number of environmental factors were either quantitatively or qualitatively considered for each project. The data used is also presented in a large matrix to illustrate the impacts on a comparative basis.

Trial Staff evaluated the environmental factors for each of the project scenarios in a multiple step process that combined the quantified, or measured, characteristics of each scenario with the qualitative environmental impact assessment performed by Staff. Each of the quantified characteristics, such as number of streams or federal (NWI) wetlands located in a ROW, miles of ROW, area of forests, forested wetlands, numbers of structures within 250 feet of residences, or State or National Register of Historic Places sites within one mile of the ROW were assigned rankings of low, medium, and high. The parameter rankings were established by calculating the average (mean) for each measurable factor. The medium rank ranges represent one-half of a standard deviation on either side of the calculated mean. Low rankings were assigned to values less than the medium rank range and high rankings were assigned to values greater than the medium rank range. Qualitative ratings of

visual, sound and river corridor impacts were prepared to have a consistent approach to these parameters.

Following the completion of the quantitative environmental parameters ratings, Trial Staff completed an overall rating for each scenario. The overall rating is not a numerical score but a qualitative assessment of the anticipated outcome of transmission facility construction in a selected ROW. The rankings are intended for comparative evaluation only. Projects with an overall ranking of "low" are anticipated to be most environmentally compatible of the proposed projects, whereas project scenarios with an overall environmental ranking of "high" are anticipated to be the least environmentally compatible. "Low" ranking may still represent significant impacts that will warrant mitigation to ultimately support a finding that the impacts have been minimized to the maximum extent practicable.

Projects rated in the "high" category, in comparison to the remaining scenarios, have the potential for greater environmental impacts, primarily as a result of the need for new or expanded rights-of-way, or the planned use of Thruway right-of-way which is fraught with complications. The remaining scenarios are significantly more environmentally compatible primarily because they are designed to use existing rights-of-way.

Staff's environmental review results in the following comparative ratings:

PROJECT SCENARIOS	Rating
P1 - NAT	High
P2 - NAT	High
P3 - NAT	High
P4 - NAT	High
P5 - NAT	High
P6 - NYTOs	Low
P7 - NYTOs	Low
P8 - NYTOs	Low
P9 - NYTOs	Low
P10 - NYTOs	High
P11 - NYTOs	Med.
P12 - NYTOs	Med.
P13 - NYTOs	Med.
P14 - NYTOs	Med.
P15 - NextEra	High
P16 - NextEra	High
P17 - NextEra	High
P18 - NextEra	High
P19 - NextEra	Med.
P19a - NextEra	Low
P20 - Boundless	Med.
P21 - Boundless	Low

Electric System Impacts

The New York Independent System Operator (NYISO), with the assistance of the Power Systems Studies Group of its consultant, TRC Environmental Corporation (TRC), assessed each project scenario for reliability and system impact implications. These assessments model power flows on the bulk electric system to identify the degree to which transmission capability changes at various locations on the electric system as a result of a given transmission upgrade. For the analysis described here, the key transmission points studied are the Central East and UPNY-SENY transmission interfaces. The table below summarizes the results of the power flow assessments:

PROJECT SCENARIOS	Combined Effect (MW)		
	UPNY SENY Effective Limit Increase	Central East Effective Limit Increase	Combined Effect
P1 - NAT	1,729	530	2,259
P2 - NAT	1,179	524	1,703
P3 - NAT	1,717	567	2,284
P4 - NAT	933	420	1,353
P5 - NAT	959	567	1,526
P6 - NYTOs	656	292	948
P7 - NYTOs	1,243	(24)	1,219
P8 - NYTOs	(469)	24	(445)
P9 - NYTOs	1,351	292	1,643
P10 - NYTOs	638	393	1,031
P11 - NYTOs	603	412	1,015
P12 - NYTOs	1,200	617	1,817
P13 - NYTOs	(677)	127	(550)
P14 - NYTOs	1,500	617	2,117
P15 - NextEra	874	617	1,491
P16 - NextEra	697	56	753
P17 - NextEra	817	617	1,434
P18 - NextEra	558	617	1,175
P19 - NextEra	697	317	1,014
P19a - NextEra	679	317	996
P20 - Boundless	588	217	805
P21 - Boundless	482	217	699

Initial Comparative Evaluation

Staff's initial comparative evaluation results in a determination that on balance, the following projects should be eliminated from consideration:

P1 NAT #1
P2 NAT #2
P3 NAT #3
P4 NAT #4
P5 NAT #5
P6 NYTOs #1
P8 NYTOs #3
P10 NYTOs #5
P11 NYTOs #6
P13 NYTOs #8
P15 NextEra #1
P16 NextEra #2
P17 NextEra #3
P18 NextEra #4
P19 NextEra #5

Staff's analysis of the Applicants' proposed projects indicates that there are seven scenarios that warrant further consideration. In order to arrive at this conclusion, Staff first examined the power flow or system impacts for the various projects. With two exceptions, each project increased the transfer capacity between UPNY and SENY, the primary basis for these proceedings. Two projects, Scenarios 8 and 13, result in less power moving between UPNY and SENY and therefore on this basis alone, Staff recommends that they not be further considered by the Commission.

Similarly, Staff's environmental review results in a recommendation that on balance, Scenarios 1-5, 10, 15, 16, 17, and 18, should be eliminated from consideration. These projects, in comparison to the remaining scenarios, have the potential for greater environmental impacts.

These two initial screenings were then looked at in tandem by Staff to determine if any further projects could be recommended for elimination from Commission consideration. Scenarios 6, 11, and 19 all result in a comparative environmental impact of medium and power flow values below 700 MW. Similarly grouped projects with lower environmental and/or higher power flow rankings remain and thus, Staff recommends that these scenarios should also be eliminated from Commission consideration.

Staff's proposes to continue studying the remainder of the projects, as follows:

P7 NYTOs #2
P9 NYTOs #4
P12 NYTOs #7
P14 NYTOs #9
P19a NextEra #5a
P20 Boundless #1
P21 Boundless #2

Conclusion

This Trial Staff Interim Report addresses primarily the issues of environmental compatibility and beneficial electric system impacts on the Central East and Upstate New York/Southeast New York (UPNY/SENY) electrical interfaces. We expect the issuance of the report to be a major step forward in narrowing the focus of the AC Transmission proceedings by recommending the elimination from further consideration of projects that have significant environmental compatibility issues in relation to the other projects, or that do not demonstrate sufficient electric system benefits as compared to the other proposals. The number of projects that deserve further consideration should be reduced to seven. These remaining scenarios are the most promising from an electric system benefit perspective, and are significantly more

environmentally compatible primarily because they are all designed to use existing rights-of-way. Trial Staff notes that the projects that are emerging from this process are better designed than as originally proposed, and that is thanks in particular to the significant efforts of the Applicants, with the assistance of the public and other parties that have participated in these proceedings. The update to be provided at a later date will also address the issue of whether there is sufficient public need for a transmission solution as a matter of public policy.

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APPENDICES & TABLES

GLOSSARY OF SUBSTATION & SWITCHYARD ABBREVIATIONS

Substation/Switchyard	*Abbreviation*
Churchtown	CH
Coopers Corners	CC
CPV Tap	CPV
East Fishkill	EF
Edic	ED
Fraser	FR
Gilboa	G
Greenbush	GB
Hurley Avenue	HA
Knickerbocker	KN
Leeds	LD
Marcy	M
New Scotland	NS
Oakdale	O
Orchard Hill	OH
Pleasant Valley	PV
Princetown	PR
Rock Tavern	RT
Roseton	RS
Rotterdam	R

INTRODUCTION

The Commission initiated Case 12-T-0502, et al. in order to consider whether and how to address the persistent transmission congestion that exists at the Central East and Upstate New York/Southeast New York (UPNY/SENY) electrical interfaces. In the Order instituting Case 12-T-0502, the Commission explained that the transmission corridors that include the Central East and UPNY/SENY electrical interfaces were persistently congested and that this congestion contributes to higher energy costs in those regions as well as reliability concerns. The Commission recognized that upgrades to those sections of the transmission system could produce various benefits for New York, including: 1) enhancing system reliability, flexibility, and efficiency; 2) reducing environmental and health impacts through less generation; 3) increasing diversity in supply, including additional renewable resources; 4) promoting job growth and the development of new efficient generation resources Upstate; and, 5) mitigating reliability problems that may arise with expected generator retirements.[2] As part of its ongoing review in these cases, the Commission directed that each of the Applicants propose projects to address these issues, which would be evaluated on a competitive, comparative basis. On January 7, 2015, in response to this directive, four Applicants, North America Transmission Corporation (NAT), the New York Transmission Owners (NYTOs),[3] NextEra Energy Transmission New York, Inc. (NextEra), and

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

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

Boundless Energy NE, LLC (Boundless) (collectively the Applicants), filed Part A Applications (collectively the Applications) with the Commission. The following report represents an initial analysis of these Applications conducted by Department of Public Service Staff (Staff) in concert with the New York Independent System Operator (NYISO) and a consultant retained by NYISO, TRC Environmental Corporation (TRC).

BACKGROUND

New York State's electric transmission system faces a longstanding problem of congestion at critical points on the pathways linking Upstate and Downstate New York. Together, New York City, Long Island, and Westchester County account for more than half of the demand for electricity in the State and peak demand continues to increase; however, in times of peak demand and high prices, lower-cost and/or cleaner power available from Upstate cannot reach these densely populated areas because of transmission system congestion or "bottlenecks". Congestion can have adverse environmental and economic consequences when older, less efficient and more expensive fossil fuel plants in urban areas run more frequently than they otherwise would if power from other cleaner cheaper sources of energy could reach these areas.[4] The Alternating Current (AC) electric transmission system is the backbone of a reliable transmission system. The AC system promotes reliability through its ability and flexibility to respond to emergencies on the system. Unlike Direct Current (DC) transmission lines, the AC system also allows for the

[4] Staff notes that the recently released State Energy Plan allocates nearly $19 million for urban areas to shut down carbon intensive plants in favor of cleaner fuel sources in recognition of this problem

interconnection of needed generation resources at multiple points on the system. DC lines serve the purpose of moving energy over long distances and interconnecting incompatible systems.

Prudent transmission planning evaluates all alternatives, including AC and DC transmission, generation, energy efficiency and other demand-side options — so as to identify new infrastructure to provide the most robust system at a reasonable cost to ratepayers. While congestion can also be reduced through strategically placed generation or DC transmission investments, AC investments provide the additional benefit of contributing to a system that is more robust and flexible with increased reliability benefits, thereby increasing the area within which generation facilities can be placed to respond to future system needs. Prudent projects have the benefit of reducing in-state transmission constraints, supporting the development of Upstate renewable energy projects, and lowering wholesale energy prices for Downstate energy consumers, while not disproportionally raising rates for Upstate consumers as a result. Further, upgrades to the AC system should provide economic development benefits to Upstate by enabling excess energy from Upstate power plants to reach Downstate markets, improving the financial viability of existing Upstate power producers, and allowing existing and future wind farms and other renewable sources in that region to access higher-priced energy markets.

In assessing the need in this State for increased transmission, the Commission was informed by several studies conducted at both the State and Federal levels. In 2005 the Energy Policy Act was passed requiring the U.S. Department of Energy (DOE) to evaluate congestion constraints nation-wide. As a result of this evaluation the DOE found that New York had

significant constraints. Part of the Energy Policy Act would allow for FERC to supersede local planning efforts if they found deficiencies in the transmission system. These deficient areas are referred to as National Interest Corridors (NIETC). In 2006 the first DOE report found that:

> New York City's electricity supply problems are especially complex and difficult. Building new generation capacity within the city is extremely challenging because of air quality restrictions, high real estate values, fuel supply problems, and local opposition to power plants. Some additional generation is being added north of the city to serve the city's requirements. Adding major new transmission lines to the north and northwest would increase the options available to the city for power. During the summer the city could be served by excess, relatively inexpensive hydropower from Canada. The flexibility provided by new transmission could also enable the city to tap recently proposed in-state wind power and clean coal generating capacity, if they are developed.[5]

DOE's 2009 National Electric Transmission Study reaffirmed its findings in the 2006 Study, stating that "little new transmission has been built in the region in the past three years, although many new backbone and expansion projects are nearing construction; therefore it is likely to be several years before current congestion levels ease."[6] The draft DOE National Electric Transmission Study in August 2014 again highlighted New York's constrained area.[7]

The Joint Coordinated System Plan (JCSP) 2008 Report issued February 2009 was the first effort at an interconnection-wide study. While the purpose of the study was to determine

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[5] National Electric Transmission Study 2006, p. 57.

[6] National Electric Transmission Congestion Study December 2009, p. x.

[7] Draft for Public Comment National Electric Transmission Congestion Study August 2014, p. xxii.

possible interconnection-wide upgrades to distribute renewable energy, the report identified constraints in eastern New York as some of the most severe in the country.

The next look at the eastern interconnection took place in a DOE funded study by the Eastern Interconnection Planning Collaborative (EIPC). This study took three different views of the future to determine what transmission upgrades might be required by 2030; Business As Usual, Nationally-Implemented Federal Carbon Constraint with Increased Energy Efficiency/Demand Response, and Regionally Implemented Renewable Portfolio Standard. Transmission constraints in the Mohawk-Hudson Valley were identified in all three scenarios.[8]

At the State level, the NYISO's Congestion Assessment and Resource Integration Study (CARIS) performs an economic analysis of the transmission system every two years. The study protocol is to examine the three most congested areas of the New York transmission system every two years. In the 2009 study the Central-East Interface and the Leeds-Pleasant Valley Corridor were identified as two of the three most congested corridors.[9] The 2011 study identified the three top transmission constrained areas in the State and found them to be the Central East-New Scotland-Pleasant Valley, New Scotland-Pleasant Valley, and Leeds-Pleasant Valley sections.[10]

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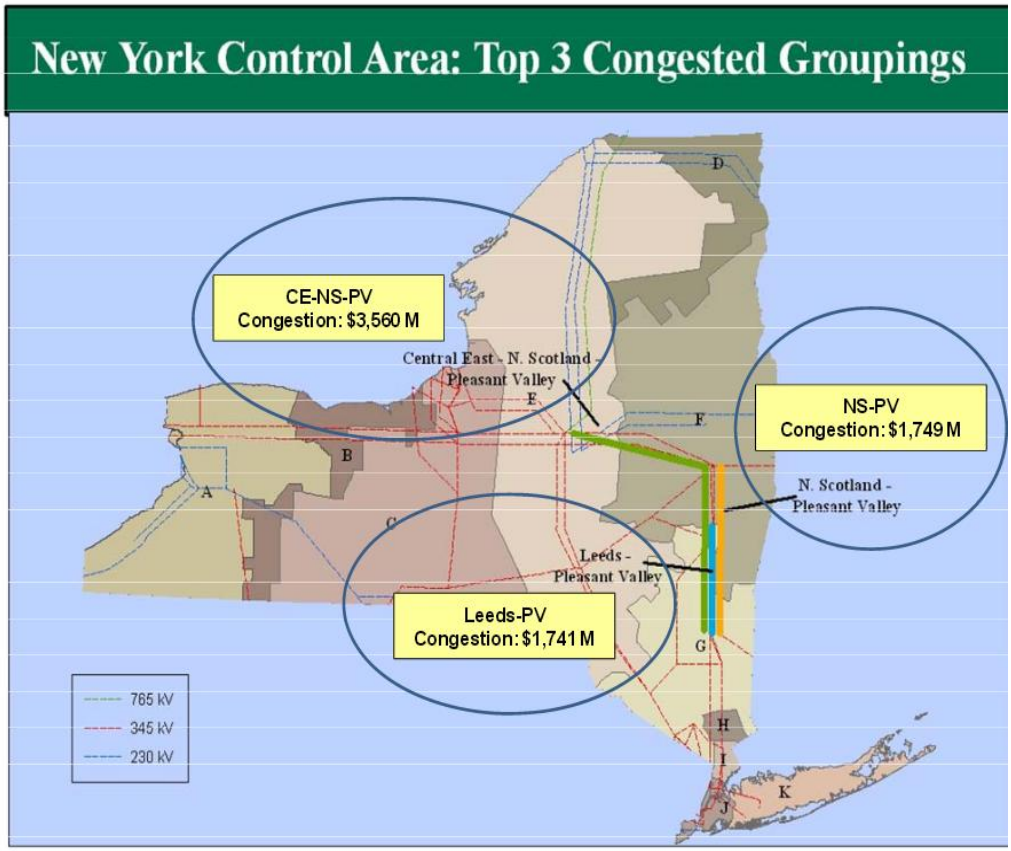
[8] Phase 2 Report: DOE Draft - Part 1 Interregional Transmission Development and Analysis for Three Stakeholder Selected Scenarios December 22, 2012, pp. 14-15

[9] 2009 Congestion Assessment and Resource Integration Study: CARIS-Phase I, January 12, 2010

[10] 2011 Congestion Assessment and Resource Integration Study: CARIS-Phase I, March 20, 2012

Figure 1: Congestion on the Top Three CARIS Studies (Present Value in 2011 $M)

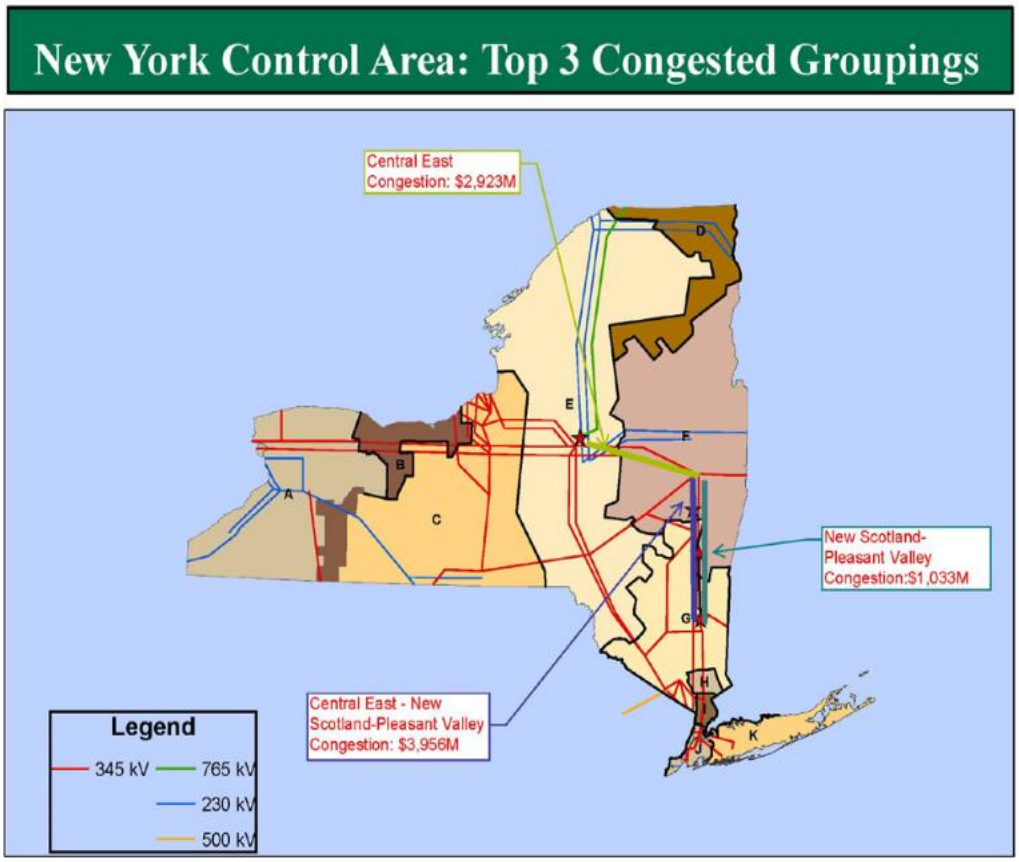


Source: NYISO, 2011 Congestion Assessment and Resource Integration Study: CARIS-Phase I, March 20, 2012, p. 7

In the 2013 study, the three top transmission constraint groupings were identified to be Central-East, New Scotland-Pleasant Valley, and Central East-New Scotland-Pleasant Valley.[11] For eight of the nine study areas examined in all the NYISO CARIS studies, the Mohawk Valley through Lower Hudson Valley transmission corridor, as indicated by the graphics below, was identified as the most constrained areas in the New York transmission system.

[11] 2013 Congestion Assessment and Resource Integration Study: CARIS-Phase I, November 19, 2013

Figure 2: Congestion on the Top Three CARIS Studies (Present Value in 2013 $M)



Source: NYISO, 2013 Congestion Assessment and Resource Integration Study: CARIS-Phase I, November 19, 2013, Fig 5-3, p. 37

The NYTOs with the cooperation of the NYISO preformed the State Transmission Assessment and Reliability Study (STARS). Phase I of the study evaluated the condition of transmission assets to determine what aging infrastructure would need attention in the near future. Phase II looked at what upgrades to the system would be required to address aging infrastructure in the future. Phase II also identified potential wind energy development interconnection opportunities and future reliability needs of the New York system. This study again identified a need to reinforce the Total East/Central East and UPNY-SENY

interfaces by rebuilding existing and/or constructing new facilities from Marcy to Leeds to Pleasant Valley.[12]

The multiple studies outlined above established the existence of persistent congestion in the Mohawk and Hudson Valley transmission corridors and concluded that this congestion is expected to persist well into the future without corrective action.

PROCEDURAL HISTORY

In order to address congestion that exists at the Central East and UPNY/SENY electrical interfaces, the Commission sought Statements of Intent from transmission owners and other developers proposing projects to increase the UPNY/SENY transfer capacity by approximately 1,000 megawatts (MW).[13] On January 25, 2013, six interested parties offered proposals intended to address the Commission's objectives.[14] Supplemental information related to the Statements of Intent was subsequently requested by the Commission on February 15, 2013.[15]

On February 7, 2013, comments were sought on proposed rule changes to streamline the certification process required by Article VII of the Public Service Law (PSL) and regulations

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[12] New York State Transmission Assessment and Reliability Study – Phase II Study Report, April 30, 2012, pp. 40-41.

[13] Case 12-T-0502, Order Instituting Proceeding (issued November 30, 2012), p. 2. A technical conference was held on December 17, 2012, in order to explain the purpose and information requirements for the Statements of Intent, and the process for reviewing specific projects. Case 12-T-0502, Notice of Technical Conference (issued November 30, 2012).

[14] Statements of Intent were filed by: 1) NAT; 2) NYTOs; 3) West Point Partners, LLC; 4) Cricket Valley Energy Center, LLC; 5) NextEra; and, 6) Boundless.

[15] Case 12-T-0502, Notice of Information Requirements (issued February 12, 2012).

promulgated there under by avoiding the need for future Applicants to seek case-specific routine waivers, and to clarify certain regulatory requirements.[16] On April 22, 2013, the Commission adopted the proposed rule changes under PSL Article VII, with modifications, and established procedures for a comparative evaluation of proposed AC project Applications, while outlining additional procedural steps.[17] The Commission also directed Staff to develop a straw proposal addressing mechanisms for cost recovery, mechanisms for allocating cost-overrun risk between developers and ratepayers, and methods for allocating project costs among ratepayers. Further, the Commission advised that other rule changes might be necessary to facilitate the comparative evaluation and directed Staff to prepare a proposal identifying such changes.[18]

On May 29, 2013, a Notice was issued seeking comments on Staff's proposed procedures to facilitate a comparative evaluation of multiple projects on a common record. Staff also proposed rule changes for how projects that are not subject to

[16] Case 12-T-0502, Notice Soliciting Comments (issued February 7, 2013).

[17] Case 12-T-0502, Order Establishing Procedures for Joint Review under Article VII of the Public Service Law and Approving Rule Changes (issued April 22, 2013) (April 2013 Order). A two-step review process was established involving the submission of initial application materials, scoping documents, and proposed schedules by October 1, 2013 (referred to as "Part A" application materials), and the submission of the remaining Article VII application materials (referred to as "Part B" application materials) on a schedule to be set by an Administrative Law Judge (ALJ).

[18] On May 14, 2013, Staff hosted a technical conference to discuss the process with potential Applicants and other interested parties and to answer questions. Case 12-T-0502, Notice of Technical Conference (issued April 29, 2013); Case 12-T-0502, Technical Conference Agenda (issued May 10, 2013).

Article VII of the PSL would be reviewed, including the content for such applications (collectively, May 2013 Staff Proposal).[19]

On July 10, 2013, a Notice was issued soliciting comments on a separate Staff proposal to address the allocation and recovery of project costs, and mechanisms for allocating risk between developers and ratepayers (collectively, July 2013 Staff Proposal).[20] The July 2013 Staff Proposal focused on the establishment of a State mechanism for allocating and recovering costs, while recognizing that an alternative cost recovery mechanism might be available pursuant to the NYISO's transmission planning process to address Public Policy Requirements, as approved by FERC.[21]

On September 19, 2013, the Commission addressed the May 2013 Staff Proposal and adopted procedural and substantive rules to help expedite and process proposed solutions. The Commission also directed the assigned ALJs to "consider, promptly after the initial applications are filed, whether an early screening would help streamline the process and serve the goal of obtaining congestion relief at the least cost to

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[19] Case 12-T-0502, Notice Soliciting Comments (issued May 29, 2013). On June 17, 2013, Staff convened an additional technical conference to further discuss the process set forth in the April 2013 Order and to answer questions. Case 12-T-0502, Notice of Technical Conference (issued May 31, 2013).

[20] Case 12-T-0502, Notice Soliciting Comments and Scheduling Technical Conference (issued July 10, 2013). The July 10, 2013 notice also advised interested parties of a technical conference to discuss the July 2013 Staff Proposal. The conference was subsequently held on August 1, 2013.

[21] FERC Docket No. ER13-102 et al., New York Independent System Operator, Inc., Order on Rehearing and Compliance, 148 FERC ¶61,044 (issued July 17, 2014). The Commission issued a Policy Statement on August 15, 2014, in Case 14-E-0068, which established generic procedures that would be used to guide the implementation of the Commission's role in the NYISO's public policy planning process.

ratepayers, and in the 2014-2018 timeframe set out in the Energy Highway Blueprint."[22]

On October 1, 2013, four AC transmission developers (NAT, NextEra, Boundless, and the NYTOs) submitted Part A application materials for consideration. Part A filings identified proposed facility locations, design and operational characteristics, as well as identification of significant environmental resources in areas potentially affected by the projects. The Part A filings were intended to inform comparative evaluation by Staff of the competing proposals but not require the full range of exhibits required to satisfy the Article VII requirements for full applications. Thereafter, the ALJs analyzed and ruled on deficiencies alleged in the applications. On February 14, 2014, the NYISO filed an initial screening-level analysis of the incremental transfer capability of each project. At a technical conference held on March 19, 2014, the NYISO provided in-depth explanations of its process and results for the initial screening-level analysis.

On February 21, 2014, the Commission stated that it would accept proposals that contribute to the targeted level of congestion relief, even if they do not, individually, provide the full 1,000 MW of additional transfer capability. The ALJs were also directed to establish a process that offers the current Applicants an opportunity to "submit alternatives to their existing proposals, incorporating, to the maximum extent

[22] Case 12-T-0502, Order Adopting Additional Procedures and Rule Changes for Review of Multiple Projects Under Article VII Of the Public Service Law (issued September 19, 2013), p. 11.

possible, projects that can be contained within the bounds of existing rights-of-way."[23]

The ALJs conducted a telephone conference on February 27, 2014 to discuss the establishment of such a process. Thereafter, on April 10, 2014, the parties were advised by the ALJs that further guidance on the next procedural steps would be forthcoming that would also address how the NYISO cost recovery mechanism for public policy requirements should apply to the ongoing AC Transmission proceeding. After considering various comments and requests for clarification made in the course of these proceedings, Advisory Staff developed recommendations regarding procedural matters, cost recovery, cost allocation, and risk-sharing. On August 13, 2014, a notice was issued seeking comments on certain Advisory Staff recommendations regarding: 1) the procedural steps for evaluating the proposed transmission projects; 2) the mechanism for recovering the costs; 3) the methodology for allocating those costs; and 4) how the risk of cost-overruns should be handled.

On December 16, 2014, the Commission adopted Advisory Staff's recommended procedural steps, with modifications and identified the Commission's preferred approaches for cost recovery, cost allocation, and risk-sharing. In this same Order, the Commission directed Trial Staff to compare and evaluate the various applications received from the NYTOs (nine scenarios), NextEra (five scenarios), NAT (five scenarios), and Boundless Energy (two scenarios).

[23] Case 12-T-0502 et al., Order Authorizing Modification Of The Process To Allow For Consideration Of Alternative Proposals (issued February 21, 2014), p. 4.

ANALYSIS

The four Applicants in this proceeding have proposed 21 distinct scenarios. A complete list of these scenarios along with identifying numbers for each is listed in the table below (a map graphically depicting these scenarios is also attached as Appendix 1).

Figure 3: Applicant Proposed Scenarios

#	Sponsor	Scenario
1	NAT	ED-FR; NS-LD-PV
2	NAT	ED-FR; NS-LD-PV Alt 1
3	NAT	ED-FR; NS-LD-PV; sc at FR; connect M-CC to FR
4	NAT	ED-FR; NS- PV Alt 2; sc at FR; connect M-CC to FR; sc at M; sc at ED
5	NAT	ED-FR; NS-KN-PV Alt 2; sc at FR; connect M-CC to FR; ED-PR-KN as proposed by others
6	NYTOs	KN-PV
7	NYTOs	LD-PV(R)
8	NYTOs	HA
9	NYTOs	NS-LD(R); LD-PV
10	NYTOs	O-FR; ED-NS; KN-PV
11	NYTOs	ED-NS; KN-PV
12	NYTOs	ED-NS; NS-LD-PV(R)
13	NYTOs	ED-NS; HA
14	NYTOs	ED-NS; NS-LD(R); LD-PV
15	NextEra	O-FR; Thruway ED-LD-PV
16	NextEra	O-FR; Marcy Southern 1 (M-PR-R;GB-KN-CH-PV)
17	NextEra	O-FR; Marcy Southern 2 (M-PR-R;PR-NS-KN; GB-KN-CH-PV)
18	NextEra	O -FR; Marcy Northern (M-OH-NS; GB-KN-CH-PV)
19	NextEra	O-FR; GB-KN-CH-PV
19a+	NextEra	GB-KN-CH-PV
20	Boundless	LD-HA(R); Athens Generating-LD-PV(R); CPV-RT(R); RS-EF; sc LD-HA-RS; sr NS-LD
21	Boundless	LD-HA(R); CPV-RT(R); RS-EF; sc LD-HA-RS; sr NS-LD

sc: Series Compensation Equipment
sr: Series Reactor
(R): Reconductoring
\+ This scenario was developed by Staff for analytical purposes based on the details and costs of Scenario 19.

General Information Regarding Proposed Scenarios

The following information is put forward as background so that all parties can better understand Staff's environmental review. There are five basic methods of installation proposed by the Applicants for the 21 scenarios. These methods include creation of new ROW, expansion of existing ROW, replacement of existing facilities with new facilities, reconductoring, underground installation including trenching, and underground installation including horizontal directional drilling (HDD).

Creation of New ROW

Creation of new ROW refers to project segments that will not utilize any portions of existing ROW. Projects incorporating this method of installation will establish wholly new ROW along land not currently used as utility, highway, or railroad ROW. This method will require property acquisition, vegetation clearing, construction of access roads, and installation of transmission towers and conductors. Depending on the nature of the area, potential impacts may affect forest, streams, wetlands, agricultural land or other land uses. Installation of new transmission towers will require significant construction equipment and labor activities at each location. If installation requires concrete foundations, additional construction equipment will be needed on-site, as these foundations involve significant excavations, spoil hauling, and concrete pouring operations. Upon installation of transmission structures, stringing of new conductor is also required. During the stringing activity, two control areas referred to as pulling stations are utilized for installation techniques within a pulling section. Both control areas will be cleared for housing tension machines, large cable spools, trucks and vehicles, and other necessary equipment. Numerous pulling station sites are

required for long stretches of transmission ROWs. Specific impacts regarding individual scenarios proposing new ROW will be further explored in the scenario descriptions in this document. This is the most disruptive method, as it involves development of land not currently used for utility, highway or railroad ROW and significant construction activities associated with structure installations.

Expansion of Existing ROW

Expansion of existing ROW refers to the widening of an existing utility, highway, or railroad ROW. A project using expanded ROW will typically require property acquisition, vegetation clearing and grading. Forests, streams, wetlands, agricultural land, and other land uses could be impacted during installation. However, it may not necessarily require construction of entirely new access roads, as portions of the existing access roads may be utilized, where appropriate. There will be a need to build sufficient access road extensions to reach the new transmission towers that may involve clearing and grading operations. Installation of towers will still be required, but may not be as impactful as when installed in entirely new ROW, due to the possible use of existing cleared land (for work space) associated with the existing ROW. Stringing and tensioning the conductors, as described previously, is also required for this method. Therefore, this method consists of some impacts, but is generally not as disruptive as the creation of new ROW.

Reconductoring Method

Reconductoring is the removal of old and installation of new power conductors on existing transmission structures. As with expansion of existing ROW, previously cleared land and access ways may be utilized for work spaces and access roads. Typically, the only construction activities required for this method include removal of old conductors and the stringing of new conductors, as described above. Some towers will require replacement to meet structural requirements for new conductor attachment or to meet clearance requirements for the 345 kV transmission lines. If structures require replacement in the Hudson River, construction of new foundations and removal of the old foundation would result in significant environmental impacts similar to new construction.

Replacement of Existing Facilities

Several proposals call for the replacement of existing transmission facilities with new equipment, including the replacement of single- or double-circuit facilities with higher voltage or additional circuits. Existing transmission towers and conductors would be removed, and new lines would be installed in replacement of the old facilities. Existing ROW and access roads would be used, limiting new land area additions, although access road upgrades may be necessary to accommodate heavy construction equipment, and for removal of existing components and delivery of large transmission structure components.

Trenching and Horizontal Directional Drilling (HDD)

Underground construction of 345 kV transmission lines is a component of the scenarios proposed by Boundless and NextEra. Construction of underground transmission requires large excavation for the duct bank trench and splice boxes. The duct bank is concrete encased and requires a trench that is eight to ten feet wide (or more) and six to eight feet deep (or more). The splice boxes are normally pre-cast concrete that require excavations that are deeper and wider than the trench that holds the duct bank. Underground construction is slow and requires complex environmental management due to the amount of soil disturbance. Excavation in bedrock conditions can add to the extent and duration of construction and site restoration activities.

The proposed scenarios include limited underground installation at various locations to cross underneath the Hudson River. The HDD method is a trenchless installation method that consists of installing conductors underground via drilling or boring equipment. Two temporarily cleared areas are needed for this type of installation: the receiving pit and entry/staging area. The directional drilling unit and associated pumping equipment occupies the majority of the staging area. Aside from these areas, there are virtually no other permanent impacts for this type of installation as the conductors are buried underground, beneath a highway, railroad or major water body.

HDD installation requires use of lubricating drilling muds composed of clay, water and surfactants to improve the characteristics of the mud. Where HDD installation is proposed at waterbody crossings, it may be done at a depth of at least ten feet below dredging depths of the water body or much deeper depending on the alignment of the bore. The drilling muds are normally contained in the bore hole and the discharge of the

mud, if there is breakout, has to be managed to limit the discharge. The drilling mud may damage aquatic habitats in the same way that any other sediments would degrade water quality and harm aquatic plants or animals.

Man holes and splice pits may be required along portions of underground conductors, to accommodate wire pulling and conductor connections.

Waterbody Crossing Methods

There are four basic waterbody crossing methods proposed for the 21 scenarios, and include: new aerial crossing installation, HDD below water bodies, reconductoring of existing crossings, and bridge attachment. New aerial crossings will create new visual impacts and new construction disturbance. Reconductoring by use of existing or in-kind replacement structures or bridge attachments should result in minimal land disturbance, although there may be some habitat disruption at Hudson River shoreline areas.

General Information Regarding Environmental Review

Staff evaluated environmental factors for each of the 21 scenarios proposed by the Applicants. The review was based primarily on the information provided by each of the Applicants in their January 7, 2015; January 19, 2015; and March 2, 2015 Part A Application Filings. The differences in how information was presented by the Applicants with respect to environmental and land-use made it difficult to compare these projects using unified criteria. Where informational gaps existed in one or more of the Part A Application Filings, Staff performed limited desktop analyses to develop a more extensive data set that covers a broad range of environmental factors. However, it should be noted that where Staff was required to perform its own

analyses, these analyses are based on Staff's knowledge and experience in siting and construction of similar electric transmission facilities. Staff's assessment of potential impacts may diverge from a particular Applicant's when, based on Staff's experience or particular resource considerations, greater impacts are readily anticipated.

For example, some of the projected impacts reported by the various Applicants were not described in a consistent manner between similar proposals that would occupy the same ROW. NextEra proposed a 110-foot wide ROW to estimate impacts for scenarios 16, 17 and 19. Conversely, NYTOs evaluated impacts by assessing the entire existing ROW width for Scenarios 10, 11, 12, 13, and 14. The land-cover area estimates provided by NextEra and NYTOs, between projects within the same ROW, are not consistent because ROW widths evaluated by the NYTOs varied from 400 to 1,000 feet in the Oakdale to Fraser ROW and 100 to 590 feet in the Edic to New Scotland ROW. The NextEra land-cover area, based on a 110-foot ROW width, represents only the portion of the existing ROW expected to be utilized for the proposed project, whereas, the NYTOs estimate represents the entire width of the existing ROW. Staff advises that the extent of direct impact on the NYTOs' ROWs would be less than those full widths of 200 feet or more.

Another source of variability is the base information used by the Applicants. The NYTOs' application used in-house mapping and included more detailed data regarding the positioning of facilities within existing ROW and the position of the transmission towers, while NAT, NextEra and Boundless compiled ROW locations and positioning of facilities within the ROWs using publicly available property information and aerial photography. The differences in the various information sources

contributed to the variability of the identified environmental characteristics.

The various components of the scenarios are described in detail below and in Table 1, Comparative Environmental Impacts. Staff's comparative ranking criteria are more fully described in the Environmental Impact, Analysis and Ranking sections of this report as well as in Table 2. Tables 1 and 2 are attached to this report.

General Information Regarding Substations and Equipment Located in Substations

The majority of the proposed projects would require the installation of new or upgraded substation equipment. These proposals, however, are preliminary and do not provide sufficient information for a complete review. The Applicants have not provided studies to allow Staff to determine the size of any transformers that would need to be installed including their design parameters. Similarly, the positions of breakers and line terminations have not been identified in a way that would allow Staff to determine their size and important operating characteristics, including the size of any emergency generator(s) required. Further material associated with any project or projects selected by the Commission to proceed should include sufficient information to make these determinations.

NAT Scenarios and Impacts

NAT proposed five scenarios for consideration. The scenarios include the following three primary features:

1. New 345-kV circuit connecting the existing Edic and Fraser substations;
2. New 345 kV circuit connecting the existing New Scotland and Pleasant Valley substations; and
3. Various components intended to improve transfer capability of the existing electric transmission system without requiring additional lands for ROW.

The five scenarios proposed by NAT are described as follows.

Scenario 1: ED-FR; NS-LD-PV

Scenario 1 includes two project components. The Edic to Fraser (ED-FR) component consists of a new 345 kV single circuit overhead transmission facility originating at the existing Edic Substation, located in the Town of Marcy, Oneida County, proceeding generally south, and terminating at the existing Fraser Substation, located in the Town of Delhi, Delaware County. For more than 90 percent of its 80 mile length, the ED-FR component will parallel NYPA's existing Marcy-South electric transmission facility. This component will include series compensation equipment at the Edic Substation. NAT proposed to use a "vertical" monopole configuration where the facility is parallel to existing infrastructure and a "delta" configuration where new ROW is proposed. According to NAT's Part A Filing, typical "vertical" tangent monopoles will be 125 feet tall and cables will be configured on the same side of the structure. Typical "delta" tangent structures will be 105 feet tall and the cables will be configured on both sides of the structure.

The ED-FR 345-kV electric transmission facility proposed by NAT will require the procurement and clearing of new ROW along the entirety of its length. Where the proposed facility will parallel NYPA's existing Marcy-South electric transmission facility an 80-foot wide ROW expansion adjacent to the existing NYPA ROW will be required. The remaining length of the proposed ED-FR facility will require new 100 foot wide ROW. The proposed line will include new overhead crossings of the Mohawk River and Erie Canalway and clearing of forest vegetation near the canal crossing, conflicting with provisions of the Canalway Preservation and Management Plan, and incrementally affecting viewsheds within the Erie Canalway National Heritage Corridor.[24] The NAT facility design will also result in visual contrasts with the adjacent existing NYPA facilities through Herkimer, Otsego and Delaware Counties. The NYPA facilities were sited and designed to minimize visual impacts based on an extensive record in PSC Article VII Case 70126.[25] A variety of mitigation measures -- including several structure types -- were used based on facility location, whereas NAT proposes to use monopole designs for the length of its proposal.

The New Scotland to Leeds to Pleasant Valley (NS-LD-PV) component consists of a new 345 kV single circuit overhead transmission facility originating at the existing New Scotland Substation, located in the Town of New Scotland, Albany County, proceeding generally south and connecting to the existing Leeds

[24] Erie Canalway National Heritage Corridor Commission, Erie Canalway National Heritage Corridor Preservation and Management Plan, 2008; http://www.eriecanalway.org/about-us_preserve-manage.htm#sthash.8LrX1Sme.dpuf

[25] Case 70126, Power Authority of the State of New York – Marcy-South 345 kV Transmission Facilities, Opinion and Order Granting Certificate of Environmental Compatibility and Public Need (issued January 30, 1985).

Substation, located in the Town of Athens, Greene County. From the Leeds Substation the proposed facility will proceed generally southeast and connect to the existing Pleasant Valley Substation, located in the Town of Pleasant Valley, Dutchess County. The proposed alignment of the NS-LD-PV component is approximately 65 miles in total length, 55 miles of which would adjoin and be parallel to the existing National Grid 345-kV electric transmission ROW. NAT proposed to use a "vertical" monopole configuration for a majority of the NS-LD-PV 345 kV facility. Where the facility will cross the Hudson River parallel to National Grid's existing 345-kV and 115-kV transmission lines, NAT proposed to use lattice steel structures in order to conform to the scale, form, line, color and texture of the existing adjacent structures.

The NS-LD-PV 345-kV electric transmission facility proposed by NAT will require procurement and clearing of new ROW along the entirety of its length, approximately 65 miles. The project will require an 80 foot wide expansion of an existing 345-kV electric transmission facility ROW for approximately 55 miles and 100 feet of new ROW for the remaining 10 miles. Additional considerations of Hudson Valley visual resources are included below in section *Coastal Zones, Scenic Areas of Statewide Significance, and Local Waterfront Revitalization Program Considerations*, below.

Scenario 2: ED-FR; NS-LD-PV Alt 1

Scenario 2 includes two project components proposed by NAT. A description of the ED-FR component was provided in the discussion of Scenario 1 above.

The New Scotland to Leeds to Pleasant Valley Alternative 1 (NS-LD-PV Alt 1) component is a new 345 kV single circuit overhead electric transmission facility originating at

the existing New Scotland Substation. The facility would be parallel to the existing CSX railroad ROW southeasterly for approximately eight miles, then proceed generally south within the I-87 New York State Thruway (Thruway) corridor, leaving the Thruway to connect to the existing Leeds Substation in the Town of Athens, Greene County. From the Leeds Substation, the NS-LD-PV Alt 1 component will re-join the Thruway I-87 ROW and proceed further south to the Town of New Paltz. The total distance that the line will be sited within the I-87 Thruway ROW is approximately 55 miles. From the I-87 corridor in New Paltz, the facility will proceed east along new ROW for approximately 14 miles to the Pleasant Valley Substation.

The NS-LD-PV Alt 1 will occupy existing I-87 ROW for approximately 62 percent of its length and the remaining 38 percent of its length will be new ROW. The proposed ROW will be located within 100 feet of 25 existing residences and 30 existing residential structures (barns, garages and swimming pools) are located within the proposed ROW. Transmission poles would be placed in scenic areas of the Thruway and be out of scale with the existing generally low-profile highway. This alternative will require a new overhead electric transmission facility crossing of the Hudson River and new electric transmission ROW through both the National Park Service's Franklin D. Roosevelt National Historic Site and the Eleanor Roosevelt National Historic Site. The NS-LD-PV Alt 1 component is out of character for the area and with existing land uses and facilities. Use of the Thruway ROW would require conformance with the numerous utility accommodation provisions of Federal Highway Administration and New York State Department of Transportation, as described further below. Additional considerations of Hudson Valley resources are included below in

section *Coastal Zones, Scenic Areas of Statewide Significance, and Local Waterfront Revitalization Program Considerations*.

Scenario 3: ED-FR; NS-LD-PV; Series Compensation on FR-G; Loop Existing M-CC 345 kV to FR

The ED-FR and NS-LD-PV 345 kV electric transmission facilities proposed by NAT are summarized in the descriptions of Scenario 1.

NAT proposed series compensation on the existing Fraser to Gilboa (FR-G) 345 kV circuit at Fraser Substation. According to NAT, the proposed series compensation could enhance transfer capability and will not require acquisition of additional lands for ROW.

Additionally, NAT proposed to connect the existing Marcy to Coopers Corner (M-CC) 345-kV circuit to the existing Fraser Substation. The M-CC loop will be constructed entirely within existing ROW and will not require acquisition of additional lands. NAT failed to provide a description and details of the proposed facilities and construction methods for this line segment.

Scenario 4: ED-FR; NS-PV Alt 2; Series Compensation on FR-G; Loop Existing M-CC 345 kV to FR; Series Compensation on M-NS; Series Compensation on ED-NS

A description of the ED-FR component was provided in the discussion of Scenario 1.

The New Scotland to Pleasant Valley Alternative 2 (NS-PV Alt 2) component is a new 345 kV single circuit overhead electric transmission facility originating at the existing New Scotland Substation. The facility would be parallel to the existing CSX railroad ROW southeasterly for approximately eight miles, crossing the Hudson River, then proceed generally south within the existing National Grid

Greenbush to Churchtown (GB-CH) and Churchtown to Pleasant Valley (CH-PV) 115 kV corridors for the remaining 54 miles to the Pleasant Valley Substation.

The NS-PV Alt 2 component will require removal of the existing 115-kV transmission structures in the portions of the GB-CH and CH-PV ROW where the facility would be located and reinstallation of the existing 115-kV and new 345-kV circuits on new multiple circuit structures. NAT proposed to use a "vertical" monopole configuration where the facility is parallel to the existing CSX railroad ROW and multiple (three) circuit horizontal H-frame structures where the facility will be located within the existing 115 kV ROW. The proposed heights of the multiple circuit horizontal H-frame structures will be no greater than the heights of the existing structures within the 115 kV ROW and the facility will not require expansion of the existing GB-CH and CH-PV 115 kV ROW. NAT's proposed design does not appear to take into account an existing National Grid gas transmission facility located within the GB-CH ROW. This gas facility may complicate design and location of the facilities proposed for this scenario. Additional considerations of Hudson Valley resources are included below in section *Coastal Zones, Scenic Areas of Statewide Significance, and Local Waterfront Revitalization Program Considerations*.

The M-CC 345 kV circuit component is addressed in the discussion of Scenario 3.

Scenario 4 includes the following series compensation projects:

1. Series compensation on the existing FR-G 345 kV circuit as described in the description of Scenario 3;
2. Series compensation on the existing M-NS 345 kV circuit at Marcy Substation, located in the Town of Marcy, Oneida County; and
3. Series compensation on the existing ED-NS 345 kV circuit at Edic Substation.

According to NAT, the proposed series compensation could enhance transfer capability and will not require acquisition of additional lands for ROW.

Scenario 5: ED-FR; NS-KN-PV Alt 2; Series Compensation on FR-G; Loop M-CC 345 kV; ED-PR-KN Circuit as Proposed by Others

A description of the ED-FR component was provided in the discussion of Scenario 1.

The New Scotland to Knickerbocker to Pleasant Valley Alternative 2 (NS-KN-PV Alt 2) component adds a connection with a proposed Knickerbocker Switchyard facility, located in the Town of Schodack, Rensselaer County, to the NS-PV Alt 2 component described in the discussion of Scenario 4. The Knickerbocker Switchyard facility will be constructed by NAT on existing property owned by National Grid. Because the existing 115 kV ROW passes through the proposed Knickerbocker Switchyard location, no additional line routing will be required for the connection. A description of the NS-KN-PV Alt 2 route is included in the discussion of Scenario 4 (see description of NS-PV Alt 2 component).

The M-CC 345 kV circuit component is addressed in the discussion of Scenario 3.

NAT also proposed an Edic to Princetown (Schenectady County) to Knickerbocker project component (as proposed by

others). However, NAT failed to provide any description or details of the environmental impacts of this proposal.

NYTOs Scenarios and Impacts

The NYTOs proposed nine scenarios (Scenarios 6-14 above in the "Proposed Scenarios" table). Scenario 6 would connect a new Knickerbocker switching station and Pleasant Valley via Churchtown. Scenario 7 would connect Leeds and Pleasant Valley. Scenario 8 proposed upgrades to the Hurley Avenue Substation. Scenario 9 would connect New Scotland, Leeds and Pleasant Valley. Scenario 10 would connect Oakdale and Fraser as well as Edic and Pleasant Valley via Churchtown. Scenario 11 would connect Edic and New Scotland as well as Knickerbocker and Pleasant Valley via Churchtown. Scenario 12 would connect Edic and New Scotland to Leeds and Pleasant Valley. Scenario 13 would connect Edic and New Scotland and would include upgrades to the Hurley Avenue Substation. Scenario 14 would connect Edic and New Scotland and Leeds and Pleasant Valley.

The NYTOs are the only applicant that currently controls the ROW needed for its proposed scenarios and therefore does not require the acquisition of any additional ROW. Environmental impacts would be limited, with the exception of the Oakdale - Fraser ROW, which presently is only partially cleared of forest lands.

Scenarios with reconductoring segments would have less environmental impacts than those requiring large numbers of new structures on existing ROWs. Some structures will likely need replacement or be increased in height along the reconductoring segments, and some new access road construction will be required to accommodate installation of new conductors, wire-pulling and tensioner equipment.

Scenario 6: KN-PV via CH-PV

Scenario 6 includes the replacement of existing lattice tower double circuit 115 kV electric transmission facilities with new 115/345 kV double circuit monopole structures within the existing CH-PV ROW and a portion of the KB-CH ROW. The proposed Knickerbocker to Pleasant Valley (KN-PV) facility will originate at a proposed Knickerbocker Switching Station and terminate at the existing Pleasant Valley Substation. Cross section CT-PV XS-3 shows the proposed removal of two single circuit lattice tower lines and the installation of a new 345 kV/115 kV double circuit monopole. The monopole has davit arms that are different lengths on either side of the pole to carry the different voltage transmission lines. This creates an asymmetrical structure that increases visual contrast since there is a visual imbalance between opposing sides of each structure that limits the visual benefit gained by reducing the number of transmission structures in the ROW. The existing 80-foot lattice structures would be replaced with fewer, but slightly taller structures approximately 85 or 90 feet in height, thereby somewhat increasing their visibility. There should be some potential reduction of impact in agricultural lands, since lattice towers have a larger footprint than monopole structures.

Replacement of two parallel transmission facilities with new monopole double circuit structures may reduce the need to maintain the entire width of the existing ROW and thereby soften the ROW edge with successional vegetation.

Scenario 7: LD-PV(R)

Scenario 7 includes reconductoring of two existing 345 kV electric transmission facilities within the LD-PV corridor. The proposal will include replacement of approximately ten percent of existing lattice structures within the ROW and several other structures will be repaired and/or increased in height. New access roads will be constructed in some locations for wire-pulling operations. Lattice structures at the Hudson River crossing will remain and be reconductored.

Scenario 8: HA

NYTOs proposed several modifications to the existing Hurley Avenue Substation, in the Town of Hurley, Ulster County, including the installation of three 575-MW phase angle regulators (PARs), two 135-MVAR switched shunt capacitors and three 345-kV circuit breakers. The proposed modifications would require expanding the substation footprint, but would not require acquisition of additional lands.

The three Phase Angle Regulators (PARs) would be 345 kV at a rating of 575 MVARs and angle of +/- 30 degrees. The smaller units were chosen because NYTOs wanted to ensure that replacement and/or maintenance could be efficiently managed.

The PARs will be put in series with line 301, the existing Leeds to Hurley 345 kV line. The substation fence line will be expanded to install the PARs, switches and five new circuit breakers.

This project would replace the series capacitor project that the NYISO had identified in the class year study to make the energy from the proposed CPV Valley generating facility deliverable.

Scenario 9: NS-LD(R); LD-PV via CH-PV

Scenario 9 includes the reconductoring of two existing 345 kV steel lattice design electric transmission facilities within the NS-LD corridor including replacement of several existing structures. The improved NS-LD line would cross the Hudson River and structure upgrades or replacement may be required. This scenario also includes replacement of existing double circuit 115 kV electric transmission facilities with new 115/345 kV double circuit structures within the LD-PV corridor. The Leeds to Churchtown (LD-CH) segment of the LD-PV component will cross the Hudson River, parts of which are designated as Scenic Area of Statewide Significance(SASS). The existing Hudson River crossing, southwest of the City of Hudson, is not in a SASS but parts of this segment can be seen from the nearby Catskill-Olana SASS, sub-unit CO-6. The tops of structures northeast of the historic Olana site will be visible from limited locations within CO-6. The existing double circuit 115 kV lattice towers will be replaced with monopole structures of similar height to support double circuit 115 and 345 kV conductors. Increases in visibility or contrast with the existing scene are expected to be minimal due to the background and mid-ground distances from CO-6. Additional considerations of Hudson Valley visual resources are included below in section *Coastal Zones, Scenic Areas of Statewide Significance, and Local Waterfront Revitalization Program Considerations*.

Scenario 10: O-FR; ED-NS; KN-PV via CH-PV

Scenario 10 is the longest of the NYTOs' proposed projects and is also known as the "Enhanced Oct. 2013 Project."

The Oakdale to Fraser (O-FR) component of this scenario would be constructed on existing NYSEG ROW. The proposed 345 kV facility would originate at the Oakdale

Substation, located in the Town of Union, Broome County, proceed generally east, and terminate at the Fraser Substation, located in the Town of Delhi, Delaware County. Approximately 1,692 acres of un-cleared forest exists on the O-FR ROW (NYTOs Table 1.1-1). This ROW is wide and varies from 400-700+ feet in width and in most locations there is a single 345 kV transmission line within the ROW. Much of the ROW was not cleared during construction of the existing transmission lines and clearing hundreds of acres of wetlands and upland forests will be required for the proposed 58 mile transmission facility on NYSEG-owned ROW. Some new access roads will be constructed across streams and wetlands for construction at new 345 kV monopole structure locations.

The existing O-FR ROW includes wooden H-frame structures ranging from 65 to 80 feet in height. The addition of the proposed new transmission facility with steel monopole structures 105 feet in height will increase the visual contrasts of the ROW on the surrounding area, as the new structure size and design will contrast with existing facilities on the ROW.

The Edic to New Scotland (ED-NS) component includes the removal of one set of 230 kV conductors and insulators from each of the two existing 230/345 kV double-circuit monopole structures along the ED-NS ROW. One set of the existing 230 kV conductors and insulators will be replaced with 345 kV conductors and insulators. Additionally, two existing single-circuit 230 kV electric transmission facilities with H-frame structures will be replaced with a single-circuit 345 kV facility primarily using H-frame structures. Tubular steel monopole structures will be used intermittently throughout this 345 kV segment.

A description of the KN-PV via CH-PV component of this scenario is provided in the discussion of Scenario 6.

The replacement of existing structures with new structures proposed by NYTOs provides the opportunity to locate them in less environmentally sensitive areas, thereby mitigating environmental impacts. Replacing four existing transmission facilities with two new transmission facilities between Edic and Pleasant Valley Substations will reduce the number of structures in wetlands and agricultural fields, as shown in Table 1.2-4 (NYTOs, March 2, 2015). NYTOs proposed to reduce the number of structures in federal wetlands from 47 and 44, and from 37 to 32 in New York State-regulated wetlands. Wetlands and agricultural fields less than 700 feet wide may be spanned and some existing structures taken out of agricultural fields and floodplains. Additionally, no new permanent access roads are anticipated in agricultural lands.

Replacing the two existing 230 kV facilities with one 345 kV facility along the 91 mile ED–NS segment ROW will reduce the occupied width of the ROW, therefore potentially reducing total acreage requiring long-term vegetation management. Utilization of the existing stream and wetland crossings along the existing ROW will also lessen the potential impact on aquatic organisms and habitats. Some of these existing crossings will, however, need to be modified to handle the additional weight of concrete trucks and heavy cranes necessary to construct and erect the larger steel monopole structures. New roads to sites without currently existing structures may impact existing ROW habitats.

NYTOs' proposed transmission structures will be taller than those presently on their ROWs. Along the ED–NS ROW the existing wooden H-frame structures are typically 60 and 65 feet tall, while the proposed steel H-frame structures will typically be 86 feet tall, resulting in some degree of increased visibility. Similarly, along the KN–PV ROW, the existing 80

foot steel lattice structures will be replaced with fewer, but slightly taller, 85 or 90 foot monopole structures, thereby increasing their visibility. The ED-NS segment includes a crossing of the Mohawk River-Erie Barge Canal, but significant clearing of forest cover is not expected to occur at this location, due to the use of the existing maintained ROW for this project.

The NYTOs proposes to use a monopole to carry both a 345-kV and a 115-kV transmission line as shown in photographic simulation 1.4-5e and 1.4-5f. The cross section CH-PV XS-3 shows the removal of two lattice towers and the construction of a new 345 kV/115 kV monopole. The monopole has davit arms that are different lengths on either side of the pole to carry the different voltage transmission lines. This creates an asymmetrical structure that increases the visual contrast between the opposing sides of the structure and limits the visual benefit gained by reducing the number of transmission structures in the ROW.

Scenario 11: ED-NS; KN-PV via CH-PV

A description of the ED-NS component of Scenario 11 is provided in the discussion of Scenario 10. A description of the KN-PV via CH-PV component of this scenario is provided in the discussion of Scenario 6.

Scenario 12: ED-NS; NS-LD-PV(R)

A description of the ED-NS component of this scenario is provided in the discussion of Scenarios 7, 9, and 10. The NS-LD-PV(R) component will include reconductoring of two existing 345 kV electric transmission facilities. Additionally, several of the existing steel lattice structures within the ROW will be replaced.

Scenario 13: ED-NS; HA

A description of the ED-NS component of this scenario is provided in the discussion of Scenario 10. A description of NYTOs proposed modifications to the existing Hurley Avenue Substation is provided in the discussion of Scenario 8.

Scenario 14: ED-NS; NS-LD(R); LD-PV via CH-PV

A description of the ED-NS component of this scenario is provided in the discussion of Scenario 10. The NS-LD(R) and LD-PV via CH-PV components of this scenario are described in the discussion of Scenario 9.

NextEra Scenarios and Impacts

NextEra proposed five scenarios (numbers 15-19) in Cases 13-T-0455 and 13-T-0456. All scenarios include connecting the Oakdale and Fraser substations (as proposed in Part A filing in Case 13-T-0456) with a new 345 kV electric transmission facility originating at the NYSEG Oakdale Substation in Broome County, proceeding generally east, and terminating at the NYSEG Fraser Substation in Delaware County. The proposed O-FR component includes installation of new 97- to 105-foot tall spun concrete monopoles at various locations within the cross section of the existing ROW that is currently occupied by various utilities (NYSEG, NYPA and others). The existing utility ROW varies in width from 400 to 700+ feet. The proposed facilities will include overhead crossings of the Tioughnioga, Chenango, and Susquehanna Rivers.

NextEra's O-FR 345-kV transmission line is proposed for the same ROW as the NYTOs O-FR project (Scenario 10) discussed above. NextEra's O-FR facility is proposed as 57.03 miles, while NYTOs is proposed as 57.7 miles.

Scenario 15 would use a significant length of the Thruway ROW. Scenarios 16 and 17 propose connections between the Oakdale and Fraser Substations and two alternative Marcy South scenarios to connect Marcy to a proposed Princetown Substation and continue to the Rotterdam Substation. Marcy Southern Route 1 re-starts east of the Hudson River at Greenbush Substation and extends south to Pleasant Valley. Marcy Southern Route 2 is located in the same ROW as Marcy Southern 1, includes an additional component from Princetown to New Scotland to a new Knickerbocker Switchyard, and builds a replacement line from Greenbush to Pleasant Valley. Marcy Southern Route 2 requires two proposed Hudson River crossings at the north end of Schodack Island. Scenario 18 proposes a connection between Marcy (expanding the existing Marcy Northern ROW) and a new substation at Orchard Hill in New Scotland, Albany County. This scenario also includes facilities east of the Hudson River at the Greenbush Substation and follows the same route identified above in Scenarios 16 and 17 from Greenbush to Pleasant Valley.

Scenario 19 would connect the Greenbush Substation to the proposed Knickerbocker Switchyard, continuing south to the Churchtown and Pleasant Valley Substations.

Scenario 19a, which was developed by Staff for analytical purposes, would connect the proposed Knickerbocker Substation to Pleasant Valley.

Scenario 15: O-FR, Thruway ED-LD-PV

Although all of the NextEra scenarios include construction of a 345-kV transmission facility between Oakdale and Fraser Substations, the second component of this scenario is to build a 345-kV transmission line alongside the Thruway and will require acquisition of at least a 35 foot-wide corridor of additional ROW area adjacent to the Thruway. Each of the

substations will require additional equipment. The proposed spun concrete transmission towers are shown in photo simulations of the existing Thruway ROW (NextEra Case 13-T-0455 Part A Application, Volume V, Figure T-5-13).

A visual analysis identified 747 aesthetic resources of state significance within the project viewshed. Furthermore, 337 aesthetic resources may be affected, including 11 Forest Preserve parcels.

In general, travelers on the Thruway will have a clear view of the lower portions or more of most transmission towers, a view of multiple towers along the highway in flat straight stretches of the road, and a near-continuous view of new towers along some 150 plus miles of the Thruway.

A Visual Resource Assessment Report (VRAR) (March 23, 2015, Case 13-T-0455, NextEra Part A Supplement) was completed for the proposed transmission line along the Thruway. NAT also proposed use of the Thruway corridor in Scenario 2 and the following evaluation is applicable to that proposal. The NextEra VRAR included two photographic simulations of the travelers' view of the proposed 97 foot tall structure facilities along the Thruway, including the travel plazas near Little Falls and New Baltimore. A Thruway traveler at either of these locations will have a view of nine or more transmission towers and associated conductors. The NAT visual assessment included a photographic simulation of the New Baltimore Rest Area (Figure D-2 KOP A1-1). In general, travelers on the Thruway will have a clear view of the lower portions or more of most transmission towers, a view of multiple towers along the highway in flat straight stretches, and a near-continuous view of new transmission towers and conductors along some 150+ miles of the Thruway. The simulations demonstrate the views along the Thruway will be changed from a vista composed of an interstate

highway and variable visual settings to a vista that will be composed of interstate highway, transmission line and less variable visual settings. The prominence of the transmission line when set against rural or undeveloped areas will change the visual character of most of the entire 150+ mile long corridor. Thruway travelers will have a continuous and repetitious view of tall transmission towers that will diminish the quality of the visual setting. The construction of a transmission line along the Thruway will introduce a visual element that has strong contrast compared to the surroundings. The introduction of the rigid vertical forms creates a sharp edge, in contrast to gradual natural rolling land forms that blend with an irregular pattern of open lands, vegetation, and forest land on a variety of land forms. The color of facilities can be selected to reduce contrast, however due to seasonal conditions and background colors there will be potential for strong color contrast in various locations.[26]

The proposed overhead transmission facilities would be built in scenic areas of the Thruway and be out of scale with the (relatively) low profile highway. Visual exposure would be high, since the Thruway carries high volumes of traffic. The Average Daily Traffic (ADT) from Rome to Schenectady (I-90) varies from 15,179 to over 26,832 in 2012.[27] In the Albany to Schenectady Thruway segment the ADT volume is 40,988 to 73,859, including both commuter traffic between the cities and longer distance travelers. Immediately south of Albany the Thruway (I-

[26] United States Department of the Interior, 2013 Best Management Practices for Reducing Visual Impacts of Renewable Energy Facilities on BLM Administered Lands Bureau of Land Management. Cheyenne, Wyoming, p. 342.

[27] NYS DOT Traffic Data Viewer, 2012 Counts, http://gis3.dot.ny.gov./html15review/?viewr=tdv.

87) ADT is 37,120. ADT is based on a continuous count of vehicles on the highway segment. The ADT is a 24 hour vehicle count that includes data collected at night; therefore the number of daytime viewers is less than the full ADT. Typically, 75 percent of Thruway traffic occurs during the daylight hours. The number of viewers in the Schenectady to Albany segment of the Thruway during daylight hours was 30,741 to 55,394 in the most recent traffic count report. Large numbers of drivers and passengers will have a clear view to the individual towers and will see numerous towers along the vista that makes up the visual setting of the Thruway. The Thruway's existing vista of a mix of mowed ROW with forested areas will change to one that is continuous area of mowed ROW with clear views of each tower 50-100 feet from the travel lanes, and generally uninterrupted views of towers along the corridor. Loss of forest cover will change the visual landscape character from rural to a setting that is typical of ROWs in more developed areas.

Aesthetic resources of state significance include sites and land uses of interest to or are identified by regulatory programs of New York State agencies. Some of the affected aesthetic resources of state significance within three miles of the proposed ROW include 11 state parks or Historic Sites, seven Forest Preserve parcels, five SASS and five state nature reserves or historic preserves. Hudson River coastal area resource considerations including SASS and Local Waterfront Revitalization Program (LWRP) are included below in the section *Coastal Zones, Scenic Areas of Statewide Significance, and Local Waterfront Revitalization Program Considerations*.

Staff performed an Electromagnetic Field (EMF) study and an Electrostatic Field study of the NextEra design, based on reported structure heights and Staff's assumed clearances for the lines and bundle configurations, as NextEra did not provide

this information. Based upon the NYS DOT Utility Accommodation Policy, the transmission line would need to be located near the outer edge of the Thruway ROW, and calculations that indicate NextEra will need a 100 foot wide ROW or 50 feet on either side of the center line, Staff concludes that one side of the facility ROW would need to be outside of Thruway ROW on private property, requiring the acquisition of new ROW by NextEra (or by NAT, for Scenario 2) to accommodate the facility and necessary clearances.

The facility would not be able to be in close proximity to any Thruway Service Areas. Close proximity to Service Areas is proposed, as represented by NextEra (and NAT) in the simulations of proposed facilities (See, NAT Case 13-T-0454, Figure D-2 KOP A1-1, and NextEra Case 13-T-0455 Part A Application, Volume V, Figure T-5-13). Staff concludes that such close proximity would result in induced voltages in vehicles and large trucks parked near the overhead AC lines. This could result in drivers experiencing static electric shocks when they returned to their vehicles. Tanker vehicles containing large volumes of volatile fluids travel on the Thruway, creating a higher risk from static charges in some situations.

Audible noise calculations from transmission facility operation show that the line is relatively quiet as compared to Thruway traffic noise. Given the noise from flow of traffic, temporary construction noise from installation of a transmission facility at this location is not expected to significantly increase the daytime average noise levels at residences located near the Thruway ROW as it would in a rural environment with no interstate highways in the vicinity.

NextEra has estimated that there are 750 residences within 1- to 250- feet of the proposed ROW (Table 2.4 -

Residences within the Marcy/Edic to Pleasant Valley Project Area, March 2, 2015). Additionally there are 2,584 residences within 500 feet of the ROW, demonstrating that the Thruway ROW proposal has the largest number of residences near the facility compared to all other scenarios in this proceeding.

Scenario 16: O-FR and Marcy Southern 1

Marcy Southern 1 is a project in three segments: Oakdale to Fraser (O-FR), Marcy to Princetown to Rotterdam (M-PR-R), and Greenbush to Pleasant Valley (GB-PV). The O-FR component is described above in the discussion of Scenario 15.

The proposed Marcy Southern 1 route would cross the Mohawk River and Erie Barge Canalway National Heritage Corridor. All construction would occur within existing ROW; based on review of aerial photography most of the ROW is cleared of large trees. NextEra proposes to decommission two National Grid 230 kV transmission lines from Marcy Substation to the proposed Princetown Substation and replace them with a single 345 kV facility. Throughout an approximately 40 mile segment, one set of existing 70 foot tall wood H-Frame structures would be replaced by 97 foot tall spun concrete monopoles, thus increasing the average height of structures by 28 feet. Throughout this segment of the ROW, the second set of existing 230 kV H-Frame structures that is not replaced would remain (as shown in NextEra Appendix B, Figure 2A-4B Project Visualizations). As noted above, the visual assessment by NextEra evaluated the visibility of the proposed transmission towers, without showing the visibility of the current transmission facilities in the ROW. In order to assess net increase or decrease in visibility of the ROW, locations and heights of existing transmission towers are required. NextEra's viewshed analysis is sufficient for the current evaluation.

NextEra proposes to build the Princetown Substation with two 600 MVA 345/230 kV autotransformers. The scenario also includes construction of a 115 kV transmission facility from the existing Greenbush Substation to a proposed Knickerbocker Switchyard. From the proposed Knickerbocker Switchyard to Pleasant Valley Substation, existing double-circuit steel lattice 115 kV structures would be replaced by a 345 kV transmission facility using spun concrete monopoles. The visual analysis (Marcy to Pleasant Valley) identified 381 aesthetic resource of state significance within three miles of the ROW, and potentially 99 that may be affected, including five State Parks or Historic Sites, one SASS, nine Forest Preserve parcels and three State Nature or Historic preserves.

NYTOs Scenario 11 and NextEra Scenario 16 are competing proposals that would be built on the same ROW between the Edic-Marcy area and Princetown. The differences in the estimates of the land cover, land use and resource information between NextEra and NYTOs, as reported in Table 1, is due to the difference in the reported width of the affected area.

NextEra and NYTOs have submitted visual analysis that includes visibility mapping and visual simulations. NextEra visual simulation VP-3 (Darrow Road near State Route 162) is east of NYTOs visual simulation SO-1 and both appear to be in the Town of Root, Montgomery County. The landscape setting is open farmland with mixed forest. The NextEra visual simulation shows the proposed monopole and the existing wood H-Frame to be retained, while NYTOs simulation of Scenario 11 shows a new steel H-Frame with removal of the existing wood H-Frame structure. While the NextEra simulation shows the increase in contrast of adding different structure types to an existing ROW, the NYTOs photographic simulations show the more limited

contrast of the proposed line due to the attendant removal of the line to be decommissioned.

NextEra photo simulation VP-4 and NYTOs S-19B are both in the Guilderland-New Scotland area of Albany County. The photographic simulation VP-4 shows the replacement of the large, tall steel H-Frame structures with two spun-concrete monopoles and conductors held in a delta formation. This change adds conductors, insulators and larger transmission structures. There is a noticeable increase in the numbers and types of structure elements in the vista. The NYTOs' photographic simulation S19b is a side-on view of the ROW that is difficult to compare to the NextEra down-the-line axial view. The NYTOs project leaves the large tall steel H-frame in place and adds an H-frame to carry the new 345 kV transmission line. This commits space in the ROW to a new transmission line but visually reduces the number of structural elements in the visual setting.

Scenario 17: O-FR and Marcy Southern Route 2 CH-PV

A description of the O-FR component of this scenario is provided in the discussion of Scenario 15.

The Marcy Southern Route 2 Churchtown to Pleasant Valley (Marcy Southern 2 CH-PV) component will include a Hudson River crossing by either rebuilding the existing National Grid overhead crossing, installing by a bridge attachment, or by underground installation via HDD. The visual analysis of Scenario 17 identified 626 aesthetic resources of statewide significance within three miles of the ROW, 182 of which may be affected, including six State Parks or Historic Sites, one SASS, 15 Forest Preserve parcels and three State Nature or Historic preserves. Coastal area resource considerations including SASS and LWRP are included below in section *Coastal Zones, Scenic*

Areas of Statewide Significance, and Local Waterfront Revitalization Program Considerations.

The arrangement of proposed structures from Marcy to New Scotland and Greenbush to Pleasant Valley is the same as that proposed for those segments of the Marcy Southern Route 1 component of Scenario 16. However, between Princetown and Knickerbocker, Scenario 17 includes removal of the metal H-frame structures that support the National Grid 345-kV (designed to 765 kV) transmission facility, but leaves the facility on wood H-frames in the ROW between Marcy and the proposed Princetown Substation. Scenario 17 is proposed for the same ROW as NYTO scenarios 10,11,12,13 and 14.

Table 1 provides additional descriptions of Scenario 17 and the resources located in the ROWs.

Scenario 18: O-FR; M-OH with GB-KN-CH-PV

Scenario 18 includes three components: the O-FR 345-kV facility, Marcy to Orchard Hill (M-OH) 345 kV facility via Northern Route, and Greenbush (115 kV) to Knickerbocker to Pleasant Valley (GB-KN-PV) 345 kV facility. A description of the O-FR component of this scenario is provided in the discussion of Scenario 15.

The proposed M-OH component is proposed as a 110-foot wide ROW expansion adjacent to existing National Grid ROW that contains the Edic-New Scotland (M-NS) 345-kV line, which is built on existing 90 foot lattice or 90 foot metal H-frame structures. The existing M-NS ROW includes a 345-kV line built on 175 foot tall green metal H-frame, designed to 765 kV, and the Rotterdam-New Scotland 115-kV line or other 115-kV transmission facilities built on 70-90 foot lattice or wood H-frames. This scenario will include construction of a new substation located on Orchard Hill Road in the Town of New

Scotland, Albany County, and a connection to the existing New Scotland Substation. The M-OH component, which is approximately 84 miles in length, would occupy 1,106 acres of land. The proposed line would include new overhead crossings of the Mohawk River and Erie Canalway and clearing of forest vegetation near the canal crossing, conflicting with provisions of the Canalway Preservation and Management Plan, and incrementally affecting viewsheds within the Erie Canalway National Heritage Corridor. Additionally, visual analysis of the facility location identified 289 aesthetic resource of state significance within three miles of the ROW which may be affected, including two State Parks or Historic sites and 12 Forest Preserve parcels.

The GB-KN-PV component of Scenario 18 would be a 115-kV transmission facility originating at the Greenbush Substation, in the Town of East Greenbush, Rennselaer County, proceeding approximately eight miles south to a proposed Knickerbocker substation, in the Town of Schodack, where the facility becomes a 345 kV facility proceeding south and terminating in Dutchess County at the Pleasant Valley Substation. This component would also include a connection to the existing Churchtown Substation in Claverack, Columbia County. The Knickerbocker-Churchtown segment traverses the Columbia-Greene North SASS area, as described below in section *Coastal Zones, Scenic Areas of Statewide Significance, and Local Waterfront Revitalization Program Considerations.*

Scenario 19: O-FR; GB-KN-CH-PV

Scenario 19 includes two primary components. The first component is the O-FR 345 kV electric transmission facility described in the discussion of Scenario 15. The second component is an electric transmission facility originating at the Greenbush Substation and terminating at the Pleasant Valley

Substation. This component will include two additional connections at the proposed Knickerbocker Switchyard and the existing Churchtown Substation. Both the O-FR component and the Greenbush to Knickerbocker to Churchtown to Pleasant Valley (GB-KN-CH-PV) components will be constructed within existing ROW.

The GB-KN-CH-PV component will include 7.8 miles of a 115 kV transmission line from the Greenbush Substation to a ring bus at the proposed 345 kV Knickerbocker Switchyard. From Knickerbocker, two 115/345 kV double circuits will be constructed south to the Churchtown Substation and a single 115/345 kV double circuit facility will proceed further south and terminate at the Pleasant Valley Substation. The KN-CH-PV component will have potential for significant visual impacts. The visual analysis of this component identified 273 aesthetic resources of state significance within three miles of the ROW, including five State parks. The line will pass through the Columbia-Greene North SASS area on existing ROW, as described below in section *Coastal Zones, Scenic Areas of Statewide Significance, and Local Waterfront Revitalization Program Considerations*.

Attached Table 1 provides additional description of this scenario and summary of the environmental components.

Scenario 19a: KN-CH-PV

Scenario 19a was a subset of Scenario 19 devised by Staff and NYISO for comparative analysis and contains only the KN-CH-PV component of Scenario 19, described above. This scenario includes construction of a new Knickerbocker Switchyard and replacement of existing 115 kV circuit with two 345/115 kV circuits connecting the proposed Knickerbocker Switchyard and existing Churchtown Substation. The scenario also includes construction of a new 115/345 kV circuit connecting the existing

Churchtown and Pleasant Valley Substations. The total combined length of the KN-CH-PV facility will be approximately 53.3 miles.

Boundless Scenarios and Impacts

Boundless has proposed two scenarios in this proceeding. Scenario 20 includes the following components:

1. Reconductoring of the existing 345 kV line from the proposed CPV Valley Tap to the Rock Tavern Substation;
2. Reconductoring from the Leeds Substation to the Hurley Avenue Substation;
3. Installation of two sets of 345 kV underground conductors from the Roseton Substation to the East Fishkill Substation;
4. 40 percent series compensation equipment to be placed along the Leeds-Hurley Avenue-Roseton 345 kV lines; and
5. Installation of a 0.5 percent series reactor facility on the New Scotland to Leeds circuits.
6. Reconductoring of the existing 345-kV circuits from the Athens Generating Substation to Leeds Substation and reconductoring of the existing 345 kV circuits from the Leeds Substation to the Pleasant Valley Substation.

Boundless' Scenario 21 includes all above listed components except number six. It should be noted that Staff has assumed that the section titled "Athens to Leeds" will not be included as part of Scenario 21. "Athens to Leeds" is limited to the short lengths of the interconnection lines between the Athens generating facility and the Leeds Substation (approximately 3000 feet). This particular section is included as a separate entity in some Application sections and combined as part of the "Leeds to Pleasant Valley" segment in other areas of Boundless' Application. For clarification, the "Athens to

Leeds" and "Leeds to Pleasant Valley" sections will be referred to as separate segments in this discussion.

For its reconductoring proposals, Boundless would use aluminum conductor composite core (ACCC) or aluminum conductor composite reinforced (ACCR) cables to replace the existing aluminum conductor steel reinforced (AACSR) cables. The cables proposed for use by Boundless reportedly increase conductivity and capacity. According to Boundless, helicopters can be used during removal of old and stringing of new conductors. Staff counters this notion, and expects that most of these activities will be performed using traditional methods utilizing ground equipment. The reconductoring process is described previously in this document. Some minor aspects of the reconductoring may be accomplished with the aid of helicopters; however, Boundless has not provided documentation supporting such use.

The specific composite cable proposed by Boundless requires unique splicing and pulling, as the cable itself is delicate and may require more equipment and land area for setup, handling and wire-stringing and pulling, than described previously in this document. Structural feasibility studies will need to be performed on towers prior to Staff's endorsing of the proposed reconductoring activities.

Some information provided by Boundless was insufficient and did not provide the environmental data necessary for full assessment of the projects. Therefore, Staff performed preliminary desktop studies for identifying potential impacts that would result from missing information; some of which is incorporated in Table 1. Staff's analyses included review of aerial photography and GIS data to determine certain impacts.

Scenario 20: Athens Generating–LD–PV(R); LD–HA(R); CPV–RT(R); RS–EF

Reconductoring is proposed from the Athens Generating Substation to the Leeds Substation, the Leeds Substation to the Pleasant Valley Substation, the Leeds Substation to the Hurley Substation, and from the CPV Valley Tap line to the Rock Tavern Substation. The proposed conductors will be ACCC or similar cables, and according to the Application, will utilize existing structures in the ROW. Certain structures, according to Boundless, will require upgrading of cross bracing units. Bounless also notes that larger sized conductors could be installed if larger capacity is desired. Some towers along this route would likely need replacement, as expressed in the STARS report. This report identified structures along routes that Boundless has proposed to reconductor, as needing upgrades within ten years (noted in 2012). From an environmental standpoint, it would not be practical to install new conductors on aging infrastructure that would require another sequence of more extensive environmental impacts in the near future. Consideration should be given to replacement of the aging infrastructure prior to and during reconductoring activities.

According to Boundless, aerial reconductoring via helicopter will be done on existing transmission structures, and therefore, no ground disturbance is anticipated to wetlands and/or waterbodies. However, as previously noted, Staff anticipates that most aspects of the helicopter reconductoring proposal appears to be infeasible. Consequently, some minor environmental impacts should be expected to wetlands and water bodies during ground activities. Data provided in Table 1 indicates wetlands/waterbodies crossed along the entire existing ROW. The number of wetlands and waterbodies noted will not necessarily be impacted during reconductoring activities, as it

is unknown if structures exist directly within these features, or if access roads will be used to cross through these features.

Boundless has proposed to install two underground 345 kV circuits from the Roseton Substation to the East Fishkill Substation, a distance of approximately eight miles. Approximately one mile of this route will be installed using the HDD method to cross the Hudson River. The remaining cable route is proposed to be installed via traditional open cut trenching; minor impacts can be expected from these activities. Impacts to be expected from the HDD activities include potential drilling fluid leaks or "frac-outs" and clearing for staging areas for construction equipment and entrance and exit pits. Additionally, noise to the surrounding community can be expected during HDD operations. Impacts expected during open cutting include traffic disruptions, erosion disturbances, and noise to residences and businesses during trenching and backfilling.

The proposed reconductoring from Leeds to Pleasant Valley will traverse the Hudson River from the Village of Athens, Greene County, to the Town of Greenport, Columbia County; crossing the designated coastal zone and Athens Village LWRP area of Greene County. Resource and environmental aspects of reconductoring the Leeds-Pleasant Valley line is generally addressed above in discussion of Scenario 7.

Scenario 21: LD-HA(R); CPV-RT(R); RS-EF

Scenario 21 includes the following three project components: LD-HA reconductoring, CPV-RT reconductoring, and the RS-EF 345 kV underground segment. A description and summary of environmental factors for each of these components are included in the discussion of Scenario 20.

SUMMARY OF COMMENTS

Initial Comments

Nearly 20 parties to these cases filed initial comments on the Part A filings of NAT, NextEra, the NYTOs and Boundless. General comments were filed by four State agencies, the New York State Department of Environmental Conservation (DEC), New York State Thruway Authority, New York State Department of Agriculture and Markets (Ag&Mkts), and the New York Power Authority (NYPA).

DEC stated that it has concerns regarding proposed projects that would use Thruway ROW because of potential impacts to wetlands and endangered species associated with such uses. Other than the proposals that seek to use Thruway ROW, DEC declined to take a position on any of the proposals and reserved further comments for the prospective Part B Application process. DEC's main comments were focused on ensuring that any Part B Applications contain enough information to allow DEC to conduct a full environmental review in accordance with their regulations.

The New York State Thruway Authority stressed that they have extensive requirements related to any construction in the ROW of the Thruway that Applicants must comply with. Specifically, the Applicants would be required to comply with Federal Regulations including but not limited to 23 CFR Part 645 regarding longitudinal accommodation of non-communication utilities. Exceptions from these Federal Highway Administration (FHWA) requirements may be granted, but must be pursued through the New York State Department of Transportation (NYSDOT) and by following the provisions of NYSDOT's "Accommodation Plan for

Longitudinal Use of Freeway Right-of-Way By Utilities."[28] This exception policy requires that any non-communications utility demonstrate that all alternatives to the use of controlled access ROW be exhausted before FHWA approval (and NYSDOT) can be granted. This policy in other words, disfavors the use of controlled access ROW, including the Thruway, for use by non-communications utilities. Therefore, any proposed scenario that would use Thruway or other DOT controlled access ROW would have to comply with this policy, including demonstration that no other feasible alternatives exist.

Ag&Mkts' comments expressed concerns that certain required information regarding land use and land control was missing from the Applicants Part A filings. Specifically, that a table identifying potentially impacted lands using specific categories is missing. In addition, Ag&Mkts commented that information across the various proposals was not accurate and the Applicants should amend or supplement their applications with more accurate data. Ag&Mkts also stated that it had concerns over many of the proposed routes that added lines because of possible impacts to farm activities and the resource base. Ag&Mkts is generally in favor of reconductoring activities and the replacement of lattice poles (with large footprint) with monopoles (with smaller footprint) as it would limit the amount of ROW, and thus agricultural lands, to be disturbed and occupied in both constructing and maintaining the transmission facilities.

[28] See, 17 NYCRR Part 131; Case 12-G-0297, Proceeding on Motion of the Commission to Examine Policies Regarding the Expansion of Natural Gas Service, NYSDOT Accommodation of Non-Communication Utilities on New York State Freeway or Controlled Access Rights-of-Way (filed January 9, 2013).

Ag&Mkts stated with respect to NextEra's project Scenario 18 that it would require additional land and there will be specific adverse impacts to dairy operations in Montgomery County that support the growing yogurt products industry. Ag&Mkts recommended rejecting Scenario 18. The addition of new structures would create obstacles for farmers who work the land in the areas where the projects are proposed. Ag&Mkts favors use of the Thruway ROW, which would reduce the impact on agricultural lands. These comments also stated that the Edic to New Scotland route, which removes structures, is beneficial whereas the Princetown to New Scotland segment would add structures having a negative impact on agriculture. However, the NextEra Scenarios 16 and 17 had potentially less involvement of agricultural lands than the NYTO Scenarios 11-14. Similarly Ag&Mkts stated that the Knickerbocker to Pleasant Valley route, which would reduce land cover by replacing lattice structures with monopoles and the Leads to Pleasant Valley reconductoring will have less impact on agriculture than projects with new structures. Ag&Mkts stated that the Boundless projects (Scenarios 20 and 21) would have the least impact to agricultural land use since most of the activities proposed are related to reconductoring lines with no new structures proposed.

NYPA stated that some of the projects proposed by the Part A submissions would affect the operation and maintenance of NYPA assets and interfere with portions of NYPA ROW.

Several municipalities located in the Hudson Valley also submitted comments. The Town of Wappinger made general comments that the latest technology should be used to benefit the ratepayer and that the integration of innovative technologies should be paramount in this case to ensure ratepayers receive the maximum long-term benefits from the transmission upgrades.

The County of Delaware submitted general comments that the Part A Applications as filed (Scenarios 1 through 5, 10 and 15 through 19) did not contain enough information to allow for serious investigations into the impacts of the proposed projects through the six towns that it represents. It stated concerns about clearing and widening of corridors, impacts to local infrastructure, impacts of construction activities, changing viewsheds due to increased tree clearing activities, impacts to the New York City Watershed, and the need for flexibility to allow for smart growth. They request that each applicant work with the local communities to ensure minimal impact from any project.

The Town and Village of Athens filed comments similar in nature to those of Delaware County stating that they had insufficient information at this point to determine the impact to their community of the various proposals. The Town and Village also asserted that because so many utility assets already exist in their community that the cumulative impacts of all those assets needs to be evaluated as part of this proceeding. The Town and Village of Athens raised a specific concern about possible overhead construction across the Hudson River and asked that undergrounding of the lines across the river be considered in lieu of new construction or replacement of existing structures. Also raised in their comments was the need for new transmission lines given other proposed action within the State such as the REV proceeding.

Dutchess County also submitted comments with respect to whether there is a continued need for transmission upgrades, the associated costs to consumers, and the environmental impacts to the County of the proposals. Dutchess County stressed the need to evaluate other proceedings, especially REV, to determine whether new transmission is needed. In addition, Dutchess

County stated that since transmission lines have such a long service life particular attention needs to be paid to protecting viewsheds for generations to come. Dutchess County noted specifically that REV's goals of implementing real time pricing and allowing non-transmission alternatives to drive down the need could forestall future transmission investments. The County is concerned about the high costs of transmission upgrades being passed on to consumers without them receiving the direct benefits in terms of price reduction. Dutchess County, as part of the Hudson Valley Smart Energy Coalition (HVSEC or the Coalition) supports the comments submitted by the Coalition.

HVSEC - the Coalition of municipal and environmental groups - submitted extensive comments that generally discussed the need, cost, and environmental impacts of the proposed projects. In addition HVSEC included charts ranking the projects from low to high impact in each category. These comments and the accompanying charts are available on the Commission's website for review (along with those of each commenter). HVSEC's general comments were similar to other municipalities and environmental groups in that they stressed the need to evaluate non-transmission alternatives and whether there is in fact congestion that transmission solutions can alleviate. HVSEC believes that the Thruway alternatives will have the most negative visual impacts and that reconductoring projects should be preferred over those using new ROW. Again, HVSEC commented on the need to properly evaluate environmental impacts to the region and that the Commission's benefit costs analysis should be robust.

Scenic Hudson also filed comments. These comments provided a detailed listing and analysis of Hudson Valley resource impacts potentially resulting from the various scenarios. Visual, historic, land use, natural resource and

conservation of agricultural and important habitat areas are described at length in the comments. These comments and the accompanying charts are available on the Commission's website for review.

The Town of Saugerties commented that any project that proposes to use Thruway ROW will have a significant impact on the Town. Any proposed use of the Thruway will impact the Town's Open Space Plan and might impact a historical viewshed including locations that are significant to the Hudson River School of Art and Hudson Valley National Heritage Area viewshed corridor.

One individual, Edwin Pell, submitted comments that any decommissioned lines that result from transmission upgrades be converted into green-ways for the enjoyment of New York residents.

The Otsego County Conservation Association, Inc. (OCCA) in collaboration with Otsego County filed extensive comments on NAT's proposals to build new facilities (Edic-Fraser) adjacent to the NYPA Marcy South line in Scenarios 1 through 5 with respect to the following categories: Economic Impacts, Local Ordinances, Communications, and Transportation. With respect to the economic impacts of the NAT projects, the comments stated that the NAT proposal is deficient and the economic analysis performed by NAT relies on incorrect methodologies and assumptions. It asks that in any Part B application NAT be required to include an updated economic impact study using current economic information and industry accepted methodologies. OCCA and the County also stated that in the Part B Application NAT should be required to show not only that any project would comply with local ordinances but also how the project would comply with each affected municipality's Comprehensive Plan and LWRP if applicable. With respect to

Communications, the OCCA and the County asked that any NAT Part B Application be required to show how the Edic to Fraser line will affect or interfere with various communication systems such as radio, television, and cellular systems. OCCA and the County also requested that any Part B applications contain Traffic Impact Studies and Loss of Service analysis related to any activities that will affect transportation systems.

OCCA also filed on behalf of a coalition of environmental groups based in Otsego County including Otsego Land Trust, Otsego 2000, Inc., the Butternut Valley Alliance (BVA), and the Delaware-Otsego Audubon Society. OCCA filed an extensive report outlining the impacts of the proposed Edic to Fraser project to inform the public record and evaluate the projects compatibility with the environmental and community characteristics of Otsego County. The report outlined the concerns of OCCA in relation to need and public benefit, siting, alternative proposals, environmental impact, other impacts, compliance with local laws, and community outreach conducted by OCCA. The report is extensive and not conducive to summary and is available on the Commission's website for review.

The Town of Wappinger made specific comments regarding the Boundless proposals and stated that Boundless neglected to mention that its undergrounding activities and Hudson River crossing as proposed will be located near the proposed NYC Delaware Aqueduct Bypass Tunnel. The Town of Wappinger stated that any activity related to the Boundless proposal should not interfere with the proposed NYC Delaware Aqueduct Bypass Tunnel, and asked that Boundless set forth a plan to insure that any transmission upgrades will not interfere with the proposed tunnel. The Town of Wappinger also stated that Boundless makes no mention of other potential utility crossings in its proposal. In light of these omissions the Town asks that the additional

information about these deficiencies be reviewed before Boundless submits any Part B application.

Reply Comments

Each of the Applicants submitted comments on the Part A Applications. Each of the Applicants stated why their projects were better suited to meet the requirements of the Commission than those of the other Applicants for either technical or practical reasons. Those aspects of the Applicants' comments will not be summarized here but are part of the record and are available for review. We will summarize other aspects of the Applicants' reply comments here, namely, their comments on cost estimates, both for their own projects and those of the others, and their responses to the intervenor comments.

Cost Estimates

In its reply comments, Boundless claims that its Leeds Path West is one of the lowest cost proposals because it seeks to rebuild the existing system and not build new facilities. Boundless argues that it is the least cost alternative because its proposal "stands alone in focusing on fixes to the existing system while concurrently providing important enhancements of high technical value but low social and environmental impact." Boundless argues as a result of this that the cost estimates of "new build" portions should be compared which would yield a highly favorable benefit/cost ratio for Boundless.

Boundless also states that NextEra's cost comparisons are "artificial and should be disregarded" because NextEra only reviewed a portion of the Boundless project for cost comparison purposes. Boundless claims to be the only project to include SRIS and included future upgrade costs in its proposal. Finally,

Boundless claims that NYTOs' and NAT's proposals should be given a lower rating because of their high estimated costs.

It its reply comments, NAT responds to Boundless' claim that their project estimates were incorrect. Boundless claimed that NAT's proposals would have higher costs, more environmental impacts and affect more residences. NAT points out that their submission is not an "all or nothing" project but rather an assemblage of components, any of which could stand alone to mitigate cost or environmental concerns.

NAT filed initial comments on the Part A submission in which it claims that many of NextEra's cost estimates were too low and that other aspects of the projects costs were improperly omitted. For example, NAT states that NextEra did not include the costs associated with sectionalizing the 115-kV line for its removal which would reduce the impacts of construction activity, but increase costs.

On May 12, 2015 NAT filed an objection to certain reply comments claiming that the comments were in fact not comments but improper attempts by other Applicants to modify their respective cost estimates. NAT claimed NextEra in particular filed reply comments in order to make their project more competitive with NAT's from a cost standpoint. NextEra also filed an objection to NAT's reply comments claiming that contained within NAT's comments was an attempt to amend its bid. Both NextEra and NAT claimed that the attempted modification was contrary to the Commission's Orders.

NextEra further claimed in its reply comments that some cost estimates were not included in the NYTOs estimates, including upgrades to the 115-kV Switchyard at the Rotterdam Substation. The NYTOs responded that this work is a planned system upgrade and thus not included since it would be completed regardless of the outcome of this proceeding. NextEra also

claims that the conductor size proposed by the NYTOs is too small and will lead to a reduction in power flow and thus increase the total costs of operation. The NYTOs responded with their own calculations indicating that NextEra's calculations were incorrect. The NYTOs also responded to Boundless' claims that the most expensive projects were those of the NYTOs by pointing out that Boundless did not provide information capable of producing an apples-to-apples comparison of project costs.

Responses to Intervenor Comments

In response to the HVSEC comments, which state that there is no need for transmission projects in general, the NYTOs responded that there is a need for three reasons: 1) congestion 2) gaining infrastructure; and 3) the hindrance of renewable development. The NYTOs argued further that changes in generation portfolios due to shifting regulatory and market landscapes make the need for upgraded transmission between UPNY and SENY even more important and cost effective. The NYTOs also responded to several comments from both HVSEC and Ag&Mkts about maintaining the use of agricultural lands, by stating that lattice towers occupy more space than the monopoles proposed, which should allow for more space for agricultural activities. The NYTOs responded to the Town and Village of Athens concerns regarding the visual impacts of the proposed Hudson River crossing by stating that the proposal doesn't increase the number of crossings and that it is too soon in the process to know what impacts there will be from any construction activities. The NYTOs responded to Delaware County that they will try to minimize impacts during construction.

Boundless responded to HVSEC's comments by stating its support for the proposition that the best proposal would be one that met the initial 1,000 MW criteria, in the least cost

manner, without increasing ROW usage, and that had the fewest environmental and visual impacts. Boundless claims that its project proposals best meets these criteria.

In its reply comments, NAT pointed out that the vast majority of comments from other parties and Applicants were devoted to the potential future Part B process and information that needs to be included in that part of the application, information that the Commission has not yet asked for. For instance, as stated above, DEC stated that it would like the Applicants to ensure that wetlands are mapped appropriately. NAT also specifically addresses a number of intervenor comments. NAT wanted to correct an error that the Town and Village of Athens had made in their initial Part A comments, namely that it was NextEra's proposal that required a new corridor between I-87 and the Leeds Substation, and not the NAT proposal which would simply expand existing ROW.

OCCA commented that they would like to see information related to "open space and recreation impacts" to historic properties that NAT claims have not yet been evaluated for listing in the State or National Registers. NAT stated that some of the information OCCA requested would have to come in the form of a Part B Application not a Part A Application, but noted their continued commitment to call upon local resources in addressing project related issues. In particular NAT wanted to point out that it had previously changed its proposed route as a result of meeting with the Otsego Land Trust.

NAT also discussed the various comments focused on the expansion of ROW and points to Commission language that states that to the degree possible Applicants should minimize both the acquisition of additional lands for ROW use and the construction of major electric transmission facilities that are out of scale

or character with existing facilities already in the landscape.[29] NAT stated that it believes the Commission's objectives were to limit, but not exclude entirely, the expansion of ROW in achieving the Commissions objectives in this proceeding. NAT also responded specifically to Delaware County's concerns regarding the expansion of ROW to 80 feet and the attendant needs for maintaining such an expansion.

[29] December Order, at 39.

SCENARIO EVALUATION

The Commission directed Trial Staff to file a Report and Motion with the Commission regarding a comparative evaluation of the remaining projects based on the following factors:

1. What is the current need for projects to alleviate congestion?
2. Public Policy Transmission Planning Docket Comments
3. How will Non-Transmission Alternatives, including REV affect the proposed designs?
4. Comparative Evaluation of Individual Projects
    a. Transfer Capability
    b. Cost
    c. Electric System Reliability and Economic Impacts
        i. Based on NYISO Power Flow and GE's Multi Area Production Simulation (GE MAPS) Runs.
    d. How much additional rights-of-ways (ROW) will be needed for each project?
    e. Innovative Technology Used, if any?
    f. Environmental Compatibility.

Description of Process Undertaken by Trial Staff and NYISO

With this direction from the Commission in mind, Trial Staff analyzed the 21 scenarios filed by the Applicants in conjunction with the NYISO. As will be explained in more detail in the sections that follow, Staff completed an environmental analysis of the various scenarios. The NYISO provided Staff with Power Flow information for all 21 scenarios, based on the project characteristics contained in the Applicants' respective Applications. Staff analyzed the Power Flow results and the results of that analysis are detailed below. In short, the results of these various analyses indicate that generally, the UPNY/SENY effective transfer limit increased from 500 MW to

1,500 MW, although some resulted in actual decreases. Impacts on the Central East effective transfer limit varied from an increase of 617 MW to a decrease of 24 MW. Need, Project Cost Estimates and Benefit/Cost Analysis will be addressed in an update to this Interim Report.

Power Flow Analysis

Each portfolio was assessed for reliability and system impact implications. These assessments provide information on reliability including what is referred to as Power Flow data. These data are a required transmission topology input data set for the GE MAPS model. Furthermore, these reliability assessments identify the degree to which transmission capability changes at various locations on the electric system as a result of a given transmission upgrade. For the analysis described here, the key transmission points include what is referred to as the UPNY-SENY transmission interface, and the Central East transmission interface.

The Power Systems Studies Group of TRC was hired as a consultant to work with the NYISO to develop reliability assessments for each transmission proposal. These assessments ensure that each scenario that is modeled using GE MAPS is reasonable in terms of the ability of the power system to deliver electricity to consumers in sufficient quantity and quality.

TRC and the NYISO's analysis confirmed that each of the 21 proposed scenarios increases the transfer capability between UPNY and SENY, with two exceptions. The 22 scenarios were evaluated on a system-wide basis to determine their wider system impacts. While almost all of the projects increased UPNY/SENY transfer capability, as well as Central East transfer capability the effect of the various proposals on other

interfaces was mixed. The full results are contained in the table below.

Figure 9: Comparative Evaluation Power Flow Results – Combined Effect (MWs)

	Combined Effect (MW)		
PROJECT SCENARIOS	UPNY SENY Effective Limit Increase	Central East Effective Limit Increase	Combined Effect
P1 - NAT	1,729	530	2,259
P2 - NAT	1,179	524	1,703
P3 - NAT	1,717	567	2,284
P4 - NAT	933	420	1,353
P5 - NAT	959	567	1,526
P6 - NYTOs	656	292	948
P7 - NYTOs	1,243	(24)	1,219
P8 - NYTOs	(469)	24	(445)
P9 - NYTOs	1,351	292	1,643
P10 - NYTOs	638	393	1,031
P11 - NYTOs	603	412	1,015
P12 - NYTOs	1,200	617	1,817
P13 - NYTOs	(677)	127	(550)
P14 - NYTOs	1,500	617	2,117
P15 - NextEra	874	617	1,491
P16 - NextEra	697	56	753
P17 - NextEra	817	617	1,434
P18 - NextEra	558	617	1,175
P19 - NextEra	697	317	1,014
P19a - NextEra	679	317	996
P20 - Boundless	588	217	805
P21 - Boundless	482	217	699

For Central East, most portfolios increased the effective limit from a thermal limit, in the Base Case, to a higher voltage limit in the Change Case.

Environmental Impact Analysis and Ranking

Staff evaluated environmental factors for each of the 21 scenarios proposed by the Applicants. The review was based primarily on the information provided by each of the Applicants in their January 19, 2015 and March 2, 2015 Part A Application filings.

Ranking Method

Table 1 provides a comparative summary of several major environmental factors for each of the 21 scenarios proposed by the Applicants. Table 1 includes data provided by the Applicants in their Part A filings. Where data gaps existed, the table was augmented by Staff in order to complete the comparisons.

A brief description of the environmental factors presented in Table 1 is provided as follows:

- "Length of Route(s)" is the total length of the proposed ROW. The total ROW lengths are identified in this column, and when zero appears in this column work is proposed at a substation only.
- "New ROW" identifies where projects will be located where there is no existing ROW. New ROW will require property acquisition, vegetation clearing, and construction of access roads, followed by installation of transmission facilities. Property acquisition may involve land purchase or easements from property owners, including the New York State utility operators that comprise NYTO and private land owners. Access roads may require stream and wetland crossings to the extent practical to support construction and operation of the transmission line.
- "Expansion of Existing ROW" identifies where a project will widen an existing ROW (transmission, highway or railroad ROW). A project in an expanded ROW will require property acquisition, vegetation clearing and grading, but may utilize existing access roads.

- "Major River Corridors" identifies potential effects on resources at the Mohawk River/Erie Canalway National Heritage Corridor and the Hudson River. Effects are based on proposed design and installation (overhead or underground); use of existing or new ROW; whether regulatory considerations such as coastal zone or LWRP criteria apply; and whether identified scenic areas or historic resources are potentially affected.

  a) Low rated scenarios will not require new facilities crossing of the Hudson River or Mohawk River / Erie Canalway. Reconducting of existing crossings of the Hudson River or Mohawk River/Erie Canalway on existing structures are also rated as low due to limited construction work and little change in visibility. Bridge attachment of conductors will also be rated as low.

  b) Medium rated scenarios involve in-kind replacement of existing transmission towers on the Hudson River and Mohawk River/Erie Canalway in the existing ROW and construction of additional transmission towers entirely within existing ROW. Medium ranking scenarios include underground crossings of the Hudson River via HDD at or near Schodack Island or at Roeston, due to reduced impacts on the SASS.

  c) High rated scenarios will require new crossings of the Hudson River or Mohawk River/Erie Canalway at new locations or where forest clearing is required. An HDD crossing of the Hudson River at Athens-Greenport or Lloyd-Poughkeepsie may cross important fisheries or habitat areas, or the overhead facility approaches to the HDD crossing will be within or directly visible from a SASS.

- "New Substation or Switchyard" applies to projects that will require construction of a new substation or switchyard. This includes proposals to construct a substation or switchyard that has been previously proposed, such as Knickerbocker, but never constructed, and proposals to construct entirely new substations (e.g. Orchard Hill or Princetown Substations).

- "Substation or Switchyard with Expanded Footprint" applies to all of the projects. The footprint expansion may be accommodated within the existing

substation yard (area inside the fence) or the yard and fence line may need to be expanded into areas already controlled by a utility company.

- "Land Needed for Substation or Switchyard" applies to projects that will require acquisition of new land (Orchard Hill). The Princetown, Knickerbocker, and North Churchtown switchyards or substations are all proposed for land currently controlled by a utility company; however an applicant will have to acquire property from that utility company.
- "S-NRHP Crossed or Within 1 Mile" represents New York State and National Register of Historic Places (S-NRHP) listed properties located within one mile of the selected ROW. Variations in the estimated number of designated sites within a mile of the same ROW are caused by use of different compiled data sets and variations in the position of center line or ownership boundaries, due to different mapping sources and rounding of the distances. Staff anticipates that where projects are proposed within the same ROW, they will have similar potential impact on designated properties, depending on the final heights of structures.
- "Distance Crossing NWI Wetlands" is a sum of the total miles of National Wetlands Inventory (NWI) wetlands crossed by the proposed transmission facility ROW. These wetlands include the DEC freshwater wetlands. Staff is unaware whether these wetlands will be crossed by access roads within an existing ROW; however, routine clearing activities within these wetlands will be required. The rating matrix represents Staff's assumption that ROW with more NWI wetlands will have more activities occurring in or near the wetlands.
- "Regulated Streams Crossed by ROW" includes all water courses with regulated stream classifications. The rating matrix reflects Staff's assumption that a ROW with more streams will require more activities occurring in or near the streams.
- "Distance in the 100 YR Floodplains" is a sum of the total miles of 100-year floodplain crossed by the ROW. Projects with greater distances of crossings will have greater potential flood risks requiring mitigation such as flood-proofing or spanning the floodplains.

- "Length of ROW in Ag Districts" is the total distance of Agricultural Districts crossed by the ROW. Designation of an Agricultural District indicates both that counties have taken measures to protect agricultural land by the establishment of Agricultural Districts and that there is active agricultural production in the area. Projects occupying "New ROW" or requiring the expansion of an existing ROW may inhibit agricultural uses within these districts.
- "Forested Wetlands" and "Total Forest" represent forested areas that are currently undisturbed by ROW development. "Forested Wetlands" are more highly valued as an ecosystem since they are more environmentally stable. Total forested area and wetland forest was compiled from the 2011 Land Cover data set. The 2011 Land Cover is a federal geographic information system (GIS) mapping effort to produce and update on a regular basis land use maps for regional planning efforts and resource analysis. The 2011 Land Cover mapping identifies multiple categories of vegetated and developed land. The potential for changes to "Forested Wetlands" or "Total Forest" may result in conversion of habitats and long term changes in the ecosystem, which may be harmful to both plant and animal species and will change the visual character of the ROW.
- "Residences Within 1-250 Feet" is the total number of residences located within 250 feet of the proposed ROW. Residences located in close proximity to the ROW may be impacted by construction, operation and maintenance of the proposed facilities.
- "Overall Noise Impact" provides an overall noise impact ranking based upon a preliminary evaluation of construction and operational noise impacts. Construction noise was associated with the following construction activities: trees clearing, construction of new structures, installation of transmission lines, and construction or upgrade of substations and switchyards. Detailed assessments of construction noise for transmission lines are not available and therefore construction noise impacts were evaluated based on the analysis of general factors such as the estimated number of acres that will require trees clearing, the total length that will require construction of new structures, the total length that

will require installation of transmission lines and the number of residences within 250 feet of the ROW. The effect of higher background sound levels for scenarios 2 and 15 with significant portions of the ROW running parallel to the Thruway was also considered, as well as the potential for higher noise levels from the Thruway caused by a potential loss of attenuation because of permanent tree clearing for electric facility clearance. Assessments for construction noise from substations are either preliminary or unavailable. Construction noise impacts of substations were associated with the total number of substations or switchyards that will be either built or upgraded and operational noise impacts were associated with the total number of proposed substations requiring pieces of electrical equipment that may have relevant sound emissions, such as electrical transformers. Construction and operational noise impacts were evaluated at a macro level, as follows:

a) Noise impacts from clearing activities were assumed to be directly proportional to the total number of acres of each scenario that will require trees clearing, in conjunction with the number of residences within 250 feet from the ROW.

b) Noise impacts from construction of new structures were assumed to be directly proportional to the total mileage of each scenario that will require new structures in conjunction with the number of residences within 250 feet from the ROW.

c) Noise impacts from the installation of transmission lines were assumed to be directly proportional to the total mileage of each scenario in conjunction with the number of residences within 250 feet from the ROW.

d) Noise impacts from construction of substations were assumed to be directly proportional to the total number of substations and switchyards of each scenario that are proposed to be built or expanded.

e) Assessments for operational noise of substations are either preliminary or unavailable, since location and design characteristics of main noise sources are not defined yet. Therefore, noise

impacts from operation of substations were assumed to be directly proportional to the total number of substations that will require electrical equipment that may produce relevant noise emissions.

Noise impacts were relatively and comparatively evaluated among all scenarios and designated as low, medium (med) or high impacts. Results are included in Table 1.

- "Visual Evaluation" considers the context of the scenarios as they relate to the existing pattern of development, locations designated as aesthetic resources and relative number of potential viewers. The visual settings of the scenarios are highly variable due to differences in the character of the land, existing and proposed transmission line structures, location in the landscape of the new or proposed ROW, and adjacent land use or development. A detailed evaluation of the potential visual impacts for most locations along the 21 proposed scenarios is not feasible due to the factors described above. Individual applicant prepared visual impact reports that provide site specific analysis of a very small number of common visual settings and visual resources near the selected ROW. That information was reviewed by Staff and considered in the qualitative evaluation below.
    - Low – Scenarios involving reconductoring or elimination of structures from a ROW. Scenarios that have low numbers of residences adjacent to the ROW and a limited number of visual resources of state or federal concern in or near the ROW. The existing ROW is well screened from viewpoints or there is no change in height, a decrease in height resulting in decreased visibility of the facilities compared to existing structures, or an increase in height of less than 10 feet. The ROW has limited forest cover, which will limit the change in the visual character when the ROW is cleared of tall growing species.
    - Medium - Scenarios built within existing transmission ROW. The number of residences near the ROW is medium, a moderate number of visual resources of state or federal concern are located near the ROW, or a low number of especially

significant aesthetic resources may be affected by the proposed construction. There will be an increase in tower heights that will generally be noticeable to the public. The ROW has a rank of medium for forest cover, which will limit the change in the visual character when the ROW is cleared of tall growing species. Limited change in visual contrast with features identified in SASS Report.

- High - Scenarios that will require new ROW, expansion or widening of existing transmission ROW. The number of residences near the ROW is high and a large number of visual resources of state or federal concern have been identified by the Applicants as having potential visibility. Increase in visual contrast for resources of statewide concern, including SASS or properties with documented scenic qualities. ROW with rank of high for existing forest cover, which will result in a possibly large change in the visual character when the ROW is cleared of tall growing species.

Project Evaluation

Staff evaluated environmental factors for each of the 22 scenarios proposed by the Applicants (and scenario 19a as defined by NYISO). Table 1 provides a comparative summary of the several major environmental factors for each of the 22 transmission scenarios.

Staff's environmental ranking of the projects was a multiple step process that combined the quantified, or measured, characteristics of each scenario with the qualitative environmental impact assessment performed by Staff. Each of the quantified characteristics, such as number of streams or federal (NWI) wetlands located in a ROW, miles of ROW, area of forests, forested wetlands, numbers of structures within 250 feet of residences, or State or National Register of Historic Places sites within one mile of the ROW were assigned rankings of low,

medium, and high. The parameter rankings were established by calculating the average (mean) for each measurable factor. The medium rank ranges represent one-half of a standard deviation on either side of the calculated mean. Low rankings were assigned to values less than the medium rank range and high rankings were assigned to values greater than the medium rank range. Table 2 identifies the ratings scales applied for each parameter.

Qualitative ratings of visual, sound and river corridor impacts were prepared to have a consistent approach to these parameters. The sound evaluation relies on multiple quantified parameters to create the rating. Definitions for the visual and river corridor ratings were prepared based on the common project attributes such as in-kind replacement or reconductoring, and the location of the scenario.

Following the completion of the quantitative environmental parameters ratings, Staff completed an overall rating for each scenario. The overall rating is qualitative since there are many unknowns in the projects that cannot be quantified. For any given scenario, it is unknown to what extent a quantified resource will be affected by construction practices and facility operation. The resource information identifies the streams and NWI wetlands located within the ROW, however, without extensive detailed information, it is unknown whether the existing access road system crosses these resources or if the road system is in a serviceable condition. The overall rating is not a numerical score but is a qualitative assessment of the anticipated outcome of transmission facility construction in a selected ROW. Staff generally assumed that a scenario in a ROW that is longer with more forest or other resources would require more work near or within those resource areas. A low rating is assigned to a reconductoring project that is short and crosses limited amounts of forests, wetlands

or other measured environmental characteristics. Scenarios in a ROW that are outside of a SASS, have a low number of state and national register listed sites within one mile, or do not require significant clearing of forestland, are ranked as low or medium. A reconductoring project of similar length may have a medium rating if the quantified parameters show that there are more resources located in or near the ROW. Projects with high ratings are long projects and many of the high rated projects have new ROW or expanded ROW. Frequently, length related parameters would drive a ranking. These rankings are intended for comparative evaluation only.

Scenarios with an overall ranking of "low" are anticipated to be most environmentally compatible, whereas project scenarios with an overall environmental ranking of "high" are anticipated to be the least environmentally compatible. Staff advises that even "low" ranking may still represent significant impacts that will warrant mitigation to ultimately support a finding that the impacts have been minimized to the maximum extent practicable.

Applicants submitted information for inventories of rare, threatened, and endangered (RTE) species that may be found near the selected ROW. However, much of this information is provided on a countywide basis; therefore, projects occurring within the same county should have a similar list. At this time, the general regional RTE species data does not create significant differences between many of the projects. Therefore, Staff did not include RTE species data in Table 1. It is routine during the Article VII process to identify measures to protect RTE species by limiting work during seasons when the RTE species are not active or to limit construction in certain areas. Staff assumes that these practices would be

required for any project approved for construction in this proceeding.

Noise Impacts

In summary, scenarios 10, 16, 17 and 18 are expected to result in a relatively greater environmental noise impact because either they have a higher number of residences proximal to the ROW, a higher number of acres requiring trees clearing, a higher mileage of wiring, a higher mileage that requires construction of new structures, a greater number of substations to be built or upgraded and/or a higher number of substations with relevant noise sources.

Scenarios 6 through 8, 13, 19a, 20 and 21 are expected to result in a relatively lower environmental noise impact because either they have a lower number of residences proximal to the ROW, a lower number of acres requiring trees clearing, a lower mileage of wiring, a lower mileage that requires construction of new structures, a lower number of substations to be built or upgraded and/or a higher number of substations with relevant noise sources.

Scenarios 1 through 5, 9, 11, 12, 14, 15 and 19 are expected to result in a relatively moderate environmental noise impact because the values of the rating variables, as described above, fall in-between the "high" and "low" category ranges.

Coastal Zones, Scenic Areas of Statewide Significance, and Local Waterfront Revitalization Program Considerations

Most of the 21 proposed transmission scenarios involve facilities that would be located in areas within the designated Coastal Area boundary established by the Waterfront Revitalization and Coastal Resources Act, and subject to New York State Executive Law Article 42. This section addresses

potential significant visual and natural resource impacts of the range of project scenarios that are proposed to be located within or are likely to have visual effects on designated coastal zone areas including Scenic Areas of Statewide Significance and adopted Local Waterfront Revitalization Programs. SASS are predominantly located within the lower Hudson Valley region, and were identified and adopted in a publication by the New York State Department of State in July, 1993. LWRP documents have been adopted in many municipalities located within the Coastal Area boundary, or in designated Inland Waterways. Four designated SASS areas (with multiple sub-units within the SASS) and three municipal LWRP areas are traversed by one or more of the individual proposed scenarios.

Schodack & Castleton LWRP & Columbia-Greene North SASS Area

Proposals by North America Transmission and NextEra cross the Hudson River coastal zone area including areas within the Town of Schodack. The Schodack coastal zone area is included entirely within the limits of the Local Waterfront Revitalization Plan adopted by the Town of Schodack and the NYS Department of State.

The proposed crossing by NAT at the New-Scotland to Leeds Alternative 2 (Scenarios 2 & 4 for this analysis) from Coeymans to Schodack is co-located adjacent to the CSX Railroad bridge spanning the Hudson River, located south of the Thruway Berkshire Spur bridge crossing, and immediately north of the existing National Grid New Scotland-Alps 345 kV electric transmission line.

NextEra revised its Hudson River crossing proposal (Scenario 17) to include use of existing National Grid transmission structures at the river span for the rebuild of the New Scotland – Alps 345-kV facility. Staff notes that structure

bases are located within the Hudson River. NextEra also proposes to install an underground circuit for a second 345 kV crossing for the Princetown to Knickerbocker line. As an alternative, NextEra proposes to attach the circuit in conduits to the CSX railroad bridge.

Both the NAT and the NextEra overhead lines would be located outside of but visible from locations within the Columbia-Greene North Scenic Area of Statewide Significance, including sub-units CGN-1 (Coeymans Hamlet Waterfront), CGN-4 (Islands) and CGN-13 (Schodack Landing). Potential views would be from both upland areas such as Schodack Island State Park, and areas within the Hudson River. Open views to the north from these areas are already influenced by the existing transportation bridges and utility line crossing of the Hudson River, providing focal points from some locations. Underground crossing, or re-use of the existing National Grid transmission structures, as proposed by NextEra (Scenario 17), would have relatively little change in the existing views, and have little visual impact. Additional structures and conductors, with associated clearing, as proposed by NAT (Scenarios 2 and 4) would likely result in an increase in clutter within the views to the bridges, particularly from SASS open water locations on the river.

Columbia-Greene North SASS Area – CGN-14 Stuyvesant Farms Sub-unit

The Stuyvesant Farms sub-unit is located in an upland area within the Town of Stuyvesant, Columbia County, east of the bluffs lining the Hudson River. It is comprised of rolling hills, small ravines, open agricultural lands and forestlands. The existing Greenbush-Churchtown National Grid 115-kV overhead transmission line crosses through the sub-unit for nearly two

miles, however the open structure and limited height of the lattice steel structures, which are similar to the height of adjoining mature forest trees for most of the length of the sub-unit crossing, limit its visibility and contrast in the landscape. The description of Sub-Unit CGN-14 in the SASS program book does not acknowledge the transmission line specifically, noting only that "no obvious discordant elements exist to distract from the pastoral landscape which is reflective of a working agricultural community" (DOS, SASS, 1993, pg. 53). The area is noted as exhibiting "an unusual variety of major components including highly diverse topography and vegetation…[this] pastoral agricultural landscape is a unique example of the traditional rural heritage." (DOS, SASS, p. 54).

Several of the proposed projects (Scenarios 4, 5, 6, 10, 11, 16, 17, 18, 19 and 19a) involve changes to the existing transmission facilities traversing SASS sub-unit CGN-14. The NAT proposals (Scenarios 4 and 5) involve replacing the existing National Grid double-circuit 115-kV lattice towers with an unusual design -- a heavier steel three-circuit structure-- supporting three 345 kV conductors in a horizontal arrangement above two 115 kV circuits in suspended trefoil arrangements. The height of replacement structures should not increase significantly, however the unusual design, the heavier upright and crosswise support elements and increase in number of wires and insulators may increase facility visibility and contrast from fore-ground viewing locations.

The NYTO proposals (Scenarios 6, 10 and 11) involve replacement of the lattice steel double circuit 115 kV structures with a line of double circuit monopole structures supporting both 115 kV and 345 kV conductors on opposite sides. These structures will be of a similar height as existing lattice

structures, but have longer cross-arms to support the higher voltage circuit. The heavier monopole and uneven cross-arm lengths may increase contrast with existing landscape elements from foreground viewing locations.

The NextEra proposals (Scenarios 16, 17, 18 and 19) involve replacement of lattice steel 115 kV structures with double circuit monopoles supporting both 115 kV and 345 kV conductors on opposite sides. These monopole structures will be taller than existing structures and involve heavier support elements than the existing lattice towers, and will be more visible in the landscape due to taller heights, thus visual contrasts are likely to increase somewhat, with potential for some adverse visual effect on SASS sub-unit CGN-14.

Catskill-Olana SASS CO-4 Catskill Creek Subunit

NAT New Scotland-Leeds PV Alternative 1 (Scenario 2) – the proposed alignment is at the eastern side of NYS Thruway (Thruway) – I-87- across Catskill Creek. As viewed from northbound lane of the Thruway, the overhead line would result in tree clearing on hills to east of the Thruway, tall structures to span Catskill Creek gorge, and a line of monopole transmission structures at alignment to north. Passengers in northbound cars have limited opportunity for views of Catskill Creek itself due to oblique angle of stream alignment in relation to the Thruway.

But the subsequent northerly view would be of tall transmission lines at ridgeline at approximate ground-level elevation of 200 feet. While this location does not specifically conflict with views to the waters of Catskill Creek – arguably the most significant aspect of this coastal zone scenic resource area - there would be significant contrast with the wooded banks of the Creek. The SASS characterization of the

site describes "large utility lines" as discordant features considering the variety of landforms within the creek corridor. Addition of more overhead utility transmission lines will increase the number of discordant features within the CO-4 sub-unit. Furthermore, the number of viewers – primarily Thruway travelers - and extent of views of discordant features will increase significantly by the addition of overhead lines within this landscape.

Southbound travelers on the Thruway are exposed to a more dramatic vista than are northbound viewers at the crossing of Sub-Unit CO-4. The vista includes a southwesterly view of Catskill Creek including "the winding creek, the flood plains and the steep banks" within "the wilderness character" of the creek ravine, toward the source of this stream within the higher terrain of the Catskill Mountains (SASS Report, NYS DOS, 1993). The location of the proposed NAT transmission facility (Scenario 2) at the eastern side of the highway would cross the crest of the steep wooded creek ravine. A cleared corridor for the overhead line would be introduced, with a row of tall transmission towers trailing into the middle-ground distance. As noted above, the nature of the change of the NAT scenarios is the introduction of additional discordant features within and highly visible from SASS sub-unit CO-4, with high degrees of visibility for a large number of viewers.

NextEra Option #1 (Scenario 15) proposes a tall monopole facility in alignment at the western side of the Thruway. This scenario would result in overhead line installation at or near high points north and south above the Catskill Creek corridor. Southbound views, as described above, would be significantly compromised by the addition of tall electric transmission structures and multiple conductor wires, cleared forest for facility right-of-way, and any associated

access route. The steep slope at south side of Catskill Creek has bedrock near ground surface, indicative of conditions that would entail rock excavation and cut rock faces for an access road to structure locations.

North-bound travelers along the Thruway would have views to the proposed NextEra transmission facility at the western side of the Thruway at the crest of the steep wooded creek ravine, extending well above the tree line. A cleared corridor for the overhead line would be introduced, with a row of tall transmission towers trailing into the middle-ground distance. The nature of these potential changes would be the introduction of additional discordant features within Sub-Unit CO-4, highly visible to a large number of viewers.

Village of Athens LWRP, and Catskill-Olana SASS area (Scenarios 1, 3, 7, 9, 12, 14, 20)

The Village of Athens LWRP spans the length of Hudson River waterfront within the Village. The LWRP acknowledges the existing National Grid transmission lines crossing the Hudson River at the southerly portion of the Village as "unattractive visual elements…in the Coastal Zone" (Athens LWRP, 2002, pg. II-10). Several scenarios including proposals by NAT, and the NYTOs, would utilize the existing National Grid transmission corridor. The existing corridor includes three overhead transmission lines on tall steel lattice structures aligned in parallel, with some structure bases located within the Hudson River. Staff notes that the existing Iroquois Gas Transmission line is also located a short distance northerly of and parallel to the National Grid transmission corridor. Important viewpoints to the corridor from within the LWRP area include the Athens Light House historic property within the river, the Lower

Village Historic District, and the Veterans Memorial Park at South Franklin Street.

Figure 16: Existing View Easterly at Hudson River Utility Crossing, Athens NY

The existing ROW of transmission lines approaching and crossing the Hudson River is also located outside of, but is visible from locations within sub-units of the Catskill-Olana SASS area, including CO-1 Catskill Bluffs Sub-unit, CO-5 Rogers Island Sub-unit, and CO-6 Olana Sub-unit. The Rip Van Winkle Bridge traverses the Hudson River at the location of CO-1 and CO-6. The Bridge is the main visual element of many views in this area, providing a stark contrast to natural elements, while also providing one of the most important viewpoints within these areas, as vehicles passing on the Bridge high above the River gain sweeping views of the River, shorelines, forested bluffs and wetlands, as well as temporal elements including ships and boats on the River and wildlife. The Bridge conveys NYS Route 23 across the River, and is a designated Scenic Road.

In Scenarios 1 and 3, NAT proposes to install an additional 345 kV line on tall steel lattice towers adjacent to the three existing transmission facilities (as depicted in NAT Part A filing, Attachment 2, Figure C-3, March 2, 2015). NAT was the only project proponent that actually simulated a view of the proposed Hudson River crossing. The proposed fourth set of transmission towers would add visual clutter and additional aviation warning lighting to the existing scene, further compromising views from historic locations and recreational sites. An added line of transmission towers would likely be visible from the Rip Van Winkle Bridge, as well as from the SASS sub-units cited above.

The proposals by NYTO for scenarios 7, 9, 12, and 14, 20, would involve either reconductoring of existing circuits (#7, 12 and 20) or replacement of old lines on lattice structures with new circuits on monopole structures (#14). Reconductoring existing lines on existing structures would result in little if any visual change from the existing scene, although the developers indicate that some number of existing structures may need to be replaced depending on conditions and detailed engineering analysis. Visibility and contrast will depend in large part on the final design and height of replacement structures. Replacement of steel lattice towers with monopoles may increase overall visibility and visual contrast with remaining steel lattice towers on adjacent circuits. Mitigation strategies for minimizing specific impacts on SASS areas and individual sub-units will be important considerations in any Part B evaluations undertaken by the Commission.

Visibility from SASS Sub-Unit CO-6 Olana (State Historic Site) is expected to be limited to vantage points located off of the carriage trails, but not from the hill-top

mansion or from most open areas on the property. Northwesterly views to the transmission corridor's western approach to the Hudson River over 2.5 miles away are available from spot locations at steep ledges located off the Ridge Road carriage trail. Northeasterly views to the transmission corridor south of the Hudson River crossing are afforded from locations in the recently restored north meadow along the Ridge Road carriage trail. The tops of existing lattice transmission towers are visible in some lighting conditions. Reconductoring proposals should not result in any increase in visibility, although use of non-specular conductors that minimize reflectance from the metallic conductor surfaces may be an important mitigation measure for consideration in final project design.

The Hudson River crossing at the Village of Athens also warrants consideration of wetlands and habitat impacts. Proposals involving construction of new facilities, replacement of existing facilities, and reconductoring of facilities in this ROW will all have some degree of disturbance to wetland and wetland habitat, with specific impacts dependent on the nature and extent of disturbance, timing and duration of construction activities, and site controls and mitigation measures associated with construction and restoration of sites. Any project(s) selected by the Commission to proceed to the Part B Application phase will need to identify specific extent of work and details of construction and mitigation to address specific impact minimization strategies, plans and procedures.

Town of Lloyd LWRP, Esopus-Lloyd SASS, and Estates District SASS (Scenarios 2 and 15)

The two proposals to utilize Thruway ROW in the vicinity of New Paltz, Ulster County, and proceed easterly to Pleasant Valley Substation, involve crossings of the designated Hudson River coastal zone area including the area within the Town of Lloyd, Ulster County that is within the Town LWRP. The proposal by NAT - Alternative 2 - (Scenario 2) would traverse forested bluffs and slopes within the Esopus Lloyd SASS Sub-Unit EL-4 (Lloyd Bluffs); as well as the open water of the river, included in Sub-unit EL-4 (as well as within Estates District SASS Sub-unit ED-27, the estate and landscape associated with the Franklin D. Roosevelt Home National Historic Site located east of the river in the Town of Wappinger, Dutchess County). Clearing of forest and installation of a major transmission facility at Sub-Unit EL-4 is likely to adversely affect views from the Sub-Unit, as well as views from the nationally significant Franklin Delano Roosevelt (FDR) Historic Site in ED-27 westerly to sub-unit EL-4. The Lloyd LWRP acknowledges that "clearing and grading would alter the existing natural state and visual quality of the bluff line…Construction on or near the bluff would alter the visual quality by introducing protruding structures, such as…utility lines in the existing landscape" (Lloyd LWRP, pg. II-32). The LWRP also recommends protection and preservation of the wooded bluffs along the Hudson River due to habitat for threatened bird species (Lloyd LWRP, Policy 7B, pg. III-8).

Development of a new utility corridor across the Hudson River at this location, as proposed by NAT, would not constitute orderly development, given that existing underground utility corridors and river crossings are located in the area of the Mid-Hudson Bridge and the historic Railroad Bridge, now a

State Park designated the "Walkway Over the Hudson" a short distance southerly of the NAT proposal.

The proposed crossing by NextEra would be sited in relation to the Mid-Hudson Bridge. Clearing of forest or grading to accommodate the transmission facilities along the wooded slopes, and installation of overhead transmission lines or underground lines within SASS sub-unit EL-4 would potentially adversely affect the natural state and visual quality of the area. NextEra suggests consideration of an alternative utilizing conduit attachments to the historic Railroad Bridge: this would warrant development of detailed engineering and consideration of compatibility with the National Register of Historic Places criteria for alteration of the historic structure, as well as the recreational use of the Walkway Over the Hudson.

Boundless Hudson River Crossing – Town of Newburgh to Town of Wappinger (Scenarios 20, 21)

Boundless proposes to install underground/under-water Hudson River crossing with cables installed by HDD. The crossing location from Town of Newburgh, Orange County, to Town of Wappinger, Dutchess County, is outside of any LWRP areas or SASS designations, and will essentially not be visible due to underground installation. Clearing of forest for a ROW and any marker signs posted to warn ships as to the underground line location would be the only potential visual changes related to underground installation of transmission line cables. The crossing location proposal coincides with existing utility and other intensive shoreline uses, so the probable changes due to underground installation would be minimal. Boundless projects (Scenarios 20 and 21) would not adversely affect any SASS areas or LWRP.

Another source of variability is the base information available to the Applicants. The NYTOs application used in-house mapping and detailed data for its ROW, for the ROW position, and transmission tower descriptions while NAT, NextEra and Boundless compiled ROW locations using publicly available property information and aerial photography. The quality differences of the various mapping sources contributed to the variability of the identified environmental characteristics.

Project scenarios with an overall ranking of "low" are anticipated to have the lowest potential environmental impact, whereas project scenarios with an overall environmental ranking of "high" are anticipated to have the highest potential environmental impact.

Environmental Rankings

The following summary of the scenarios identifies the major factors for ranking the relative environmental impact of each of the transmission facilities scenarios. This description does not re-create the full range of information considered in reaching the rankings as reflected in Table 1, but is rather illustrative of the major drivers of each scenario's ranking.

Scenario 1 was assigned an overall environmental ranking of high. The primary factors for this ranking were the potential visual impacts of the overhead facilities on the Erie Canalway National Heritage Corridor and the Hudson River corridor and the high amount of new ROW that would be required as compared to other proposals in this proceeding. Projects requiring new ROW are anticipated to require large amounts of new property acquisition, impacts to agricultural land uses and new land clearing through previously undisturbed wetlands,

forests, wildlife habitats and other environmentally sensitive areas.

Scenario 2 was assigned an overall environmental ranking of high. The primary factors for this ranking were the high amount of new ROW and associated land clearing that would be required as compared to other proposals in this proceeding, incompatibility of the proposed facility with existing land uses and potential visual impacts of the overhead facilities on the I-87 Thruway corridor, Erie Canalway National Heritage Corridor, Hudson River corridor and the Franklin D. Roosevelt and Eleanor Roosevelt National Historic Sites.

Scenario 3 was assigned an overall environmental ranking of high. The primary factors for this ranking were those identified in the discussion of the overall environmental ranking of Scenario 1. Because NAT did not provide details regarding the MA-CC loop, this component was not included in Staff's overall environmental assessment of Scenario 3.

Scenario 4 was assigned an overall environmental ranking of high. The primary factors for this ranking were potential visual impacts of the overhead facilities on the Erie Canalway National Heritage Corridor and the Hudson River corridor, the high amount of new ROW and associated land clearing that would be required for the ED-FR component and the new ROW that would be required for the NS-PV Alt 2 component where it will parallel the existing CSX railroad ROW. Additionally, although the proposed structures will be no greater in height than the existing structures on the GB-CH and CH-PV ROW, the proposed multi-circuit horizontal H-frame structures will have a more visually dense arrangement than existing towers and

therefore may result in an increase in the visible contrast to the existing landscape.

Scenario 5 was assigned an overall environmental ranking of high. The primary factors for this ranking were those identified in the discussion of the overall environmental ranking of Scenario 4.

Scenario 6 was assigned an overall environmental ranking of low. The primary factors for this ranking were its relatively short length, use of existing ROW and replacement of existing structures with fewer, new structures.

Scenario 7 was assigned an overall environmental ranking of low. The primary factors for this ranking were the relatively short length of the route and the limited amount of environmental impacts anticipated from reconductoring construction activities within an existing ROW.

Scenario 8 was assigned an overall environmental ranking of low due to construction impacts confined to an existing substation and no transmission facility construction.

Scenario 9 was assigned an overall environmental ranking of low. The primary factors for this ranking were the relatively short length, the limited amount of environmental impacts anticipated from reconductoring construction activities within an existing ROW and replacement of existing structures with fewer, new structures. The proposed facilities may result in some increase in visual contrast due to the change in structure type; however, they should also reduce agricultural land impacts.

Scenario 10 was assigned an overall environmental ranking of high. The primary factors for this ranking were the need to clear hundreds of acres of forested wetlands and upland areas within the existing O-FR ROW, the increase in height and change in design of the existing O-FR transmission facility,

which result in a design contrast between the old and new lines and the relatively long total length of this scenario.

Scenario 11 was assigned an overall environmental ranking of medium. The primary factors for this ranking were the relatively moderate length and associated environmental construction impacts, and the possibilities of reducing the number of structures within an existing ROW and siting structures in more suitable locations with less severe environmental impacts.

Scenario 12 was assigned an overall environmental ranking of medium. The primary factors for this ranking were the relatively moderate length and associated environmental construction impacts, and the possibilities of reducing the number of structures within an existing ROW and siting structures in more suitable locations with less severe environmental impacts.

Scenario 13 was assigned an overall environmental ranking of medium. The primary factors for this ranking were the relatively moderate length and associated environmental construction impacts, and the possibilities of reducing the number of structures within an existing ROW and siting structures in more suitable locations with less severe environmental impacts.

Scenario 14 was assigned an overall environmental ranking of medium. The primary factors for this ranking were the relatively moderate length and associated environmental construction impacts, and the possibilities of reducing the number of structures within an existing ROW and siting structures in more suitable locations with less severe environmental impacts.

Scenario 15 was assigned an overall environmental ranking of high. The primary factors for a high ranking were the

clearing of expanded areas of ROW and changes in the visual character of the Thruway corridor, potentially affecting numerous travelers and residences, and the estimated distance of 21.1 miles in floodplains.

Scenario 16 was assigned an overall environmental ranking of high. The primary factors for this ranking are the amount of forest clearing, combined length of the components and the number of streams to be crossed in the ROW.

Scenario 17 was assigned an overall environmental ranking of high. The primary factors for this ranking were the cumulative length of the components, length of NWI wetlands and agricultural districts located along the ROW, and construction of a new substation. Scenario 17 is similar to Scenario 10 by NYTO, which is also rated as high. Both of these Scenarios include the O-FR project that will be constructed in an existing ROW. Scenario 11 by NYTO has a common segment between Marcy and New Scotland, however, Scenario 17 includes a Hudson River crossing and O-FR, which creates the difference in the ratings between 11 and 17.

Scenario 18 was assigned an overall environmental ranking of high. The primary factors for this ranking were construction of new ROW that will disturb forested and agricultural lands, potential visual impacts of the overhead facilities on the Erie Canalway National Heritage Corridor, the high number of residences in close proximity to the ROW and the construction of the new Oak Hill Substation facility.

Scenario 19 was assigned an overall environmental ranking of medium. The primary factors for this ranking were the relatively short length of the facilities, the number of streams in the ROW and length of NWI wetlands crossed by the selected routes.

Scenario 19a was assigned an overall environmental ranking of low. The primary factors for this ranking were the relatively short length of the facilities and the use of existing ROW for the entire length of the facility.

Scenario 20 was assigned an overall environmental ranking of medium. In general, activities proposed as parts of Scenario 20 would typically be considered insignificant. However, there are uncertain factors in the proposal that create potential concerns. First, Staff considers aspects of the proposed activities to be infeasible; chiefly, this is exhibited by the proposed helicopter reconductoring proposal. Second, structures along proposed reconductoring segments would likely require replacement during or after Boundless' activities are undertaken. This would create another round of more extensive environmental impacts in the near future. Lastly, Boundless has not provided all the proper information for assessment of its project. This uncertainty leads Staff to conclude that there may be additional impacts that have not been identified by the Applicant.

Finally, Scenario 21 was assigned an overall environmental ranking of low, due to new facilities being located underground and use of HDD for installation of the Hudson River crossing.

COMPARATIVE EVALUATION CONCLUSIONS

Staff's analysis of the Applicants' proposed scenarios indicates that at present there are certain scenarios that warrant further consideration. In order to arrive at this conclusion, Staff first examined the power flow or system impacts for the various projects. With two exceptions, each project increased the transfer capacity between UPNY and SENY,

the basis for this proceeding. Two projects, Scenarios 8 and 13, result in less power moving between UPNY and SENY and therefore on this basis alone, should not be further considered by the Commission.

Similarly, Staff's environmental review results in a determination that on balance, Scenarios 1-5, 10, 15, 16, 17, and 18, should be eliminated from consideration. These projects, in comparison to the remaining scenarios, have the potential for greater environmental impacts, primarily as a result of the need for new or expanded ROW, and in the cases of Scenarios 1-5 and 15, the planned use of Thruway ROW, which is fraught with complications as explained in detail above.

These two initial screenings were then looked at in tandem by Staff to determine if any further projects could be recommended for elimination from Commission consideration. Scenarios 6, 8, 11, 13, and 19 all result in a comparative environmental impact of medium and power flow values below 700 MW. Similarly grouped projects with lower environmental and/or higher power flow rankings remain and thus, these scenarios should also be eliminated from Commission consideration.

Staff notes first that this screening eliminates all projects proposed by NAT on environmental grounds. Staff also notes that Boundless' projects remain in consideration despite relatively small increases in UPNY/SENY transfer capability and medium environmental rankings.

The scenarios that should be subject to further evaluation and consideration by the Commission are Scenarios 7, 9, 12, 14, 19a, 20, and 21. Boundless' Scenarios 20 and 21 should remain in consideration because during the development of this report, CPV Valley, a proposed generation facility located in Waywayanda, Orange County, which has been given authorization by the Commission to construct and operate a combined-cycle

electric generating facility with a nominal rating of 720 MW, obtained financing.[30] CPV announced that it had received financing for its project and expected to begin construction in 2015, with the facility commencing commercial operation in 2018. The Base Case developed by Staff, the NYISO and Brattle Group, Inc., however, did not include CPV Valley.

Boundless' two projects, which include work directly related to the transmission line on which CPV Valley intends to interconnect to the grid, may result in a better benefit/cost ratio and better power flow results with CPV Valley included the Base Case for such analyses. Therefore the power flow and GE MAPS derived cost-benefit analyses that were performed for Boundless in particular, and for the other five projects that Staff recommends remain to be considered by the Commission, would not have presented a complete picture of the impacts of those projects. Therefore, this report is only be the first Staff report to the Commission and further analysis must now be conducted and new cost/benefit results prepared before further recommendations will be provided to the Commission.

CONCLUSION

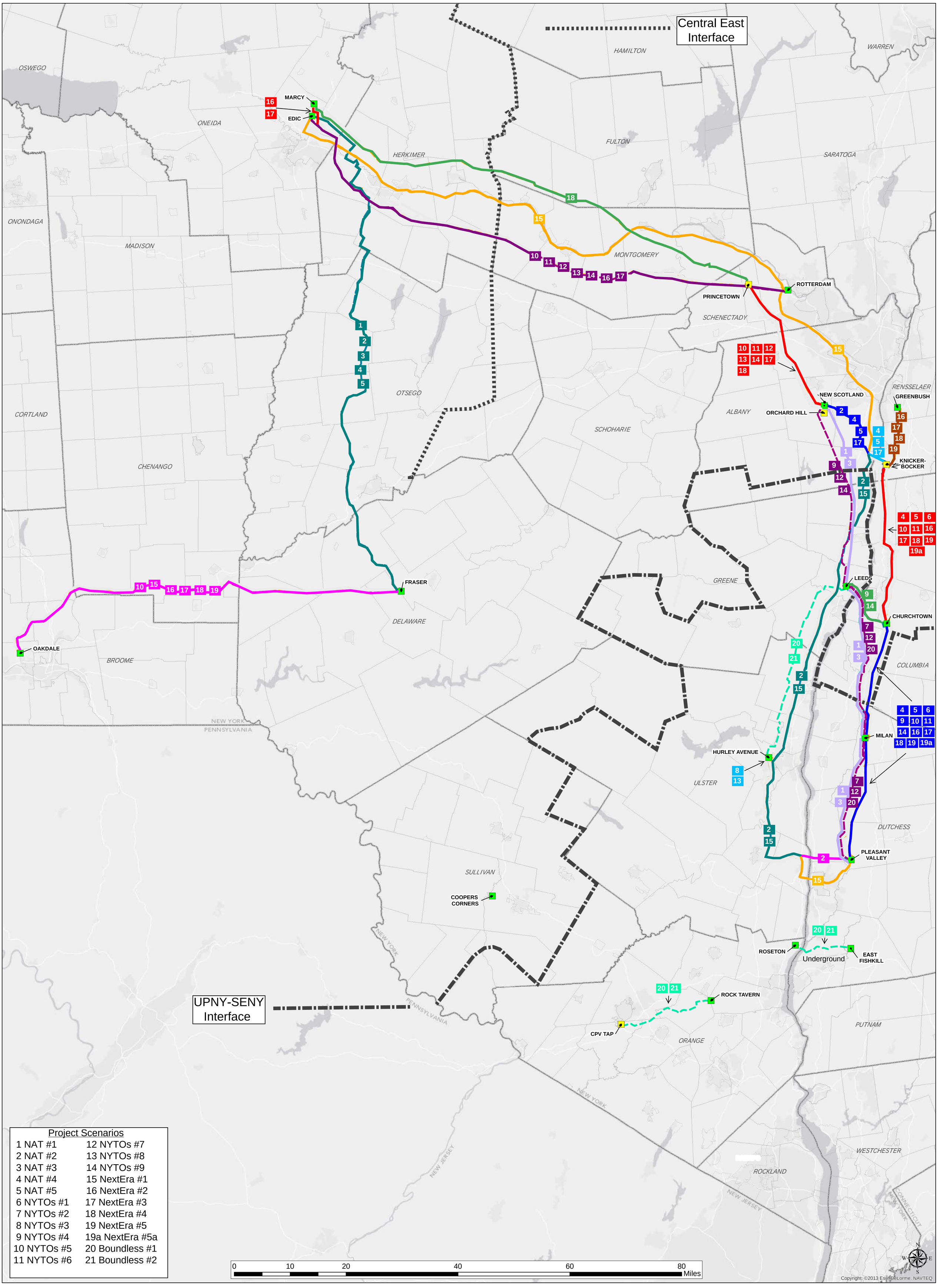
The preceding Trial Staff Interim Report addresses primarily the issues of environmental compatibility and beneficial electric system impacts on the Central East and Upstate New York/Southeast New York (UPNY/SENY) electrical interfaces. The number of projects that deserve further

[30] Case 10-E-0501, Petition of CPV Valley, LLC for a Certificate of Public Convenience and Necessity Pursuant to Section 68 of the Public Service Law, Approval of Financing Pursuant to Section 69 and for Approval of a Lightened Regulatory Regime, Order Granting Certificate of Public Convenience and Necessity, Authorizing Lightened Ratemaking Regulation, and Approving Financing (issued May 9, 2014).

consideration should be reduced to seven. These remaining scenarios are the most promising from an electric system benefit perspective, and are significantly more environmentally compatible primarily because they are all designed to use existing rights-of-way. The update to be provided at a later date will include an analysis of, project cost estimates, benefit/cost analysis as well as the issue of whether there is sufficient public need for a transmission solution as a matter of public policy.

TABLES & APPENDICES

APPENDIX 1



Project Scenarios

1 NAT #1	12 NYTOs #7
2 NAT #2	13 NYTOs #8
3 NAT #3	14 NYTOs #9
4 NAT #4	15 NextEra #1
5 NAT #5	16 NextEra #2
6 NYTOs #1	17 NextEra #3
7 NYTOs #2	18 NextEra #4
8 NYTOs #3	19 NextEra #5
9 NYTOs #4	19a NextEra #5a
10 NYTOs #5	20 Boundless #1
11 NYTOs #6	21 Boundless #2

Overhead Line = Solid
Reconductored Line = Dashed
Underground Line = Dashed Labeled Underground

Project Substations/Switchyards

- Proposed
- Existing

AC Transmission Upgrades Proceeding
Case 13-E-0488

(Proposed Transmission Lines)

July 6, 2015

NEW YORK STATE OF OPPORTUNITY. Department of Public Service

APPENDIX 2

	UPNY-SENY Power Flow Modeling Results (MW) (Source: NYISO)					
PROJECT SCENARIOS	**UPNY SENY Base Case (STE)**	**UPNY SENY w/Project (LTE)**	**UPNY SENY Effective Limit Increase**	**SENY N-1-1**	**UPNY-SENY Emergency N-1**	**ISO-NE Import**
P1 - NAT	5,469	7,198	1,729	1,354	2,722	(185)
P2 - NAT	5,469	6,648	1,179	1,158	2,122	(158)
P3 - NAT	5,469	7,186	1,717	1,284	2,657	(186)
P4 - NAT	5,469	6,402	933	1,048	1,203	(186)
P5 - NAT	5,469	6,428	959	1,090	1,880	(205)
P6 - NYTOs	5,469	6,125	656	993	1,544	(17)
P7 - NYTOs	5,469	6,712	1,243	509	1,243	(37)
P8 - NYTOs	5,469	5,000	(469)	218	116	(19)
P9 - NYTOs	5,469	6,820	1,351	1,198	1,598	(58)
P10 - NYTOs	5,469	6,107	638	959	1,507	(34)
P11 - NYTOs	5,469	6,072	603	946	1,469	(55)
P12 - NYTOs	5,469	6,669	1,200	1,228	1,200	(11)
P13 - NYTOs	5,469	4,792	(677)	248	(108)	(4)
P14 - NYTOs	5,469	6,969	1,500	1,154	2,460	(60)
P15 - NextEra	5,469	6,343	874	1,071	1,780	(103)
P16 - NextEra	5,469	6,166	697	1,095	1,587	(94)
P17 - NextEra	5,469	6,286	817	1,123	1,653	(131)
P18 - NextEra	5,469	6,027	558	1,038	1,436	(88)
P19 - NextEra	5,469	6,166	697	1,127	1,601	(88)
P19a - NextEra	5,469	6,148	679	1,106	1,528	(73)
P20 - Boundless	5,469	6,057	588	601	588	(31)
P21 - Boundless	5,469	5,951	482	339	482	(48)
Athens SPS In Service	Yes	No	No	No	No	No

Central East Power Flow Modeling Results (MW) (Source: NYISO)									
PROJECT SCENARIOS	Central East Baseline Thermal Limit	Central East Thermal Limit w/Project	Central East Thermal Impact	Central East Baseline Voltage Limit	Central East Voltage Limit w/Project	Central East Voltage Impact	Central East Baseline Limit	Central East Limit w/Project	Central East Effective Limit Increase
P1 - NAT	2,433	2,963	530	2,700	3,000	300	2,433	2,963	530
P2 - NAT	2,433	2,957	524	2,700	3,000	300	2,433	2,957	524
P3 - NAT	2,433	3,177	744	2,700	3,000	300	2,433	3,000	567
P4 - NAT	2,433	2,853	420	2,700	3,000	300	2,433	2,853	420
P5 - NAT	2,433	3,629	1,196	2,700	3,000	300	2,433	3,000	567
P6 - NYTOs	2,433	2,947	514	2,700	2,725	25	2,433	2,725	292
P7 - NYTOs	2,433	2,409	(24)	2,700	2,650	(50)	2,433	2,409	(24)
P8 - NYTOs	2,433	2,457	24	2,700	2,650	(50)	2,433	2,457	24
P9 - NYTOs	2,433	2,896	463	2,700	2,725	25	2,433	2,725	292
P10 - NYTOs	2,433	2,826	393	2,700	3,050	350	2,433	2,826	393
P11 - NYTOs	2,433	2,845	412	2,700	3,050	350	2,433	2,845	412
P12 - NYTOs	2,433	3,426	993	2,700	3,050	350	2,433	3,050	617
P13 - NYTOs	2,433	2,560	127	2,700	2,650	(50)	2,433	2,560	127
P14 - NYTOs	2,433	3,147	714	2,700	3,050	350	2,433	3,050	617
P15 - NextEra	2,433	3,169	736	2,700	3,050	350	2,433	3,050	617
P16 - NextEra	2,433	2,489	56	2,700	3,050	350	2,433	2,489	56
P17 - NextEra	2,433	3,273	840	2,700	3,050	350	2,433	3,050	617
P18 - NextEra	2,433	3,160	727	2,700	3,050	350	2,433	3,050	617
P19 - NextEra	2,433	2,876	443	2,700	2,750	50	2,433	2,750	317
P19a - NextEra	2,433	2,795	362	2,700	2,750	50	2,433	2,750	317
P20 - Boundless	2,433	2,704	271	2,700	2,650	(50)	2,433	2,650	217
P21 - Boundless	2,433	2,708	275	2,700	2,650	(50)	2,433	2,650	217

	Combined Effect (MW)		
PROJECT SCENARIOS	UPNY SENY Effective Limit Increase	Central East Effective Limit Increase	Combined Effect
P1 - NAT	1,729	530	2,259
P2 - NAT	1,179	524	1,703
P3 - NAT	1,717	567	2,284
P4 - NAT	933	420	1,353
P5 - NAT	959	567	1,526
P6 - NYTOs	656	292	948
P7 - NYTOs	1,243	(24)	1,219
P8 - NYTOs	(469)	24	(445)
P9 - NYTOs	1,351	292	1,643
P10 - NYTOs	638	393	1,031
P11 - NYTOs	603	412	1,015
P12 - NYTOs	1,200	617	1,817
P13 - NYTOs	(677)	127	(550)
P14 - NYTOs	1,500	617	2,117
P15 - NextEra	874	617	1,491
P16 - NextEra	697	56	753
P17 - NextEra	817	617	1,434
P18 - NextEra	558	617	1,175
P19 - NextEra	697	317	1,014
P19a - NextEra	679	317	996
P20 - Boundless	588	217	805
P21 - Boundless	482	217	699

APPENDIX 3

General Information Regarding Public Involvement Plans (PIPs)

The Commission has stated that it encourages the Applicants to voluntarily communicate with the public early in the process and throughout all phases of the project. However, with one exception, none of the Applicants filed a public involvement plan (PIP) with its filing. While not required, the lack of PIP makes it difficult to ascertain whether the Applicants have made a minimum effort to include the public in the project. The proposed projects have garnered a large amount of public interest and Staff recommends the development of a PIP for any project selected by the Commission to proceed beyond this comparative proceeding.

This PIP should document the applicant's plans to explain the project to the public, collect input and provide feedback, and establish a presence within the community. In addition, Applicants are encouraged to work with any subsequently assigned Administrative Law Judge and municipal parties to establish a schedule for public information sessions.

One applicant, NAT did file such a plan. The Public Involvement Plan provided by the Company was well done and contained good information regarding affected communities and outreach activities to date.

Any subsequently filed plan from any applicant selected by the Commission should include at minimum 1) a basic description of the project (similar to the public notice), 2) information regarding the techniques and tools that will be used to communicate with interested and affected parties, 3) details on the schedule of outreach activities, including future public information sessions, 4) information on intervenor funding (brief description, amount available, process), 5) a project website URL and description of what information can be obtained

on-line, 6) establishment of document repositories where project materials can be viewed by the public, 7) contact information for project representative (or toll-free line is one has been established) and, 8) a list of stakeholders beyond the municipalities (as an appendix).

TABLE 1

Table 1 Comparative Environmental Parameters 7-2-15

Scenario	Description	OVERALL RANK	Length of Route(s)		New ROW			Expansion of Existing ROW			Total New ROW and Expanded ROW			Structures [1]	Major River Corridors				New Substations or Switchyards	Substations or Switchyards with Expanded Footprint	Land Acquisition Needed for Substations or Switchyards	
			Miles	Rank	Miles	Acres	Rank	Miles	Acres	Rank	Miles	Acres	Rank		Mohawk River/Erie Canalway	Rank	Hudson River	Rank	#	#	Y/N	Rank
1 - NAT Edic - Fraser w/series comp at Edic; New Scotland - Leeds - Pleasant Valley	**ED-FR**: Approx 80 miles: 72 miles adjacent to existing 345 kV ROW; 8 miles new ROW. 80' width where adjacent ROW; 100' width where new ROW. **NS-LD-PV**: Approx 65 miles: 55 miles adjacent to existing 345 kV ROW; 10 miles new ROW. 80' width where adjacent ROW; 100' width where new ROW.	high	145.0	med	18.0	218.2	high	127.0	1231.5	high	145.0	1449.7	high	Vertical Monopole/ Lattice Tower	Overhead Crossing on New ROW with Forest Clearing at Erie Canalway	high	Overhead Crossing Adjacent ROW; Lattice Structures; Athens LWRP; SASS Views	high	0	1	No	low
2 - NAT Edic - Fraser w/series comp at Edic; New Scotland - Leeds - Pleasant Valley Alt 1	**ED-FR:** Approx 80 miles: 72 miles adjacent to existing 345 kV ROW; 8 miles new ROW. 80' width where adjacent ROW; 100' width where new ROW. **NS-LD-PV Alt 1**: Approx 77 miles: 55 miles entirely within existing I-87 ROW; 14 miles of new 100' ROW; 8 miles of 80' expanded ROW adjacent to existing CSX ROW.	high	157.0	med	22.0	266.7	high	80.0	775.8	med	102.0	1042.5	med	Vertical Monopole/ Lattice Tower	Overhead Crossing on New ROW with Forest Clearing at Erie Canalway	high	Overhead Crossing New ROW; Monopole/ Forest Clearing; SASS; Lloyd LWRP	high	0	1	No	low
3 - NAT Edic - Fraser w/series comp at Edic; New Scotland - Leeds - Pleasant Valley; series comp on Fraser - Gilboa 345 kV; loop existing Marcy - Coopers Corners to Fraser	**ED-FR**: Approx 80 miles: 72 miles adjacent to existing 345 kV ROW; 8 miles new ROW. 80' width where adjacent ROW; 100' width where new ROW. **NS-LD-PV**: Approx 65 miles: 55 miles adjacent to existing 345 kV ROW; 10 miles new ROW. 80' width where adjacent ROW; 100' width where new ROW.	high	145.0	med	18.0	218.0	high	127.0	1232.0	high	145.0	1450.0	high	Vertical Monopole/ Lattice Tower	Overhead Crossing on New ROW with Forest Clearing at Erie Canalway	high	Overhead Crossing Adjacent ROW; Lattice Structures; Athens LWRP/ SASS Views	high	0	2	No	low
4 - NAT Edic - Fraser w/series comp at Edic; New Scotland - Pleasant Valley Alt 2; series comp on Fraser - Gilboa 345 kV; loop existing Marcy - Coopers Corners to Fraser; series comp on Marcy - New Scotland 345 kV; series comp on Edic - New Scotland 345 kV	**ED-FR**: Approx 80 miles: 72 miles adjacent to existing 345 kV ROW; 8 miles new ROW. 80' width where adjacent ROW; 100' width where new ROW. **NS-PV Alt 2**: Approx 62 miles; 8 miles of 80' expanded ROW adjacent to existing CSX ROW; 54 miles entirely within an existing 115 kV ROW.	high	142.0	med	8.0	96.7	low	80.0	775.8	med	88.0	872.4	med	Vertical Monopole/H-Frame	Overhead Crossing on New ROW with Forest Clearing at Erie Canalway	high	Overhead Crossing Adjacent ROW; Schodack LWRP; SASS Views	high	0	3-4[3]	No	low
5 - NAT[2] Edic - Fraser w/series comp at Edic; New Scotland - Knickerbocker - Pleasant Valley Alt 2; series comp on Fraser - Gilboa 345 kV; loop existing Marcy - Coopers Corners to Fraser; Edic - Princetown - Knickerbocker (as proposed by others)	**ED-FR**: Approx 80 miles: 72 miles adjacent to existing 345 kV ROW; 8 miles new ROW. 80' width where adjacent ROW; 100' width where new ROW. **NS-KN-PV Alt 2**: Approx 62 miles; 8 miles of 80' expanded ROW adjacent to existing CSX ROW; 54 miles entirely within an existing 115 kV ROW. New switchyard constructed at Knickerbocker.	high	142.0	med	8.0	96.7	low	80.0	775.8	med	88.0	872.4	med	Vertical Monopole/H-Frame	Overhead Crossing on New ROW with Forest Clearing at Erie Canalway	high	Overhead Crossing Adjacent ROW; Schodack LWRP; SASS Views	high	1	2-3[3]	No	low
6 - NYTO Knickerbocker to Pleasant Valley	**KN-PV:** Removal of existing 1 or 2 115 kV double circuit lines and construction of new 115/345 kV double circuit monopole structure line.	low	54.2	low	0	0	low	0	0	low	0	0	low	Steel Monopoles/ Replacement of some lattice towers	N/A	low	No Crossing; SASS Area	low	1	2	No	low
7 - NYTO Leeds to Pleasant Valley (Reconductor)	**LD-PV(R)**: Reconductoring of the two existing 345 kV lattice structure lines and replacement of certain structures within an existing ROW.	low	39.8	low	0	0	low	0	0	low	0	0	low	Existing Steel Lattice with Replacement of Certain Structures	N/A	low	Replace River Crossing; Athens LWRP	med	0	0	No	low

[1] - For each NAT scenario, the ED-FR structures will be vertical monopole configuration where parallel to existing ROW and delta formation where not parallel to existing ROW.

[2] - NAT has not provided details regarding the proposed ED-PR-KN (as proposed by others) component of Scenario 5. Therefore Staff omitted this component from its environmental evaluation of Scenario 5.

[3] - NAT states that modifications to existing Churchtown 115 kV substation will be required. However, NAT does not provide details of the modifications or indicate whether modifications will require expanded footprint.

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Table 1 Comparative Environmental Parameters 7-2-15

Scenario	Description	OVERALL RANK	Counties	Towns, Villages & Cities	S-NRHP Crossed or Within 1 Mile		Distance Crossing NWI Wetlands		Regulated Streams Crossed by ROW		Distance Crossing 100-YR Floodplains		Length of ROW in Ag Districts		Forested Wetlands		Total Forest		Residences Within 1-250 Feet		Overall Noise Impact	Visual Assessment
			#	#	#	Rank	Miles	Rank	#	Rank	Miles	Rank	Miles	Rank	Acres	Rank	Acres	Rank	#	Rank	Rank	Rank
1 - NAT Edic - Fraser w/series comp at Edic; New Scotland - Leeds - Pleasant Valley	**ED-FR**: Approx 80 miles: 72 miles adjacent to existing 345 kV ROW; 8 miles new ROW. 80' width where adjacent ROW; 100' width where new ROW. **NS-LD-PV**: Approx 65 miles: 55 miles adjacent to existing 345 kV ROW; 10 miles new ROW. 80' width where adjacent ROW; 100' width where new ROW.	high	8	29	30	med	5.9	high	217	high	9.3	high	41.8	high	84.1	med	866.7	med	98	low	med	high
2 - NAT Edic - Fraser w/series comp at Edic; New Scotland - Leeds - Pleasant Valley Alt 1	**ED-FR:** Approx 80 miles: 72 miles adjacent to existing 345 kV ROW; 8 miles new ROW. 80' width where adjacent ROW; 100' width where new ROW. **NS-LD-PV Alt 1**: Approx 77 miles: 55 miles entirely within existing I-87 ROW; 14 miles of new 100' ROW; 8 miles of 80' expanded ROW adjacent to existing CSX ROW.	high	8	32	42	med	4.8	med	167	med	9.5	high	28.1	med	82.9	med	804.0	med	232	med	med	high
3 - NAT Edic - Fraser w/series comp at Edic; New Scotland - Leeds - Pleasant Valley; series comp on Fraser - Gilboa 345 kV; loop existing Marcy - Coopers Corners to Fraser	**ED-FR**: Approx 80 miles: 72 miles adjacent to existing 345 kV ROW; 8 miles new ROW. 80' width where adjacent ROW; 100' width where new ROW. **NS-LD-PV**: Approx 65 miles: 55 miles adjacent to existing 345 kV ROW; 10 miles new ROW. 80' width where adjacent ROW; 100' width where new ROW.	high	8	29	30	med	5.9	high	217	high	9.3	high	41.8	high	84.1	med	866.7	med	98	low	med	high
4 - NAT Edic - Fraser w/series comp at Edic; New Scotland - Pleasant Valley Alt 2; series comp on Fraser - Gilboa 345 kV; loop existing Marcy - Coopers Corners to Fraser; series comp on Marcy - New Scotland 345 kV; series comp on Edic - New Scotland 345 kV	**ED-FR**: Approx 80 miles: 72 miles adjacent to existing 345 kV ROW; 8 miles new ROW. 80' width where adjacent ROW; 100' width where new ROW. **NS-PV Alt 2**: Approx 62 miles; 8 miles of 80' expanded ROW adjacent to existing CSX ROW; 54 miles entirely within an existing 115 kV ROW.	high	8	32	33	med	4.5	med	183	high	6.8	med	52.5	high	58.0	low	721.5	med	113	med	med	high
5 - NAT[2] Edic - Fraser w/series comp at Edic; New Scotland - Knickerbocker - Pleasant Valley Alt 2; series comp on Fraser - Gilboa 345 kV; loop existing Marcy - Coopers Corners to Fraser; Edic - Princetown - Knickerbocker (as proposed by others)	**ED-FR**: Approx 80 miles: 72 miles adjacent to existing 345 kV ROW; 8 miles new ROW. 80' width where adjacent ROW; 100' width where new ROW. **NS-KN-PV Alt 2**: Approx 62 miles; 8 miles of 80' expanded ROW adjacent to existing CSX ROW; 54 miles entirely within an existing 115 kV ROW. New switchyard constructed at Knickerbocker.	high	8	32	33	med	4.5	med	183	high	6.8	med	52.5	high	58.0	low	721.5	med	113	med	med	high
6 - NYTO Knickerbocker to Pleasant Valley	**KN-PV:** Removal of existing 1 or 2 115 kV double circuit lines and construction of new 115/345 kV double circuit monopole structure line.	low	3	11	32	med	2.8	low	59	low	2.09	low	55.8	high	44.3	low	257.8	low	121	med	low	med
7 - NYTO Leeds to Pleasant Valley (Reconductor)	**LD-PV(R)**: Reconductoring of the two existing 345 kV lattice structure lines and replacement of certain structures within an existing ROW.	low	3	8	20	low	3.8	low	28	low	3.46	low	9.72	low	83.2	med	182.4	low	33	low	low	low

[1] - For each NAT scenario, the ED-FR structures will be vertical monopole configuration where parallel to existing ROW and delta formation where not parallel to existing ROW.

[2] - NAT has not provided details regarding the proposed ED-PR-KN (as proposed by others) component of Scenario 5. Therefore Staff omitted this component from its environmental evaluation of Scenario 5.

[3] - NAT states that modifications to existing Churchtown 115 kV substation will be required. However, NAT does not provide details of the modifications or indicate whether modifications will require expanded footprint.

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Scenario	Description	OVERALL RANK	Length of Route(s)		New ROW			Expansion of Existing ROW			Total New ROW and Expanded ROW			Structures	Major River Corridors				New Substations or Switchyards	Substations or Switchyards with Expanded Footprint	Land Acquisition Needed for Substations or Switchyards	
			Miles	Rank	Miles	Acres	Rank	Miles	Acres	Rank	Miles	Acres	Rank		Mohawk River/Erie Canalway	Rank	Hudson River	Rank	#	#	Y/N	Rank
8 - NYTO Hurley Avenue Phase Angle Regulators (PARs)	**HA:** Installation of three 575 MW PARs, two 135 MVA switched shunt capacitors and three 345 kV circuit breakers at the Hurley Avenue Substation.	low	0	low	0	0	low	0	0	low	0	0	low	N/A	N/A	low	N/A	low	0	1	No	low
9 - NYTO New Scotland to Leeds (Reconductor) and Leeds to Pleasant Valley	**NS-LD(R):** Reconductoring of two existing 345 kV lattice structure lines and replacement of certain structures. **LD-PV:** Removal of the existing 115 kV double-circuit lattice structure lines and the construction of a new monopole double-circuit 115/345 kV line; removal of existing 1 or 2 115 kV double circuit lines; construction of a new 115/345 kV double circuit monopole structure line.	low	67.1	low	0	0	low	0	0	low	0	0	low	Steel Monopoles/ Replacement of some lattice towers	N/A	low	Replace Existing Overhead Crossing; Athens LWRP; SASS Views	med	0	3	No	low
10 - NYTO Oakdale to Fraser and Edic to New Scotland and Knickerbocker to Pleasant Valley (Enhanced Oct. 2013 Project)	**O-FR:** Construction of 57.7 mile 345 kV circuit within existing ROW supported by steel monopoles. **ED-NS:** Removal of one set of 230 kV wires and insulators from each of the two existing 230/345 kV double-circuit monopole structures and installation of one set of 345 kV wires and insulators to one of them; replace two existing 230 kV H-frame structure lines with one new 345 kV line consisting predominately of H-frame structures; intermittent new 345 kV tubular steel monopole structures. **KN-PV:**Removal of existing 1 or 2 115 kV double circuit lines and construction of new 115/345 kV double circuit monopole structure line.	high	203.4	high	0	0	low	0	0	low	0	0	low	H-Frame and Monopoles	Replace Overhead Crossing No clearing at Erie Canalway	low	No Crossing; ROW in SASS	med	1	6	No	low
11 - NYTO Edic to New Scotland and Knickerbocker to Pleasant Valley	**ED-NS:** Removal of one set of 230 kV wires and insulators from each of the two existing 230/345 kV double-circuit monopole structures and installation of one set of 345 kV wires and insulators to one of them; replace two existing 230 kV H-frame structure lines with one new 345 kV line consisting predominately of H-frame structures; intermittent new 345 kV tubular steel monopole structures. **KN-PV:** Removal of existing 1 or 2 115 kV double circuit lines and construction of new 115/345 kV double circuit monopole structure line.	med	203.4	med	0	0	low	0	0	low	0	0	low	Steel Monopole/H-Frame	Replace Overhead Crossing No clearing at Erie Canalway	low	No Crossing; ROW in SASS	med	1	4	No	low
12 - NYTO Edic to New Scotland and New Scotland to Leeds to Pleasant Valley (Reconductor)	**ED-NS:** Removal of one set of 230 kV wires and insulators from each of the two existing 230/345 kV double-circuit monopole structures and installation of one set of 345 kV wires and insulators to one of them; replace two existing 230 kV H-frame structure lines with one new 345 kV line consisting predominately of H-frame structures; intermittent new 345 kV tubular steel monopole structures. **NS-LD-PV(R):** Reconductoring of two existing 345 kV lattice structure lines and replacement of certain structures.	med	203.4	med	0	0	low	0	0	low	0	0	low	Steel Monopoles/ Replacement of some H-frame & lattice towers	Replace Overhead Crossing No clearing at Erie Canalway	low	Replace Existing Overhead Crossing; Athens LWRP; SASS Views	med	0	4	No	low
13 - NYTO Edic to New Scotland and Hurley Avenue PARs	**ED-NS:** Removal of one set of 230 kV wires and insulators from each of the two existing 230/345 kV double-circuit monopole structures and installation of one set of 345 kV wires and insulators to one of them; replace two existing 230 kV H-frame structure lines with one new 345 kV line consisting predominately of H-frame structures; intermittent new 345 kV tubular steel monopole structures. **HA:** Installation of three 575 MW PARs, two 135 MVA switched shunt capacitors and three 345 kV circuit breakers at the Hurley Avenue Substation.	med	203.4	low	0	0	low	0	0	low	0	0	low	H-Frame and Steel Monopoles	Replace Overhead Crossing No clearing at Erie Canalway	low	N/A	low	0	3	No	low
14 - NYTO Edic to New Scotland and New Scotland to Leeds (Reconductor) and Leeds to Pleasant Valley	**ED-NS:** Removal of one set of 230 kV wires and insulators from each of the two existing 230/345 kV double-circuit monopole structures and installation of one set of 345 kV wires and insulators to one of them; replace two existing 230 kV H-frame structure lines with one new 345 kV line consisting predominately of H-frame structures; intermittent new 345 kV tubular steel monopole structures. **NS-LD(R):** Reconductoring of two existing 345 kV lattice structure lines and replacement of certain structures. **LD-PV:** Removal of the existing 115 kV double-circuit lattice structure lines and the construction of a new monopole double-circuit 115/345 kV line; removal of existing 1 or 2 115 kV double circuit lines; construction of a new 115/345 kV double circuit monopole structure line.	med	203.4	med	0	0	low	0	0	low	0	0	low	Steel Monopoles/ Replacement of some H-frame & lattice towers	Replace Overhead Crossing No clearing at Erie Canalway	low	Existing Overhead Crossing; replace lattice with monopoles, Athens LWRP; SASS Views	med	0	2	No	low

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			#	#	#	Rank	Miles	Rank	#	Rank	Miles	Rank	Miles	Rank	Acres	Rank	Acres	Rank	#	Rank	Rank	Rank
8 - NYTO Hurley Avenue Phase Angle Regulators (PARs)	**HA:** Installation of three 575 MW PARs, two 135 MVA switched shunt capacitors and three 345 kV circuit breakers at the Hurley Avenue Substation.	low	1	1	0	low	0	low	0	low	0	low	0	low	0	low	0.21	low	0	low	low	low
9 - NYTO New Scotland to Leeds (Reconductor) and Leeds to Pleasant Valley	**NS-LD(R):** Reconductoring of two existing 345 kV lattice structure lines and replacement of certain structures. **LD-PV:** Removal of the existing 115 kV double-circuit lattice structure lines and the construction of a new monopole double-circuit 115/345 kV line; removal of existing 1 or 2 115 kV double circuit lines; construction of a new 115/345 kV double circuit monopole structure line.	low	3	12	61	high	2.8	low	60	low	4.6	med	8.9	low	149.9	med	453.0	med	137	med	med	low
10 - NYTO Oakdale to Fraser and Edic to New Scotland and Knickerbocker to Pleasant Valley (Enhanced Oct. 2013 Project)	**O-FR:** Construction of 57.7 mile 345 kV circuit within existing ROW supported by steel monopoles. **ED-NS:** Removal of one set of 230 kV wires and insulators from each of the two existing 230/345 kV double-circuit monopole structures and installation of one set of 345 kV wires and insulators to one of them; replace two existing 230 kV H-frame structure lines with one new 345 kV line consisting predominately of H-frame structures; intermittent new 345 kV tubular steel monopole structures. **KN-PV:**Removal of existing 1 or 2 115 kV double circuit lines and construction of new 115/345 kV double circuit monopole structure line.	high	11	44	50	high	6.1	high	242	high	7.4	med	55.5	high	268.1	high	2966.0	high	169	med	high	med
11 - NYTO Edic to New Scotland and Knickerbocker to Pleasant Valley	**ED-NS:** Removal of one set of 230 kV wires and insulators from each of the two existing 230/345 kV double-circuit monopole structures and installation of one set of 345 kV wires and insulators to one of them; replace two existing 230 kV H-frame structure lines with one new 345 kV line consisting predominately of H-frame structures; intermittent new 345 kV tubular steel monopole structures. **KN-PV:** Removal of existing 1 or 2 115 kV double circuit lines and construction of new 115/345 kV double circuit monopole structure line.	med	8	30	51	high	5.3	med	169	med	5.2	med	28.1	med	258.2	high	1005.0	high	156	med	med	med
12 - NYTO Edic to New Scotland and New Scotland to Leeds to Pleasant Valley (Reconductor)	**ED-NS:** Removal of one set of 230 kV wires and insulators from each of the two existing 230/345 kV double-circuit monopole structures and installation of one set of 345 kV wires and insulators to one of them; replace two existing 230 kV H-frame structure lines with one new 345 kV line consisting predominately of H-frame structures; intermittent new 345 kV tubular steel monopole structures. **NS-LD-PV(R):** Reconductoring of two existing 345 kV lattice structure lines and replacement of certain structures.	med	8	31	62	high	7.8	high	170	med	5.0	med	7.9	low	322.7	high	989.8	high	171	med	med	low
13 - NYTO Edic to New Scotland and Hurley Avenue PARs	**ED-NS:** Removal of one set of 230 kV wires and insulators from each of the two existing 230/345 kV double-circuit monopole structures and installation of one set of 345 kV wires and insulators to one of them; replace two existing 230 kV H-frame structure lines with one new 345 kV line consisting predominately of H-frame structures; intermittent new 345 kV tubular steel monopole structures. **HA:** Installation of three 575 MW PARs, two 135 MVA switched shunt capacitors and three 345 kV circuit breakers at the Hurley Avenue Substation.	med	6	20	16	low	2.5	low	111	med	3.1	low	0.2	low	213.9	high	747.7	med	35	low	low	med
14 - NYTO Edic to New Scotland and New Scotland to Leeds (Reconductor) and Leeds to Pleasant Valley	**ED-NS:** Removal of one set of 230 kV wires and insulators from each of the two existing 230/345 kV double-circuit monopole structures and installation of one set of 345 kV wires and insulators to one of them; replace two existing 230 kV H-frame structure lines with one new 345 kV line consisting predominately of H-frame structures; intermittent new 345 kV tubular steel monopole structures. **NS-LD(R):** Reconductoring of two existing 345 kV lattice structure lines and replacement of certain structures. **LD-PV:** Removal of the existing 115 kV double-circuit lattice structure lines and the construction of a new monopole double-circuit 115/345 kV line; removal of existing 1 or 2 115 kV double circuit lines; construction of a new 115/345 kV double circuit monopole structure line.	med	8	32	37	med	7.1	high	170	med	7.7	med	9.0	low	363.8	high	1198.0	high	171	med	med	med

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Scenario	Description	OVERALL RANK	Length of Route(s)		New ROW			Expansion of Existing ROW			Total New ROW and Expanded ROW			Structures	Major River Corridors				New Substations or Switchyards	Substations or Switchyards with Expanded Footprint	Land Acquisition Needed for Substations or Switchyards	
			Miles	Rank	Miles	Acres	Rank	Miles	Acres	Rank	Miles	Acres	Rank		Mohawk River/Erie Canalway	Rank	Hudson River	Rank	#	#	Y/N	Rank
15 - NextEra Oakdale - Fraser; Edic -Leeds - Pleasant Valley via Thruway and other ROW	**O-FR:** Approximately 57 miles; installation of new 345 kV circuit on spun concrete monopoles entirely within existing ROW. **Thruway ED-LD-PV:** 345 kV line approximately 180 miles in length; adjacent to existing NYS Thruway ROW for approximately 163 miles requiring expansion of existing NYS Thruway ROW 30-35 feet wide; where not adjacent to NYS Thruway ROW, facility will be entirely within or will require expansion of existing electric transmission ROW and short segments of new ROW.	high	236.0	high	8.5	128	med	166.5	1528	high	175.0	1656.0	high	Spun Concrete Monopoles	New Overhead Adjacent to Existing; Forest Clearing near Erie Canalway	high	River Crossing either Overhead, HDD or bridge, Lloyd LWRP; SASS	high	0	5	No	low
16 - NextEra Oakdale - Fraser; Marcy Southern Route 1: Marcy - Princetown; Princetown - Rotterdam; Knickerbocker Route: Greenbush - Knickerbocker - Churchtown - Pleasant Valley	**O-FR:** Approximately 57 miles; installation of new 345 kV circuit on spun concrete monopoles entirely within existing ROW. **Marcy Southern 1 (M-PR, PR-R, GB-KN, KN-CH-PV):** Entirely within existing ROW; new PR Substation; **M-PR:** Replace existing two 230 kV lines with one 345 kV circuit; Approximately 68 miles; 56 miles new 345 kV line; 12 miles 345 kV reconductoring; **PR-R:** Approximately 5 miles; rebuild two existing 230 kV parallel circuits. **Knickerbocker Route:** Entirely within existing ROW; new KN Switchyard; **GB-KN:** New 115 kV facility approximately 8 miles long; **KN-CH-PV:** Replace existing KN-PV double circuit 115 kV lines; new 345/115 kV double cirucit transmission line approximately 22 miles long KN-CH; new 345 kV transmission line approximately 32 miles long CH-PV.	high	197.0	high	0	0	low	0	0	low	0.0	0.0	low	Spun Concrete Monopoles	Replace Overhead Crossing; Forest Clearing near Erie Canalway	med	No Crossing; Line in SASS	med	2	6	Yes	high
17 - NextEra Oakdale-Fraser; Marcy Southern Route 2: Marcy - New Princetown; Princetown - Rotterdam (rebuild); Princetown - New Scotland - Knickerbocker; Knickerbocker Route: Greenbush - Knickerbocker - Churchtown - Pleasant Valley	**O-FR:** Approximately 57 miles; installation of new 345 kV circuit on spun concrete monopoles entirely within existing ROW. **Marcy Southern 2** Entirely within existing ROW; replace existing M-NS-KN 765 kV facility; new PR Substation; **M-PR:** Replace existing two 230 kV lines with one 345 kV circuit; Approximately 68 miles; 56 miles new 345 kV line; 12 miles 345 kV reconductoring; **PR-R:** Approximately 5 miles; rebuild two existing 230 kV parallel circuits; **PR-NS:** Approximately 20 miles; two parallel 345 kV transmission lines, partial rebuild of existing M-NS 345 kV line and addition of one new PR-KN 345 kV line; **NS-KN:** Approximately 13 miles; two parallel 345 kV transmission lines; rebuild existing 345 kV NS-Alps line and new PR-KN 345 kV line. **Knickerbocker Route:** Entirely within existing ROW; new KN Switchyard; **GB-KN:** New 115 kV facility approximately 8 miles long; **KN-CH-PV:** Replace existing KN-PV double circuit 115 kV lines; new 345/115 kV double cirucit transmission line approximately 22 miles long KN-CH; new 345 kV transmission line approximately 32 miles long CH-PV.	high	224.0	high	0	0	low	0	0	low	0.0	0.0	low	Spun Concrete Monopoles	Replace Overhead Crossing; Forest Clearing near Erie Canalway	med	1-HDD, or 1-rebuild New Scotland Alps or Bridge Attachment, Schodack LWRP; Line in SASS	high	2	8	Yes	high
18 - NextEra Oakdale - Fraser; Marcy Northern Route: Marcy - Orchard Hill - New Scotland; Knickerbocker Route: Greenbush - Knickerbocker - Churchtown - Pleasant Valley	**O-FR:** Approximately 57 miles; installation of new 345 kV circuit on spun concrete monopoles entirely within existing ROW. **Marcy Northern:** Approximately 84.5 miles; new OH Switchyard; **MA-OH:** New 345 kV transmission line on expanded ROW 110 feet wide parallel to existing 345 kV facility; **OH-NS:** Approximately 0.5 miles; two parallel 345-kV lines on new ROW. **Knickerbocker Route:** Entirely within existing ROW; new KN Switchyard; **GB-KN:** New 115 kV facility approximately 8 miles long; **KN-CH-PV:** Replace existing KN-PV double circuit 115 kV lines; new 345/115 kV double cirucit transmission line approximately 22 miles long KN-CH; new 345 kV transmission line approximately 32 miles long CH-PV.	high	204.0	high	0.5	3.7	low	84.0	1120.0	high	84.5	1123.7	med	Spun Concrete Monopoles	New Overhead Adjacent to Existing; Forest Clearing near Erie Canalway	high	No River Crossing; Line in SASS	med	2	7	Yes	high
19 - NextEra Oakdale - Fraser; Knickerbocker Route: Greenbush - Knickerbocker - Churchtown - Pleasant Valley	**O-FR:** Approximately 57 miles; installation of new 345 kV circuit on spun concrete monopoles entirely within existing ROW. **Knickerbocker Route:** Entirely within existing ROW; new KN Switchyard; **GB-KN:** New 115 kV facility approximately 8 miles long; **KN-CH-PV:** Replace existing KN-PV double circuit 115 kV lines; new 345/115 kV double cirucit transmission line approximately 22 miles long KN-CH; new 345 kV transmission line approximately 32 miles long CH-PV.	med	120.0	med	0	0	low	0	0	low	0.0	0.0	low	Spun Concrete Monopoles	N/A	low	No River Crossing; Line in SASS	med	1	5	Yes	high
19A -NextEra/NYISO Knickerbocker to Pleasant Valley	**KB-PV:** Entirely within existing ROW; new KN Substation; **KN-CH:** Replace two existing 115 kV lines with one 115/345 kV double circuit facility; approximately 22.2 miles; **CH-KN:** New 115/345 kV double circuit facility; approximately 31.1 miles.	low	53.3	low	0	0	low	0	0	low	0	0	low	Steel Monopoles/ Replacement of some lattice towers	N/A	low	No River Crossing; Line in SASS	med	1	2	No	low
20 - Boundless Leeds - Hurley Avenue; Athens Generating - Leeds - Pleasant Valley; CPV Tap to Rock Tavern; Roseton - East Fishkill	**LD-HA(R), Athens Generating-LD-PV(R), CPV VALLEY-RT(R):** Reconductoring of approximately 83 miles of existing 345 kV circuits on existing structures using ACCC or ACSR conductor cables; installation of a total of 40% series compensation equipment at the Hurley Ave Substation. **RS-EF:** Installation of 2 new underground 345 kV lines from RS to EF; approximaetly 8 miles.	med	92.0	low	0	0	low	8.1	20.0	low	8.1	20.0	low	Monopoles/H-frame/ Lattice/ Underground	N/A	low	HDD Crossing	med	0	7	No	low
21 - Boundless Leeds - Hurley Avenue; CPV Tap - Rock Tavern; Roseton - East Fishkill	**LD-HA(R), CPV-RT(R):** Reconductoring of approximately 44 miles of existing 345 kV circuits on existing structures using ACCC or ACSR conductor cables; installation of a total of 40% series compensation equipment at the Hurley Ave Substation. **RS-EF:** Installation of 2 new underground 345 kV lines from RS to EF; approximaetly 8 miles.	low	52.0	low	0	0	low	8.1	20.0	low	8.1	20.0	low	Monopoles/H-frame/ Lattice/ Underground	N/A	low	HDD Crossing	med	0	6	no	low

[A] - This information is from NYTO's application, Table 1.1-5, and only accounts for residences along the Leeds to Pleasant Valley segment of Scenario 20.

[B] - Data listed is Staff's approximation from GIS information

Unknown - Information was not provided by Boundless

LWRP - Local Waterfront Revitalization Program

SASS - Scenic Area of State-wide Significance

Table 1 Comparative Environmental Parameters 7-2-15

Scenario	Description	OVERALL RANK	Counties	Towns, Villages & Cities	S-NRHP Crossed or Within 1 Mile		Distance Crossing NWI Wetlands		Regulated Streams Crossed by ROW		Distance Crossing 100-YR Floodplains		Length of ROW in Ag Districts		Forested Wetlands		Total Forest		Residences Within 1-250 Feet		Overall Noise Impact	Visual Assessment
			#	#	#	Rank	Miles	Rank	#	Rank	Miles	Rank	Miles	Rank	Acres	Rank	Acres	Rank	#	Rank	Rank	Rank
15 - NextEra Oakdale - Fraser; Edic -Leeds - Pleasant Valley via Thruway and other ROW	**O-FR:** Approximately 57 miles; installation of new 345 kV circuit on spun concrete monopoles entirely within existing ROW. **Thruway ED-LD-PV:** 345 kV line approximately 180 miles in length; adjacent to existing NYS Thruway ROW for approximately 163 miles requiring expansion of existing NYS Thruway ROW 30-35 feet wide; where not adjacent to NYS Thruway ROW, facility will be entirely within or will require expansion of existing electric transmission ROW and short segments of new ROW.	high	11	43	135	high	3.9	low	257	high	21.1	high	33.7	med	43.7	low	483.0	med	783.0	high	med	high
16 - NextEra Oakdale - Fraser; Marcy Southern Route 1: Marcy - Princetown; Princetown - Rotterdam; Knickerbocker Route: Greenbush - Knickerbocker - Churchtown - Pleasant Valley	**O-FR:** Approximately 57 miles; installation of new 345 kV circuit on spun concrete monopoles entirely within existing ROW. **Marcy Southern 1 (M-PR, PR-R, GB-KN, KN-CH-PV):** Entirely within existing ROW; new PR Substation; **M-PR:** Replace existing two 230 kV lines with one 345 kV circuit; Approximately 68 miles; 56 miles new 345 kV line; 12 miles 345 kV reconductoring; **PR-R:** Approximately 5 miles; rebuild two existing 230 kV parallel circuits. **Knickerbocker Route:** Entirely within existing ROW; new KN Switchyard; **GB-KN:** New 115 kV facility approximately 8 miles long; **KN-CH-PV:** Replace existing KN-PV double circuit 115 kV lines; new 345/115 kV double cirucit transmission line approximately 22 miles long KN-CH; new 345 kV transmission line approximately 32 miles long CH-PV.	high	10	40	16	low	3.9	low	241	high	4.8	med	33.0	med	53.2	low	807.0	med	214.0	med	high	med
17 - NextEra Oakdale-Fraser; Marcy Southern Route 2: Marcy - New Princetown; Princetown - Rotterdam (rebuild); Princetown - New Scotland - Knickerbocker; Knickerbocker Route: Greenbush - Knickerbocker - Churchtown - Pleasant Valley	**O-FR:** Approximately 57 miles; installation of new 345 kV circuit on spun concrete monopoles entirely within existing ROW. **Marcy Southern 2** Entirely within existing ROW; replace existing M-NS-KN 765 kV facility; new PR Substation; **M-PR:** Replace existing two 230 kV lines with one 345 kV circuit; Approximately 68 miles; 56 miles new 345 kV line; 12 miles 345 kV reconductoring; **PR-R:** Approximately 5 miles; rebuild two existing 230 kV parallel circuits; **PR-NS:** Approximately 20 miles; two parallel 345 kV transmission lines, partial rebuild of existing M-NS 345 kV line and addition of one new PR-KN 345 kV line; **NS-KN:** Approximately 13 miles; two parallel 345 kV transmission lines; rebuild existing 345 kV NS-Alps line and new PR-KN 345 kV line. **Knickerbocker Route: E**ntirely within existing ROW; new KN Switchyard; **GB-KN:** New 115 kV facility approximately 8 miles long; **KN-CH-PV:** Replace existing KN-PV double circuit 115 kV lines; new 345/115 kV double cirucit transmission line approximately 22 miles long KN-CH; new 345 kV transmission line approximately 32 miles long CH-PV.	high	11	46	21	low	6.4	high	282	high	11.0	high	34.5	med	160.7	med	1157.0	high	325.0	high	high	med
18 - NextEra Oakdale - Fraser; Marcy Northern Route: Marcy - Orchard Hill - New Scotland; Knickerbocker Route: Greenbush - Knickerbocker - Churchtown - Pleasant Valley	**O-FR:** Approximately 57 miles; installation of new 345 kV circuit on spun concrete monopoles entirely within existing ROW. **Marcy Northern:** Approximately 84.5 miles; new OH Switchyard; **MA-OH:** New 345 kV transmission line on expanded ROW 110 feet wide parallel to existing 345 kV facility; **OH-NS:** Approximately 0.5 miles; two parallel 345-kV lines on new ROW. **Knickerbocker Route: E**ntirely within existing ROW; new KN Switchyard; **GB-KN:** New 115 kV facility approximately 8 miles long; **KN-CH-PV:** Replace existing KN-PV double circuit 115 kV lines; new 345/115 kV double circuit transmission line approximately 22 miles long KN-CH; new 345 kV transmission line approximately 32 miles long CH-PV.	high	10	31	23	med	5.7	high	270	high	6.1	med	62.1	high	111.7	med	1014.0	high	293.0	high	high	high
19 - NextEra Oakdale - Fraser; Knickerbocker Route: Greenbush - Knickerbocker - Churchtown - Pleasant Valley	**O-FR:** Approximately 57 miles; installation of new 345 kV circuit on spun concrete monopoles entirely within existing ROW. **Knickerbocker Route:** Entirely within existing ROW; new KN Switchyard; **GB-KN:** New 115 kV facility approximately 8 miles long; **KN-CH-PV:** Replace existing KN-PV double circuit 115 kV lines; new 345/115 kV double circuit transmission line approximately 22 miles long KN-CH; new 345 kV transmission line approximately 32 miles long CH-PV.	med	6	25	15	low	3.0	low	153	med	2.1	low	31.6	med	39.7	low	559.0	med	215.0	med	med	low
19A -NextEra/NYISO Knickerbocker to Pleasant Valley	**KB-PV:** Entirely within existing ROW; new KN Substation; **KN-CH:** Replace two existing 115 kV lines with one 115/345 kV double circuit facility; approximately 22.2 miles; **CH-KN:** New 115/345 kV double circuit facility; approximately 31.1 miles.	low	3	12	15	med	2.8	low	59	low	2.09	low	55.8	high	44.3	low	258.0	low	121	med	low	med
20 - Boundless Leeds - Hurley Avenue; Athens Generating - Leeds - Pleasant Valley; CPV Tap to Rock Tavern; Roseton - East Fishkill	**LD-HA(R), Athens Generating-LD-PV(R), CPV VALLEY-RT(R):** Reconductoring of approximately 83 miles of existing 345 kV circuits on existing structures using ACCC or ACSR conductor cables; installation of a total of 40% series compensation equipment at the Hurley Ave Substation. **RS-EF:** Installation of 2 new underground 345 kV lines from RS to EF; approximaetly 8 miles.	med	5	23	18	low	7.7[B]	high	127	med	10.5[B]	high	28.0	med	280.0[B]	high	1160.0[B]	high	33[A]		low	low
21 - Boundless Leeds - Hurley Avenue; CPV Tap - Rock Tavern; Roseton - East Fishkill	**LD-HA(R), CPV-RT(R):** Reconductoring of approximately 44 miles of existing 345 kV circuits on existing structures using ACCC or ACSR conductor cables; installation of a total of 40% series compensation equipment at the Hurley Ave Substation. **RS-EF:** Installation of 2 new underground 345 kV lines from RS to EF; approximaetly 8 miles.	low	4	16	3	low	3.4[B]	low	91	low	7.0[B}	med	14.0	low	197.0[B]	high	978[B]	high	Unknown		low	low

[A] - This information is from NYTO's application, Table 1.1-5, and only accounts for residences along the Leeds to Pleasant Valley segment of Scenario 20.

[B] - Data listed is Staff's approximation from GIS information

Unknown - Information was not provided by Boundless

LWRP - Local Waterfront Revitalization Program

SASS - Scenic Area of State-wide Significance

TABLE 2

Table 2 - Comparative Ranking Criteria

Physical or Environmental Parameters	Low	Medium	High
Length of Route(s) (miles)	0-108.0	108.1-167.0	167.1+
New ROW (miles / acres)	0-8.0 / 0-100.0	8.1-15.7 / 100.1-193.0	15.8+ / 193.1+
Expansion of Existing ROW (miles / acres)	0-57.0 / 0-568.0	57.1-124.0 / 568.1-1,094.0	124.1+ / 1,094.1+
Total New ROW and Expanded ROW (miles / acres)	0-65.2 / 0-649.0	65.3-135.8 / 649.1-1,240.0	135.9 / 1,240.1+
Major River Corridors	•No new crossings •Reconductoring on existing structures •Bridge attachment crossings	•In-kind replacement of existing structures •New structuers entirely within existing ROW •HDD crossings of Hudson River at Roseton and at or near Schodack Island	•New crossings at new locations or where forest clearing is required •HDD crossings of Hudson River at Athens-Greenport or Lloyd-Poughkeepsie
S-NHRP Crossed or Within 1 Mile	0-22	23-48	49+
Distance Crossing NWI Wetlands (miles)	0-4.0	4.1-5.6	5.7+
Regulated Streams Crossed by ROW	0-106	107-181	182+
Distance Crossing 100-YR Floodplains (miles)	0-4.5	4.6-9.0	9.1+
Length of ROW in Ag. Districts (miles)	0-22.0	22.1-41.0	41.1+
Forested Wetlands (acres)	0-79.0	79.1-169.0	169.1+
Total Forest (acres)	0-380.0	380.1-972.0	972.1+
Residences Within 1-250 Feet	0-110	111-276	277+
Overall Noise Impact	•Limited tree clearing, short length of route, limited number of new structures and/or lower number of residences within 250' from ROW. •Limited number of substations to be built or upgraded or with new noise sources.	•Moderate tree clearing, moderate length of route, moderate number of new structures and/or moderate number of residences within 250' from ROW. •Moderate number of substations to be built or upgraded or with new noise sources.	•High amount of tree clearing, long length of route, high number of new structures and/or high number of residences within 250' from ROW. •High number of substations to be built or upgraded or with new noise sources.
Visual Assessment	•Reconductoring •Removal of facilities •Low number of residences adjacent to ROW •Limited tree clearing	•Facilities proposed within existing ROW •Moderate number of residences and/or visual resources near ROW	•New ROW development •Expansion of existing ROW •New clearing •Large number of residences and/or visual resources near ROW

NOTE: The rankings were established by calculating the average (mean) for each measurable factor. The medium rank ranges represent half of a standard deviation on either side of the calculated mean. Low rankings were assigned to values less than the medium rank range and high rankings were assigned to values greater than the medium rank range.