

NextEra Energy Transmission New York, Inc.

Marcy to Pleasant Valley Project

Exhibit E-4

Engineering Justification

Table of Contents

Exhibit	Page
EXHIBIT E-4 – ENGINEERING JUSTIFICATION.....	E4-1
E-4.1 Summary of the Marcy to Pleasant Valley Project and Its Benefits	E4-1
E-4.2 Description of Existing Transmission System	E4-2
E-4.3 Need for the Proposed Project.....	E4-3
E-4.4 Marcy to Pleasant Valley Project and Its Benefits	E4-5
E-4.5 Impact of a Delay in the Construction Schedule.....	E4-9
E-4.6 System Impact Study.....	E4-9

List of Tables

Table

E4-1. NYISO Electrical Interconnection Studies Summary Status	E4-10
---	-------

List of Figures

Figure

E4-1 Marcy to Pleasant Valley Project Location in Relation to Existing Facilities and Interfaces	
--	--

EXHIBIT E-4 – ENGINEERING JUSTIFICATION

This Exhibit addresses the requirements of 16 New York Codes, Rules and Regulations (NYCRR) Section 88.4 and the New York Public Service Commission’s (Commission) orders in Case No. 12-T-0502 on April 22, 2013 and September 19, 2013.

E-4.1 Summary of the Marcy to Pleasant Valley Project and Its Benefits

NextEra Energy Transmission New York, Inc. (NEETNY) proposes to construct and operate an approximately 148-mile 345-kilovolt (kV) single-circuit alternating current (AC) transmission line paralleling existing transmission lines between the Marcy Substation in Oneida County and the Pleasant Valley Substation in Dutchess County (Marcy to Pleasant Valley Project or the Project) with an expected in-service date of September 2017.¹

NEETNY’s proposed point of interconnections will be New York Power Authority’s (NYPA) Marcy 345-kV Substation located in Oneida County, New York; Niagara Mohawk Power Corporation d/b/a National Grid’s (National Grid) New Scotland 345-kV Substation located in Albany County, New York; National Grid’s Leeds 345-kV Substation located in Greene County, New York; and Consolidated Edison Company of New York’s (ConEd) Pleasant Valley 345-kV Substation located in Dutchess County, New York. The Marcy to Pleasant Valley Project will increase the power import capability into Southeastern New York and will improve power delivery on the New York Independent System Operator, Inc.’s (NYISO) Central East Interface and Upper New York to Southeast New York Interface (UPNY/SENY). The Project will, therefore, provide several important benefits: reducing persistent congestion across the interfaces, which will result in production cost savings and lower transmission line losses; enhancing system reliability, flexibility, and efficiency while minimizing costs to ratepayers; reducing harmful environmental emissions as a result of improved generator dispatch; and the facilitation of new generation, both renewable and conventional.

¹ For purposes of the Part A Application, the “Marcy to Pleasant Valley Project” refers to NEETNY’s Preferred Project route discussed in Exhibit 2, although NEETNY is evaluating several potential alternatives to ensure that an optimal and comprehensive solution is delivered.

E-4.2 Description of Existing Transmission System

The Central East Interface consists of two 345-kV lines, two 230-kV lines, and several 115-kV lines.² The two 345-kV lines are the Edic to New Scotland and the Marcy to New Scotland lines. These two 345-kV lines have a combined transmission rating of approximately 3000 mega volt amperes (MVA).³ The two 230-kV lines that are a part of the Central East Interface are the Porter to Rotterdam 230-kV lines. These two lines have been identified in the New York State Transmission Assessment and Reliability Study (NY STARS)⁴ report as eventually needing replacement due to age, and have a combined rating of approximately 880 MVA.

The UPNY/SENY Interface runs from New Scotland to Leeds to Pleasant Valley. The existing New Scotland 345-kV Substation is currently connected to the Leeds 345-kV Substation with two transmission lines, with a combined transmission rating of approximately 2600 MVA. From Leeds to Pleasant Valley, there are also two 345-kV transmission lines, of which the combined transmission rating is approximately 2600 MVA. These four transmission lines, from New Scotland to Leeds to Pleasant Valley, are highly congested elements as defined in NYISO's 2011 Congestion Assessment and Resource Integration Study (CARIS).⁵

Marcy to Pleasant Valley Project Description

The Marcy to Pleasant Valley Project will include the following components:

- A new 345-kV line from the existing Marcy Substation to the existing New Scotland Substation, approximately 84 miles in length. The line will terminate at dead-end structures located at or adjacent to the Marcy and New Scotland Substations.
- A new 345-kV line from the existing New Scotland Substation to the existing Leeds Substation, approximately 25 miles in length. The line will terminate at

² As defined by NYISO Central East Interface – Open:

http://www.nyiso.com/public/webdocs/markets_operations/services/planning/Planning_Studies/Reliability_Planning_Studies/Reliability_Assessment_Documents/ARCHIVE/appendix_e.pdf.

³ The MVA ratings in this section are calculated based on NYISO 2013 Gold Book summer capacity ratings.

⁴ Available at:

http://www.nyiso.com/public/webdocs/markets_operations/services/planning/Documents_and_Resources/Special_Studies/STARS/Phase_2_Final_Report_4_30_2012.pdf.

⁵ Available at:

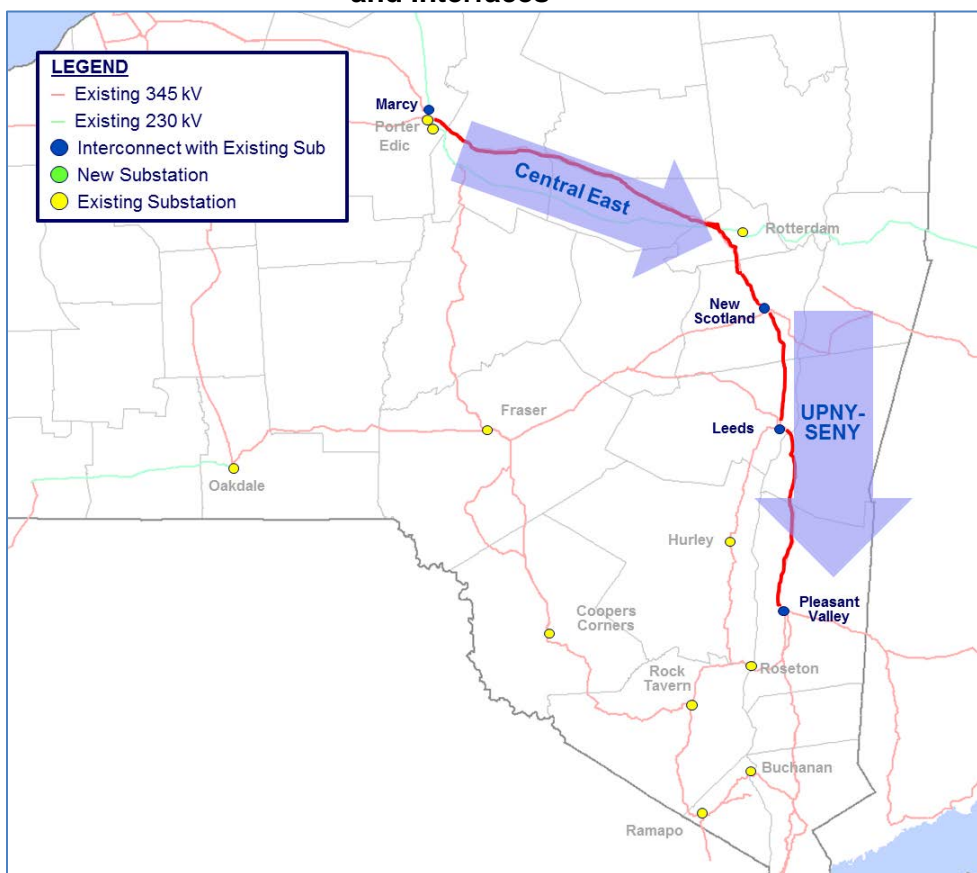
[http://www.nyiso.com/public/webdocs/markets_operations/services/planning/Planning_Studies/Economic_Planning_Studies_\(CARIS\)/Caris_Final_Reports/2011_CARIS_Final_Report__3-20-12.pdf](http://www.nyiso.com/public/webdocs/markets_operations/services/planning/Planning_Studies/Economic_Planning_Studies_(CARIS)/Caris_Final_Reports/2011_CARIS_Final_Report__3-20-12.pdf).

dead-end structures located at or adjacent to the New Scotland and Leeds Substations.

- A new 345-kV line from the existing Leeds Substation to the existing Pleasant Valley Substation, approximately 39 miles in length. The line will terminate at dead-end structures located at or adjacent to the Leeds and Pleasant Valley Substations.

The Marcy to Pleasant Valley Project location is shown in Figure E4-1.

Figure E4-1: Marcy to Pleasant Valley Project Location in Relation to Existing Facilities and Interfaces



E-4.3 Need for the Proposed Project

The New York State Energy Highway Blueprint (the Energy Highway Blueprint), issued in October of 2012, called for actions to reduce constraints over key transmission interfaces in order to expand transmission to carry excess power from Upstate New York to Downstate New

York.⁶ The Energy Highway Blueprint also identified a need to accelerate investments in electric transmission to strengthen reliability, safety, and storm durability and resilience.⁷ On November 30, 2012, the Commission issued its Case No. 12-T-502 and asked for proposals to increase transfer capacity through the congested transmission corridor, which includes both the Central East and UPNY/SENY Interfaces. In addition, as discussed in more detail below, NYISO's 2011 CARIS,⁸ NYISO's 2012 Reliability Needs Assessment (RNA),⁹ and the NY STARS report identified transmission needs related to the ability to deliver new generation, resolve congestion, and address aging infrastructure. The Marcy to Pleasant Valley Project reinforces the Central East Interface and UPNY/SENY Interface by providing an electrically parallel path, and will address the congestion, reliability, and aging infrastructure issues identified in these studies.

Economic Need

New York State's grid currently faces significant impediments to the economical transmission of electricity due to limited transmission capability from Upstate to Downstate, which result in the NYISO market experiencing increased congestion, which in turn leads to market inefficiencies and higher production costs. In NYISO's 2011 CARIS report, the top two congested interfaces were found to be the Central East Interface and the UPNY/SENY Interface, which have cost the NYISO market over \$5.8 billion of demand congestion over the course of five years, and are forecasted to cost another \$3.2 billion of demand congestion over the next 10 years.¹⁰ The location of these two congested interfaces is shown above in Figure E4-1.

Reliability Need

As is the case with any transmission system, the New York State transmission system faces the potential that unexpected events could impact reliability. Additional factors, such as unexpected generation retirements, higher than anticipated load growth, or severe system conditions (e.g., Superstorm Sandy) could make the system more vulnerable to reliability

⁶ New York Energy Highway Blueprint at 38-39.

⁷ New York Energy Highway Blueprint at 56.

⁸ Available at:

[http://www.nyiso.com/public/webdocs/markets_operations/services/planning/Planning_Studies/Economic_Planning_Studies_\(CARIS\)/Caris_Final_Reports/2011_CARIS_Final_Report__3-20-12.pdf](http://www.nyiso.com/public/webdocs/markets_operations/services/planning/Planning_Studies/Economic_Planning_Studies_(CARIS)/Caris_Final_Reports/2011_CARIS_Final_Report__3-20-12.pdf).

⁹ Available at:

http://www.nyiso.com/public/webdocs/markets_operations/services/planning/Planning_Studies/Reliability_Planning_Studies/Reliability_Assessment_Documents/2012_RNA_Final_Report_9-18-12_PDF.pdf.

¹⁰ NYISO's 2011 CARIS Report: Section 5.2, Table 5-6 at 46

problems. If unexpected events resulted in a transmission blackout, the blackout could have widespread consequences that could result in billions of dollars of damage. For example, the Northeastern blackout of August 14, 2003 affected an estimated 50 million people and impacted 61,800 MWs of electric load in eight states.¹¹ To address these uncertainties and to allow safe and reliable operation of power delivery for the transmission system in New York, new transmission facilities are needed.

NYISO's 2012 RNA identifies several reliability concerns that the Marcy to Pleasant Valley Project will address. The Leeds to Pleasant Valley line is expected to exceed its emergency rating in the year 2022,¹² and could also exceed its emergency rating as early as 2016 in the event of an Indian Point retirement.¹³ Likewise, NYISO's 2012 RNA found that the same Leeds to Pleasant Valley 345-kV line is already projected to exceed its emergency rating in 2022 under the Loss of Load Expectation (LOLE) criteria.¹⁴

The NY STARS report found that 40 percent of the existing transmission system in New York—nearly 4,700 miles of transmission lines operating at 115-kV or greater—will need to be replaced over the next 30 years. The report recommended several transmission lines to be reinforced in order to provide increased transmission capability, and to generate significant economic benefits at a relatively modest cost. These lines included the Porter to Rotterdam 230-kV lines,¹⁵ which make up part of the Central East Interface, and the Leeds to Pleasant Valley 345-kV line,¹⁶ which makes up part of the UPNY/SENY Interface.

E-4.4 Marcy to Pleasant Valley Project and Its Benefits

Economic Benefits

The Marcy to Pleasant Valley Project will electrically parallel the Central East and UPNY/SENY Interfaces and will increase the transfer capability of these congested interfaces.

As described above, the two 345-kV lines in the Central East Interface, the Edic to New Scotland and the Marcy to New Scotland lines, have a combined rating of approximately 3000 MVA. The Marcy to Pleasant Valley Project has a rating of nearly 2000 MVA from Marcy to

¹¹ Source: Interim Report, Causes of the August 14th Blackout in the United States and Canada, <http://www.nerc.com/pa/rrm/ea/Pages/Blackout-August-2003.aspx>.

¹² NYISO's 2012 RNA: Section 4.2.1 at 31.

¹³ NYISO's 2012 RNA: Section 4.3.2 at 42.

¹⁴ NYISO's 2012 RNA: Section 4.2.5, Table 4-10 at 37.

¹⁵ 2012 STARS: Section 6.1, Figure 6.4 at 34.

¹⁶ 2012 STARS: Section 6.1, Figure 6.8 at 35.

New Scotland which will significantly increase the 345-kV transmissions rating of the Central East Interface. Additionally, the Marcy to Pleasant Valley Project will support retirement of any or both of the Porter to Rotterdam 230-kV line circuits (which have been identified by the NY STARS report as eventually needing replacement due to age).

The four primary lines that make up the UPNY/SENY Interface, which the CARIS report identified as highly congested, have a combined transmission rating of approximately 2600 MVA from New Scotland to Leeds to Pleasant Valley. The Marcy to Pleasant Valley Project will provide a parallel path from New Scotland to Leeds to Pleasant Valley with a rating of 1986 MVA, almost doubling the rating of this pathway.

NEETNY's finding that the Marcy to Pleasant Valley Project will increase transfer capability along the Central East and UPNY/SENY Interfaces is supported by NYISO's 2011 CARIS. NYISO's 2011 CARIS evaluated the benefits of a new transmission line from the Edic Substation to New Scotland to Pleasant Valley. NYISO's 2011 CARIS states that a new line along this path will increase the transfer capability along the Central East Interface by 600 MWs and the UPNY/SENY Interface by 1200 MWs. The path and electrical connection, as well as the impact to the congested interfaces, of this generic transmission solution studied by NYISO, is nearly equivalent to the Marcy to Pleasant Valley Project.

NYISO's 2011 CARIS cited specific benefits that would result from increasing transfer capability as described above. Because the Marcy to Pleasant Valley Project is comparable to the generic solution in NYISO's 2011 CARIS, the Marcy to Pleasant Valley Project would generate similar benefits. The specific benefits include:

- Allows for least cost generators to run more often, resulting in nearly \$350 million in production cost savings over 10 years;¹⁷
- Provides an alternative transmission path that will improve transmission system losses, estimated to be \$349 million over 10 years;¹⁸
- Reduces capacity payments up to \$803 million over 10 years;¹⁹
- Reduces demand congestion costs by nearly \$2.3 billion over 10 years;²⁰

¹⁷ NYISO's 2011 CARIS: Section 5.3.2, Figure 5-10 at 51.

¹⁸ NYISO's 2011 CARIS: Section 5.4.4, Figure 5-17 at 60.

¹⁹ NYISO's 2011 CARIS: Section 5.4.4, Figure 5-17 at 60.

²⁰ NYISO's 2011 CARIS: Section 5.4.4, Figure 5-18 at 60.

- Improves generation dispatch which will allow for more environmental friendly generation to run, resulting in reduced CO₂ emissions of approximately 3,705 tons over 10 years, at an estimated cost of \$37.8 million,²¹ and reduced NO_x emissions of approximately 2,327 tons over 10 years, at an estimated cost of \$2.1 million;¹⁵ and
- Reduces operating reserve costs, because the Marcy to Pleasant Valley Project will decrease congestion on the system and will increase the transfer capability into the Downstate New York area that would otherwise be required to hold additional operating reserves under certain system conditions.

The proposed alternatives to the Preferred Route of the Marcy to Pleasant Valley Project discussed in Exhibit 2 are anticipated to be comparable with respect to their economic benefits to the transmission system in that they all provide an electrically parallel path along the Central East and UPNY/SENY Interfaces. NEETNY will conduct further analyses of the proposed alternatives to evaluate their impact on the system, and to determine the most optimal solution in terms of their transfer capability.

Reliability Benefits

The Marcy to Pleasant Valley Project will strengthen the network between key transmission substations in New York and will create a more reliable transmission system by providing a new reliable transmission path. The Project will therefore reinforce the existing grid against system failures, whether it is due to aging infrastructure, unexpected generation retirements, or severe weather conditions. The specific reliability benefits of the Marcy to Pleasant Valley Project are:

- Provides a parallel path across the Central East and UPNY/SENY Interfaces that will enable additional transfer of energy across the system during normal and emergency system conditions Downstate;
- Increases transmission availability by addressing aging infrastructure identified in NY STARS report;
- Improves LOLE; and

²¹ NYISO's 2011 CARIS: Section 5.4.4, Figure 5-20 at 62.

- Facilitates diversification of NYISO's generation portfolio to enable deployment of conventional and renewable generation.

The proposed alternatives to the Preferred Route of the Marcy to Pleasant Valley Project discussed in Exhibit 2 are anticipated to be comparable with respect to their benefits to the transmission system in that they all provide an electrically parallel path along the Central East and UPNY/SENY Interfaces. NEETNY is currently pursuing reliability assessment to evaluate impact of the proposed alternatives and to determine the most optimal solution in terms of reliability performance (voltage and thermal) for both intact system and post contingent conditions.

Delivering New Generation, including Renewable Generation Energy

The Marcy to Pleasant Valley Project will generate important contributions to integrating renewable energy. The reduction of the 345-kV transmission constraints along the Marcy to New Scotland to Pleasant Valley corridor and development of additional interregional transmission capacity across the Central East and UPNY/SENY Interfaces would afford New York access to diversified and cleaner sources of electricity.

New York State currently has 6,076 MWs of renewable generation in service, and additional renewable projects currently in development (currently the proposed wind generation in NYISO's interconnection queue is 2,256 MW).²² The proposed wind projects are located primarily in Upstate and Western New York. The Marcy to Pleasant Valley Project would increase transmission capability from Upstate to Downstate, will increase access to underutilized generation, and will also support development of new generation, including renewable generation.

The proposed alternatives to the Preferred Route of the Marcy to Pleasant Valley Project discussed in Exhibit 2 are anticipated to be comparable with respect to their benefits to the transmission system in that they all provide an electrically parallel path along the Central East and UPNY/SENY Interfaces to support new generation, including renewable generation energy.

²² New York Power Trends, 2013 *available at*: http://www.nyiso.com/public/webdocs/media_room/publications_presentations/Power_Trends/Power_Trends/Power_Trends_2013_May_2013_FINAL.pdf.

NEETNY will conduct further analyses of the proposed alternatives to evaluate their impact on the system, and to determine the most optimal solution in terms of their transfer capability.

E-4.5 Impact of a Delay in the Construction Schedule

The Marcy to Pleasant Valley Project proposed commercial operation date is September 2017.

NEETNY understands the importance of completing the proposed Project on time, as the numerous benefits explained earlier cannot be realized until the Project has been completed. Failure to complete the transmission line on this date may have several impacts. The inability to deliver new generation, including clean renewable energy to the ratepayers of New York, will result in more expensive and less environmentally friendly generation being used to serve the load. As identified in the CARIS report, delaying the in-service date of the Marcy to Pleasant Valley Project will result in increased production costs, losses, capacity payments, demand congestion, and CO₂ and NO_x emissions. Additionally, the NYISO transmission system will be more vulnerable to contingent events or severe system conditions that may leave it susceptible to loss of load. This concern is further reinforced by the fact that the NY STARS report has identified nearly 4,700 miles of transmission lines that may need to be replaced over the next 30 years.

E-4.6 System Impact Study

The interconnection transmission process for interconnecting the Marcy to Pleasant Valley Project is governed by NYISO pursuant to Attachment X of its Open Access Transmission Tariff (OATT). To support the interconnection of the Marcy to Pleasant Valley Project, starting in May 2013, NextEra Energy Transmission, LLC (NEET), NEETNY's parent company, initiated the interconnection process for the Marcy to Pleasant Valley Project. NYISO has accepted these requests and assigned them queue numbers as identified in Table E4-1. The dates upon which NEETNY filed its Feasibility Study Agreement (FESA) and NYISO held or scheduled scoping meetings related to the interconnection requests are also outlined in Table E4-1.

Table E4-1. NYISO Electrical Interconnection Studies Summary Status			
Project	FESA Filed	Q#	FESA Scope Meeting
Preferred Route	September, 2013	418	October, 2013
Alternative 1	September, 2013	419	October, 2013
Alternative 2	September, 2013	416	October, 2013
Alternative 3	May, 2013	402 & 404	June, 2013
Alternative 4	June, 2013	406 & 404	July, 2013
Alternative 5	September, 2013	417 & 404	October, 2013
Alternative 6	September, 2013	420 & 404	October, 2013

Promptly upon completion of the Feasibility Studies for the Marcy to Pleasant Valley Project, NEETNY will submit the results to the Commission. Subsequently, the System Reliability Impact Study will be submitted upon completion, as well.