

**THE STATE OF NEW HAMPSHIRE
BEFORE THE
NEW HAMPSHIRE SITE EVALUATION COMMITTEE
DOCKET NO. 2015-06**

**SUBSTITUTE PRE-FILED DIRECT AND SUPPLEMENTAL TESTIMONY
OF
ROBERT D. ANDREW**

**IN SUPPORT OF THE
APPLICATION OF NORTHERN PASS TRANSMISSION LLC
AND PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE
D/B/A EVERSOURCE ENERGY
FOR A CERTIFICATE OF SITE AND FACILITY TO CONSTRUCT A NEW
HIGH VOLTAGE TRANSMISSION LINE AND RELATED FACILITIES IN
NEW HAMPSHIRE**

March 24, 2017

Qualifications and Purpose of Testimony

Q. Please state your name, title, and business address.

A. My name is Robert D. Andrew. My title is Director – System Solutions. I work for Eversource Energy Service Company (“Eversource”) and my business address is 780 North Commercial St, Manchester, New Hampshire 03101.

Q. Briefly summarize your educational background and work experience.

A. I hold a Bachelor of Science in Electrical Engineering Degree with Concentration in Electric Power Systems from Northeastern University and also a Master of Science in Electrical Engineering with Concentration in Electric Power Systems from Northeastern University. I have worked in the electric power field for more than 35 years. Starting in 1979 as a Distribution Engineer for Public Service Company of New Hampshire, I then spent 12 years working in the generation area followed by another ten years as a Transmission System Operator and Manager of Transmission System Operations in the Greater Boston area. Finally the last five years have been spent in the System Planning area. Please see my resume, Attachment A.

Q. Have you previously testified before the Site Evaluation Committee?

A. Yes, I previously testified on behalf of Eversource in support of the Merrimack Valley Reliability Project, New Hampshire Site Evaluation Committee docket number 2015-05. I have also submitted pre-filed testimony on behalf of Eversource in support of the Seacoast Reliability Project, NH SEC docket number 2015-04. I have also testified on behalf of Eversource before the Energy Facilities Siting Board (“EFSB”) in the Commonwealth of Massachusetts.

Q. What is the purpose of your testimony?

A. I adopt the testimony of Bradley Bentley originally filed with the Application, which has two purposes, and I update it for certain actions taken subsequent to filing. First, I explain why the Northern Pass Transmission Project (“Northern Pass” or the “Project”), as proposed by Northern Pass Transmission, LLC (“NPT”), will not adversely impact system stability or reliability. Second, I describe the benefits that Northern Pass will provide to the electric transmission system. To update the testimony, I deleted a sentence that said NPT expected to submit Proposed Plan Applications by the end of 2015. I also deleted a question and answer concerning the expected nature of the required upgrades, which have since been

1 approved. Finally, I revised page 3 of my testimony to reflect the fact that the required upgrades
2 have been approved.

3 **ISO-NE Project Approval**

4 **Q. What regional reliability approvals are necessary for the Project to**
5 **interconnect with the New England power system?**

6 A. The Project must receive approval from the Independent System Operator of New
7 England (“ISO-NE”) pursuant to Section I.3.9 of the ISO-NE Tariff in order to interconnect to
8 the New England regional electric grid.

9 **Q. What is the process for ISO-NE approval of Northern Pass?**

10 A. Pursuant to the ISO-NE tariff, which was revised for 2015, NPT must submit a
11 package of materials referred to as Proposed Plan Applications (“PPAs”), including certain
12 transmission facility data and study results. ISO-NE performs transmission studies, which must
13 show, through rigorous and complex technical analyses, that the Project will have no significant
14 adverse effect upon the reliability or operating characteristics of any transmission facilities or
15 systems comprising the regional electric grid. The technical analysis includes system impact
16 study work for steady state, stability, and short circuit conditions. Additional testing of inter-
17 regional transfers is conducted to ensure that the Project does not affect neighboring transmission
18 systems.

19 **Q. Has the Project received ISO-NE Proposed Plan Application (“PPA”)**
20 **approval?**

21 A. NPT submitted PPAs in October 2013 for a 1,200 MW project under the ISO-
22 NE’s prior rules. ISO-NE issued a letter approving that proposal on January 9, 2014, subject to
23 certain requirements. See Appendix 40. Subsequently, NPT asked ISO-NE to study a proposal
24 for a technology change that would reduce the Project capacity from 1,200 MW to 1,090 MW,
25 which is described in the testimony of James A. Muntz. NPT therefore submitted an
26 interconnection request for an elective transmission upgrade early in 2015, which initiated
27 another ISO-NE study and approval process. See Appendix 40.

28 **Q. Has ISO-NE approved PPA’s for the Project at the reduced capacity of 1090**
29 **MW?**

30 A. Yes, by letter dated July 19, 2016, ISO-NE approved the PPAs associated with the
31 Project, namely, ES-16-T31 through ES-16-T37, and determined that these PPAs would have no

1 significant adverse effect pursuant to Section I.3.9 of the ISO Tariff. More specifically, ISO-NE
2 determined that the implementation of the PPA will not have a significant adverse effect upon
3 the reliability or operating characteristics of the Transmission Owner's transmission facilities,
4 the transmission facilities of another Transmission Owner, or the system of a Market Participant,
5 as those terms are defined by the ISO Tariff. The approved in-service date of the Project is May
6 31, 2019. For a copy of the July 19, 2016 ISO-NE letter, please see Attachment B, which was
7 provided with the Applicants' Supplemental Materials submitted to the Committee on July 29,
8 2016, consistent with Site 301.03(g)(11) and (12).

9 **Q. Did the original ISO-NE approval identify upgrades to the transmission**
10 **system?**

11 A. Yes. The results of the testing for the PPAs concluded that transmission upgrades
12 at the existing Deerfield and Scobie Pond Substation, and on three 345 kV lines that connect to
13 the Deerfield and Scobie Pond Substations, would be required. The upgrades include capacitor
14 banks and a static var compensator ("SVC"), as well as breakers and transmission structure
15 upgrades. The details of these upgrades are included in the ISO-NE PPA approval letter for NPT
16 in Appendix 40.

17 **System/Electrical Benefits**

18 **Q. What benefits does Northern Pass provide to the regional electric grid?**

19 A. The Federal Energy Regulatory Commission ("FERC") identified a number of
20 specific benefits to the regional power grid when it accepted NPT's Transmission Service
21 Agreement with H.Q. Hydro Renewable Energy, Inc., a subsidiary of Hydro Québec. It noted,
22 for example, that the Project "will include making available up to 1,200 MW of hydro-electric
23 power previously unavailable from Québec. The [Project] will not only diversify New England's
24 power supply mix, but it will also allow more energy imported from Québec to be delivered
25 during peak hours when marginal generation costs and market-clearing prices are highest."¹
26 FERC also commented that, "we find that with the addition of hydro-electric power to the base
27 case, the existence of the [Project] will help mitigate overloads."²

¹ *Northern Pass Transmission LLC*, 134 FERC 61,095 at ¶ 40 (2011).

² *Id.* at ¶ 26.

1 **Q. Will the Project address power system concerns raised by ISO-NE?**

2 A. As described in the pre-filed testimony of Julia Frayer, the Project will help to
3 respond to the nearly 8,300 MWs of coal- and oil-fired generation that ISO-NE has identified as
4 being at risk of retirement between now and 2020.³ In addition, it will increase fuel diversity in
5 New England, which has become increasingly dependent on natural gas for power generation.
6 The region's heavy dependence on natural gas raises serious questions about the reliability of
7 power delivery in winter months because the gas is also needed for home heating and industrial
8 uses. Over the long term, the Project will also help to meet future load growth requirements, and
9 it may avoid or defer the need to construct new fossil fuel plants and associated transmission
10 projects that would otherwise be required to produce an equivalent quantity of reliable power.

11 **Q. As an HVDC project, does Northern Pass provide benefits to the power**
12 **system?**

13 A. The Project provides important system benefits. First, the DC link will provide
14 power system support. Second, it may be able to limit the effects of a cascading blackout and
15 provide emergency support after outages. Third, it has the capability of helping New England
16 meet its reserve requirements. Finally, this new regional interconnection is highly dispatchable
17 and will allow for use by others when Hydro-Québec has not scheduled power deliveries.

18 **Q. Will the Project's AC transmission system upgrades provide benefits to the**
19 **power system?**

20 A. Yes, the AC system upgrades will help maintain system voltages and reactive
21 reserve, and improve power transfer capabilities and deliverability in New Hampshire as
22 described below. First, transmission system operators must deal with changes in load and
23 generation on a minute-by-minute basis and be prepared to respond to disturbances on the
24 system. In addition, operators must be able to schedule maintenance outages without significant
25 risk to reliability. The regional network upgrades required by ISO-NE will allow the system
26 operators to be more responsive and flexible in responding to power system needs. This is
27 because the required upgrades are designed to address stressed conditions, which occur
28 infrequently during the year. At other times, the system operators will be able to support the
29 power system with the additional infrastructure. Second, in addition to providing increases in

³ ISO-NE, *ISO New England's Strategic Transmission Analysis, New England Electricity Restructuring Roundtable: Generation Retirement Study & 2020 Resource Options* at 4 (June 14, 2013).

1 power carrying capability, new transmission infrastructure provides resiliency benefits. When
2 new transmission reactive devices, such as those NPT expects to construct, are added to the
3 system, the devices help support the power system in emergency conditions, especially during
4 storm events. Essentially, a power system that has multiple paths to connect various areas of the
5 system is more reliable. This includes new line interconnections and reactive support for areas
6 as load continues to grow. Third, the location of the converter terminal in Franklin facilitates the
7 potential use and incorporation of the 345 kV alternating current transmission facilities of
8 Northern Pass into a PSNH reliability project should ISO-NE determine that those facilities,
9 along with other system improvements, could address a reliability need at some point in the
10 future.

11 **Q. In summary, what is your conclusion with respect to the interconnection of**
12 **Northern Pass to the New England transmission system?**

13 A Based on my experience and knowledge of the extensive testing and analyses
14 performed by ISO-NE as part of the I.3.9 process, Northern Pass will be able to interconnect
15 with the New England transmission system in a manner that assures system stability and
16 reliability. Moreover, as discussed above, the Project will provide material benefits to the New
17 England transmission system.

18 **Q. Does this conclude your testimony?**

19 A. Yes.

Robert D. Andrew

Education

- **Northeastern University, Master of Science in Electrical Engineering, 1983**
- **Northeastern University, Bachelor of Science in Electrical Engineering, 1979**

Professional Experience

1983 – Present Eversource Energy (Northeast Utilities (NSTAR Electric (Boston Edison Company)))

Director, System Solutions (Eversource): January 2017 to present

Accountable for ensuring optimal performance of electric transmission and distribution system assets. Responsibilities include;

- Implement best practices to achieve efficient and effective planning practices.
- Collaboration with others on preliminary and final project designs.
- Participate in the ISO-NE Planning Process including;
 - Area Study Groups
 - Tariff section I.3.9 analyses
 - Transmission Cost Allocation processes
 - Generator Interconnection Studies
- Develop and execute electric system improvement plans for the transmission system and major substation facilities.

Director, System Planning (Eversource and NSTAR Electric): 2010 to December 2016

Accountable for ensuring optimal performance of electric transmission and distribution system assets. Responsibilities include;

- Implement best practices to achieve efficient and effective planning practices.
- Collaboration with others on preliminary and final project designs.
- Participate in the ISO-NE Planning Process including;
 - Area Study Groups
 - Tariff section I.3.9 analyses
 - Transmission Cost Allocation processes
 - Generator Interconnection Studies
- Develop and execute electric system improvement plans for the transmission system and major substation facilities.

Manager, Bulk Power System Operations (NSTAR Electric): 2004 to 2010

Responsible for the safe, reliable and economic operation of the NSTAR Electric Transmission System. Major duties include:

- Preparation and presentation of evidence of compliance with NERC “TOP” Reliability Standards during NPCC On-site Audit. Received “compliant” rating for all audited standards/requirements.
- Create/implement the Procedures and Training required for NSTAR to become a Local Control Center under ISO New England.
- Manage, select, train, coach and develop Control Room staff
- Manage Transmission System daily operating tasks, including facility outages needed to construct upgrades to facilities
- Responsible Operations Manager for the upgrade of the SCADA System and addition of EMS Applications.
- Implemented use of the Common Information Model (CIM) to update the electric system model used by EMS software applications.

Senior Planning Engineer (NSTAR Electric): 2001 to 2004

Responsible for the development of changes to the NSTAR Electric Transmission System to address:

- Overload conditions during normal or contingency conditions
- Improper voltage levels during all operating conditions

Provide assistance to Dispatchers to improve operation of the transmission system including:

- Loadflow analysis supporting outage applications
- Revise SCADA screens to improve the display of system parameters
- Creation of Operating Guides and training to address contingencies and extreme operating conditions

NSTAR’s representative on the ISO-NE Voltage Task Force.

Lead Engineer – Asset Strategy Distribution (NSTAR Electric and Boston Edison): 1997 to 2001

Provided innovative ideas and leadership on Teams tasked with developing post-merger plans for SCADA, GIS and Communication Systems. Responsible for the Y2K compliance of all Distribution System equipment and review of Y2K Contingency Plans for technical accuracy and operational issues. Identified and implemented “PI” software allowing desktop access to electric system status information via the SCADA System.

Senior Dispatching Supervisor (Boston Edison): 1996 to 1997

Responsible for the safe and reliable operation of Boston Edison’s electric system. Applied SCADA technology to change the methods for implementing Voltage Reduction, Load Shedding and Transformer Load Tap Changer control eliminating over \$150K/year in maintenance expenses. Boston Edison’s alternate member on the REMVEC Operating Committee and Team Leader for the original issue of the Power System Restoration Plan. Initiated efforts to automate relay testing via the SCADA System and to automate restoration of distribution circuits via SCADA controlled operation of RADSEC devices.

Bulk Power Supply System Controller (Boston Edison): 1993 to 1996

Responsible for the safe and reliable operation of the NSTAR Electric transmission system including:

- Switching and tagging activities
- Review and approval of outage applications in support of maintenance and construction activities
- Coordination of operating activities with NEPEX, REMVEC and other Utilities
- Loadflow analyses supporting outage applications and changing operating conditions

Senior Instrumentation and Controls Engineer (Boston Edison): 1983 to 1993

Technical lead engineer for NRC Audits of Pilgrim Station's environmental qualification program and Instrument Set Point Bases, both audits resulted in no adverse findings. Member of various Multi-Discipline Assessment Teams tasked with root cause analysis and corrective action on major plant systems such as the main turbine control system. Responsible for Project Management and Contract Management for numerous changes to plant design and equipment.

1981 – 1983 Stone and Webster Engineering Corporation

Engineer – Electric Power Group

Responsible for the Environmental Qualification of electric equipment for the Millstone 3 Plant. Effort included a staff of four and an estimated budget of 12 million dollars.

1979 – 1981 Public Service Company of New Hampshire -Distribution Engineer



Stephen J. Rourke
Vice President, System Planning

July 19, 2016

Mr. Dennis Carberry
Eversource Energy
56 Prospect Street
Hartford, CT 06103

Subject: Northern Pass Transmission Project - Proposed Plan Applications (PPAs) ES-16-T31 through ES-16-T37

Dear Mr. Carberry:

This letter is to inform you that, pursuant to review under Section I.3.9 of the ISO Tariff, no significant adverse effect has been identified with regard to the following PPAs:

ES-16-T31 through ES-16-T37 – Transmission notifications from Eversource Energy (ES) for the Northern Pass Transmission Project

The in-service date of the project is May 31, 2019. The Reliability Committee (RC) reviewed the materials presented in support of the proposed project and did not identify a significant adverse effect on the reliability or operating characteristics of the transmission facilities of ES, the transmission facilities of another Transmission Owner or the system of any other Market Participant.

Having given due consideration to the RC review, ISO New England has determined that implementation of the plan will not have a significant adverse effect upon the reliability or operating characteristics of the Transmission Owner's transmission facilities, the transmission facilities of another Transmission Owner, or the system of a Market Participant.

A determination under Section I.3.9 of the ISO Tariff is limited to a review of the reliability impacts of a proposed project as submitted by Participants and does not constitute an approval of a proposed project under any other provisions of the ISO Tariff.

Sincerely,

A handwritten signature in black ink, appearing to read "Stephen J. Rourke", written over a faint, larger version of the same signature.

Stephen J. Rourke
Vice President, System Planning

cc: Proposed Plan Applications

ISO New England Inc.
One Sullivan Road
Holyoke, MA 01040-2841
413-535-4306
srourke@iso-ne.com

ISO-NE PUBLIC

iso-ne.com
isonewswire.com
@isonewengland
iso-ne.com/Isotogo
iso-ne.com/isoexpress