STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
PUBLIC UTILITIES COMMISSION

The Narragansett Electric Company d/b/a	)	
National Grid (Rhode Island Reliability Project)	)	RIPUC Docket No. 4029

PREFILED TESTIMONY OF FRANK MEZZANOTTE

ON BEHALF OF ISO NEW ENGLAND INC.

March 13, 2009

Mr. Mezzanotte is a Manager of Area Transmission Planning at ISO New England Inc. with the responsibility for the Southern New England studies. His testimony describes the responsibilities of ISO New England, including its function as the regional transmission planner for the New England bulk power grid, discusses electric system reliability concerns in Rhode Island, and supports the Rhode Island Reliability Project as a solution to such reliability concerns.

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1. Introduction

Q1. Please state your name, position, and business address.

A1. I am Frank Mezzanotte, Manager – Area Transmission Planning at ISO New England Inc. (the "ISO"). My business address is ISO New England Inc., One Sullivan Road, Holyoke, Massachusetts 01040.

Q2. Please state your educational background and work experience.

A2. I have a Masters in Power Engineering & Engineering Management from the George Washington University. I began my career with the Long Island Lighting Company where I worked for nineteen years in various planning and engineering positions. After that, I served as the Manager of System Engineering & Planning at Northern Virginia Electric Cooperative.

I joined Transmission Planning at the ISO as a Lead Engineer in June, 2001, was promoted to Supervisor in 2004, and achieved the title of Manager in 2008. My main responsibility has been to lead, coordinate and review studies in the three southern New England states of Rhode Island, Massachusetts and Connecticut. I have been directly involved in the development of all of the Regional Transmission Expansion Plan and Regional System Plan reports since joining the ISO in 2001.

I am a licensed Professional Engineer in the states of Massachusetts, New York and Virginia.

Q3. Have you previously testified before the Rhode Island Public Utilities Commission?

A3. Yes. I testified in the Southern Rhode Island Transmission Project proceeding in Docket No. 3732.

2. Summary of Testimony

Q4. What is the purpose of your testimony in this proceeding?

A4. In my testimony, I describe generally the ISO's mission and responsibilities. I also describe the ISO's planning criteria and how they relate to the Federal Energy Regulatory Commission ("FERC"), the North American Electric Reliability Corporation ("NERC") and the Northeast Power Coordinating Council, Inc. ("NPCC") standards and requirements for the Nation's bulk power transmission system. My testimony supports the need for the Rhode Island Reliability Project to address identified reliability concerns in Rhode Island.

Q5. Please summarize your testimony.

A5. Based on studies to date and applicable regional reliability standards, the ISO is concerned about the reliability of the existing electricity delivery system in Rhode Island. In an effort to evaluate the ability of the transmission system in southern New England to continue to perform reliably, a working group, consisting of planners from the ISO, National Grid and Northeast Utilities was formed. Under my direction and supervision, this working group undertook a comprehensive forward looking transmission planning study, known as the Southern New England Transmission Reliability analysis. This analysis is documented in the

Southern New England Transmission Reliability Report, Needs Assessment ("Needs Assessment")[1].

Transmission reliability and dependence on local generation are major concerns for the Rhode Island system. Section 3.3.2 of the Needs Assessment identifies critical weaknesses in Rhode Island where, without transmission improvements, the system may fail to provide reliable service.

After establishing the existence, nature and location of the reliability concerns, the working group identified possible transmission solutions and evaluated each solution. This step involved determining the advantages and disadvantages of each possible transmission solution: what new infrastructure, configurations and operational changes could best cure the identified problems. The working group detailed this analysis in the New England East-West Options Analysis ("Options Report")[2], including the selection of the Rhode Island Reliability Project (the "Project") in conjunction with the Interstate Reliability Project as the recommended solutions for the identified reliability concerns in Rhode Island. The Project consists of a new 345 kV transmission line, and the relocation of two existing 115 kV transmission lines on an existing 21.4 mile right-of-way from the West Farnum Substation in North Smithfield to the Kent County Substation in Warwick. The major component of the Project is the construction of a second 345 kV transmission line to National Grid's existing Kent County Substation. In

[1] Included as Appendix D to the Petitioner's Environmental Report.
[2] Included as Appendix E to the Petitioner's Environmental Report.

order to accomplish this, it is necessary to relocate two existing 115 kV lines on the right-of-way and relocate short segments of other 115 kV lines. To accept the new 345 kV transmission line, the existing West Farnum and Kent County Substations will be expanded and modified.

In September 2008, Narragansett Electric Company ("National Grid") filed with the Rhode Island Energy Facility Siting Board an application to construct the Rhode Island Reliability Project. I support the Project as needed to address the reliability concerns identified in the Needs Assessment and to ensure the continuation of reliable electric service to customers in Rhode Island.

3. The ISO Mission and Responsibilities

Q6. Why was the ISO established?

A6. The "Independent System Operator" concept was developed by FERC as part of the framework to support competitive electricity markets. In 1996, FERC stated its principles for the ISO operation and governance in FERC Order 888.[3] FERC identified Independent System Operator principles as: providing independent, open and fair access to the region's transmission system; establishing a non-discriminatory governance structure; facilitating market based wholesale electricity rates; and ensuring the efficient management and reliable operation of the regional bulk power system.

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[3] Promoting Wholesale Competition Through Open Access, Non-Discriminatory Transmission Services by Public Utilities; Recovery of Stranded Costs by Public Utilities and Transmitting Utilities, Order No. 888, 75 FERC ¶ 31,036 (1996)(establishing principles for ISO's operation and governance).

The ISO was established to be the Independent System Operator of the New England bulk power grid on July 1, 1997,[4] and it assumed certain operating and transmission reservation responsibilities which had previously been carried out by NEPOOL, which transferred staff and assets to the ISO.

Q7. *Does the ISO make any profit from its role as the Independent System Operator?*

A7. No. As the Independent System Operator, the ISO complies with FERC Order No. 889.[5] In this regard, the ISO is an independent, private, non-profit, non-stock, company. The ISO therefore has no shareholders, and its Board of Directors and employees are barred from being employed by or owning shares in NEPOOL Market Participants. Its budget is reviewed and approved annually by FERC, and the ISO only recoups its annual expenses. As a result, market activity covers the ISO's expenses in monitoring and administering the system.

Q8. What are the ISO's mission and responsibilities?

A8. The ISO manages the New England region's bulk electric power system, operates the wholesale electricity market, administers the region's Open Access Transmission Tariff, and conducts regional transmission planning. More specifically, the ISO's responsibilities include independently operating and maintaining a highly reliable bulk transmission system, promoting efficient wholesale electricity markets, and working collaboratively and proactively with

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4 New England Power Pool, Order Conditionally Authorizing Establishment of an Independent System Operator and Disposition of Control Over Jurisdictional Facilities, 79 FERC ¶ 61,374 (1997) (authorizing formation of ISO).

5 Open Access Same-Time Information System Conduct, Order No. 889, 75 FERC ¶ 61,078 (1996) (rules establishing and governing Open Access Same-Time Information System).

state and federal regulators, NEPOOL Participants, and other stakeholders in pursuit of these goals.

As pertinent to this proceeding, FERC has conferred upon the ISO responsibility for conducting long-term system planning for New England.[6] As such, the ISO must maintain a level of system reliability that meets criteria established by NERC, NPCC, and the ISO's own planning standards. Applicable reliability standards are discussed more fully below.

It is appropriate to add that the massive outage that struck the North American electric power system on August 14, 2003, causing the loss of approximately 2,500 megawatts ("MW") of load in New England, has underscored the significance of the ISO's mission and responsibilities. The event demonstrated the need for appropriate reliability standards, effective monitoring of compliance, and, most importantly, a reliable bulk power transmission system. A well coordinated regional system plan and additional power system infrastructure are more essential than ever to ensure reliability of service to load, because without a well-planned system, there may not be operating options available to maintain reliable service.

[6] ISO New England Inc. and New England Power Pool,Order on Reh'g, 95 FERC ¶ 61,384 (2001) (authorizing ISO to oversee regional transmission planning); ISO New England Inc and New England Power Pool, 103 FERC ¶ 61,304 (2003) (finding that "[w]e are persuaded by ISO-NE's arguments it is the appropriate authority to approve planning for transmission upgrades..."); Order Accepting Compliance Filing, As Modified, 123 FERC ¶ 61,113 (2008) (accepting ISO Tariff provisions regarding transmission planning).

Q9. What is the ISO's role in conducting regional transmission planning?

A9. The ISO is responsible for conducting long-term regional transmission planning for the New England region. The ISO annually prepares a comprehensive Regional System Plan ("RSP") for the six New England states that includes forecasts of future load and how the electrical transmission system as planned can meet the growing demand by adding generating resources, energy efficiency or other demand-side resources, and transmission. Transmission upgrades are planned and required throughout New England to maintain system reliability, improve the efficiency of system operations, increase system transfer capability, serve major load pockets, and reduce locational dependence on generating units. The RSP identifies additional work required to fully develop a highly coordinated regional plan to meet the reliability requirements of New England. The regional transmission plan is developed through an open process and through participation of, and review by, interested parties, including state regulators and NEPOOL market participants. To ensure that the ISO receives the full benefit of input from all interested stakeholders, the ISO convenes multiple planning meetings over the course of the year with the Planning Advisory Committee ("PAC")—a stakeholder group that is open to any interested entity, including, but not limited to, Transmission Customers, Market Participants, and various officials of the New England states. The ISO also coordinates the regional system planning process with the Participating Transmission Owners and other asset owners in New England.

4. Reliability Standards

Q10. What criteria does the ISO use in determining whether electricity service in New England, including Rhode Island, is reliable?

A10. As explained below, there are numerous criteria employed in planning a reliable transmission system. Overall, these criteria all seek to satisfy one overarching objective - to ensure an electric system that can reliably deliver electric energy to the distribution systems served by the Participating Transmission Owners. Without this objective, the probability of widespread electric outages to many customers is increased significantly. In other words, the reliability objectives seek to keep the lights on in the region, generally, and in specific areas of transmission need, particularly.

The ISO plans the New England regional transmission system to comply with the reliability and criteria standards established by NERC, NPCC and the ISO. The ISO's implementation and compliance with NERC/NPCC Reliability Rules are codified in its Operations, Planning, and Administrative manuals and other written procedures. NERC oversees a number of regional councils, one of which is the NPCC. The NPCC covers New York, New England, and parts of Canada. Under this framework, NERC has established a general set of mandatory rules and criteria applicable to all geographic areas. NPCC has established a set of rules and criteria particular to the Northeast, although they also encompass the more general NERC standards. In turn, the ISO has developed standards and

criteria specific to New England that coordinate with the NPCC rules. Similar standards exist throughout the nation and other portions of North America. Whether developed by NERC, NPCC, or the ISO, the standards and criteria applicable to the New England transmission system are applied in a deterministic fashion (*i.e.,* for specific disturbances or "contingencies") in order to assess the ability for it to perform under a series of defined contingency situations. Specifically, these standards and criteria dictate a set of operating circumstances or contingencies under which the New England transmission system must perform without experiencing overloads, instability, or voltage violations. For NPCC, these performance measurements are set forth in NPCC Document A-2, "Basic Criteria for the Design and Operation of Interconnected Power Systems" (revised May 2004) attached as Attachment A. The ISO planning procedures are designed to meet the reliability standards that are specifically defined in Planning Procedure No. 3, "Reliability Standards for the New England Bulk Power Supply System" ("PP3"), attached as Attachment B. PP3 provides the published standard that provides consistent system planning criteria throughout New England. Analyses of these contingencies also include assessment of the potential for widespread cascading outages due to overloads, instability or voltage collapse.

5. The Reliability of the Transmission System in Rhode Island

Q11. Does the ISO have concerns regarding the ability of the transmission system in Rhode Island to provide continued reliable electric service?

A11. Yes. The Needs Assessment identifies and details reliability concerns with the Rhode Island electric system. The ISO presented the deficiencies of the Rhode Island electric system at PAC meetings on five different occasions: May 4, 2005; March 15, 2006; December 15, 2006; December 3, 2007; and May 19, 2008.

Q12. What are the ISO's concerns regarding the ability of this transmission system to provide continued reliability of electricity service in Rhode Island?

A12. From a reliability perspective, the ISO is concerned that the existing system in Rhode Island faces a combination of growing summer peak demand, limited transmission capacity, and limited generation that is effectively integrated to serve the load. As the Needs Assessment shows, there is a high and increasing potential exposure to being unable to withstand single and multiple element contingencies following the single loss or outage of certain critical facilities in Rhode Island as the system approaches or exceeds forecasted peak load levels. Single element contingencies refer to the loss of an individual transmission line, transformer, or generator due to any event such as a lightning strike. Multiple element contingencies refer to a single event which removes multiple pieces of generating or transmission equipment from service such as may occur following the failure of a circuit breaker or the simultaneous loss of multiple transmission circuits which are on the same tower. These contingencies can result in thermal

and voltage violations of the reliability and security standards established by NERC, the NPCC and the ISO.

Because of Rhode Island's dependence on local generation, reliability concerns are exacerbated if local generation is unavailable. If local generation is not available, the limited amount of electricity that the existing transmission system can import from other areas and transmit in Rhode Island places the area at an unacceptable risk of loss of service.

Q13. What specifically are the ISO's reliability concerns in Rhode Island?

A13. The ISO shares National Grid's concerns with thermal overloading of transmission lines, poor voltage performance and potential voltage collapse. As stated in the Needs Assessment, transmission system reliability and dependence on local generation are the major concerns for the Greater Rhode Island area. A number of steady-state thermal and voltage violations were observed on the transmission facilities while analyzing the conditions for the 2009 system. The reliability problems on the Rhode Island 115 kV system are caused by a number of contributing factors (both independently and in combination), including high load growth (especially in southwestern Rhode Island and the coastal communities), generation unit availability, and transmission outages (planned or unplanned). Additionally, the Rhode Island 115 kV system is constrained when one of the Greater Rhode Island 345 kV lines is out-of-service. The 345 kV transmission lines critical for serving load in the Rhode Island 115 kV system are as follows:

- Line 328 (Sherman Rd – West Farnum)
- Line 332 (West Farnum – Kent County)
- Line 315 (West Farnum – Brayton Point)
- Line 303 (ANP Bellingham – Brayton Point)

Outage of any of these transmission lines result in limits to power transfer into Rhode Island. For line-out conditions, the next critical contingency would involve a loss of a 345/115 kV autotransformer or the loss of a second 345 kV tie.

Q14. How do thermal overloads occur?

A14. Thermal overloads occur when transmission lines, often as a result of a contingency event elsewhere in the system, carry current in excess of their design capacity. Overloaded lines build up heat beyond their temperature limits and may sag in an unsafe manner or fail, redirecting power to other lines, which in turn may become overloaded; a pattern that may result in a sustained loss of load, equipment damage and cascading outages that could affect areas well outside Rhode Island.

Transmission lines have normal and emergency current ratings. Normal ratings are the rating limits within which a line should generally operate at all times. Normal line loading ratings are violated when a transmission line is used to carry current in excess of its rating for sustained planned system configurations. Transmission lines can be operated at current loads that exceed the normal rating, but only for a limited period of time, such as following a sudden equipment outage. An emergency current rating is the upper operational limit of the line.

Consequences of operating lines between normal and emergency limits include reduced life expectancy of the transmission line and reduction in the ability to respond to subsequent outages. Exceeding the emergency ratings of transmission lines can result in line mechanical failure or sagging into public areas, such as highways; thereby compromising public safety and causing uncontrolled outages. Lines that sagged into trees in Ohio contributed to the Northeast Blackout of August 2003.

Q15. Why is low voltage a concern?

A15. Low voltage at the consumer level is a concern because it can damage equipment and interfere with the proper operation of appliances and machinery. At the transmission level, insufficient voltage can also cause unanticipated and undesirable protective equipment operation, voltage collapse and loss of load.

Q16. How many violations of the ISO Reliability Standards may occur before a system is considered to be out of compliance?

A16. None. A system that has only one violation of the criteria outlined in the ISO Reliability Standards is not in compliance.

Q17. What consequences can an uncontrolled blackout have?

A17. There are two consequences of an uncontrolled blackout. First, it is often difficult to accurately predict how large an area will be affected by blackout, and as a result, it could encompass the entire northeastern United States, as happened in 1965 and again on August 14, 2003, when parts of the Midwest and Canada were also affected along with the Northeast. Second, it may result in equipment

damage that will hamper restoration of service, thus prolonging outages, and make efforts to remedy the system more expensive.

6. Benefits of the Rhode Island Reliability Project

Q18. What reliability benefits will the Rhode Island Reliability Project provide to the transmission system?

A18. The installation of the Rhode Island Reliability Project will address the reliability issues described above by eliminating the thermal and voltage criteria violations. Moreover, the transmission upgrades will serve to ensure that Rhode Island's transmission system remains in compliance with NERC, the NPCC, and the ISO reliability standards.

Q19. Are there any factors that could influence the timing of when these upgrades are needed?

A19. Yes. The first Forward Capacity Auction ("FCA") was held in February 2008 and the second FCA was held in December 2008. The ISO's Tariff requires that the ISO "reflect proposed market responses in the regional system planning process."[7] As required by the Tariff, the ISO has considered the impact on the need for the Rhode Island Reliability Project based on the cleared resources resulting from the FCA. Additionally, the ISO has considered the timing of need for the project based on recent load forecasts.

The ISO has concluded that neither the FCA resources nor the revised load forecast would affect the timing of the need for the project. A total of 76 MW of

[7] Section 4.2(a) of Attachment K to the ISO New England Transmission, Markets and Services Tariff.

Demand Resources in Rhode Island cleared in the second FCA. Only about half of these resources are located in the load area that would impact the need for the project. Additionally, only two New Generating Capacity Resources in Rhode Island cleared in the auctions and both of these resources are small landfill units. Finally, the recent reduced load forecast is comparable (within 1%) of the original 2005 forecast in the Needs Assessment.

Q20. Will these findings be presented to the PAC?

A.20. Yes. The findings and analysis supporting the determination that neither the FCA resources nor the revised load forecast affect the timing of the need for the Rhode Island Reliability Project will be presented to the PAC on May 15, 2009.

Q21. Does the ISO support the proposed Rhode Island Reliability Project?

A21. Yes. As described above and in the Needs Assessment, the ISO is concerned about the ability of the existing transmission system to maintain reliable electric service in Rhode Island. The Rhode Island Reliability Project proposes a new 345 kV line from West Farnum to Kent County, which is needed to support the southwestern Rhode Island area if the existing 345 kV line (line 332) is lost, especially if either the FPLE Rhode Island State Energy generation plant or Manchester Street generation plant is out-of- service. The Project will provide a critical reinforcement when line 332 is out-of- service and an additional key southwestern Rhode Island element is lost (an N-1-1 contingency condition).

Q22. Does this conclude your testimony?

A22. Yes, thank you.

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ISO ATTACHMENT LIST

Frank Mezzanotte

Attachment A	NPCC Document A-2 "Basic Criteria for the Design and Operation of the Interconnected Power Systems."
Attachment B	ISO Planning Procedure No. 3, "Reliability Standards for the New England Bulk Power Supply System."