STATE OF CONNECTICUT
CONNECTICUT SITING COUNCIL

The Connecticut Light & Power Company Application for a Certificate of Environmental Compatibility and Public Need for the Connecticut Portion of the Interstate Reliability Project that traverses the municipalities of Lebanon, Columbia, Coventry, Mansfield, Chaplin, Hampton, Brooklyn, Pomfret, Killingly, Putnam, Thompson, and Windham, which consists of (a) new overhead 345-kV electric transmission lines and associated facilities extending between CL&P's Card Street Substation in the Town of Lebanon, Lake Road Switching Station in the Town of Killingly, and the Connecticut/Rhode Island border in the Town of Thompson; and (b) related additions at CL&P's existing Card Street Substation, Lake Road Switching Station, and Killingly Substation.	))))))))))))))))	**Docket 424** **July 17, 2012**

PREFILED TESTIMONY OF ISO NEW ENGLAND INC.

By Messrs. Stephen Rourke and Brent Oberlin

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1. Introduction

Q: *Please state your name, position, and business address.*

A: *Mr. Rourke.* My name is Stephen Rourke. I am Vice President of System Planning at the ISO. My business address is One Sullivan Road, Holyoke, Massachusetts 01040.

Mr. Oberlin. My name is Brent Oberlin. I am Director of Transmission Planning at the ISO.

Q: *Please summarize your experience and qualifications.*

A: *Mr. Rourke:* I have a Bachelor of Science degree in Electrical Engineering from Worcester Polytechnic Institute and a Master of Business Administration degree from Western New England College. In my current position as Vice President of System Planning, I am responsible for overseeing development of the annual Regional System Plan ("RSP"); analysis and approval of new transmission and generation interconnection projects, including the approval of qualification of generating capacity resources, demand resources, and import capacity resources to participate in the Forward Capacity Auction[1] ("FCA"); implementing the Federal Energy Regulatory Commission ("FERC") approved generator interconnection process; developing the ISO's findings for Transmission Cost Allocation; and supporting the capacity markets in New England.

Previously, I served as the ISO's Director, Reliability and Operations Services. I was also a former manager of the Rhode Island—Eastern Massachusetts—

[1] Capitalized terms used but not otherwise defined in this filing have the meanings ascribed thereto in the ISO's Transmission, Markets and Services Tariff (FERC Electric Tariff No. 3) (the "Tariff").

Vermont Energy Control center in Westborough, Massachusetts and former manager of marketing operations for Northeast Utilities/Select Energy Inc. in Berlin, Connecticut. I have over 30 years of experience in operations and planning of the New England bulk power system.

Mr. Oberlin. I began my career with the Northeast Nuclear Energy Company, a subsidiary of Northeast Utilities, in 1992 where I advanced to Project Engineer. From 1996 to 2006, I worked in the Transmission Planning Department at Northeast Utilities where I advanced to Project Manager. As Project Manager, my key responsibilities included system analysis, planning and interconnection studies for Southwest Connecticut.

I joined the ISO in 2006. Initially, I served as Manager, Area Transmission Planning for northern New England. In 2011, I was promoted to Director, Transmission Planning. My responsibilities include regional bulk power system planning, interconnection studies, evaluation of the continuing need for generators, and technical support for the Forward Capacity Market.

I am a Licensed Professional Engineer in the State of Connecticut and hold a Bachelor of Science degree in Electric Power Engineering from Rensselaer Polytechnic Institute.

Q: *Have you previously testified before the Connecticut Siting Council?*

A. *Mr. Rourke:* Yes. I testified in the Greater Springfield Reliability Project proceeding in Docket No. 370.

Mr. Oberlin: Yes, most recently in the Middletown Norwalk proceeding in Docket No. 272. However, I should note that I was an employee of Northeast Utilities at the time.

2. Summary of Testimony

Q: *What is the purpose of your testimony in this proceeding?*

A: The testimony describes generally the ISO's mission and responsibilities. It also describes the ISO's planning criteria and how they relate to the 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. The testimony supports the need for the Interstate Reliability Project ("Interstate") to address identified reliability concerns in southern New England.

Q: *Please summarize your testimony.*

A: Based on studies to date and applicable regional reliability standards, the ISO is concerned about the reliability of the existing electricity delivery system in southern New England and the transfer of power over the transmission system connecting Massachusetts, Connecticut, and 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 system planning engineers from the ISO, National Grid and Northeast Utilities was formed (the "Working Group"). The 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 2011 Updated Needs Report referenced in the Application in this proceeding.

On July 10, 2012, Northeast Utilities filed in this proceeding a follow-up to the 2011 Updated Needs Report entitled *Follow-Up Analysis to the 2011 New England East-West Interstate Reliability Project Component Updated Needs Assessment* ("Follow-Up Needs Assessment"). The Follow-Up Needs Assessment evaluated the reliability of the southern New England Transmission system under 2022 projected system conditions. The Follow-Up Needs Assessment also accounted for the results from FCA 6, which was held in April 2012; the most recent load forecast as reported in the 2012 Capacity, Energy, Loads and Transmission ("CELT") report; and the newly formulated Energy Efficiency forecast published in the CELT report.

Transmission reliability, which can be described as the ability to supply the area's load under all design contingency events, within all applicable equipment ratings, and while serving the needs of the region, is a major concern for the southern New England system. Critical weaknesses in Connecticut are identified in Section 5.2.3.4 of the Follow-Up Needs Assessment, where there are reliability criteria violations. Without transmission improvements, the system may fail to provide reliable service in these areas.

After establishing the existence, nature and location of the reliability concerns, the Working Group identified a number of possible solutions and tested each to determine its ability to eliminate the criteria violations. As a result, a number of possible transmission solutions were developed. This analysis is detailed in the

New England East-West Interstate Reliability Project Component Updated Solutions Report dated February 2012 ("Solutions Report"). The Solutions Report explains that Interstate was selected as the preferred transmission solution to meet the reliability need identified in the 2011 Updated Needs Report. While the ISO has updated the reliability need in the Follow-Up Needs Assessment, Interstate, as identified in the Solutions Report, remains the preferred transmission solution to address the reliability need in the Follow-Up Needs Assessment. Interstate consists of approximately 75 miles of new 345 kV transmission lines to be developed predominantly along existing rights-of-way, as well as modifications to substations and switching stations. In Connecticut, the project includes new overhead 345 kV transmission lines and associated facilities between the Card Street substation, Lake Road switching station and the Connecticut/Rhode Island border. In addition, the project includes modifications to Card Street substation, and Lake Road switching station.

3. <u>The ISO's Mission and Responsibilities</u>

Q: *Why was the ISO established?*

A: 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.[2] FERC identified Independent System Operator principles as: providing independent,

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

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.

The ISO was established to be the Independent System Operator of the New England bulk power grid on July 1, 1997,[3] and it assumed certain operating and transmission reservation responsibilities which had previously been carried out by the New England Power Pool ("NEPOOL"), which transferred staff and assets to the ISO. In May 1999, the ISO commenced administration of the restructured wholesale electricity marketplace for the region.[4] In June 2001, FERC conferred authority on the ISO to be responsible for the regional transmission planning process.[5] In March 2004, FERC granted the ISO status as a Regional Transmission Organization ("RTO"),[6] and the ISO began operation as an RTO in February 2005.

Q: *Does the ISO make any profit from its role as the Independent System Operator?*

A: No. As the Independent System Operator, the ISO complies with FERC Order No. 889.[7] In this regard, the ISO is an independent, private, non-profit, non-stock,

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[3] 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).

[4] New England Power Pool, Order Conditionally Accepting New and Revised Market Rules, 87 FERC ¶ 61,045 (1999)(authorizing ISO-NE to administer the restructured wholesale electricity marketplace).

[5] ISO New England Inc. & New England Power Pool, Order On Rehearing Requests and Compliance Filings, 95 FERC ¶ 61384 (2001)(authorizing ISO to oversee regional transmission planning).

[6] Order Granting RTO Status Subject to Fulfillment of Requirements and Establishing Hearing and Settlement Judge Procedures 106 FERC ¶ 61,280 (2004)(granting ISO-New England RTO status).

[7] 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).

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.

Q: *What are the ISO's mission and responsibilities?*

A: 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 ("OATT"), 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 state and federal regulators, NEPOOL Participants, and other stakeholders in pursuit of these goals.

Because FERC has conferred upon the ISO responsibility for conducting long-term system planning for New England,[8] 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 and criteria 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

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[8] 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).

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.

Q: *What is the ISO's role in conducting regional transmission planning?*

A: The ISO is responsible for conducting long-term regional transmission planning for the New England region. Attachment K to the ISO's OATT sets forth the ISO's responsibility for regional transmission planning in New England. Specifically, Attachment K requires the ISO to undertake an assessment of the needs of the bulk power system. The ISO annually prepares the 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 as 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 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. <u>Reliability Standards</u>

Q: *What criteria does the ISO use in determining whether the transmission system in New England is reliable?*

A: 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 across the transmission networks owned by the participating transmission owners. If this objective is not met, the consequence would be a significantly increased risk of widespread electric outages to many customers.

The ISO plans the New England regional transmission system to comply with the reliability criteria and 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 standards applicable to all geographic areas. NPCC has established criteria particular to the Northeast, which generally encompass the NERC standards. In turn, the ISO has developed criteria specific to New England that coordinate with the NPCC criteria. Similar standards and criteria exist throughout the nation and other portions of North America.

Whether developed by NERC, NPCC, or the ISO, the standards and criteria applicable for assessing the reliability of the New England transmission system are applied in a deterministic fashion (*i.e.,* for specific disturbances or "contingencies") in order to assess the ability of the system 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 Reliability Reference Directory #1 "Design and Operation of the Bulk Power System." 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"). PP3 is 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 Southern New England

Q: *Does the ISO have concerns regarding the ability of the transmission system in southern New England to provide continued reliable electric service?*

A: Yes. The Follow-up Needs Assessment identifies and details reliability concerns with the southern New England electric system.

Q: *What are the ISO's concerns regarding the ability of this transmission system to provide continued reliability of electricity service in southern New England?*

A: From a reliability perspective, the ISO is concerned that the existing system in southern New England faces a combination of limited transmission capacity, limited generation that is effectively integrated to serve the load, and limited transfer capability into and through the area. As the Follow-Up Needs Assessment shows, there is an increasingly high risk that the system will be unable to withstand single and multiple element contingencies following the single loss or outage of certain critical facilities in these areas 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 and criteria established by NERC, the NPCC and the ISO.

Q: *What specifically are the ISO's reliability concerns in the southern New England Area?*

A: The ISO is concerned with thermal overloading of transmission lines and poor voltage performance under numerous contingencies. As explained in the Follow-Up Needs Assessment, for purposes of the study, New England was divided into three sub-areas: Eastern New England, Western New England, and Rhode Island. Due to the nature of the system, for the Eastern New England study, Greater Rhode Island was considered part of the Western New England sub-area. For the Western New England study, Greater Rhode Island was considered part of the Eastern New England sub-area.

For the Eastern New England Reliability Analysis, N-1 and N-1-1 thermal violations were observed on the 328 line (Sherman Road to West Farnum). N-1 and N-1-1 thermal and voltage violations were observed on the 115 kV path connecting Connecticut to Rhode Island along the Long Island Sound shoreline. Additional N-1-1 thermal violations were observed on the 301-302 lines (Millbury to Carpenter Hill to Ludlow), the 3520 line (ANP Bellingham to West Medway) the 345 kV path between Killingly and West Medway (347, 3361 and 336 lines), and on the 115 kV network connecting Rhode Island and Southeastern Massachusetts to Central Massachusetts. With the 301-302 lines (Millbury to Carpenter Hill to Ludlow) out of service as the first contingency, the 142 circuit breaker failure at Sherman Road which removes the 328 line (Sherman Road to

West Farnum) and the 3361 line (Sherman Road to ANP Blackstone) showed the potential for voltage collapse. These results indicated a need to increase the eastern New England import capability.

For the Western New England Reliability Analysis, N-1-1 violations were observed for the loss of the 330 line (Lake Road to Card Street) as the initial element out of service. The central 345 kV East-West path connecting the Boston area to western Massachusetts (301-302 lines) were thermally overloaded as the other remaining East-West 345 kV path was lost under a N-1-1 contingency event. The 115 kV path from Rhode Island to Connecticut along the Long Island Sound shoreline also had N-1-1 thermal violations for loss the 330 line and an additional 345 kV East-West path.

Because the overloading 115 kV lines are on a Connecticut import path, and the critical first element, the 330 line, is a Connecticut import line, the results demonstrate a need to increase Connecticut import capability along with increasing western New England import capability.

In Rhode Island, a voltage collapse scenario was observed for the loss of two 345 kV lines into West Farnum, the 328 line (Sherman Road to West Farnum) and 315 (Brayton Point to West Farnum). These results indicate a need for a new 345 kV line into the West Farnum substation to reliably serve load in Rhode Island.

Q: *How do thermal overloads occur?*

A: 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 southern New England.

Exceeding the 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.

Q: *Why is low voltage a concern?*

A: 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.

Q: *What consequences can an uncontrolled blackout have?*

A: There are two consequences of an uncontrolled blackout. First, it is often difficult to accurately predict how large an area will be affected by a blackout, and as a result. As an example, it could encompass most or all of the 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 Interstate Reliability Project**

Q: *What reliability benefits will the Interstate Reliability Project provide to the transmission system?*

A: The installation of the Interstate Reliability Project will address the reliability issues described above by eliminating the thermal and voltage criteria violations and improving transfer capabilities. Moreover, the transmission upgrades will serve to ensure that the transmission system remains in compliance with reliability standards and criteria established by NERC, the NPCC, and the ISO.

The new line into Millbury from West Farnum provides a new import line into eastern New England and allows for the movement of power from western New England and Greater Rhode Island to reliably serve load in eastern New England during capacity deficiency conditions in eastern New England.

The line into Card Street substation via Lake Road and West Farnum provides a new import path into Connecticut and western New England and allows for the movement of power from eastern New England and Greater Rhode Island to reliably serve load in Connecticut and western New England during capacity deficiency conditions in the west.

The project also provides two new 345 kV lines into West Farnum which resolve the criteria violations in Rhode Island seen for the loss of the two existing 345 kV lines into West Farnum from Sherman Road and Brayton Point.

Q: *Did the ISO consider market responses in evaluating the need for Interstate?*

A: Yes. The ISO's Tariff requires that the ISO "reflect proposed market responses in the regional system planning process."[9] Market responses include, but are not limited to, demand-side projects, generation, distributed generation and Merchant Transmission Facilities. The ISO evaluates the need for Regulated Transmission Upgrades based on viable market responses that have been proposed and (i) have cleared in a FCA, (ii) are contractually bound by a state-sponsored Request for Proposals ("RFP"), or (iii) have a financially binding obligation pursuant to a contract.[10]

As explained in the Follow-Up Needs Assessment, the ISO considered the impact on the need for Interstate based on the cleared resources in the most recent FCA, the most recent load forecasts and forecasted state-sponsored Energy Efficiency measures through 2022. Even considering these updates, there continues to be a need for Interstate within the 10-year planning horizon.

Q: *Will these findings be presented to the PAC?*

A: Yes. The findings supporting the determination that the need for Interstate continues to be within in the 10-year planning horizon will be presented at the July 18, 2012 PAC meeting.

Q: *Does the ISO support Interstate?*

A: Yes. As described above and in the Follow-Up Needs Assessment, the ISO is concerned about the ability of the existing transmission system to maintain reliable electric service in southern New England. Interstate is the preferred transmission solution to meet the reliability needs identified in the Follow-Up Needs Assessment.

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[9] Section 4.2(a) of Attachment K to the Tariff.
[10] *Id.*

Q: *Does this conclude your testimony?*

A: Yes, thank you.