

STATE OF CONNECTICUT

SITING COUNCIL

Docket 370A: The Connecticut Light and Power Company application for a Certificate of Environmental Compatibility and Public Need for (1) The Greater Springfield Reliability Project consisting of a new 345-kV electric transmission line and associated facilities from the North Bloomfield Substation in Bloomfield to the Connecticut/Massachusetts border, together with associated improvements to the North Bloomfield Substation, and potentially including portions of a new 345-kV electric transmission line between Ludlow and Agawam, Massachusetts that would be located in the Towns of Suffield and Enfield, Connecticut; and (2) the Manchester Substation to Meekville Junction Circuit Separation Project in Manchester, Connecticut

Docket 370B: NRG Energy, Inc. application pursuant to C.G.S. §16-50/(a)(3) for consideration of a 530 MW combined cycle generating plant in Meriden, Connecticut

DOCKET 370

January 15, 2010

**POST-HEARING BRIEF OF
THE CONNECTICUT LIGHT AND POWER COMPANY**

The Connecticut Light and Power Company

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INTRODUCTION

The Connecticut Light and Power Company (“CL&P” or “Applicant”) requests that the Connecticut Siting Council (“Council”) issue Certificates of Environmental Compatibility and Public Need for the Connecticut Valley Electric Transmission Projects (“Projects”), consisting of the portion of the Greater Springfield Reliability Project (“GSRP”) to be located in the State of Connecticut, and the Manchester Substation to Meekville Junction Circuit Separation Project (“MMP”).

The GSRP is a joint undertaking of CL&P and Western Massachusetts Electric Company (“WMECO”), both of which are wholly-owned subsidiaries of Northeast Utilities. The GSRP includes the construction of a new 345-kilovolt (“kV”) transmission line to complete a 345-kV loop through north-central Connecticut and Western Massachusetts. Approximately 12 miles of this new transmission line would be constructed on an existing CL&P right-of way (“ROW”) between CL&P’s North Bloomfield Substation and the Connecticut-Massachusetts border, through portions of Bloomfield, East Granby, and Suffield. In addition, CL&P seeks Council approval of improvements to and expansion of the North Bloomfield Substation located in Bloomfield that would be required to interconnect the new 345-kV transmission line and install a second 345/115-kV autotransformer.

CL&P also seeks the Council’s contingent approval for the construction and operation of an additional 5.4 miles of new 345-kV line in Suffield and Enfield, which would only be required if the Massachusetts Energy Facilities Siting Board (“EFSB”) specifies that the Massachusetts portion of the GSRP must follow the “Southern Route Alternative” (“SRA”) between WMECO’s new Agawam, MA and its Ludlow, MA

substations. This route is a “Noticed Alternative” submitted by WMECO to the EFSB in accordance with its requirements. Two segments of this 345-kV route would follow an existing ROW into Connecticut (i.e., approximately 1.1 miles in Suffield and 4.3 miles in Enfield).

The MMP proposes the reconfiguration of an existing 115-kV transmission circuit segment over a distance of approximately 2.2 miles within an existing CL&P right-of-way in Manchester, Connecticut.

The Docket Record

The Docket Record reflects comprehensive examination of all issues relevant to transmission line siting required by the Public Utility Environmental Standards Act (“PUESA”). It includes the reports of the Southern New England Transmission Reliability (“SNETR”) “Working Group” convened by the Independent System Operator - New England (“ISO-NE”) in 2004 to study multiple existing and developing reliability problems in the southern New England transmission system. That group identified many inter-related transmission system needs and developed numerous project “options” for the elements of a comprehensive long range plan to address those reliability problems. This overall transmission reinforcement plan is known as the New England East - West Solution (“NEEWS”). Northeast Utilities Service Company (“NUSCO”), still working under the guidance of ISO-NE, brought this work forward by determining that its first priority should be to proceed with a project that would address the urgent reliability problems in the greater Springfield, Massachusetts and north-central Connecticut area; and then by designing the GSRP as the most environmentally, technically, and economically practical solution option for addressing those needs. Those analyses have

been presented in the numerous transmission planning studies and in the GSRP “Solution Report” that are included in the Docket Record.

Prior to filing the Application, CL&P provided the public with extensive opportunities to obtain information about the Projects and to provide their input concerning them. CL&P held three information “open houses” and numerous public meetings, provided direct mailing updates to a list of 150 stakeholders in the Project areas, maintained a frequently updated website and provided a project telephone hotline for members of the public. CL&P also engaged in extensive consultations with municipal and state officials about the Projects. The formal municipal consultation filing, which was published in June of 2008 and consisted of five volumes of information, was provided to all of the Connecticut municipalities in which the Projects are proposed to be located, and also to the Connecticut Energy Advisory Board (“CEAB”). The extensive municipal consultation process spanned nearly five months (rather than the minimum 60 days as specified by the Council’s regulations). In addition, from June 16, 2008 through December 19, 2008, CL&P provided voluminous technical information to the CEAB. On October 20, 2008, approximately four months after initiating the municipal consultation and CEAB processes, CL&P filed its Application, comprising 11 volumes of detailed information regarding the Projects. From February, 2009 through November, 2009, CL&P responded to extensive interrogatories posed by the Council and other parties and intervenors and supplied further technical information concerning the Projects. The Council held four separate public comment hearings in municipalities that would potentially be affected by the Projects; an additional public comment hearing in the municipality where a competing project was proposed; and 12 days of evidentiary

8hearings. The evidentiary record is massive. CL&P has submitted detailed Proposed Findings of Fact (“PFOF”) to the Council, buttressed by specific record citations, which cover virtually every fact and issue that the Council may be called upon to consider.

CL&P will not reiterate its PFOF in this brief. Rather, it will use this opportunity to discuss the principal issues that the Council must now decide, referring, as appropriate to the PFOF.

The Applicant’s Proof

With the support of ISO-NE, CL&P has established that there is a public need for the Projects to maintain transmission system reliability in accordance with mandatory national and regional reliability standards and criteria, which should be constructed as soon as possible; that there is no alternative for meeting the public need for the Projects that is superior to the proposed construction; and that CL&P and WMECO are proposing the most cost-effective and environmentally compatible solution for meeting that need. CL&P has also established that the proposed transmission lines should be constructed entirely overhead, because the presumption of Conn. Gen. Stats. §16-50p(i) has been overcome, if it applies.

Other issues that remain to be resolved by the Council in its decision-making process include the specific configuration of the Connecticut portion of the proposed North Bloomfield to Agawam 345-kV line in a Connecticut “BMP Focus Area;” whether to order a modification to the proposed MMP that would provide greater system benefits at a higher cost; and whether to grant contingent approval for the Connecticut segments of the Massachusetts 345-kV.

Description Of The Projects

A. GSRP

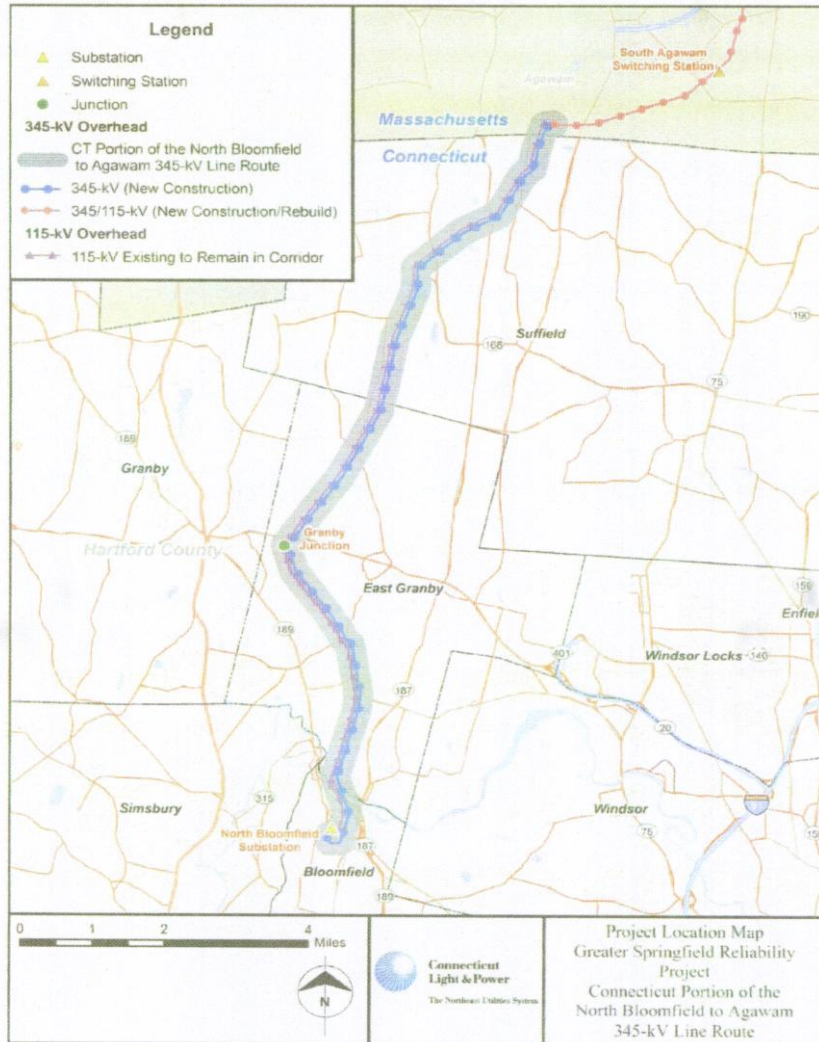
As proposed, the GSRP, most of which would be constructed in Massachusetts, would consist of the construction and operation of a new 345-kV transmission line along approximately 35 miles of existing CL&P and WMECO overhead transmission line ROWs; extensive reconstruction of 115-kV transmission lines in Massachusetts also along existing WMECO ROWs; the construction of two new 115-kV switching stations in Massachusetts; and the expansion or upgrading of various substations and switching stations in both Massachusetts and Connecticut. The proposed new 345-kV transmission line would extend from CL&P's North Bloomfield Substation in Bloomfield, Connecticut to an expanded substation in Agawam, Massachusetts, to be constructed by WMECO; and from there to WMECO's existing substation in Ludlow, Massachusetts.

1. The Proposed 345-kV Construction at North Bloomfield Substation and From There North to the State Border

The section of 345-kV transmission line between the North Bloomfield Substation and the Connecticut / Massachusetts state line in Suffield, Connecticut and South Agawam, Massachusetts would be approximately 12 miles long. Except for two locations where the ROW would have to be slightly expanded to accommodate the 345-kV line, the Connecticut portion of the GSRP would be developed within existing CL&P ROWs. Use of CL&P's existing ROWs, where linear utility uses are already established, is consistent with the Federal Energy Regulatory Commission's ("FERC") "Guidelines for the Protection of Natural, Historic, Scenic, and Recreational Values in the Design and Location of Rights-of-Way and Transmission Facilities," as required by Conn. Gen. Stats. §16-50p(a)(3)(D). Significantly, by using the existing ROW, CL&P would avoid

or minimize conflicts with residential, commercial and industrial land uses such as homes, businesses, and airport approach zones, and more importantly, certain uses that are accorded special protection under Conn. Gen. Stats. §16-50p(i), including private or public schools, licensed child day-care facilities, licensed youth camps, and public playgrounds. (*PFOF* ¶ 386; CL&P Ex. 1, Application, p. L-38) The proposed GSRP line route is shown on the map below.

Figure ES-2: Connecticut Portion of the North Bloomfield to Agawam 345-kV Line Route



(CL&P Ex. 1, Application, Vol. 1, p. ES-8)

In addition, the North Bloomfield Substation would be modified by constructing a 345-kV switchyard and adding a 345/115-kV 600-Megavolt Ampere autotransformer.

(PFOF ¶ 53) All improvements to the North Bloomfield Substation can be

accommodated within the CL&P's 34-acre property, which has housed the substation since at least the mid-1950s. (PFOF ¶ 51; CL&P Ex. 15, Carberry / Newland, p. 9)

2. The Massachusetts Southern Route Alternative (“SRA”)

In addition to approval of the construction described above, CL&P seeks contingent approval of the additional 5.4 miles of new 345-kV transmission line between the Agawam and Ludlow Substations, which could potentially be located in Connecticut. Although WMECO has proposed to build the Massachusetts portion of the GSRP 345-kV transmission line along existing ROWs (i.e., the “Northern Route”) that would not enter Connecticut, it is possible that the Massachusetts EFSB, which has siting jurisdiction over the Massachusetts portion of the GSRP, may order construction of a 345-kV line along the SRA, which would include these two Connecticut sections. In both cases, the new 345-kV transmission line would be constructed within existing ROWs. CL&P seeks contingent approval of this construction so that, in the event that the EFSB should select the SRA for the Agawam to Ludlow 345-kV transmission line, WMECO not need to file a new application with the Siting Council. The SRA line route is shown on the map below.

Should the Council determine not to grant such contingent approval in advance of action by the Massachusetts EFSB, CL&P requests that the Council deny its application relating to the Connecticut portion of the SRA “without prejudice.” In the event that the EFSB subsequently selects the Noticed Alternative for the Massachusetts portion of the GSRP, the Council should invite CL&P to apply to open this proceeding pursuant to Conn. Gen. Stats. §4-181a for reconsideration and modification of that denial.

B. The Manchester Substation to Meekville Junction Circuit Separation Project (“MMP”)

In addition to approval of the Connecticut portion of the GSRP, CL&P seeks a Certificate of Environmental Compatibility and Public Need for the MMP. The MMP proposes the replacement of a 2.2-mile long section of an existing 2.6-mile long 115-kV circuit on the ROW between Manchester Substation and Meekville Junction. The circuit segment to be replaced is currently on common structures with the 345-kV 395 circuit. It would be replaced by an equivalent segment on independent structures. The MMP would be located entirely within the Town of Manchester, between CL&P’s Manchester Substation and Meekville Junction. The proposed transmission circuit separation would eliminate reliability criteria violations in the Hartford, Connecticut area.

DISCUSSION

This Brief summarizes the evidence showing that:

- The Projects are needed urgently (Section I);
- The Connecticut line routes proposed for both GSRP and MMP provide the optimal balance of reliability and economic and social impacts (Section II);

- Overhead construction of the entire segment of 345-kV transmission line from North Bloomfield to the Connecticut / Massachusetts state line is consistent with the Council’s EMF Best Management Practices and statutory requirements (Section III);
- The Council must determine whether to approve the MMP as proposed, or to modify it in accordance with the MMP Variation (“MMP-V”) identified in the course of the proceedings (Section IV); and
- The Council should take appropriate action with respect to the SRA (Section V).

Appendix A to this Brief lists the conclusions and findings that the Council is directed to make by PUESA in order to issue a certificate, and provides citations to the relevant paragraphs of the PFOF supporting those findings.

I. THERE IS AN IMMEDIATE PUBLIC NEED FOR THE PROJECTS FOR REGIONAL RELIABILITY

A. The Projects Are Needed To Ensure Reliable Electric Service To North-Central Connecticut and Western Massachusetts (Conn. Gen. Stats. §16-50p(a)(3)(A))

1. The Southern New England Electric System Does Not Currently Meet Applicable Mandatory Reliability Standards

Beginning in 2004, the Working Group convened by ISO-NE carefully examined reliability problems in the southern New England transmission system and developed a long-range plan to address such problems, now known as NEEWS (initially referred to as the Southern New England Transmission Reliability Plan or SNETR). That plan included “Options” that are detailed in the Options Report. These “Options” were studied by ISO-NE, NUSCO and National Grid. The Greater Springfield Solutions Report was developed by NUSCO to evaluate the options for the Springfield component of NEEWS and to determine the best solution based on system performance, routing,

environmental and cost considerations. Both reports are included in Volume 5 of CL&P's Application. (PFOF ¶¶105-107)

In the course of their work, the ISO-NE Working Group performed transmission planning analyses based on power-flow simulations using future peak load forecasts based on the ISO-NE 2005 Capacity, Energy, Loads and Transmission Report ("CELT"). Later studies were conducted by CL&P to update those analyses to reflect recent changes in system conditions as a result of the ISO-NE load forecast changes and the forward capacity market. Greater Springfield and the adjacent northern Connecticut area are effectively served by the same transmission system. These studies clearly demonstrate that this system, consisting primarily of 115-kV transmission lines constructed from the 1940s through the early 1970s, does not meet current mandatory national standards and regional reliability criteria. The mandatory national requirements are those developed by the North American Electric Reliability Corporation ("NERC") and approved by FERC. The applicable regional criteria are the requirements authorized by FERC and independently maintained and enforced by the Northeast Power Coordinating Council ("NPCC") and ISO-NE. (PFOF ¶¶ 17-20, 80-88, 112-113, 122)

The power-flow studies select one or more dispatch scenarios and appropriate transfers over defined transmission interfaces to stress the system, as required by the mandatory national standards and regional reliability criteria. Credible contingencies defined by the NERC standards and NPCC and ISO-NE criteria must be simulated for each generation/transfer scenario. Those contingencies include both "N-1" and "N-1-1" contingencies. N-1 contingencies involve the loss of a single generating unit or critical transmission element (such as a single transmission line) or the simultaneous loss of two

transmission circuits sharing a common structure (this is known as a double circuit tower contingency (DCT)). An N-1 simulation assumes all transmission lines are in-service as the initial condition. N-1-1 contingencies involve the overlapping loss of two unrelated transmission system elements, with a short opportunity to make specific manual power system adjustments (as defined by NERC, NPCC and ISO-NE) to prepare the system to withstand the second contingency. (CL&P Ex. 15, Scarfone, pp. 16-17)

Violations of reliability criteria that occurred during these studies are explained below.

a. Thermal Overloads

In studies performed in 2008 and 2009, the N-1 contingency analyses showed thermal overloads on multiple transmission circuits in the greater Springfield area and on the 345-kV line between the Ludlow Substation in Massachusetts and the Barbour Hill Substation in Connecticut. The N-1-1 analyses showed that multiple thermal overloads occurred on transmission circuits in the greater Springfield area including the 115-kV lines between western Massachusetts and the North Bloomfield Substation in Connecticut. (CL&P Ex. 15, Scarfone, p. 32)

b. Voltage Stability Issues

In the 2008 and 2009 analyses showed that, under certain N-1 contingencies, low voltages and the potential for voltage collapse in the greater Springfield area could cascade into north-central Connecticut. The risk of a system collapse that could affect a greater area of New England was greater under N-1-1 contingencies. (PFOF ¶¶ 114-116; CL&P Ex. 15, Scarfone, p. 33)

2. The Projects Will Address Critical Reliability Issues In Connecticut And Massachusetts

The Projects will improve the transmission system reliability of the electrical system in Connecticut and western Massachusetts. Specifically, they will provide the following reliability benefits:

- Eliminate transmission line overloads following multiple first and second contingency events;
- Eliminate low-voltage conditions following first and second contingency events and the potential for system voltage collapse;
- Increase transmission system reliability by the construction of a 345-kV loop which provides two diverse 345-kV sources to the Agawam and the North Bloomfield Substations; and
- Establish a new 345/115-kV “hub” west of the Connecticut River in the greater Springfield area and north of the North Bloomfield Substation at the existing Agawam Substation.

(PFOF ¶¶ 108, 122, 123)

Significantly, the Projects work together with the Massachusetts elements of GSRP to address inter-related transmission system reliability problems in both states by increasing the reliability of the supply from all substations that will be served by the new 345-kV loop, including the expanded Ludlow Substation and the new Agawam Substation in Massachusetts, and the Barbour Hill and expanded North Bloomfield Substations in Connecticut. (PFOF ¶ 11)

Furthermore, the Projects, as a component of NEEWS, conform to a long-range plan for expansion of the Southern New England electric power grid that addresses the major problems of the Southern New England bulk power supply system, and are integrated with the new 345-kV transmission loop in Southwest Connecticut. (PFOF ¶ 24)

By improving the overall reliability of the grid, the Projects reduce the risk of cascading outages, such as the blackout that occurred on August 14, 2003. As stated by CL&P's consultant, Ms. Scheller, the economic cost of a single outage is severe. (Transcript ("Tr."), 7/22/09, pp. 58-59, Scheller)

In summary, the Projects will improve transmission system reliability by using the new high-capacity 345-kV loop to relieve congestion on the 115-kV system that serves the Greater Springfield area and north-central Connecticut and by enabling increased power transfers across the Connecticut Import interface. (PFOF ¶ 108)

Finally, although the Projects are primarily designed with the Massachusetts segment of GSRP to address reliability issues in Massachusetts and Connecticut, they are likely to provide an additional benefit of increasing the maximum Connecticut Import interface transfer limit of 2,500 MW by approximately 200 to 300 MW. (PFOF ¶ 23)

The benefits of such an increase include:

- Increases system reliability during both high and low load periods by permitting greater amounts of power to move across the interface and into the deficient area during normal "all lines in" conditions and following the unexpected loss of a generating unit or transmission circuit;
- Enables greater use of newer, more economic out-of-state generation, including renewable and non-carbon resources, to meet the state's customer load demands; and
- Will favorably impact energy costs because the same broadened base of supply should reduce the instances of federally mandated reliability agreements and other charges that are associated with restricted transfer limitations.

3. ISO-NE Strongly Supports CL&P's Assessment Of The Need And The Ability Of The Projects To Meet That Need

ISO-NE, the independent system operator of the New England bulk power grid since July 1, 1997, has the ultimate responsibility for ensuring the efficient management

and reliable operation of the regional bulk power transmission system that serves the New England states. ISO-NE is an independent, private, non-profit, non-stock, company. It is empowered by the FERC and is required to maintain a level of system reliability that meets the criteria established by NERC and NPCC as well as its reliability standards. Significantly, ISO-NE's testimony in support of the Projects was presented by three of its senior planning experts, including ISO-NE's Senior Vice President of Transmission Planning. This testimony supports the urgent need for the Projects:

- The Needs Analysis shows that “there is an increasingly high risk that the greater Springfield and north-central Connecticut transmission system will be unable to withstand single and multiple element contingencies following the single loss or outage of certain critical facilities as the system approaches or exceeds forecasted peak load levels.”
- ISO-NE “shares Northeast Utilities' concerns with thermal overloading of transmission lines and poor voltage performance under numerous contingencies.”
- The Projects “will address the reliability issues described above by eliminating the thermal and voltage criteria violations and improving transfer capabilities.”
- The upgrades to the transmission system “will serve to ensure that the transmission system remains in compliance with NERC, the NPCC, and the ISO reliability standards.”

Additionally, ISO-NE's support for the Projects recognizes the reliability benefits of the Projects as follows:

- GSRP – creates a second 345-kV transmission circuit (needed to unload the 115-kV system and increase capabilities to transfer power between the 2 states), provides an alternative 345-kV source to North Bloomfield Substation and establishes a new 345/115-kV hub at Agawam Substation.
- MMP – eliminates a critical double-circuit contingency that creates overloads on 115-kV underground cables in downtown Hartford.

(ISO-NE Ex. 4, Pre-filed Testimony of Mezzanotte)

4. The OCC's Claim That There is No Need For The Projects Is Unsupported and Insubstantial

Only one docket participant disputed the need for the Projects. On behalf of the Office of Consumer Counsel, Paul Chernick, who has no expertise in transmission planning or operations,¹ and indeed acknowledges that he is not a transmission planning or operations expert,² testified that although there might be a need for a transmission project, CL&P had not proven it to his satisfaction. This testimony would have sounded familiar to the Council members who presided in Docket 217, as Mr. Chernick testified there as well that no need had been proven for the proposed transmission improvements, in part because he thought it likely that new generation and a merchant transmission project would solve the Southwest Connecticut (“SWCT”) problems, and in part because he thought that prospects for dramatic improvements in demand side management were so good that the 27,700 MW New England peak load on which CL&P’s need case was based might never be attained. Of course, as the Council knows, the new generation hypothesized by Mr. Chernick did not materialize (nor could it have been connected to the weak SWCT system if it had); the Neptune merchant transmission project that he suggested could make SWCT a supply node rather than a load pocket will never land in SWCT; and the 27,700 MW New England peak load was surpassed a few years after Mr. Chernick completed his Docket 217 testimony. Still, Mr. Chernick was uncertain as to

¹ At the hearing on October 21, 2009, Mr. Chernick admitted that: he is not a professional engineer, did not take any college courses in electrical engineering, transmission system planning, power engineering, transmission system design or operation, has not written any peer reviewed articles on transmission system planning or electrical engineering generally, has no work experience with transmission system planning load flow simulations or steady state transmission systems, did not perform any independent computer simulations or studies to test CL&P or WMECO systems, is not capable of performing computer simulations of transmission load flow, and has never worked in a control room or in any organization providing reliable service, (Tr. 10/21/09, pp. 16-21, Chernick) Furthermore, none of the qualifications that Mr. Chernick possesses establish any expertise in the complexities of transmission system planning. (OCC Ex. 2)

² (Tr. 10/21/09, pp. 20-21, Chernick)

whether his testimony in Docket 217 could be accurately characterized as mistaken. (Tr. 10/21/09, p. 180, Chernick)

The idiosyncratic criteria by which Mr. Chernick judged whether need had been established were not those promulgated by the NERC, NPCC and ISO-NE, but rather criteria of his own devising. According to these criteria, thermal overloads generally do not require system improvements unless they can be expected to occur frequently - such as several times a summer, and unless they can't be eliminated by operator action before the lines fail. He thinks that operators will have twelve hours to fix overloads that exceed a line's long time emergency rating; and he simply makes no allowance for overloads that exceed a line's short-time emergency rating and therefore lead to failure in 15 minutes, or for low voltage conditions that lead to instantaneous failures. (Tr. 10/21/09, pp. 120-123, 190-194, Chernick; Tr. 10/22/09, pp. 46-48, Chernick)

Mr. Chernick's view that no improvements have been shown to be needed rests as well on his belief that ISO-NE, as the operator of the system, would never let conditions occur that are modeled in power flow simulations to test the system under stress. At the same time, he acknowledged that the system is not designed by planners simply to withstand the specific events for which it is tested in the power-flow simulations. Rather, those tested contingencies serve as a proxy for multiple other potential future events that can not be defined or predicted, but which the system should be able to survive. (Tr. 10/21/09, pp. 60-61, Chernick) Moreover, as the ISO-NE witnesses testified, the fact that stresses that could cause a failure of the system have not occurred to date is due not just to ISO's operational precautions, but to good luck as well. In fact, the Springfield area

system has had to be operated in highly risky conditions at the edge of its capabilities.

(Tr. 10/27/09, pp. 178-181, Mezzanotte; Tr. 10/28/09, pp. 114-115, Mezzanotte)

5. *There Are No Practical System Alternatives That Would Properly Resolve The Reliability Problems Addressed By The Projects*

a. No Action

Doing nothing to eliminate violations of national and regional reliability standards and criteria would be inconsistent with the mission of CL&P and WMECO to provide reliable transmission service for their customers and the region. CL&P and WMECO are obligated under the ISO-NE Tariff to develop “backstop” transmission solutions that can be implemented in a timely manner to ensure the reliability of the transmission system when market solutions do not exist or do not come forward. Failure to develop and construct “backstop” transmission solutions would subject CL&P and WMECO to federal fines for failing to take action to address known violations of mandatory NERC standards. (PFOF ¶¶ 88, 164, 165) The only docket participant to urge a “No Action” alternative was the OCC, whose contention is discussed in the previous point. (PFOF ¶ 166)

b. Non-Transmission System Alternatives

The Record leaves no doubt that there are no practical non-transmission alternatives to the Projects. In some cases, electric reliability needs can be met by means other than improvements to the transmission system. For instance, where the reliability problem is simply a lack of sufficient generation resources to reliably serve the load in a defined area, it may be possible to meet the reliability need through building new generation in the area, reducing demand in the area, or through some combination of these strategies.

In other cases, the only practical means of resolving transmission reliability criteria violations is through improvements to those transmission systems. This is such a case, as shown by the testimony and other evidence provided by CL&P and ISO-NE, particularly that of the witnesses of ICF Resources LLC (“ICF”) who are expert in both the economic and technical aspects of electric power delivery systems.

(i) ISO-NE’s Analysis of a Generic Generation Alternative

Early on in its study of the Springfield area and related problems, ISO-NE determined that there was no practical generation alternative to the Springfield transmission project, and disclosed the results of these studies to its Planning Advisory Committee (“PAC”) in December, 2006. (*PFOF* ¶ 173) ISO-NE determined that large new generators in the Springfield area could not resolve the multiple problems of moving power to serve load without overloading the old and weak transmission lines, and could not in any case be connected to the grid without extensive new transmission improvements. Moreover, new generation in Connecticut would not be effective in eliminating thermal overloads by “pushing back” on the flows that cause those overloads. Although, hypothetically, strategically placed net new generation in Connecticut might enable a reduction of flows on the Western Massachusetts tie lines below the existing established limit of 2,500 MW, the overloads occur not only when imports are modeled at their established limit of 2,500 MW, but at much lower levels as well. ISO-NE performed testing at Connecticut import levels of 1,200 MW all the way down to zero, and the simulation results still showed overloads. To successfully push back on some of the problems in the area, ISO-NE had to simulate an export from Connecticut of 2,500 MW to 3,000 MW. (*PFOF* ¶ 174)

(ii) ICF's Analysis

ICF's more detailed studies validated ISO-NE's conclusions that generation would not provide a practical alternative to the Projects. ICF simulated the addition of adding up to 600 MW of new generation in the Springfield area, while maintaining existing generation in-service. ICF also modeled the effect of reducing the Connecticut zonal demand by 1,000 MW, which provides a good indication of the effect of adding the same amount of generation, without reducing load. Extensive reliability criteria violations occurred in all of these modeled scenarios. (*PFOF ¶¶ 185-186*)

ICF's analysis also considered the potential impact of hypothetical highly aggressive load reductions through demand-side management measures. In addition to the 1,000 MW reduction in the Connecticut load described in the preceding paragraph, they tested the impact of a 1,000-MW load reduction in Western Massachusetts, and the combination of a new generation in Massachusetts together with extensive load reductions in Massachusetts and Connecticut. Finally, at the direction of the CEAB, ICF modeled an extreme scenario that added hundreds of MW of new generation in Western Massachusetts, thousands of MW of new generation in CT, reduced load by hundreds of MW in each of Massachusetts and Connecticut, cut back deliveries of contracted power to Long Island over the Cross Sound cable to zero, and kept imports to Connecticut at the low level of 700 MW. However, even under these highly unrealistic scenarios, the ICF studies determined that the Springfield system would still experience overload violations. (*PFOF ¶¶ 187-190*)

All of this information was available to the CEAB when it decided that it would issue a request for proposals for alternative projects to the proposed GSRP and MMP.

(iii) The CEAB Process

When an application for approval of a power facility is filed with the Siting Council, the CEAB may issue a “request for proposal” (“RFP”) that “shall...seek alternative solutions to ***the need that will be addressed*** by the proposed facility in such application.” Conn. Gen. Stats. §16a-7c(b). (Emphasis supplied.) If the CEAB receives one or more responses to its RFP, it is required to issue to the Siting Council a report that “evaluates each proposal received” in accordance with certain “infrastructure criteria guidelines” that the CEAB is required to adopt. Conn. Gen. Stats. §16a-7c(f). After the CEAB evaluation report has been issued, the sponsor of an RFP proposal may file an application with the Siting Council to compete with the original application, in which case the Council may issue a certificate only for the facility that “represents the most appropriate alternative among such applications based on the findings and determinations pursuant to this section [Conn. Gen. Stats. §16-50p(a)(3)(E)].”

In one of its guidance documents, the CEAB has characterized “the primary goals of the CEAB evaluation” process as “***to assess how well applications meet the identified need and to rank the applications against the Preferential Criteria.***” CEAB, *A Primer for Energy Project Developers and Stakeholders*, <http://www.ctenergy.org/pdf/PrimerVol1FINAL.pdf>. January 3, 2006, p. 14. (Emphasis supplied). However, in this case, the CEAB took a different view of its responsibilities, which led to confusion in the proceeding. The CEAB solicited proposals for “energy resources that could address ***part*** or all of the claimed needs identified in the CL&P filing.” (CEAB Ex. 1, RFP, p. 2) Therefore, none of the proposals the CEAB received purported to meet all of the needs addressed by the Projects, and the CEAB had no

common yardstick with which to measure the proposals. Perhaps for that reason, the CEAB decided that it would not, after all, “rank” the Projects and the competing proposals against the preferential criteria and the identified need. (Tr. 11/04/09, p. 87, Gaudiosi; *and see*, CEAB Request for Intervenor Status, May 8, 2009.)

The CEAB’s evaluation of the competing proposals was further hampered because, although it recognizes that power-flow analyses are necessary to evaluate the compliance of transmission reliability projects and alternatives to them with national and regional reliability criteria as promulgated by NERC, NPCC, and ISO-NE, the CEAB does not have the time or resources to perform such analyses. For that and other reasons, the CEAB did not conduct a comparative reliability analysis of GSRP and each of the competing proposals and did not consider whether each of the RFP proposals could provide a substitute for either the entirety of GSRP and the MMP, or for specific Connecticut GSRP or MMP facilities. Instead, the CEAB analyzed the potential of the three RFP proposals (two generating plants and a demand-reducing measure) for providing economic benefits as a “portfolio” and drew no definitive conclusions concerning their effectiveness in meeting the reliability needs addressed by the Projects. (CEAB Ex. 1; *PFOF* ¶¶ 201-207)

(iv) NRG’s Proposed Meriden Generating Plant

Of the three respondents to the CEAB RFP, only one filed an application with the Council. NRG Energy, Inc. (“NRG”) filed an application for a certificate for its proposed 530-MW combined cycle generating plant in Meriden, CT, which had previously been approved by the Council in 2000, but had never been built.

NRG's prosecution of its application can best be described as a publicity stunt. It never seriously claimed, nor could it, that the Meriden Plant would provide a reliability substitute for the Projects. Instead, NRG sought to call attention to the economic benefits it claimed its plant would have for Connecticut ratepayers. The objective of this strategy was to "gain some traction" that would help it to "build a case to the Department of Public Utility Control, or whomever else has authority and capability" to obtain a state-mandated long-term contract for the output of the Plant. (*PFOF* ¶¶ 217, 218) Without such a contract, the Plant would not be commercially viable and would not be built.

Given this limited objective, NRG did not commission detailed power-flow simulations that would provide evidence of the effectiveness of its Plant in addressing the reliability criteria violations resolved by the Projects. NRG did, however, perform a limited in-house simulation of the effect of adding new generation at three locations in Connecticut: 750 MW in Middletown; 750 MW in Meriden; and 300 MW in Torrington. The results of this analysis were consistent with those of the earlier analyses by ISO-NE and ICF: "no appreciable criteria violations" were eliminated through the introduction of the Connecticut generation. Accordingly, NRG could not and did not claim that its proposed plant would be an alternative to the entirety of GSRP, including the major portion of GSRP to be located in Massachusetts, or to any identified facilities to be located in Connecticut. Rather, NRG claimed only that to the extent the Projects increase import capability into Connecticut, its plant could provide a similar benefit, and therefore could provide a substitute for "some part of GSRP" that NRG had been unable to "tease out" as of the time of the hearing. In stark contrast to this claim, ISO-NE concluded that

construction of the Meriden Plant “would not change the project at all.” (PFOF ¶¶ 208-209, 211-214)

NUSCO did perform a power flow analysis to study the effect of building the Meriden Plant rather than the Projects, and this analysis showed that the Meriden Plant did not address the reliability problems resolved by the Projects. (PFOF ¶ 210) No other docket participant identified any flaws in this analysis.

Thus, there is no evidence in the Record that would permit a finding that the Meriden Plant would meet the need addressed by the Projects, and therefore no basis upon which the Council could issue a certificate in this proceeding for the Meriden Plant as the “most appropriate” project to meet that need. Indeed, it is clear that if the Council were to issue a certificate for the Meriden Plant rather than one for the Projects, the urgent reliability needs addressed by the Projects would go unmet - at least until CL&P could obtain approval of a new application for the Projects. In light of NRG’s failure to make even a colorable showing that its proposed Plant would provide a reliability substitute for the Projects, the Council need not, and should not, expend any time to evaluate the economic claims made for the Meriden Plant. The Council has no obligation to help or hinder NRG in gaining “traction” for its projects with the DPUC or any other agency.

6. The Projects Are Needed Now

In 2005, the Working Group estimated that the need for the Projects could be as early as 2009 for contingency conditions during peak load periods. Since then, forecasts of future loads have declined somewhat because of economic conditions. However, based on current CL&P and WMECO schedules, the earliest date on which the Projects

can now be put into service is the end of 2013, and the ISO-NE CELT forecasts for that date are actually higher than the 2009 forecasts on which the original need studies were based. (ISO-NE Ex. 3, Supplemental Response to OCC-16)

ISO-NE concurs with CL&P's assessment that the need for the Projects is "as soon as reasonably possible." Moreover, ISO-NE emphatically stated that it would not recommend a "wait and see" approach because there have been close calls already and the system is beyond its capability to meet NERC standards. (Tr. 10/28/09, pp. 25, 26, Mezzanotte, Kowalski, Rourke)

B. The Projects Conform To A Long-Range Plan For Expansion Of The Electric Power Grid Of The Electric Systems Serving The State And Interconnected Utility Systems (Conn. Gen. Stats. §16-50p(a)(3)(D))

In order to grant a certificate for an electric transmission line, the Council must find that "the facility conforms to a long-range plan for expansion of the electric power grid of the electric systems serving the state and interconnected utility systems". Conn. Gen. Stats. §16-50p(a)(3)(D). The Record leaves no doubt that such is the case with respect to the GSRP, particularly the proposed North Bloomfield to Agawam 345-kV line, and the ancillary construction, such as the MMP, that complements the GSRP. The origins of the current plan can be traced back to before 1977. In that year, in CSC Docket No. 11, CL&P proposed a new 345-kV Manchester to North Bloomfield line to remedy anticipated deficiencies in the northwestern Connecticut and southwestern Massachusetts 115-kV systems. In its application to the Council, CL&P identified a long-range plan to extend the proposed 345-kV Manchester to North Bloomfield circuit from North Bloomfield to the Agawam Substation along the existing ROW, and from there to the Ludlow Substation, so as to create "a second 345-kV connection between Manchester

Substation and Ludlow Substation (via North Bloomfield and Agawam Substations).” (PFOF ¶ 104) This strategy was designed to establish bulk power delivery points that would decrease reliance on the lower capacity 115-kV system.

More recently, the ISO-NE Working Group developed the NEEWS Plan, which is itself a long-range regional plan, developed after intensive work and study over a period of approximately five years, for four separate, but inter-related projects to address multiple inter-related problems within the southern New England transmission system. The GSRP and MMP are designed to provide an integral part of the solution to those problems, and will support and fit together with the remaining three projects, when they are constructed. (PFOF ¶ 106)

C. The Projects Will Serve The Public Need For Economic Service And Serve The Interests Of System Economy (Conn. Gen. Stats. §16-50p(a)(3)(D))

1. The Projects Will Provide the Needed Improvements at the Lowest Reasonable Cost

The design and proposed routing of the GSRP as a whole is the outcome of a lengthy process of intense study that began with the ISO-NE Working Group and was then carried on by NUSCO, in an interactive process with ISO-NE, for years after the Options Report was substantially completed. In the course of this process, NUSCO was able to develop a design that would eliminate or defer the reconstruction of the underground Springfield Cables and Hartford Cables and other 115-kV construction, thus reducing Project costs by hundreds of millions of dollars, without sacrificing reliability. (See generally, CL&P Ex. 1, Application, Vol. 5, Solution Report, pp. 2-39 to 2-43; 3-28 to 3-33; Vol. 1, Sec. G)

The proposed North Bloomfield to Agawam to Ludlow solution is the superior solution for the 345-kV portion of the GSRP because, as compared to the alternatives that could provide acceptable performance, it offers the most system benefits, at lower or comparable cost, and with comparable or fewer environmental impacts. (*See generally, PFOF ¶¶ 222-234*) Only the proposed configuration provides a new bulk power supply point for the Springfield 115-kV system and would not require the use of complex and expensive 115-kV phase shifters. The baseline all-overhead construction for the 345-kV line is part of the most cost effective transmission solution for the Springfield area and north-central Connecticut reliability problems.

With respect to the Connecticut portion of the proposed 345-kV line construction, the most economic means of satisfying the system need to extend a new 345-kV line from the North Bloomfield Substation to the Agawam Substation is quite clearly using the existing CL&P ROW between these locations, which provides the shortest and most direct path between them. Except for two short segments in Suffield (where an additional 3.2 total acres of easements would have to be acquired) CL&P's existing ROW is sufficiently wide to accommodate the new 345-kV line without the acquisition of additional rights. There are no other technically, economically, and environmentally practical overhead routes between these points.

The estimated cost of the GSRP, built as proposed with a "baseline" all-overhead line configuration, is \$714 million. That estimate is of the "all-in" capital cost, escalated to future years of spending (assuming an in-service date of 2013). Approximately \$133 million of that cost (less than 20%) is attributable to facilities in Connecticut. The North Bloomfield Substation work is estimated to cost \$92.08 million, or 69% of the \$133

million of the cost of the Connecticut GSRP facilities. The cost of the proposed overhead 345-kV transmission line accounts for the remaining approximately \$41 million of the Connecticut facilities' cost. The estimated cost of the MMP, built as proposed, is \$14 million dollars, in 2008 dollars, escalated to the year of spend. (PFOF ¶¶ 126, 127, 129)

Under applicable tariff provisions, regardless of where these facilities are located, their costs will be allocated to Connecticut "load" based on Connecticut's share of the New England wide load. At present, Connecticut's sharing percentage is 27%³. As discussed below, the net cost of the reliability benefit that the Projects will provide will be substantially less than its investment cost, because the Projects will have a favorable impact on the prices that consumers will pay for electric power service after the Projects are on-line.

2. The Overhead Portions of the GSRP Are Cost-Effective and the Most Appropriate Alternative Based on a Life-Cycle Cost Analysis of the Facility and Underground Alternatives to It

Section 16-50p(a)(3)(D) of the General Statutes requires that when the Council grants a Certificate, it specify "what part, if any, of the facility shall be located overhead... and... that the overhead portions, if any, of the facility are cost-effective and the most appropriate alternative based on a life-cycle cost analysis of the facility and underground alternatives to such facility..." Accordingly, a transmission line applicant and the Council must assess the practicality and life-cycle cost of an all-underground alternative to a proposed overhead transmission line. The record in this matter demonstrates that the development of the new 345-kV line in an all-underground 345-kV

³ Note that, because CL&P estimates cost allocation based on the initial capital costs of facilities, it uses this 27% figure to derive the Connecticut share. On the other hand, in estimating costs and benefits over a future ten year period, CL&P's economic consultant, London Economics, Inc. uses a 25% value for the Connecticut cost share, because it estimates that the average Connecticut load share over that ten year period will be 25%.

line configuration between the North Bloomfield Substation and the Connecticut / Massachusetts state border would be not be cost-effective or preferable to the proposed overhead line configuration.

CL&P identified and evaluated two potential all-underground 345-kV cable system alignments between the North Bloomfield Substation and the state line - one predominantly within the existing CL&P overhead transmission line ROW, and the other within and adjacent to roads. The evidence concerning these potential routes is summarized in detail at *PFOF* ¶¶ 265-307. Any all-underground 345-kV configuration would add operational complexity to the transmission system, and thus would make it less reliable. The in-ROW route would require extensive disturbance to environmental resources, including wetlands and streams, and would result in substantially greater and unavoidable adverse environmental effects, compared to the proposed overhead configuration. In addition, any in-ROW underground alternative would be a serious concern to the Connecticut Department of Environmental Protection's ("CTDEP") Wildlife Division, because of its impacts on wildlife habitat. *CL&P Ex. 5, Q-CSC-034*, (Ltr. From CTDEP Wildlife Division, April 3, 2008) Accordingly, such a configuration would not represent the least environmentally damaging practical alternative for the GSRP, pursuant to federal Clean Water Act requirements. Thus, it would be unlikely that CL&P could obtain the required regulatory approvals for the underground in-ROW configuration from the United States Army Corps of Engineers ("USACE") and the CTDEP.

Most glaringly, neither all-underground line alternative would be economically practical. For the all-underground in-ROW variation, the initial capital cost (in 2008

dollars) is estimated to be approximately \$455 million as compared to \$41 million for an overhead line with the “baseline” configuration using H-frame structures. Life-cycle costs are estimated to be \$648 million for the in-ROW underground alternative as compared to \$85 million for the proposed “baseline” overhead line. For the all-underground public roads alternative, the initial capital cost is estimated at approximately \$479 million in 2008 dollars, and the estimated “life-cycle” cost is estimated at \$682 million. Thus, in both cases, the gap between the life-cycle costs of the all-underground transmission cable system and the all-overhead H-frame line is greater than that between their initial capital costs. (*PFOF* ¶¶ 292, 297, 304-305, 307)

These cost differentials become much greater when the cost to Connecticut customers is considered, because the excess cost of underground line construction, as compared to overhead line construction, must be assumed to be “localized” rather than shared by the entire region. The term “localized” means that Connecticut customers would pay 100% of those incremental costs. The GSRP project is expected to qualify for inclusion in New England regional transmission rates, so that its cost would be shared throughout New England according to company load share. Since, as previously noted, Connecticut accounts for approximately 27% of the New England load, Connecticut customers would bear approximately 27% of the project cost included in regional rates. However, recovery of project costs through regional rates is not automatic. Only costs determined by ISO-NE to be eligible for regionalization according to specific tariff provisions will be included in regional rates. (*PFOF* ¶ 294)

ISO-NE Planning Procedure 3 provides, and CL&P’s recent experience has shown, that where a line (or a line segment) that would normally be constructed overhead

in conformity with good utility practice is instead constructed underground, the excess cost of underground line construction will not be included in regional rates, but will be “localized.” The effect of localization of excess underground costs would be that Connecticut consumers would bear 27% of what the cost of an overhead line (or segment) would have been, plus 100% of the difference between that cost and the cost of an underground line (or segment) and any overhead/underground transmission line transition stations. (*PFOF ¶¶ 293-295; CL&P Ex. 8, Response to CSC-02-031*)

Accordingly, for example, the initial capital cost of the all-underground public road alternative to Connecticut ratepayers would be \$479 million, as opposed to \$41 million for the H-frame overhead line; and the difference in the life-cycle costs for the underground alternative, as opposed to the proposed overhead line, would be even greater. Moreover, in addition to this cost for the line, Connecticut ratepayers would also pay a 27% share of the North Bloomfield Substation costs (assumed to be the same for both overhead and underground line construction) and the same share of the cost of the Massachusetts construction. (*PFOF ¶¶ 304-307*)

These vast cost differences preclude finding that an all-underground line would be more cost-effective, on a life-cycle cost basis, than an all-overhead line, or that it would be a more appropriate alternative than an overhead line.

3. The Cost of the Projects Will Be Partially Offset by Market Benefits That They Will Enable

The estimated 200- to 300-MW increase in the Connecticut import capability that the GSRP will provide will yield economic benefits to electric consumers that will partially offset the costs of the Projects. That is because the increased transfer capability

that the Projects will provide will broaden consumers' access to generation and tend to reduce wholesale energy market prices and locational forward reserve requirements.

Of course, quantifying these anticipated benefits is challenging. Indeed, recognizing that the uncertainty of the estimate increases as the projections reach further out in time, CL&P's economic consultants, London Economics Inc. ("LEI"), did not attempt to forecast benefits beyond the first ten years of the Projects' life. Thus, no benefits were assigned for at least 30 years of the Projects' expected useful life. In many other respects as well, reviewed in detail in paragraphs 140-163 of the PFOF, LEI structured its economic modeling so as to produce benefit estimates that would conservatively under-represent the probable benefits. Finally, LEI's estimate of market benefits included nothing for any effect the Projects may have in eliminating the need for Reliability Agreements with generators, and did not take into account any economic benefits other than market price benefits.

The LEI Base Case demonstrates probable combined benefits for all ISO-NE ratepayers from the energy market and Locational Forward Reserve Market ("LFRM") equal to \$351 million to \$459 million in nominal terms. The present value of the cumulative ten year sum of these benefits ranges from \$217 million to \$287 million with a 95% confidence. LEI estimated that based on its anticipated future load share, Connecticut ratepayers will likely be responsible for approximately 25% of the costs of GSRP, or approximately \$180 million of the \$714 million total investment costs. Given the projected energy price reductions in Connecticut in combination with Connecticut load and the anticipated application of the Market Rules for the settlement of the LFRM charges, LEI estimates Connecticut ratepayers will receive a ten-year benefit stream with

a present value in the range of over \$85 million to \$113 million with a 95% confidence (at a 10% discount rate). These benefits could cover as much as 63% of the investment costs under the Base Case. Under other scenarios considered, such as an extended outage of the Millstone nuclear plant, the projected economic benefits contribute even more towards investment costs and may even exceed them.

Another way to consider the value of the “side benefit” of increased transfer capability is in terms of its impact on cost of service. Over the first ten years of its life, the charge to Connecticut consumers allocable to the cost of GSRP (assuming a \$714 million capital cost) would be roughly \$1.26 per MW-hr. For that cost, in addition to the reliability benefits for which the GSRP will be built, Connecticut consumers could expect savings reflected in rates of approximately 40 cents per MW-hr (applying a mid-range estimate from the Base Case). Under this conservative scenario, the rate impact of the GSRP reliability improvement is reduced by approximately a third.

Only time will tell what the full extent of the economic benefits that the Projects will produce will be, and even in retrospect they will have to be estimated rather than counted. However, it is virtually certain that there will be such benefits, and that they will be substantial.

II. THE LOCALIZED AND SHORT-TERM ADVERSE ENVIRONMENTAL EFFECTS AND POLICY CONFLICTS OF THE PROPOSED OVERHEAD TRANSMISSION LINE DO NOT JUSTIFY DENIAL OF THE APPLICATION OR AN ORDER THAT THE LINE BE INSTALLED UNDERGROUND (Conn. Gen. Stats. §16-50p(a)(3)(B)&(C))

Section 16-50p(a)(3)(B) requires the Council to find, when it issues a certificate, “[t]he nature of the probable environmental impact of the facility alone and cumulatively with other existing facilities, including a specification of every significant adverse effect,

including, but not limited to, electromagnetic fields that, whether alone or cumulatively with other effects, on, and conflict with the policies of the state concerning, the natural environment, ecological balance, public health and safety, scenic, historic and recreational values, forests and parks, air and water purity and fish, aquaculture and wildlife; ” and §16-50p(a)(3)(C) requires the Council to find why these effects do not provide sufficient reason to deny the application. Electric and magnetic fields, and the visual implications of structure designs that reduce them, will be discussed in following sections of this brief. With respect to the other listed environmental concerns, CL&P has provided extensive evidence, which is summarized in detail at PFOF Section M, to demonstrate that environmental resources along the Project routes have been carefully evaluated and that the Projects’ design and planned construction and operation incorporates measures to avoid or minimize adverse environmental effects to the extent practicable. For the most part, the adverse environmental effects associated with the Projects will be minor, localized and short-term. Given the importance to society of maintaining reliable electric service, such adverse impacts as the Projects may have provide no reason to deny a certificate.

The breadth and depth of the environmental impact analyses provided to the Council and summarized in the PFOF should not obscure a few simple facts: the development of the Connecticut portion of the GSRP will involve improvements to CL&P’s existing North Bloomfield Substation, all of which will be accomplished on CL&P’s fee-owned station property, and the construction of a 12-mile segment of new overhead 345-kV line within a long-established CL&P ROW, along which only 3.2 acres of new easement rights will have to be acquired for the Project. Similarly, the MMP

will include the construction of a short (2.2-mile) section of new structures, which will be in between the multiple lines of existing structures that presently occupy this CL&P ROW. Overall, the Connecticut portion of the GSRP and the MMP will involve only 14.2 miles of 345-kV transmission line development, virtually all of which will be within existing CL&P ROWs that have traditionally been devoted to utility use. The scope of the proposed Connecticut construction is much smaller than that of, for instance, the Southwest Connecticut Reliability Projects. Both Projects maximize the use of existing linear ROWs, as favored by FERC's "Guidelines for the Protection of Natural Historic Scenic and Recreational Values in the Design and Location of Rights-of-Way and Transmission Facilities", with which any electric transmission approved by the Council must be consistent. Conn. Gen. Stats. §16-50p(a)(3)(D). Neither project, if built as proposed, will affect significant archaeological or historic resources, and only short term and localized effects on traffic, air quality, and ambient noise. Highlights from the PFOF emphasizing the environmental compatibility of each of the Project components individually follow.

A. The North Bloomfield - State Line 345-kV Line Construction and Operation

CL&P's existing ROW between North Bloomfield and the state line consists principally of land characterized by scrub-shrub vegetation, and forested areas. Approximately 4.3 miles (36%) of the ROW extends across properties owned in fee by CL&P. New easements will be required over only 3.2 acres of land - approximately 2% of the Connecticut land affected by the development of the new line. The development of the new transmission line along this ROW, which has been dedicated to utility use for decades, is consistent with land use policies. In siting the new line within the ROW,

CL&P has taken into primary consideration the avoidance, minimization, or mitigation of adverse effects to environmental resources.

The new transmission line will modify the visual character of the ROW, creating a long-term, but incremental, effect since one or more overhead transmission lines have long been present on the ROW for almost 90 years. However, for the most part, the surrounding forested vegetation and topography preclude long views of the ROW.

The construction will have negligible effects on geology, and only minor and highly localized impacts on topography and soil resources. CL&P will develop and implement a soil erosion and sediment control plan, pursuant to DEP requirements, to avoid or minimize the potential for erosion and sedimentation as a result of construction activities. Overhead line construction will span the 35 watercourses along the route.

Less than 0.1 acre of wetlands will be permanently filled as a result of the Connecticut portion of the GSRP. Approximately 2.1 acres of wetlands will be temporarily affected by construction work areas, such as crane pads or timber mat access roads; such areas will be restored following the completion of the 345-kV facility installation.

Approximately 26 acres of forested wetlands along the ROW will be converted to scrub-shrub or emergent marsh wetlands, representing a long-term modification but not a net loss of wetlands. To avoid or minimize adverse effects to wetlands, CL&P has attempted to locate new transmission line structures in upland areas wherever possible and to place access roads outside of wetlands where practical. Where structures must be located in wetlands, CL&P will attempt to limit temporary impacts by reducing the size of the crane pad and by using timber pads for support, where practical. Further, CL&P will

implement wetland compensation measures, as determined based on consultations with the USACE and DEP, to offset such impacts.

The construction of the 12-mile Connecticut segment of the GSRP will involve the removal of approximately 128 acres of forested vegetation (upland and wetland forest) and, in these areas, the ROW will subsequently convert to and be maintained as shrubland or old field habitat. This conversion from forest to shrubland vegetation along the ROW will represent a long-term, but not an adverse, effect because the vegetation clearing will modify, but will not eliminate, habitat. The creation of additional shrubland habitat (and the preservation of such existing habitat) along the ROW would represent a long-term benefit because shrubland habitat is otherwise declining in New England. In Connecticut, transmission line ROWs are considered a major source of shrubland habitat. According to the DEP, the conversion of forested habitat along the ROW to early successional habitat (shrubland and old fields) will benefit many of the wildlife species that are declining in Connecticut. Further, this habitat will persist indefinitely, as long as the ROW is maintained for utility purposes. (DEP Comment Letter dated July 15, 2009, p. 7)

The GSRP ROW will be maintained in accordance with CL&P's well-established vegetation management program, the objective of which is to maintain safe access to the transmission facilities and to promote the growth of vegetative communities along the ROW that are compatible with transmission line operation, pursuant to federal and state standards. Part of this program also includes invasive species management. Special care will be taken to avoid, minimize, or mitigate any effects on fisheries, amphibians, and breeding birds.

Finally, all of the GSRP construction activities in Connecticut will be in compliance with a detailed Development and Management Plan that CL&P will prepare in consultation with Council staff and subject to Council approval, after a certificate is issued.

B. Modifications to North Bloomfield Substation

The modifications to the North Bloomfield Substation will require the development of an additional 2.7 acres of CL&P's fee-owned property, generally to the southeast and southwest of the present substation footprint. Upon completion, the expanded substation will occupy approximately 9.7 acres, leaving 72% of the 34-acre property undeveloped. The proposed substation expansion will unavoidably and permanently affect two (wetlands W9-212 and -213) of the four wetlands delineated on the CL&P property. Specifically, approximately 0.78 acre of wetlands will be filled, including 0.76 acre of forested / scrub-shrub wetland and 0.02 acre of isolated forested wetland. Most of these wetlands are within areas disturbed by the 1978 substation expansion. The expansion of the substation will have a minor, incremental effect on visual resources because the new 345-kV facilities will not appreciably alter the existing appearance of the substation. The substation expansion will not affect recreational resources and will not encompass any areas of known archaeological or historic sites. (PFOF ¶¶ 553-565)

C. MMP Circuit Separation

With the exception of a 2,400-square-foot (0.055 acre) parcel of commercial land adjacent to the Tolland Turnpike, the 2.2-mile MMP would be located entirely within CL&P's existing ROW, which is presently occupied by and maintained for the safe

operation of various transmission line structures. All of the lands surrounding this parcel, which consists of a paved parking lot in a commercial area, are presently included in CL&P's existing ROW easement. CL&P proposes to acquire an easement on this property for the MMP; the acquisition of this easement would have no adverse effect on the environment.

The development of the MMP will affect approximately 8.9 acres of land, consisting of areas within the existing CL&P ROW that will be temporarily disturbed during construction as a result of vegetation removal, access road expansion, crane pads, and structure installation. However, overall, the MMP is consistent with land use plans and policies, because it represents solely a modification of structures within an existing, CL&P ROW that has long been dedicated to such utility purposes.

As a result of the installation of the new monopole structures and the limited vegetation clearing required for construction, the development of the MMP will modify views of the ROW. However, although long-term, the overall visual effect will be highly localized and incremental, because the new structures will be aligned between the multiple existing overhead transmission lines (e.g., 130-to-155-foot-tall lattice steel towers), which presently occupy CL&P's ROW. Further, the MMP route is located within an area where long views of the ROW are limited by a combination of topography, screening vegetation, and the road network.

The MMP will span seven watercourses, five of which are perennial (including the Hockanum River and Hop Brook) and two of which are intermittent. The MMP traverses the 100-year FEMA floodplain and DEP-designated Stream Channel Encroachment Lines ("SCEL") associated with the Hockanum River. Given the location

of the MMP along the Hockanum River, certain of the proposed and relocated MMP structures will unavoidably have to be located within the river's designated SCEL. CL&P has filed an application with the DEP for a SCEL permit for this work.

The MMP ROW encompasses 13 wetlands. Along the existing MMP ROW, nine transmission line structures are presently located in wetlands, including in the two wetlands identified as supporting amphibian habitat.

The development of the MMP will affect the vegetation characteristics of approximately 1.4 acres of forested wetlands, within which the trees would be cleared and the plant communities converted to scrub-shrub or emergent marsh species. However, these 1.4 acres would continue to function as wetlands. Less than 0.05 acre of wetlands would be permanently and unavoidably affected (filled) as a result of structure foundations and access roads. Approximately 3.8 acres of wetlands would be temporarily affected by construction activities; however, the affected portions of these wetlands would be restored after the installation of the MMP facilities. To compensate for the MMP's effects on wetlands, CL&P is coordinating with the DEP and the USACE to define appropriate mitigation.

Overall, CL&P will avoid to minimize adverse effects to wetlands and watercourses by implementing various mitigation measures, including design modifications (involving the location of transmission structures outside of wetlands where possible); spanning of all watercourses; installation and use of access roads across smaller streams so as to minimize adverse effects to water quality; and maintenance of riparian vegetation along watercourses to the extent practical. CL&P also will adhere to

the conditions of any mitigation measures including in the Council, DEP, and USACE approvals. (PFOF ¶¶ 566-578)

III. OVERHEAD CONSTRUCTION OF THE ENTIRE SEGMENT OF 345-kV LINE FROM NORTH BLOOMFIELD TO THE CONNECTICUT / MASSACHUSETTS STATE LINE IS CONSISTENT WITH THE COUNCIL'S EMF BEST MANAGEMENT PRACTICES AND STATUTORY REQUIREMENTS

A. The Statutory and Regulatory Framework for Analyzing Overhead vs. Underground Construction of Electric Transmission Lines (Conn. Gen. Stats. §16-50p(a)(3)(D)(i), (ii); §16-50p(a)(3)(E); §16-50p(i); §16-50t(c); Best Management Practices)

Since the Council last considered electric and magnetic field (“EMF”) issues in a major transmission line docket (Docket 272, Middletown to Norwalk), there have been two significant developments with respect to consideration of EMF issues in the approval of overhead transmission lines, one of which relates only to lines of 345 kV and above. First, pursuant to Conn. Gen. Stats. §16-50t(c) the Council adopted revised EMF Best Management Practices (“BMP”), following a two-year proceeding in which it considered, among other things, a comprehensive review of the scientific consensus concerning the potential health effects of transmission line electric and magnetic fields. (*Council Petition No. 754, Electric and Magnetic Field Best Management Practices, Record; Council Administrative Notice Item 3, Electric and Magnetic Field Best Management Practices for the Construction of Electric Transmission Lines in Connecticut, December 14, 2007. Website Link: <http://www.ct.gov/csc/emf-bmp>.) The revised BMP, like their predecessor, apply to all transmission lines that require a Certificate from the Council.*

The other significant development was an amendment to Conn. Gen. Stats. §16-50p(i), which establishes a presumption that overhead construction of 345-kV lines “adjacent to” certain areas where children congregate is “inconsistent with the purposes

of” PUESA. In Public Act 07-4 §116, the legislature clarified that, in determining whether that presumption has been overcome, the Council must consider, among other things, “whether the cost of any contemplated technology or design configuration may result in an unreasonable economic burden on the ratepayers of the state.” The specified land uses - “residential areas, private or public schools, licensed child day care facilities, licensed youth camps [and] public playgrounds” are often informally collectively called, for convenience, “statutory facilities.”

The legislature and the Council have made clear that the BMP and the presumption against overhead 345-kV line construction modify one another, and should be considered together when determining if overhead line construction is appropriate. Conn. Gen. Stats. §16-50p(a)(3)(D)(iii) (requiring finding that approved overhead line adjacent to statutory facilities will be (i) within protective buffer zone and (ii) consistent with BMP); BMP, Sec. III, p. 4 (BMP were developed “in conjunction with” Section 16-50p(i)). The Council has also recognized that established safety regulations provide ample protection from transmission line electric fields, so that the BMP concentrate on the reduction of magnetic fields. (BMP, p. 1) With these recent amendments and revisions, the regulatory framework concerning magnetic fields from overhead power lines at 345 kV and above is as follows:

- a) The Council must conclude that any overhead portions of a transmission line are “cost-effective,” based on a life-cycle cost analysis of the facility and underground alternatives to it. (§16-50p(a)(3)(D)(iii))
- b) The Council must find that any overhead portions of the facility “are consistent with the purposes of this chapter.” (§16-50p(a)(3)(D)(iii))

(i) Overhead construction of a line at 345-kV or above, that is proposed to be “adjacent to” statutory facilities, is presumed not to meet this consistency test. (§16-50p(i))

(ii) But this presumption may be overcome by a demonstration “that it will be technologically infeasible to bury the facility,” and in determining feasibility, the Council is to consider effects “of burying the facility on...reliability” and “whether the cost of any contemplated technology or design configuration may result in an unreasonable economic burden on the ratepayers of the state.” (§16-50p(i), *as amended by* P. A. 07-4 §116)

(iii) Like any rebuttable presumption, this presumption should also be subject to being overcome by more general proof that the proposed construction *is* consistent with the purposes of PUESA. However, that point has never been ruled upon by the Council or a court.

- c) The Council must find that any overhead section of a line is “consistent with” the Council’s own regulations and standards, particularly including its BMP. (§16-50p(a)(3)(D)(iii))
- d) The Council must find that overhead lines in general, and in particular those that are to be constructed “adjacent to” statutory facilities are contained within a suitable buffer zone (which may be the existing ROW) that will protect public health and safety. (§16-50p(a)(3)(D)(iii))

Thus, the Council’s first inquiry when an overhead line is proposed is whether an underground line is more cost-effective on a life-cycle basis or otherwise more consistent with the “purposes” of PUESA, which are stated in detail in §16-50g and summarized there as “To provide for the balancing of the need for adequate and reliable public utility services at the lowest reasonable cost to consumers with the need to protect the environment and ecology of the state....” This determination applies to the whole line, regardless of its voltage class and whether or not it is adjacent to statutory facilities.

Next, the Council considers whether any segments of the proposed overhead line will be “adjacent to” statutory facilities. As will be discussed later on, this determination can require a judgment by the Council as to whether a particular use is or is not one of the specified “statutory facility” uses; and, if it is, a determination whether the proposed line would be “adjacent to” that statutory facility. If the Council answers both of these

questions affirmatively, it will consider whether the “adjacent” section of overhead line in question will be contained within a suitable buffer zone. In doing that, the Council may evaluate, among other things, the projected electric and magnetic fields associated with the line, both before and after the potential application of its BMP.

If the voltage class of the proposed overhead line is 345 kV or above, the Council must also consider whether the presumption against overhead line construction “adjacent to” statutory facilities has been overcome by proof of infeasibility (including proof of an unreasonable burden on ratepayers) or by any other allowable proof. In determining whether the “burden” on ratepayers is or is not “unreasonable,” the Council should take into account not just the cost differential between overhead and underground line construction, but also the benefit, if any, that would be provided by the greater expense. Thus, the Council can consider the MF levels that will be associated with the proposed construction; any conclusion it has reached with respect to whether the ROW provides a suitable “buffer zone” for the proposed line; and how the MF exposure levels that would be associated with the proposed construction compare to those that would exist if the proposed line were constructed elsewhere, or constructed underground.

Turning now to the judgments that must be made by the Council in administering the BMPs and the §16-50p(i) presumption, a threshold determination will need to be made as to whether or not a specific land use constitutes a statutory facility. There will rarely be doubt as to whether a facility is a school or a licensed day-care center or youth camp. As the Council saw in Docket 272, there can be some doubt as to what portion of a public recreation area constitutes a “playground.” However, the most vexing question is determining whether a place qualifies as a “residential area.”

The legislature has provided no definition of a “residential area.” Rather, as the Co-chair of the Committee that reported the bill that introduced this concept into the Council’s governing legislation said, the legislature “left up to the Siting Council to try to define residential based upon hopefully what they can determine about electromagnetic fields.” Comments of Rep. Backer, 2004 House Proceedings, May 3, 2004, pp. 239, 263. Exercising this discretion, the Council has previously construed the term “residential areas,” as used in Conn. Gen. Stats. §16-50p(i) and the BMP as referring to developed “neighborhoods,” not residentially zoned land where people do not yet live. (*Council Administrative Notice Item 45, Docket 272 (Middletown to Norwalk 345-kV Line), Opinion, April 7, 2007, p. 15*). CL&P understands that by a “neighborhood” the Council meant to designate a rather densely settled and integral development or collection of homes - such as, for instance, the Royal Oak subdivision that received extensive consideration in Docket 272.

Another determination requiring an exercise of discretion by the Council is whether a statutory facility - such as a group of homes constituting a “residential area” would be “adjacent to” the proposed 345-kV line if the line were built overhead. As the Council noted in Docket 272, there is no legislative definition of the term “adjacent,” and in common speech it is used to mean both “near to” and “abutting.” Indeed, both concepts are included in the primary dictionary definition of the term. For instance, the Oxford English Dictionary (1971 ed.) defines “adjacent” to mean “Lying near or close; adjoining; contiguous; bordering; not necessarily touching (though this is by no means precluded).” The Council asked, in Docket 272, for briefing on which of these meanings

should be used in applying the presumption.⁴ However, the term will have to be construed in widely varying circumstances, and it seems prudent to apply it on a case-by-case basis, rather than to settle upon a single restrictive definition that will be applied in all cases. A fixed definition applied in all cases could result in over-serving or under-serving the statutory objective of reducing magnetic fields in areas where children congregate. (*Council Administrative Notice Item 3*, BMP, p. 4) This is likely the conclusion that the Council came to in Docket 272, since it did not then adopt any fixed definition of the term in that Docket.

B. As Applied to the Facts in This Docket, the Analytical Framework for Consideration of 345-kV Overhead Line Construction Clearly Favors Approval of an All Overhead Line from the North Bloomfield Substation to the Connecticut / Massachusetts State Border

1. *The Council May Consider the Section of ROW Between Country Club Lane in East Granby and Phelps Road in Suffield Appropriate for the Application of Low EMF Line Designs*

CL&P has already shown in this brief that overhead construction of the entire proposed section of line from North Bloomfield to the state border is more cost-effective on a life-cycle basis than underground line construction and that, in general, it is more consistent with the statutory objective of providing reliable electric service at the lowest reasonable cost with the protection of the environment. *See* Section I.C.2 herein

⁴ “In interpreting C.G.S. §16-50p(i), does the term “adjacent” mean that the proposed line goes through or borders the property (parcel) of the listed facility? Or does it mean that the proposed line has to be within a certain distance from a listed facility? If the protected facility is on a large parcel of land, does the underground requirement still pertain if the proposed line is adjacent to the property, but a substantial distance (such as 300 feet) from the actual facility? Conversely, does the underground requirement still pertain if the proposed line (or its ROW) does not actually border or go through the property of a protected facility, but the protected facility is relatively close (such as less than 100 feet) from the proposed line (or ROW)?” (Docket 272, Council’s Request for Briefing, Feb. 17, 2005)

However, having dismissed an “all-underground” alternative, the Applicant and the Council must go on to determine whether and how the BMP should be applied to the base-line overhead line design; whether the presumption against overhead 345-kV line construction applies to any portion of the line; and if so, whether it has been overcome. The threshold inquiry in making this determination is whether there are any statutory facilities along the proposed route to which the proposed 345-kV line might be considered “adjacent.” Part of the answer is easy: there are no private or public schools, licensed child day-care facilities, licensed youth camps, or public playgrounds along the ROW. (*PFOF* ¶ 386) Whether there are any “residential areas” along the ROW is not so clear.

For the most part, the ROW from North Bloomfield to the state border traverses countryside that can accurately be described as rural or sparsely settled. However, along approximately 3.2 miles of the route, from existing 115-kV line structures 3191 to 3221, (or roughly between the points where Country Club Lane in East Granby comes closest to the ROW and where Phelps Road in Suffield intersects with the ROW) there are groups of residences that have been constructed near the ROW, and in some cases, very close to the pre-existing 115-kV line on the ROW. Whether or not these groups of homes are sufficiently dense and integral to qualify, in the Council’s opinion, as a “neighborhood” will be a close call. To assist the Council in making this judgment, CL&P has provided extensive information concerning the relationship of these homes to one another, to the existing transmission ROW, and to the existing transmission line on that ROW, in the form of photography-based alignment maps provided with the Application, (CL&P Ex. 1, Application, “Connecticut Portion of the North Bloomfield to Agawam 345-kV Line

Route, ” Vol. 9, Sheets 5 to 8 of 10 (400-scale); Vol. 11, Sheets 23 - 36 of 45 (100-scale); Figures 7, 8 and 9 in Appendix O-1)) and testimony (CL&P Ex. 15, Ex. CN-8 to the Carberry / Newland testimony). Copies of the Figures from Appendix O-1 (CL&P’s Field Management Design Plan for the proposed route) are attached to this brief as **Exhibit 1**. In addition, of course, the Council members may also call upon their own direct observations, in the course of their field inspection of this route on June 9, 2009.

In contrast to, for instance, the Royal Oak Subdivision in Docket 272, the groups of homes on the two sides of the 3.2-mile segment of the GSRP ROW are not part of a single, integral development. Rather, there are separate clusters of homes, and homes separated by this wide ROW, built along different roads, that do not appear as part of a single “neighborhood.” Moreover, the houses that are close to the ROW are predominantly along its west side, where some houses were built right up to the ROW edge, close to the existing 115-kV line on that side of the ROW. (PFOF ¶¶ 408-411). It is reasonable to ask whether these homes should be considered to be “adjacent to” the new line, since they will be separated from it by the intervening 115-kV line, and there would be approximately 165 feet from the western edge of the ROW to the centerline of the new line. The section of ROW between structures 3191 and 3221, is part of Cross Section 2, where the baseline configuration would place a line of new H-frame structures, typically 90 feet high, next to an existing line of lattice steel towers, typically 70 feet high. This configuration is shown in cross-section in Exhibit CN-4, attached to the Carberry-Newland testimony (CL&P Ex. 15). An additional copy of that exhibit is attached to this brief as **Exhibit 2**. The estimated edge-of-ROW magnetic fields with a

projected annual average load (AAL) scenario, before (2012) and years after (2017) construction of the new line in its baseline configuration, are:

**Magnetic Field
XS-2 Granby Jct. to CT/MA Border**

Cross Section	Magnetic Field (mG)	
	West/North ROW	East/South ROW
XS-2 – Pre	8.7	0.1
XS-2 – Post	23.5	12.6

(PFOF ¶ 383; CL&P Ex. 1, Application, Vol. 1, pp. O- 29-30; CL&P Ex. 22, Q-OCC-01-SP-03, new p. 39)

Thus, both sides of the ROW would experience an increase in MF under the baseline configuration. However, the larger increase would be on the side where the 115-kV line is already located. Moreover, the resultant AAL values on both ROW edges would be at the low end of the range of levels that the Council has recognized occur “in the vicinity of transmission lines,” which “can range from about 5 to 150 mG,” (*Council Administrative Notice Item 3*, BMP, p. 2). In considering these relatively low values, the Council should also bear in mind that CL&P has consistently shaded its assumptions used in projecting future MF to conservatively over-represent the field levels, by, for instance, using the lowest typical conductor height along the route as the assumed height for all calculations; modeling power flows that could be achieved only if all of the NEEWS projects are built (not just GSRP and MMP); and assuming a high Connecticut import level at the time of the calculation. (PFOF ¶¶ 369-373).

Considering all of this evidence, the Council may determine that the portion of the new line that will be built alongside the portion of the existing 115-kV line on structures 3191 to 3221 would be “adjacent to” one or more “residential areas.” Moreover, since this stretch of ROW in any case traverses the most populated section of the Connecticut

portion of the proposed route, it would in any case be an appropriate place for which to consider the use of BMP designs. The BMP do not appear to require consideration of BMP designs *only* where there are adjacent statutory facilities, but rather just to give first preference to such areas. If there are no statutory facilities along a proposed route, the Applicant should examine the use of low MF designs in other “publicly accessible areas.” (*Council Administrative Notice 3*, BMP, p. 8) Accordingly, CL&P has designated this section of ROW as a “BMP Focus Area,” where the use of a low EMF line design should be considered.

2. In Determining What Line Design to Order for the BMP Focus Area, the Council Must Balance Considerations of Comparative EMF Reduction, Scenic Impacts, and Cost

The BMP “are based on the established Council policy of reducing MF levels at the edge of a right-of-way (ROW), and in areas of particular interest, with no-cost/low-cost designs that do not compromise system reliability or worker safety, or environmental and aesthetic project goals.” (*Council Administrative Notice Item 3*, BMP, p. 6) That balancing approach requires delicate judgment in this case. CL&P respectfully suggests that, of the many options presented to the Council for this area, three deserve serious consideration; and each of them has distinct advantages and disadvantages.

The first option is to approve the use of the baseline design, which would result in only modest AAL edge-of-ROW MF levels, and also would create the least visual contrast, in terms of structure height and composition, with the surrounding landscape. Along this 3.2-mile segment of the GSRP, the federally-designated New England National Scenic Trail (i.e., the Metacomet Trail) is located close to the ROW and, from certain vantage points, the existing 115-kV structures are visible from the trail.

Therefore, the potential visual effects of the baseline vs. BMP designs should be evaluated not only in terms of views from nearby homes that were built over the years next to the existing ROW, but also in terms of the potential effects on the scenic panoramas as viewed by hikers using the Metacomet Trail. The evidence of these differential impacts is summarized at PFOF Section L.2.5 and in the record evidence cited there. Neither the proposed baseline construction nor any of the alternate BMP designs would constitute a very prominent visual feature to users of the trail, since, under most circumstances, the existing lines and ROW are only peripherally visible from certain vantage points along the trail. Nonetheless, from these locations, the taller BMP designs would be more visible than the proposed relatively lower H-frame line construction, which would blend in with the surrounding forest better than the steel monopoles that would be used for BMP designs.

The second option is to approve CL&P's suggested BMP design, a line of steel monopoles typically 110 feet high, with the conductors arranged in a delta configuration. The ROW configuration that would result from this choice is shown on Ex. CN-5 to the Carberry / Newland testimony, an additional copy of which is attached to this brief as **Exhibit 3**. The estimated AAL fields at the ROW edges associated with this design, compared with the pre-construction and post-construction base-line values would be:

BMP Focus Area – Pre and Post Construction Electric and Magnetic Fields

Cross Section	Magnetic Field (mG)	
	West/North ROW	East/South ROW
XS-2 – Pre	8.7	0.1
XS-2 – Post	23.5	12.6
XS-2 BMP (Delta) – Post	17.9	9.8

CL&P has recognized several advantages of this option in recommending it. Most important, it achieves the BMP objectives of lowering MF levels (as compared to the base-line post construction levels) by more than 15% at each edge of the ROW; and it does so at a cost that is well within the 4% spending guideline of the BMP. (*PFOF* ¶¶ 390-394 and the evidence summarized there) The disadvantage of this configuration is its greater potential visual impacts on scenic resources such as the vantage points from the Metacomet Trail: the steel monopole structures do not blend into the wooded background as the vertical supports of wood-pole H-frames tend to do; and the steel-monopole structures would typically be 40 feet taller than the existing lattice-steel towers, making them more visible from both nearby and distant vantage points. (*See PFOF* ¶¶ 395, 396, 399 and the evidence cited there)

The third option for the BMP Focus Area that the Council should consider is a “split-phase” design. As the Council knows, this design has the potential of achieving very large reductions in MF. (*See generally, PFOF* ¶ 401). A cross-section showing a split-phase configuration for the new line has been provided as Figure 16 in Appendix O-1 of Volume 1 of the Application, and is reproduced as **Exhibit 4** to this brief.

For this BMP Focus Area, a split-phase configuration has one pronounced advantage over the other two options, and several disadvantages. The advantage is that the split-phase configuration would result in edge-of-ROW MF levels (in the AAL case) that would be lower than (on the west edge) or comparable to (on the east edge) the pre-construction fields. These values, together with those associated with the base-line and recommended BMP configurations, are estimated as follows:

BMP Focus Area – Pre and Post Construction Electric and Magnetic Fields

Cross Section	Magnetic Field (mG)	
	West/North ROW	East/South ROW
XS-2 – Pre	8.7	0.1
XS-2 – Post	23.5	12.6
XS-2 BMP (Delta) – Post	17.9	9.8
XS-2 BMP (Split Phase) – Post	2.4	1.9

(PFOF ¶¶ 389, 391, 402; CL&P Ex. 1, Application, Vol. 1, pp. O- 29-30; CL&P Ex. 22, Q-OCC-01-SP-03, new p. 39)

As discussed later on in this brief, the split-phase configuration would result in less overall MF exposure to the public than even an underground line in streets, because the very low edge-of-ROW fields with both the split-phased 345-kV line and a 115-kV line on the ROW would be comparably low as those from the 115-kV line alone post construction; and because an underground line in and alongside streets would create a second source of exposure to the public.

Unfortunately, the dramatic lowering of MF produced by the split-phase line comes at a cost - in both dollars and potential impacts on scenic views. The cost of the line through the BMP Focus Area, if constructed in a split-phase configuration, would be \$ 24,776,000, as compared to \$11,293,000 for the base-line construction. The difference of \$13,483,000 represents approximately 10% of the Connecticut GSRP project cost - more than twice the BMP's 4% guideline. (PFOF ¶¶ 389, 405). The excess cost must be of particular concern because it is unlikely to qualify for regional cost recovery, but rather must be paid for by Connecticut consumers. (PFOF ¶ 135)

In addition, the split-phase configuration would be even taller than the delta configuration. The monopoles supporting the split-phase line would be typically 130 feet

high - nearly twice the typical height of the existing lattice-steel towers; and since there would be twice as many conductors as there would be on a delta configuration, the conductors themselves will be more visible. Altogether, the potential scenic impacts of the split-phase line would be greater than those of the baseline H-frame design or of the delta design. (See *PFOF* ¶ 404 and the evidence cited there)

The Department of Public Health (“DPH”) has suggested that the cost of the split-phase option could be brought into line with the BMP guidelines by recalculating it as a percentage of the entire project cost - 80% of which is attributable to construction in Massachusetts. (DPH Comments dated 10/8/09, p. 2) That suggestion does not seem fair or right. The Siting Council has jurisdiction only over the Connecticut construction. The DPH has also suggested that the Council consider reducing the length of the split-phase section to reduce its cost. (DPH Comments dated 10/8/09, pp. 2-3) If the Council is interested in that approach, it does have in the record sufficient information to enable it to determine approximately where to draw the lines for the beginning and end of the split-phasing; and it can roughly estimate the cost on a per mile basis. Even more roughly, the Council may consider that a 4% of project cost allowance would support split-phase construction through approximately half of the BMP Focus Area that CL&P has identified. Finally, the DPH has suggested that the new line might be moved to the east, further away from the existing line, and thus further away from the homes closest to the west side of the ROW. (DPH Comments dated 10/8/09, pp. 2-3) However, such a move would, of course, increase MF on the opposite side of the ROW. In any case, an effort to “snake” the line along the ROW to maximize its lateral distance from whichever side

currently has more homes would not be good utility engineering practice; and it would be wasteful of precious ROW.

One thing, however, is clear. The cost of the split-phase alternative, both its capital cost and its cost to Connecticut consumers, would be a small fraction of any underground variation ordered to avoid overhead line construction in the BMP Focus Area. Thus, the split-phase configuration not only achieves lower overall MF exposure than an underground line variation, but does so at a small fraction of its cost.

Accordingly, if the Council determines that the objective of lowering edge of ROW MF is paramount in siting the proposed line, it should order construction using the split-phase design in the BMP Focus Area. On the other hand, the Council may determine that a balanced consideration of MF levels favors the use of the baseline H-frame construction for the entire Connecticut section of the North Bloomfield to Agawam route; or that use of the BMP delta design in the BMP Focus Area provides the best balance of cost, EMF reduction, and minimizing scenic impacts.

In any case, CL&P urges the Council to make this determination as part of its Decision and Order, rather than to defer it to the D&M Plan stage. Since the support structures must be specially ordered with a long lead time, and the D&M process can be lengthy, deferring the choice could cause project delay.

3. The Existing ROW Will Provide an Adequate Buffer Zone for the Connecticut Section of the New Overhead North Bloomfield to Agawam 345-kV Line (Conn. Gen. Stats. §16-50p(a)(3)(D)(iii))

The ROW between the North Bloomfield Substation and the state line is broad - typically 305 feet (XS-2) or 385 feet (XS-1) wide. From Granby Junction to the state line, the ROW edges will typically be approximately 25 and 180 feet from the centerline

of the new line. From North Bloomfield to Granby Junction, there will be a minimum of 175 feet from the centerline of the new line to the easterly ROW edge. Vegetation buffers on the east side of the ROW will remain or be reestablished after the new line is built. The line will be constructed in full compliance with the National Electrical Safety Code, published by the Institute of Electrical and Electronic Engineers, which as the Council has recognized, provides standards for “the safe installation, operation, and maintenance of electrical utility lines, including clearance requirements from vegetation, buildings, and other natural and man-made objects that may arise in the ROW, ... the safety of power-line workers and the general public.” (*Council Administrative Notice Item 3, BMP, p. 7*) With respect to MF levels, in evaluating whether an existing ROW provides an adequate buffer, the Council will consider, in addition to its own BMP, guidelines or benchmarks used by other states, such as the 85 mG Massachusetts benchmark for comparing different design alternatives, and the 150- 250 mG range allowed for extra high voltage lines in Florida. *Id.* The edge of ROW MF levels, regardless of the line design chosen, and regardless whether they are estimated with average or peak loads, will be comfortably within these guidelines. (*See e.g., CL&P Ex. 1, Application, Vol. 1, Section O, Appendix O-2*)

The edge-of-ROW MF, estimated on an annual average load basis, will be toward the lower end of the range typically encountered in the vicinity of electric transmission lines, regardless of which line design is selected by the Council. Accordingly, the Council has a clear basis for a finding that the new line will be contained within a “buffer zone that protects the public health and safety,” consisting of

the existing ROW. (Conn. Gen. Stats. §16-50p(a)(3)(D)(iii); *Council Administrative Notice Item 3*, BMP, p. 7)

IV. THE COUNCIL MAY DETERMINE THE DESIGN OF THE MMP

A. The Proposed Design of the MMP Meets Project Needs and Complies With the BMP

CL&P's MMP proposal involves the reconfiguration of a section of an existing 115-kV line (1448 circuit) that extends for approximately 2.2 miles of the total 2.6-mile length of the ROW between Manchester Substation and Meekville Junction. That 2.2-mile section of the 1448 circuit is currently on a line of double-circuit structures, together with a 345-kV circuit (395 circuit). (*PFOF* ¶ 235) Arranging these two circuits on independent lines of structures, rather than leaving them in part on common structures, will eliminate contingent overloads for which the system must be planned.

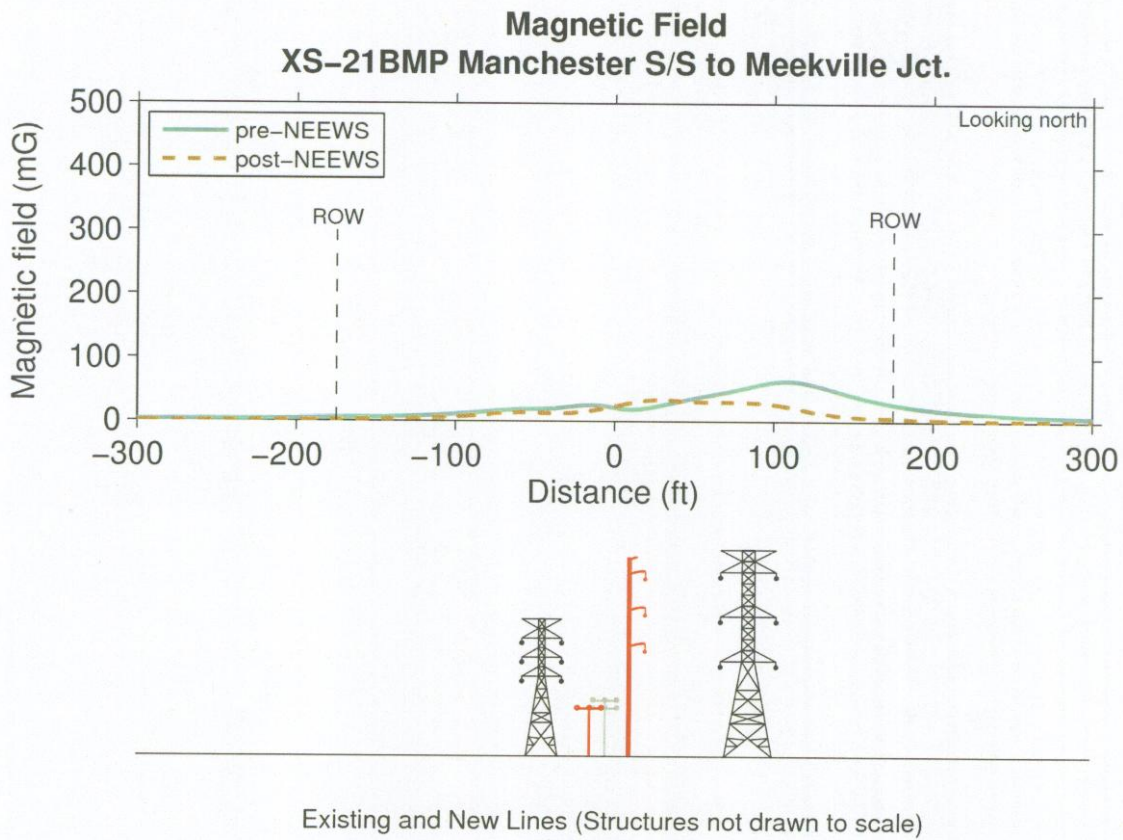
CL&P proposes to accomplish the circuit separation by replacing the 2.2-mile segment of the 1448 circuit with a new segment of 115-kV line on its own set of structures. For the remaining approximately 0.4 miles of ROW, the 1448 circuit is already on an independent set of structures. CL&P proposes to leave that section of the circuit in place. (*PFOF* ¶¶ 235, 236)

Because CL&P anticipated that the 1448 circuit would need to be upgraded to 345 kV in the future, the 2.2-mile segment currently on 345-kV structures was built with 345-kV insulation, conductor and hardware. For the same reason, CL&P proposes that the replacement segment of 115-kV line also be built with structures, insulation levels, and conductors that will be suitable for future operation at 345 kV. Accordingly, the MMP as proposed by CL&P would result in a 115-kV line on its own set of structures for the entire 2.6-mile length of the ROW between Manchester Substation and Meekville

Junction, consisting of the new 2.2 miles of the new construction pre-built for future operation at 345 kV and 0.4 miles of the existing conventional 115-kV line. (PFOF ¶ 236)

This construction would result in the conductors on one side of the existing double-circuit lattice tower not being energized. Since both sides of the tower are currently constructed for 345-kV operation, the de-energized set of conductors can be used to create a single split-phased 345-kV circuit, which CL&P has proposed to do as part of its EMF Field Design Management Plan for the MMP. This can be accomplished at a minimal cost, well within the 4% guideline. (PFOF ¶ 236)

The configuration and appearance of the ROW would be essentially the same whether the baseline or BMP configuration were constructed. See the icon below.



(PFOF ¶¶ 430)

There are no youth camps, child day-care facilities or residential areas along the MMP ROW. However, there is one school and one playground on the east side of the ROW. The baseline construction for the MMP would *reduce* the pre-construction edge of ROW MF, including in the vicinity of these statutory facilities. (See PFOF ¶¶ 430-432) Nevertheless, CL&P proposes to treat the entire 2.2-mile long segment of the MMP ROW where the proposed construction will take place as a BMP focus area, and further reduce MF. In this BMP section of ROW, the existing 345-kV line can be reconfigured as a split-phase line. This can be done using the conductors of the existing 115-kV circuit. (See PFOF ¶¶ 434-435)

Configuring the existing 345-kV line as a split-phase line will dramatically reduce magnetic field levels beyond those that would be achieved with the base-line design. The following table shows the projected edge-of-ROW MF levels, pre-construction (2012), and years after construction (2017) with each of the base-line and BMP designs, assuming AAL loads:

Summary of pre-NEEWS (2012) and post-NEEWS (2017) EMF Levels at the edge of the ROW at annual average loading (AAL) - Manchester to Meekville Junction

Manchester Substation to Meekville Junction				
Cross Section	Magnetic Field (mG)		Electric Field (kV/m)	
	West/North ROW	East/South ROW	West/North ROW	East/South ROW
XS-21 – Pre	4.8	27.4	0.06	0.15
XS-21 – Post	3.2	12.2	0.07	0.15
XS-21 BMP – Post	2.2	4.9	0.05	0.14

(PFOF ¶ 436)

B. The MMP Variation Offers More System Benefits Than the MMP As Proposed By CL&P, But Would Be More Costly

The Council may condition a certificate for a new facility upon a modification of the proposed construction or operation as it deems appropriate. Conn. Gen. Stats. §16-50p(a)(1). The Council identified such a potential modification of the MMP in the course of the hearings on this Docket. In essence, this modification would continue the proposed new line construction for an additional 0.4 miles, so that the new configuration would continue all the way to Meekville Junction; and would include improvements to the Manchester Substation so that the new 2.6-mile line segment could be operated at 345-kV. The new line segment would then not be a 115-kV segment pre-built for future operation at 345 kV, but a segment of a new line that could be operated at 345-kV immediately. The 115-kV circuit segment on common structures with the existing 345-kV line would then be left undisturbed. (*PFOF ¶¶ 237-238*)

As presently configured, the 345-kV No. 395 circuit is a “three terminal” line. It extends from the Manchester Substation to Meekville Junction, and from there branches extend to terminate at each of the North Bloomfield and Barbour Hill Substations. The MMP-Variation (“MMP-V”) would build a second 345-kV line segment in the ROW from Manchester to what is now Meekville Junction, and would make changes at Meekville Junction and Manchester Substation resulting in two independent 2-terminal 345-kV circuits. One circuit would be between the North Bloomfield and Manchester Substations. The second circuit would be between the Barbour Hill and Manchester Substations. This change would provide several system benefits:

- In general, 2-terminal lines are preferred to 3-terminal lines because it is more challenging to design system protection that is reliable under fault conditions for 3-terminal lines and because a fault on a 3-terminal line will

entail the loss of a circuit connection at three, rather than two terminals. The elimination of a 3-terminal line by the creation of two 2-terminal lines represents an improvement of the system.

- In this case, the elimination of a 3-terminal 345-kV line would result in two independent 345-kV circuit paths between the Ludlow and Manchester Substations, which would be mostly on diverse rights-of-way. This configuration provides robust support to both substations that the MMP would not provide.
- Establishing a new 345-kV connection between the North Bloomfield and Manchester Substations reduces power flow on the 115-kV network between those substations following N-1 and N-1-1 contingency events.
- As compared to the MMP, the MMP-V is a more robust solution which provides greater operating flexibility especially during maintenance periods and following N-1 and N-1-1 contingency events.
- Although ISO-NE has not performed the detailed studies required to assess the impact of these improvements on transfer capacity, preliminary analyses performed by CL&P and by ISO-NE indicate that the import capability may be increased by between 20 and 120 MW.

(PFOF ¶¶ 240-243)

Nevertheless, CL&P has not proposed to build the MMP-V. The power flow simulations that it and the ISO-NE Working Group performed indicate that, with the proposed GSRP configuration, the MMP-V is not needed to comply with applicable national, regional and ISO-NE reliability standards and criteria by eliminating simulated overloads or voltage violations. However, this conclusion could change if the projected Central Connecticut Reliability Project ("CCRP") is deferred. If the GSRP is built as proposed, there will be two 345-kV system connections between Manchester Substation and western Massachusetts. If the Barbour Hill-North Bloomfield-Manchester 395 circuit were to trip, both of these connections would be interrupted, thus defeating one of the benefits of having a looped system. CL&P plans to eliminate this condition by the

construction of the CCRP, a future NEEWS project. If the CCRP does not go forward, CL&P would be required to formulate another plan, which would very likely include the construction proposed by the MMP-V. ISO-NE is currently re-evaluating the need for and the timing of the CCRP, in light of developments since the Needs Report was completed.

The disadvantages of the MMP-V are basically its higher cost and construction complexity, and its somewhat greater environmental impact, as compared to the proposed MMP. The construction difficulties and environmental concerns are set forth in CL&P's PFOF. (PFOF ¶ 250). CL&P estimates the excess cost of the MMP-V as approximately \$10.5 million, in addition to the baseline cost of the MMP of \$14 million. Because, at present, the additional construction has not been determined to be needed to meet reliability criteria, that excess cost is likely not to be regionalized, in which case Connecticut customers would be responsible for 100% of the excess cost, rather than approximately 27%. (PFOF ¶¶ 248-249)

Finally, there is very little information in the record concerning the MF levels that would be associated with the MMP-V. The MF modeling of the baseline design of the proposed MMP would not apply to the MMP-V, because the configuration of the lines on the ROW would be different; and there would be no opportunity to configure the existing 115-kV line as a single split-phased circuit. CL&P suggests that, if the Council is inclined to order the MMP-V as a modification to CL&P's proposed construction, it should consider approving both the MMP and the MMP-V in the alternative with the MMP-V approval conditioned upon the Council's receipt and approval of a satisfactory analysis of

the magnetic fields that would be associated with that configuration, and how they could be reduced by application of the BMP.

V. **THE COUNCIL MUST DETERMINE THE APPROPRIATE DISPOSITION OF CL&P'S REQUEST FOR CONTINGENT APPROVAL OF THE CONNECTICUT PORTION OF THE SOUTHERN ROUTE ALTERNATIVE**

The Council's enabling legislation authorizes it to approve proposed construction "upon such terms, conditions, limitations ... as the council may deem appropriate."

(Conn. Gen. Stats. §16-50p(a)(1)) The Council accordingly has the power to issue an approval conditioned upon the occurrence of a future event. In this case, CL&P asks the Council to approve the construction of the additional two short segments of the SRA that would have to be constructed within CL&P's existing ROW in Connecticut, should the Massachusetts EFSB select that route option for the Massachusetts portion of the GSRP between the Agawam and Ludlow Substations, rather than WMECO's preferred route between these points, which would not enter Connecticut.

This request is made for practical reasons. Since the existing WMECO / CL&P ROW for the SRA meanders into and back into Massachusetts twice, construction along that route requires the Council's approval. However, it is clear that the EFSB will not have issued any determination by the time of the Council's statutory decision date in March of 2010. Therefore, at the time it acts on CL&P's application, the Council will not know whether or not the EFSB will approve WMECO's preferred route, or require construction along the SRA.

Although the SRA is not WMECO's preferred route, it is technically, economically, and environmentally practical, and thus its Connecticut portions are eligible for the Council's approval. CL&P has, accordingly, provided the Council with

extensive information concerning the portions of the SRA that would have to be constructed in Connecticut. That information is summarized in Sections C. 3 (Technical Description); F. 1.3 (Cost); K. 4 (Underground Variations); L.3 (EMF); and M. 6.2 (Environmental Effects) of CL&P’s PFOF.

Basically, the proposed 345-kV line would be built within a ROW that is 280- to 300 feet wide, where a single 115-kV line on H-frame structures that are typically 60 feet tall already exists. The baseline configuration for the new line would employ H-frame structures typically 90 feet high. After construction, there would still be approximately 95 feet of ROW width that would not need to be maintained. Along about 3.7 miles of the 4.4-mile long section in Enfield, both sides of the ROW are rather densely settled, and CL&P has identified this section as a “BMP Focus Area.” In order to reduce magnetic field levels in this area, taller steel monopoles averaging 110 feet, with the conductors arrayed in a vertical or delta configuration, are recommended. This modification would qualify as a “low cost” measure within the BMP’s 4% guideline. The projected edge of ROW MF levels, assuming AAL loads before (2012) and years after (2017) construction, with the baseline and recommended BMP designs, are as follows:

**Connecticut Portion of Massachusetts Southern Route Alternative
EMF Pre and Post Construction - Baseline & Recommended BMP Designs**

Cross Section	Magnetic Field (mG)	
	West/North ROW*	East/South ROW*
<i>PFPXS-S05 – Pre</i>	3.8	0.3
<i>XS-S05 – Post</i>	12.5	15.2
<i>XS-S07 – Pre</i>	7.0	0.3
<i>XS-07 Post</i>	17.3	15.2
<i>XS-07 BMP</i>	12.1	11.9

The Town of Enfield did not express any preference among the alternate line designs; the witness for the Town indicated that the Town of Enfield was not familiar enough with the information presented by CL&P. (Tr. 11/5/09, p. 12, Vindigni)

CL&P has also identified an underground variation to overhead line construction in the BMP Focus Area. This variation would consist of an XLPE cable system installed in part in the existing ROW and in part in streets for a total distance of 4.3 miles. The cost of this 4.3-mile underground variation would be \$184 million – more than the estimated cost of the entire overhead GSRP line segment from North Bloomfield Substation to the state border (not including substation costs.) After adjusting for the localization of the excess underground cost, the cost to Connecticut consumers of the variation would be more than 42 times that of the overhead section of line that it would replace. (PFOF ¶¶ 426, 427)

On this record, summarized in more detail in CL&P's PFOF, the Council may make all of the findings required to approve the Connecticut portion of the SRA, particularly including that the presumption of §16-50p(i) has been overcome, because underground construction would impose an unreasonable burden on ratepayers.

If, however, the Council is reluctant to take a definitive position with respect to the Connecticut portions of the SRA before it knows whether or not the Massachusetts EFSB has selected that route, it may consider denying this aspect of CL&P's application without prejudice, and advising CL&P to apply for reconsideration of that determination in the event that the EFSB were to select the SRA. In Docket 217, the Council took a similar course, which was later approved by the Superior Court. (*Council Administrative*

*Notice Item 47, CSC Docket 217, Initial Decision, March 27, 2003; City of Norwalk v. The Connecticut Siting Council, et al, 37 Conn. L. Rptr. 862, 2004 WL 2361540, at ** 7-8 (2004).*

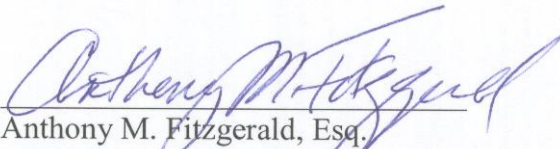
CONCLUSION

CL&P respectfully requests that the Council issue two certificates of environmental compatibility and public need; one for the Connecticut portion of the North Bloomfield to Agawam 345-kV line construction, and one for the Manchester to Meekville Circuit Separation Project, to be constructed entirely overhead. CL&P further asks that the Council include in the GSRP certificate approval for overhead construction of the Connecticut portions of the Southern Alternative Route for the Agawam to Ludlow 345-kV line, contingent upon the selection of that route by the Massachusetts Energy Facilities Siting Board in the proceeding now pending before them. Should the Council approve the proposed construction with modifications by specifying any of the BMP designs CL&P has presented to the Council, or by approving the MMP-V, CL&P will proceed with that construction, subject to obtaining the additional required permits and approvals.

In **Appendix A** to this brief, CL&P has included a list of the conclusory findings that the Council is directed to make in order to support the issuance of the certificates. CL&P further requests that the Council, either in its Findings of Fact, or in its Opinion and Order, as it deems appropriate, include these findings with respect to the construction that it approves.

Respectfully submitted,

**THE CONNECTICUT LIGHT AND
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CERTIFICATION

This is to certify that a copy of the foregoing has been served on this 15th day of January, 2010 upon all parties and intervenors as referenced in the Connecticut Siting Council's Service List dated November 13, 2009. Copies have been sent by U.S. mail, postage prepaid, to those parties/intervenors who requested U.S. mail service; copies and a CD with an electronic version have been sent by express mail, to those parties/intervenors who requested e-mail service.


Marianne Barbino Dubuque