

STATE OF CONNECTICUT

SITING COUNCIL

<p>DOCKET NO. 424 - The Connecticut Light & Power Company application for a Certificate of Environmental Compatibility and Public Need for the Connecticut portion of the Interstate Reliability Project that traverses the municipalities of Lebanon, Columbia, Coventry, Mansfield, Chaplin, Hampton, Brooklyn, Pomfret, Killingly, Putnam, Thompson, and Windham, which consists of (a) new overhead 345-kV electric transmission lines and associated facilities extending between CL&P's Card Street Substation in the Town of Lebanon, Lake Road Switching Station in the Town of Killingly, and the Connecticut/Rhode Island border in the Town of Thompson; and (b) related additions at CL&P's existing Card Street Substation, Lake Road Switching Station, and Killingly Substation.</p>	<p>DOCKET NO. 424</p> <p>July 17, 2012</p>
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**DIRECT TESTIMONY OF JUDAH ROSE, KENNETH COLLISON,
AND MARIA FUSCO SCHELLER
CONCERNING NON-TRANSMISSION SYSTEM ALTERNATIVES**

- 1 **Q.** **Mr. Rose, please introduce yourself and your colleagues to the Siting Council.**
- 2 A. We are Judah Rose, Kenneth Collison, and Maria Fusco Scheller. We are employed by
- 3 ICF International, Inc., a multinational consulting firm founded in 1969 and
- 4 headquartered in Fairfax, Virginia. Each of us has provided a resume of our professional
- 5 qualifications and experience relevant to our work on the Interstate Reliability Project
- 6 ("Interstate"), which are included in the Resume Volume that we understand has been
- 7 designated CL&P Exhibit 19.

1 **Q. Is the information in each of your resumes true and correct to the best of your**
2 **knowledge and belief?**

3 A. (Mr. Rose) Yes. (Mr. Collison) Yes. (Ms. Scheller) Yes.

4 **Q. Does the consulting practice of ICF International include work in the energy**
5 **sector?**

6 A. Yes, the division that we work in, known as ICF Resources, LLC (ICF) specializes in
7 energy and natural resource issues. Our clients include energy utilities, governments,
8 major corporations and multilateral organizations in North America, Asia, Europe, and
9 Latin America. These clients include the United States Department of Energy, the Federal
10 Energy Regulatory Commission, and the United States Environmental Protection
11 Agency, as well as major power producers and state, regional, and local governmental
12 organizations and agencies.

13 **Q. What is the purpose of your testimony?**

14 A. The purpose of our testimony is to present and summarize a report that we prepared, with
15 the assistance of others at ICF, and to explain the continuing relevance of that report in
16 light of the very recent analyses of the Independent System Operator – New England
17 (ISO-NE). Our report (the “ICF Report”) is titled “Assessment of Non-Transmission
18 Alternatives to the NEEWS Transmission Projects: Interstate Reliability Project”, dated
19 December 1, 2011. We understand that a copy of this report, with portions of Section 5
20 and Appendices A and B redacted to comply with Critical Energy Infrastructure
21 Information (CEII) requirements, was included as Exhibit 5 in Volume 5 of the
22 Application, and that a complete copy of Section 5 and Appendices A and B were

1 included in the “CEII Appendix” to that Application filed with the Siting Council
2 (Council) on February 9, 2012.

3 **Q. Can you summarize your testimony?**

4 A. Yes. ICF assessed Non-Transmission Alternatives (NTAs) to the Interstate Reliability
5 Project (“Interstate”). The goal of the study was to determine whether new generation or
6 incremental demand resources, alone or in combination, could resolve the thermal
7 violations that IRP resolved. The methodology involved analyzing alternative scenarios
8 using a power flow case based on the same case used by ISO-NE in its *New England*
9 *East-West Solution (NEEWS) Interstate Reliability Project Component Updated Needs*
10 *Assessment* (April, 2011) (*the "2011 Updated Needs Report"*). The steps in the
11 methodology were:

- 12 • First, ICF corroborated the ISO-NE findings that in the absence of Interstate there
13 were thermal violations under contingency conditions in southern New England.
- 14 • Second, ICF demonstrated that Interstate resolved these violations.
- 15 • Third, ICF identified supply, demand, and combined supply and demand resource
16 alternatives to Interstate, i.e., ICF identified NTAs.
- 17 • Fourth, ICF analyzed the identified NTAs in place of Interstate to determine
18 whether they were able to resolve all the violations resolved by Interstate. They
19 were not.

- 1 • Fifth, ICF concluded, based on an intense and wide-ranging analysis of non-
2 transmission alternatives available for Interstate, that no feasible and practical
3 non-transmission alternative would meet the needs that Interstate is designed to
4 meet. In addition, we concluded that any hypothetical non-transmission
5 alternative that was considered would be unprecedented in scope, immensely
6 costly, difficult or impossible to implement, and less flexible and robust in
7 operation than Interstate.

8 The July 2012 draft study by ISO-NE entitled “*Follow-Up Analysis to the 2011 New*
9 *England East-West Solution (NEEWS) Interstate Reliability Project Component Updated*
10 *NEEDS Assessment*”(July 2012) (“*The July 2012 Follow-Up Analysis*”) was recently
11 provided to ICF (in early July 2012). ICF also received an ISO-NE presentation to be
12 given to the Planning Advisory Committee Meeting on July 18, 2012 entitled “*New*
13 *England East-West Solution (NEEWS) 2012 Follow-Up Study Needs and Solutions*” (the
14 *July 2012 Follow-Up Presentation*”). The July 2012 Follow-Up Analysis, and the July
15 2012 Follow-Up Presentation corroborate the 2011 Updated Needs Report and the ICF
16 Report’s conclusions that:

- 17 • In the absence of Interstate, there are thermal overloads under contingency
18 conditions in Southern New England.
- 19 • Interstate resolves these violations.
- 20 • Even with large reductions in demand due to greater amounts of passive demand
21 resources, violations remain.

- Interstate is an appropriate solution to the identified violations.

Although we have not had the opportunity to conduct a detailed study using the new updated ISO-NE power flow cases, our conclusion is that there are two main differences between our work and the latest ISO-NE study. First, the July 2012 Follow-Up Analysis has similar net demand levels at the end of the planning period as ICF, i.e., within a few percent in southern New England, but arrives at this net demand differently: ISO-NE effectively assumes that the incremental demand resources contained in ICF's Reference DR Case are in place as part of its baseline assessment rather than as a NTA. Importantly, both ICF and ISO-NE found that there were violations that the incremental passive demand resources did not eliminate. Second, the July 2012 Follow-Up Analysis did not analyze supply NTAs. However, the ICF report analyzed supply NTAs, and still did not identify a practical NTA.¹

A consequence of the increase in demand resources is increased competition in the ISO-NE Forward Capacity Market (FCM). All else equal, this will tend to lower capacity prices and encourage more power plant retirements. In addition, the aging of the ISO-NE fleet of power plants, and tighter environmental regulations can also contribute to power plant retirements. The need for additional transmission like Interstate can be increased by power plant retirements. This occurs in part because retirements can cause increased need for transfers across the East-West interface during system peak conditions overloading elements in the southern New England area during contingencies. One of our findings was that without Interstate, it was difficult to resolve the violations using

¹ As discussed later, July 2012 Follow-Up Analysis did not examine incremental active DR, but ICF did and still found no practical NTA.

1 NTAs even with supply resources resulting from West to East transfers. Subsequent to
2 the initiation of our study and the establishment of base case assumptions, the following
3 developments in ISO-NE reinforce ICF's concerns about meeting reliability standards
4 and criteria in the face of potential generation retirements:

- 5 • Many of the supply resources identified as potential supply NTAs due to their
6 presence in the ISO-NE Interconnection Queue have since been removed from the
7 Interconnection Queue even though they had either Interconnection Agreements
8 or had completed the I.3.9 process. This demonstrates that potential supply NTAs
9 may not be available when and where needed.
- 10 • Salem Harbor announced its retirement. The retirement of Salem Harbor which is
11 located in NEMA Boston, and hence, east of the East-West Interface, all else
12 equal, can increase the West to East transfers.
- 13 • Mystic 7, also located in NEMA Boston, became a static delist in FCA #6. This
14 also may be a harbinger of greater West to East power transfers.
- 15 • Fuel supply problems at Mystic 8 and 9, also in NEMA Boston, required special
16 action by ISO-NE which is also a potential cause of greater West to East transfers.

17 Thus, we agree with ISO-NE that retirements make the need for a robust transmission
18 grid including Interstate even more pressing. This view is repeatedly expressed in ISO-

1 NE's conclusions.² In sum, our study, like the ISO-NE 2011 and 2012 studies show the
2 need for Interstate and that the need is reinforced by potential retirements.

3 **Q. Please summarize ICF's experience related to the assessment of potential non-**
4 **transmission alternatives to electric transmission projects.**

5 A. We have extensive experience in performing transmission assessments and other
6 evaluations that require modeling of the transmission system of the continental United
7 States and Canada, taking into account the economics of power plants and the physical
8 and electrical characteristics of the transmission grid. We have performed many studies
9 requiring modeling of the New England power system. In addition, we perform
10 integrated resource planning studies, and that work is supported by our extensive
11 experience in advising clients concerning central power plant, combined heat and power,
12 distributed generation, energy efficiency and demand-side management projects.

13 **Q. Please tell the Council how ICF came to perform a non-transmission alternatives**
14 **assessment for Interstate.**

15 A. In December 2007, ICF was retained by Northeast Utilities Service Company (NUSCO)
16 and National Grid U.S.A. to perform non-transmission system alternatives analyses for
17 each of the four New England East West Solution (NEEWS) projects, starting with the
18 Rhode Island Reliability Project, and then moving on the Greater Springfield Reliability
19 Project, the Interstate Reliability Project, and finally the Central Connecticut Reliability
20 Project.

² See page 44, ISO-NE, Draft NEEWS – Follow-Up to 2011 Interstate Updated Needs Assessment.“ The draft report concludes with the retirement of Salem Harbor, there is greater need for additional transmission transfer capability to Eastern New England.” On the same page, on four separate occasions, the study concludes there is a need for greater transmission capacity or advanced need for transmission if generation resources retire.

1 **Q. What is the status of that work?**

2 A. We concluded our evaluation of potential alternatives to the Rhode Island Reliability
3 Project and delivered our report of that work in August, 2008. That report was presented
4 to the Rhode Island Energy Facilities Siting Board, in support of National Grid's
5 application for approval of the Rhode Island Reliability Project. We concluded an
6 assessment of non-transmission alternatives to GSRP in September, 2008; after our report
7 of that evaluation was presented to the Connecticut Energy Advisory Board (CEAB), we
8 executed a supplemental power-flow study at the direction of the CEAB. Our report and
9 the testimony of Ms. Scheller were presented to the Council in support of CL&P's
10 application for approval of GSRP; and to the Massachusetts Energy Facilities Siting
11 Board (EFSB) in support of the application of the Western Massachusetts Electric
12 Company's application for approval of the Massachusetts portion of GSRP. We
13 concluded an assessment of non-transmission alternatives to the Interstate project in
14 December 2011. As noted above, The ICF Report relating to the Interstate project is
15 included in the application for approval pending with the Council. After completing that
16 Report, we did some supplemental work for National Grid concerning the segment of the
17 Interstate project between its West Farnum Substation and its Millbury Switching Station.
18 That supplemental report has recently been submitted as part of National Grid's
19 application to the Massachusetts Energy Facilities Siting Board for approval of the
20 Massachusetts segment of the Interstate project. Finally, very recently we have
21 considered the significance of ISO-NE's July 2012 Update to the analyses and
22 conclusions in our Report, and we address that subject in this testimony. We have not

1 done any work with respect to the Central Connecticut Reliability Project (CCRP)
2 evaluation, which we understand is being re-evaluated and may change substantially.

3 **Q. Are the ICF Report and the data and conclusions set forth in it correct, to the best**
4 **of your knowledge and belief?**

5 A. Yes.

6 **Q. Do you have any corrections to make to the Report?**

7 A. No.

8 **Q. Did ICF assist CL&P in responding to any data requests directed to it concerning**
9 **ICF's work?**

10 A. Yes, we did.

11 **Q. I have provided you with a copy of CL&P's previously filed response to the**
12 **Council's Data Request CSC-01, Q. CSC-11. Did ICF assist in the preparation of**
13 **this response?**

14 A. Yes.

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16 **Q. Are there any corrections or additions required to this response?**

17 A. Yes. The response states that ICF is in the process of assessing the performance of a
18 modified transmission option in which the segment of the Interstate Project from
19 Millbury to West Farnum is not constructed, and that this work was currently underway.
20 That was the case when the response was filed, on March 9, 2012. However, as

1 mentioned above, ICF completed that assessment shortly before National Grid filed its
2 application with the Massachusetts EFSB, and it was included as part of that application.

3
4 **Q. Please summarize for the Council the results described in the ICF Report of your**
5 **analysis of transmission needs without Interstate in service.**

6 A. Based on ISO-NE's needs assessment, ICF found a large number of thermal violations
7 spread across numerous locations in southern New England (SNE) as follows: in 2015,
8 206 violations with 20 overloaded system elements; by 2020, 6,029 violations with 53
9 overloaded system elements, assuming the unexpected failure of two key transmission
10 elements (N-1-1 contingency analyses). With one key transmission element failure (N-1
11 contingency analysis), 12 thermal violations occurred in 2020 with 8 overloaded system
12 elements. We concluded that due to the number and locations of thermal violations, a
13 non-transmission alternative solution would likely need to be dispersed across all of SNE.

14 **Q. Did the ICF Report determine whether, with Interstate in service, all identified**
15 **thermal violations in 2015 and 2020 would be eliminated?**

16 A. Yes, we determined that they would be.

17 **Q. Please summarize the work ICF did with respect to identifying potential non-**
18 **transmission alternatives to Interstate.**

19 A. First, we obtained ISO-NE's power-flow simulation data used to evaluate the need for
20 Interstate, as ISO-NE documented it in the report titled *New England East-West Solution*
21 *(NEEWS) Interstate Reliability Project Component Updated Needs Assessment* (April,
22 2011) (*the "2011 Updated Needs Report"*). Next, we translated the data into our system.

1 We could not simply load a model obtained from ISO-NE into our system because we
2 use a different power-flow analysis program than that used by NUSCO and ISO-NE.
3 This primarily involved saving the data in an alternate file format which could be read by
4 the software ICF relies on³. We ran the ISO-NE power-flow cases on our software and
5 found that results of the pre-Interstate power-flow simulations agreed with those of the
6 *2011 Needs Re-analysis* and the post-Interstate simulation results agreed with ISO-NE's
7 simulations in its updated solution analysis. We then used that model to analyze the
8 effect on non-transmission alternatives in addressing the documented thermal violations.

9 **Q. Did ICF analyze whether any non-transmission alternatives would have resolved or**
10 **aggravated the pre-Interstate voltage violations?**

11 A. No.

12 **Q. Why not?**

13 A. None of the non-transmission alternatives resolved all thermal violations addressed by
14 Interstate so it would have been pointless to analyze the pre-Interstate voltage violations.

15 **Q. What types of non-transmission alternatives were considered in the ICF Report?**

16 A. In assessing the potential for alternative resources to displace or defer Interstate, ICF
17 considered the following options:

18 **(1) Demand-Side Resources:** Demand-side resources tend to reduce the demand
19 for system generation and transmission services either through direct reductions

³ ICF utilizes GE's PSLF model while ISO-NE relies on Siemens PSS@E software. Both software packages simulate the power system load flow.

1 in the load, or the addition of distributed generation at the source of the load.

2 Both active (responsive) and passive (non-responsive) demand resources were
3 considered including energy efficiency, distributed generation, active demand
4 response resources and real-time emergency generation resources;

5
6 **(2) Central Generation:** Generation resources located close to the load demand
7 centers may also help reduce the overall load on the transmission system
8 provided they are appropriately sized and operating at the time of need; and

9
10 **(3) Combination of Demand-Side and Generation Resources.**

11 These resource alternatives were tested for their effectiveness in either deferring or
12 displacing the upgrades to the existing transmission system while maintaining the same
13 level of reliability i.e., fully complying with national and regional reliability criteria.

14 **Q. Why did you consider these types of resources as potential non-transmission**
15 **alternatives to Interstate?**

16 **A.** These demand and generation resources alone, or in combination, have the potential in
17 some circumstances to defer or displace the need for upgrades to the existing
18 transmission system, while maintaining the same level of reliability. However, they may
19 not offer the same certainty offered through transmission projects. For example, to
20 provide reliability benefits, active demand resources must be dispatched. Many of these
21 resources can only be called on for short periods of time, and may take 30 minutes or
22 longer to respond, if they do respond. Hence, they do not offer the same certainty as the

1 transmission lines or components which are always present and have a very high
2 availability.

3 **Q. What criteria were used in the ICF Report to evaluate whether these resources, or**
4 **some combination of them, could provide a practical and feasible non-transmission**
5 **alternative to Interstate?**

6 A. We evaluated the performance of the potential non-transmission alternatives under the
7 same reliability standards and criteria that govern the New England transmission system.
8 These are the standards established by the North American Electric Reliability
9 Corporation (NERC) and the criteria established by the Northeast Power Coordinating
10 Council, Inc. (NPCC), and ISO-NE.

11 **Q. What projected area loads were used in the the power-flow cases you ran to test the**
12 **hypothetical non-transmission alternatives against the applicable reliability**
13 **standards?**

14 A. The load projections relied on in the ICF Report were from the ISO-NE CELT ⁴ released
15 in April 2010. The study year considered in the power-flow for the five-year horizon is
16 2015 and for the ten-year horizon is 2020. Hence, we relied on the 2015 and 2020
17 projected peak demands under the 90/10 scenario, respectively, in the ISO-NE CELT
18 report for the base power-flow case and made several adjustments to this.

19 **Q. What key assumptions were built into ISO-NE's development of the base power-**
20 **flow cases described in the 2011 Updated Needs Report?**

21 A. ISO-NE's key assumptions were as follows:

⁴ "2010-2019 Forecast Report of Capacity, Energy, Loads, and Transmission," April 2010, ISO New England.

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- (1) **Demand:** Because the CELT’s demand forecast includes estimated transmission losses, the value was reduced to avoid “double counting” in the power-flow simulation;

- (2) **Generation Facilities:** All generation projects that cleared Forward Capacity Auction #4 (delivery year June 1, 2013 to May 31, 2014) with a firm capacity supply obligation were included; Vermont Yankee nuclear power generating station was considered offline, as ISO-NE had modeled it in its studies – because of the great uncertainty with respect to its continued operation after 2102. ; Northfield Station and Bear Swamp Station (hydroelectric facilities) were de-rated to 50% of their capacity to account for potential output limitations during a peak summer day; an unavailability rate of 20% was assumed for quick-start resources in the area of interest; the Salem Harbor generators were assumed to be in service;

- (3) **Dispatch Conditions:** In each case, the two largest generating units or supply sources in the area of interest were assumed to be out of service;

- (4) **Demand Resources:** Active and passive demand resource values were increased to account for the reduction in losses on the local distribution network; and

1 **(5) Transmission Facilities:** Projects in ISO-NE's June 2010 RSP Project Listing
2 with Proposed Plan Application (PPA) approval [I.3.9 approval] were included.
3 Those projects include the Rhode Island Reliability Project and GSRP.

4 **Q. In the ICF Report, how did ICF determine the load level at which the southern New**
5 **England transmission system must be expanded to support demand?**

6 A. The critical load level (CLL) reflects the demand level (MW) above which reliability
7 violations begin to occur. At the CLL, the transmission system must be expanded to
8 meet the demand. ICF estimated the SNE CLL based on the approach utilized by ISO-
9 NE in its analyses of the CLL for the entire regional market. ICF focused on the SNE
10 load to determine the level at which the pre-Interstate violations occur.

11 **Q. Please explain the calculation of the CLL for SNE described in the ICF Report.**

12 A. ICF first determined a sub-regional CLL for each of the three sub-regions where the pre-
13 Interstate reliability violations occur, Eastern New England, Western New England,
14 Rhode Island, and then combined them into a CLL for SNE.

15 **Q. Is the combining CLL's for the three sub-regions to estimate a regional CLL a**
16 **reasonable approach?**

17 A. Yes, due to the nature of power-flow cases, reductions in one sub-region have only a
18 small impact on violations in other sub-regions. Also, the aggregate CLL is less likely to
19 overstate the required load reduction as compared with a uniform regional reduction that
20 ISO-NE utilized in its analyses.

1 **Q. Applying this CLL analyses, what demand reduction did ICF Report conclude**
2 **would be required to resolve all of the thermal violations in SNE in 2015?**

3 A. A demand reduction of approximately 3,400 MW or 15% of the total SNE load would be
4 required to resolve all of the thermal violations.

5 **Q. What demand reductions did the CLL analysis indicate would be required to**
6 **resolve all of the thermal violations in SNE in 2020?**

7 A. A demand reduction of 5,300 MW or 22% of the total SNE load would be required to
8 resolve all of the thermal violations.

9 **Q. How were passive demand resources estimated in the ICF Report?**

10 A. ICF tested two different levels of demand resources in Connecticut, Rhode Island and
11 Massachusetts, including a Reference DR Case and an Aggressive DR Case. The
12 Reference DR Case was based on estimates for each state if targeted goals for current
13 programs and expected legislation are achieved at similar levels each year through 2020,
14 while the Aggressive DR Case considered the potential for passive resources assuming
15 higher, yet reasonably achievable growth.

16 **Q. How much higher was the Aggressive DR Case as compared with the Reference DR**
17 **Case?**

18 A. The Aggressive DR Case assumed approximately 17% more load reducing resources than
19 were modeled in the Reference DR Case.

20 **Q. What were the achievable demand reductions from the Reference DR Case and the**
21 **Aggressive DR Case as compared with the required DR reduction?**

1 A. The achievable demand reductions were as follows:

	Required DR Reduction	Reference DR Case Reduction	Aggressive DR Case Reduction
2015	3,400	342	405
2020	5,300	1,439	1,883

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3 **Q. Were the passive demand resources anticipated to be achievable under the**
4 **Reference DR Case and the Aggressive DR Case sufficient to produce a demand**
5 **resource-only non-transmission alternative solution equal to the necessary load**
6 **reduction for the SNE CLL?**

7 A. No, the above table illustrates the wide gaps between the required demand reductions and
8 the achievable demand reductions when considering passive demand resources.

9 **Q. What was the next step after estimating potential passive demand resources in the**
10 **analysis described in the ICF Report?**

11 A. ICF then evaluated potentially available active demand resources to fill the gap in
12 demand resources.

13 **Q. What was the outcome of that evaluation?**

14 A. ICF found that it is not reasonable to achieve the required levels of active demand
15 resources in 2015 based on the 2014 currently considered available resources and that
16 achieving the 2020 levels would require unprecedented growth levels to be maintained
17 for the next several years.

18 **Q. How were the generation alternatives evaluated in the ICF Report?**

1 A. ICF selected the planned interconnections into the SNE load zones in the New England
2 Generation Interconnection Queue as of April 1, 2011. ICF then categorized these
3 resources based on a likelihood of construction into three categories.

4 **Q. Please briefly explain the three categories.**

5 A. The three categories were as follows:

- 6 • Category 1 (very likely): Facilities with completed Interconnection Agreements;
- 7 • Category 2: Facilities with PPA approval other than Category 1;
- 8 • Category 3 (lowest probability): All facilities in the Interconnection Queue other
9 than Category 1 or 2.

10
11 **Q. How much capacity was assumed in the ICF Report to be available from these categories for
12 SNE?**

13 A. A total of 1,302 MW of generation capacity was assumed available for SNE from these
14 categories in 2015 and 2,850 MW in 2020 of generation capacity was assumed to be
15 available for SNE from these categories, although approximately 75% of the generation
16 facilities in the Interconnection Queue never enter commercial operation.

17 **Q. Using the assumptions modeled in the ICF Report, which were based on those used
18 by ISO-NE in its 2011 Updated Needs Analysis, if all of the SNE generation in the
19 Interconnection Queue were added, would the reliability criteria violations that
20 Interstate addresses be resolved?**

21 A. No. In 2015, those generation resources would only reduce the thermal violations by
22 56% and in 2020, by 53%. In addition, the number of elements overloaded would only

1 decrease by 15% in 2015 and 42% in 2020 if all the queued SNE generation was
2 available.

3 **Q. Was the Meriden generating plant included in ICF's generation alternatives**
4 **analysis?**

5 A. Yes. For the Western NE sub-region, the 510 MW Meriden Power Plant was included in
6 Category 2 for the 2015 capacity additions for Scenario 1.

7 **Q. Why did ICF Report consider two scenarios, Scenario 1 and Scenario 2, for the 2015**
8 **capacity additions?**

9 A. ICF developed both scenarios to prioritize and select generators in SNE from the
10 Interconnection Queue to ensure that the choice of units did not affect the results.

11 **Q. Have there been any changes to the Interconnection Queue affecting the SNE load**
12 **zones since April 1, 2011 that would affect ICF's analysis?**

13 A. No, although we have seen both the addition and withdrawal of projects in the queue
14 since April 2011, the changes identified would not impact the result of the analysis.
15 Specifically, four facilities, totaling approximately 1066 MW of capacity in Connecticut
16 and 105 MW in Massachusetts which were assumed to contribute in part to an NTA
17 solution have withdrawn from the queue. However, the generation did not provide an
18 adequate NTA option to the Interstate project, so its withdrawal does not change our
19 conclusions. A new queue entry of 745 MW has been added in the same vicinity as one
20 of the initial projects; however, the original facilities had completed the I.3.9 process and
21 had IA contracts already in place at the time of the withdrawals and hence were eligible

1 to be included in our analysis, while the new queue listed would currently not qualify as
2 it is not past any of the queue analysis stages.

3 **Q. In what manner did the analyses in the ICF Report evaluate combinations of**
4 **generation resources and demand resources?**

5 A. ICF first developed a Reference DR Combination NTA and an Aggressive DR
6 Combination Case using its applicable estimates of passive demand resources with
7 generation resources. Passive demand resources were estimated based on the amounts
8 that cleared in the Forward Capacity Auction #4.

9 **Q. Did these combined resource alternatives resolve all the identified reliability criteria**
10 **violations?**

11 A. No.

12 **Q. What was the next step in the analysis described in the ICF Report, after**
13 **considering the combined effect of potential active and passive demand resources?**

14 A. The next step was to factor in active DR to see if passive DR, generation and active DR
15 could provide a solution.

16 **Q. Did this combination non-transmission alternative provide a solution?**

17 A. No, while the combination non-transmission alternatives under both the Aggressive DR
18 Combination NTA and Reference DR Combination NTA Cases were nearly sufficient
19 (98-99%) in reducing thermal violations in 2020, significant thermal violations remained
20 for 2015 (35-37%) and the number of elements overloaded was reduced by only 20-25%

1 in 2015 and by 64-68% in 2020. Therefore, the combination non-transmission alternative
2 is not an adequate alternative to Interstate, which resolves all thermal violations and
3 element overloads in 2015 and 2020.

4 **Q. The ICF Report modeled and analyzed two sensitivity scenarios, why?**

5 A. ICF determined that two sensitivity scenarios would affect the analysis of load serving
6 capability in Eastern New England on the results of the Combination NTA assessments.

7 **Q. Please briefly describe the two sensitivity scenarios.**

8 A. In one scenario, the Salem Harbor generation plant is assumed to retire in 2014 based on
9 the owner's stated intention and ISO-NE's direction to Transmission Owners. In the
10 other scenario, up to 1,400 MW of incremental generation is available in northern New
11 England by 2015 at the location of the Tewksbury Substation.

12
13 **Q. What was the outcome of the Salem Harbor retirement sensitivity?**

14 A. Reliability criteria violations worsened under this scenario.

15
16 **Q. What was the outcome of the northern New England generation (Tewksbury)
17 injection sensitivity?**

18 A. This sensitivity improved the situation but could not resolve all of the violations.

19
20 **Q. With Interstate in service under the sensitivity scenarios, are all identified reliability
21 criteria violations resolved?**

22 A. Yes.

1 **Q. Have you provided a detailed explanation of all of the assumptions in the power-**
2 **flow studies that are described in the ICF Report?**

3 A. Yes, these assumptions are set out in the Report itself, and also summarized in Section
4 13.2 at pages 13-32 through 13-49 of the Application.

5 **Q. What are the challenges associated with implementing non-transmission alternatives**
6 **even if it were possible for non-transmission alternatives to solve the thermal**
7 **violations that Interstate addresses?**

8 A. Simply stated, the challenges of a non-transmission alternative solution include the
9 following: the hypothetical non-transmission alternatives likely would involve numerous
10 power plants and demand resources at multiple locations, absence of centralized multi-
11 state procedures for non-transmission alternative implementation, risk of over-reliance by
12 ISO-NE on demand response, greater financial risk for ratepayers due to likelihood of
13 contracts for differences to make up revenue shortfalls, very high capital costs and
14 unavailability of region-wide allocation of costs.

15 **Q. Does Interstate face any of these implementation challenges?**

16 A. No, these challenges do not apply to transmission projects like Interstate. Most
17 importantly, Interstate: (1) is a single integrated solution to multiple violations across the
18 SNE load system, (2) has proven technology, (3) would be administered by ISO-NE, and
19 (4) would be constructed by experienced transmission owners.

20 **Q. In the ICF Report, did you estimate the capital costs of any of the portfolios of non-**
21 **transmission alternatives that you analyzed, as compared to those of Interstate?**

1 A. Yes, we estimated the cost of hypothetical non-transmission alternative solutions based
2 on the Combination NTA Cases as compared with the then estimated cost of Interstate of
3 \$532 million. Our analysis is included in our report as Appendix E in Volume 5 of
4 Exhibit 5 of the Application.

5 **Q. Did the ICF Report evaluate the capital costs for a hypothetical demand resource-**
6 **only alternative and demand and supply non-transmission alternatives?**

7 A. Yes.

8 **Q. How did the demand resource-only alternative cost compare with the cost of**
9 **Interstate?**

10 A. For the demand resource-only alternative, ICF estimated the average cost of incremental
11 demand resources which was roughly 25 times the cost of Interstate on a capitalized
12 basis.

13

14 **Q. What was the lowest estimated capital cost for a hypothetical demand and supply**
15 **non-transmission alternative?**

16 A. The lowest capital cost calculated by ICF for a hypothetical demand and supply non-
17 transmission alternative was for the Combination NTA with Aggressive DR Case at a
18 cost of \$15.1 Billion, roughly 30 times the cost of Interstate on a capitalized basis.

19 **Q. Did the ICF Report examine the potential economic benefits of hypothetical demand**
20 **and supply non-transmission alternatives?**

21 A. No. The very high capitalized costs of the demand and supply non-transmission
22 alternatives decreased the likelihood that any economic benefits would exceed costs.

1 **Q. The ICF Report mentions that new ISO-NE rules make non-transmission**
2 **alternatives less practical than in the Past. Why?**

3 A. The new rules eliminate or greatly decrease the potential for out-of-market non-
4 transmission alternatives to depress the Forward Capacity Market (FCM) price, thereby
5 making non-transmission alternatives less economically attractive to regulators and
6 consumers, and there is now greater emphasis on power transmission across zones to
7 maintain reliability and moderate the FCM price changes.

8 **Q. Did ICF consider transmission alternatives to Interstate?**

9 A. No. This was not part of the scope of work which ICF was engaged to perform.

10 **Q. What is the basis for the ICF Report's assessment that Interstate offers a flexible**
11 **solution to reliability problems and increasing deliverability?**

12 A. Unlike non-transmission alternatives, Interstate solves reliability problems associated
13 with power flows in two directions. Interstate also increases both Connecticut import and
14 export capability across two of the most significant SNE transmission interfaces – e.g.,
15 the New England East-West and Connecticut Import Interfaces.

16 **Q. Please summarize the conclusions of the ICF Report.**

17 A. We concluded, based on an intense and wide-ranging analysis of non-transmission
18 alternatives available for Interstate, that no feasible and practical non-transmission
19 alternative would meet the needs that Interstate is designed to meet. In addition, we
20 concluded that any hypothetical non-transmission alternative that was considered would
21 be unprecedented in scope, immensely costly, difficult or impossible to implement, and
22 less flexible and robust in operation than Interstate.

1 Q **Have you reviewed the July 2012 Follow-Up Analysis and the July 2012 Follow-Up**
2 **Presentation concerning the Interstate project?**

3 A. Yes, we have.

4 Q. **When was the July 2012 Follow-Up Analysis first available to you?**

5 A. In early July 2012.

6 Q. **Have you been able to consider whether there is anything in that July 2012 Follow-**
7 **Up Analysis that should alter the essential conclusions of the ICF Report?**

8 A. Yes, we have.

9 Q. **And what have you determined on that point?**

10 A. The July 2012 Follow-Up Analysis, and the July 2012 Follow-Up Presentation
11 corroborate the 2011 Updated Needs Report and the ICF Report's conclusions that:

- 12 • In the absence of Interstate, there are thermal overloads under contingency
13 conditions in Southern New England.
- 14 • Interstate resolves these violations.
- 15 • That even with large reductions in demand due to greater amounts of passive
16 demand resources, violations remain.
- 17 • Interstate is an appropriate solution to the identified violations.

18

1 **Q. Was there any fundamental change in the methodology that ISO-NE employed to**
2 **assess the need for the Interstate Project in the 2011 Updated Needs Assessment and**
3 **that which it used in the July 2012 Follow-Up Analysis?**

4 A. No. However, although we have not had the opportunity to conduct a detailed study
5 using the new updated ISO-NE power flow cases, our conclusion is that there are two
6 main differences between our work and the latest ISO-NE study. First, the July 2012
7 Follow-Up Analysis has similar net demand levels at the end of the planning period as
8 ICF, i.e., within a few percent in southern New England, but arrives at this net demand
9 differently: ISO-NE effectively assumes that the incremental demand resources contained
10 in ICF's Reference DR Case are in place as part of its baseline assessment rather than as
11 a NTA. Importantly, both ICF and ISO-NE found that there were violations that the
12 incremental passive demand resources did not eliminate. Second, the July 2012 Follow-
13 Up Analysis did not analyze supply NTAs. However, the ICF report analyzed supply
14 NTAs, and still did not identify a practical NTA.⁵

15
16 **Q. In addition to the change in the approach to modeling future energy efficiency**
17 **measures, does the July 2012 Follow-Up Analysis include any important assumptions**
18 **that are different than those used in the 2011 Updated Needs Analysis?**

19 A. No. There are other assumptions that while they have changed do not appear to be
20 significant enough to change our conclusions. They include:

- 21 • Analysis of 2022 rather than 2020
- 22 • More retirements including Salem Harbor in the baseline

⁵ As discussed later, July 2012 Follow-Up Analysis did not examine incremental active DR, but ICF did and still found no practical NTA.

- 1 • Changes in demand that nonetheless still result in similar net demand levels

2
3 **Q. Has ICF been able to run additional power-flow analyses of potential NTA's using**
4 **the new approach and assumptions of the *July 2012 Follow-Up Analysis*?**

5 A. No.

6
7 **Q. Without the benefit of additional power flow analyses, are you able to estimate**
8 **whether utilization of ISO-NE's new methodology and assumptions for determining**
9 **need would make a significant difference in your conclusion that there are not**
10 **practical and feasible non transmission alternatives to the Interstate Reliability**
11 **Project?**

12 A. Yes. As explained above, we do not believe, subject to the caveat that we have not had
13 time to conduct detailed load flows, that ISO-NE's changes in assumptions and
14 methodology would make a significant difference to our conclusion that there are not
15 practical and feasible NTAs to Interstate.

16
17 **Q. Does that conclude your testimony?**

18 A. Yes.