NPCC 2012 New England Annual Interim Review of Resource Adequacy

ISO New England Inc.

Approved by RCC on November 27, 2012

1. Executive Summary

This report is ISO New England's 2012 annual assessment (Interim Review) of its 2011 Comprehensive Review of Resource Adequacy, which covers the time period of 2012 through 2016. This Interim Review is conducted to comply with the Reliability Assessment Program (RAP) as established by the Northeast Power Coordinating Council (NPCC). It follows the resource adequacy review guidelines as outlined in the *NPCC Regional Reliability Directory #1 Appendix D, Basic Criteria for Design and Operation of Bulk Power System.*

Results of this Interim Review show that New England will comply with the NPCC resource adequacy reliability criterion under both the reference and the high demand forecasts for the study period 2013 through 2016. Tables E1 and E2 summarize the Loss of Load Expectation (LOLE) for the study years for the demand forecast scenarios simulated under two sets of capacity resource conditions.

Table E1 LOLE under Reference Demand Forecast

Year	2011 Comprehensive Review (Days/Year)	2012 Interim Review (Days/Year)	
		Based on Capacity Market Obligation	Based on Installed Resource Seasonal Rating
2013	0.012	0.019	0.000
2014	0.005	0.014	0.001
2015	0.044	0.040	0.011
2016	0.067	information available in February 2013	0.018

Table E2 LOLE under High Demand Forecast

Year	2011 Comprehensive Review (Days/Year)	2012 Interim Review (Days/Year)	
		Based on Capacity Market Obligation	Based on Installed Resource Seasonal Rating
2013	0.024	0.032	0.001
2014	0.014	0.026	0.002
2015	0.083	0.071	0.024
2016	0.140	information available in February 2013	0.039

To ensure resource adequacy for the region, ISO New England identifies the amount and locations of resources the system needs and meets these needs in the short term through the Forward Capacity Market (FCM). Forward Capacity Auctions (FCA) have been successfully conducted to procure an adequate amount of resources to cover the resource needs of the New England system through the year 2015/16[1].

[1] A capacity commitment period of 20xx/yy refers to a period from June 1, 20xx through May 31, 20yy.

The Forward Capacity Auction for the 2016/17 year will be conducted in February 2013. Given that the current level of installed capacity in the region is much higher than the Installed Capacity Requirement (ICR) identified for 2016/17, it is expected that ISO New England will be able to purchase the adequate amount of resources to meet the 2016/17 resource needs in the upcoming auction.

The resources procured by ISO New England through FCM assume a capacity supply obligation (CSO), and must be available in the specified timeframe to provide energy and reserve for the system. Other resources that do not have a capacity supply obligation can also participate in the energy and reserve markets to serve New England load and provide reserve. For this Interim Review, resource adequacy is assessed under two sets of resource assumptions: 1) using capacity supply obligations resources assumed under Forward Capacity Market; and 2) using the seasonal ratings of the existing and planned resources in the system.

2. Introduction

This is the first update of New England's 2011 Comprehensive Review of Resource Adequacy, which was approved by NPCC in November 2011. Since the approval of the 2011 Comprehensive Review, ISO New England has conducted additional comprehensive resource adequacy assessments as part of its Regional System Planning (RSP) process. The major assumptions of this Interim Review are consistent with those used for the most recent RSP, RSP12[2].

3. Assumptions Changes

3.1 Resource

Table 1 compares resource assumptions between the two reviews. In the 2011 Comprehensive Review, the then known resources with capacity supply obligations were used for 2013 and 2014, and the same set of resources for 2014 (except for capacity imports that were adjusted down to include only the grand-fathered contracts) was used for both 2015 and 2016. In this Interim Review, two sets of resource assumptions are used to simulate the system LOLE. As shown in Table 1, the first set of resource assumptions is based on "Capacity Market Obligation" that reflects the known CSOs resources assume under FCM. Since the FCA for 2016 will occur in February 2013, no simulation was conducted for 2016. The other set of resource assumptions is based on "Installed Resource Seasonal Rating", which includes all the existing and planned resources, and capacity imports, and uses their seasonal ratings as reported in the ISO New England *2012–2021 Forecast Report of Capacity, Energy, Loads, and Transmission* (2012 CELT Report)[3].

In recent years, the New England states have made energy efficiency (EE) a priority for the region, and the New England state-sponsored EE programs have grown to unprecedented levels. The Forward Capacity Market provides ISO New England with information about the commitments to deliver EE (also known as passive demand resources) to the region over a four-year period into the future. Historically, ISO New England held this level of EE constant when analyzing future years beyond the FCM timeframe. Thus, no incremental growth in EE was forecasted beyond the latest known amounts of FCM passive demand resources. The levels of state-sponsored EE investments and the magnitude of EE programs

[2] http://www.iso-ne.com/committees/comm_wkgrps/prtcpnts_comm/pac/mtrls/2012/sep132012/index.html

[3] *http://www.iso-ne.com/trans/celt/report/2012/2012_celt_report.pdf*

prompted ISO New England and the region's energy-efficiency stakeholders to develop an EE forecast for 2015 through 2021. The results of the EE forecast for 2016 were incorporated in the LOLE assessment under the "Installed Resource Seasonal Rating" assumption set.

Table 1 - Resources[4] Assumptions Comparison (Summer Ratings)

Year	2011 Comprehensive Review (MW)	2012 Interim Review (MW)			
		Capacity Market Obligation	Difference	Installed Resource Seasonal Rating	Difference
2013	33,362	33,347	-15	36,501	3,139
2014	34,395	34,348	-47	36,658	2,263
2015	32,886	33,760	574	35,398	2,512
2016	32,664	information available in February 2013	-	35,384	2,720

3.2 Load

The RSP11 load forecast was used in the 2011 Comprehensive Review, while this Interim Review uses the RSP12 forecast. The forecasts for annual energy and the winter peaks for these two load forecasts are not materially different. However, the RSP12 forecast for summer peak demand is lower than the RSP11 forecast, ranging from 760 MW in 2013 to 375 MW in 2016, as shown in Tables 2. Table 3 compares the peak demand forecast under a high economic growth scenario between these two reviews, which shows a similar trend. The changes are mainly a result of the updated economic forecast, which reflects (1) the recent recession ending in 2009, followed by weak economic growth beginning in 2010, and (2) a projected moderate rebound in 2014 through 2016, followed by sustained economic growth. This year's forecasts also incorporate the expected effects of federal energy-efficiency standards for appliances and commercial equipment, which will go into effect in 2013, and the historical energy-efficiency savings.

Table 2 - Reference Peak Load Forecast Comparison

Year	2011 Comprehensive Review (MW)	2012 Interim Review (MW)	Difference (MW)
2013	28,525	27,765	-760
2014	28,970	28,275	-695
2015	29,380	28,840	-540
2016	29,775	29,400	-375

[4] Resources include internal generating units, demand-side resources and capacity imports.

Table 3 - High Load Forecast Comparison

Year	2011 Comprehensive Review (MW)	2012 Interim Review (MW)	Difference (MW)
2013	29,085	28,200	-885
2014	29,645	28,815	-830
2015	30,150	29,470	-680
2016	30,635	30,110	-525

3.3 Interface Limits

The same sub-area representation is used in these two reviews. The transmission interface limits used in the 2011 Comprehensive Review were based on RSP11 assumptions, while RSP12 assumptions are used in this Interim Review. Table 4 shows the transmission transfer limits used for both reviews. The differences are mainly due to changes of in-service dates of proposed transmission upgrades.

Table 4 - Major Transmission Interface Limits Assumed in the 2011 & 2012 Reviews (MW)

Interface	Limit assumed in 2011 Comprehensive Review (MW)	Limit assumed in 2012 Interim Review (MW)
New Brunswick to New England	700	700
Orrington South	1,200	1,200
Surowiec South	1,150	1,150
Maine – NH	1,600 1,575 (2015) 1,550 (2016)	1,600
North to South	2,700	2,700
Boston Import	4,900 4,850 (2014)	4,900 4,850 (2014)
SEMA Export	No Limit	No Limit
SEMA / RI Export	3,000 3,300 (2016)	3,000 3,300 (2016)
East to West	2,800 3,500 (2016)	2,800 3,500 (2017)
Connecticut Import	2,500 2,600 (2014) 3,400 (2016)	2,500 2,600 (2014) 3,400 (2017)
Southwestern CT Import	3,200	3,200
Norwalk / Stamford Import	1,650	1,650
New York/New England (Summer/Winter)	1,400/1,875	1,400/1,875
HQII Import	1,400	1,400
Highgate Import	200	200
Cross Sound Cable	0	0

3.4 Unit Availability

Table 5 compares the weighted average EFORd assumptions used in the 2011 Comprehensive Review and this Interim Review. Overall, the system weighted average EFORd for generating capacity assumed

in this review has slightly increased as compared to the 2011 review assumptions.

Table 5 - Change In EFORd Assumptions – Weighted Averages

Unit Type	2011 Comprehensive Review EFORd (%)	2012 Interim Review EFORd[5] (%)
Fossil	6.9	8.9
Combined Cycle	4.1	3.6
Diesel	6.8	6.9
Jet	7.6	8.7
Nuclear	1.8	2.4
Hydro	3.5	3.3
Others	14.4	15.6
System	4.9	**5.5**

3.5 Fuel Supply Diversity

In New England, different types of generators provide capacity and generate electric energy using a variety of fuels, including natural gas, nuclear, coal, oil, hydroelectric, and several types of renewable resources. One of the main risks to system reliability is that the region has become highly dependent on natural gas to generate electricity and provide reserves. New England has faced challenging operating conditions resulting from the actual or anticipated unavailability of the region's gas-fired generating capacity or energy production. During the winter when peak natural gas use occurs for space heating, the local distribution companies (LDCs) exercise their firm pipeline (and storage) entitlements to service their core customers and satisfy the space heating needs of residences and businesses, which could leave most of the single-fuel, gas-only power plants without a fuel source to generate electricity. Additionally, at any time during the year, the loss of a major pipeline or compressor station, due to forced outages or maintenance for example, could temporarily constrain pipeline capacity and limit service to non-firm customers in New England. Market conditions under which generating units could not capture volatile intraday gas pricing in their wholesale electricity market offers create a disincentive for generators to use their nominated gas for electric power generation and thus allow them to profit more from selling their gas transportation and supply into the gas market than using the gas to generate electricity.

ISO New England has started working with stakeholders through its Strategic Planning Initiative to address the region's fuel diversity needs, especially the risks related to increased reliance on natural gas-fired capacity. ISO New England has identified a set of solutions to pursue with stakeholders. These include long-term changes to the Forward Capacity Market and Forward Reserve Market to create better incentives for generators to perform in accordance with their operating characteristics. Generators may achieve this performance by adding dual-fuel capability and making alternative fuel arrangements, such as investing in oil inventory, or entering into firm gas transportation contracts. The latter may, in turn, encourage pipeline expansion, thereby addressing current pipeline limitations.

[5] http://www.iso-ne.com/committees/comm_wkgrps/relblty_comm/pwrsuppln_comm/mtrls/2012/sep62012/2013ara3_2014ara2_2015ara1_icr_values_pspc9-06revised.pdf

In the short-term, ISO New England continues to leverage experience from operating events in the past years, including adverse weather and decreased availability of liquefied natural gas supply, to minimize the adverse reliability consequences of fuel-shortage events. In addition, ISO New England has also indentified a set of market- and information- based solutions with proposed implementation targets within the next few years, which includes 1) a supplemental procurement mechanism to assure appropriate levels of firm fuel capability for the existing gas and oil fleet; 2) market rule changes to allow generators to modify their offers to recover their costs of acquiring fuel intra-day, and to align the timing of electricity market with the gas market; 3) information enhancements to allow ISO New England to obtain information from the generators regarding their fuel schedule and differences between cleared amounts and scheduled fuel supply, thus improving the system operator's ability to assess the likelihood that generators will fail to accurately follow dispatch requests.

3.6 Impacts of Environmental Emission Regulations

The development and implementation of several major EPA and regional environmental regulations, including those addressing ambient air quality, greenhouse gases (such as carbon dioxide), air toxics, and cooling water, are raising various issues that ISO New England is evaluating and addressing through studies and planning processes pursuant to its tariff and in consultation with stakeholders.

Environmental regulations could materially affect various electric power generators beginning in this year and continuing through 2020, when many affected facilities are required to come into compliance. EPA estimates show that, when finalized, these regulations could affect a significant amount of installed fossil-fueled capacity and, in the case of cooling water, nuclear capacity across the region. Compliance with upcoming environmental regulations, in some cases, will entail significant capital investment for retrofitting facilities with post-combustion control devices, closed-cycle cooling systems, or fuel-switching equipment or for retiring electric generators. ISO New England estimated that, in total, these regulations would affect over 12.1 GW of installed capacity across New England.

The aggregate impact of these regulations for many of the affected generators will be greater operations, maintenance, and capital costs. These increased costs will result from new emissions allowances, new pollutant controls, increased waste disposal, and unit conversions to allow the use of cleaner fuels, such as natural gas. These environmental regulations also may affect system reliability by limiting generator energy production, reducing capacity output, or hastening generator retirements. Many generators in New England either have retrofits in place or are planning retrofits to comply with environmental rules. ISO New England will continues to monitor the evolving environmental regulations and evaluate both the likelihood of future compliance activities and the potential retirements of generating units.

3.7 Others

The interconnection benefits from neighboring Areas are considered in both assessments. Since the 2011 Comprehensive Review, ISO New England has conducted additional tie benefit studies to identify the amount of tie reliability assistance New England can rely on from its neighbors for resource adequacy studies. Table 6 summarizes the tie benefit assumptions for these two reviews.

Table 6 – Assumed Tie Benefits from Neighboring Areas (MW)

Year	2011 Comprehensive Review	2012 Interim Review
2013	1,700	1,828[6]
2014	1,689	1,689[7]
2015	1,676	1,676[8]
2016	1,676	1,870[9]

Other assumptions for these two reviews are consistent with each other.

4. RESULTS

Tables 7 and 8 summarize the New England system LOLE results for the scenarios investigated within this Interim Review and those from the 2011 Comprehensive Review. The differences in the results of the two reliability reviews can be attributed to the differences in assumptions used for each review as previously outlined.

The LOLE results indicate that New England's forward capacity market has procured adequate resources for years 2013 to 2015, and the existing and planned resources in the region are expected to be adequate to satisfy reliability requirements for the year 2016.

Table 7 – LOLE Under Reference Demand Forecast

Year	2011 Comprehensive Review (Days/Year)	2012 Interim Review (Days/Year)	
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[6] http://www.iso-ne.com/committees/comm_wkgrps/relblty_comm/pwrsuppln_comm/mtrls/2012/jul312012/2013ara3_tie_benefits_pspc_07312012.pdf

[7] http://www.iso-ne.com/committees/comm_wkgrps/relblty_comm/relblty/mtrls/2011/jan182011/index.html

[8] http://www.iso-ne.com/committees/comm_wkgrps/relblty_comm/pwrsuppln_comm/mtrls/2011/sep152011/index.html

[9] http://www.iso-ne.com/committees/comm_wkgrps/relblty_comm/pwrsuppln_comm/mtrls/2012/jun142012/2016_fca_tie_benefits_study.pdf

Table 8 – LOLE Under High Demand Forecast

Year	2011 Comprehensive Review (Days/Year)	2012 Interim Review (Days/Year)	
		Based on Resource Market Obligation	Based on Installed Resource Seasonal Rating
2013	0.024	0.032	0.001
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5. Conclusion

Results of this Interim Review show that New England will comply with the NPCC resource adequacy reliability criterion under both the reference and the high demand forecasts for the study period 2013 through 2016.