

**NEW ENGLAND 2004
INTERIM REVIEW
OF
RESOURCE ADEQUACY**



Approved by the RCC March 9, 2005

NEW ENGLAND 2004 INTERIM REVIEW OF RESOURCE ADEQUACY

EXECUTIVE SUMMARY

This is ISO New England's 2004 Annual Interim Assessment of its 2002 Area Review of Resource Adequacy covering 2005 through 2007. This assessment is conducted to comply with the Reliability Assessment Program established by the Northeast Power Coordinating Council (NPCC). This assessment follows the resource adequacy review guidelines as outlined in the NPCC B-8 Document "Guidelines for Area Review of Resource Adequacy."

The review utilized General Electric's Multi-Area Reliability Simulation (GE MARS) program reliability program to assess resource adequacy of the New England Power Pool (NEPOOL) system. Results of this interim assessment show that New England will comply with the NPCC resource adequacy reliability criterion under the Reference and High Load Forecasts. However, resources from the Request for Proposal (RFP) for Southwestern Connecticut (SWCT) emergency capability are needed to ensure the operational reliability of the Southwestern Connecticut area.

INTRODUCTION

This is the second update of the New England 2002 Triennial Review of Resource Adequacy, which was approved in November 2002. The first interim review was approved in November 2003. Since the approval of the 2003 interim review, ISO New England has conducted a comprehensive resource adequacy assessment as part of the Regional Transmission Expansion Plan, 2004 (RTEP04). The major assumptions of this interim review are consistent with those used for the RTEP04 assessment.

ASSUMPTION CHANGES

Resources

The 2002 Triennial Review assumed a total installed capacity of 33,292 MW. This value assumed a total of 5,984 MW of cumulative new capacity additions by the year 2004. As of September 2004, 5,448 MW of that has been placed into commercial operation. The remaining 536 MW has stopped construction and is no longer assumed to be in-service for the Base Case Scenario. Since the 2002 Triennial Review, approximately 800 MW assumed available is no longer included in the Base Case of the 2004 Interim Review.

In the 2002 Triennial Review, the deactivation of Devon Units 7, 8 and 10 (a total of 231 MW) was modeled as a sensitivity scenario. In this review, the sensitivity scenario assumes that Devon 7 & 8¹, New Boston 1, Kendall Steam 1-3, Kendall Combustion Turbine, and Salem Harbor (1,492 MW) are all deactivated or retired from the system in 2006.

¹ Devon 10 retired in late 2002 and is not considered available in the 2004 interim review.

NEW ENGLAND 2004 INTERIM REVIEW OF RESOURCE ADEQUACY

The installed capacity of the 2002 Review and this Interim Review is illustrated in the following table.

Table 1. Installed Capacity² Comparison

Year	Base Case		Sensitivity Case	
	2002 Triennial Review (MW)	2004 Interim Review (MW)	2002 Triennial Review (MW)	2004 Interim Review (MW)
2005	33,292	31,841	33,067	31,841
2006	33,292	31,841	33,067	30,348
2007	33,292	31,841	33,067	30,348

Load

Tables 2 and 3 compare the New England peak load forecasts for the 2002 Triennial Review and this review.

As shown in Table 2, the reference annual peak loads used in the 2004 Interim Review are about 660 to 860 MW higher than the corresponding values used in the 2002 Triennial Review. The difference is mainly a result of the updated load forecast parameters used for the forecast process, including both economy and weather.

Table 2. Reference Peak Load Forecast Comparison

Year	2002 Triennial Review (MW)	2004 Interim Review (MW)	Difference (MW)
2005	25,443	26,305	862
2006	25,817	26,570	753
2007	26,159	26,815	656

As shown in Table 3, the annual peak loads associated with the High Load Forecast for this interim review are approximately 330 to 880 MW higher than those assumed in the 2002 review. Similar to the increase in the reference loads, this is mainly a result of the updated load forecast parameters used for the forecast process, including both economy and weather.

Table 3. High Load Forecast Comparison

Year	2002 Triennial Review (MW)	2004 Interim Review (MW)	Difference (MW)
2005	27,054	27,935	881
2006	27,629	28,220	591
2007	28,152	28,485	333

² Installed capacity values include assumed net firm purchases and sales and accounts for total unit additions and attrition.

NEW ENGLAND 2004 INTERIM REVIEW OF RESOURCE ADEQUACY

Interface Limits

The sub-area representation modeled in this 2004 Interim Review is consistent with the 2002 Triennial Review. However, the transfer capabilities of some interfaces have changed to reflect improvements made to the transmission system. Table 4 compares the interface limits used for these two studies.

Table 4. Change In Interface Limits³

Interface or Interface Group	2002 Triennial Review (MW)	2004 Interim Review (MW)	Explanation for Change
Boston Import	3,500 3,600 (Jan 2006)	3,600 4,500 (Jan 2006)	Existing and scheduled system upgrades
SEMA Export	1,450	No limit	System upgrades
SEMA/RI Export	2,200	3,000	System upgrades
East to West	2,100	2,400	System upgrades
Connecticut Import	2,500	2,200	2,500 MW values used in 2002 was based on temporary system configuration
Southwestern CT Import	1,850 2,150 (May 2004)	2,000 2,550 (Jan 2006)	Further analysis; Scheduled system upgrade
Norwalk/Stamford Import	1,100	1,100 1,300 (Jan 2006)	Scheduled system upgrade
New York/New England	1,400 (summer) 1,700 (winter)	1,225 (summer) 1,475 (winter)	New operating studies
Highgate Import	225	210	Load increase on HQ system
New Brunswick-New England	700	700 1,000 (Jan 2007)	Scheduled system upgrade
Orrington South	1,050	1,050 1,200 (Jan 2007)	Scheduled system upgrade

In both the 2002 review and this Interim Review, the Cross Sound Cable interconnection with New York was not modeled.

Unit Availability

Since the 2002 Triennial Review, the Equivalent Forced Outage Rates (EFOR) assumed for the generating units in New England have decreased. The decrease is due to the different years of historical operating data used to calculate the rates of these units. In the 2002 Review, historical

³ Only those interfaces having limit changes are included in this table.

NEW ENGLAND 2004 INTERIM REVIEW OF RESOURCE ADEQUACY

operating data from 1997 to 2001 was used. For this Interim Review, historical operating data from 1999 to 2003 was used. As was described in the 2001 Generator Unit Availability Study⁴ conducted by ISO-NE in June 2001, generating unit availability has been improving since the beginning of the market environment introduced in 1999. The decrease in unit EFORs is due to this positive environment.

For informational purposes, Table 5 below compares the average EFOR, weighted by unit size, assumptions used in the 2002 Review with those used for the 2004 Review. In the modeling of the system, each resource was modeled with a calculated EFOR based on its historical operating data.

Table 5. Change In Unit EFOR Assumptions – Weighted Averages

Unit Type	2002 Triennial Review EFOR (%)	2004 Interim Review EFOR (%)
Fossil	8.28	5.76
Combined Cycle Installed Pre-1999	5.19	1.31
Diesel	4.21	2.23
Jet	3.25	3.26
Nuclear	5.90	2.66
Hydro	0.83	0.93

The table above does not include information for combined cycle units added to the New England power system since 1999. Due to the lack of operating history on these units, unit maturity rates were calculated from available information and applied for these generators for their first years of operation.

Table 6 below compares the unit maturity EFOR assumptions assumed for these units.

Table 6. Change In Unit EFOR Assumptions

Year of Operation	2002 Triennial Review EFOR (%)	2004 Interim Review EFOR (%)
1 st Year	14.46	13.30
2 nd Year	7.92	5.14
3 rd Year	4.78	2.32
4 th and 5 th Year	4.49	4.49

Others

Other assumptions for these two reviews are consistent, or the impacts on the reliability results are negligible.

⁴ http://www.iso-ne.com/special_studies/2001/Understanding_New_England_Generating_Unit_Availability.pdf

NEW ENGLAND 2004 INTERIM REVIEW OF RESOURCE ADEQUACY

Fuel Supply Diversity

An important aspect of regional system planning for reliability is the degree of diversity and dependency on specific fuels for energy supply. ISO New England has conducted various assessments regarding fuel dependency. Given that New England generators are becoming more dependent on natural gas as a fuel source, the assessments particularly focus on issues relating to the ability of the gas pipeline infrastructure to supply the energy needs of New England. Results of these assessments indicate that New England's increasing reliance upon natural gas-fired generating units has potentially negative system-wide impacts, particularly during the winter season.

Issues surrounding generator natural gas supply and delivery is a growing concern in New England during the winter season. Although natural gas supplies within New England are projected to be adequate during the upcoming winter periods, extreme weather can impact the regional supply and delivery infrastructures. As experienced by New England last winter during the January 14-16, 2004 cold snap, extreme winter weather drove up demand for natural gas. This increase in demand caused an abnormal number of gas units to report gas and unit availability problems. It was observed that, at the time of last year's winter peak demand, approximately 7,200 MW of gas capable capacity was unavailable. To avoid or mitigate this potential capacity shortage in future winter periods, ISO New England and market participants took the following actions that will result in up to 2,000 MW of capacity being available that was not available during the January 2004 cold snap:

- Establishment of an ISO/Gas Pipeline Operating Committee to improve near term planning, coordination of maintenance, and planning of pre-cold snap type operations on both the electric and gas pipeline systems.
- Establish mechanisms for cold snap periods that would trigger:
 1. Elimination or cancellation of generator outages taken for economic reasons (i.e. fuel arbitrage);
 2. Efficient switching to alternative fuels for dual fueled units; and
 3. Unit commitment processes allowing generators to obtain the information needed to procure the fuel requirements necessary to meet their energy obligations.

In summary, ISO New England is concerned with issues relating to fuel supply and is actively reviewing associated reliability impacts on the bulk power system to make sure that system reliability would not be compromised due to fuel supply issues.

New Market Rules

In late 2003, ISO-NE along with the New England Transmission Owners submitted to the Federal Energy Regulatory Commission (FERC) the documents necessary to create a Regional Transmission Organization (RTO) for New England. Conditional approval was granted in a March 2004 order which directed the parties to develop a more comprehensive seams agreement with the neighboring New York Independent System Operator (NYISO). In recent months, the FERC issued an order accepting a settlement and compliance filing resolving a number of key issues stemming from the March order and also accepted a 50 basis point (0.5%) rate of return on equity adder applicable to Regional Network Service under the ISO-NE's open access

NEW ENGLAND 2004 INTERIM REVIEW OF RESOURCE ADEQUACY

transmission tariff. The Commission rejected the same adder as it would apply to the transmission owners' local service schedules.

In the past year, the FERC has ordered the implementation of a Locational Installed Capacity (LICAP) market, effective on January 1, 2006. LICAP will differentiate the value of resources based on their location. In addition, the LICAP market will utilize a downward-sloping demand curve to price capacity in each ICAP region. As a result, prices for capacity will increase to a capped level as shortage conditions occur and gradually decrease to zero with surplus capacity. This design of the demand curve will improve the stability of LICAP prices. The introduction of LICAP should help provide the appropriate price signals to encourage investments in new and existing demand and supply resources in load pockets and congested zones.

To address the lack of a market signal for "quick-start" resources, ISO New England introduced a Forward Reserve Market in December 2003 that essentially secures on-peak operating reserves for the winter and summer seasons. Furthermore, the 2005-2006 Wholesale Markets Plan includes the development and implementation of the Ancillary Services Market that will have a locational reserve requirement for 30-minute operating reserve. ISO New England is currently planning to implement its Ancillary Services Market in 2005. The Ancillary Services Market will enable dispatchable loads as well as generating resources to participate in the real-time energy dispatch and to provide ancillary services.

RESULTS AND CONTINGENCY PLAN

Tables 7 through 10 summarize the New England system Loss of Load Expectation (LOLE) results for the scenarios investigated in the 2004 Review and compares them with the reference and sensitivity case results from the 2002 Review. The difference in the results of the two reviews can be attributed to the difference in assumptions used for each Review as outlined previously. These changes include system capacity, load, and transmission system constraints. Tables 7 through 10 indicate that, under the Reference and High Load Forecasts, New England is in compliance with the NPCC criterion.

Table 7. Base Case LOLE With Reference Load Forecast

Year	2002 Triennial Review (Days/Year)	2004 Interim Review (Days/Year)
2005	0.000	0.004
2006	0.000	0.009
2007	0.003	0.009

Table 8. Sensitivity Case LOLE With Reference Load Forecast

Year	2002 Triennial Review (Days/Year)	2004 Interim Review (Days/Year)
2005	0.002	0.004
2006	0.003	0.021
2007	0.006	0.025

NEW ENGLAND 2004 INTERIM REVIEW OF RESOURCE ADEQUACY

Table 9. Base Case LOLE With High Load Forecast

Year	2002 Triennial Review (Days/Year)	2004 Interim Review (Days/Year)
2005	0.007	0.004
2006	0.015	0.011
2007	0.033	0.013

Table 10. Sensitivity Case LOLE With High Load Forecast

Year	2002 Triennial Review (Days/Year)	2004 Interim Review (Days/Year)
2005	0.016	0.004
2006	0.041	0.028
2007	0.082	0.042

Detailed results of the LOLE simulation indicate that the southwestern Connecticut areas (SWCT and NOR sub-areas) contribute most to the system risk. This is due to the fact that overall capacity margins are low within these areas and they are at higher risk of load loss events. In order to mitigate this risk, a request for proposals (RFPs) was issued and agreements to secure emergency energy resources have been made. The resources will provide approximately 125 MW of additional capacity beginning June 1, 2004 and up to 255 MW by the summer of 2007 from demand response resources, including both emergency generation and reductions in electricity use, and from conservation resources.

CONCLUSION

New England will meet the NPCC Resource Adequacy Criterion under Base and Sensitivity Case assumptions. Most of the system risk of load loss comes from the Southwestern Connecticut areas, which has a small margin of available capacity to supply their own load, and a constrained transmission capability to import power from the rest of the system. To temporarily improve reliability in Southwestern Connecticut, ISO New England issued a Request for Proposals on December 1, 2003 to solicit up to 300 MW of additional resources for SWCT over the period 2004 to 2007. This will act as a temporary solution to the resource situation in the area until the Southwest Connecticut Reliability Project (Phase I and II) is in-service.