

**BRIEF SUMMARY**  
**NEPOOL Tie Reliability Benefits Study 2003**  
**February 26, 2003**

**1. Study Assumptions**

**1.1 New England Assumptions**

○ **Generation**

The capacity assumptions are modeled the same as the Base Case assumptions as defined in the RTEP02 report<sup>1</sup>, with the exception that Devon 7, 8 and 10 were deactivated, and New Boston Unit 1 and Meriden Power are assumed unavailable.

**Table 1. NEPOOL Sub-Area Capacity Summary for Year 2003**

<b>Sub-Area</b>	<b>MW</b>
BHE	858
ME	1,090
S-ME	1,522
NH	3,993
VT	854
BOSTON	3,873
CMA-NEMA	244
WMA	3,675
SEMA	3,350
RI	5,414
CT	4,361
SWCT	1,998
NOR	462
<b>NEPOOL</b>	<b>31,694</b>

○ **Transmission Interfaces**

Several sets of interface transfer limits between the NEPOOL sub-areas are used for the study. They include:

- **As-Is** – all internal interface transfer limits are consistent with RTEP02 Base Case for the year 2003, as shown in Table 2.
- **SWCT Import Relaxed to 2,150 MW** – SWCT Import interface limit is relaxed from 1,850 MW to 2,150 MW, and all other interface limits remain the same as RTEP02 Base Case.

<sup>1</sup> Reference to: [http://www.iso-ne.com/transmission/Regional\\_Transmission\\_Expansion\\_Plan/RTEP\\_2002](http://www.iso-ne.com/transmission/Regional_Transmission_Expansion_Plan/RTEP_2002)

- **SWCT & Norwalk/Stamford Import Relaxed to 2,950 MW and 1,500 MW** – SWCT Import interface limit is relaxed from 1,850 MW to 2,950 MW, Norwalk/Stamford Import interface limit is relaxed from 1,100MW to 1,500MW, and all other interface limits remain the same as RTEP02 Base Case.
- **SWCT & Norwalk/Stamford Import Relaxed to 2,950 MW and 1,500 MW, CT Import Relaxed to 2,950MW** – SWCT Import interface limit is relaxed from 1,850 MW to 2,950 MW, Norwalk/Stamford Import interface limit is relaxed from 1,100MW to 1,500MW, CT Import interface limit is relaxed from 2,500MW to 2,950MW, and all other interface limits remain the same as RTEP02 Base Case.
- **Without Constraints** – there are no internal constraints between the sub-areas within NEPOOL, and NEPOOL is modeled as a single area.

**Table 2. RTEP02 Transmission Interface Transfer Limits for Base Case**

<b>Interface or Interface Group</b>	<b>Interface Limit (MW)</b>
Orrington South	1,050
Surowiec South	1,150
Maine – NH	1,400
North to South	2,700
Boston Import	3,500
SEMA Export	1,450
SEMA / RI Export	2,200
East to West	2,100
Connecticut Import	2,500
Southwestern CT Import	1,850
Norwalk / Stamford Import	1,100

- **Loads**

The hourly loads for the NEPOOL sub-areas are consistent with RTEP02.

**Table 3. NEPOOL Peak Loads for Year 2003 (Based on RTEP02)**

<b>Summer Peak (MW)</b>	<b>Winter Peak (MW)</b>
24,760	21,760

## 1.2 Other NPCC Control Areas Assumptions

The topologies of all other NPCC control areas (Maritimes, Hydro Quebec, Ontario, and New York) are consistent with the *NEPOOL Tie Reliability Benefits Study 2002*. Their capacity and load conditions are modeled in two scenarios.

- **As-Is Scenario**

In this scenario, the capacity and loads of Maritimes, Hydro Quebec, Ontario, and New York control areas are modeled as their current conditions, based on the latest available data.

- **At-Criteria Scenario**

In this scenario, the loads of Maritimes, Hydro Quebec, Ontario, and New York control areas are adjusted so that the reserve margins are at their planning criteria. For Maritimes, Hydro Quebec and New York control areas, the required reserve margins are based on their latest *NPCC Triennial Review of Resource Adequacy*. For Ontario, the weekly required reserve margins specified in *IMO 18-Month Outlook* are used.

Table 4 shows the summary of capacity and loads of other NPCC control areas for the study.

**Table 4. Capacity and Loads of Other NPCC Control Areas**

Control Area	System Condition	Installed Capacity (MW)	Peak Load (MW)	Reserve Margin (%)
Maritimes	As Is	6,049	4,629	31%
	At Criteria	5,555	4,629	20%
Hydro Quebec	As Is	37,850	33,480	13%
	At Criteria	36,480	33,480	10%
New York	As Is	37,869	31,053	22%
	At Criteria	36,643	31,053	18%
Ontario	As Is	28,485	23,754	20%
	At Criteria	28,072	23,754	18%

### 1.3 NPCC Interconnection Assumptions

- **Transfer Limits**

The transfer limits between the NPCC control areas are modeled the same as *NEPOOL Tie Reliability Benefits Study 2002*, as shown in the following table.

**Table 5. NPCC Transfer Limits**

Interfaces	Interface Limit (MW)
New Brunswick to NE	700
New York / New England	1,400 (Summer) 1,700 (Winter)
HQII Import	1,500

- **Load Correlations**

All NPCC control area loads are correlated.

## 2. Study Methodologies

### 2.1 Calculation of NEPOOL Seasonal Tie Benefits

The NEPOOL Seasonal Tie Benefits include Summer Tie Benefits and Winter Tie Benefits. The Summer season runs from June to September, and the Winter season includes the rest of the months of the year. The Seasonal Tie Benefits are determined as follows.

**Step 1.** With all the NPCC control areas interconnected, the NEPOOL annual Loss of Load Expectation (LOLE) is brought to NEPOOL’s planning criterion, 0.1days/year, by proportionally scaling up the hourly loads of all NEPOOL sub-areas, while other NPCC control areas are modeled as either “As-Is” or “At-Criteria”. The NEPOOL seasonal LOLEs, Summer LOLE and Winter LOLE, are calculated by summing the monthly LOLE indexes for all the months of each season.

**Step 2.** NEPOOL is then isolated from the NPCC interconnected system. With the capacity and loads of NEPOOL the same as Step 1, a simulation is performed to determine the NEPOOL Summer LOLE and Winter LOLE on the isolated basis.

**Step 3.** The NEPOOL Summer Tie Benefits are the minimum MWs to bring the NEPOOL isolated Summer LOLE as determined in Step 2 to the interconnected Summer LOLE as determined in Step 1. The same methodology is applied to obtain the NEPOOL Winter Tie Benefits.

## **2.2 Calculation of Potential Seasonal Tie Benefits from Different Control Ares**

After the determination of Seasonal Tie Benefits, the Potential Seasonal Tie Benefits from adjacent control areas, Maritimes, Hydro Quebec and New York, will be calculated as follows.

**Step 1.** Instead of interconnecting all the NPCC control areas, only NEPOOL and the target control area are interconnected to each other, and the capacity and loads of NEPOOL and the target control area are maintained the same as Step 1 in the calculation of NEPOOL Seasonal Tie Benefits. Then, the NEPOOL seasonal LOLEs, Summer LOLE and Winter LOLE, are calculated by summing the monthly LOLE indexes for all the months of each season.

**Step 2.** NEPOOL is then disconnected from the interconnection with the target control area. With the capacity and loads of NEPOOL the same as Step 1, a simulation is performed to determine the NEPOOL Summer LOLE and Winter LOLE on the isolated basis.

**Step 3.** The Potential Seasonal Tie Benefits from the target control area are the minimum MWs to bring the NEPOOL isolated Seasonal LOLEs as determined in Step 2 to the interconnected Seasonal LOLEs as determined in Step 1.

## **2.3 Allocation of Seasonal Tie Benefits**

The allocation of NEPOOL Seasonal Tie Benefits from the Maritimes, Hydro Quebec and New York control areas are based on the determined Potential Seasonal Tie Benefits from these areas. The formula is as follows.

Seasonal Tie Benefits from Target Control Area

$$\frac{(\text{NEPOOL Seasonal Tie Benefits}) * (\text{Potential Seasonal Tie Benefits from Target Control Area})}{(\text{Sum of the Potential Seasonal Tie Benefits from Maritimes, Hydro Quebec and New York})}$$

## **3. Study Cases**

The amount of tie reliability benefits from interconnections is a function of capacity and loads, as well as the interface transfer limits of all the interconnected areas. A number of study cases are set up to investigate the impact on the NEPOOL tie reliability benefits from the variation of the capacity, loads and interface transfer conditions of both NEPOOL and other NPCC control areas.

**Table 6. Study Cases Description**

<b>Study Case</b>	<b>NEPOOL Interface Assumptions</b>	<b>Other NPCC Control Areas Assumptions</b>
Case 1	As-Is	As-Is
Case 1a	As-Is	At-Criteria
Case 2	SWCT Interface Relaxed to 2,150MW	As-Is
Case 2a	SWCT Interface Relaxed to 2,150MW	At-Criteria
Case 3	SWCT Interface Relaxed to 2,950MW Norwalk/Stamford Interface Relaxed to 1,500 MW	As-Is
Case 3a	SWCT Interface Relaxed to 2,950MW Norwalk/Stamford Interface Relaxed to 1,500 MW	At-Criteria
Case 4	SWCT Interface Relaxed to 2,950MW Norwalk/Stamford Interface Relaxed to 1,500 MW CT Interface Relaxed to 2,950MW	As-Is
Case 4a	SWCT Interface Relaxed to 2,950MW Norwalk/Stamford Interface Relaxed to 1,500 MW CT Interface Relaxed to 2,950MW	At-Criteria
Case 5	Without Constraints	As-Is
Case 5a	Without Constraints	At-Criteria

#### 4. Study Results

- **NEPOOL Seasonal Tie Benefits**

**Table 7. Summary of Results for NEPOOL Seasonal Tie Benefits**

Study Case	Summer Tie Benefits (MW)	Winter Tie Benefits (MW)
Case 1	50	N/A
Case 1a	50	N/A
Case 2	1,400	N/A
Case 2a	1,400	N/A
Case 3	1,900	N/A
Case 3a	1,900	N/A
Case 4	2,988	N/A
Case 4a	2,900	N/A
Case 5	2,988	N/A
Case 5a	2,980	N/A

- **Potential Summer Tie Benefits from Maritimes, Hydro Quebec and New York**

**Table 8. Summary of Results for Potential Summer Tie Benefits**

Study Case	Maritimes (MW)	Hydro Quebec (MW)	New York (MW)
Case 1	50	50	50
Case 1a	50	50	50
Case 2	300	1,400	1,273
Case 2a	300	1,400	700
Case 3	300	1,415	1,273
Case 3a	300	1,415	760
Case 4	300	1,415	1,273
Case 4a	300	1,415	1,040
Case 5	300	1,415	1,273
Case 5a	300	1,415	1,200

- **Allocation of NEPOOL Summer Tie Benefits**

**Table 9. Summary of Results for the Allocation of NEPOOL Summer Tie Benefits**

Study Case	Total Tie Benefits (MW)	Maritimes (MW)	Hydro Quebec (MW)	New York (MW)
Case 1	50	17	17	17
Case 1a	50	17	17	17
Case 2	1,400	141	663	596
Case 2a	1,400	174	820	406
Case 3	1,900	191	900	809
Case 3a	1,900	230	1086	583
Case 4	2,988	300	1,415	1,273
Case 4a	2,900	316	1,489	1,095
Case 5	2,988	300	1,415	1,273
Case 5a	2,980	307	1,447	1,227

**5. ISO New England Proposed Tie Reliability Benefits Assumptions**

**Table 10. Proposed Tie Reliability Benefits**

	<b>June – September 2003 (MW)</b>	<b>October 2003 – May 2004 (MW)</b>
<b>New York</b>	600	N/A
<b>New Brunswick</b>	200	N/A

**6. ISO New England Proposed HQICC**

**Table 11. Proposed HQICC**

	<b>June – September 2003 (MW)</b>	<b>October 2003 – May 2004 (MW)</b>
<b>HQICC</b>	1,100	N/A