

Agenda Item 6.1

PSPC Meeting 271

January 14, 2010

Effects of Modeling Internal Transmission Constraints in Tie Benefit Study - Impact of Modeling Orrington South Export Constraints

Quan Chen/Peter Wong

Results Presented at the December 2009 PSPC Meeting (MW)

At the December 2009 PSPC meeting, the following tie benefit results, associated with modeling the Orrington South transmission constraint, were presented:

Impact of Orrington South Export constraint on Tie Benefits (MW) 2010/2011 Capability Year (ARA3 Data Base)

	Total TB	HQ	MT	NY
Without Internal Constraints	1560	788	657	115
with Orrington S. constraint only	1320	856	382	82

A question was raised regarding the tie benefits associated with the NY Control Area.

PSPC members could understand the trend associated with HQ and MT tie benefits but could not understand why tie benefits from NY would be lower when the Orrington South constraint is modeled.

Reviewing the Simulation Results

- ISO reviewed the simulation assumptions and results and discovered that:
 - The Cross Sound Cable was not removed when simulating the tie benefits from New York, thus resulting in lower tie benefits
 - The load model for New England does not reflect sub-area diversity
 - Does not impact total tie benefits but impacts the tie benefits contributions from the neighboring control areas.

Updated Results

Removing the Cross Sound Cable and modeling sub-area load diversity, the results of the simulations are as follows:

Impact of Orrington South Export constraint on Tie Benefits (MW)

	Total TB	HQ	MT	NY
Without Internal Constraints	1560	788	657	115
with Orrington S. constraint only	1320	806	373	141

Updated Results - Details

- Total tie benefits value calculated assuming only the Orrington South export constraints in New England, and by proportionally adjusting subarea resource/load to bring systems to criterion
 - $TB_{\text{Total(w/ OrrinS internal constraints-Proportional Method)}} = 1,320 \text{ MW}$
- Individual Area Tie Benefit Contributions
 - Total Tie Benefits from Quebec, Maritimes and New York
 $TB_{\text{Total}} = 1,320 \text{ MW}$
 - Tie Benefit associated with Quebec
 $TB_{\text{Tie_Q}} = 800 \text{ MW}$
 - Tie Benefit associated with Maritimes
 $TB_{\text{Tie_MT}} = 370 \text{ MW}$
 - Tie Benefit associated with New York
 $TB_{\text{Tie_NY}} = 140 \text{ MW}$ (A correction to include benefit for both NYAC and CSC)

Allocation of Total Tie Benefit Contribution to Individual Neighboring Areas

Since the sum of the tie benefits from the individual neighboring Areas simulated is not equal to the total tie benefits calculated, each of the neighboring Areas' tie benefits are adjusted based on the ratio of the individual area tie benefit to the sum of the tie benefits.

- Adjusted Quebec Tie Benefit Contribution

$$TB_{\text{Tie}_Q} = 1,320 * 800 / (800 + 370 + 140) = 806 \text{ MW}$$

- Adjusted Maritimes Tie Benefit Contribution

$$TB_{\text{Tie}_{MT}} = 1,320 * 370 / (800 + 370 + 140) = 373 \text{ MW}$$

- Adjusted New York Tie Benefit Contribution

$$TB_{\text{Tie}_{NY}} = 1,320 * 140 / (800 + 370 + 140) = 141 \text{ MW}$$

Observations

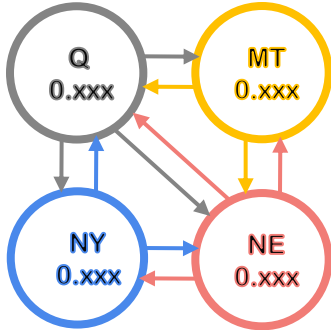
- Modeling internal transmission constraints would/could impact total tie benefits and tie benefits contribution from individual control areas.
- Modeling sub-area loads would/could have (minor) impact on tie benefits contribution from individual control areas.

Appendix A
Effects of Modeling Orrington South
Transmission Constraint – System Diagram
and
Study Methodology

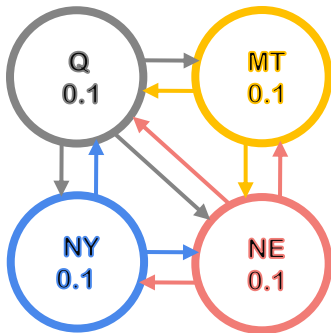
Study Methodology

– Calculation of Total Tie Benefits, TB_{Total}

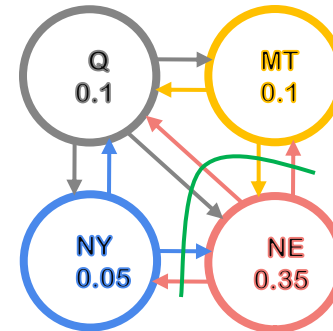
Step 1: Interconnect New England, Quebec, New York and Maritimes systems and calculate each Control Area's risk index ($LOLE_{interconnected}$).



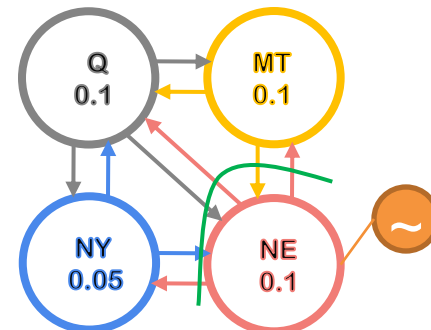
Step 2: Bring all Control Area's risk index to the 0.1 days/year level simultaneously, by adjusting the resource/load in each Control Areas. Resource/load in the subareas of NE are adjusted in proportion to their peak loads



Step 3: Reduce the total transfer capabilities of the interconnections from neighboring Areas to allow for only firm capacity import, and calculate the New England risk index ($LOLE_{NE-w/oNY\&HQ\&MT}$). $LOLE_{NE-w/oNY\&HQ\&MT} > 0.1$ days/year.



Step 4: Bring New England Control Area's risk index, $LOLE_{NE-w/oNY\&HQ\&MT}$, back to the 0.1 days/year, by adding unforced resources to New England in proportion to their peak loads.



Step 5: The total tie benefits from neighboring Areas, TB_{Total} equals to the amount of resources added to New England in the Step 4.

Appendix B
Simulation Results
Without
Modeling Internal Transmission Constraints

Preliminary Study Results

– No Internal Transmission Constraints

- Total tie benefits value assuming no internal constraints in New England
 - $TB_{\text{Total(w/o internal constraints)}} = 1,560 \text{ MW}$
- Individual Area Tie Benefit Contributions
 - A close case of 2011 ARA2 case: $TB_{\text{Total(w/o internal constraints)}} = 1,560 \text{ MW}$
 - Tie Benefit associated with Quebec
 - $TBTie_Q = 750 \text{ MW}$ (After Adjustment 788 MW)
 - Tie Benefit associated with Maritimes
 - $TBTie_MT = 625 \text{ MW}$ (After Adjustment 657 MW)
 - Tie Benefit associated with New York
 - $TBTie_NY = 110 \text{ MW}$ (After Adjustment 115 MW)

