Agenda Item 5.1

PSPC Meeting 276

April 22, 2010

Tie Benefits Calculation Methodology Review

Effects of Modeling Additional Control Areas of PJM and Ontario - with Internal Transmission Constraints Modeled within External Control Areas

ISO new england

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Introduction

- Results of a previous study revealed that by modeling additional control areas of PJM and Ontario, the total tie benefits to New England would increase.
  - Previous study: http://www.iso-ne.com/committees/comm_wkgrps/relblty_comm/pwrsuppln_comm/mtrls/2009/sep32009/modeling_additional_control_areas.pdf
  - Total tie benefits were 1,525 MW if modeling only the control areas New England has direct interconnection with: Maritimes, Quebec and New York. (tie benefits value changed to 1,560 if subarea load representation is used for New England)
  - Total tie benefits became 1,780 MW if additional control areas of PJM and Ontario were modeled.
  - Those tie benefit results were obtained under the assumptions of
    - "at criterion" conditions for all the control areas
    - Transmission constraints between control areas were modeled, while no internal transmission constraints were modeled within each control area.
- Question was raised at the March 22, 2010 RC meeting:
  - Can the additional tie benefits from PJM and Ontario be deliverable to New England if internal transmission constraints are modeled in these external control areas?

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Purpose of this Presentation

- To identify transmission interface(s) within the external control areas that may limit the deliverability of tie benefits from PJM and Ontario, and to investigate such impacts.

- "Central East Group" and "Total East" interfaces in New York are first selected for the investigation
  - "Central East Group" was identified as the interface in New York that has most limiting effects on the tie benefits to New England in a previous study
    - Previous study: http://www.iso-ne.com/committees/comm_wkgrps/relblty_comm/pwrsuppln_comm/mtrls/2009/nov52009/a3.1_impact_internal_constraints_20091102.pdf
    - Flows on both AC and DC ties from New York to New England are on the downstream side of the interface
    - Limit the interconnection benefits from the sources on the upstream side of the interface (subarea A to E, and Quebec wheel-through)
  - "Total East" interface has similar interconnection topology
    - Flows on both AC and DC ties from New York to New England are on the downstream side of the interface
    - Flows from both PJM and Ontario are on the upstream side of this interface
    - Once it binds, it may limit the interconnection benefits from PJM and Ontario

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Supporting Analysis

- Probabilistic analysis
  - Six control areas model: HQ, MT, NY, ONT, PJM and NE
    - Assumptions/data for all the control areas are consistent with those used for the previous study that investigated the effects of modeling additional control areas of PJM and Ontario (http://www.iso-ne.com/committees/comm_wkgrps/relblty_comm/pwrsuppln_comm/mtrls/2009/sep32009/modeling_additional_control_areas.pdf)
  - Inter-Area transmission constraints are modeled, while internal constraints within each Area are relaxed, except for:
    - "Central East Group"
    - "Total East"
  - Total benefits value is calculated assuming "at-criterion" conditions for all control areas
    - Resources/loads in all areas are adjusted to bring all areas to .1 days/year simultaneously while interconnected
    - For New York, adjustments are made to the resources/loads in subareas on the downstream side of the interfaces (F to K)
      - Priority given to New York to utilize the interfaces to serve its internal loads

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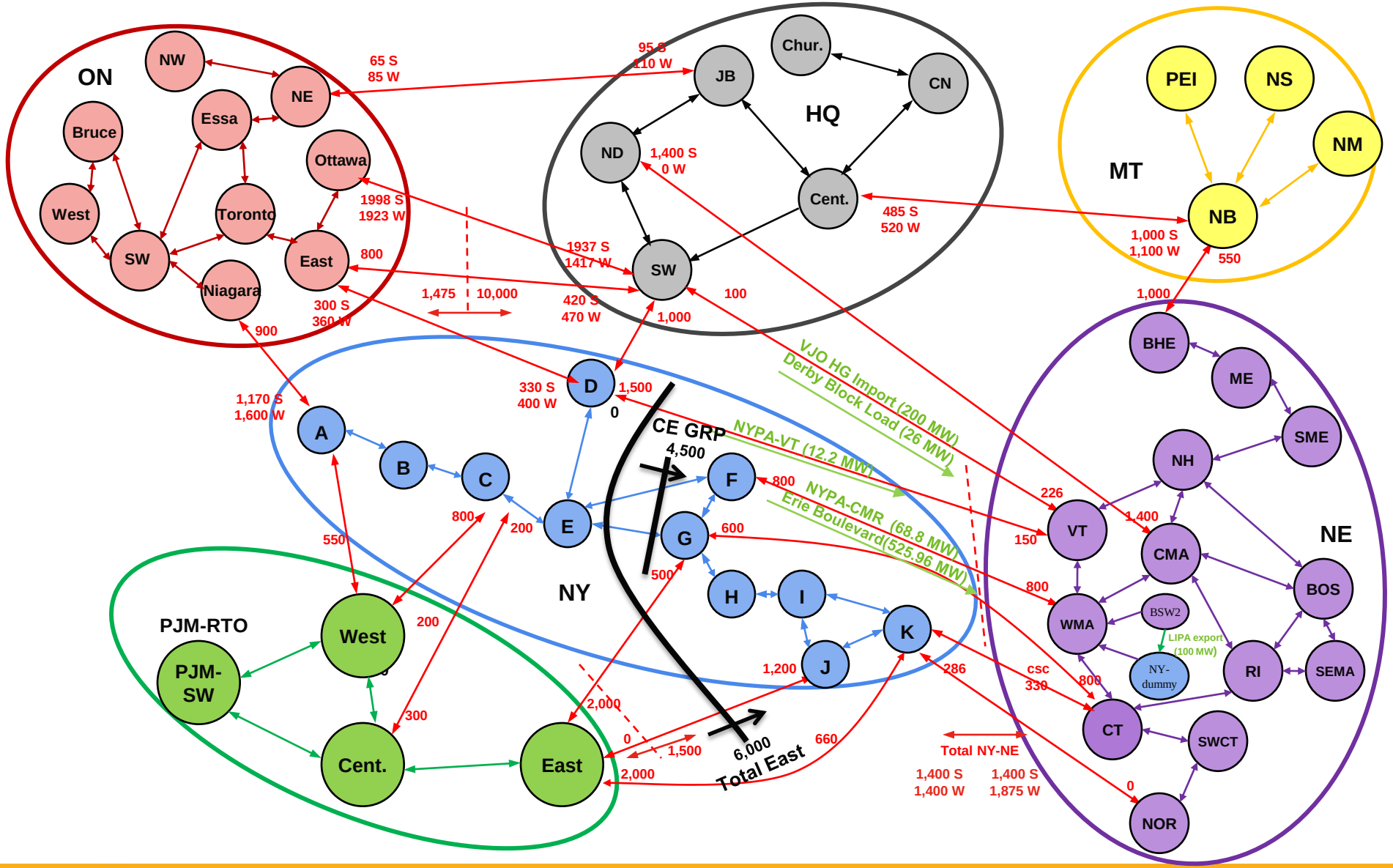
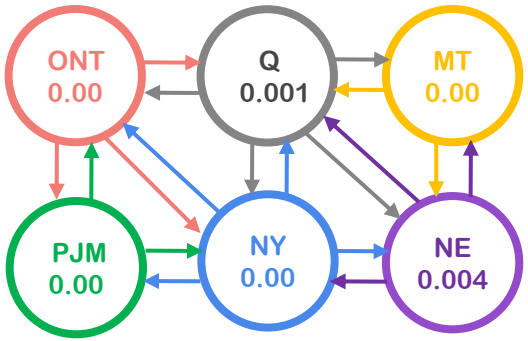
Interconnection System Representation



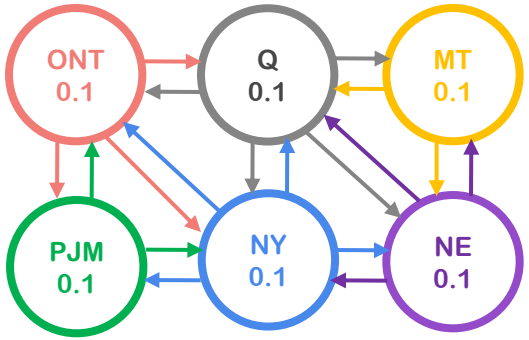
Tie Benefits Calculation using "At-criteria" Conditions

– Calculation of Total Tie Benefits, TB_{Total}

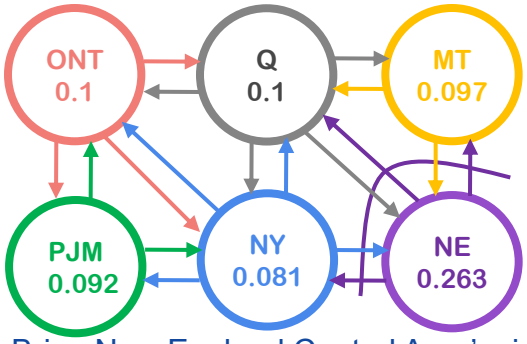
Step 1: Interconnect New England, Quebec, New York, Maritimes, PJM and Ontario systems, and calculate each Control Area's risk index ($LOLE_{interconnected}$).



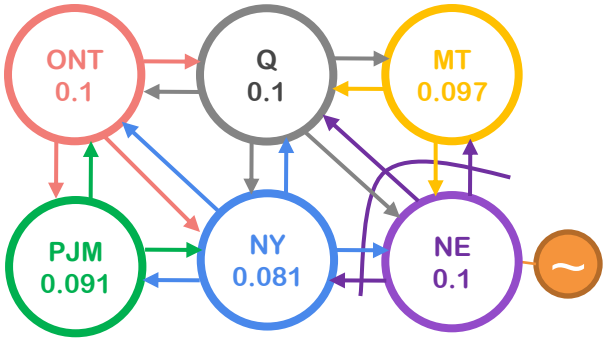
Step 2: Bring the all Control Area's risk index to the 0.1days/year level simultaneously, by adjusting the resource/load in each Control Areas.



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 ($LOLE_{NE\text{-}w/oExternalAreas}$). $LOLE_{NE\text{-}w/oExternalAreas}$ > 0.1 days/year.



Step 4: Bring New England Control Area's risk index, $LOLE_{NE\text{-}w/oExternalAreas}$, back to the 0.1 days/year, by adding unforced resources to New England.



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

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Preliminary Study Results

- Total tie benefits based on 6-Area model and with transmission constraints of “Central East Group” and “Total East” modeled

  $TB_{Total(6\ Area)\text{-}constrained} = 1{,}310$ MW

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Discussions

Scenario	Number of External Areas Modeled	Internal Transmission Constraints Modeled within Control Areas	Total Tie Benefits (MW)
I (current method)	4	None	1,560 (1,525 if using single area load representation)
II	6	None	1,780
III	4	Only "Central East Group" constraint modeled in NY, none in other Areas	1,480
IV	6	Only "Central East Group" and "Total East" constraints modeled in NY, none in other Areas	1,310

I vs. II: Additional benefits obtained from PJM and Ontario if assumed no deliverability issues within external areas

I vs. III: "Central East Group" interface limits the assistance from the sources on the upstream side of the interface (NY subareas A to E, and HQ wheel-through from Chateauguay)

II vs. IV: "Central East Group" and "Total East" interfaces limit the assistance from the sources on the upstream side of the interfaces (NY subareas A to E, and wheel-through from HQ, PJM and Ontario)

III vs. IV: Higher value in III is from the interface D-VT:

- it is not subject to constraint of "Central East Group" interface
- it is subject to the constraint of "Total East" interface