2019/20 FCA Tie Benefits Study

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RESOURCE ADEQUACY

Objective

- To review the tie benefits results for the 2019/20 Forward Capacity Auction (FCA10)
  - Total tie benefits for New England
  - Tie benefits contribution from individual or group of interconnection(s)
    - Maritimes (New Brunswick)
    - HQ Phase II
    - Highgate
    - New York AC ties
    - Cross Sound Cable (CSC)

Highlight of Major Assumptions

- Detailed study assumptions were presented to the PSPC on May 25, 2015
  - http://www.iso-ne.com/static-assets/documents/2015/05/2019_fca_tie_benefits_study_assumptions.pdf
  - Updates to the internal interface transfer limits according to the values presented to the Reliability Committee on June 17, 2015
    - *https://smd.iso-ne.com/operations-services/ceii/rc/2015/06/a9_transfer_capability_update.pdf*

- Identification of capacity zones
  - For FCA 10, only Southeast New England (SENE) is identified as an import-constrained capacity zone, therefore the SENE interface limit is relaxed for this study
    - http://www.iso-ne.com/static-assets/documents/2015/06/fca10_zone_formation.pdf
  - Northern New England (NNE) is not an export-constrained capacity zone, therefore the North/South interface is modeled in this study
    - http://www.iso-ne.com/static-assets/documents/2015/08/pspc_081415_a3.0_fca10_zone_formation2.pdf

Summary of FCA10 Tie Benefits Study Results

- Total tie benefits
  - TB_Total = 1,990 MW
- Tie benefits for New Brunswick ties
  - TB_NB = 519 MW
- Tie benefits for HQ Phase II
  - TB_PH-II = 975 MW
- Tie benefits for Highgate
  - TB_HG = 142 MW
- Tie benefits for NY AC ties
  - TB_NY-AC = 354MW
- Tie benefits for Cross Sound Cable
  - TB_CSC = 0 MW

Recap of Calculation Process

- Process 1.0
  - Calculate the tie benefits values for all possible interconnection states using isolated New England system as the reference
- Process 2.0
  - Calculate initial total tie benefits for New England from all neighboring control areas
- Process 3.0
  - Calculate initial tie benefits for each individual neighboring control area
  - Pro-rate tie benefits values of individual control areas based on the total tie benefits, if necessary
- Process 4.0
  - Calculate initial tie benefits for individual interconnection or group of interconnections
  - Pro-rate tie benefits values of individual interconnection or group of interconnections based on the individual control area tie benefits, if necessary
- Process 5.0
  - Adjust tie benefits of individual interconnection or group of interconnections to account for capacity imports
- Process 6.0
  - Calculate the final tie benefits for each individual neighboring control area
- Process 7.0
  - Calculate the final total tie benefits for New England

Process 1.0
Calculation of Tie Benefits for All Interconnection States

Interconnection State	Discription	Interconnection Status					LOLE	Equivalent TB (MW)
		Maritimes	Ph II	Highgate	NY-AC	CSC		
1	Cut All	x	x	x	x	x	0.403	**0**
2	Cut None	√	√	√	√	√	0.100	**1990**
3	Cut MT	x	√	√	√	√	0.138	**1515**
4	Cut Ph II	√	x	√	√	√	0.181	**1105**
5	Cut Highgate	√	√	x	√	√	0.110	**1855**
6	Cut NY-AC	√	√	√	x	√	0.114	**1785**
7	Cut CSC	√	√	√	√	x	0.100	**1990**
8	Cut MT & Ph II	x	x	√	√	√	0.249	**670**
9	Cut MT & Highgate	x	√	x	√	√	0.149	**1400**
10	Cut MT & NY-AC	x	√	√	x	√	0.162	**1270**
11	Cut MT & CSC	x	√	√	√	x	0.138	**1515**
12	Cut Ph II & Highgate	√	x	x	√	√	0.197	**990**
13	Cut Ph II & NY-AC	√	x	√	x	√	0.229	**785**
14	Cut Ph II & CSC	√	x	√	√	x	0.181	**1105**
15	Cut Highgate & NY-AC	√	√	x	x	√	0.127	**1630**
16	Cut Highgate & CSC	√	√	x	√	x	0.110	**1855**
17	Cut NY-AC & CSC	√	√	√	x	x	0.114	**1785**
18	Cut MT, Ph II & Highgate	x	x	x	√	√	0.268	**570**
19	Cut MT, Ph II & NY-AC	x	x	√	x	√	0.350	**195**
20	Cut MT, Ph II & CSC	x	x	√	√	x	0.249	**670**
21	Cut MT, Highgate & NY-AC	x	√	x	x	√	0.178	**1135**
22	Cut MT, Highgate & CSC	x	√	x	√	x	0.149	**1400**
23	Cut MT, NY-AC & CSC	x	√	√	x	x	0.162	**1270**
24	Cut Ph II, Highgate & NY-AC	√	x	x	x	√	0.257	**625**
25	Cut Ph II, Highgate & CSC	√	x	x	√	x	0.197	**990**
26	Cut Ph II, NY-AC & CSC	√	x	√	x	x	0.229	**785**
27	Cut Highgate, NY-AC & CSC	√	√	x	x	x	0.127	**1630**
28	Cut MT, Ph II, Highgate & NY-AC	x	x	x	x	√	0.403	**0**
29	Cut MT, Ph II, Highgate & CSC	x	x	x	√	x	0.268	**570**
30	Cut MT, Ph II, NY-AC & CSC	x	x	√	x	x	0.350	**195**
31	Cut MT, Highgate, NY-AC & CSC	x	√	x	x	x	0.178	**1135**
32	Cut Ph II, Highgate, NY-AC & CSC	√	x	x	x	x	0.257	**625**

Process 2.0
Calculation of Initial Total Tie Benefits

- Compare state 1 (without any ties) and state 2 (with all the ties)
  - TB_total_initial = 1,990 MW
  - This value is subjected to the adjustment later to account for imports

Process 3.0
Calculation of Tie Benefits for Neighboring Control Areas

- All interconnections connected to a given neighboring control area are grouped together to represent the state of interconnection between New England and that neighboring control area. The simple average of values for all the interconnection states represents the tie benefits of the target neighboring control area (four states for each area)
- Tie Benefits from Maritimes
  - 1 vs. 32 = 625 2 vs. 3 = 475 12 vs. 18 = 420 17 vs. 23 = 515
  - Average = 509 MW
- Tie Benefits from Hydro Quebec
  - 1 vs. 23 = 1,270 2 vs. 12 = 1,000 3 vs. 18 = 945 17 vs. 32 = 1,160
  - Average = 1,094 MW
- Tie Benefits from New York
  - 1 vs. 18 = 570 2 vs. 17 = 205 3 vs. 23 = 245 12 vs. 32 = 365
  - Average = 346 MW
- Tie Benefits after Proration (since 509 + 1094 + 346 = 1,949 < 1,990)
  - TB_MTCA_initial = 1,990 * 509 / (509 + 1,094 + 346) = 519 MW
  - TB_HQCA_initial = 1,990 * 1094 / (509 + 1,094 + 346) = 1,117 MW
  - TB_NYCA_initial = 1,990* 346 / (509 + 1,094 + 346) = 354 MW

Process 4.0
Calculation of Tie Benefits for Individual or Group of Interconnections

- Each individual interconnection or group of interconnections subject to individual tie benefits contribution calculation is treated independently. The simple average of values for all the interconnection states represents tie benefits of the target interconnection or group of interconnections
- Interconnections with Maritimes
  - No individual interconnections subject to the calculation
- Interconnections with Quebec (Phase II and Highgate are subject to the calculation)
  - Phase II
    - 1 vs. 31 = 1,135 2 vs. 4 = 885 3 vs. 8 = 845 5 vs. 12 = 865
    - 9 vs. 18 = 830 17 vs. 26 = 1,000 23 vs. 30 = 1,075 27 vs. 32 = 1,005
    - Average = 955 MW
  - Highgate
    - 1 vs. 30 = 195 2 vs. 5 = 135 3 vs. 9 = 115 4 vs. 12 = 115
    - 8 vs. 18 = 100 17 vs. 27 = 155 23 vs. 31 = 135 26 vs. 32 = 160
    - Average = 139 MW
  - Tie Benefits after Proration (since 955 + 139 = 1,094 < 1,117)
    - TB_Ph-II_initial = 1,117 * 955 / (955 + 139) = 975 MW
    - TB_HG_initial= 1,117 * 139 / (955 + 139) = 142 MW

Process 4.0 (cont.)

- Interconnections with New York (NY AC ties and Cross Sound Cable (CSC) are subject to the calculation)
  - NY AC ties
    - 1 vs. 29 = 570 2 vs. 6 = 205 3 vs. 10 = 245 7 vs. 17 = 205
    - 11 vs. 23 = 245 12 vs. 24 = 365 18 vs. 28 = 570 25 vs. 32 = 365
    - Average = 346 MW
  - CSC
    - 1 vs. 28 = 0 2 vs. 7 = 0 3 vs. 11 = 0 6 vs. 17 = 0
    - 10 vs. 23 = 0 12 vs. 25 = 0 18 vs. 29 = 0 24 vs. 32 = 0
    - Average = 0 MW
  - Tie Benefits after Proration (since 346 + 0 = 346 < 354)
    - TB_NYAC_initial = 354 * 346/(346 + 0) = 354 MW
    - TB_CSC_initial = 0 MW

Process 5.0
Adjustment to Initial Tie Benefits Values

- Tie benefits determined in Process 4.0 for individual interconnection or group of interconnections are adjusted to account for capacity imports

- Interconnections with Maritimes
  - No adjustments required as no existing capacity imports

- Interconnections with Quebec
  - Phase II
    - No adjustments required as no existing capacity imports
  - Highgate
    - Existing import = 6 MW
    - Assumed total import capability = 200 MW
    - Remaining import capability after import = 200 – 6 = 194 MW
    - Tie benefits value calculated in Process 4.0 = 142 MW
    - Since 142 MW < 194 MW, no adjustment is required
    - TB_HG = 142 MW

Process 5.0 (cont.)

- Interconnections with New York
  - NY AC Ties
    - Existing import = 82.8 MW
    - Assumed total import capability = 1,400 MW
    - Remaining import capability after import = 1,400 – 82.8 = 1,317.2 MW
    - Tie benefits value calculated in Process 4.0 = 354 MW
    - Since 354 MW <1317.2 MW, no adjustment is required
    - TB_NY-AC = 354 MW
  - CSC
    - No adjustments required since there are no tie benefits
    - TB_CSC = 0 MW

Process 6.0
Determination of Tie Benefits for Individual Neighboring Control Area

- Final tie benefits for each neighboring control area are the sum of the tie benefits from the individual interconnections or groups of interconnections with that control area, after accounting for the adjustments for capacity imports as determined in Process 5.0

  - Maritimes
    - TB_MTCA= 519 MW
  - Quebec
    - TB_HQCA = 975 + 142 = 1,117 MW
  - New York
    - TB_NYCA = 354 + 0 = 354 MW

Process 7.0
Determination of Total Tie Benefits for New England

- Final total tie benefits from all neighboring control areas are the sum of the control area tie benefits after the adjustments made to account for capacity imports as determined in Process 6.0.

  – TB_Total = 519 + 1,117 + 354 = 1,990 MW

Summary of Tie Benefits Results

- Total tie benefits
  - TB_Total = 1,990 MW
- Tie benefits for New Brunswick ties
  - TB_NB = 519 MW
- Tie benefits for HQ Phase II
  - TB_PH-II = 975 MW
- Tie benefits for Highgate
  - TB_HG = 142 MW
- Tie benefits for NY AC ties
  - TB_NY-AC = 354MW
- Tie benefits for Cross Sound Cable
  - TB_CSC = 0 MW

Comparison of Tie Benefits for FCA10 and FCA9 (MW)

	2019/20 (FCA10)	2018/19 (FCA9)
Total Tie Benefits	1,990	1,970
New Brunswick	519	523
HQ Phase II	975	953
Highgate	142	148
New York AC	354	346
CSC	0	0

APPENDIX: STUDY ASSUMPTIONS AND METHODOLOGY

Scope of Study

- To calculate tie benefits values from neighboring control areas to New England for the 2019/20 FCA through a probabilistic analysis, using the calculation methodology described in III.12.9 of Market Rule 1. The calculations include:
  - Total tie benefits from all neighboring control areas
  - Tie benefits associated with each neighboring control area
  - Tie benefits associated with individual interconnection or group of interconnections of interest

Resource Assumptions
- *New England*

- All existing qualified resources are modeled
  - Ratings, EFORd, Maintenance Weeks consistent with assumptions for the 2019/20 FCA ICR calculation

    - Real-Time Emergency Generations (RTEG)
      - modeled as resources that are dispatched under OP-4
      - Derated to account for unavailability

    - Real-Time Demand Resources (RTDR)
      - RTDR assumed to be dispatched to meet system load and operating reserve requirements
      - modeled as resources that are dispatched prior to OP-4
      - EFORd is used to reflect historical performance

Resource Assumptions
- *External Areas*

- Resources assumptions based on
  - 2014 NPCC Long Range Adequacy Overview
  - 2015 NPCC Seasonal Assessments
  - 2015 New York Gold Book

Load Assumptions

- Load Forecast
  - New England: based on 2015 CELT
  - Other Areas: based on their latest load models used in NPCC studies

- Load Shape
  - 2002 shape is used, consistent with current NPCC studies

Transmission System Representation

- Areas to be modeled
  - New England, Maritimes, Quebec, and New York are simulated using bubble transportation model
  - Equivalent model is used to reflect the impacts of the known capacity import/export between our directly interconnected neighboring areas and PJM and Ontario
- Transmission interfaces and transfer capabilities
  - New England
    - Thirteen RSP subarea representation
    - Transfer capabilities consistent with RSP15 values
    - Interfaces associated with capacity zones are not modeled
  - Other Areas
    - Consistent with their latest model used in NPCC studies

RSP 15 Internal Transmission Interface Limits

Interface[a]	Year									
	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Orrington South Export	1,325	1,325	1,325	1,325	1,325	1,325	1,325	1,325	1,325	1,325
Surowiec South	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500
Maine–New Hampshire	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,900
Northern New England–Scobie + 394	3,100	3,100	3,100	3,100	3,100	3,100	3,100	3,100	3,100	3,100
North–South[b]	2,100	2,100	2,100	2,100	2,675[c]	2,675	2,675	2,675	2,675	2,675
East–West	2,800	3,500[d]	3,500	3,500	3,500	3,500	3,500	3,500	3,500	3,500
West–East	1,000	2,200[d]	2,200	2,200	2,200	2,200	2,200	2,200	2,200	2,200
Boston Import (N-1)	4,850	4,850	4,850	4,850	5,700[c]	5,700	5,700	5,700	5,700	5,700
Boston Import (N-1-1)	4,175	4,175	4,175	4,175	4,600[c]	4,600	4,600	4,600	4,600	4,600
SEMA/RI Export	3,000	3,400[d]	3,400	3,400	3,400	3,400	3,400	3,400	3,400	3,400
SEMA/RI Import (N-1)	-	-	-	786	1,280[e]	1,280	1,280	1,280	1,280	1,280
SEMA/RI Import (N-1-1)	-	-	-	473	720[e]	720	720	720	720	720
Southeast New England Import (N-1)	-	-	-	-	5,700	5,700	5,700	5,700	5,700	5,700
Southeast New England Import (N-1-1)	-	-	-	-	4,600	4,600	4,600	4,600	4,600	4,600
Connecticut Import (N-1)	3,050	2,950[d]	2,950	2,950	2,950	2,950	2,950	2,950	2,950	2,950
Connecticut Import (N-1-1)	1,850	1,750[d]	1,750	1,750	1,750	1,750	1,750	1,750	1,750	1,750
SW Connecticut Import (N-1)	3,200	3,200	3,200	3,200	3,200	3,200	3,200	3,200	3,200	3,200
SW Connecticut Import (N-1-1)	2,300	2,300	2,300	2,300	2,300	2,300	2,300	2,300	2,300	2,300
Norwalk–Stamford	No limit for each year									

Please see Table 4-8 in RSP15 at: http://www.iso-ne.com/committees/planning/planning-advisory

RSP 15 Internal Transmission Interface Limits (cont.)

(a) The transmission interface limits are single-value, summer peak (except where noted to be winter), for use in subarea transportation models. The limits may not include possible simultaneous impacts and should not be considered as "firm." (The bases for these limits will be subject to more detailed review.) For the years within the FCM horizon (2019, FCA #10 and sooner), only accepted certified transmission projects are included when identifying transfer limits. Certified transmission projects were presented to the Reliability Committee at their January 27, 2015, meeting (http://www.iso-ne.com/committees/reliability/reliability-committee). For the years beyond the FCM horizon (2020 and later), proposed plan approved transmission upgrades are included according to their expected in-service dates.

(b) The North–South transfer capabilities reflect the retirements of Brayton Point and Vermont Yankee.

(c) The ISO has accepted the certification of the Greater Boston upgrades project (see Section 6.4.2.1) to be in service by June 2019.

(d) The ISO has accepted the certification of the New England East–West Solution (NEEWS) Interstate Reliability Program (IRP) (see Sections 6.4 and 6.5) to be in service by December 2015.

(e) In response to the Brayton Point retirement, the following Rhode Island area facilities are now planned to be upgraded (and are certified to be in service by the start of the tenth capacity commitment period ((i.e., by June 1, 2019): The V148N 115 kV line between Woonsocket and Washington, the West Farnum 345/115 kV autotransformer upgrade (already in service), and the Kent County 345/115 kV autotransformer (already in service).

RSP 15 External Transmission Interface Limits

Interface[a]	Year									
	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
New Brunswick–New England (energy import capability)[b]	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
New Brunswick–New England (capacity import capability)	700	700	700	700	700	700	700	700	700	700
HQ-NE (Highgate) (energy import capability)[c]	217	217	217	217	217	217	217	217	217	217
HQ-NE (Highgate) (capacity import capability)	200	200	200	200	200	200	200	200	200	200
HQ-NE (Phase II) (energy import capability)[d]	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000
HQ-NE (Phase II) (capacity import capability)	1,400	1,400	1,400	1,400	1,400	1,400	1,400	1,400	1,400	1,400
Cross–Sound Cable (CSC) (energy import capability)[e]	330	330	330	330	330	330	330	330	330	330
CSC (capacity import capability)	0	0	0	0	0	0	0	0	0	0
New York–New England (NY–NE) (energy transfer capability)[f]	1,400	1,400	1,400	1,400	1,400	1,400	1,400	1,400	1,400	1,400
NY–NE (capacity transfer capability)	1,400	1,400	1,400	1,400	1,400	1,400	1,400	1,400	1,400	1,400

Please see Table 4-9 in RSP15 at: http://www.iso-ne.com/committees/planning/planning-advisory

RSP 15 External Transmission Interface Limits (cont.)

(a) The transmission interface limits are single-value, summer peak (except where noted to be winter), for use in subarea transportation models. The limits may not include possible simultaneous impacts and should not be considered as "firm." (The bases for these limits will be subject to more detailed review.) For the years within the FCM horizon (2019, FCA #10 and sooner), only accepted certified transmission projects are included when identifying transfer limits. Certified transmission projects were presented to the Reliability Committee at their January 27, 2015, meeting (http://www.iso-ne.com/committees/reliability/reliability-committee). For the years beyond the FCM horizon (2020 and later), proposed plan approved transmission upgrades are included according to their expected in-service dates.

(b) The electrical limit of the New Brunswick–New England (NB–NE) tie is 1,000 MW. When adjusted for the ability to deliver capacity to the ISO New England Balancing Authority Area, the NB–NE transfer capability is 700 MW because of downstream constraints, in particular, Orrington South.

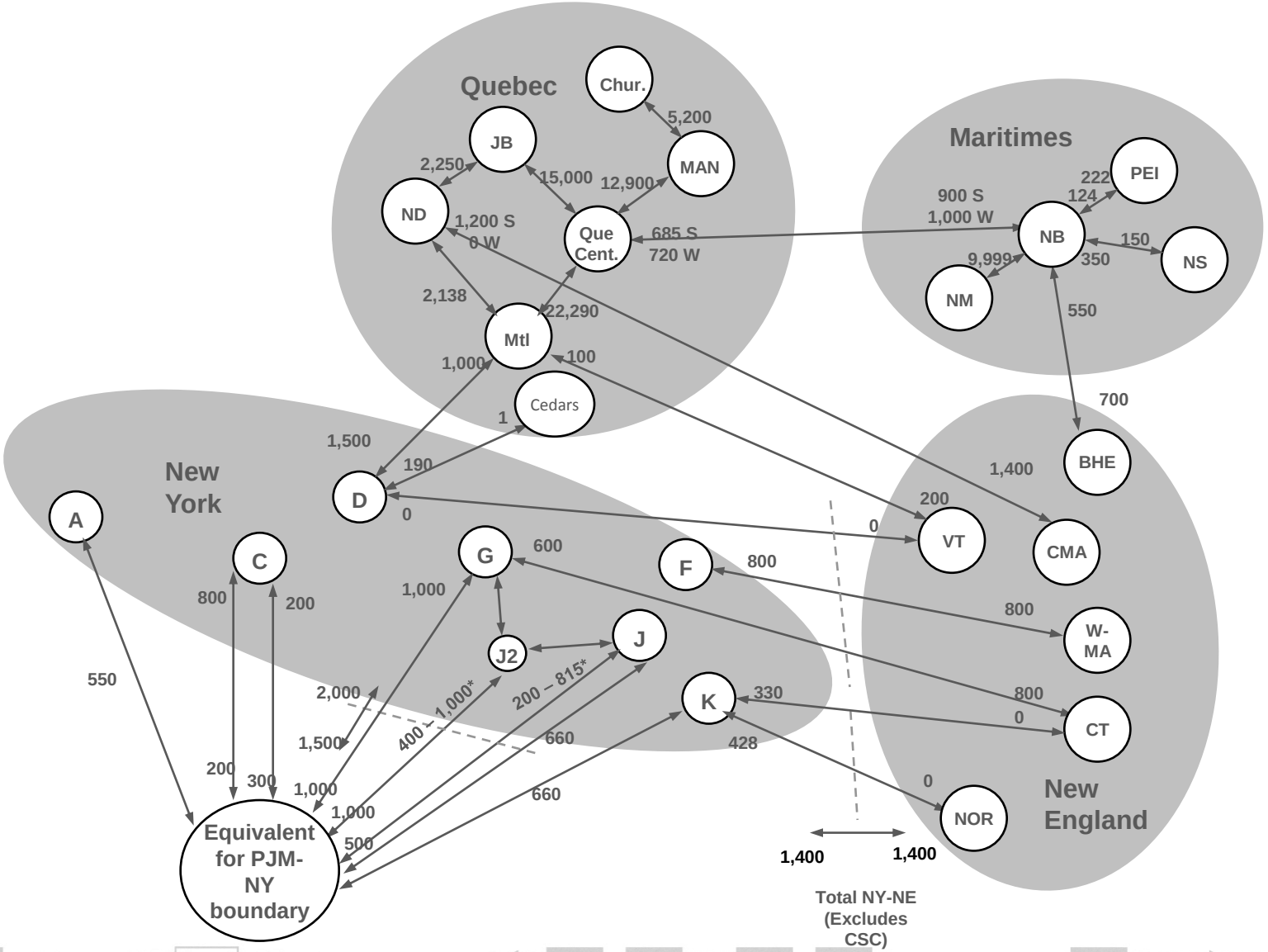
(c) The capability for the Highgate facility is listed at the New England AC side of the Highgate terminal.

(d) The HQICC interconnection is a DC tie with equipment ratings of 2,000 MW. The PJM and NYISO systems may be constrained by the loss of this line. As a result, ISO New England has assumed that its transfer capability is 1,400 MW for capacity and reliability calculations. This assumption is based on the results of loss-of-source analyses conducted by PJM and NYISO.

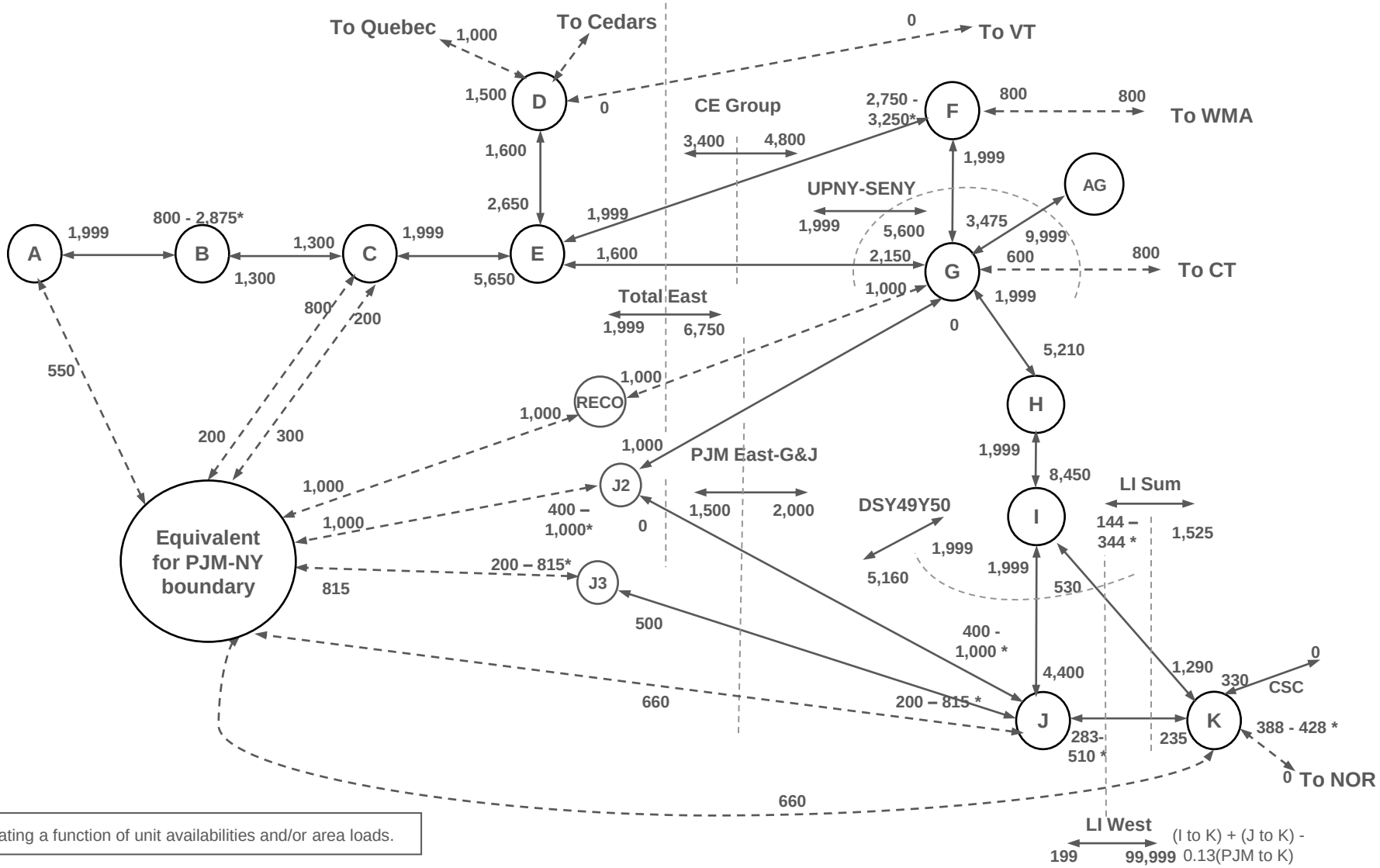
(e) The import capability on the CSC is dependent on the level of local generation.

(f) The New York interface limits are without the CSC and with the Northport–Norwalk Cable at 0 MW flow. Simultaneously importing into New England and SWCT or CT can lower the NY–NE capability (very rough decrease = 200 MW). Conversely, simultaneously exporting to NY and importing to SWCT or CT can lower the NE–NY capability (very rough decrease = 700 MW).

Interconnected System Representation

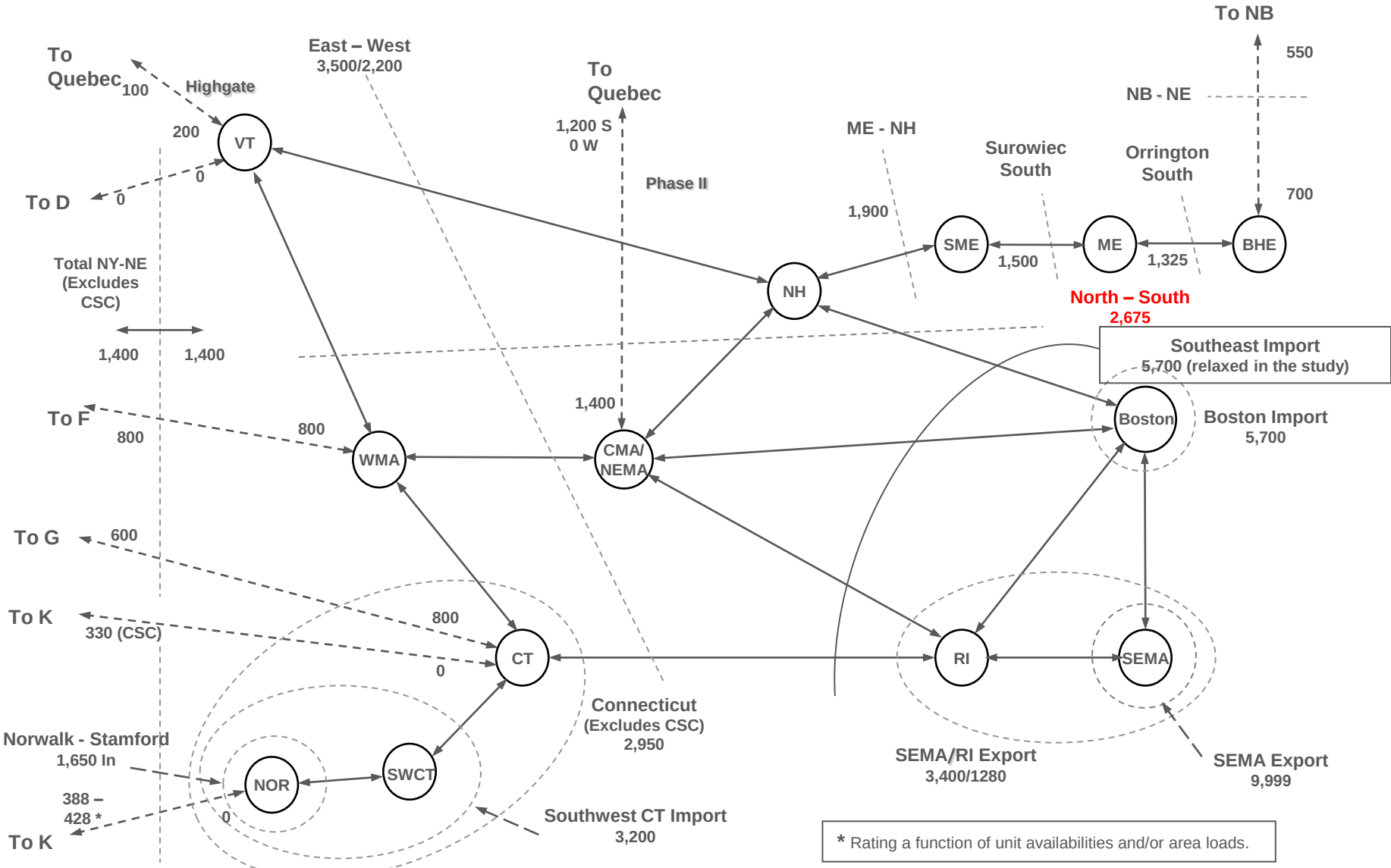


New York System Representation



* Rating a function of unit availabilities and/or area loads.

New England System Representation



* Rating a function of unit availabilities and/or area loads.

Other Assumptions

- Emergency Operating Procedures
  - New England
    - 2,375 MW of system-wide operating reserve assumed
      - Allowed to deplete to a minimum of 200 MW as OP-4 procedures progress prior to firm load shedding
    - Local reserve requirements are based on the latest forward reserve market requirements
      - CT: 714 MW (summer); 363 MW (winter)
      - SWCT: 138 MW (summer); 87 MW (winter)
      - BOSTON: 331 MW (summer); 0 MW (winter)
    - Voltage reductions
      - Consistent with the ICR calculation, and the amount for subareas calculated as
        - (90/10 Subarea Coincident Peak Load MW – Subarea DR MW with a system-wide RTEG limited to 600 MW) * 1.5%
  - Other Areas
    - Consistent with their latest model in NPCC studies

Imports used for Tie Benefits Adjustments

Name	Hydro-Quebec Highgate	New Brunswick	New York AC Ties	Phase I/II HQ Excess
NYPA - CMR			68.8	
NYPA - VT			14	
VJO - Highgate	6			
VJO - Phase I/II				
Total	**6**	**0**	**82.8**	**0**

Study Methodology

Calculation Process

- Process 1.0
  - Calculate the tie benefits values for all possible interconnection states using isolated New England system as the reference
- Process 2.0
  - Calculate initial total tie benefits for New England from all neighboring control areas
- Process 3.0
  - Calculate initial tie benefits for each individual neighboring control area
  - Pro-rate tie benefits values of individual control areas based on the total tie benefits, if necessary
- Process 4.0
  - Calculate initial tie benefits for individual interconnection or group of interconnections
  - Pro-rate tie benefits values of individual interconnection or group of interconnections based on the individual control area tie benefits, if necessary
- Process 5.0
  - Adjust tie benefits of individual interconnection or group of interconnections to account for capacity imports
- Process 6.0
  - Calculate the final tie benefits for each individual neighboring control area
- Process 7.0
  - Calculate the final total tie benefits for New England

Study Methodology
Calculation Process 1.0

- Calculation of tie benefits values for all possible interconnection states
  - Bring all interconnected areas to LOLE of 0.1 days/year simultaneously
  - Calculate New England's LOLE for all the possible interconnection states, e.g.
    - with no interconnections (isolated state)
    - With any single interconnection only
    - With any of two interconnections
    - With any of three interconnections
    - …
  - Calculate the equivalent tie benefits values for each interconnection state using the isolated state as reference
    - As the equivalent MW to bridge the LOLE delta between these two states

Study Methodology
Calculation Process 2.0

- Calculation of total tie benefits for New England
  - Compare the following two interconnection states
    - New England system with all interconnections to neighboring control areas connected
    - New England System with all interconnections with neighboring Control Areas disconnected
  - Total tie benefits for New England is the equivalent MW value to bridge the LOLE delta between these two states
  - This initial total tie benefits value is subject to adjustment to account for capacity imports in the later process.

Study Methodology

Calculation Process 3.0

- Calculation of initial tie benefits for each individual neighboring control area
  - all interconnections connected to a given neighboring control area are grouped together to represent the state of interconnection between New England and that neighboring control area
  - For each target neighboring control area, identify all the related interconnection states and calculate the equivalent tie benefits values for each of these states
    - With a total of three neighboring control areas, there are four interconnection states for each neighboring area
    - Use the simple average of values for all the interconnection states to represent the tie benefits of the target neighboring control area
  - If the sum of the individual control area tie benefits calculated above is different than the total tie benefits calculated in Process 2.0, each control area's tie benefits shall be adjusted based on the ratio of the individual control area tie benefits to the total tie benefits
  - These initial individual control area tie benefits are subject to further adjustment to account for capacity imports in the later process.

Study Methodology

Calculation Process 4.0

- Calculation of preliminary tie benefits for individual interconnection or group of interconnections
  - Each individual interconnection or group of interconnections subject to individual tie benefits contribution calculation is treated independently.
  - For each target interconnection or group of interconnections, identify all the related interconnection states and calculate the equivalent tie benefits values for each of these states
    - Use the simple average of values for all the interconnection states to represent the tie benefits of the target interconnection or group of interconnections
  - If the sum of the individual interconnection's or group of interconnection's tie benefits calculated above is different than the relative control area's tie benefits calculated in Process 3.0, tie benefits of the individual interconnection or group of interconnections shall be adjusted ratio of the tie benefits of the individual interconnection or group of interconnections to the relative control area's tie benefits
  - These initial individual interconnection's or group of interconnection's tie benefits are subject to further adjustment to account for capacity imports in the later process.

Study Methodology
Calculation Process 5.0

- Adjustment to the initial tie benefits for individual interconnection or group of interconnections
  - Deduct capacity imports from the import capability of each individual interconnection or group of interconnections to determine the remaining available import capability to support tie benefits
    - Capacity imports are the Qualified Existing Import Capacity for FCA 2014/15
  - Compare the tie benefits value of an individual interconnection or group of interconnections as determined in Process 4.0 to its remaining transmission import capability
    - If the tie benefits value is greater than the remaining transmission import capability, the tie benefit value of the individual interconnection or group of interconnections is capped to the remaining transmission import capability
    - Otherwise, no adjustments are made.

Study Methodology

Calculation Process 6.0

- Determination of tie benefits for individual neighboring control area
  - Final tie benefits for each neighboring control area are the sum of the tie benefits from the individual interconnections or groups of interconnections with that control area, after accounting for any adjustment for capacity imports as determined in Process 5.0

Study Methodology

Calculation Process 7.0

- Determination of total tie benefits for New England
  - Final total tie benefits from all neighboring control areas are the sum of the control area tie benefits after accounting for any adjustment for capacity imports as determined in Process 6.0.

Questions