Transmission Security Analysis (TSA) Requirements

2019-2020 Forward Capacity Auction (FCA #10)

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Purpose of the Discussion

- Review the TSA requirements for the 2019-2020 Capacity Commitment Period (FCA #10)
  - Based on the same methodology that was used for FCA #5
  - The assumptions and methodology details are available in the appendix

FCA #10 TSA Requirements - Assumptions

- The assumptions for TSA requirements were presented to the Power Supply Planning Committee on 07/23/2015; details are available at:
  - http://www.iso-ne.com/static-assets/documents/2015/07/pspc_07_23_2015_a2.3_FCA10_TSA_Reqt_Assumptions.pdf

- The assumptions details are also available in the appendix

FCA #10 TSA Requirements - SENE

FCA #10 TSA Requirements for SENE

Sub-area 2015 90/10 Load*	13,342
Reserves (Largest unit)	1,413
Sub-area Transmission Security Need	**14,755**
Existing Resources**	11,194
Assumed Unavailable Capacity	-1,086
Sub-area N-1 Import Limit	5,700
Sub-area Available Resources	**15,808**

TSA Requirement (14755-5700)/(1-1086/11194)

= 10,028

**Behind the Meter not Embedded in the Load Forecast (BTMNEL) PV is modeled as a reduction to the load forecast*

***The 2019-20 Qualified Existing Capacity amount as of 06/04/2015*

NOTE: All values have been rounded off to the nearest whole number

Questions

APPENDIX

Methodology, Additional Assumptions Behind the TSA Values for the 2019-20 FCA

Background

- The methodology and assumptions used to determine the 2019-20 TSA requirements were developed in accordance with section III.12.2.1.2. of Market Rule 1, and section 6 of ISO Planning Procedure 10 – Planning Procedure to Support the Forward Capacity Market

Methodology

- The TSA determines the requirement of the sub-area to meet its load through internal generation and import capacity
- It stems from ISO Planning Procedure 3 - Reliability Standards for the New England Area Bulk Power Supply System key transmission security requirements
  - Integrate all resources and serve area load under N-1 and N-1-1 conditions
  - Perform review under reasonably stressed conditions (“With due allowance for generator maintenance and forced outages”)
- It is performed via a series of transmission load flow studies
  - In performing the analysis, static transmission interface transfer limits may be established as a reasonable representation of the transmission system’s capability to serve sub-area load with available existing resources
    - Results may be presented in the form of a deterministic operable capacity analysis

Methodology, *cont.*

- When presented in the form of a deterministic operable capacity analysis, the TSA simply compares need with available resources
  - Needs include
    - Load + Loss of Generator ("Line-Gen" scenario), or
    - Load + Loss of import capability (going from an N-1 import capability to an N-1-1 import capability; "Line-Line" scenario)
  - Resources include
    - N-1 Import capability
    - Regular generation
    - Operating actions (fast start units, demand response…)
  - Resource unavailability is applied by de-rating capacity

Methodology, *cont.*

- Example

Subarea 90/10 Load	8,300
Reserves (Largest unit or loss of import capability)	1,200
Subarea Transmission Security Need	**9,500**
Existing Resources	10,000
Assumed Unavailable Capacity	-500
Subarea N-1 Import Capability	2,500
Subarea Available Resources	**12,000**
Subarea Transmission Security Margin	**2,500**

- For each of the potential import constrained Capacity Zones, the TSA requirement (resource requirement that will be compared to the LRA) is the amount of internal resources (generators and Demand Resources) needed in the zone, so that the Line-Line or Line-Gen requirements can be met after proper accounting for resource unavailability

Methodology, *cont.*

- The TSA requirement can be approximated by using the following formula

$$\text{TSA Requirement} = \frac{\text{(Need – Import Limit)}}{\text{1 – (Assumed Unavailable Capacity / Existing Resources)}}$$

- The TSA requirement ensures that the zone's transmission security margin remains close to zero

Methodology, *cont.*

- Example

Subarea 90/10 Load	8,300
Reserves (Largest unit or loss of import capability)	1,200
Subarea Transmission Security Need	**9,500**
Existing Resources	10,000
Assumed Unavailable Capacity	-500
Subarea N-1 Import Capability	2,500
Subarea Available Resources	**12,000**
Subarea Transmission Security Margin	**2,500**

$$\text{TSA Requirement} = \frac{(9{,}500 - 2{,}500)}{1 - (500/\ 10{,}000)} = 7{,}368 \text{ MW}$$

- The proposed TSA requirement formula is based on the assumption that the amount of assumed unavailable capacity, prior to the N-1 or N-1-1 state, is proportional to the amount of existing resources
  - In the prior example, it is assumed that 500/10,000=5% of the resources will be unavailable on forced or maintenance outage, prior to the N-1 or N-1-1 state. This assumption is maintained regardless of the amount of existing resources that is assumed in the sub-area

Methodology, *cont.*

- The TSA requirement calculation is an approximation, due to:
  - The use of static transmission interface transfer limits
  - The reliance on specific scenarios (“Line-Gen”) and (“Line-Line”)
  - The nature of the calculation
    - The term [Assumed Unavailable Capacity / Existing Resource] in the above equation depends on the actual proportion of regular generation, peaking generation, intermittent resources, Real-Time Emergency Generation (RT-EG), active non-RTEG Demand Resources (DR) and passive DR
  - The fact that the energy Load Zones boundaries do not exactly correspond to the real operating boundaries
    - Real operating boundaries are based on the limiting constraints that define a zone’s import capability and the ability of the generation within the zone to alleviate those constraints
    - The TSA requirement is calculated based on the zone’s real operating boundaries and is an approximation for what the requirement would be for the energy Load Zone

FCA #10 TSA Requirements Assumptions – Transfer Limits

Interface	2019-2020 Capacity Commitment Period Transfer Limit in MW
SENE Import (N-1)	5,700
SENE Import (N-1-1)	4,600

The 2015 Transfer Limits were presented at the Reliability Committee on June 16, 2015

FCA #10 TSA Requirements Assumptions – Detailed Assumptions

- Load Forecast Data
  - 2015 CELT forecast adjusted for PV forecast*
    - SENE sub-area 90/10 peak load: 13,342 MW
- Resource Data
  - 2019-20 Existing Capacity Qualification data as of June 4, 2015
    - Generating capacity: 9,937 MW
      - Includes 9,237 MW of regular generation resources, 158 MW of intermittent generation resources and 542 MW of peaking generation resources
    - Passive Demand Resources: 1,039 MW
    - Non-RTEG Active Demand Resources: 180 MW
    - Real-Time Emergency Generation: 39 MW

Behind the Meter not Embedded in the Load Forecast (BTMNEL) PV is modeled as a reduction to the load forecast
NOTE: All values have been rounded off to the nearest whole number

FCA #10 TSA Requirements Assumptions – Detailed Assumptions, cont.

- Resource Unavailability Assumptions
  - Regular Generation Resources - Weighted average EFORd
    - SENE sub-area: 10%
  - Peaking Generation Resources - Operational de-rating factor: 20%
  - Passive Demand Resources: 0%
  - Non-RTEG Active Demand Resources - De-rating based on performance factors
    - Boston sub-area: 17%
    - SEMA sub-area: 23%
    - RI sub-area: 17%
  - Real-Time Emergency Generation - De-rating based on performance factors
    - Boston sub-area: 10%
    - SEMA sub-area: 17%
    - RI sub-area: 9%

NOTE: All values have been rounded off to the nearest whole number