Agenda Item 3.0

PSPC Meeting 279

September 9, 2010

Transmission Security Analysis Requirement (TSA) Values for the

- 2011/12 Third Annual Reconfiguration Auction (2011/12 ARA3) &
- 2012/13 Second Annual Reconfiguration Auction (2012/13 ARA2)

DRAFT

TSA Values for 2011/12 ARA3 and 2012/13 ARA2

2011/12 ARA3 TSA Requirements

2011/12 ARA3 TSA Requirement (in MW)	Connecticut	NEMA/Boston
Sub-area 2011 90/10 Load	7905	6075
Reserves (Largest unit or loss of import capability)	1200	1200
Sub-area Transmission Security Need	**9105**	**7275**
Existing Resources	8365	3344
Assumed Unvailable Capacity	648	312
Sub-area N-1 Import Limit	2500	4900
Sub-area Available Resources	**10218**	**7932**
Sub-area Transmission Security Margin	1113	657

TSA Requirement =(9105-2500)/(1-648/8365) =(7275-4900)/(1-312/3344)

=7159 **=2619**

2012/13 ARA2 TSA Requirements

2012/13 ARA2 TSA Requirement (in MW)	Connecticut	NEMA/Boston
Sub-area 2012 90/10 Load	8020	6165
Reserves (Largest unit or loss of import capability)	1200	1200
Sub-area Transmission Security Need	**9220**	**7365**
Existing Resources	8365	3344
Assumed Unvailable Capacity	648	312
Sub-area N-1 Import Limit	2500	4900
Sub-area Available Resources	**10218**	**7932**
Sub-area Transmission Security Margin	998	567

TSA Requirement =(9220-2500)/(1-648/8365) =(7365-4900)/(1-312/3344)

=7284 **=2718**

Methodology and Assumptions Behind the TSA Values for the 2011/12 ARA3 and 2012/13 ARA2

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
- 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**

Methodology, *cont.*

- 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
- 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

2011/12 ARA2 and 2012/13 ARA3 TSA Assumptions

- Load Forecast Data

2010 CELT Forecast	2011	2012
Connecticut sub-area 90/10 peak load* (MW)	7905	8020
Boston sub-area 90/10 peak load* (MW)	6075	6165

- Resource Data
  - Capacity Supply Obligations (CSO) resulting from the 2011/12 ARA2 will be used to determine the 2011/12 ARA3 and 2012/13 ARA2 TSAs

Generating Capacity	Regular Generation Resources	Intermittent Resources	Fast Start Resources
Connecticut sub-area (MW)	5912	368	1289
Boston sub-area (MW)	2584	63	276

*The 90/10 peak load for the sub-area differs slightly from the 90/10 peak load for the Load Zone.

2011/12 ARA2 and 2012/13 ARA3 TSA Assumptions, *cont.*

- Resource Data

Demand Resource Capacity	Passive Demand Resources	Non-RTEG Demand Resources	RTEG Resources
Connecticut sub-area (MW)	287	242	268
Boston sub-area (MW)	137	168	116

  - The DR capacity shown is the DR supply obligation minus the Reserve Margin Gross-up from the results of the 2011/12 ARA2
  - It includes the Transmission and Distribution Loss Adjustment of 8%

2011/12 ARA2 and 2012/13 ARA3 TSA Assumptions, *cont.*

- Resource Unavailability Assumptions

Generating Capacity	Regular Generation Resources	Intermittent Resources	Fast Start Resources
Connecticut sub-area (%)	5	0	20
Boston sub-area (%)	7.5	0	20

Demand Resource Capacity	Passive Demand Resources	Non-RTEG Demand Resources	RTEG Resources
Connecticut sub-area (%)	0	24	13
Boston sub-area (%)	0	28	13

2011/12 ARA2 and 2012/13 ARA3 TSA Assumptions, *cont.*

- Transfer Limits – 2010 Regional System Plan (RSP)
  - Internal Transmission Transfer Capability
    - Connecticut sub-area
      - N-1 Limit: 2,500 MW
      - N-1-1 Limit: 1,300 MW
    - Boston sub-area
      - N-1 Limit: 4,900 MW
      - N-1-1 Limit: 3,700 MW