Scenario Results – Part 2

FSSTF

11/22/2019

Overview – Scenario Results

Part 1 (October FSSTF)

1. Phase 1 sensitivities based on stakeholder feedback
   a. Pipeline disruption concurrent with event peak load
   b. 14-day pipeline disruption
   c. Initial oil inventory level at 50%
   d. Portfolio sensitivity with additional renewable replacement of retirements (Escalated 3)
2. RTO-wide scenarios using Relevant Risk data from Historical Cold Snap Events

Part 2 (November FSSTF)

3. Locational scenarios using Relevant Risk data from Historical Cold Snap Events
4. Scenarios for summer event
5. Address feedback from October FSSTF

Goals of Scenario Analysis

Inform stakeholders about:	Phase 1	Phase 2	
		Phase 1 sensitivities based on stakeholder feedback	Additional scenarios using Relevant Risk data from historical cold snaps
1. Potential impacts of fuel/energy/resource risk events	✓	✓	✓
2. Factors that contribute to fuel/energy/resource security	✓	✓	✓
3. Risk of occurrence of selected scenarios			✓
4. Analysis framework that could be applied to **risks in other seasons** and **other resource portfolios**	✓	✓	✓

Locational Scenarios using Relevant Risk data from Historical Cold Snap Events

Locational Phase 2 Analysis

- At the October FSSTF, PJM presented RTO-wide Phase 2 results using Relevant Risk data from Historical Cold Snap Events
- For the Locational analysis, an analysis similar to that performed for the RTO was carried out. However, there are some differences
  - Load and generation performance data (random forced outages, relevant risks, wind/solar capacity factors) was specific to zone under study
  - An additional input data was required: the amount of Imports from the rest of RTO into the zone under study

Locational Phase 2 Analysis

- The Locational analysis was performed only for 3 zones: MAAC, EMAAC and SWMAAC.
- The following table shows the amount of Imports assumed for each zone and portfolio as well as the source for that value

Zone	Announced Retirements	Escalated Retirements #1	Escalated Retirements #2	Escalated Retirements #3
MAAC	4,019	1,142	0	1,595
EMAAC	9,000	3,827	4,159	3,946
SWMAAC	9,082	5,715	4,109	5,715
Source	**2023 CETLs**	**2023 Calculated CETOs**	**2023 Calculated CETOs**	**2023 Calculated CETOs**

Note: Negative Calculated CETOs values were increased to 0 MW.

Locational Phase 2 Analysis Results

- The reported results show the size of the generic disruption that would trigger the winter LOLE to increase above 0 days/year
  - Such a Threshold Disruption Size can reflect unavailable MWs inside the zone or unavailable MWs outside the zone that reduce the amount of imports into the zone

Locational Phase 2 Analysis Results

Threshold Disruption Size for each LDA and portfolio

Zone	Announced Retirements	Escalated Retirements #1	Escalated Retirements #2	Escalated Retirements #3
MAAC	15,500	4,000	8,000	4,000
EMAAC	12,400	5,600	5,600	5,200
SWMAAC	4,200	0	0	0

For disruption sizes greater than the above values, the winter LOLE is greater than zero in the corresponding zone and portfolio.
For reference, below are the total ICAP values for each zone and portfolio:

Zone	Announced Retirements	Escalated Retirements #1	Escalated Retirements #2	Escalated Retirements #3
MAAC	75,307	65,082	69,451	64,576
EMAAC	34,813	32,926	32,480	32,773
SWMAAC	12,276	9,624	11,330	9,624

Scenarios for Summer Event

Summer Scenarios

- At stakeholders' request, PJM ran some sensitivities on the 2019 Reserve Requirement Study to determine the Loss of Load Expectation (LOLE) impact of a generic disruption of variable size *X* that occurs coincident with the summer peak week.
  - Supply resilience risks that could result in such a disruption include, but are not limited to:
    - Storms and flooding
    - Extreme heat resulting in drought and/or elevated water temperatures (e.g. NREL report on Water-Related Power Plant Curtailments)

- As expected, the LOLE is very sensitive to such disruptions, especially under the Escalated Retirements portfolios which have a 15.8% installed reserve margin.

Summer Scenarios Results

Escalated Retirements #1, #2, #3 (15.8% ICAP Reserves)

Disruption Size X (MW)	Additional LOLE (days/year)
1,000	0.02
2,000	0.04
3,000	0.07
4,000	0.09
5,000	0.13
6,000	0.17
7,000	0.21
8,000	0.26
9,000	0.32
10,000	0.38

Announced Retirements (28.5% ICAP Reserves)

Disruption Size X (MW)	Additional LOLE (days/year)
1,000	0.0005
2,000	0.0012
3,000	0.0021
4,000	0.0033
5,000	0.0048
6,000	0.0069
7,000	0.0095
8,000	0.0129
9,000	0.0172
10,000	0.0227

The above LOLE values for each portfolio are in addition to the LOLE of each portfolio due to random forced outages and load uncertainty

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