FERC Order 825 – Shortage Pricing

Adam Keech
Executive Director, Market Operations
Members Committee
April 27, 2017

Order 825 – Shortage Pricing Overview

- Order 825 directs ISOs/RTOs to trigger shortage pricing for any interval that a shortage of energy or operating reserves is indicated
  - Differs from PJM's current practice, which requires shortage to be forecast for a sustained period of time before it can be triggered in real-time (avoids "transient shortages")
  - FERC ordered an implementation date of May 11, 2017
    - FERC did not respond to PJM's request to implement this coincident with 5 minute settlements, therefore PJM will implement these changes on May 11 as directed.

- Any suggested changes to the operating reserve demand curves (ORDC) used in pricing shortages must be filed in a separate docket
  - PJM plans to submit a 205 filing at FERC contingent upon approval at the April Members Committee
  - Implementation date is dependent on FERC approval (earliest date is July 2017)

PJM ORDC Proposal

	Current		Proposed	
	Penalty Factor	MW	Penalty Factor	MW
Step 1	$850	Economic Maximum of the single largest contingency	$850 (No change)	Actual output of the single largest contingency (changes dynamically in real-time)
Step 2 (Permanent)	N/A	N/A	$300	Step 1 MW + 190 MW 190 MW = (MAD Synch Reserve Deficit Mean + 1 Standard Deviation)
Step 2 (Extended)	$300	Step 1 MW + Additional Reserve MW	$300 (No change)	Step 2 MW + Additional Reserve MW

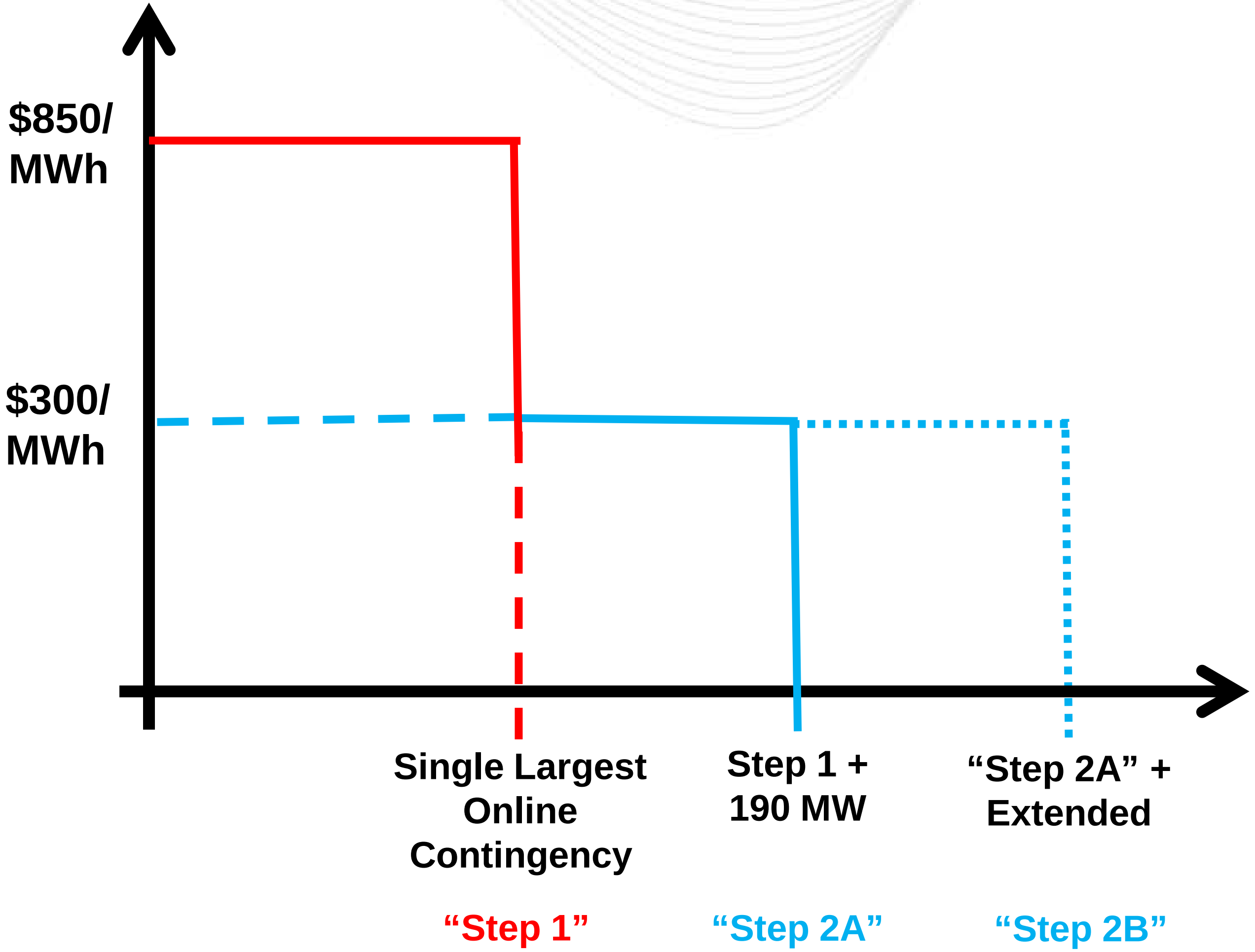
Why Add a Permanent 2nd Step?

- Absent a change to the demand curve, the change to start pricing transient shortages will result in \$850/MWh reserve prices during minimal / transient shortages
  - This pricing could overstate the severity of system conditions
  - Will likely result in operational volatility if participants respond heavily to these transient events

- Adding a smaller step to the demand curve will:
  - Better reflect the lower reliability concern of small reserve deficiencies
  - Create better price signals prior to when synchronized reserves are less than the largest contingency
    - Resources and interchange will be incentivized earlier, potentially avoiding a larger reserve shortage at the \$850/MWh level

Appendix

PJM Proposed Recommendation - Graph



OATT / OA changes for Demand Curve Proposal

- Minimal tariff changes are needed to implement the permanent second step on the demand curve
  - Language for the two step demand curve already exists as a result of the ERPIV enhancements that were implemented in 2015
  - Updated the definitions of “Extended Synchronized Reserve Requirement” and “Extended Primary Reserve Requirement” to include the additional 190 MW being added to the second step of the ORDC.
  - Clarifying changes in the following sections of OATT Attachment K – Appendix to make existing rules clearer:
    - Section 2.5: Calculation of Real-time Prices
    - Section 3.2.3A: Synchronized Reserve
    - Section 3.2.3A.001: Non-Synchronized Reserve

Three different reasons for changes to Manual 11

1) Order 825 Compliance allowing transient shortages (blue highlight in M11 redline)
   a) Based on language to be filed on January 11, 2017
   b) Proposed February 1, 2018 effective date

2) 205 Filing to include a permanent second demand curve step (green highlight in M11 redline)
   a) Based on current PJM's proposal
   b) Proposed February 1, 2018 effective date

3) Changes conforming with M13 (yellow highlight in M11 redline)
   a) Will become effective upon endorsement of manual changes

The following changes were made to M11 to achieve compliance with FERC Order 825's directive to allow transient shortages

- Section 2.3.2 and 2.3.3 - added clarifying language to which step in the demand curve is used
- Section 2.5 – removed wording describing the demand curve and penalties and reworded in Section 4.2
- Section 2.9 - removed IT SCED from determining shortage
- Section 4.2.2, 4.2.2.1, 4.2.9 and 4b.2.2 – incorporated language from Section 2.5 and clarified how the demand curves, penalties and requirements are structured
  - Section 4.2.2.1 outlining the shape of the demand curve is new
- Other ministerial changes to address capitalization

The following change was made to M11 to implement the PJM proposal to add a permanent second step on the demand curve

- Section 4.2.2.1 – Within the newly created section, three words were added to Step 2
  - *Step 2*
    - *Penalty Factor = $300/MWh*
    - *Desired Reserve MW = locational reserve requirement for the specified reserve product as defined in M13 plus 190 MW plus any additional reserves that are being carried in anticipation of heavy load conditions, as referenced in Section 4.2.2 above.*

M11 - Conforming / Ministerial Changes

(Effective upon manual endorsement)

Section 4.2.2

- Clarified wording describing additional reserves carried during outage conditions that cause the largest single contingency to become a loss of more than one generator (historically referred to as a ‘double spin’ event)

- Removed on-peak/off-peak differentiation during such conditions to conform with operational change

Section 4b.2.3

- Corrected NSR MW equation to add missing floor at 0 MW (ministerial change)

Sensitivity Analysis
on
Impact to Synchronized and Non-Synchronized Reserve Credits

Study Approach

- At stakeholder request, PJM conducted a sensitivity analysis on the impact of the proposed operating reserve demand curve (ORDC) changes on Synchronized Reserve (SR) and Non-Synchronized Reserve (NSR) Credits.

- This analysis did not attempt to predict the exact impact the ORDC changes will have on reserve clearing prices, but rather illustrate the potential magnitude of order of the change. It shows that <u>if</u> there is an X% increase in the clearing price, <u>then</u> the corresponding impact to reserve clearing price (MCP) credits will be approximately Y%.

- The following simplifying assumptions were made:
  - LOC credits will remain static
    - Although LOC credits would be reduced by an increase in the Market Clearing Price, it is also possible that LMPs could increase as a result of the MCP increases and therefore offset the change
  - Impacts to LMP were not analyzed

High-Level Methodology

Requirement Calculations:

- SR Requirement = MW Output of largest unit + 190 MW
  - originally fixed 1450 MW, now 1531 MW on average
- PR Requirement = (150% x MW Output of largest unit) + 190 MW
  - originally fixed 2175 MW, now 2296 MW on average

MW Calculations

- It is assumed there is no change in Tier 1 MW
- Tier2 Assigned = SR Requirement – Tier1 MW
- NSR Assigned = PR Requirement – Tier1 MW – Tier2 Assigned
  - Assumes NSR is always available. This is consistent with operating conditions over the analyzed timeframe.

High-Level Methodology

Credit Calculations

The credit calculations focus on the market clearing price credits since it is assumed that the LOC portion of the total billed credits is static for the purpose of this analysis

- **Tier1 Credit** = In intervals where NSR price was non-zero, Tier1 MW x NSR clearing price
- **Tier2 Credit** = Tier2 Assigned x SR clearing price
- **NSR Credit** = NSR Assigned x NSR clearing price

Credit Sensitivity –

- To calculate the impact on total credits, the MCPs were scaled up from their original prices by 2.5%, 5%, and 10%. The credits were then recalculated using the updated MCPs and recalculated MW assignments.
- The originally billed credits for the period were retrieved.

Sensitivity Analysis

MCP Credit Type (Excludes LOC Credits)	Assumed Increase in MCP	Total for Jul 2015 through Dec 2016	Resulting Percentage Increase in Credits
TIER1 CREDIT	ACTUAL BILLED	$3,118,133	N/A
TIER2 CREDIT	ACTUAL BILLED	$37,072,498	N/A
NSR CREDIT	ACTUAL BILLED	$2,973,494	N/A
Total		$43,164,125	N/A
TIER1 CREDIT	2.5%	$3,196,086	103%
TIER2 CREDIT	2.5%	$41,834,001	113%
NSR CREDIT	2.5%	$3,296,892	111%
Total		$48,326,979	112%
TIER1 CREDIT	5.0%	$3,274,040	105%
TIER2 CREDIT	5.0%	$42,854,343	116%
NSR CREDIT	5.0%	$3,377,304	114%
Total		$49,505,687	115%
TIER1 CREDIT	10.0%	$3,429,946	110%
TIER2 CREDIT	10.0%	$44,895,026	121%
NSR CREDIT	10.0%	$3,538,128	119%
Total		$51,863,100	120%