

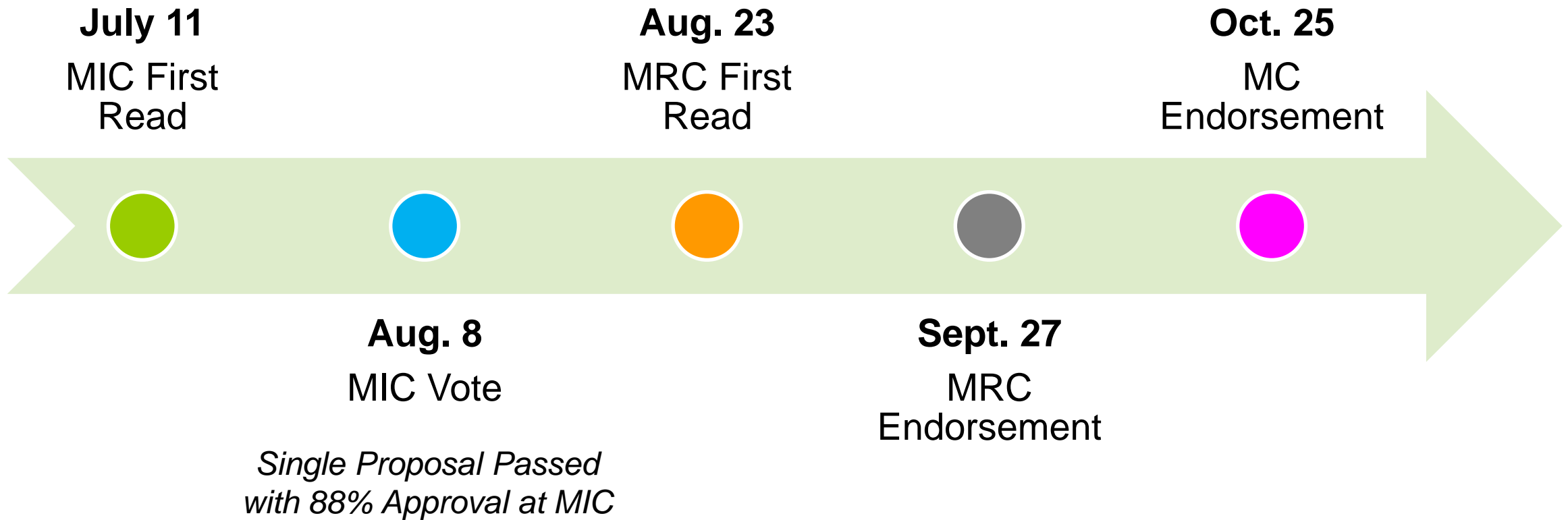
Market Seller Offer Cap Balancing Ratio Proposal

Patrick Bruno
Sr. Engineer, Capacity Market Operations
Markets and Reliability Committee
September 27, 2018

- PJM raised the issue regarding the Balancing Ratio (B) used in the default Market Seller Offer Cap ($MSOC$) for RPM auctions in September, 2017
 - $Default\ MSOC = Net\ CONE_{LDA} * B$
 - Current Tariff formula to calculate B does not work when no Performance Assessment Intervals (PAIs) occur during the three calendar years that precede the BRA

- Review of the assumed number of hours of PAIs to occur in a year included with Issue Charge, as used in the Non-Performance Charge Rate (PPR)
 - Status quo of 30 hours
 - $PPR_{PAI} = (Net\ CONE_{LDA} * 365\ days) / 30\ hours / 12\ settlement\ intervals$

- Issue approved by the MRC and assigned to MIC
 - Single proposal passed at MIC with 88% approval



To estimate the expected future Balancing Ratio (B) used in the default MSOC...

Take the average Balancing Ratios during the 3 Delivery Years that immediately precede the BRA using:

- a) actual Balancing Ratios calculated during RTO PAIs of the Delivery Year, *and*
- b) for any preceding Delivery Year with less than 360 intervals (30 hours) of RTO PAIs, estimated Balancing Ratios calculated during the intervals of the highest RTO peak loads that do not overlap a PAI

- Straight-forward solution that augments the existing methodology by providing reasonable proxy hours and Balancing Ratios to use when no, or relatively few, actual PAIs occur
 - Peak load hours of the RTO provide reasonable proxies given correlation between hours of high demand and Emergency Actions
- Proposed Balancing Ratios on par with those calculated from actual data during historical RTO Emergency Actions
- Determinable in time to inform the unit-specific offer cap submission deadline for documentation
 - 120 days prior to the BRA (mid-January)

- Tariff - Attachment DD
 - Section 6.4(a): Update to Balancing Ratio in the default MSOC
- Manual 18
 - Section 5.4.1: Update to Balancing Ratio in the default MSOC

- Tariff - Attachment DD Section 6.4 Market Seller Offer Caps

(a) The Market Seller Offer Cap for any Base Capacity Resource, stated in dollars per MW/day of unforced capacity, applicable to price-quantity offers within the Base Offer Segment for an Existing Generation Capacity Resource shall be the Avoidable Cost Rate for such resource, less the Projected PJM Market Revenues for such resource, stated in dollars per MW/day of unforced capacity. ~~provided, however, that~~ The default Market Seller Offer Cap for any Capacity Performance Resource through the 2021/2022 Delivery Year, shall be the product of (the Net Cost of New Entry applicable for the Delivery Year and Locational Deliverability Area for which such Capacity Performance Resource is offered times the average of the Balancing Ratios in the three consecutive calendar years (during the Performance Assessment *Intervals* in such calendar years) that precede the Base Residual Auction for such Delivery Year), however, for the Base Residual Auction for the 2021/2022 Delivery Year, the Balancing Ratio used in the determination of the default Market Seller Offer Cap shall be 78.5 percent. ~~and that~~ The default Market Seller Offer Cap for any Capacity Performance Resource effective with the 2022/2023 Delivery Year, shall be the product of (1) the Net Cost of New Entry applicable for the Delivery Year and Locational Deliverability Area for which such Capacity Performance Resource is offered, and (2) average of the Balancing Ratios in the three Delivery Years immediately preceding the Base Residual Auction for such Delivery Year, using both (i) actual Balancing Ratios calculated for Performance Assessment Intervals declared for the entire PJM Region, and (ii) for any Delivery Year with less than 360 Performance Assessment Intervals, estimated Balancing Ratios, for the number of intervals less than 360, calculated during intervals of the highest RTO peak loads that do not overlap a Performance Assessment Interval. ~~and provided further that~~ The submission of a Sell Offer with an Offer Price at or below the revised Market Seller Offer Cap permitted under this proviso shall not, in and of itself, be deemed an exercise of market power in the RPM market. Notwithstanding the previous sentence foregoing, a Capacity Market Seller may seek and obtain a Market Seller Offer Cap for a Capacity Performance Resource that exceeds the revised Market Seller Offer Cap permitted under the prior sentence above, if it supports and obtains approval of such alternative offer cap pursuant to the procedures and standards of subsection (b) of this section 6.4. A Capacity Market Seller may not use the Capacity Performance default Market Seller Offer Cap, and also

Appendix



Proposal Example of a Preceding Delivery Year w/ less than 360 PAIs (30 hours)

Interval Count	Date	Time	PAI	Peak Hour	Balancing Ratio
1	Jul-18	14:15	Y	Y	93.4%
2	Jul-18	14:20	Y	Y	93.7%
3	Jul-18	14:25	Y	Y	93.7%
4	Jul-18	14:30	Y	Y	93.5%
5	Jul-18	14:35	Y	Y	93.3%
6	Jul-18	14:40	Y	Y	92.7%
7	Jul-18	14:45	Y	Y	92.4%
8	Jul-18	14:50	Y	Y	91.2%
9	Jul-18	14:55	Y	Y	90.8%
10	Aug-5	16:00	Y	Y	86.3%
11	Aug-5	16:05	Y	Y	85.7%
12	Aug-5	16:10	Y	Y	85.5%
⋮	⋮	⋮	⋮	⋮	⋮
216	Feb-2	07:10	Y	-	78.5%
217	Jul-18	14:00	-	Y	93.1%
218	Jul-18	14:05	-	Y	93.2%
219	Jul-18	14:10	-	Y	93.5%
⋮	⋮	⋮	⋮	⋮	⋮
360	Feb-2	07:05	-	Y	78.8%



a) 216 Balancing Ratios from actual PAIs (18 hours)



b) 144 estimated Balancing Ratios from highest RTO peak load hours not overlapping a PAI (12 hours)

Total of 360 intervals (30 hours) of Balancing Ratios to be averaged with the ratios of other 2 preceding DYs

Comparison of Existing and Proposed Balancing Ratios (*B*)

Delivery Year	Existing <i>B</i>	Proposed <i>B</i>	Prior 3 DYs
2018/2019	85.0%	88.3%	11/12, 12/13, 13/14
2019/2020	81.0%	85.3%	12/13, 13/14, 14/15
2020/2021	78.5%	83.8%	13/14, 14/15, 15/16
2021/2022	78.5% *	86.8%	14/15, 15/16, 16/17

Balancing Ratios during historical RTO Emergency Actions from 2011 - 2014

Summer (16 hours): **Avg = 93.5%** Min = 87.7% Max = 95.1%

Winter (26 hours): **Avg = 78.3%** Min = 71.5% Max = 84.9%

Actual Balancing Ratios determined for Performance Assessment Intervals

- The calculated Balancing Ratio for a Performance Assessment Interval represents the percentage share of total generation capacity commitments needed to support the load and reserves on the system within the Emergency Action Area during the interval
 - i.e. $(\text{Load} + \text{Reserves}) / \text{Generation Capacity Commitments}$
- The Balancing Ratio is used to set the Expected Performance level of Generation Capacity Performance Resources within the Emergency Action Area during the Performance Assessment Interval
 - $\text{Expected Performance} = \text{Capacity Commitment (UCAP)} \times \text{Balancing Ratio}$

Total Actual Generation and Storage Performance + Net Energy Imports * + Demand Response Bonus Performance

All Generation and Storage Committed UCAP

$$p = PPR \times H \times B' + \max\{0, (ACR - PPR \times H \times A')\}$$

Where:

- p: Offer price in RPM on a UCAP basis (\$/MW-year)
- PPR: Non-Performance Charge Rate (\$/MWh)
 - Assumed to be equivalent to the Bonus Performance Rate
- H: Expected number of Performance Assessment Hours in the year (hours/year)
- B': Expected value of balancing ratio across all Performance Assessment Hours in year
- ACR: Net ACR (net going forward costs) for a resource (\$/MW-year)
- A': Expected value of availability across all Performance Assessment Hours in year

Note: The full overview and explanation of the Capacity Performance Offer Cap Logic can be found in Appendix 1 of PJM's April 10, 2015 response to FERC in Docket No. ER15-623-001

Low ACR Resource is one whose net avoidable costs are less than its total expected Bonus Performance payments as an energy-only resource

- Second term of competitive offer drops to zero
- PPR substituted with Non-Performance Charge Rate

$$P_{(\$ / \text{MW-year})} = \text{PPR} \times H \times B' + \max\{0, (\text{ACR} - \text{PPR} \times H \times A')\}$$

$$P_{(\$ / \text{MW-year})} = (\text{Net CONE} \times 365 / H) \times H \times B'$$

$$P_{(\$ / \text{MW-year})} = \text{Net CONE} \times 365 \times B'$$

$$P_{(\$ / \text{MW-day})} = \text{Net CONE} \times B' \longrightarrow \text{CP default MSOC}$$

High ACR Resource is one whose net avoidable costs are greater than its total expected Bonus Performance payments as an energy-only resource

- Second term of competitive offer remains greater than zero
- PPR substituted with Non-Performance Charge Rate
- Competitive offer dependent on unit-specific ACR and expected resource performance compared to B', requiring a unit-specific review of its MSOC
 - An appropriate unit-specific risk premium may also be included in the unit-specific review

$$P_{(\$ / \text{MW-year})} = \text{PPR} \times H \times B' + (\text{ACR} - \text{PPR} \times H \times A')$$

$$P_{(\$ / \text{MW-year})} = \text{ACR} + \text{PPR} \times H \times (B' - A')$$

$$P_{(\$ / \text{MW-year})} = \text{ACR} + (\text{Net CONE} \times 365 / H) \times H \times (B' - A')$$

$$P_{(\$ / \text{MW-day})} = \text{ACR} + \text{Net CONE} \times (B' - A')$$

	Capacity Resource	Energy-Only
Nameplate (MW)	100	100
Capacity Obligation (UCAP MW)	100	0
Net CONE (\$/MW-day)	\$250	\$250
Balancing Ratio (B')	0.9	0.9
Actual Performance (A')	100	100
Expected Performance (MW)	90	-
Bonus Performance (MW)	10	100
Bonus Rate (\$/MWh)	\$3,042	\$3,042
Bonus Performance Hours	30	30
Annual Bonus Performance (\$/year)	\$912,500	\$9,125,000
Foregone Bonus Performance (\$/year)	\$8,212,500	-
Lost Opportunity Cost (\$/MW-day)	\$225	-
Default MSOC of Net CONE x B' (\$/MW-day)	\$225	-