



ASO and Real-time Reg MCP Differentiation

Regulation Market Issue Senior Task Force

January 13, 2016

Michael Olaleye

Sr. Engineer, Real-Time Market Operations



What are the Differences Between Clearing and Pricing?

Input	ASO	LPC
Regulation requirement	Used to determine resource clearing	Not used
Offers	Used to determine resource clearing	Used for pricing cleared resources
PBR Metrics	<ul style="list-style-type: none"> • Historical Mileage • Historical Performance Score • Benefits Factor calculated by ASO 	<ul style="list-style-type: none"> • Actual Mileage • Historical Performance Score • Benefits Factor calculated by LPC
Load Profile	Hour ahead forecast	Actual
Transmission Constraints	Hour ahead forecast	Actual
Dispatch MW	Hour ahead projection *Hydro special case	Actual
Output	Resource assignments based on Rank Price	5 minute pricing (RMCP)
LOC	Uses forecasted LMP	Uses actual LMP

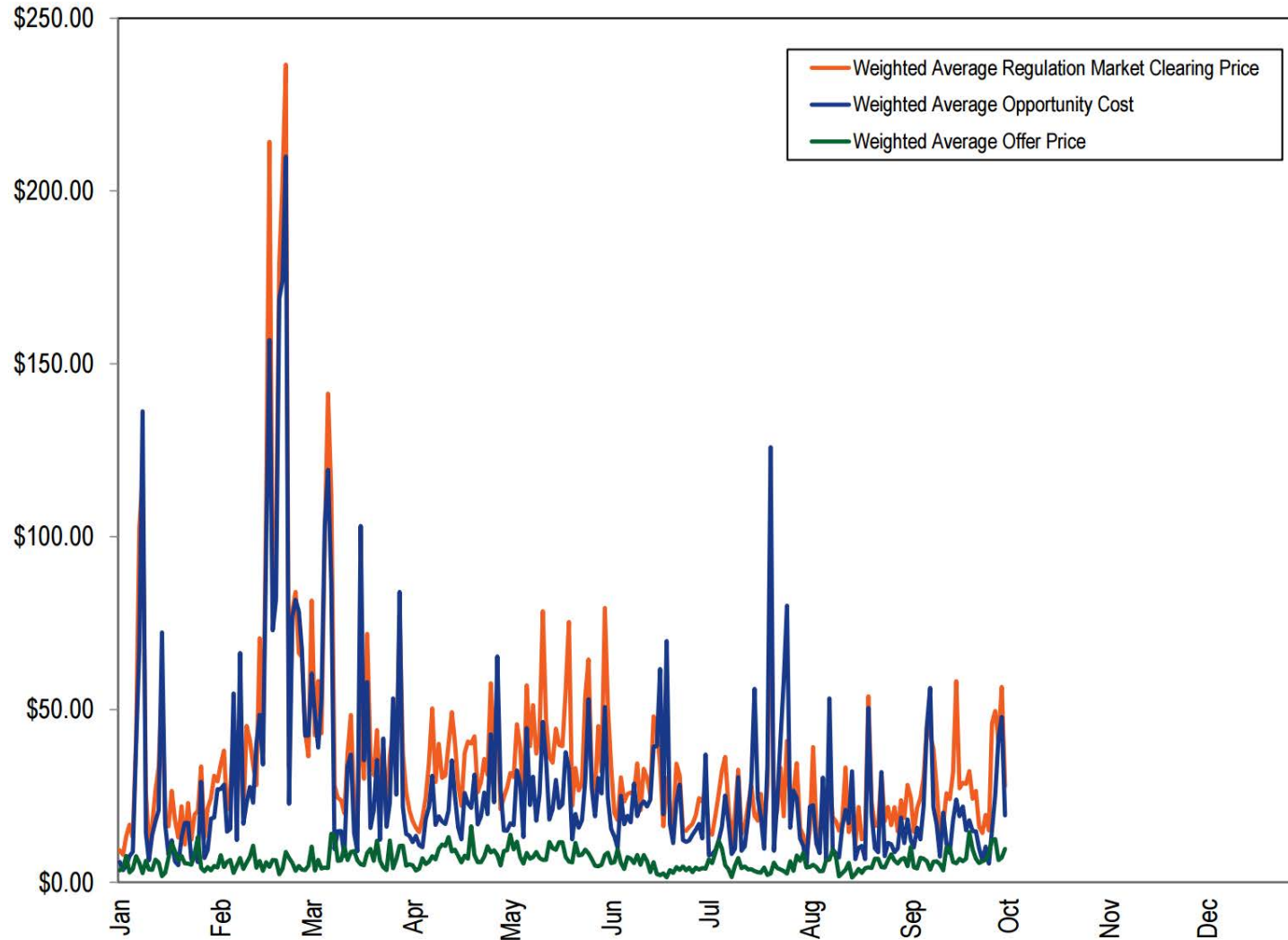
2015 Data

Opportunity Cost (LOC) is a very large percentage of the Regulation Market Clearing Price (RMCP)

LOC changes considerably with change in system condition

Source: SOM 2015
 PJM Regulation Market daily weighted average market-clearing price, marginal resource opportunity cost and offer price in \$/MW

http://www.monitoringanalytics.com/reports/PJM_State_of_the_Market/2015/2015q3-som-pjm-sec10.pdf



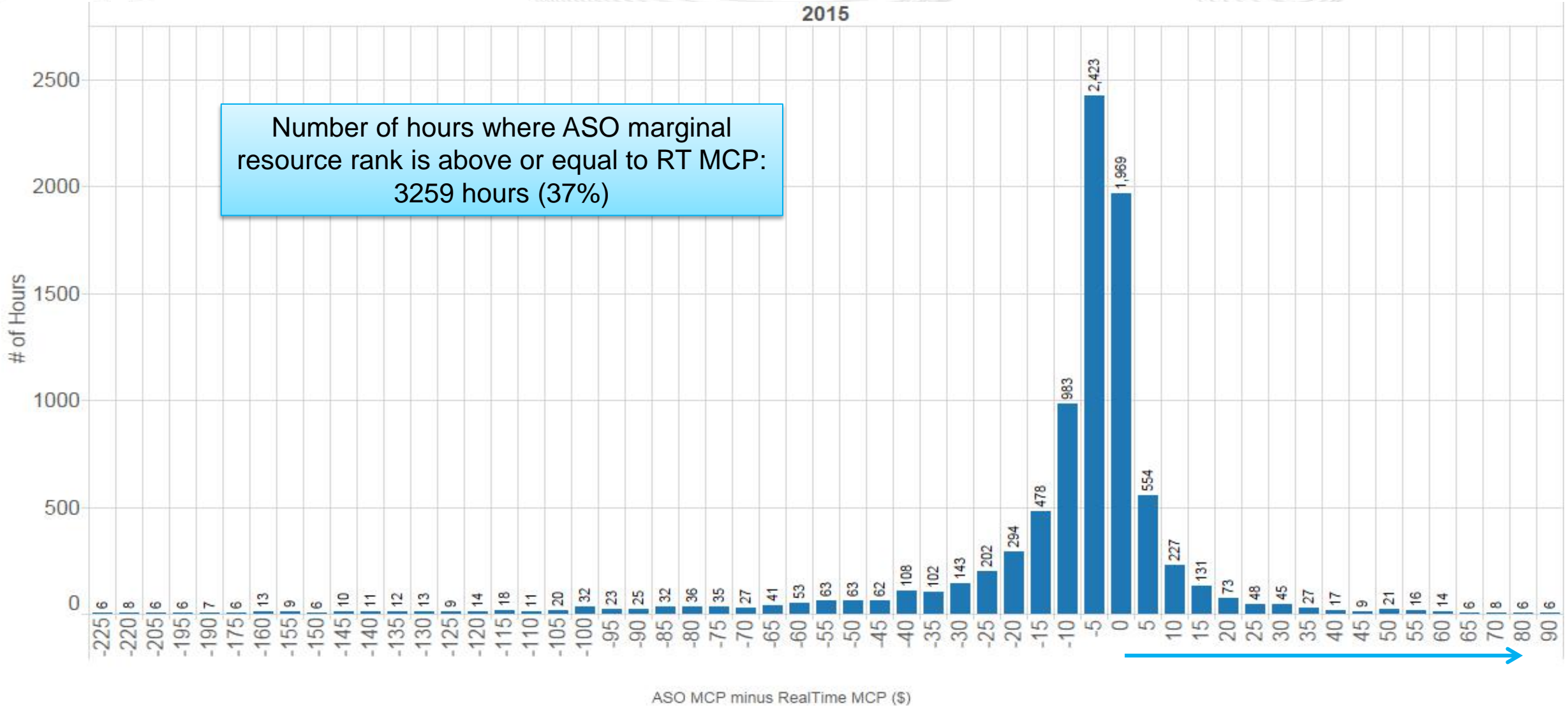


Components of Regulation MCP - Offer and LOC

PJM Regulation Market monthly weighted average MCP, marginal resource LOC and offer price for 2015

Month	Weighted Average MCP	Weighted Average Marginal Resource Offer	Weighted Average Marginal Resource LOC	LOC as a percentage of MCP
Jan	\$27.13	\$5.60	\$22.67	84%
Feb	\$73.24	\$5.40	\$57.07	78%
Mar	\$45.79	\$7.09	\$41.78	91%
Apr	\$32.77	\$7.77	\$21.60	66%
May	\$43.12	\$8.24	\$27.37	63%
Jun	\$25.95	\$4.50	\$25.96	100%
Jul	\$24.40	\$4.79	\$26.92	110%
Aug	\$20.85	\$4.66	\$17.83	86%
Sep	\$29.71	\$7.20	\$19.83	67%

http://www.monitoringanalytics.com/reports/PJM_State_of_the_Market/2015/2015q3-som-pjm-sec10.pdf

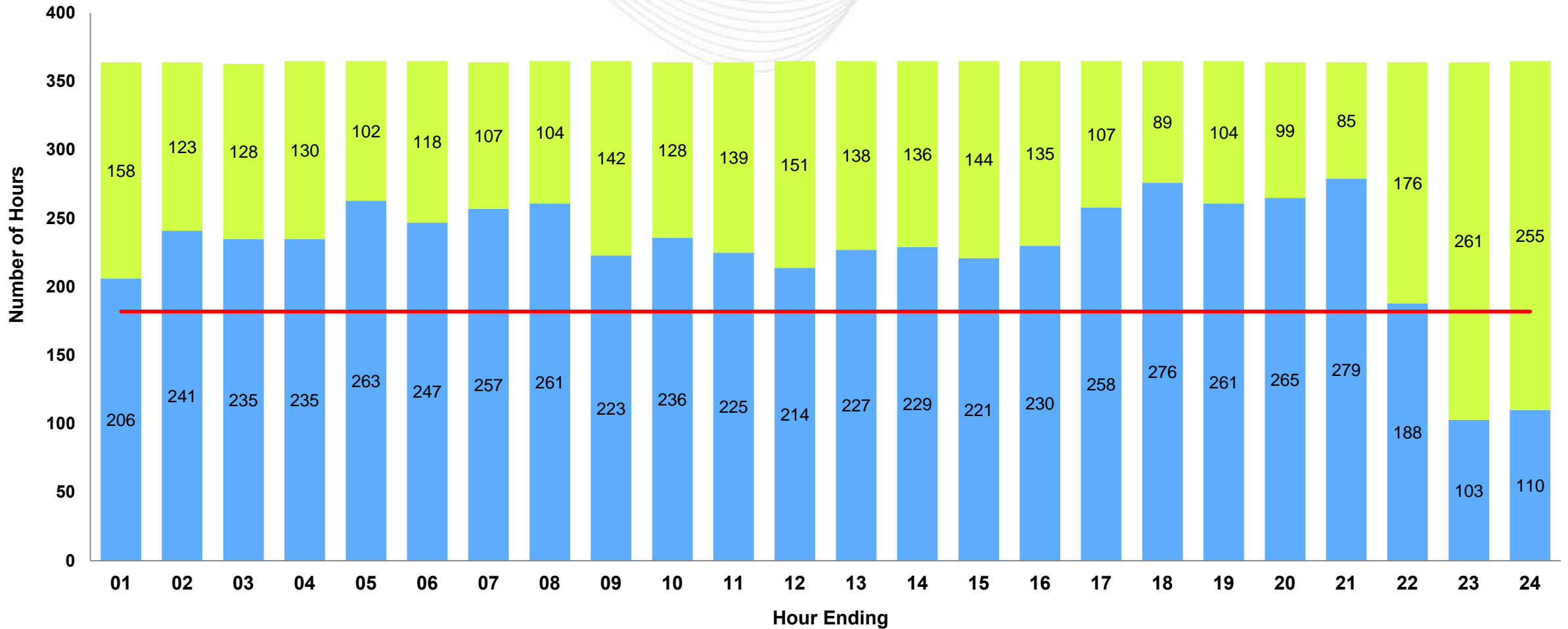


Effect of Changes in System Condition – Hourly Differences

Jan – Dec 2015

ASO Rank (MCP) \geq RT MCP

ASO Rank (MCP) $<$ RT MCP



- Changes in system condition can affect market results
- ASO clears regulation using one time snapshot of 60 minute look-ahead forecast
- LPC prices pre-assigned regulation every 5 minutes in real-time
- RT MCP is above ASO marginal resource rank more of the time

- If continue to clear regulation in the hour-ahead study
 - Need 100% accurate load forecast
 - Resources must accurately follow PJM dispatch signal at all times
 - Little or no change to resources availability and capability within hour
- If should clear regulation in real-time
 - Resources will need to open up the currently confined regulation range