



# PJM Regulation Clearing Price Components

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December 20, 2022

## Ancillary Services Optimizer (ASO)

Clearing and assignment of regulation and inflexible reserve resources (solved 60 minutes prior to target time, looks ahead 60 minutes beyond target time)

ASO



Data



60 min.

LPC

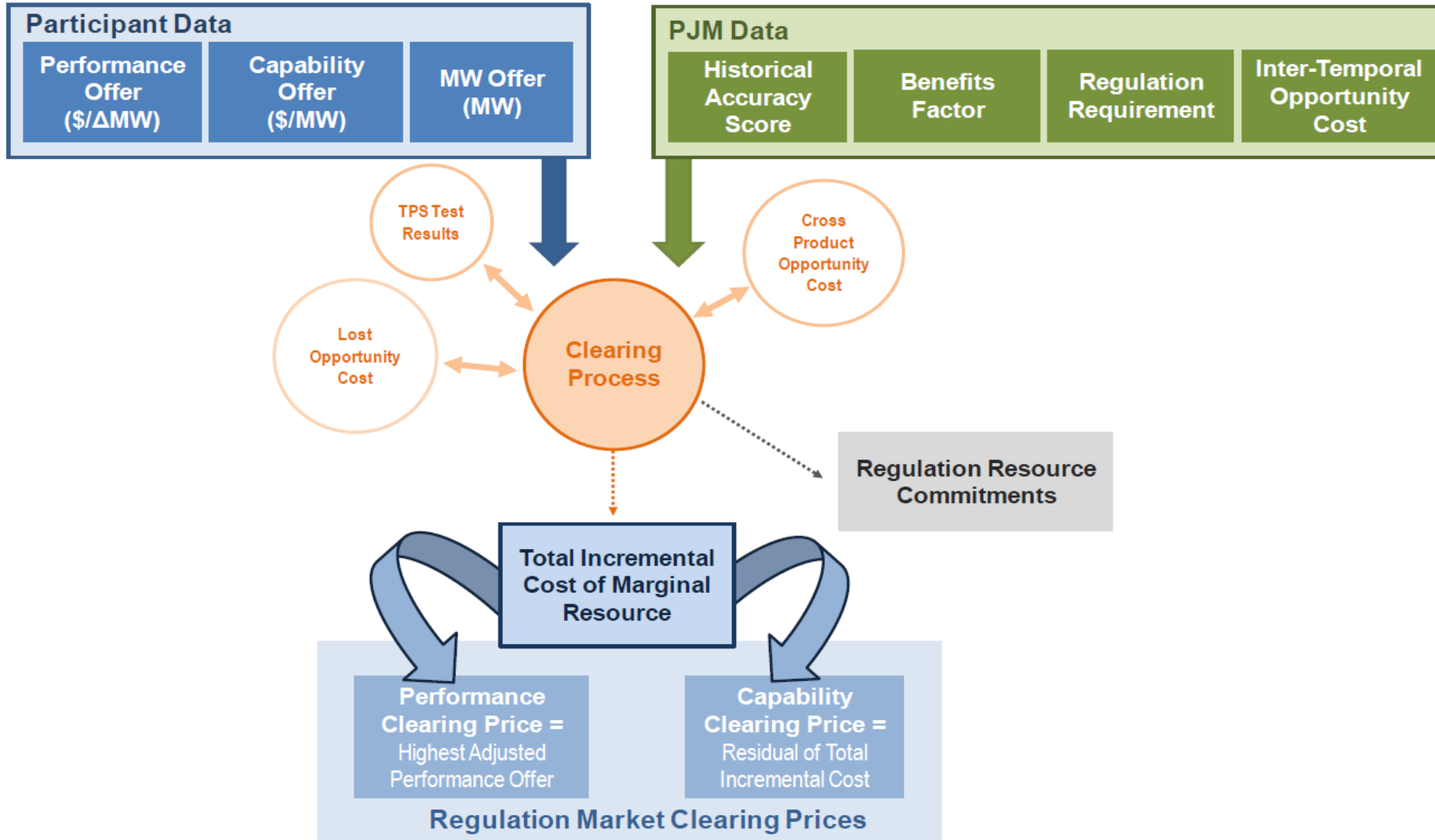


1 Hour  
Prior

Target  
Time

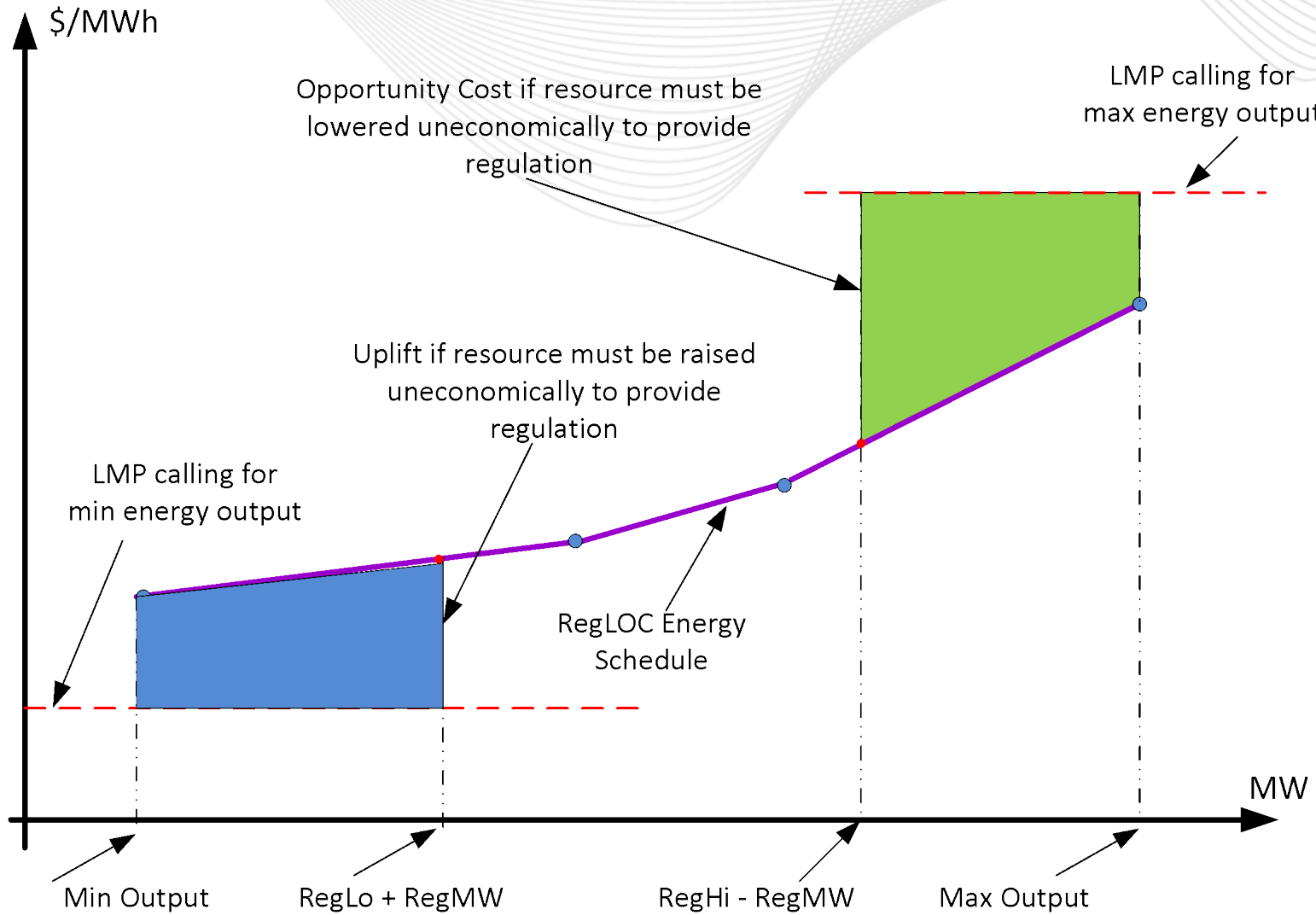
## Locational Pricing Calculator (LPC)

5-minute energy and ancillary service prices  
Based on latest approved RT SCED case



RegLOC – The difference in net compensation from the Energy Market between what a resource receives when providing Regulation service and what it would have received for providing energy only.

- Calculated only for resources providing energy along with regulation service
- Calculated only for pool scheduled regulation resources
- Is \$0 for DSR, and self-schedule and Non-Energy Regulation resources
- Can only be positive, else zero
- Calculated only within Eco limit range
  - Economic Minimum to Economic Maximum range
- RegLOC is a component of the Regulation Market Clearing Price





# 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"> <li>• Historical Mileage</li> <li>• Historical Performance Score</li> <li>• Benefits Factor calculated by ASO</li> </ul>	<ul style="list-style-type: none"> <li>• Actual Mileage</li> <li>• Historical Performance Score</li> <li>• Benefits Factor calculated by LPC</li> </ul>
Load Profile	Hour ahead forecast	Actual
Transmission Constraints	Hour ahead forecast	Actual
Dispatch MW	Hour ahead projection	Actual
Output	Resource assignments based on Rank Price	5 minute pricing (RMCP)
LOC	Uses forecasted LMP	Uses actual LMP



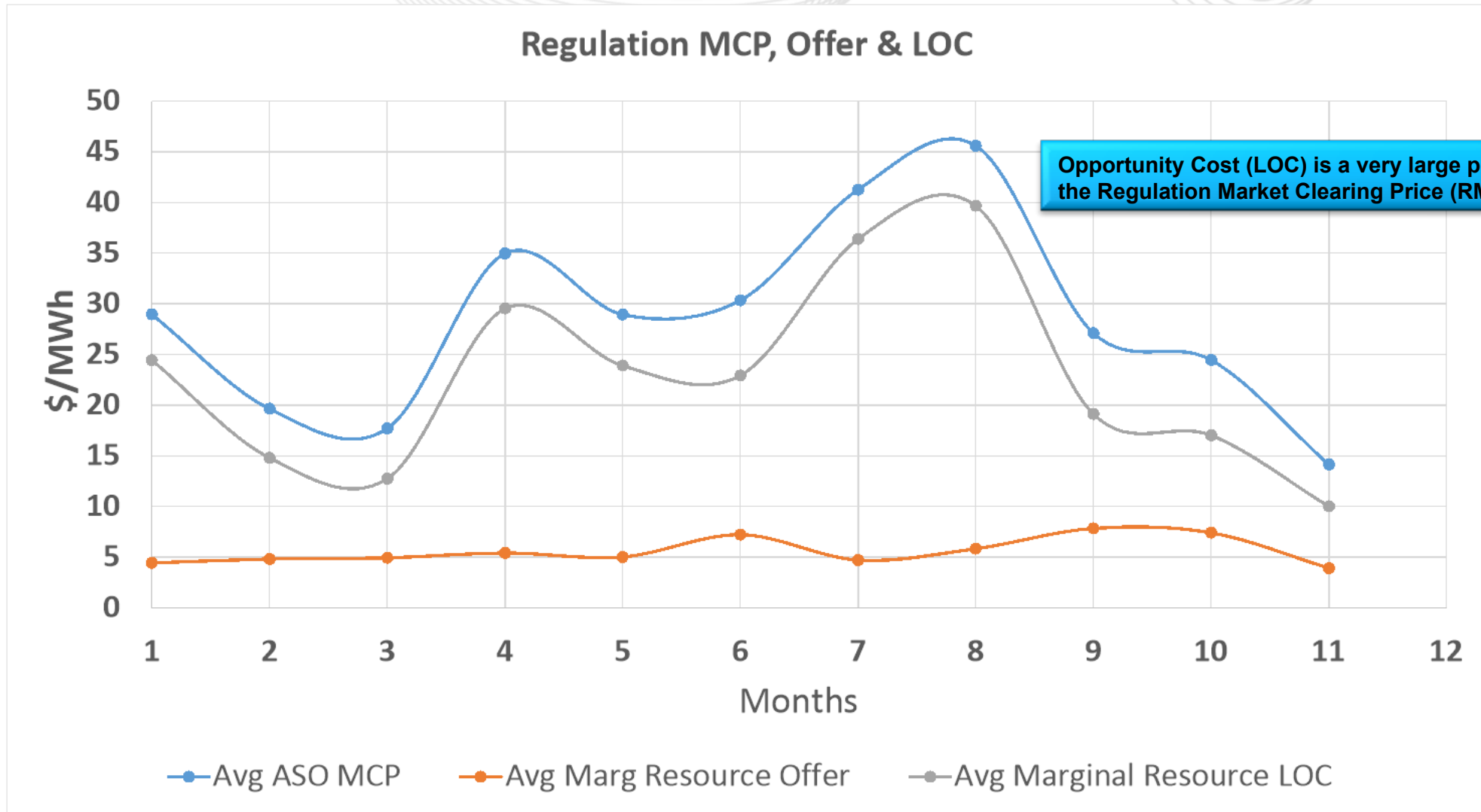
# Components of Regulation Clearing MCP - Offer and LOC

PJM Regulation Market monthly average MCP, marginal resource LOC and offer price for 2022

Month	Average MCP	Average Marginal Resource Effective Offer	Average Marginal Resource LOC	LOC as a percentage of MCP
Jan	\$28.97	\$4.45	\$24.46	74%
Feb	\$19.66	\$4.84	\$14.82	63%
Mar	\$17.72	\$4.95	\$12.77	61%
Apr	\$34.99	\$5.43	\$29.55	72%
May	\$28.95	\$5.04	\$23.91	65%
Jun	\$30.36	\$7.24	\$22.95	63%
Jul	\$41.27	\$4.73	\$36.4	75%
Aug	\$45.6	\$5.85	\$39.68	76%
Sep	\$27.12	\$7.86	\$19.14	58%
Oct	\$24.47	\$7.43	\$17.04	60%
Nov	\$14.16	\$3.94	\$10.03	55%

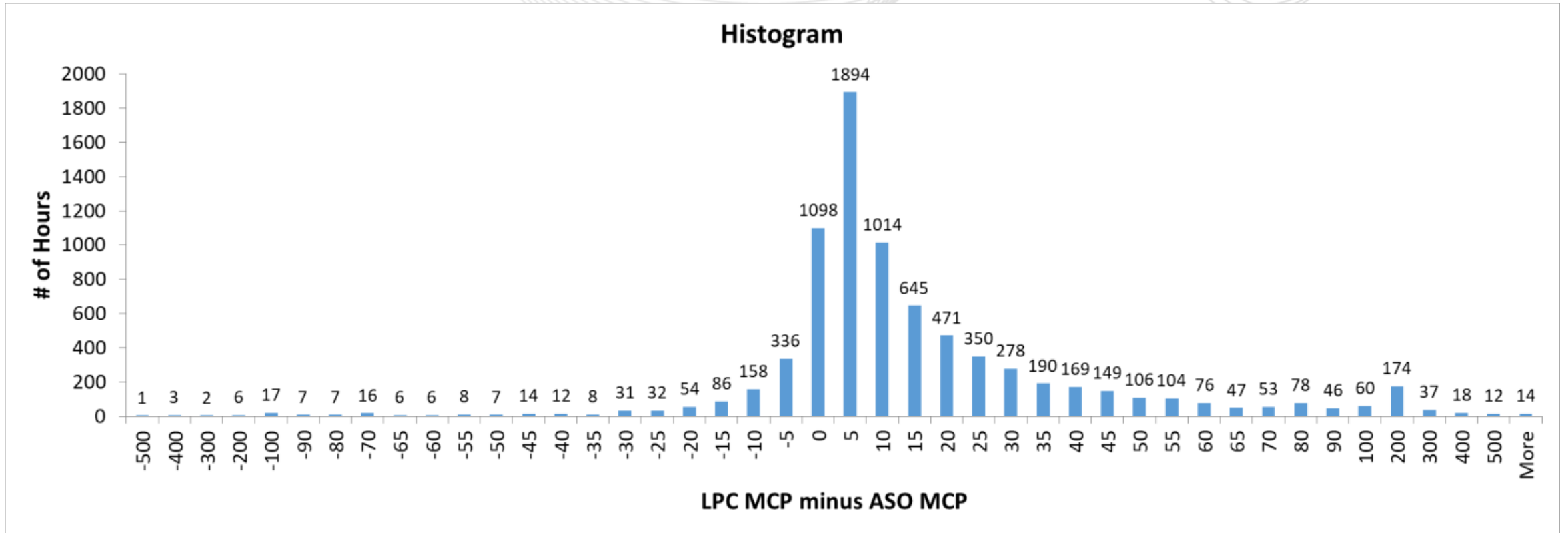


# Components of Regulation Clearing MCP in 2022: Offer and LOC





- Hour ahead regulation clearing
  - Some of the committed resources may no longer be economic during the regulation hour
- Hourly clearing and commitment
  - Some of the committed resources may not be economic through the regulation hour
- Restrictive regulation band typically in the middle resource operating range



Number of hours where ASO marginal resource rank is below or equal to LPC

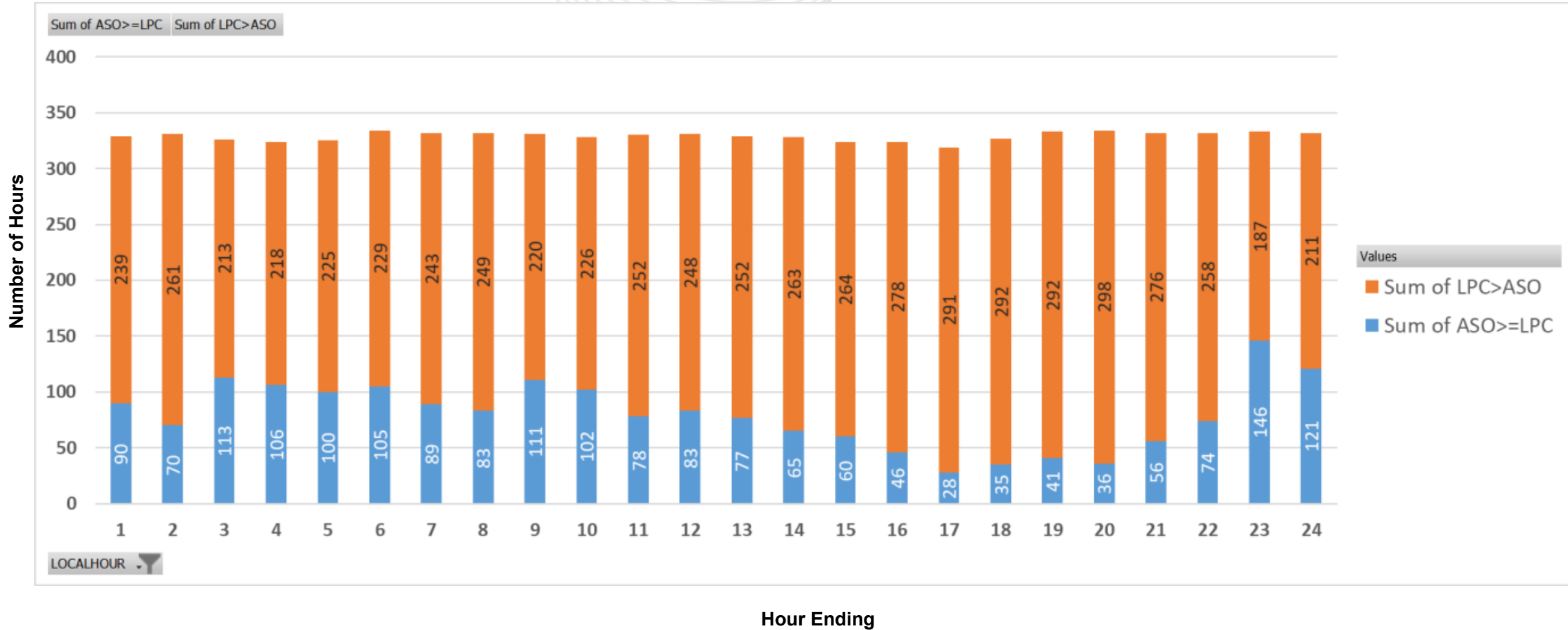


# Effect of Changes in System Condition – Hourly Differences

Jan – Nov 2022

ASO Rank (MCP) < LPC MCP

ASO Rank (MCP) >= LPC 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
- LPC MCP is above ASO marginal resource rank most of the time
  - Fast Start implementation



# How Do We Reduce LOC or Eliminate Price Differences Between Clearing and Pricing ?

- Discussion (intentionally left blank)

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