# 2025 Real-Time Market Pricing Impacts: Multi-Step ORDCs with Extended Requirements

Austin Lin
Advanced Analytics
Reserve Certainty Senior Task Force
June 9, 2026

# Introduction

- Analyzed the pricing and commitment impacts in the Real-Time Market (RTM) for the following:
  - Unnesting of 10-Min Synchronized Reserve (SR) from 30-Min Reserve
  - 30-Min Reserve having a nested 30-Min Online Reserve component
  - 10-Min Online Reserve includes 10-Min SR and 10-Min RUR
  - 30-Min Online Reserve includes 30-Min RUR
  - The proposed reserve products are represented using Operating Reserve Demand Curves (ORDCs) that are updated every 15 minutes with multi-step segments.

# Introduction (cont.)

- Simulations were performed for the full year 2025
  - PROBE Prefect Dispatch (PD) was used to run the simulations for the RTM.
  - Only combustion turbines (CTs) and diesel units were allowed to be committed and decommitted by PROBE PD. The unit commitment for steam units was held fixed to actual real-time operations, but they were allowed to be redispatched by PROBE PD.
  - The MAD reserve sub-zone was not enforced in any of the simulations.
  - 14 days were removed due to the simulations not converging and other data issues.

# Introduction (cont.)

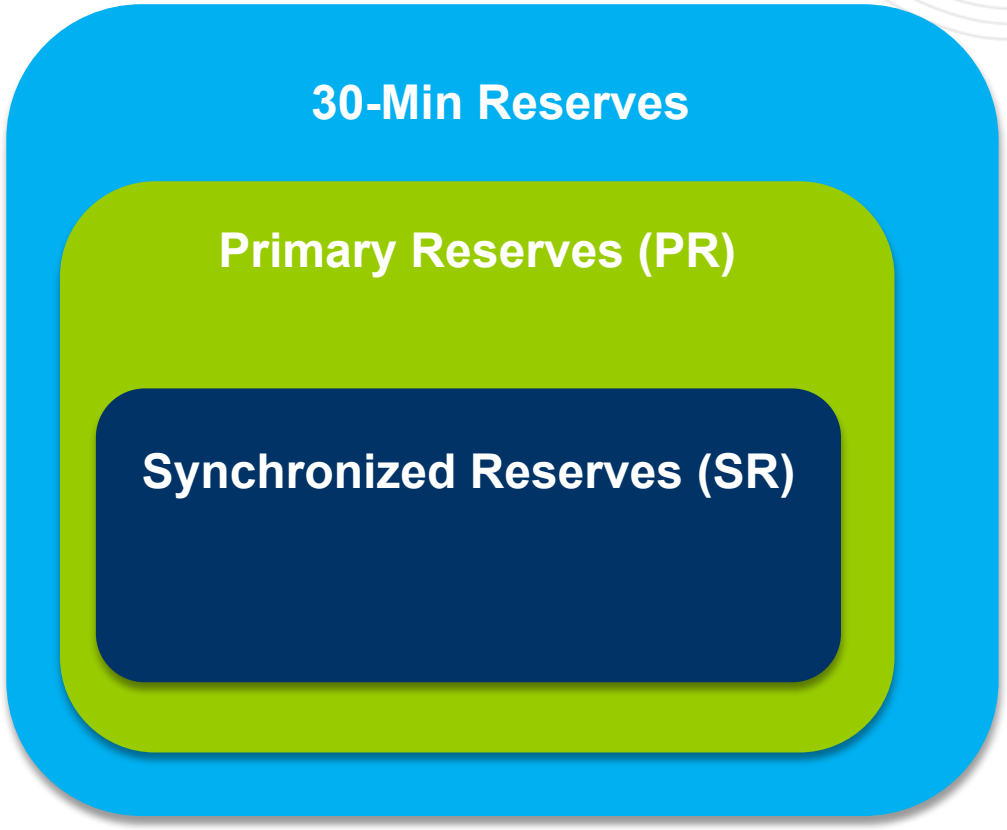
- Two scenarios* were simulated:
  - **Base Case**
    - Status quo with no changes
  - **Full Case**
    - Updated ORDCs for all products with Primary Reserve not cleared to reflect the updated market design.
    - 30-Min Online product requirement is fully added to the SR requirement since PROBE PD lacks a 30-Min Online product

      (i.e. SR Requirement = 10-Min Online Reserve Requirement + 30-Min Online Reserve Requirement)
    - Note: This case can represents an upper bound on the impacts on energy and ancillary service prices due to the proposed reserve market changes.

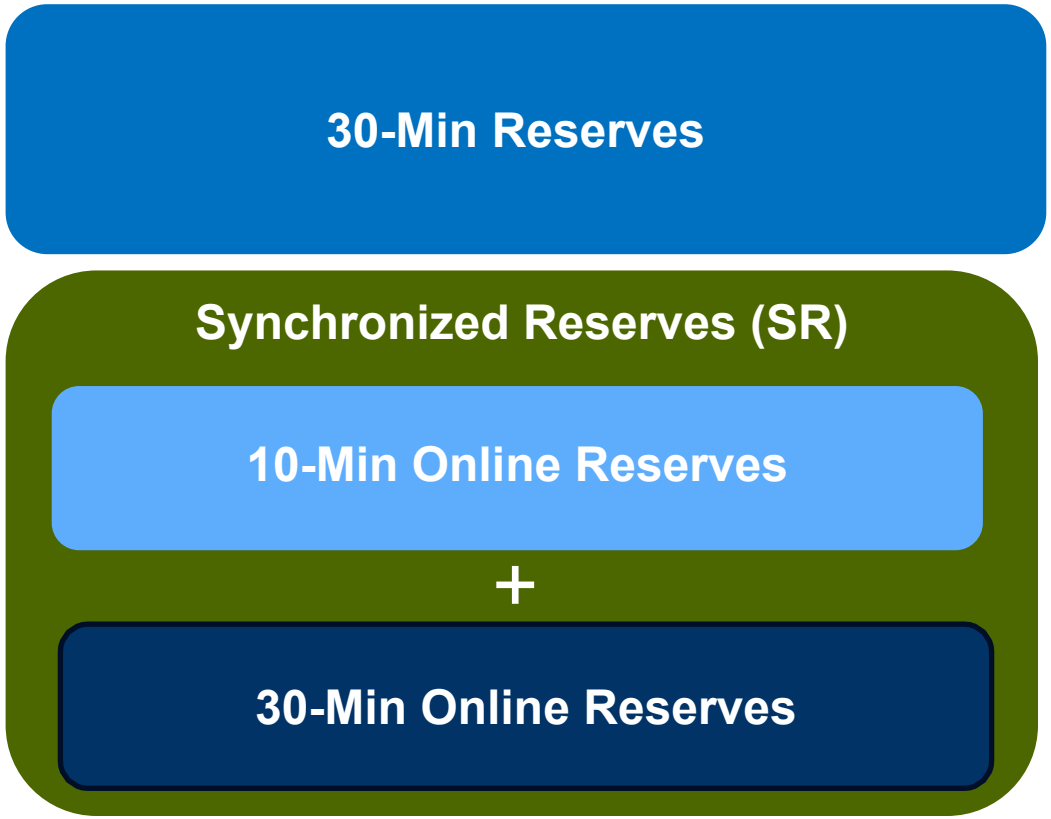
*Unlike the simulation results presented during the May 21, 2026 RCSTF meeting, we do not provide a sensitivity analysis with 1/3rd and 2/3rd cases.

# Introduction (cont.)

- Base Case




- Full Case



# 2025 Summary Statistics

- The following table shows a summary of the yearly* simulation results**.

| Category | Metric | Product/Type | Base Case | Multi-step ORDC | Multi-step ORDC – Base Case |
|---|---|---|---|---|---|
| Energy | Gen-Weighted Avg. LMP ($/MWh) | N/A | 42.78 | 43.58 | 0.80 |
| Reserves | Avg. MCP ($/MWh) | 10-Min Online | 10.25 | 13.04 | 2.79 |
| | | Primary | 10.19 | - | - |
| | | 30-Min Online | - | Included in 10-Min Online product | - |
| | | 30-Min | 0.00 | 0.00 | 0.00 |

- Uplift*** reduced by 3.80% in the Multi-step ORDC Case.

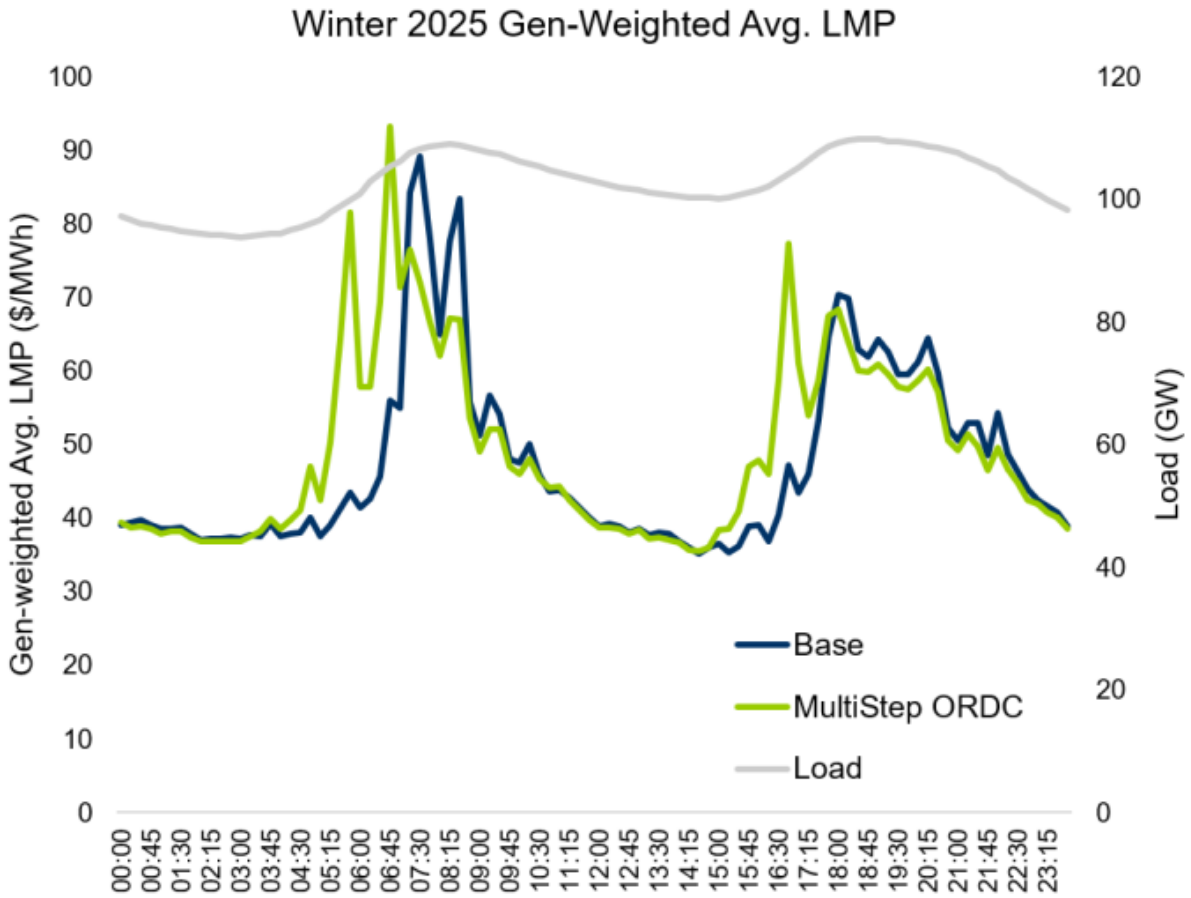
*The following days are excluded from the results due to non-convergence and other data issues: 3/2, 3/9, 5/5, 6/24, 6/25, 6/27, 6/29, 8/4, 8/5, 8/11, 11/2, 11/12, 11/16, 11/26

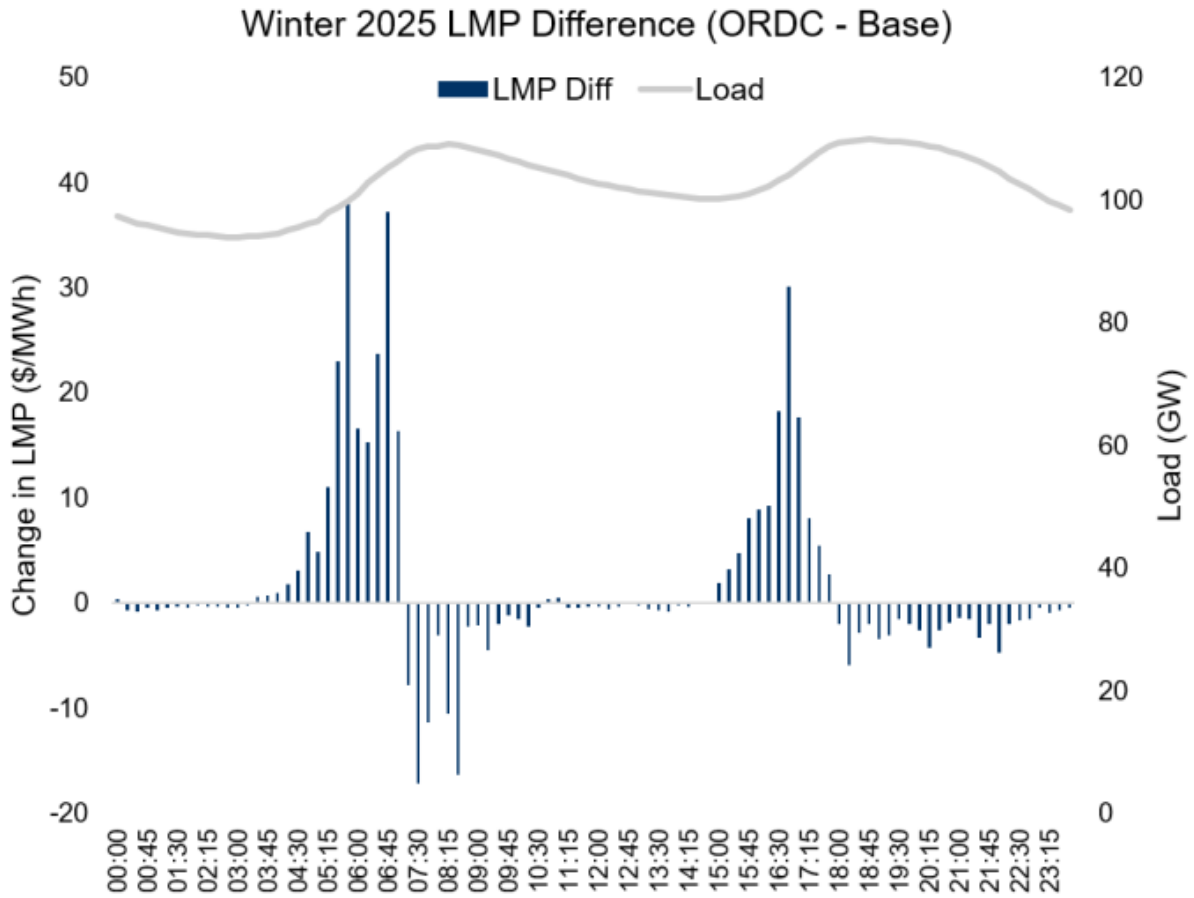
**The results are rounded to two decimal places.

***Uplift is calculated as the difference between a unit's costs and revenues over each day summed for all days and units.

# Real-Time Simulation Results – Seasonal LMPs

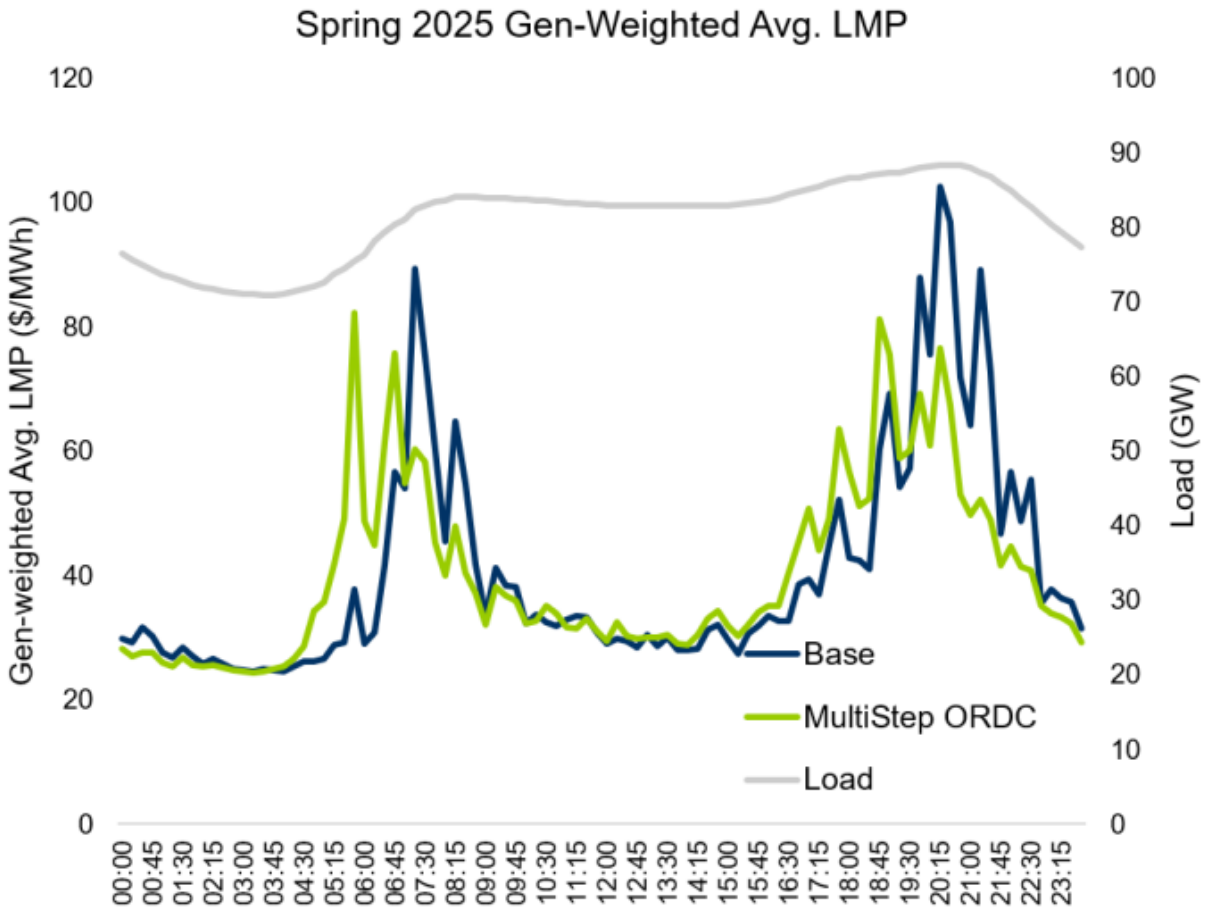
- Winter Generation-Weighted Average LMPs

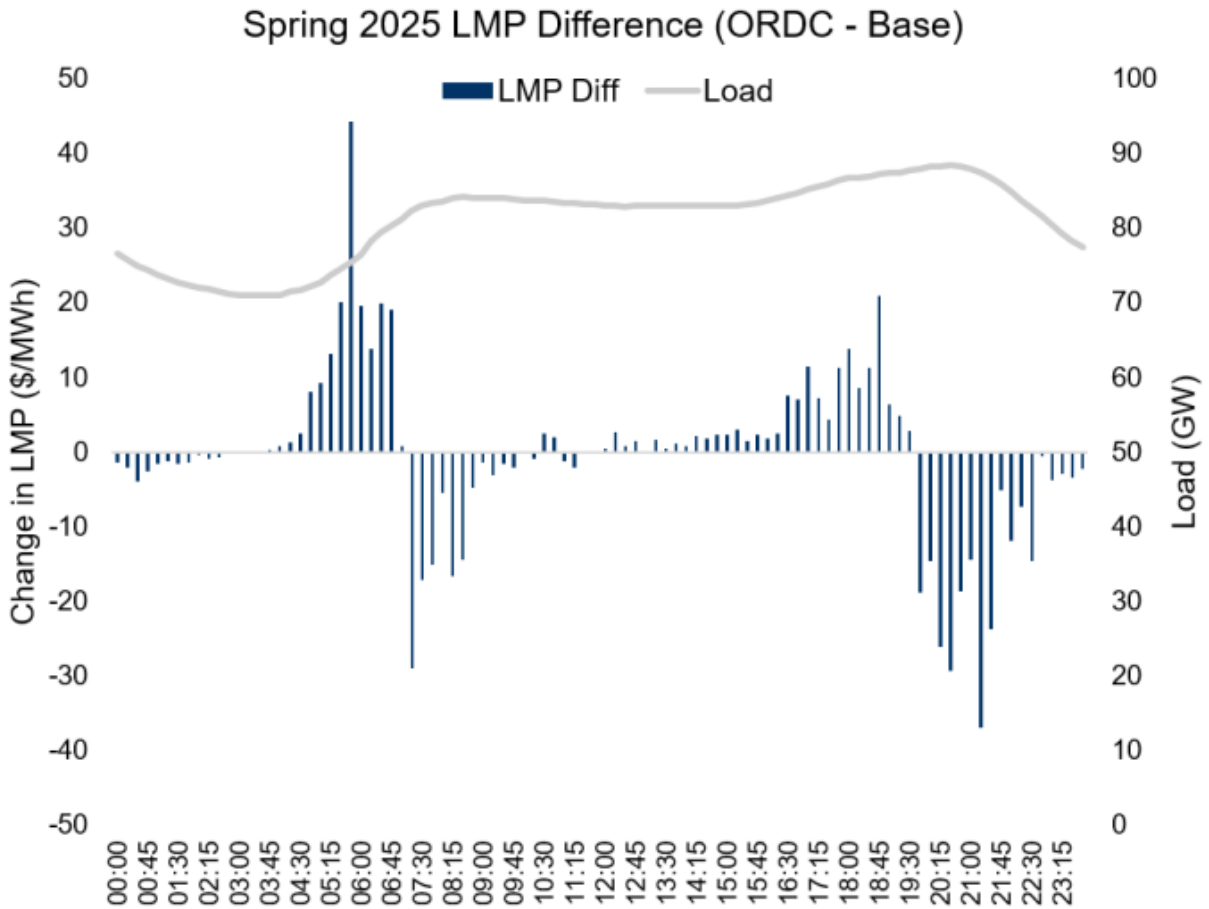


# Real-Time Simulation Results – Seasonal LMPs

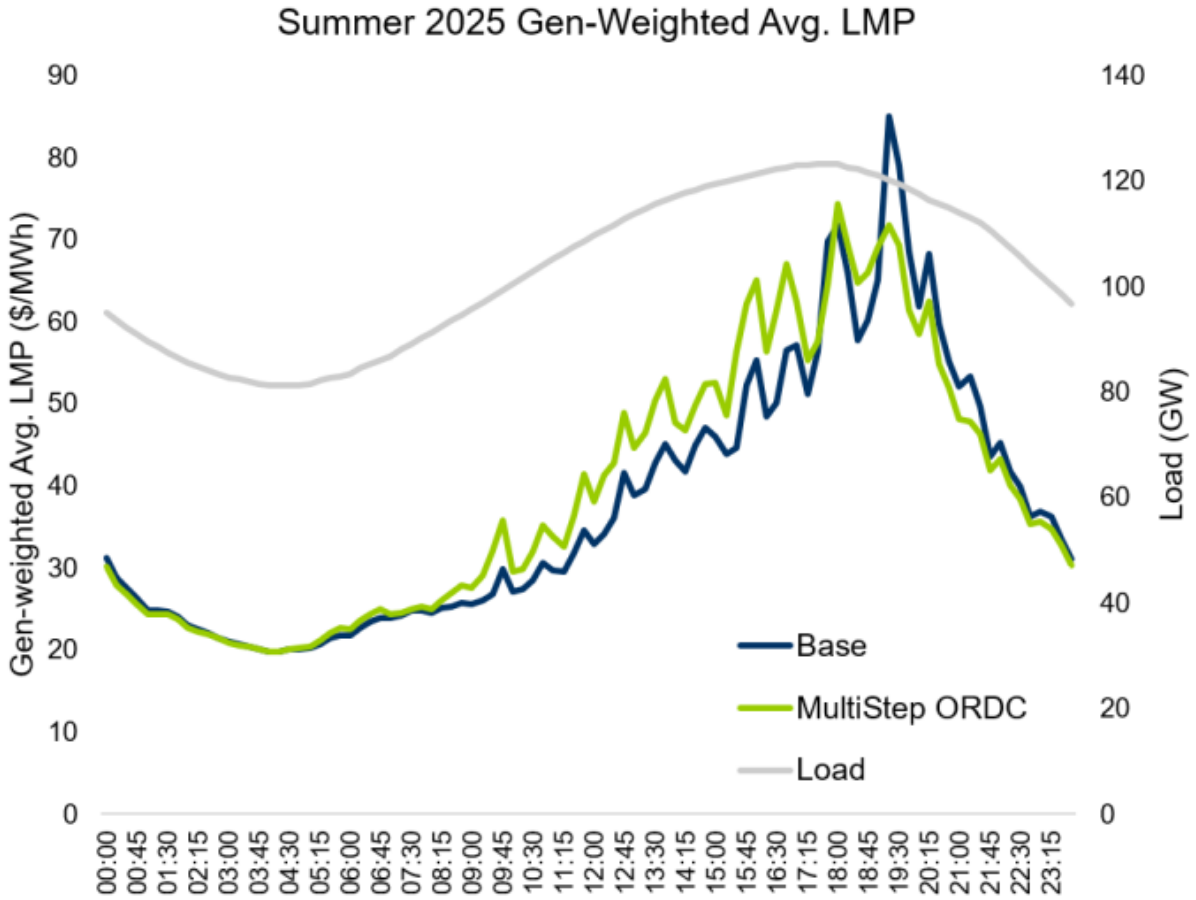
- Spring Generation-Weighted Average LMPs

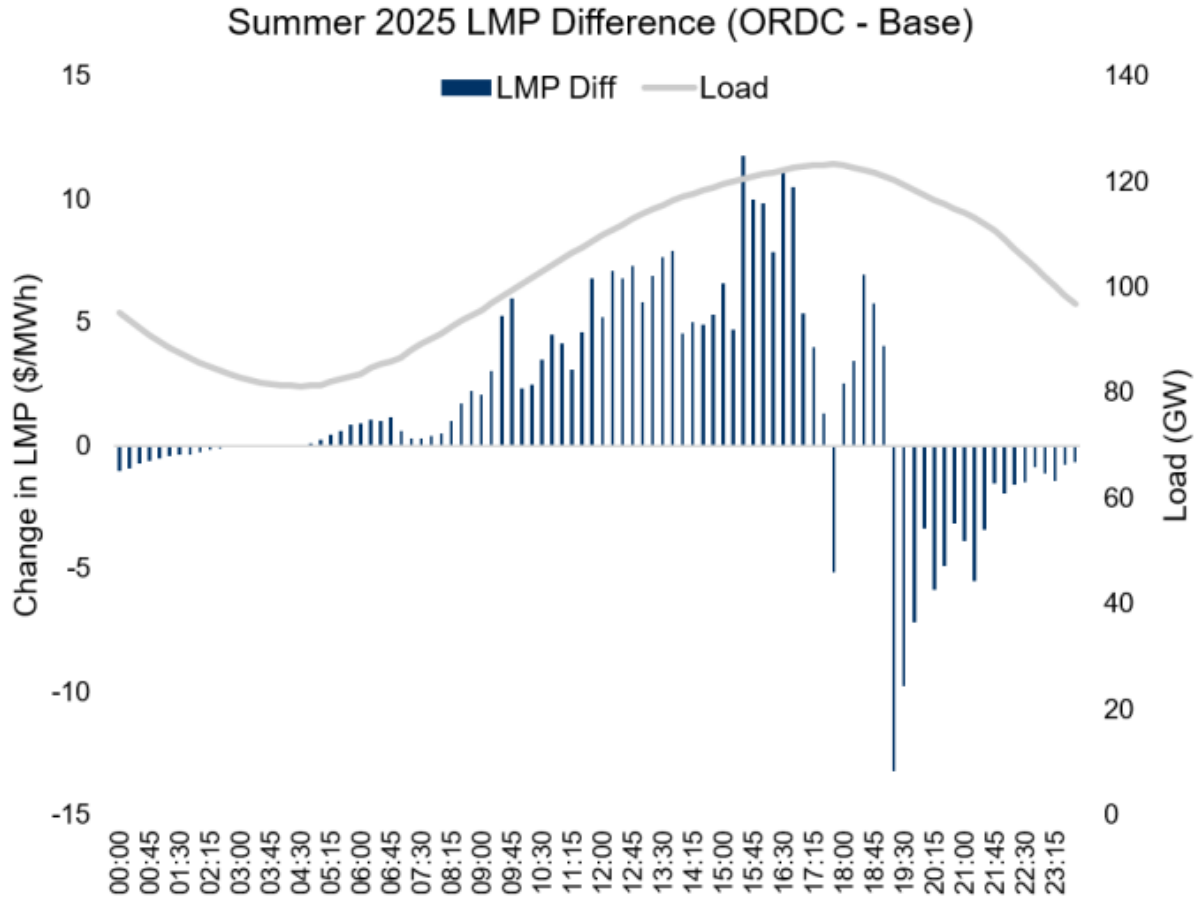


# Real-Time Simulation Results – Seasonal LMPs

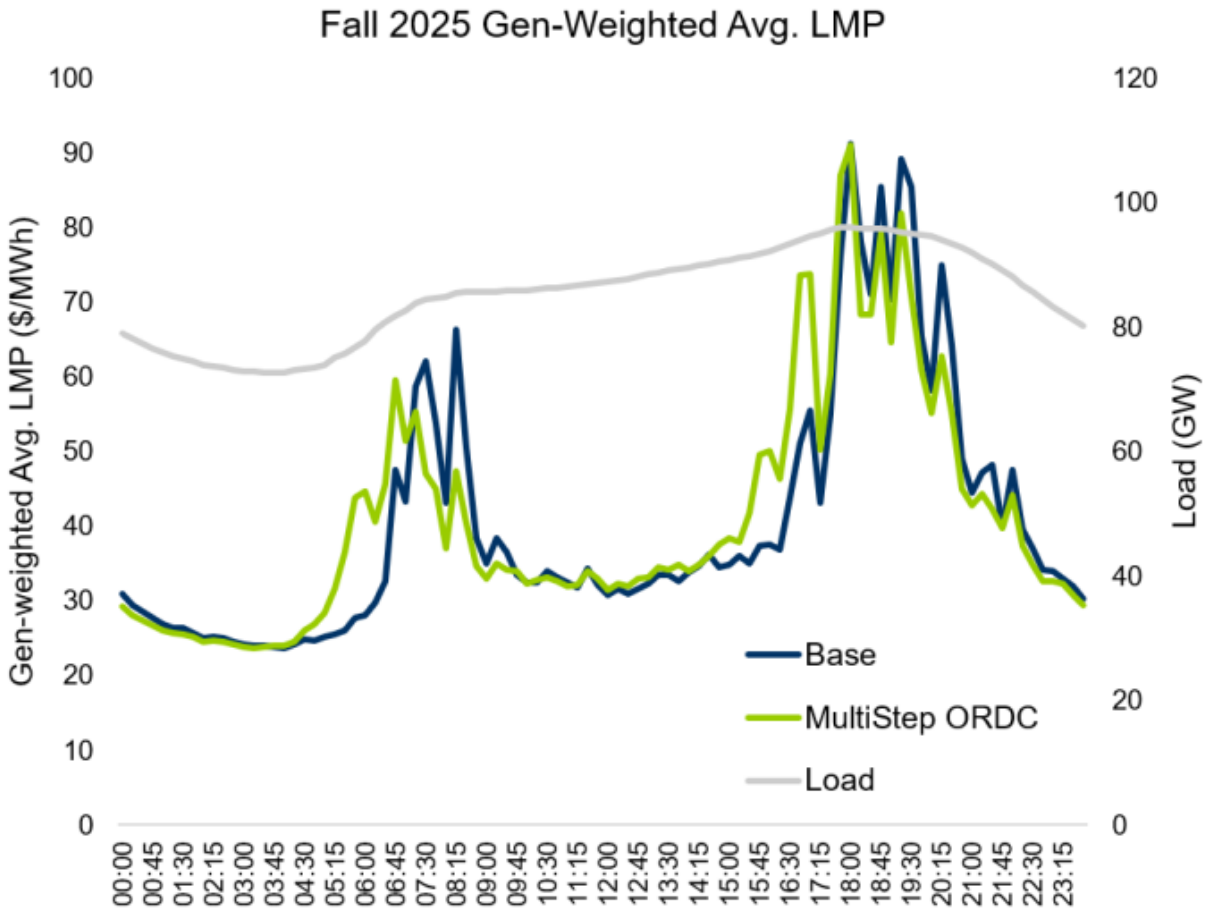
- Summer Generation-Weighted Average LMPs

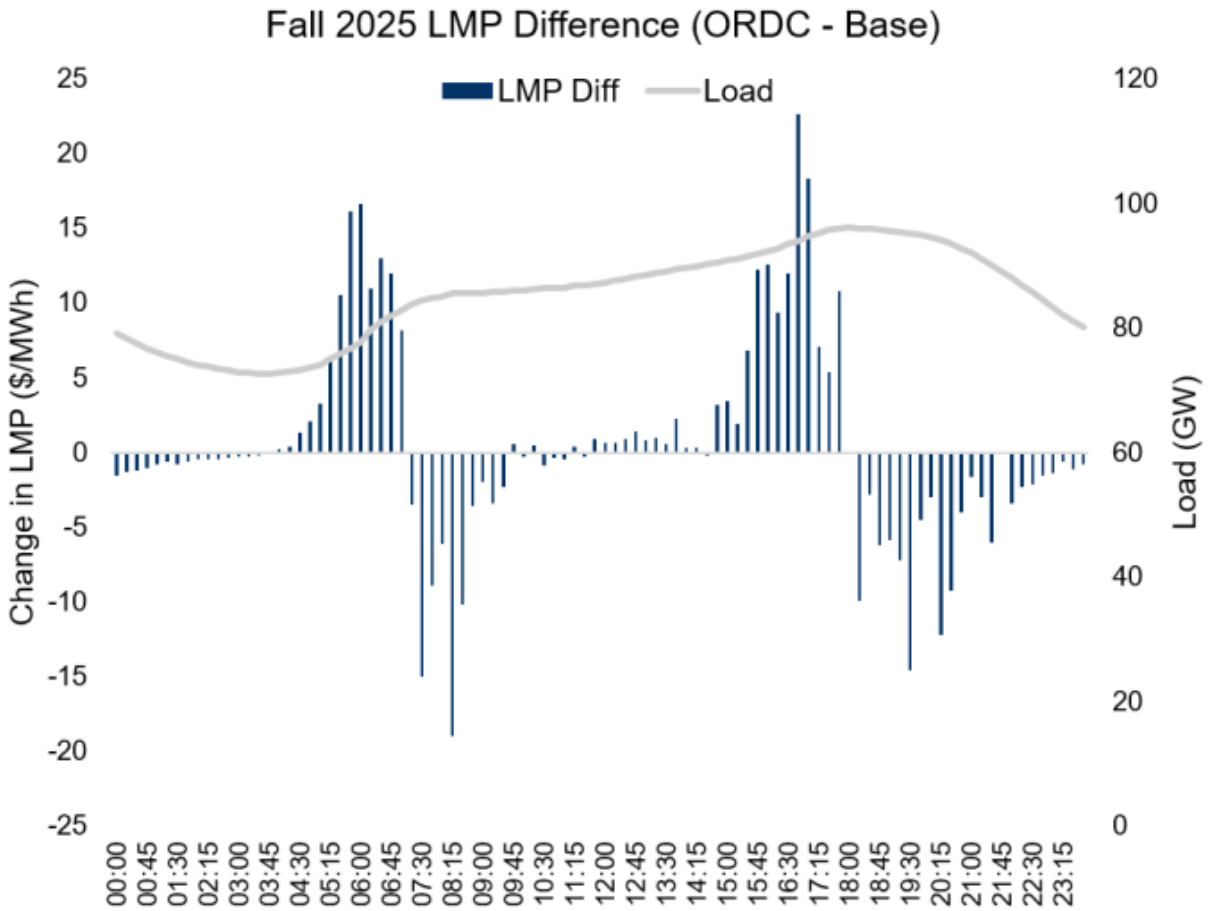


# Real-Time Simulation Results – Seasonal LMPs

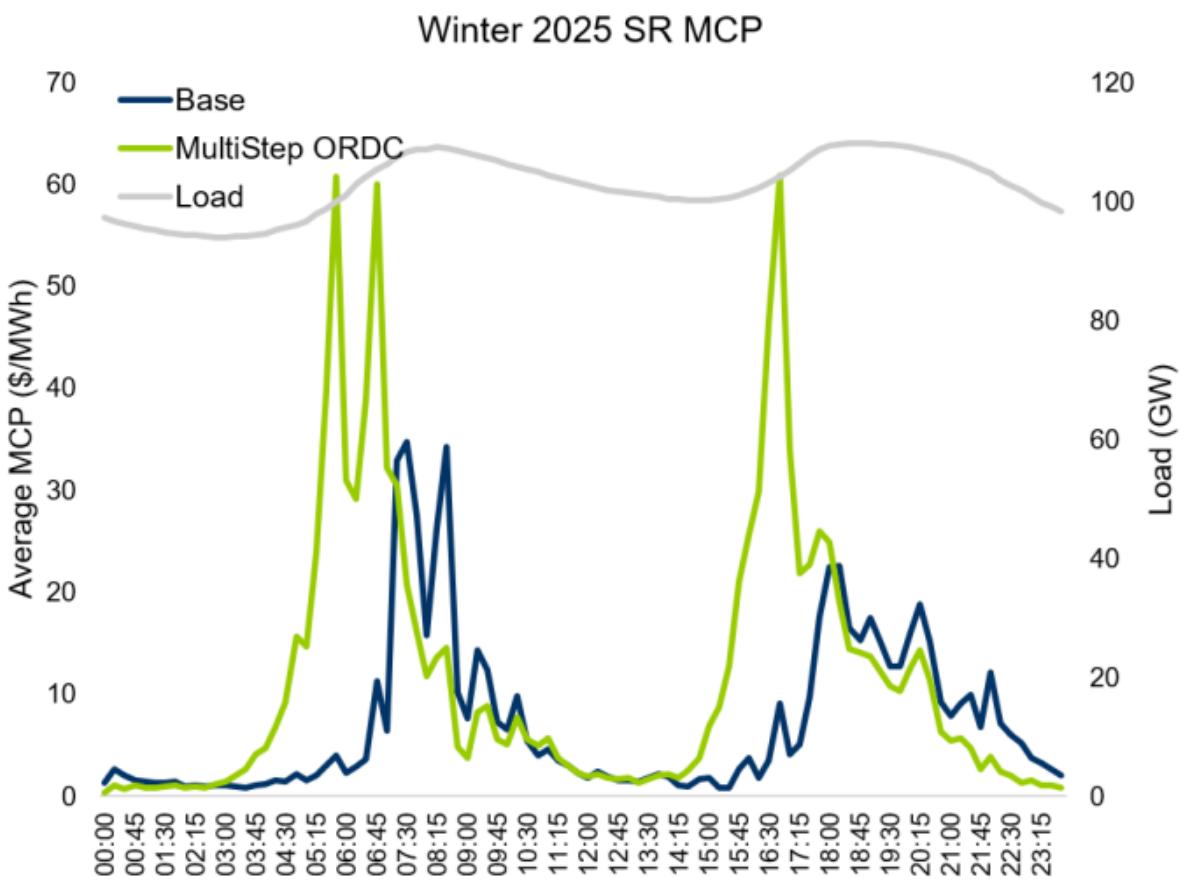
- Fall Generation-Weighted Average LMPs

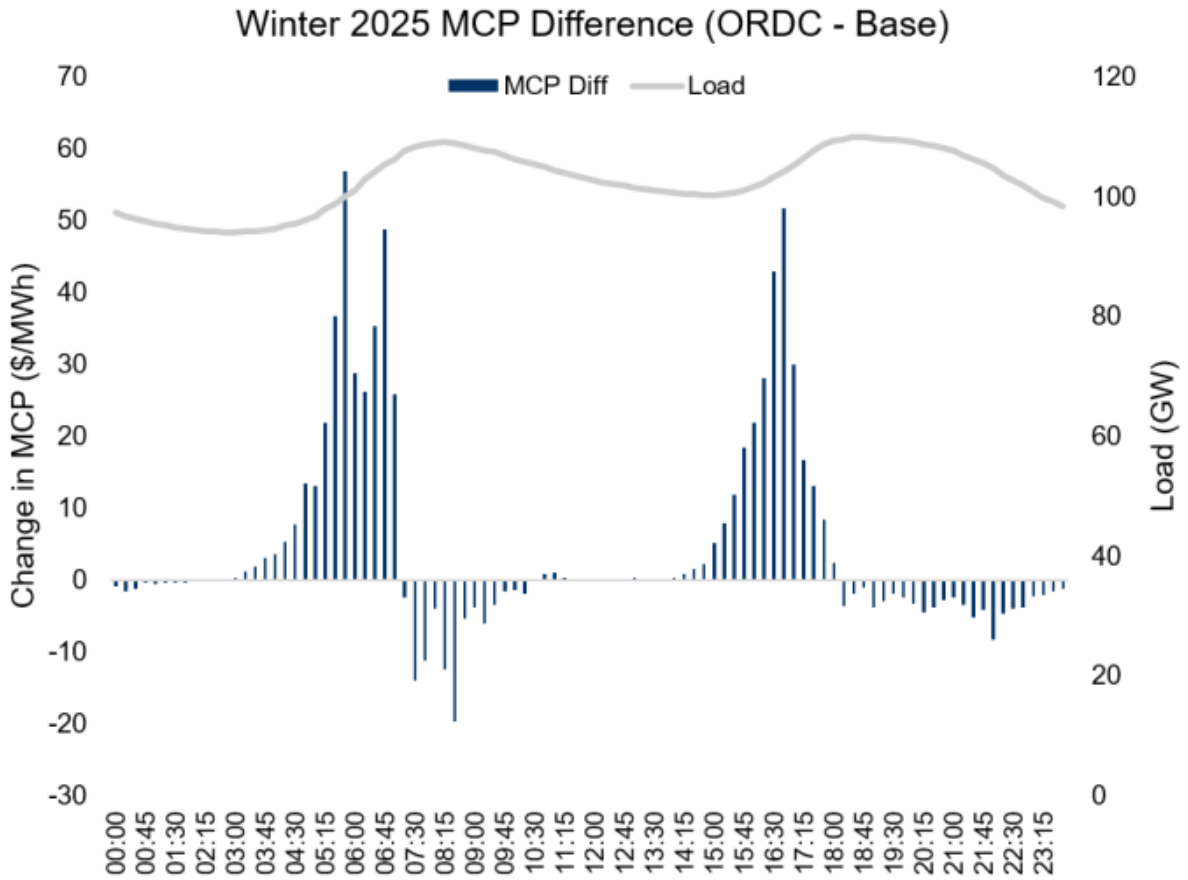


# Real-Time Simulation Results – AS MCPs

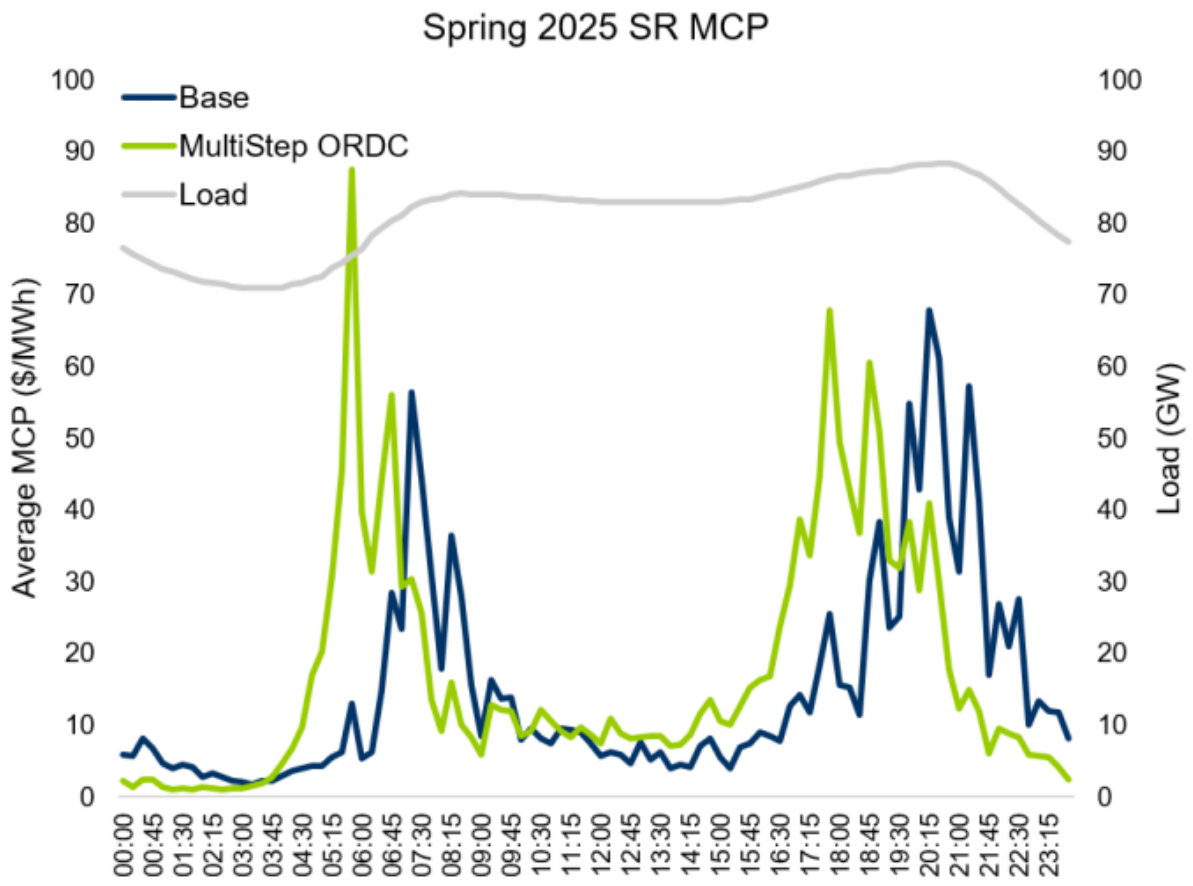
- Winter Average SR MCPs

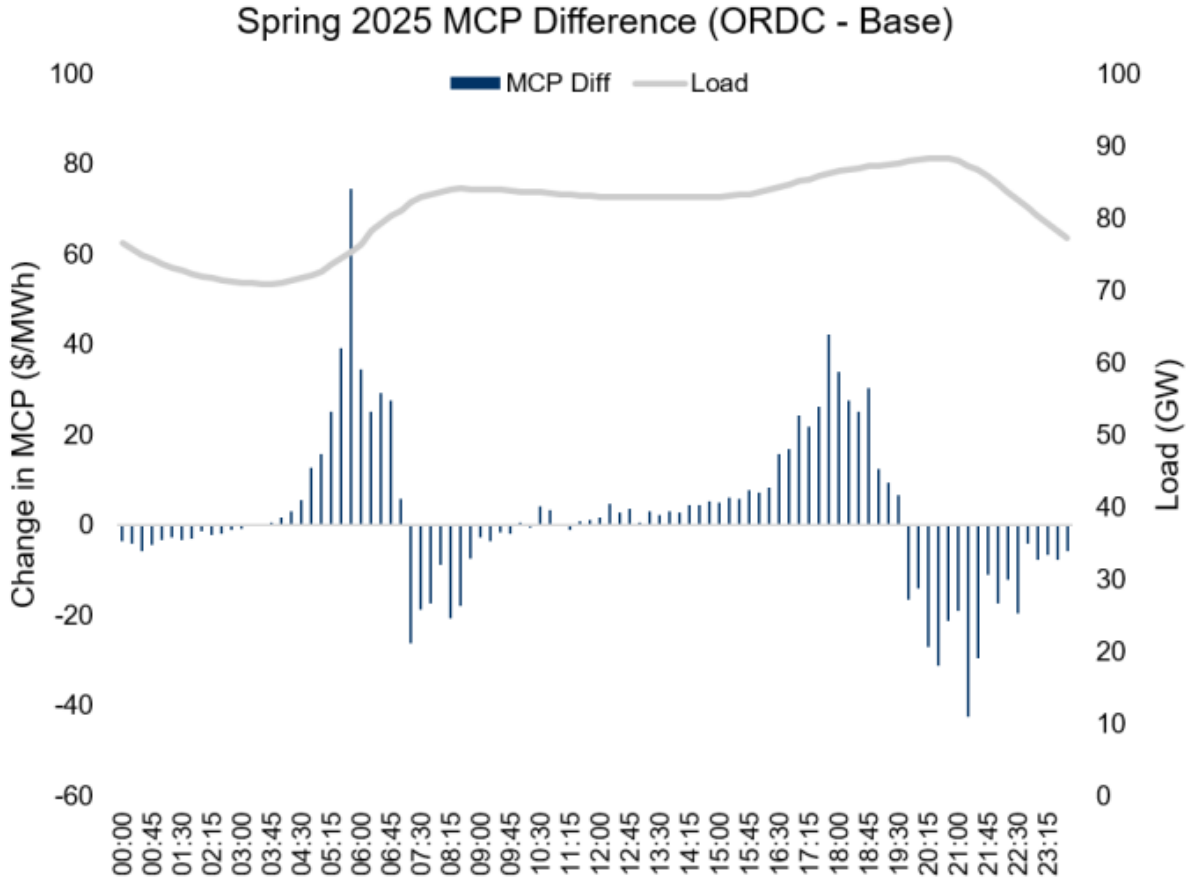


# Real-Time Simulation Results – AS MCPs

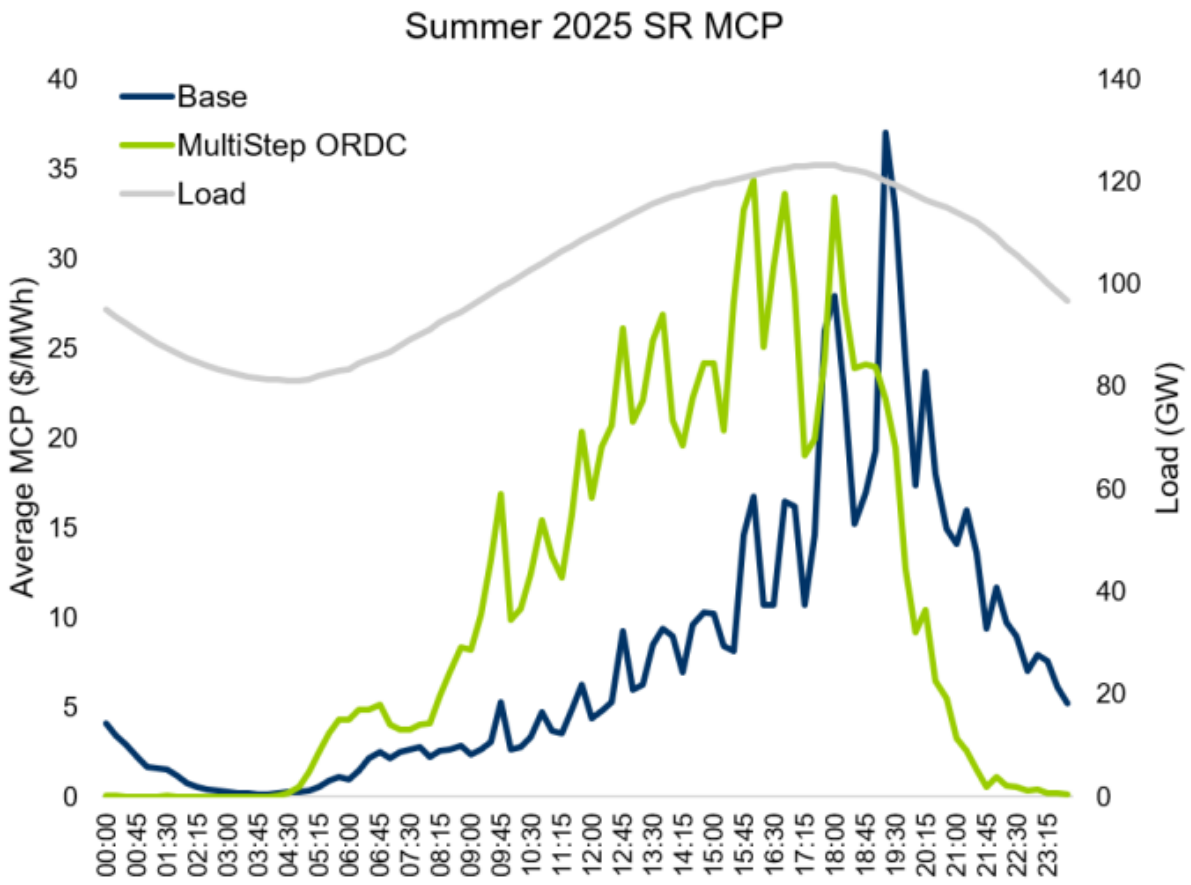
- Spring Average SR MCPs

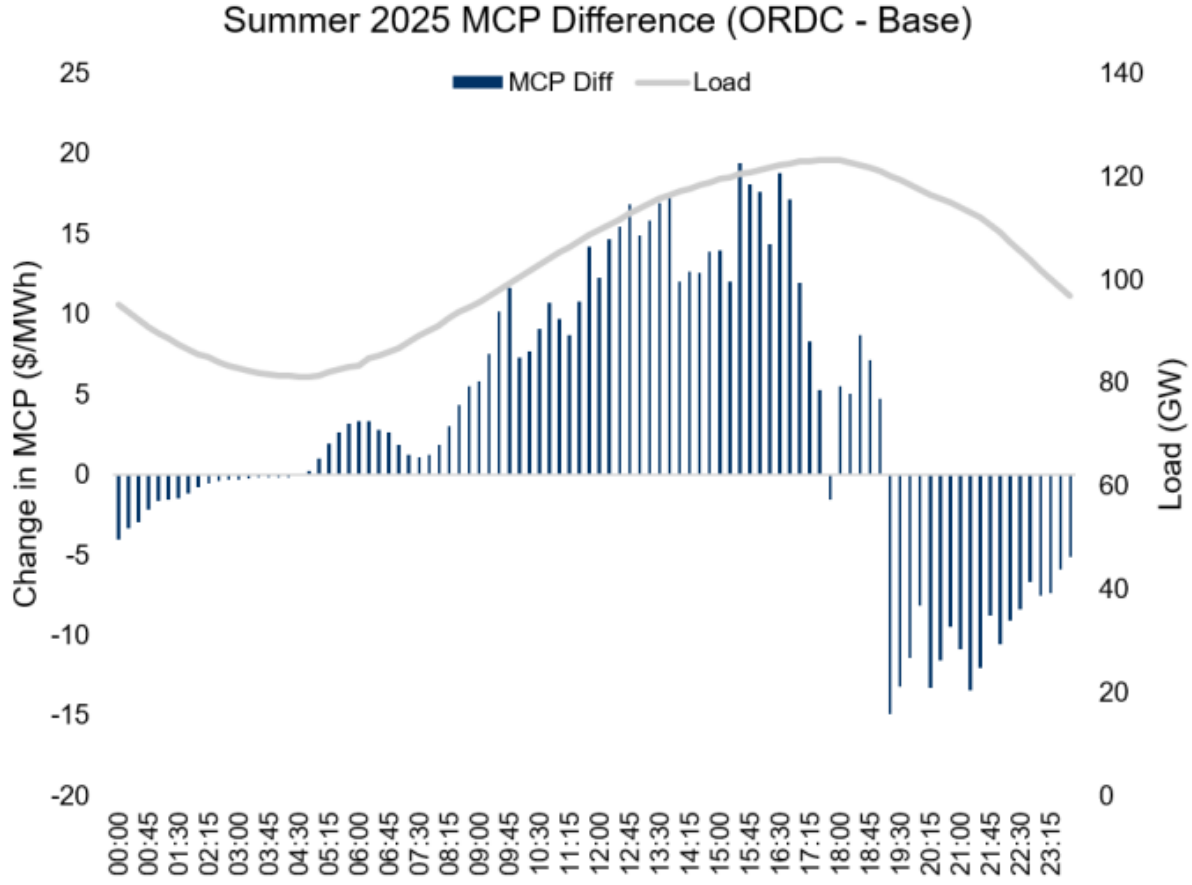


# Real-Time Simulation Results – AS MCPs

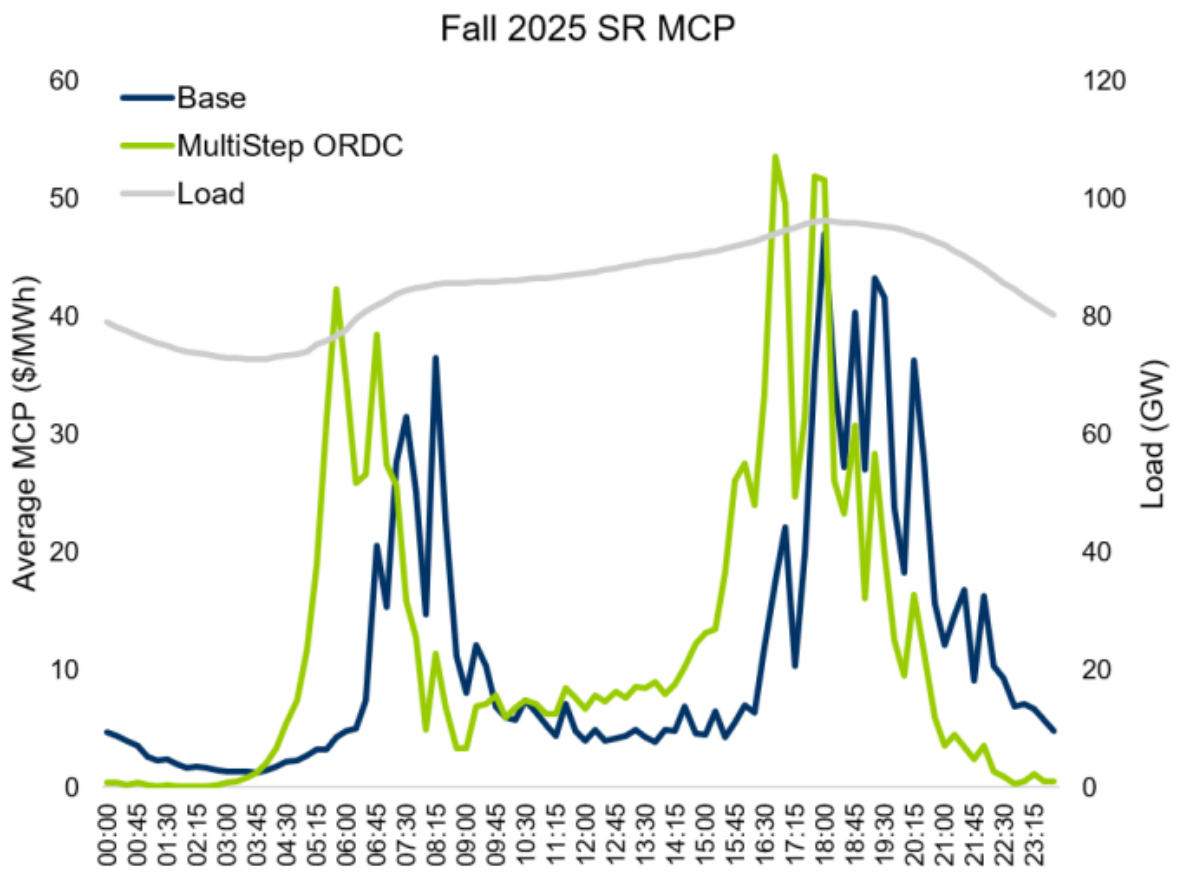
- Summer Average SR MCPs

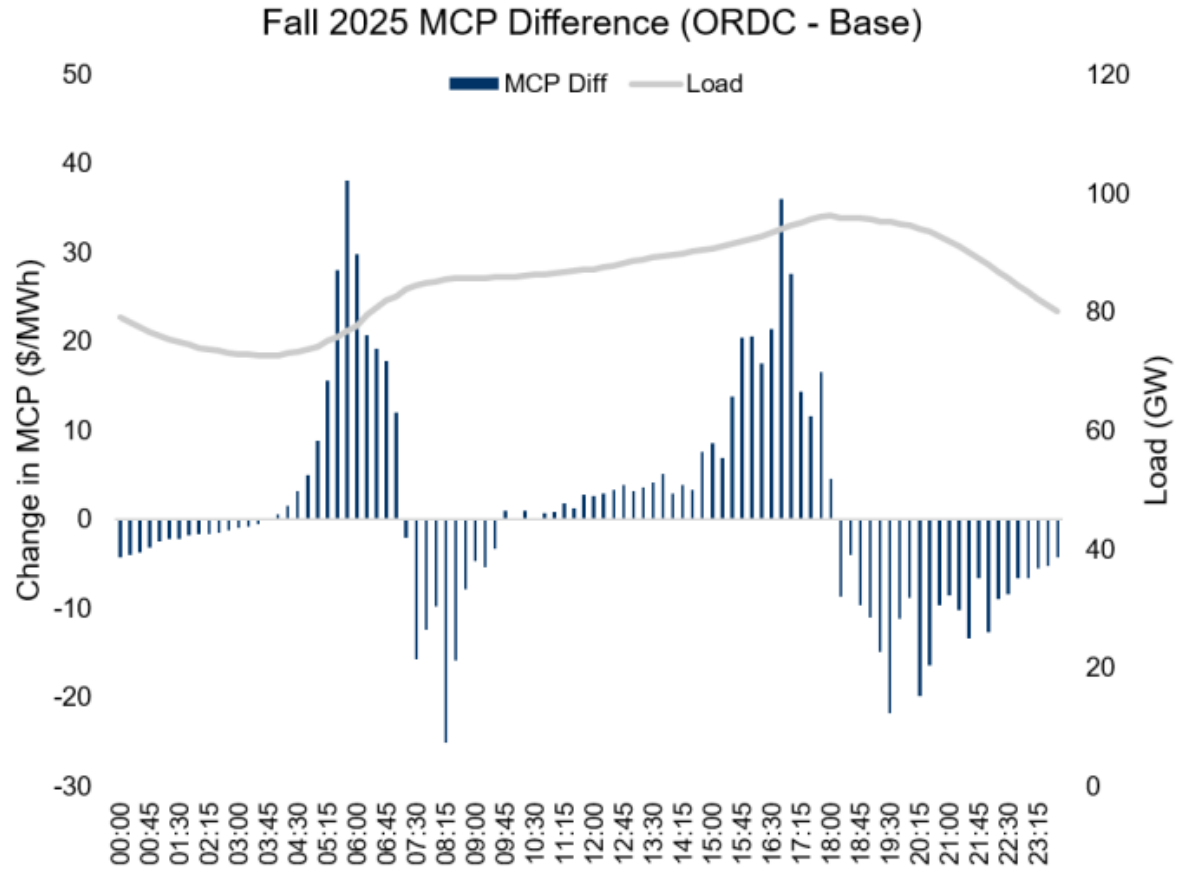


# Real-Time Simulation Results – AS MCPs

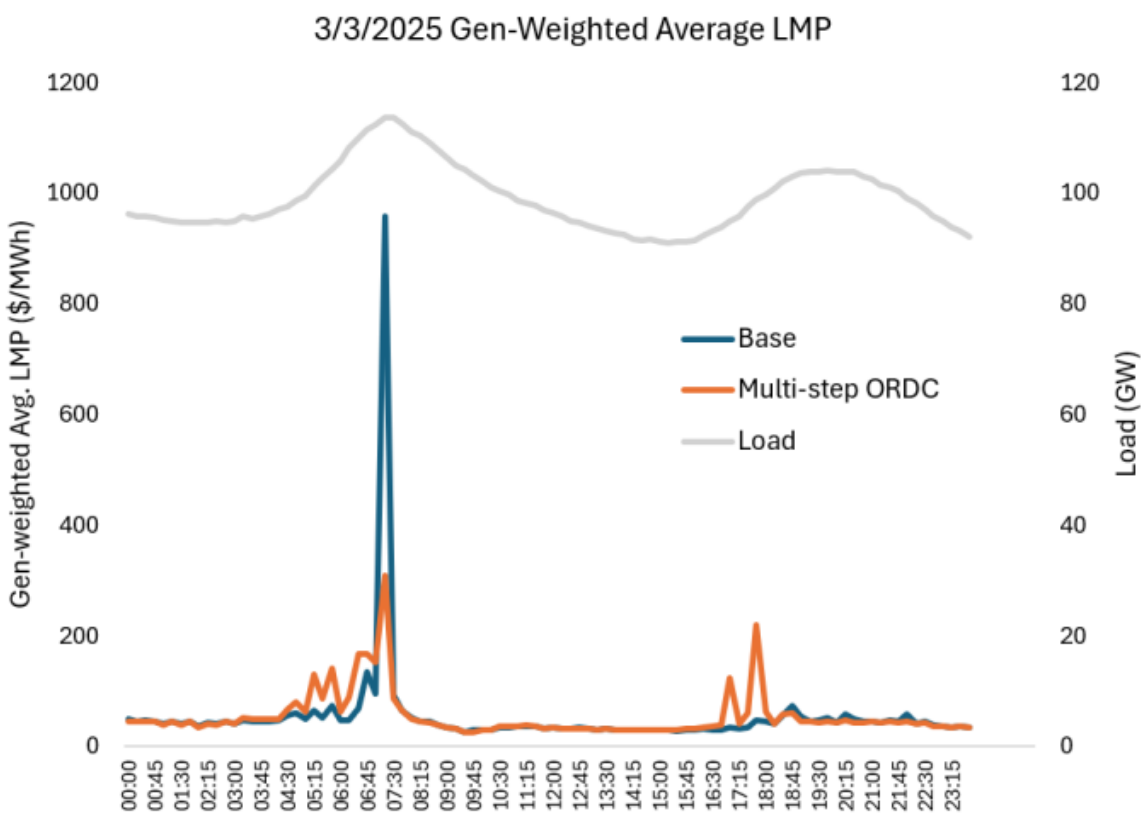
- Fall Average SR MCPs

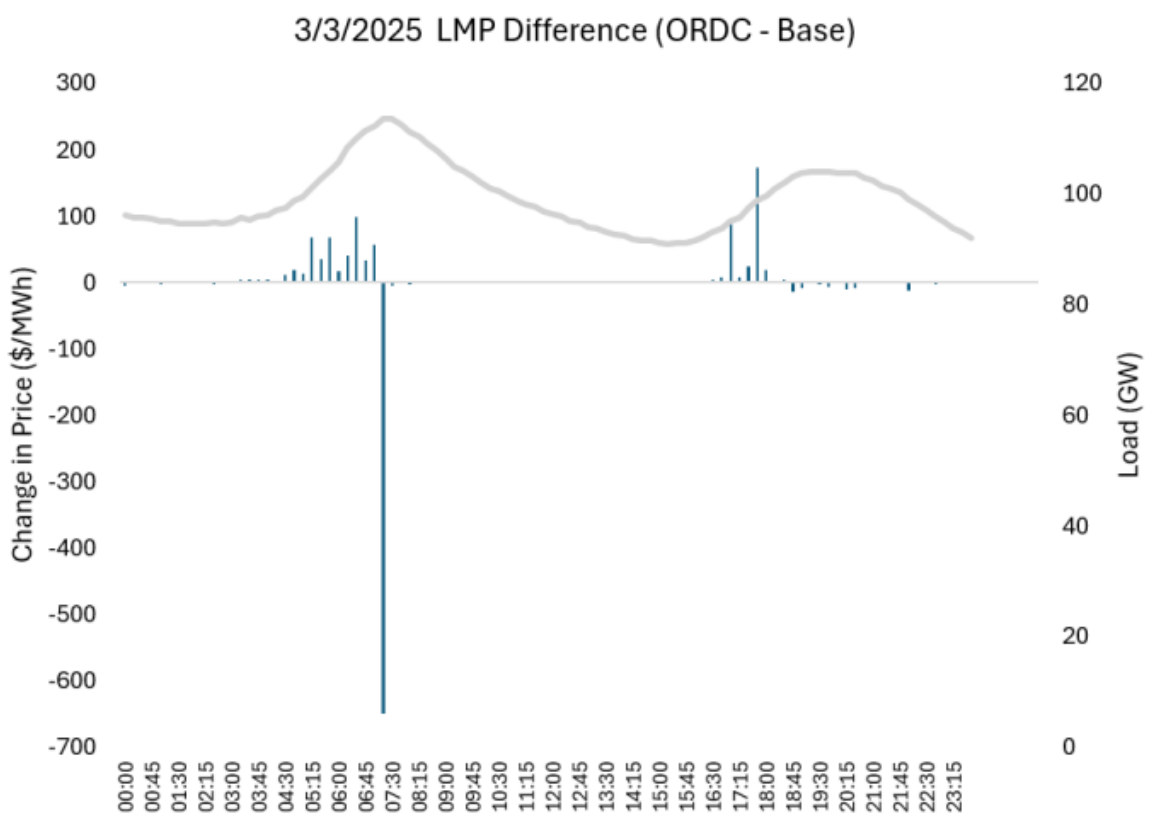


# Reserve Shortage Event 1 – LMP Outcome

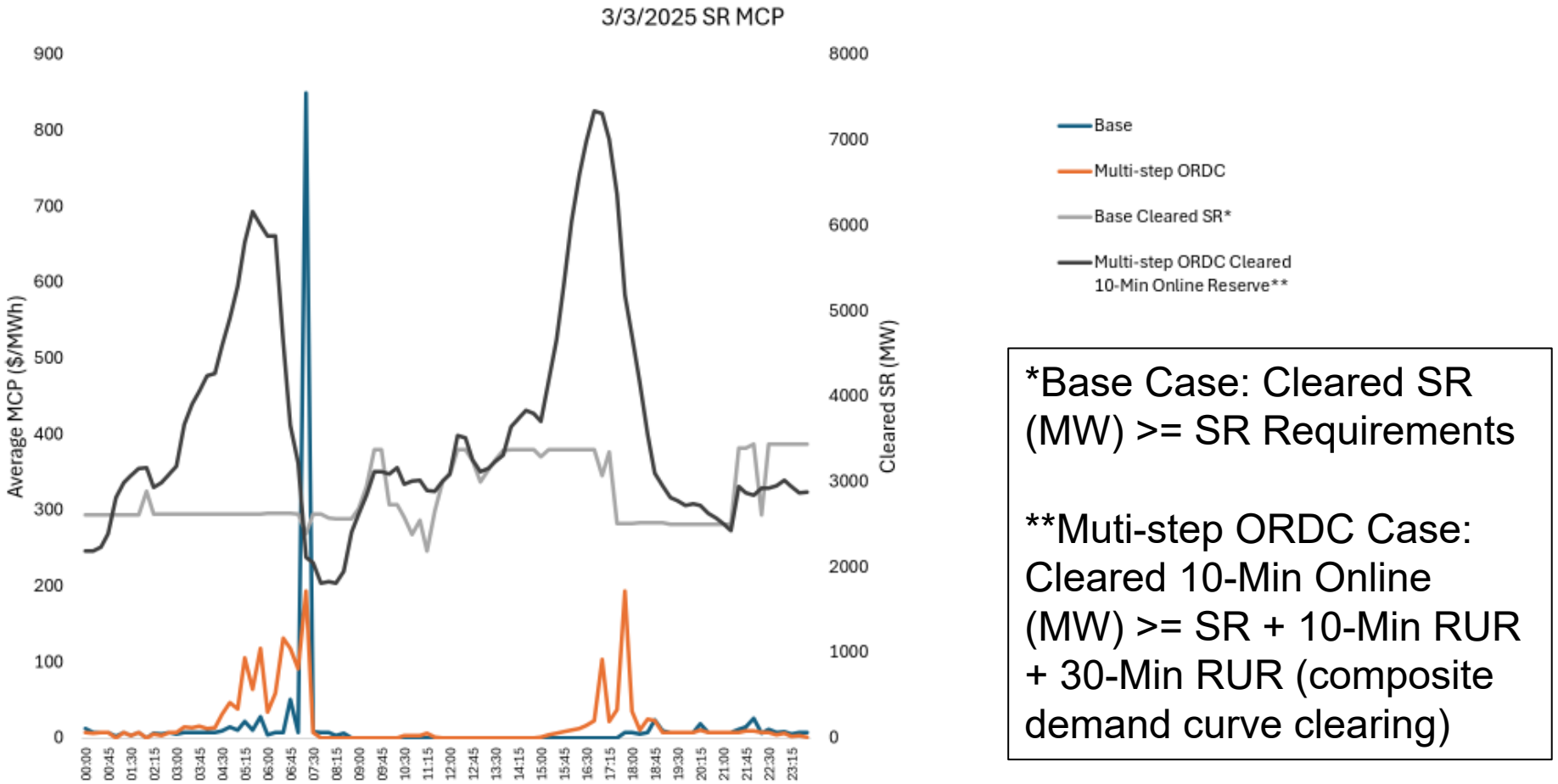
- LMPs on 3/3/2025



# Reserve Shortage Event 1 – AS MCP Outcome

- 10-Min Online Reserve MCPs on 3/3/2025

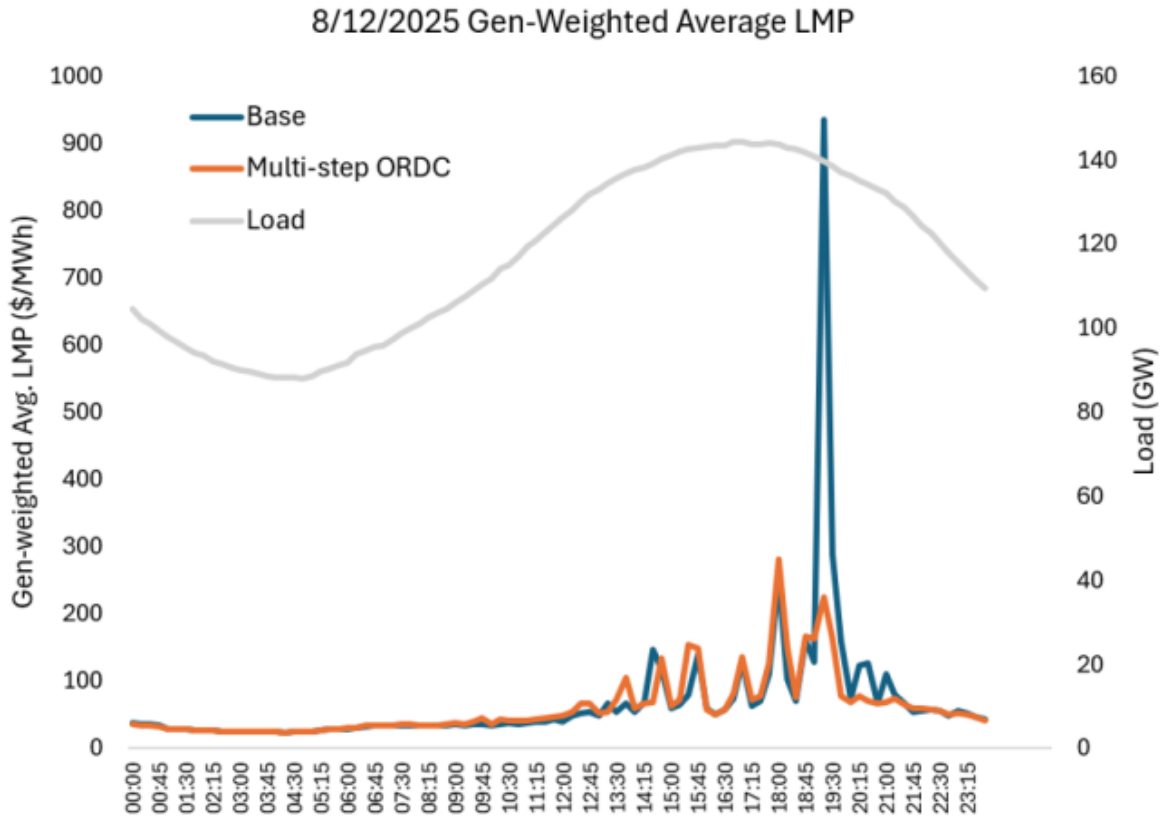


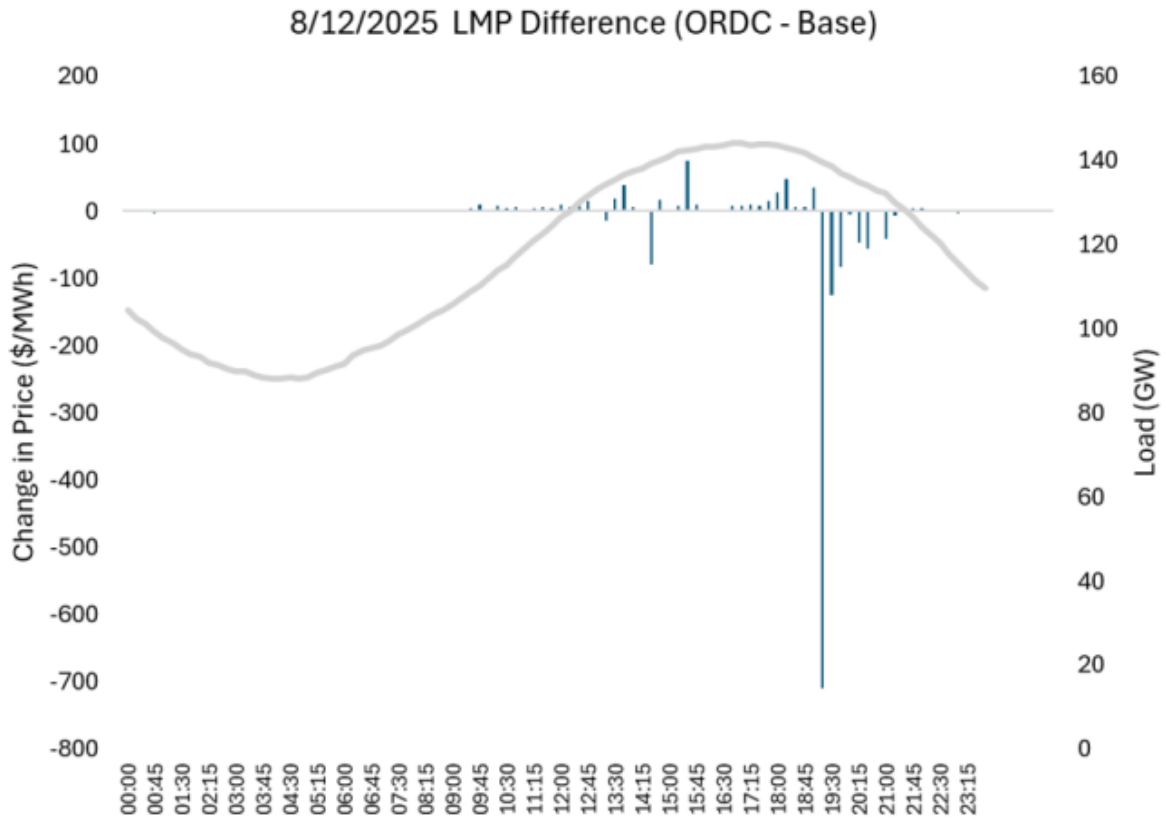

*Base Case: Cleared SR (MW) >= SR Requirements

**Muti-step ORDC Case: Cleared 10-Min Online (MW) >= SR + 10-Min RUR + 30-Min RUR (composite demand curve clearing)

# Reserve Shortage Event 2 – LMP Outcome

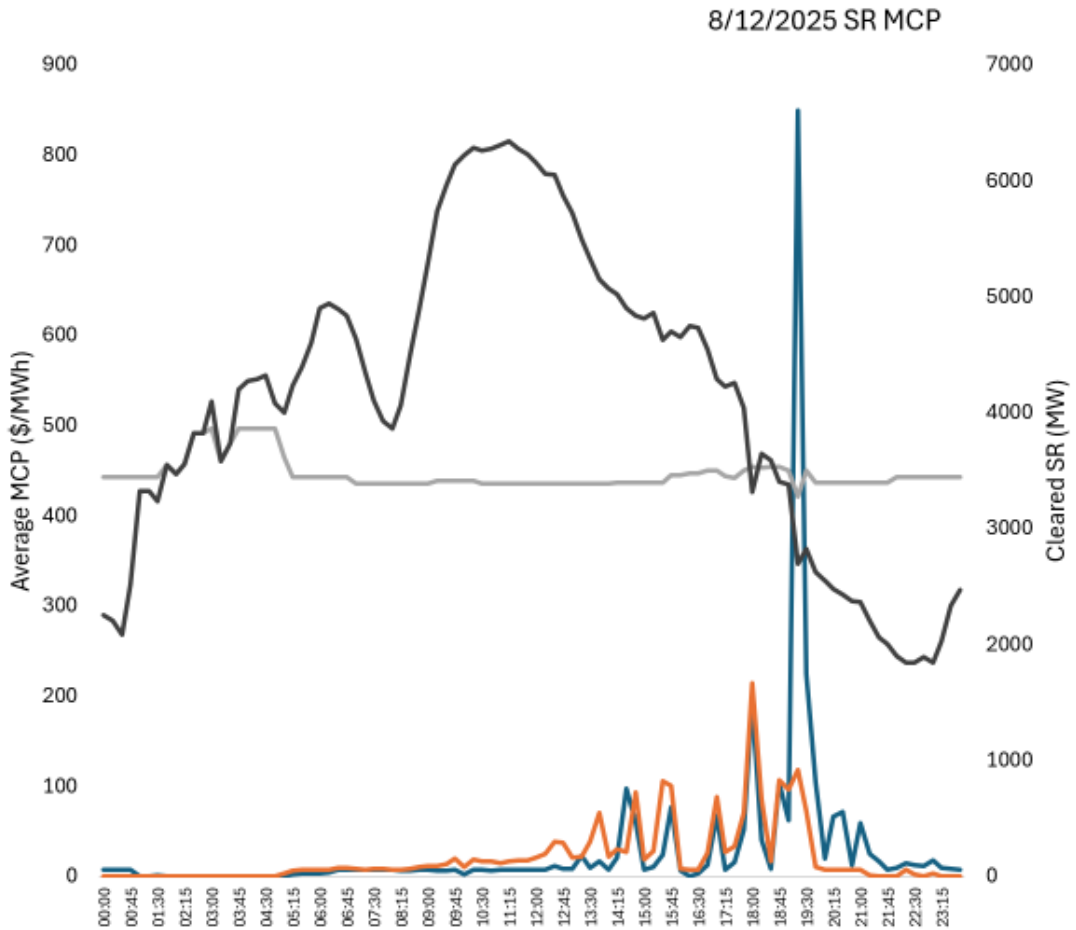
- LMPs on 8/12/2025



# Reserve Shortage Event 2 – AS MCP Outcome

- 10-Min Online Reserve MCPs on 8/12/2025




*Base Case: Cleared SR (MW) >= SR Requirements

**Muti-step ORDC Case: Cleared 10-Min Online (MW) >= SR + 10-Min RUR + 30-Min RUR (composite demand curve clearing)

# Load Payment Comparison

- The following table shows an approximate yearly real-time load* payment comparison between the cases.
- Note: these costs cannot be simply added to those of the Day-Ahead Market simulation results load payments posted with the May 1, 2026 RCSTF meeting materials.

| Category | Metric | Product/Type | Base Case | Multi-step ORDC | Multi-step ORDC – Base Case |
|---|---|---|---|---|---|
| Energy | Load Payment ($M) | N/A | 37,401 | 38,182 | 781 |
| Reserves** | Load Payment ($M) | 10-Min Online | 261 | 477 | 216 |
| | | Primary | 39 | - | -39 |
| | | 30-Min Online | - | Included in 10-Min Online product | - |
| | | 30-Min | 0 | 0 | 0 |

**The reserves $ impact includes both changes in yearly average MCP and MW provision between the cases.

# Load Payment Comparison (cont.)

- The load payment costs presented on the previous slide cannot be simply added to those of the Day-Ahead Market simulation results load payments posted with the May 1, 2026 RCSTF meeting materials.
- PJM uses a two-market settlement system where only balancing energy and reserves are settled on the Real-Time Market prices.
- The payments on the preceding slide assume **all** load and reserves are settled at the Real-Time Market prices, which is not an accurate reflection of reality, and will be an overestimation of actual load payments, in addition to the overestimation caused by adding the 30-Min Online Reserve requirement to the SR requirement.
- Over all days in 2025, the median amount of total daily RT load cleared in the DAM was 96.7% and the minimum amount was 89.1%. In summary, only a small fraction of load is settled at Real-Time Market prices.
- The calculations are being provided for informational purposes only.

# Simulation Results Summary

- Seasonal generation-weighted average LMPs remain broadly similar between the Base Case and the Multi-step ORDC Case with increases occurring just before the peak hours and decreases occurring after the peak hours.
- Seasonal hourly-average ancillary MCPs generally show higher prices in the Multi-step ORDC Case across all seasons due to the increased requirements. Specifically, prices increased leading into the peak hours, and decreased after the peak hours.
- The total uplift for 2025 reduced in the Multi-step ORDC Case.
- Days with reserve shortages in the Base Case show the benefits of prepositioning the system with the ramping products in the Multi-step ORDC Case reducing the frequency of scarcity events.

# Key Takeaways

| 1 | 2 | 3 |
|---|---|---|
| • New ORDCs increase the reserve requirements when reserves are needed most and decrease them when they are not needed as much compared to the status quo. | • Prepositioning units with the ramping products reduces the frequency of scarcity events. | • Overall, the average impact of the proposed changes to LMPs are minimal. |

# Contact


Facilitator:
Lisa Morelli, Lisa.Morelli@pjm.com

Secretary:
Amanda Egan, Amanda.Egan@pjm.com

Presenter:
Austin Lin, Austin.Lin@pjm.com


**2025 Real-Time Market Pricing Impacts: Multi-Step ORDCs with Extended Requirements**

Member Hotline

(610) 666 – 8980

(866) 400 – 8980

custsvc@pjm.com

# PROTECT THE POWER GRID

# THINK BEFORE YOU CLICK!

Be alert to malicious phishing emails.

**Report suspicious email activity to PJM.**

(610) 666-2244 / it_ops_ctr_shift@pjm.com