Item 14.3: System Operations Update

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Board of Directors Meeting

ERCOT Public
April 7-8, 2025

Overview

- **Purpose**
  - Provide an update on key operational metrics to the Board of Directors
  - Provide information on recent Ancillary Services performance
  - Provide information on hot topics
- **Voting Items / Requests**
  - No action is requested of the Board of Directors; for discussion only

- **Key Takeaways**
  - The proposed change in NPRR1273 better ensures that PRC is an accurate indicator of the amount of capacity that currently has sufficient energy to support the grid until any needed load shed could be implemented.
  - Multiple Wind, Solar, and Renewable records were set during March 2025.
  - Winter Storm Kingston was the 6th highest Net Load hour for ERCOT.
  - Power electronic Large Load events continue to occur.
  - All key operational metrics are trending well, and all Ancillary Services are performing well.

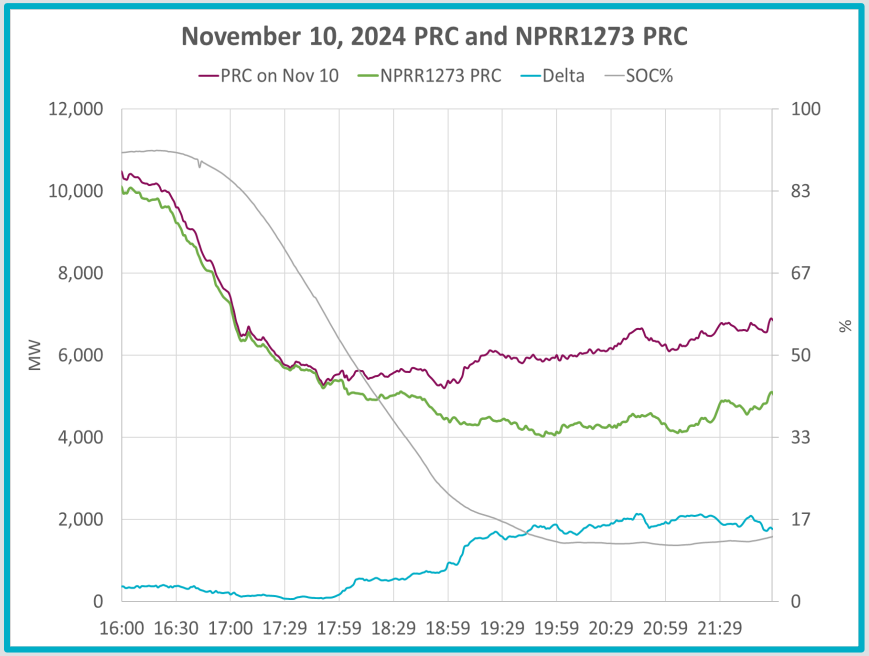
NPRR1273 – Appropriate Accounting of Energy Storage Resource (ESR) headroom in Physical Responsive Capability (PRC)

Introduction to NPRR1273

What? NPRR1273 proposes to change PRC so that any headroom ESRs can sustain for 45 minutes is used rather than for 15 minutes.

Why? November 10, 2024, was a tight operating day due to outages and unusually low wind. Offline Non-Spin was deployed and SCED-dispatchable ECRS was released. Stored energy in ESRs was relied upon for a period of 4 hours to continue serving load.

ESR State of Charge (SOC) declined from 10,707 MWh (~92.73%) to an all-time minimum value of 1,460 MWh (~11.61%) at 9:03 pm. At 9:03 pm, PRC was 6,140 MW, 55.4% of which was from ESRs.



On November 10, 2024, PRC was not a good indicator of how far from the edge the system was operating. From the perspective of energy needs during an EEA Level 3 event, accounting headroom that can be sustained for 15 minutes may not give sufficient time for manual actions.

Key Takeaway: The proposed change in NPRR1273 better ensures that PRC is an accurate indicator of the amount of capacity that currently has sufficient energy to support the grid until any needed load shed could be implemented. With NPRR1273, PRC at 9:03 pm on November 10, 2024 would have been 2,000 MW lower.

Recent Renewable Records

Recent Renewable Records

	Wind	Solar	Renewable
Record Generation	28,550 MW	26,332 MW	39,989 MW
Record Generation Time	3/03/2025 20:42	3/20/2025 12:15	3/18/2025 15:55
Penetration at Record Generation Time	54.36%	56.31%	72.96%

Record Penetration	69.15%	56.60%	76.11%
Record Penetration Time	4/10/2022 1:43	3/20/2025 12:25	3/02/2025 14:45
Generation at Record Penetration Time	23,968 MW	26,324 MW	36,966 MW

Key Takeaway: Multiple Wind, Solar, and Renewable records were set during March 2025.

Peak Net Load Analysis

Peak Net Load Analysis – Top 15 Net Load Hours

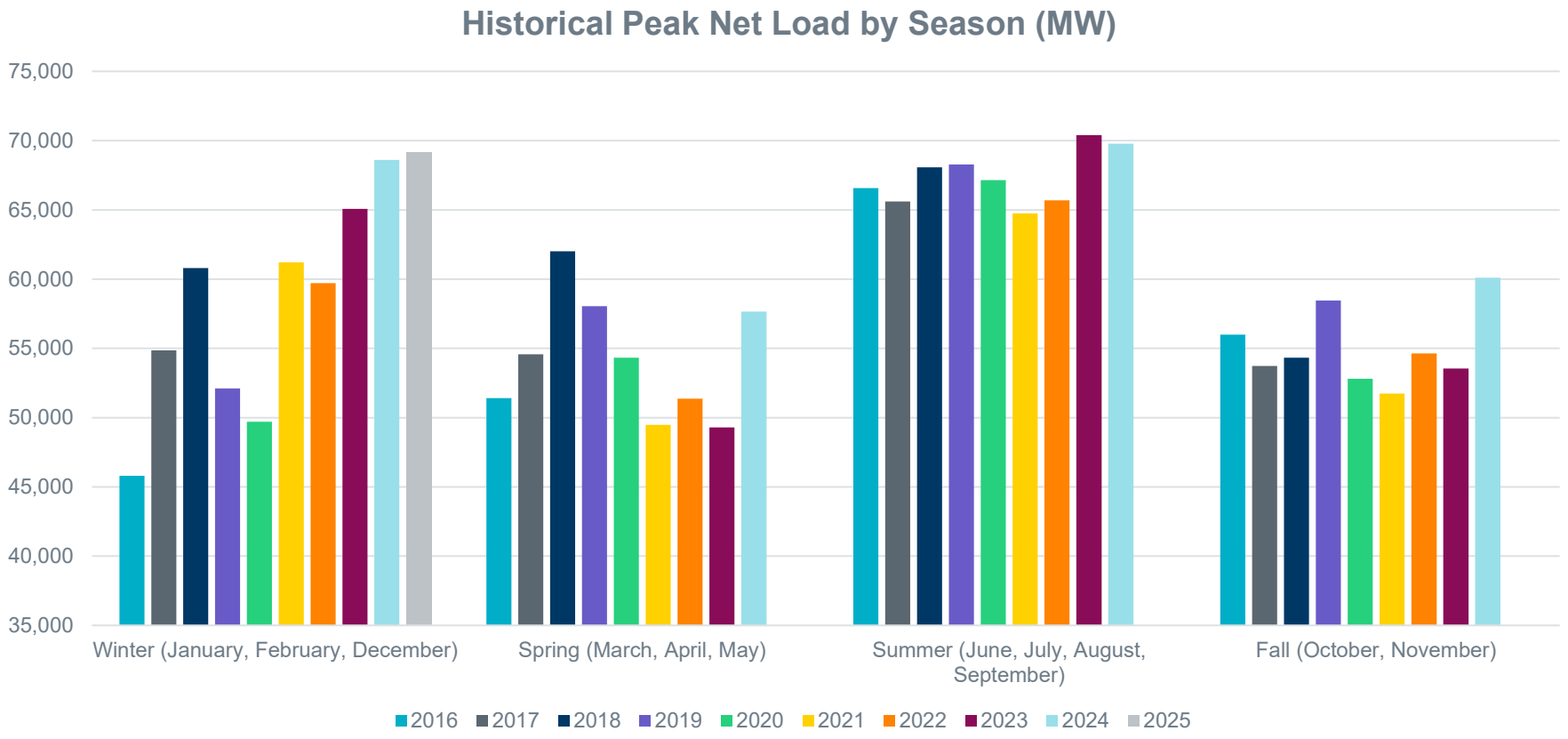
	Time of Hourly Peak Net Load	Hourly Peak Net Load (MW)	Comment
1	8/25/2023 20:00	70,405	
2	9/6/2023 20:00	70,154	EEA2
3	8/17/2023 20:00	69,908	
4	8/20/2024 20:00	69,822	
5	8/25/2023 21:00	69,466	
6	2/20/2025 8:00	69,174	Winter Storm Kingston
7	9/7/2023 20:00	69,172	
8	8/20/2024 21:00	69,118	
9	8/24/2023 20:00	69,073	
10	2/20/2025 7:00	68,822	Winter Storm Kingston
11	8/24/2023 21:00	68,641	
12	1/16/2024 8:00	68,599	Winter Storm Heather
13	8/6/2024 20:00	68,473	
14	8/6/2024 21:00	68,455	
15	8/11/2015 16:00	68,446	

Key Takeaway: Winter Storm Kingston was the 6th highest Net Load hour for ERCOT.

Notes:

- Net Load = Load – Wind – Solar
- Battery charging was removed from the Load.
- The light grey text indicates a repeat day within the table.

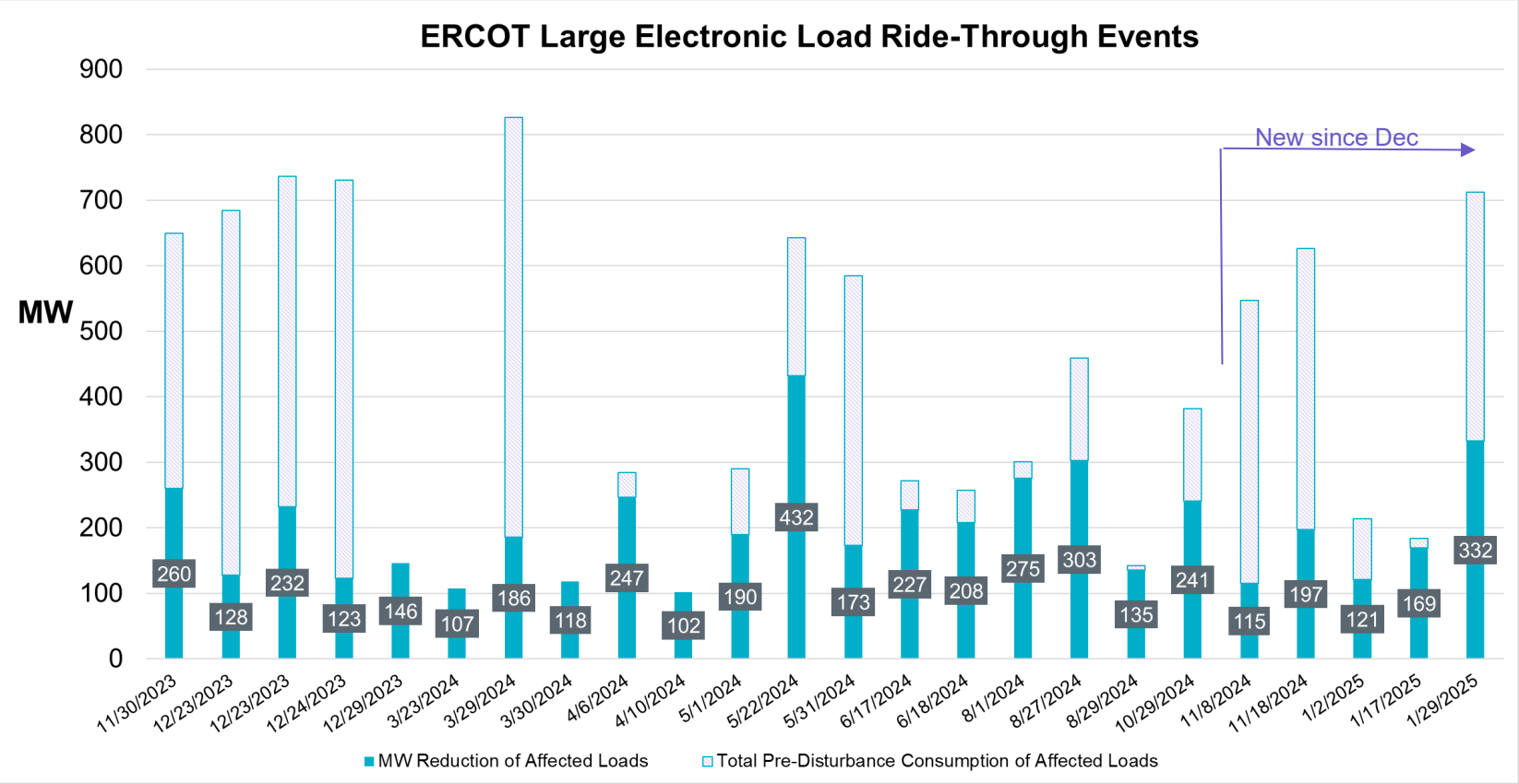
Peak Net Load Analysis – Seasonal Peaks



Key Takeaway: When looking at each season's historical peak net load, Winter is the only season that has a clear increase in the maximum seasonal net load over time.

Large Load Events

Power Electronic Large Load Ride-Through Events

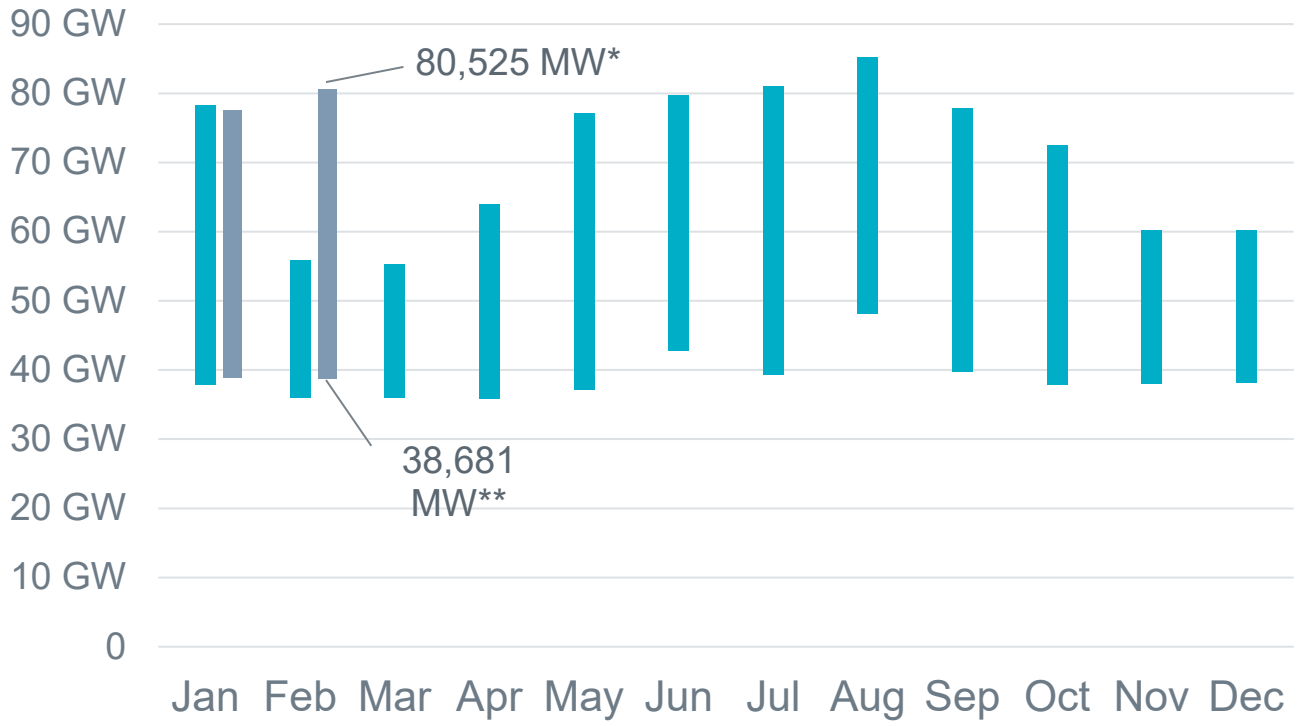


Key Takeaway: Power electronic Large Loads reduce consumption quickly when system faults occur in their area. The magnitude and frequency of these events will likely increase as more of these types of loads are connected to the system, especially when they are concentrated in an area.

This is an update with new events from the slide presented at December 2024 R&M.

Appendix
Operational Metrics and Ancillary Services Performance

Demand



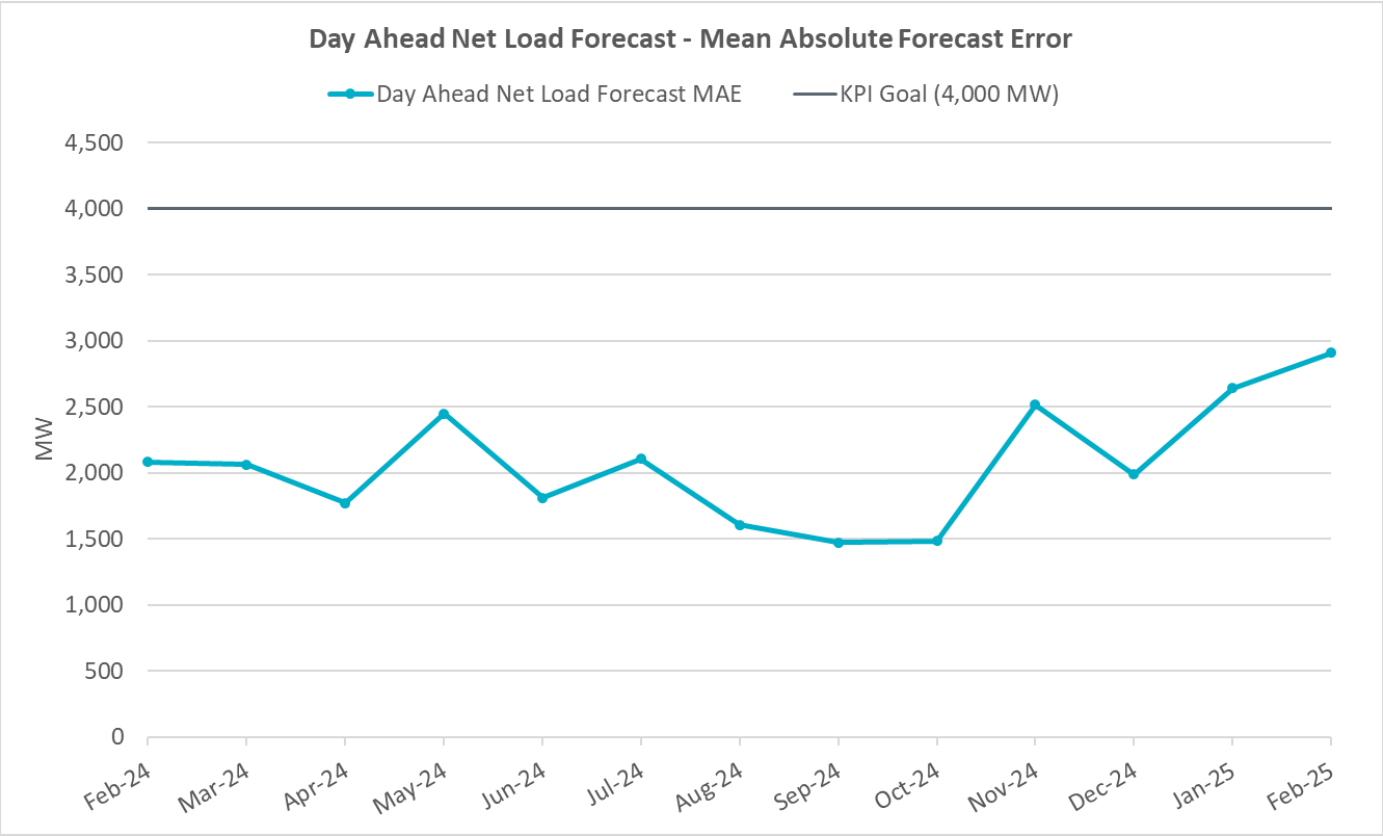
*Based on the maximum net system hourly value from February release of Demand and Energy 2025 report.

**Based on the minimum net system 15-minute interval value from February release of Demand and Energy 2025 report.

Data for latest two months are based on preliminary settlements.

Key Takeaway: ERCOT set a new all-time record of 80,525 MW* for the month of February on 2/20/2025. This is 24,665 MW more than the February 2024 demand of 55,860 MW on 2/19/2024.

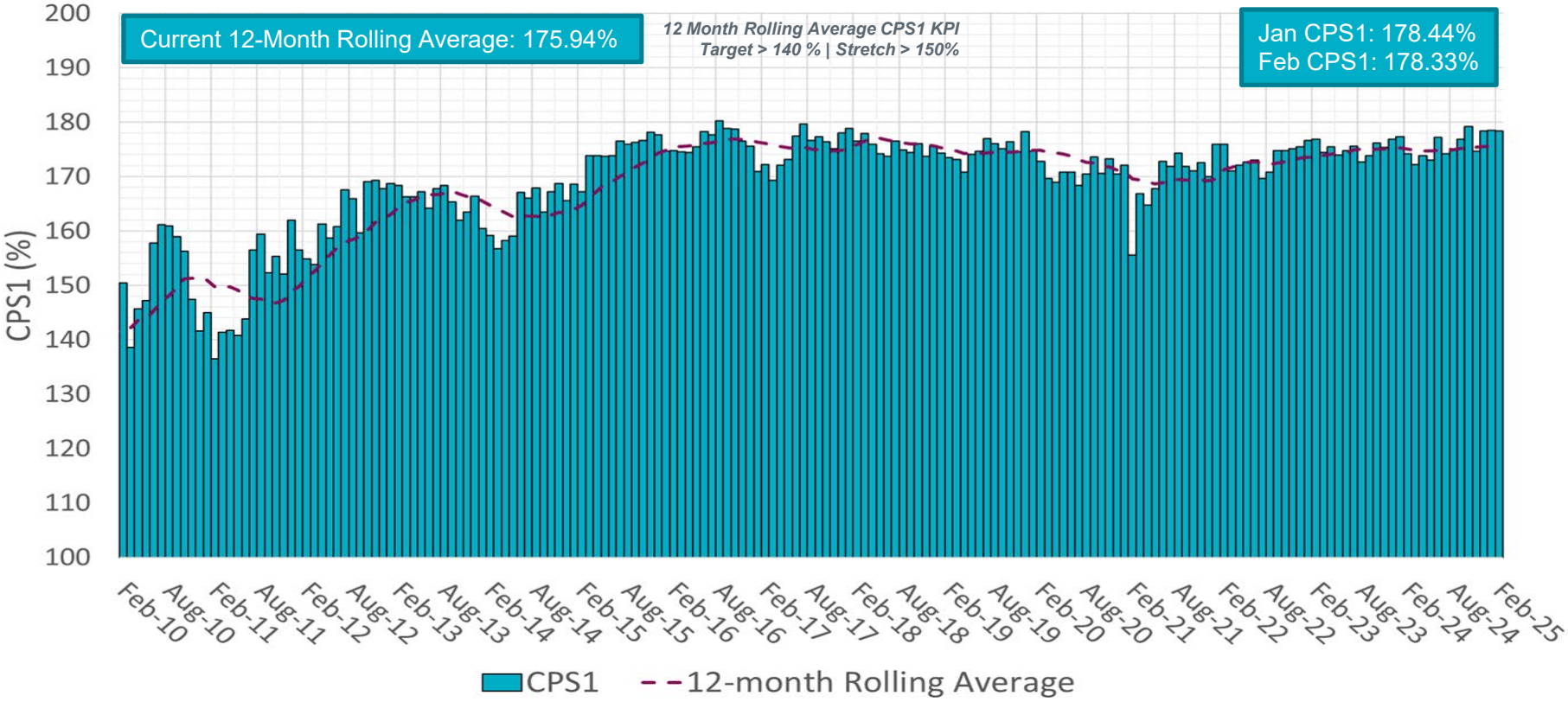
Forecast Performance



Key Takeaway: Day Ahead Net Load Forecast Mean Absolute Forecast Error is a new Key Performance Indicator from 2023. This metric has met the target and has been trending well.

Frequency Control

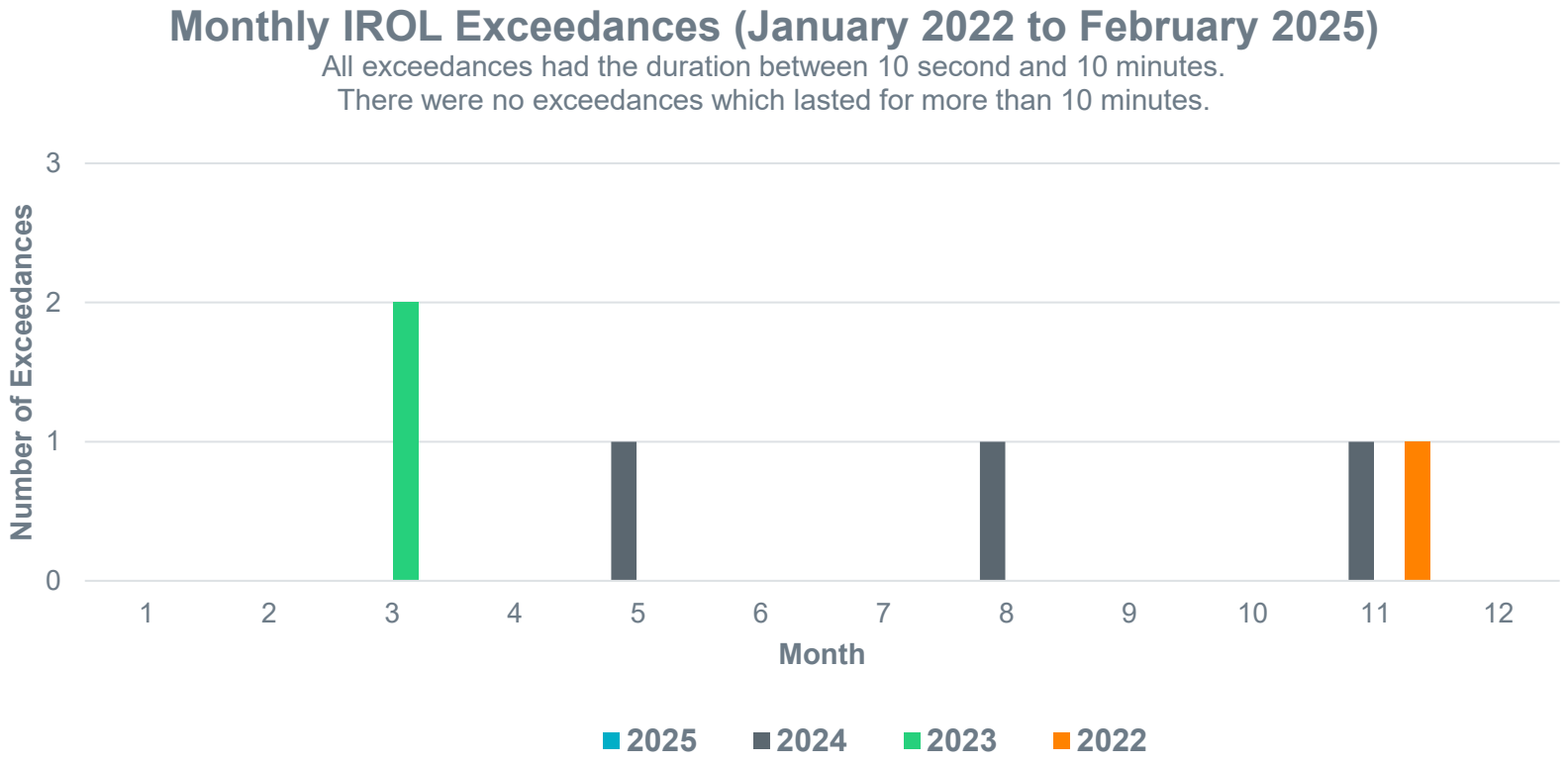
- Control Performance Standard 1 (CPS-1) is a measure of the frequency control on a power system, pursuant to NERC Standard BAL-001. The 12-month rolling-average of this measure is required to stay above 100%.



Key Takeaway: Frequency control has been performing extremely well.

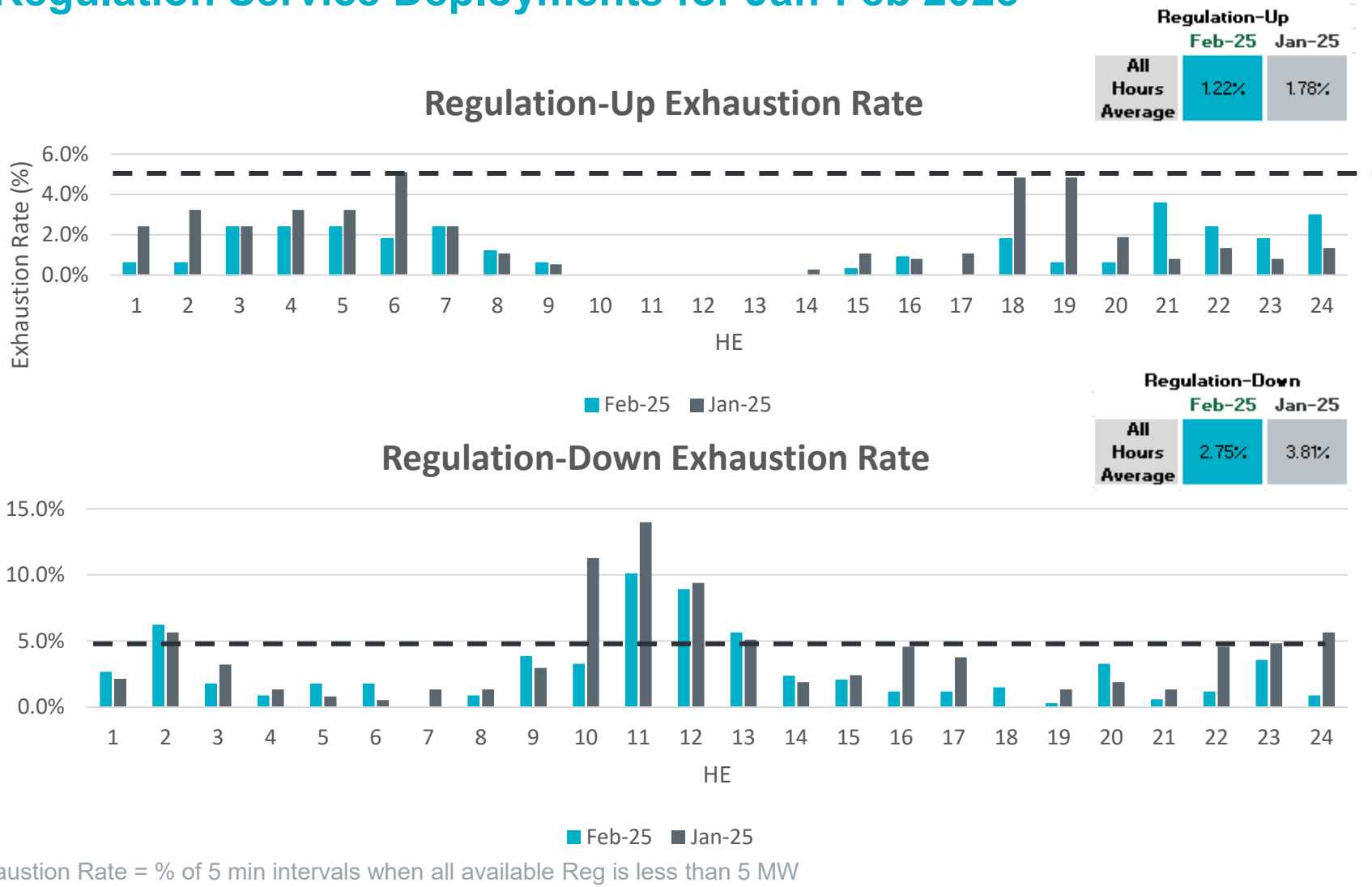
Transmission Limit Control

- The most-recent Interconnection Reliability Operating Limit (IROL) exceedance occurred in November 2024.



Key Takeaway: No IROL exceedances for this reporting period (January – February 2025).

Regulation Service Deployments for Jan-Feb 2025



Exhaustion Rate = % of 5 min intervals when all available Reg is less than 5 MW

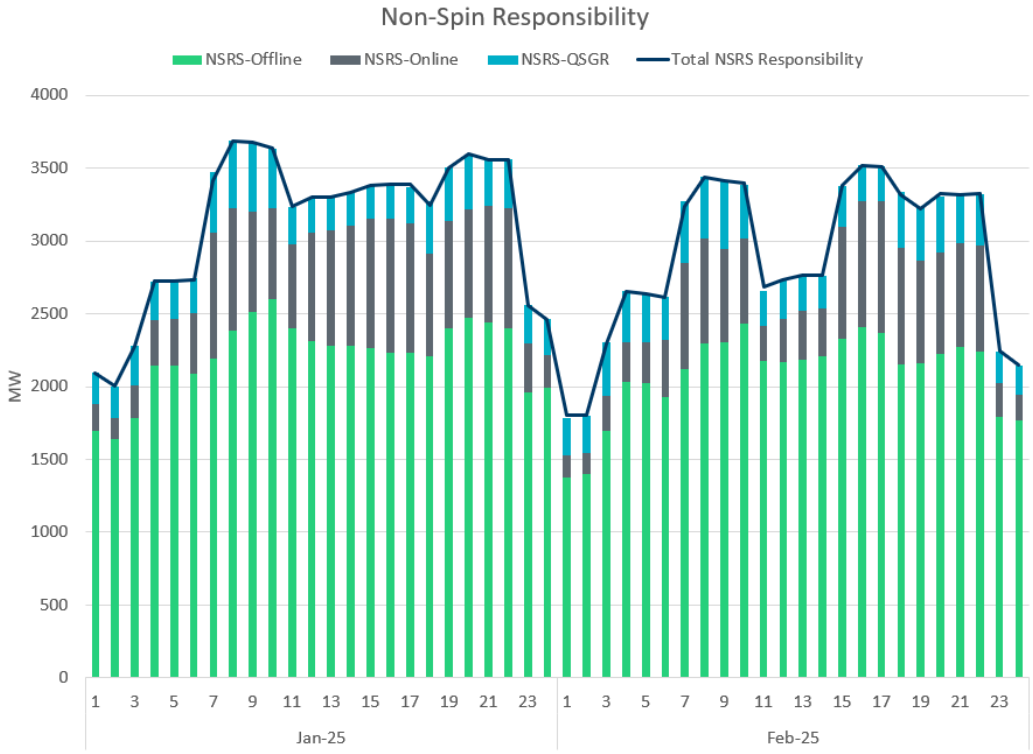
Key Takeaway: Average Regulation Up and Down exhaustion rates were similar to previous years.

Non-Spinning Reserve Service (Non-Spin) Deployments for Jan-Feb 2025

From January to February 2025, there was 1 event that resulted in deployment of offline Non-Spin.

During this time, an average of ~28% of Non-Spin was provided using online capacity and by Quick Start Generation Resources. This type of Non-Spin is always available to SCED to dispatch (with an offer floor of $75) and no operator action is needed to deploy this capacity.

Deployment Start Time	Deployment Duration	Max Deployment (MW)
1/15/2025 7:35	00:43:42	1167.3

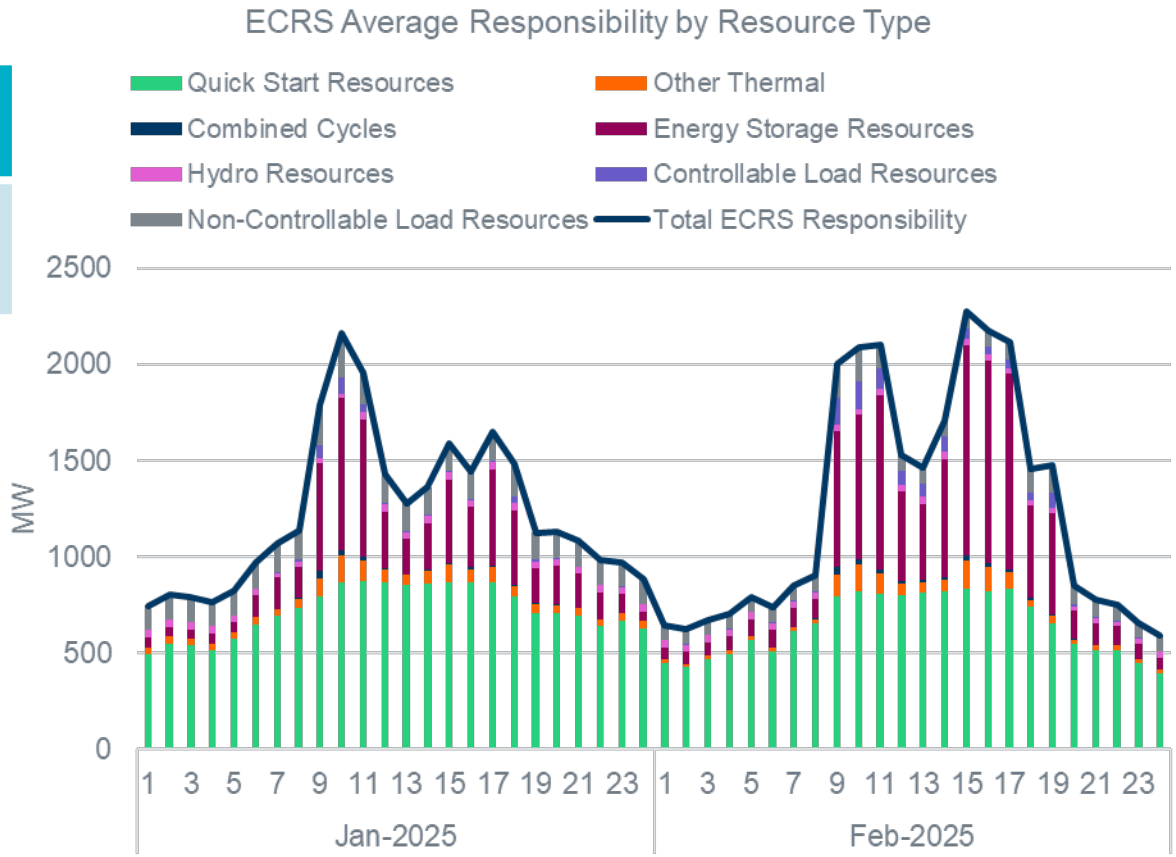


Key Takeaway: All recent Non-Spin deployments were to meet 30-minute ramping needs. Non-Spin performed well in all deployments.

ERCOT Contingency Reserve Service (ECRS) Release for Jan-Feb 2025

From January to February 2025, there was 1 event that resulted in the release of SCED dispatchable ECRS.

Deployment Start Time	Deployment Duration	Maximum SCED Dispatchable MW Released	Reason
1/15/2025 7:06	1:04:48	965	Insufficient Capacity for projected netload ramp



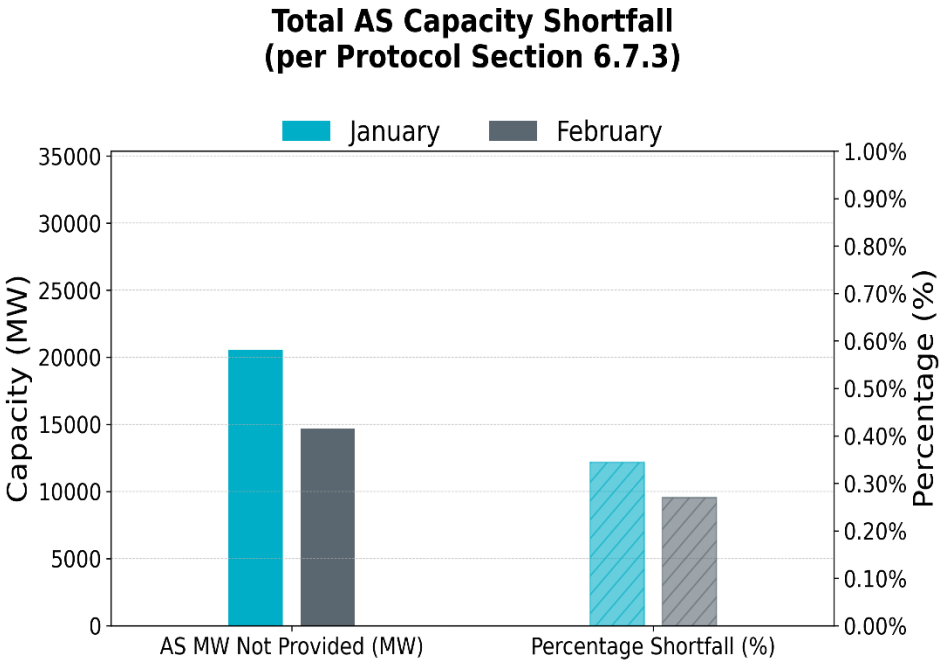
Key Takeaway: ECRS Performed well in all deployments and helped recover from the events that triggered deployments.

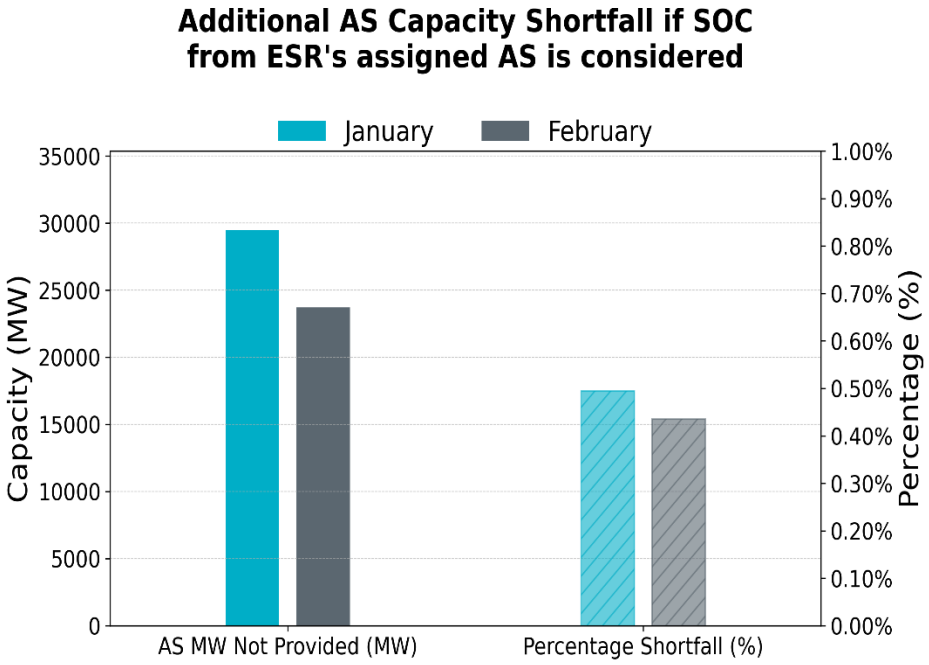
Responsive Reserve Service (RRS) Released for Jan-Feb 2025

- From January to February 2025, there was no manual release of RRS.
- With the implementation of ECRS, RRS capacity autonomously deploys when frequency exceeds the frequency dead-band. RRS may be manually released to SCED during scarcity events when additional capacity is needed.

Key Takeaway: There was no manual RRS release from Jan-Feb 2025.

AS MW Shortfall Analysis





Key Takeaway: A (small) portion of the procured AS is not being assigned to resources (regardless of technology type) by QSEs and is not available in Real Time. The magnitude of AS capacity unavailable in Real Time increases further if SOC from ESRs that are assigned AS is considered.

****Capacity data (MW) is plotted on primary y-axis and percentage shortfall (%) is plotted with a pattern format on secondary y-axis. Percentages in both graphs are based on total AS procured.*