PUBLIC

Item 8: System Operations Update

Dan Woodfin
Vice President, System Operations

Board of Directors Meeting

April 20-21, 2026

Purpose

- Provide an update on key operational metrics to the Board of Directors
- Provide information on hot topics

For information only

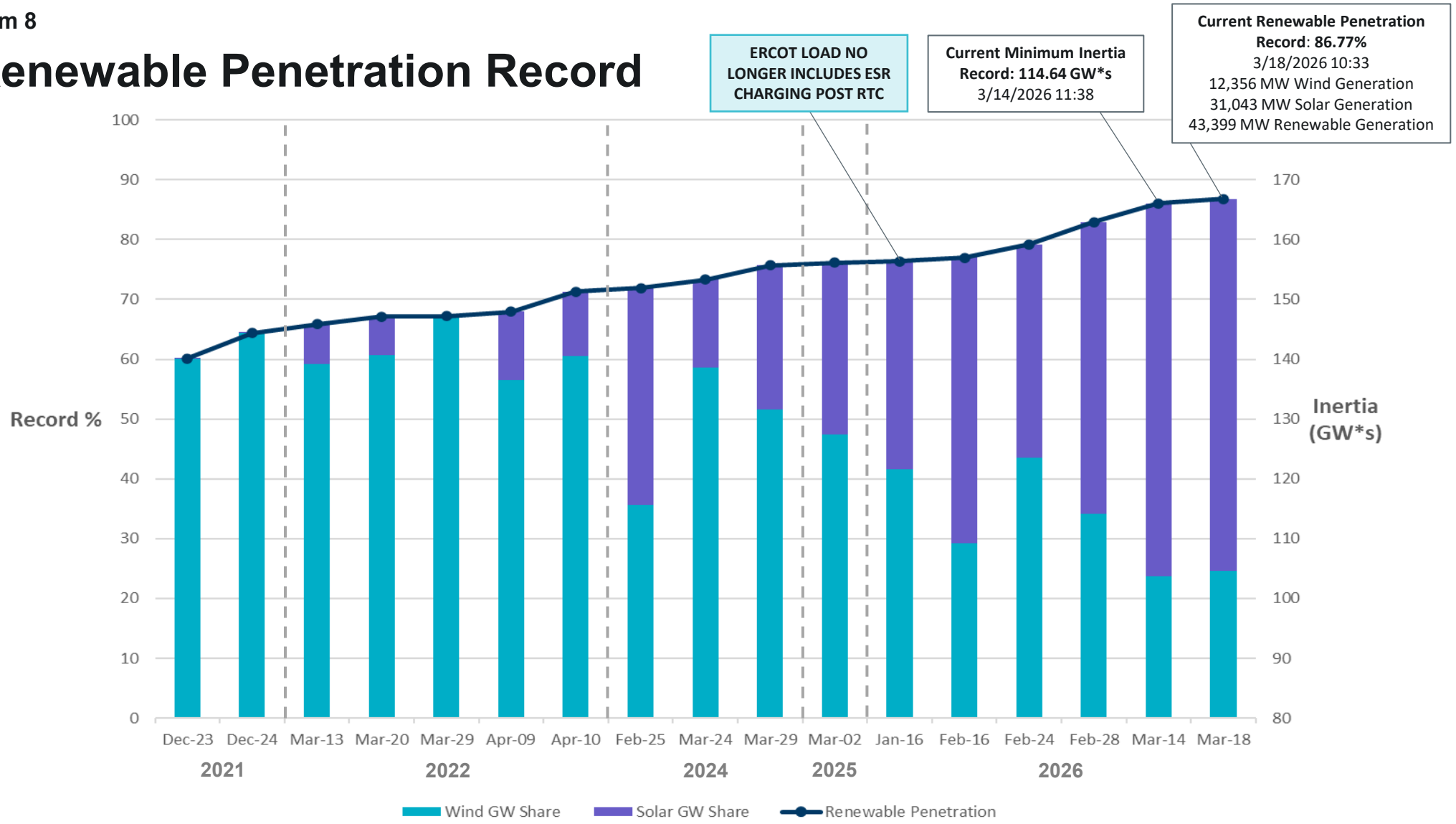
No action is requested; for discussion only.

Key Takeaways

- All key operational metrics are trending well.
- On 3/18/26, a new renewable penetration record of 86.77% was set. Renewable generation was recorded as 43,399 MW and wind/solar curtailment was 2,231 MW.
- ERCOT is developing a Large Load Curtailment Manager (LLCM) to efficiently issue curtailment instructions of Large Loads.
- ERCOT has reviewed the tight conditions on 1/28/2026 and is implementing several lessons learned.

Changing Renewable Penetration Records

Renewable Penetration Record

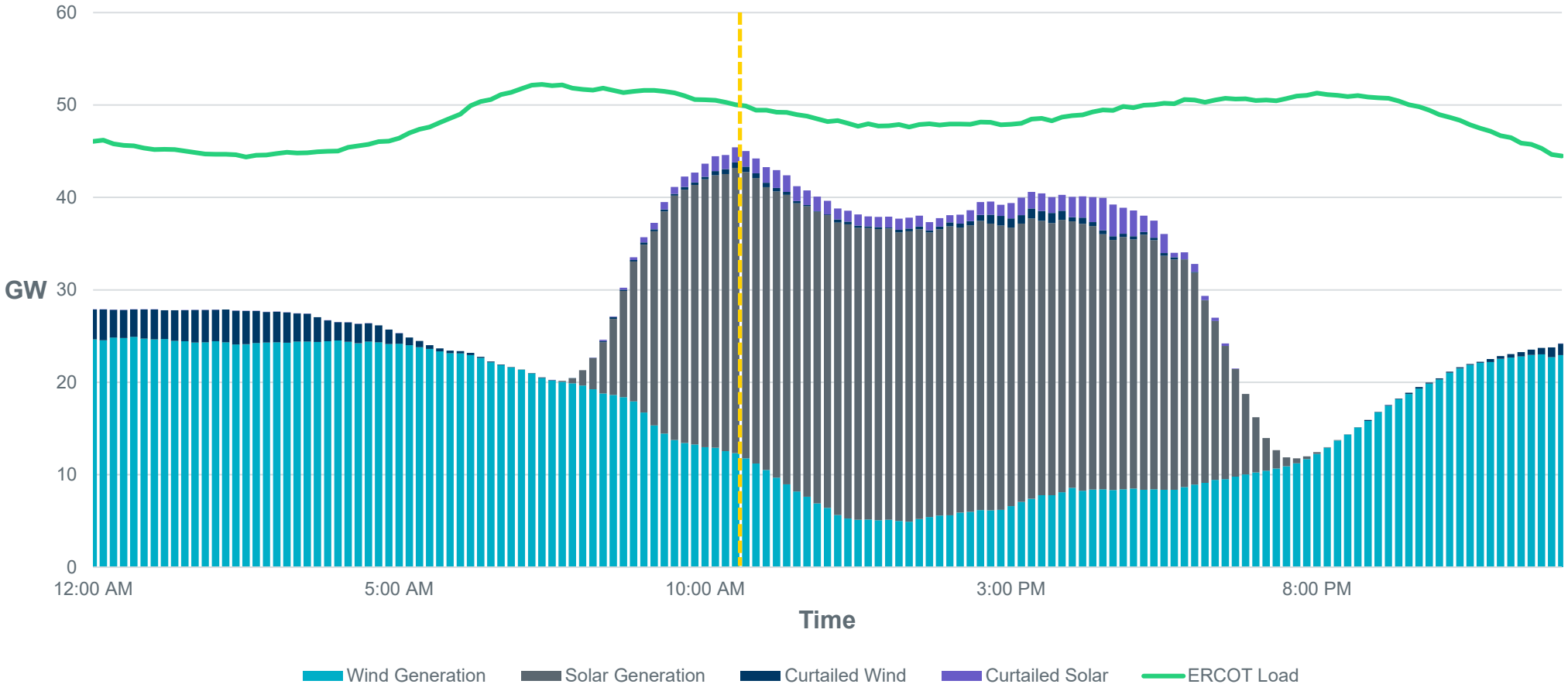


Key Takeaway: On March 18th, 2026, a new renewable penetration record of 86.77% was set. The system inertia at the time of the record was 131.41 GW*s, and the total system load was 50,016 MW.

*Data current through 3/24/26

PUBLIC

MARCH – 3/18/2026 Renewable Penetration Record



Key Takeaway: The renewable penetration record of 86.77% was set on 3/18/26 at 10:33 (yellow line). Renewable generation at the time of the record was 43,399 MW and Wind/Solar curtailment was 2,148 MW. Minimum inertia of the day was 126.55 GW*s at 11:55.

*Data current through 3/24/26

SB6 Large Load Curtailment Implementation

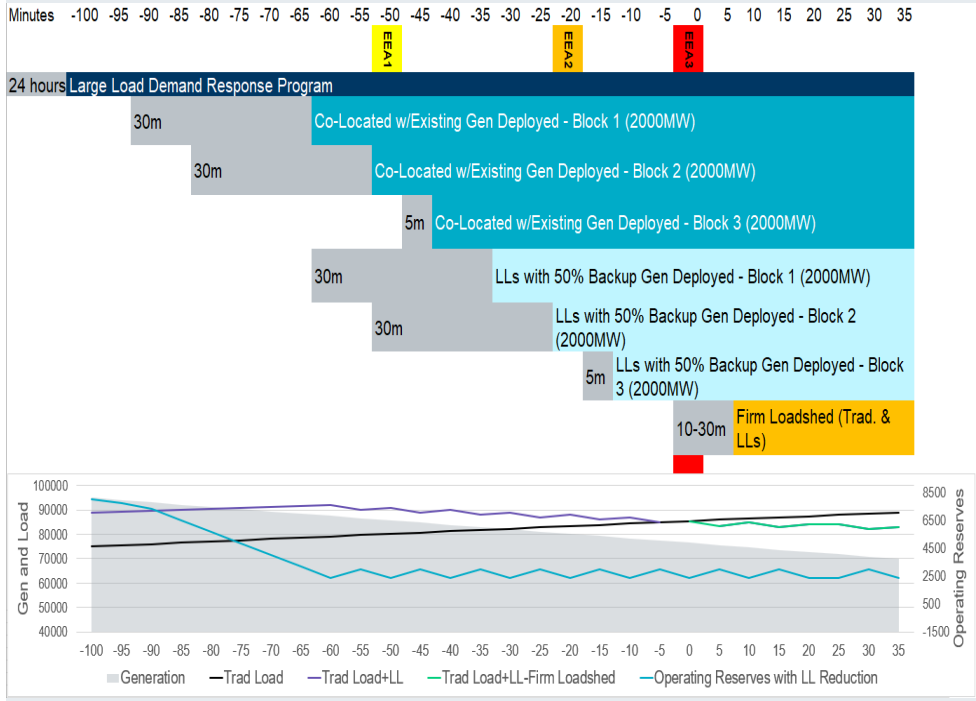
PUBLIC

SB6 Large Load Curtailment Implementation

- ERCOT is developing a Large Load Curtailment Manager (LLCM), a system that allows ERCOT to issue curtailment instructions for Large Loads in specific categories when ERCOT projects to be in tight operating conditions.
- ERCOT is aiming to build a minimum viable release of LLCM by June 2026, pending market rule approval.
    - This version of LLCM will focus on the ability to curtail Load Loads with net-metering arrangements that fall under SB6.
- Future releases of LLCM will also include:
    1. **SB6 50% Backup** - Large Loads with at least 50% backup generation, curtailed with notice to avoid loadshed.
    2. **VECL** - Voluntary Early Curtailment Loads (VECLs), created by NPRR 1238.
    3. (Potentially) Large Loads impacting system stability that are defined as impacting a Generic Transmission Constraint.
- ERCOT is working on an NPRR related to this topic and plans to submit soon.

Key Takeaway(s): ERCOT is developing a LLCM to efficiently issue curtailment instructions of Large Loads, with the first phase focusing on SB6 Co-located Large Loads.

Example: LLCM Curtailments for Projected EEA Conditions



*Note this example is intended to illustrate the concept of LLCM curtailments. Look-ahead times and trigger points are not finalized.

Review of Operations on January 28, 2026

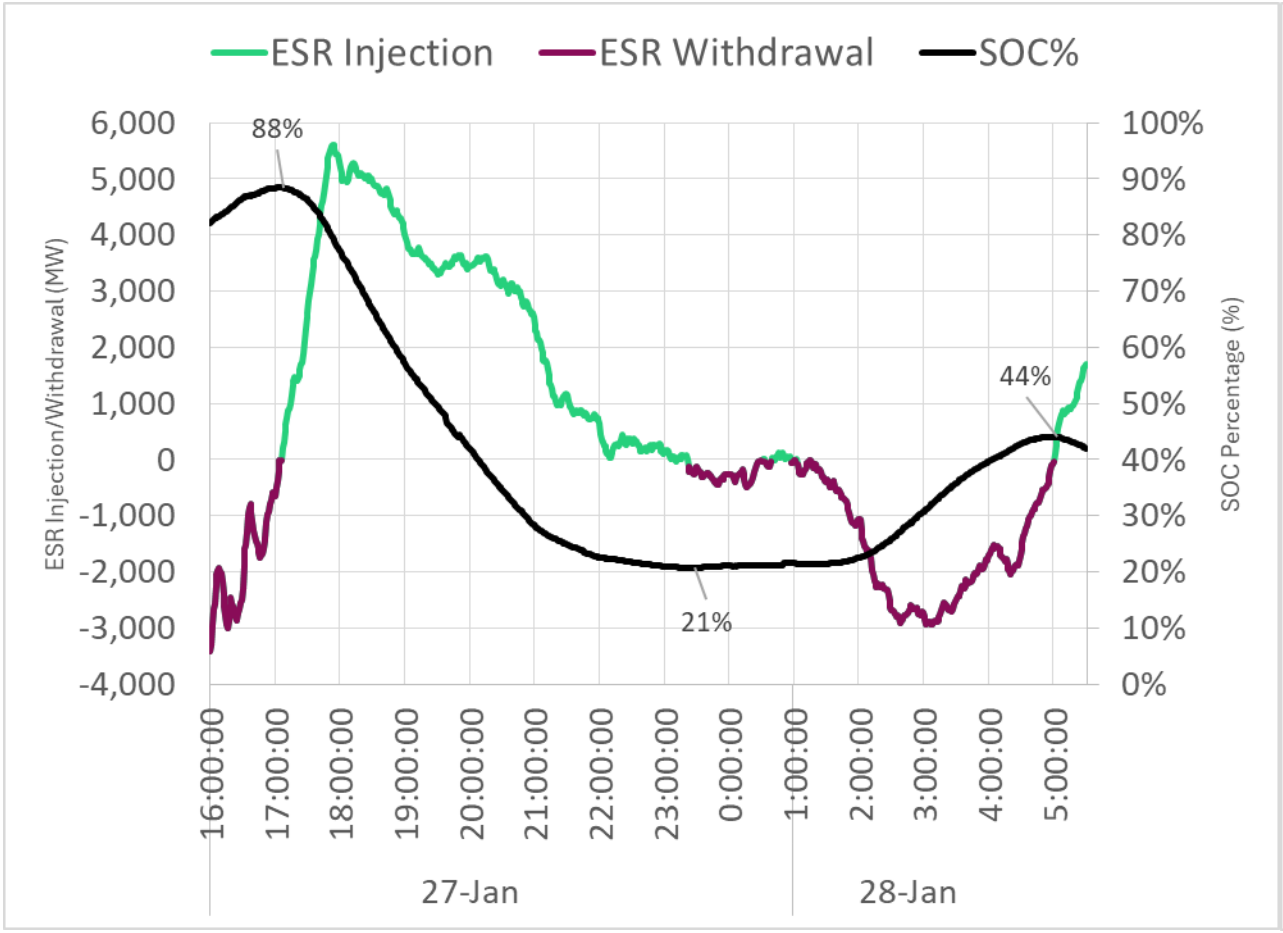
In the morning hours of January 28, 2026, ERCOT operated under tight conditions and relied on additional actions by Operators.

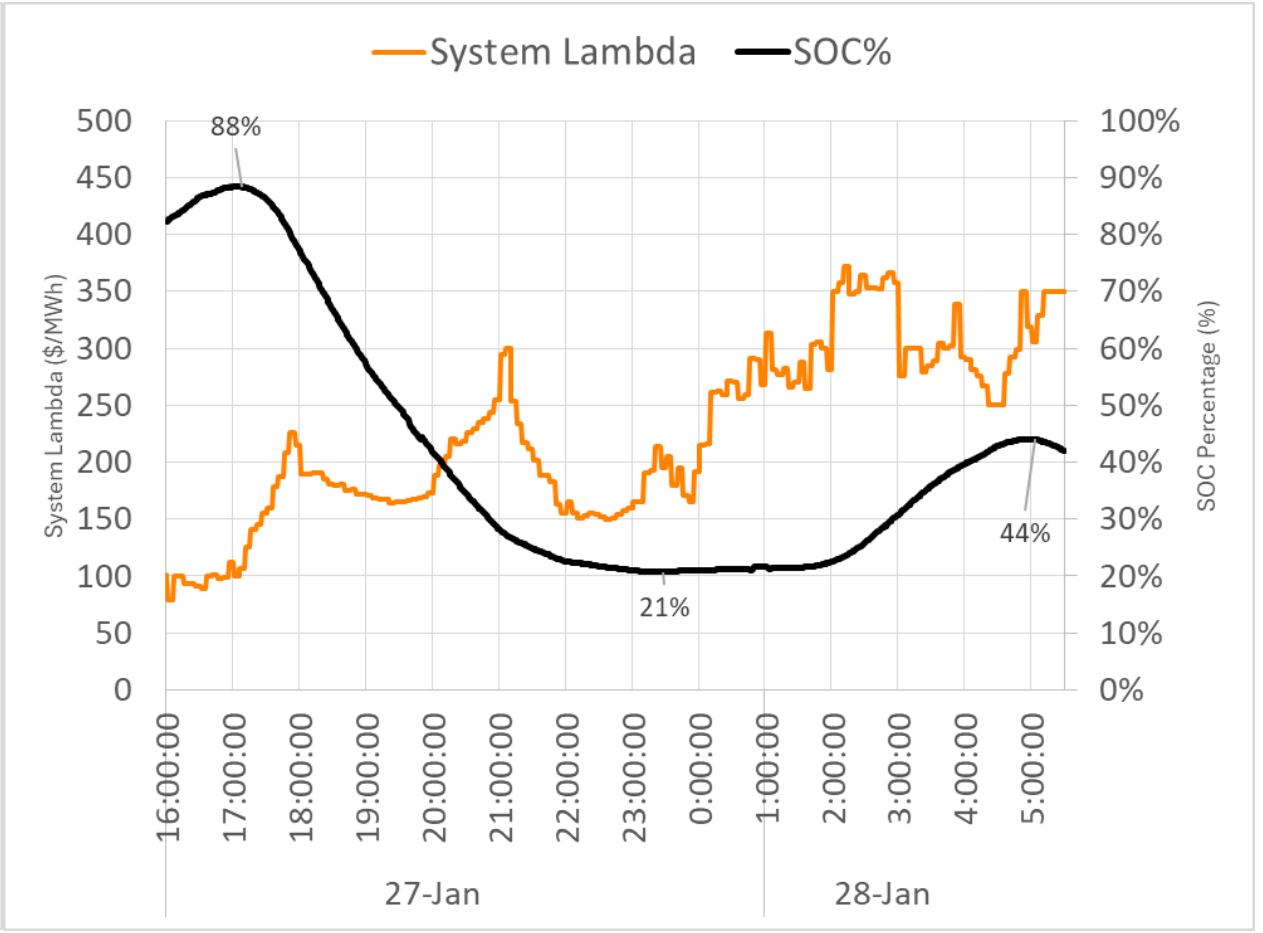
- **Reliability Unit Commitments (RUCs) and Verbal Dispatch Instructions (VDIs) were used to bring thermal units online ahead of the net load peak.**
- **Offline Non-Spinning Reserve Service (Non-Spin) was deployed to ensure sufficient capacity was available to meet demand.**

PUBLIC

ESR STATE OF CHARGE GOING INTO MORNING RAMP

ESRs discharged heavily during the January 27 evening peak, (SOC dropped from ~88% to ~21%). Overnight on January 28, low wind output, high demand and elevated natural gas prices associated with Winter Storm Fern, resulted in sustained high energy prices. ESRs only charged to ~44% by 5:00 a.m. on January 28.

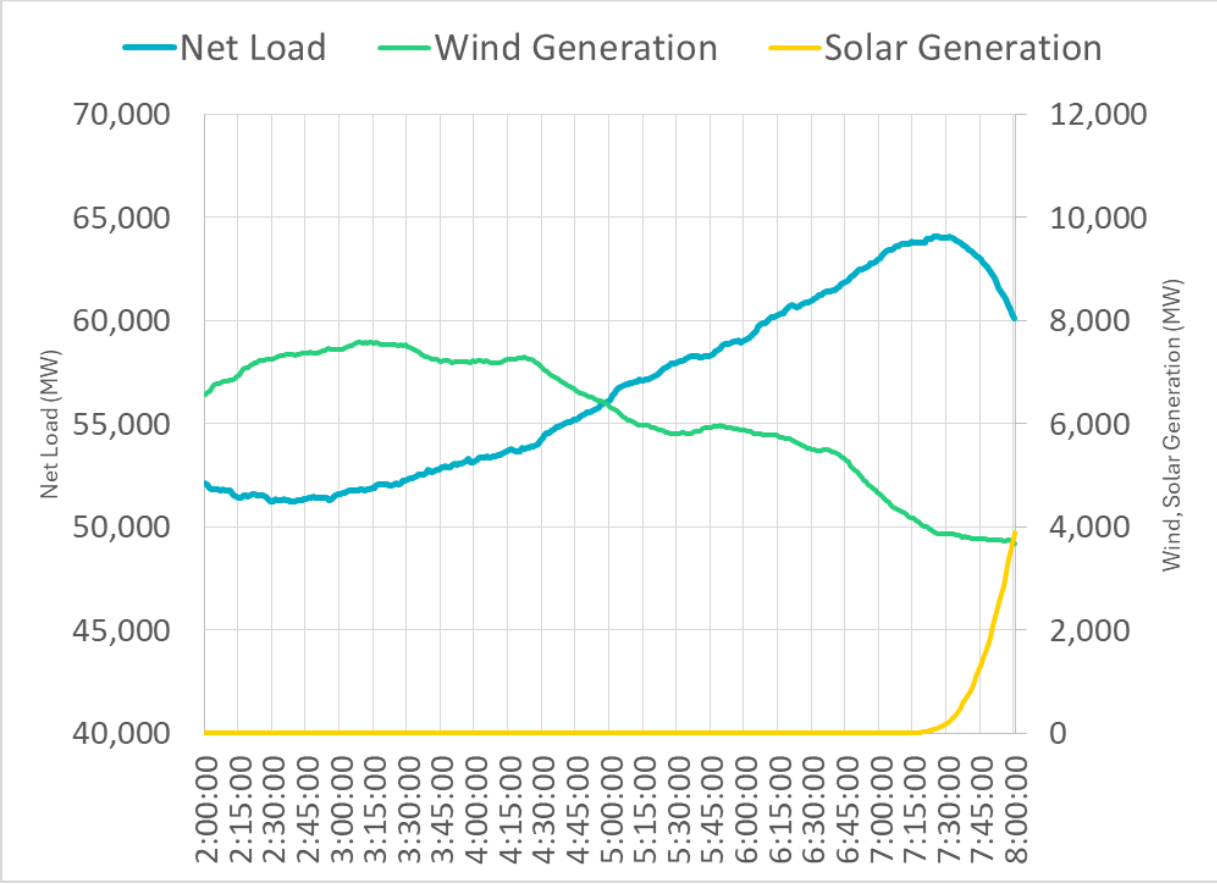


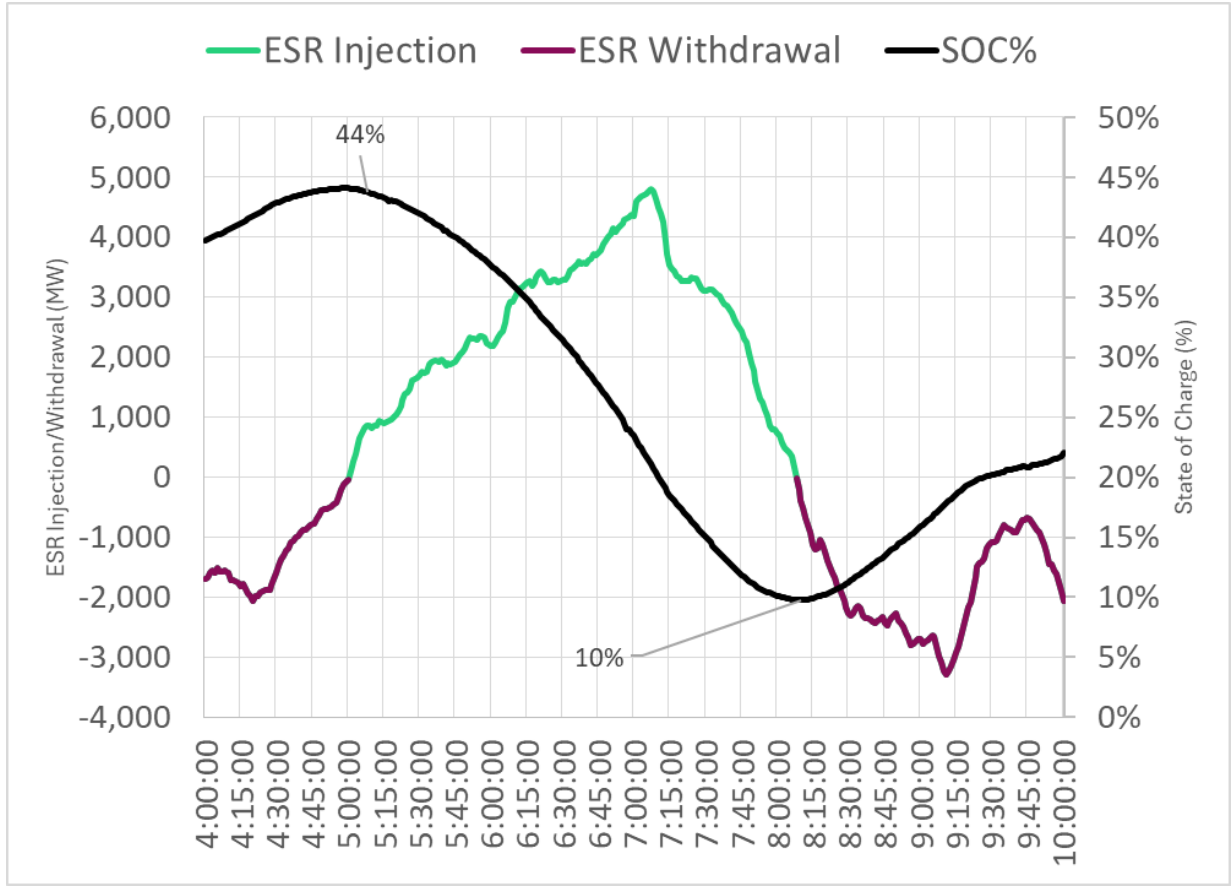


MORNING OF JANUARY 28

Net load steadily increased from about 2:30 am to 7:30 am due to rising load and declining wind output, which began dropping around 3:30am.

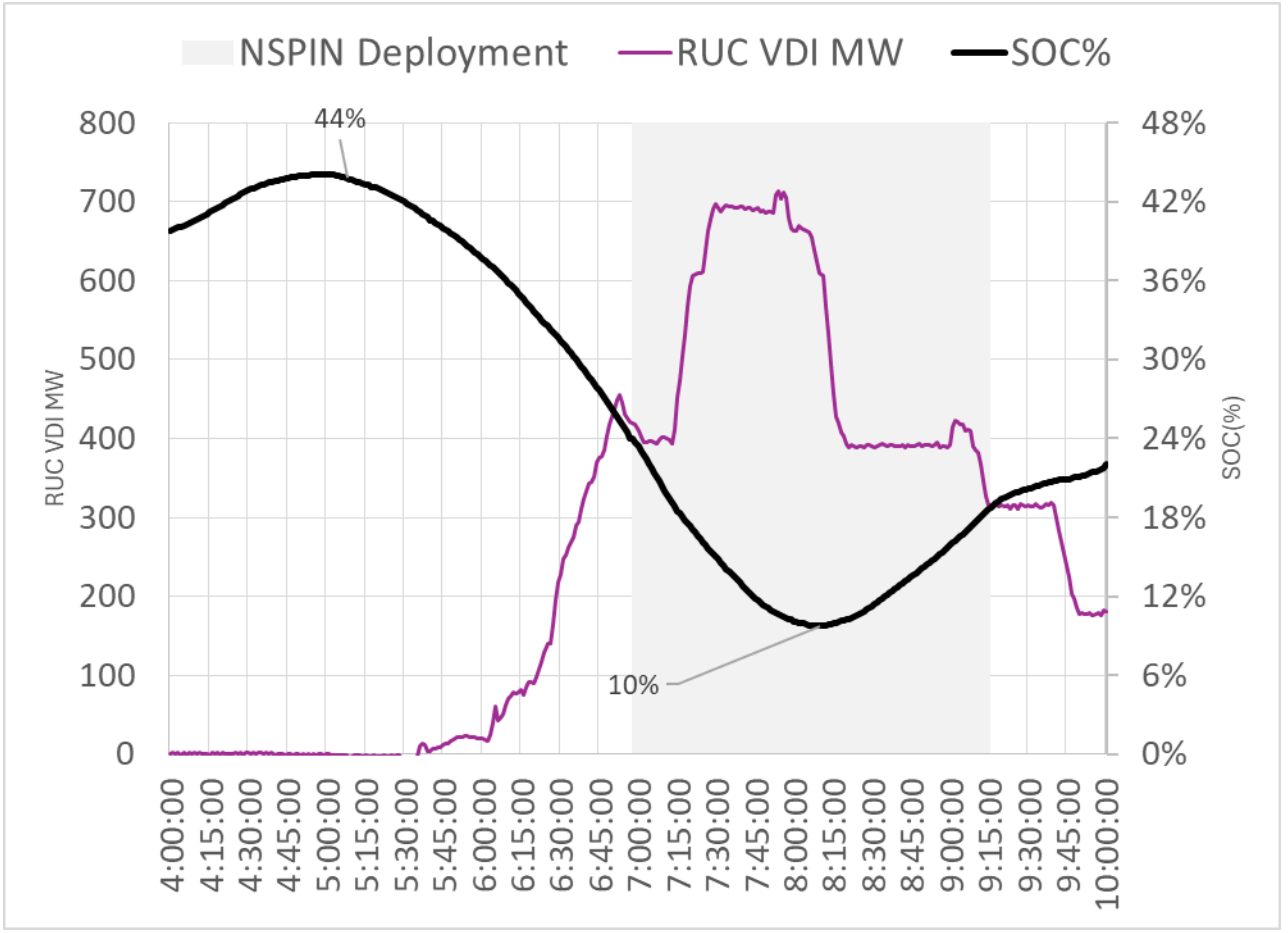
ESRs discharged from 5:00 am to about 8:10 am, peaking at ~4,822 MW net injection at 7:07 am. SOC declined from 44% at 5:00 am to a minimum of 10% at about 8:10 am.





RELIABILITY ACTIONS

- Between 5:00 am and 6:00 am, ERCOT issued VDI and RUC instructions as applicable to six thermal resources totaling ~1,189 MW capacity. These units produced approximately 931 MWh from the time they were online through ~8:10 am (the time when ESRs stopped discharging).
- ERCOT deployed offline Non-Spin at 6:58 am, which was recalled at 9:15 am.
- Between 6:00 am and 8:35 am RTCB-SCED was short of procuring several Ancillary Service requirements (i.e. "deployed" those reserves). Maximum shortfall:
  - 73.35% in Non-Spin,
  - 19.16% in ERCOT Contingency Reserve Service (ECRS)
  - 1.68% in Responsive Reserve Service (RRS).

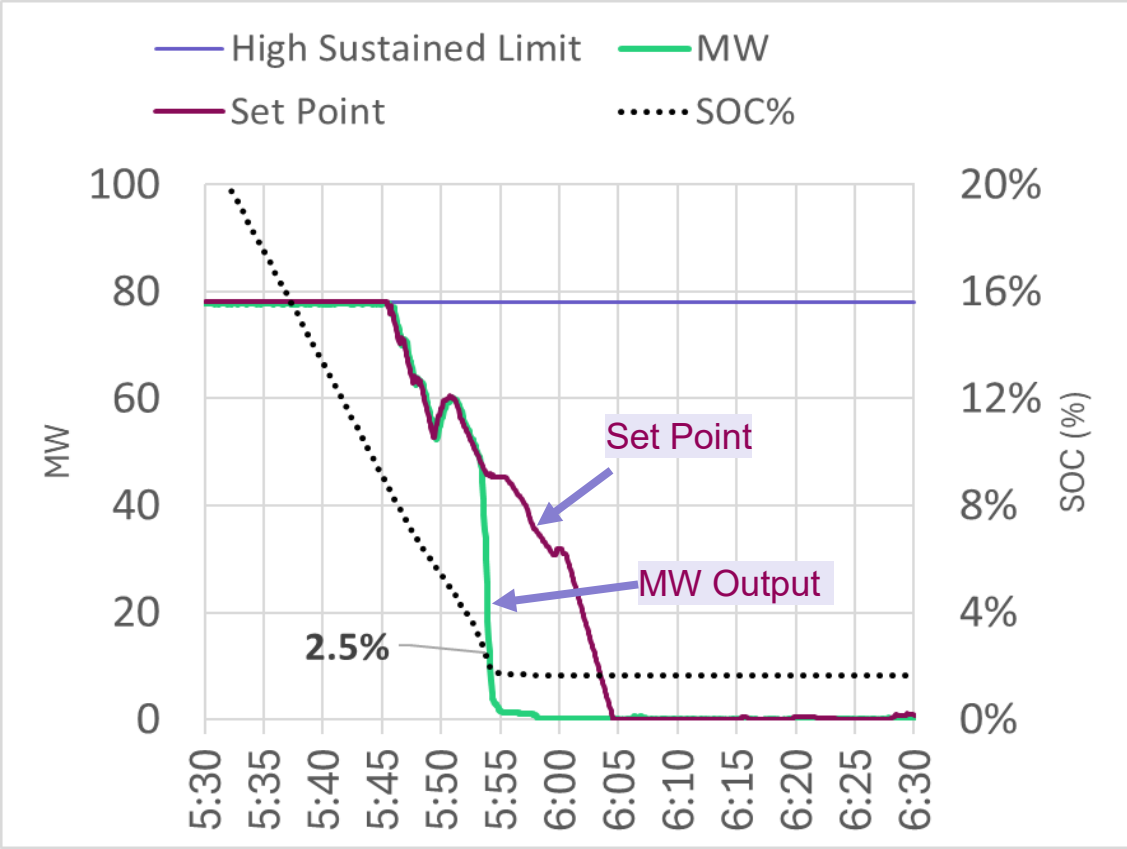


Key Takeaway(s): ERCOT manually committed thermal Resources to help lessen dependence on ESR capacity that was approaching energy depletion. RTCB-SCED effectively "deployed" Non-Spin and ECRS reserves.

PUBLIC

REVIEW OF SOC AVAILABLE: BURNOUT ANALYSIS

"Burnout" occurs when ESRs operating at very low SOC cannot follow dispatch instructions. In the example below, burnout appears around 2.5% SOC.



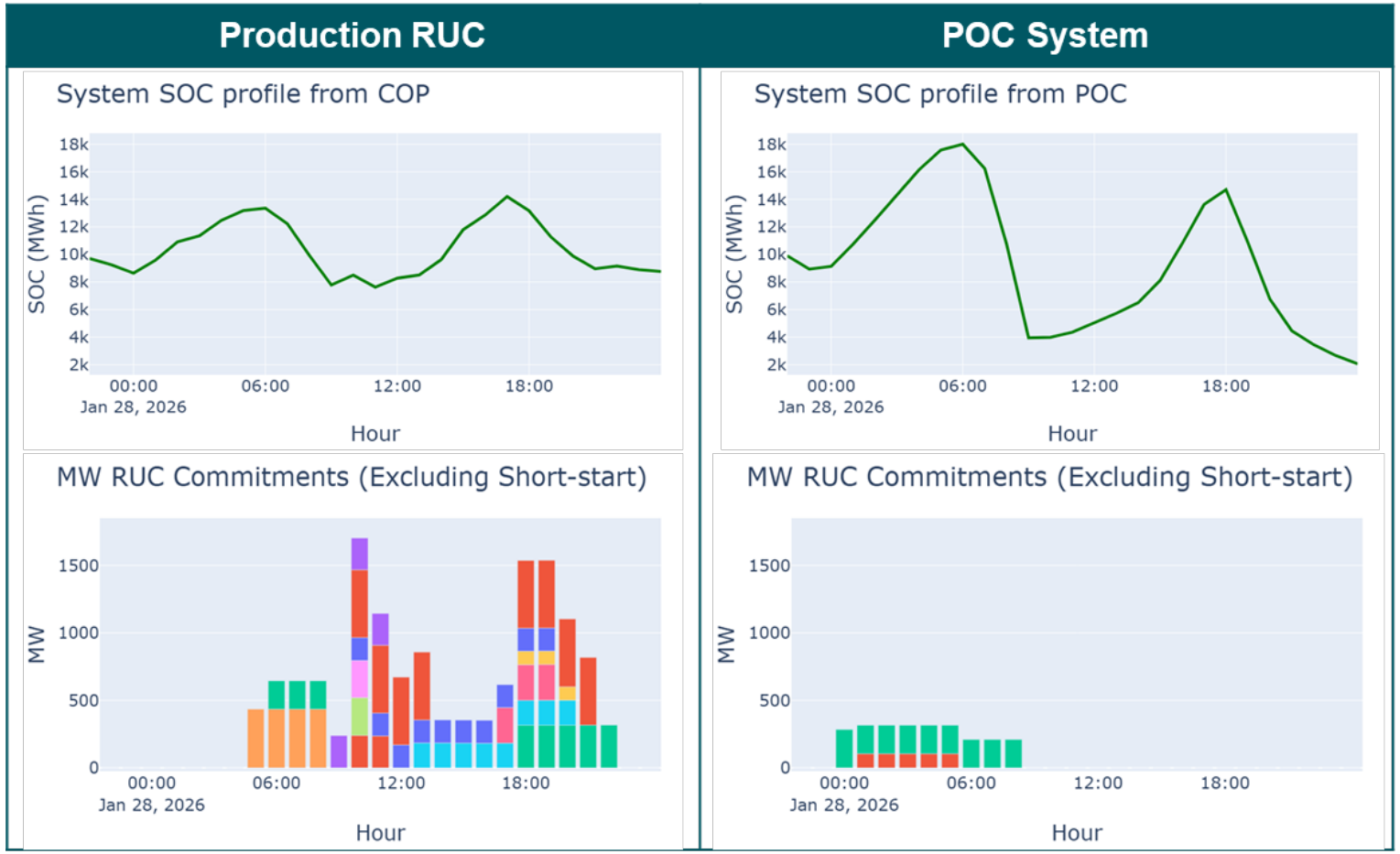
- During the morning of January 28, ERCOT identified that 27 ESRs in "burnout" with an average SOC of ~3.4%.
- **Review of all 2025 burnout events shows burnout typically occurring between 2% and 10% SOC (median 5%)**
- This indicates that the lowest ~5% of system SOC may not be deliverable.

Key Takeaway(s): When relying heavily on ESRs during tight conditions, the final 5% of SOC may be undeliverable due to burnout and should not be counted in projecting available reserves.

PUBLIC

REVIEW OF SCUC PROOF OF CONCEPT (POC) RESULTS

The security-constrained unit commitment (SCUC) system is a multi-interval study tool that is under development based on the existing RUC engine; it will optimize the state-of-charge of ESRs to identify periods of potential energy insufficiency and recommend commitments to support ERCOT in managing reliability. *ERCOT investigated how January 28th RUC results differed in the POC system compared to production RUC.*



- The POC system identified a **need to increase SOC during the early morning hours ahead** of the morning net-load peak.
- Compared with production RUC results for the same study, the POC recommended additional early morning RUCs to support charging.
- By allowing more flexible control of ESR charge-discharge patterns, the POC solution was able to reduce the total daily RUC MWh and better position ESRs for the morning peak.

Key Takeaway(s): The POC system identified an energy concern and would have recommended actions that could have allowed ESRs to charge in preparation for the morning net-load peak.

Moving Forward

This event highlighted several operational needs:

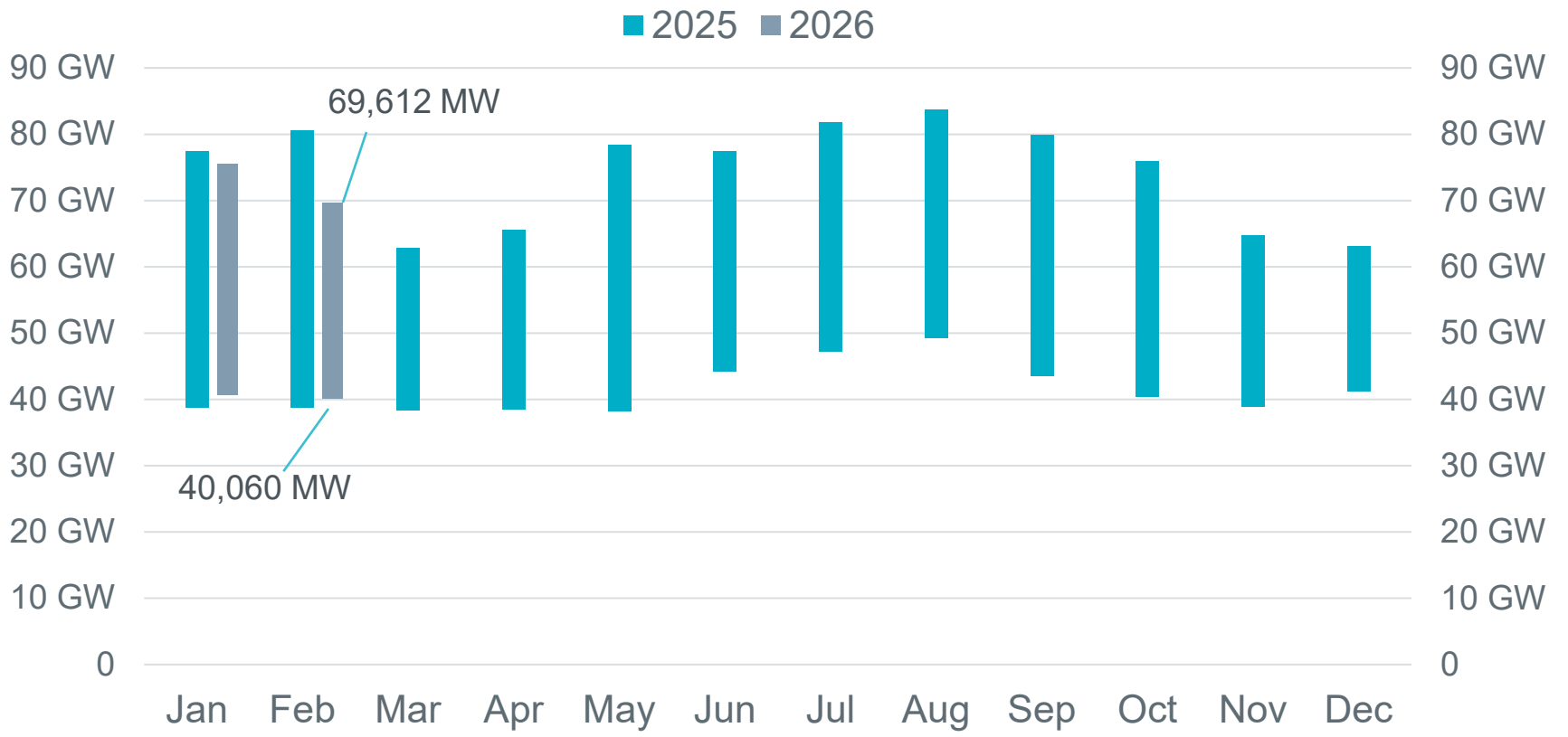
- New displays to monitor results from RUC studies to identify periods when RUC was short in awarding the AS up to the AS requirements. (Implemented)

- Update the triggers for offline Non-Spin deployment to make them SOC aware. (OBDRR055 submitted)

- Improved SOC accounting, including:
  - A new energy-based trigger for Emergency Operations (see agenda item 8.1)
  - Enhanced situational awareness when operating with low SOC margins (On-going)
  - Minimum SOC constraints in SCED for upcoming Net Load (On-going)

Appendix

Demand



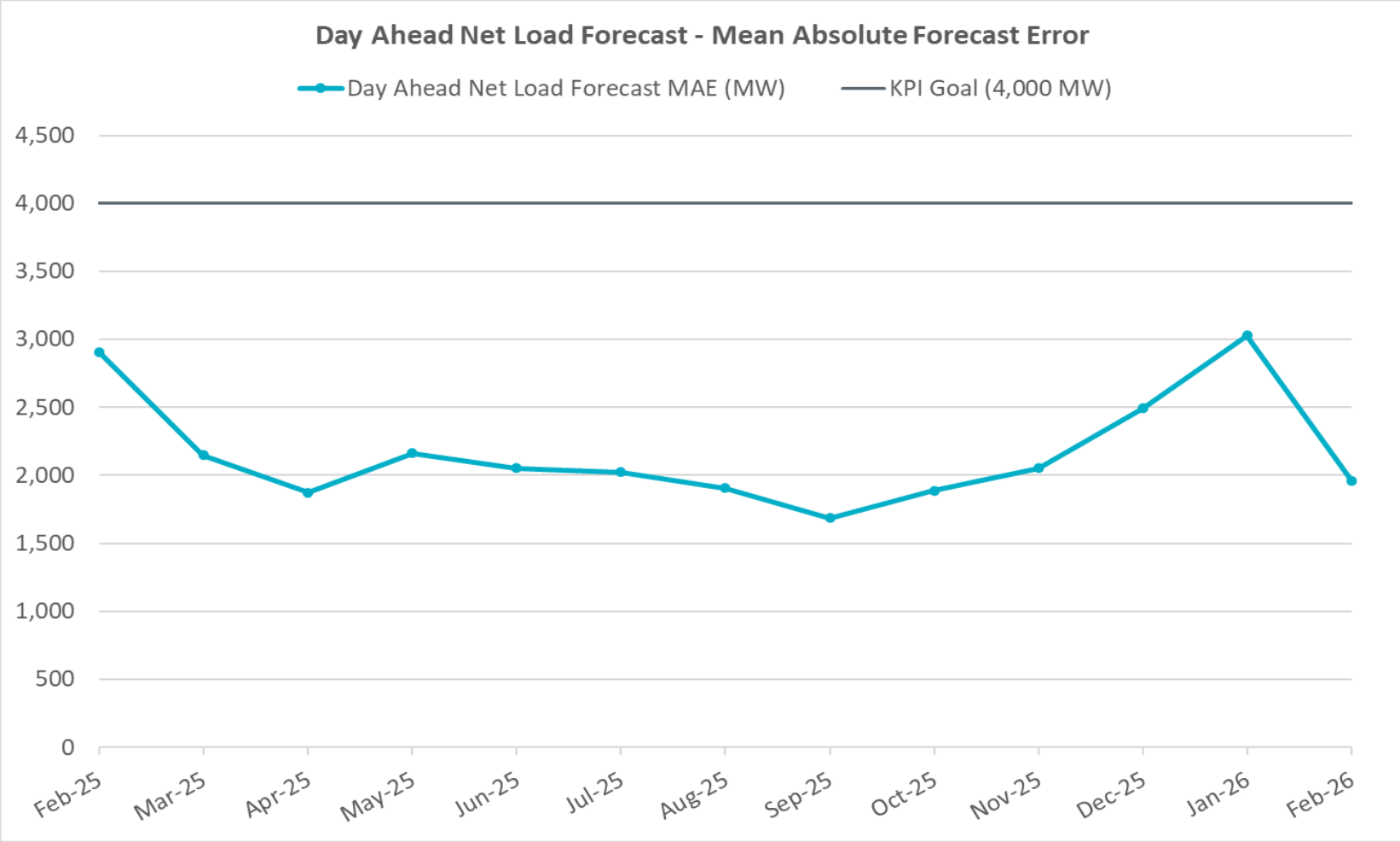
*Based on the maximum net system hourly value from February release of Demand and Energy 2026 report.

**Based on the minimum net system 15-minute interval value from February release of Demand and Energy 2026 report.

Data for latest two months are based on preliminary settlements.

Key Takeaway: ERCOT was below the all-time high maximum demand set in February 2025 by 10,949 MW.

Forecast Performance

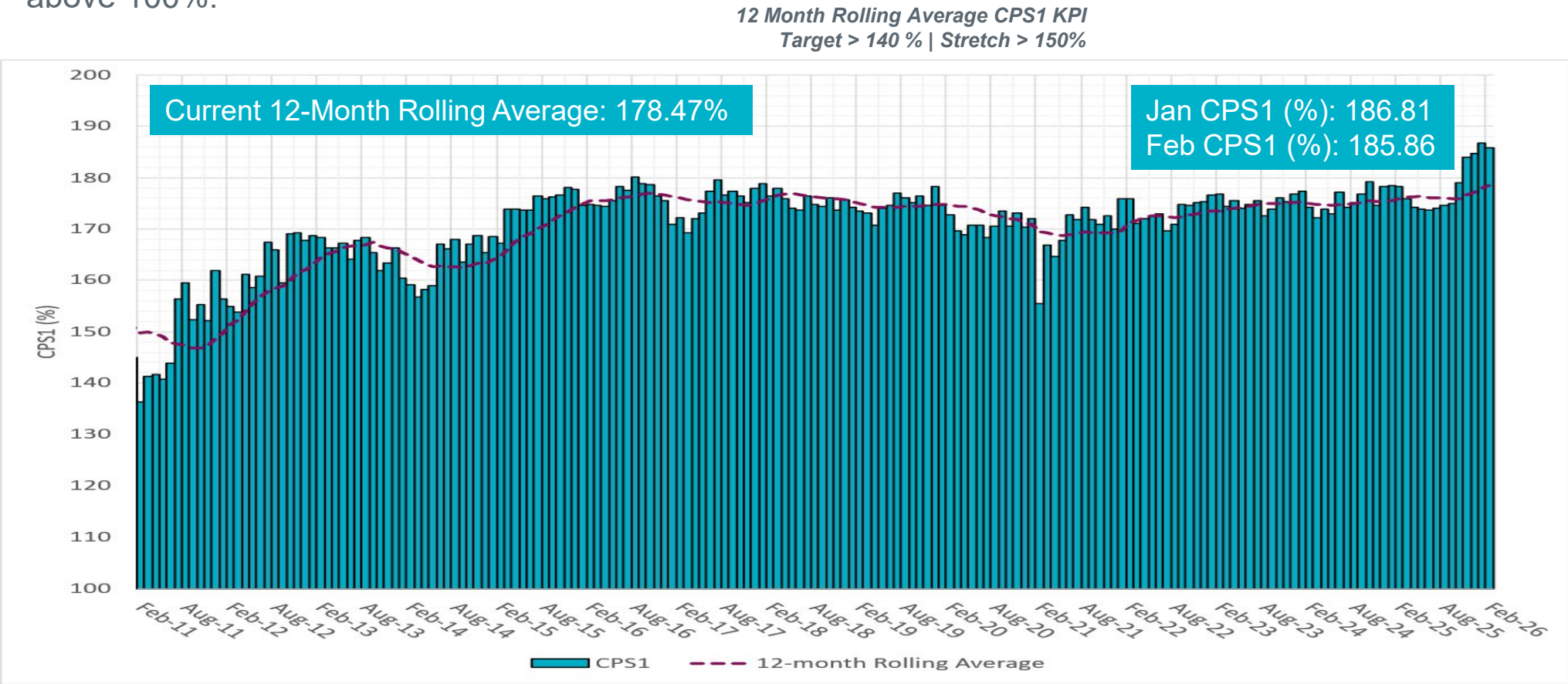


Key Takeaway: Day Ahead Net Load Forecast Mean Absolute Forecast Error has met the target and has been trending well.

PUBLIC

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%.

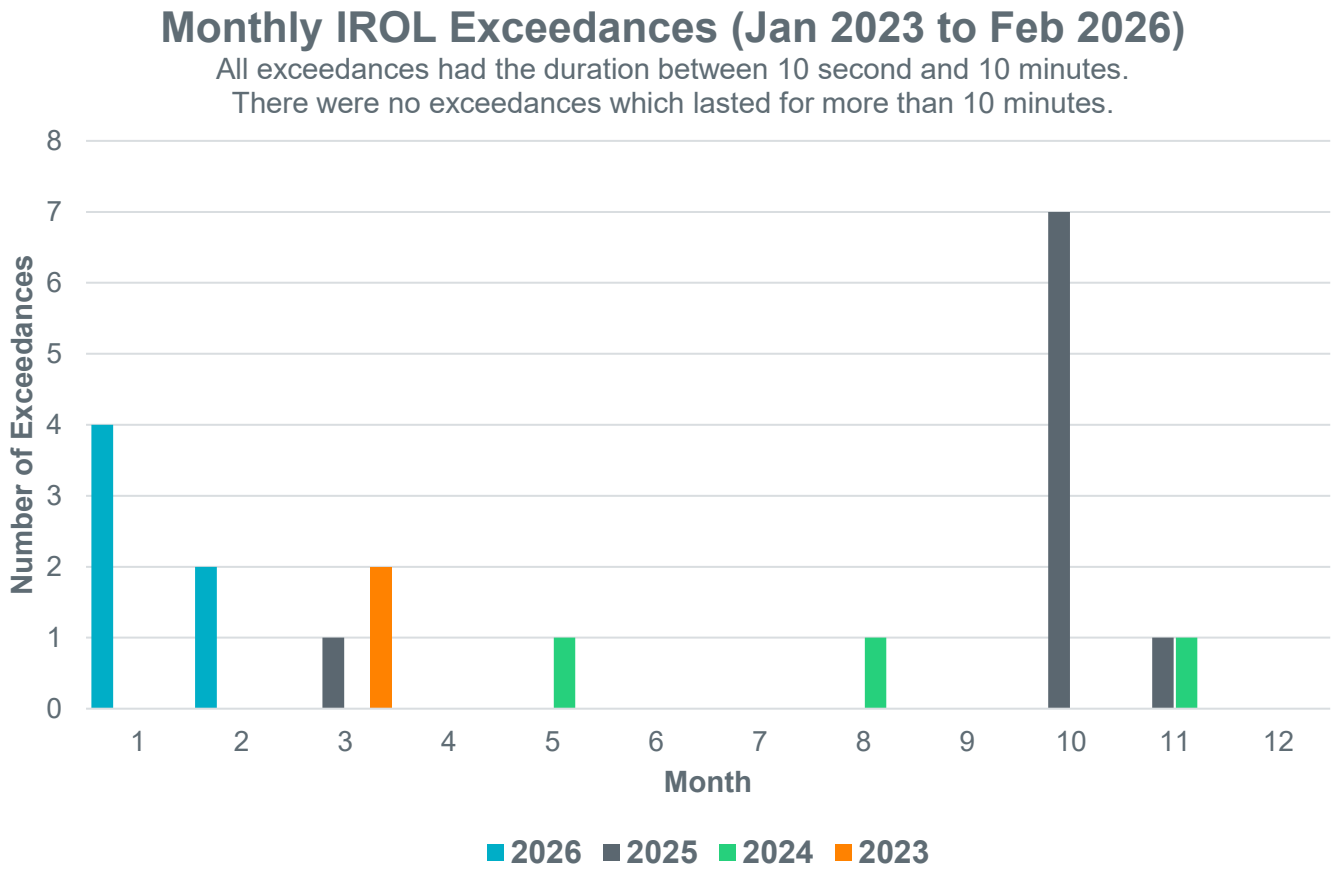


Key Takeaway(s): Frequency control has been performing extremely well.

PUBLIC

Transmission Limit Control

The most-recent Interconnection Reliability Operating Limit (IROL) exceedance occurred in February 2026.



- 01/18/26 PNHNDL IROL Exceedance @ 9:10 AM for 1 min due to solar ramp up in Panhandle.
- 01/20/26 PNHNDL IROL Exceedance @ 5:13 PM for ~2 mins was due to a wind resource not following curtailment basepoints.
- 01/25/26 E_PASP IROL Exceedance @ 8:38 PM for 1.5 mins was due to the loss of over 400 MW after a unit trip .
- 01/30/26 E_PATA IROL Exceedance @ 3:34 AM for 2 mins was from a wind resource not following curtailment basepoints.
- 02/04/26 E_PATA IROL Exceedance @ 11:25 AM for 2 mins and @ 4:08 PM for 20 secs, likely due to a line outage in South Central.

Key Takeaway: In January, ERCOT had 4 IROL exceedances occur and in February, ERCOT had 2 IROL exceedances occur.

2026 Year-to-Date (YTD) Event Analysis Summary

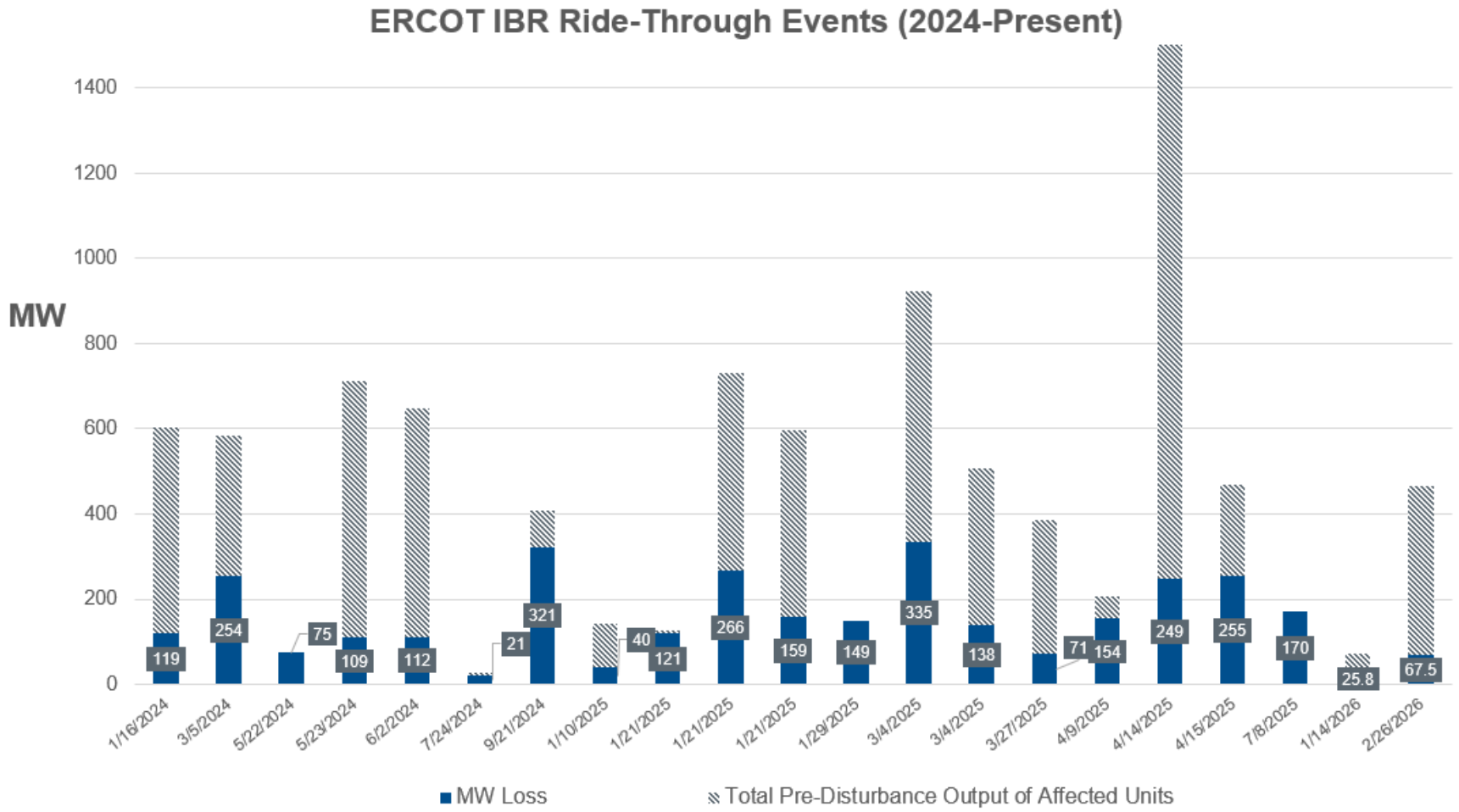
Event Type	Number of Events (All 2025)	Number of Events (Jan-Feb 2026)
NERC Reportable by ERCOT*	0	1
Inverter Based Resource (IBR) Ride-Through Events	12	2
Large Load Ride-Through Events	12	1
Large Load Oscillation Events	1	0
IBR Oscillation Events	24	2
IBR Large MW Change Events (no fault associated)	39	9
Miscellaneous (transmission or telemetry event)	4	0

Key Takeaway: The Event Analysis team investigates each event to keep the system reliable and prevent reoccurring issues.

*Meeting the criteria for NERC's Electric Reliability Organization Event Analysis Process and requiring ERCOT to submit a report.

PUBLIC

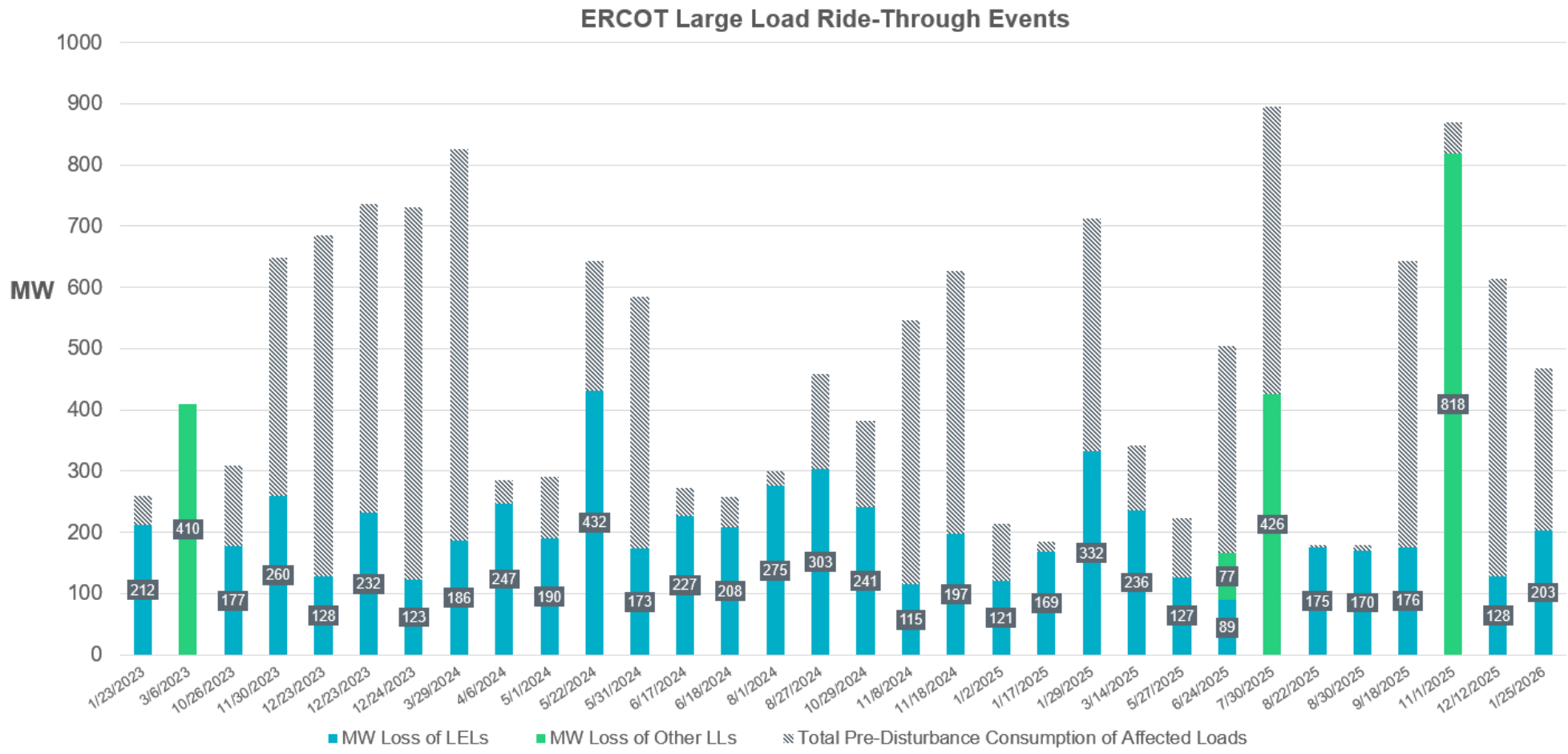
IBR Ride-Through Events



Key Takeaway: ERCOT continues to have IBR ride-through events, although the magnitude of events has remained below 500 MW. The 2/26/2026 event is still under investigation due to the potential misoperations, falling under consequential loss.

PUBLIC

Large Load Ride-Through Events



Key Takeaway: Large Electronic 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.