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# Item 16.1: System Operations Update

*Dan Woodfin*
Vice President, System Operations

Board of Directors Meeting

September 22-23, 2025

- **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

- **For Information Only**
  - No action is currently requested; for discussion only

**Key Takeaways**

- Two Interconnection Reliability Operating Limits (IROLs) went into effect on 9/15/25.
- Improved event analysis capability has led to identification of new issues so they can be resolved before they become a major problem.
- Further studies are ongoing to better understand the Large Load voltage ride-through issues and solutions.
- ERCOT will be proposing an NPRR to provide a one-time incentive for existing ESRs that adopt Advanced Grid Support technology.
- All key operational metrics are trending well, and all Ancillary Services are performing well.

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# Far West Texas Interconnection Reliability Operating Limit (IROL)

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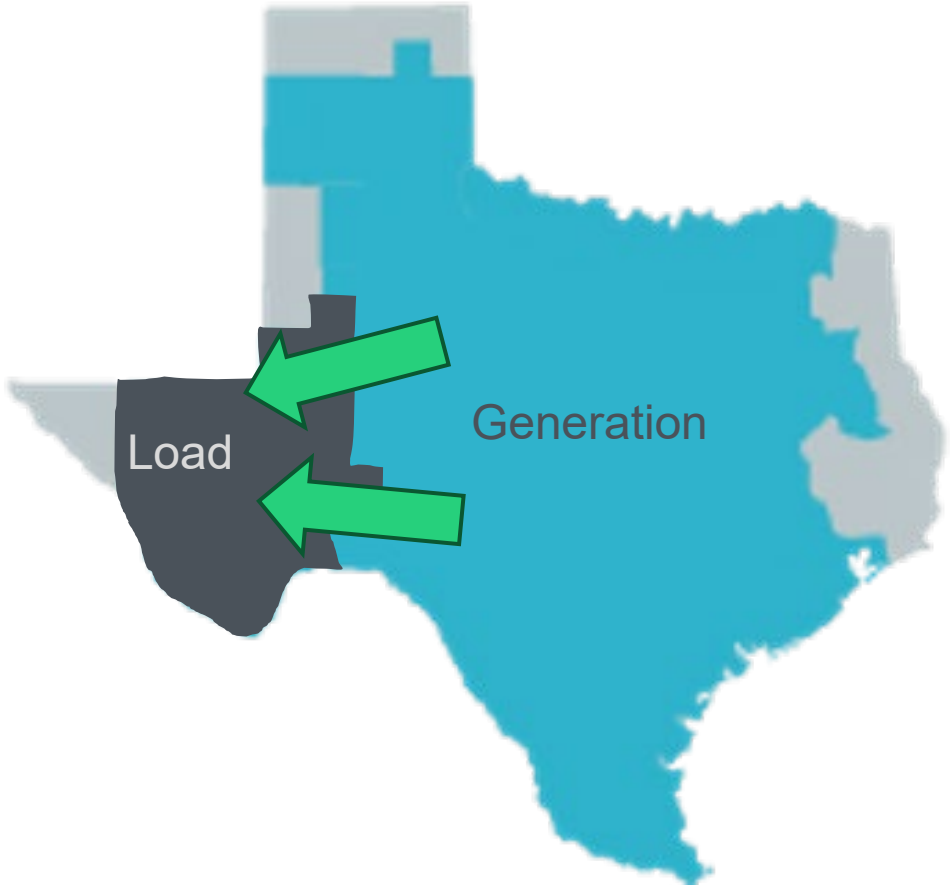
# Far West Texas Import Limit

- Significant new transmission is planned for Far West Texas, but load growth is expected to occur faster than new transmission will be completed
- ERCOT has identified that under low wind and solar conditions, there may not be sufficient transmission to import power to serve the increasing load in the area
  - The load in the area does not yet exceed this amount but will exceed it when it is all built out to the level that has already been approved to energize
  - This buildout could occur as early as late 2025, resulting in overloads during outages needed to complete the needed transmission upgrades
  - The resulting overloads would be cascading if these imports are not managed




**Key Takeaway:** As load increases in Far West Texas the transmission becomes stressed in low wind and solar generation conditions.

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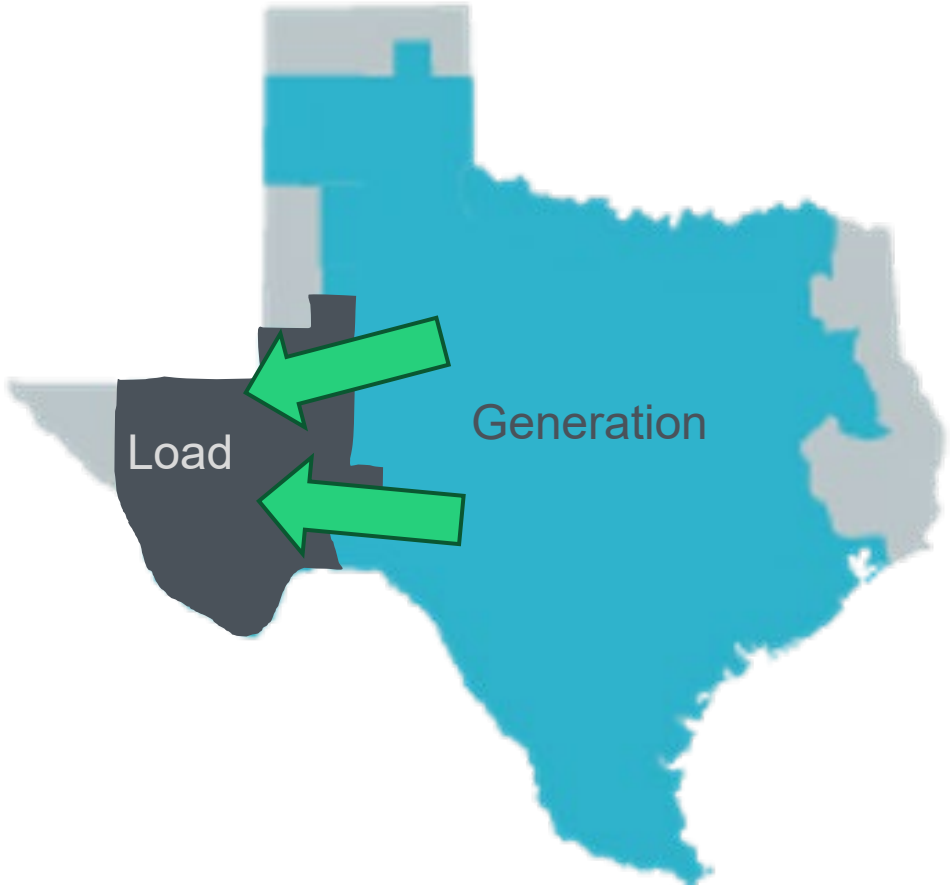
# Far West Texas Import Limit

- While SCED will inherently monitor and control the overloads on individual transmission elements, ERCOT has created two new Generic Transmission Constraints to allow monitoring and control of the import level that would result in cascading
  - Effective September 15, 2025
  - I_FW_N: North to Far West Texas Import
  - I_FW_S: South to Far West Texas Import
  - The limits will be calculated in real-time in order to be as accurate as possible
- The use of these GTCs will help to send appropriate price signals to resources in the area. A significant portion of the load in the area is, or is expected to be, price sensitive; however, it is not clear if they will respond to higher prices in this sub-zonal area
- These interfaces will be treated as Interconnection Reliability Operating Limits (IROLs) requiring pre-contingency loadshed to avoid being exceeded
- ERCOT is working with TSPs in the area to develop plans to reduce the need for this localized loadshed




**Key Takeaway:** Once the load in the area has grown to the level that is a concern, managing the imports into this area to a reliable level may require localized loadshed during low wind and solar generation until transmission improvements are completed.

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# Event Analysis Summary and Examples

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# 2025 Year-to-Date Event Analysis Summary

| Event Type | Number of Events |
|---|---|
| NERC Reportable by ERCOT* | 0 |
| Inverter Based Resource (IBR) Ride-Through Events | 12 |
| Large Load Ride-Through Events | 7 |
| IBR Oscillation Events | 16 |
| IBR Large MW Change Events (no fault associated) | 19 |
| Miscellaneous (Transmission or Telemetry Event) | 4 |

**Key Takeaway:** Numerous events have occurred in 2025, and the Event Analysis team investigates each event to keep the system reliable and prevent reoccurring issues. Have previously talked about IBR and Large Load Ride Through Events; will provide examples of IBR Oscillations and Large MW Changes.

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

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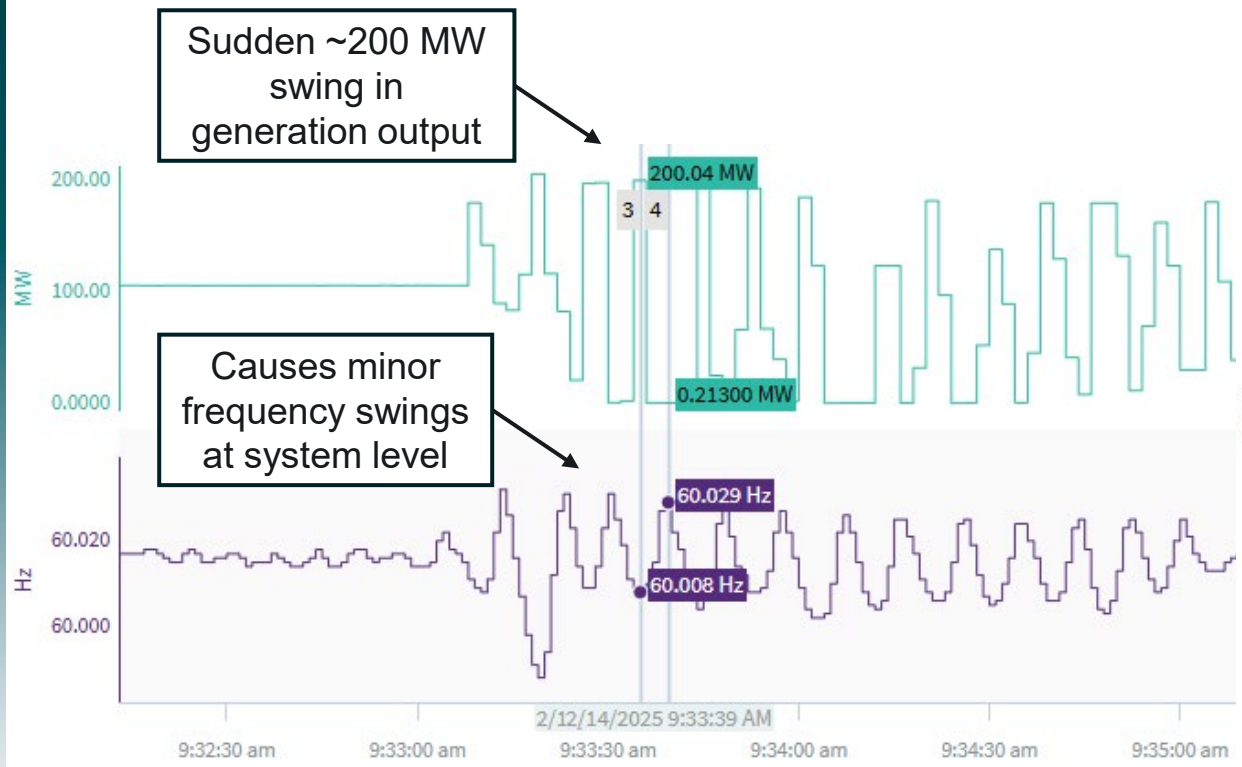
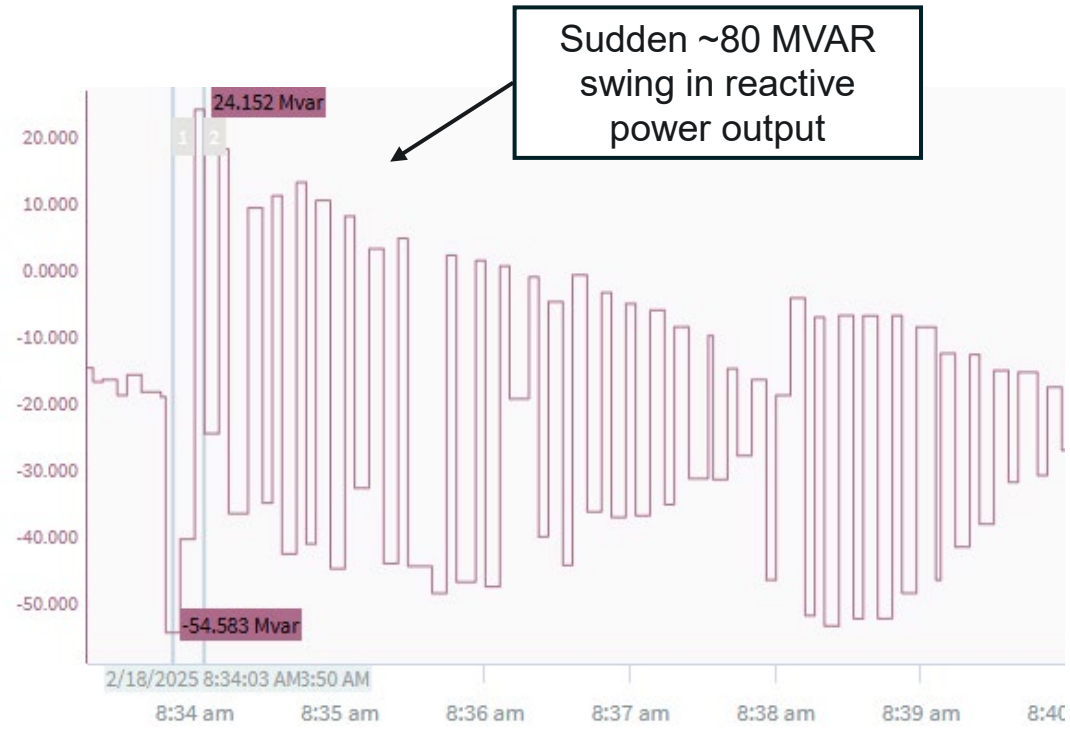
# Event Example 1: IBR Oscillations




Example: IBR MW Oscillation




Example: IBR MVAR Oscillation

**Key Takeaway:** Generator oscillations are undesired because of potential impact on neighboring transmission and generation equipment, which could lead to tripping of equipment. MW oscillations can impact system frequency. Some oscillations are minor and resolve before the control room becomes aware. However, ERCOT reaches out for information to proactively prevent future occurrence.

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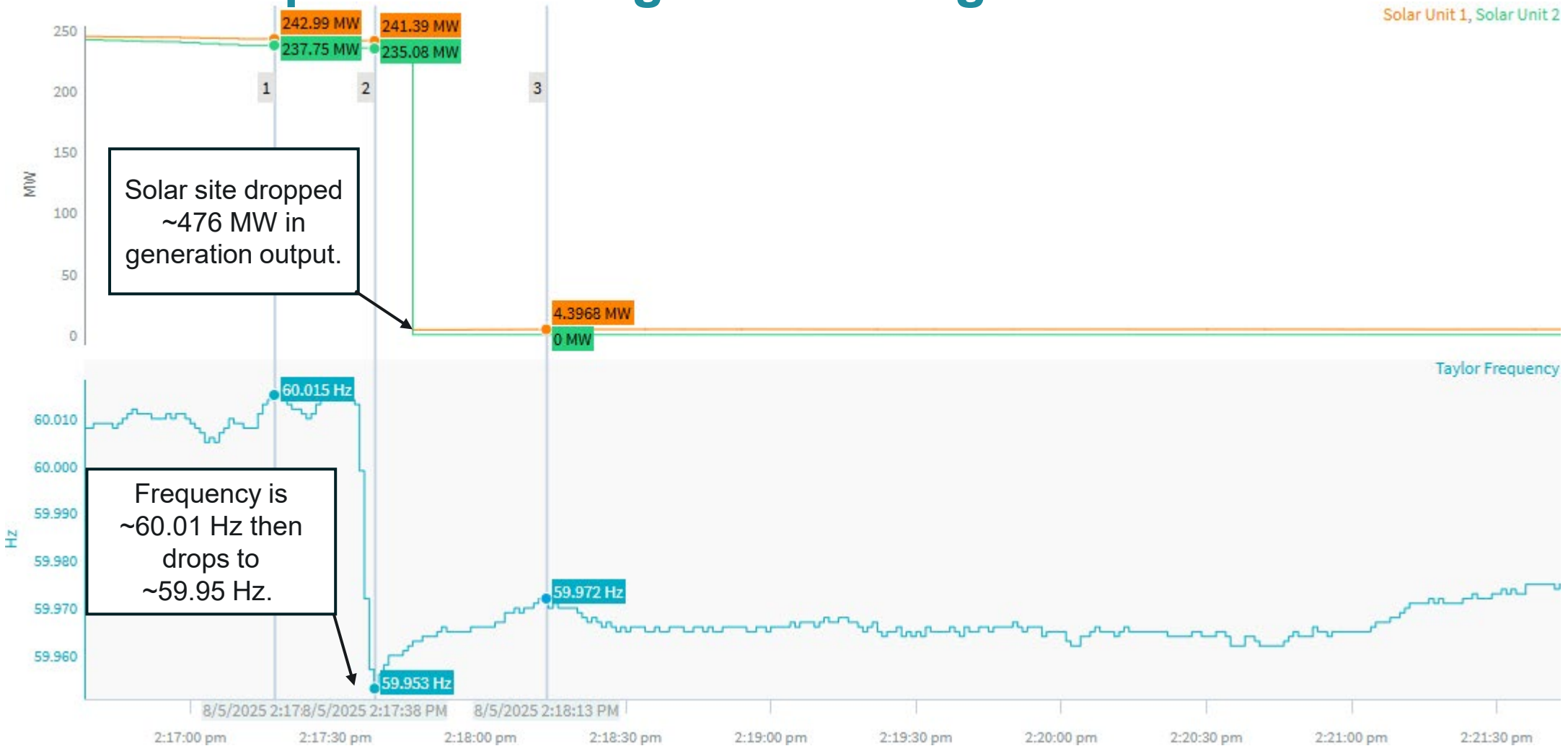
# Event Example 2: IBR Large MW Change




**Key Takeaway:** Large MW changes from generators impact system frequency. These kind of events are not associated with a fault and could happen due to a number of issues, for example, an incorrect control system setting or a mistake during commissioning testing.

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# Large Electronic Load Ride Through Studies and Requirements

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# Large Load Stability Studies

Several additional studies are underway to facilitate efficient management of the Large Load Voltage Ride-through (VRT) Issues:

| Large Load Frequency Limit | Large Load VRT SOL | Large Load VRT Proposal | Benefit of Transmission Improvement |
|---|---|---|---|
| • To determine Large Load loss thresholds for various inertia and down-room conditions | • To identify System Operating Limits(SOLs) based on the threshold established by the Frequency Limit study<br>• To develop mitigation plan to manage SOLs | • To help develop a recommended VRT requirement for Large Loads | • Identify relative loss of Large Load reduction benefits of various transmission improvements |

**Key Takeaway:** After identifying potential problems associated with Large Load Ride-through in some areas, and under worst case conditions, ERCOT is in process of performing additional analyses to investigate other areas, other conditions and potential solutions.

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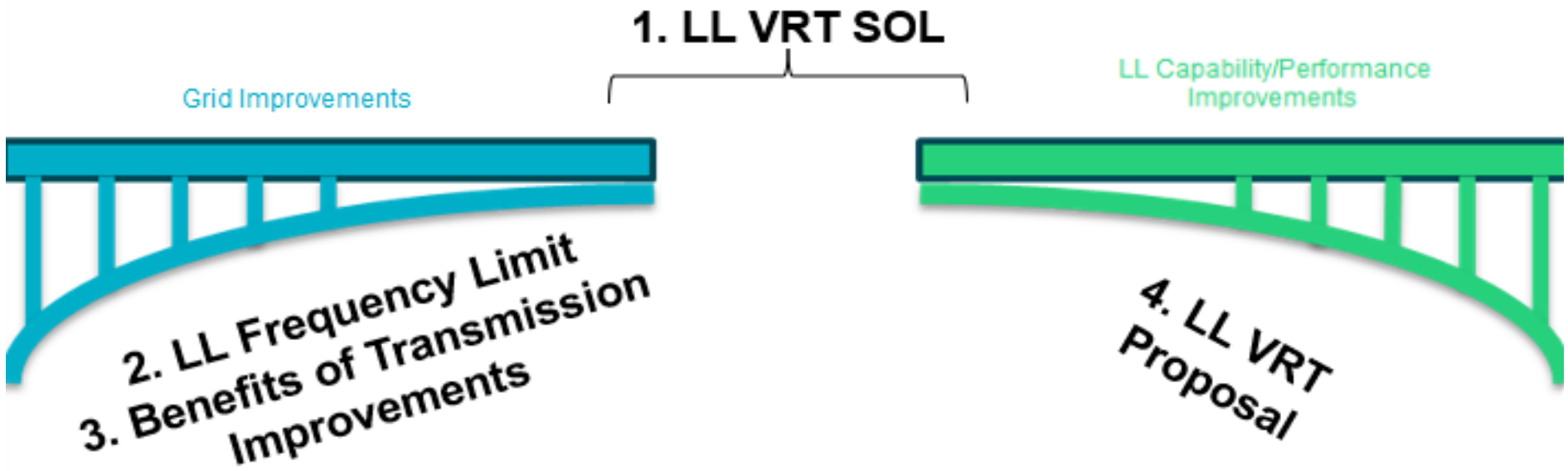
# Large Load Studies and Requirements

As discussed previously, bridging the reliability gap related to Large Load ride-through will require solutions from both the Grid and the Large Loads. These studies will help facilitate each aspect of that bridge:




**Key Takeaway:** These four stability studies address the Large Load VRT issue by examining operational solutions, grid solutions, and load-side solutions. Both grid upgrades and load VRT capabilities are needed to adequately mitigate the reliability risks associated with Large Load loss events.

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# Advanced Grid Support (AGS) One-Time Incentive NPRR

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# Upcoming NPRR for Advanced Grid Support (AGS)

**Problem Statement**: NOGRR 272 / PGRR 121 require new Energy Storage Resources (ESRs) to provide advanced grid support. Existing Inverter-Based Resources (IBR) are not required to implement AGS capability even if only settings changes are required.

**Proposed Solution**: ERCOT proposes to sponsor a future NPRR that would implement a one-time AGS new technology incentive concept to encourage AGS adoption for existing IBRs.

**Outcome**: To encourage technology adoption and provide grid stability and resilience.

**Key Takeaway:** ERCOT will soon be proposing an NPRR to incent existing ESRs to implement AGS capability.

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# Appendix
# Operational Metrics and Ancillary Services (AS) Performance

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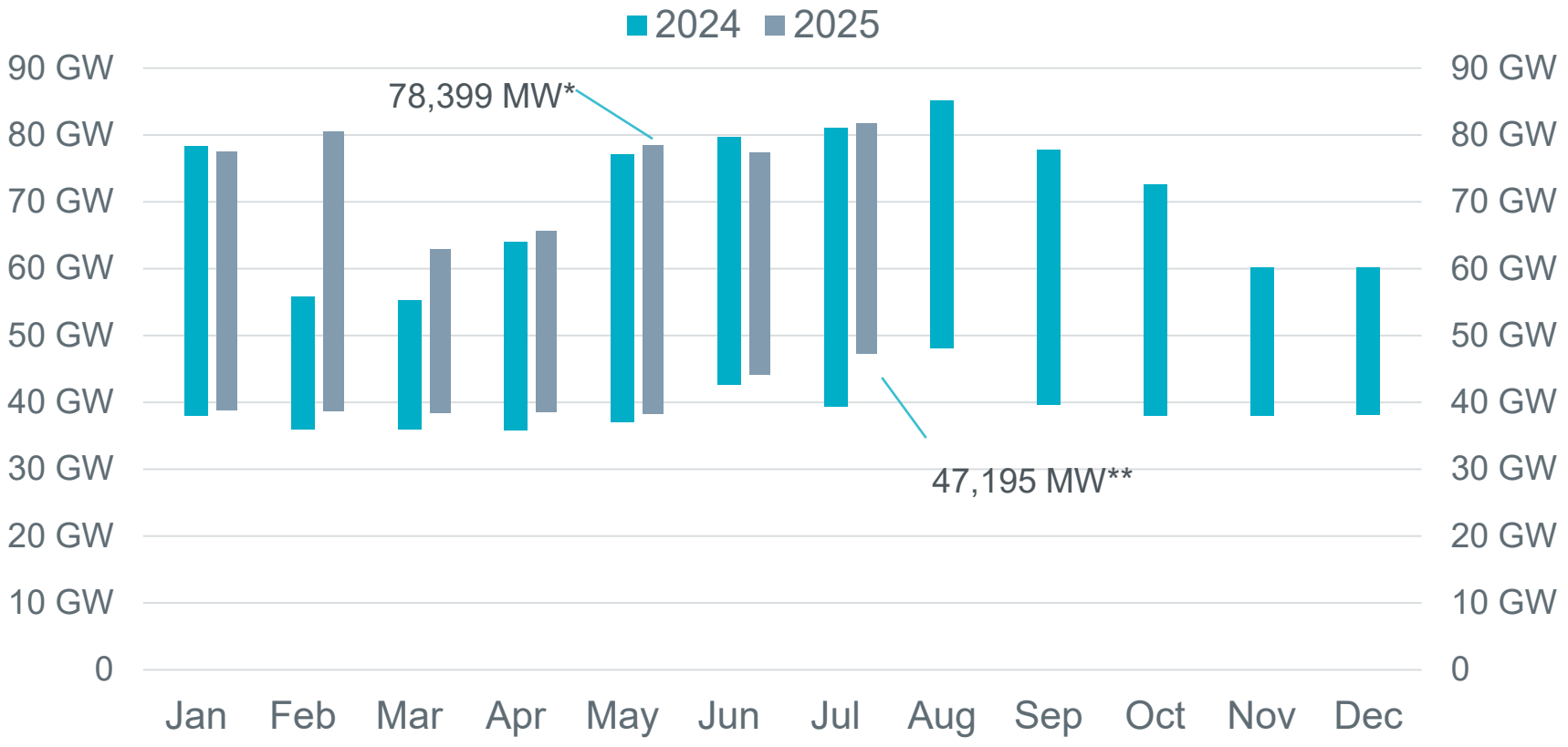
# Demand




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

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

Data for latest two months are based on preliminary settlements.

**Key Takeaway:** ERCOT set a new demand record of 78,399 MW* for the month of May on 5/23/2025. This is 1,261 MW more than the May 2024 demand of 77,139 MW on 5/27/2024.

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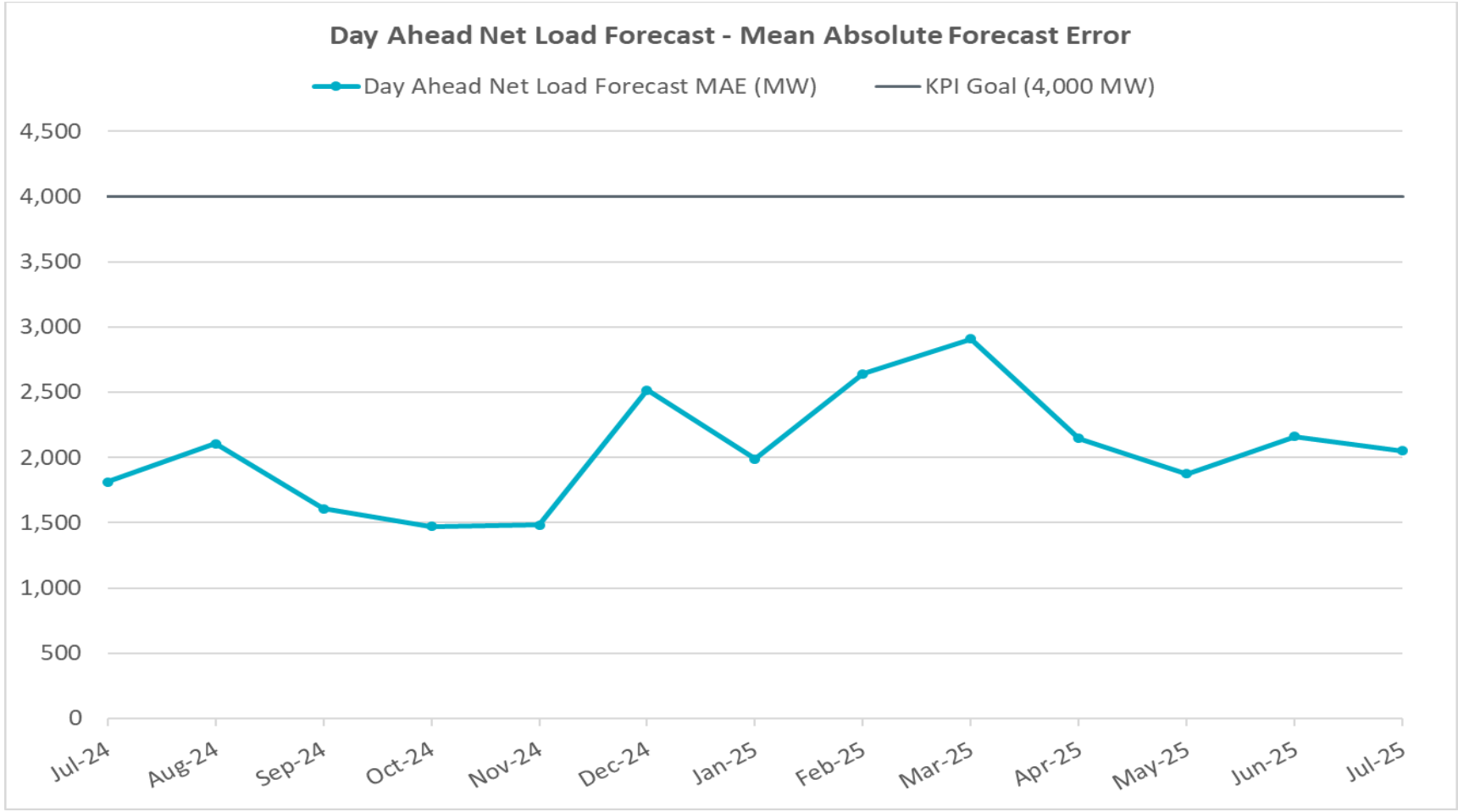
# Forecast Performance




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

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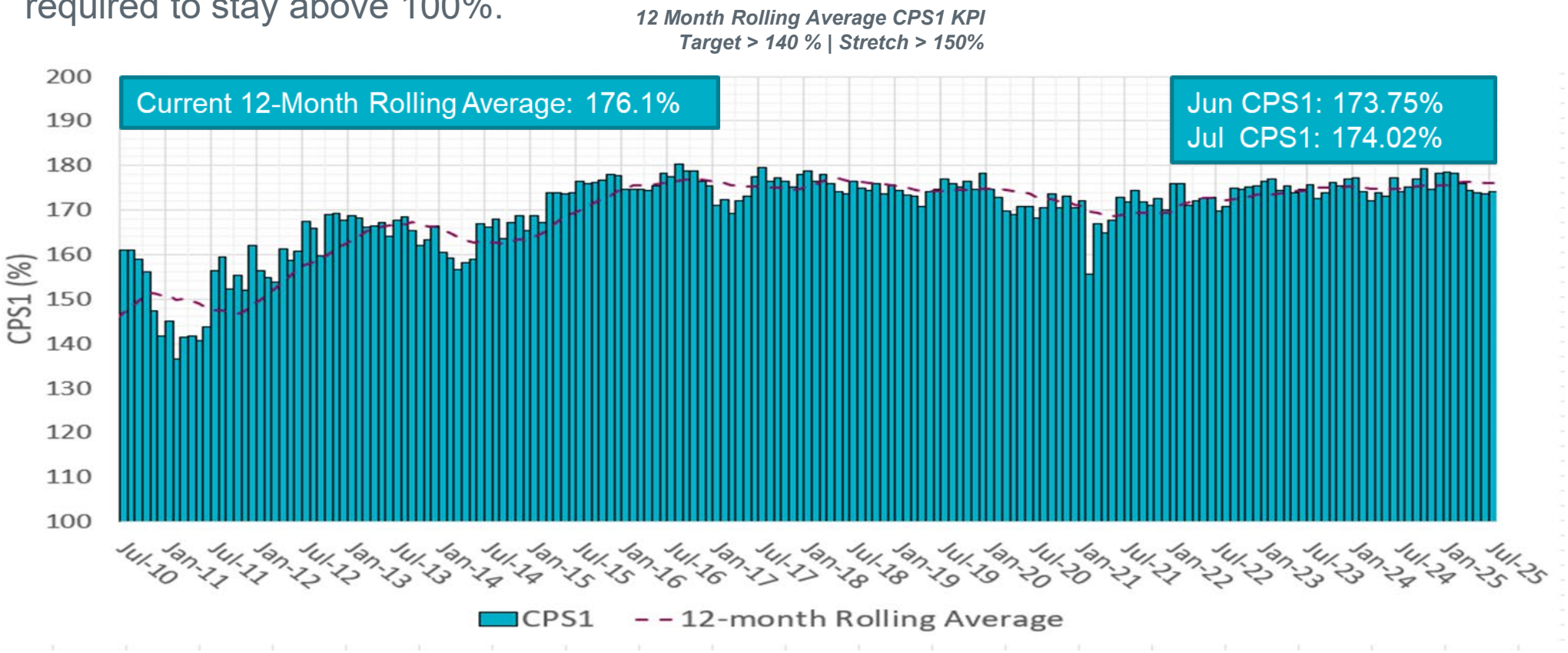
# Frequency Control

- 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.

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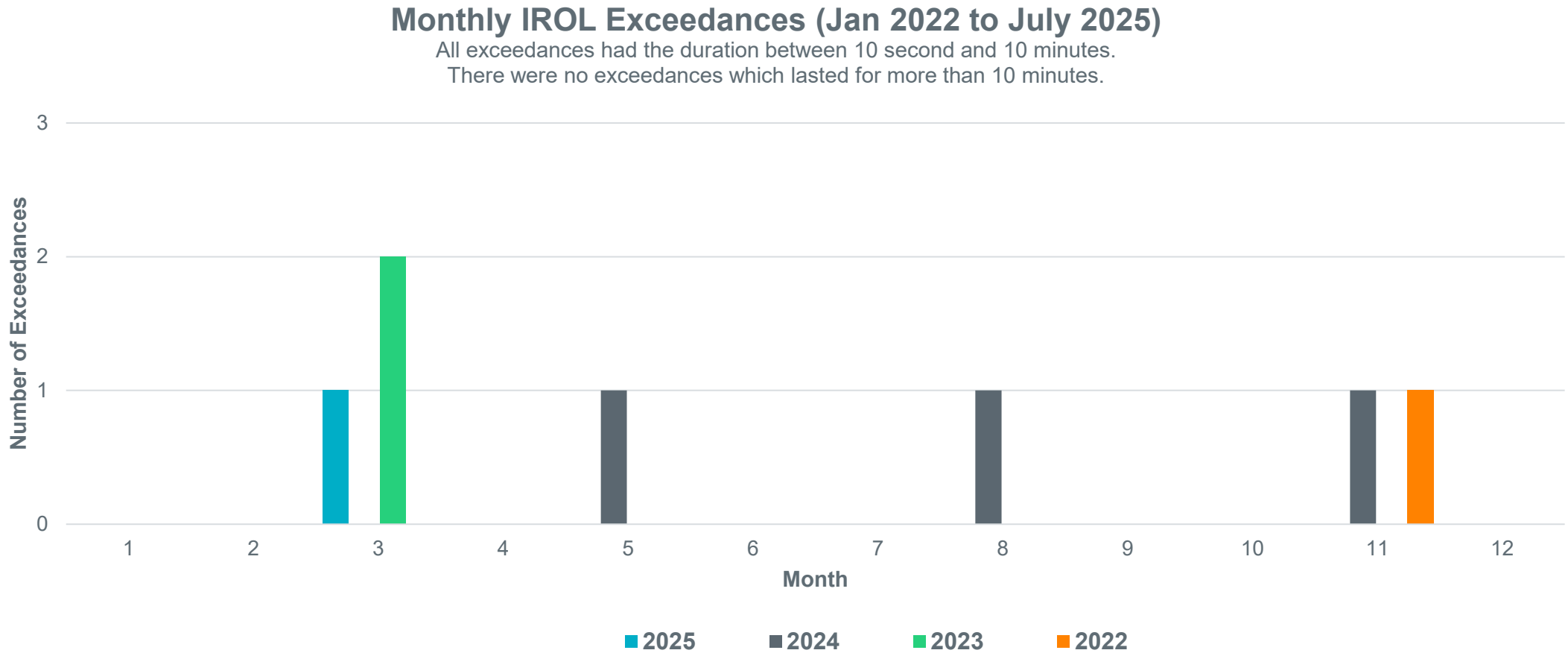
# Transmission Limit Control

The most-recent Interconnection Reliability Operating Limit (IROL) exceedance occurred in March 2025.




**Key Takeaway:** ERCOT has not experienced significant reliability risks associated with exceeding IROLS.

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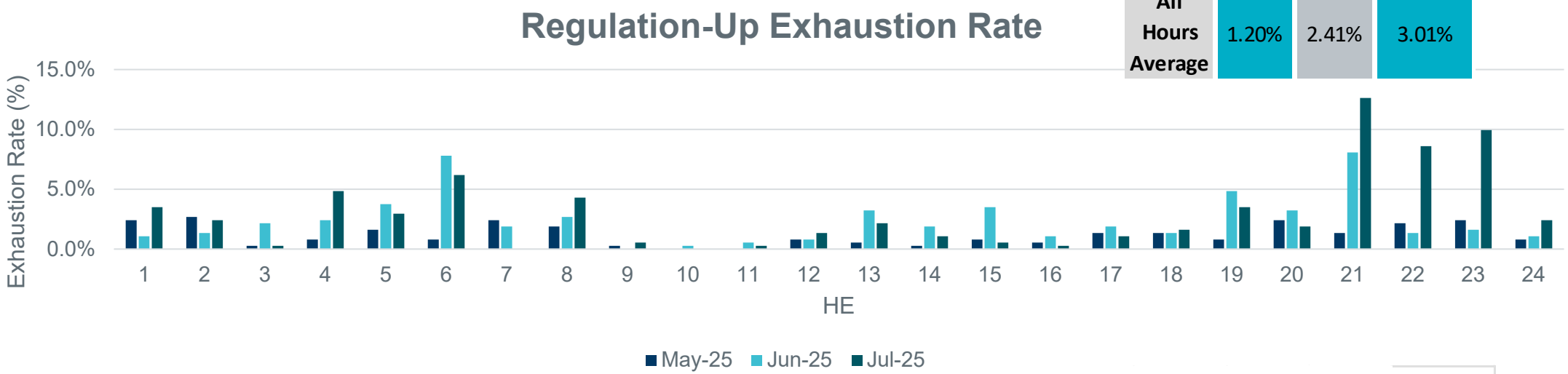
# Regulation Service Deployments for May – July 2025

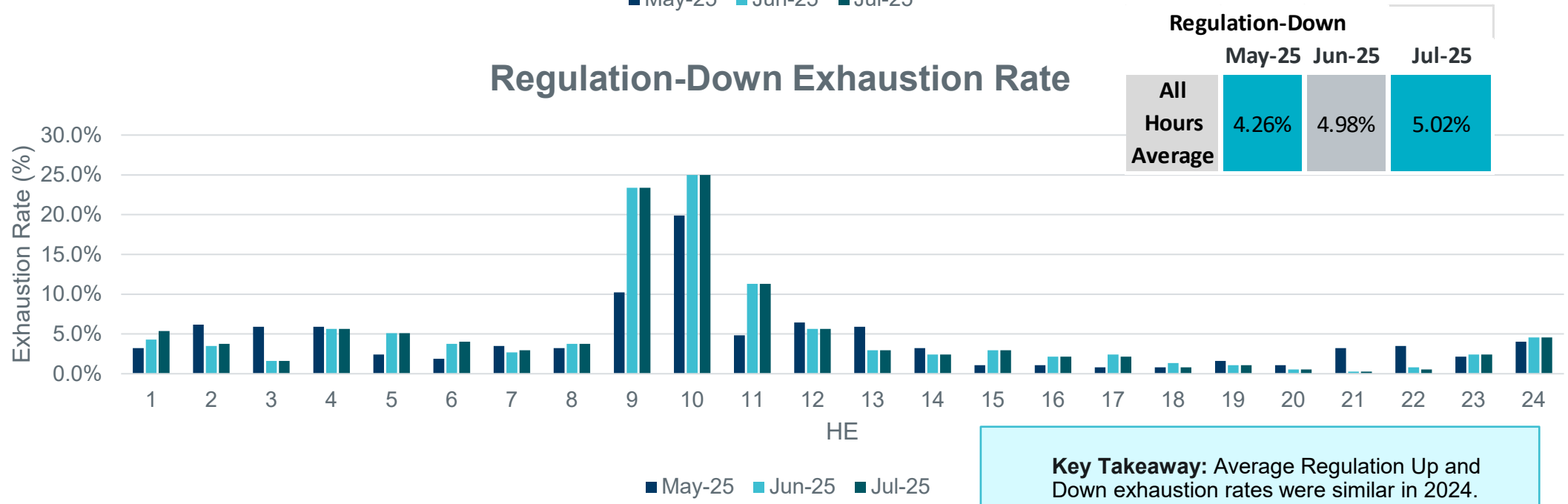
**Regulation-Up**

| | May-25 | Jun-25 | Jul-25 |
|---|---|---|---|
| All Hours Average | 1.20% | 2.41% | 3.01% |




**Regulation-Down**

| | May-25 | Jun-25 | Jul-25 |
|---|---|---|---|
| All Hours Average | 4.26% | 4.98% | 5.02% |




**Key Takeaway:** Average Regulation Up and Down exhaustion rates were similar in 2024.

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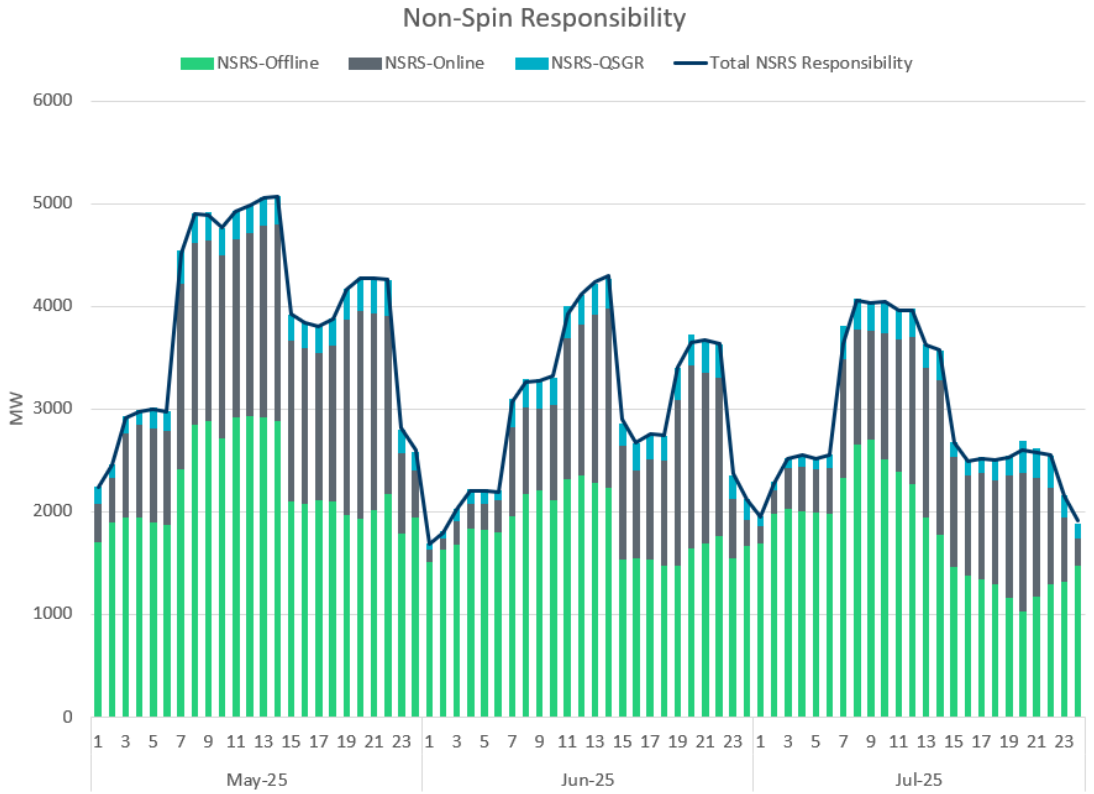
# Non-Spinning Reserve Service (Non-Spin) Deployments for May - July 2025

From May to July 2025, there were 2 events that resulted in deployment of offline Non-Spin.

During this time, an average of ~38% 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) |
|---|---|---|
| 5/16/2025 19:39 | 01:38:51 | 1194.7 |
| 5/17/2025 19:27 | 00:57:56 | 451.6 |




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

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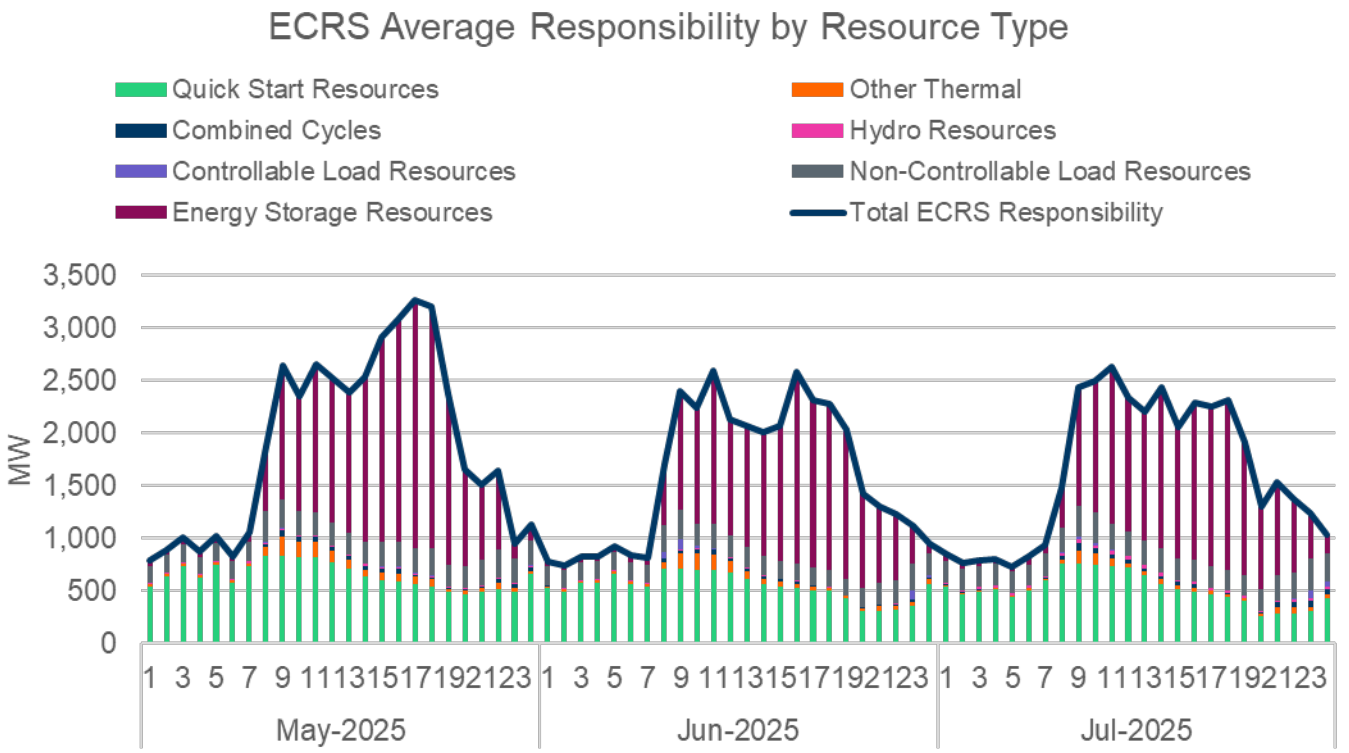
# ERCOT Contingency Reserve Service (ECRS) Release for May-July 2025

From May to July 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 |
|---|---|---|---|
| 5/16/2025 19:35 | 01:10:12 | 1,000 | Release due to SCED UnderGen |




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

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# Responsive Reserve Service (RRS) Released for May-July 2025

- From May to July 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 May-July 2025.

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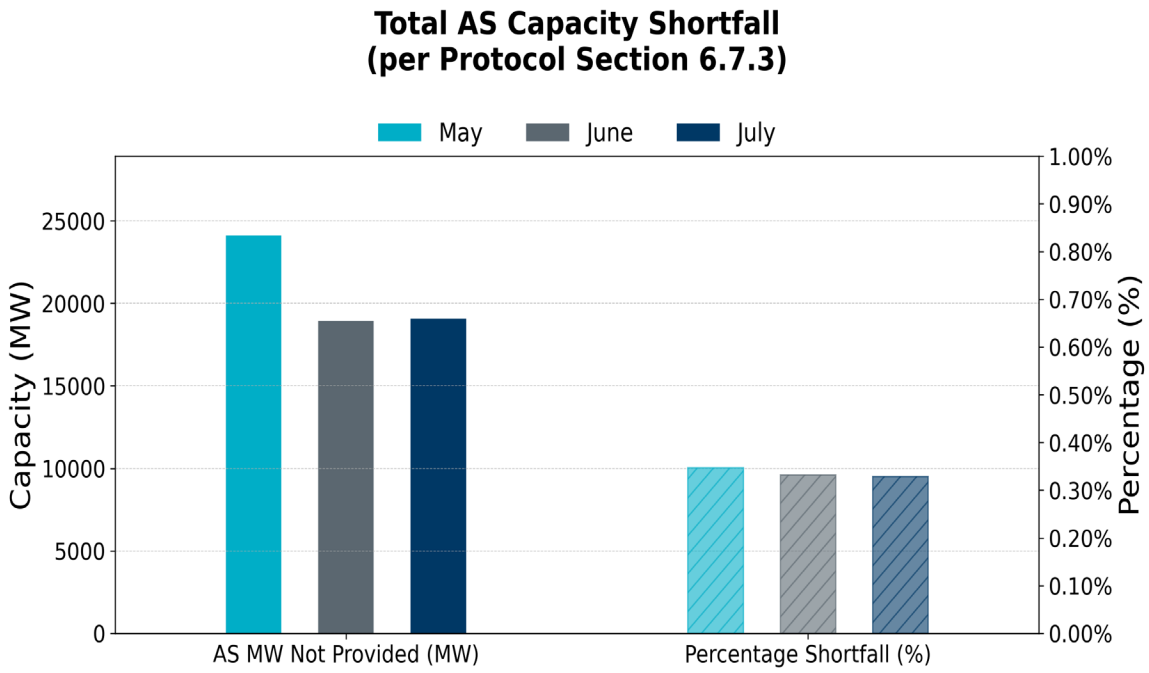
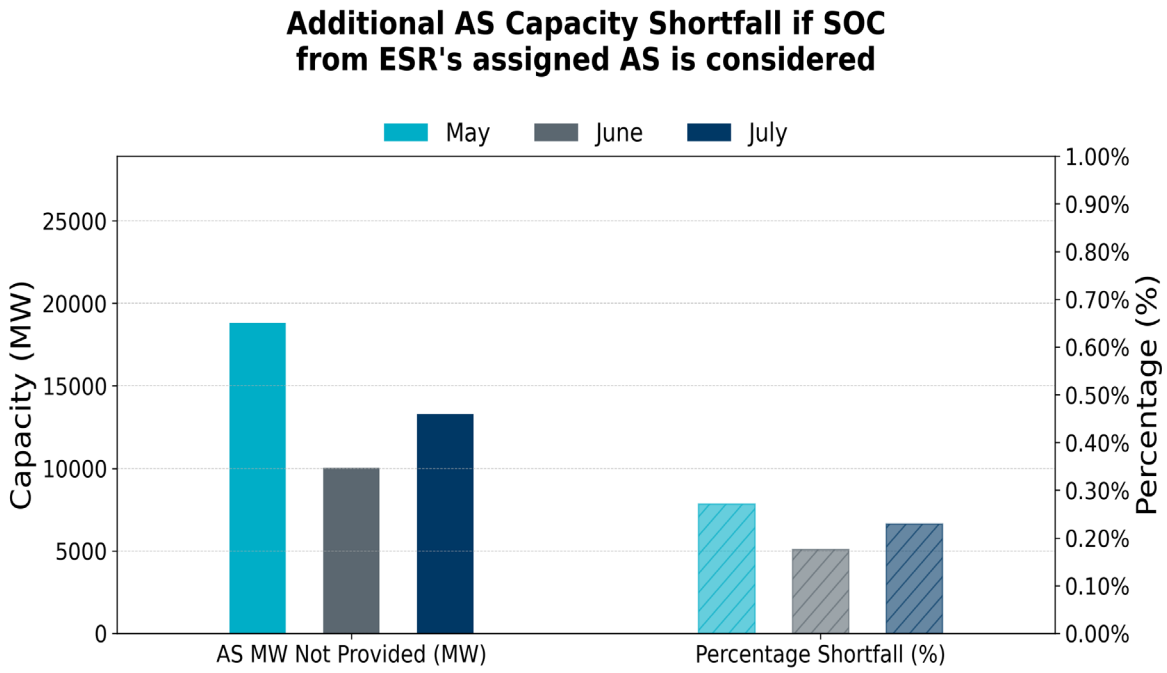
# AS MW Shortfall Analysis




**Key Takeaways:** 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.

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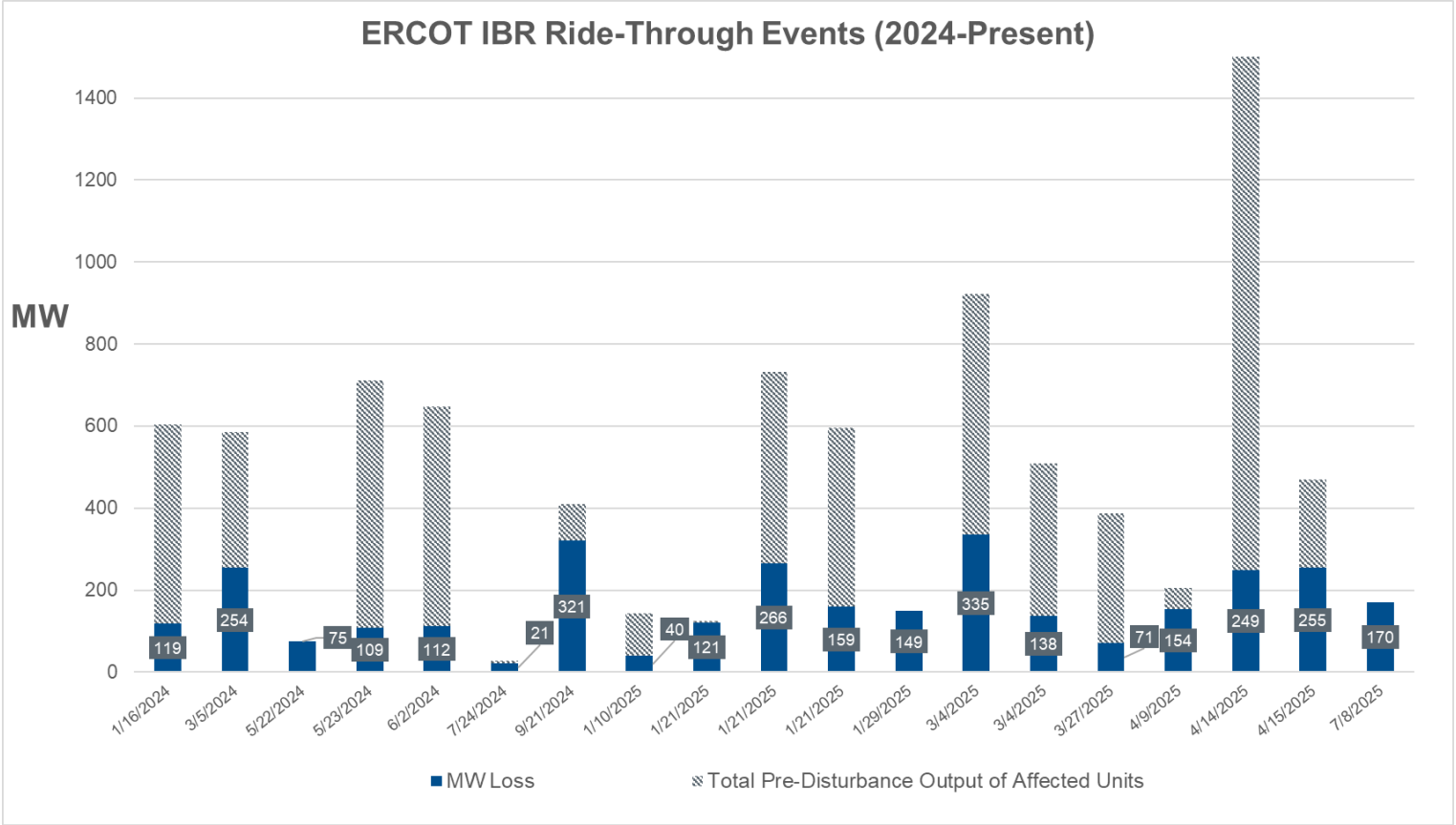
# IBR Ride-Through Events




**Key Takeaway:** ERCOT continues to have IBR ride-through events, although the magnitude of events has remained below 500 MW. The most common cause of ride-through failure has been individual turbines tripping on a variety of different fault codes such as UPS failure, crowbar circuit failure, vibration sensors, etc. Also, improper frequency measurements during fault events have caused Power Plant Controllers to inhibit proper ride-through operation of turbines and inverters.

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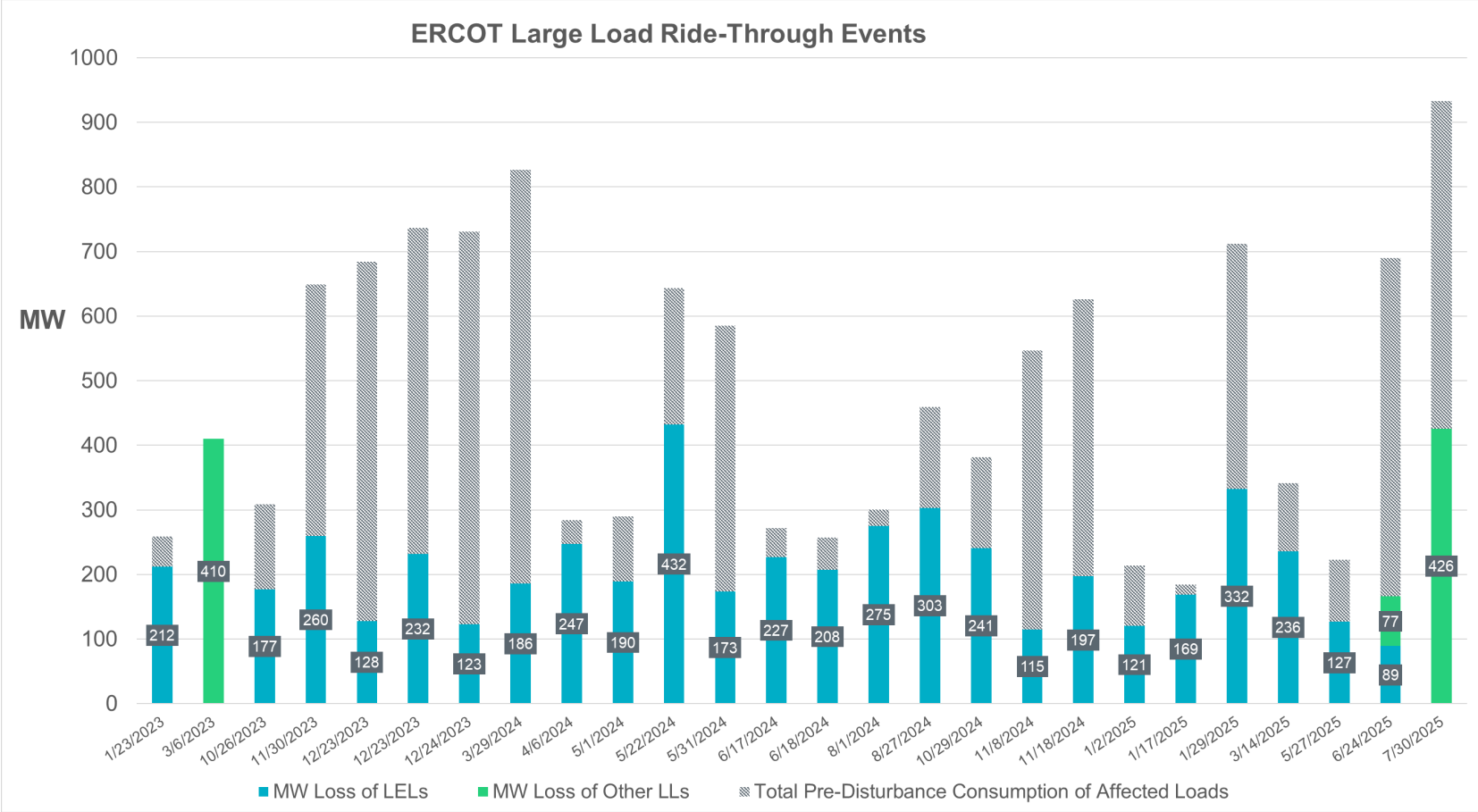
# Large Load Ride-Through Events




**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.