



Item 10.2: System Operations Update

Dan Woodfin

Vice President, System Operations

Reliability and Markets Committee Meeting

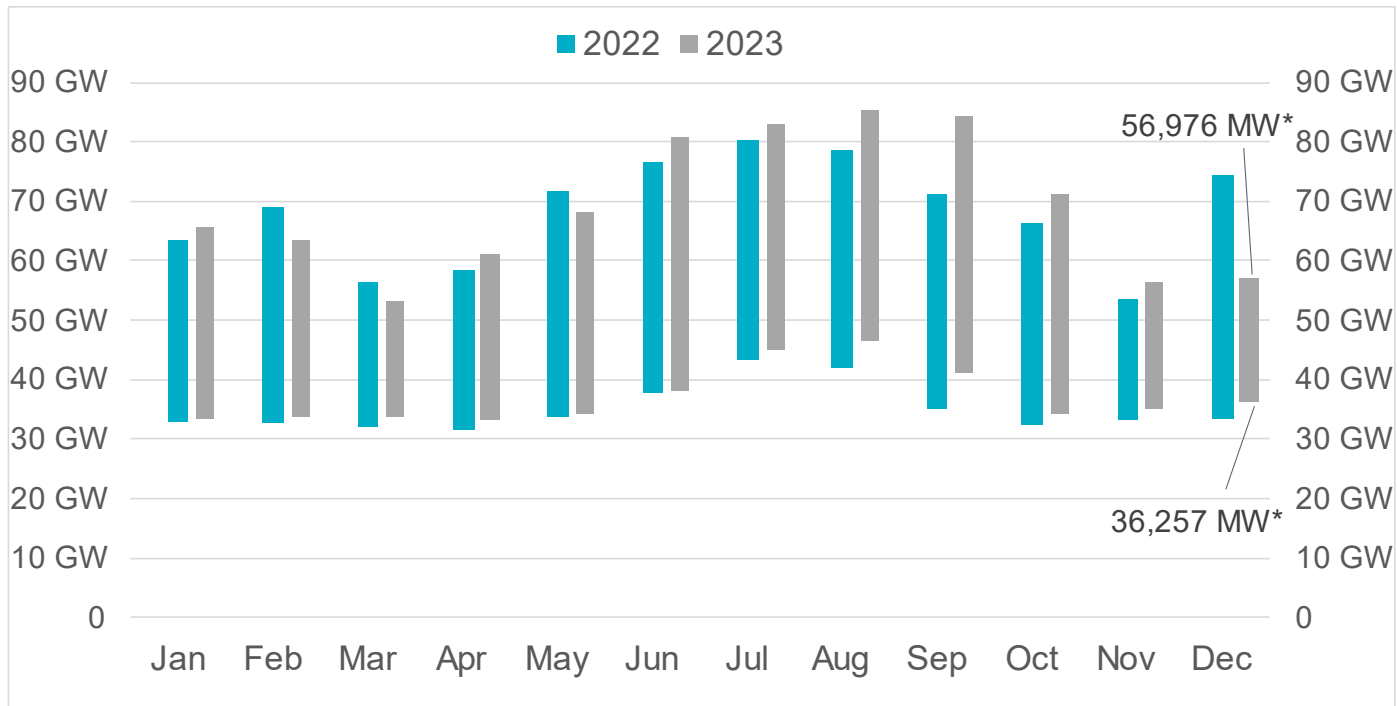
ERCOT Public

February 26, 2024

Overview

- **Purpose**
 - Provide an update on key operational metrics to the Reliability and Markets (R&M) Committee
 - Provide information on recent Ancillary Services performance
 - Provide information on hot topics
- **Voting Items / Requests**
 - No action is requested of the R&M Committee or Board; for discussion only
- **Key Takeaways**
 - All key operational metrics are trending well, and all Ancillary Services are performing well
 - System performance during Winter Storm Heather was good

Demand



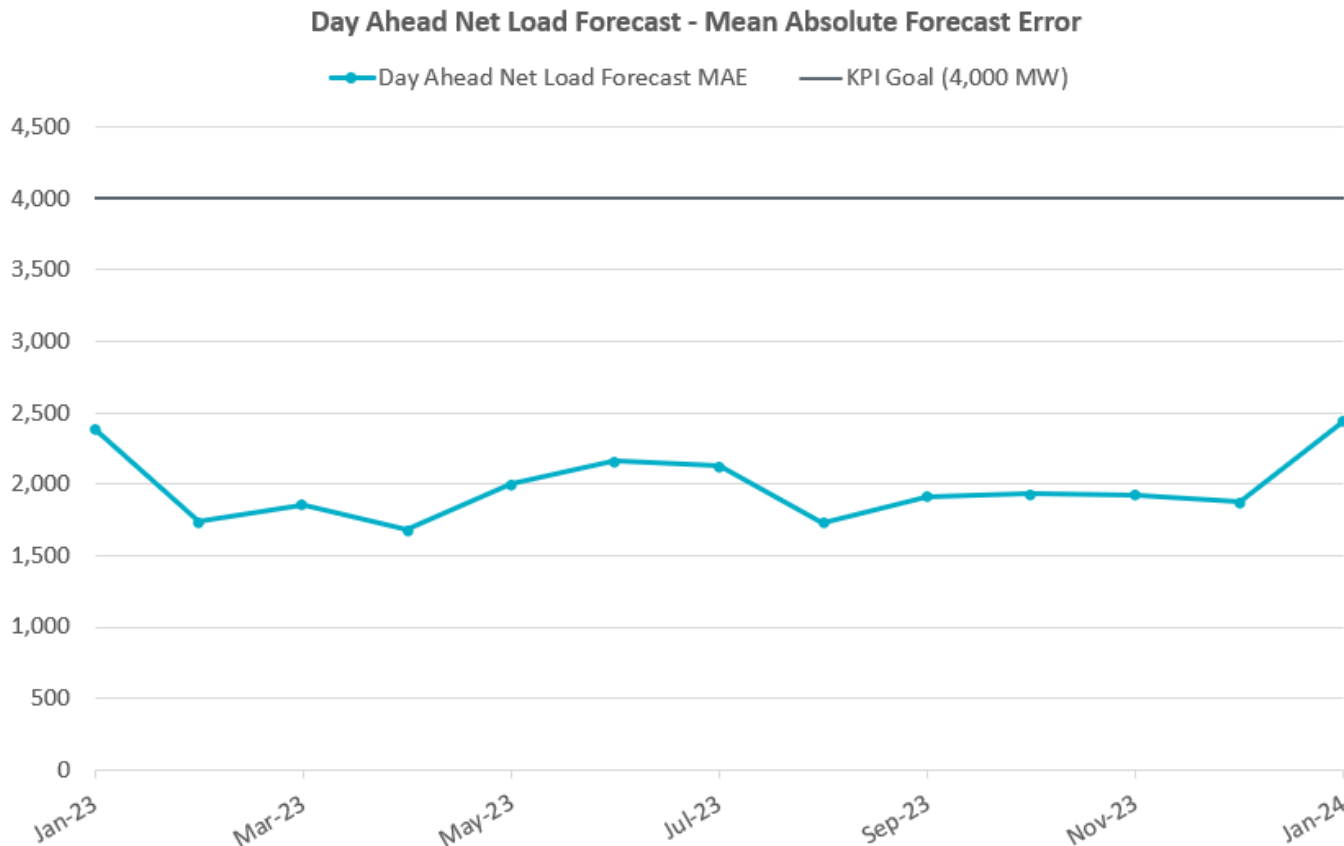
*Based on the maximum net system hourly value from December release of Demand and Energy 2023 report.

**Based on the minimum net system 15-minute interval value from December release of Demand and Energy 2023 report.

Data for latest two months are based on preliminary settlements.

Key Takeaway: ERCOT’s maximum peak demand for the month of December was 59,976 MW*; this is 17,549 MW less than the December 2022 demand of 74,525 MW.

Forecast Performance

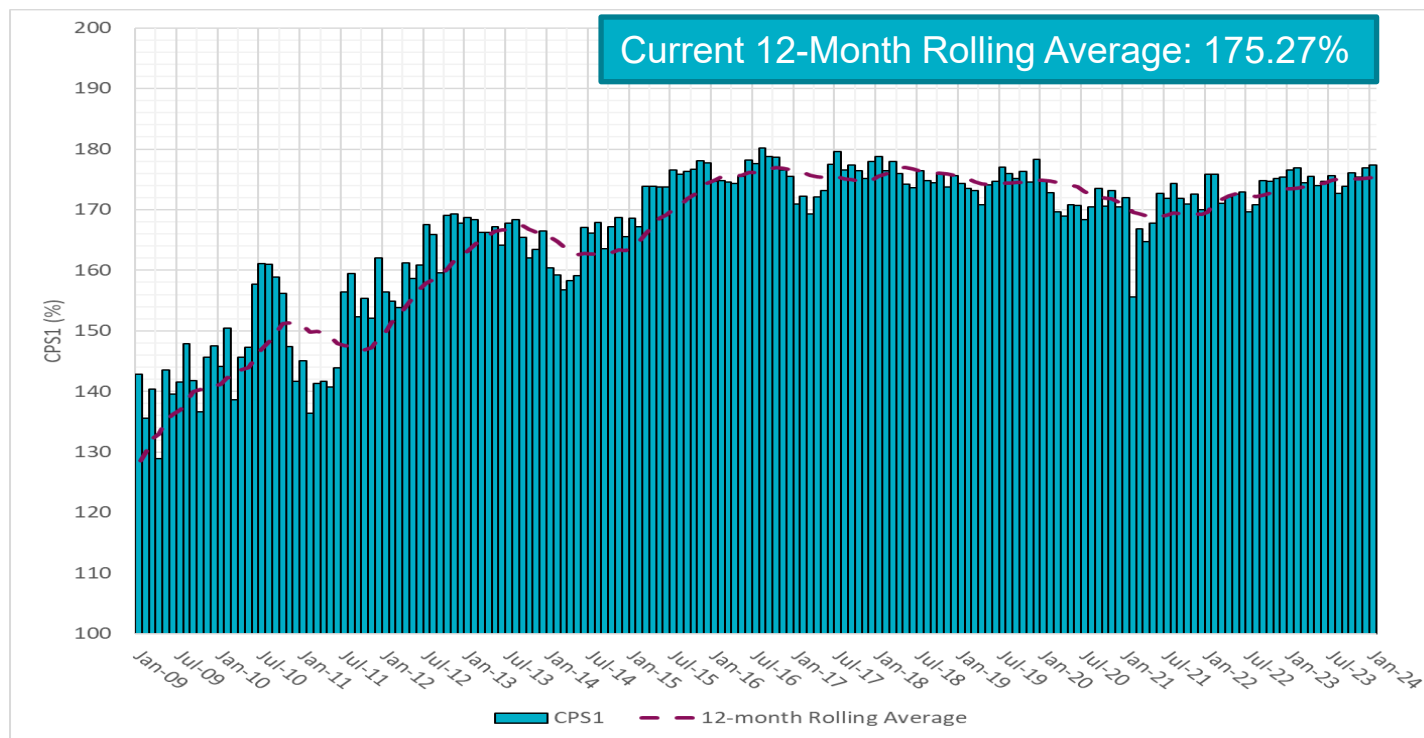


Key Takeaway: The Day Ahead Net Load Forecast Mean Absolute Forecast Error metric has met the target and has been trending well.

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%.

12 Month Rolling Average CPS1 KPI
Target > 140 % | Stretch > 150%



Key Takeaway: Frequency control has been performing extremely well.



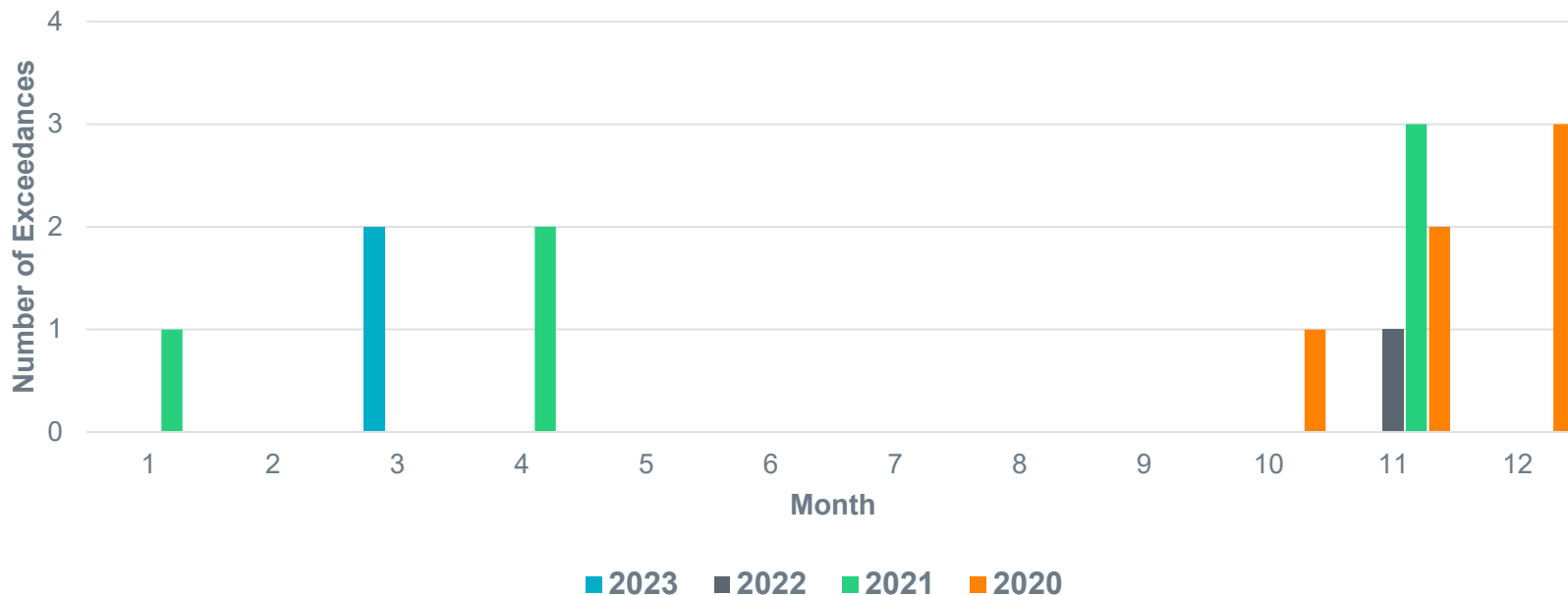
Transmission Limit Control

- The most-recent Interconnection Reliability Operating Limit (IROL) exceedance occurred in March 2023.

Monthly IROL Exceedances (Jan 2020 to Dec 2023)

All exceedances had the duration between 10 second and 10 minutes.

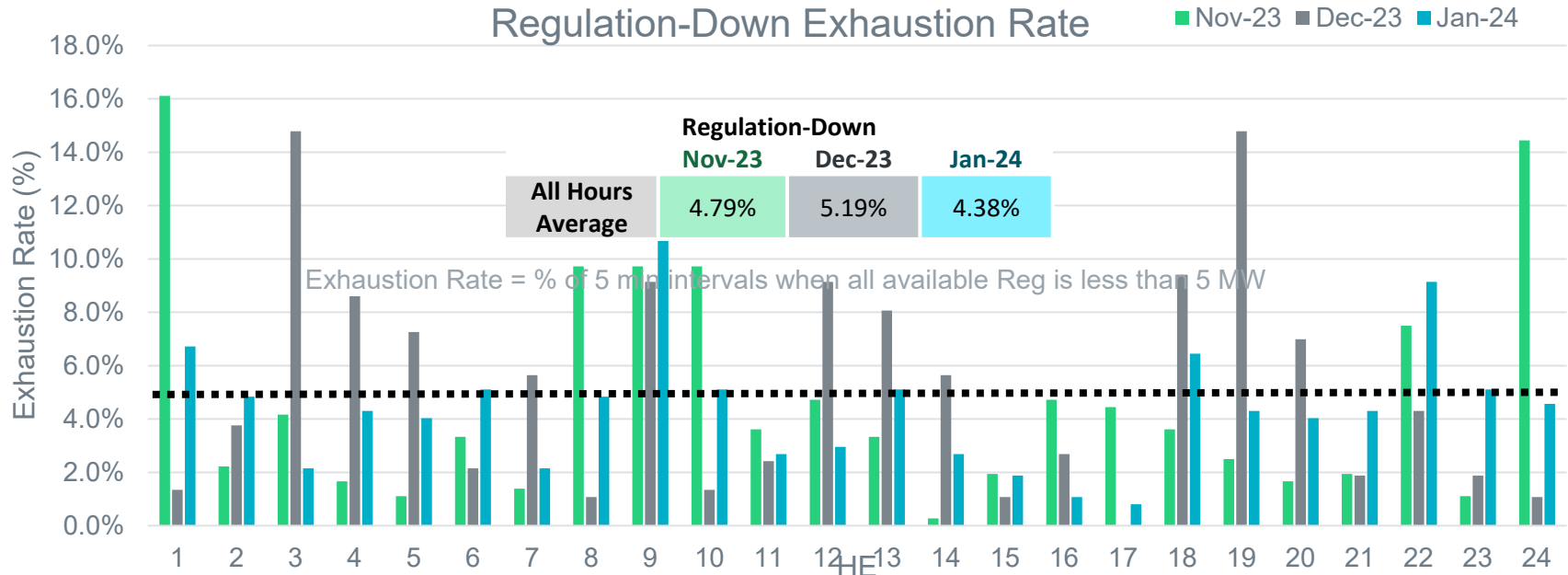
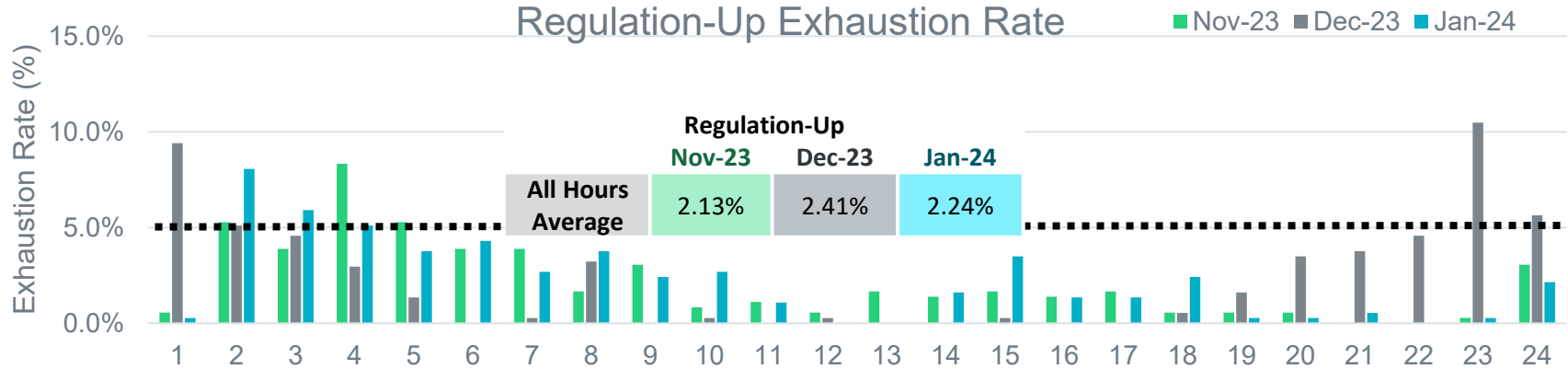
There was no exceedance which lasted for more than 10 minutes.



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

Ancillary Services Performance

Regulation Service Deployments for Nov 2023 to Jan 2024



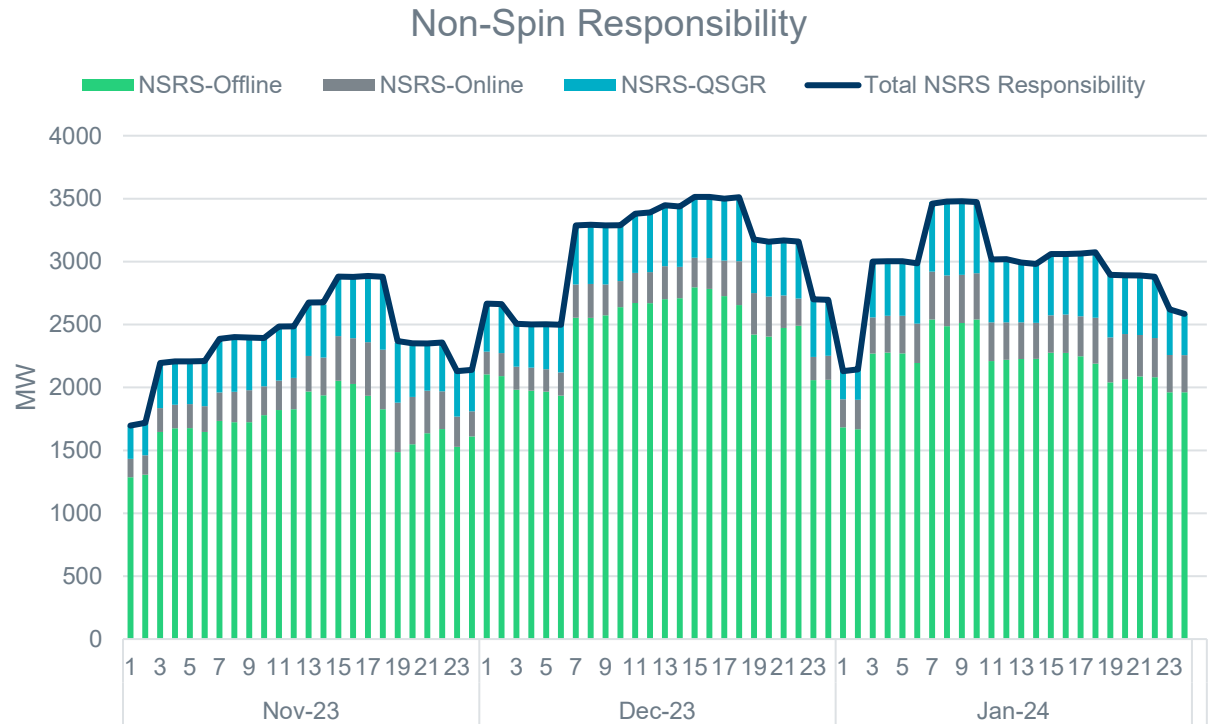
Key Takeaway: Average Regulation Up and Down exhaustion rates have been similar in recent years.



Non-Spinning Reserve Service (Non-Spin) Deployments for Nov 2023 to Jan 2024

Between Nov 2023 and Jan 2024, there were 3 events that resulted in deployment of offline Non-Spin. During this time, an average of ~29% 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)
11/8/2023 4:18	1:42:53	178.9
11/15/2023 16:23	2:39:01	706.1
1/22/2024 17:42	1:56:02	1214.1



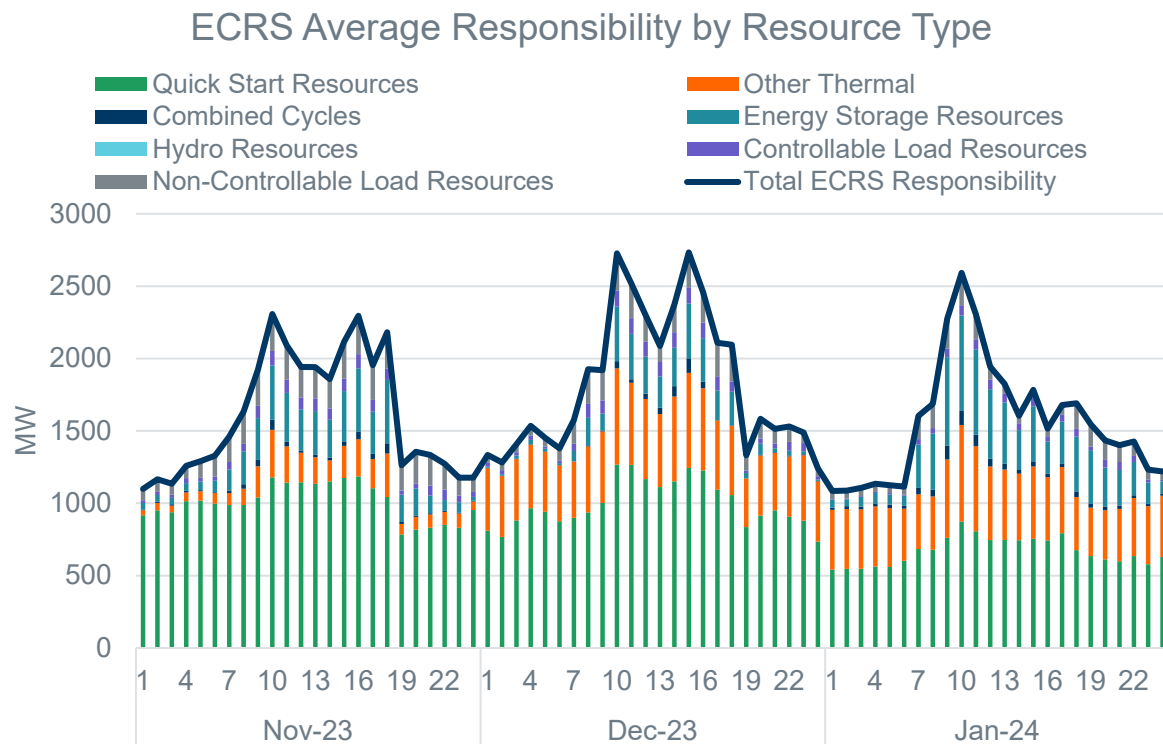
Key Takeaway: All recent Non-Spin deployments have been to meet 30-minute ramping needs. Non-Spin performed well in all deployments.



ERCOT Contingency Reserve Service (ECRS) Release for Nov 2023 to Jan 2024

Between Nov 2023 and Jan 2024, there were 5 events that resulted in release of SCED dispatchable ECRS. 4 releases were for frequency trigger while 1 release was to meet 10-minute projected net load.

Deployment Start Time	Deployment Duration	Maximum SCED Dispatchable MW Released	Reason
11/13/2023 6:21	0:03:32	149	Frequency below 59.91Hz
11/13/2023 10:28	0:04:52	546	
12/14/2023 19:29	0:06:56	805	
1/1/2024 20:13	0:06:23	549	
1/16/2024 18:25	0:42:24	400	Available capacity not sufficient for projected Net Load



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



Responsive Reserve Service (RRS) Released for Nov 2023 to Jan 2024

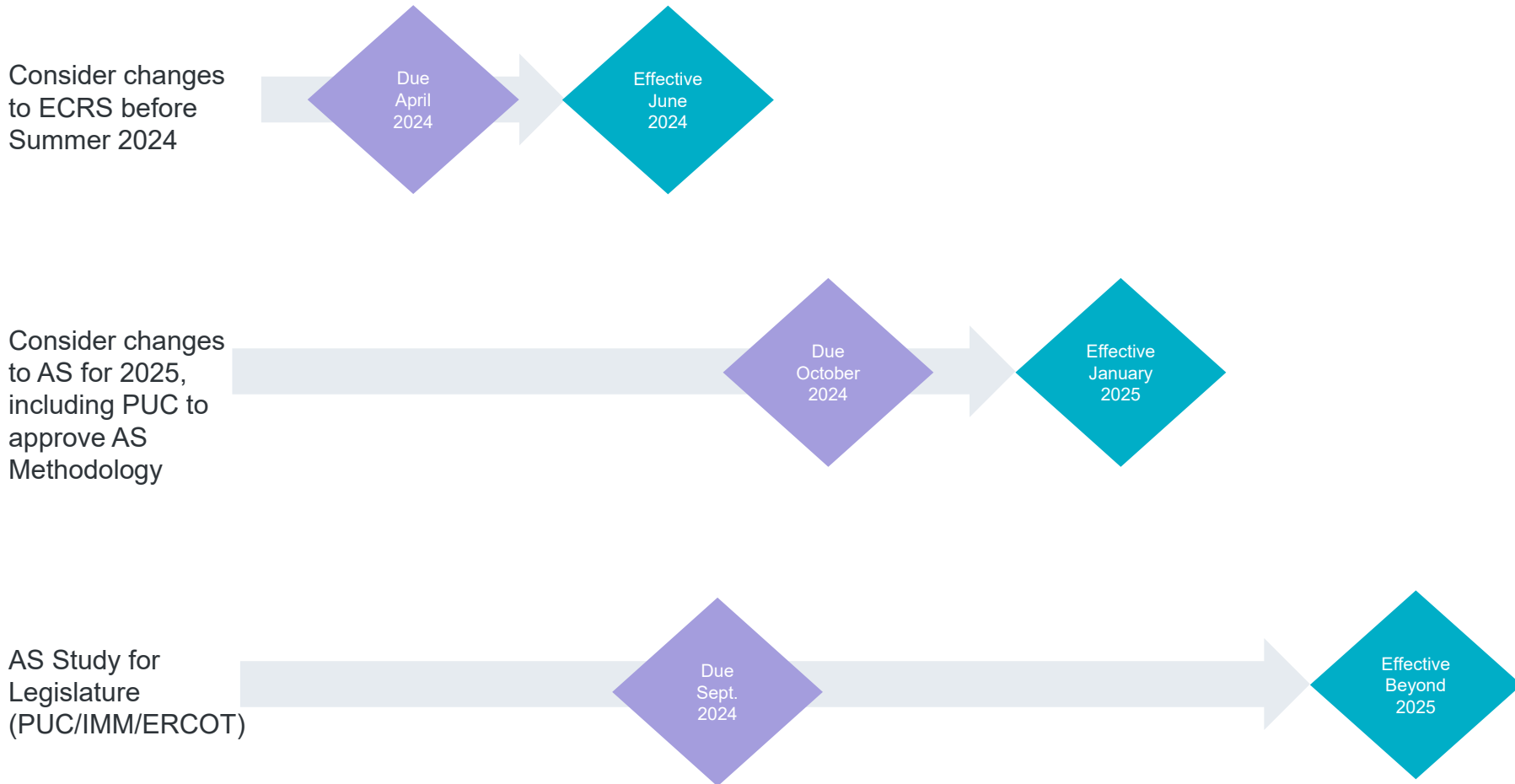
- From Nov 2023 to Jan 2024 there were no manual release of RRS
- With implementation of ECRS, RRS capacity autonomously deploys when frequency exceeds the frequency dead-band. RRS may be manually released to SCED during scarcity events when additional capacity is needed.

Key Takeaway: No Manual RRS Release from Nov 2023 to Jan 2024.

Hot Topics

- Ancillary Services Initiatives
- April 8 Solar Eclipse
- Winter Storm Heather Review

Relationship Between Ancillary Services Initiatives

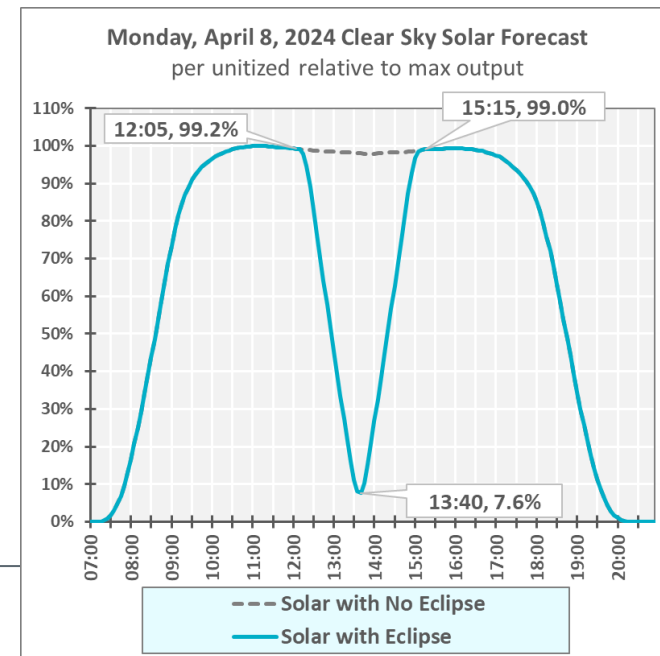
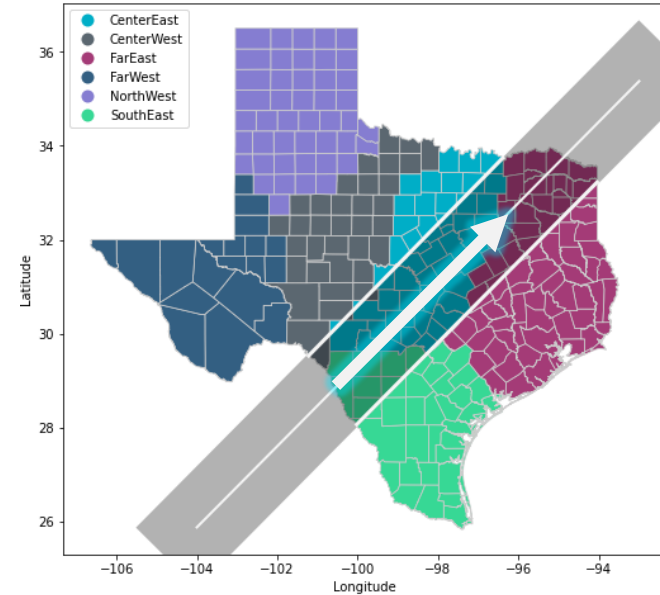


Total Solar Eclipse – Monday, April 8, 2024

- On Monday, April 8, 2024, a total solar eclipse will pass over North America from southwest to northeast direction.
- The eclipse in Texas will occur between approximately 12:10 pm (southwest point) and 15:10 CDT (northeast point), with sun coverage ranging from 81% to 99% in Texas.
- ERCOT solar generation will be impacted between approximately 12:10 and 15:10. The maximum impact will occur around 13:40, reducing solar generation to about 7.6% of its maximum clear sky output.
- ERCOT is working with solar forecast vendors to ensure the forecasting models account for the impact of the eclipse. ERCOT is actively monitoring expected operations and will rely on Ancillary Services and other actions to posture the system as necessary for balancing needs during the eclipse.

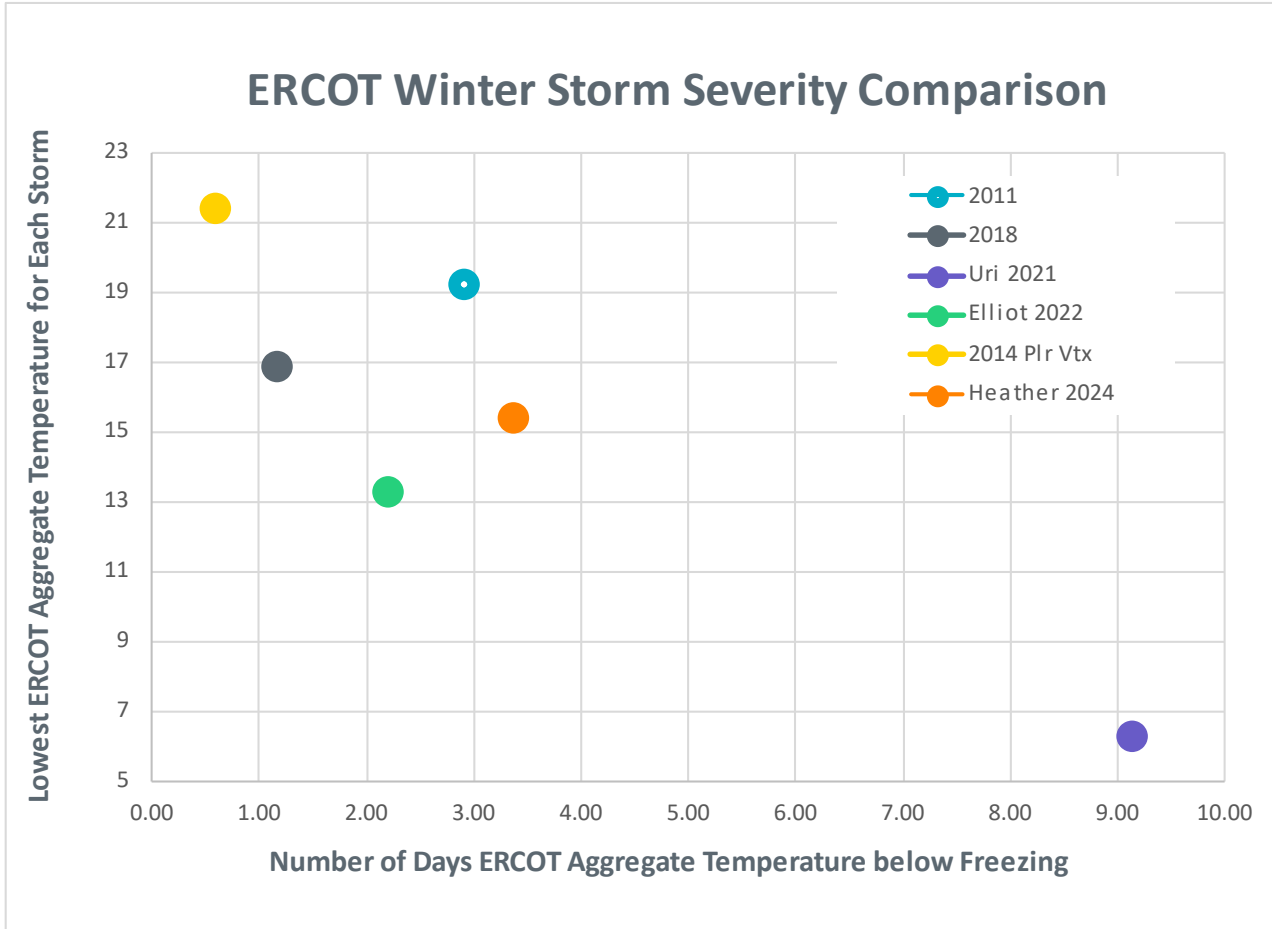
Key Takeaway: ERCOT is planning for the total solar eclipse on April 8, 2024, and will use available tools to balance the system.

April 8, 2024 Total Solar Eclipse in Texas



Winter Storm Heather

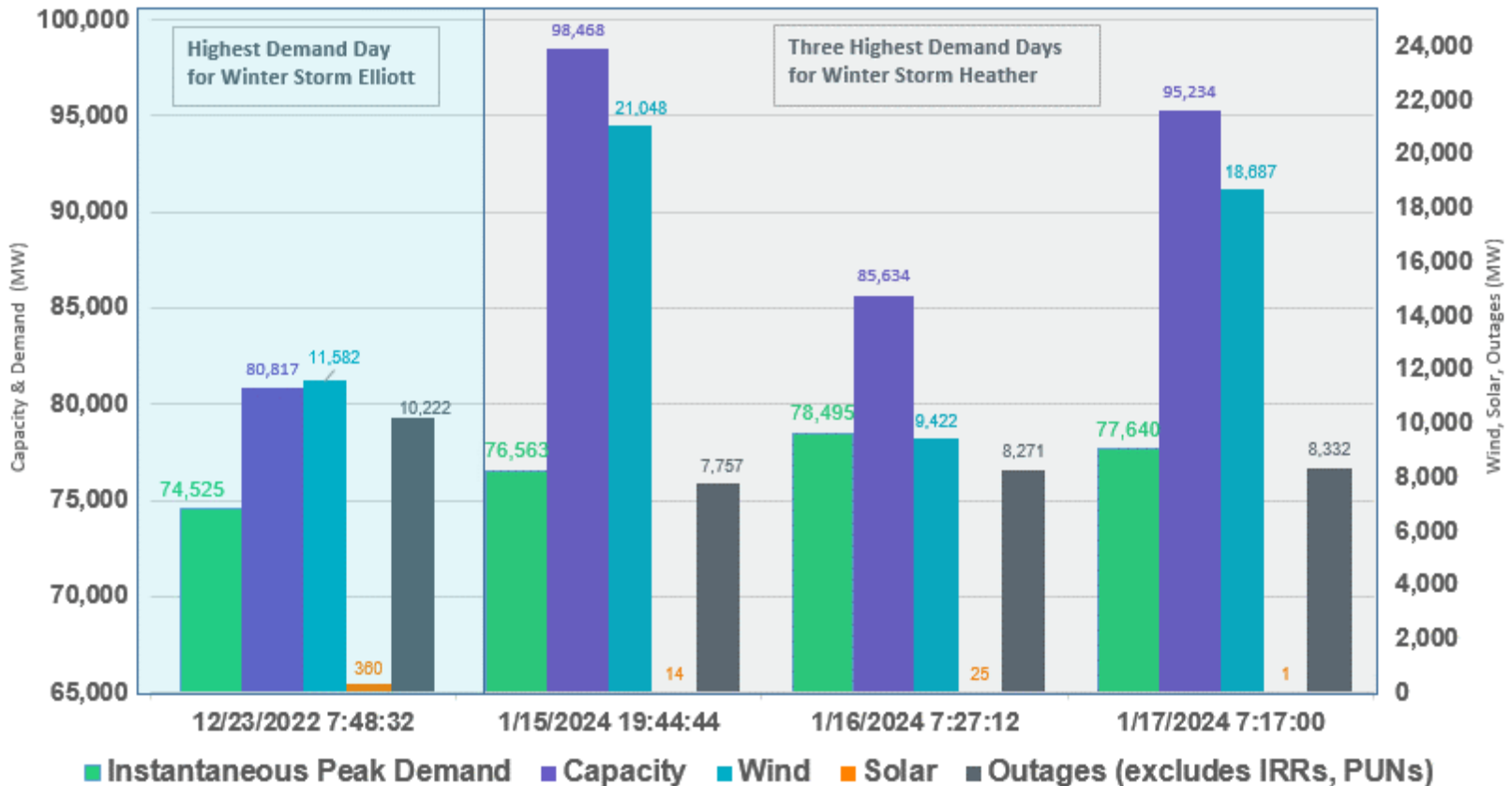
Comparison of Past Winter Storms



Key Takeaway: Winter Storm Heather was the third coldest, and second most long lasting of the significant winter storms shown here.

System Analysis at Various Peaks

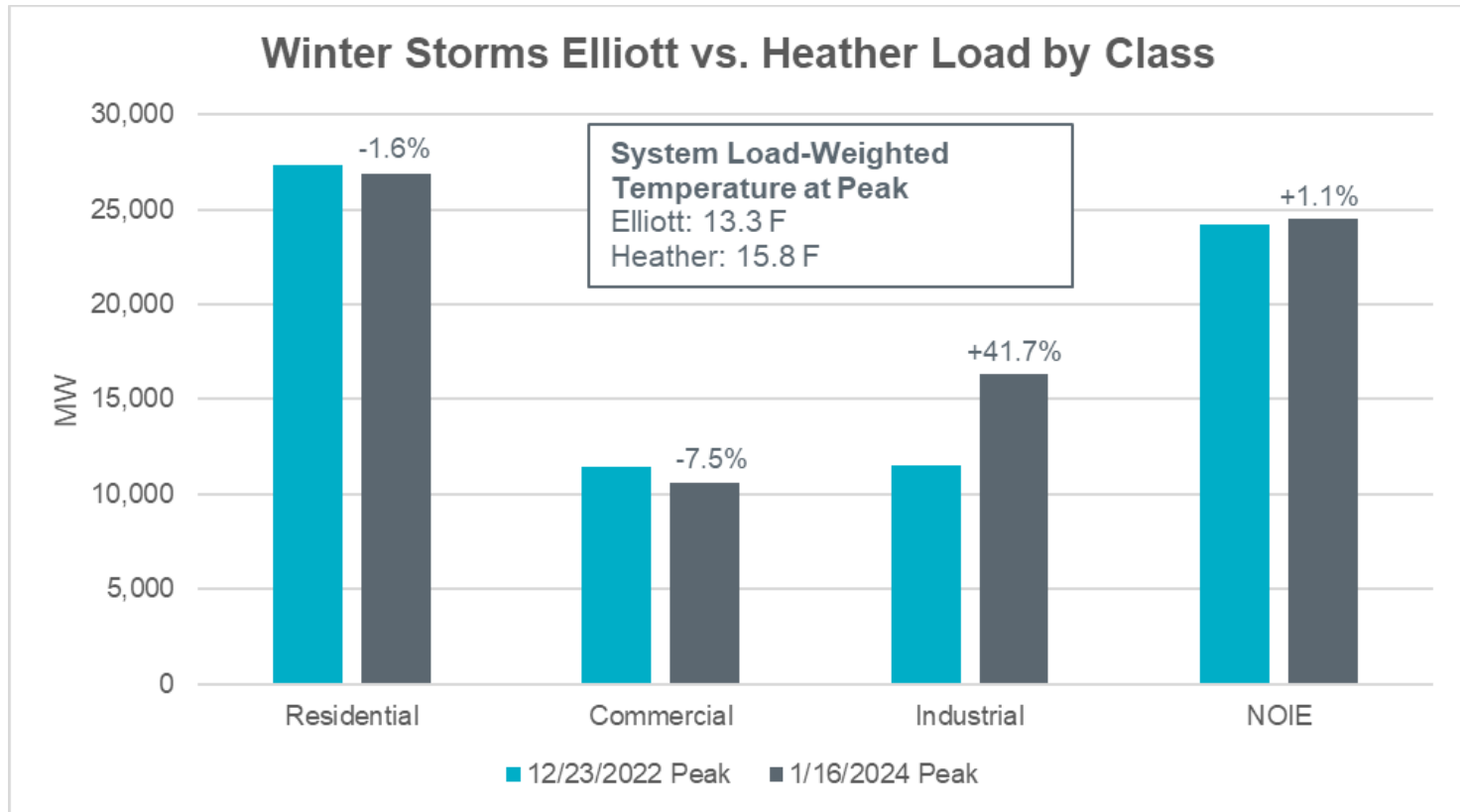
Winter Storm Elliott and Heather: System Analysis at Peak Demand



Key Takeaway: ERCOT’s maximum peak demand during Winter Storm Heather was 78,495 MW; this was 3,970 MW higher than the previous winter peak of 74,525 MW which occurred during Winter Storm Elliott in December of 2022.



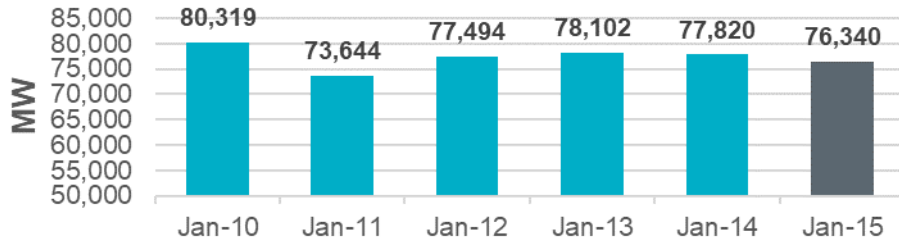
Actual Load by Customer Class



Key Takeaway: ERCOT observed lower residential and commercial customer demand during WS Heather compared to WS Elliott (temperatures were not as cold). Industrial customer demand was higher, even after demand response (high growth in this sector).

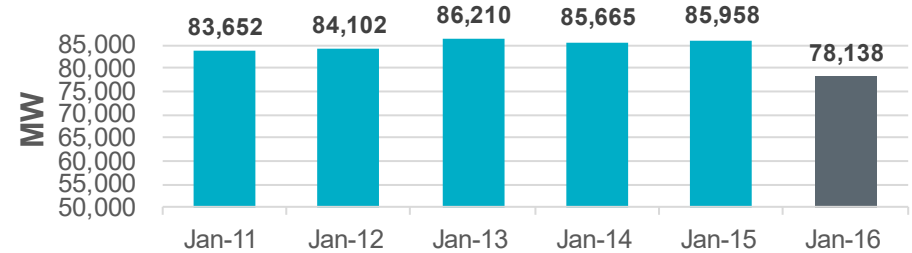
Load Forecast Data from Winter Storm Heather

Load Forecast vs. Actual for Jan 15 HE21



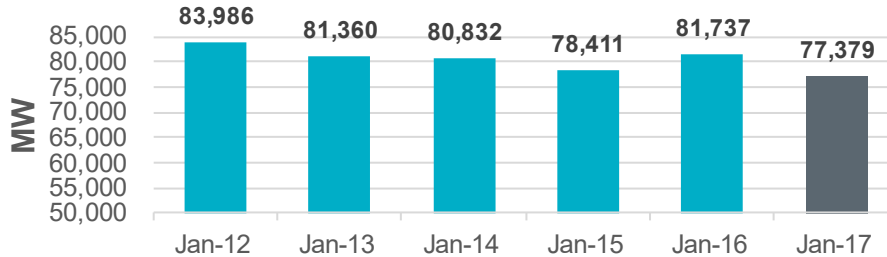
Forecast Creation Date
(except for Jan-15 which shows the actual value)

Load Forecast vs. Actual for Jan 16 HE08



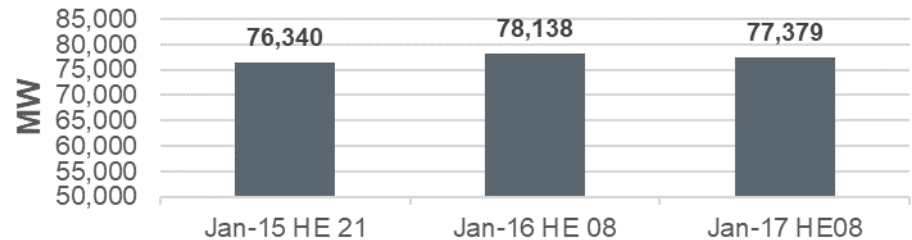
Forecast Creation Date
(except for Jan -16 which shows the actual value)

Load Forecast vs. Actual for Jan 17 HE08



Forecast Creation Date
(except for Jan -17 which shows the actual value)

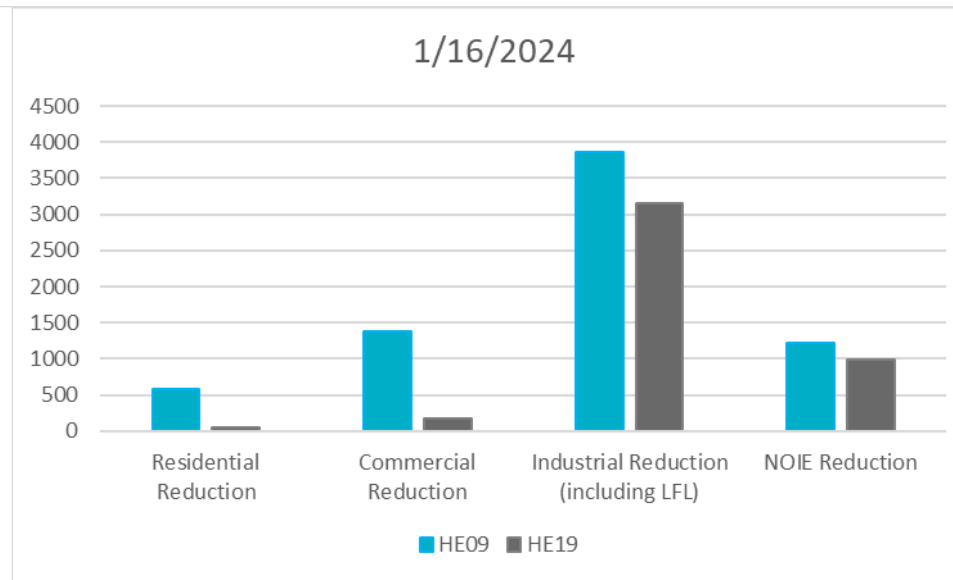
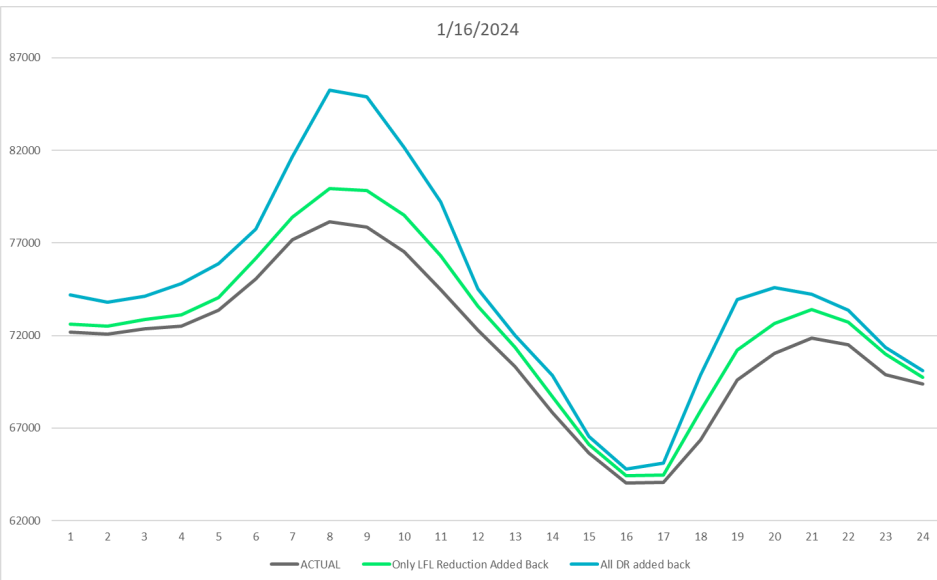
Actual Daily Peak Load (Jan 15 - 17)



Daily Peak Load Hour

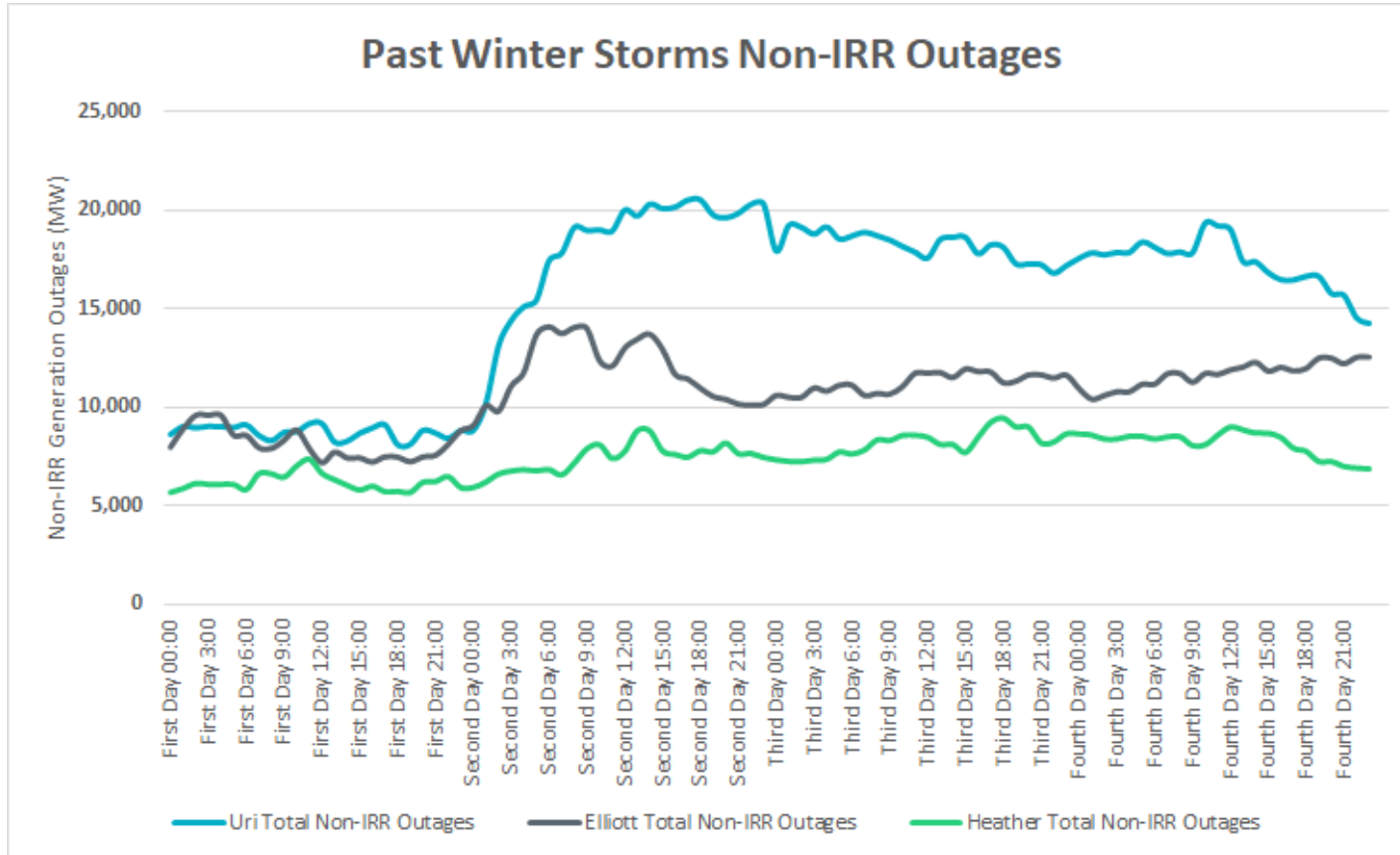
Key Takeaway: Actual peak demands generally came in below the forecasted load during Winter Storm Heather due to demand response during peak periods and milder weather experienced than used for forecasts.

Estimated Demand Reduction



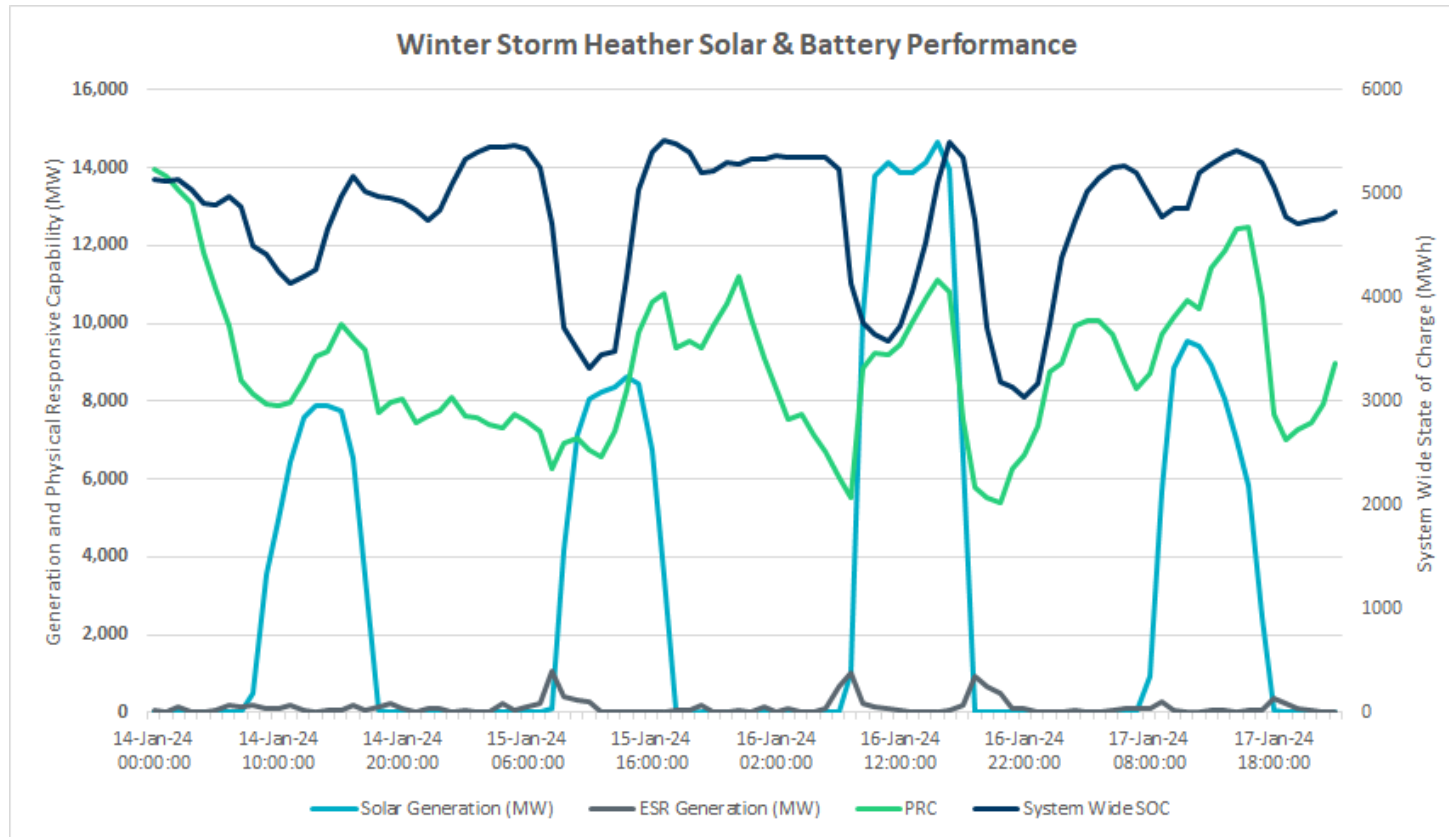
Key Takeaway: Significant demand response occurred during peak periods, with largest impact estimated at ~7000MW during morning peak on 1/16.

Comparison of Past Winter Storms Non-IRR Outages



Key Takeaway: No significant increase in Non-IRR outages in WS Heather, which remained lower than WS Elliott and WS Uri.

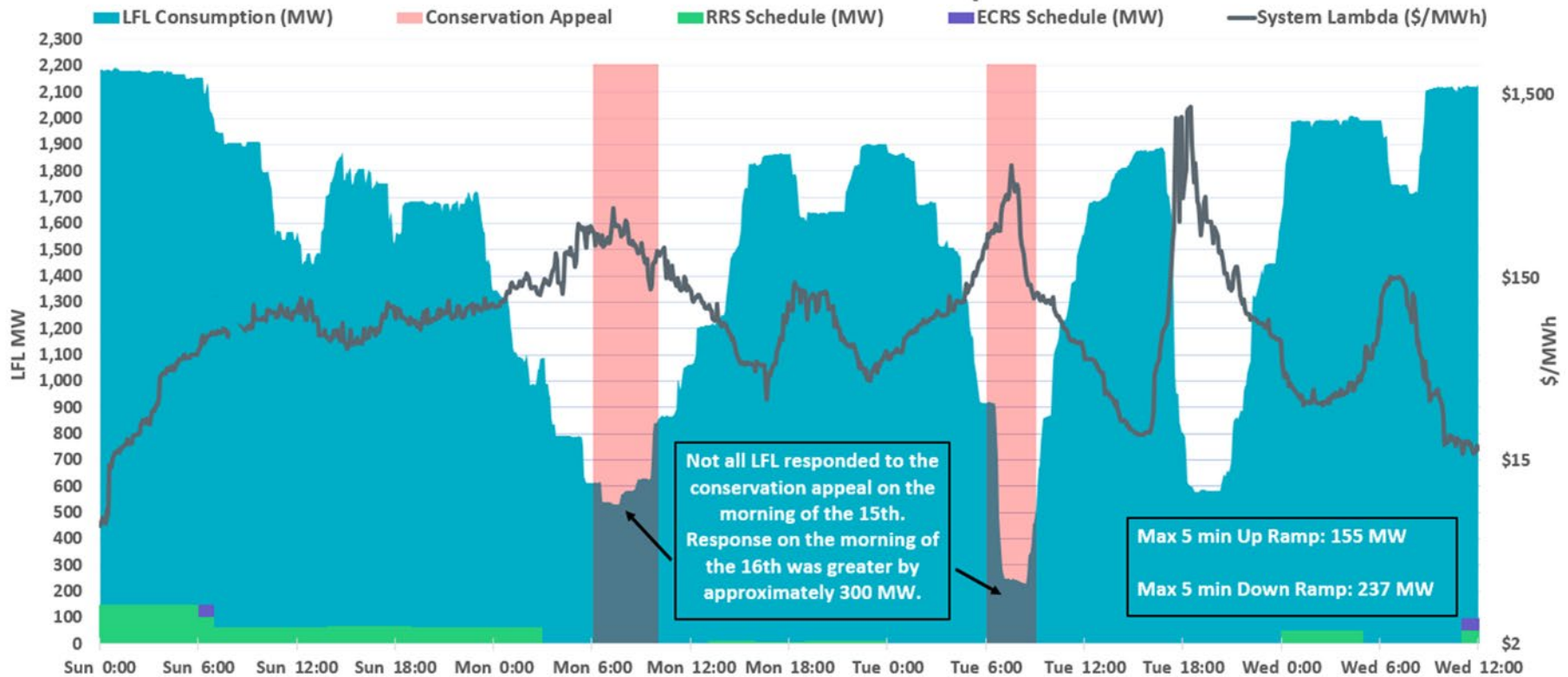
Winter Storm Heather Solar & Battery Performance



Key Takeaway: Before the solar ramp up in the morning, during the coldest part of the day and when PRC was the lowest, batteries were partially supplementing the lack of solar generation available. Once solar was fully ramped up, batteries would begin charging. Note that the amount of generation available by batteries is still relatively low when compared to solar.

Winter Storm Heather LFL Response

Winter Storm Heather LFL Response



Key Takeaway: During Winter Storm Heather, Large-Flexible-Loads (LFLs), curtailed their consumption on several occasions. These curtailments closely aligned with times of high systemwide prices or public appeals for conservation, but the magnitude of response was not consistent day to day.

