



## **Item 6: Summer 2023 Operational and Market Review**

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Board of Directors Meeting

ERCOT Public

October 17, 2023

# Overview

- **Purpose**

Provide an Operational and Market review of Summer 2023

- **Voting Items / Requests**

No action is requested of the Board; for discussion only

- Note: Unless noted, data for September is through the 15th

- **Key Takeaways**

- Increase in peak demand since last year is due to both economic growth and hotter temperatures
- Solar down ramp led to tighter conditions in late evening than at peak demand; high demand and lower wind output on some days led to the need to request conservation
- Forced outage levels were fairly consistent and all available generation was brought online on high net load days

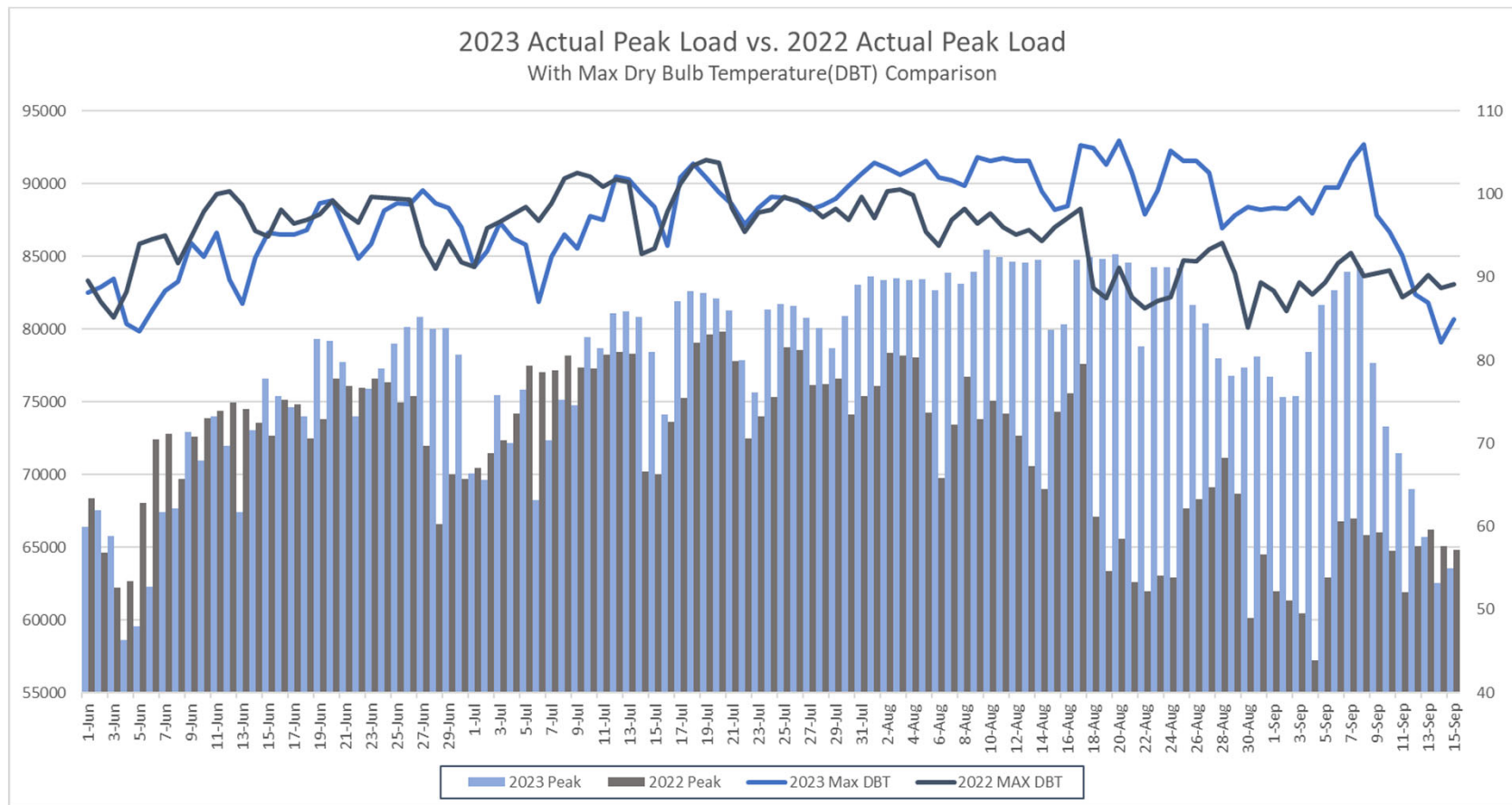
## Overview (continued)

- **Key Takeaways (continued)**

- Energy storage resources contributed meaningfully to meeting ancillary services and energy requirements
- A significant transmission constraint from south to central Texas affected several days, and the need to manage that constraint contributed to the EEA on Sept. 6
- Both Energy and Ancillary Service Cost were higher in Summer 2023 than previous two summers
- Overall, operations and market outcomes supported reliability needs

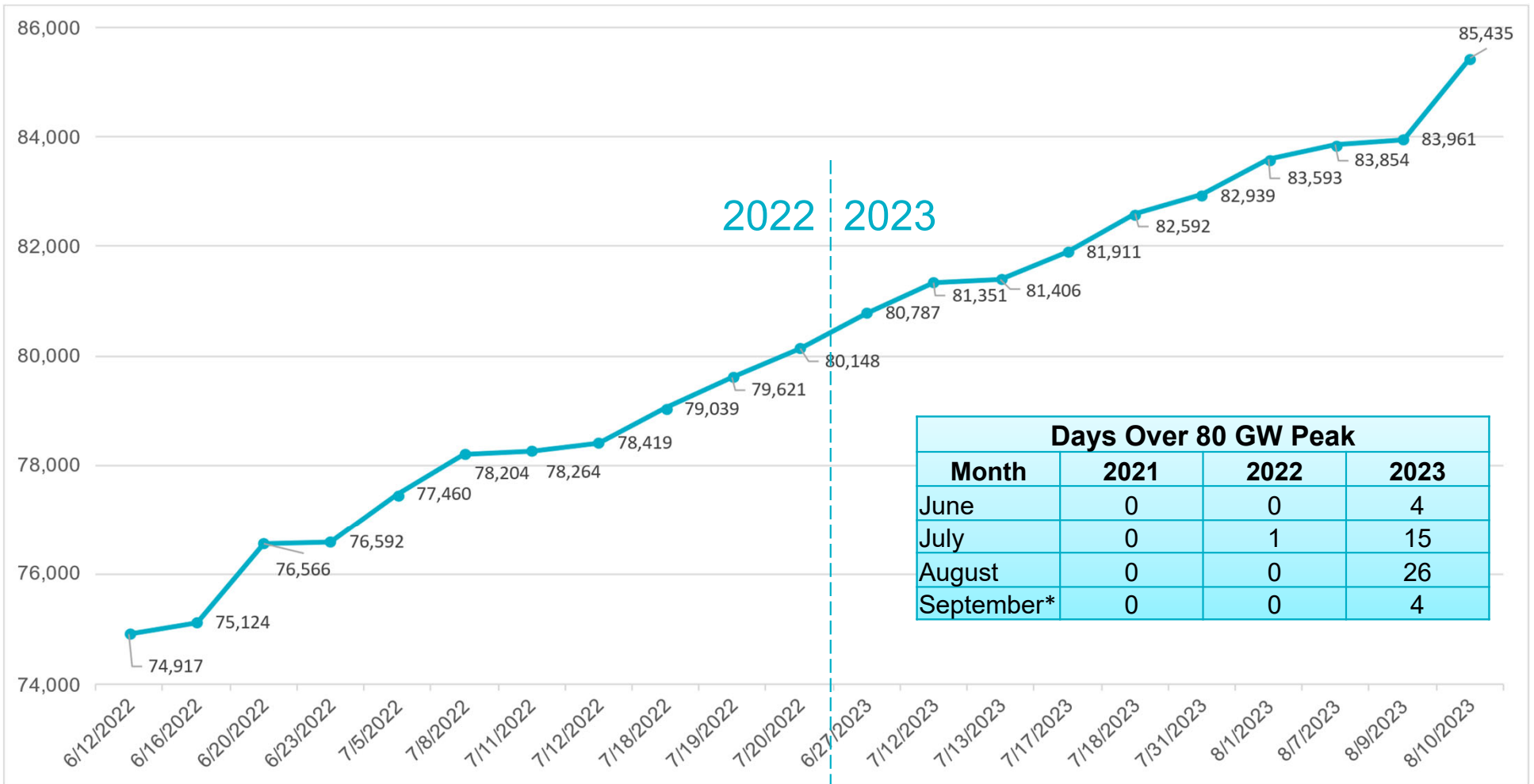
# Summer 2022 vs Summer 2023

- Summer 2023 started with temperatures lower than 2022
- Temperatures started to shift to a hotter pattern in the last week of June 2023
- With Texas' economic growth, demand was expected to exceed 2022



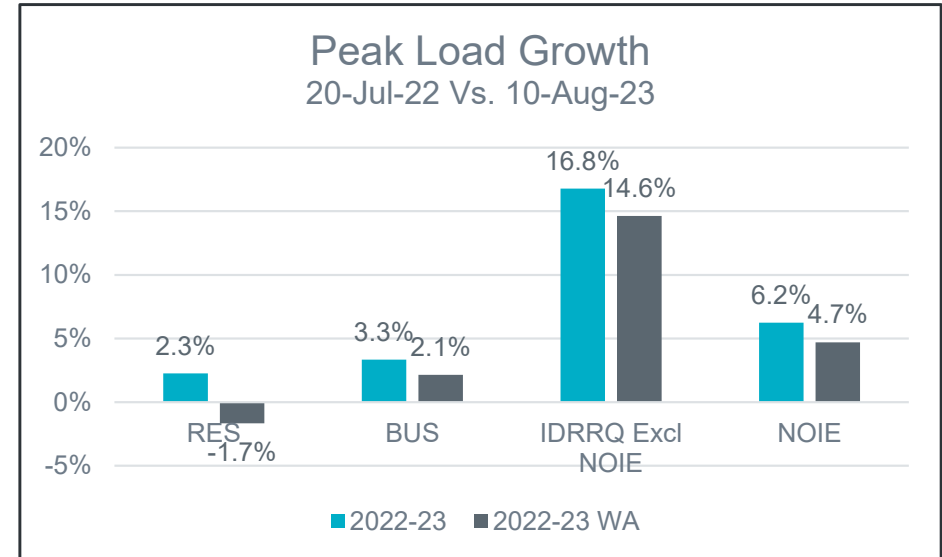
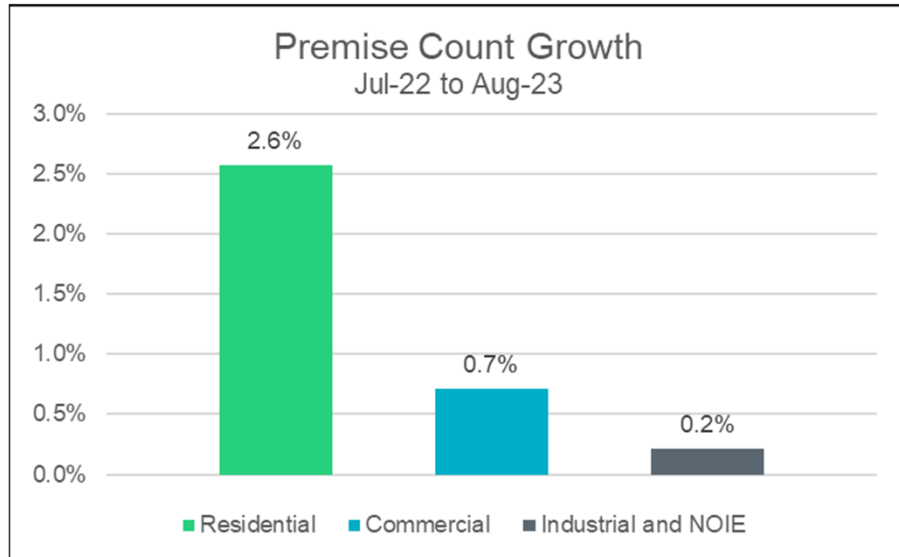
**Key Takeaway:** Summer 2023 was drier and hotter than Summer 2022 which contributed to higher peak demand.

# Summer Peak Demand Records for 2021- 2023

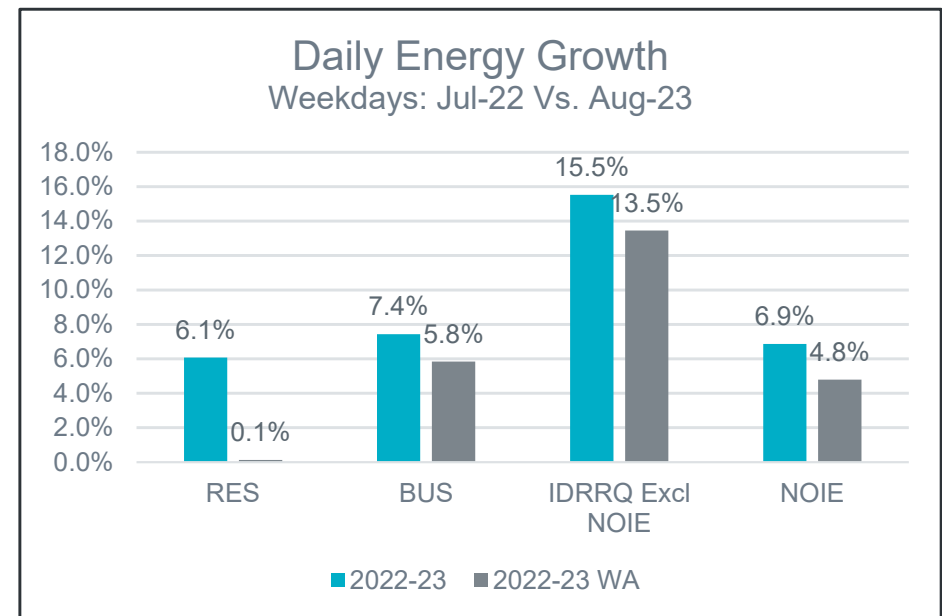


**Key Takeaway:** Peak demand for summer increased drastically over the last two years. Summer 2023 had 49 days with a peak higher than 80 GW (the previous all-time peak demand).

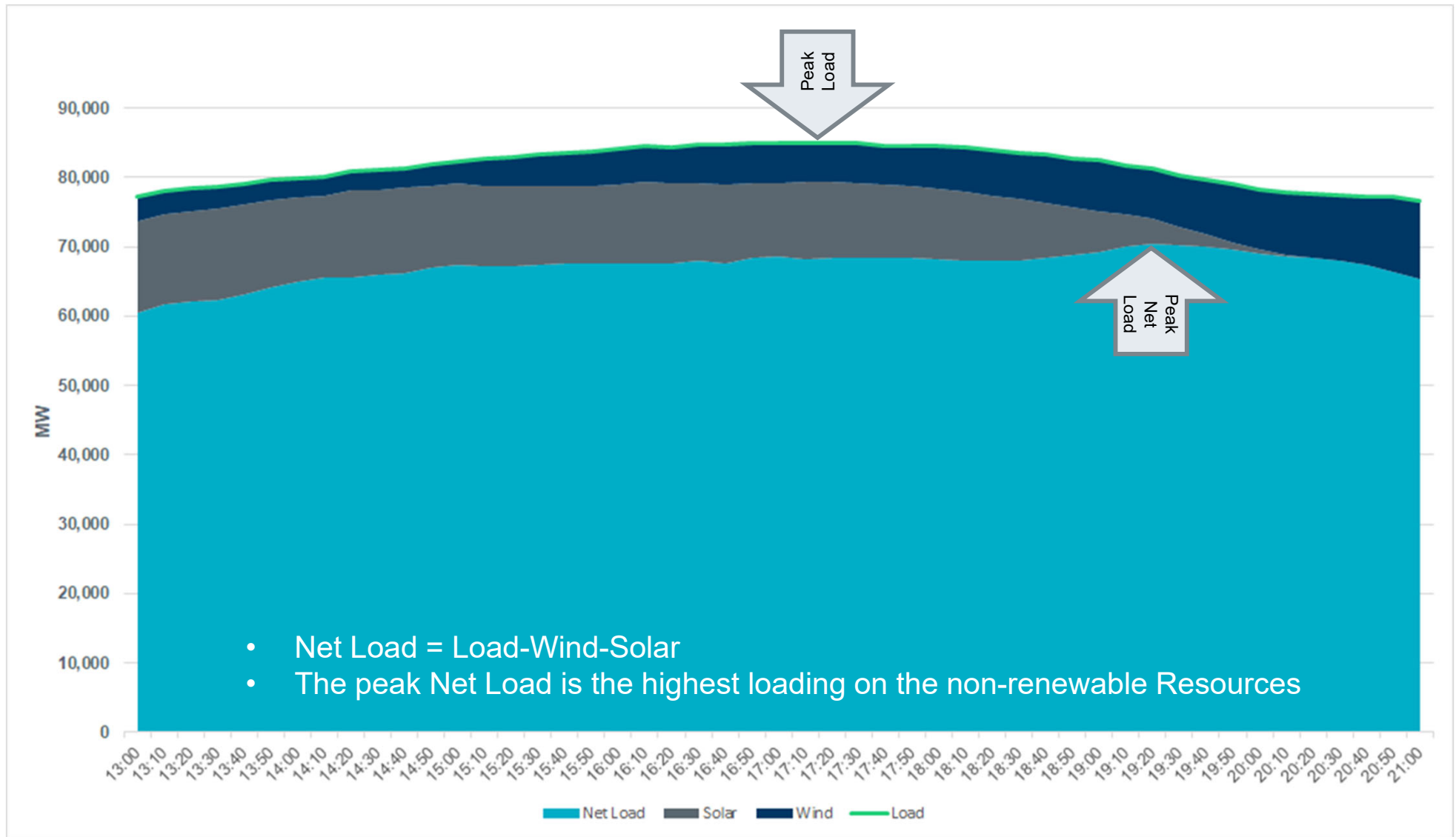
# Load Growth By Class



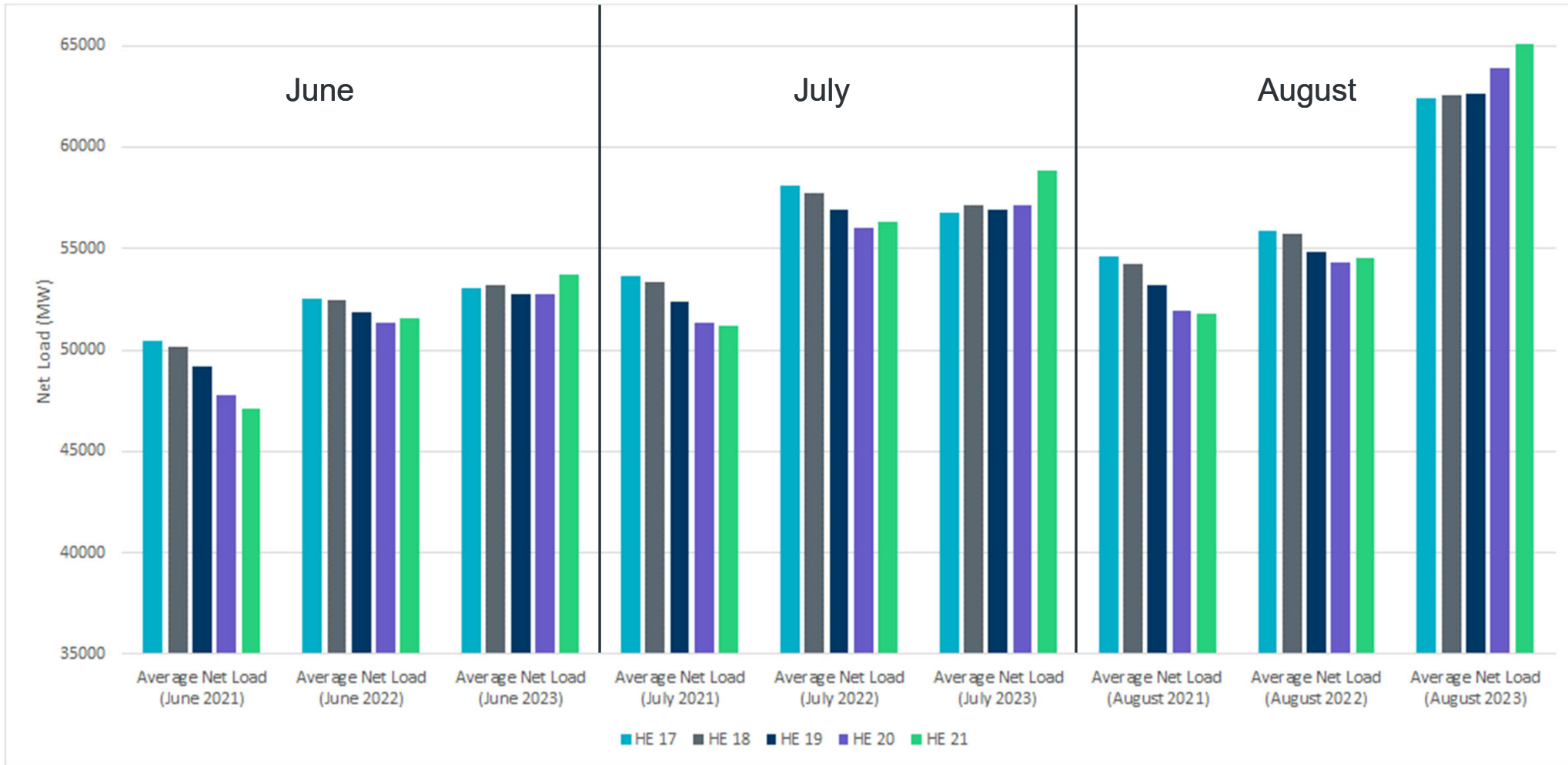
**Key Takeaway:** Much of the growth was in the IDRRQ profile group that includes industrial consumers (with Non Opt-In Entities (NOIEs) separated). On a weather-adjusted (WA) basis, the peak and energy growth of residential and commercial is offset due to: growth in rooftop solar, continually improving energy efficiency of appliances and HVAC systems, and load management programs.



## Example: Load versus Net Load



# Net Load HE 17-21 for Summer 2021-2023



Net Load = Load-wind-solar; the peak net load is the highest loading on the non-renewable Resources

**Key Takeaway:** In 2023, the peak net load hours during summer months have shifted from HE 17 to HE 21.



# Peak Load, Peak Net Load, Wind, Solar

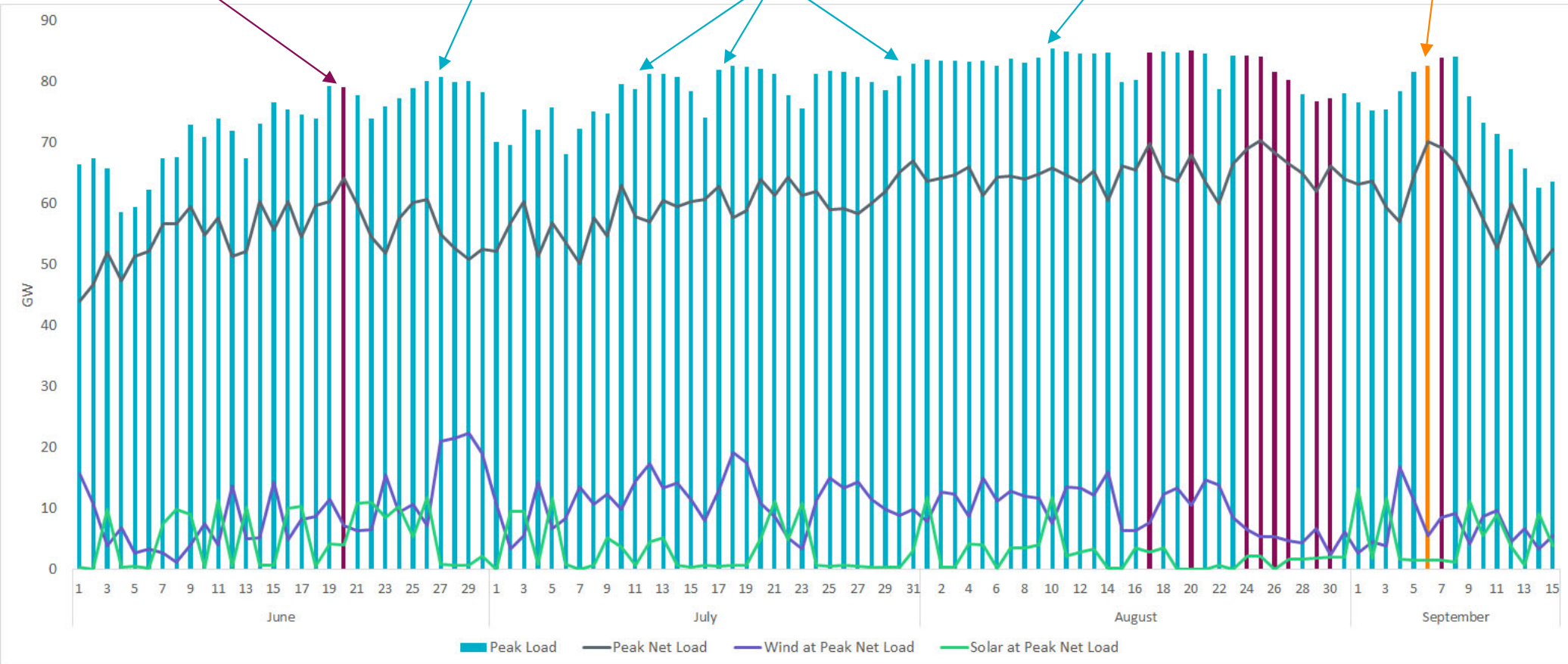
ERCOT appealed for conservation on all days with a maroon data marker during summer 2023.

June hit a first new all-time peak demand record of 80.8 GW on 6/27/2023.

July continued to hit new all-time peaks on 7/12/2023, 7/13/2023, 7/17/2023, and 7/31/2023.

8/10/2023 hit an all-time peak demand record of 85.7 GW.

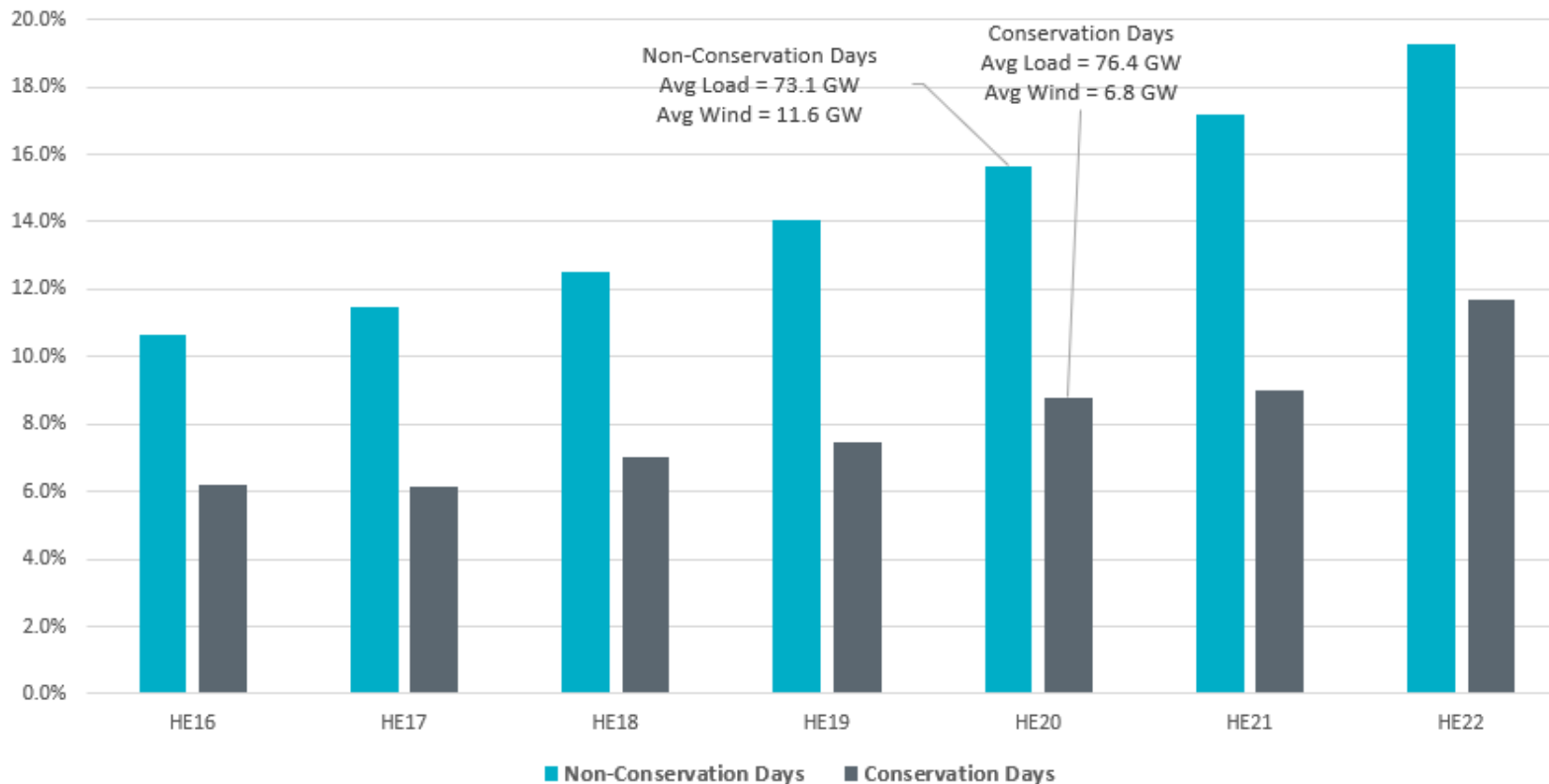
9/6/2023 was the tightest day during summer 2023. ERCOT entered an EEA level 2.



**Key Takeaway:** ERCOT appealed for conservation on 11 days, including the day ERCOT entered an EEA level 2. These were generally needed on expected highest net load days.

# Wind During Conservation Appeal Days

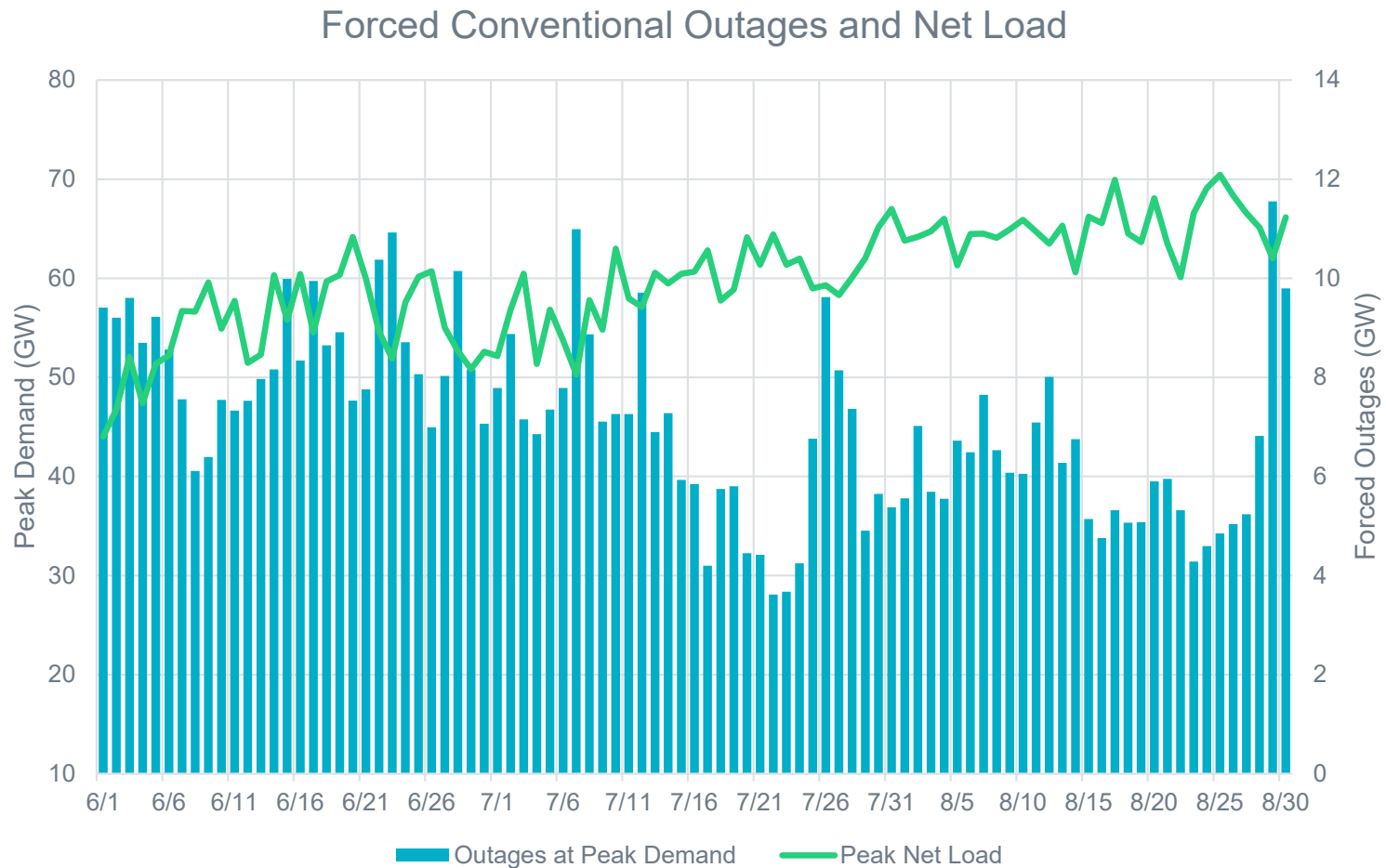
Wind % of Load: Conservation vs. Non-Conservation Hours (6/1/23 - 9/15/23)



Conservation Days
6/20 (HE16-20)
8/17 (HE16-20)
8/20 (HE20-22)
8/24 (HE16-22)
8/25 (HE16-21)
8/26 (HE16-21)
8/27 (HE17-21)
8/29 (HE18-21)
8/30 (HE19-21)
9/6 (HE19-21)
9/7 (HE18-21)

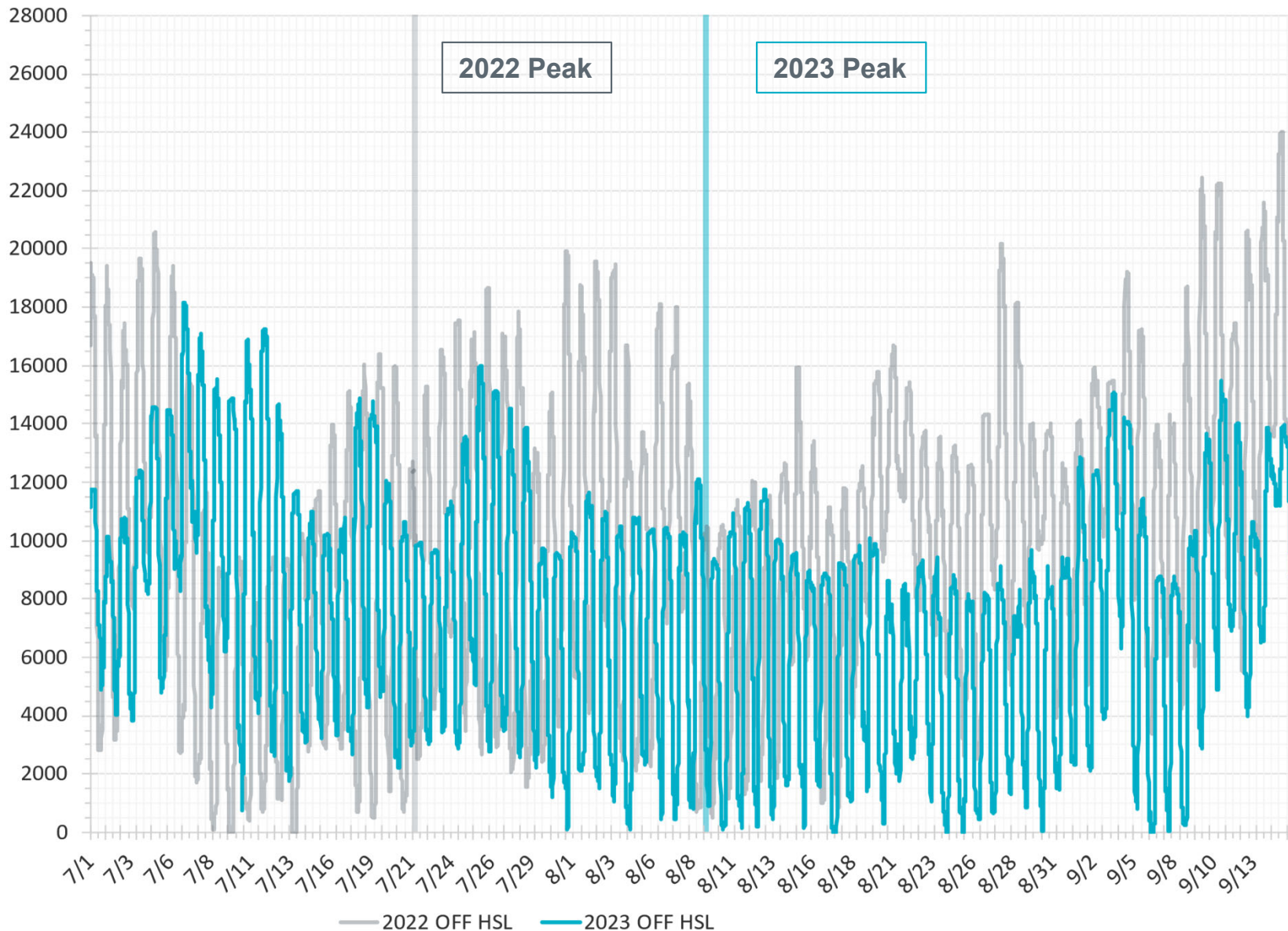
**Key Takeaway:** Wind generation ramping up in the evenings was key to serving demand on most days, however low wind output was a primary factor contributing to tight conditions on the conservation appeal days.

# Forced Outages During Daily Peak Net Load

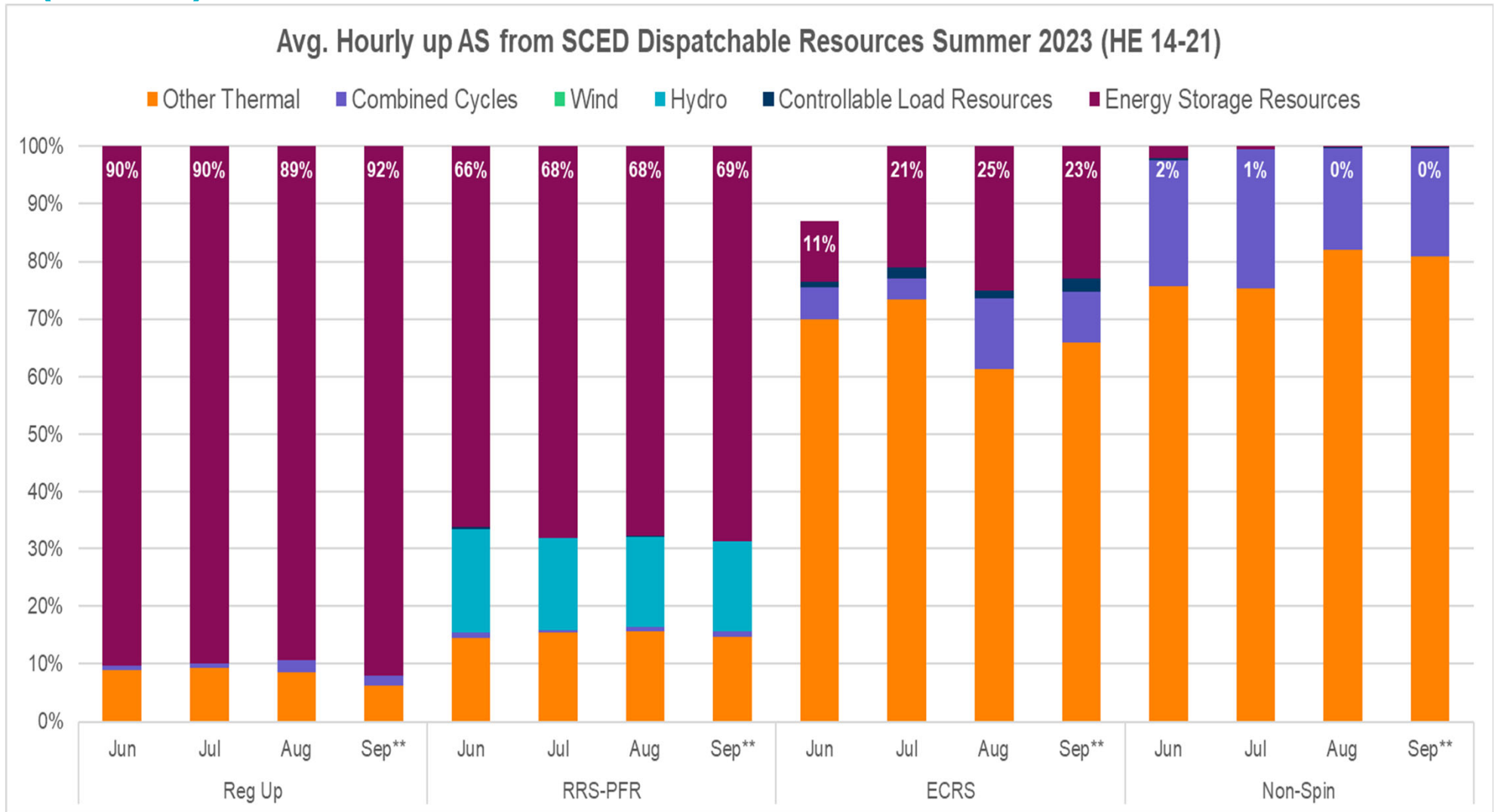


**Key Takeaway:** Forced Outages of thermal units stayed in the range of 4-8 GW, except on low Net Load days when generators took the opportunity to do repairs.

# 2022 vs. 2023 HSL of Offline Resources



# Ancillary Services Carried by Energy Storage Resources (ESRs)



\* ECRS was introduced on June 10<sup>th</sup>, 2023

\*\* September data is for 9/1/23-9/15/23

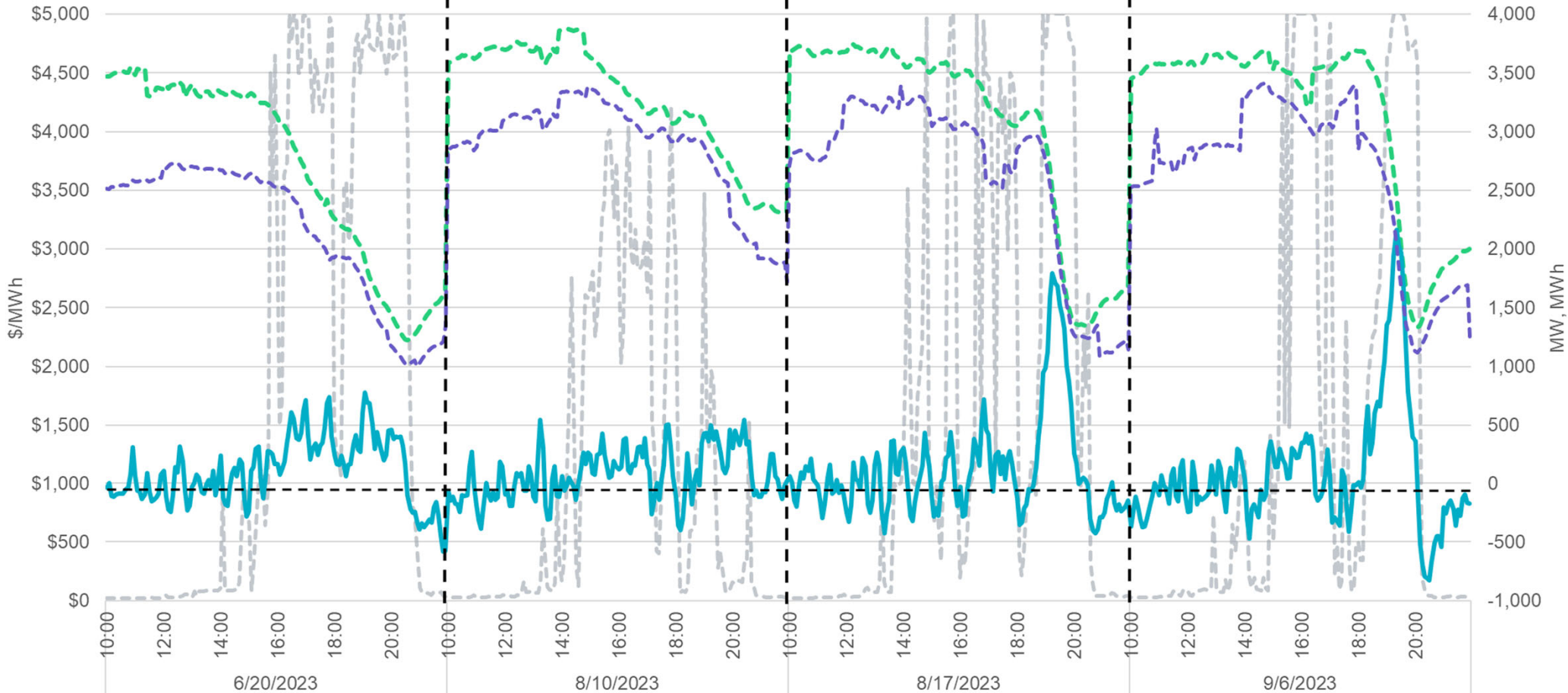
**Key Takeaway:** ESRs provided a significant portion of the Ancillary Services this summer.



# Energy Storage Net Output on Tightest Summer Days

Energy Storage Resource Net Output on June 20th, August 10th, 17th, and September 6th 2023

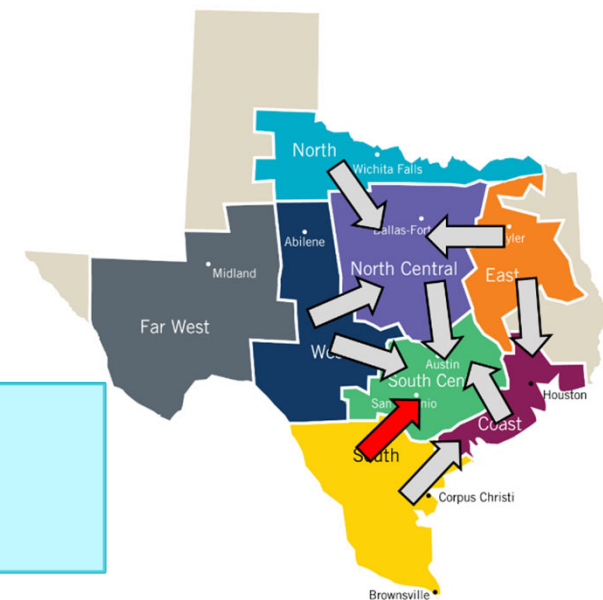
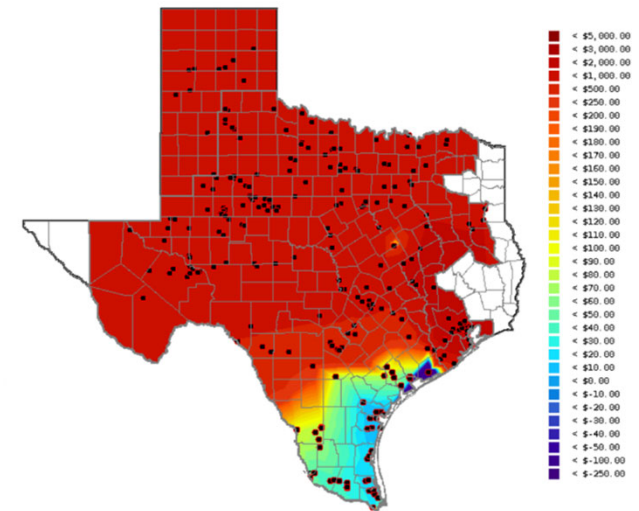
--- System Lambda (\$/MWh)    - - - SOC Total (MWh)    Net Output (MW)    - - - SOC for up AS Responsibility (MWh)



**Key Takeaway:** ESRs injected energy and helped serve load during the high price periods in summer.

# Central Texas Congestion

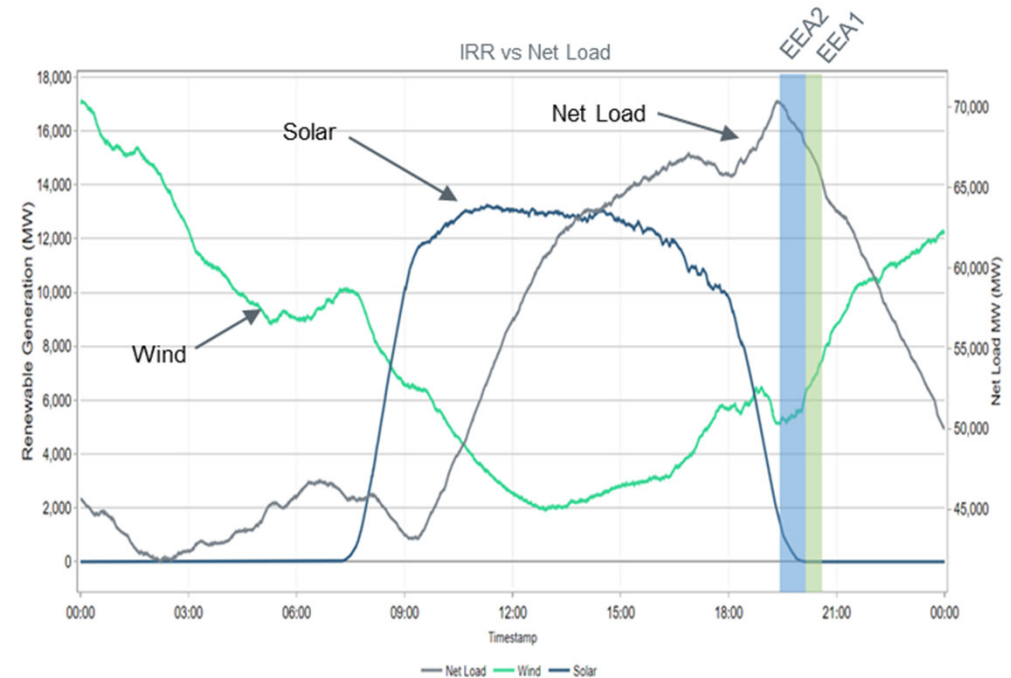
- Transmission constraint that limits transfers of generation in South Texas to Central and North Texas
- Very high demand in North and Central Texas
- Constraint is binding when there is insufficient generation in North, Central and West Texas to meet demand. This is due to:
  - North and west solar generation reducing in evening
  - Sustained high demand in evening
  - Moderate west wind generation
  - Load north of constraint approaches the available generation north of constraint
- Energy Storage Resources (ESRs) north of constraint generally have high offer price



**Key Takeaway:** Higher temperatures, higher demand and insufficient resources in North and West led to a high-risk transmission limitation in Central Texas.

# September 6<sup>th</sup> – Emergency Operations

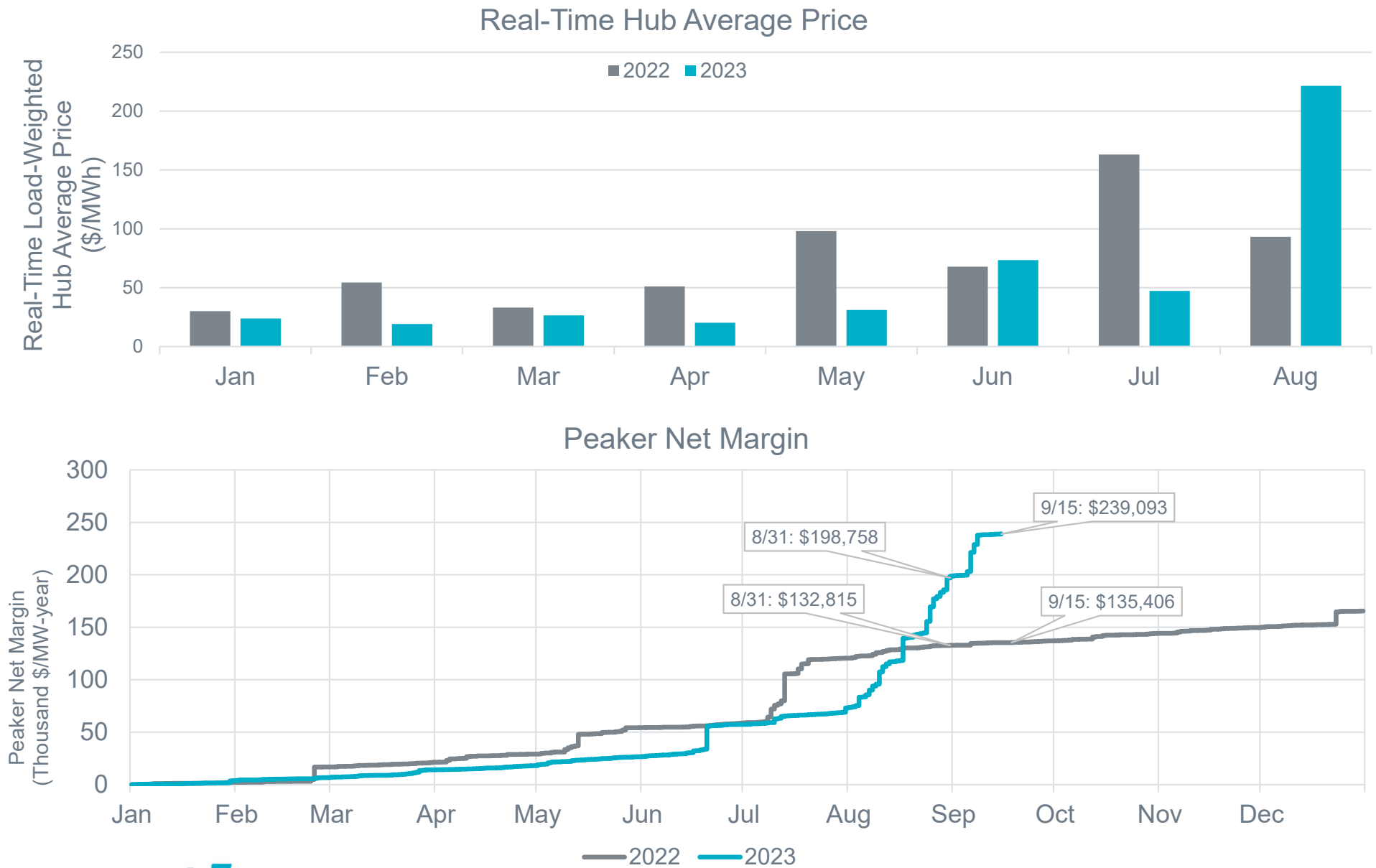
- Reserves were very tight during this period due to high demand, low wind in north and west, and earlier solar ramp compared to August
- Use of all available generation resulted in the overload of a high-risk transmission constraint from South Texas to rest of ERCOT
- ERCOT appropriately balanced the overload of the transmission constraint against the risk of going into EEA and began to manually curtail generation in South Texas to relieve the overload
- Even though frequency-responsive reserves appeared to remain above 2,000 MW, frequency began to decline, reaching a low of 59.77 Hz by 7:25 pm (ERCOT is investigating this incorrect response or reporting by Resources)
- EEA2 was declared at 7:25 pm and Load Resources were deployed
- ERCOT moved to EEA1 at 8:27 pm and to normal operations at 8:37 pm



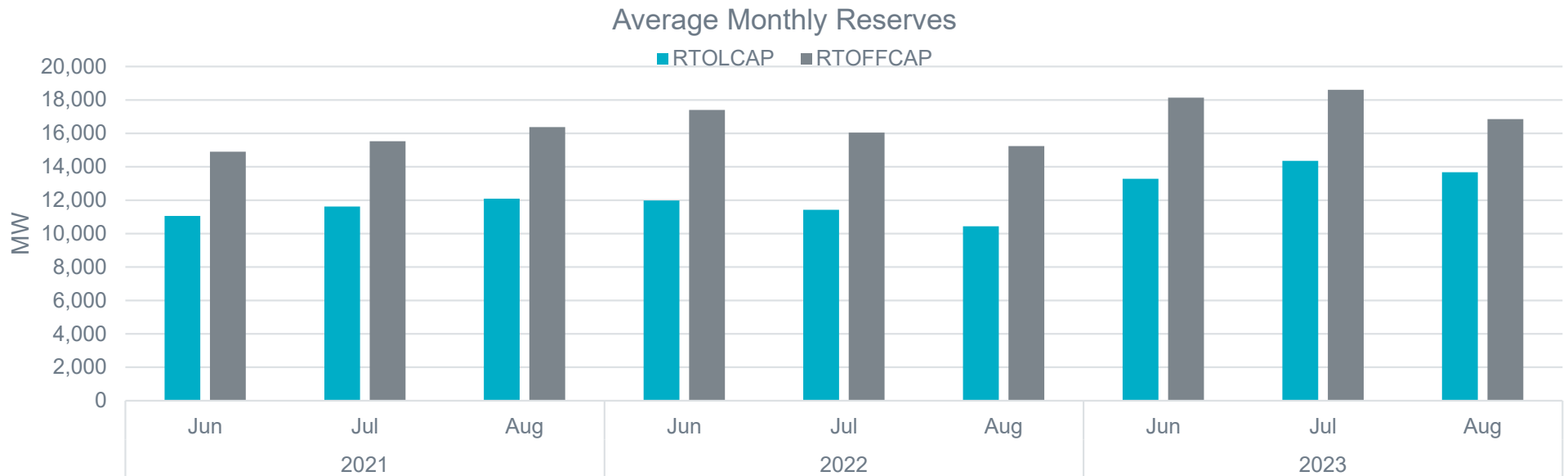
**Key Takeaway:** High net load and the need to manage a high-risk transmission constraint led to the need to declare EEA2 and deploy Load Resources



# Real-Time Hub Price and Peaker Net Margin



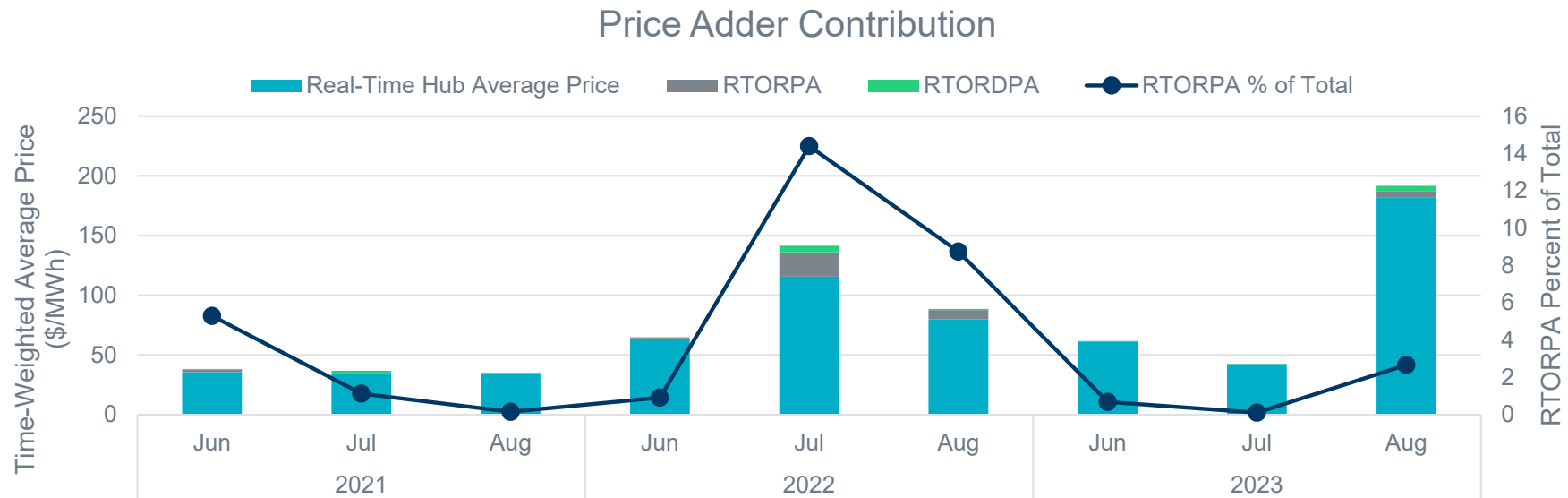
# ORDC Capacity consists of Online and Offline Reserves



RTOLCAP is the Real-time Online Reserve Capacity  
RTOFFCAP is the Real-time Offline Reserve Capacity

**Key Takeaway:** Online and offline reserves were greater in 2023 than in 2022.

# ORDC Contribution to Real-Time Prices

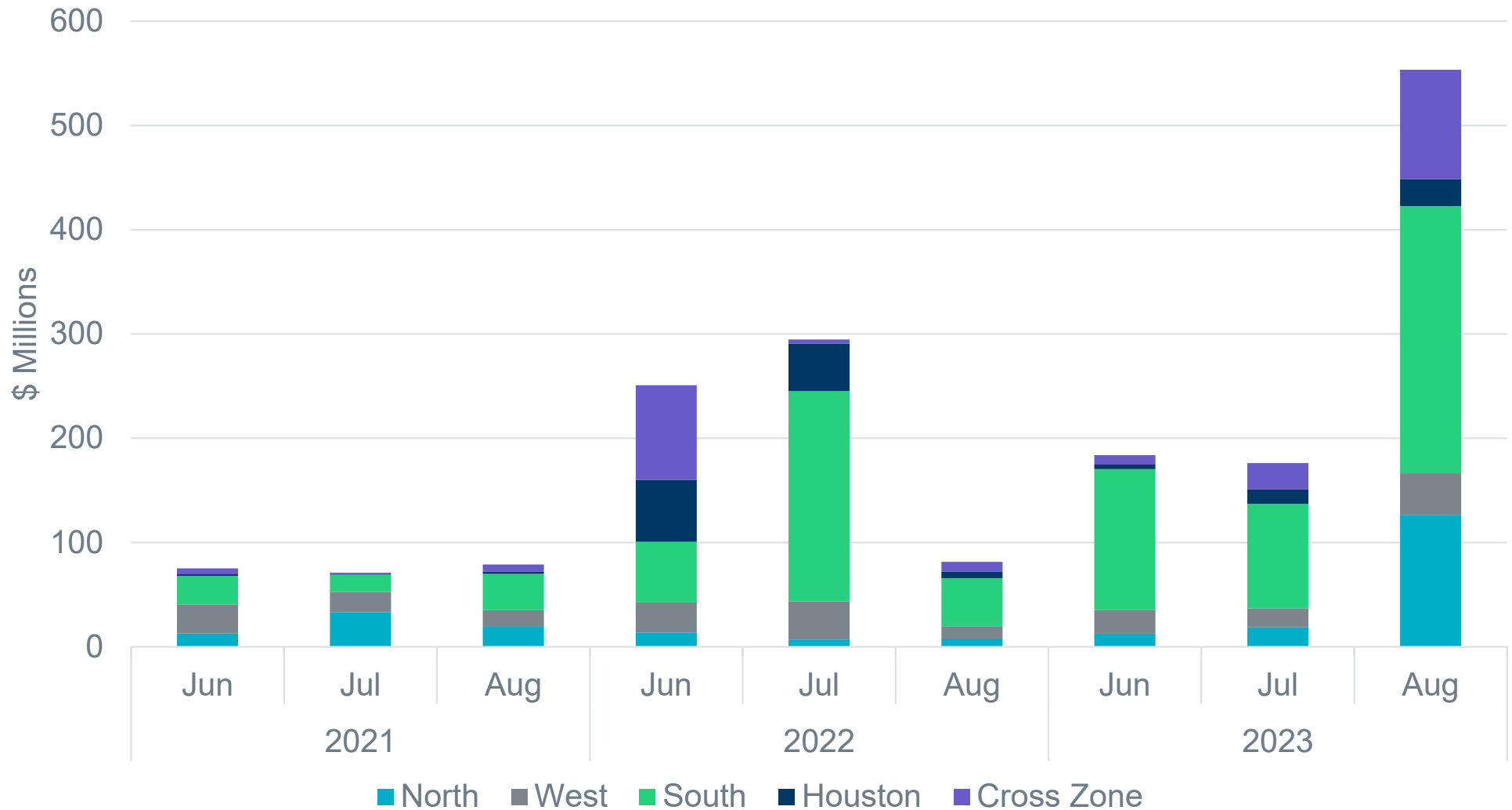


RTORPA is the Real-time Online Reserve Price Adder

RTORDPA is the Real-time Online Reserve Deployment Price Adder

**Key Takeaway:** Adders had a lower contribution to the market price in 2023 relative 2022.

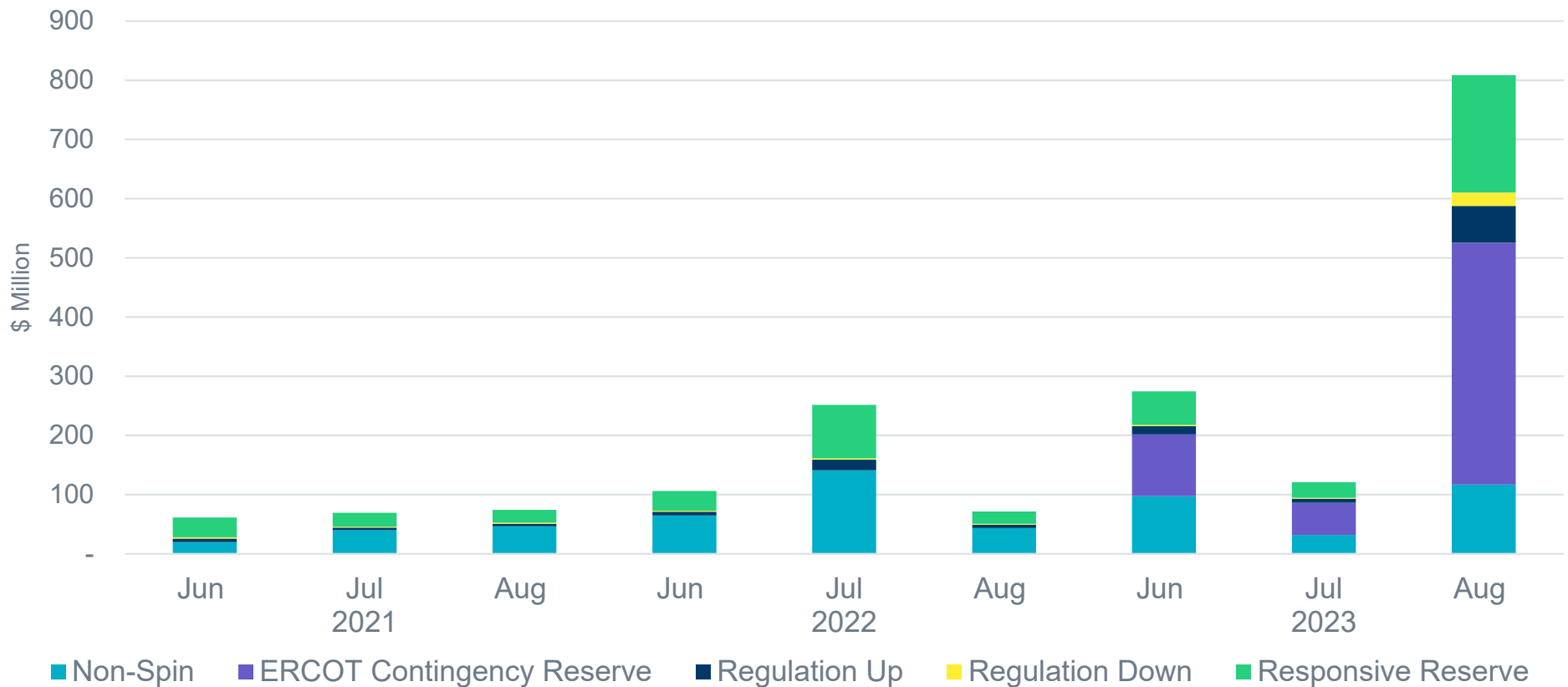
# Real-Time Congestion Rent by Zone



**Key Takeaway:** As demonstrated in slide 15, congestion between South Texas and South-central/North Texas pushed up congestion rent in the South, North, and across zones.

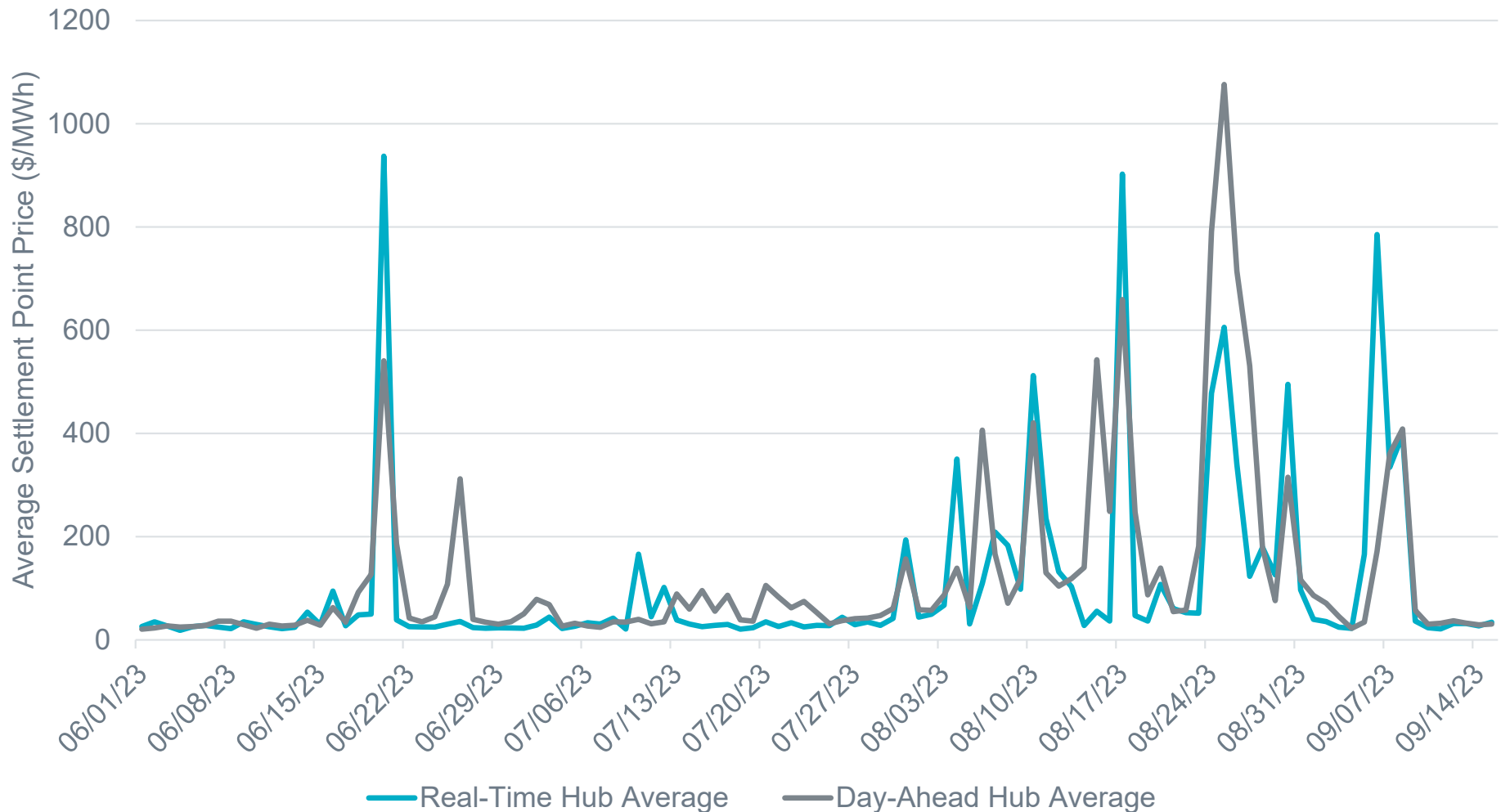
## Cost for Ancillary Services

- ERCOT Contingency Reserve Service (ECRS) went live on June 10, 2023.
- Ancillary Service costs in summer 2023 were substantially higher than for the previous two summers, particularly in August.
  - This corresponds with higher energy prices in the Day-Ahead Market (DAM) for August 2023.



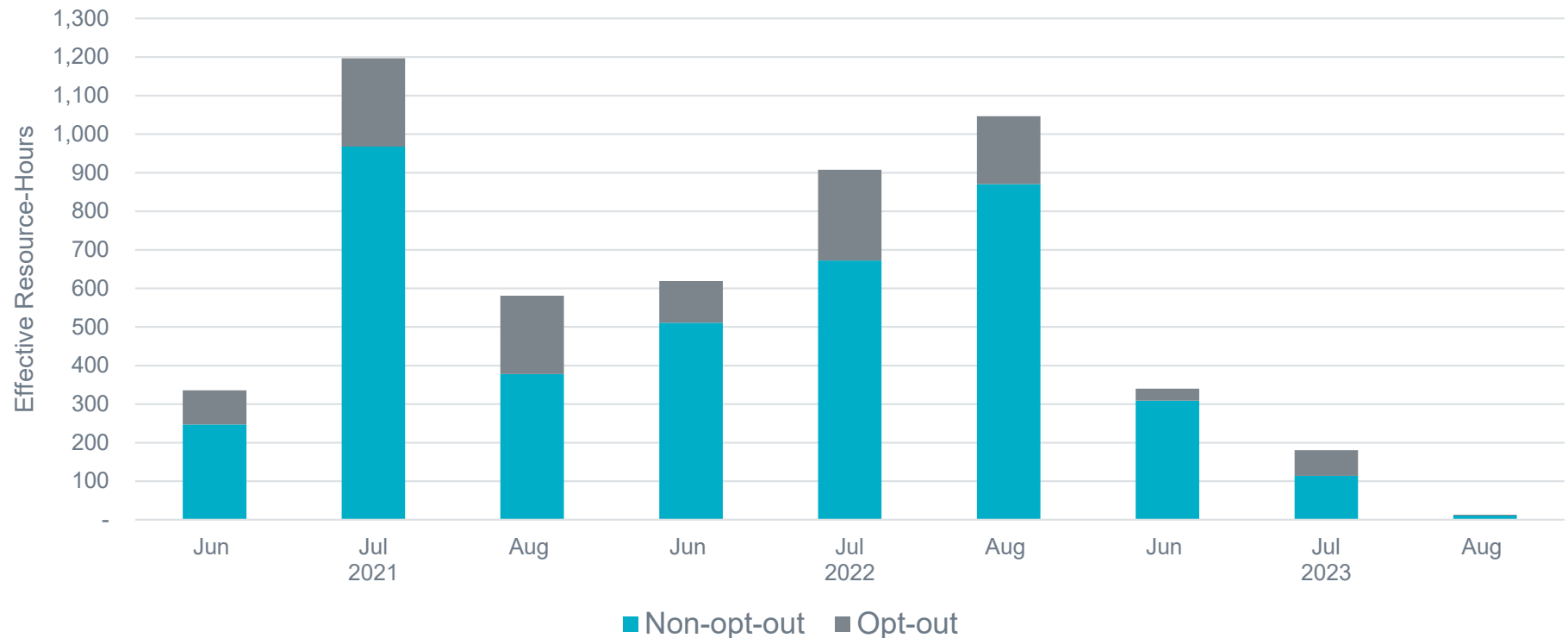
# Comparison of Day-Ahead and Real-Time prices

- Price convergence between the Day-Ahead and Real-Time Markets remained normal during summer 2023.



# Resources Committed Through RUC

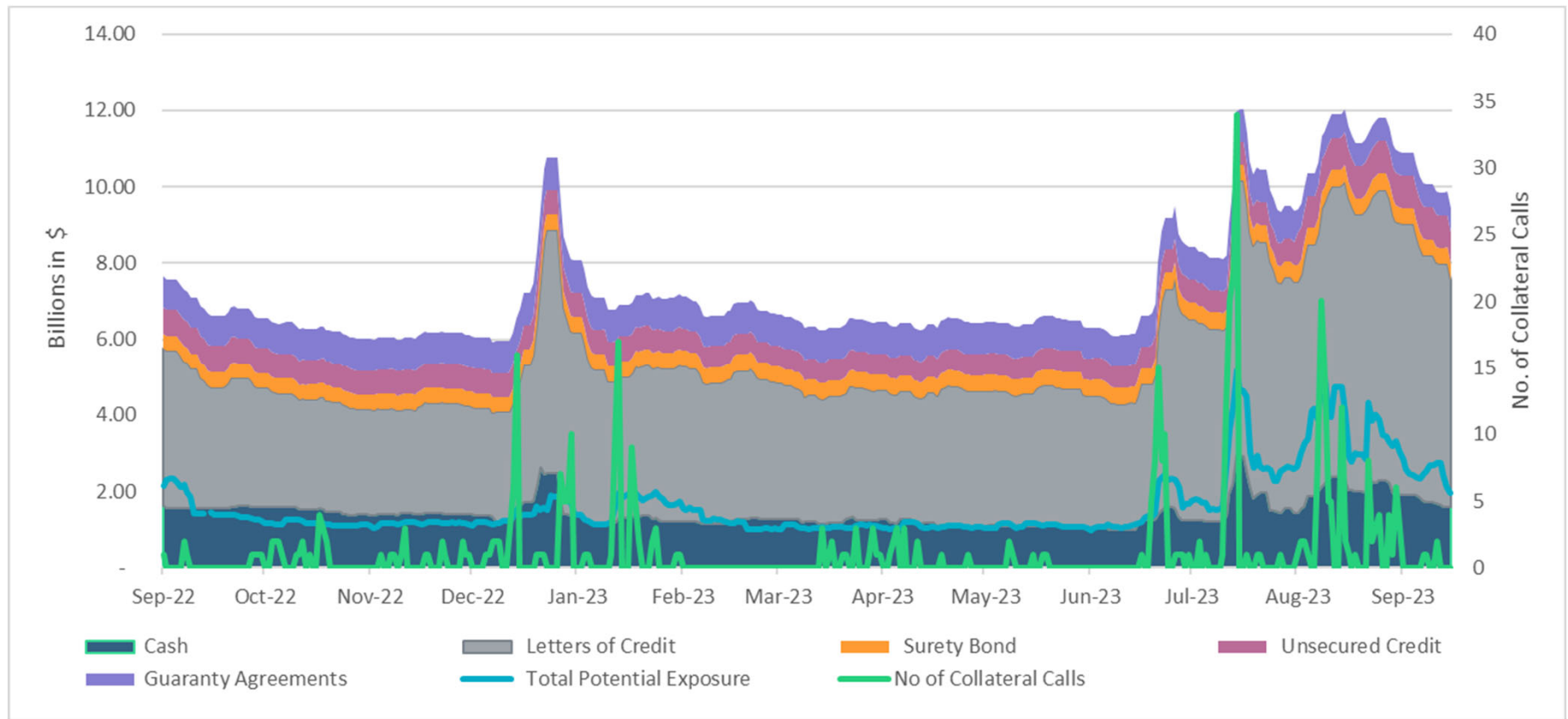
- There were 534 total Reliability Unit Commitment (RUC) effective Resource-hours in summer 2023. This was a substantial reduction from the summer 2022 count of 2,573 Resource-hours.
- 36 unique Resources were committed from June to August 2023, while 42 unique Resources were committed during summer 2022.



*"Effective Resource-hours" excludes any period during a RUC-instructed hour when the committed Resource was starting up, shutting down, off-line, or otherwise not available for dispatch by SCED.*

**Key Takeaway:** High demand and prices created incentives for greater self-commitment resulting in significantly less RUC.

# Total Potential Exposure, Collateral and Collateral Calls September 2022 – September 15, 2023



\* TPE excludes entities that defaulted from Winter Storm URI

**Key Takeaway:** High consumption, production and prices increased total potential exposure, and collateral requirements.