



**TEXAS RE**



## **Summer Outlook**

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# Antitrust Admonition

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**Summer Outlook:  
Seasonal Assessment of Resource  
Adequacy (SARA) Report**

*Pete Warnken*

ERCOT Public  
May 31, 2022

# SARA Capacity Reserves Risk Measure: Capacity Available for Operating Reserves (CAFOR)

- CAFOR Formula:
  - = Seasonal Maximum Expected Resource Generation Capability
    - Demand
    - Uses of Reserves\*
    - + EEA Resources if CAFOR < 2,300 MW

\* Uses of Reserves:

- Higher-than-expected peak demand
- Thermal unit outages
- Renewable generation below expected values

# Summer SARA: Base & Moderate Risk Scenarios

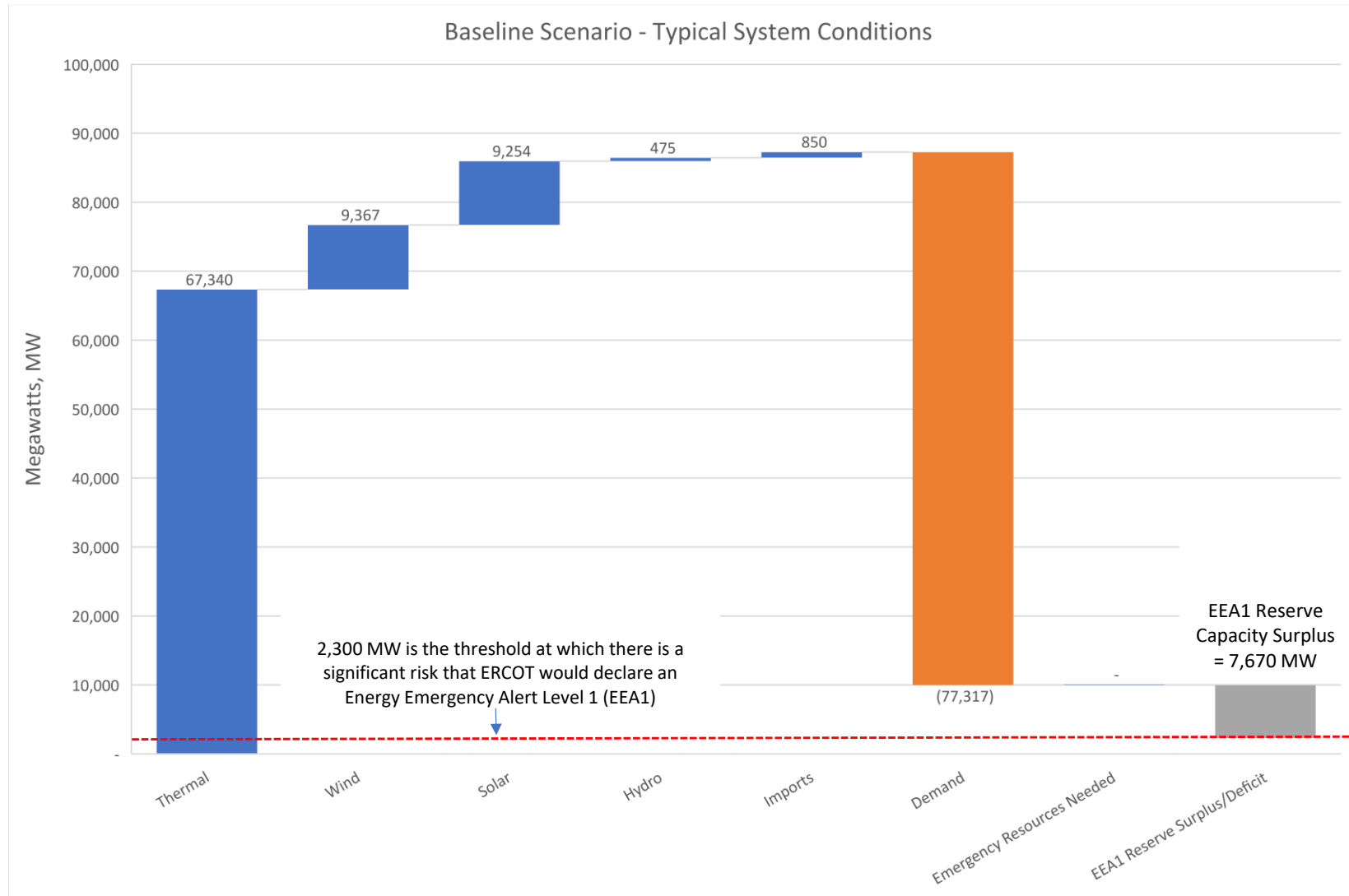
**Base & Moderate Reserve Capacity Risk Scenarios, MW**

| Load and Resources                                                                                 | Forecasted Peak Load /<br>Typical Unplanned Outages /<br>Typical Renewable Output | High Peak Load /<br>Typical Unplanned Outages /<br>Typical Renewable Output | Forecasted Peak Load /<br>High Unplanned Outages /<br>Typical Renewable Output | Forecasted Peak Load /<br>Typical Unplanned Outages /<br>Low Renewable Output |
|----------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------|--------------------------------------------------------------------------------|-------------------------------------------------------------------------------|
| Peak Demand                                                                                        | 77,317                                                                            | 79,239                                                                      | 77,317                                                                         | 77,317                                                                        |
| Resources, Summer-rated Capacity                                                                   |                                                                                   |                                                                             |                                                                                |                                                                               |
| Thermal and hydro                                                                                  | 63,554                                                                            | 63,554                                                                      | 59,569                                                                         | 63,554                                                                        |
| Capacity from Private Use Networks*                                                                | 4,262                                                                             | 4,262                                                                       | 4,262                                                                          | 4,262                                                                         |
| Wind                                                                                               | 9,367                                                                             | 9,367                                                                       | 9,367                                                                          | 2,878                                                                         |
| Solar                                                                                              | 9,254                                                                             | 9,254                                                                       | 9,254                                                                          | 7,025                                                                         |
| Storage                                                                                            | 0                                                                                 | 0                                                                           | 0                                                                              | 0                                                                             |
| Non-Synchronous Ties                                                                               | 850                                                                               | 850                                                                         | 850                                                                            | 850                                                                           |
| Total Resources                                                                                    | 87,287                                                                            | 87,287                                                                      | 83,302                                                                         | 78,569                                                                        |
| Capacity Available for Operating Reserves<br>(Less than 2,300 MW indicates risk of EEA1)           | 9,970                                                                             | 8,048                                                                       | 5,985                                                                          | 1,252                                                                         |
| Emergency Resources                                                                                | 0                                                                                 | 0                                                                           | 0                                                                              | 2,895                                                                         |
| Capacity Available for Operating Reserves<br>(Less than 1,000 MW indicates risk of EEA3 Load Shed) | 9,970                                                                             | 8,048                                                                       | 5,985                                                                          | 4,147                                                                         |

\* Reflects only the installed capacity used to deliver power to the ERCOT grid.

- One of the four scenarios (forecasted peak load, typical thermal unplanned outages, low renewable output) presumes that emergency resources are needed to restore reserves to pre-Energy Emergency Alert levels

# Waterfall Chart: Base Scenario



# Summer SARA: Three Extreme Risk Scenarios

## Extreme Reserve Capacity Risk Scenarios, MW

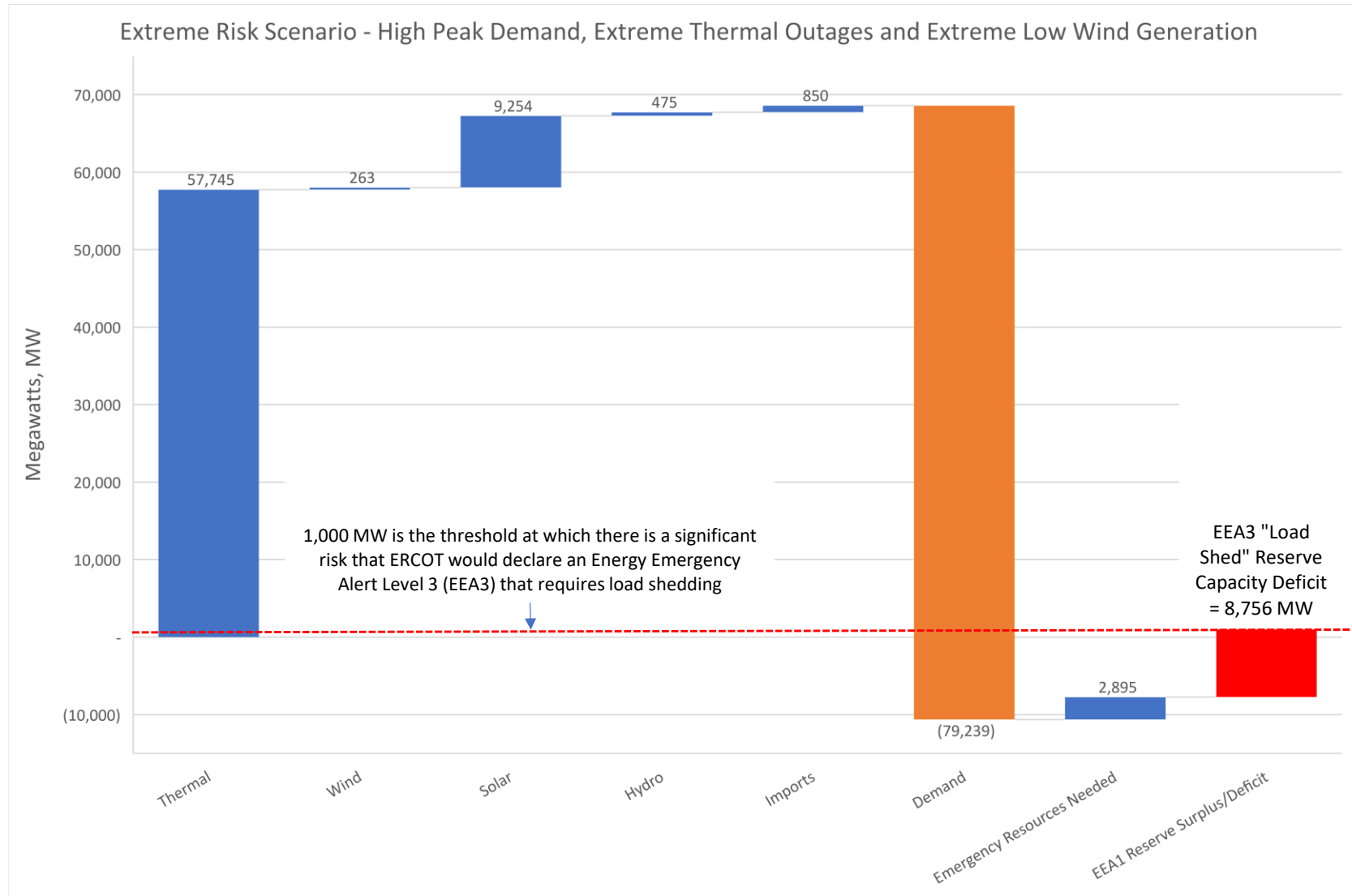
(One or a combination of extreme risk assumptions resulting in low probability, high impact outcomes)

| Load and Resources                                                                                 | Extreme Peak Load /<br>Typical Unplanned Outages /<br>Typical Renewable Output | Extreme Peak Load /<br>Extreme Unplanned Outages /<br>Typical Renewable Output | High Peak Load /<br>Extreme Unplanned Outages /<br>Extreme Low Wind Output |
|----------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------|--------------------------------------------------------------------------------|----------------------------------------------------------------------------|
| Peak Demand                                                                                        | 81,567                                                                         | 81,567                                                                         | 79,239                                                                     |
| Resources, Summer-rated Capacity                                                                   |                                                                                |                                                                                |                                                                            |
| Thermal and hydro                                                                                  | 63,554                                                                         | 53,959                                                                         | 53,959                                                                     |
| Capacity from Private Use Networks*                                                                | 4,262                                                                          | 4,262                                                                          | 4,262                                                                      |
| Wind                                                                                               | 9,367                                                                          | 9,367                                                                          | 263                                                                        |
| Solar                                                                                              | 9,254                                                                          | 9,254                                                                          | 9,254                                                                      |
| Storage                                                                                            | 0                                                                              | 0                                                                              | 0                                                                          |
| Non-Synchronous Ties                                                                               | 850                                                                            | 850                                                                            | 850                                                                        |
| Total Resources                                                                                    | 87,287                                                                         | 77,692                                                                         | 68,588                                                                     |
| Capacity Available for Operating Reserves<br>(Less than 2,300 MW indicates risk of EEA1)           | 5,720                                                                          | (3,875)                                                                        | (10,651)                                                                   |
| Emergency Resources                                                                                | 0                                                                              | 2,895                                                                          | 2,895                                                                      |
| Capacity Available for Operating Reserves<br>(Less than 1,000 MW indicates risk of EEA3 Load Shed) | 5,720                                                                          | (980)                                                                          | (7,756)                                                                    |

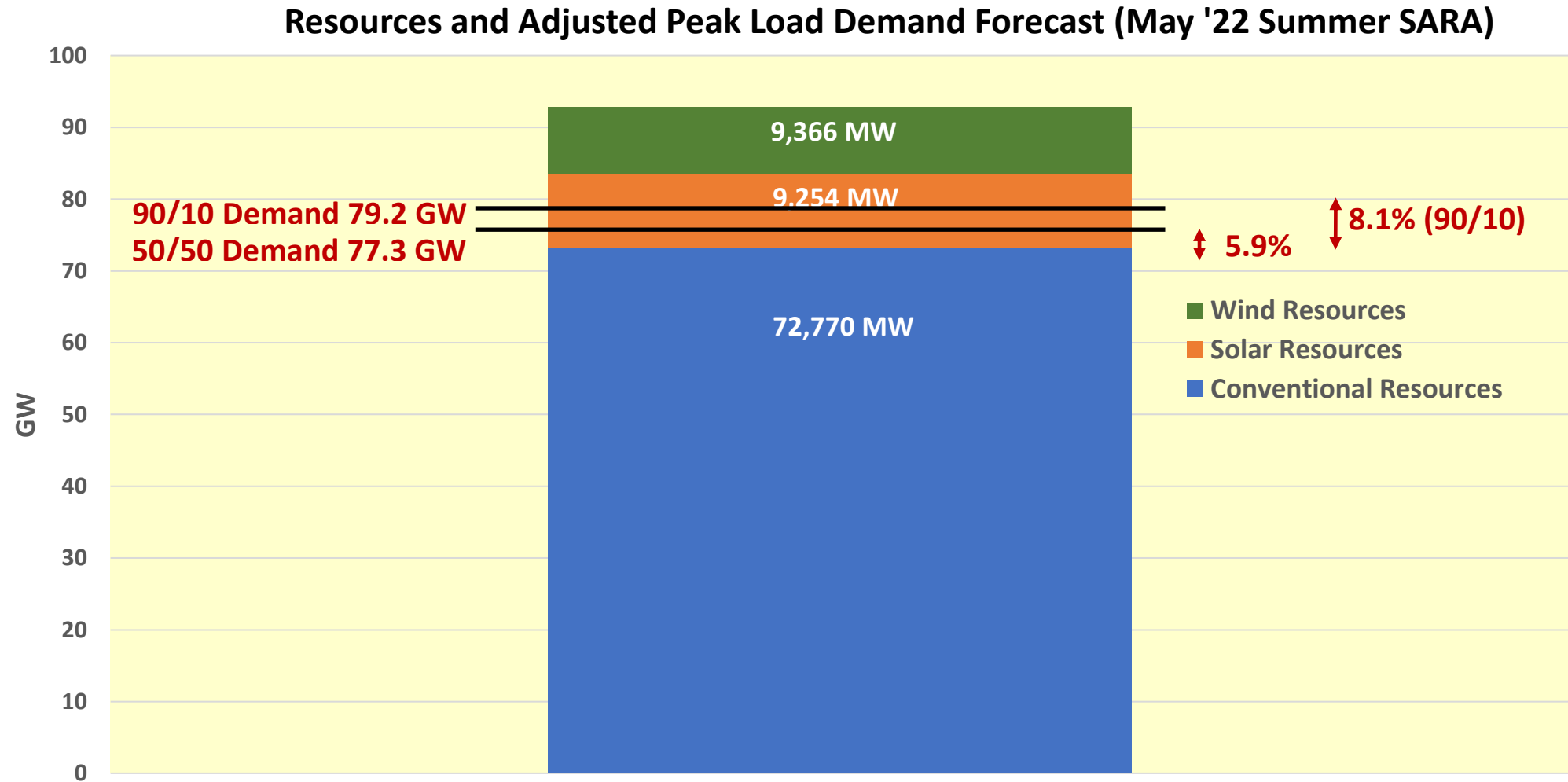
\* Reflects only the installed capacity used to deliver power to the ERCOT grid.

- Two of the three scenarios presume that emergency resources are needed; rotating outages likely required under both scenarios

# Waterfall Chart: Most Extreme Risk Scenario

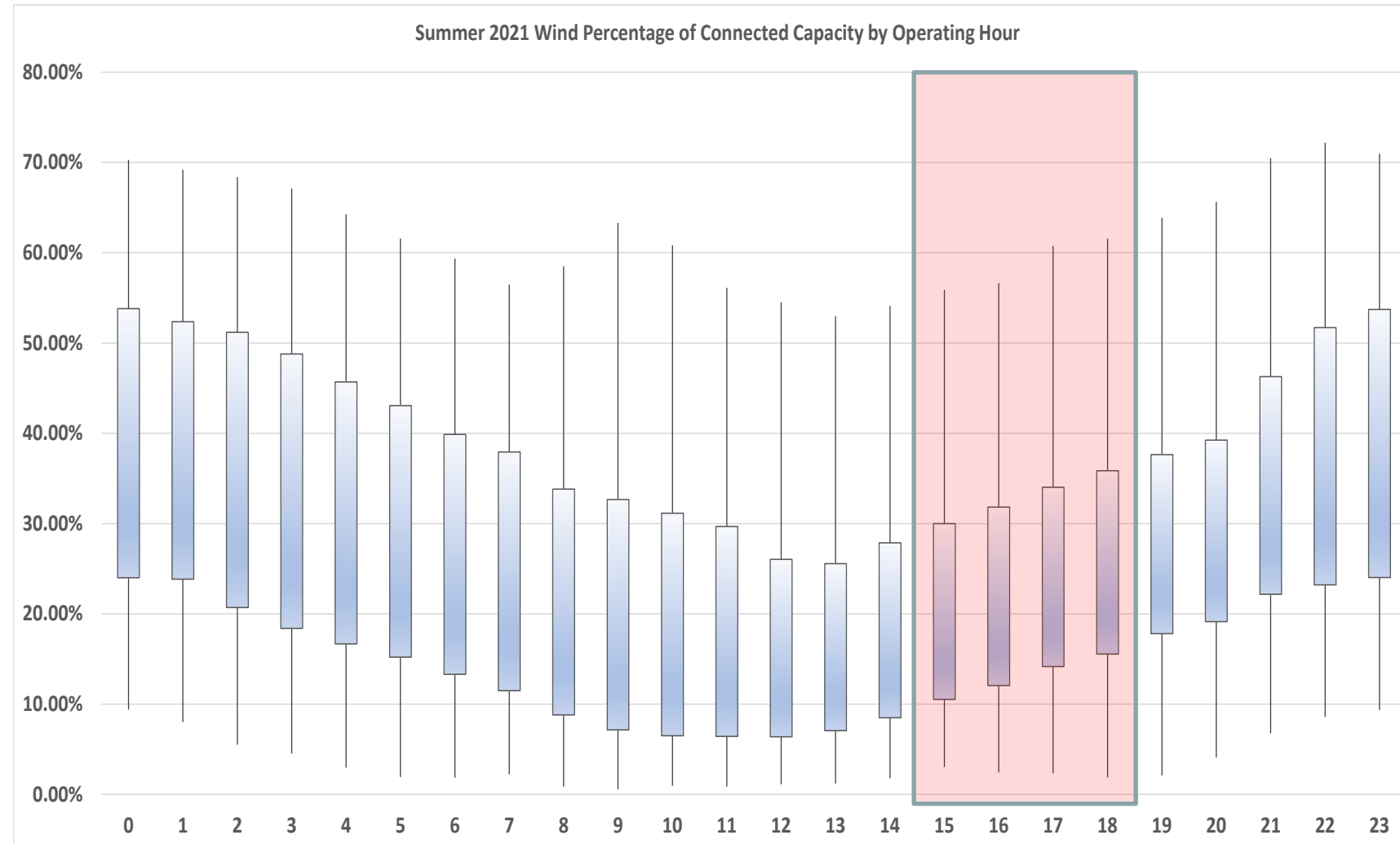


# Projected Need for Solar and Wind at Time of 2022 Summer Peak



# Wind Performance

Summer 2021 Wind Percentage of Connected Capacity by Operating Hour



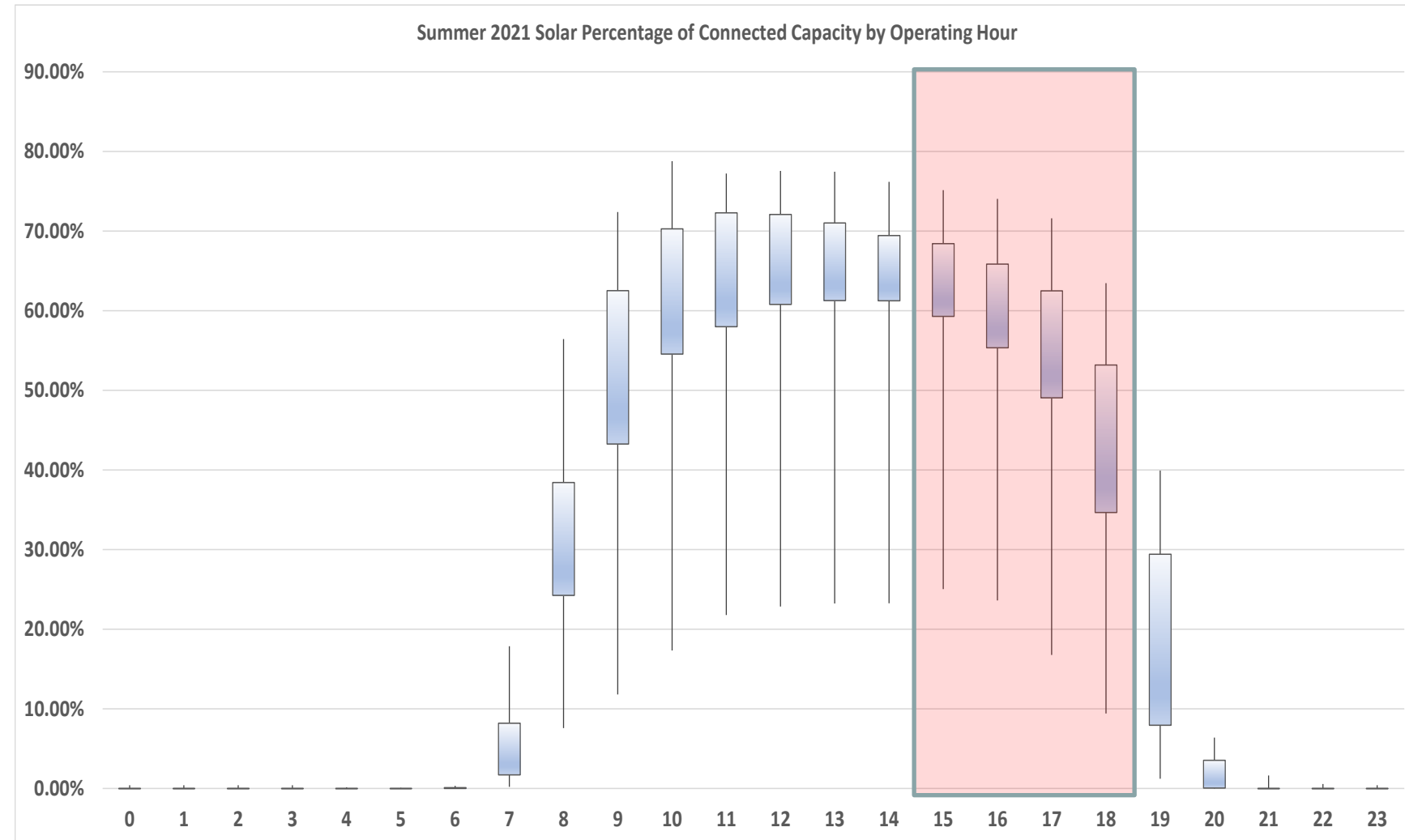
## Summer 2021 Wind Performance

- Wind MW output as a percentage of total nameplate capacity
- Highly variable
- Average value between 20-25% during peak load hours
- 50-50 percentile ranges between 10%-35%
- Min/Max values range from 5% to 65%

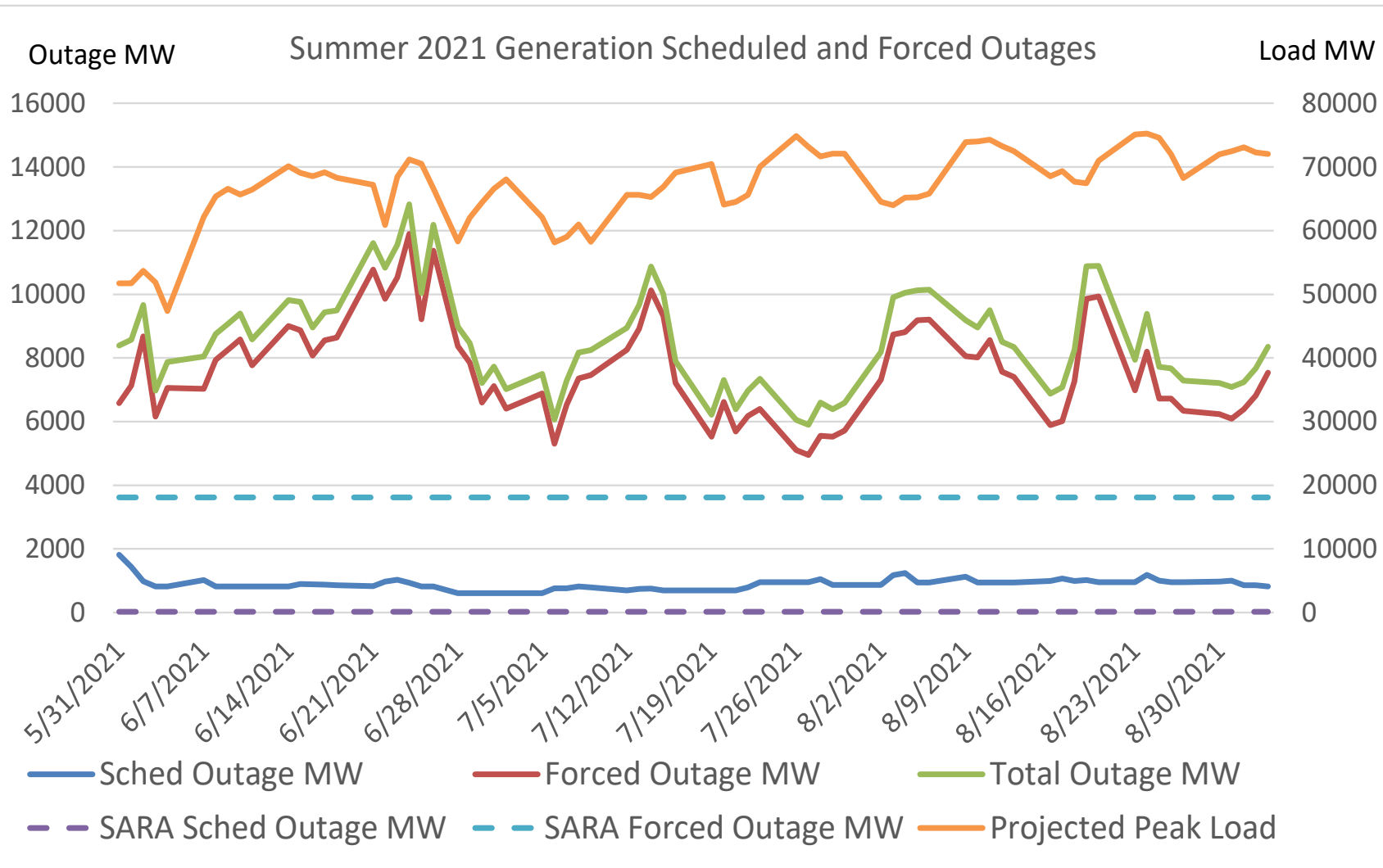
# Solar Performance

## Summer 2021 Solar Performance

- Solar MW output as a percentage of total nameplate capacity
- Much more predictable than wind
- Average value between 45-65% during peak load hours
- 50-50 percentile ranges between 35%-70%
- Min/Max values range from 10% to 75%



# Generation Outages



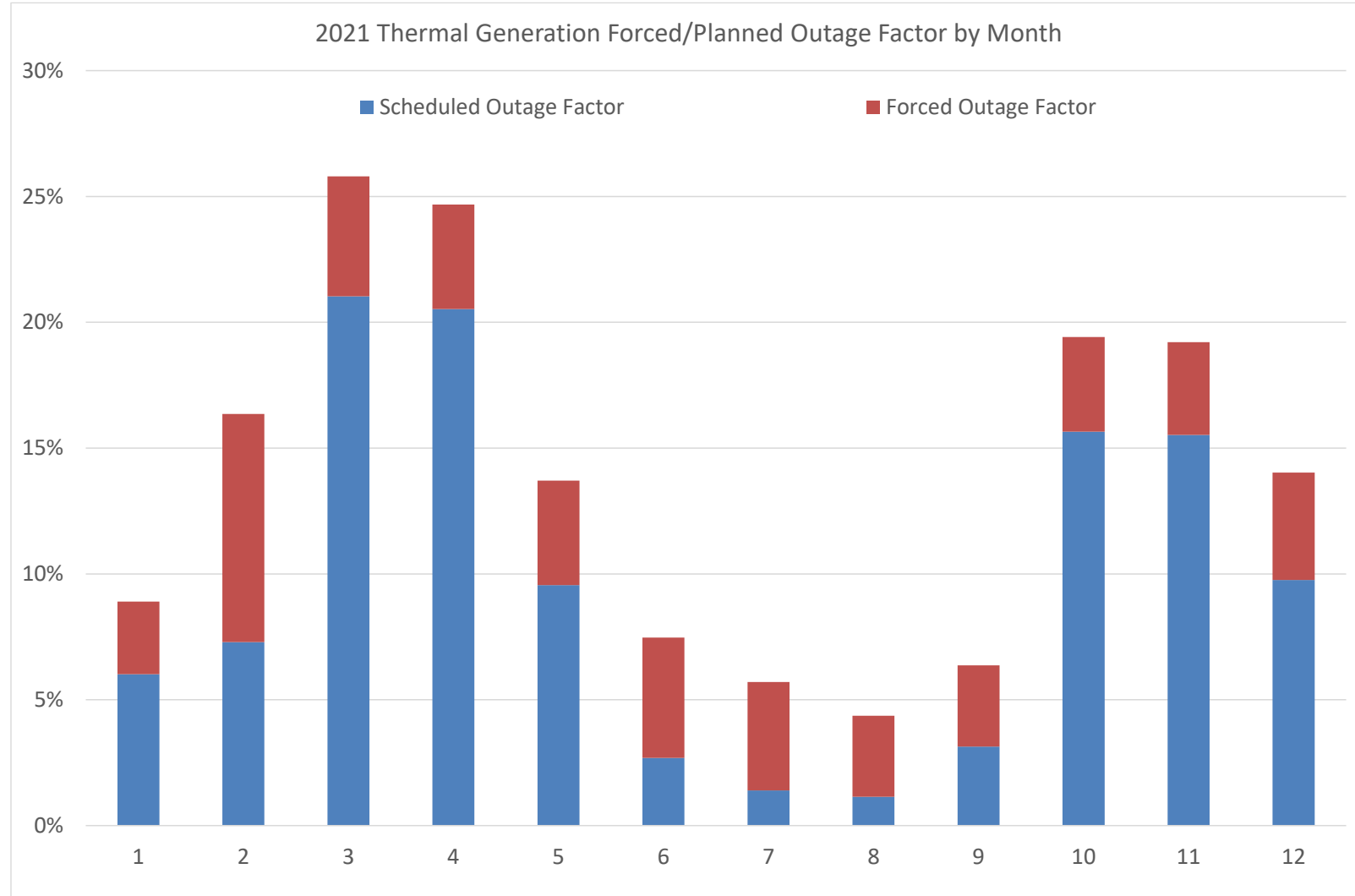
## 2021 Actual Generation Outages

- Dashed lines show estimated outages for thermal units from summer 2021 SARA
- Solid lines show actual outages, including wind and solar

# Thermal Generation Outages

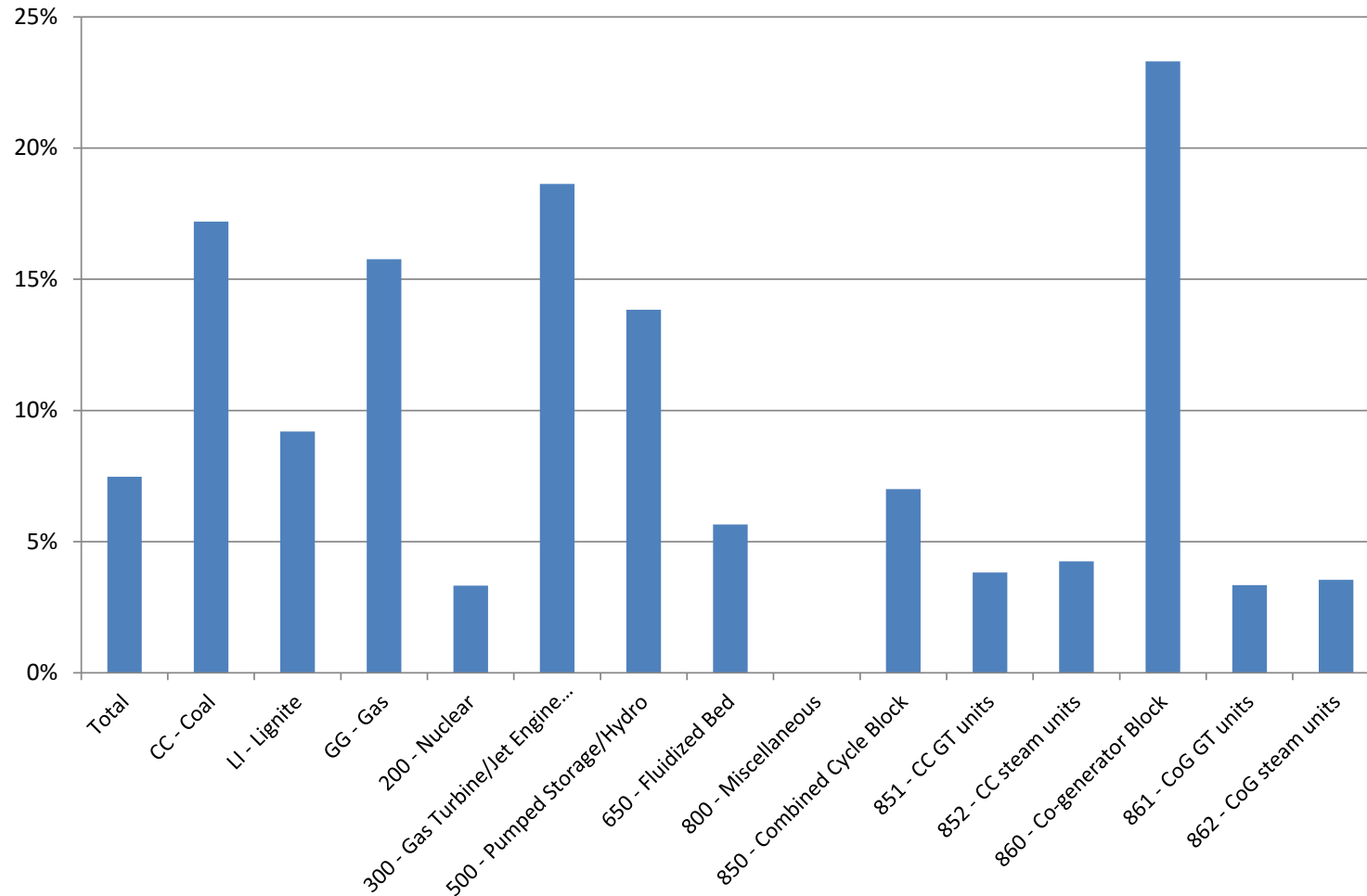
## Thermal Generation outages

- Thermal generation outages decrease in summer
- Combined forced and planned outage rates range from 4-7%



# Thermal Generation Outages

Summer 2021 Equivalent Forced Outage Rate (EFOR) by Fuel Type



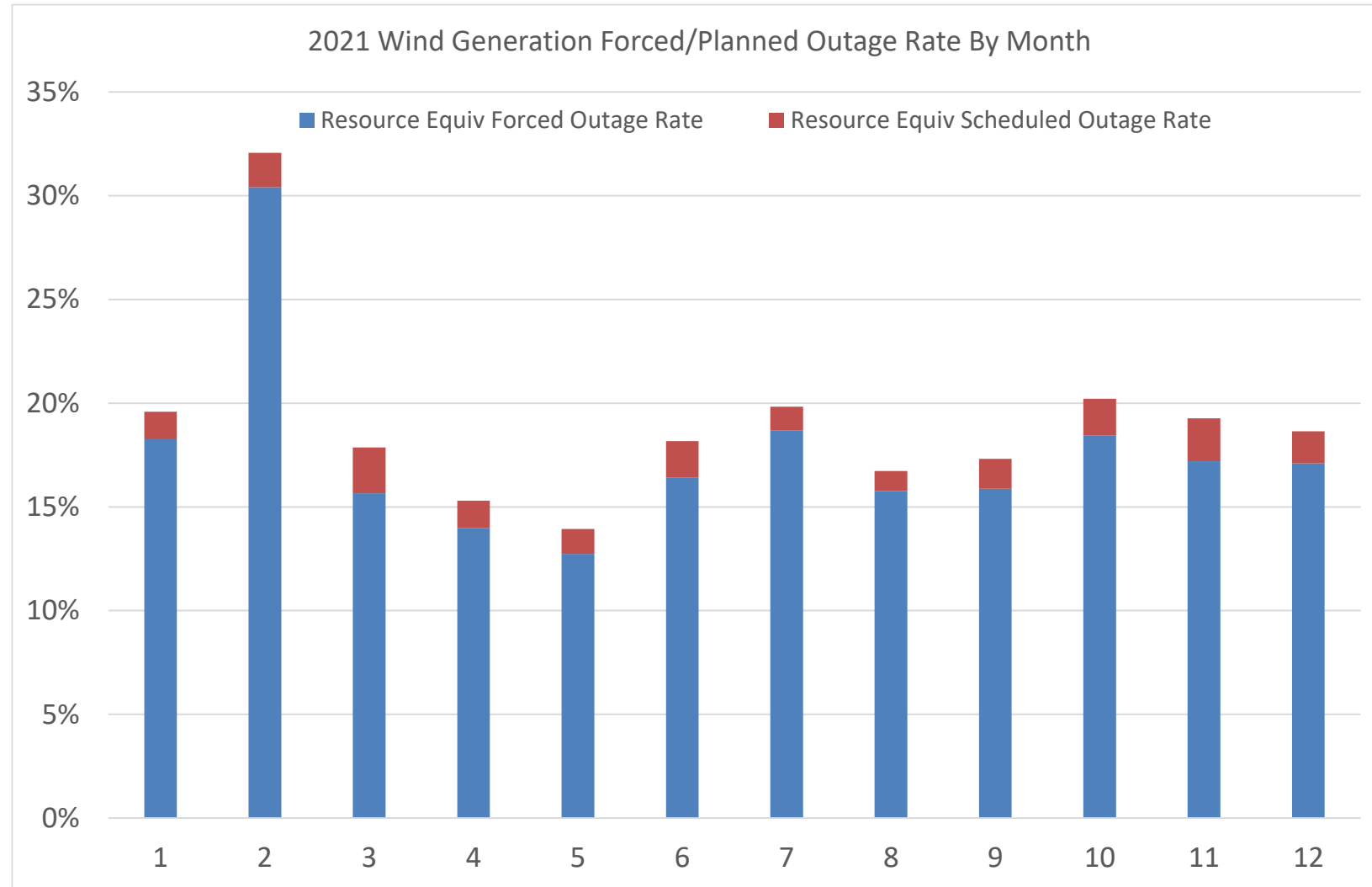
## Thermal Generation Outages

- Forced outage rates vary widely between different fuel types

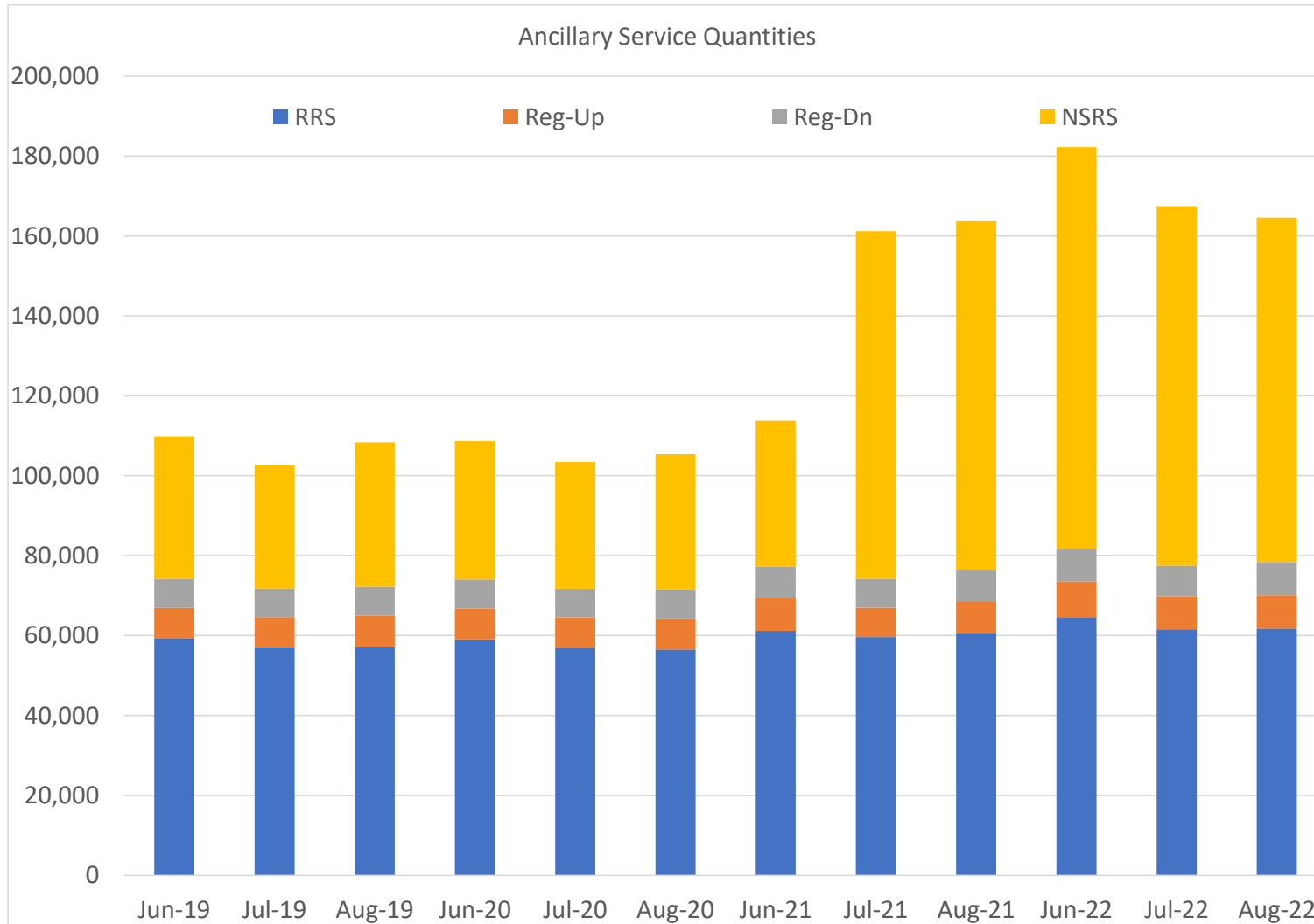
# Wind Generation Outages

## Wind Generation Outages

- Wind generation outage rates in summer are in-line with other months of the year
- Combined forced and planned outage rates range from 17-20%



# Ancillary Services



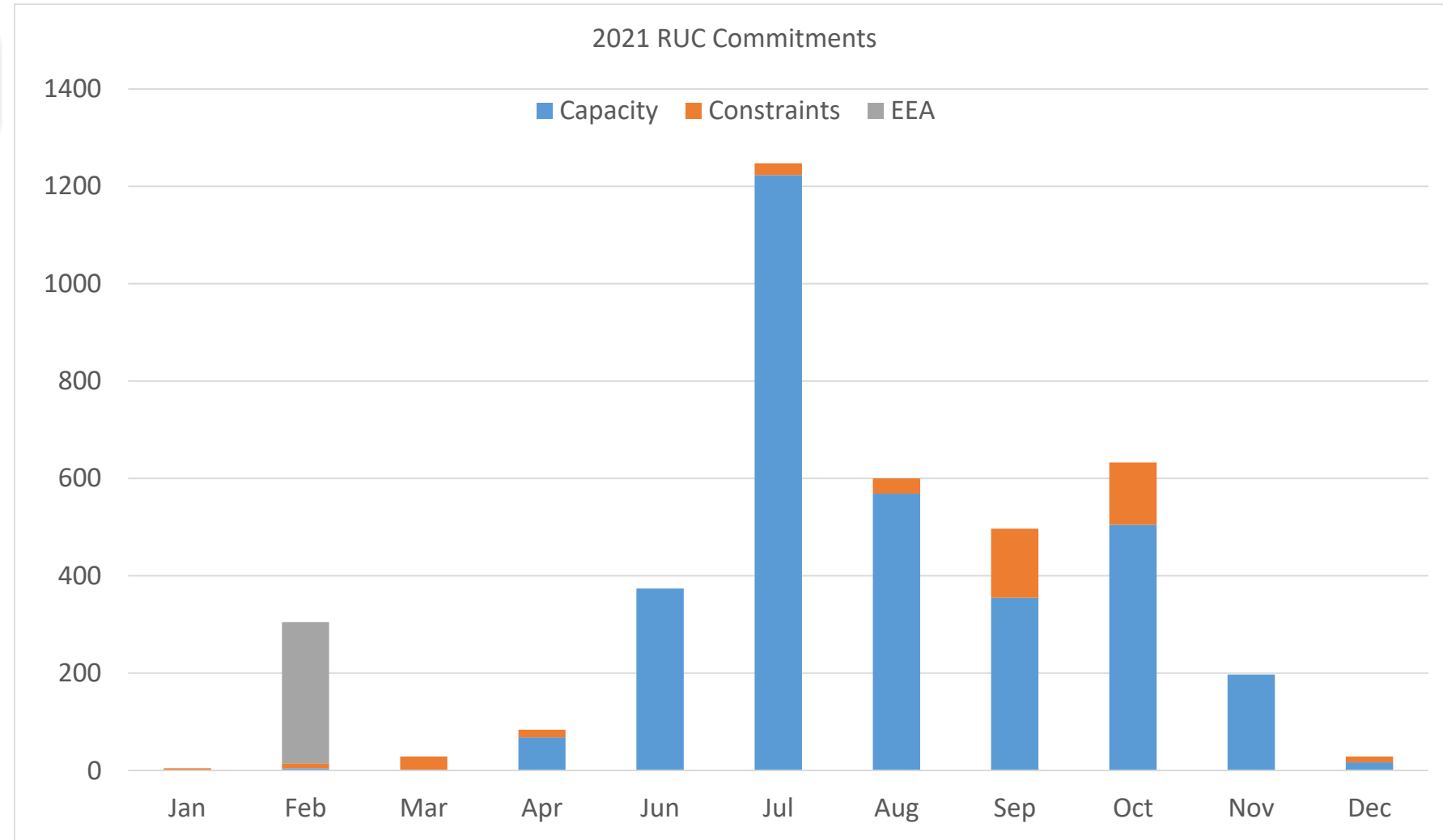
## Ancillary Services

- ERCOT is operating the grid more conservatively compared to previous years
- Large increase in NSRS quantities in 2021 and 2022 compared prior years

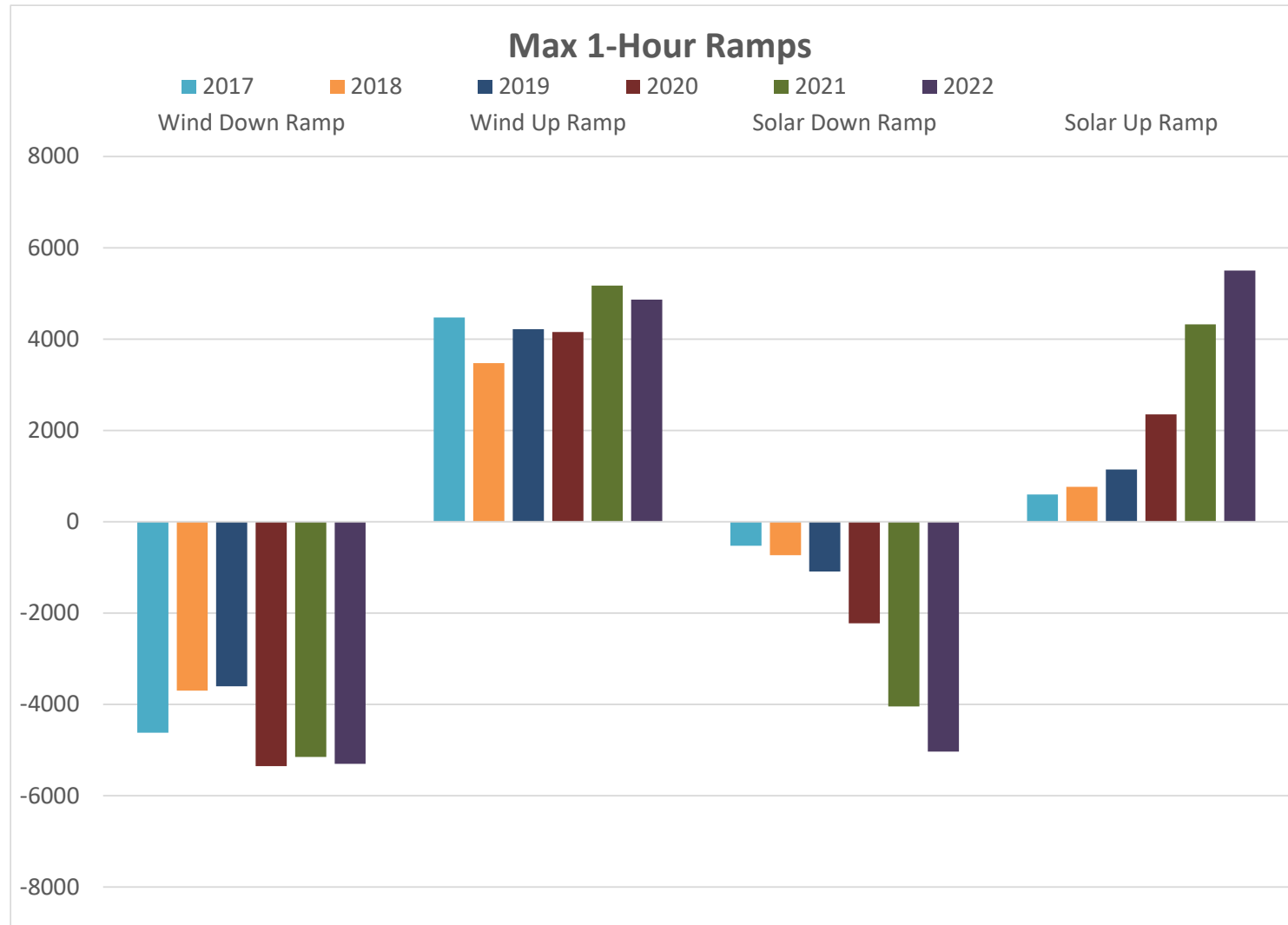
# Reliability Unit Commitment (RUC) Commitments

## RUC

- More conservative operation approach
- Rate of RUC commitments increased significantly starting in June 2021
- Primary reason is Capacity
- Practice has continued into 2022



# Ramping



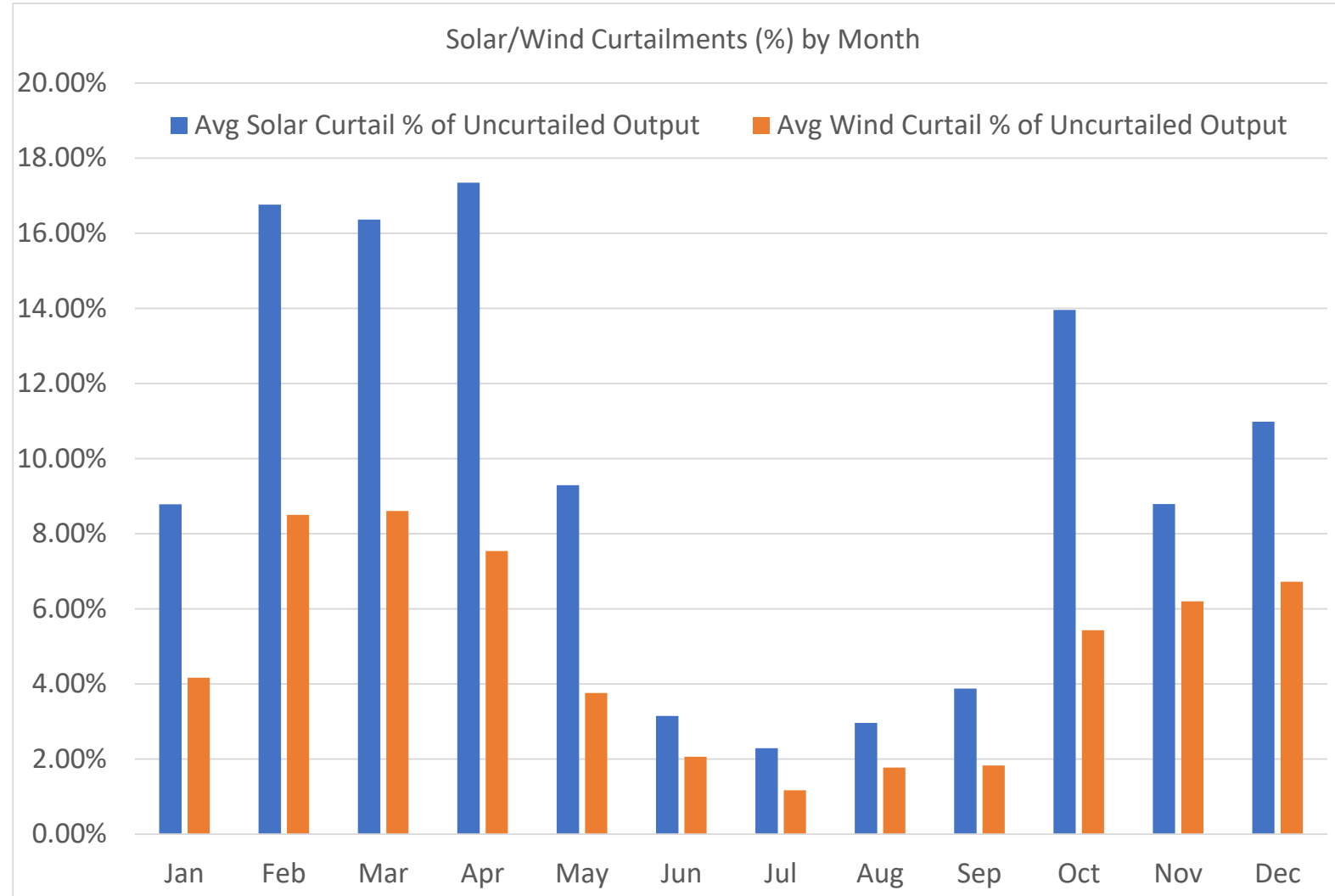
## Solar Ramping

- Solar ramp magnitudes continue to increase
- Maximum 1-hour up and down ramps exceeding 5500 MW per hour, or approximately 50% of connected nameplate capacity

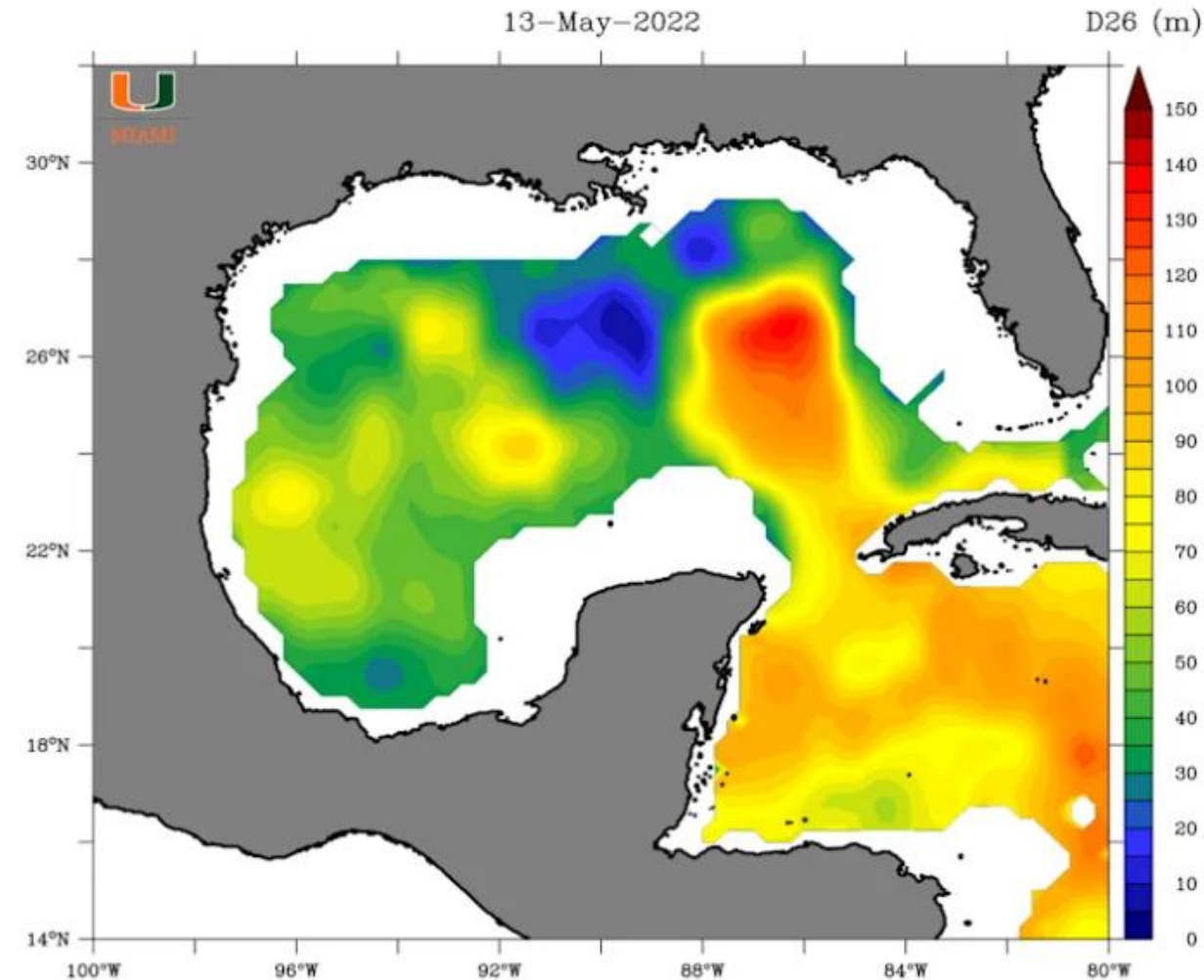
# Curtailments

## Curtailments

- Wind and solar curtailments decrease significantly during summer months



# Hurricane Outlook



**Bad news for the 2022 hurricane season: The Loop Current, a fueler of monster storms, is looking a lot like it did in 2005, the year of Katrina**

- The Atlantic hurricane season starts on June 1
- Gulf of Mexico is warmer than average
- Water temperatures are warmer than 2005, the year of Hurricanes Katrina, Wilma and Rita formed in the Gulf

The background of the slide features a blurred Texas state flag on the left and a close-up of a wind turbine's hub and blades on the right, all set against a clear blue sky.

# Questions?



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Ensuring electric reliability for Texans