

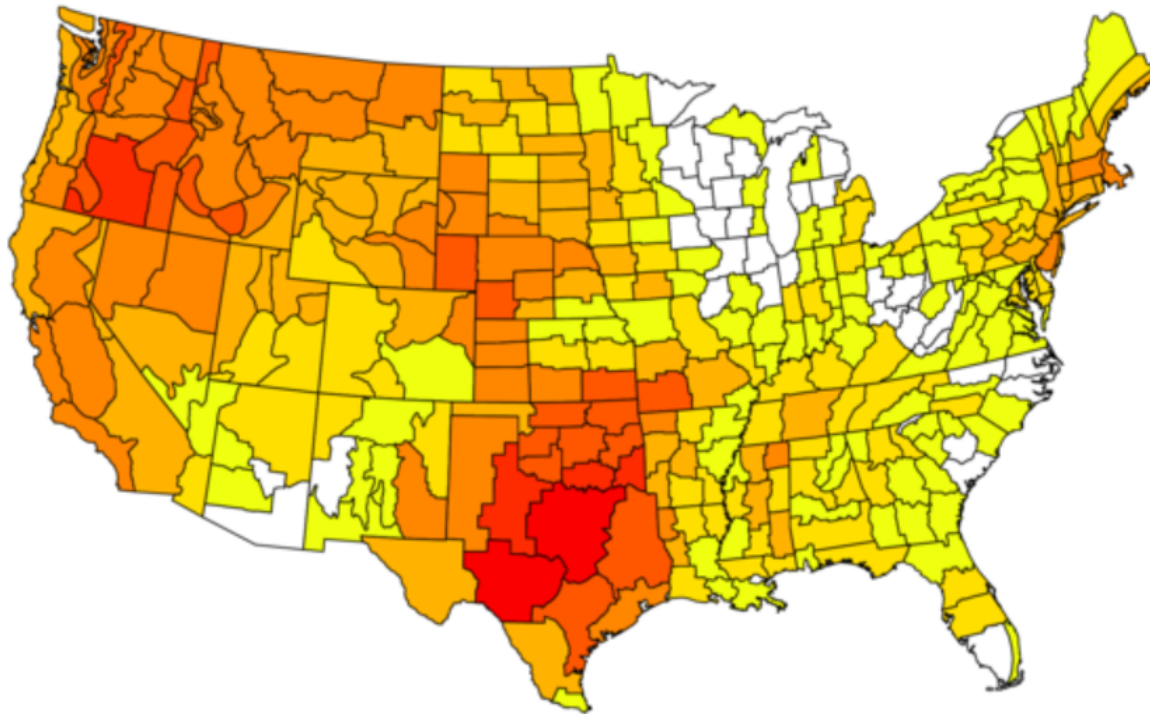


# Summer Operations of the PJM Grid: June 1, 2022 – August 31, 2022

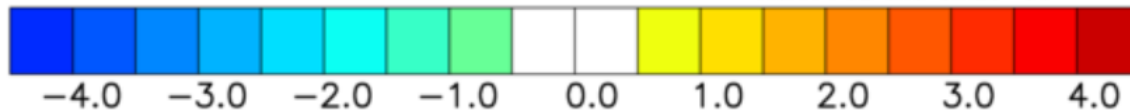
Operating Committee  
October 7, 2022

# Summer 2022 Overview

NOAA/NCEI Climate Division Temperature Anomalies (F)  
Jun to Aug 2022  
Versus 1991–2020 Longterm Average



NOAA PSL and CIRES-CU



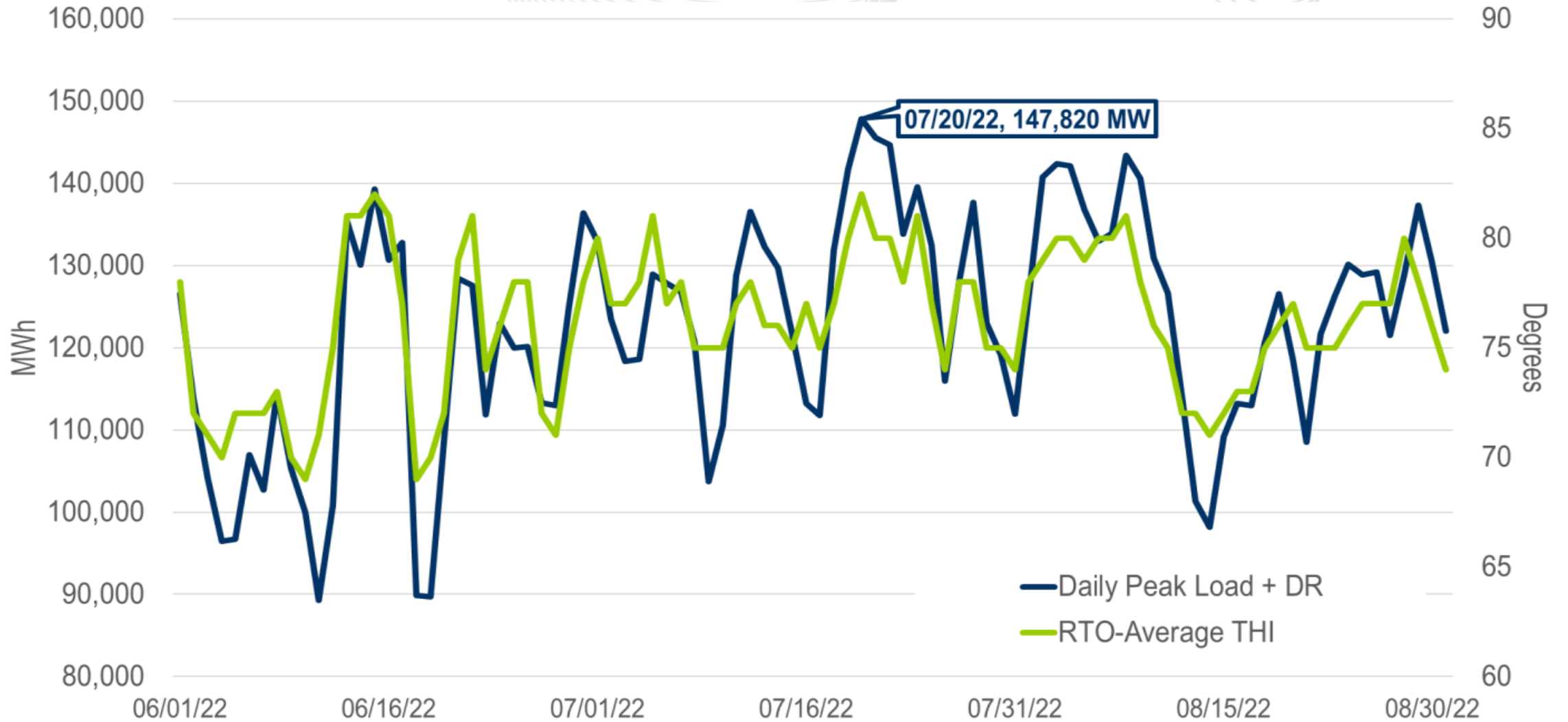
Source: [NOAA/NCEI U.S. Climate Division Data Plots: NOAA Physical Sciences Laboratory](https://www.noaa.gov/data/physical-science-laboratory)

- Temperatures were near to or just above normal across the RTO this summer.
- However, temperatures did not fluctuate much leading to sustained heat from the beginning of June through the end of August.
- Twenty seven Hot Weather Alerts were issued during this summer.

- There is a strong relationship between load and Temperature Humidity Index (THI), a measure that accounts for the combined effects of temperature and relative humidity.
- In the summer, as THI goes up, the load goes up (and vice versa), exhibiting a strong, positive relationship.
- The following slide shows the close tracking between load and THI.



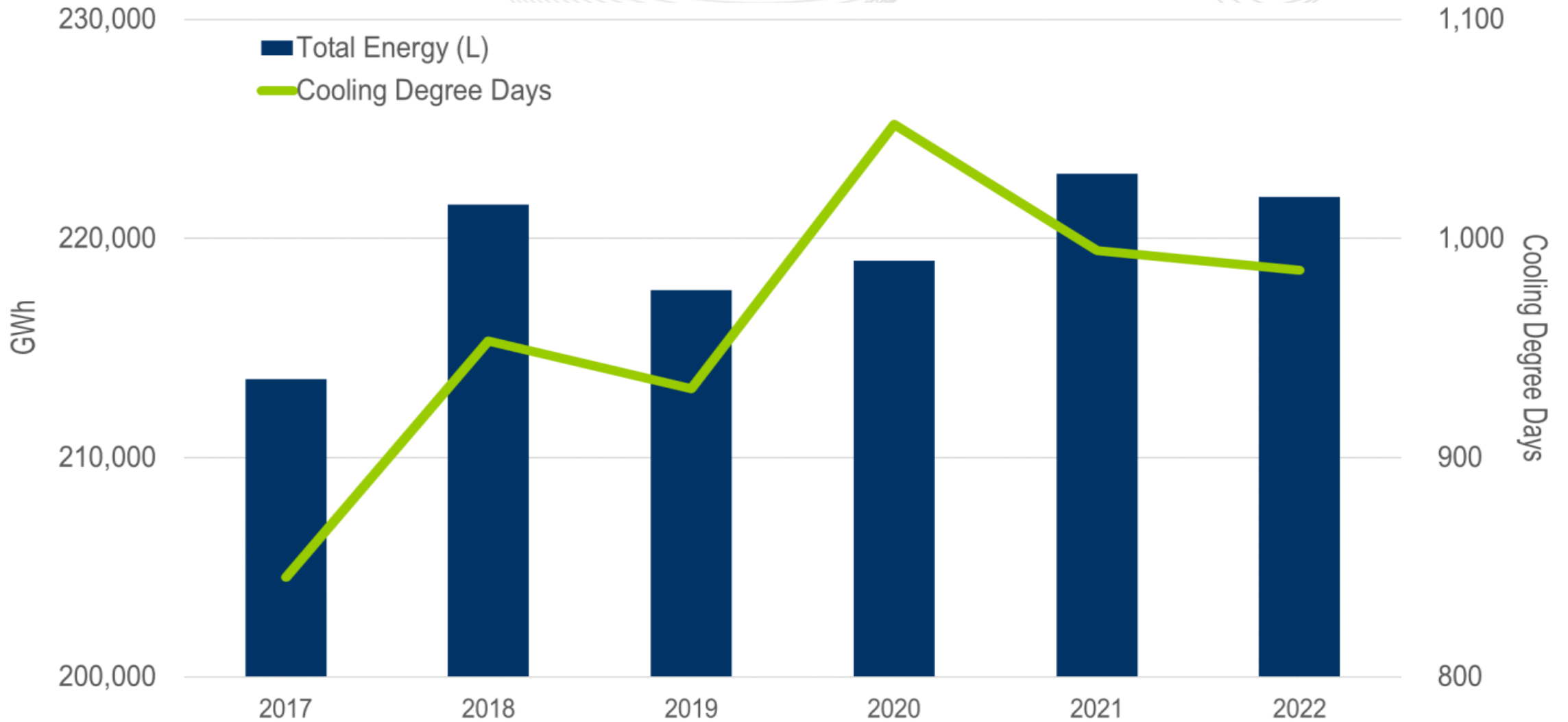
# Daily RTO Peak Load and Temperature Humidity Index



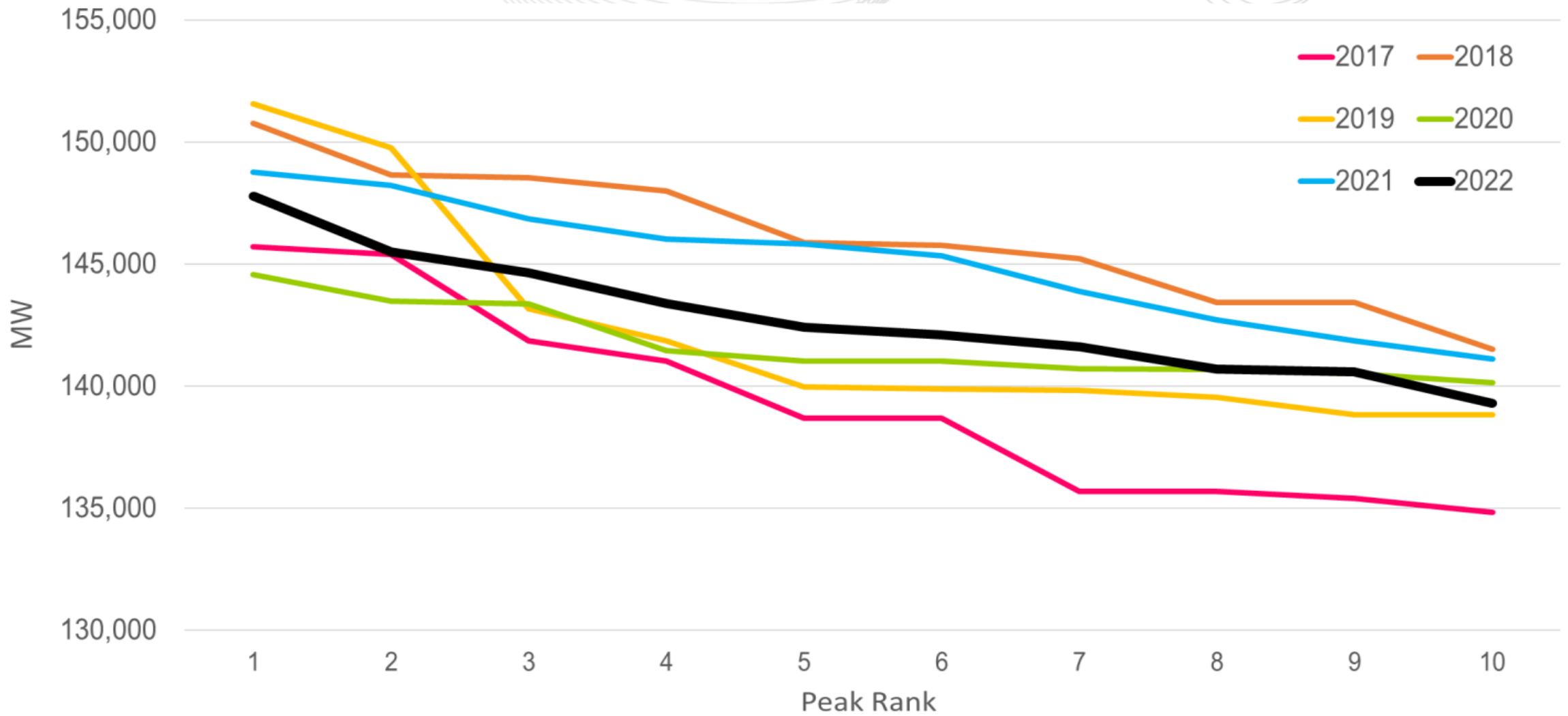
- The following slides show the historic relationship between cooling degree days and total energy, and historic summer peak loads, respectively.
- Cooling degree days measure the temperature's cumulative deviation from a base point, in this case 65 degrees, over a specified time period.
- In general, total energy and cooling degree days are closely tied with the exception of 2020 when load levels were dampened as a result of the Corona Virus.



# Historic Total Energy and Cooling Degree Days

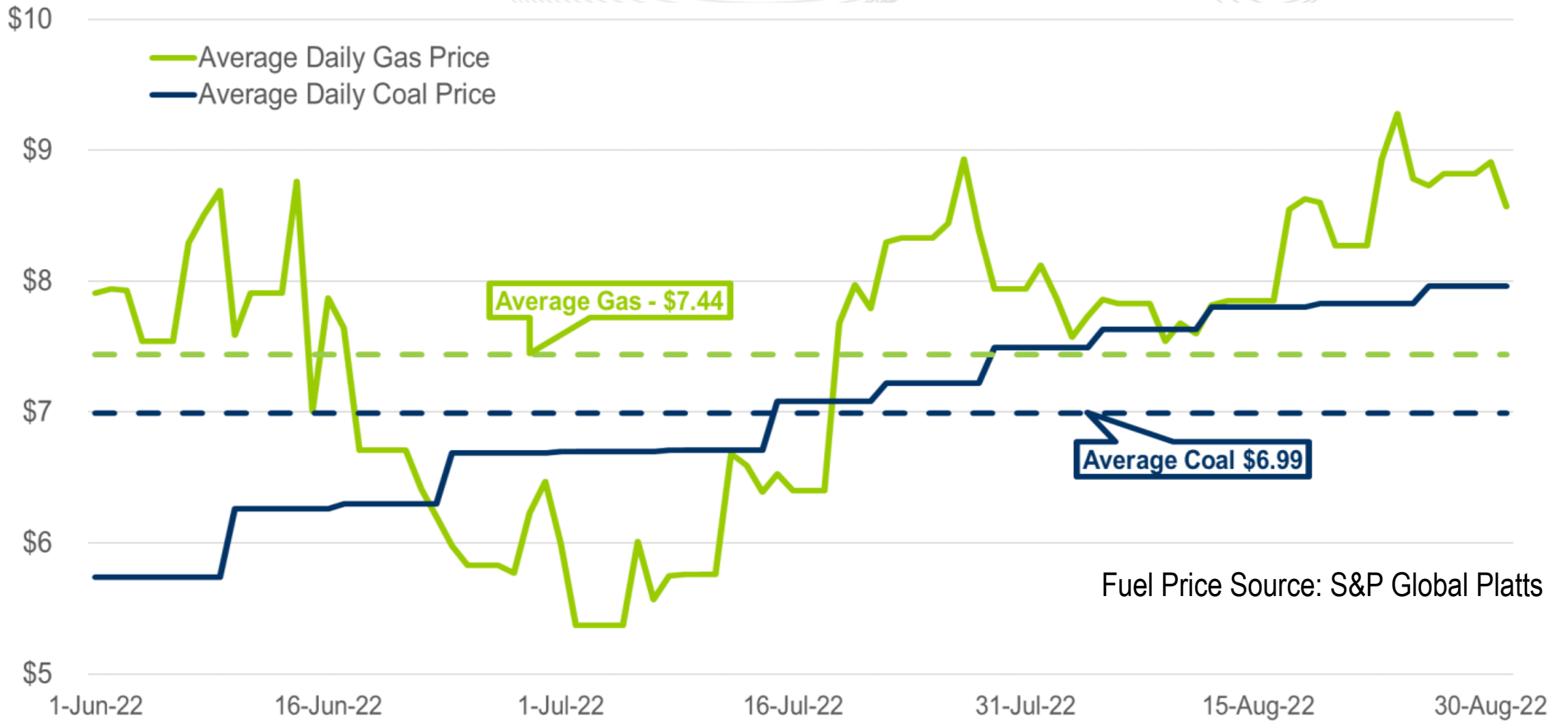


# Top 10 Summer Peaks by Year





- The following slide shows the daily average fuel prices for coal and natural gas.
- These fuel prices are straight averages of a selection of representative fuel pricing hubs in PJM's footprint. Averages are not load weighted, nor are they meant to represent the price that any particular market participant may have experienced.
- Natural gas and coal prices much higher than last year driven by
  - Underground gas storage levels well below 5 year average
  - Record gas power demand
  - LNG exports at full capacity
  - Strong demand for natural gas and coal from Europe and Asia
  - Supply chain concerns, particularly rail deliveries, limiting coal supply

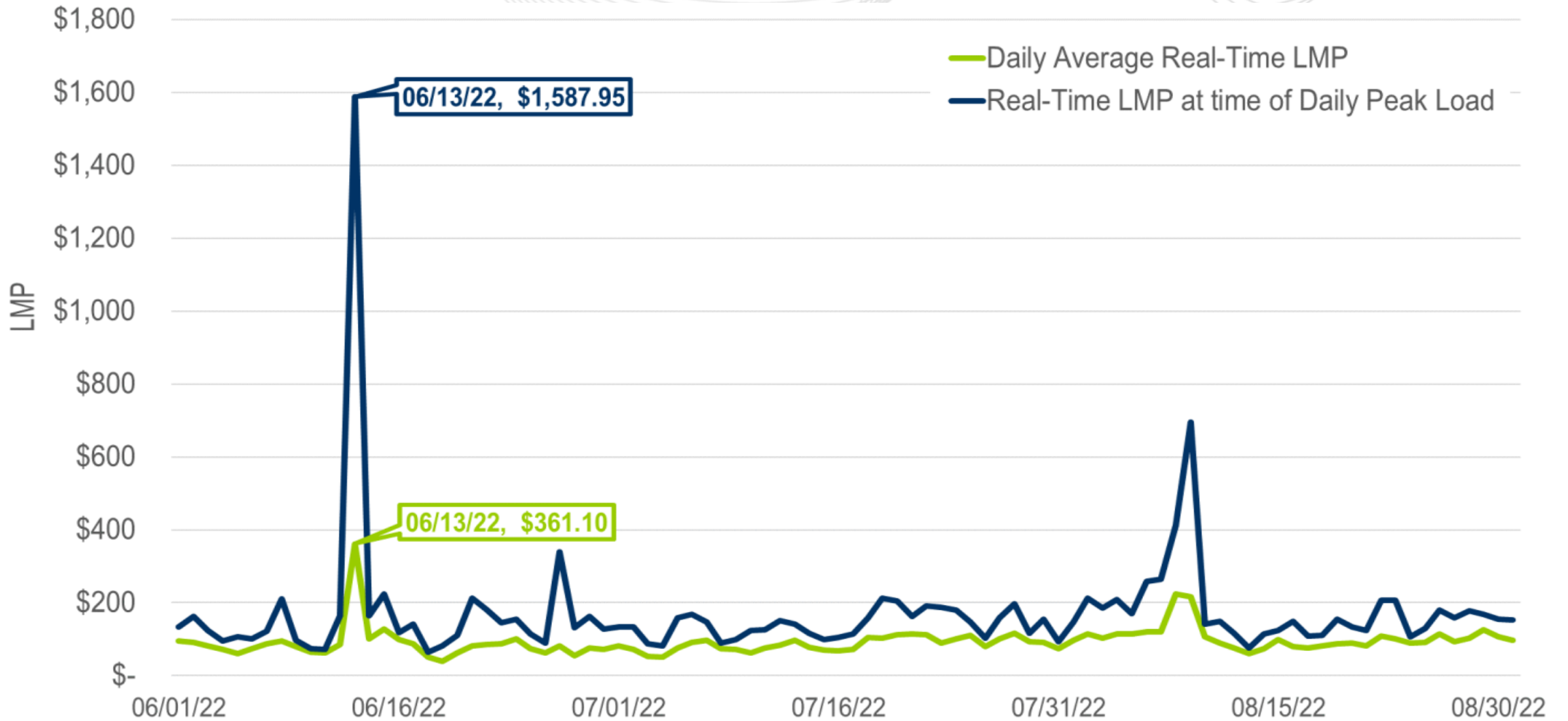


Fuel Price Source: S&P Global Platts

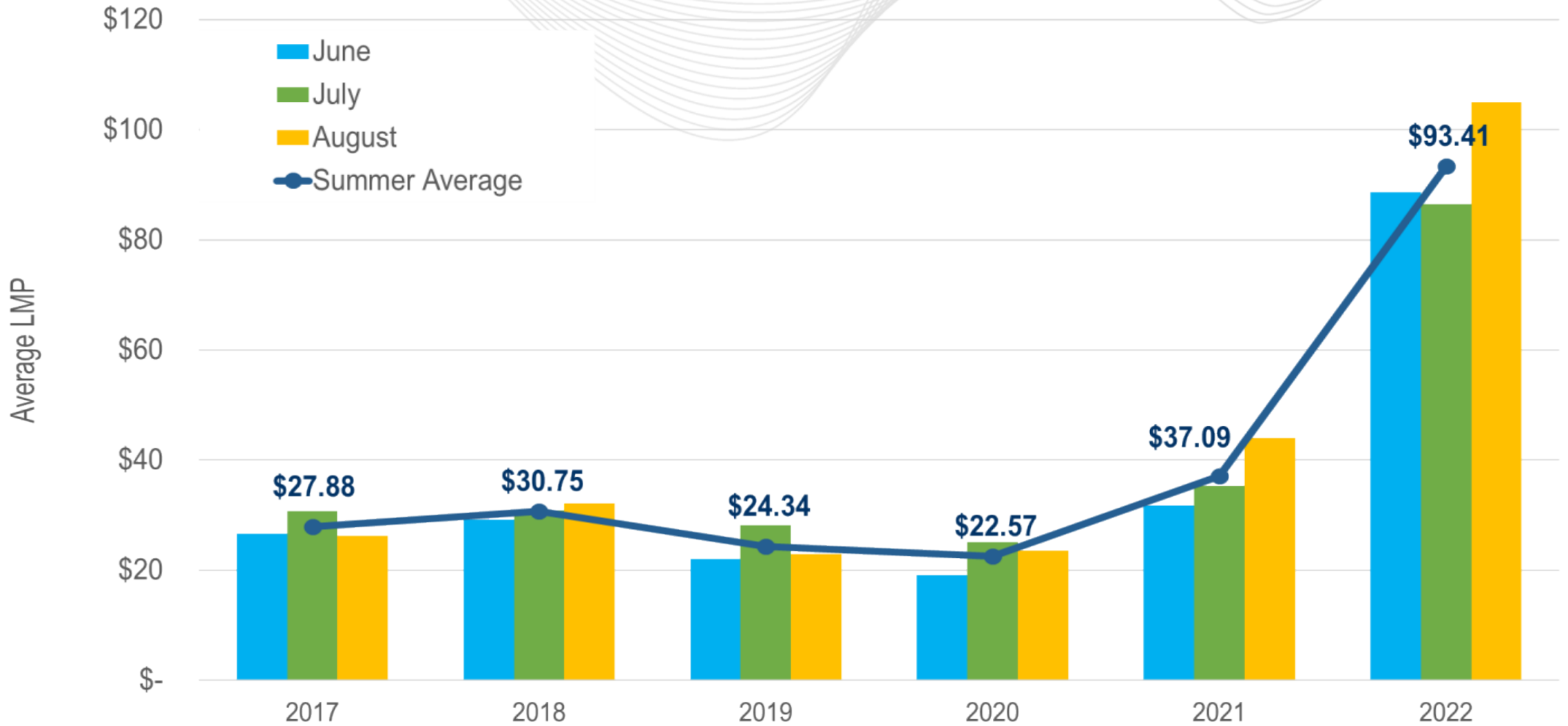
- The following slides show the daily average LMP and the LMP at the time of the daily load peak, and the historic monthly average LMPs, respectively.
- LMPs were higher this summer than in recent years. There were 28 hours in which LMP exceeded \$250.
- High natural gas and coal prices, rebounding electricity demand relative to 2020, and sustained hot weather were all contributing factors to higher LMPs this summer.



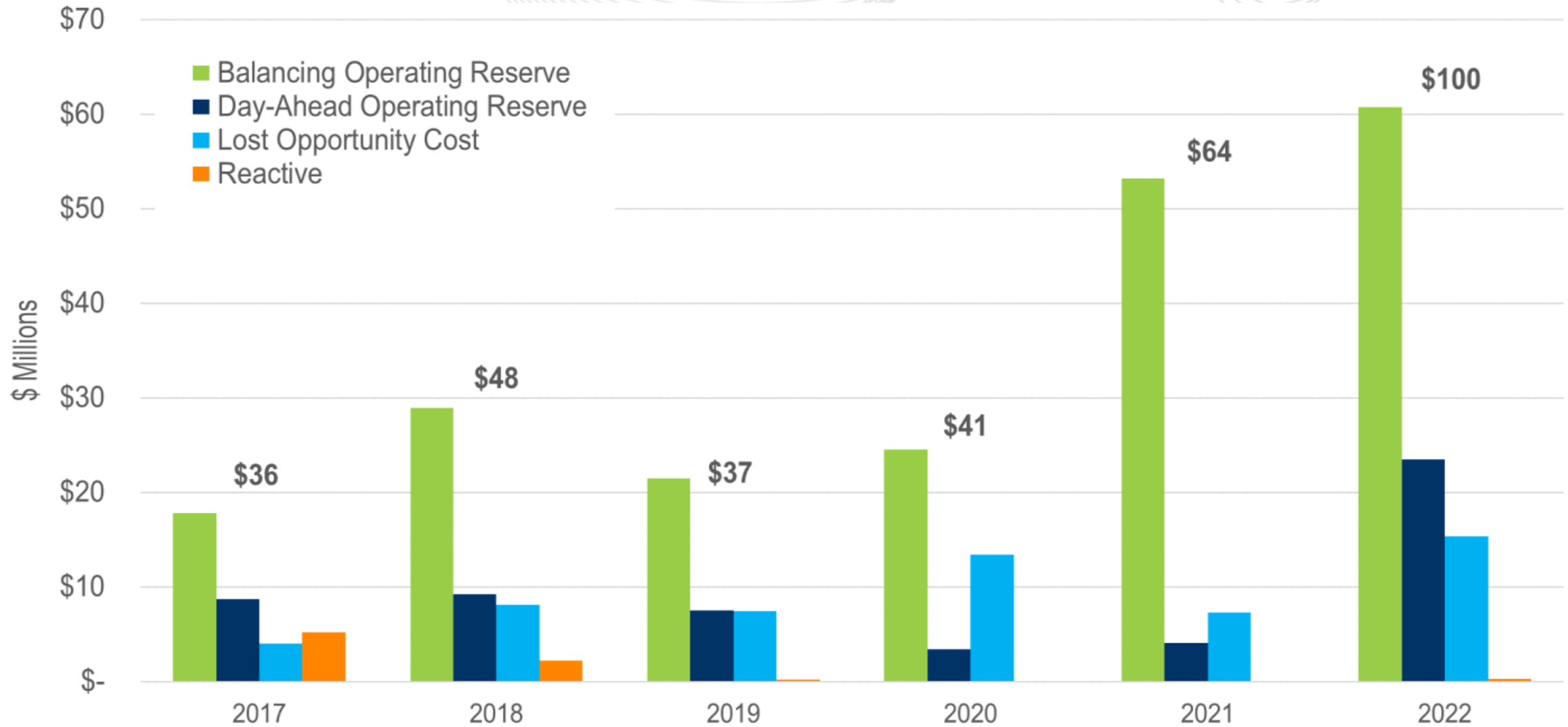
# Daily Average and Peak Real Time LMPs



# Historic Summer Average Real Time LMPs



- The following slide shows uplift for the past six summers.
- Total uplift, and more specifically, Balancing Operating Reserves (BOR) was up over recent summers.
- Given the higher load levels relative to 2020, hot weather, and constraint control dynamics, additional flexible resources were called throughout operating days. This resulted in higher levels of BOR when congestion and/or load patterns reduced localized LMP for the units in question.



# Operations



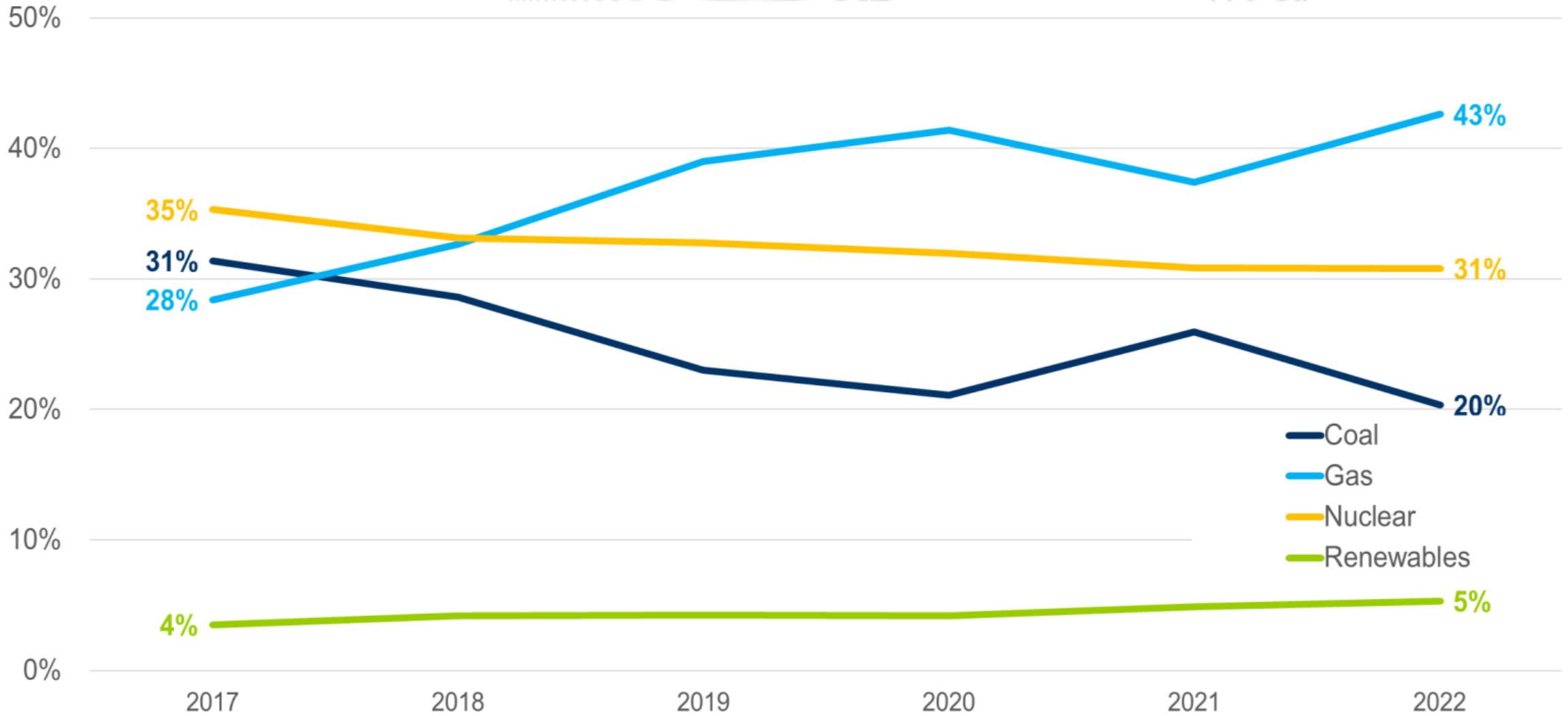
Emergency Procedure	2017	2018	2019	2020	2021	2022
100% Spinning Reserve - RTO and/or MAD	2	9	2	3	6	3
High System Voltages	3	0	0	1	3	0
Minimum Generation Alert	18	2	0	0	0	0
Load Shed Directive	0	0	0	0	0	6
Manual Load Dump Warning or Action	0	1	0	0	0	0
Hot Weather Alert - Any Region	15	16	12	20	20	27
<b>Total</b>	<b>38</b>	<b>28</b>	<b>14</b>	<b>24</b>	<b>29</b>	<b>36</b>

- Hot Weather Alerts accounted for 75% of the Emergency Procedures enacted this summer.

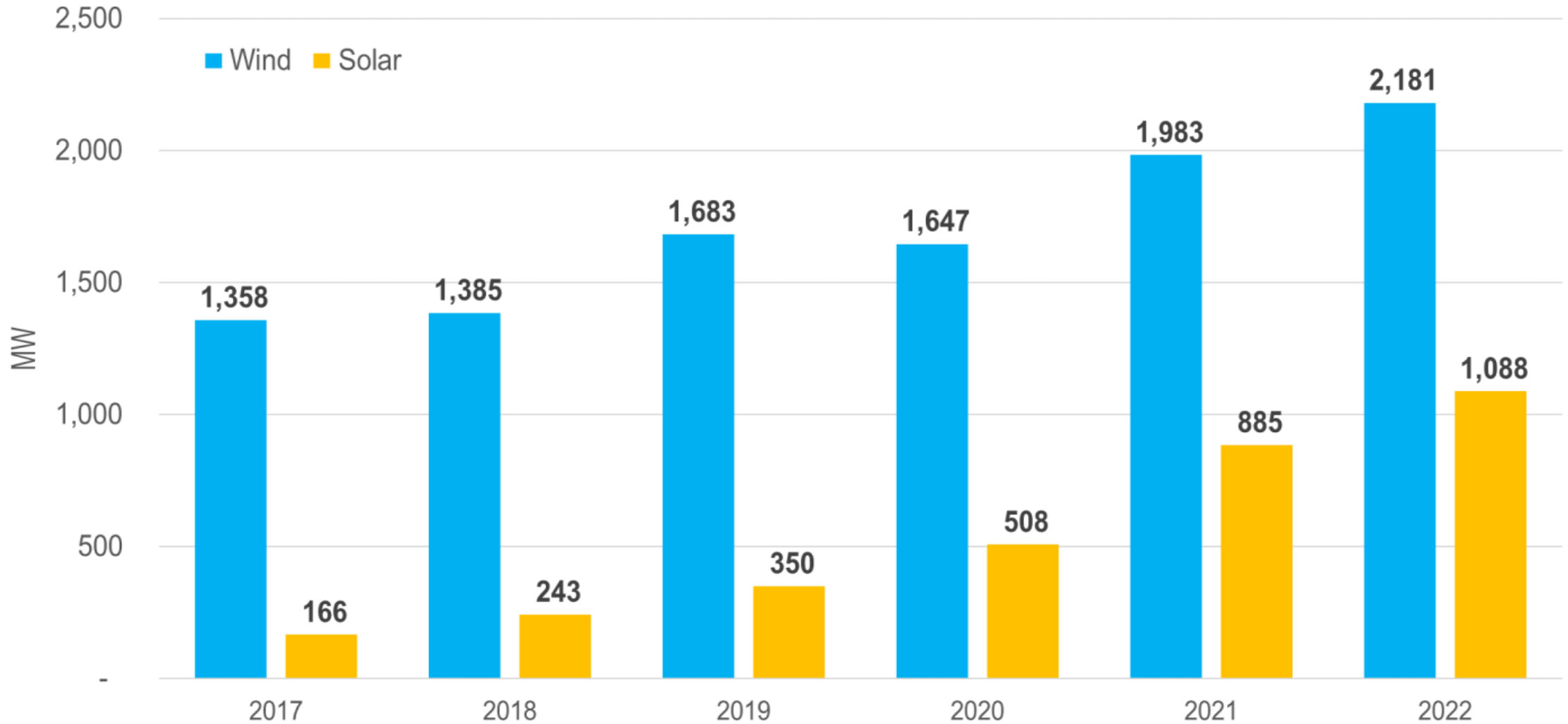
- The following slide shows the fuel mix of on-line generation for the past six summers for all hours. Following that is a slide breaking out average wind and solar performance for all hours.
- Patterns are very similar when examining only peak hours.
- Since the summer of 2017, natural gas has overtaken coal as the most utilized online fuel across all hours of the summer.
- Since the summer of 2017, renewables have increased their share of the on-line fuel mix both during peak hours and all other hours.



# Historic Online Fuel Mix for all Summer Hours



# Renewable Performance for all Summer Hours



- The following slides show the daily average and daily maximum forced outage rates, as well as the historic average forced outage rates, respectively.
- The 2022 daily data is sourced from eDART. The historic data is from GADS.
- Overall, forced outage rates for summer of 2022 are higher than those experienced the previous two summers.

