



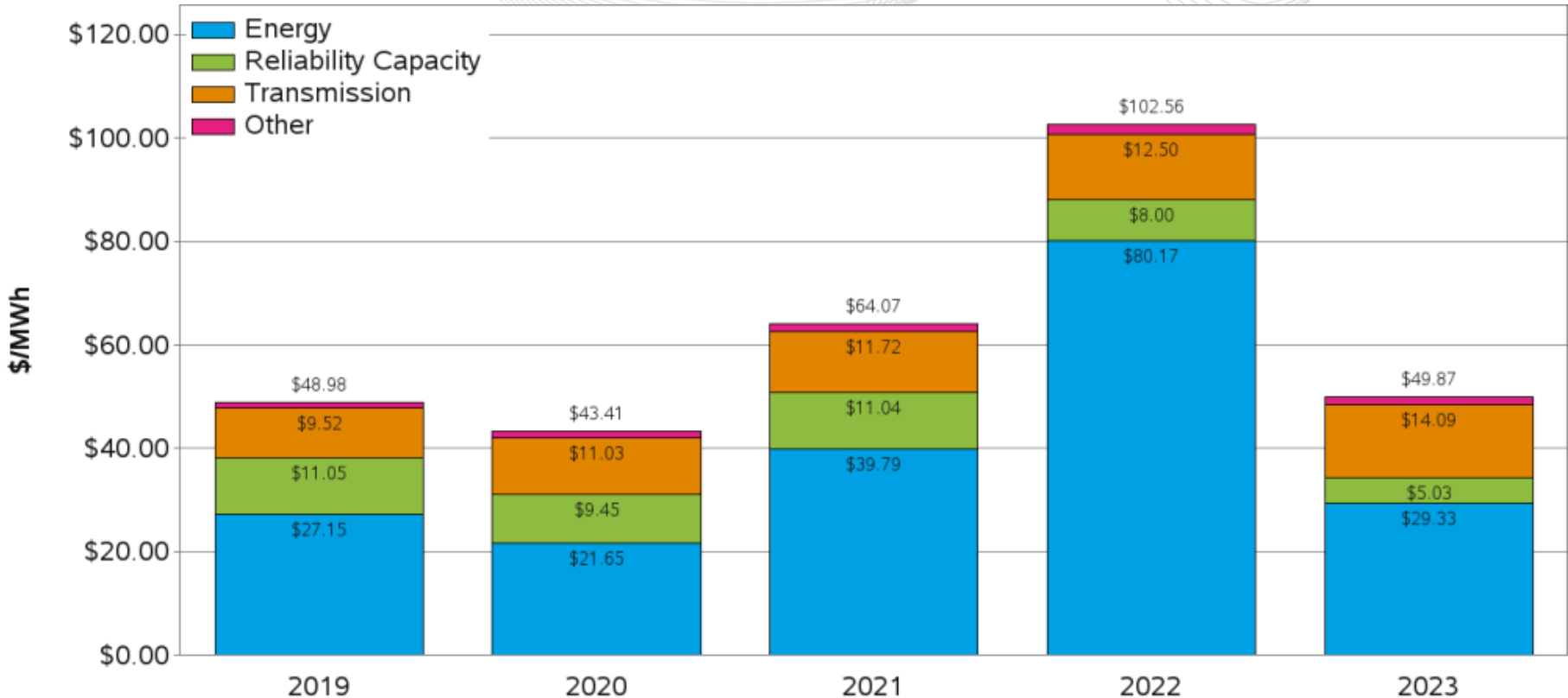
# Markets Report

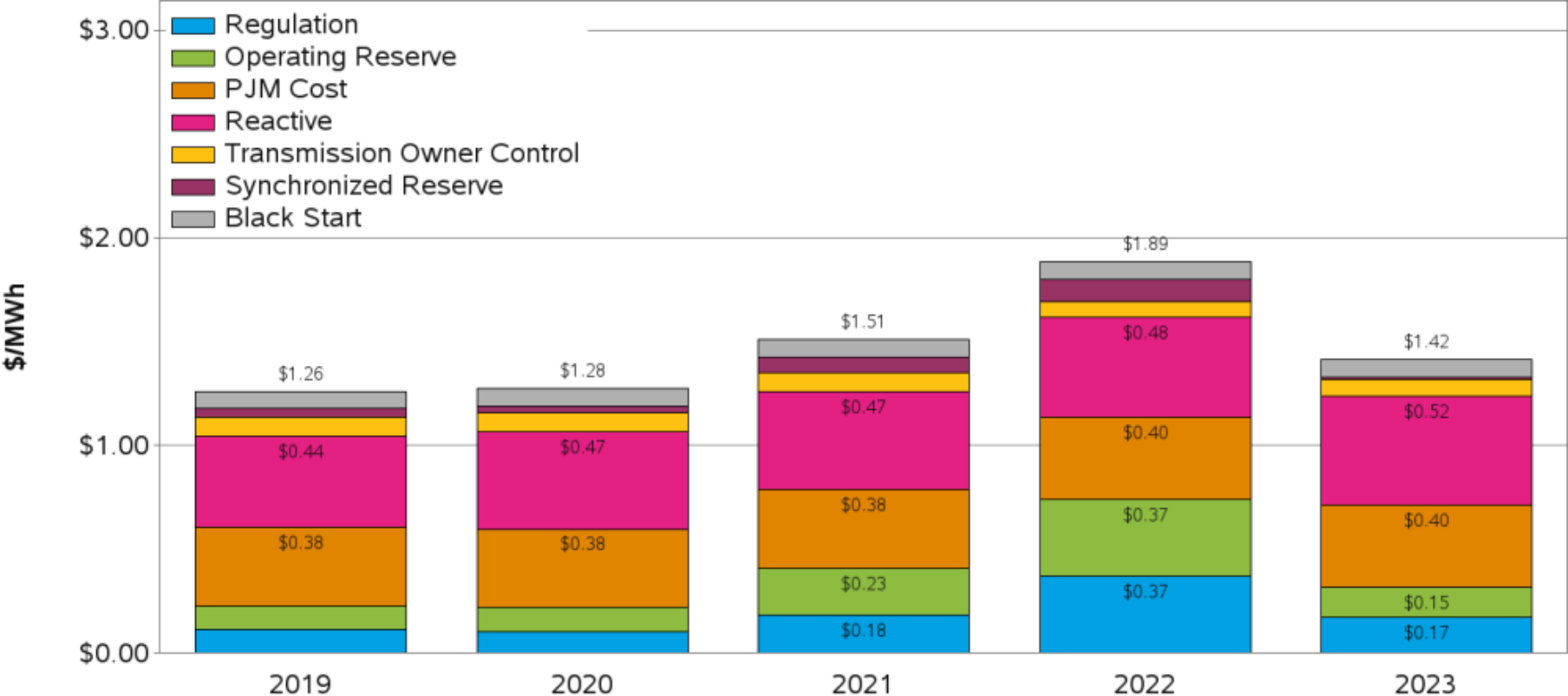
MC Webinar  
July 24, 2023

- PJM Wholesale Cost in 2023 is \$49.87/MWh, down from full-year 2022 costs of \$102.56/MWh. (Slides 5 & 6)
- Slides pertaining to weather conditions, in addition to slides showing average fuel prices, generation on-line fuel mixes, and System Marginal Prices have been combined into a **Market Conditions** section. (Slides 8- 22)
- In June, temperatures were below average for most of the month. Thus, the sum of Heating and Cooling Degree Days was also below its historic average. (Slides 8-10)
- Energy use was also below its historic average for June. (Slides 8-10)
- In June, uplift exceeded \$800,000 on one day. (Slides 25 & 26)

- Load-weighted average LMP for 2023 is \$29.33/MWh: (Slides 34-36)
  - June 2023 was \$27.10/MWh, which is much lower than June 2022 (\$97.90/MWh) and also lower than June 2021 (\$34.10/MWh).
- There were no 5-minute intervals that experienced shortage pricing in June. (Slides 33, Report Appendix)
- FTR revenue adequacy for the month of June is 100% and the 2023-2024 Planning Year is currently funded at 100%. (Slides 51-54)
- Congestion values have been trending lower in 2023 as compared to 2022. (Slide 52)
- Regulation and Synchronized Reserve market costs have generally tracked with energy prices over time. (Slides 68-70)

# Markets Report



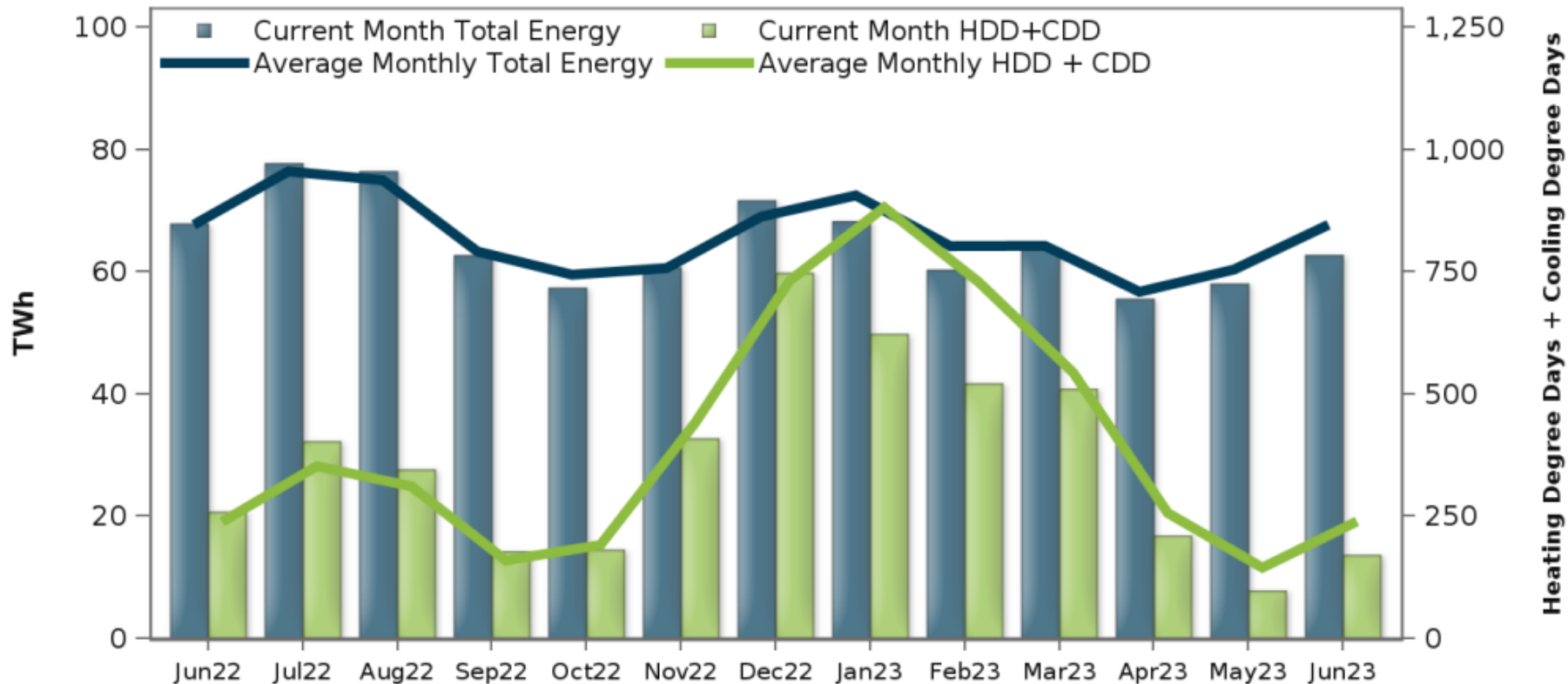


# Market Conditions

- The weather parameter shown in the following slide is a monthly sum of daily Heating Degree Days (HDD) and Cooling Degree Days (CDD).
- Degree days represent a deviation from a baseline temperature, in this case 60 degrees for HDD and 65 degrees for CDD. As temperatures get more extreme, colder or hotter, either HDDs or CDDs, respectively, will increase.
- Typically, winter months will only record HDDs, while summer months will only record CDDs. Shoulder months may have both HDDs and CDDs.
- Degree Days are calculated using a daily load weighting that weights values from stations in each TO zone according to the zonal contribution to the RTO peak on that day.
- Average values use data from 1998 to the most recent complete year, in this case, 2022. Averages include load data for all of TO zones in the current RTO footprint.

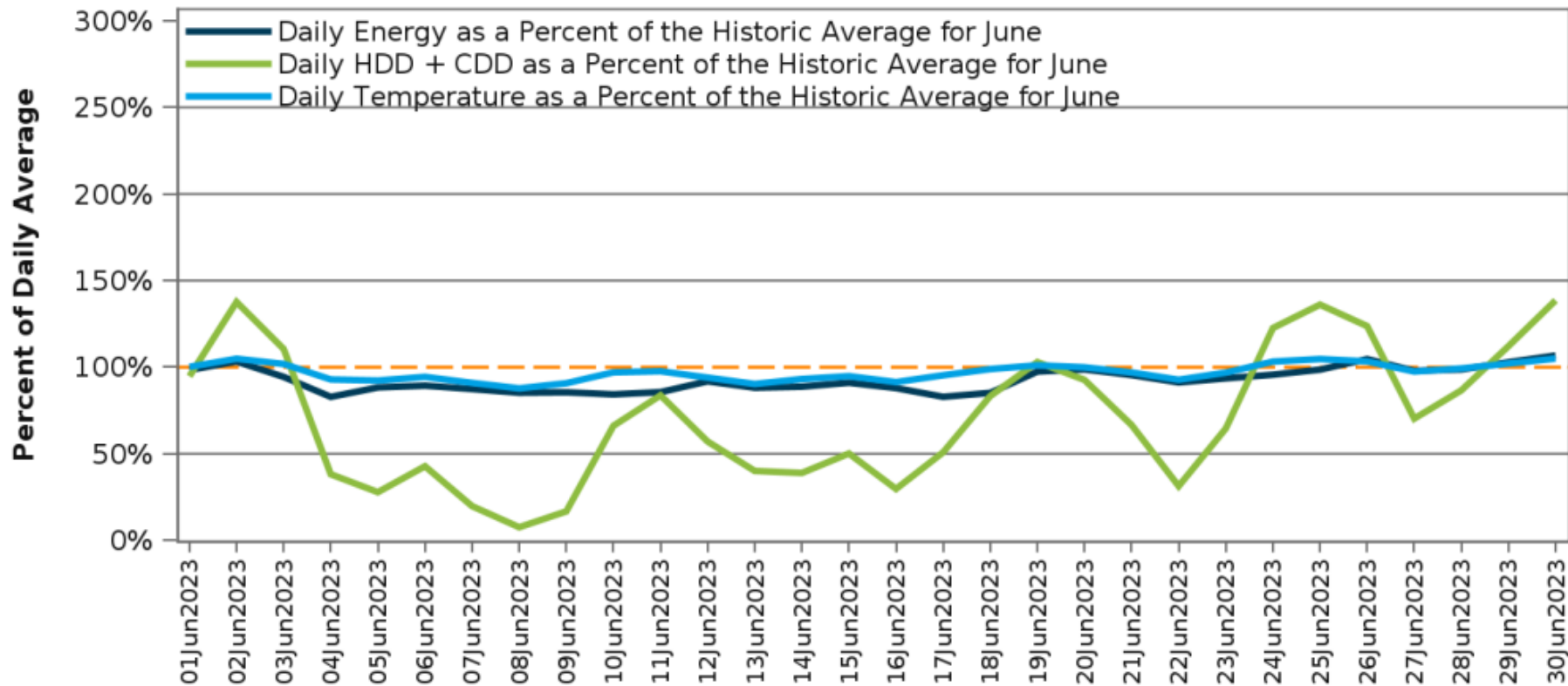


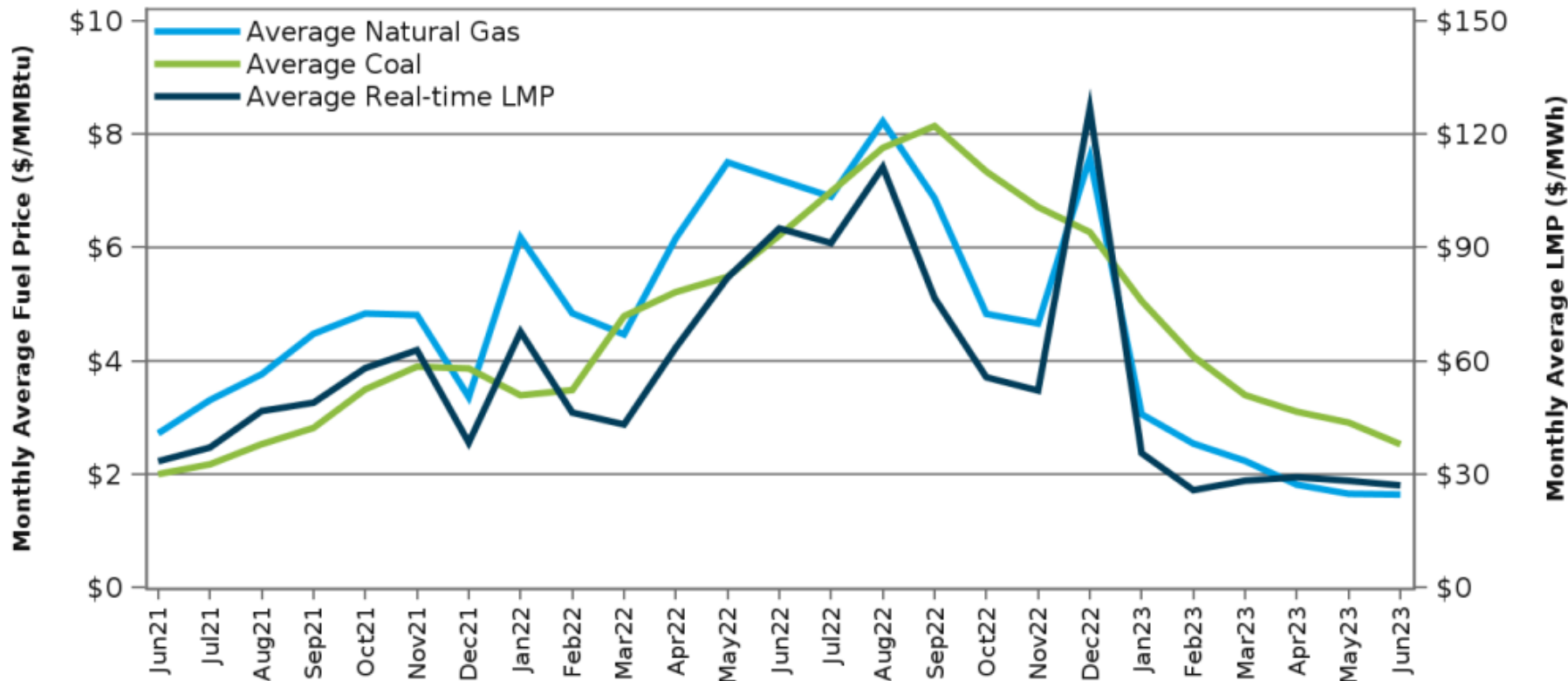
# Historic Average Weather and Energy versus Current Month



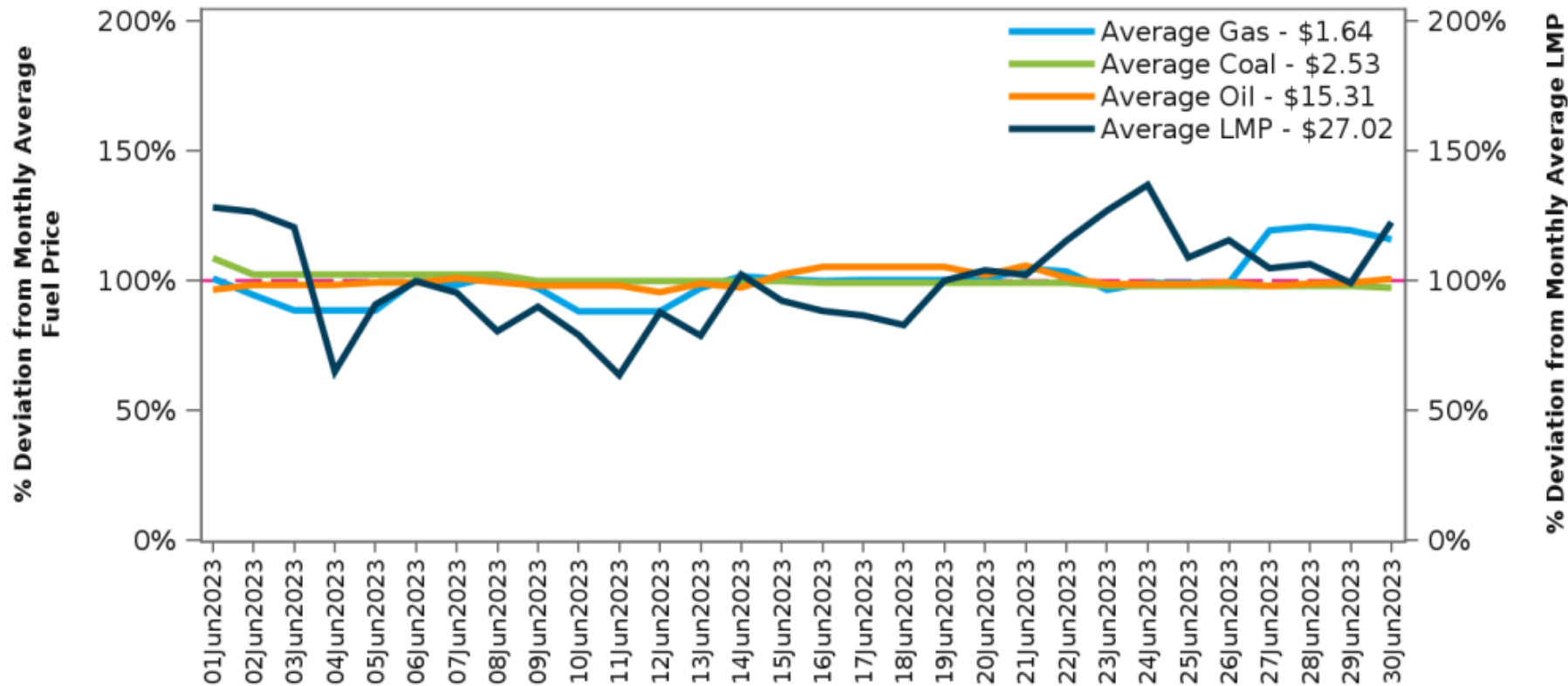


# Historic Average Weather and Energy versus Current Month - Daily





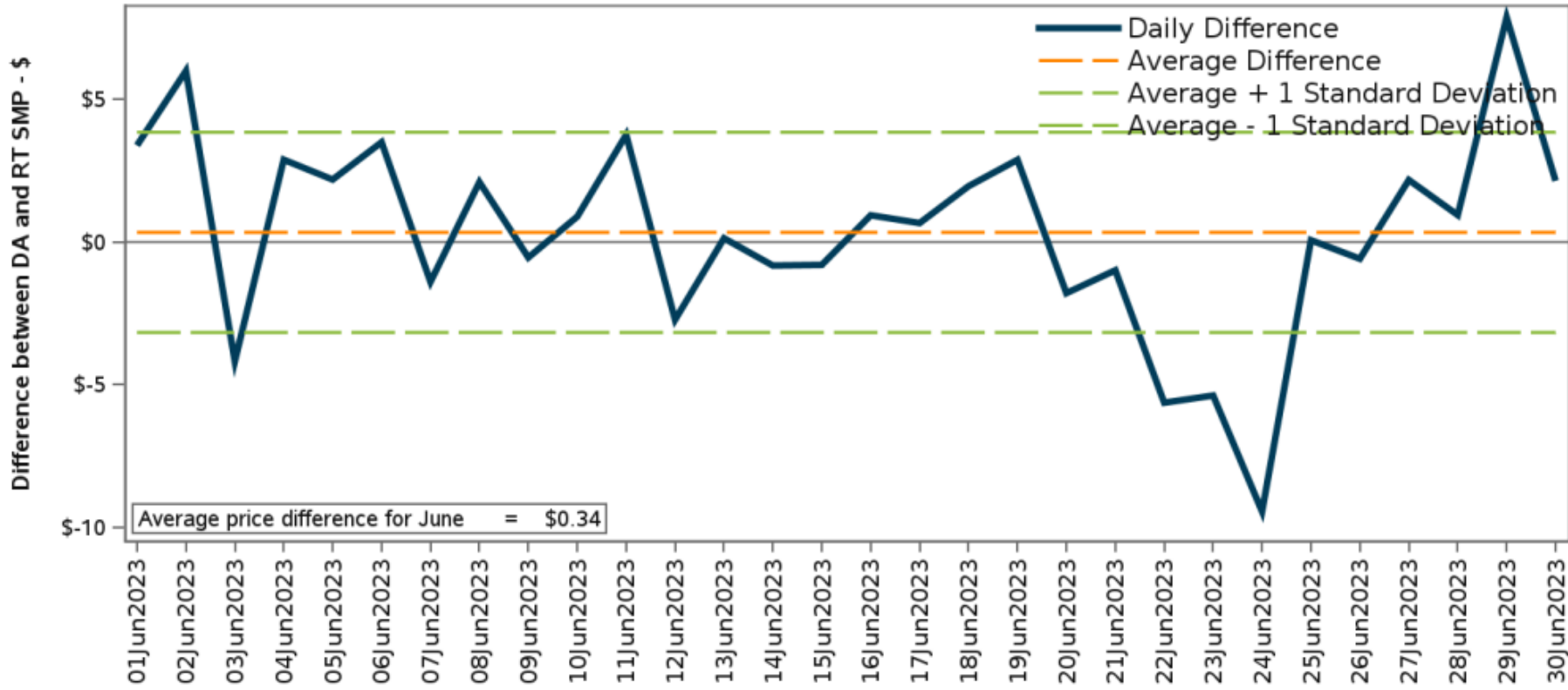
Fuel Price Source: S&P Global Platts



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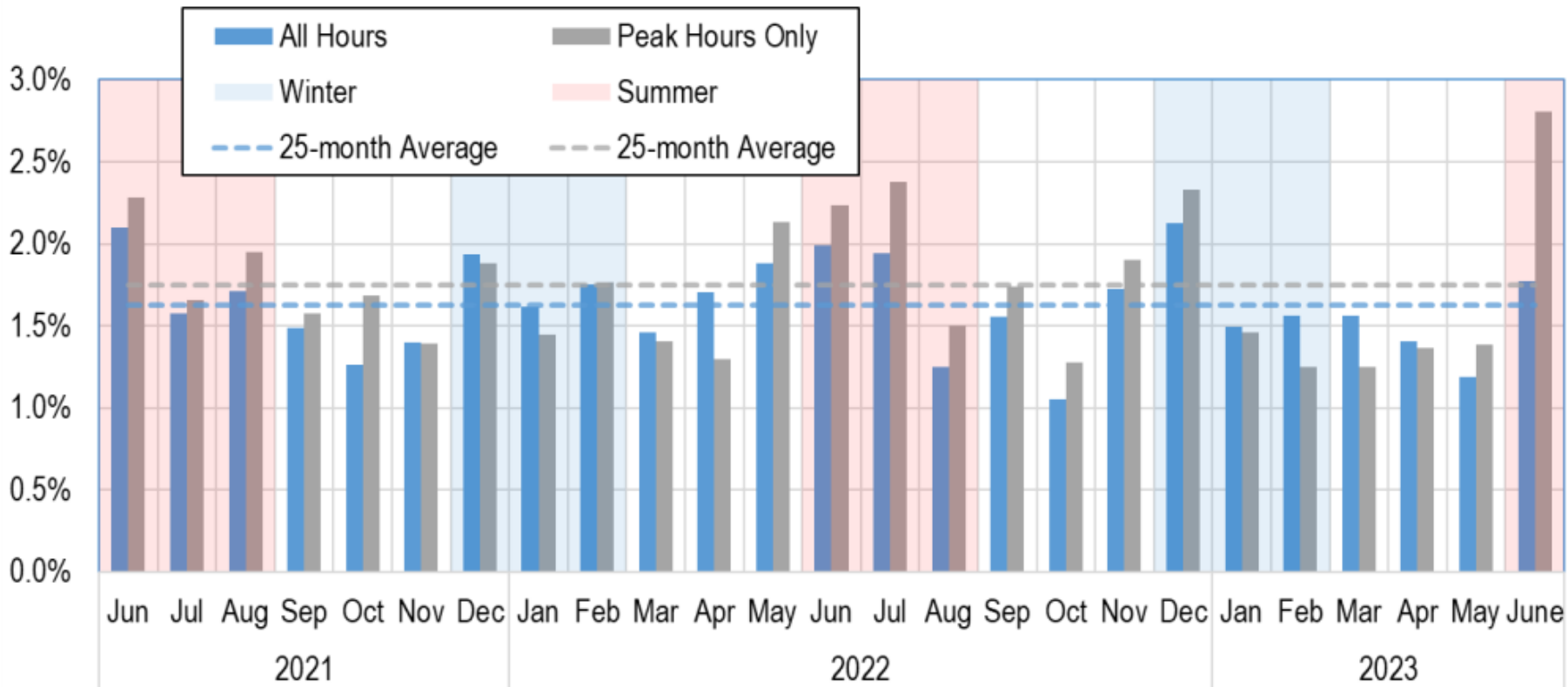


# Daily Difference Between Day-Ahead and Real-Time System Marginal Prices

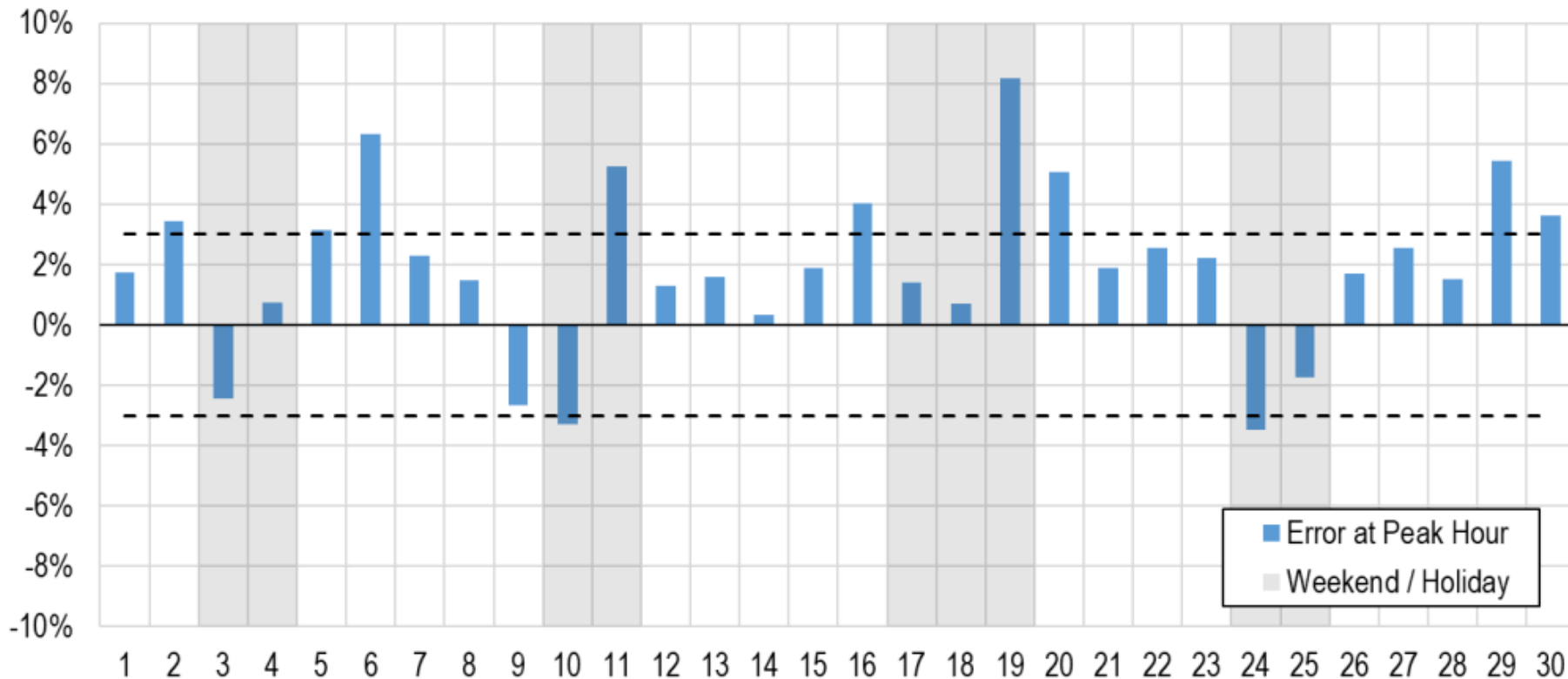


Positive values represent days when the DA daily average price was higher than RT. Negative values represent days when the DA price was lower.

# Load Forecast Error - Monthly Absolute Error, 10:00 Forecast



# Load Forecast Error - June Daily Peaks, 10:00 Forecast



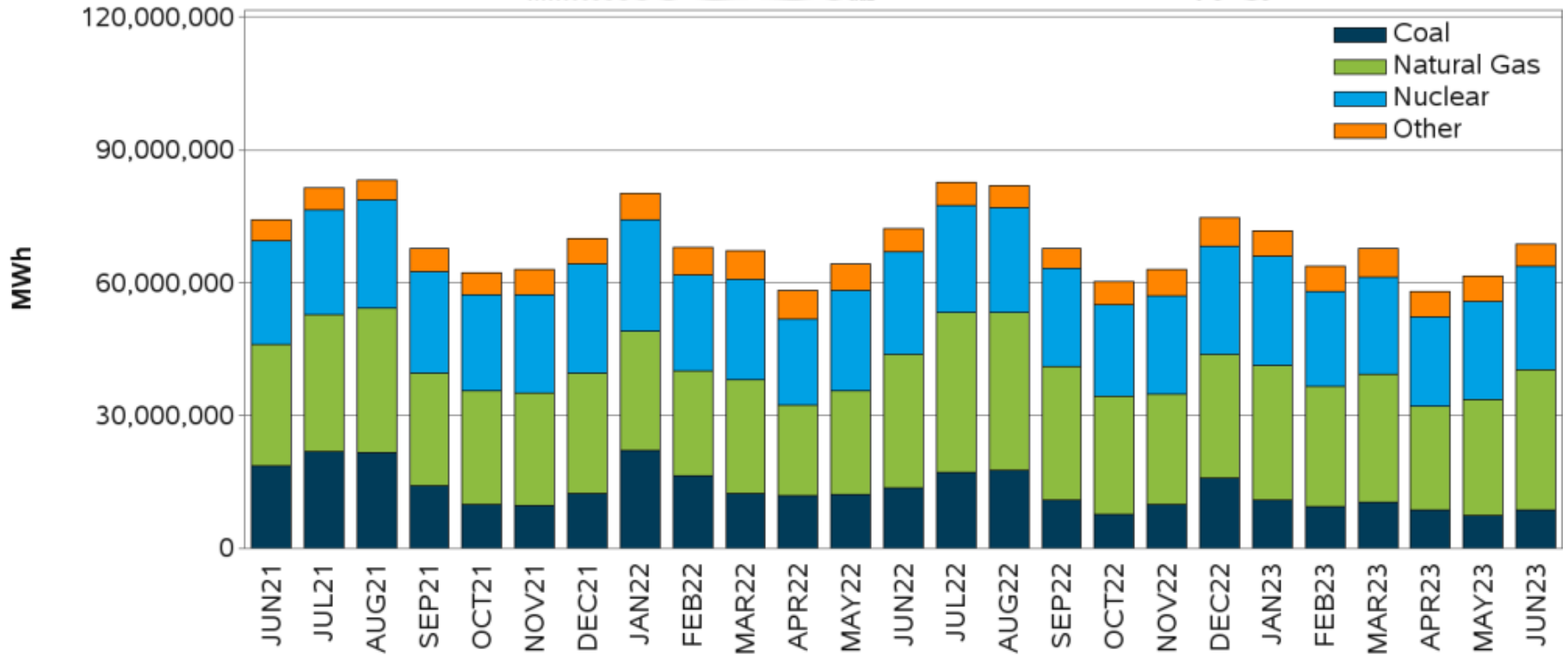
- PJM prepares a day-ahead load forecast at 10:00 am for use by our members.
- This forecast is not used to clear the day-ahead market and is not utilized for the reliability tools that run subsequent to the day-ahead market.

For the most part, barring two days, days in which error which exceeded 3% saw over-forecast load. These conditions were due to a combination of factors throughout the month:

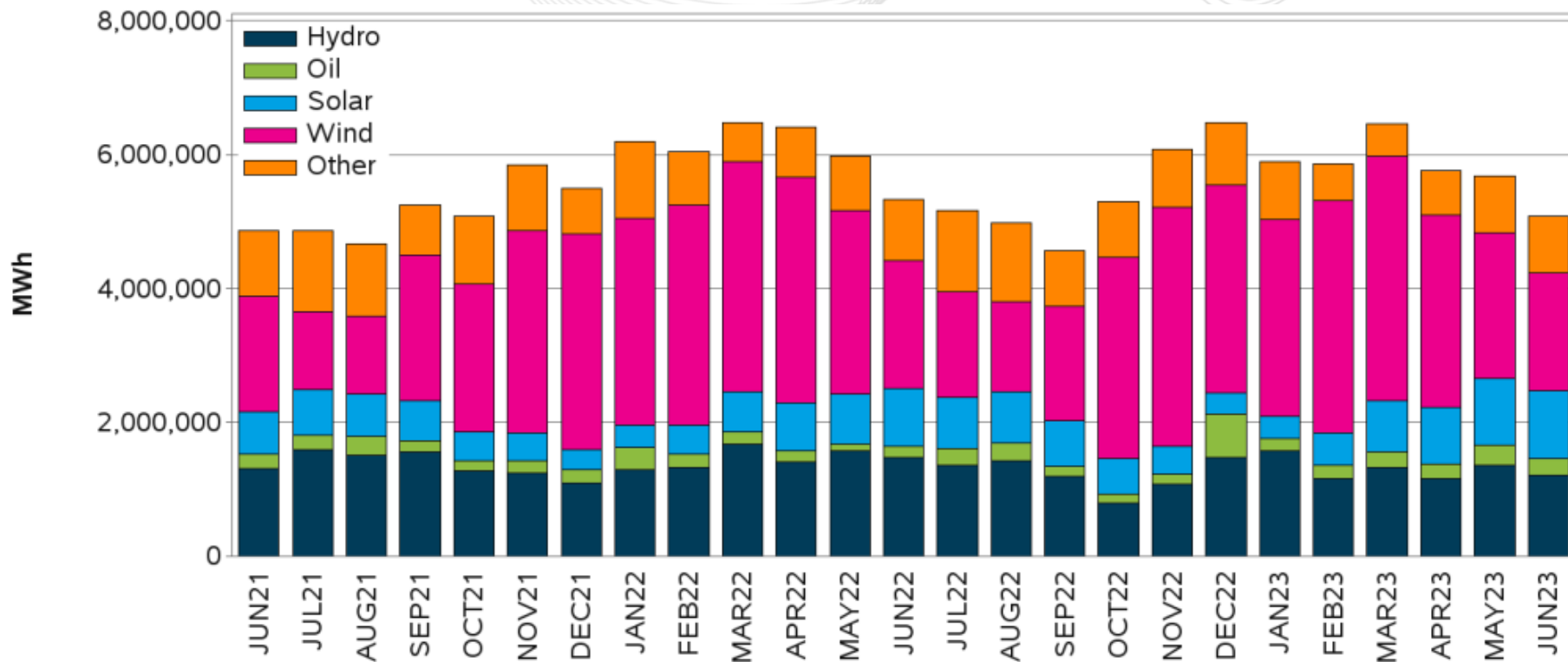
- smoke impacting and limiting temperatures from reaching their forecast high and leading to over-forecast model output
- scattered showers and thunderstorms in a less predictable weather pattern
- holiday influence and post-holiday impacts (June 19 and June 20) and being conservative with the load forecast after analysis of historical data

In the two cases, June 2 and June 24, under-forecasting was observed due to model error rooted in unusually warm temperatures; for some regions, the observed temperatures came in higher than forecast temperatures, and for other regions, load models struggled to solve for the high temperatures, leading to under-forecasting. It is also important to note that one day, June 2, temperatures ended up being the highest load of the year for that point in time.

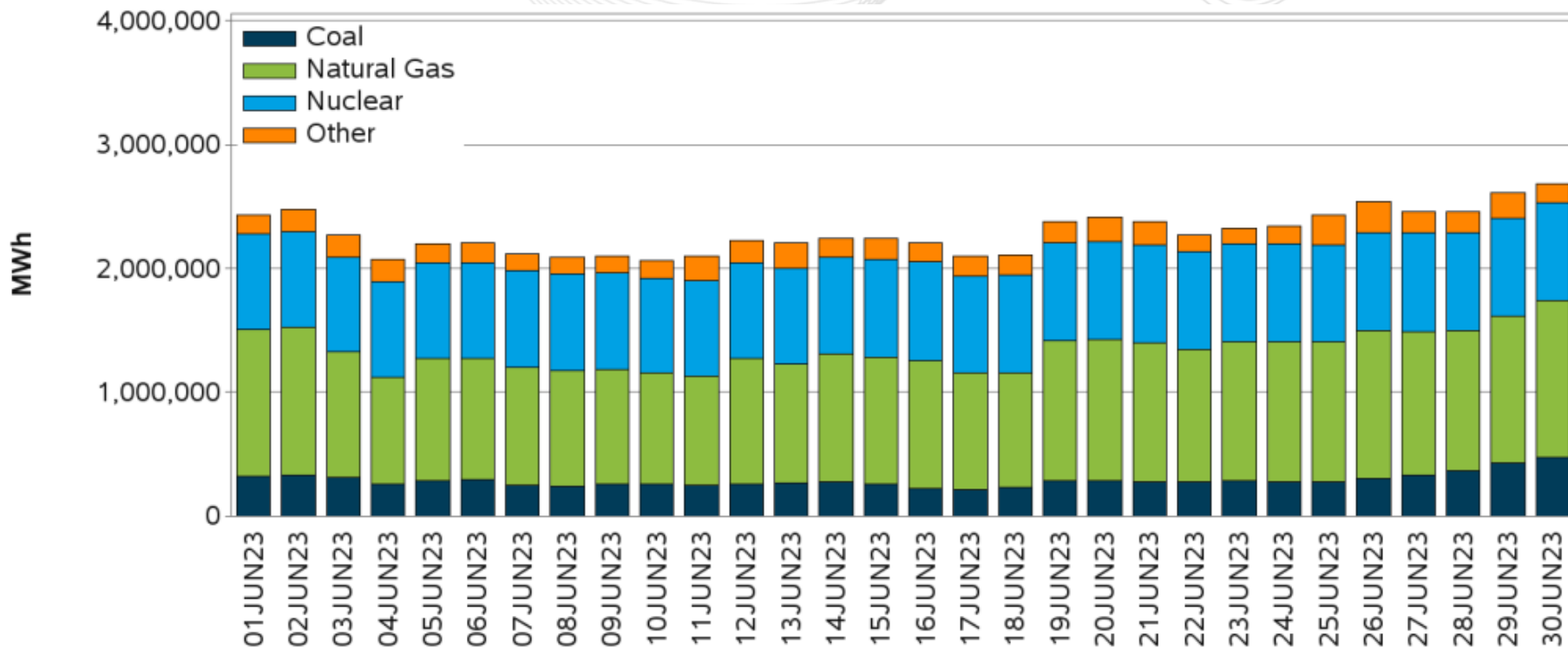




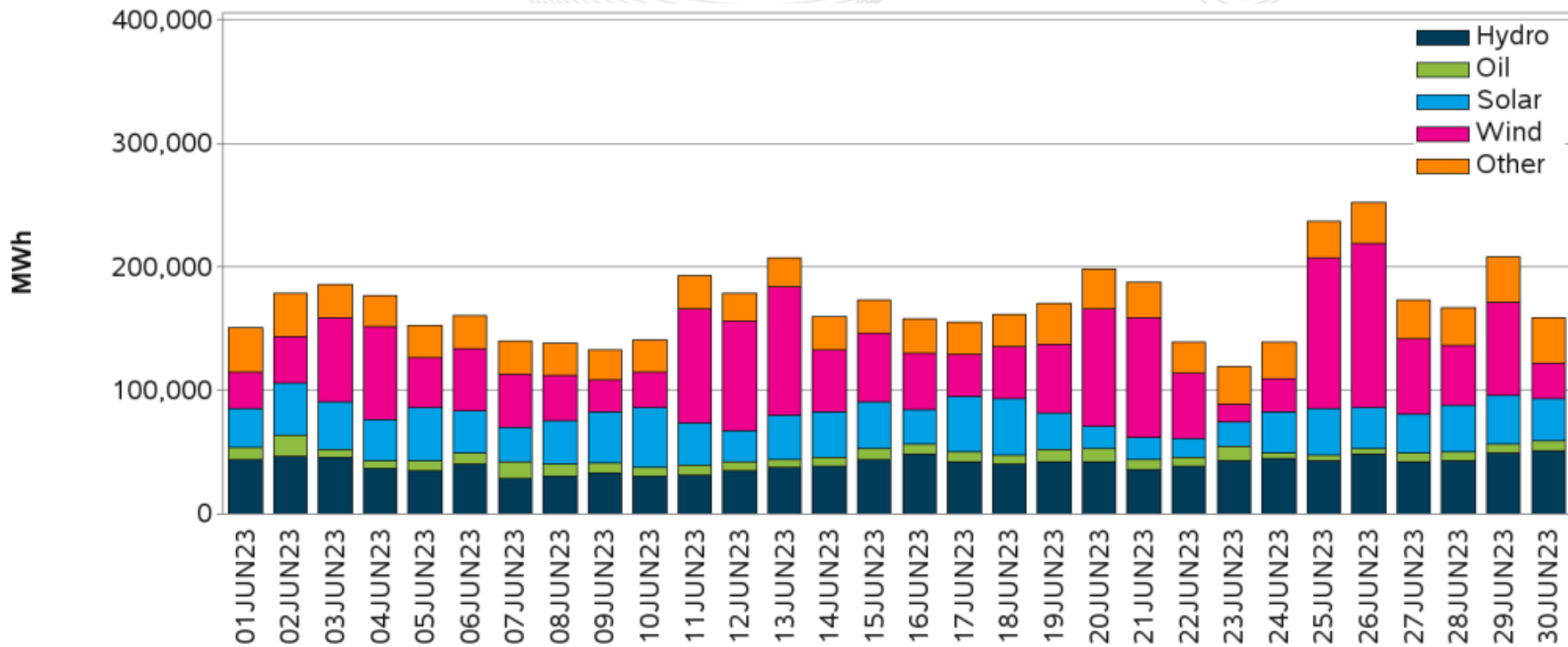
\*Other\* includes Hydro, Oil, Solar, Wind, and Other



'Other' includes Flywheels, Multiple Fuels, Storage, and Other Renewables

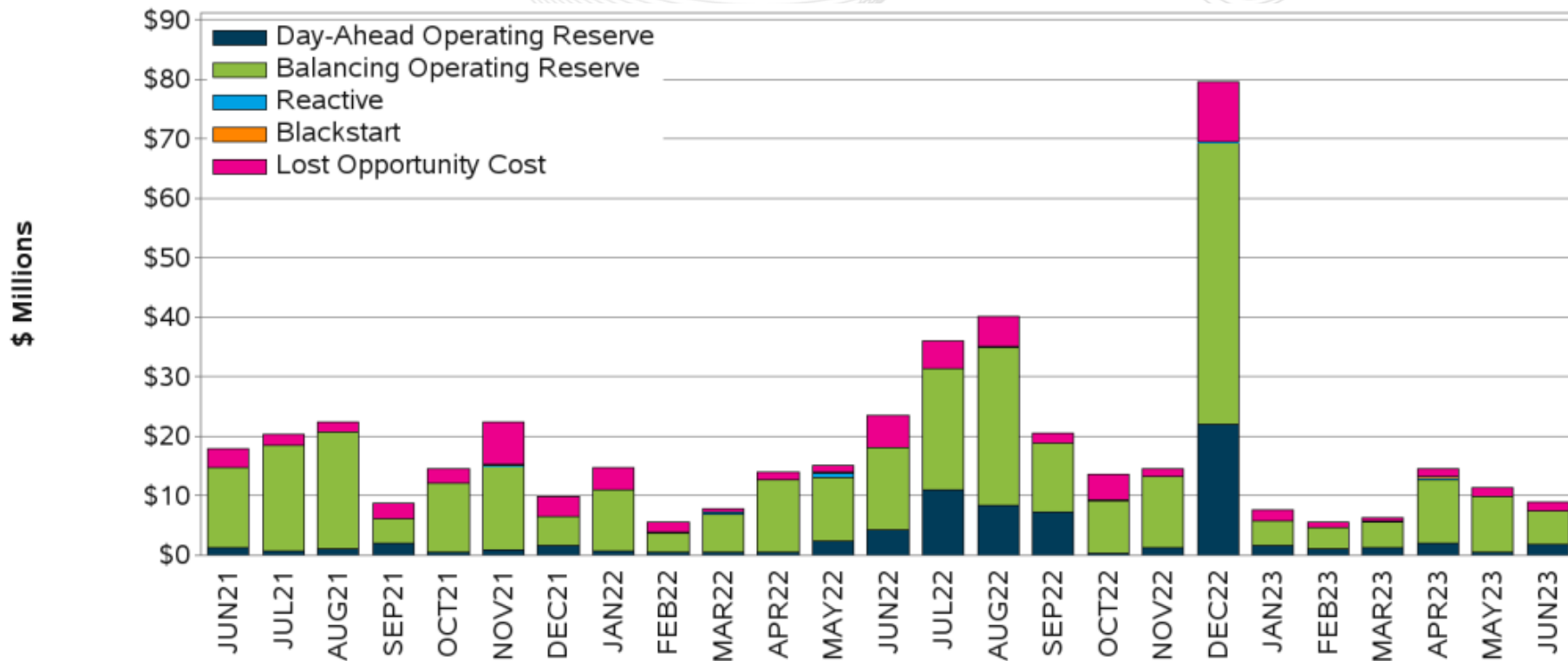


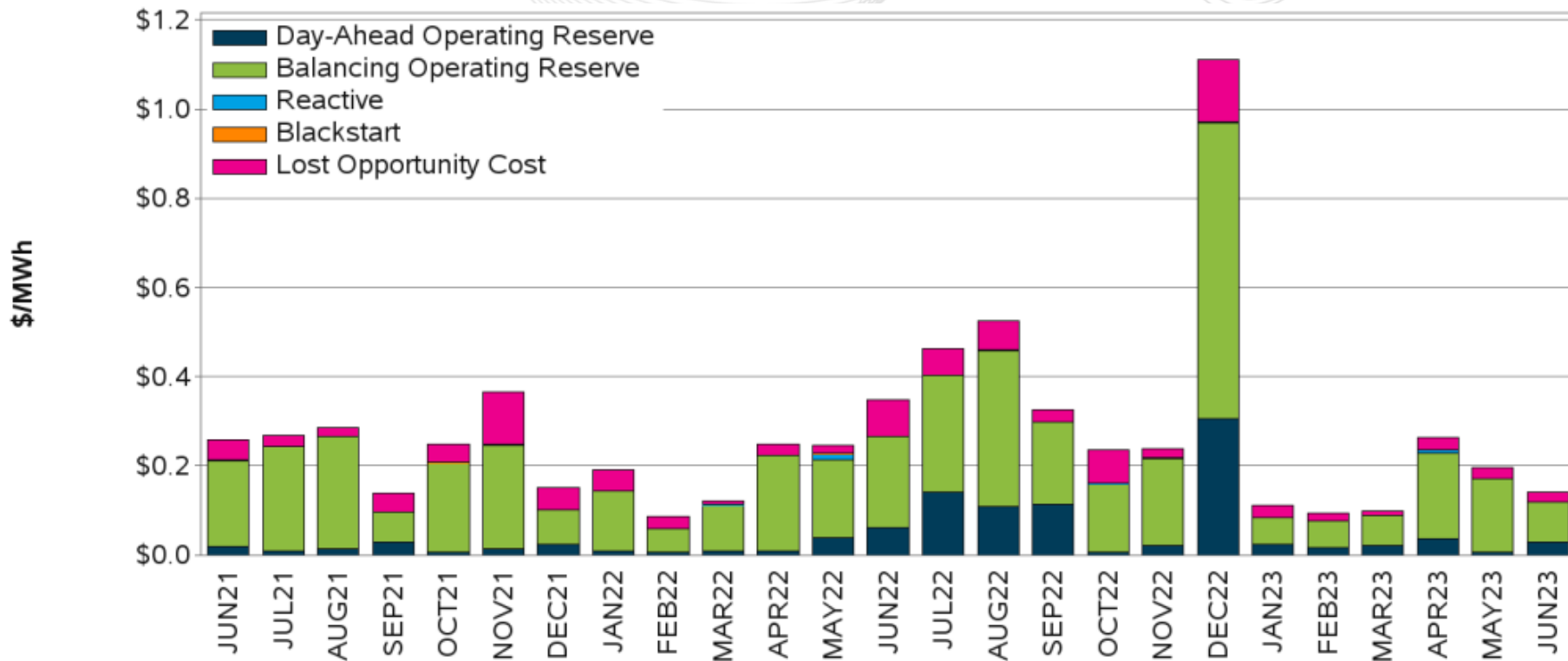
\*Other\* includes Hydro, Oil, Solar, Wind, and Other

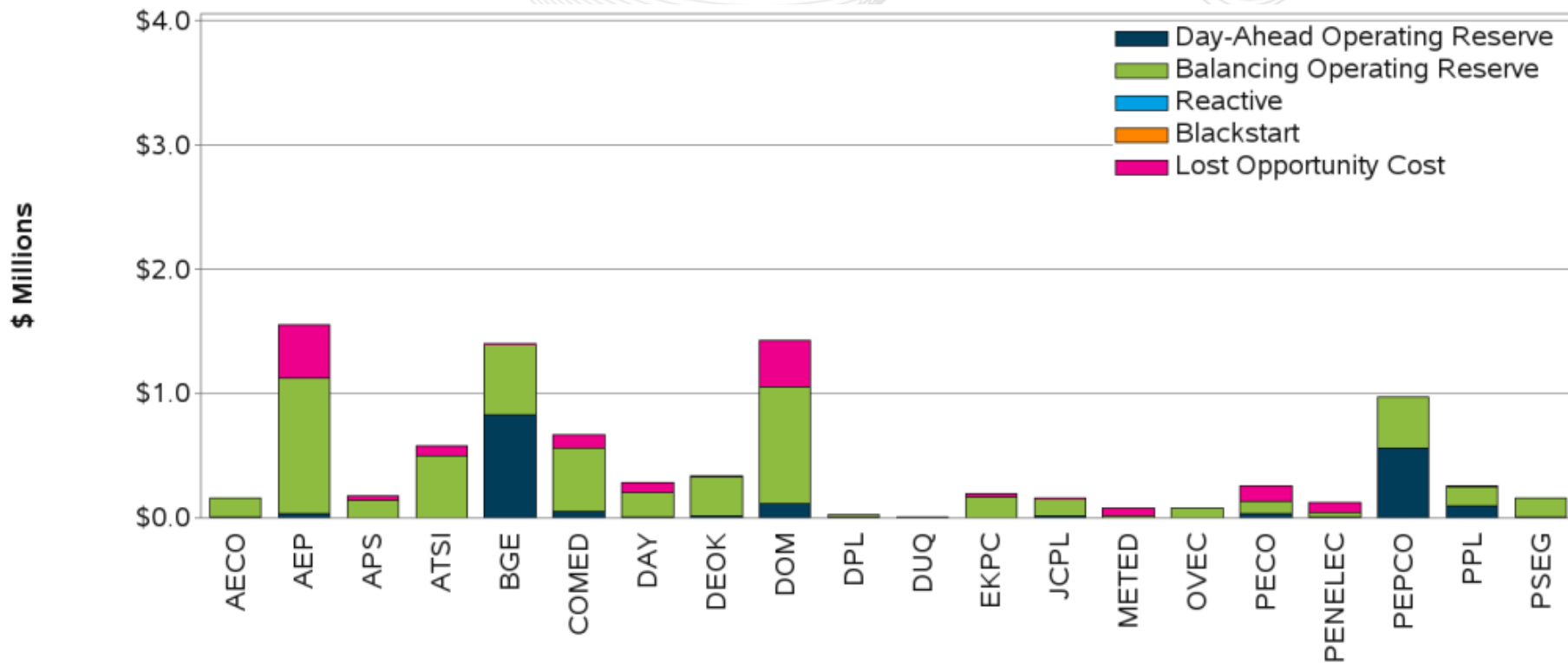


'Other' includes Flywheels, Multiple Fuels, Storage, and Other Renewables

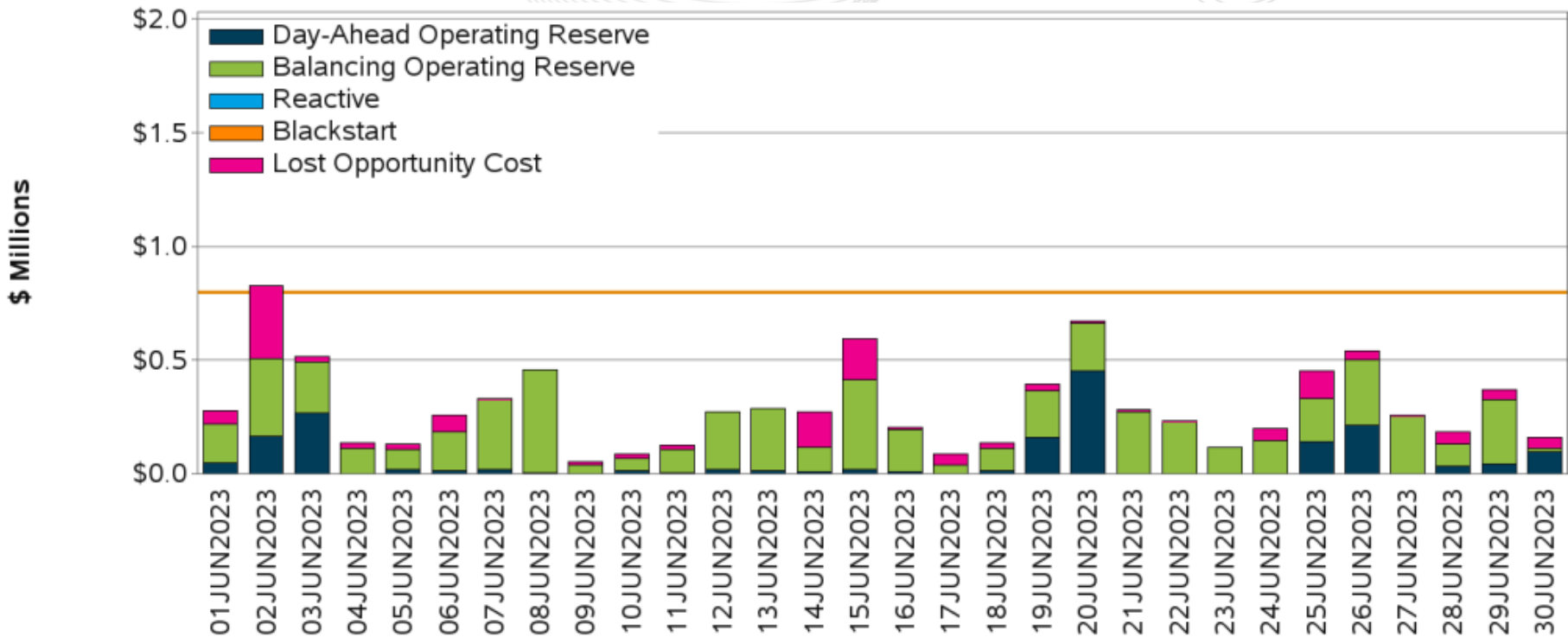
# Operating Reserve (Uplift)



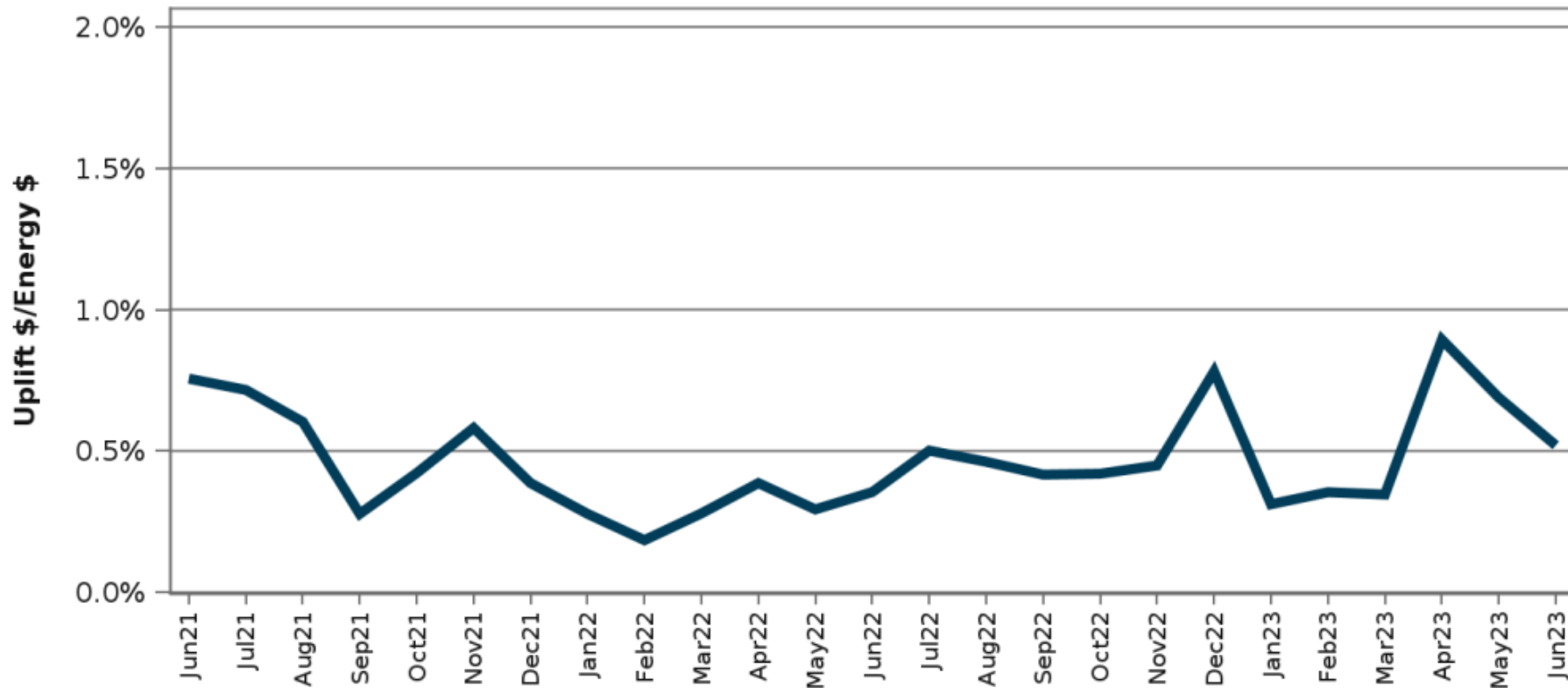




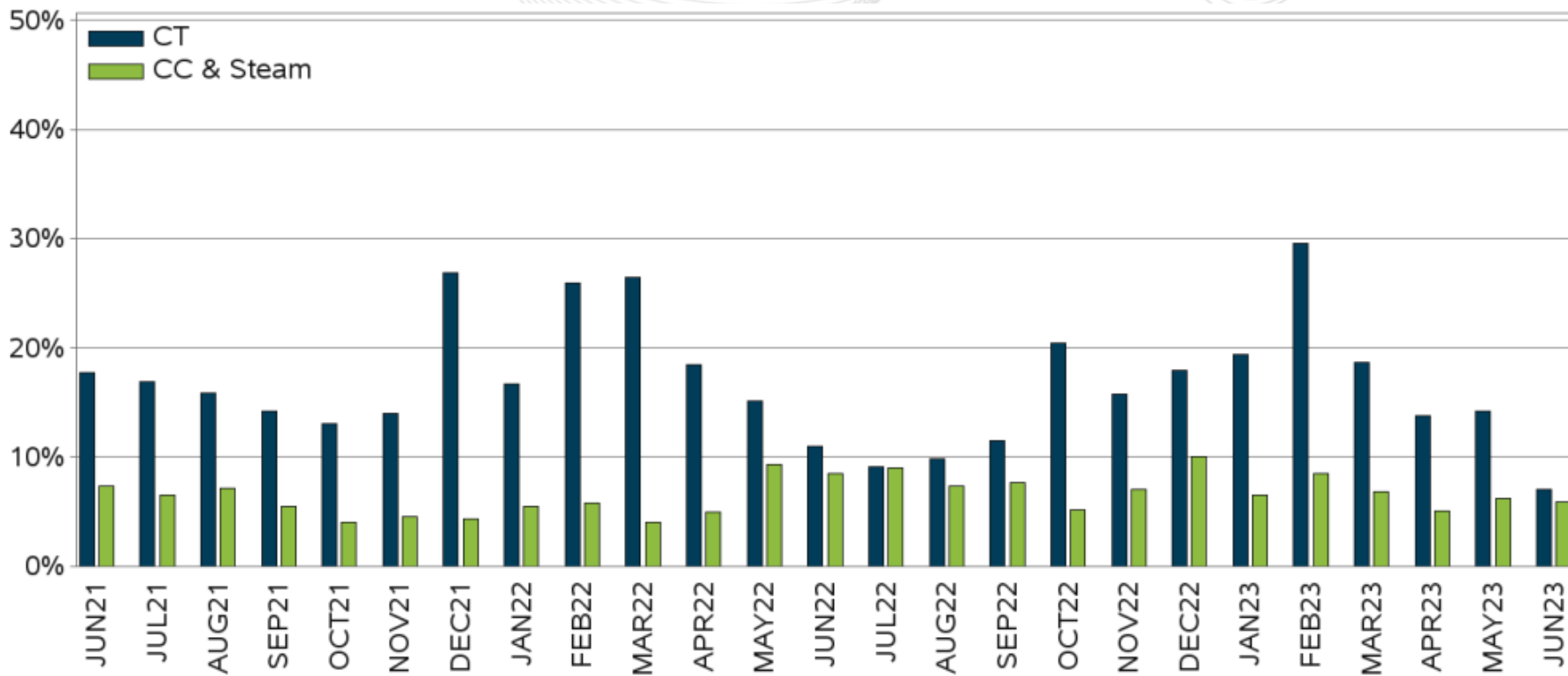




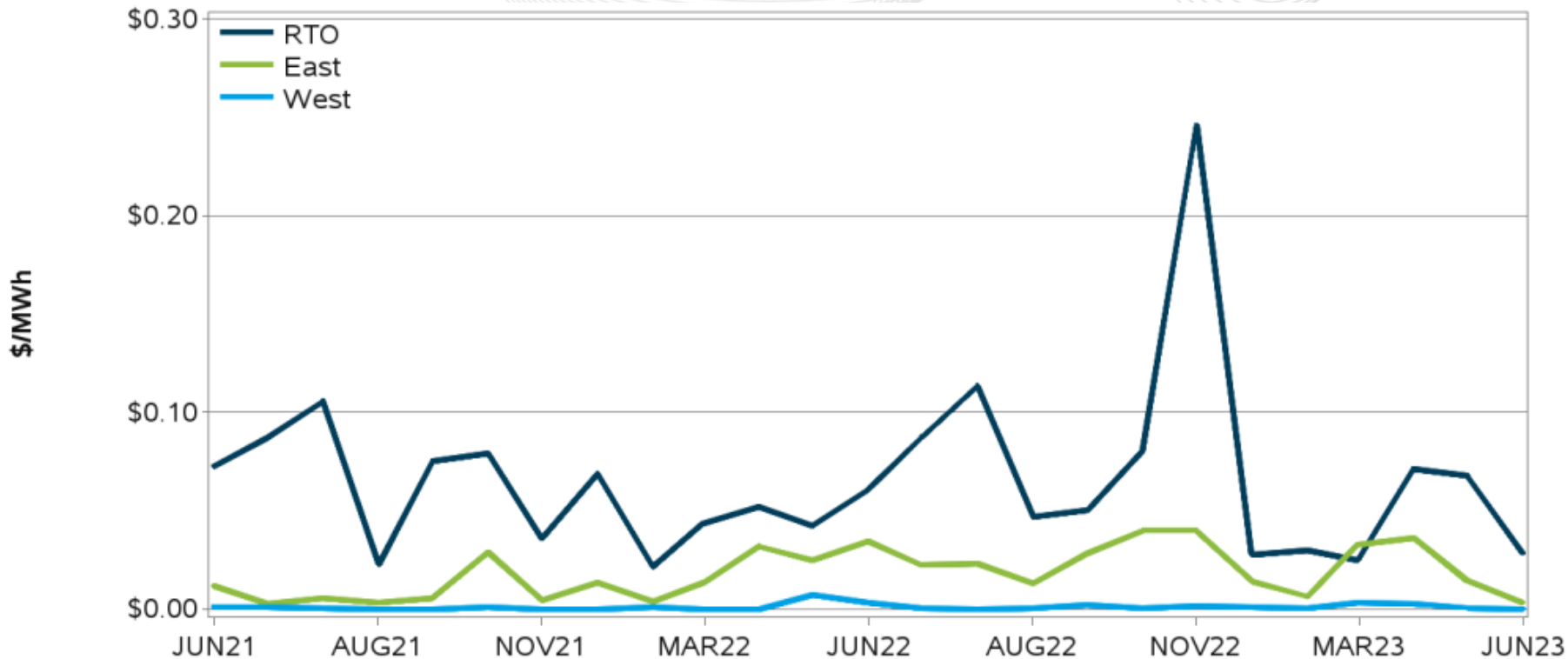
- In June, uplift exceeded \$800,000 on one day -
- **Contributing factors to uplift were:**  
    **Constraint control, localized congestion, and reactive support**
- More information on Uplift can be found on the PJM website at [Drivers of Uplift](#)



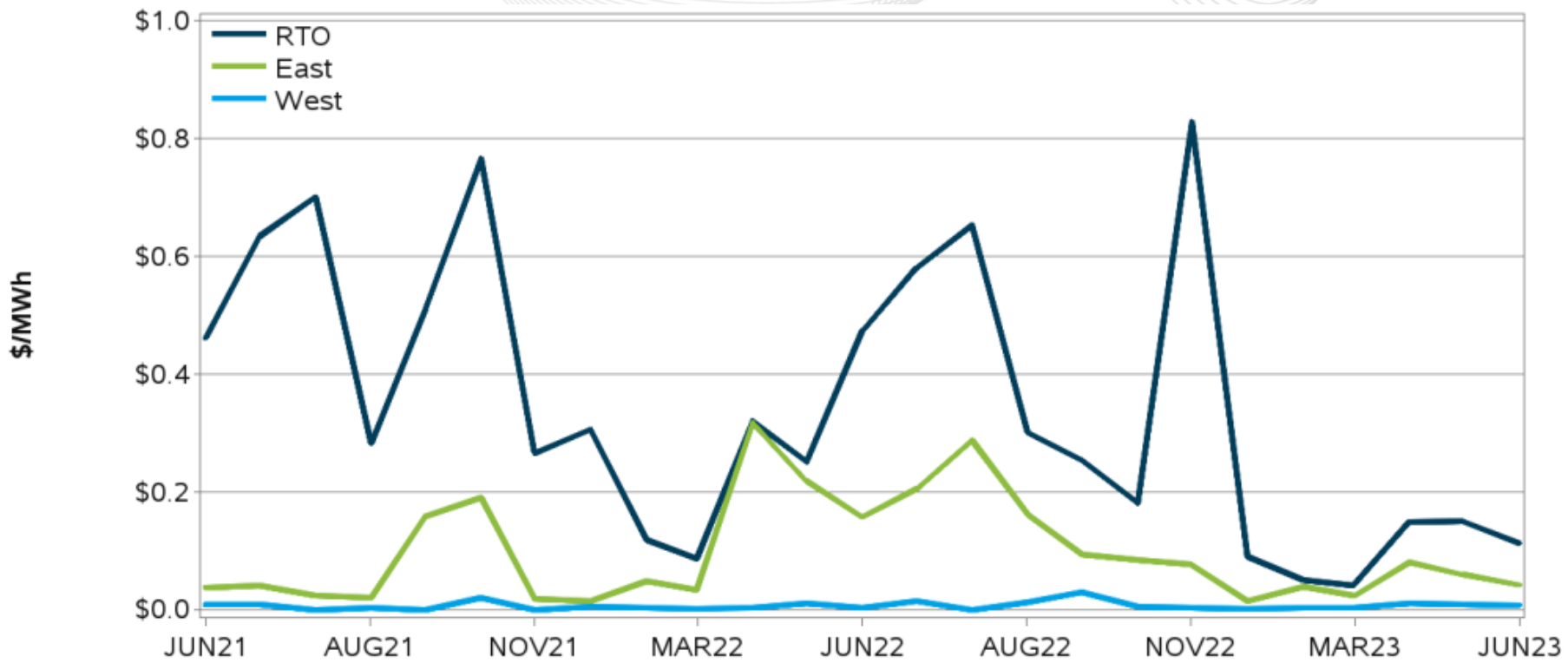
# Percent of Total CT, CC and Steam Hours with LMP < Offer



- Beginning in December 2008, the daily Balancing Operating Reserves (BOR) rate was replaced with six different BOR rates: RTO BOR for Reliability Rate, RTO BOR for Deviations Rate, East BOR for Reliability Rate, East BOR for Deviations Rate, West BOR for Reliability Rate, West BOR for Deviations Rate.
- Reliability rates are charged to all real-time load and exports, whereas deviation rates, as before, are charged only to real-time deviations. RTO rates are charged to the whole footprint, whereas East and West rate adders are charged based on location.

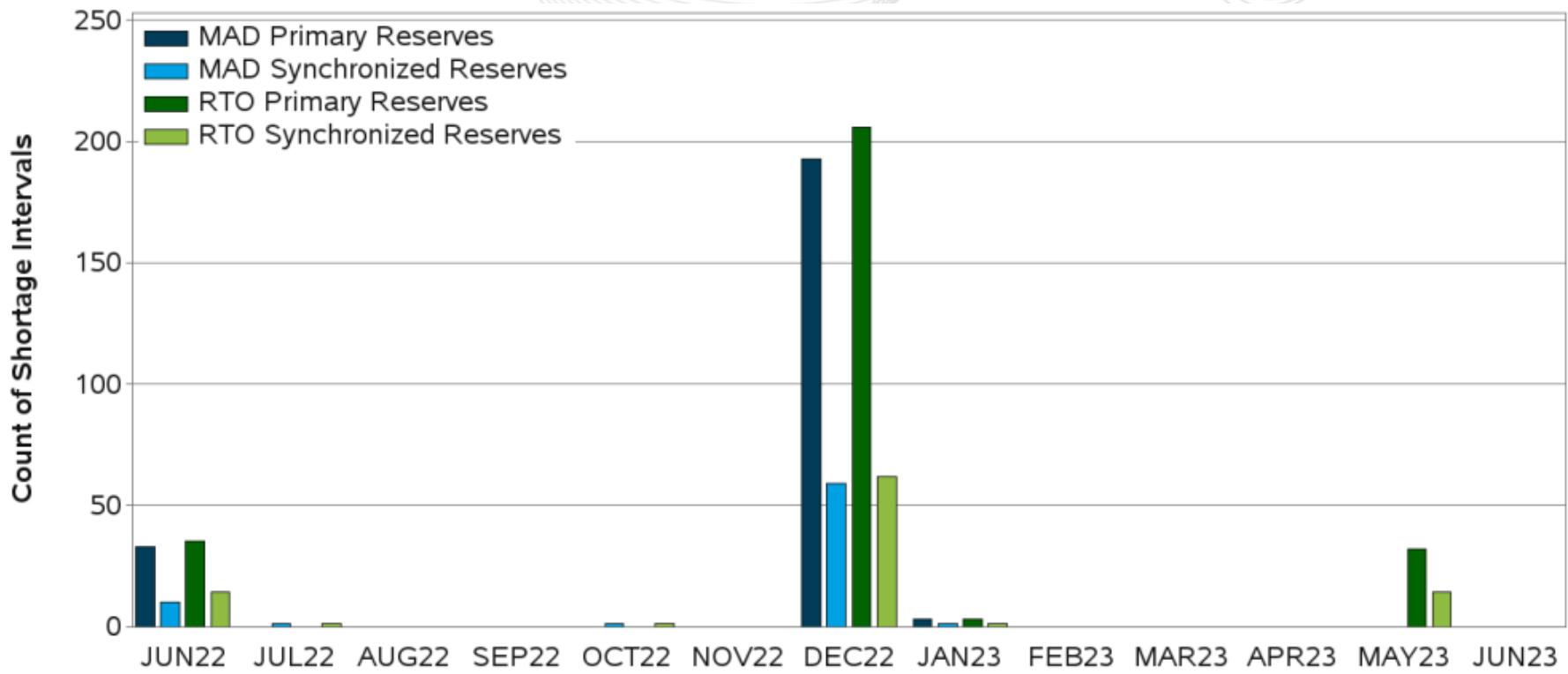


# Deviations Balancing Operating Reserve Rates



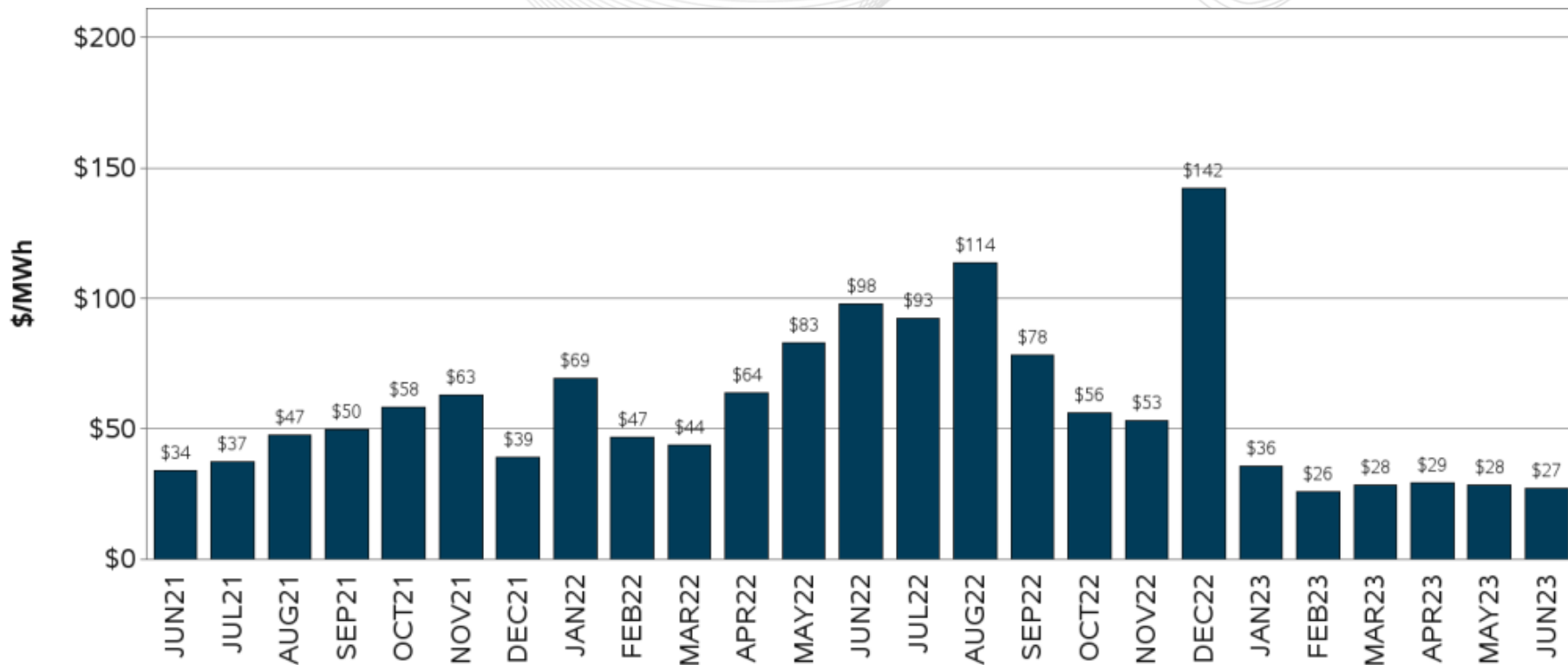
# Energy Market LMP Summary



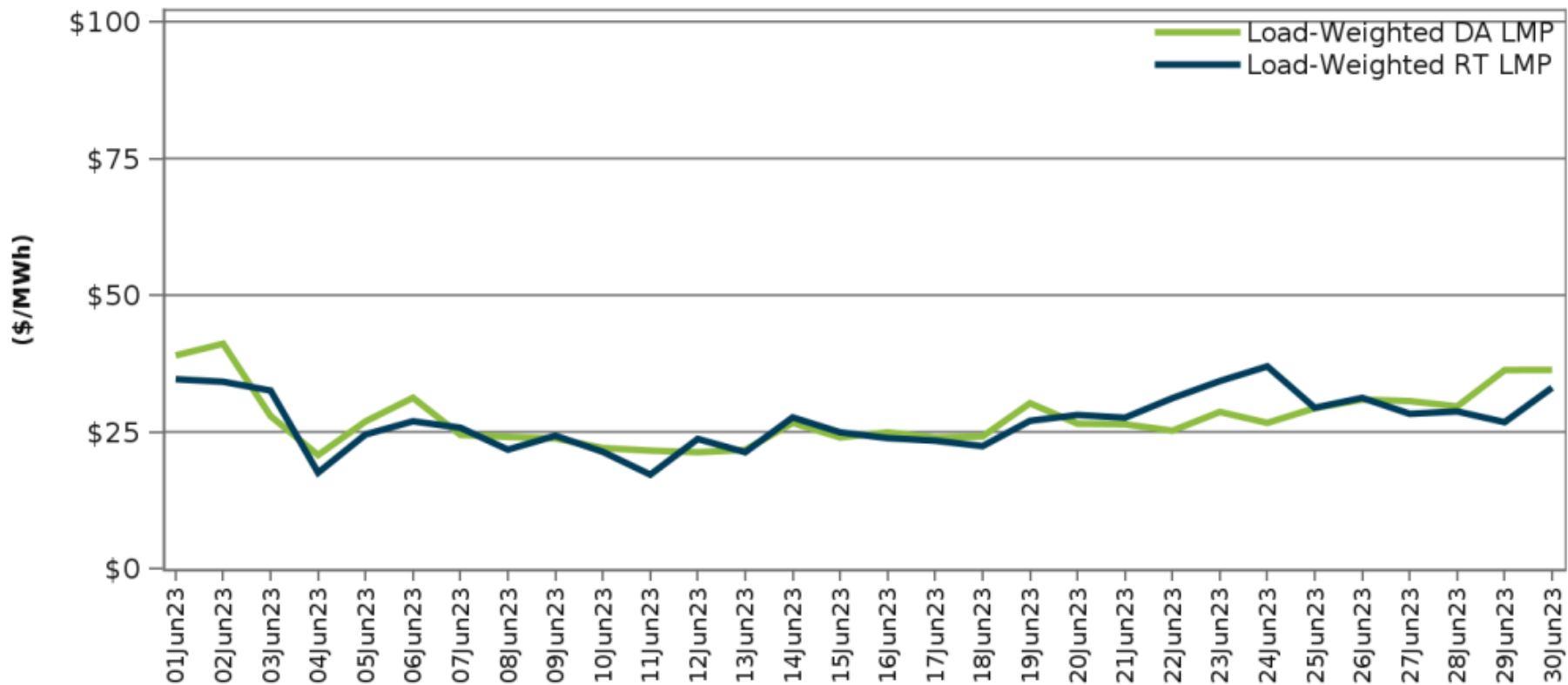


[Information on constraints and shadow prices can be found here](#)

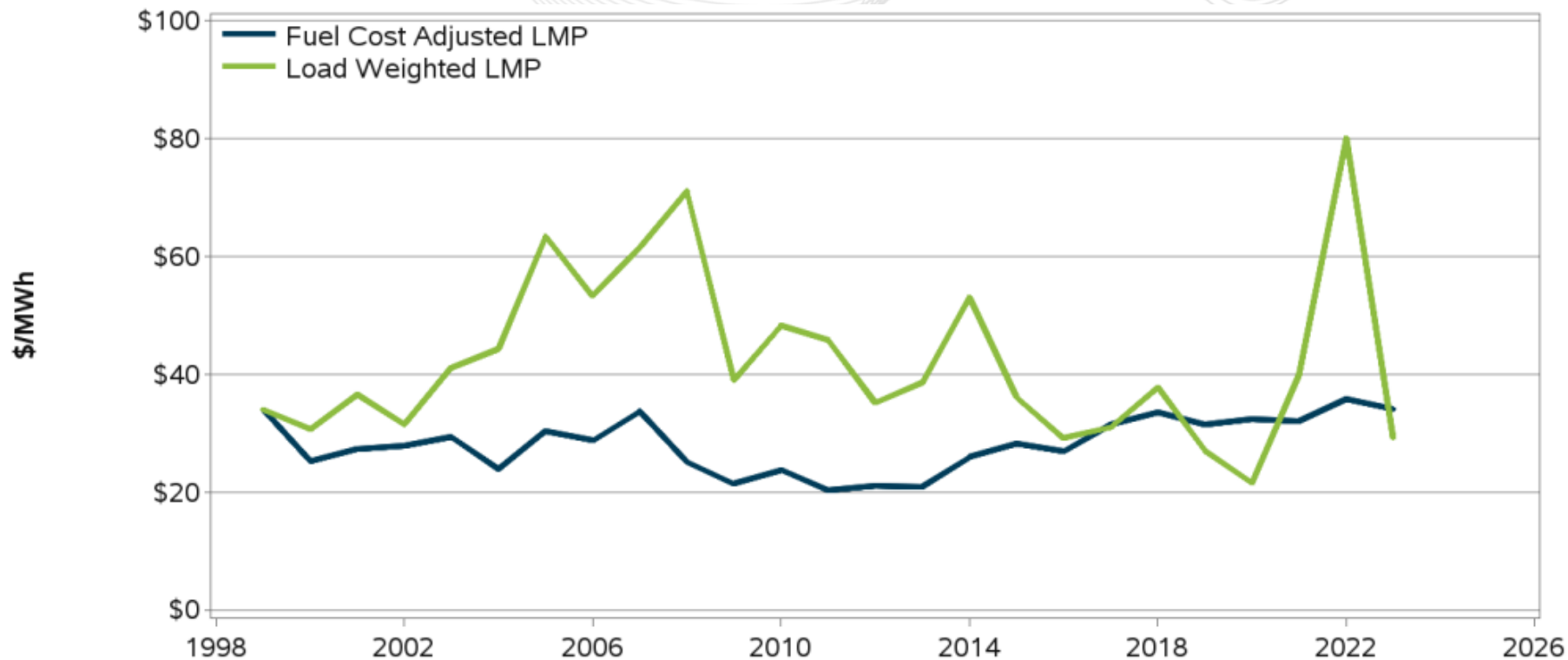
# Monthly Load-Weighted Average Real-time LMP

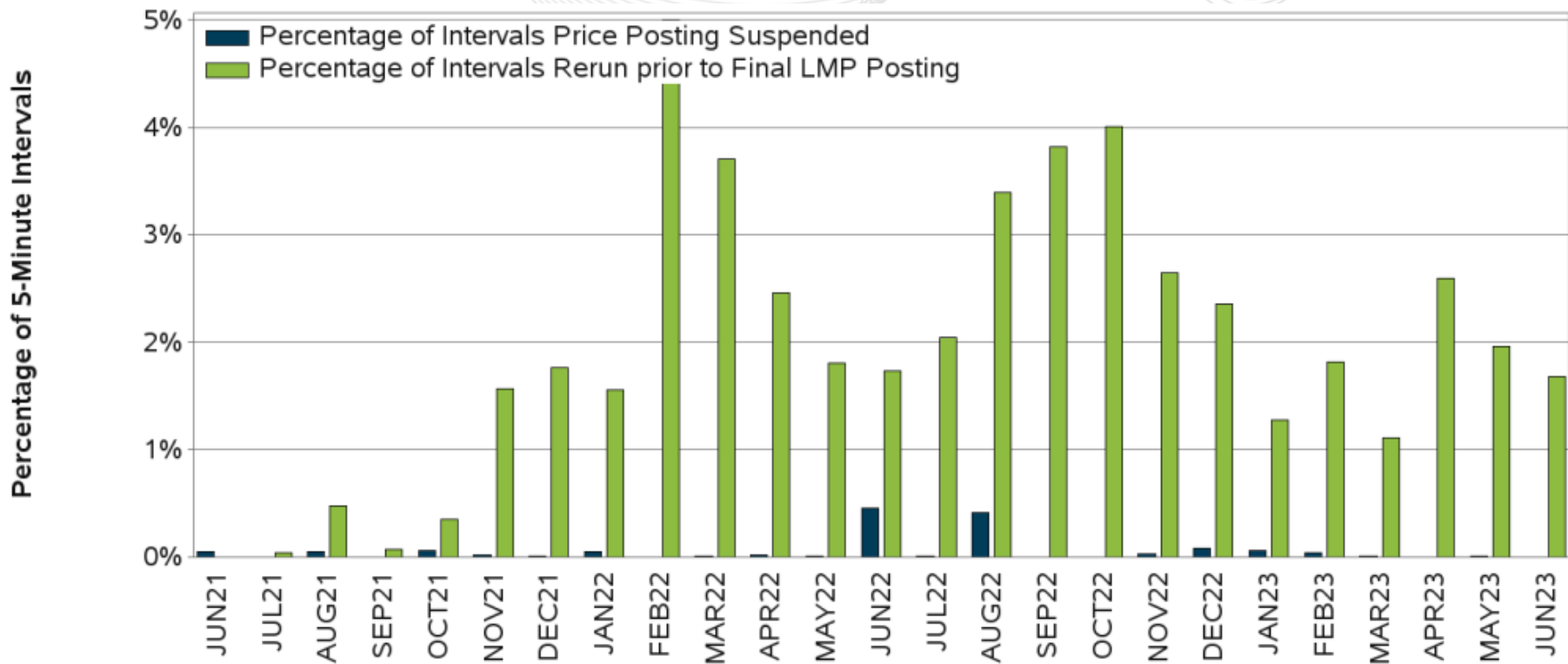


# Daily Load-Weighted Average DA & RT LMP



# Fuel Cost Adjusted LMP (Referenced to 1999 Fuel Prices)

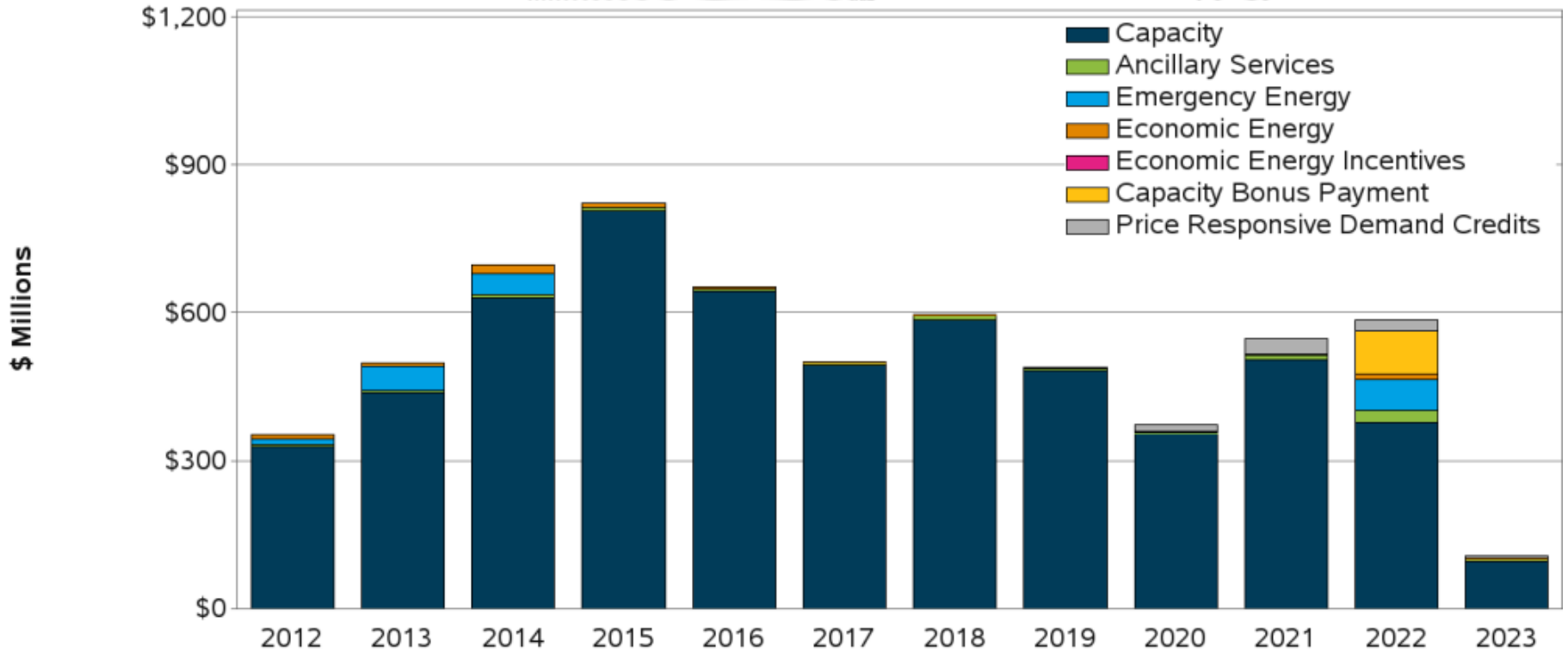


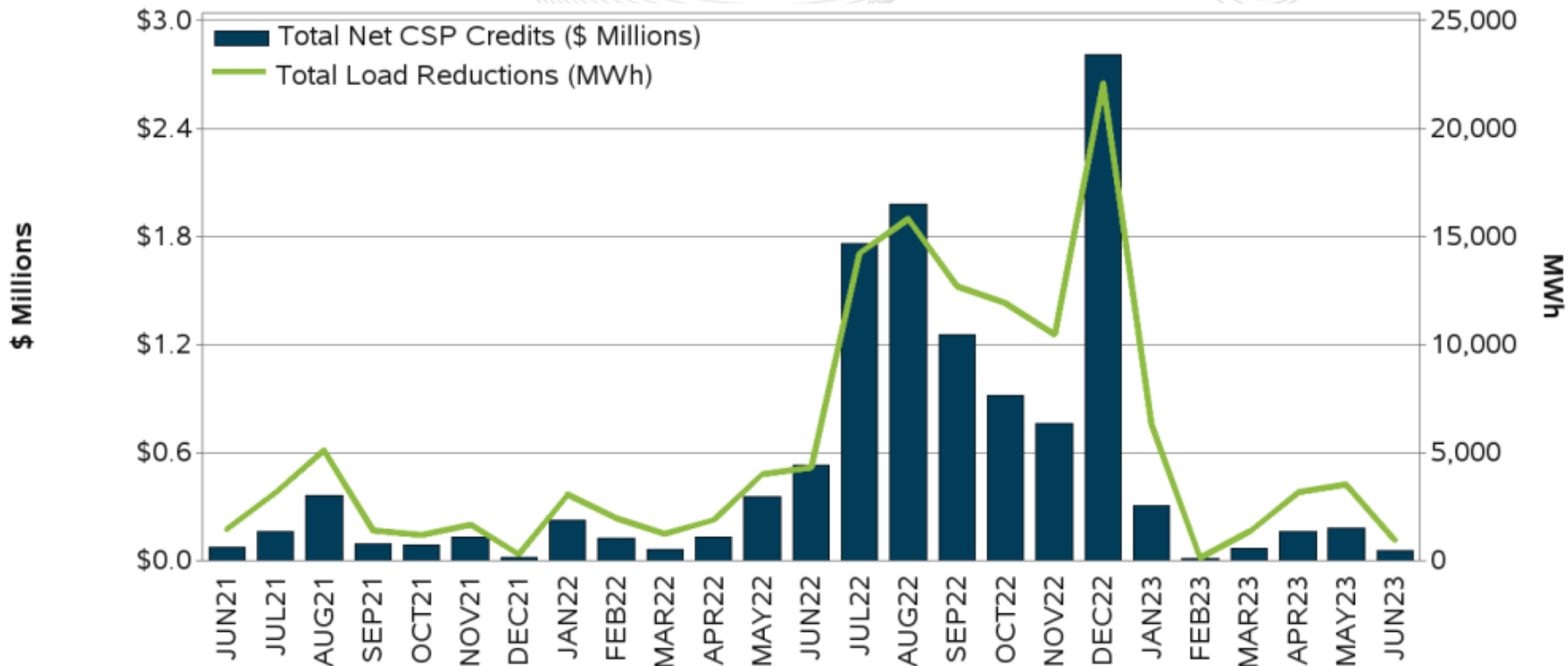


# Energy Market

# Demand Response Summary

# Demand Side Response Estimated Revenue





\*Data for the last few months are subject to significant change due to the settlement window.



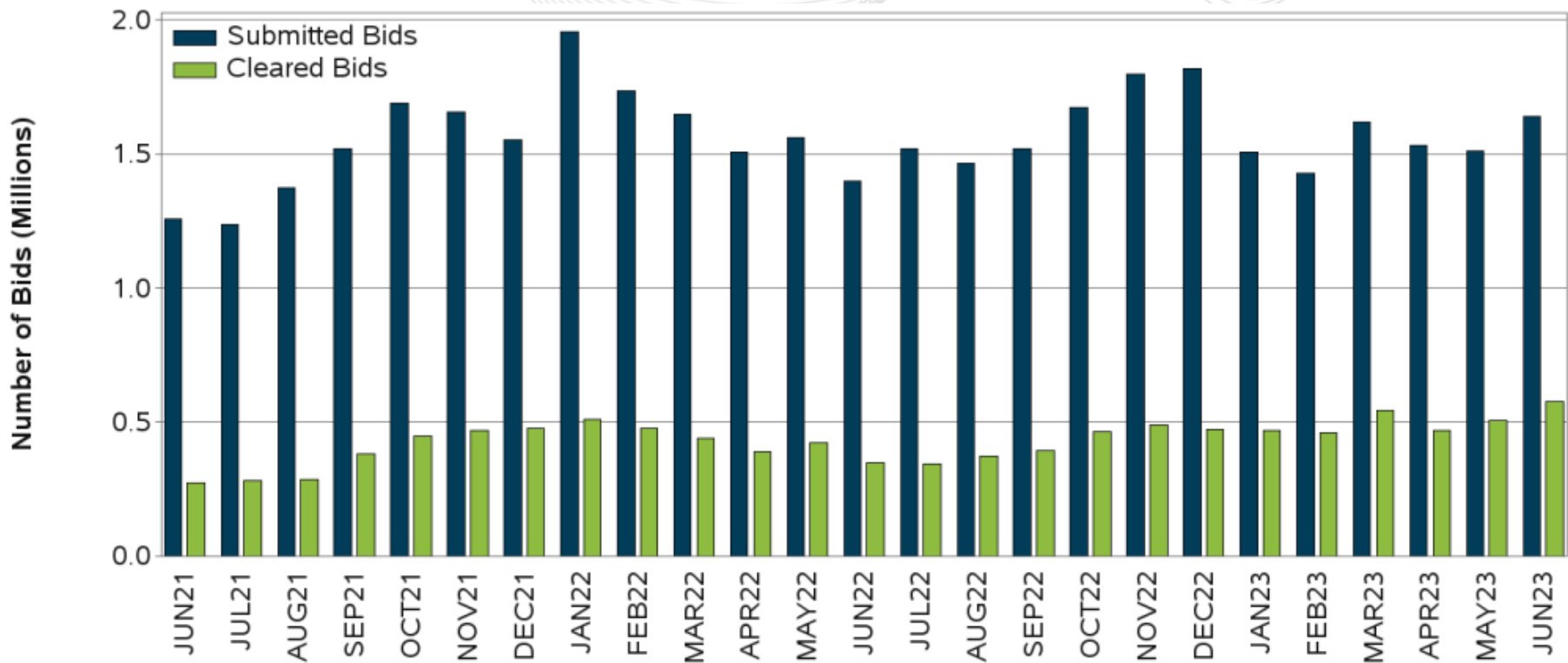
# Total Registered MW in PJM's Economic Demand Response

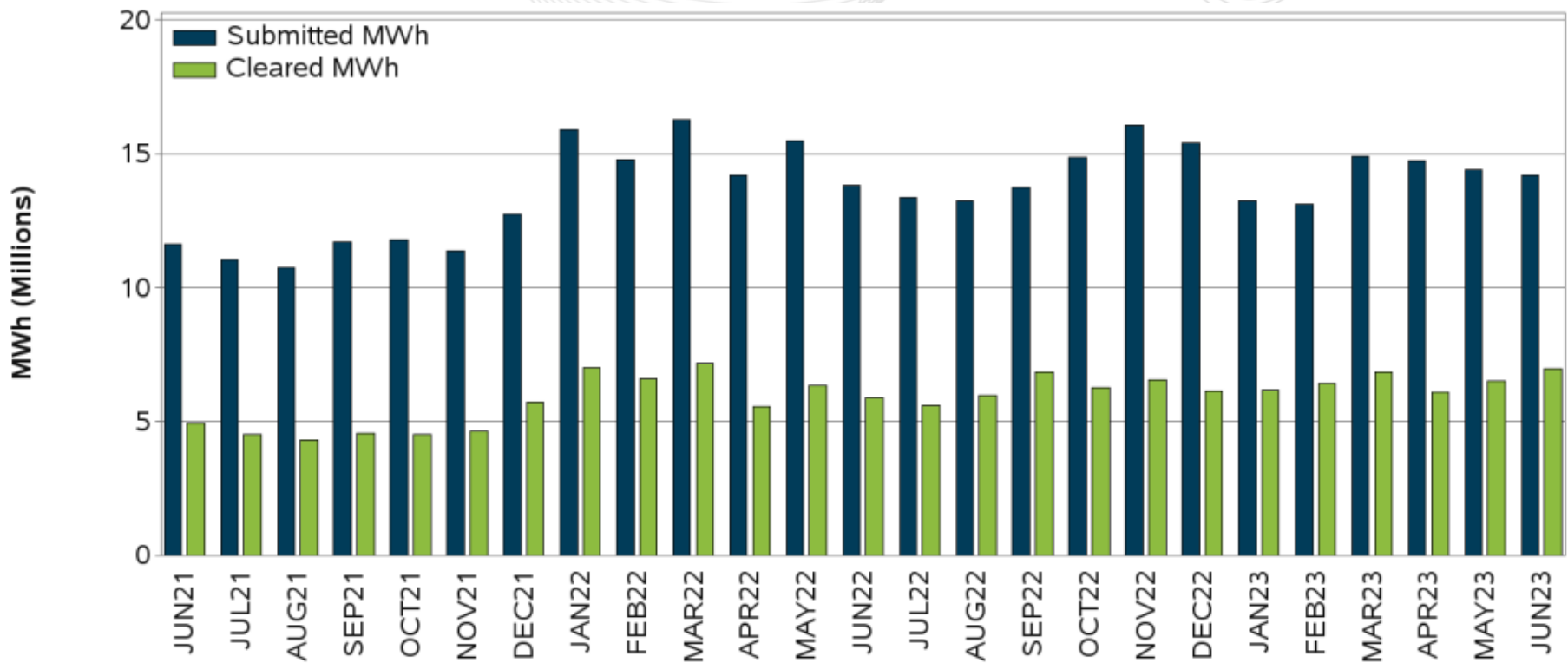


# Energy Market

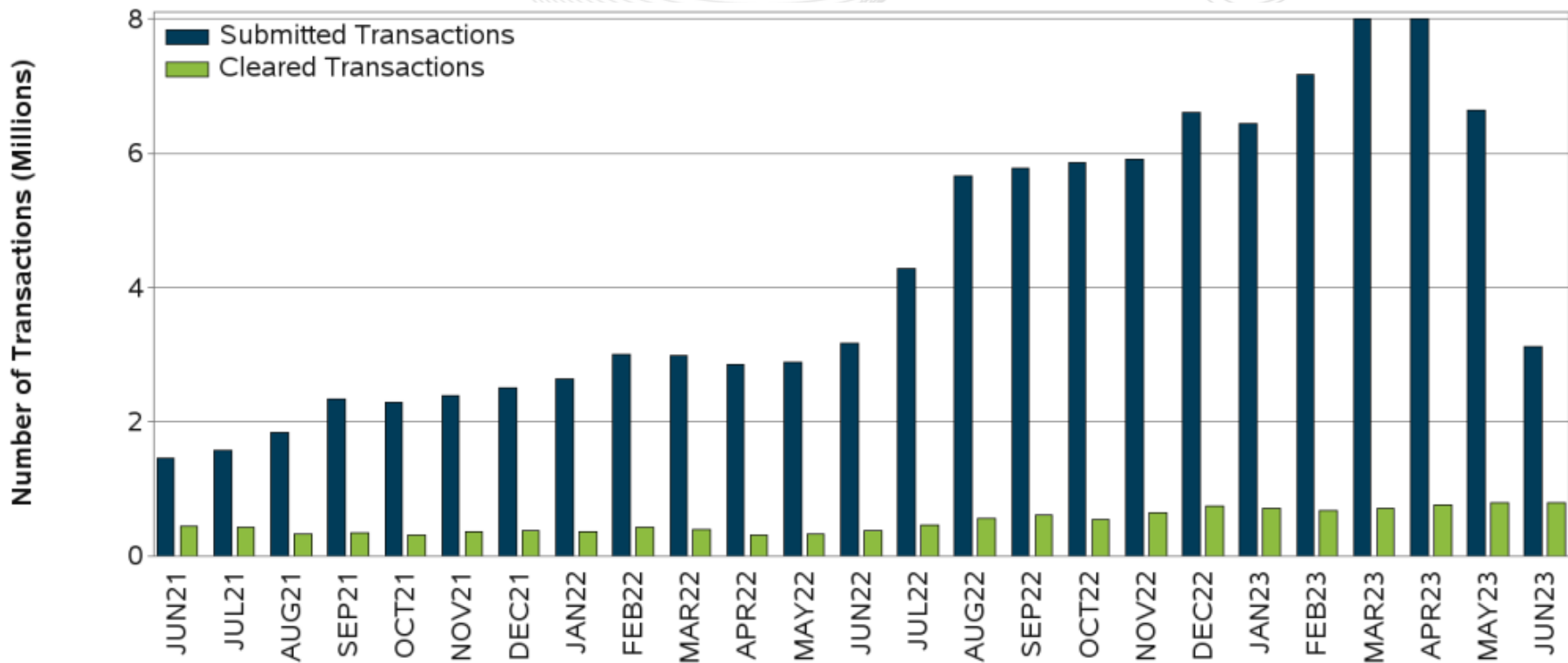
## Virtual Activity Summary

- The following six charts depict trends in submitted and cleared virtual and up-to-congestion transactions, in terms of number and volume, into the PJM Energy Market. The first two of these charts show the submitted and cleared increment and decrement bids (virtual transactions or virtuals) and they are the same as what was previously being presented in this report. The two charts after them display the trends in submitted and cleared up-to-congestion transactions into the PJM Energy Market. The last two of these six charts combine the virtual and up-to-congestion transactions and show the sum of these two categories.
- To clarify what a bid or transaction is, please consider the following example: An offer (increment, decrement or up-to-congestion) of 10 MW, valid for eight hours for a given day, is captured in the charts as eight submitted bids/transactions and 80 submitted MWh. If this offer fully clears for three of the hours it was submitted for, it shows in the charts as three cleared bids/transactions and 30 cleared MWh.

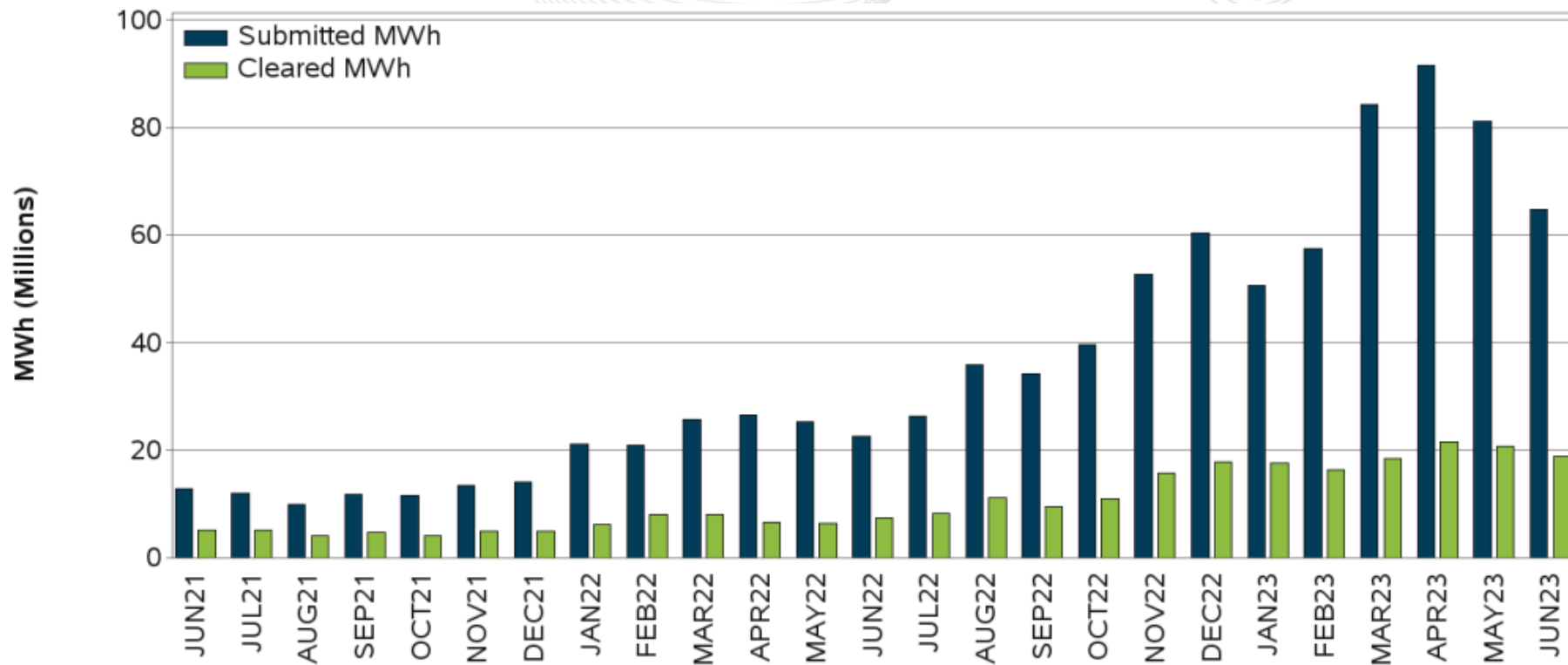




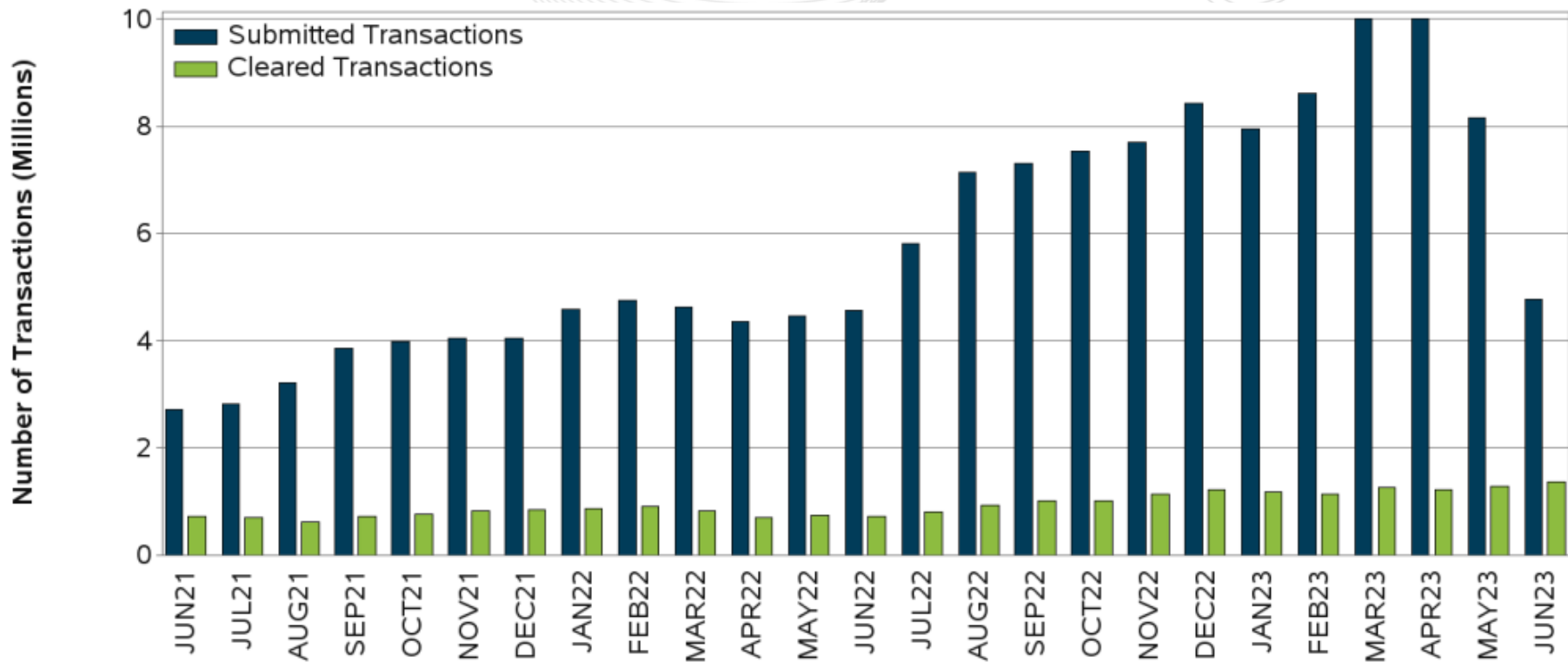
# Up-To-Congestion Transactions - Total Number



# Up-To-Congestion Transactions - Total Volume

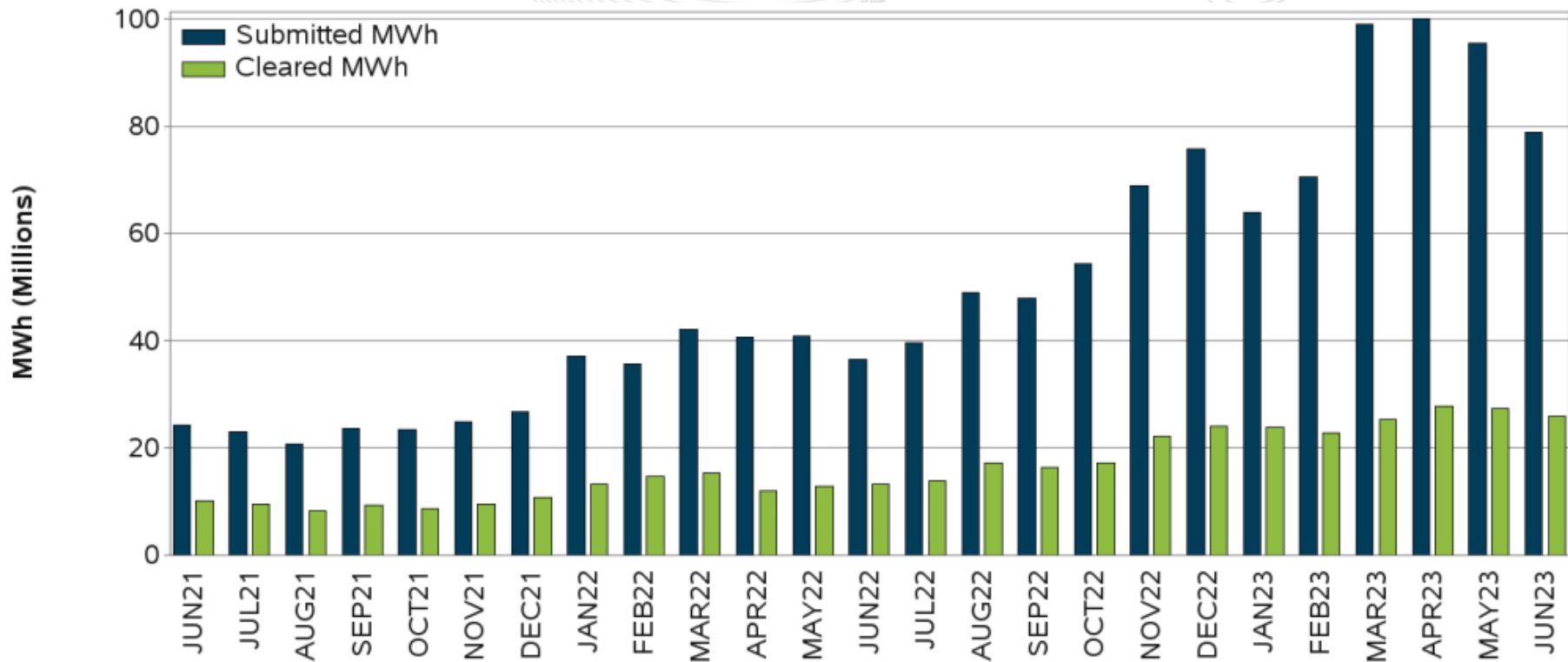


# INCs, DECIs and Up-To-Congestion Transactions - Total Number





# INCs, DEC and Up-To-Congestion Transactions - Total Volume

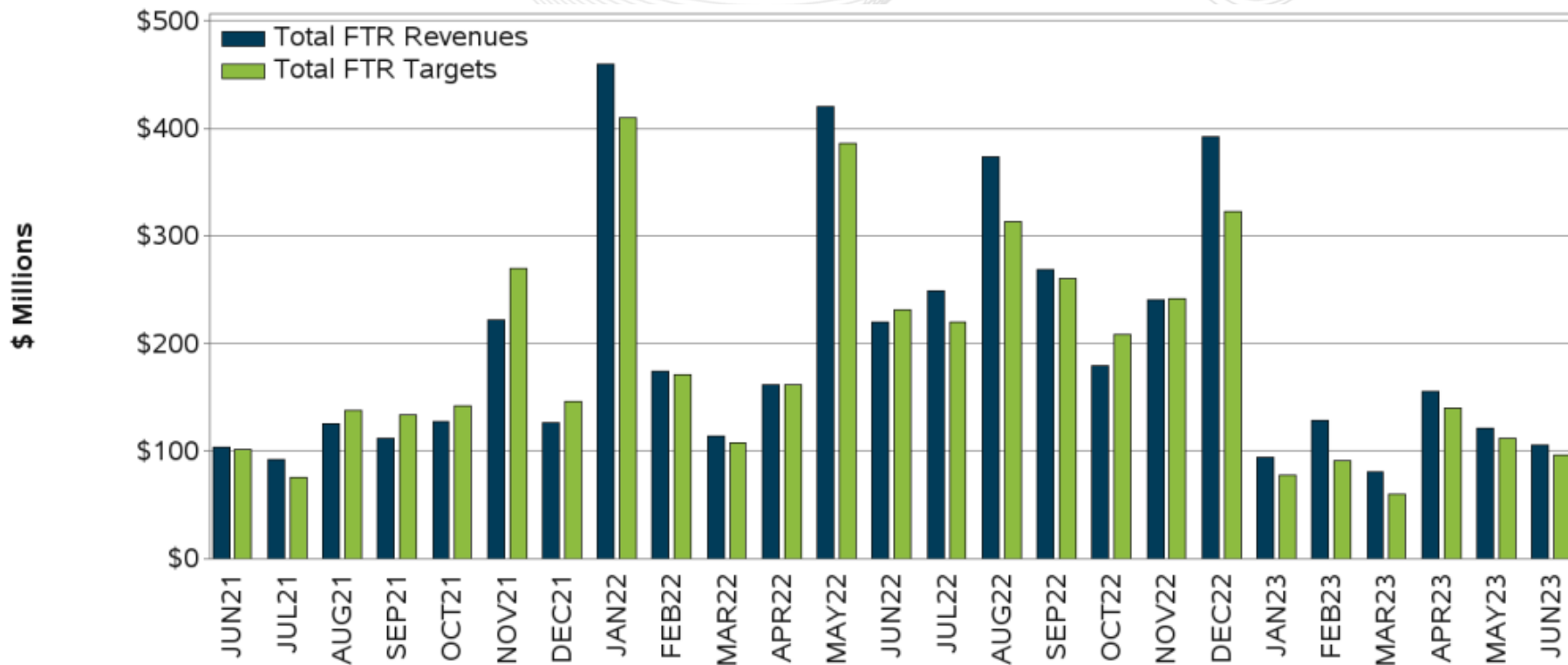


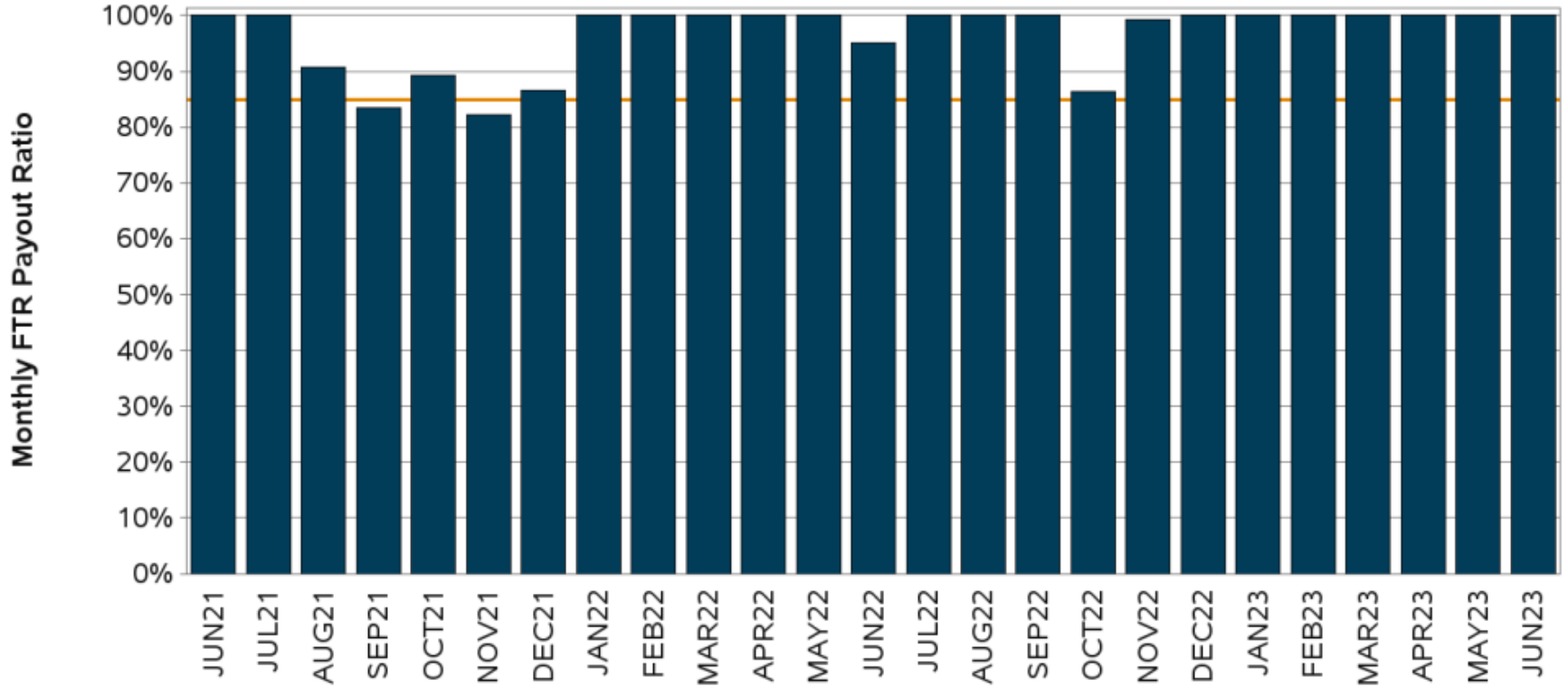
# Energy Market

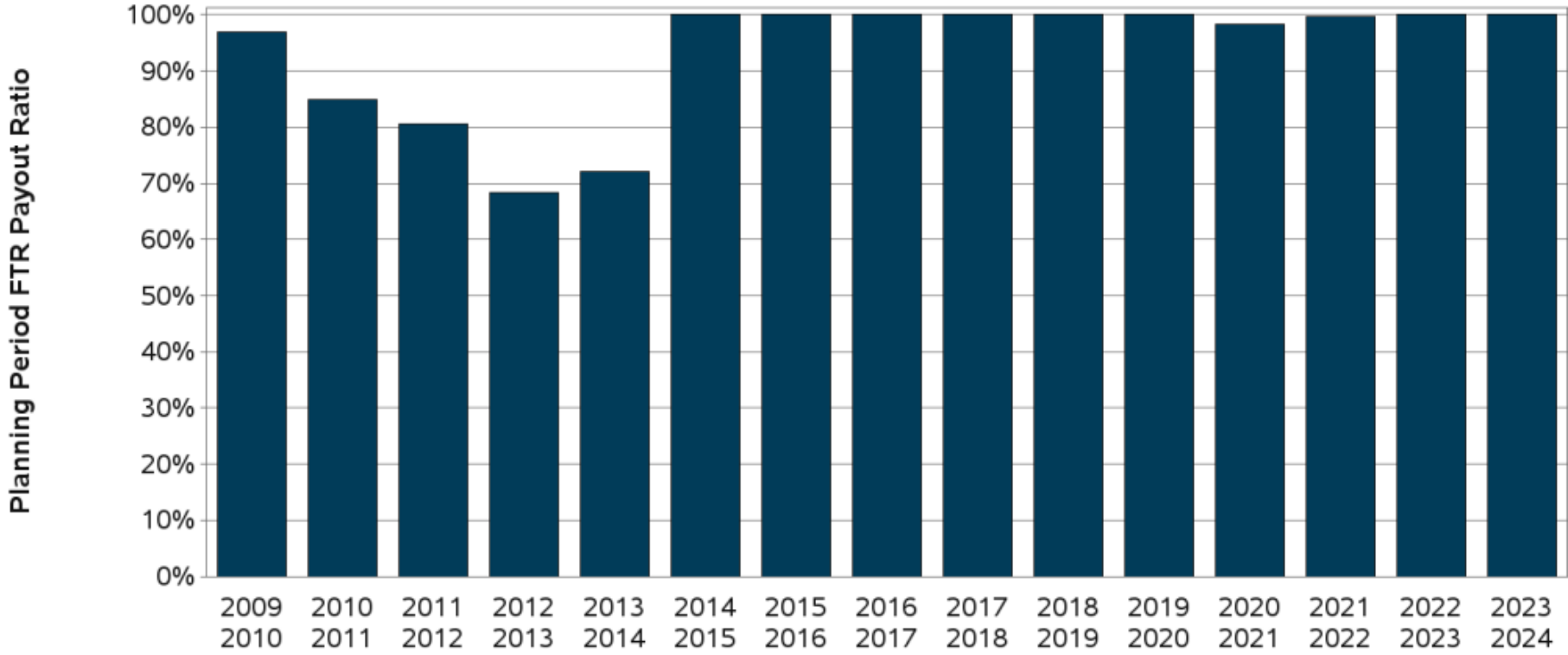
# Congestion and FTR Summary

Period	Surplus / Underfunding	Payout Ratio
June 2023	\$9,334,935	100%
2023	\$109,096,518	100%
2023/2024	\$9,334,935	100%

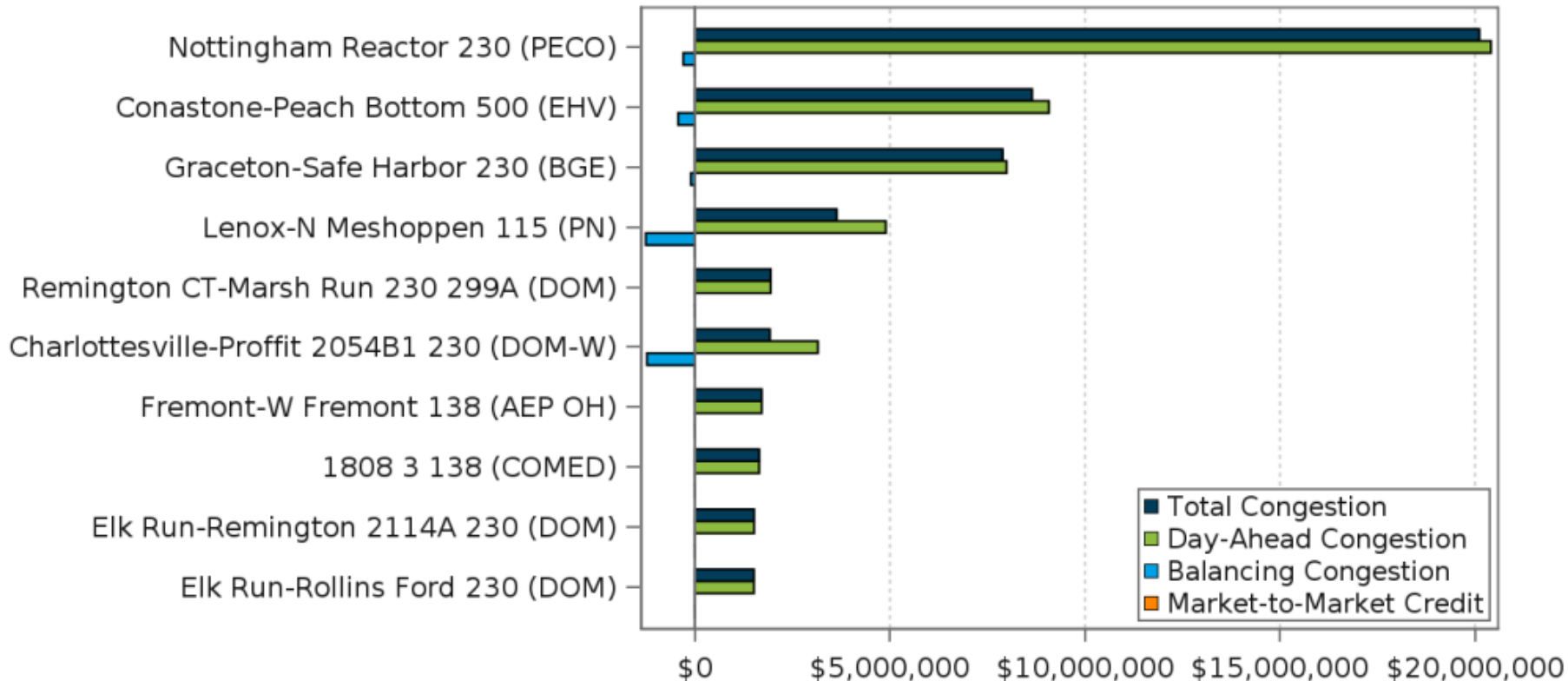
# FTR Revenue vs. FTR Target Allocation





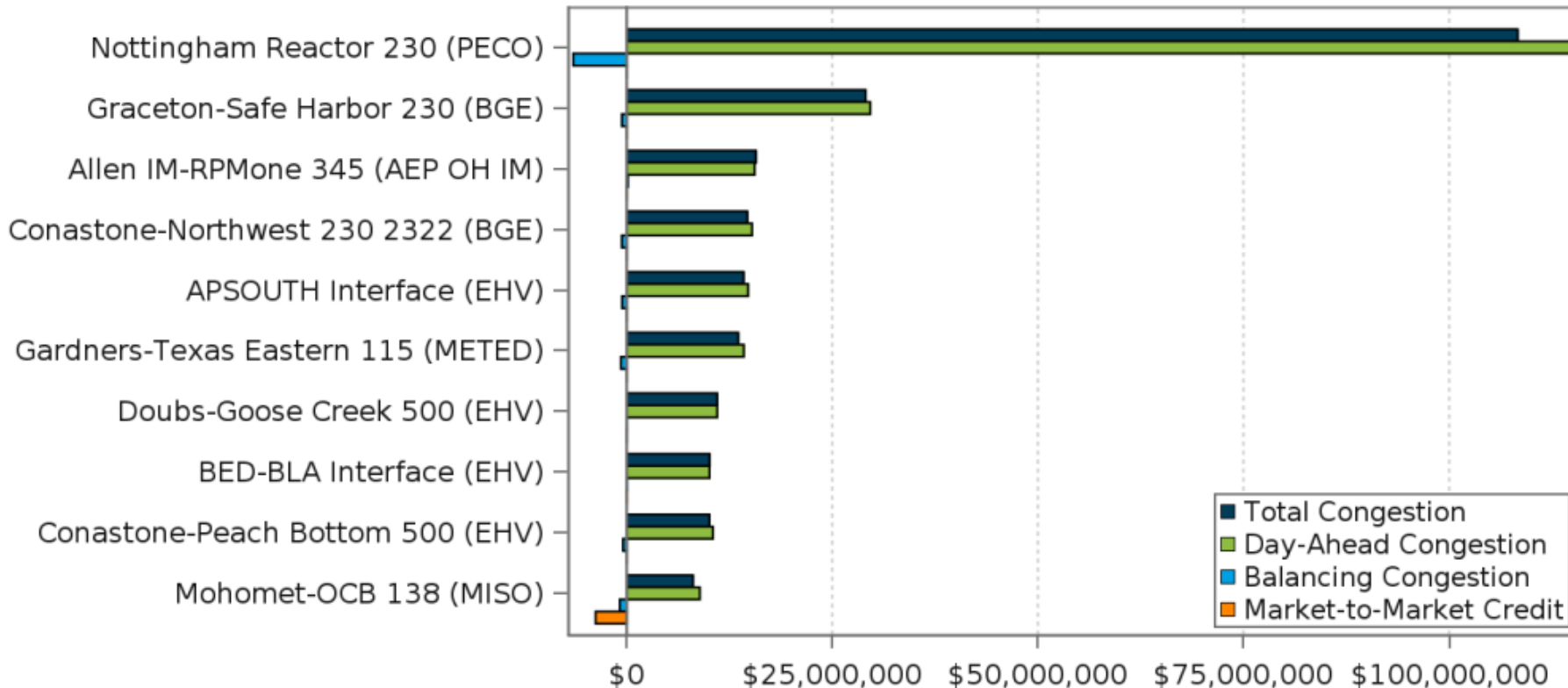


# Ten Most Heavily Congested Transmission Facilities - Overall, June



The ten most heavily congested facilities account for 67% of total congestion for June.

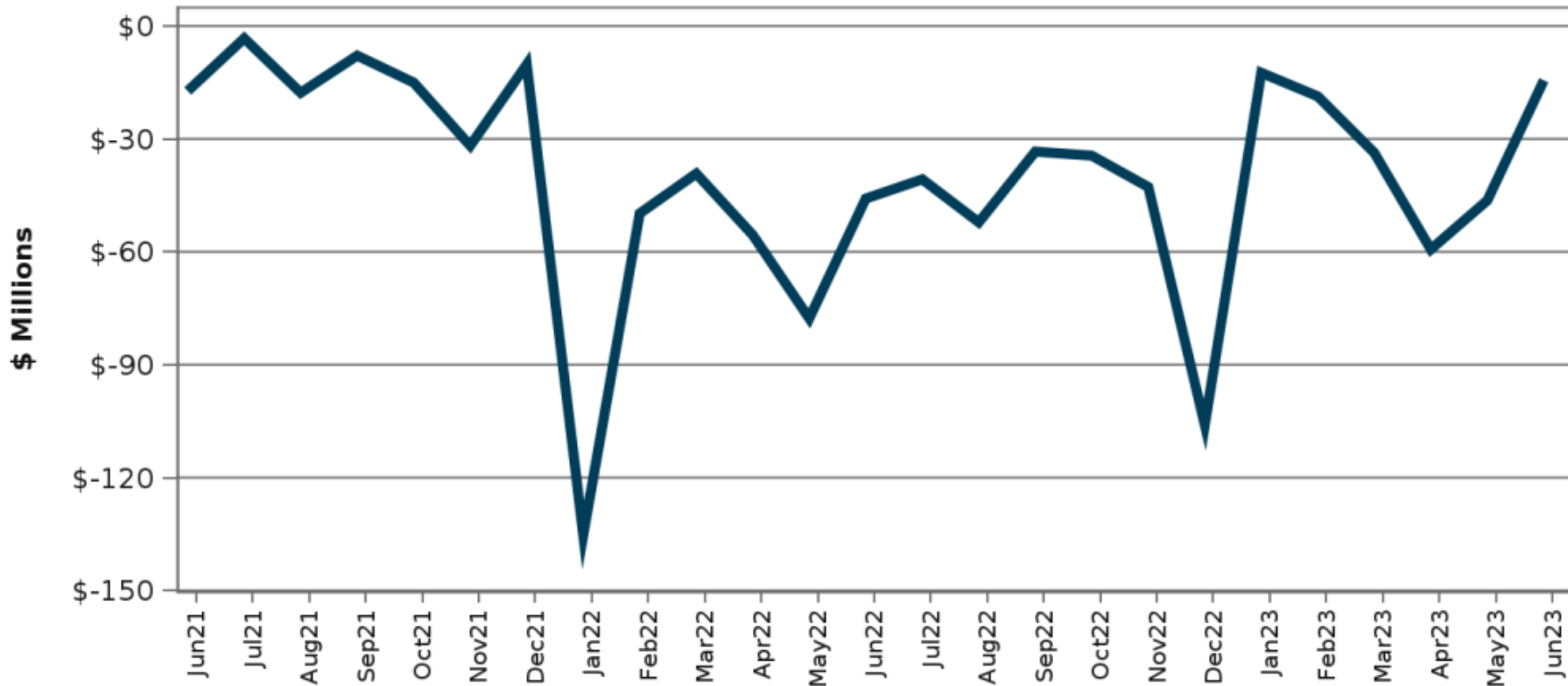
# Ten Most Heavily Congested Transmission Facilities - Overall, 2023



The ten most heavily congested facilities account for 59% of total congestion for 2023.

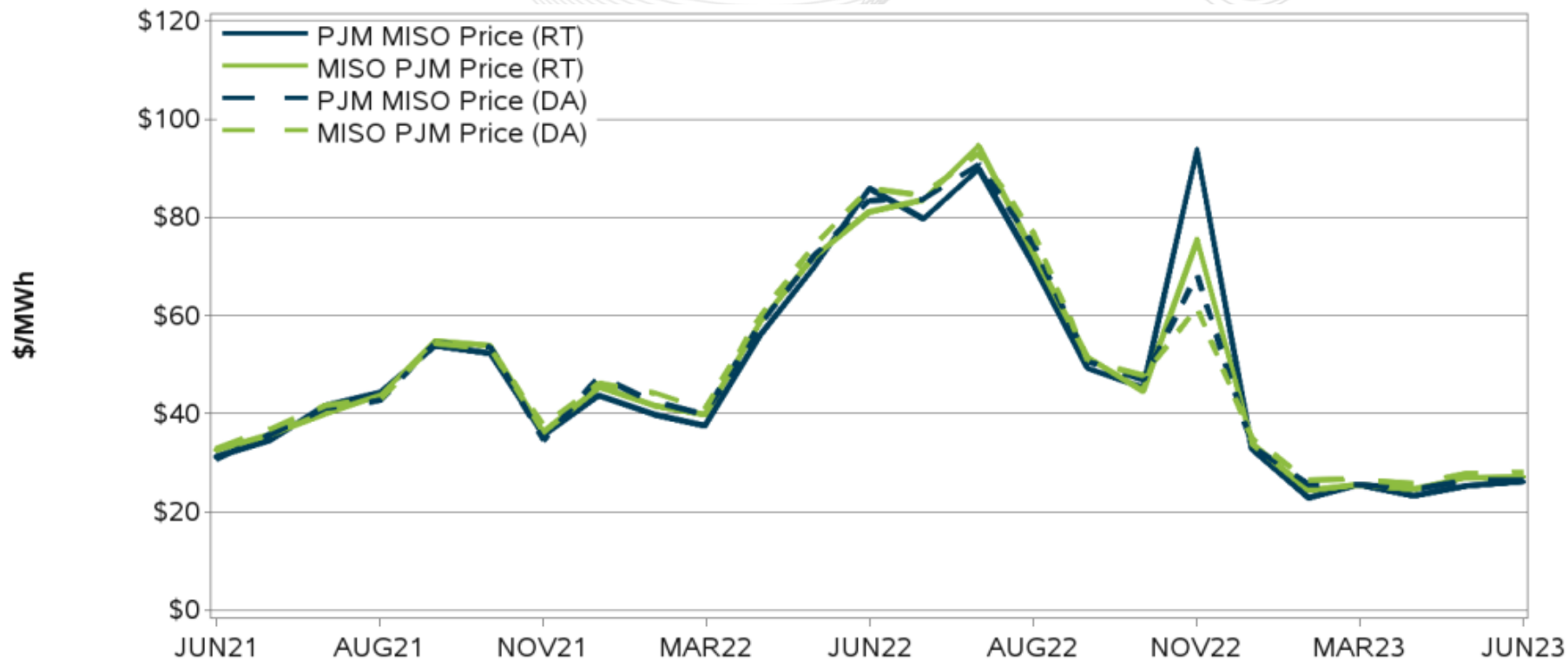


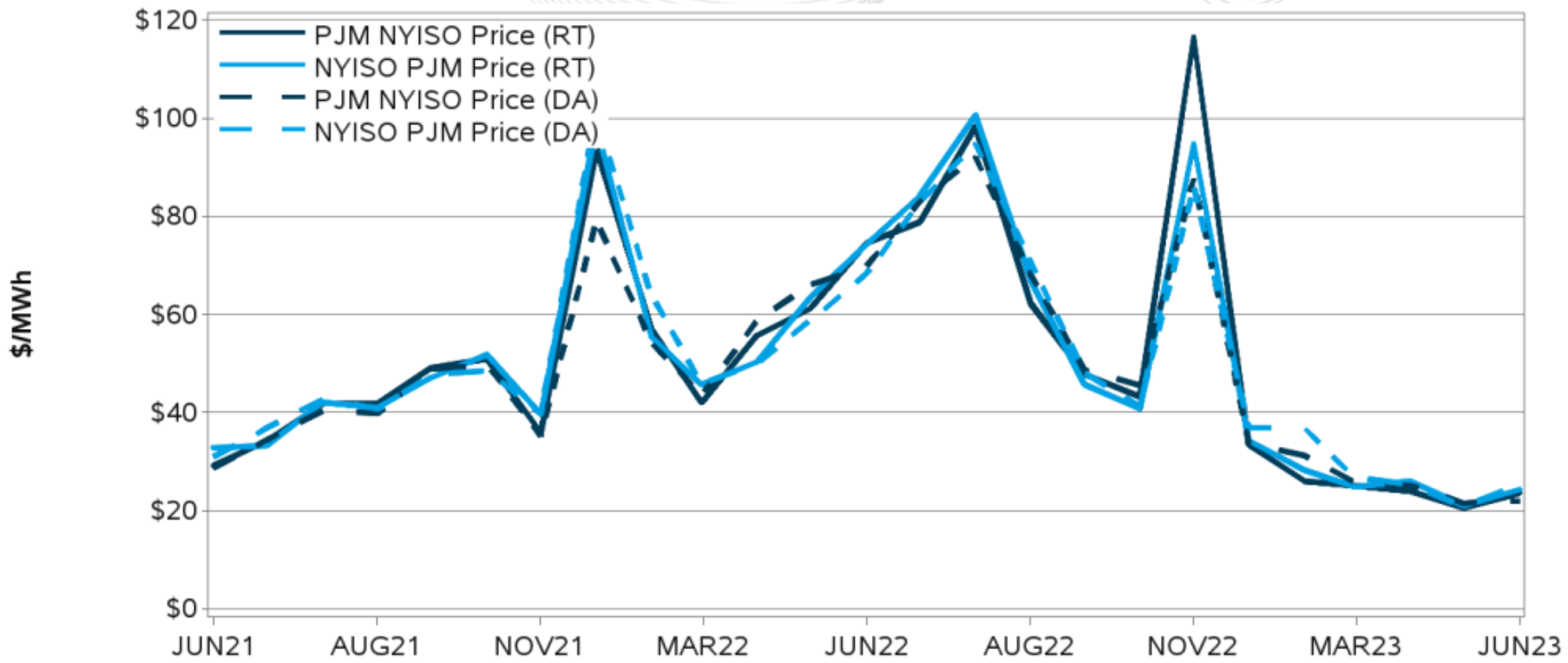
# Balancing Congestion Charge Revenues (BLI 2215)



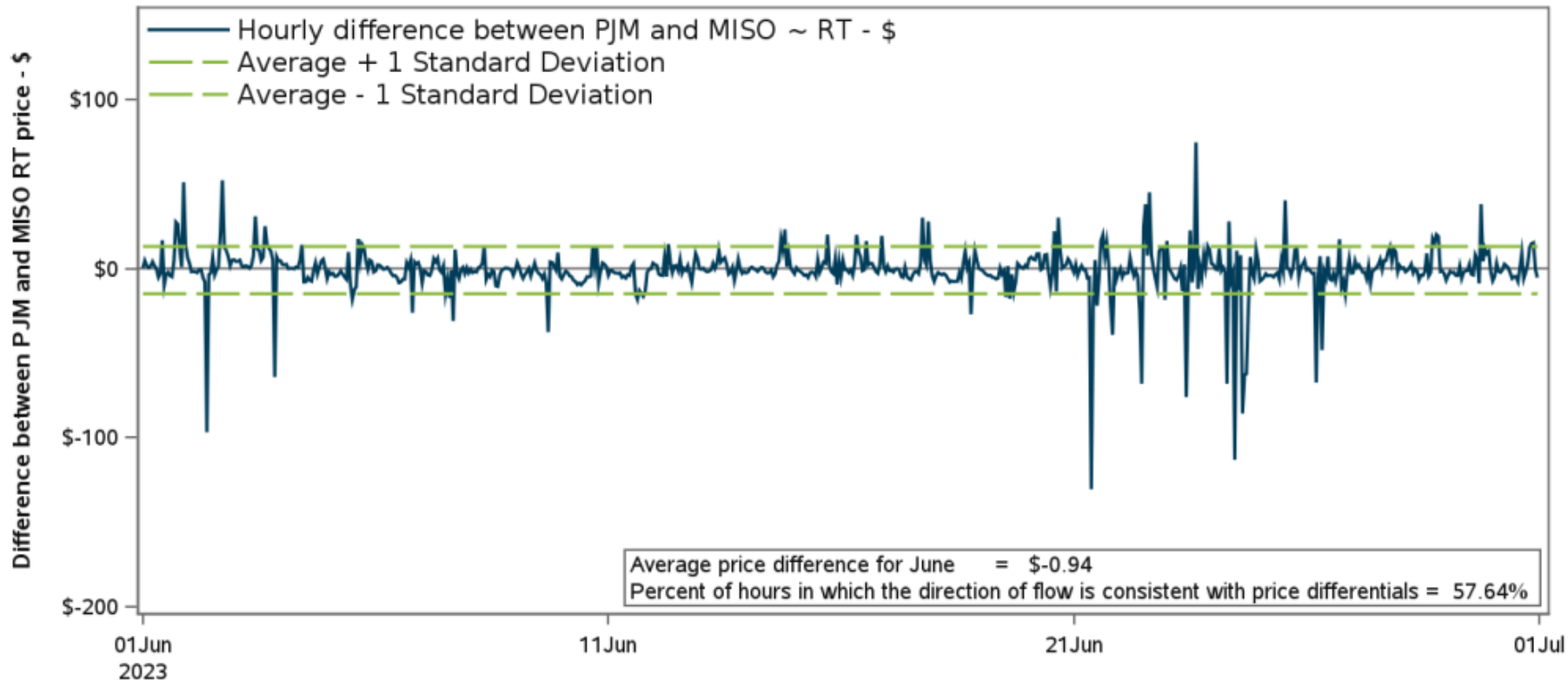
# Energy Market

# Interchange/Seams Summary



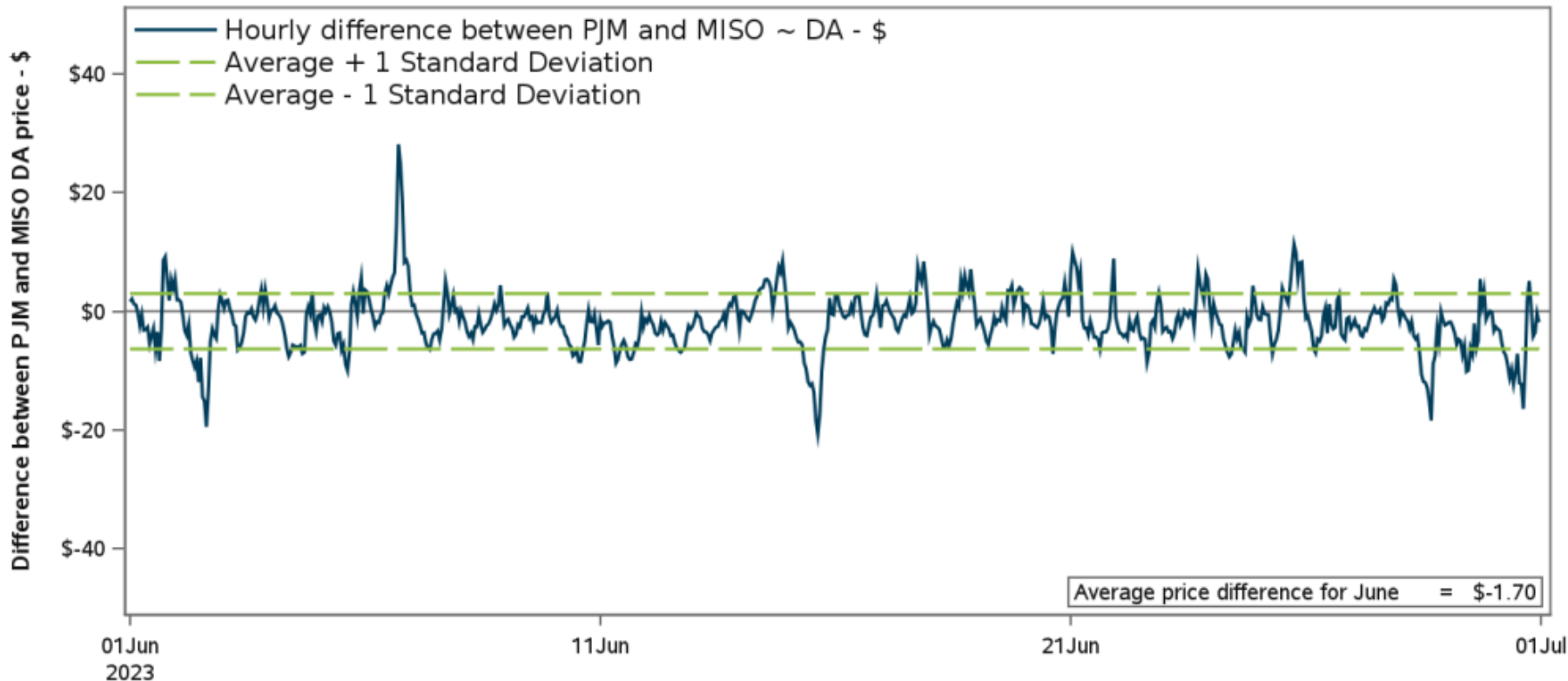


# Hourly Difference Between PJM and MISO Real-Time Prices



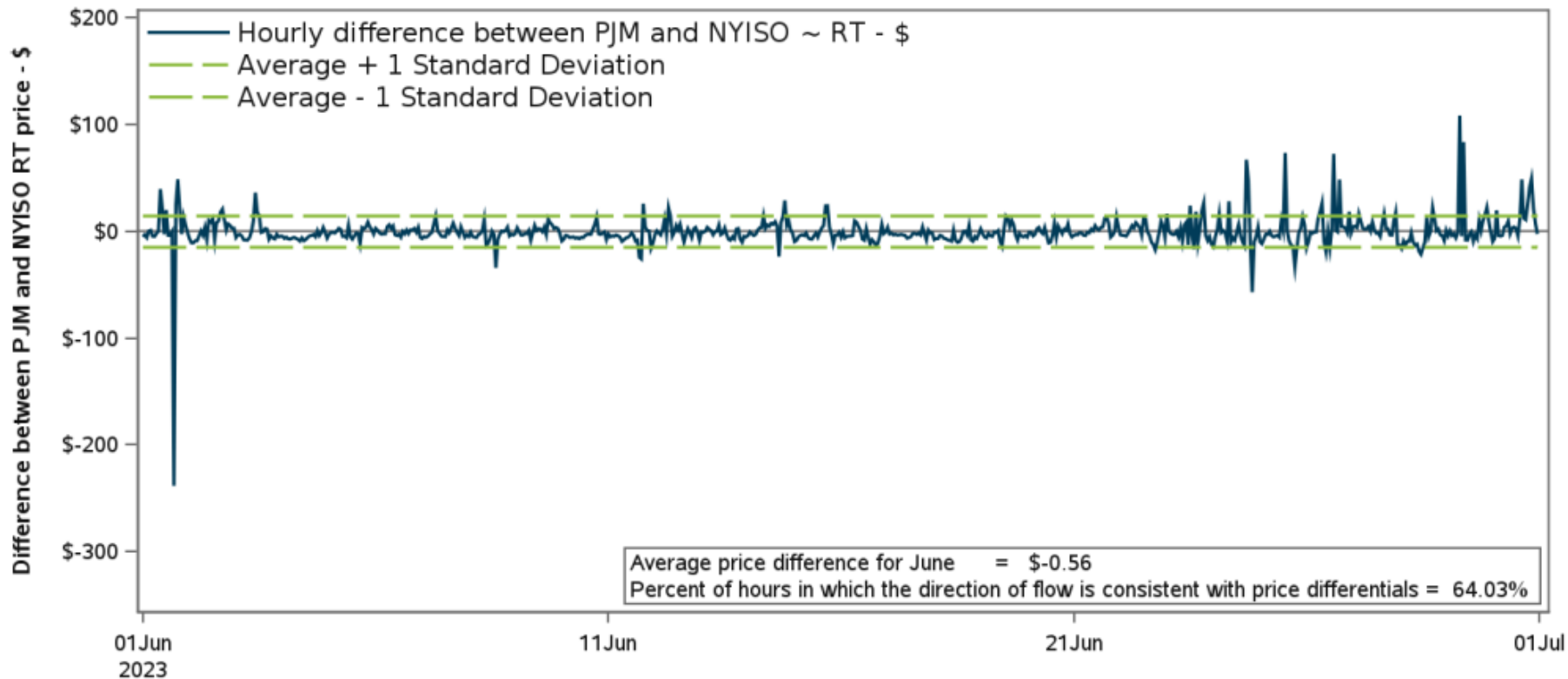
Positive values represent hours when the PJM price was higher. Negative values represent hours when the PJM price was lower.

# Hourly Difference Between PJM and MISO Day-Ahead Prices



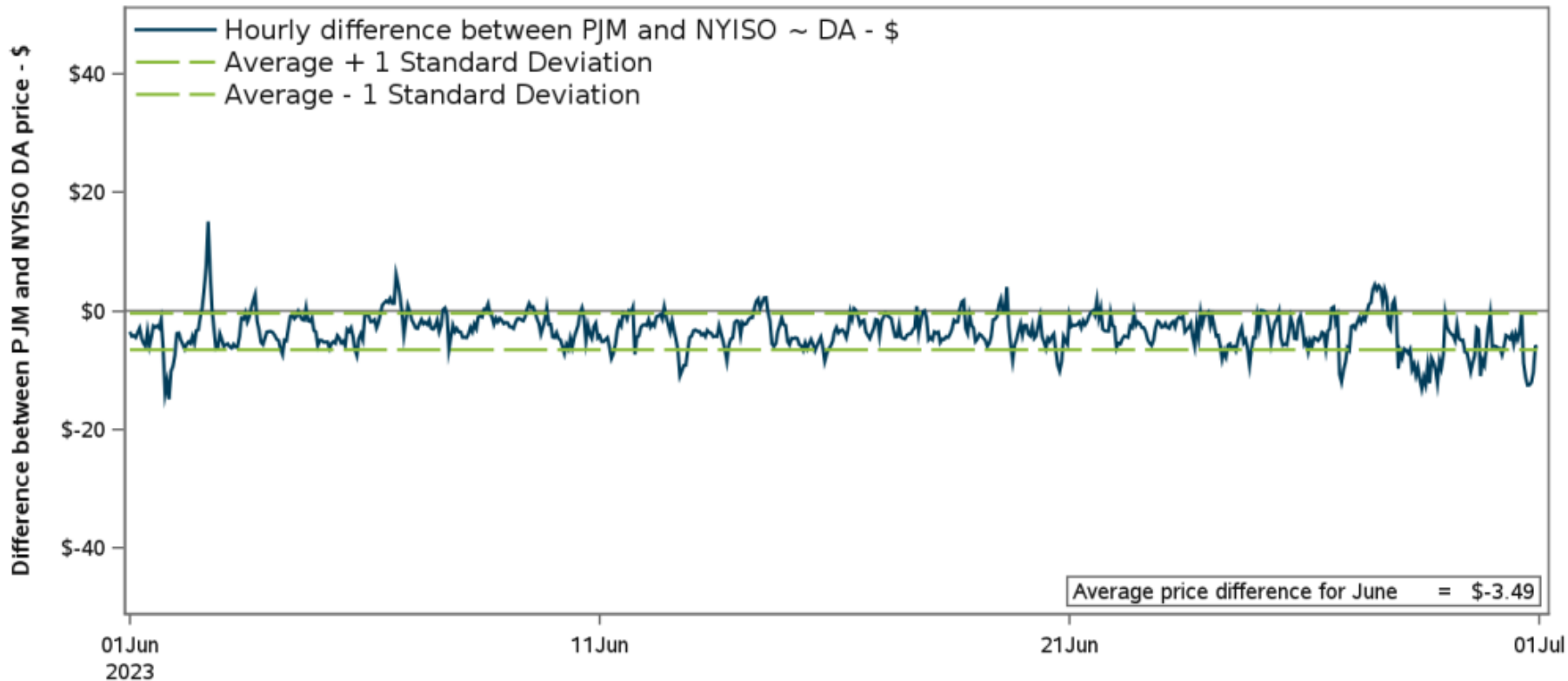
Positive values represent hours when the PJM price was higher. Negative values represent hours when the PJM price was lower.

# Hourly Difference Between PJM and NYISO Real-Time Prices



Positive values represent hours when the PJM price was higher. Negative values represent hours when the PJM price was lower.

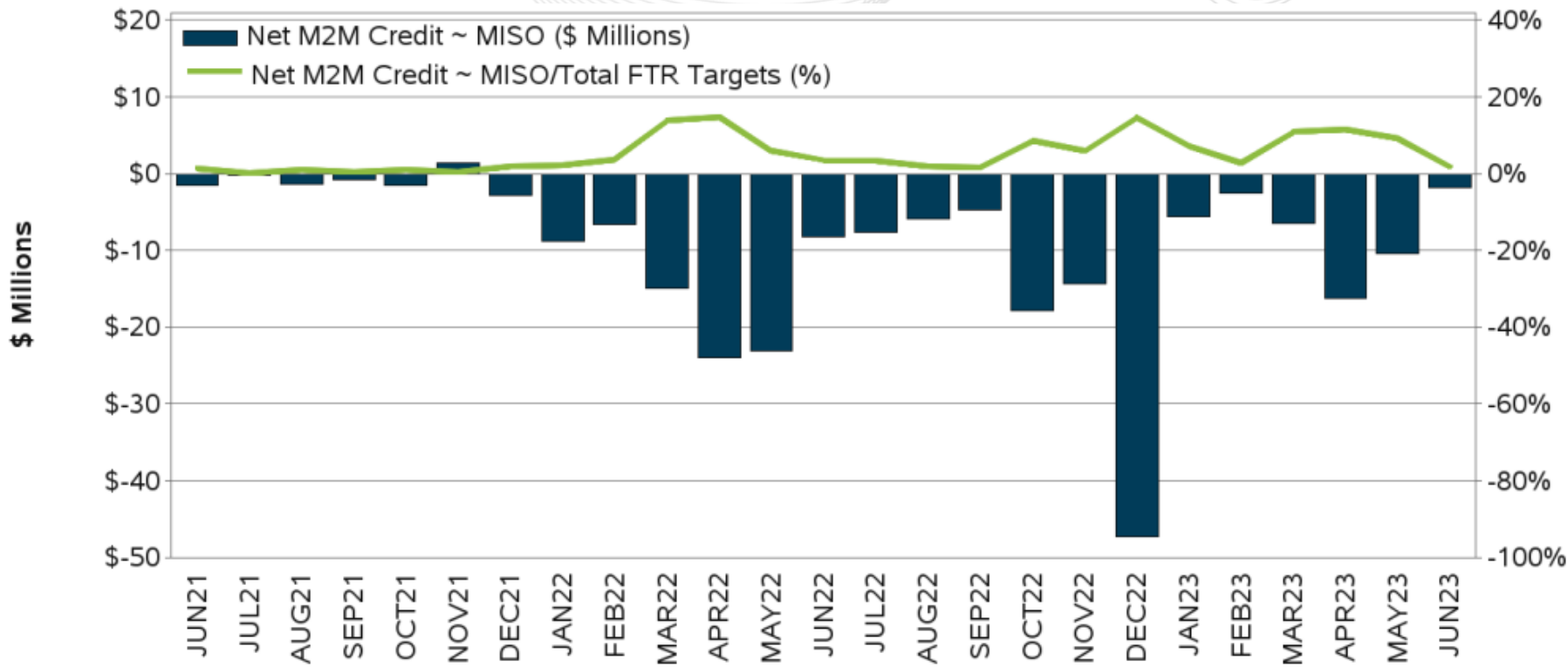
# Hourly Difference Between PJM and NYISO Day-Ahead Prices



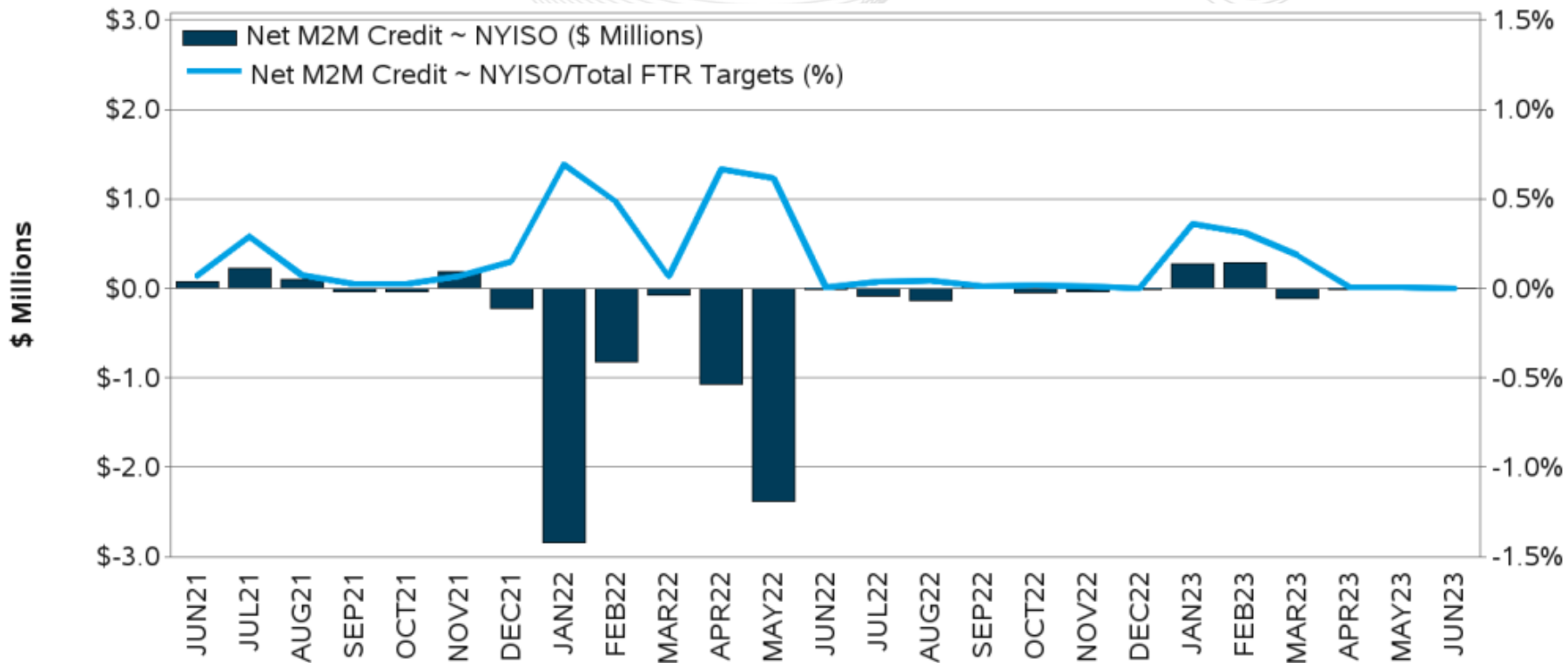
Positive values represent hours when the PJM price was higher. Negative values represent hours when the PJM price was lower.



# PJM-MISO Market-to-Market Coordination Settlement

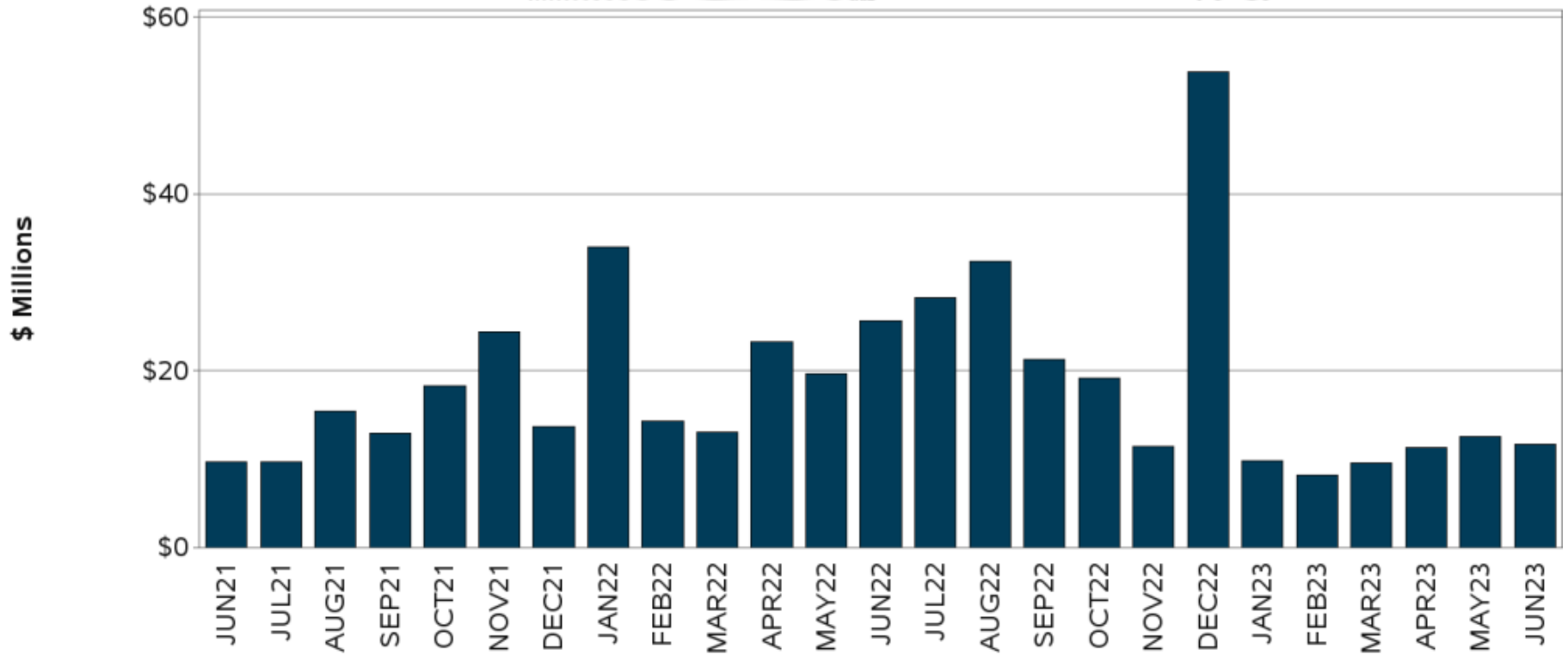


Negative M2M Credit represents PJM payment to MISO

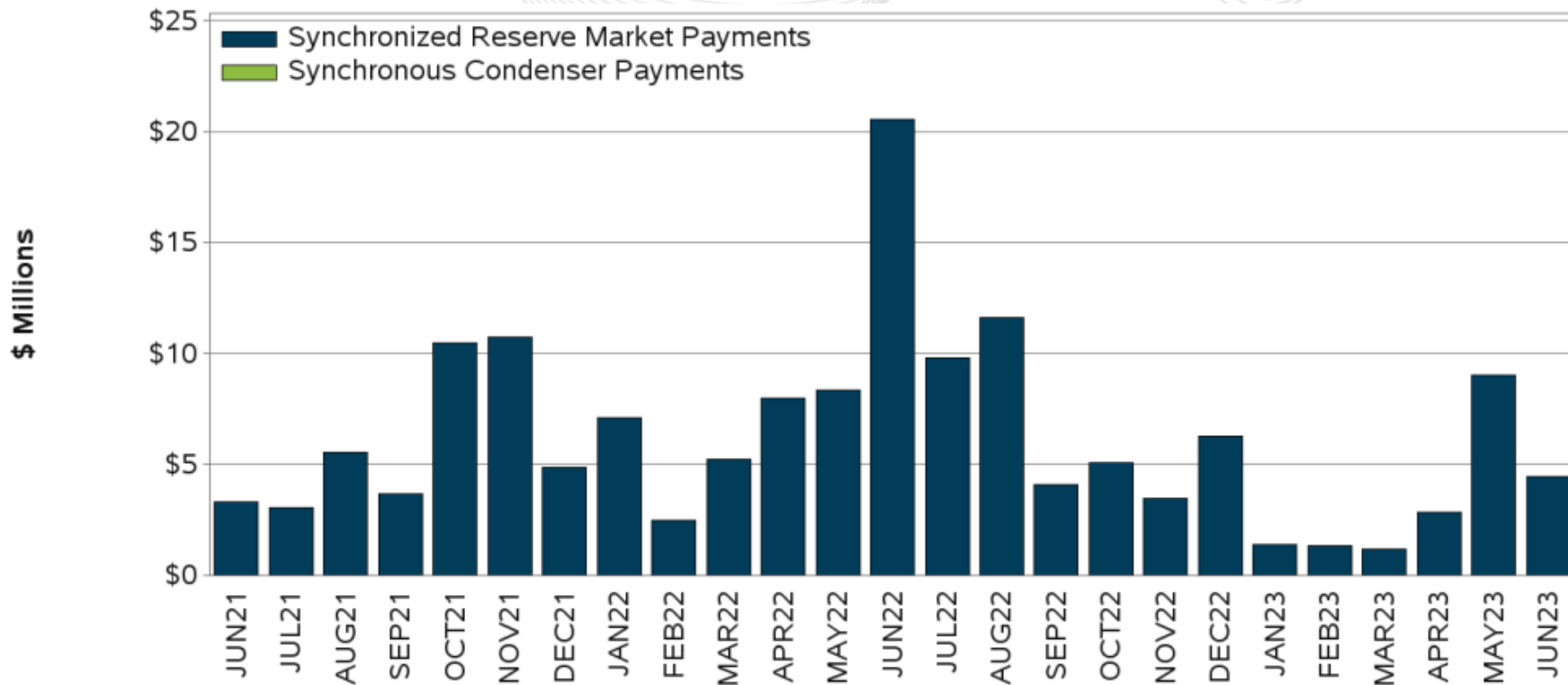


Negative M2M Credit represents PJM payment to NYISO

# Ancillary Service Market Summary

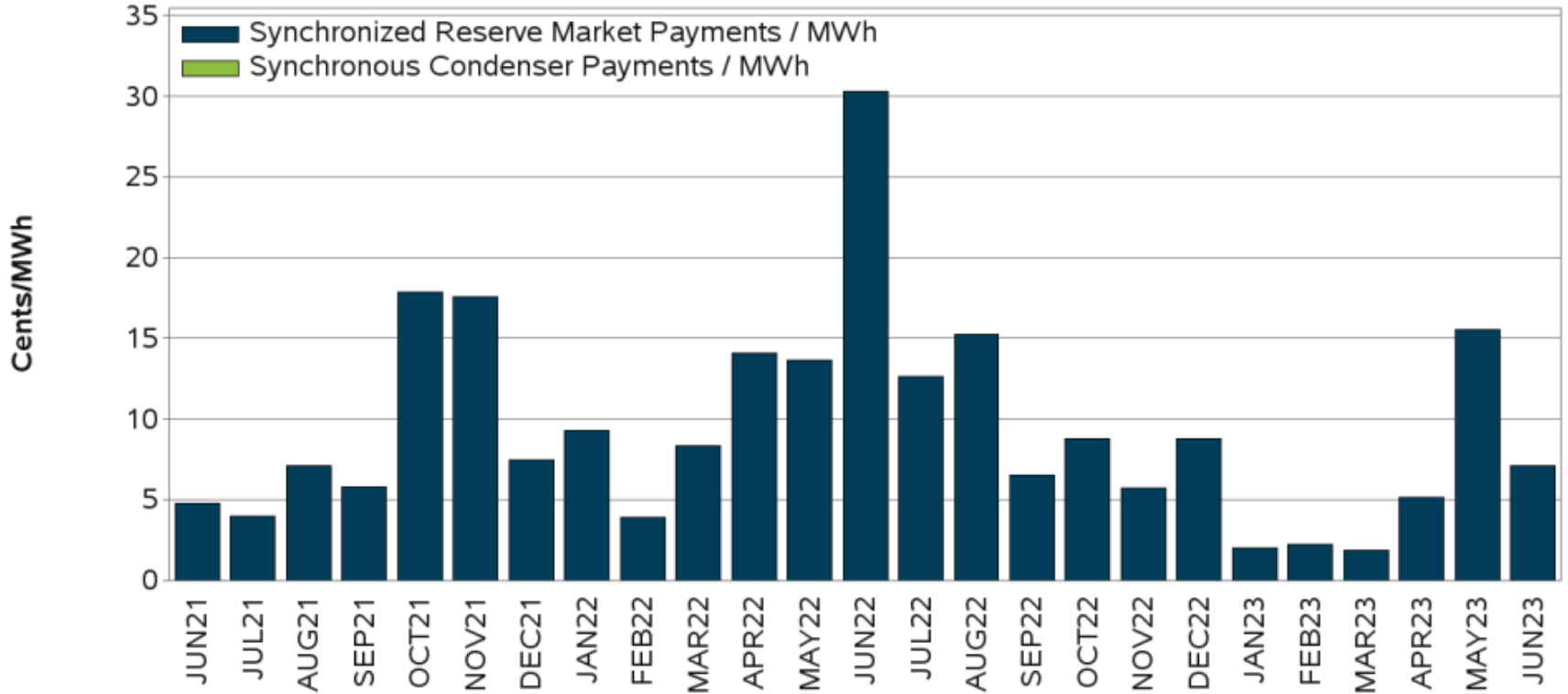


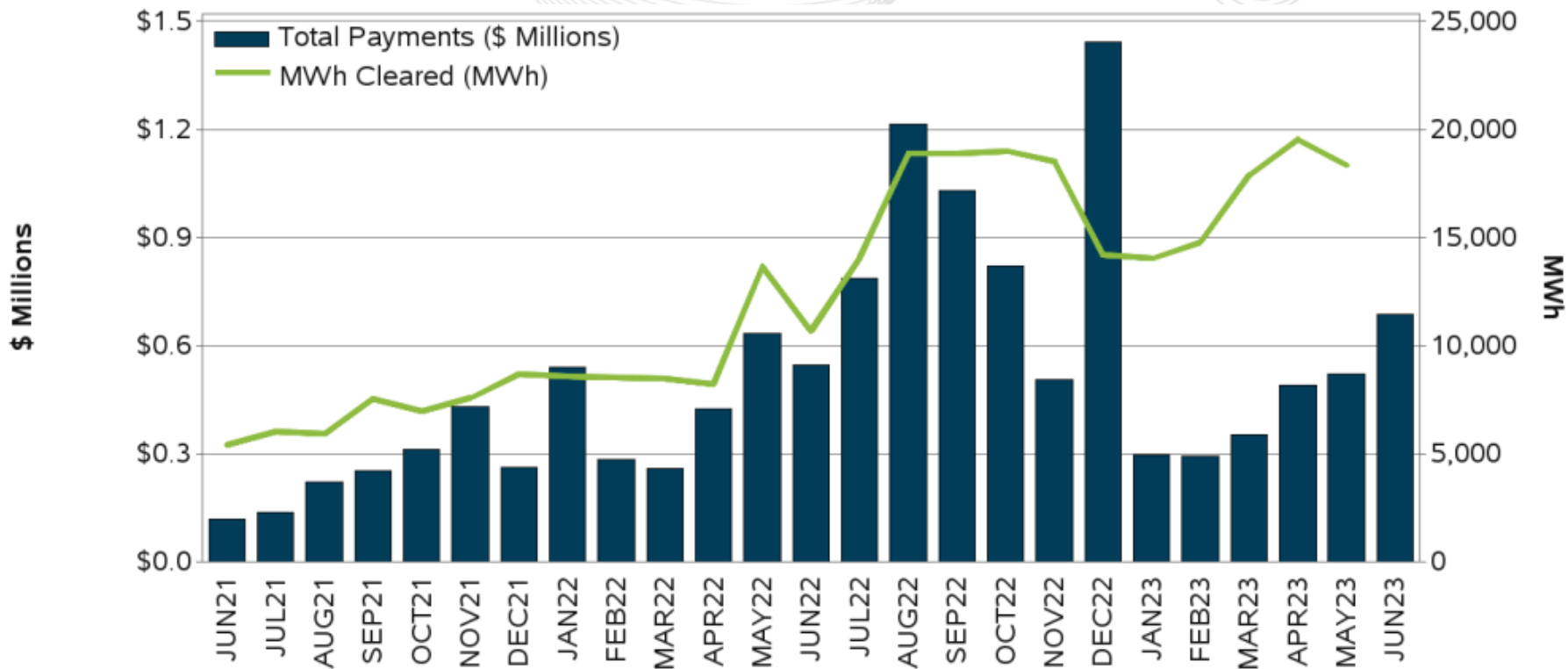
# Synchronized Reserve and Synchronous Condenser Costs



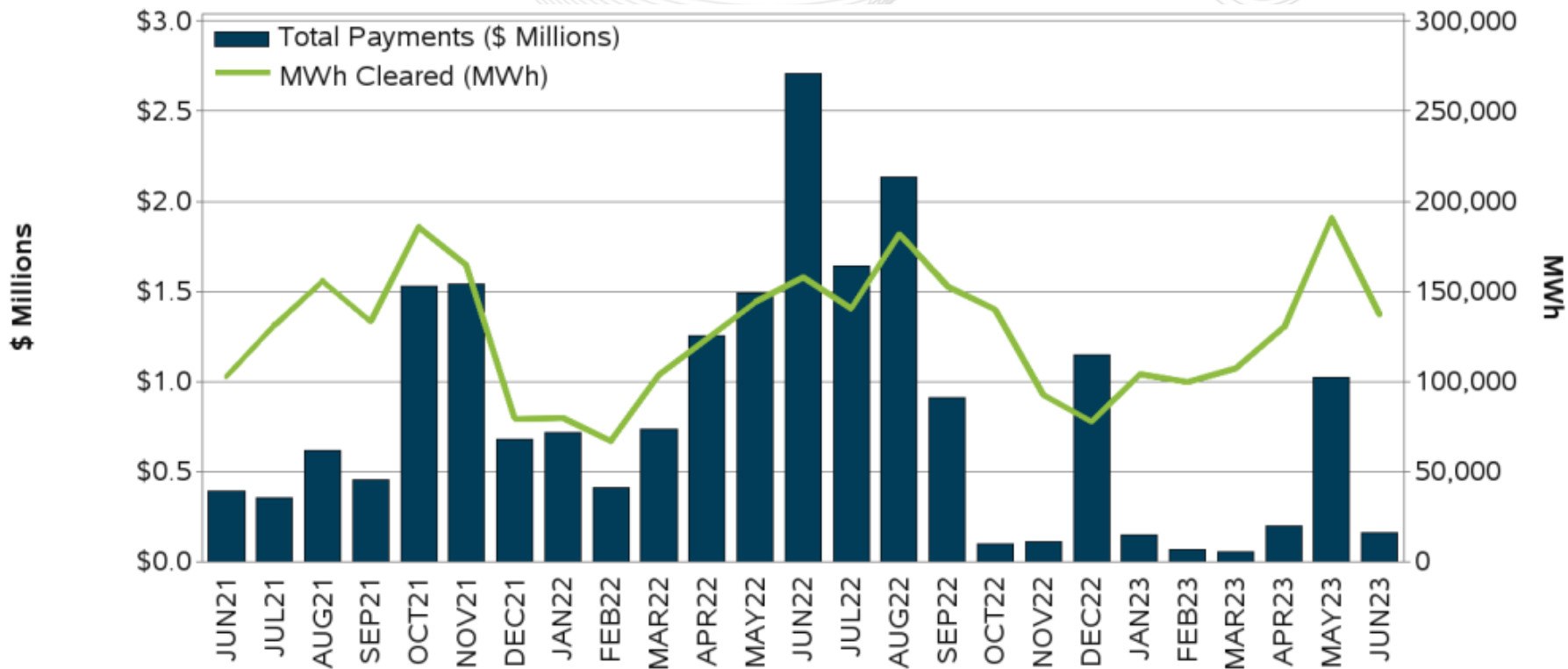


# Load-Adjusted Synchronized Reserve and Synchronous Condenser Costs



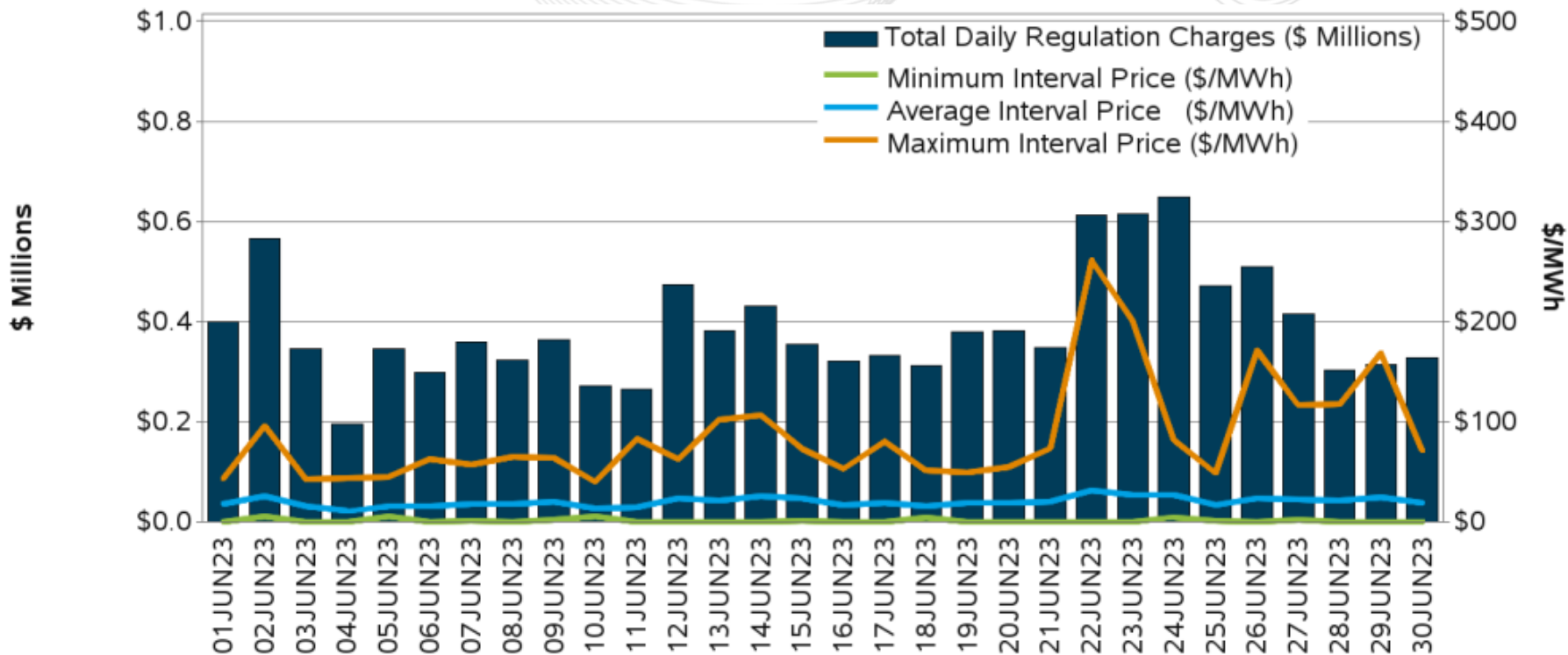


# DR Participation in PJM Synchronized Reserve Markets

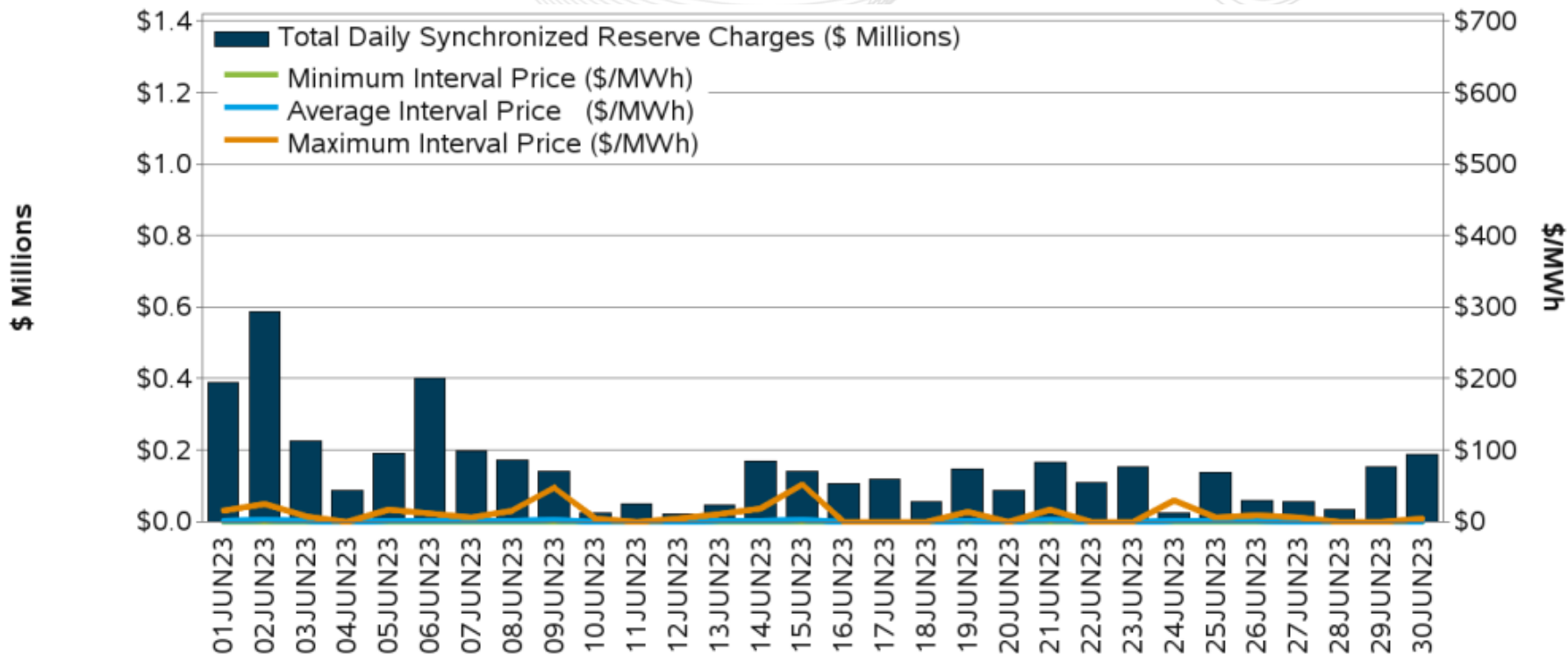




# Regulation Market Daily Prices and Charges



# Synchronized Reserve Market Daily Prices and Charges



Jennifer Warner-Freeman  
[Jennifer.Freeman@pjm.com](mailto:Jennifer.Freeman@pjm.com)



### Member Hotline

(610) 666 – 8980

(866) 400 – 8980

[custsvc@pjm.com](mailto:custsvc@pjm.com)