



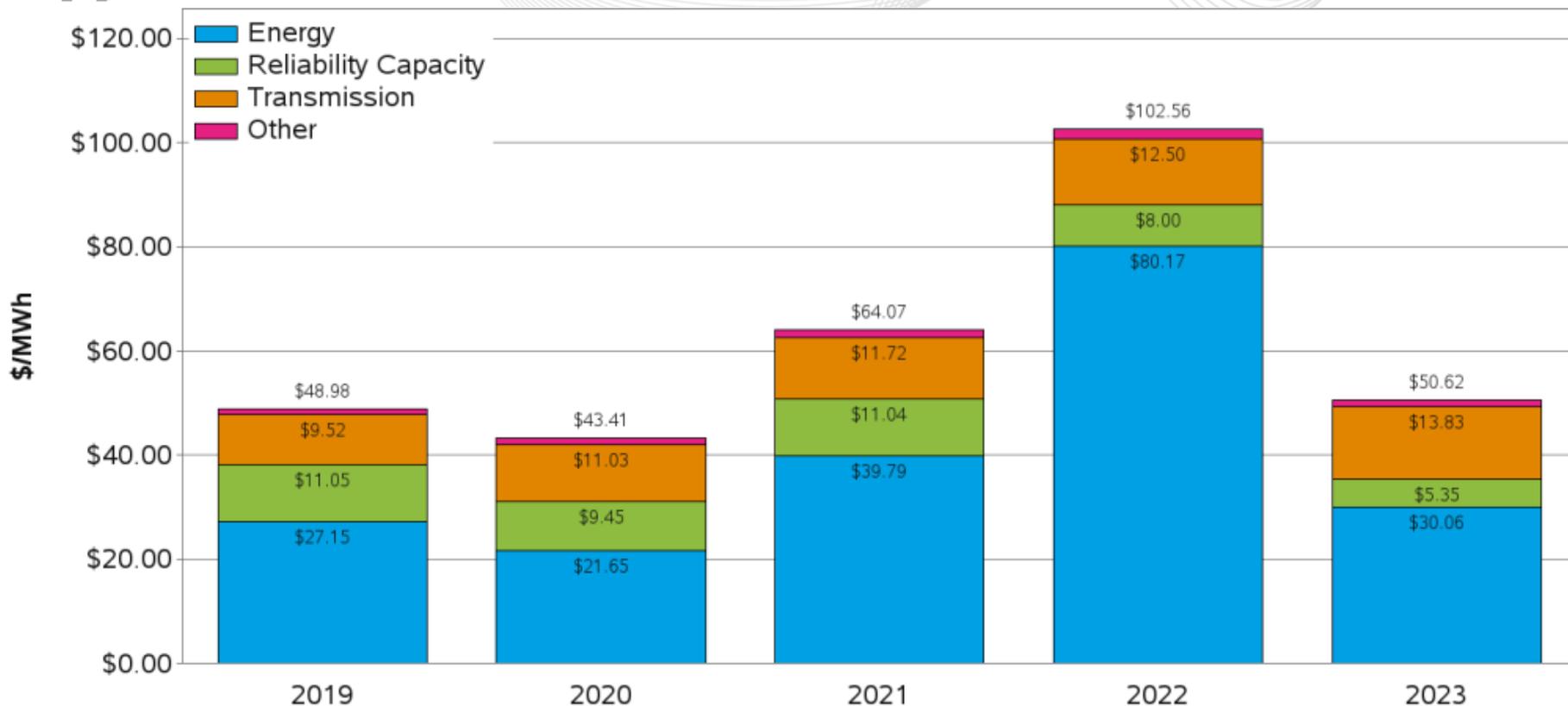
Markets Report

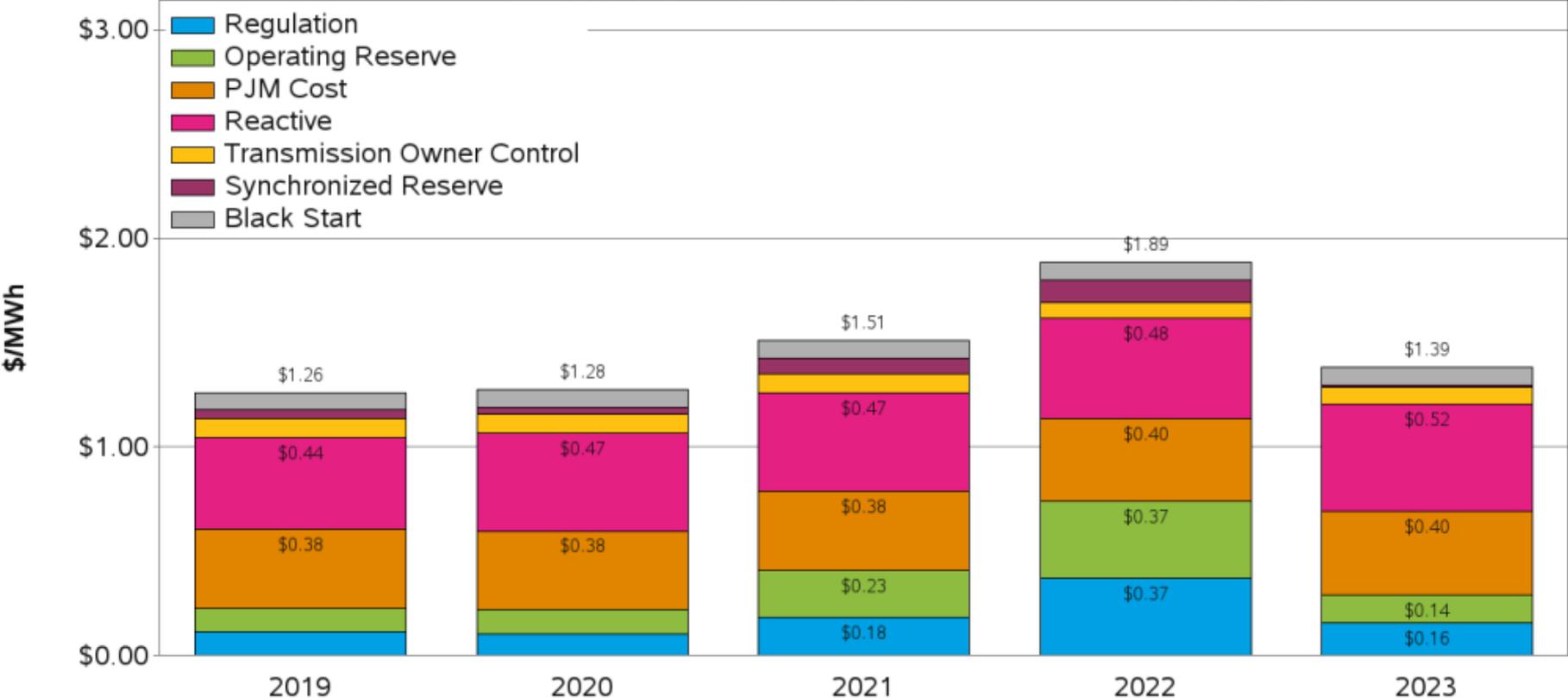
MC Webinar
May 22, 2023

- PJM Wholesale Cost in 2023 is \$50.62/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 April, temperatures were above average for most of the month. Thus, the sum of Heating and Cooling Degree Days was below its historic average. (Slides 8-10)
- Energy use was also below its historic average for April. (Slides 8-10)
- In April, uplift exceeded \$800,000 on four days. (Slides 25 & 26)

- Load-weighted average LMP for 2023 is \$30.06/MWh: (Slides 35-37)
 - April 2023 was \$29.30/MWh, which is lower than April 2022 (\$63.90/MWh) but in-line with April 2021 (\$26.70/MWh).
- There were no 5-minute intervals that experienced shortage pricing in April. (Slides 33-34)
- FTR revenue adequacy for the month of April is 100% and the 2022-2023 Planning Year is currently funded at 100%. (Slides 52-55)
- Congestion values were trending upwards in 2022. However, 2023 has seen a return to lower monthly values. (Slide 53)
- Regulation and Synchronized Reserve market costs have generally tracked with energy prices over time. (Slides 69-71)

Markets Report

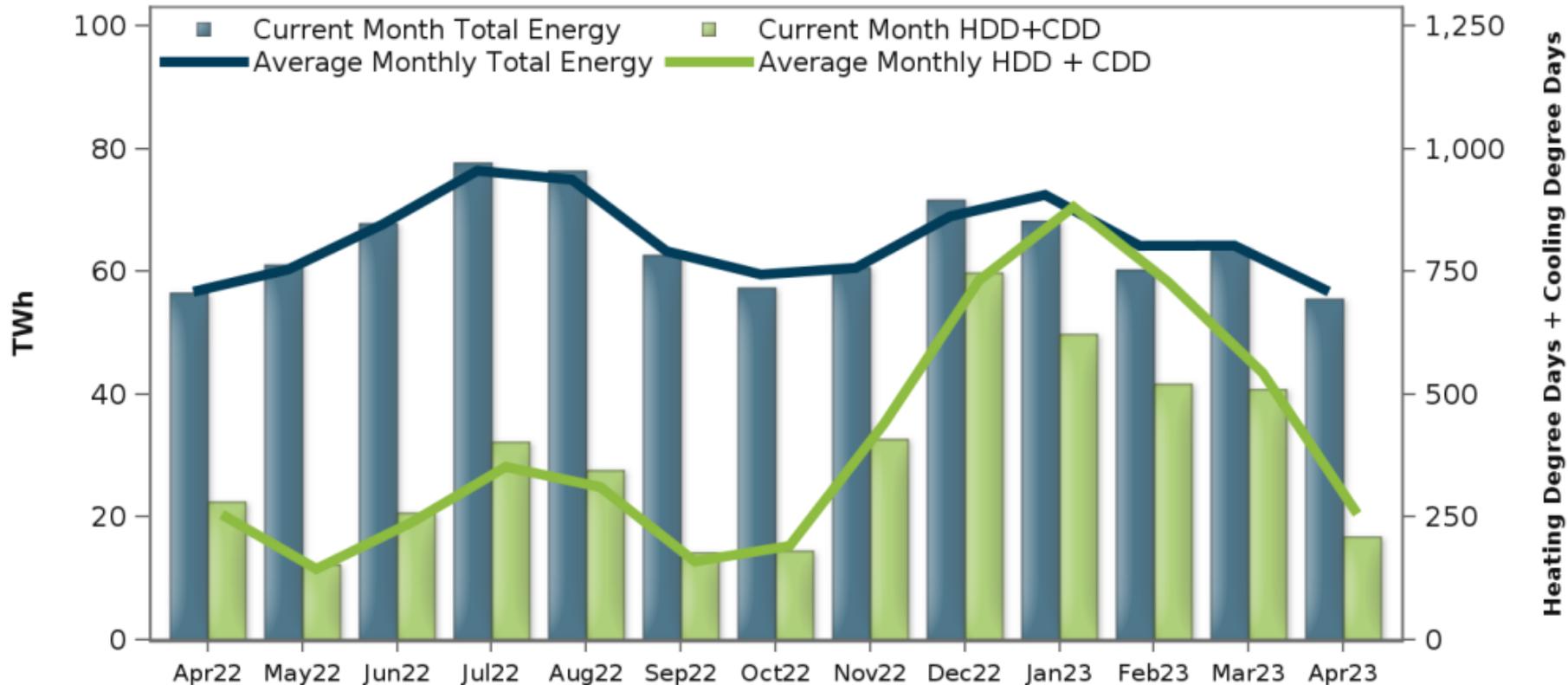




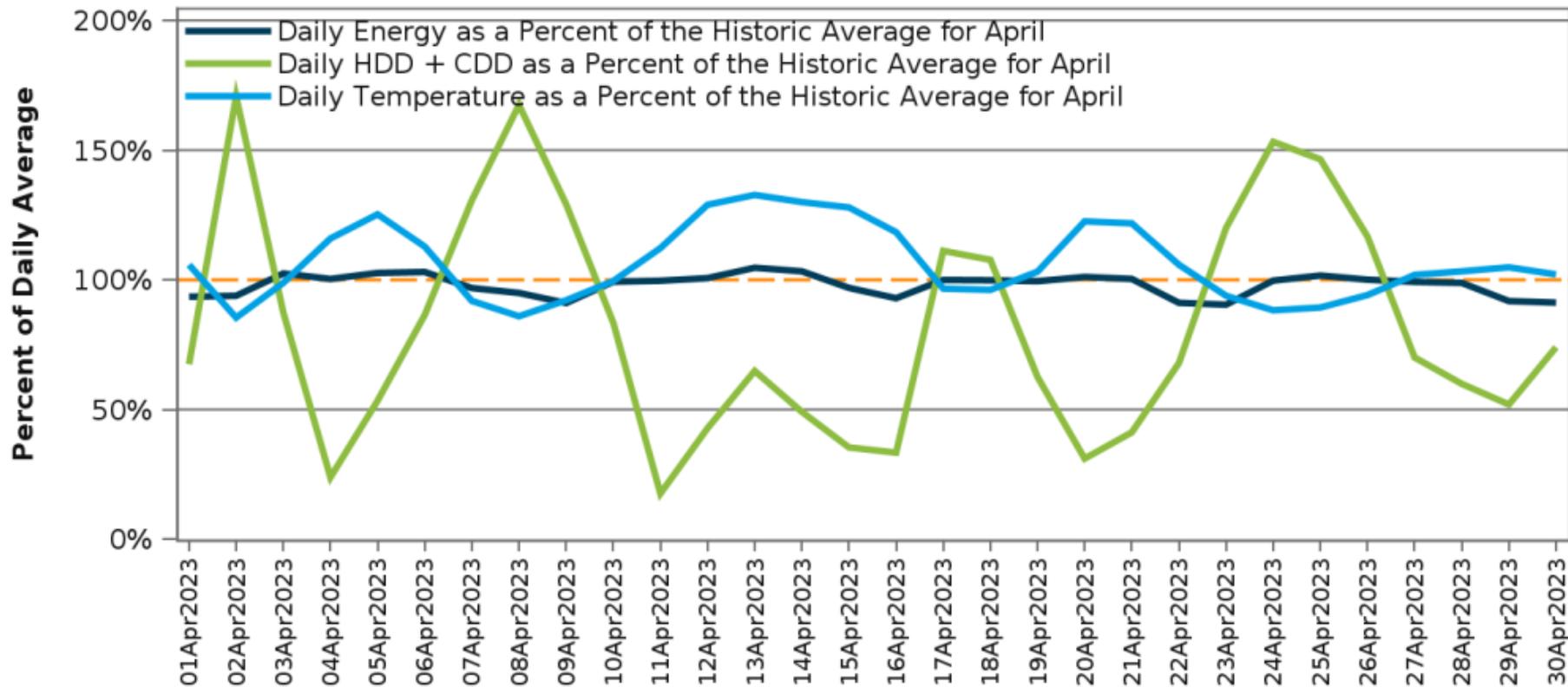
Market Conditions

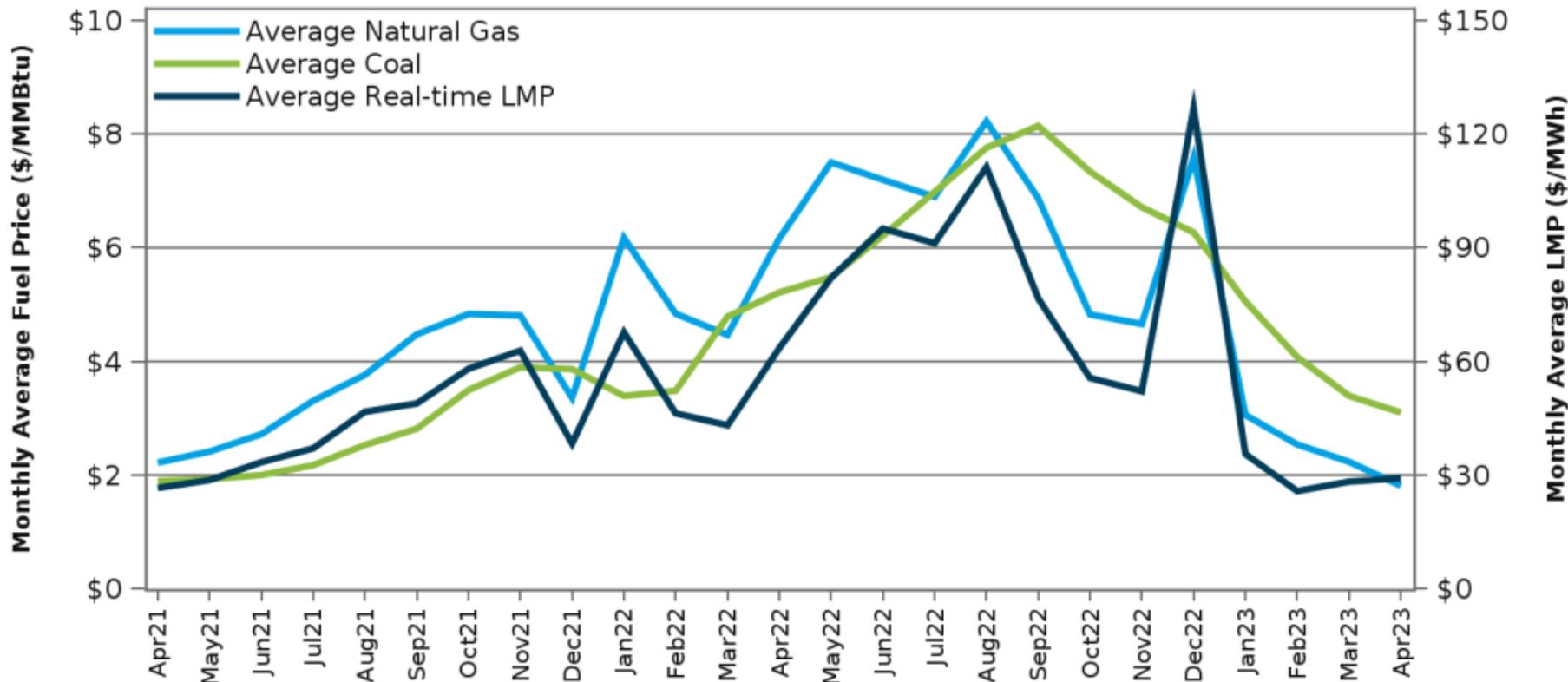
- The weather parameter shown in the following slide is a monthly sum of daily Heating Degree Days (HDD) and Cooling Degree Days (CDD).
- Degree days represent a deviation from a baseline temperature, in this case 60 degrees for HDD and 65 degrees for CDD. As temperatures get more extreme, colder or 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, 2020. Averages include load data for all of TO zones in the current RTO footprint.

Historic Average Weather and Energy versus Current Month

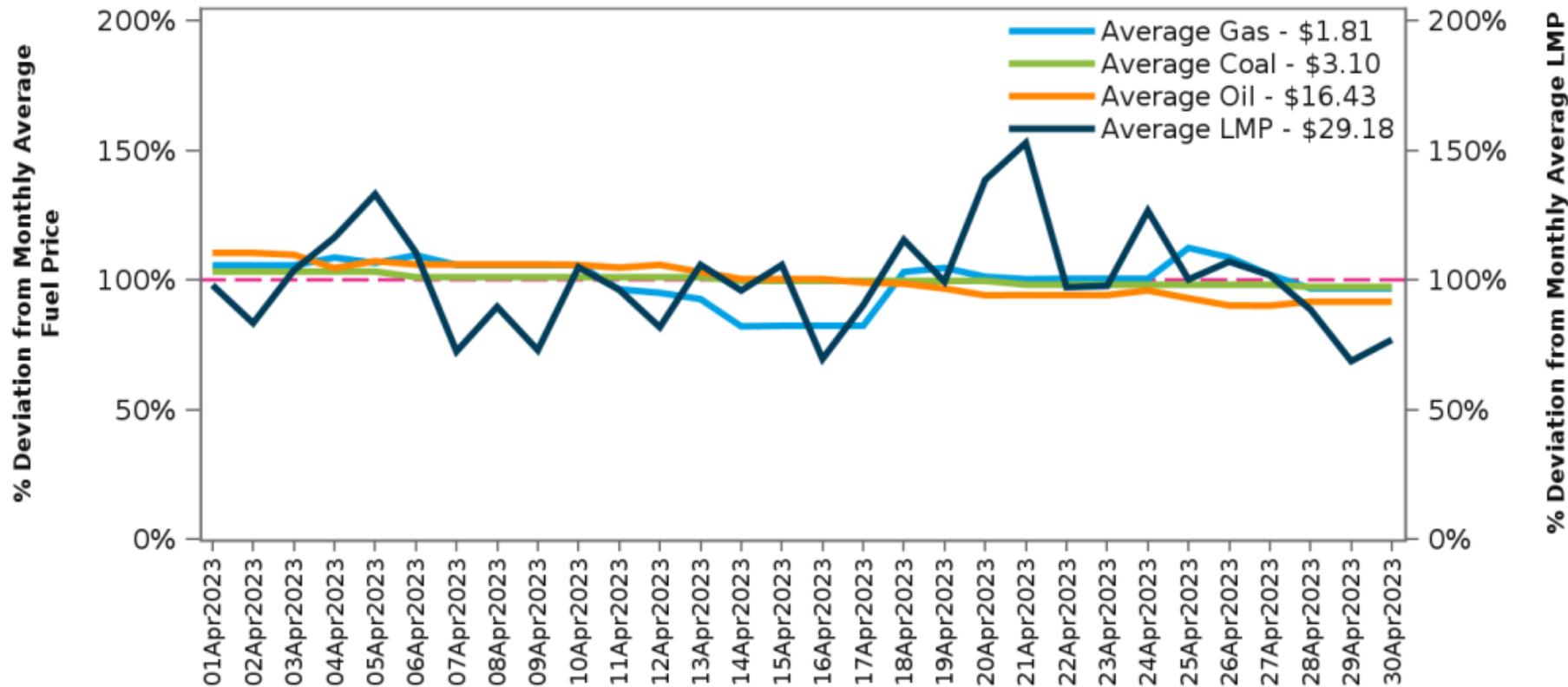


Historic Average Weather and Energy versus Current Month - Daily





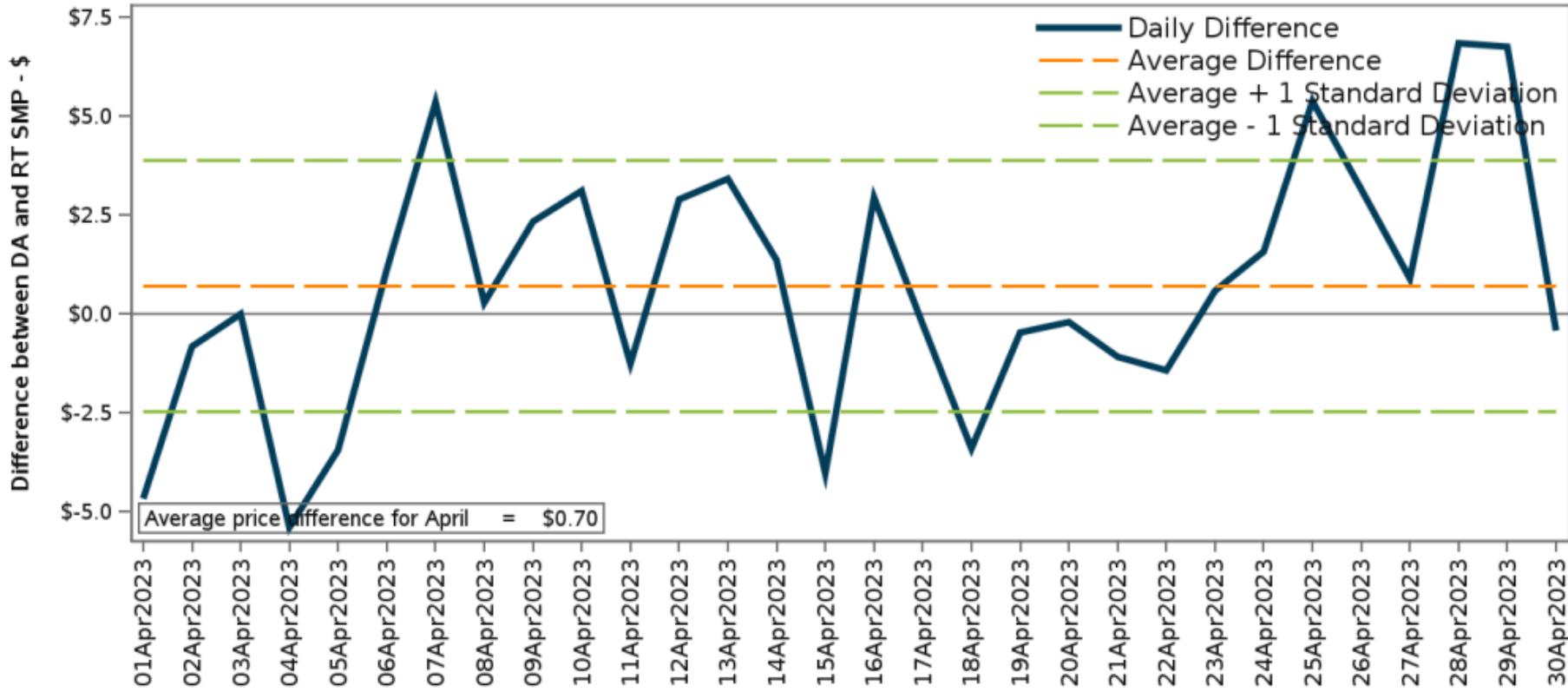
Fuel Price Source: S&P Global Platts



Fuel Price Source: S&P Global Platts

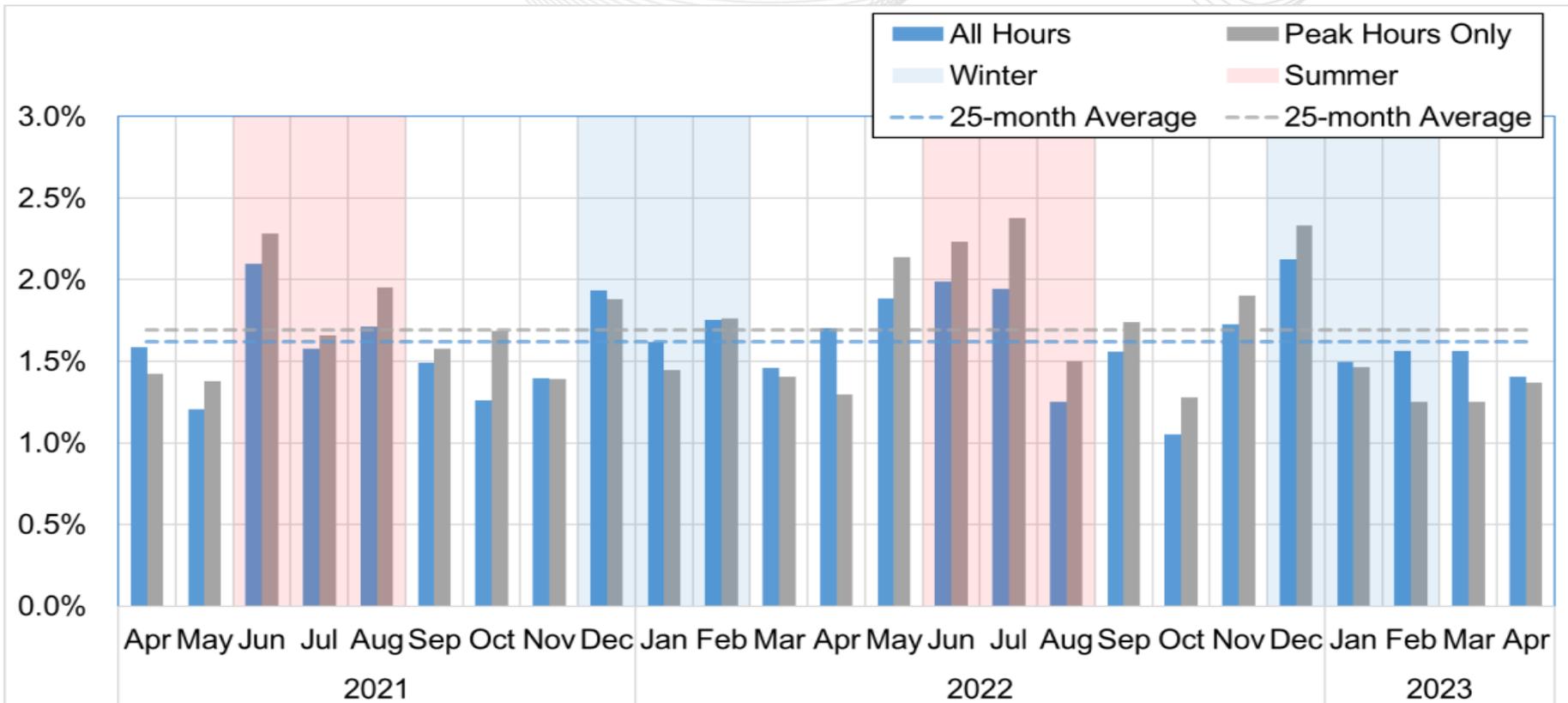


Daily Difference Between Day-Ahead and Real-Time System Marginal Prices

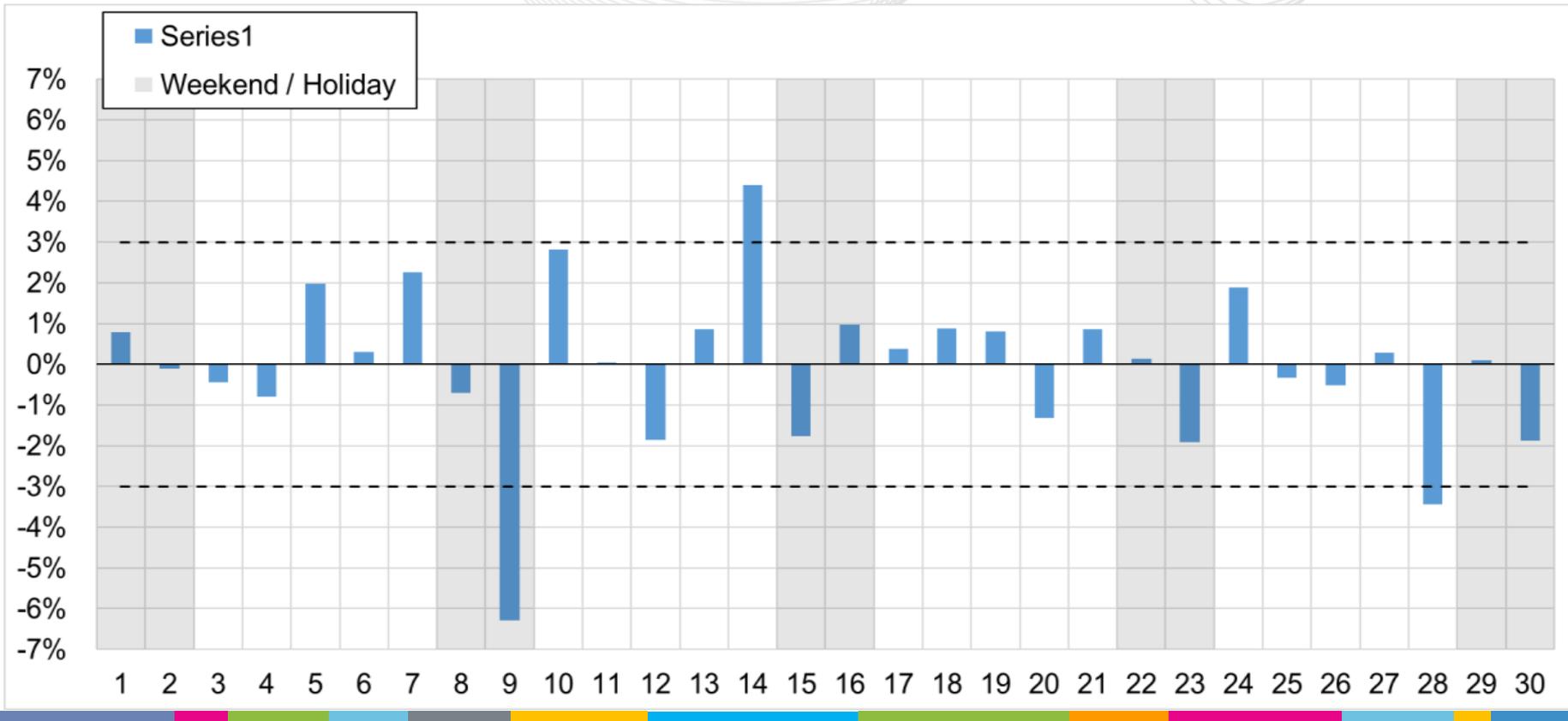


Positive values represent days when the DA daily average price was higher than RT. Negative values represent days when the DA price was lower.

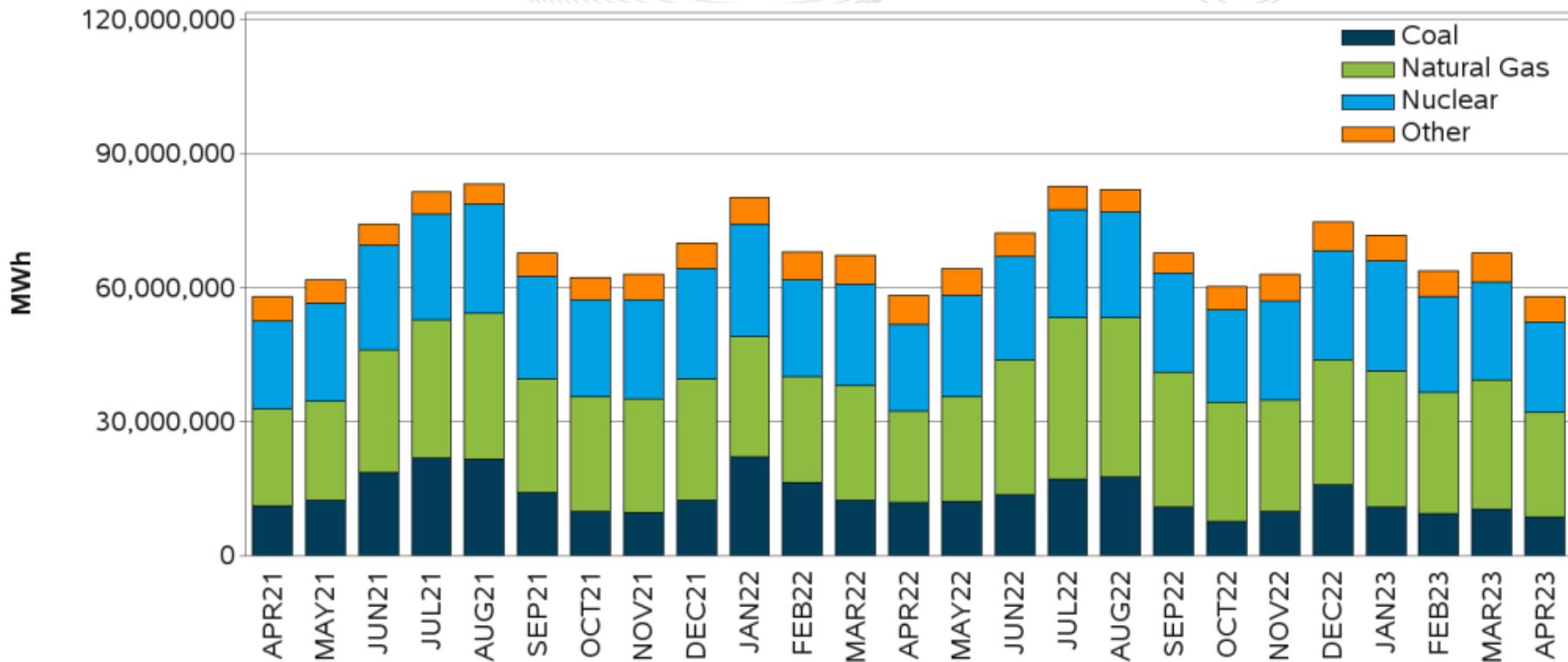
Load Forecast Error - Monthly Absolute Error, 10:00 Forecast



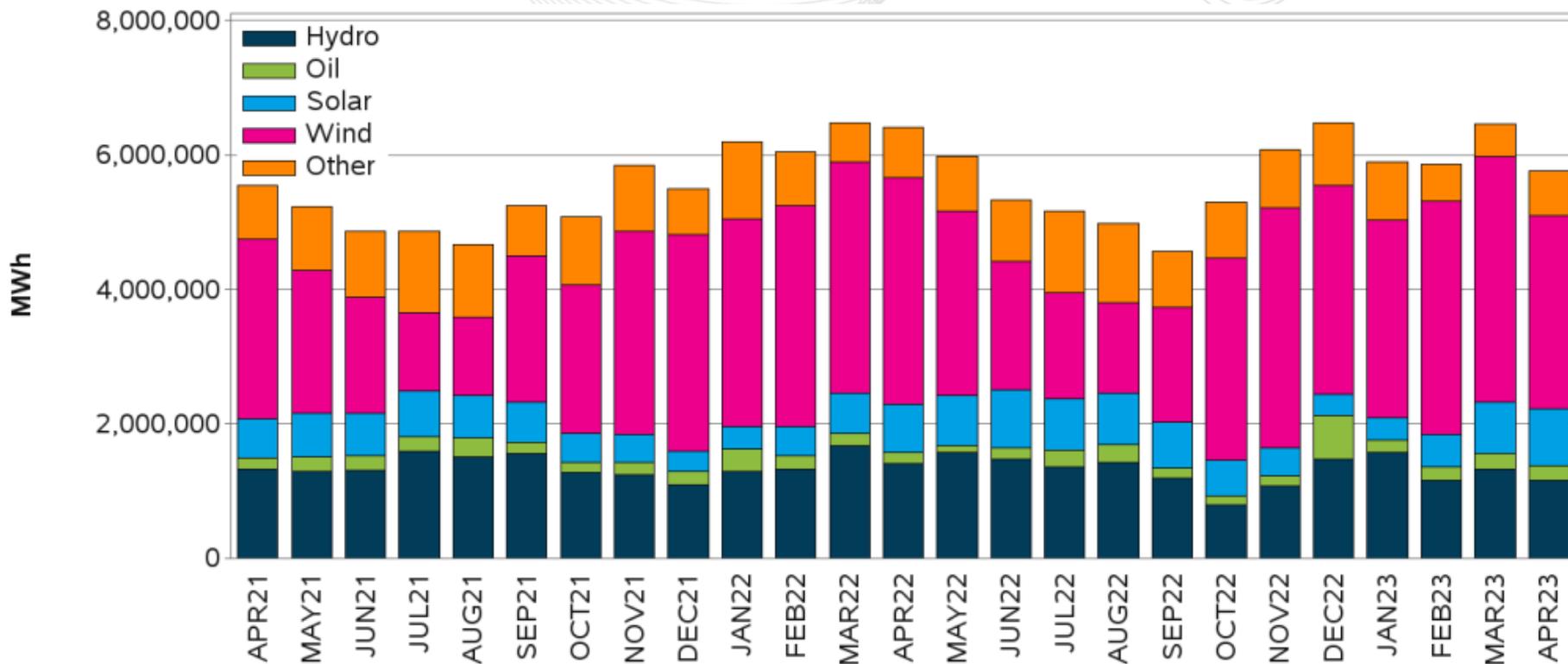
Load Forecast Error - April Daily Peaks, 10:00 Forecast



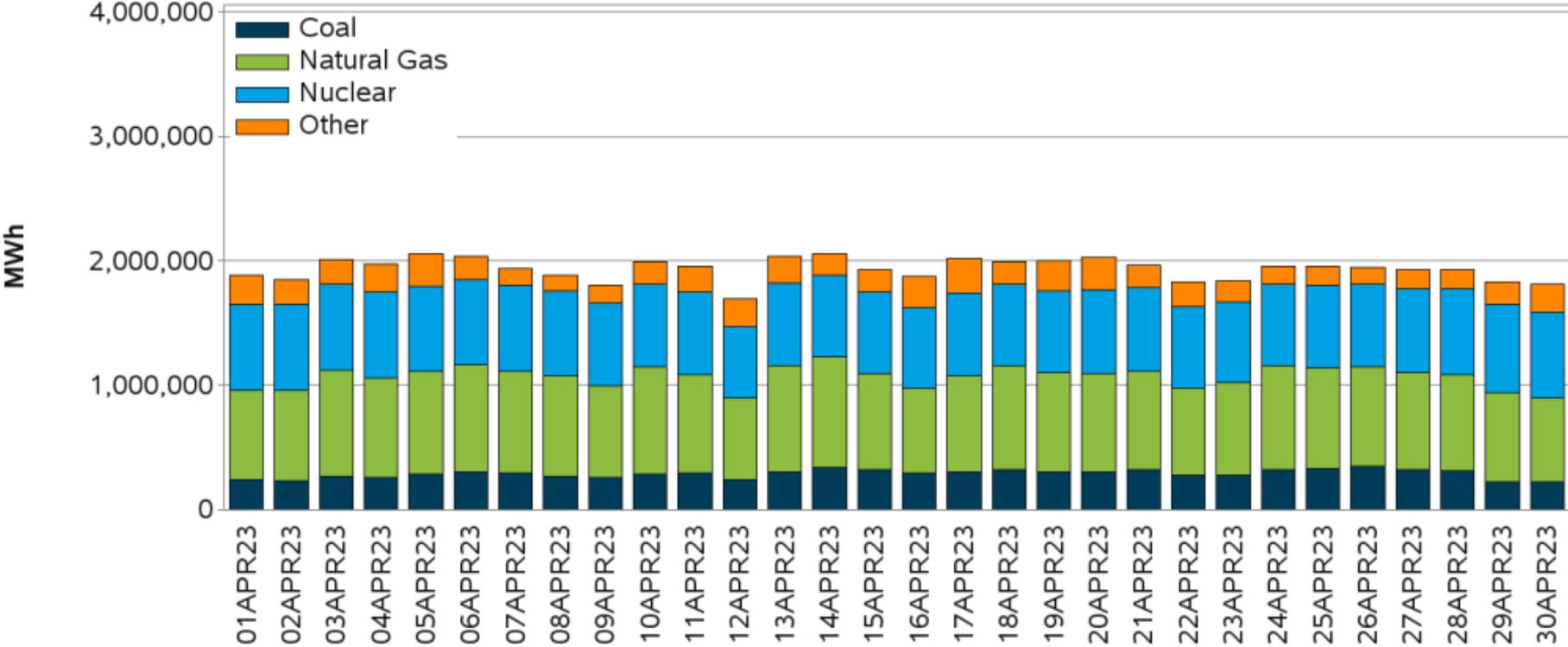
- PJM prepares a day-ahead load forecast at 10:00 am for use by our members.
- This forecast is not used to clear the day-ahead market and is not utilized for the reliability tools that run subsequent to the day-ahead market.
 - On April 9, peak load was under-forecasted due to temperatures coming in colder than forecast and a low biased holiday impact as loads in Easter's of the past few years have come in much lower than forecast.
 - On April 14, peak load was over-forecasted due to temperature error and cloud forecast error as high amounts of cloud cover kept temperatures cooler within an unusual early season warm spell.
 - On April 28, the peak load was under-forecasted due to extensive cloud cover and temperatures that came in cooler than forecast in the eastern RTO.



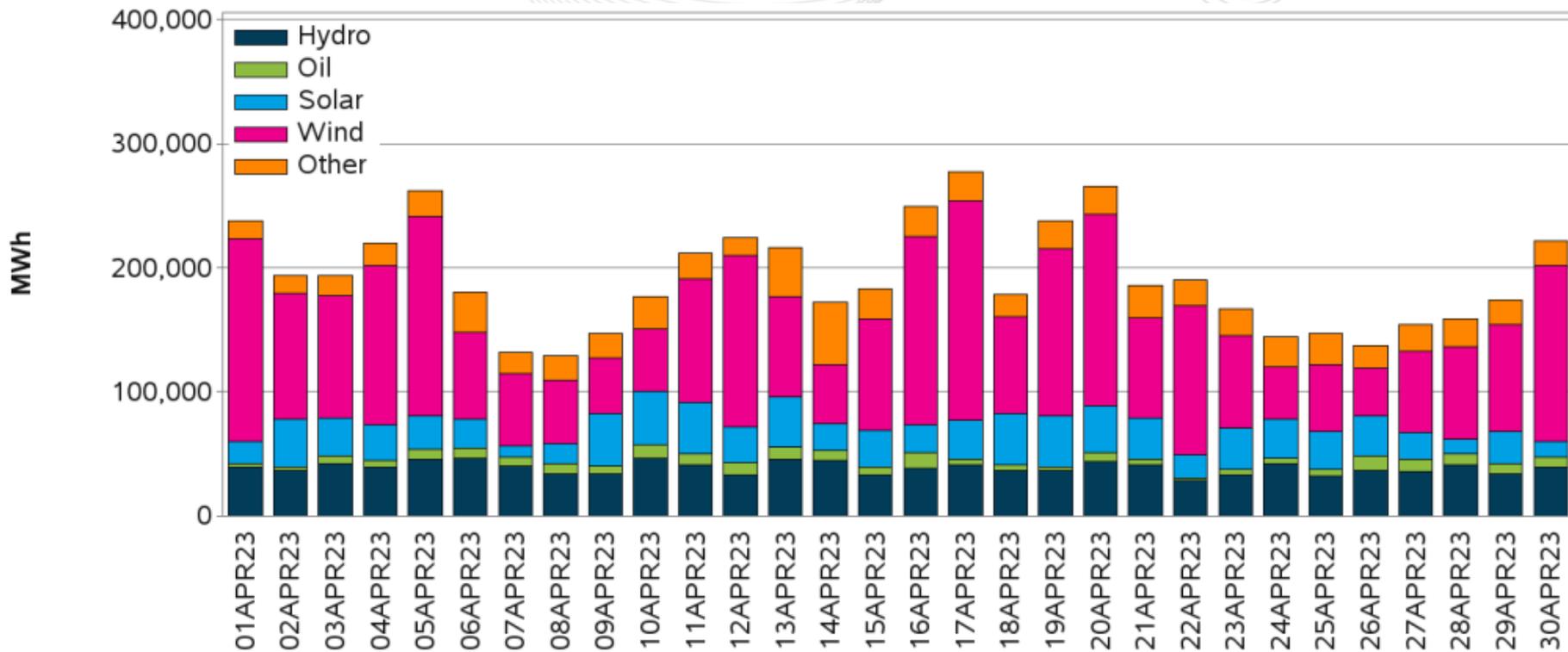
Other includes Hydro, Oil, Solar, Wind, and Other



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

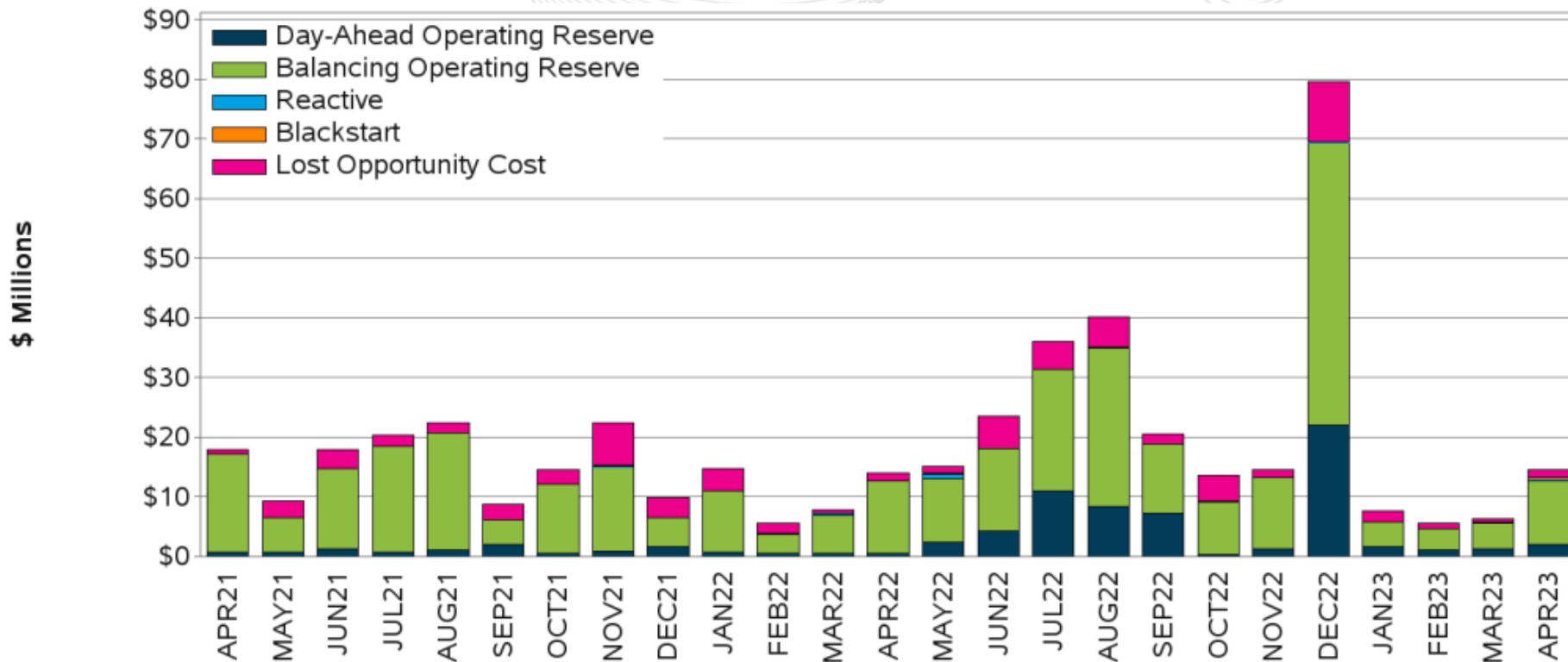


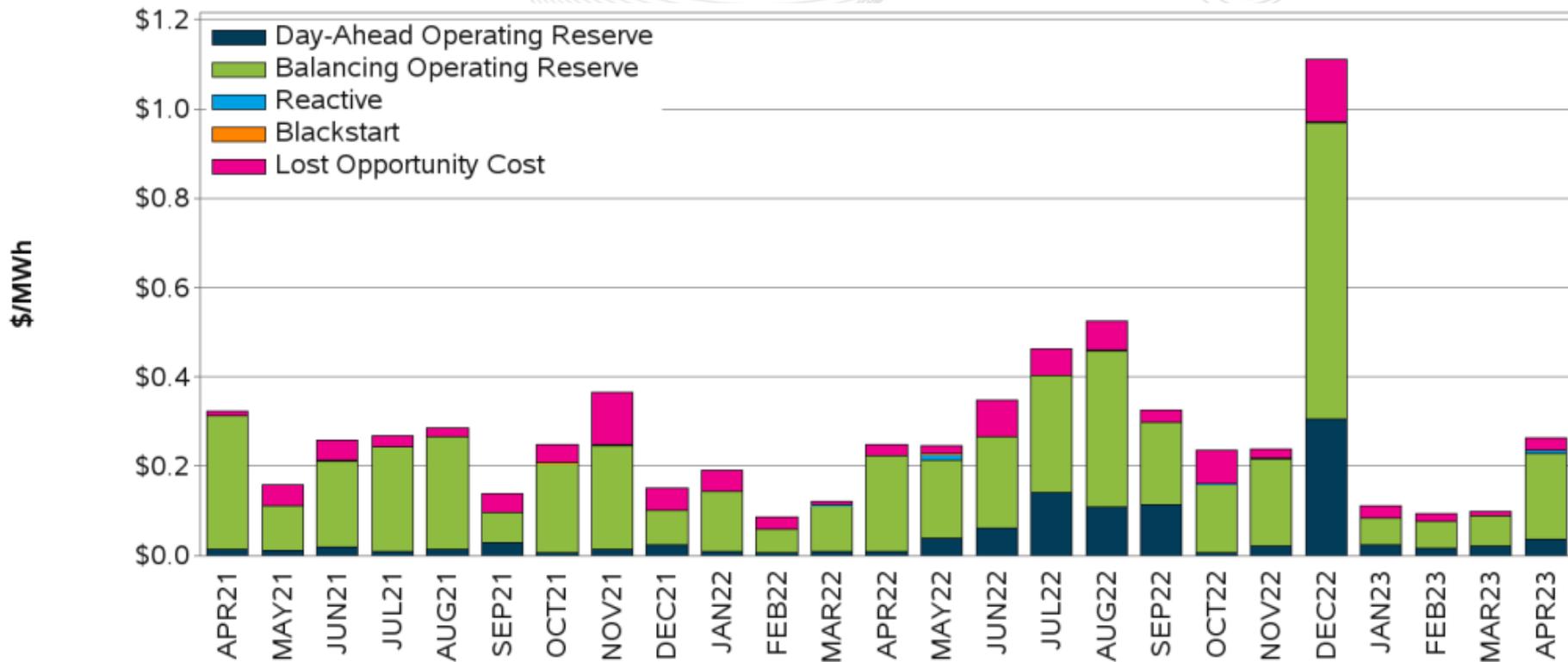
Other includes Hydro, Oil, Solar, Wind, and Other

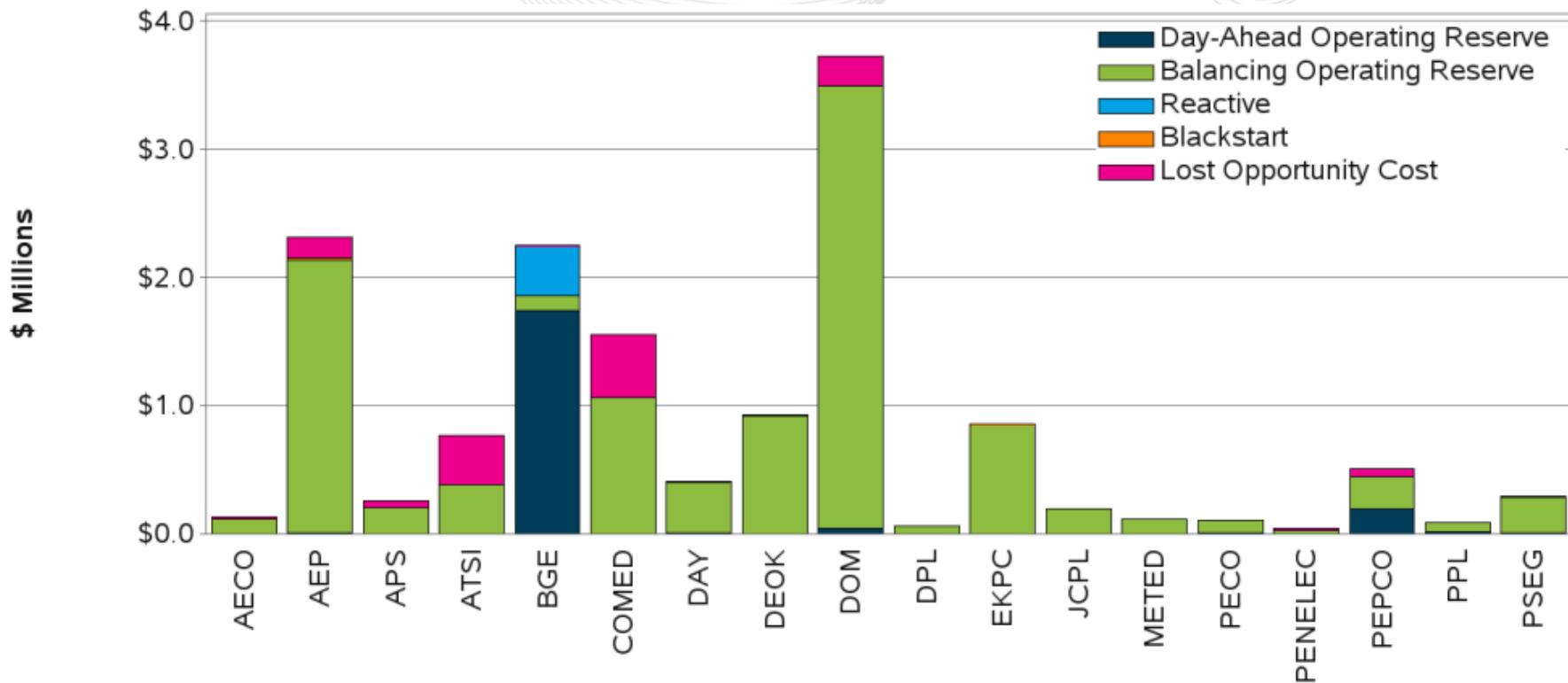


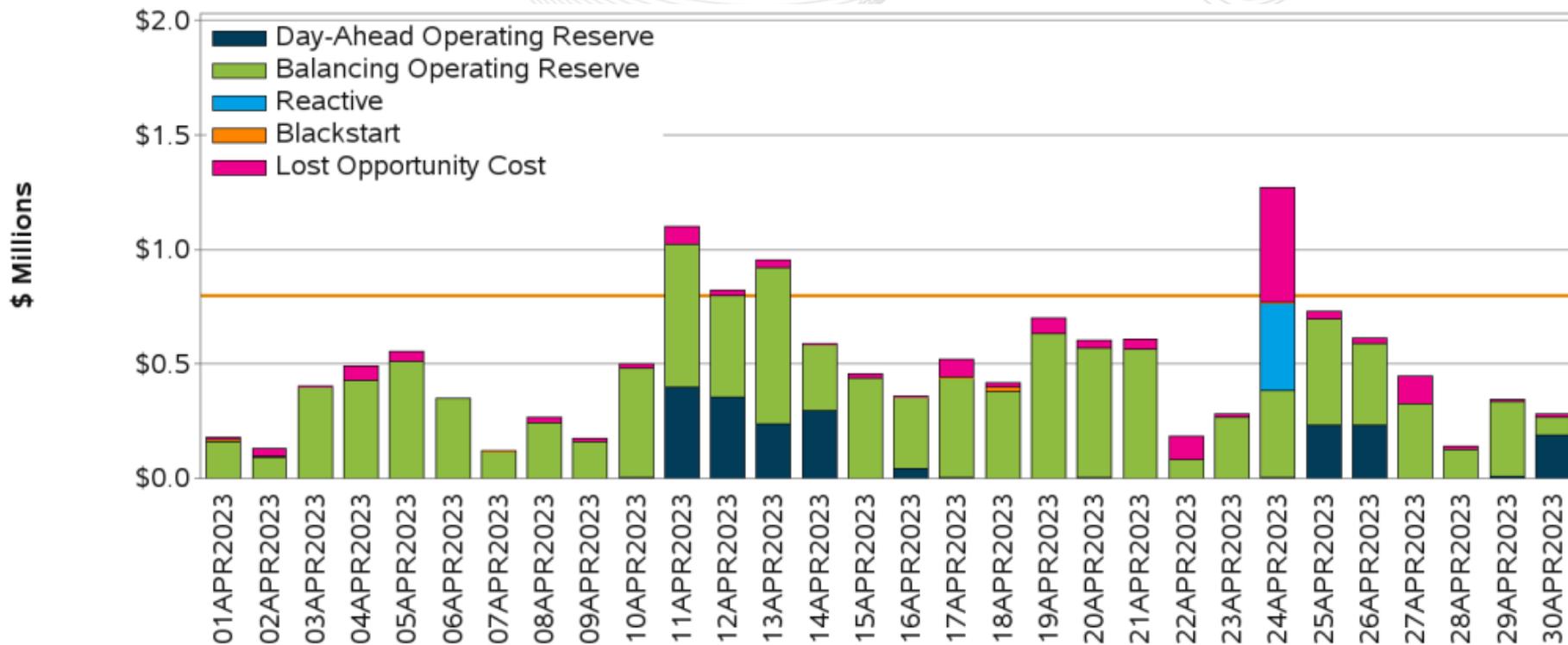
'Other' includes Flywheels, Multiple Fuels, Storage, and Other Renewables

Operating Reserve (Uplift)



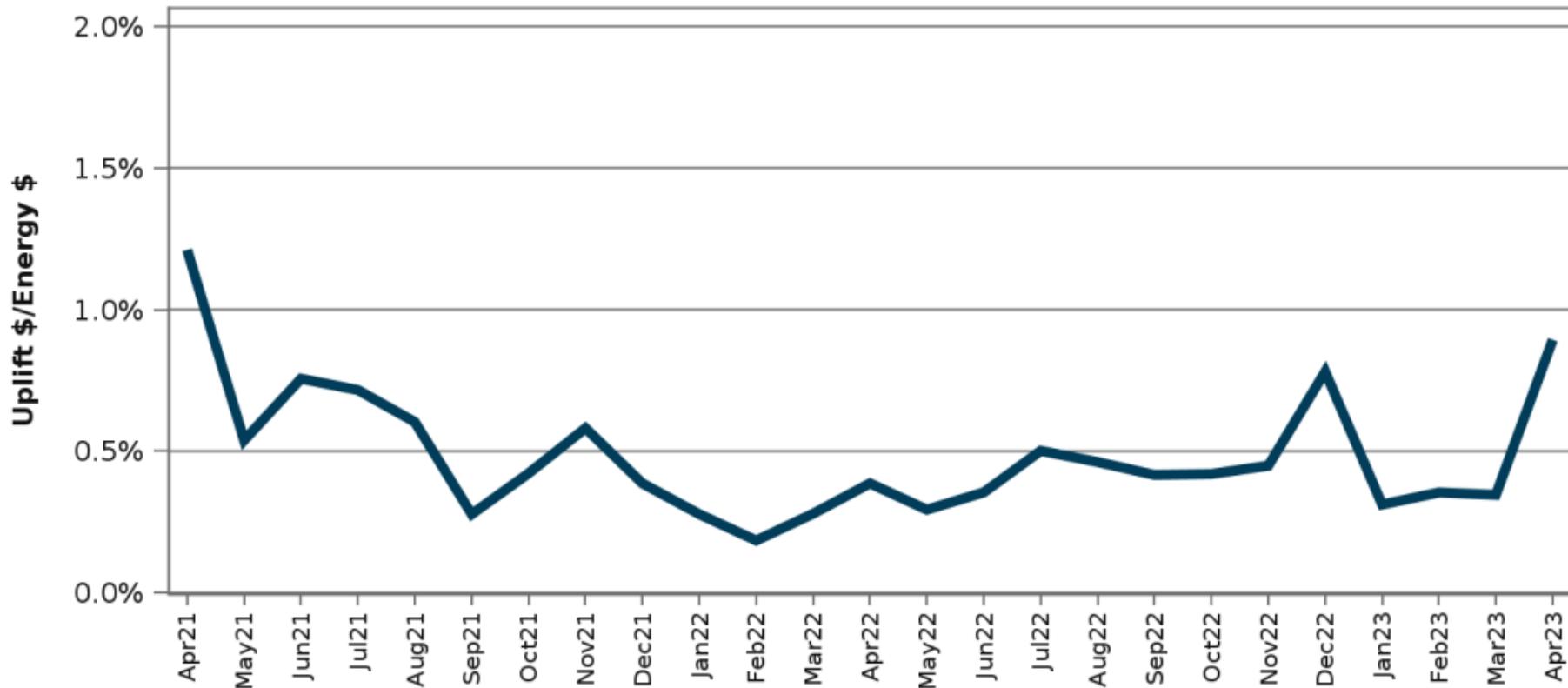




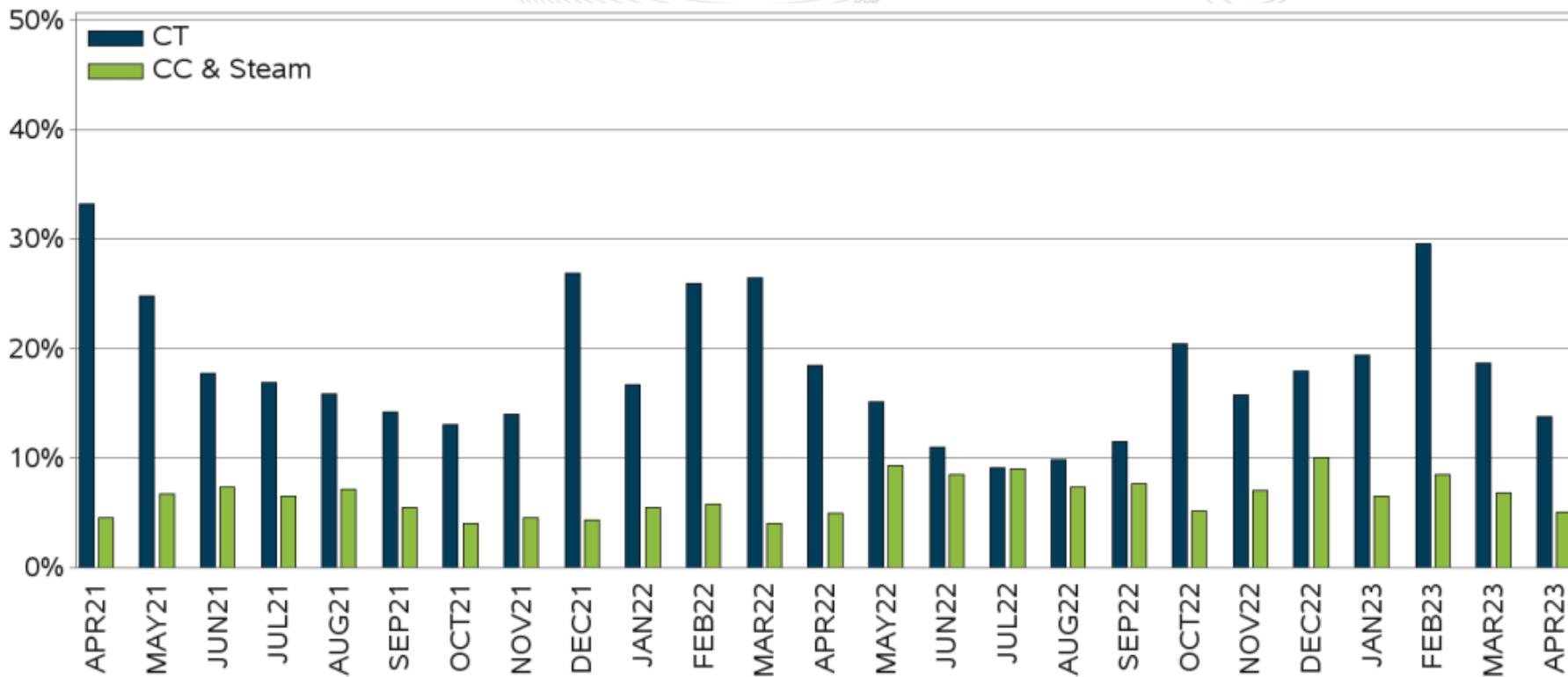


- In April, uplift exceeded \$800,000 on four days -
- Contributing factors to uplift were:
 - Outages coupled with localized congestion

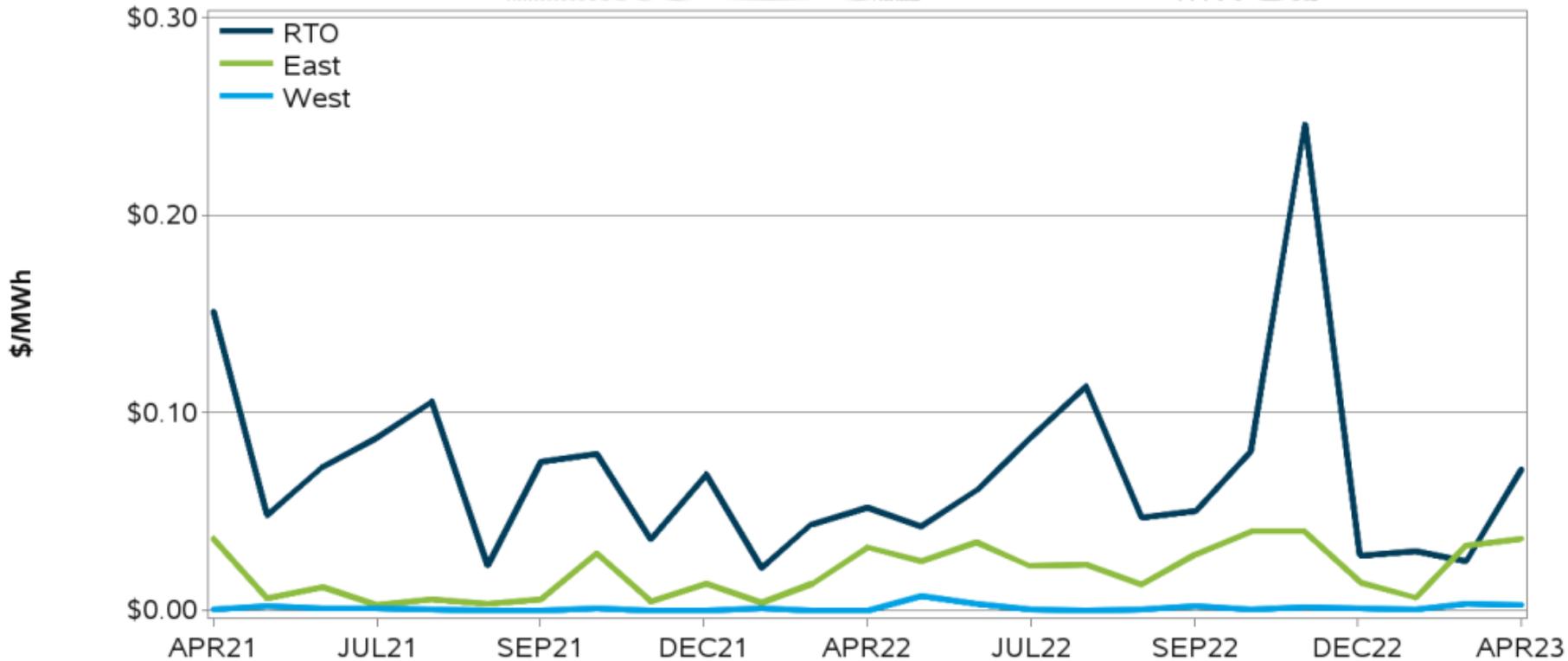
- More information on Uplift can be found on the PJM website at [Drivers of Uplift](#)



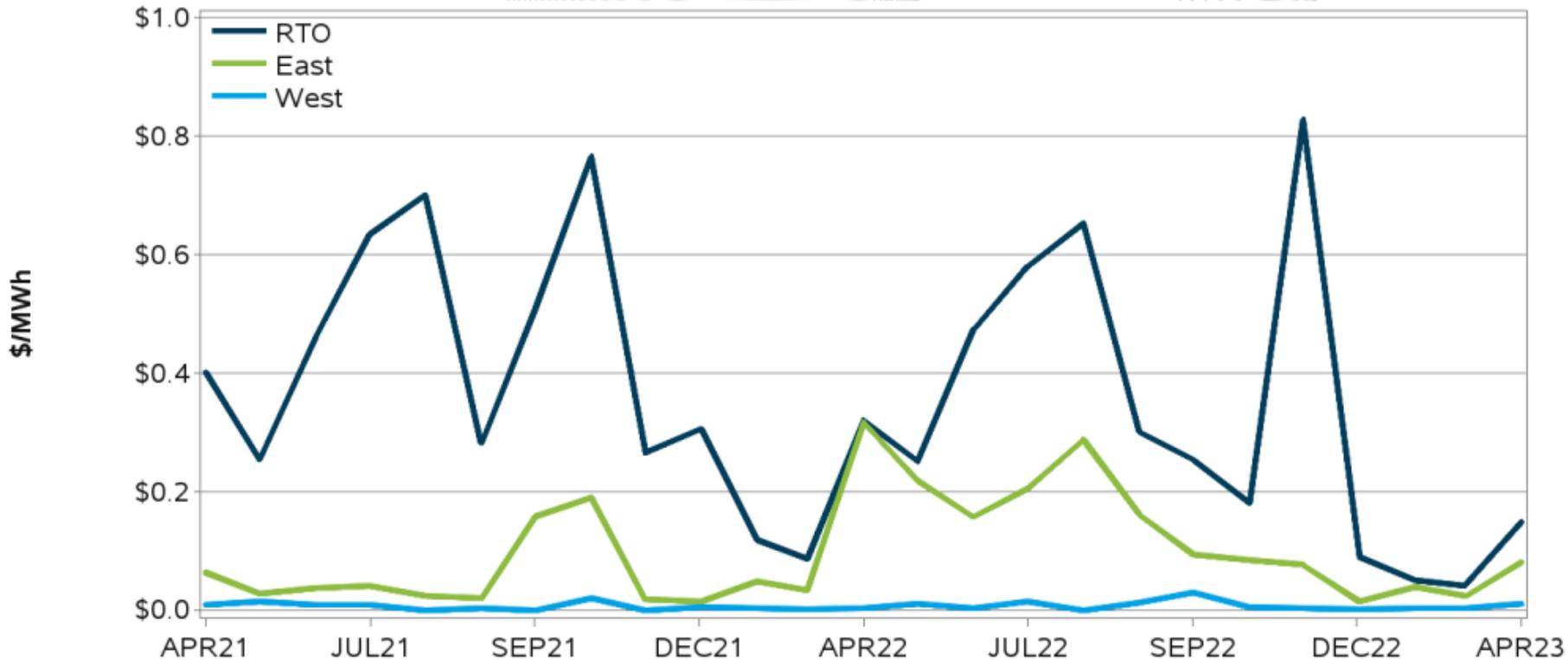
Percent of Total CT, CC and Steam Hours with LMP < Offer



- 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.

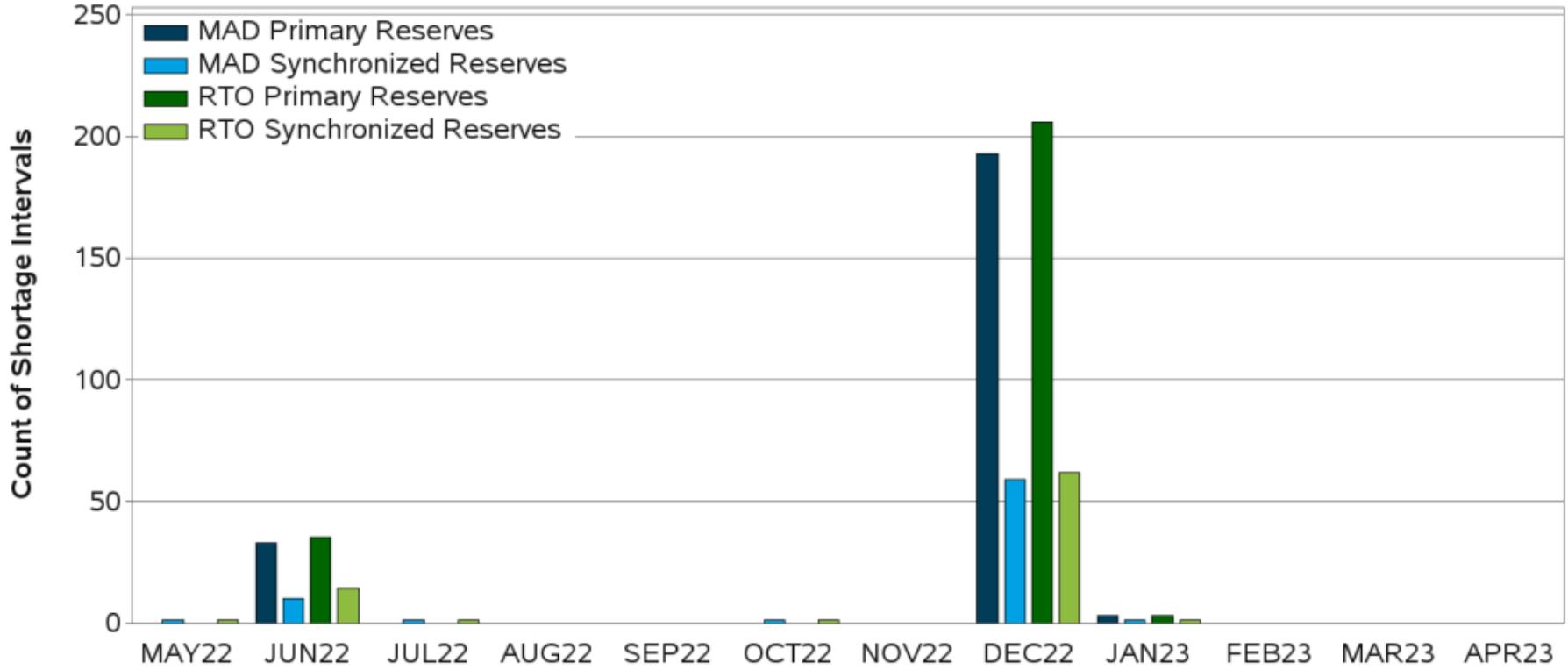


Deviations Balancing Operating Reserve Rates



Energy Market

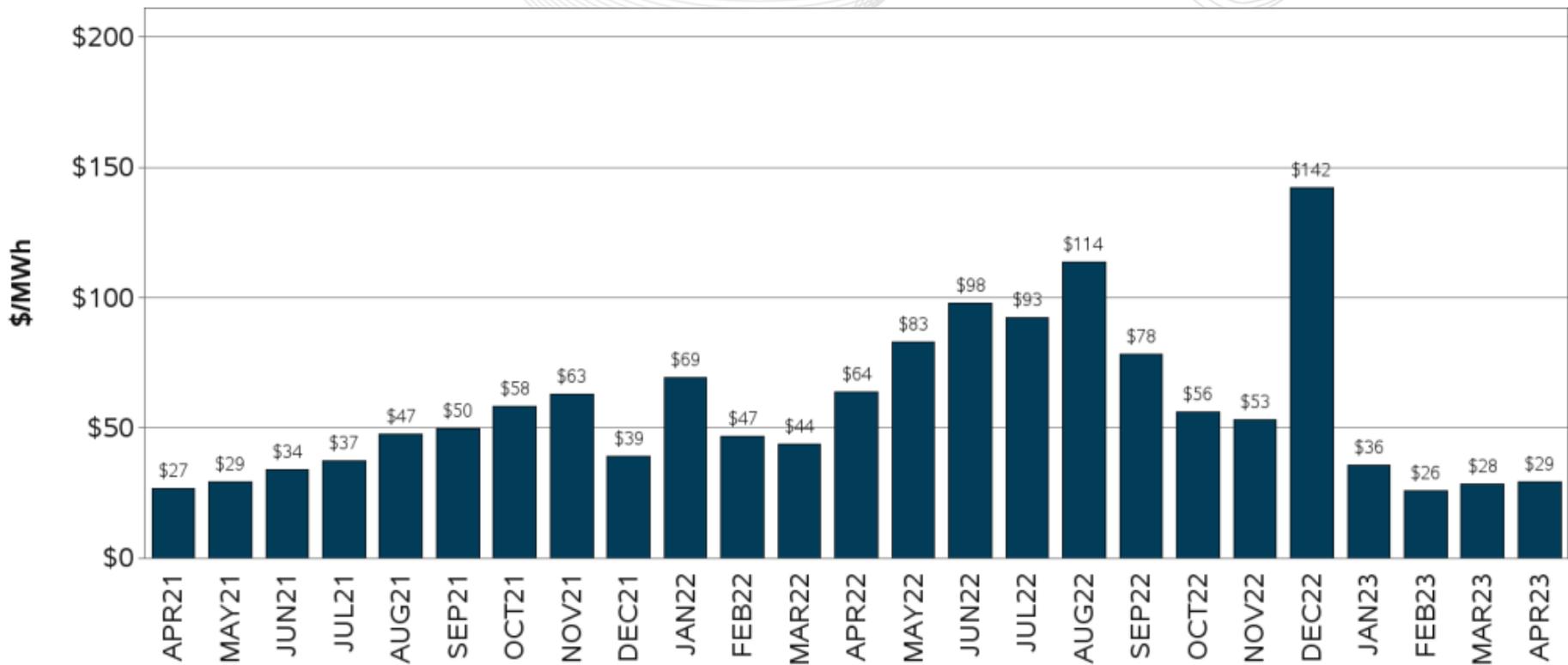
LMP Summary



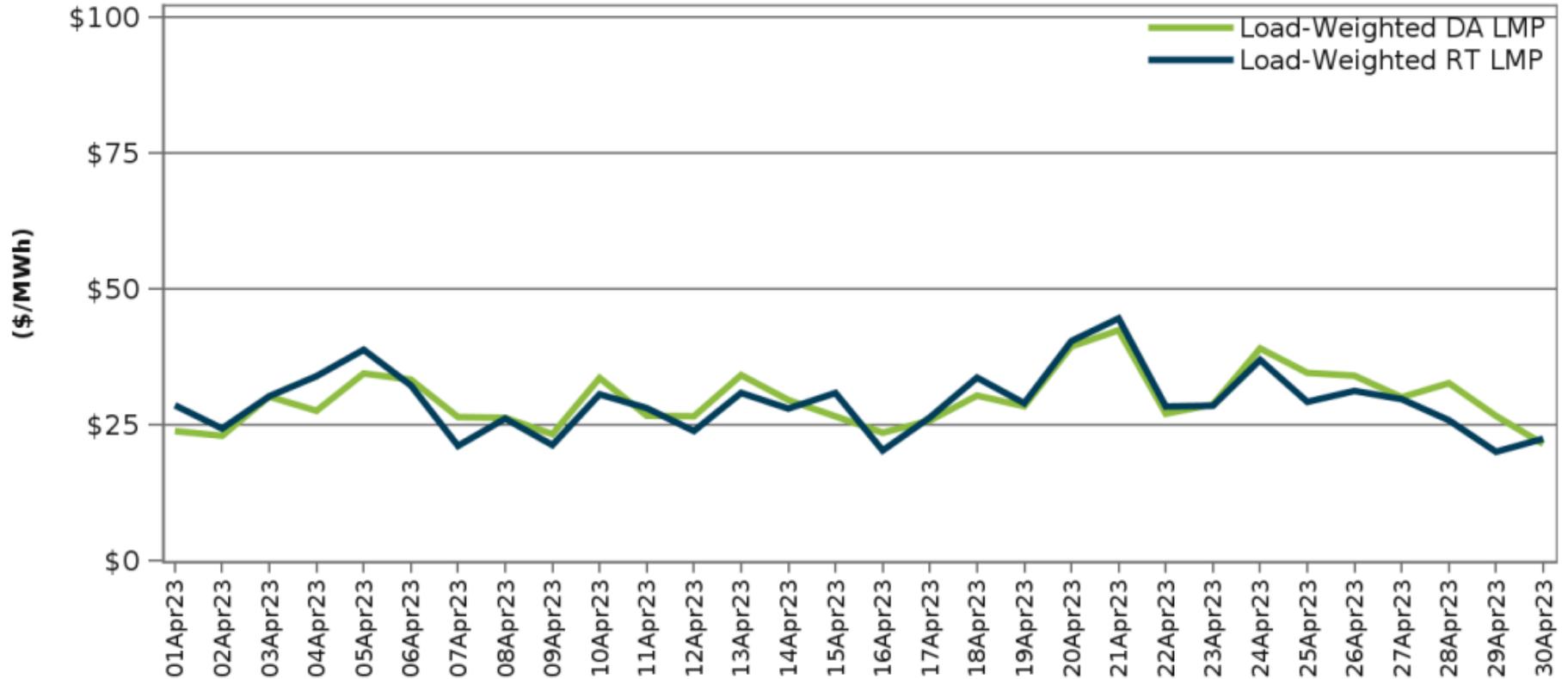
Information on constraints and shadow prices can be found here:

http://dataminer2.pjm.com/feed/rt_marginal_value

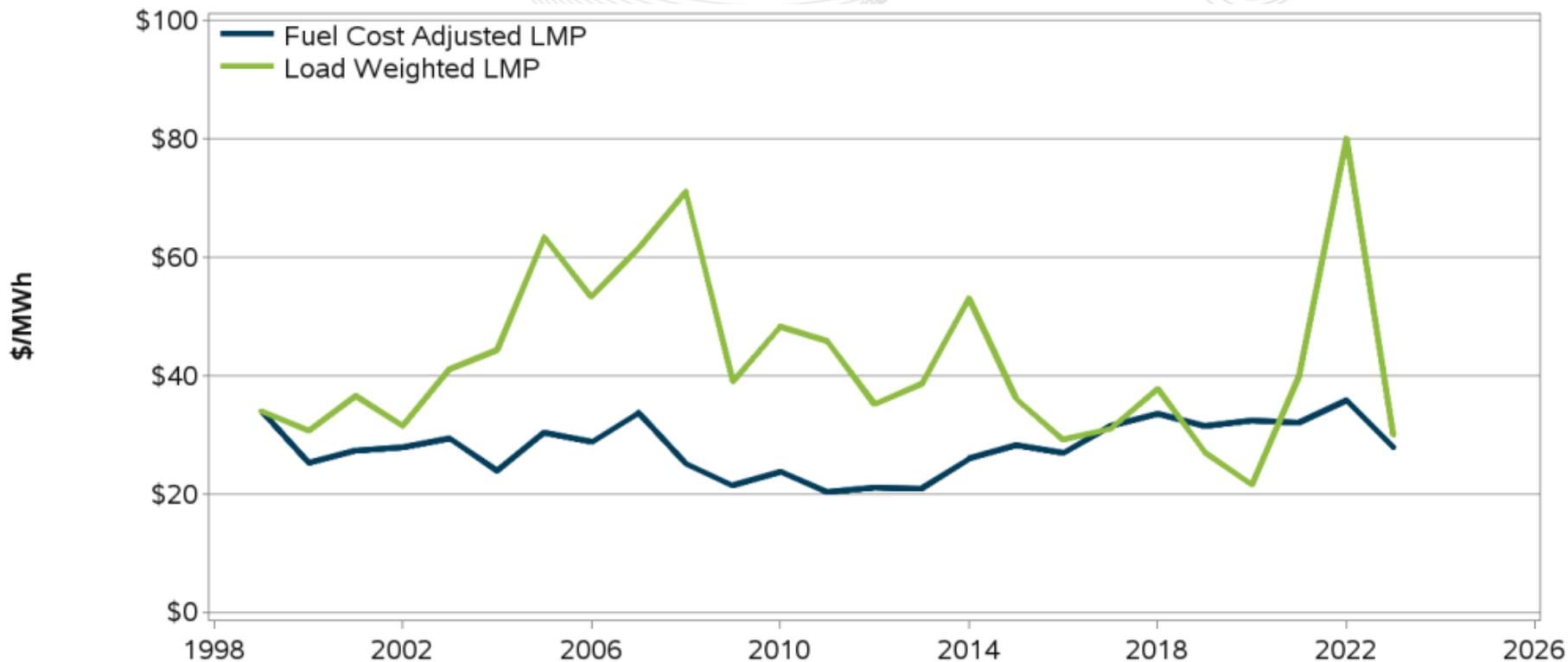
Monthly Load-Weighted Average Real-time LMP

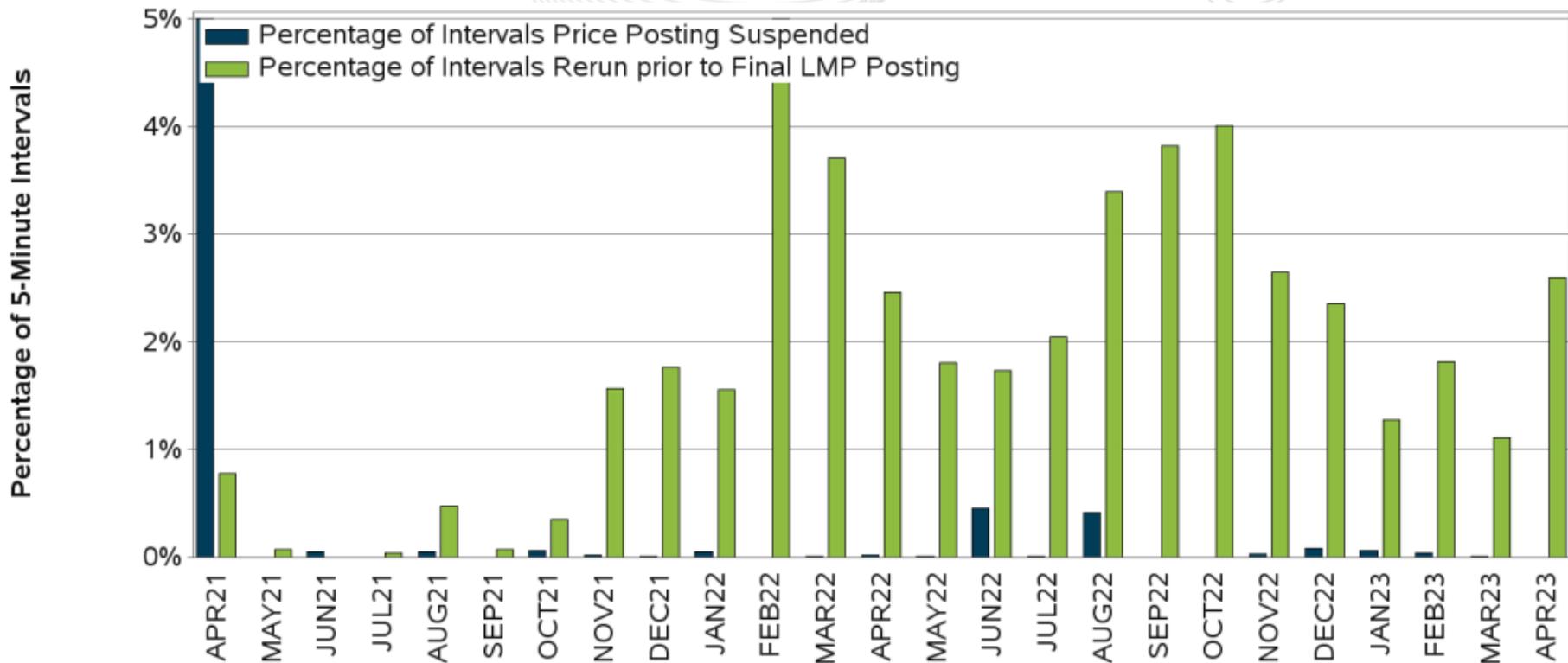


Daily Load-Weighted Average DA & RT LMP



Fuel Cost Adjusted LMP (Referenced to 1999 Fuel Prices)



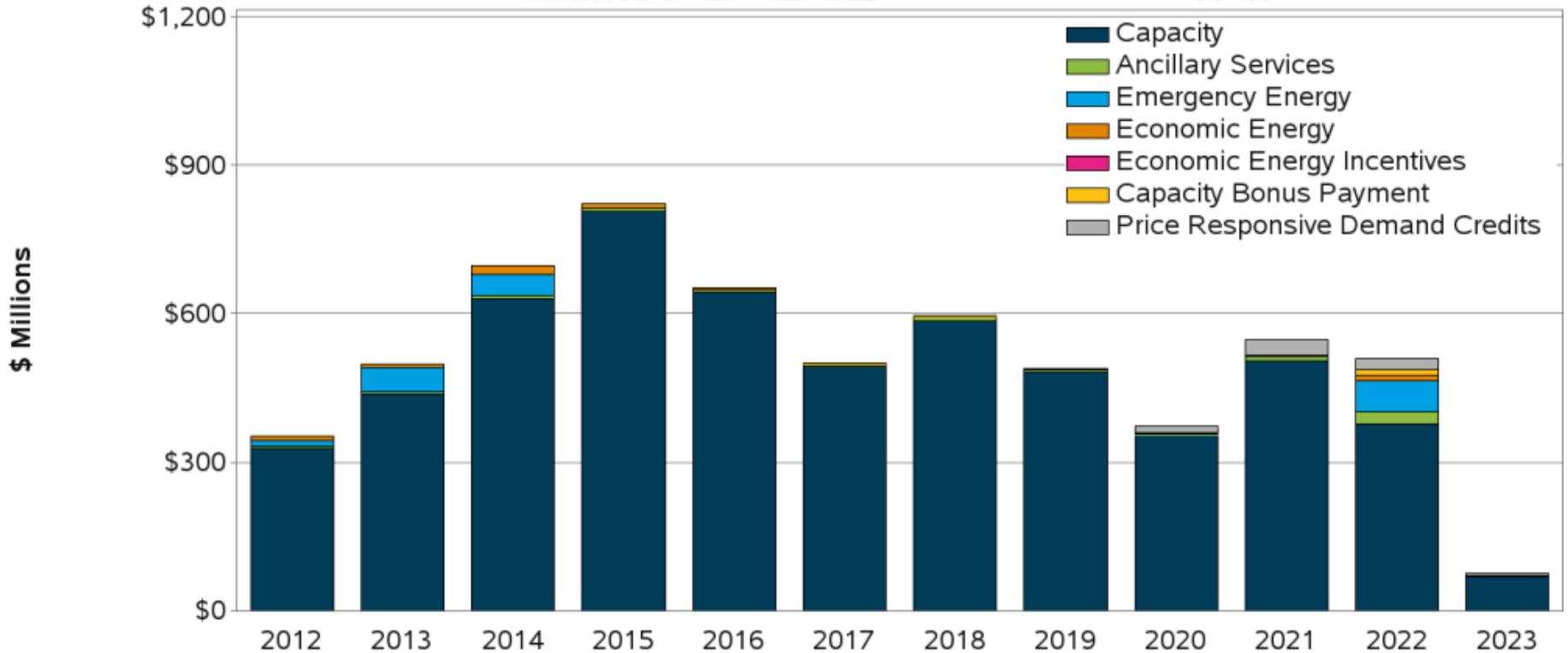


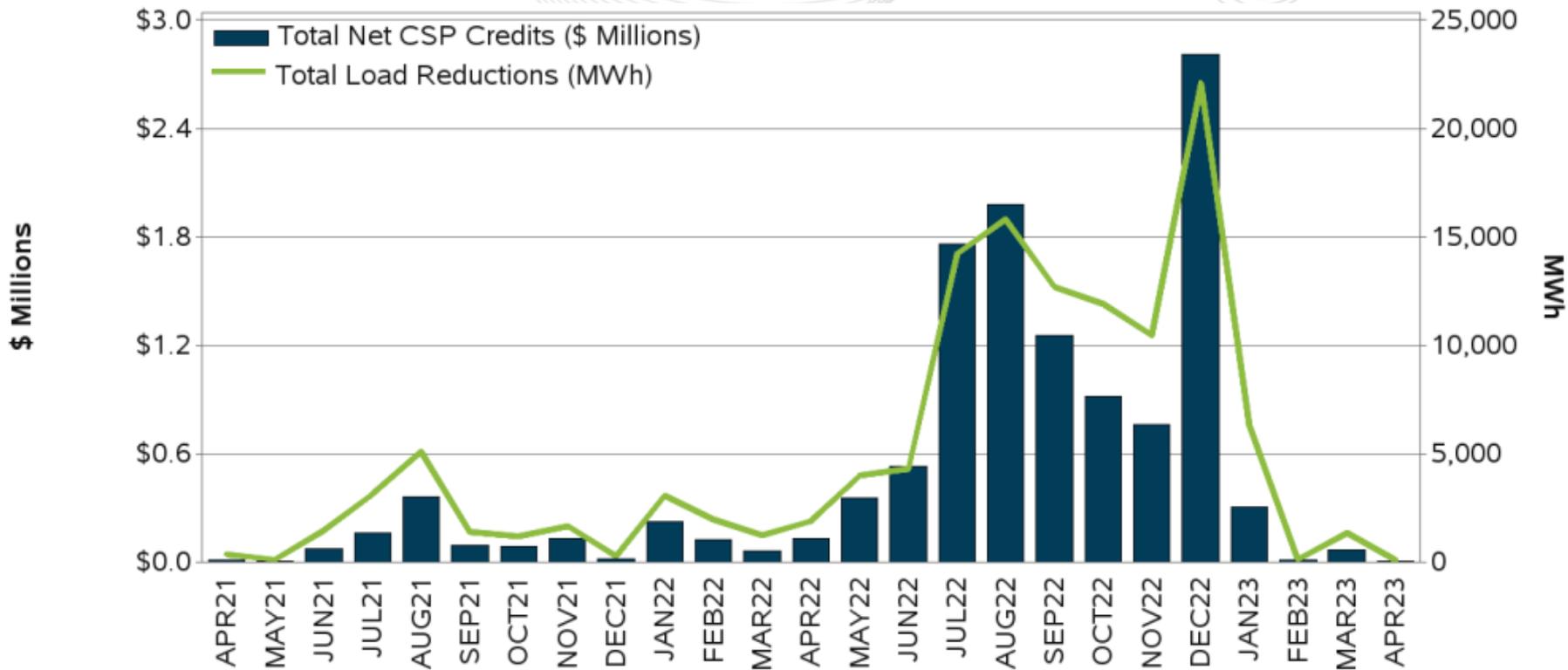
Spike seen in April 2021 is incorrect and due to a software bug which has since been fixed.

Energy Market

Demand Response Summary

Demand Side Response Estimated Revenue

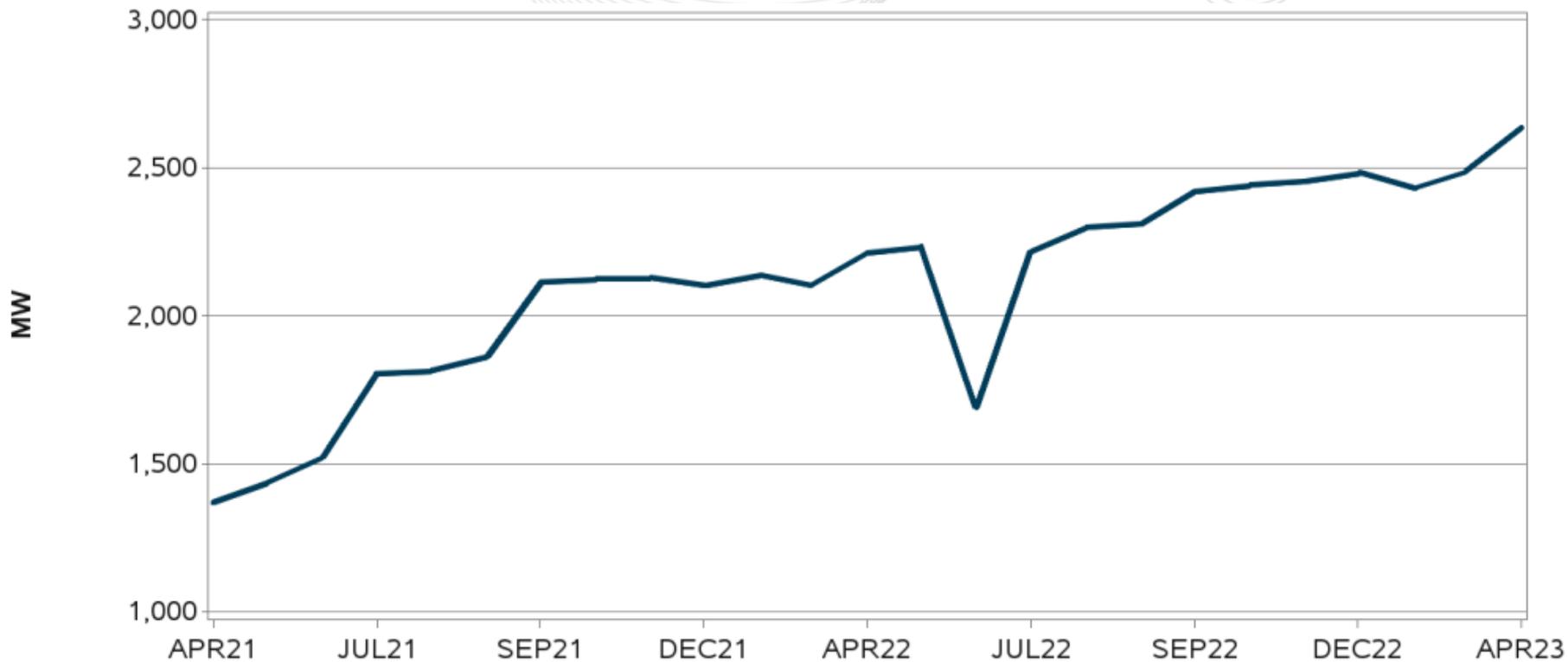




*Data for the last few months are subject to significant change due to the settlement window.



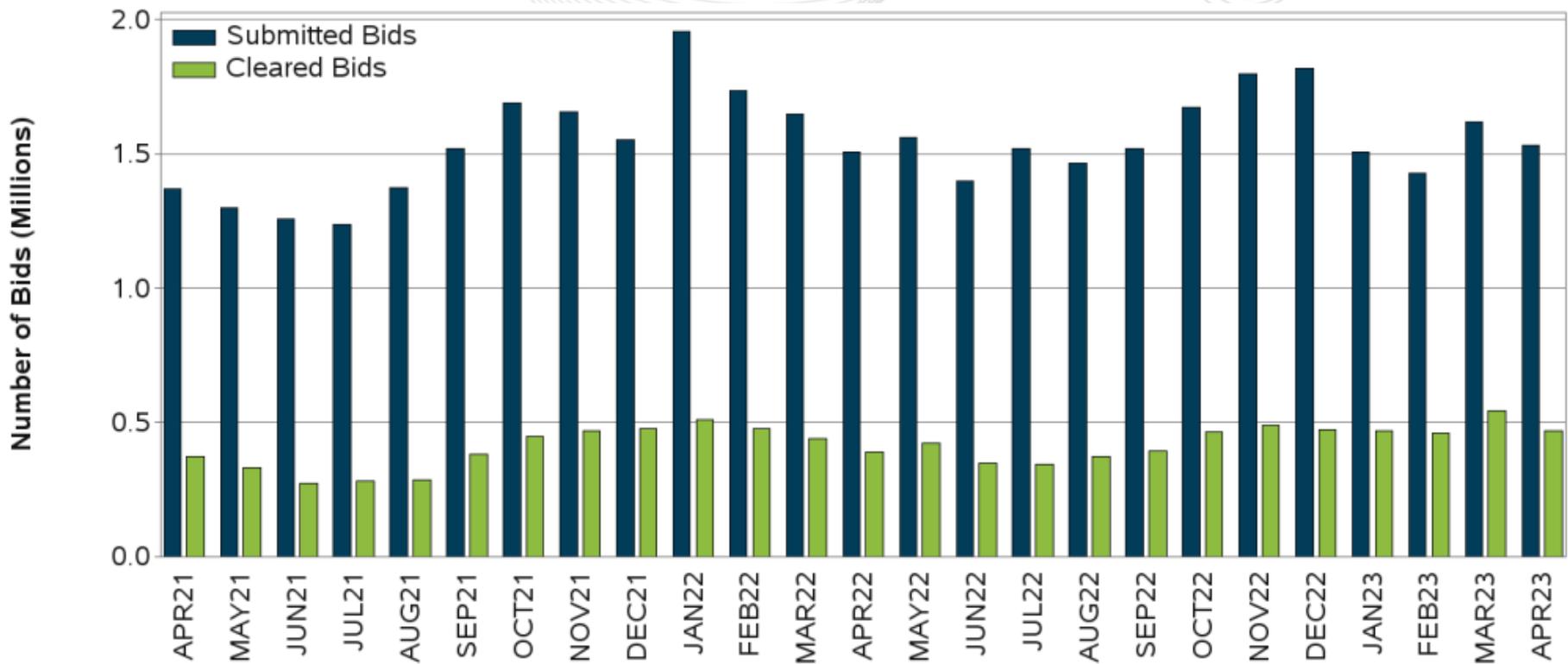
Total Registered MW in PJM's Economic Demand Response

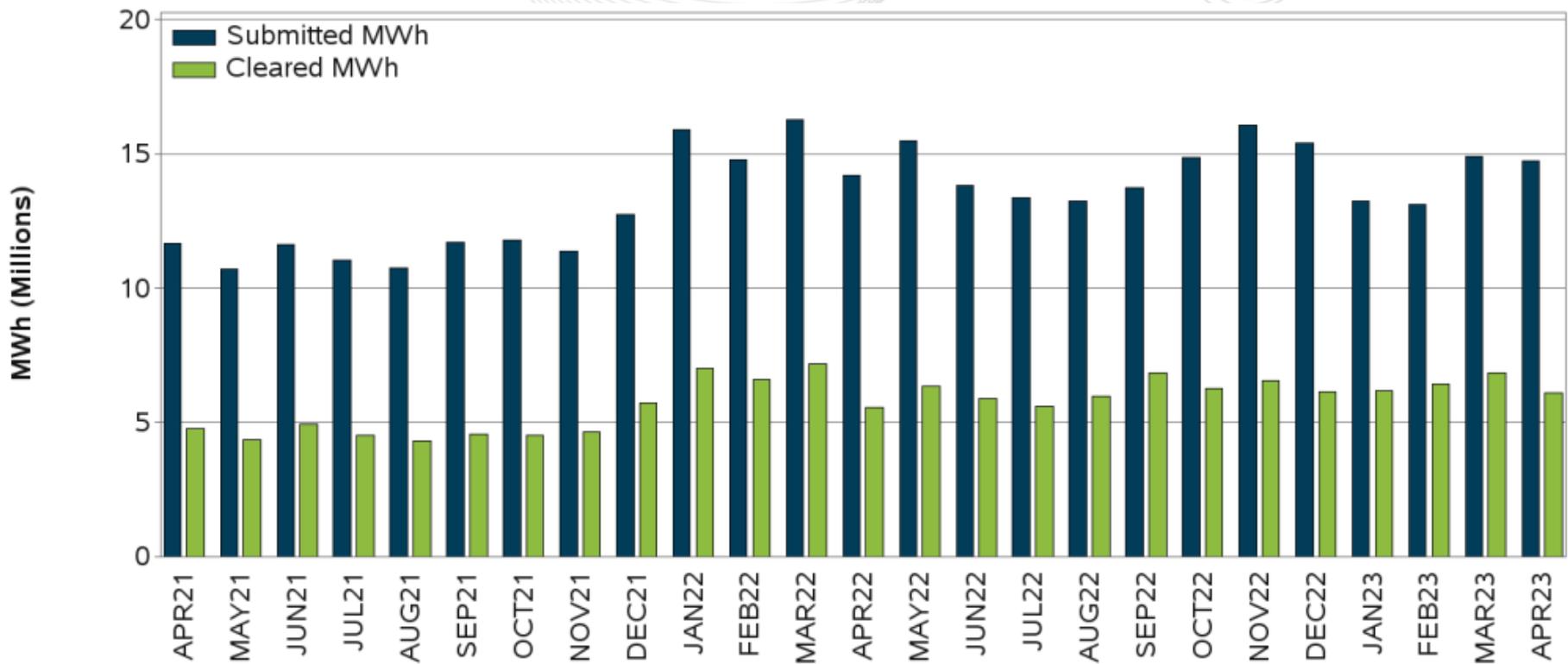


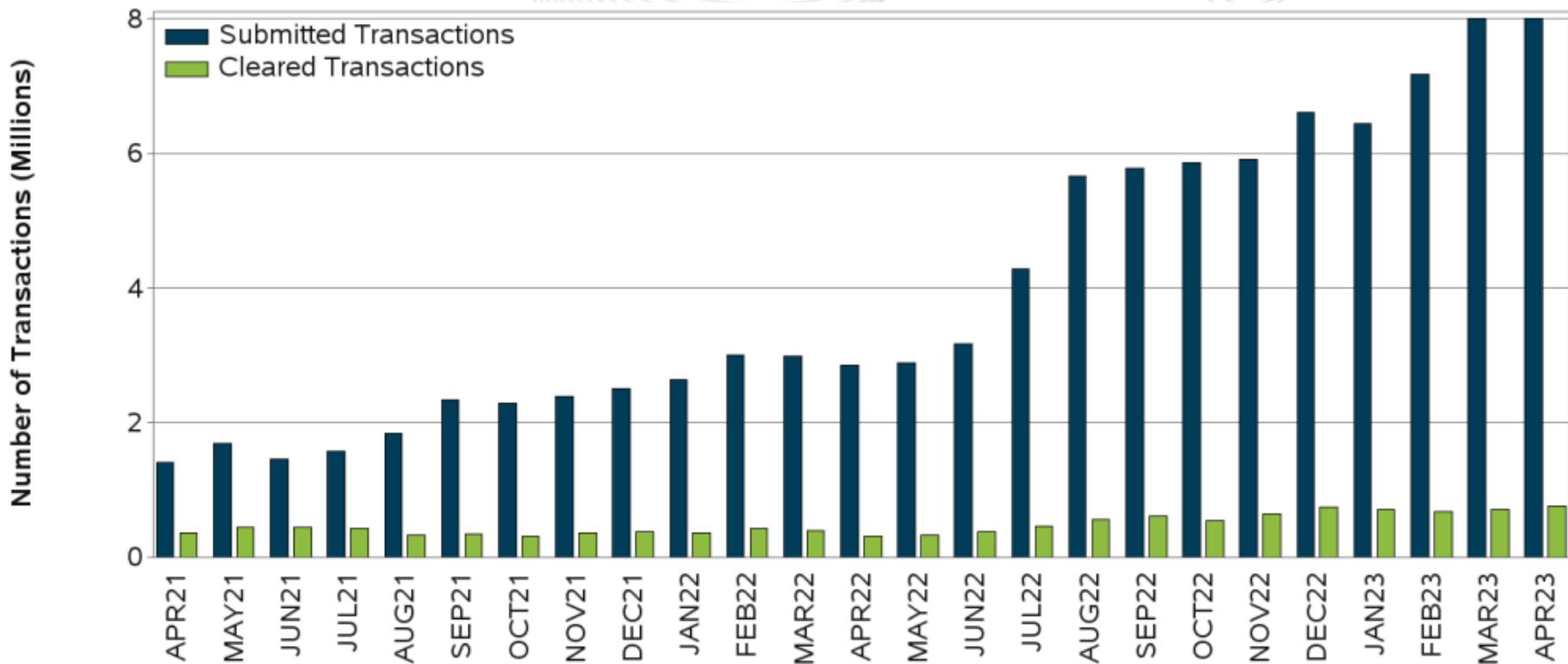
Energy Market

Virtual Activity Summary

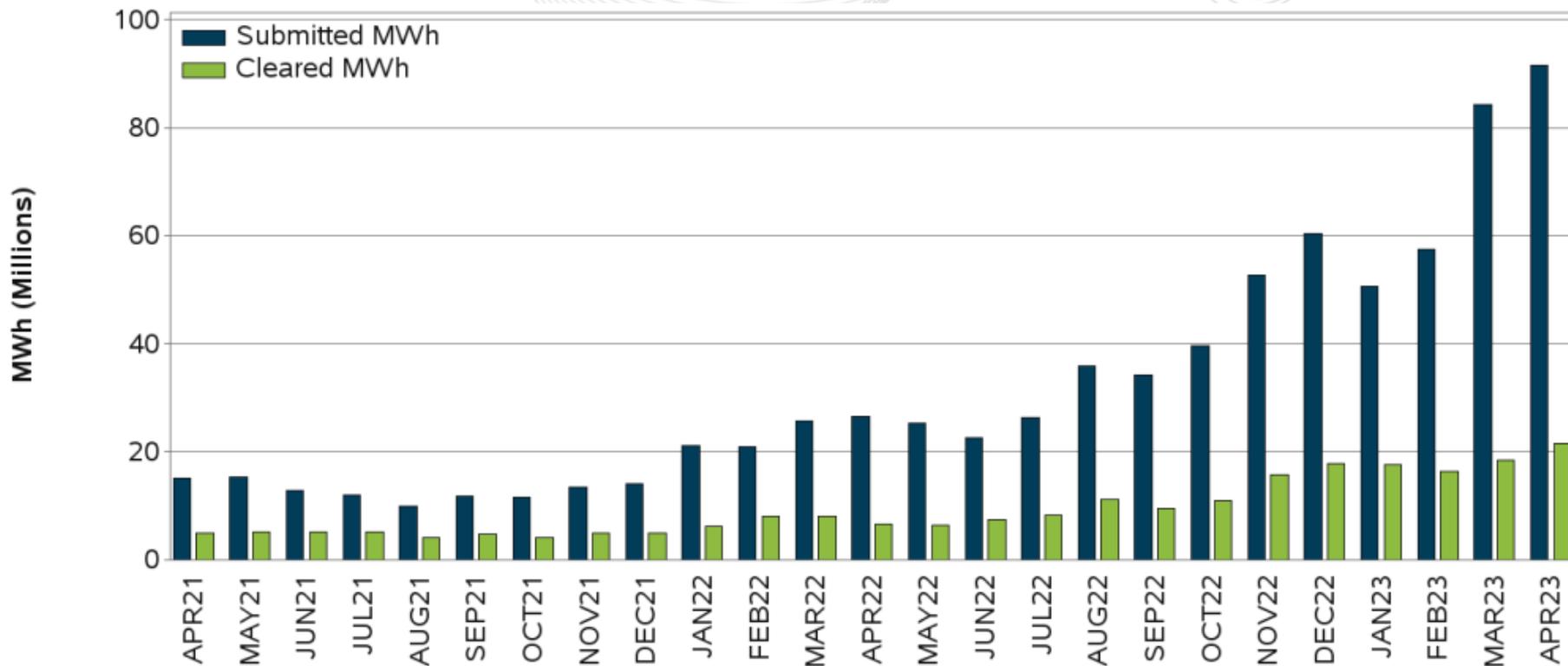
- The following six charts depict trends in submitted and cleared virtual and up-to-congestion transactions, in terms of number and volume, into the PJM Energy Market. The first two of these charts show the submitted and cleared increment and decrement bids (virtual transactions or virtuals) and they 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.



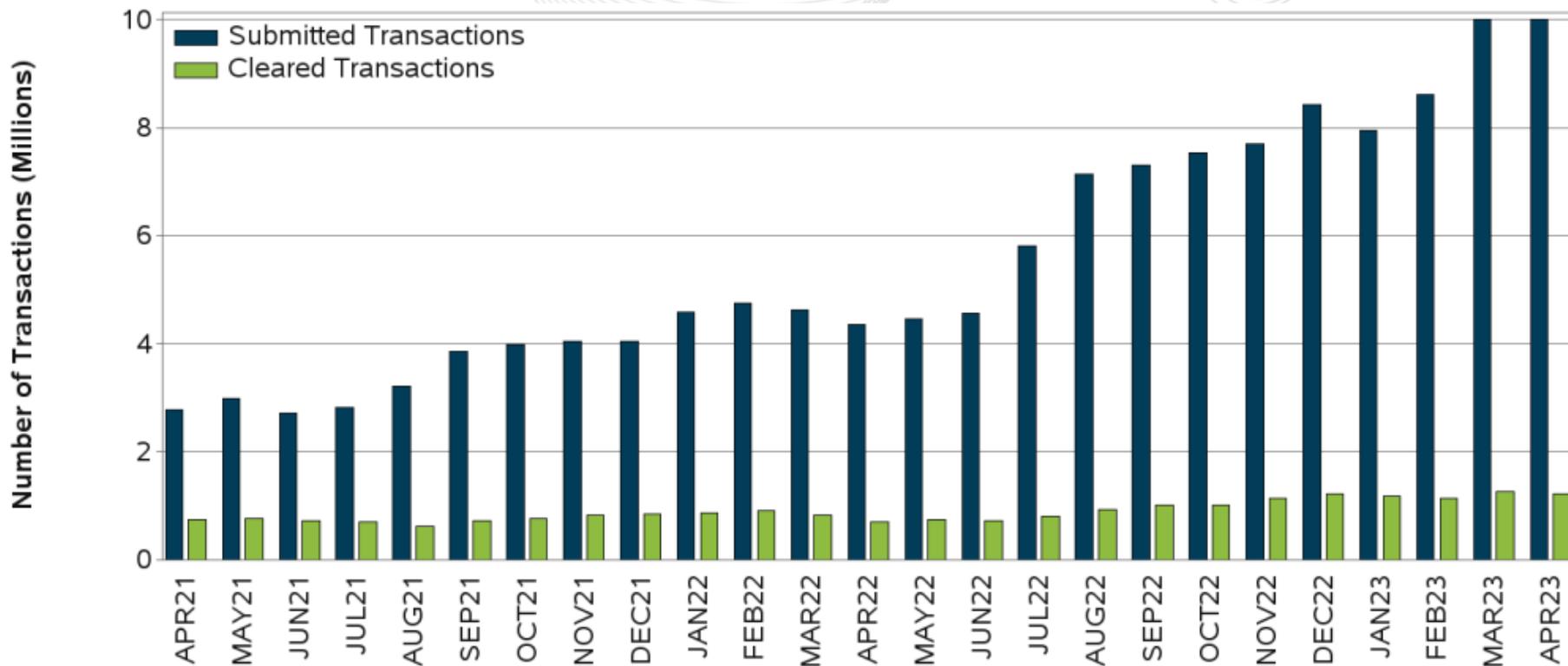




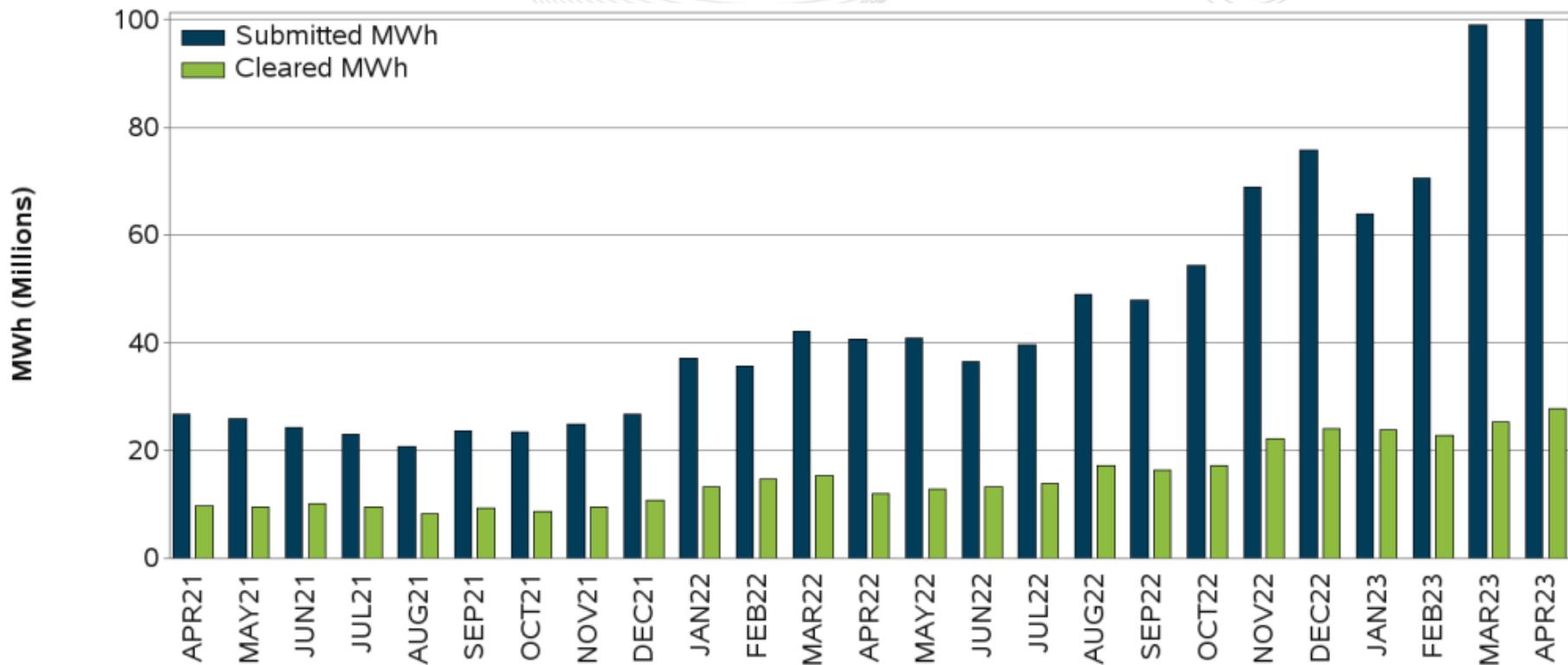
Up-To-Congestion Transactions - Total Volume



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



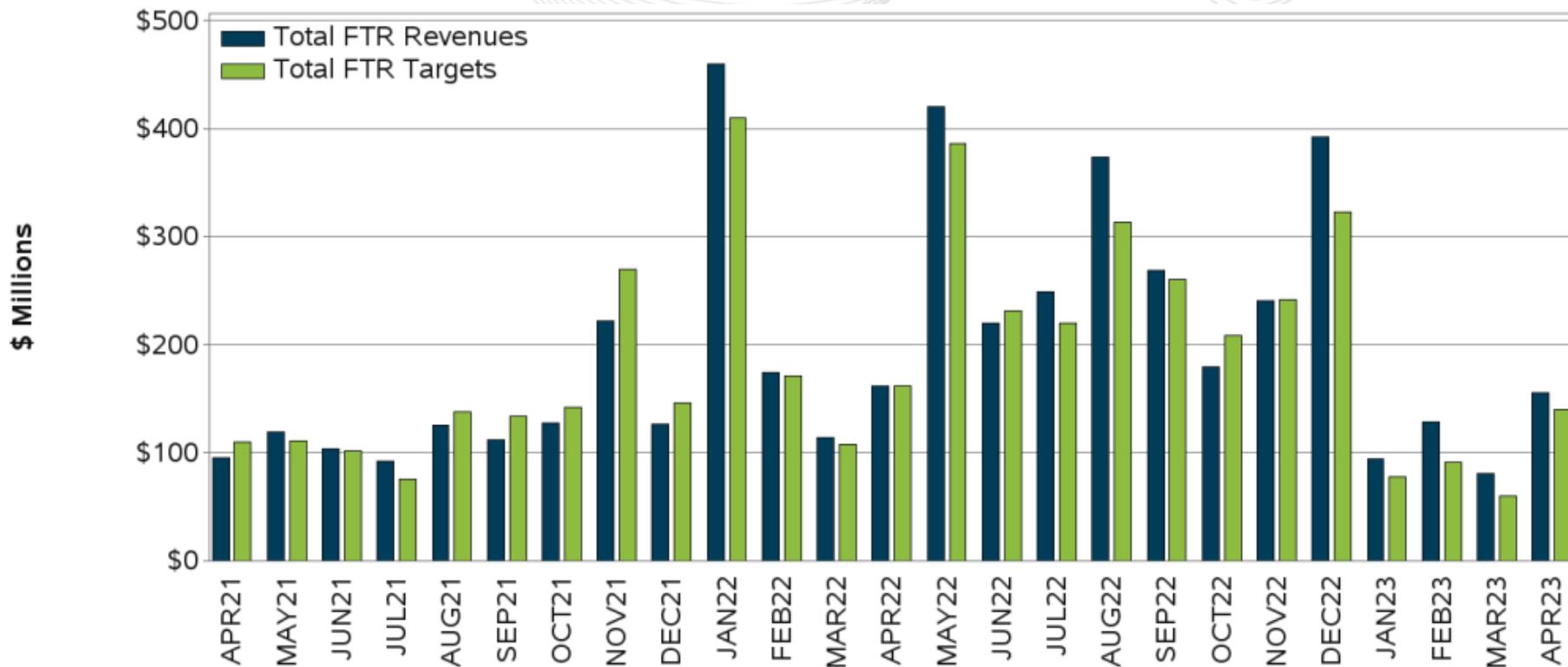
INCs, DEC and Up-To-Congestion Transactions - Total Volume

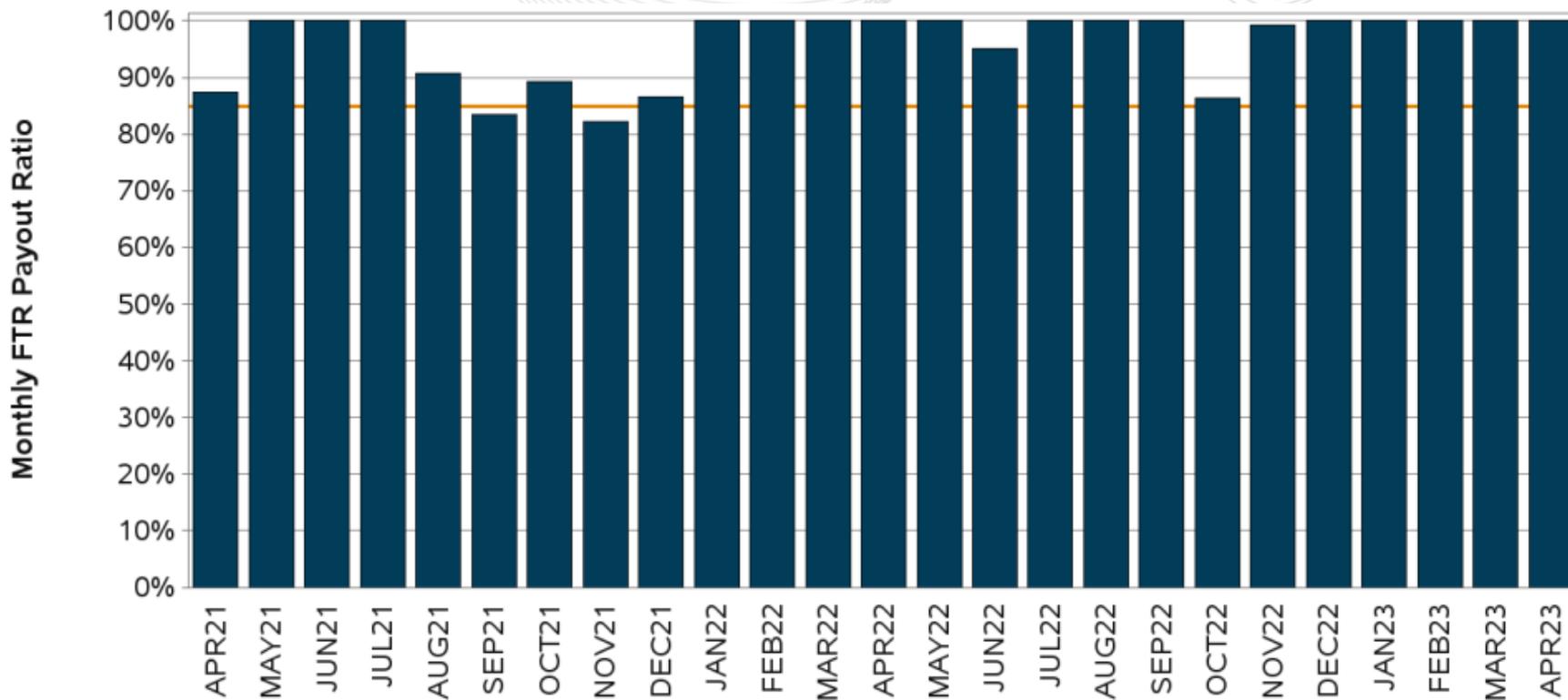


Energy Market

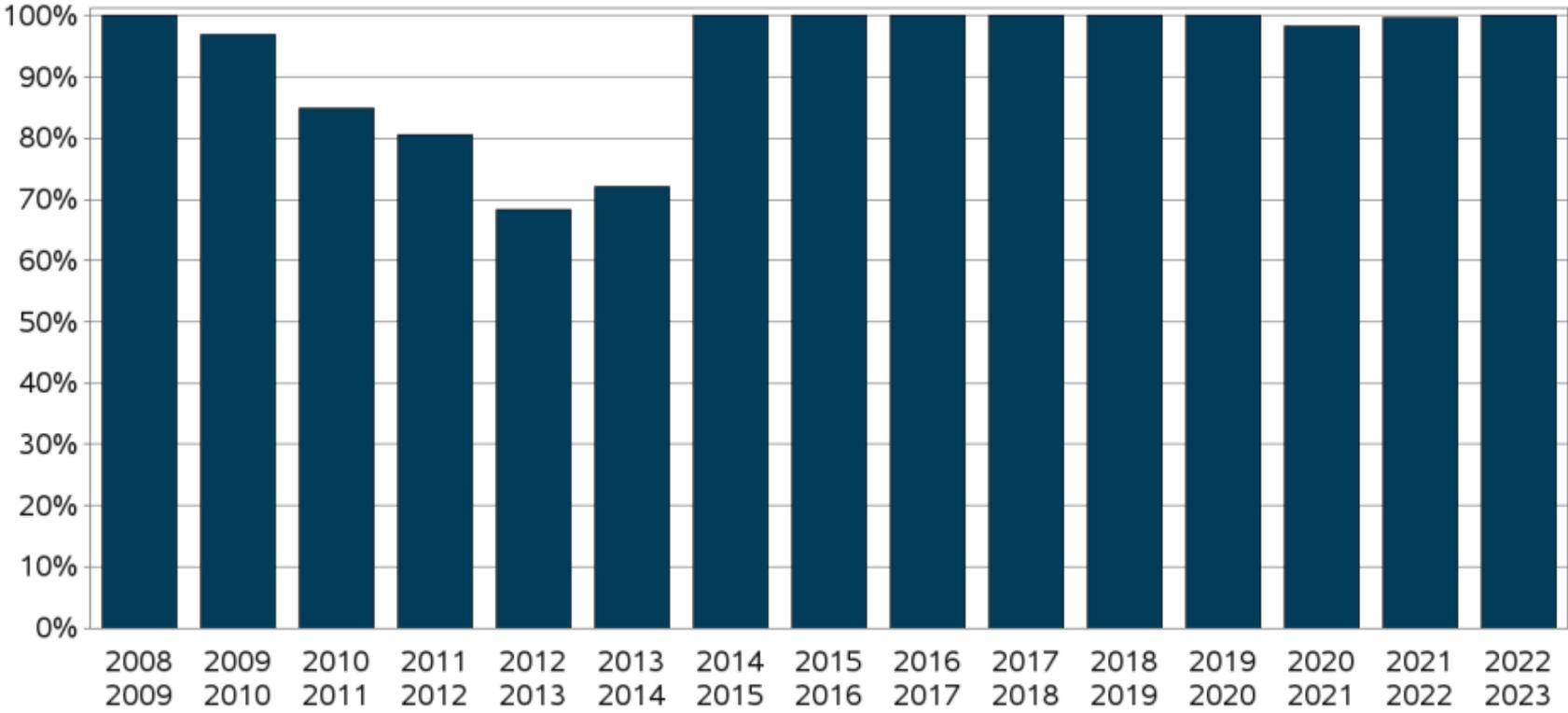
Congestion and FTR Summary

Period	Surplus / Underfunding	Payout Ratio
April 2023	\$15,183,949	100%
2023	\$90,638,996	100%
2022/2023	\$224,183,686	100%

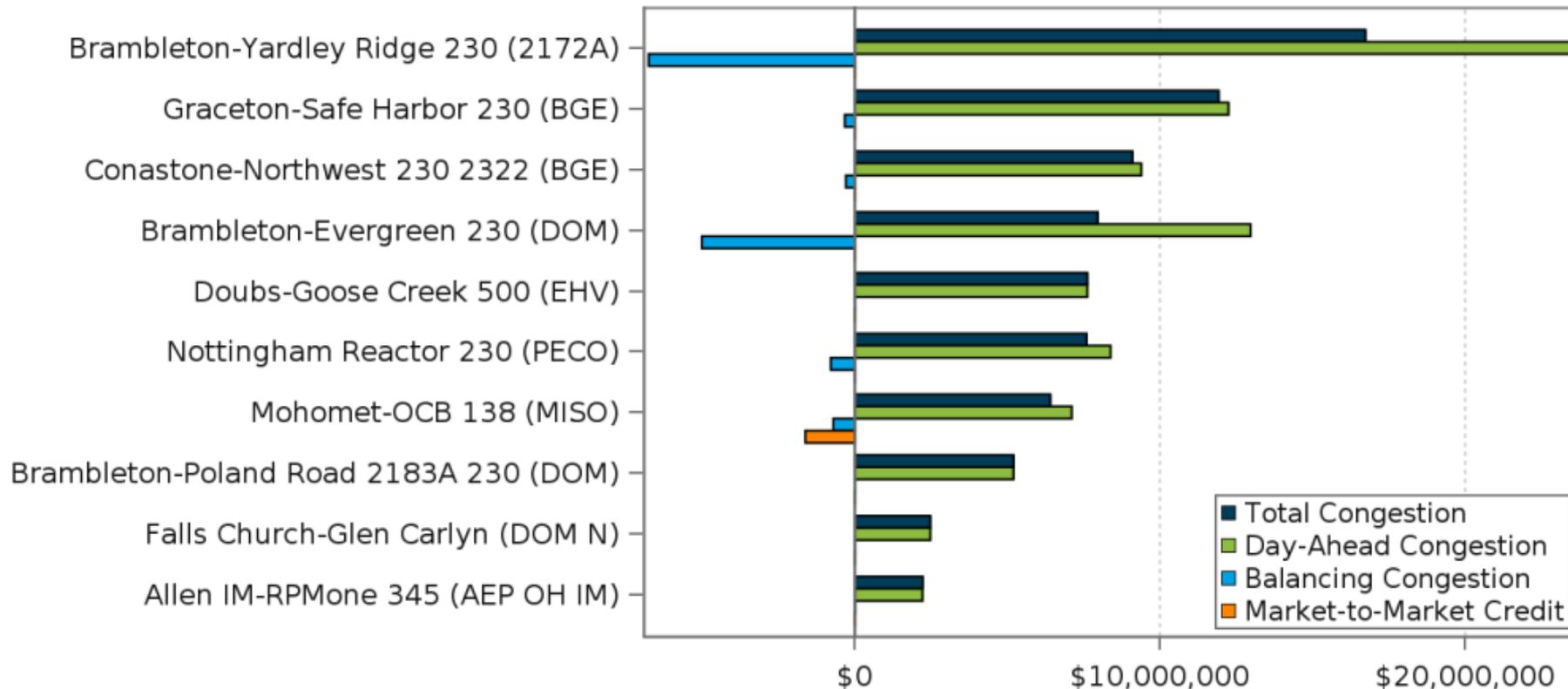




Planning Period FTR Payout Ratio

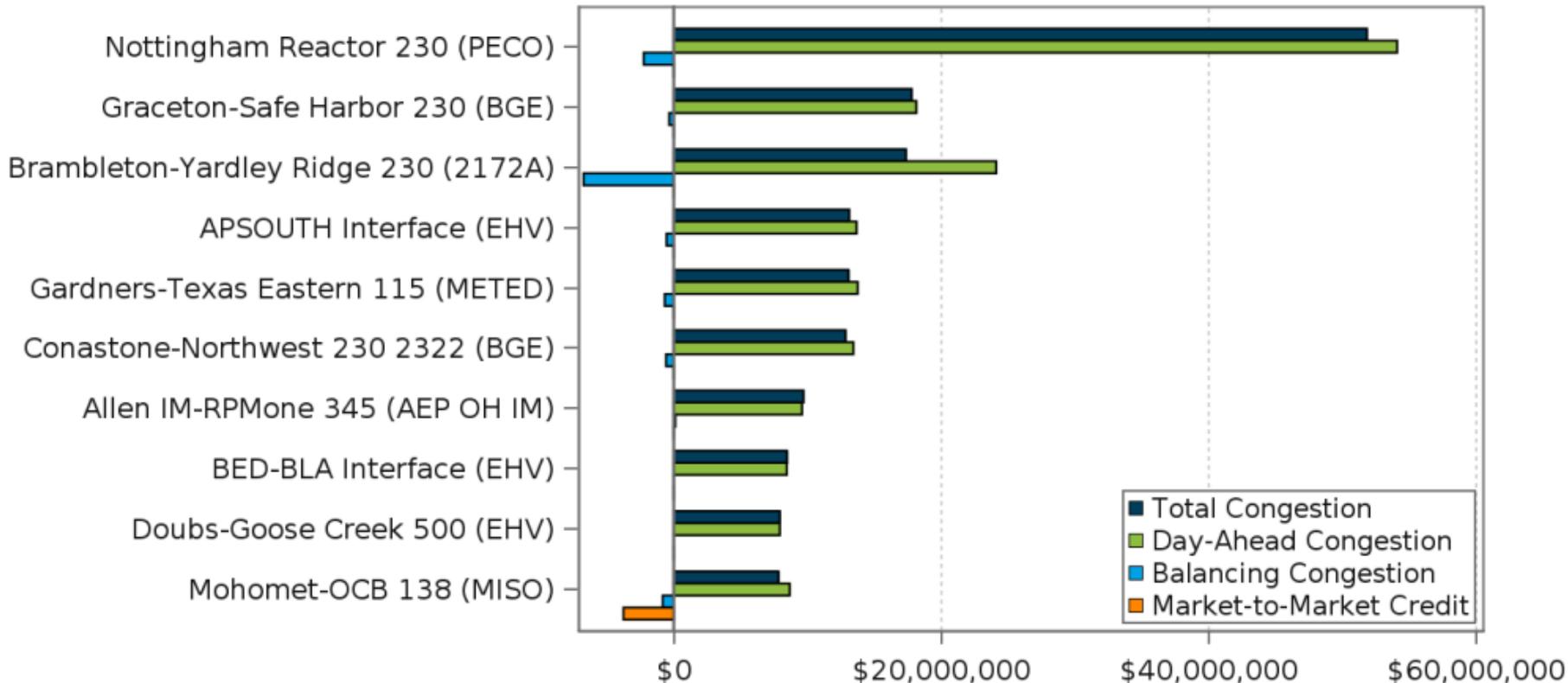


Ten Most Heavily Congested Transmission Facilities - Overall, April



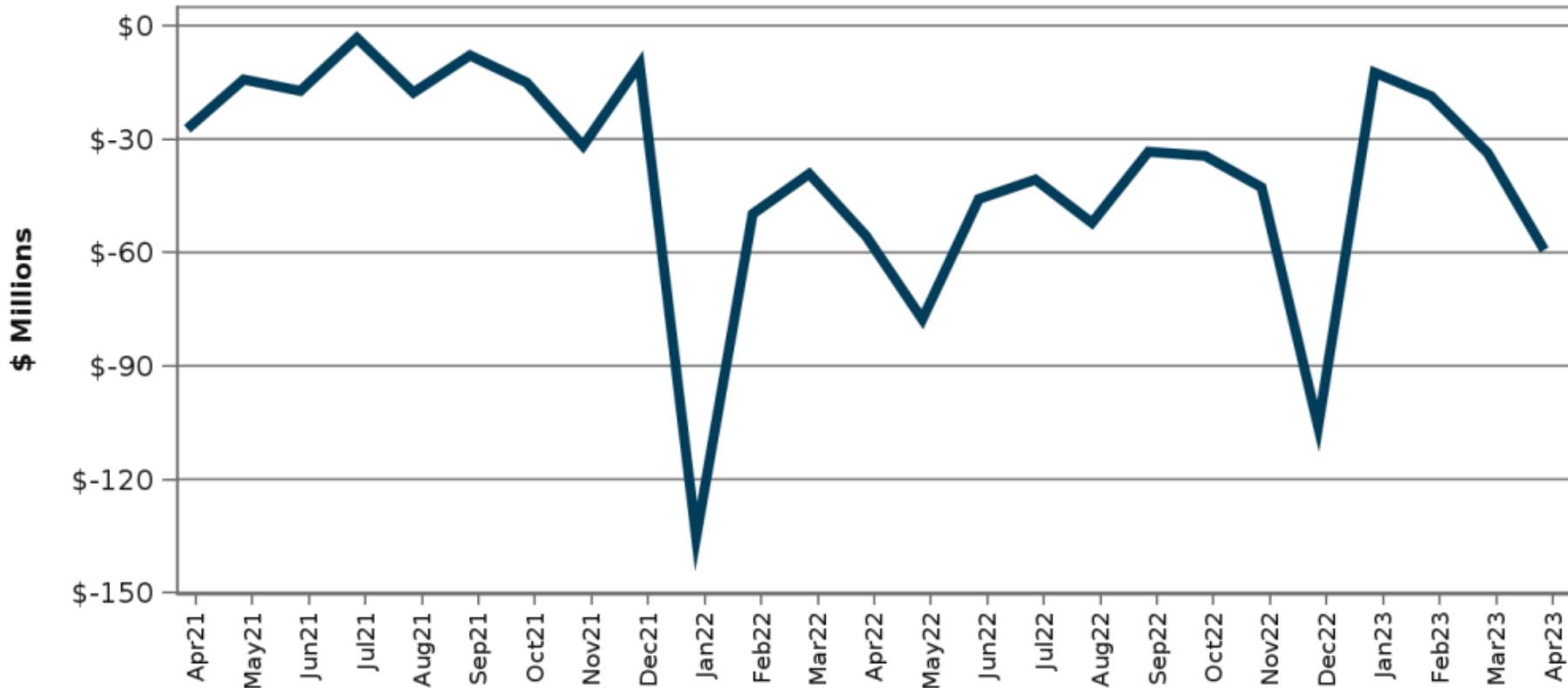
The ten most heavily congested facilities account for 98% of total congestion for April.

Ten Most Heavily Congested Transmission Facilities - Overall, 2023



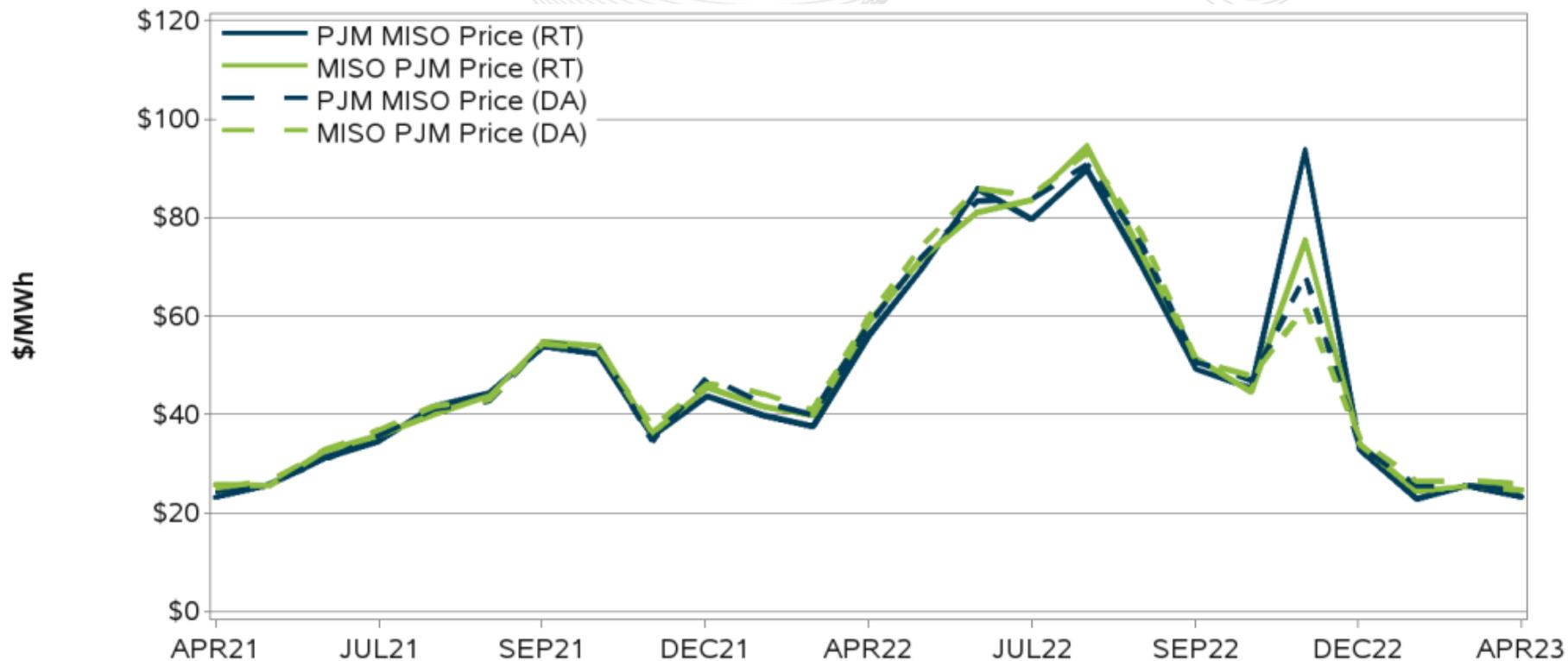
The ten most heavily congested facilities account for 60% of total congestion for 2023.

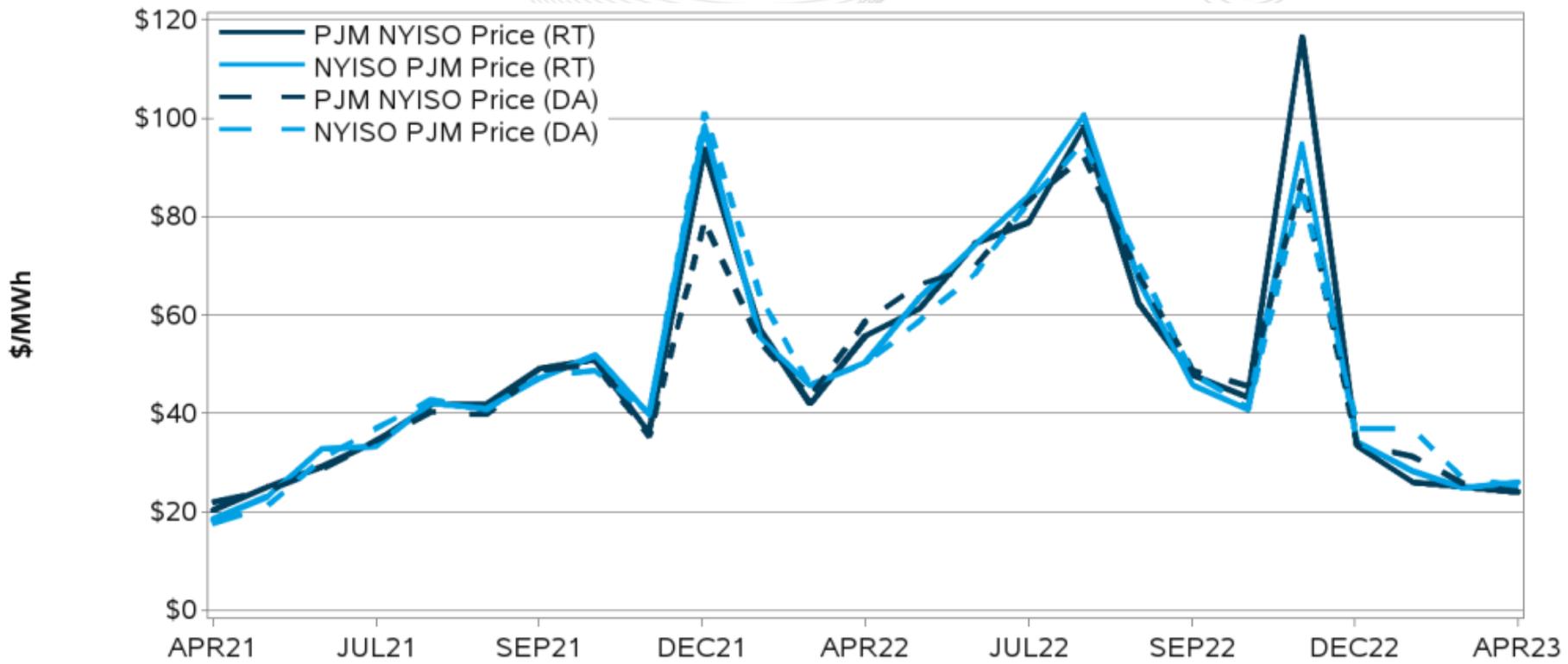
Balancing Congestion Charge Revenues (BLI 2215)



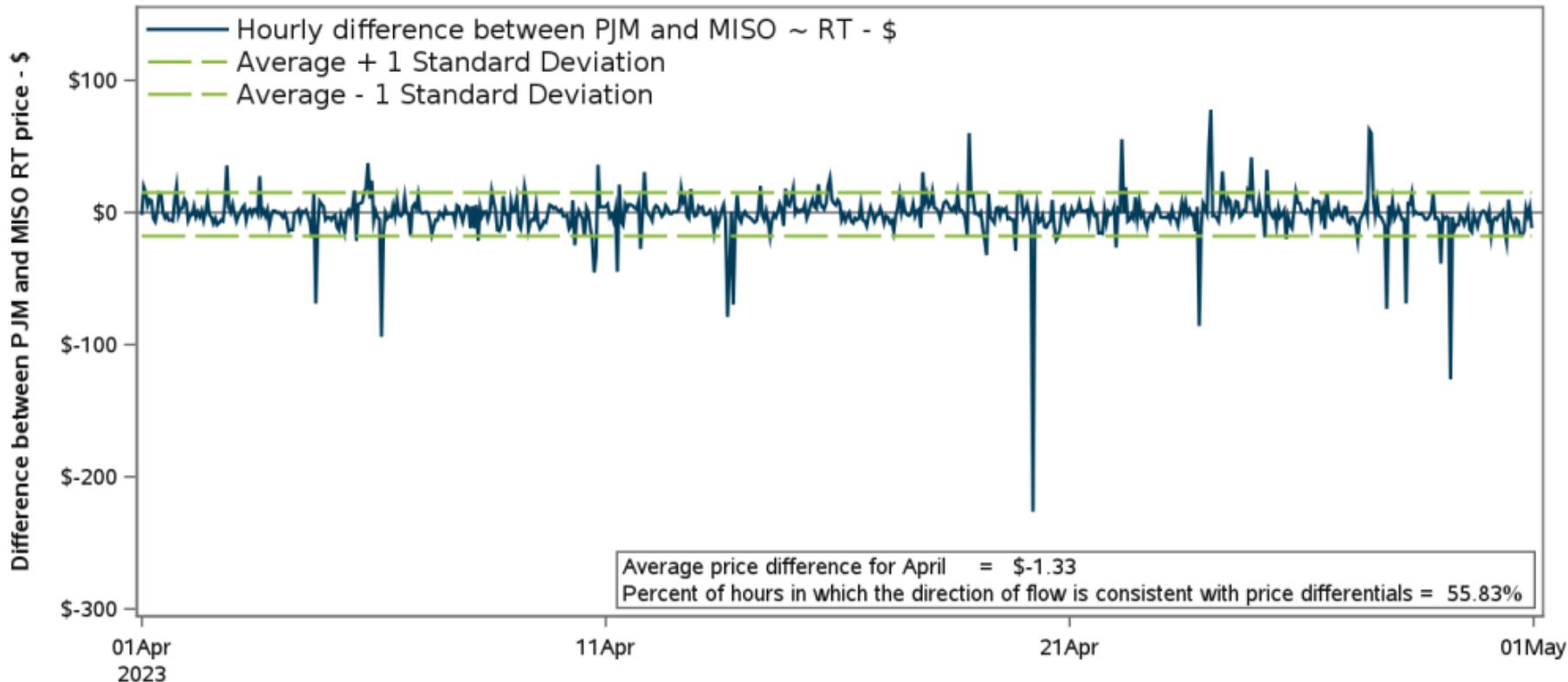
Energy Market

Interchange/Seams Summary



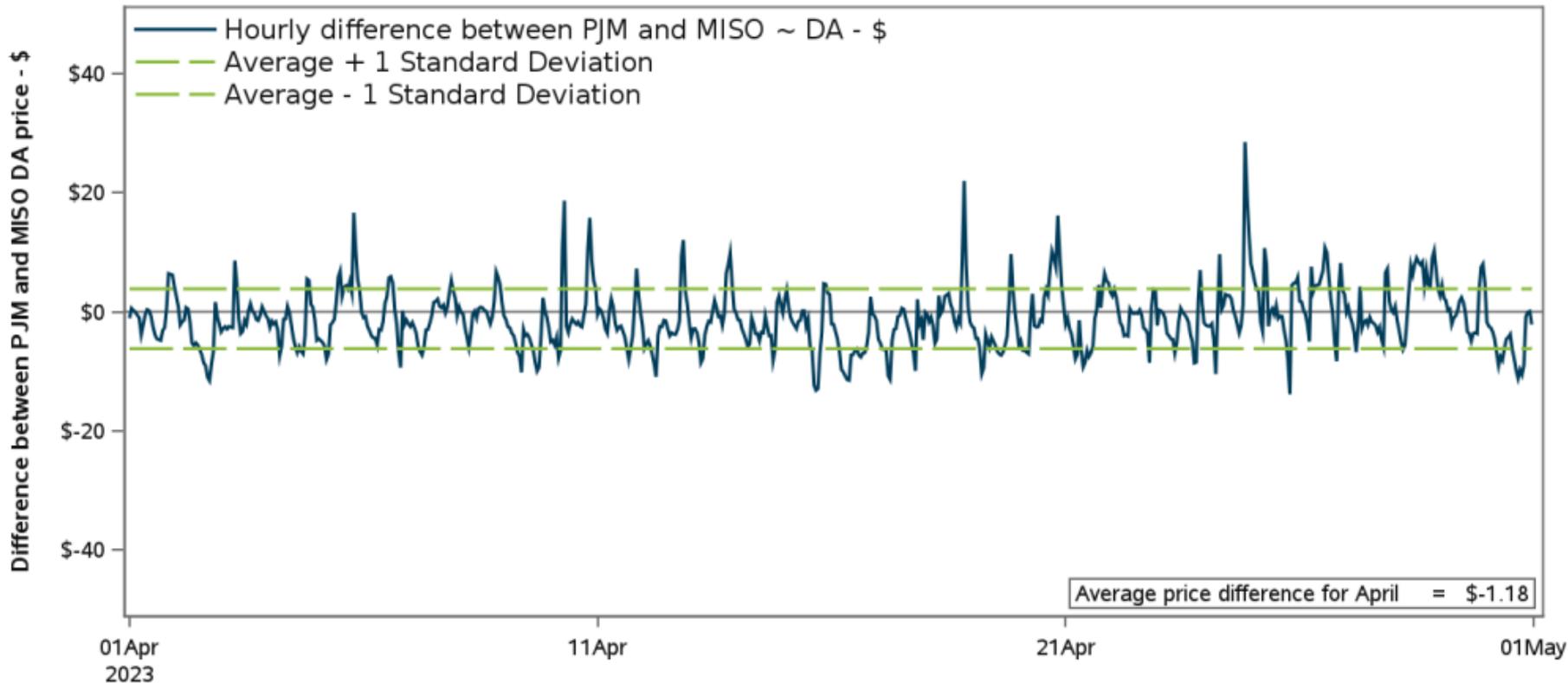


Hourly Difference Between PJM and MISO Real-Time Prices



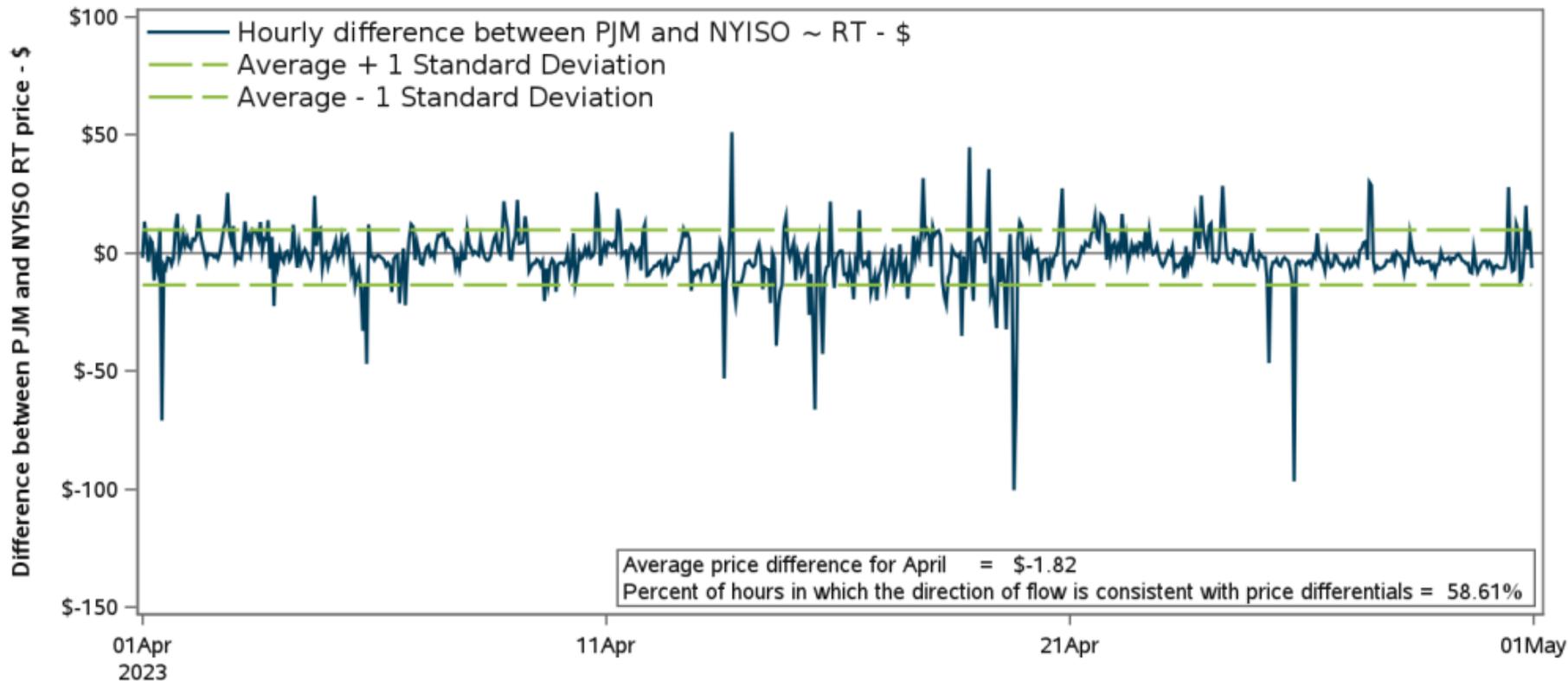
Positive values represent hours when the PJM price was higher. Negative values represent hours when the PJM price was lower.

Hourly Difference Between PJM and MISO Day-Ahead Prices



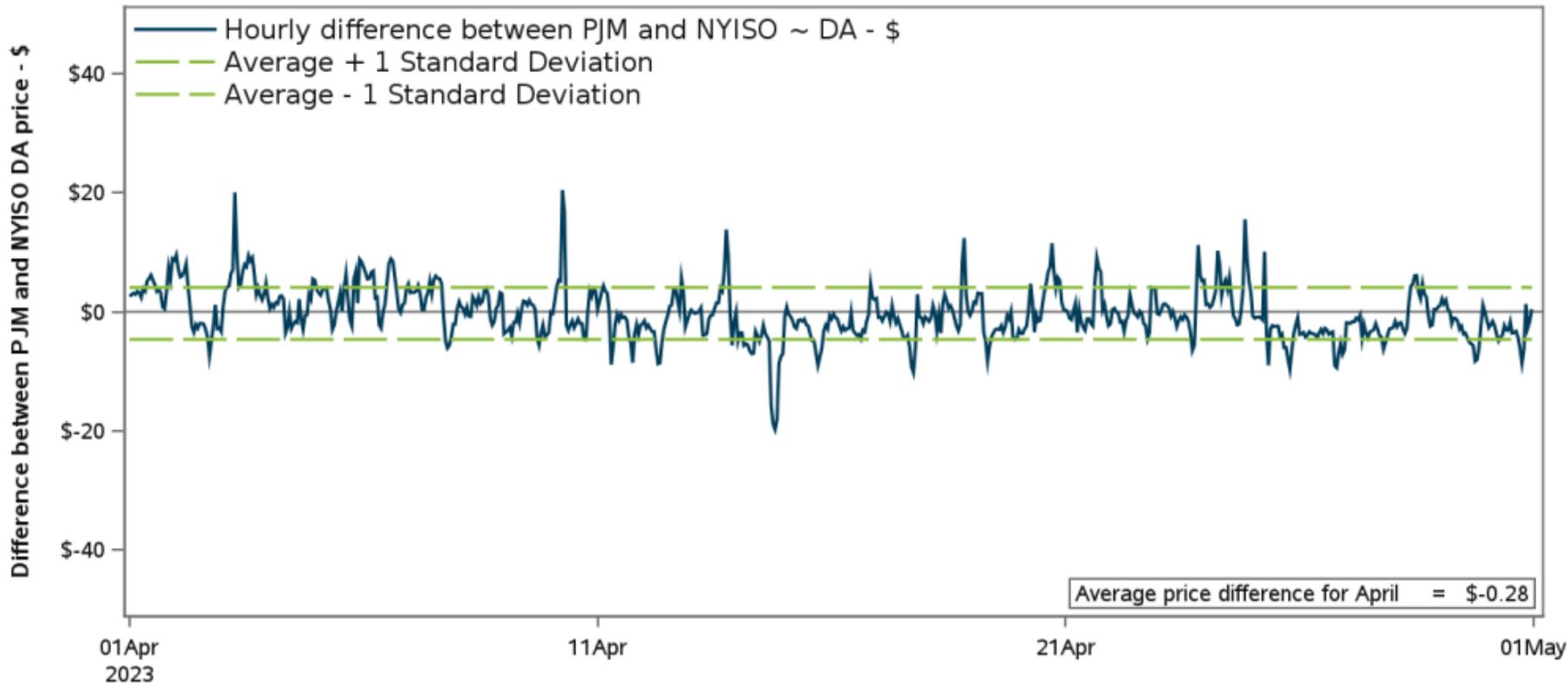
Positive values represent hours when the PJM price was higher. Negative values represent hours when the PJM price was lower.

Hourly Difference Between PJM and NYISO Real-Time Prices



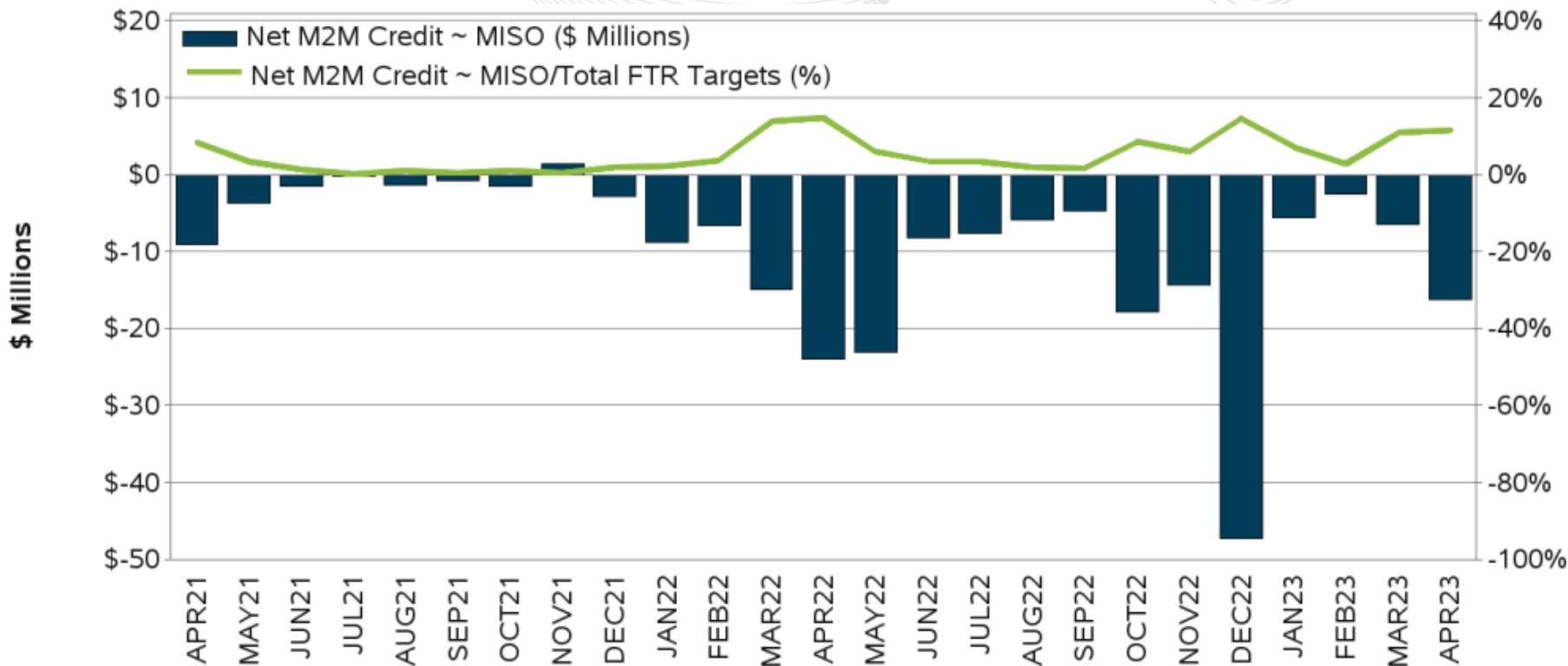
Positive values represent hours when the PJM price was higher. Negative values represent hours when the PJM price was lower.

Hourly Difference Between PJM and NYISO Day-Ahead Prices

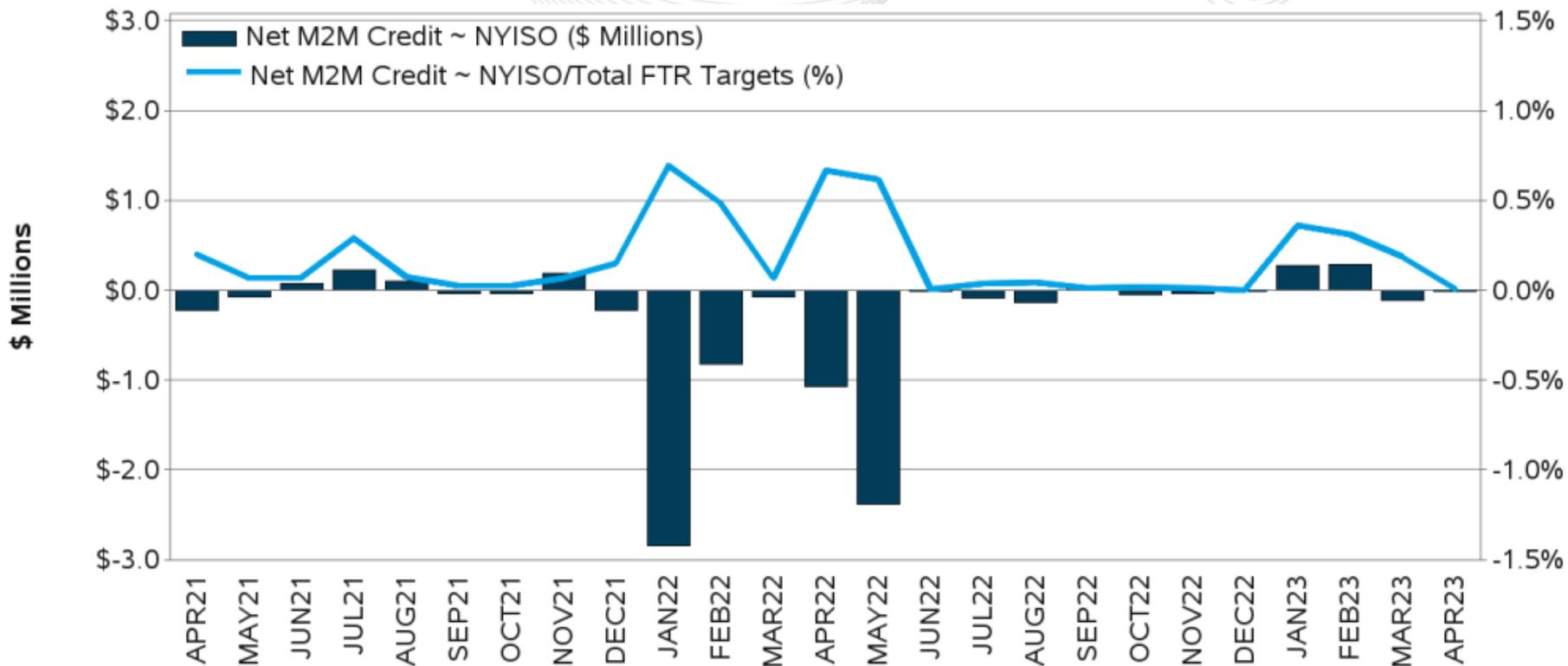


Positive values represent hours when the PJM price was higher. Negative values represent hours when the PJM price was lower.

PJM-MISO Market-to-Market Coordination Settlement

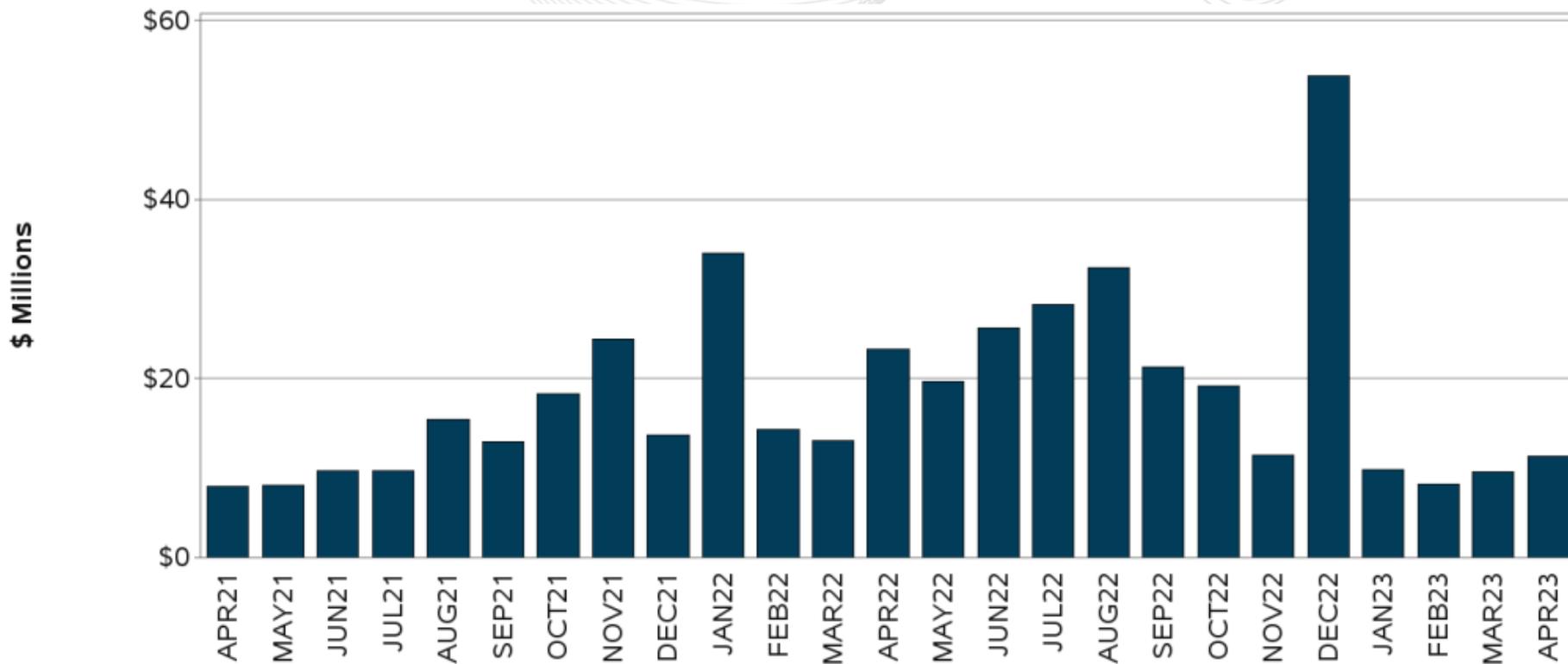


Negative M2M Credit represents PJM payment to MISO

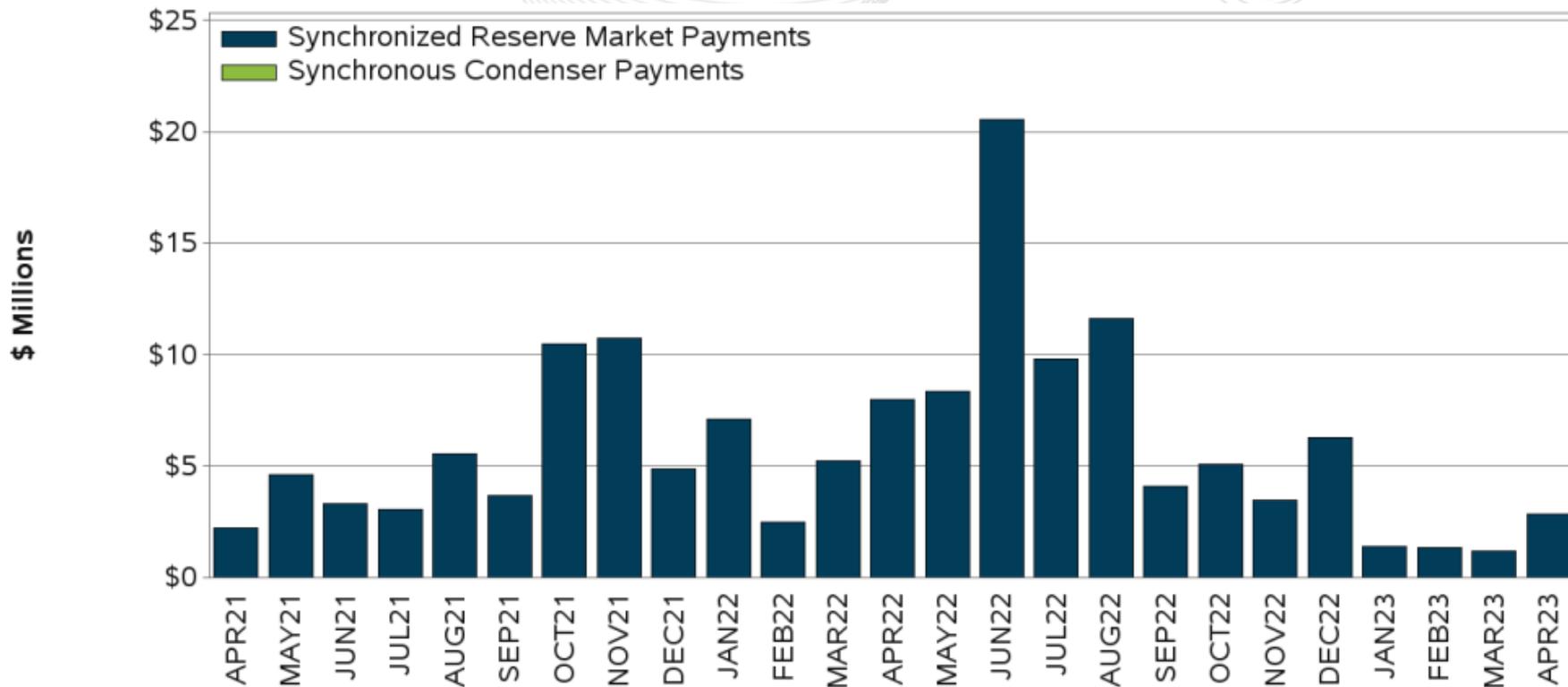


Negative M2M Credit represents PJM payment to NYISO

Ancillary Service Market Summary

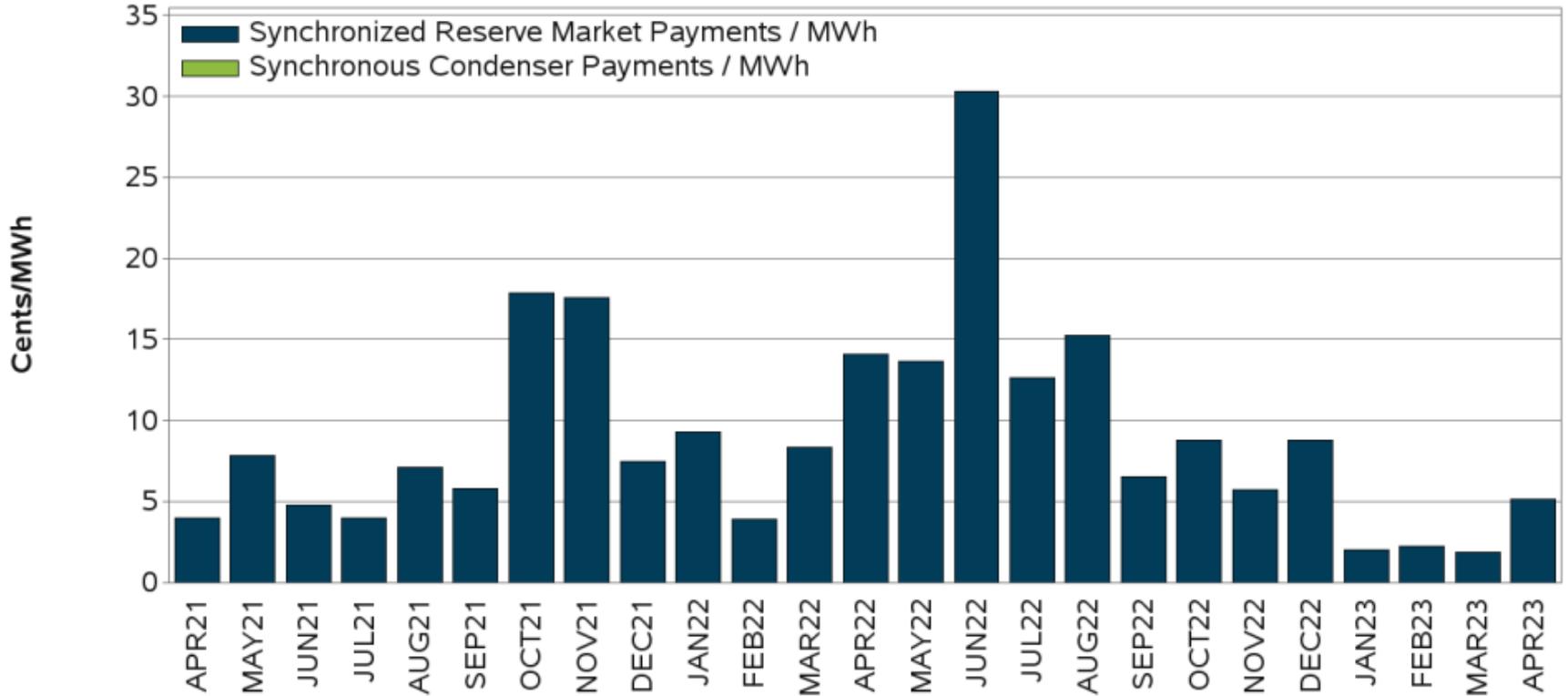


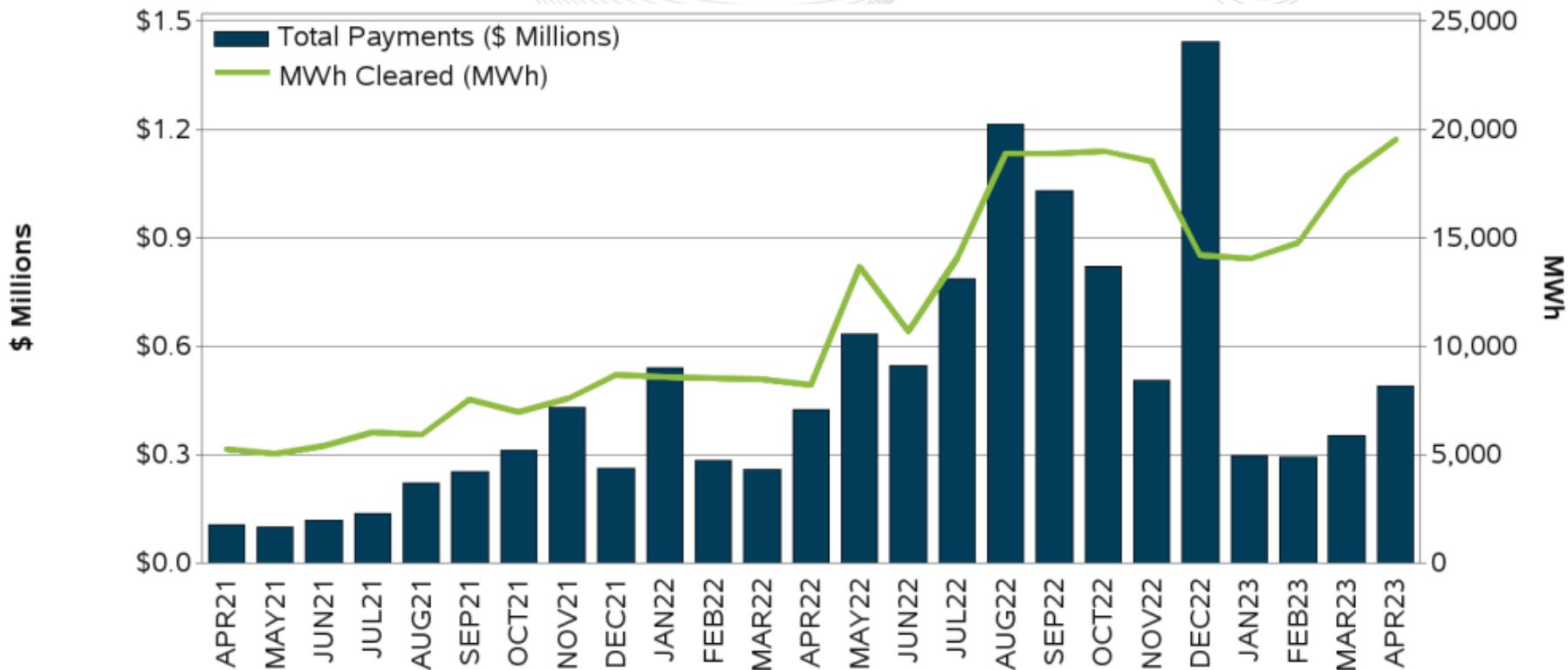
Synchronized Reserve and Synchronous Condenser Costs



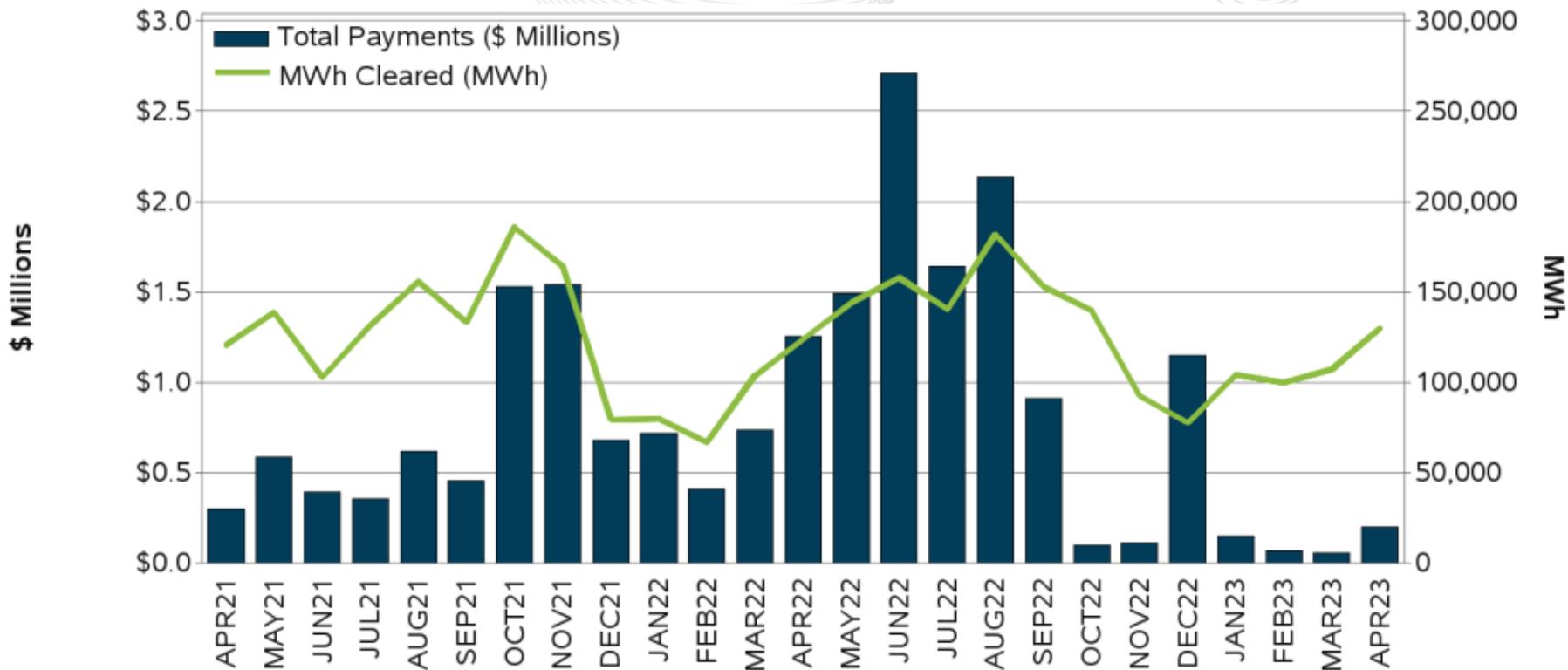


Load-Adjusted Synchronized Reserve and Synchronous Condenser Costs

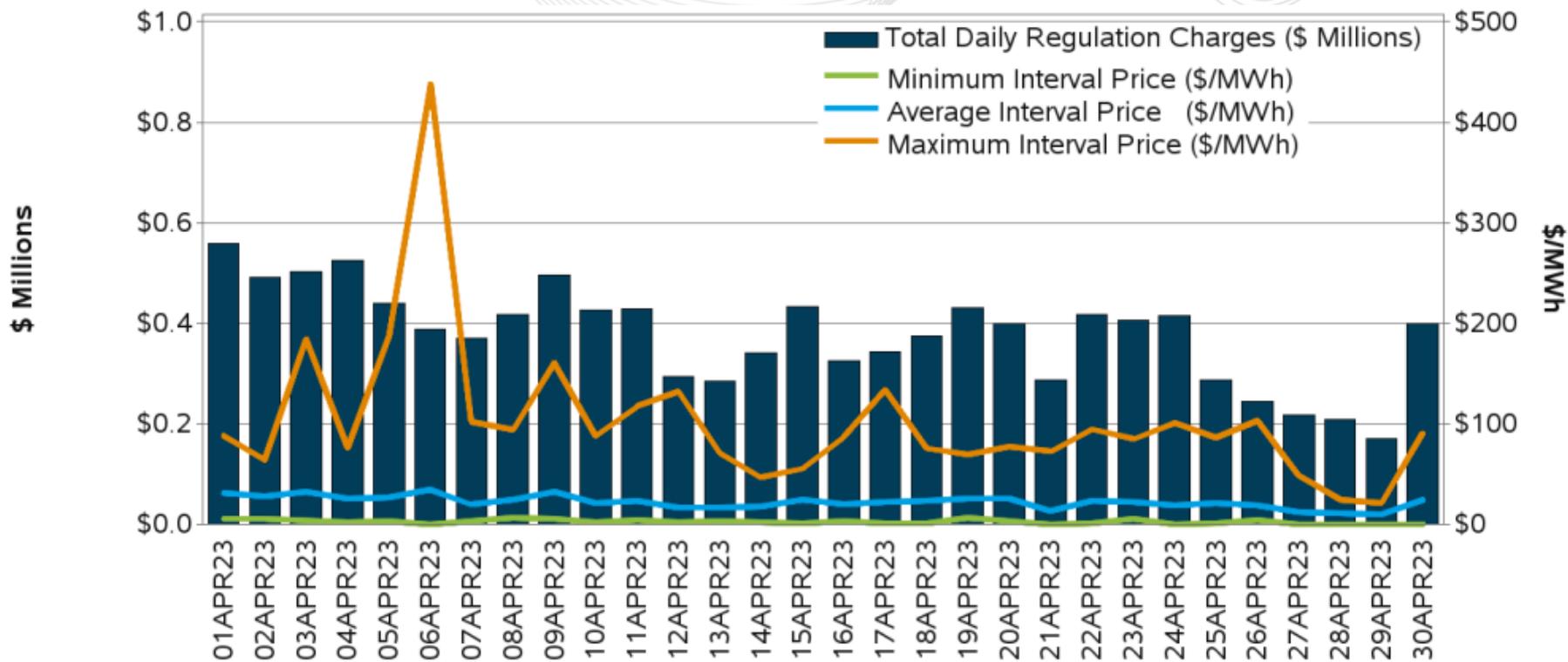




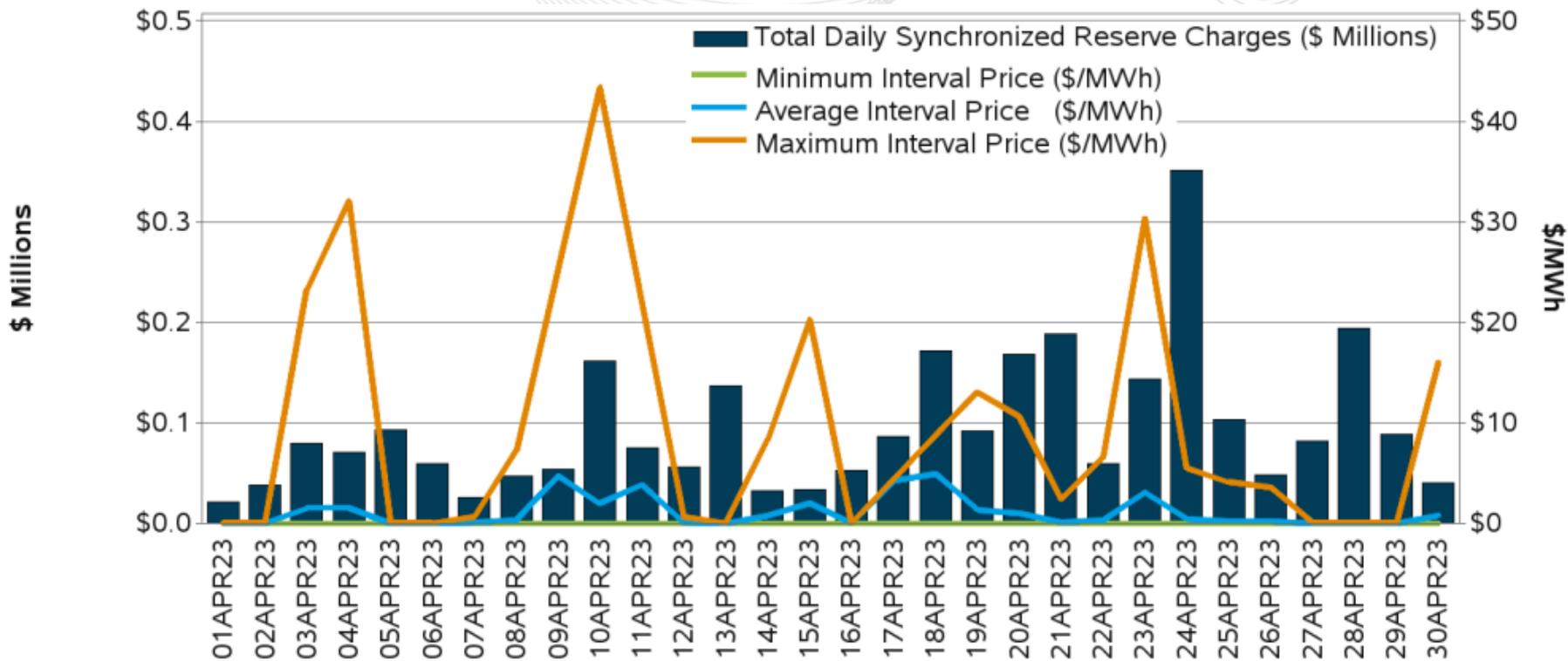
DR Participation in PJM Synchronized Reserve Markets



Regulation Market Daily Prices and Charges



Synchronized Reserve Market Daily Prices and Charges



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