



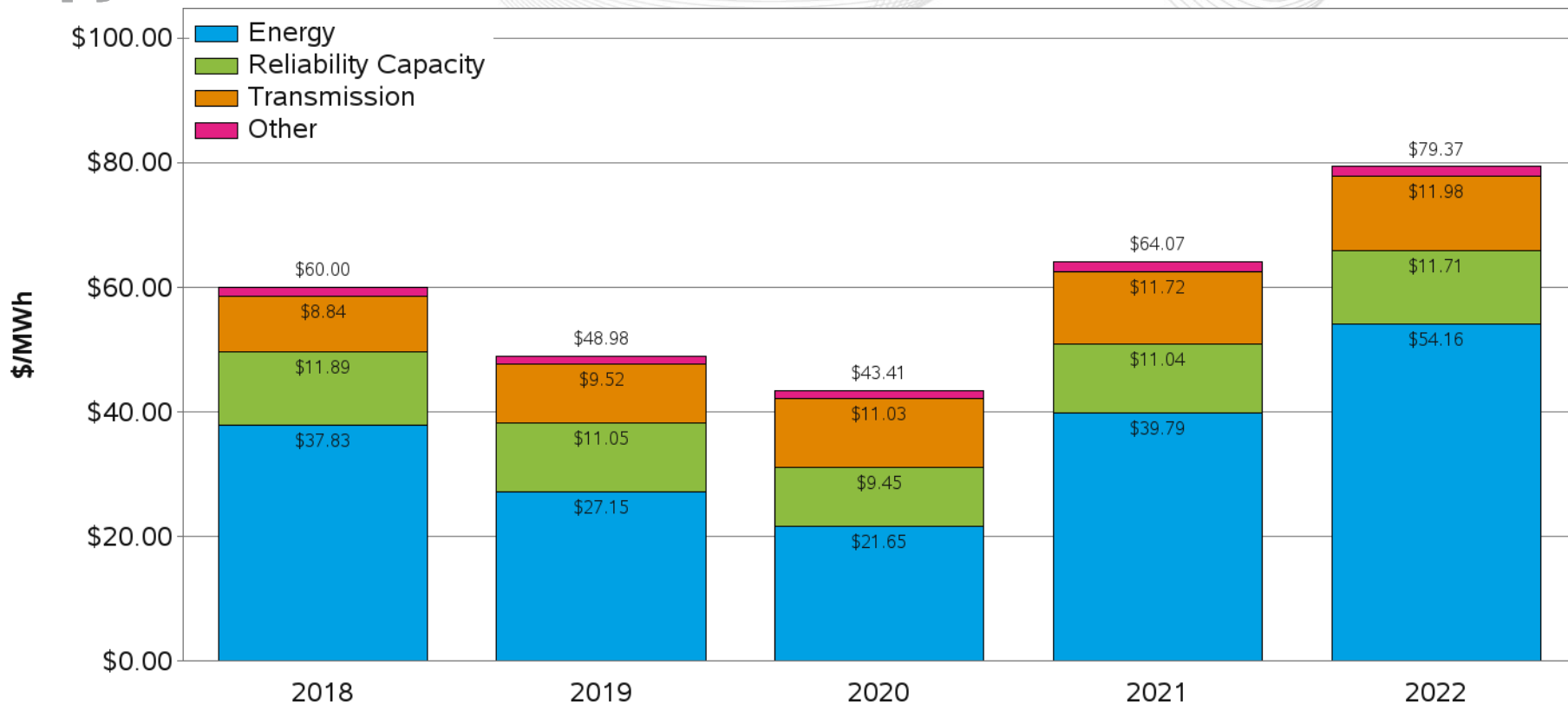
Markets Report

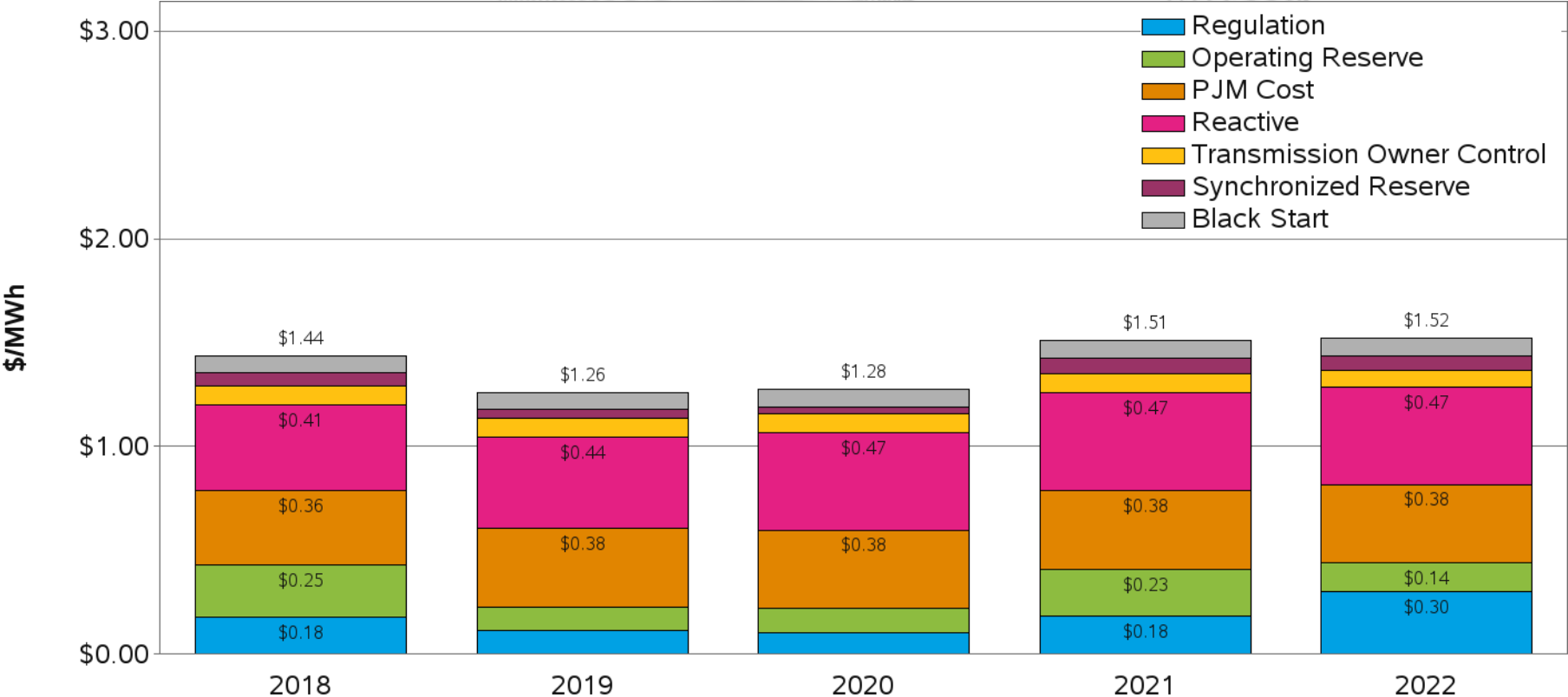
MC Webinar
April 25, 2022

- PJM Wholesale Cost for 2022 YTD is \$79.37/MWh, up from full-year 2021 costs of \$64.07/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- 19)
- In March, 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 March. (Slides 8-10)
- In March, uplift exceeded \$800,000 on one day. (Slides 24 & 25)

- Load-weighted average LMP for 2022 YTD is \$54.61/MWh: (Slides 33 & 34)
 - March 2022 was \$43.60/MWh, which is higher than March 2021 (\$26.30/MWh) and March 2020 (\$17.90/MWh).
- There were five 5-minute intervals that experienced shortage pricing in March. (Slides 31 & 32)
- FTR revenue adequacy for the month of March is 100% and the 2021-2022 Planning Year is currently funded at 98%. (Slides 49-52)
- Congestion values have been trending upwards. March's value is much more in line with recent history than January's. (Slide 50)
- Regulation and Synchronized Reserve market costs have generally tracked with energy prices over time. (Slides 65-67)

Markets Report

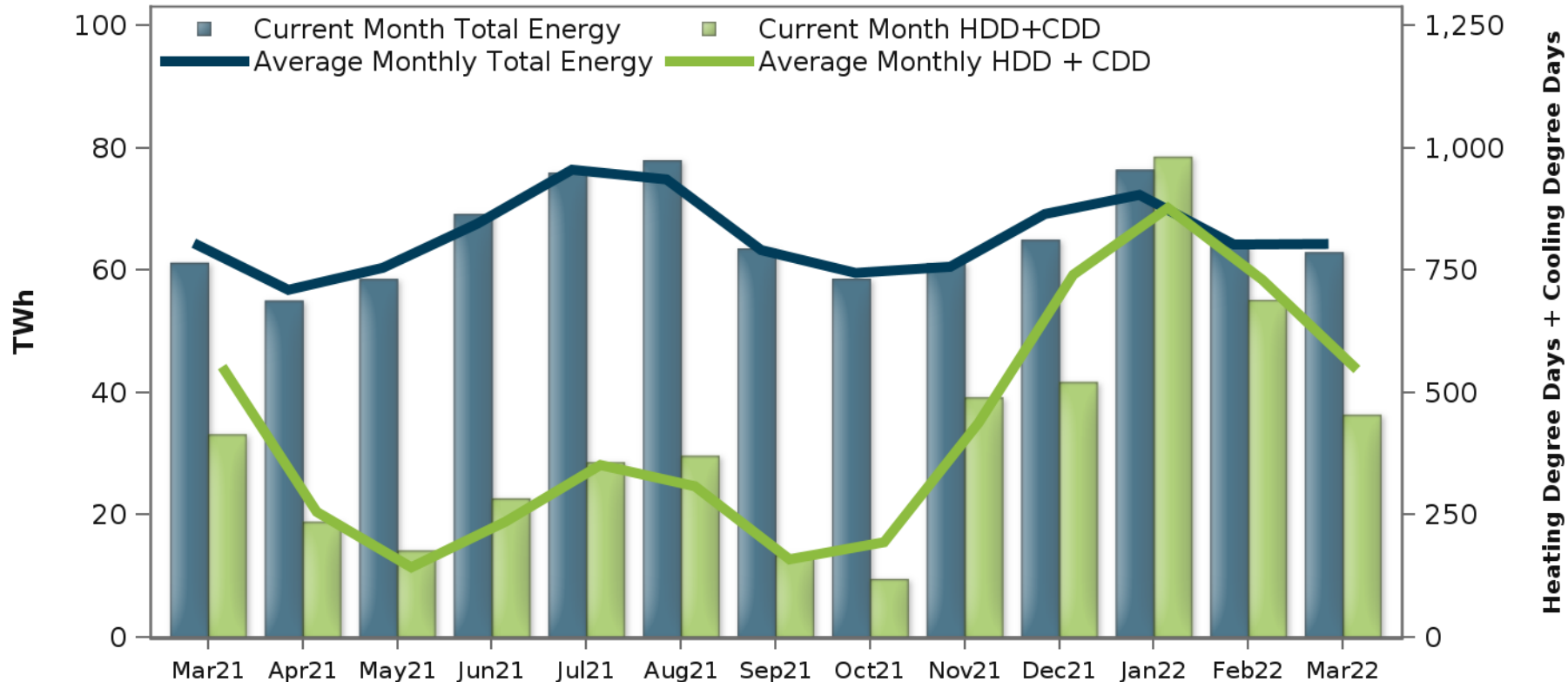




Market Conditions

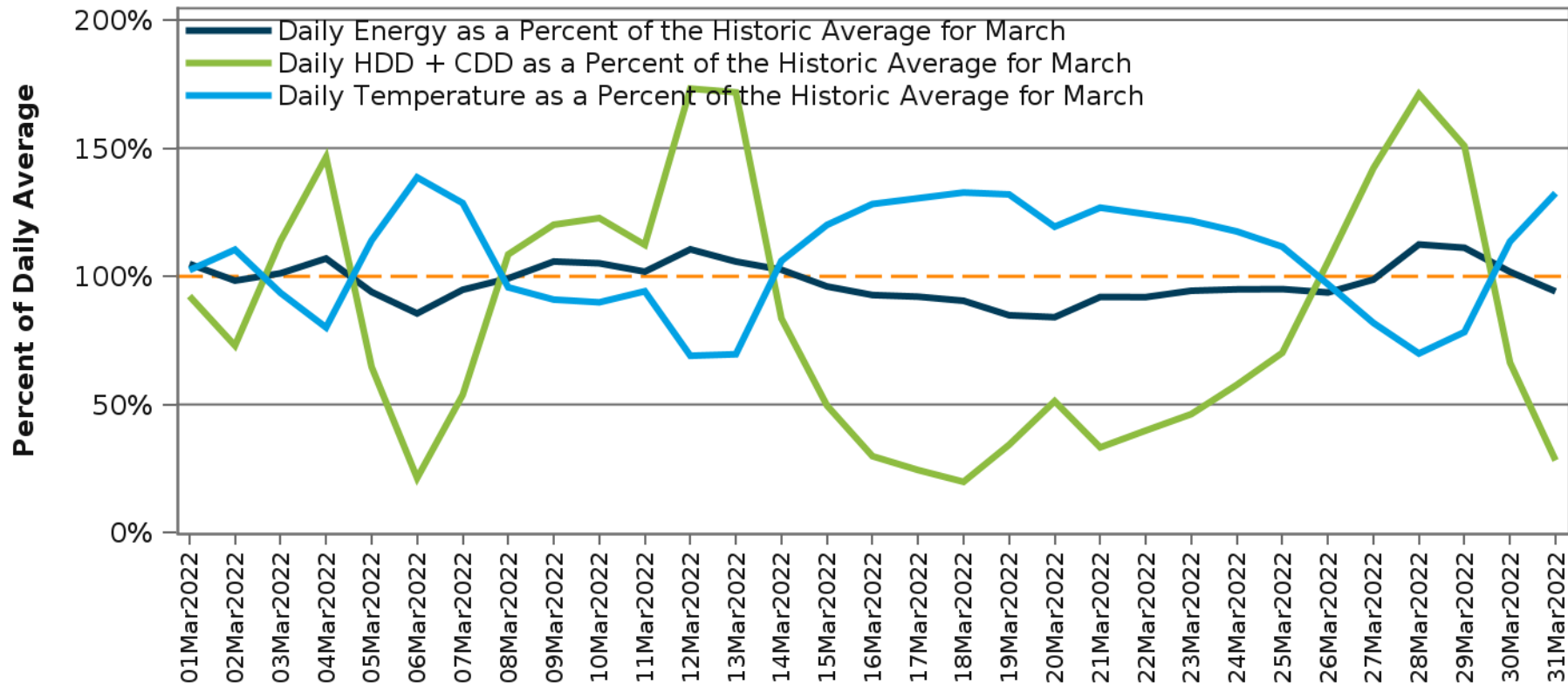
- The weather parameter shown in the following slide is a monthly sum of daily Heating Degree Days (HDD) and Cooling Degree Days (CDD).
- Degree days represent a deviation from a baseline temperature, in this case 60 degrees for HDD and 65 degrees for CDD. As temperatures get more extreme, colder or 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, 2021. Averages include load data for all of TO zones in the current RTO footprint.

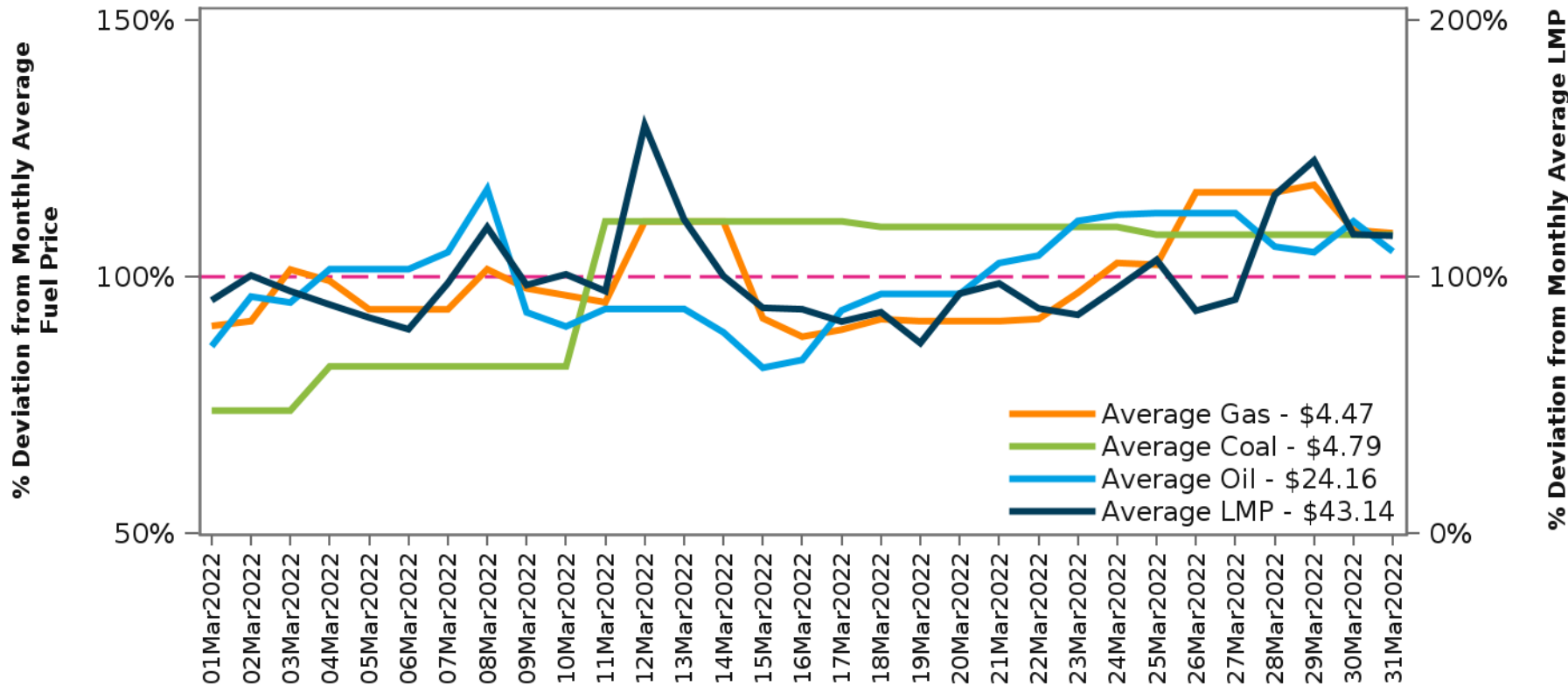
Historic Average Weather and Energy versus Current Month





Historic Average Weather and Energy versus Current Month - Daily

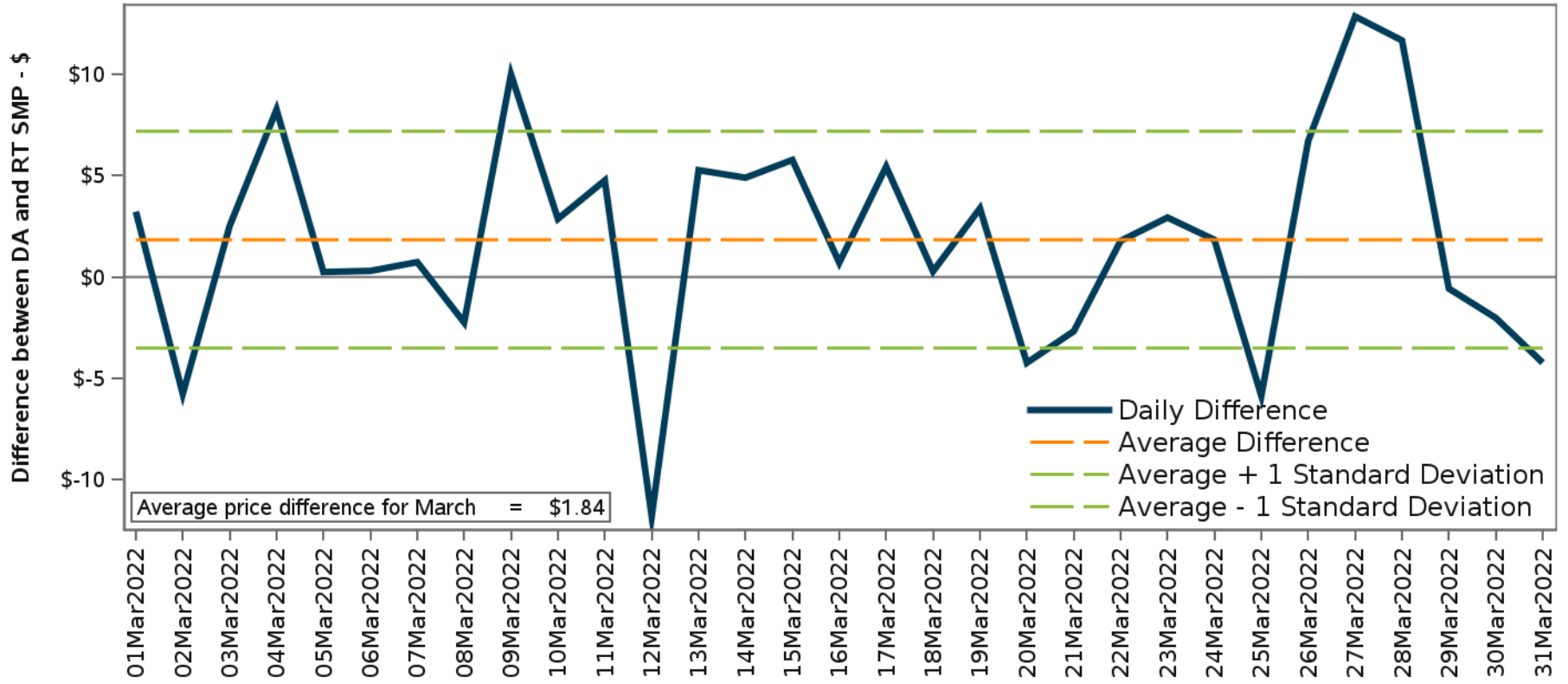




Fuel Price Source: S&P Global Platts

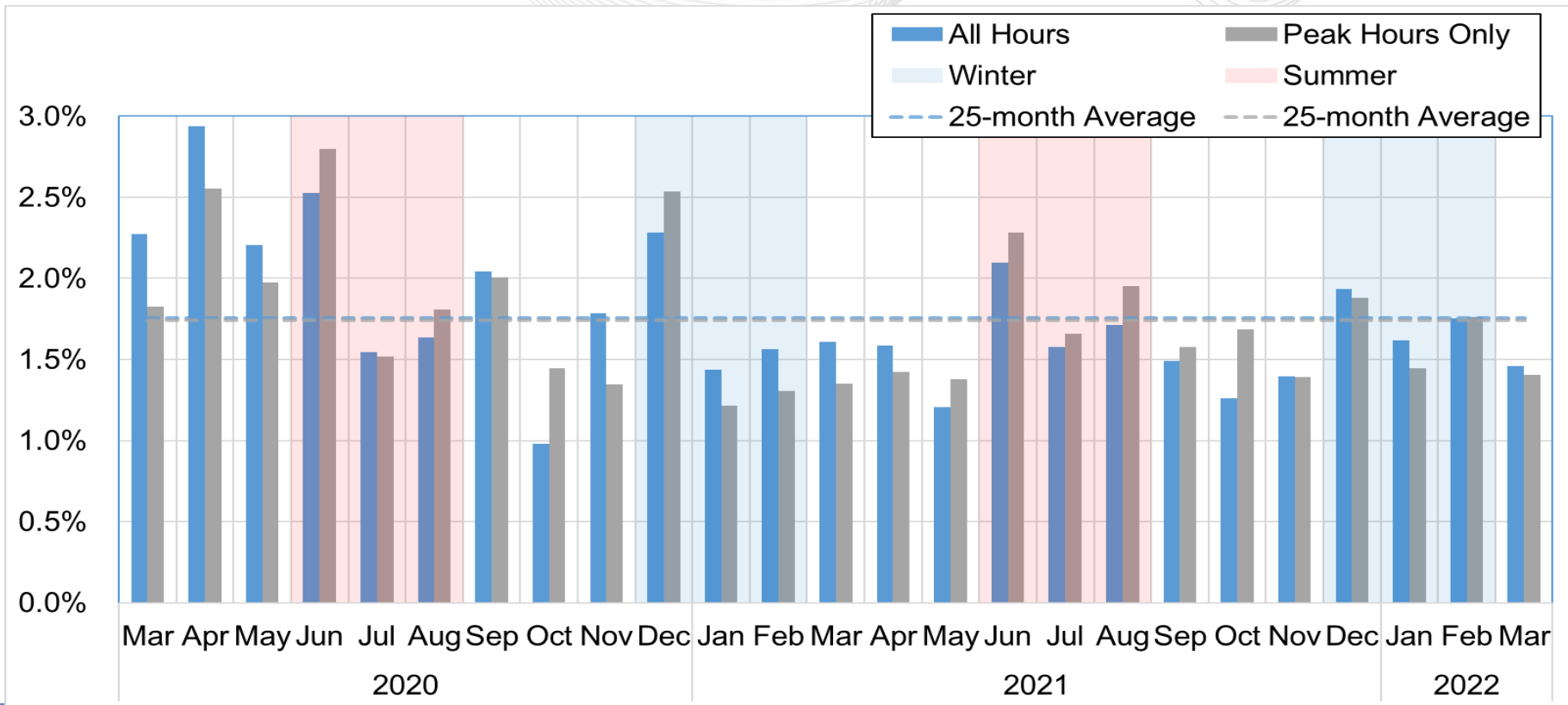


Daily Difference Between Day-Ahead and Real-Time System Marginal Prices

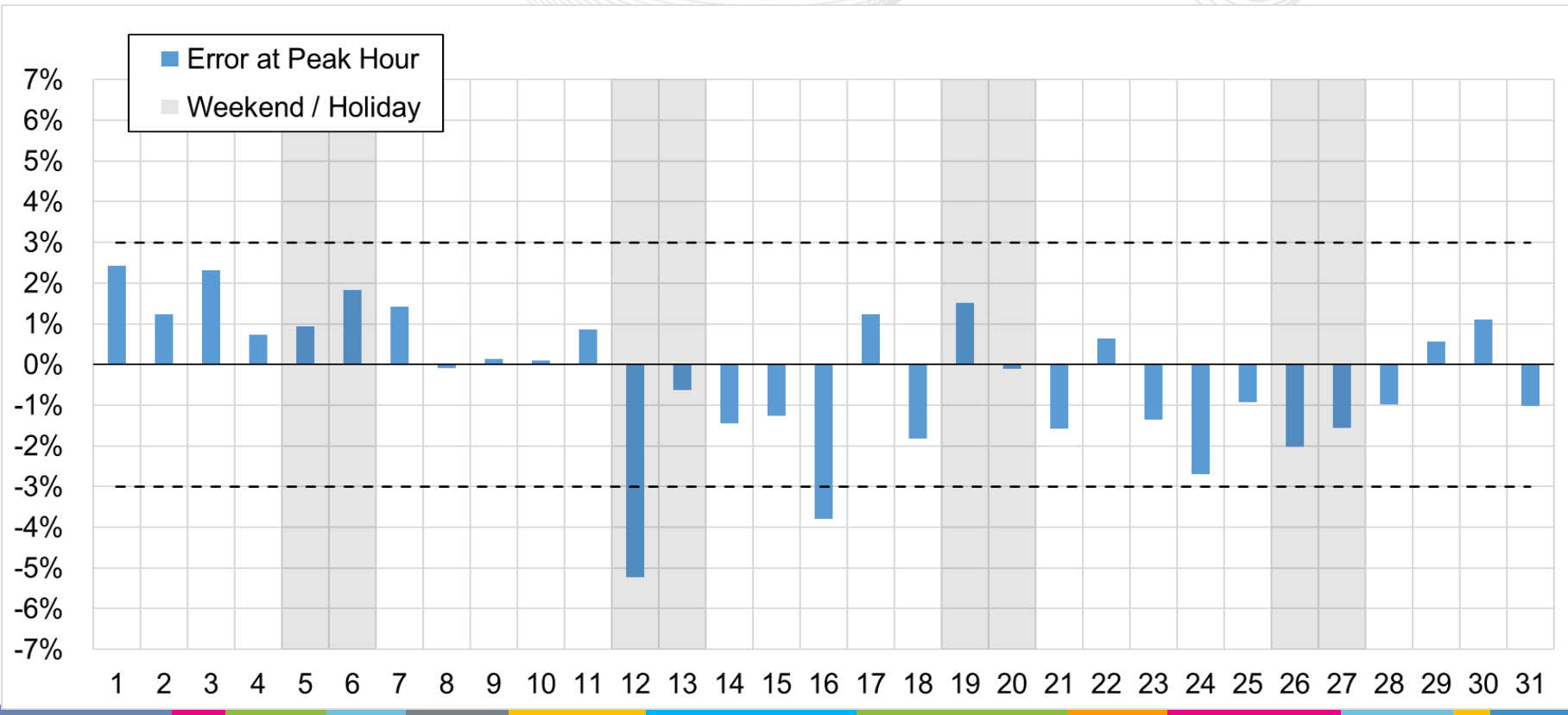


Positive values represent days when the DA daily average price was higher than RT. Negative values represent days when the DA price was lower.

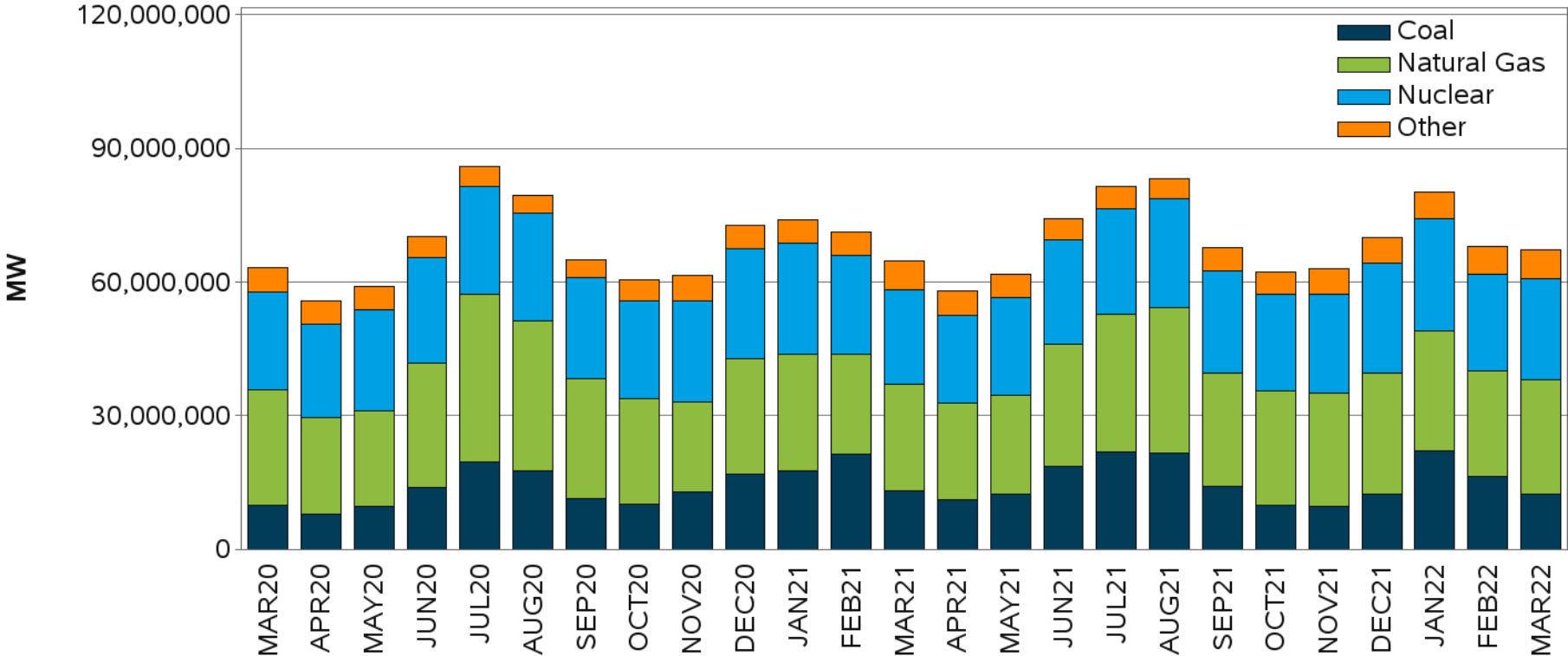
Load Forecast Error - Monthly Absolute Error, 10:00 Forecast



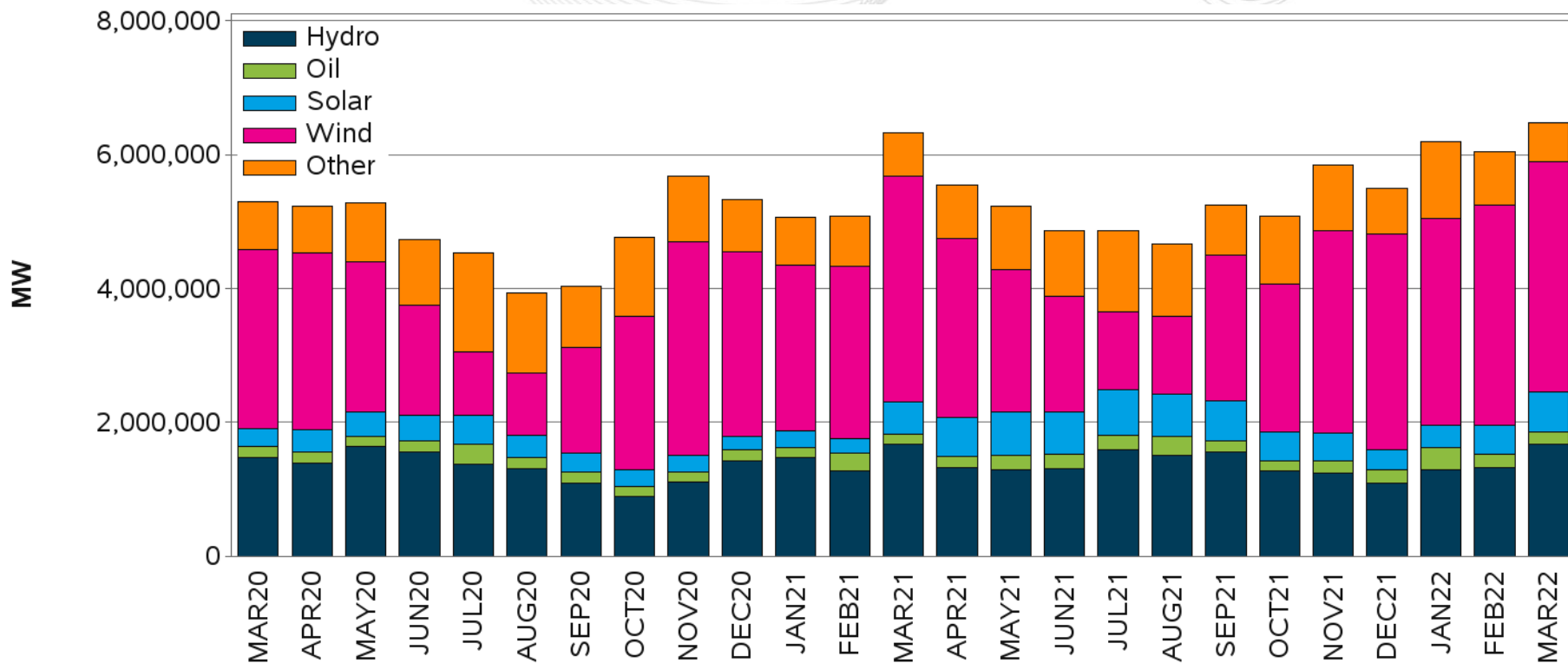
Load Forecast Error - March Daily Peaks, 10:00 Forecast



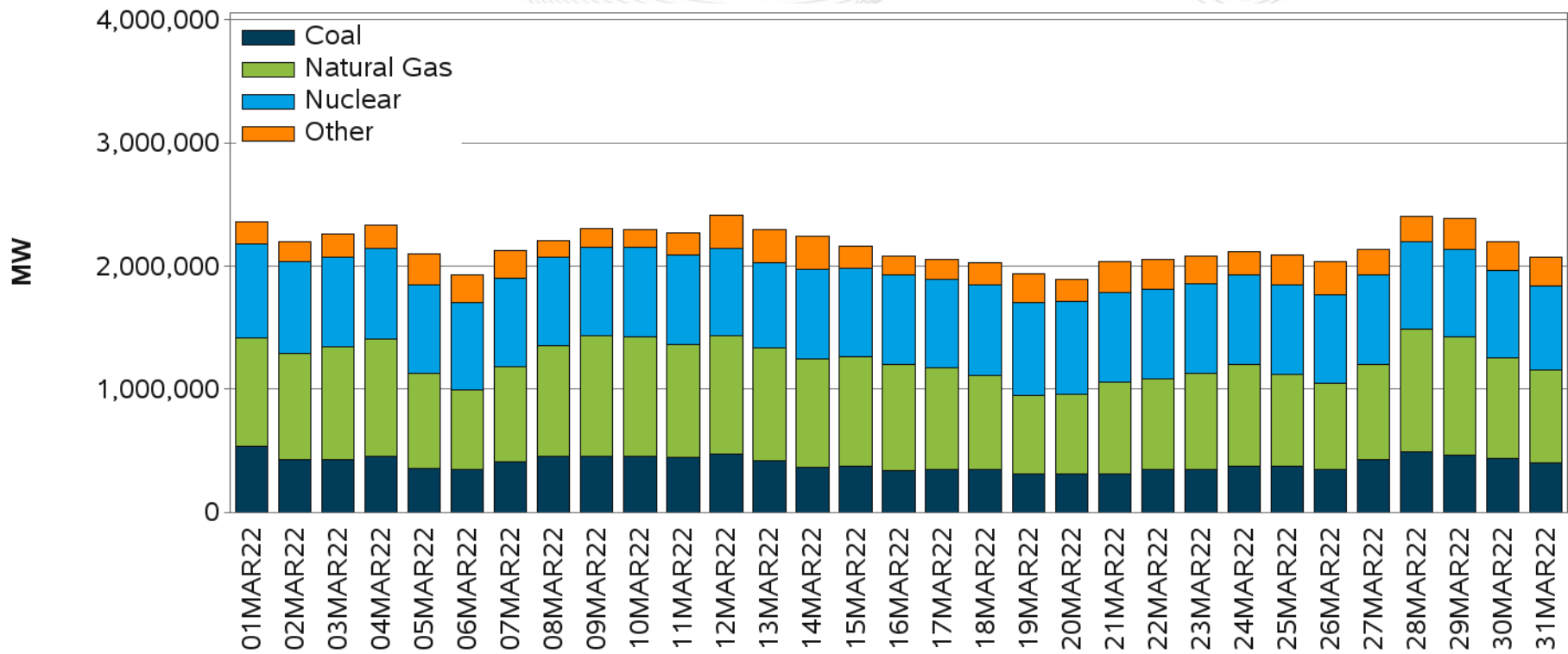
- PJM prepares a day-ahead load forecast at 10:00 am for use by our members.
- This forecast is not used to clear the day-ahead market and is not utilized for the reliability tools that run subsequent to the day-ahead market.
- *On March 12, a large storm was impacting the PJM footprint with snow, rain and a dramatic drop in temperature from the day prior. This dynamic weather, coupled with impacts to behind-the-meter solar production, lead to larger than normal error in our forecast models. On March 16, the morning peak forecast was impacted by model error, due in part to the Daylight Saving Time shift the weekend before, and over-forecasted temperatures in the Western zones.*



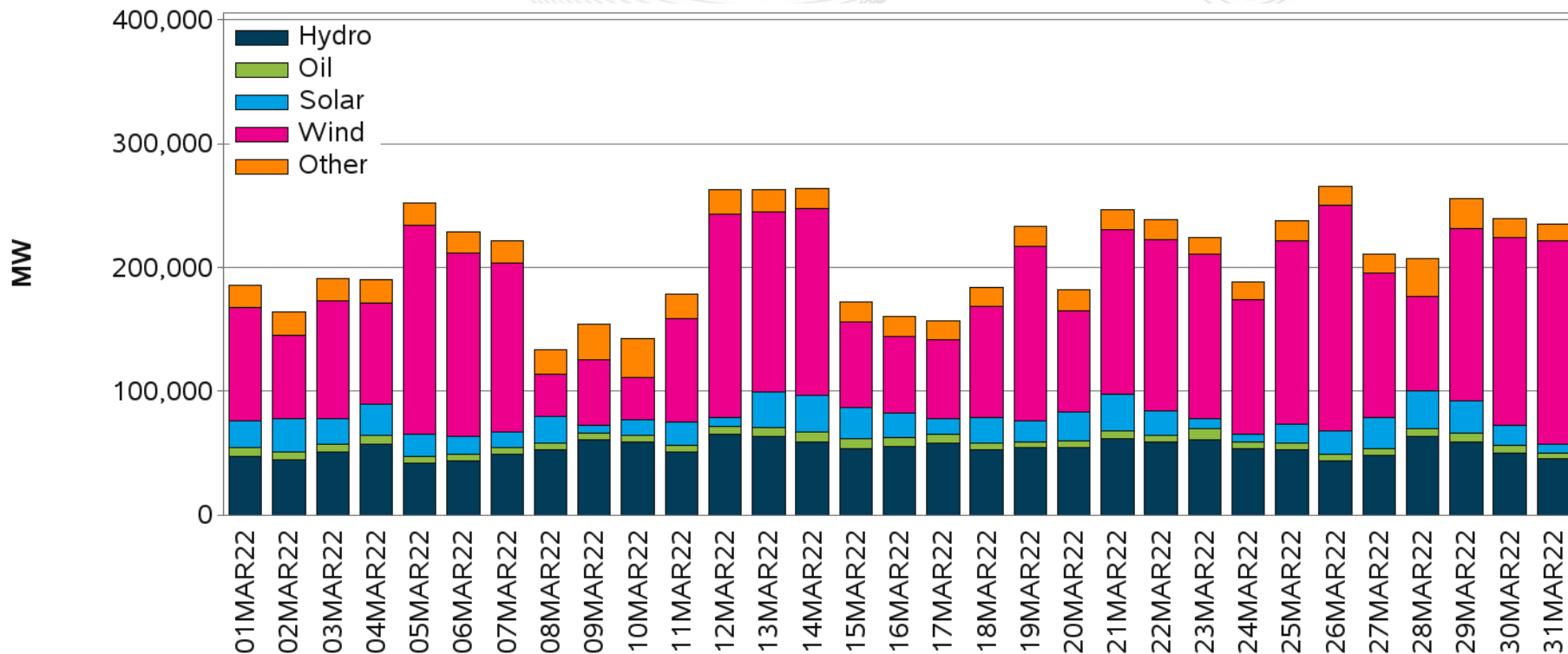
Other includes Hydro, Oil, Solar, Wind, and Other



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

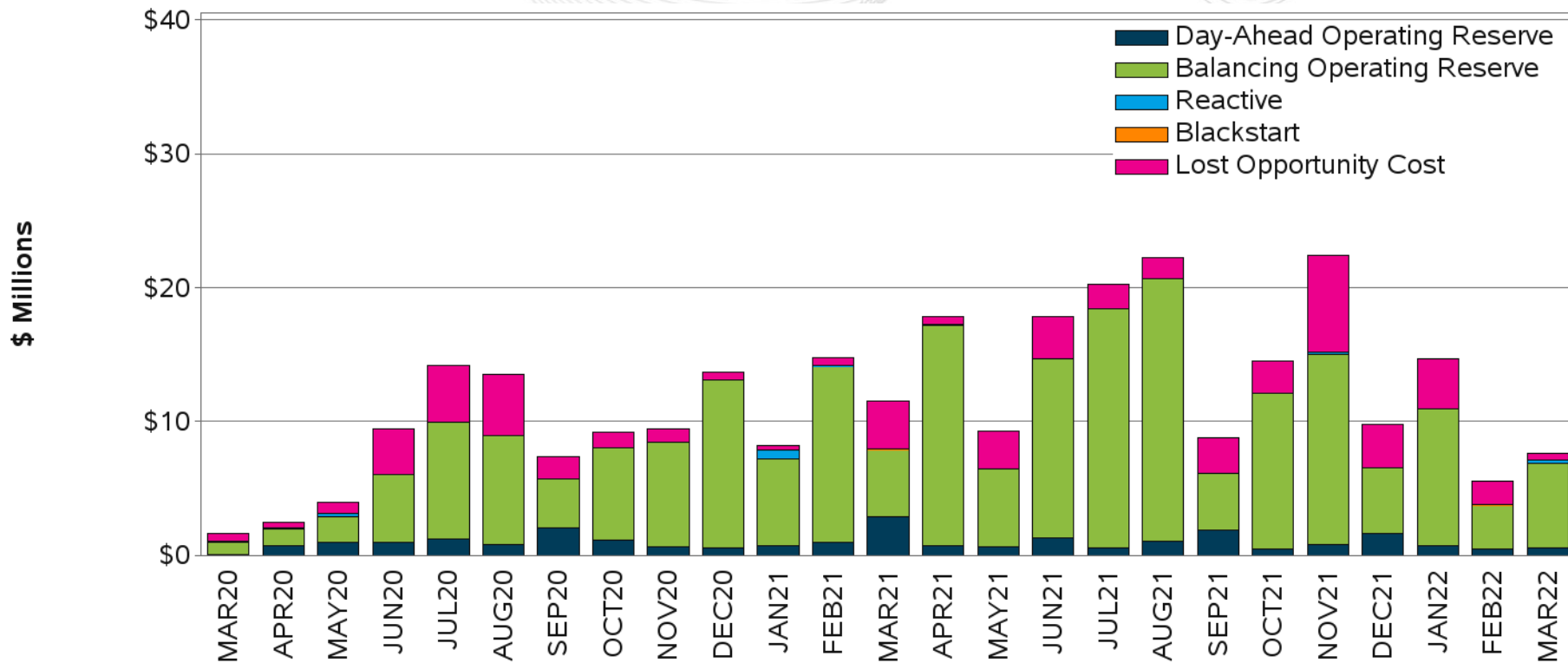


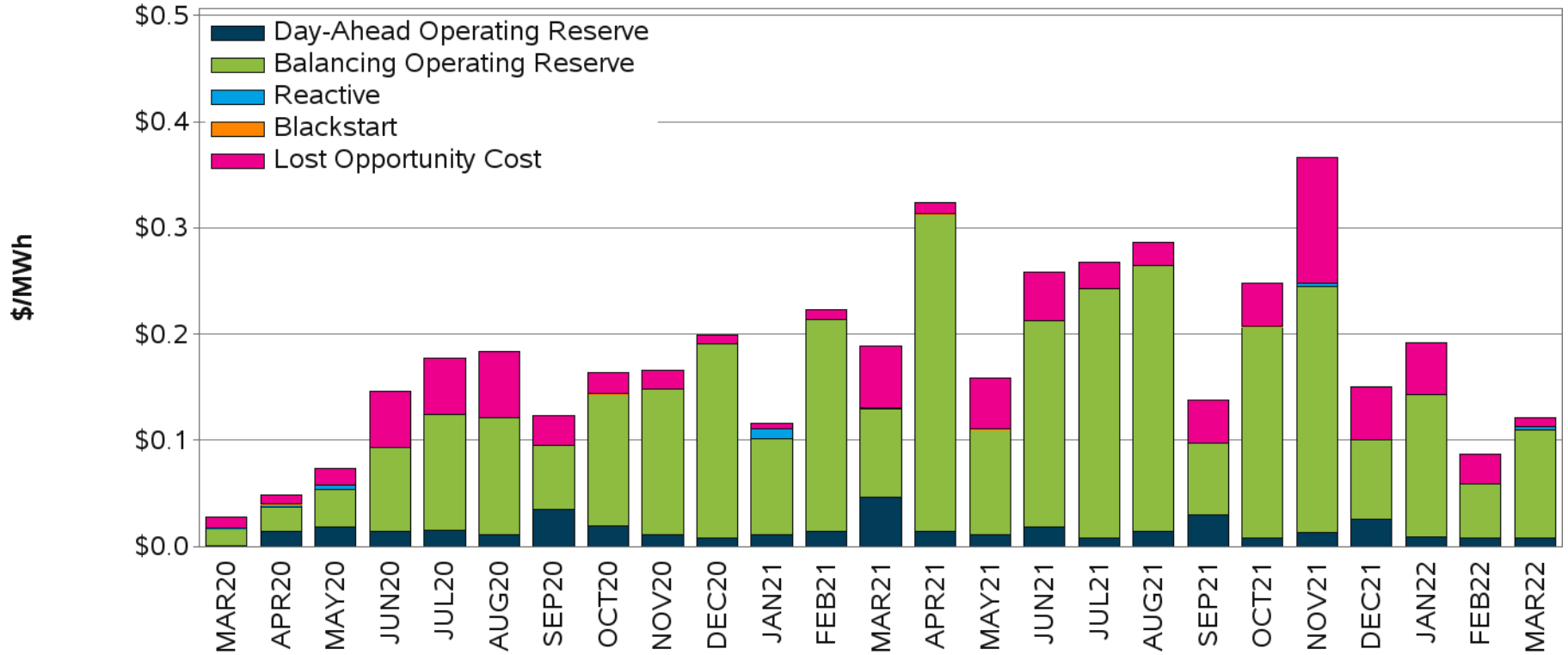
Other includes Hydro, Oil, Solar, Wind, and Other

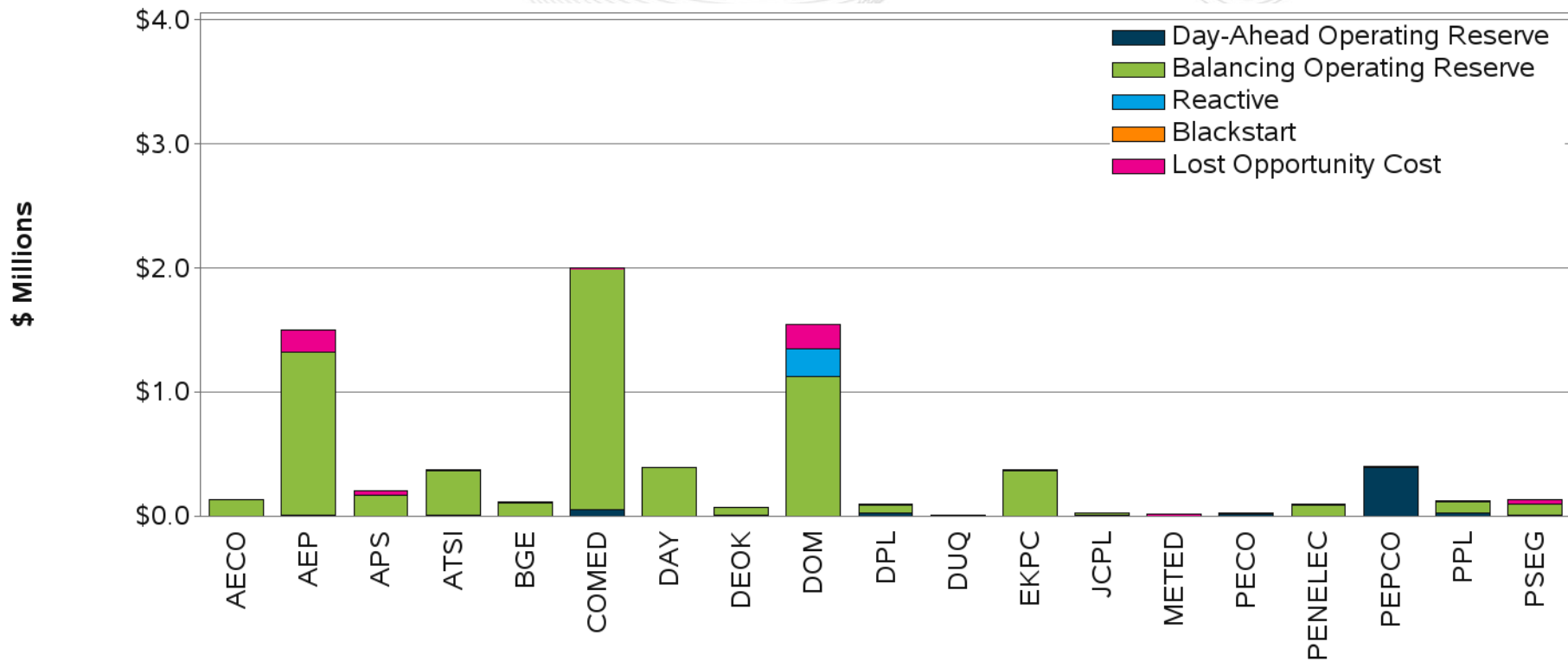


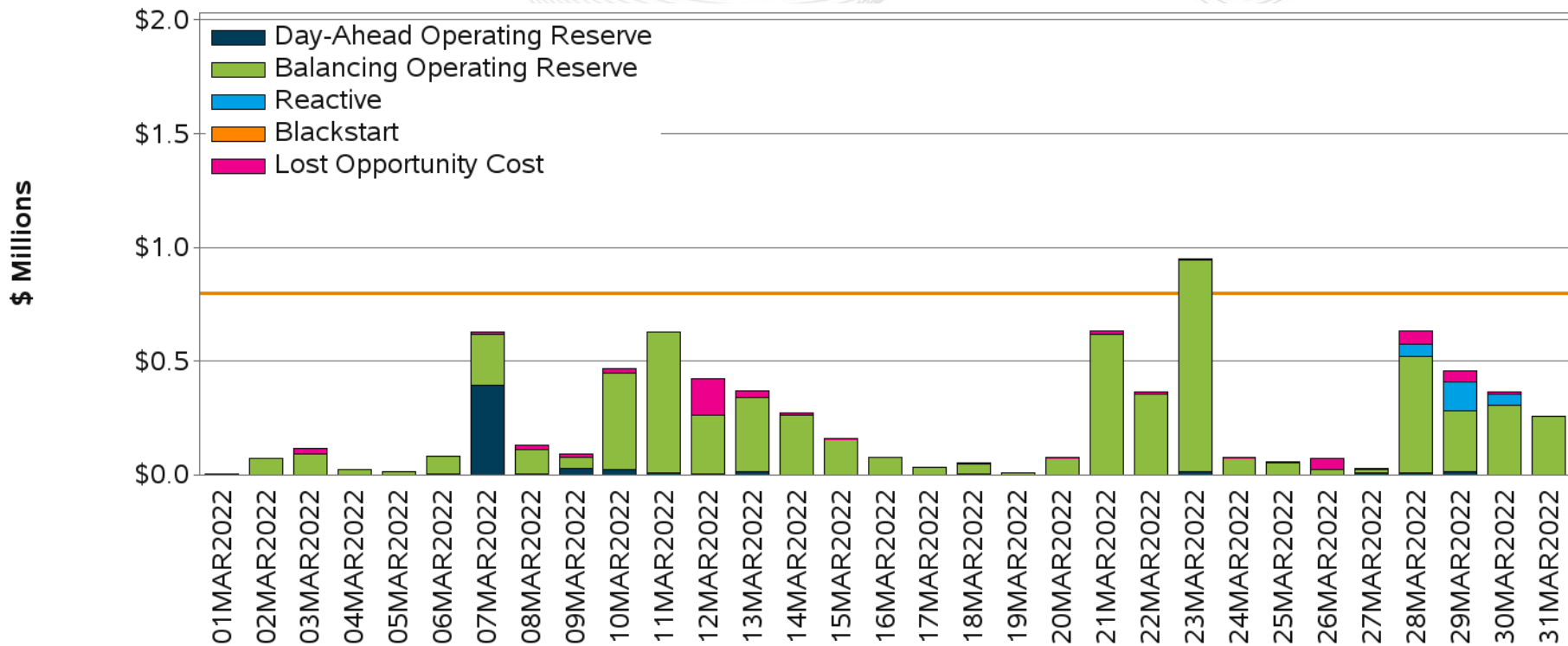
'Other' includes Flywheels, Multiple Fuels, Storage, and Other Renewables

Operating Reserve (Uplift)





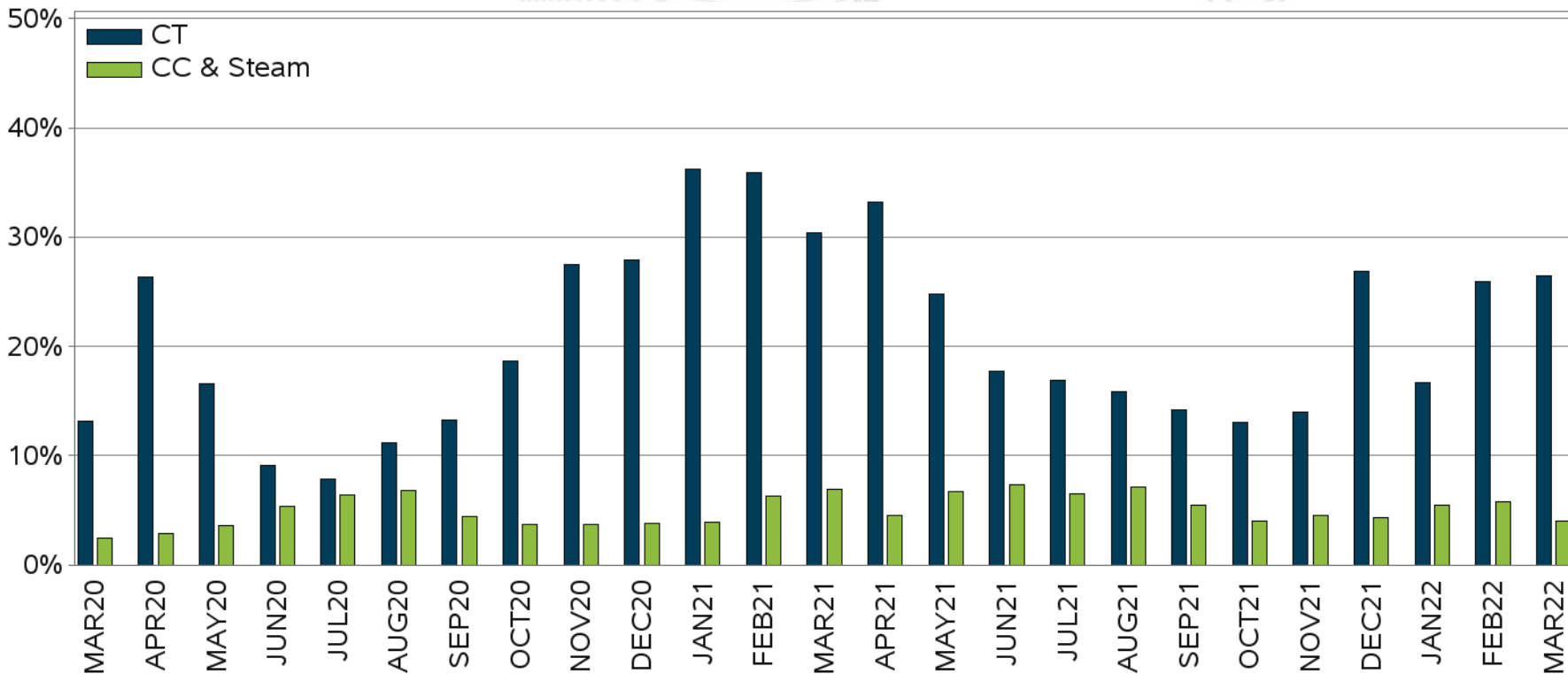




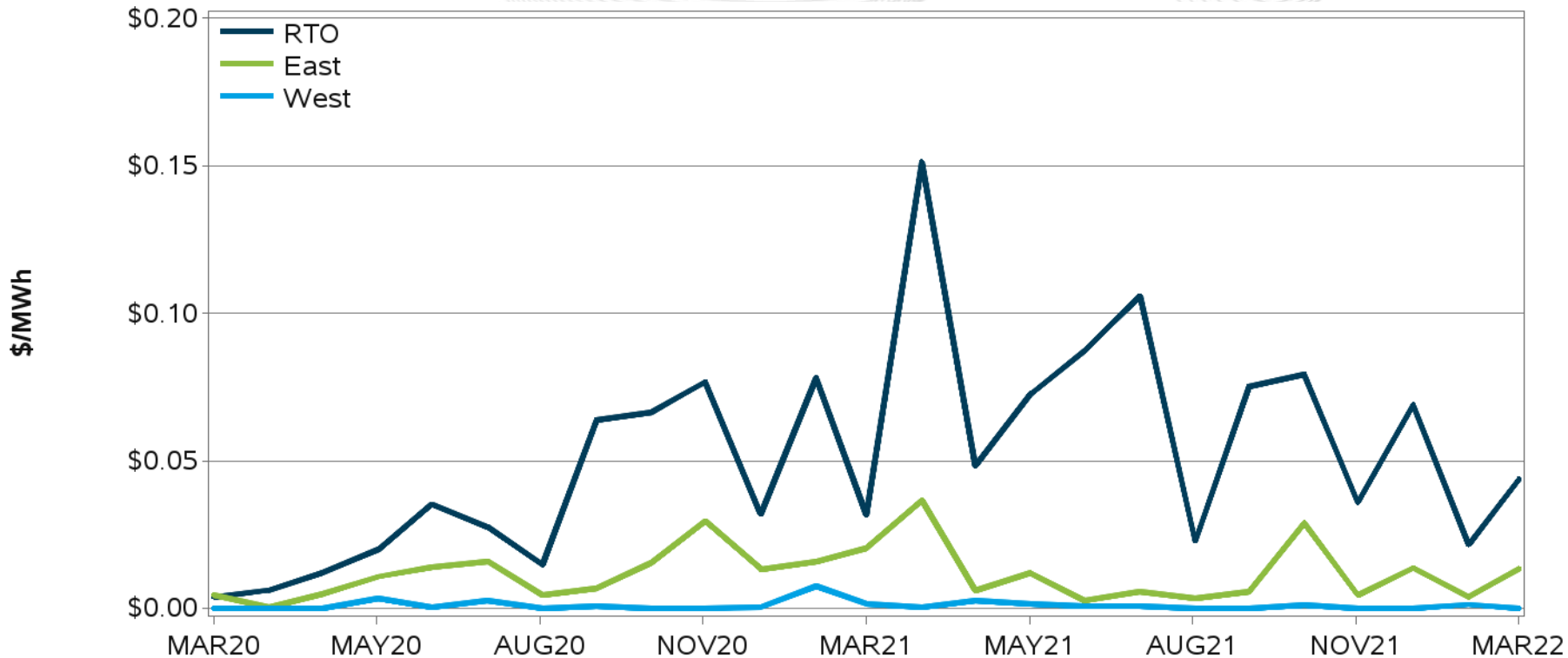
- In March, uplift exceeded \$800,000 on one day – March 23rd.
- Contributing factors to uplift were:
 - A localized issue not allocated to members

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

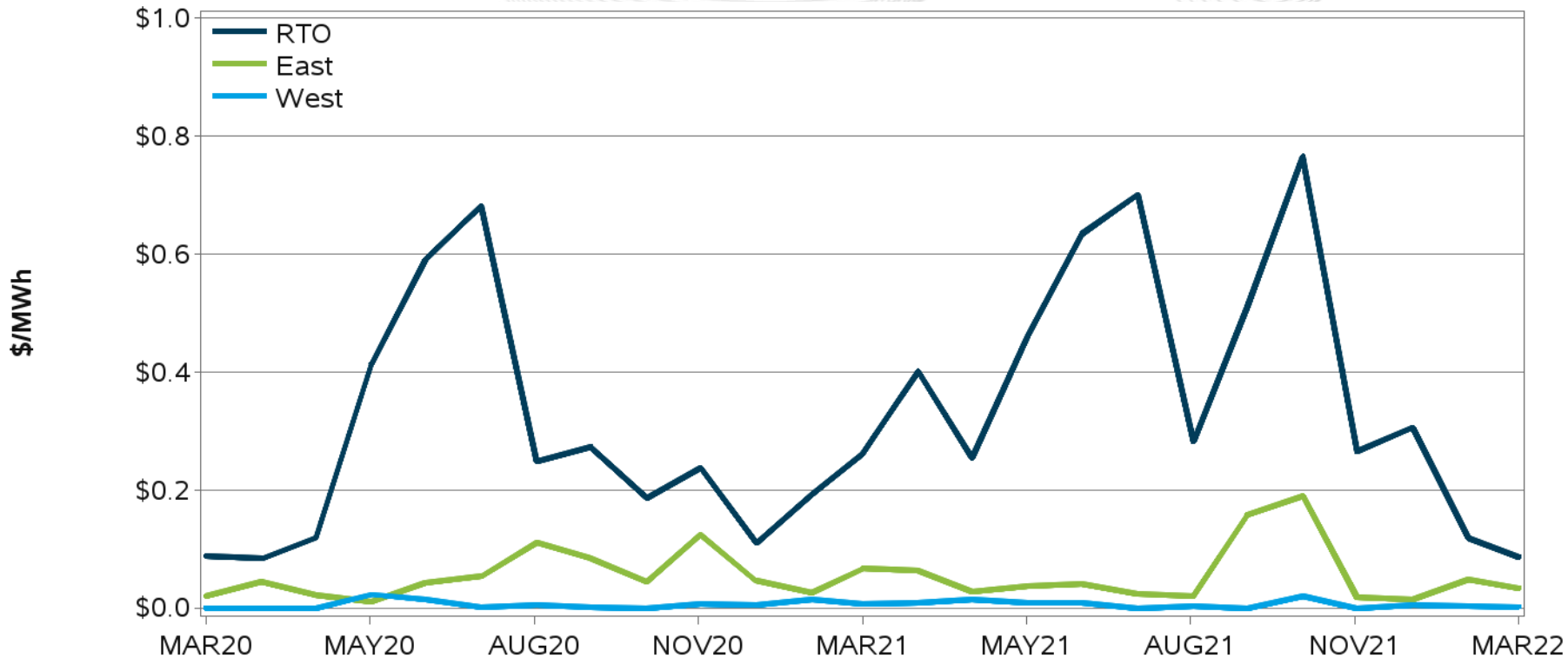
Percent of Total CT, CC and Steam Hours with LMP < Offer



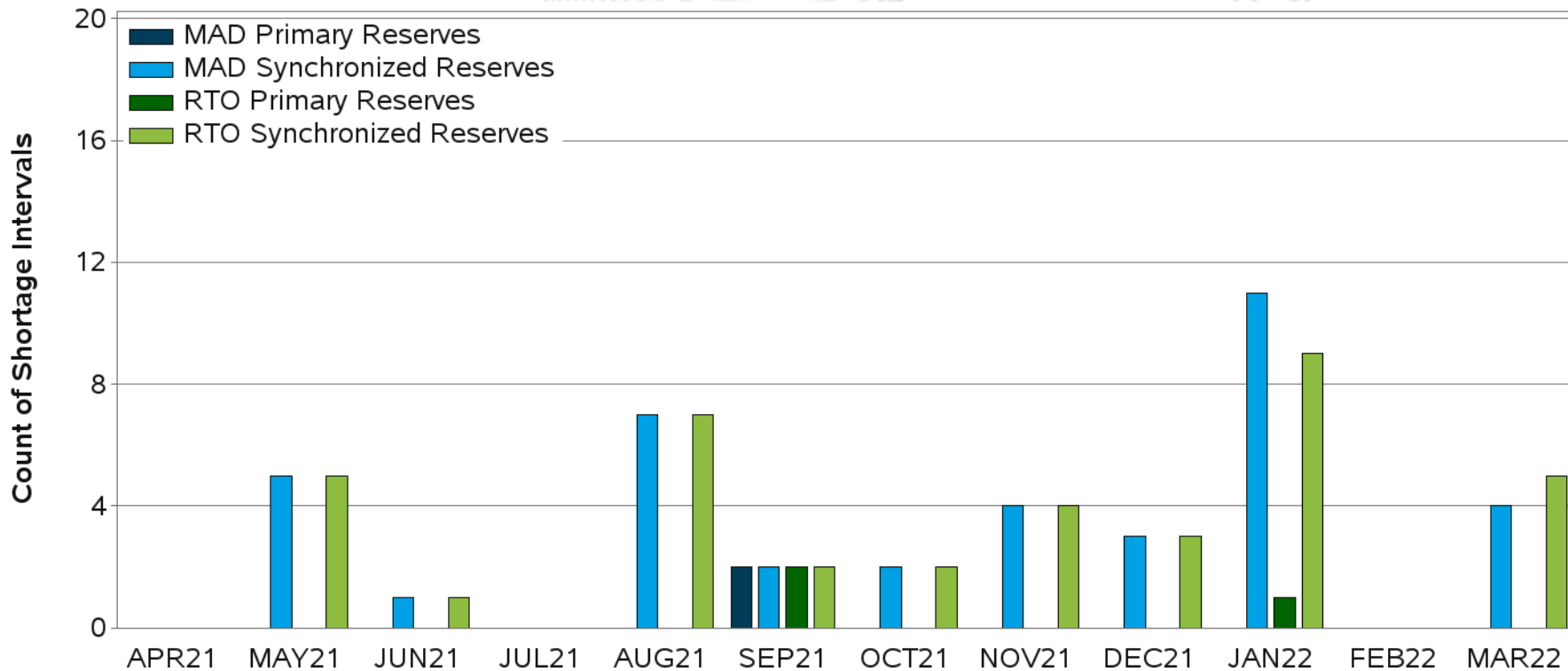
- Beginning in December 2008, the daily Balancing Operating Reserves (BOR) rate was replaced with six different BOR rates: RTO BOR for Reliability Rate, RTO BOR for Deviations Rate, East BOR for Reliability Rate, East BOR for Deviations Rate, West BOR for Reliability Rate, West BOR for Deviations Rate.
- 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



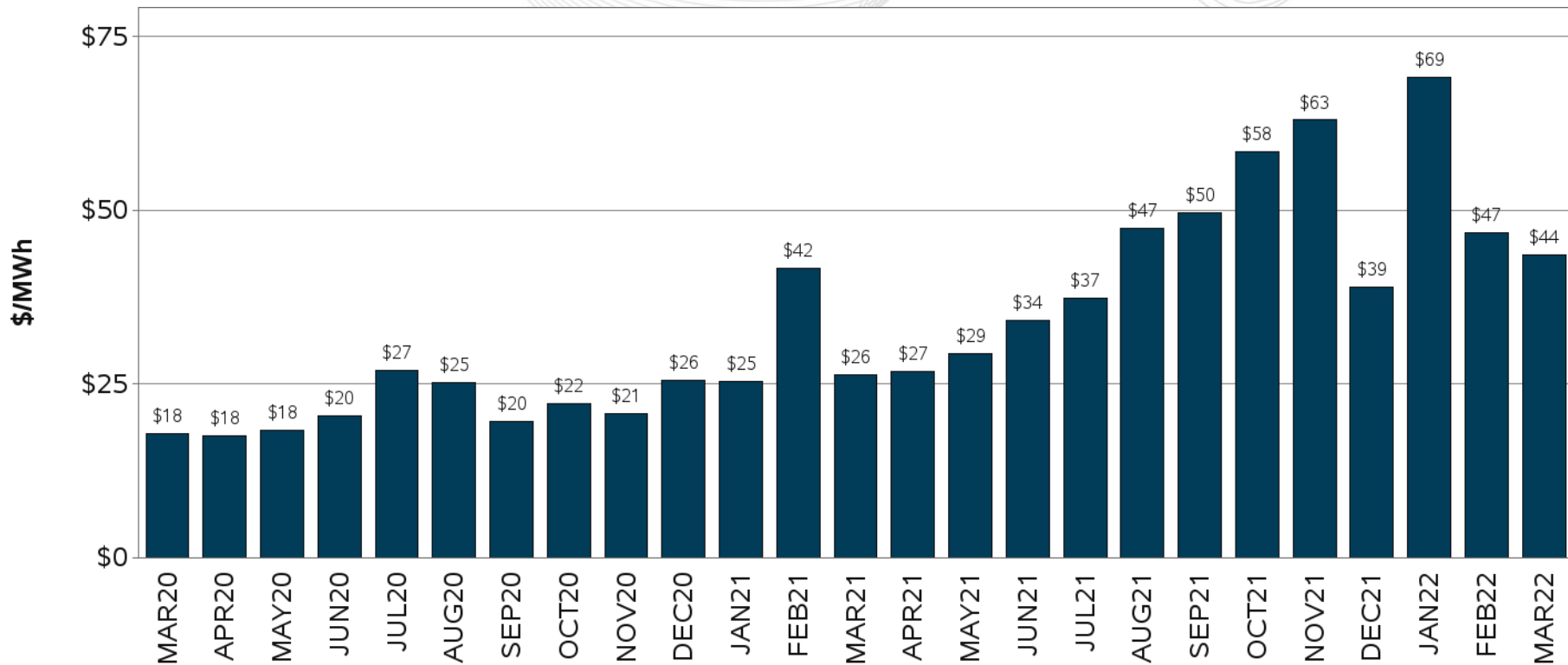
Energy Market LMP Summary



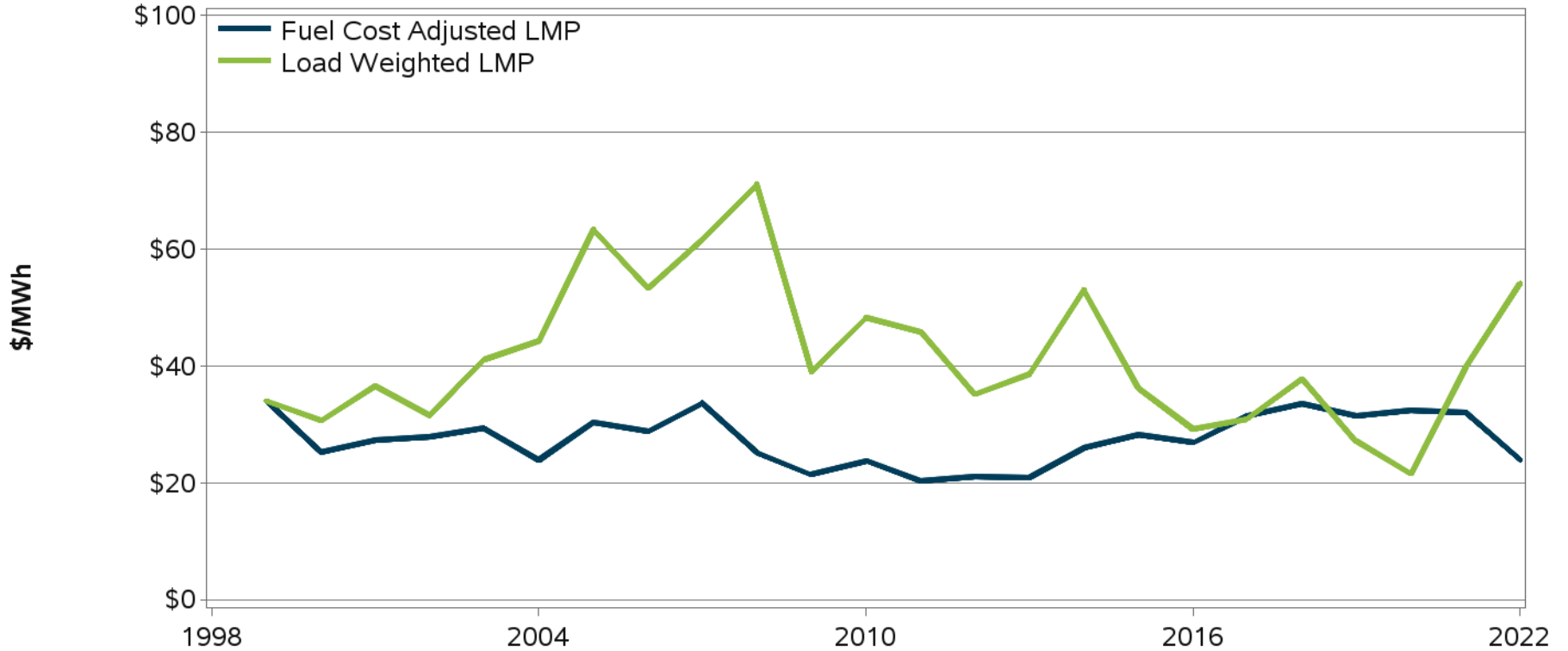
| Date | 5-Minute Interval | Reserve Penalty Factors | 5-Minute Interval SMP | Hourly Integrated SMP |
|--------------------------|-------------------|--|-----------------------|-----------------------|
| Wednesday, March 2, 2022 | 17:25 - 17:30 | RTO Synchronized Reserves; MAD Synchronized Reserves | \$653.14 | \$166.68 |
| Wednesday, March 2, 2022 | 17:30 - 17:35 | RTO Synchronized Reserves; MAD Synchronized Reserves | \$875.00 | \$166.68 |
| Saturday, March 12, 2022 | 10:20 - 10:25 | RTO Synchronized Reserves; MAD Synchronized Reserves | \$740.58 | \$139.27 |
| Sunday, March 20, 2022 | 19:40 - 19:45 | RTO Synchronized Reserves; MAD Synchronized Reserves | \$639.00 | \$122.90 |
| Monday, March 21, 2022 | 6:40 - 6:45 | RTO Synchronized Reserves | \$324.73 | \$100.33 |

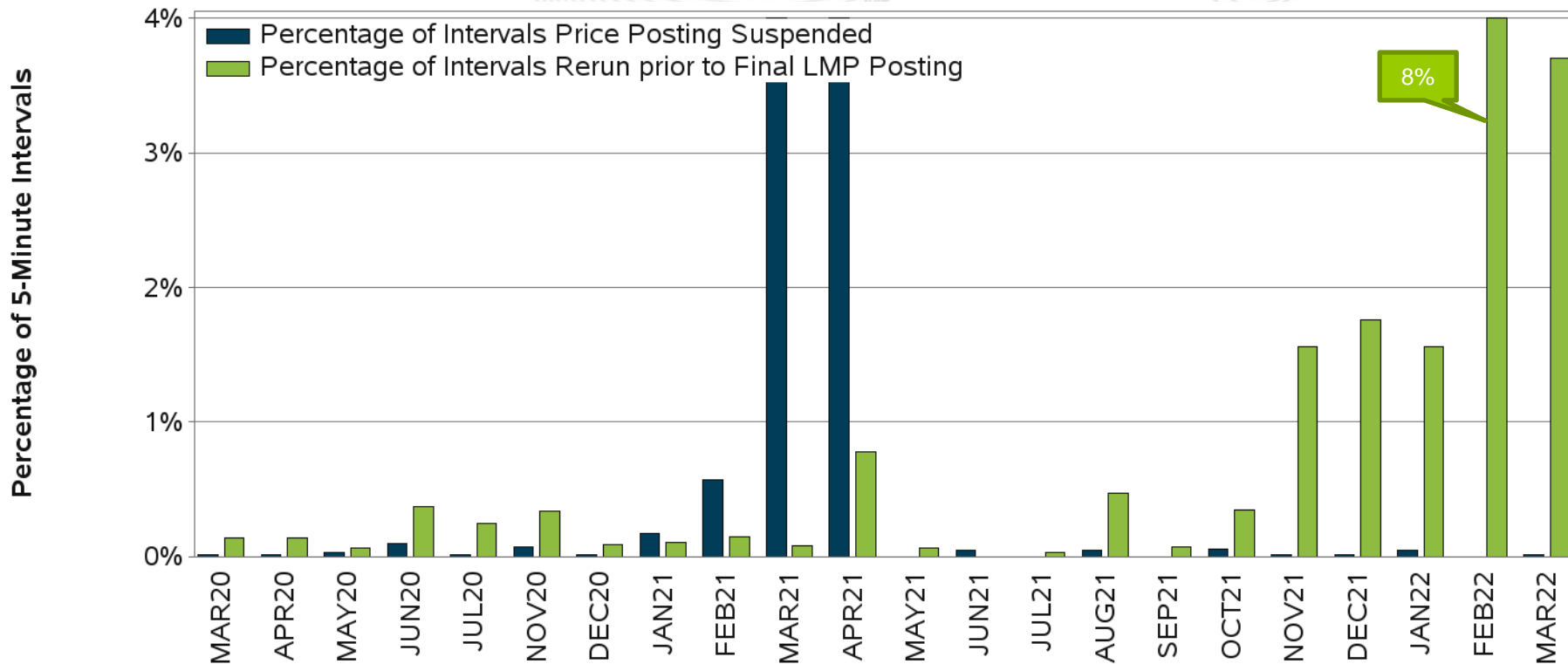
Information on constraints and shadow prices can be found here:

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



Fuel Cost Adjusted LMP (Referenced to 1999 Fuel Prices)

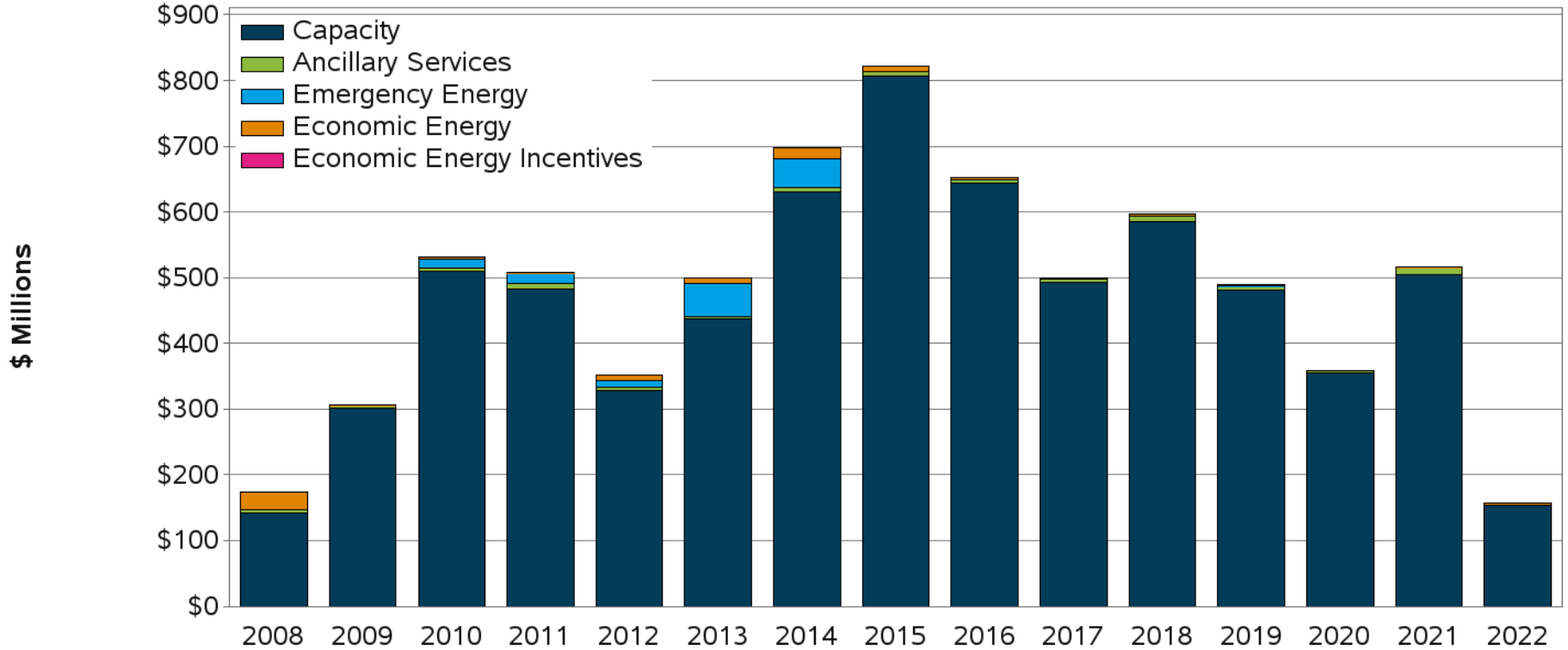


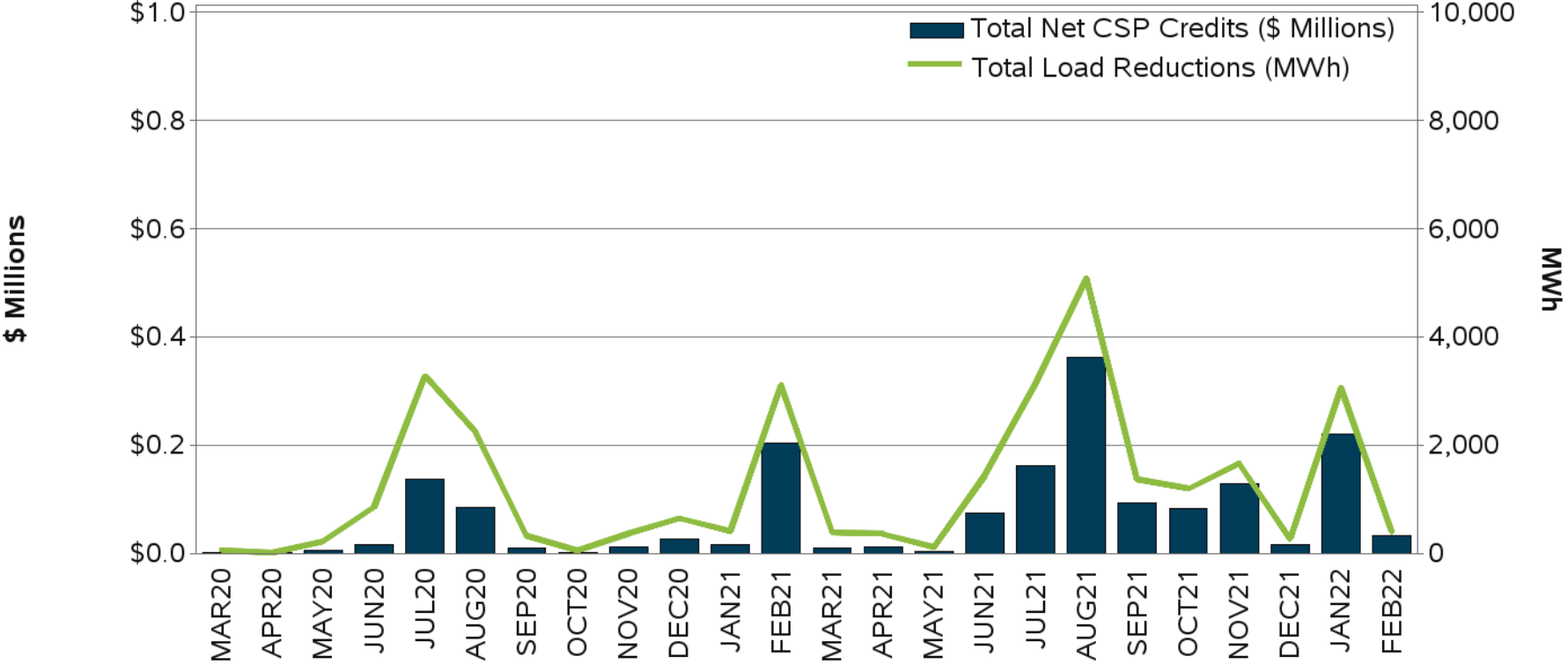


Spikes seen in March and April 2021 are incorrect and due to a software bug which has since been fixed. The February 2022 rate is due to reruns for the Lanexa-Dunsville outage.

Energy Market

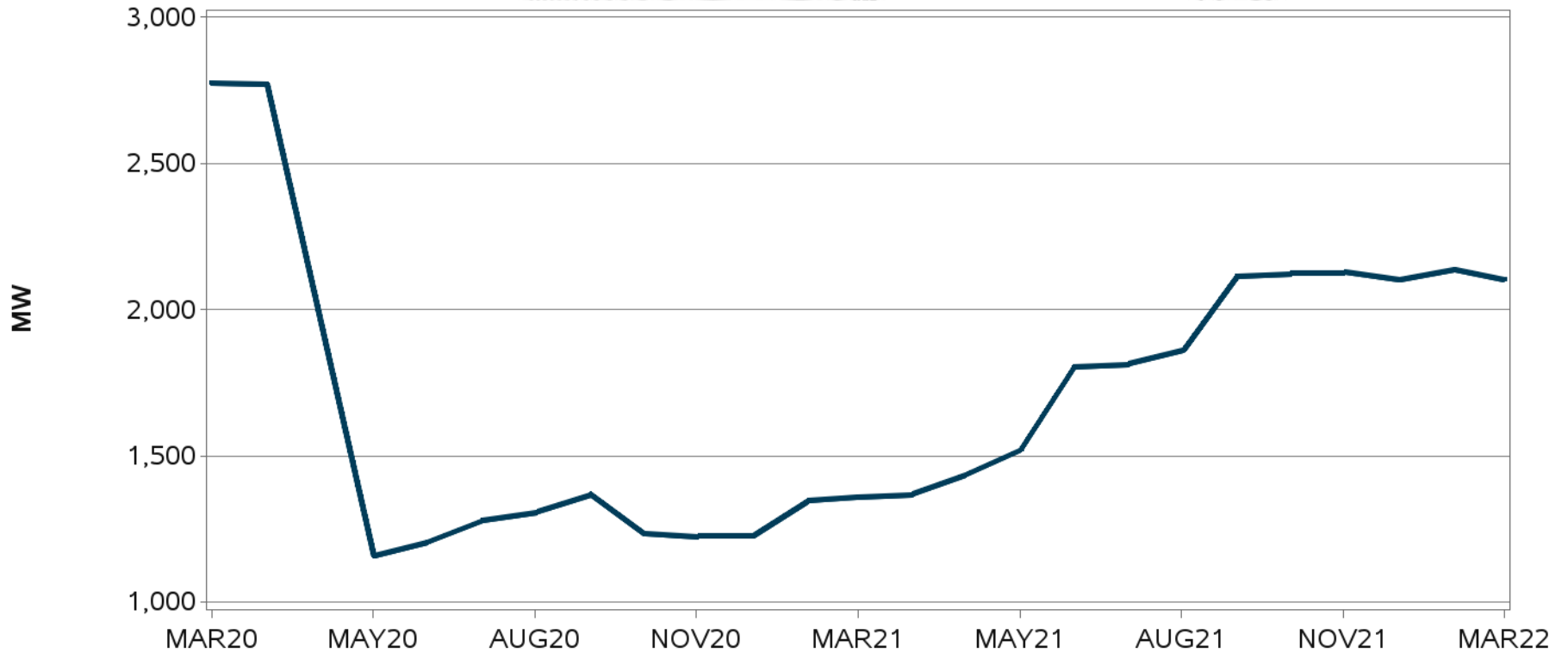
Demand Response Summary





*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

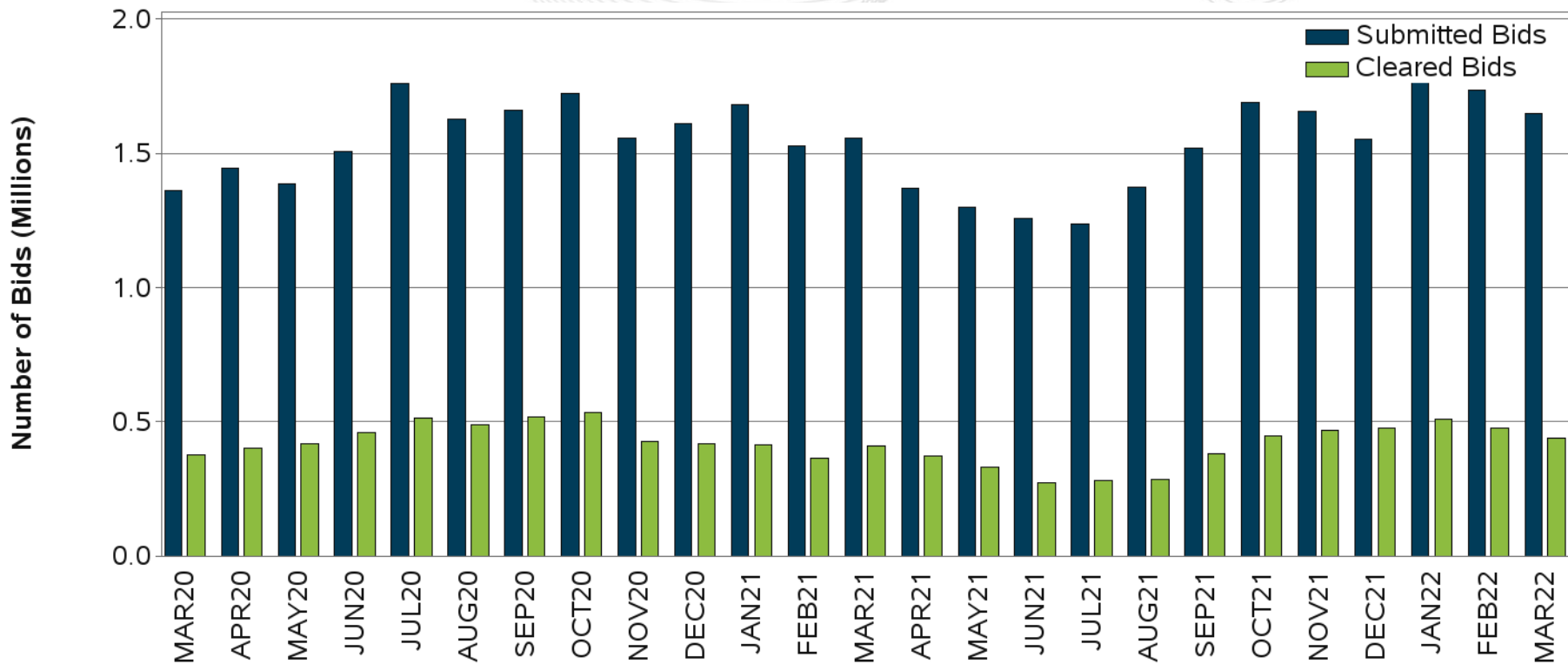


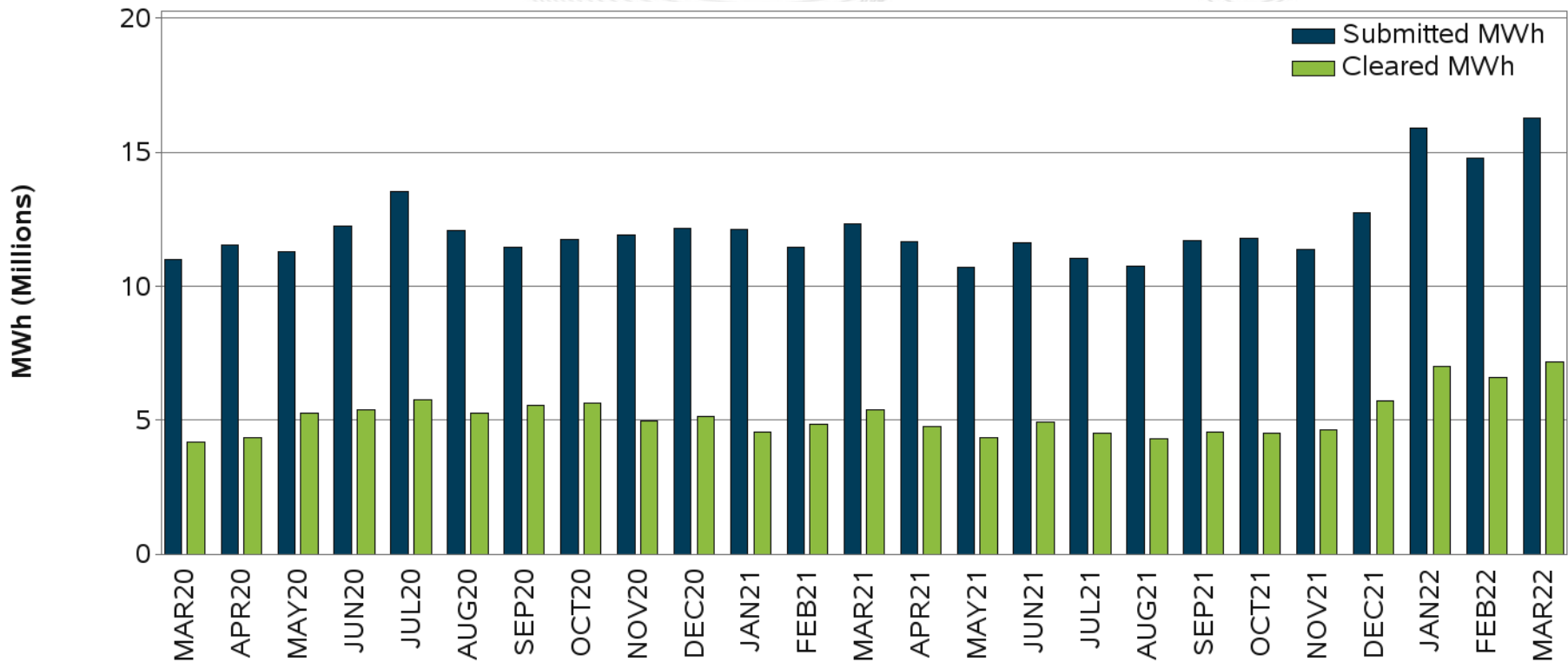
Energy Market

Virtual Activity Summary

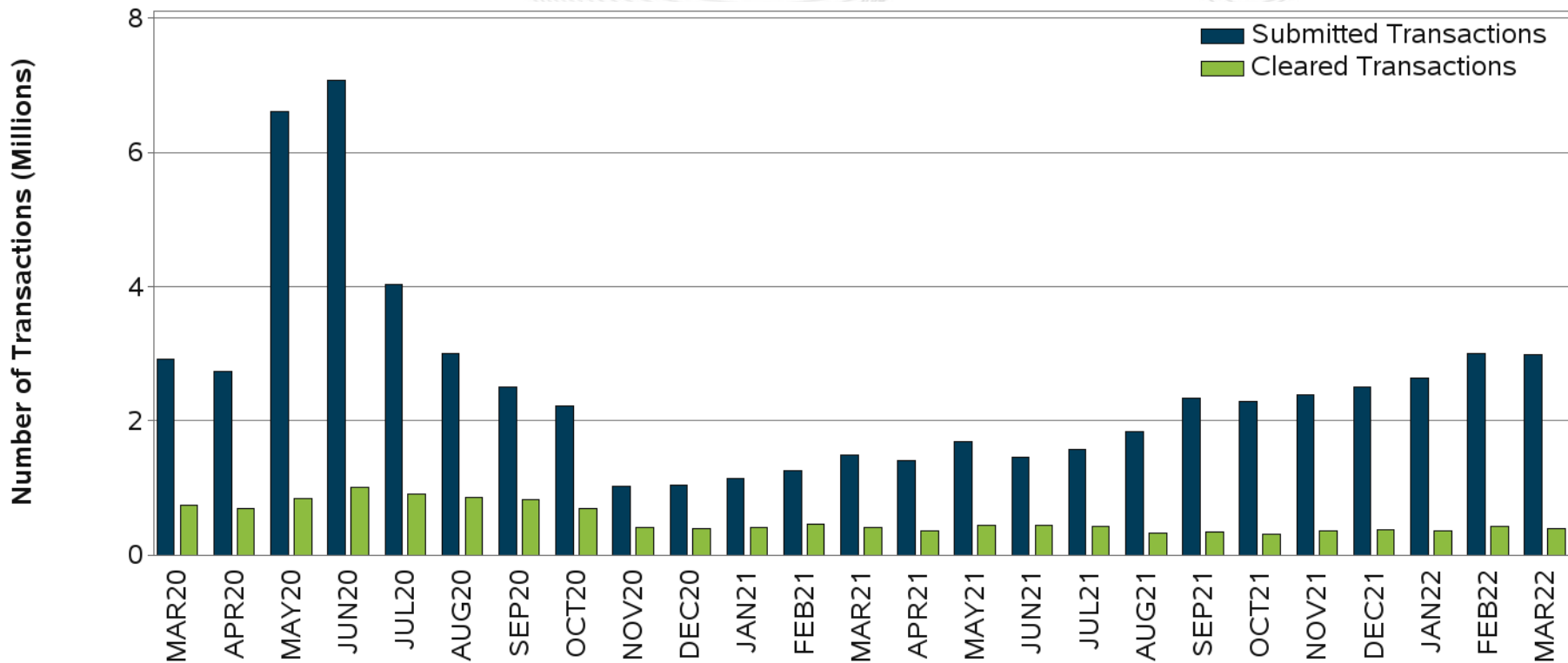
- The following six charts depict trends in submitted and cleared virtual and up-to-congestion transactions, in terms of number and volume, into the PJM Energy Market. The first two of these charts show the submitted and cleared increment and decrement bids (virtual transactions or virtuals) and they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

Virtual Bids (INCs & DEC)s - Total Number

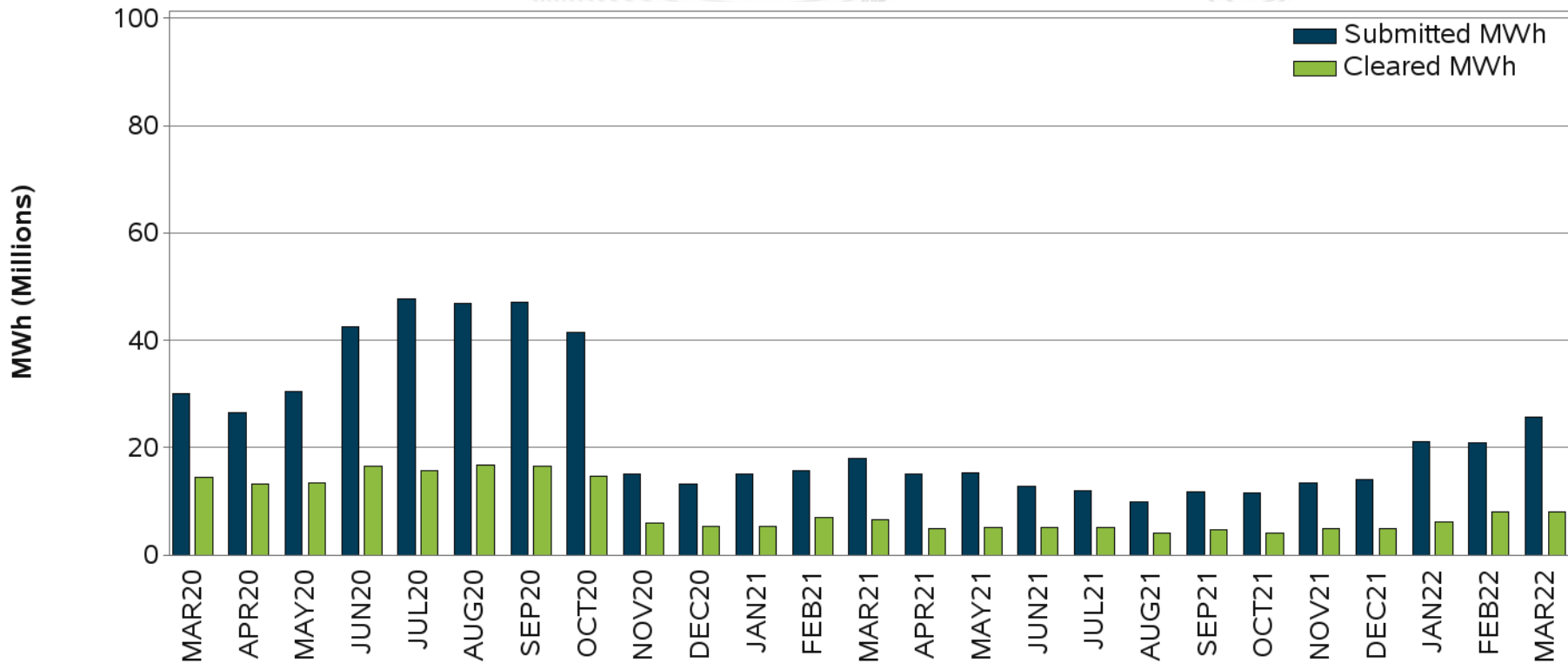




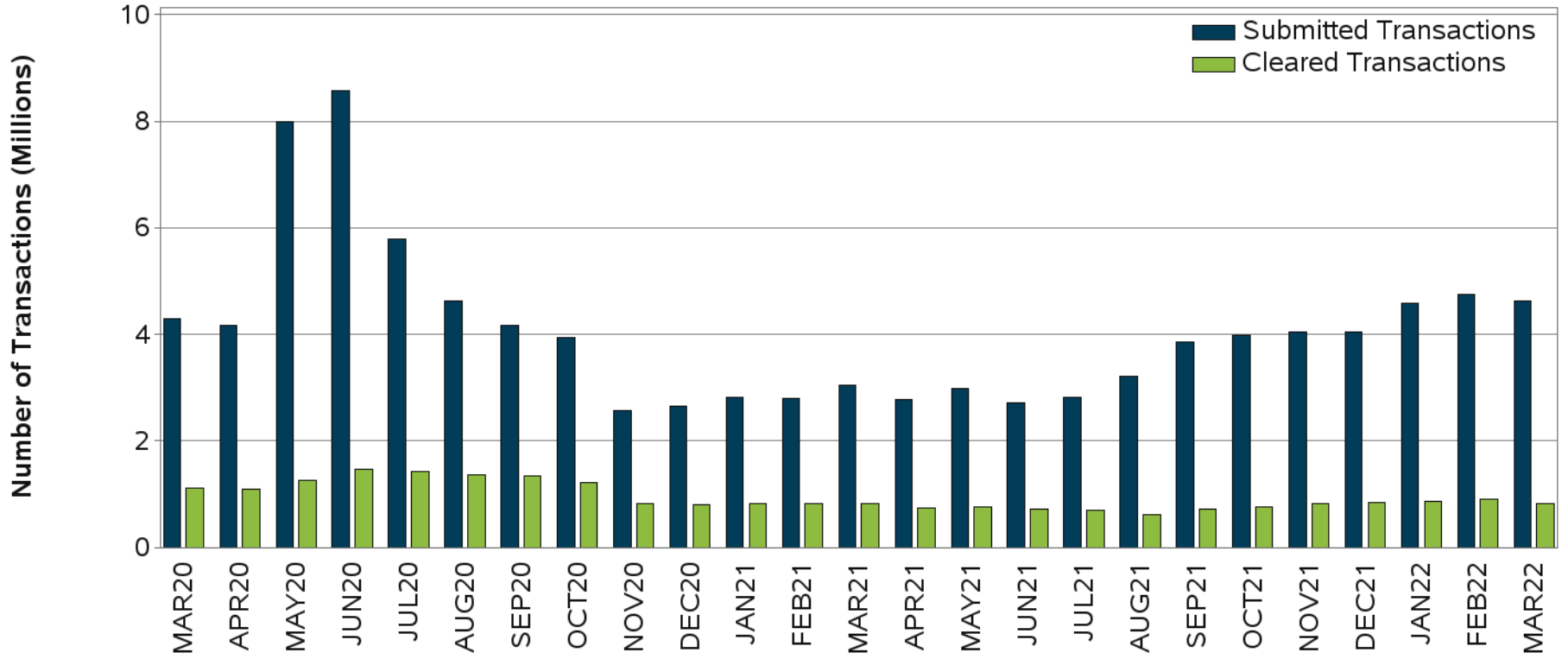
Up-To-Congestion Transactions - Total Number



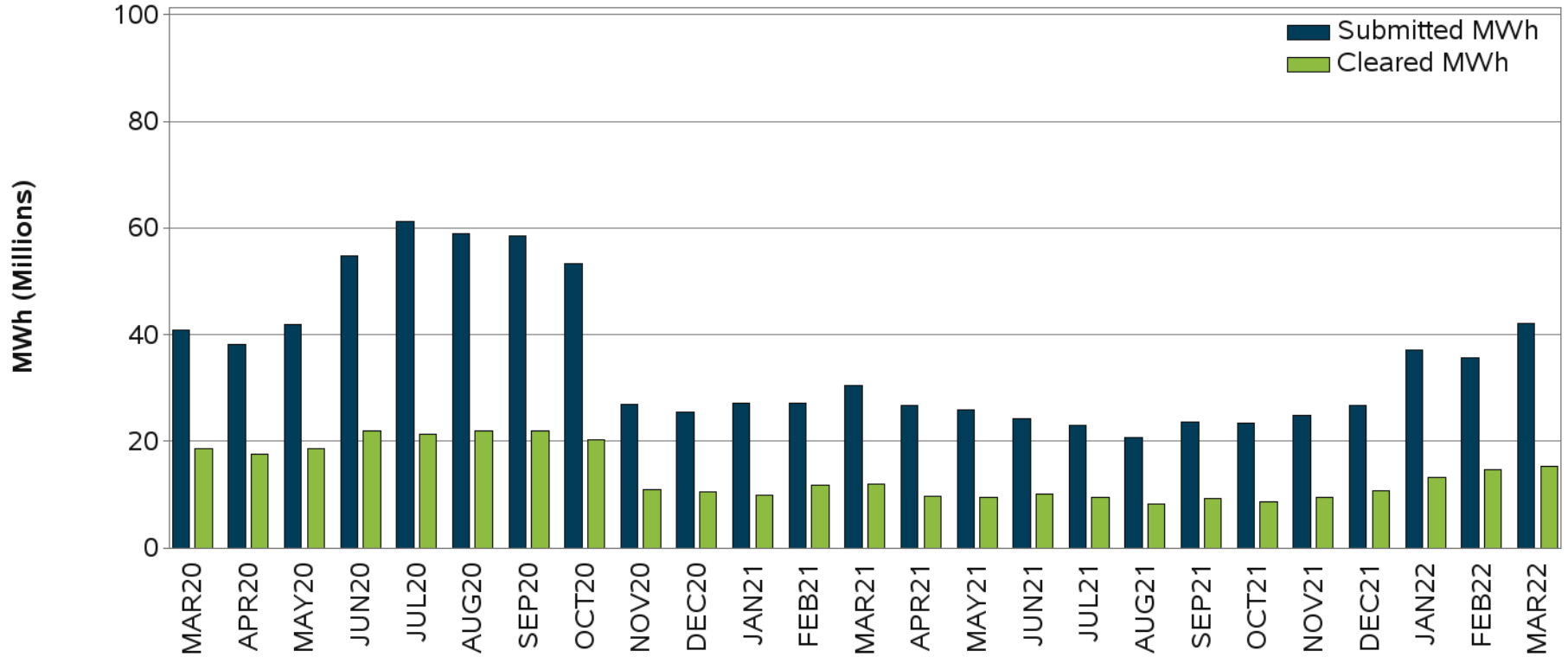
Up-To-Congestion Transactions - Total Volume



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



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

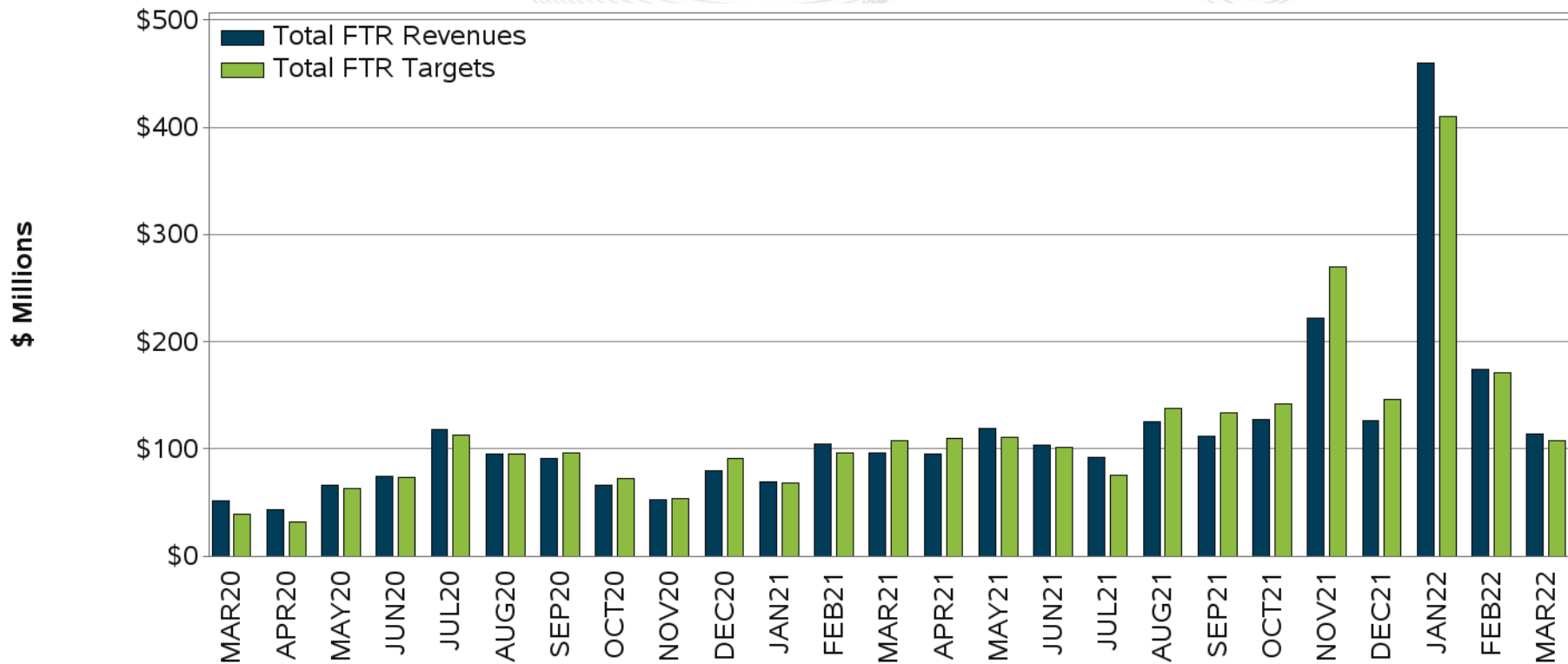


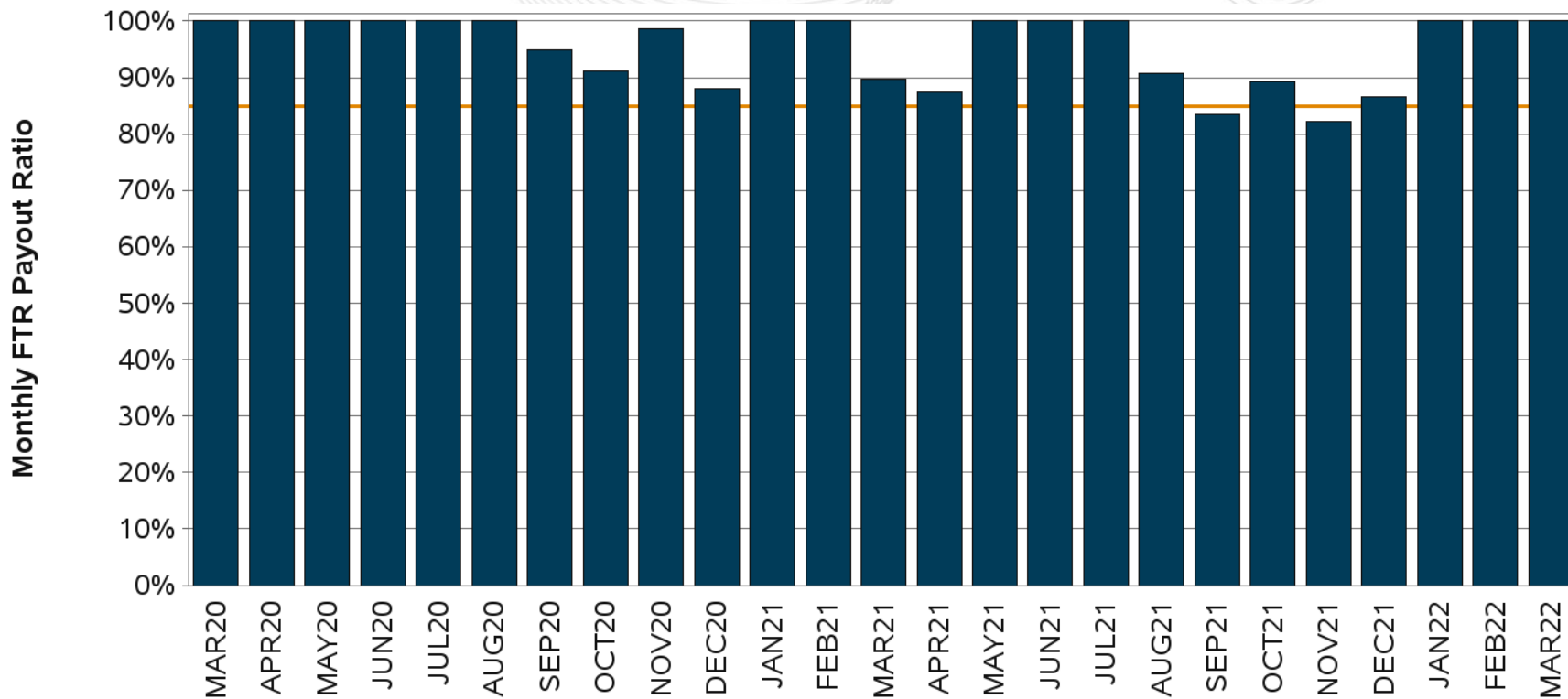
Energy Market

Congestion and FTR Summary

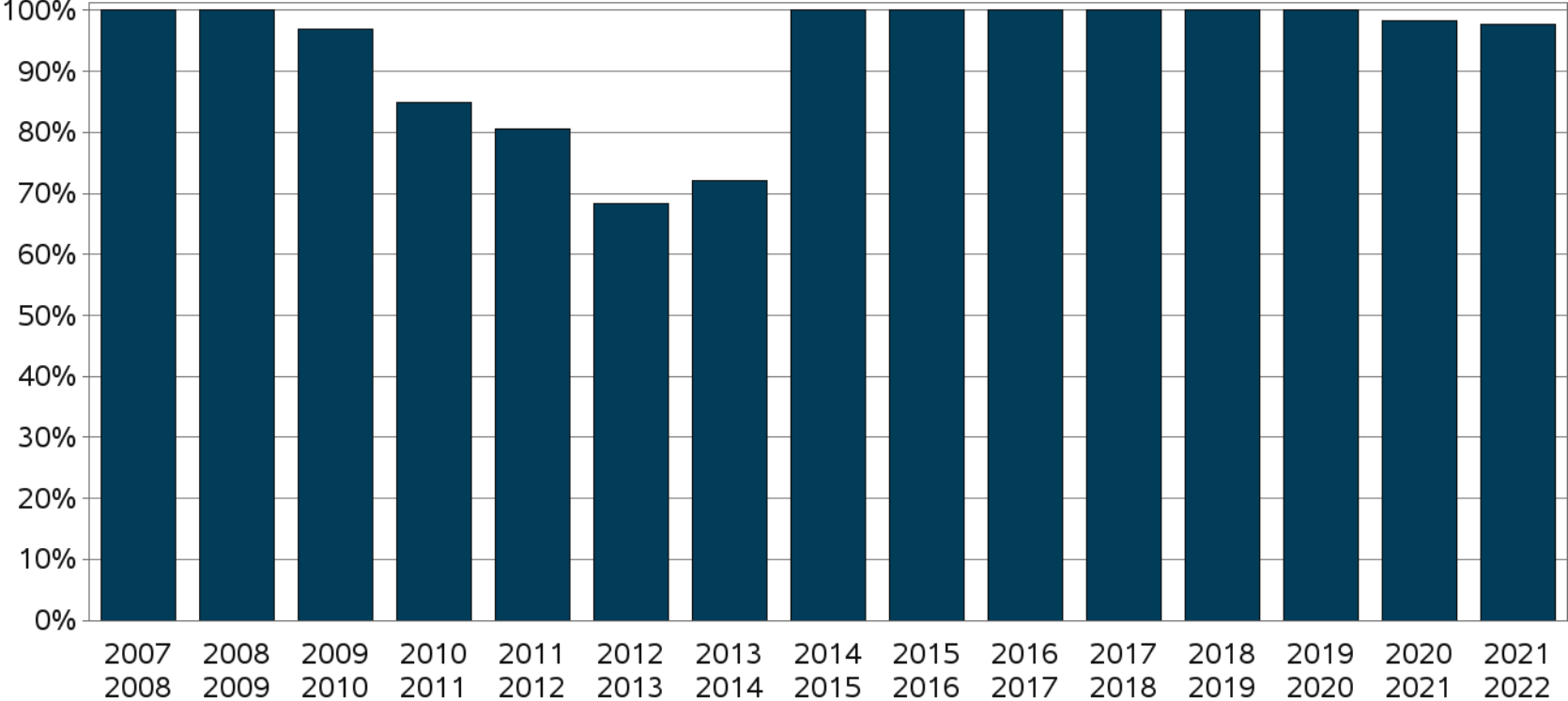
| Period | Surplus / Underfunding | Payout Ratio |
|-------------|------------------------|--------------|
| March, 2022 | \$6,536,951 | 100% |
| 2022 | \$59,330,522 | 100% |
| 2021/2022 | \$-40,154,879 | 98% |

FTR Revenue vs. FTR Target Allocation

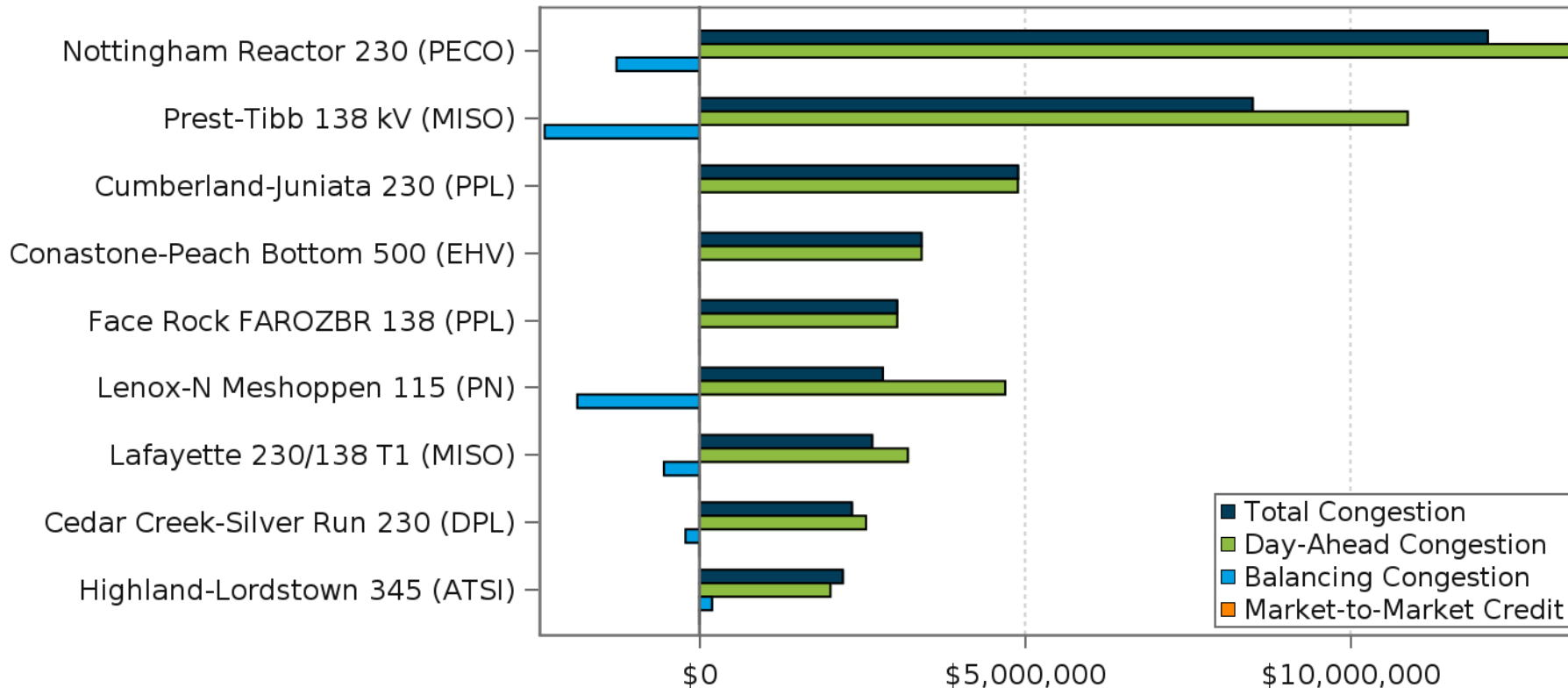




Planning Period FTR Payout Ratio

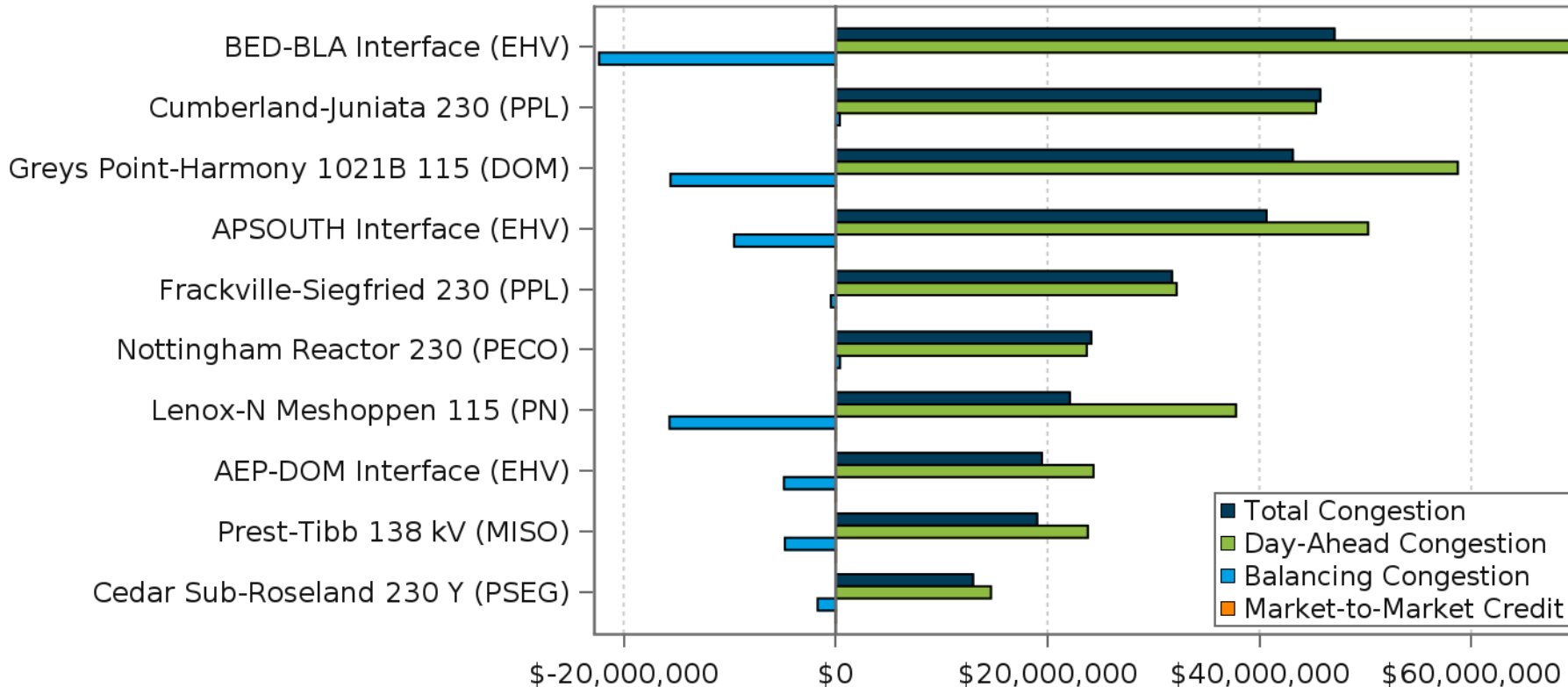


Ten Most Heavily Congested Transmission Facilities - Overall, March



The ten most heavily congested facilities account for 62% of total congestion for March.

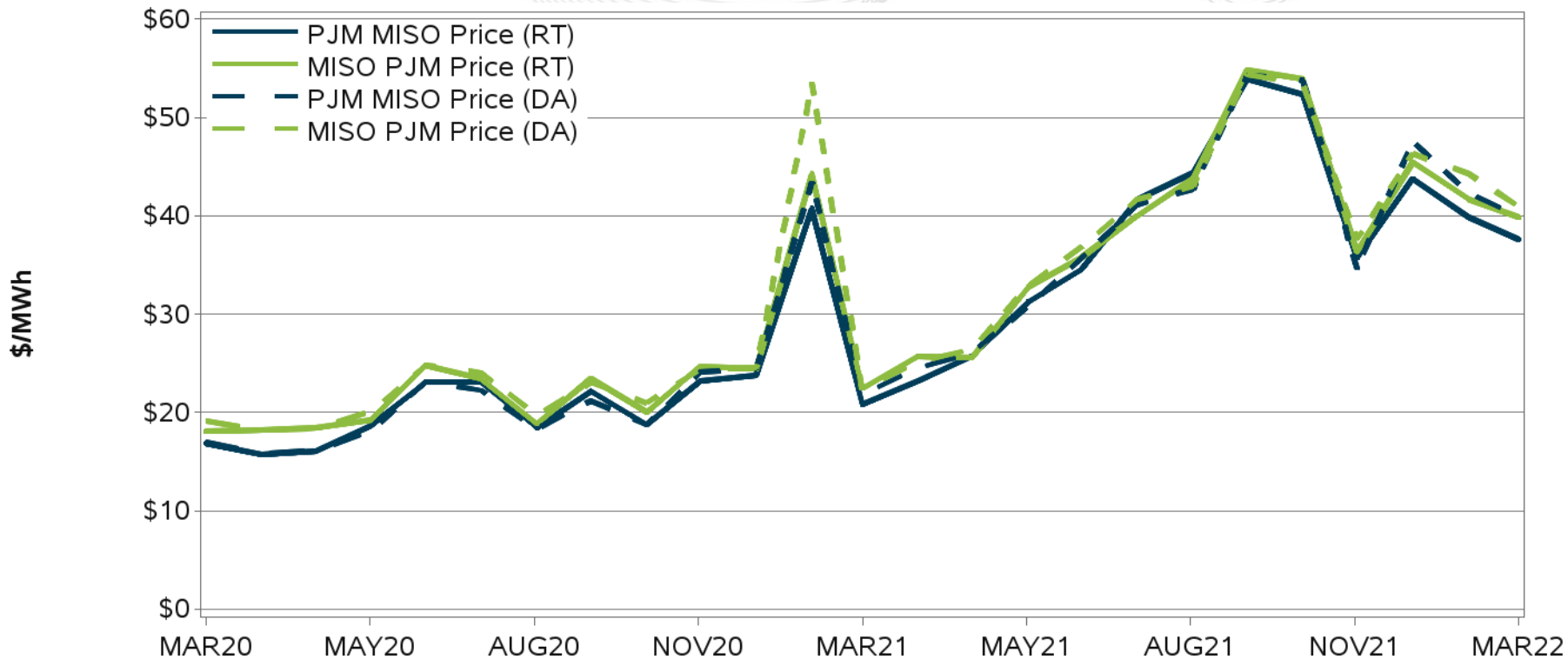
Ten Most Heavily Congested Transmission Facilities - Overall, 2022

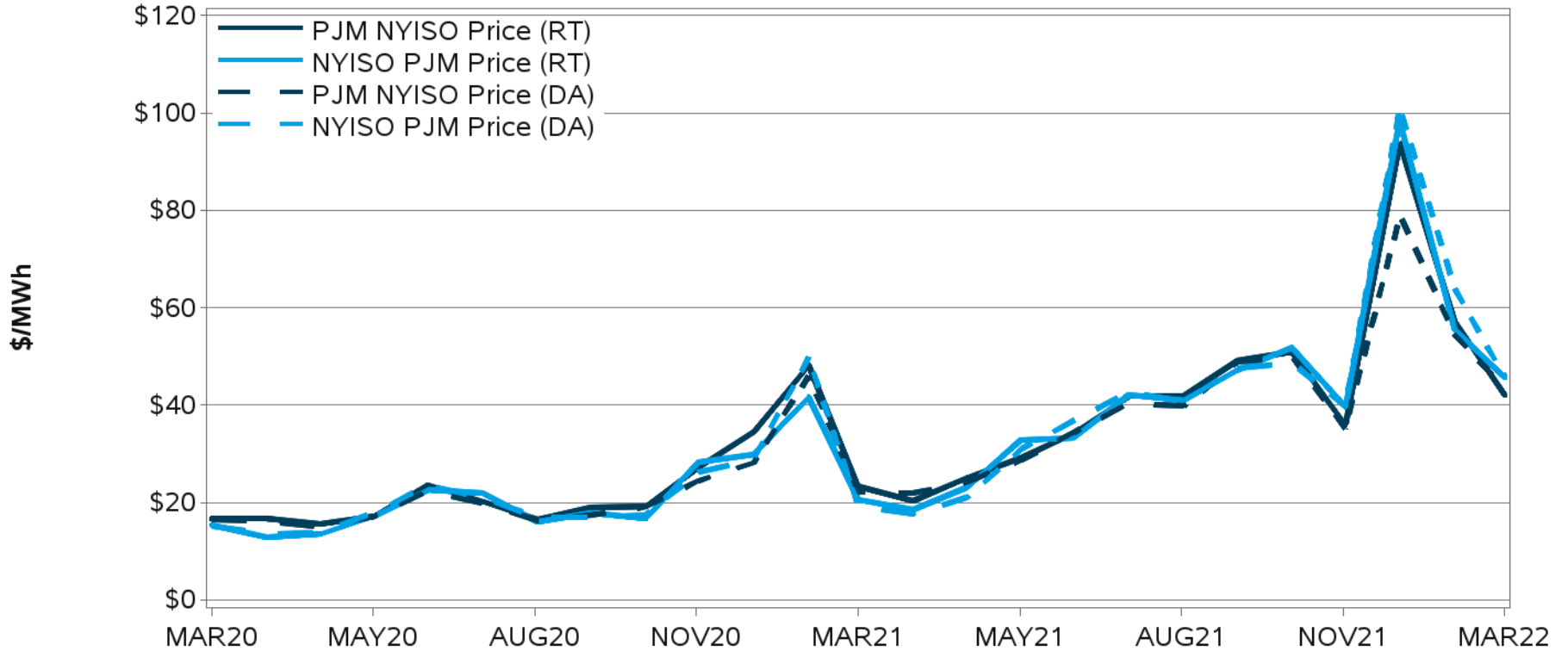


The ten most heavily congested facilities account for 59% of total congestion for 2022.

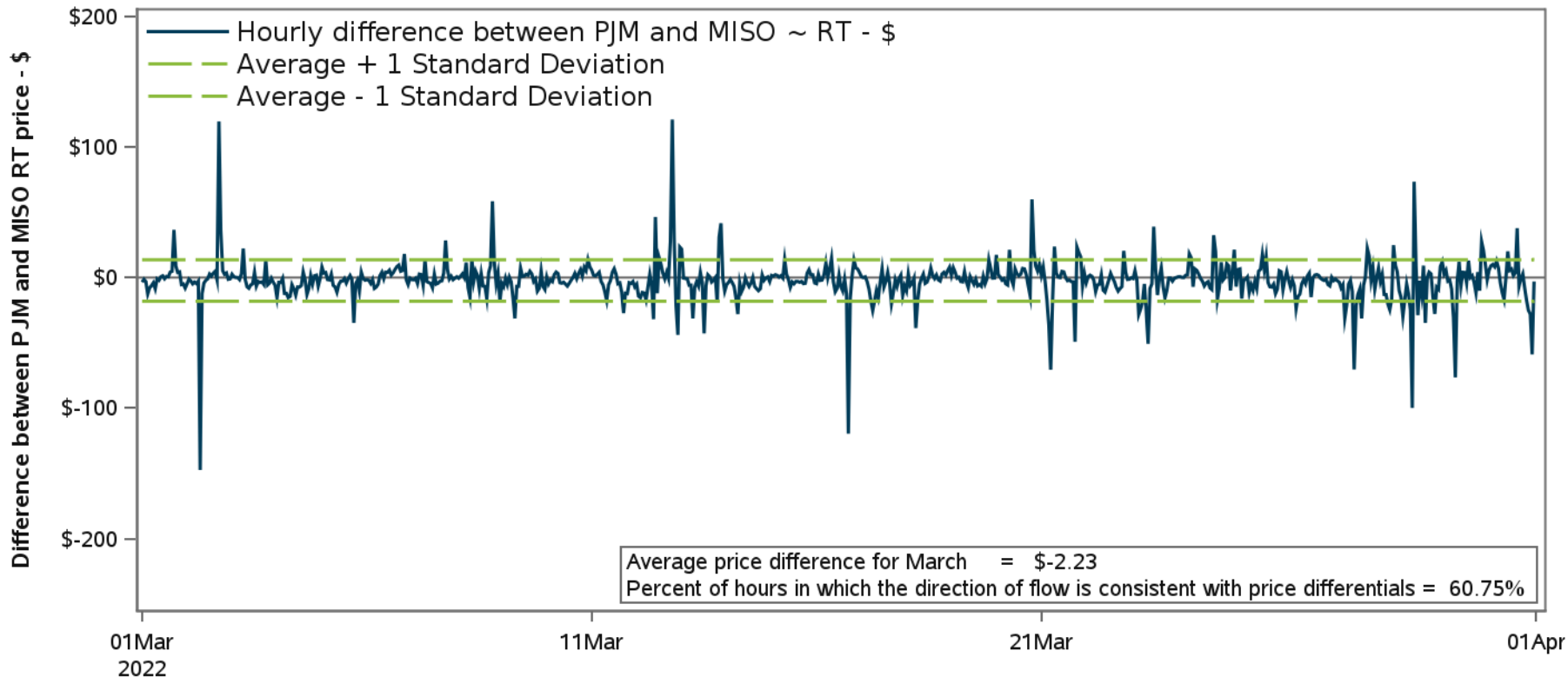
Energy Market

Interchange/Seams Summary



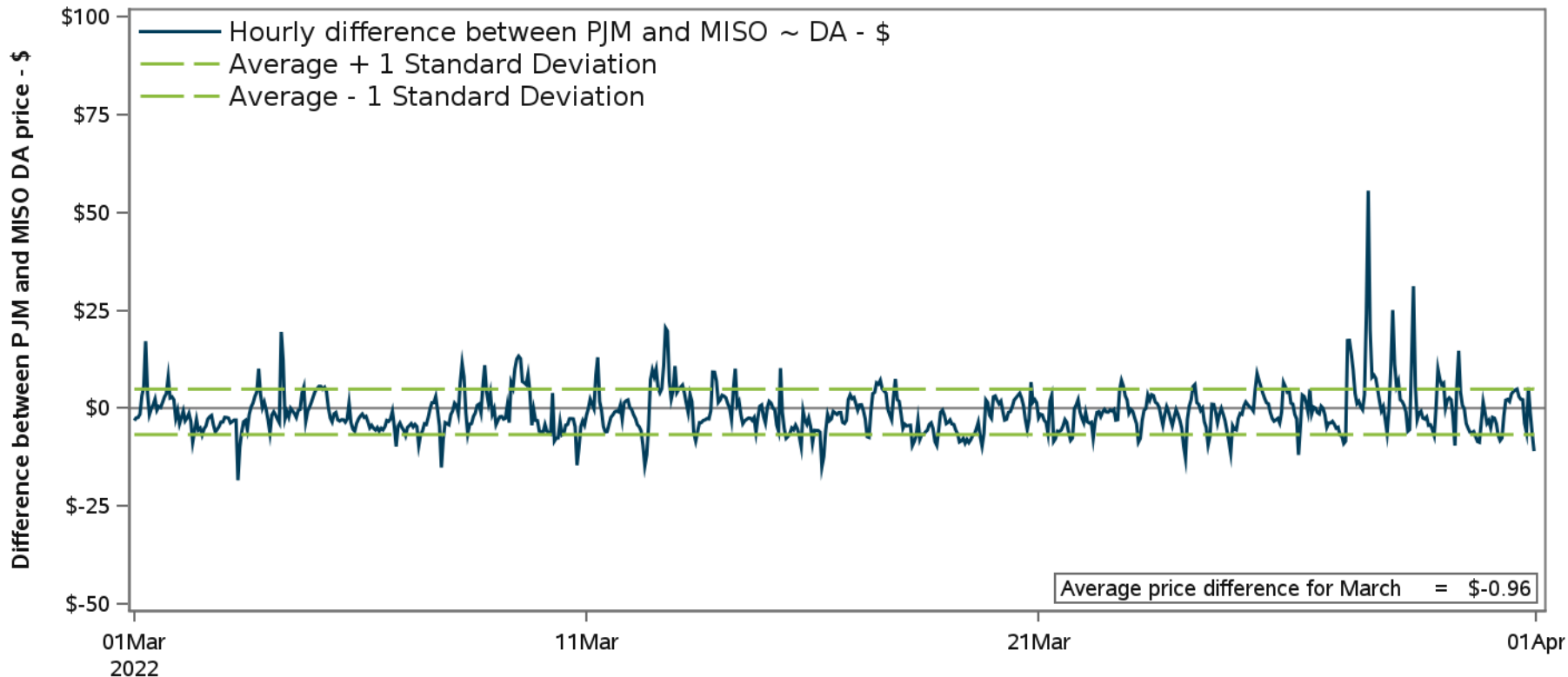


Hourly Difference Between PJM and MISO Real-Time Prices



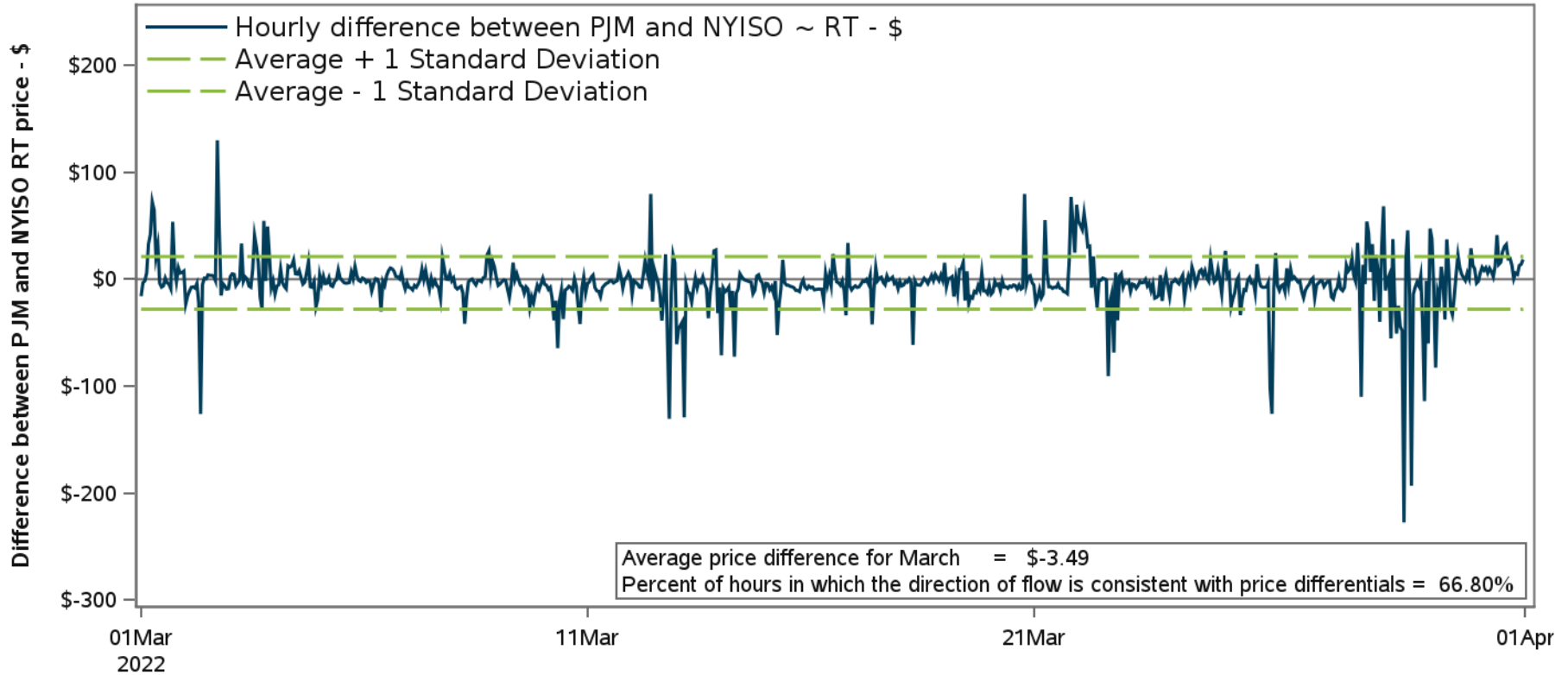
Positive values represent hours when the PJM price was higher. Negative values represent hours when the PJM price was lower.

Hourly Difference Between PJM and MISO Day-Ahead Prices



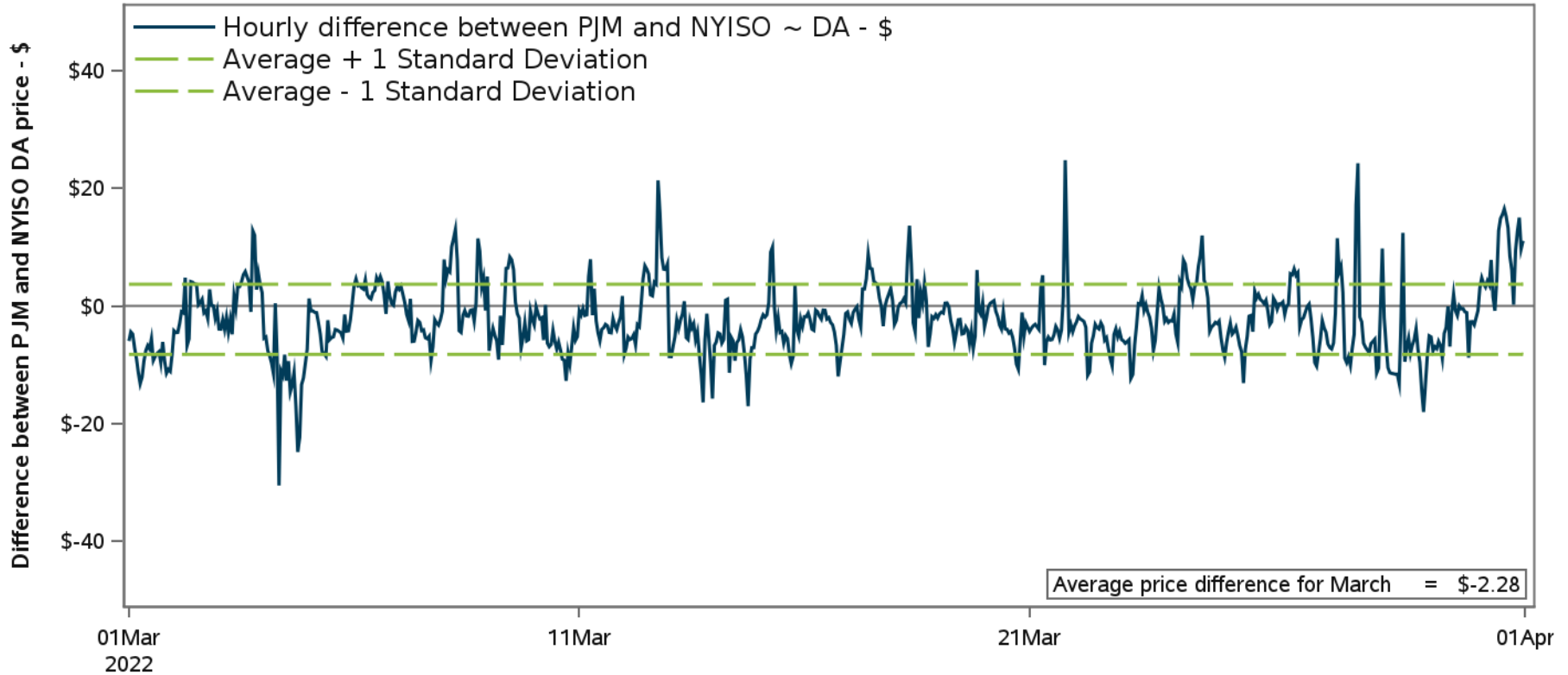
Positive values represent hours when the PJM price was higher. Negative values represent hours when the PJM price was lower.

Hourly Difference Between PJM and NYISO Real-Time Prices

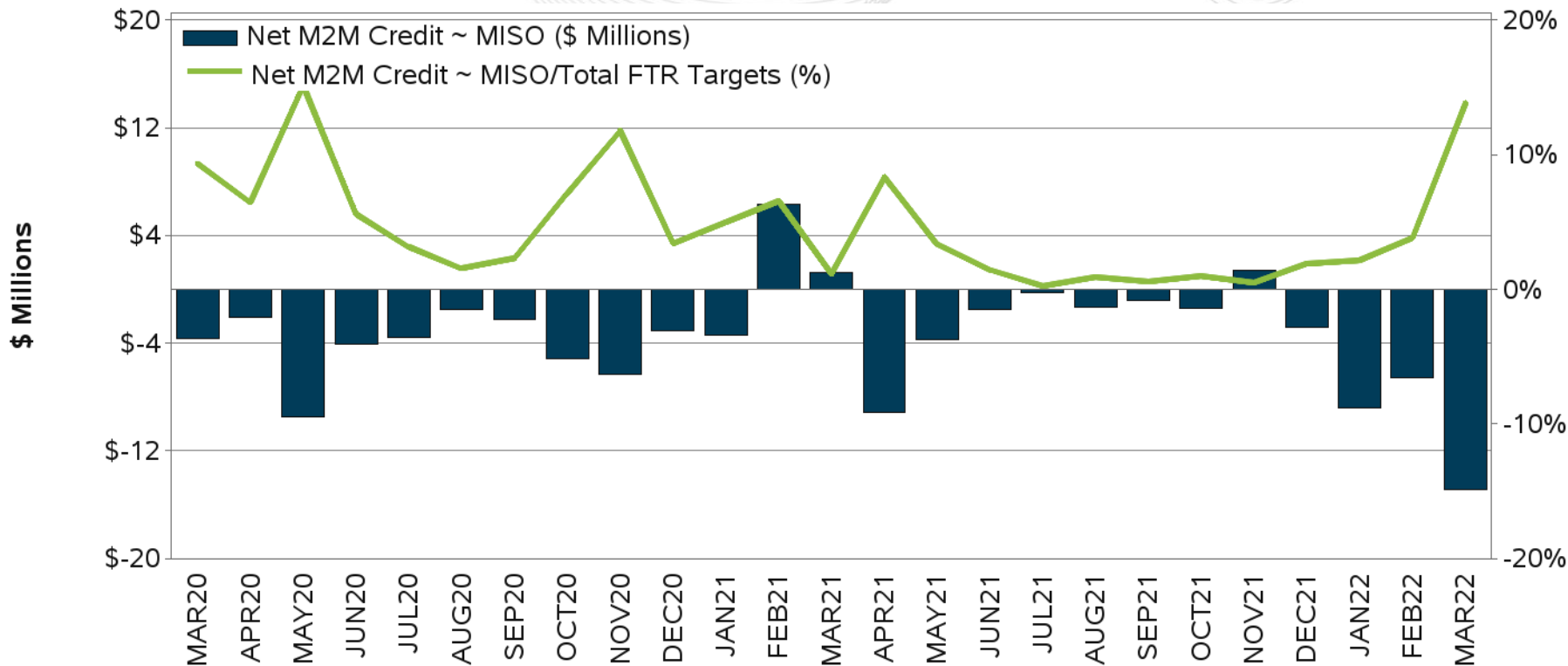


Positive values represent hours when the PJM price was higher. Negative values represent hours when the PJM price was lower.

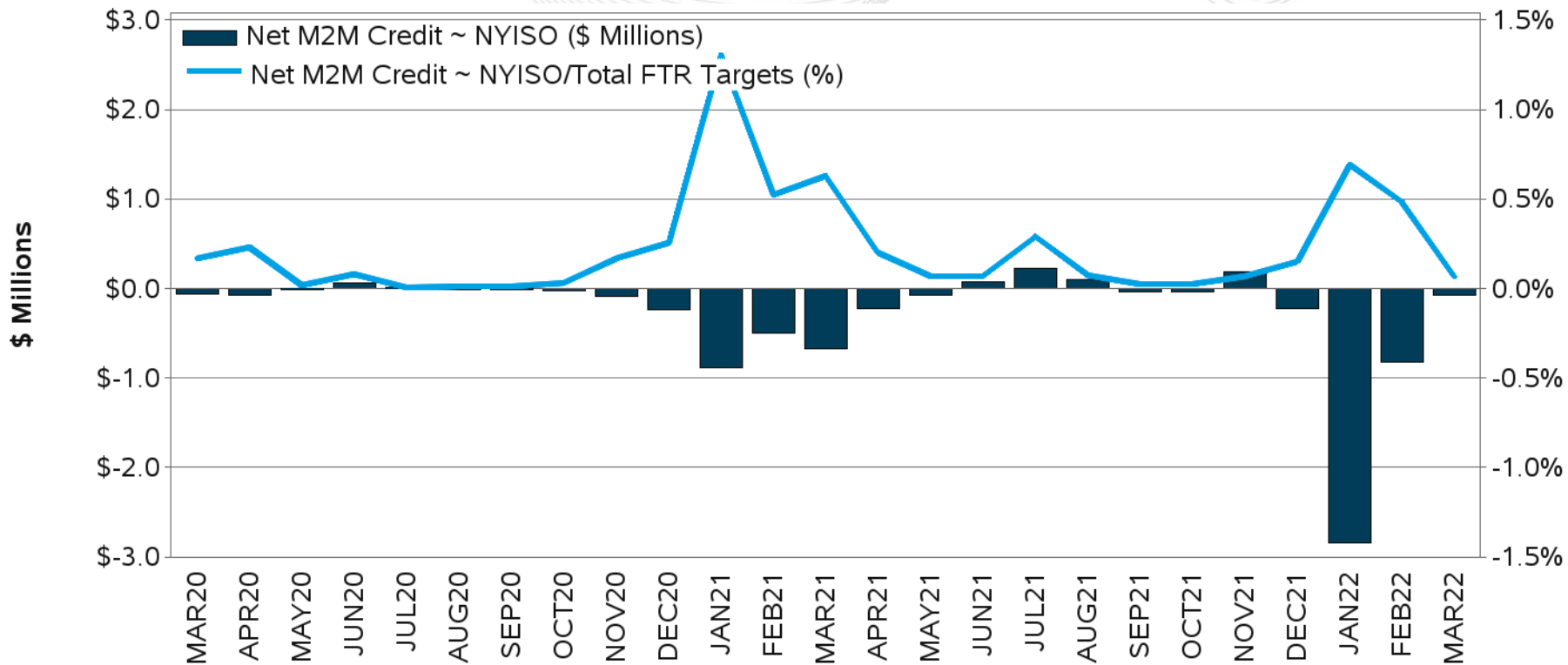
Hourly Difference Between PJM and NYISO Day-Ahead Prices



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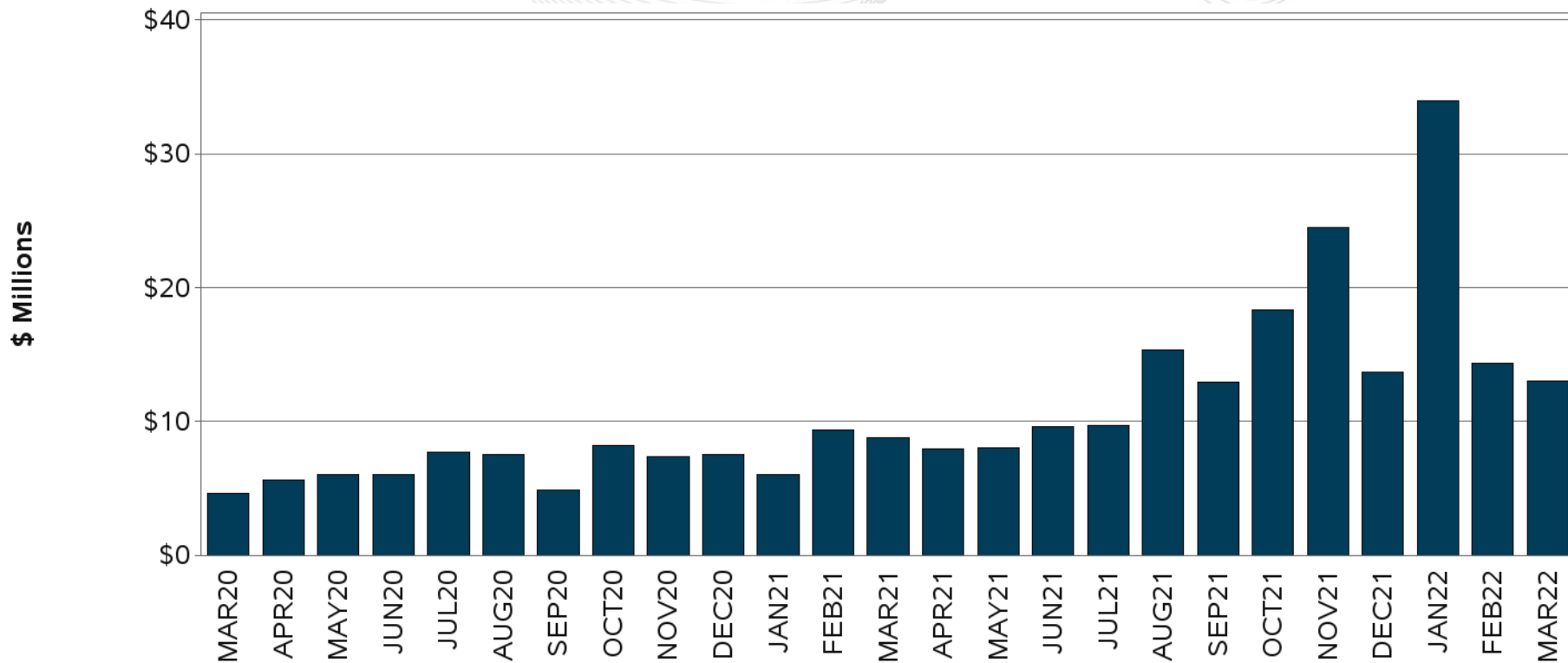


Negative M2M Credit represents PJM payment to MISO

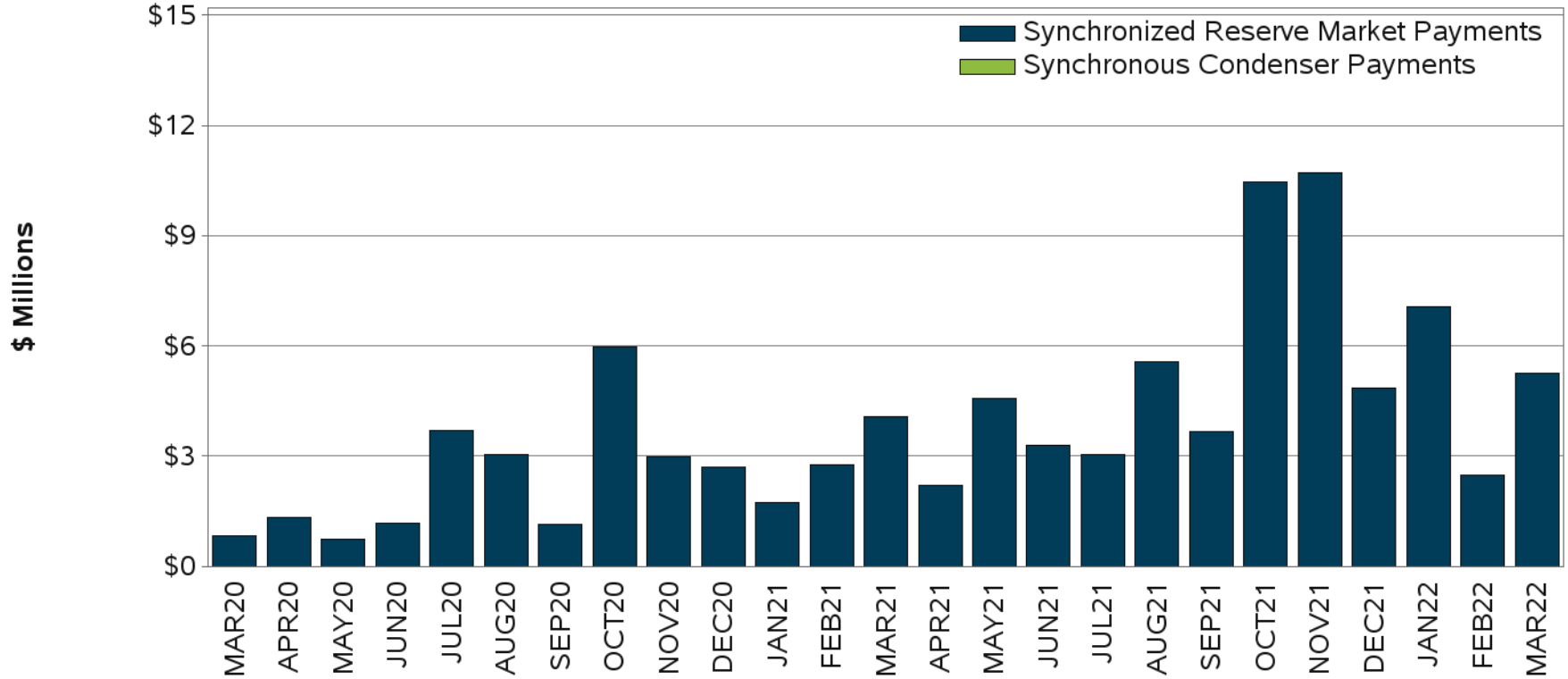


Negative M2M Credit represents PJM payment to NYISO

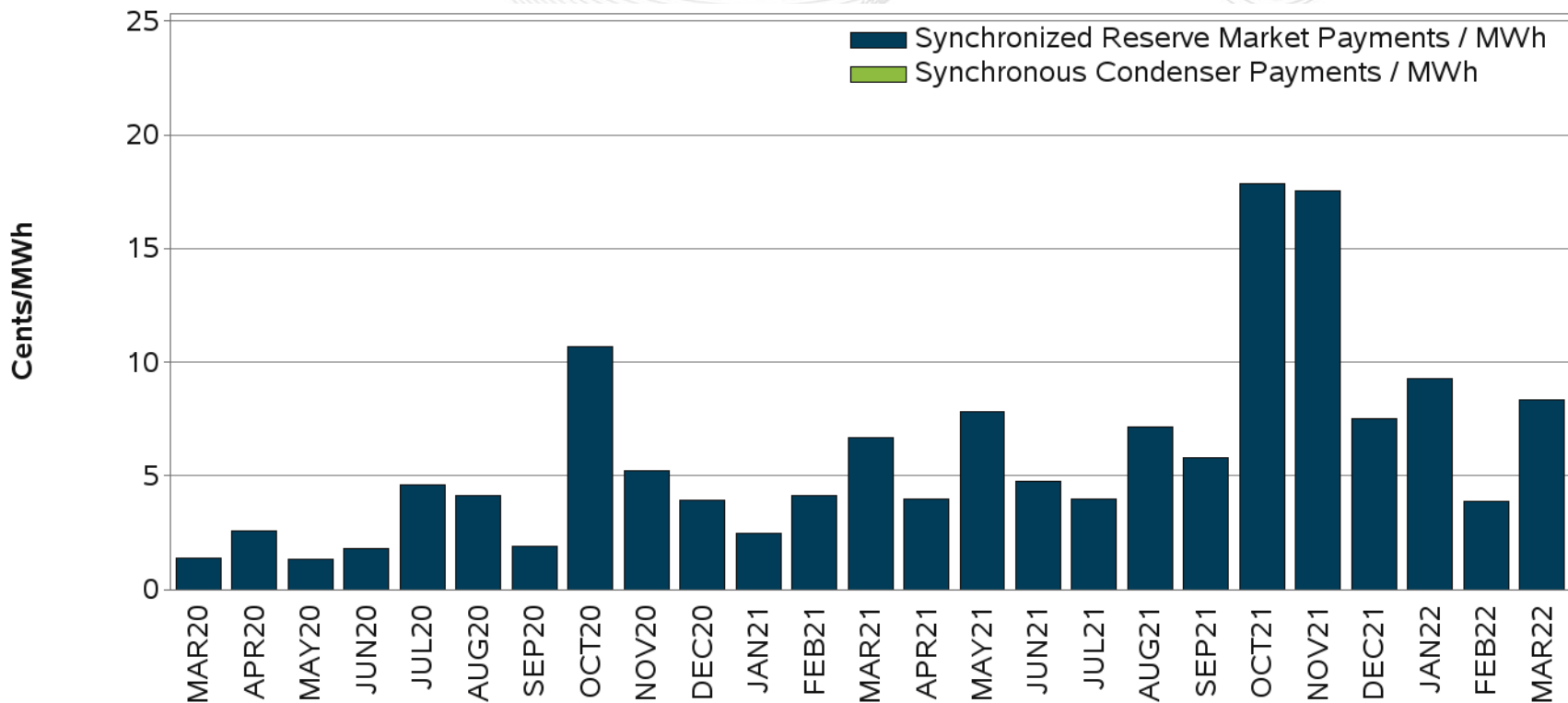
Ancillary Service Market Summary

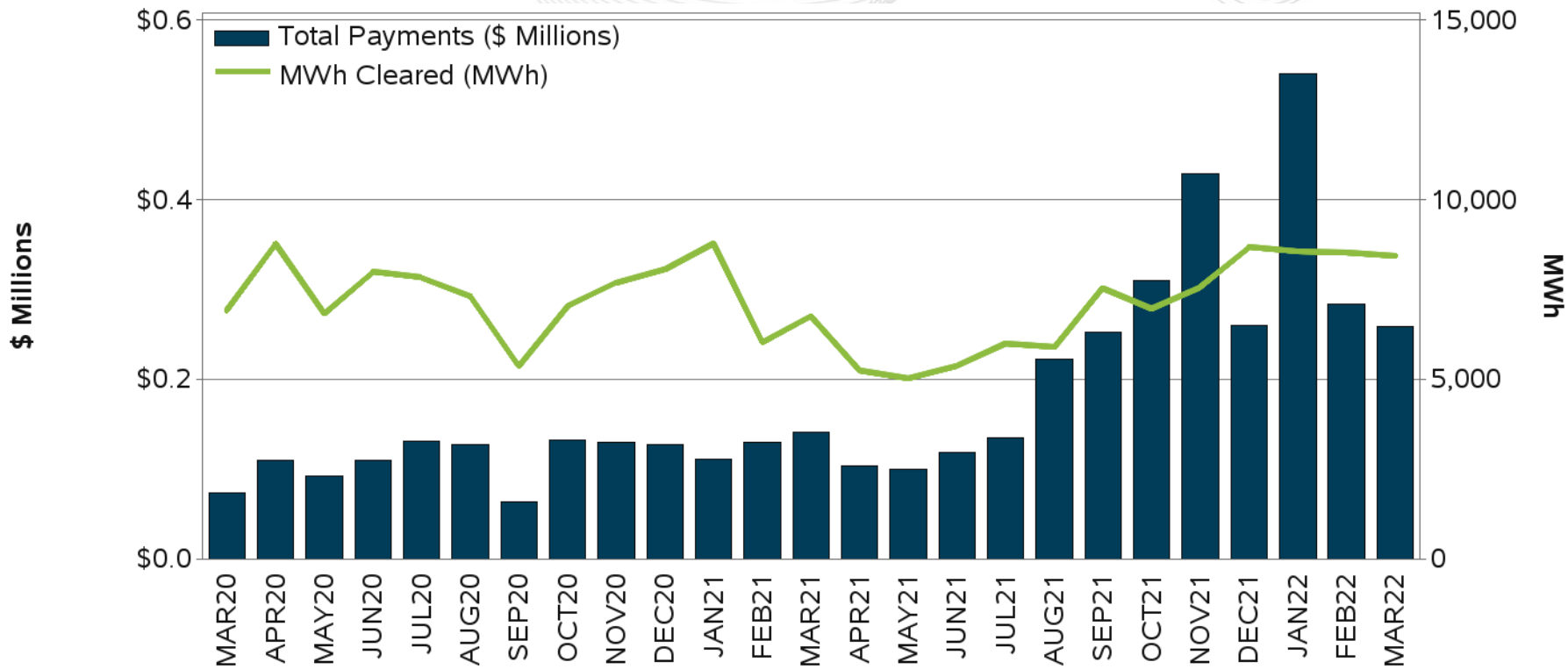


Synchronized Reserve and Synchronous Condenser Costs

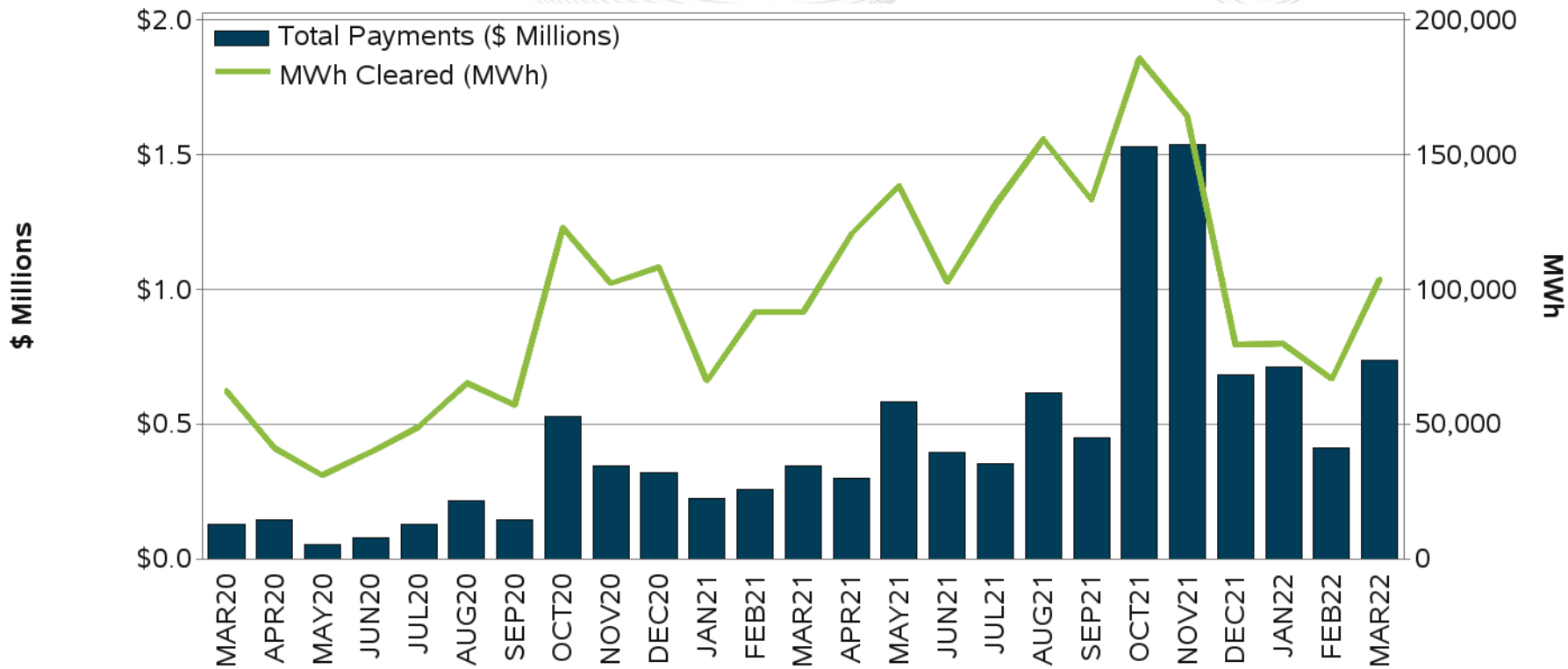


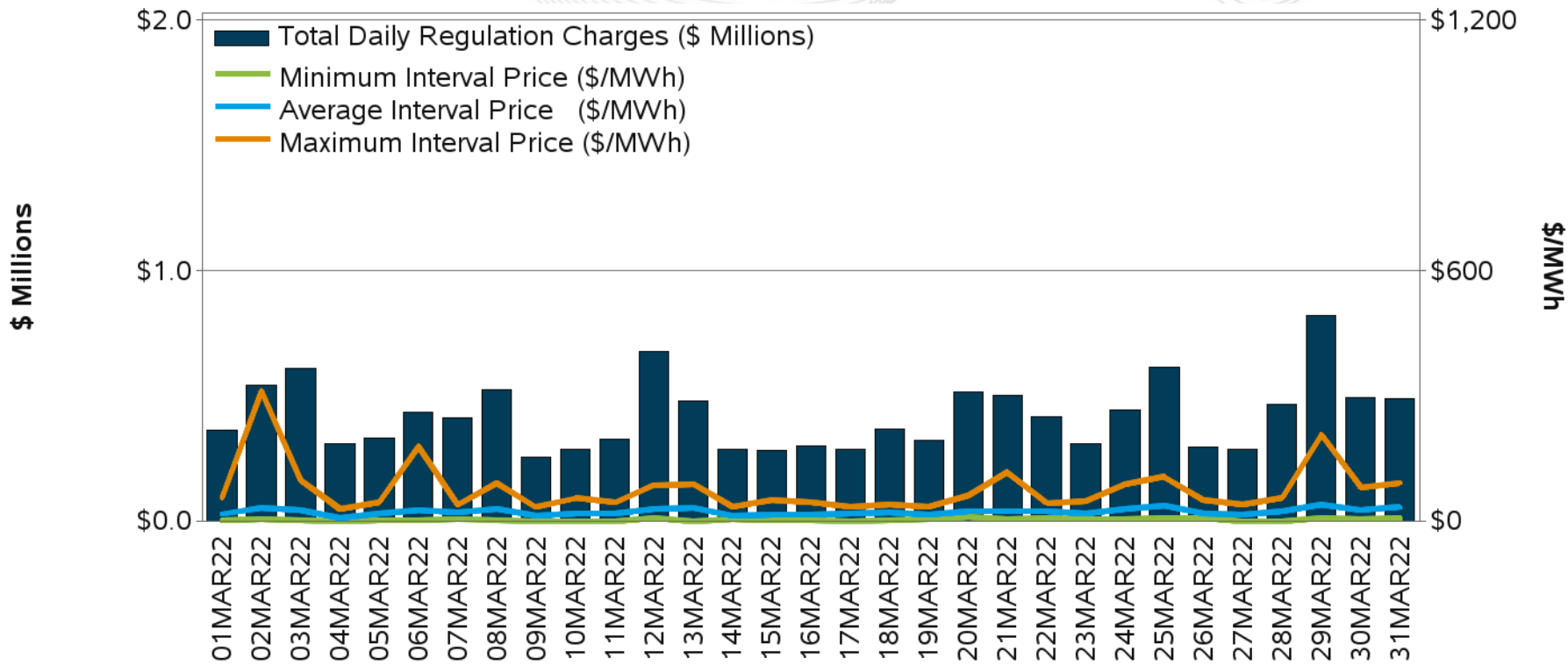
pjm Load-Adjusted Synchronized Reserve and Synchronous Condenser Costs



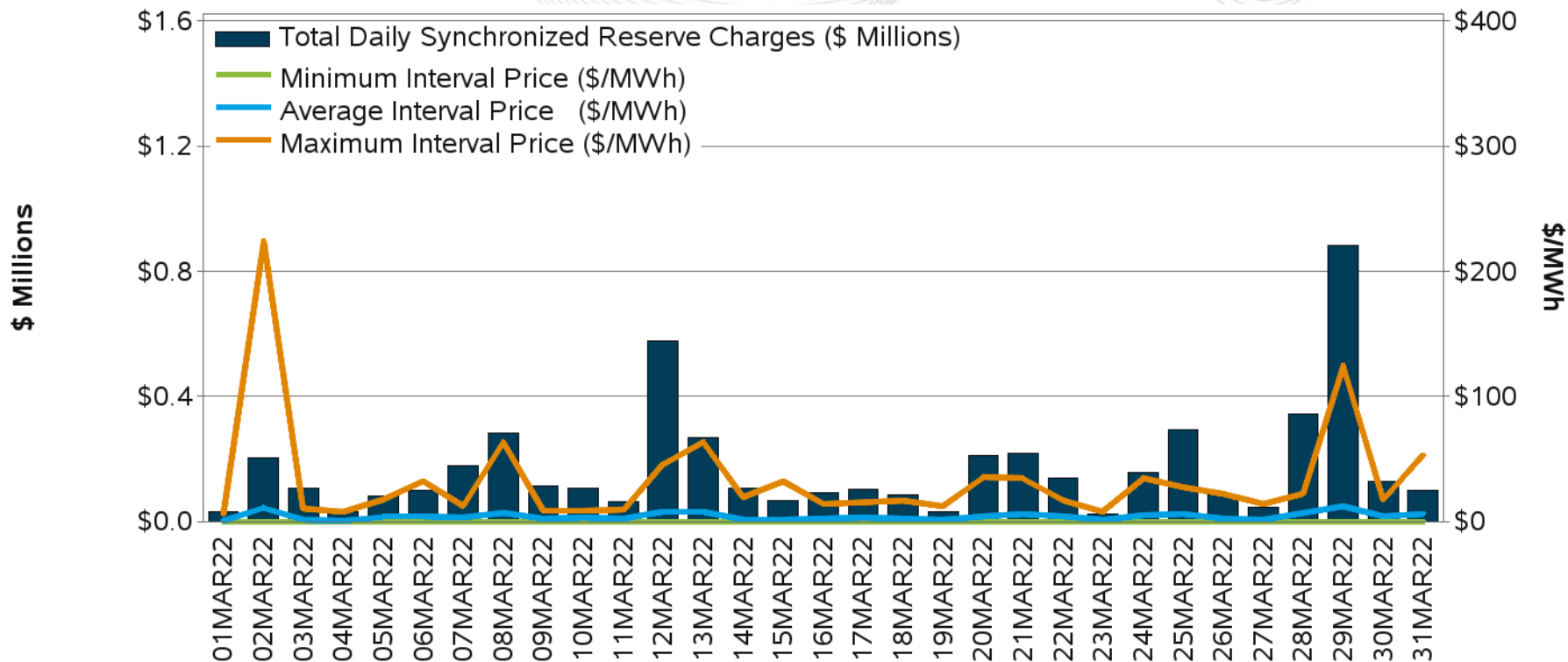


DR Participation in PJM Synchronized Reserve Markets





Synchronized Reserve Market Daily Prices and Charges



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