



Markets Report

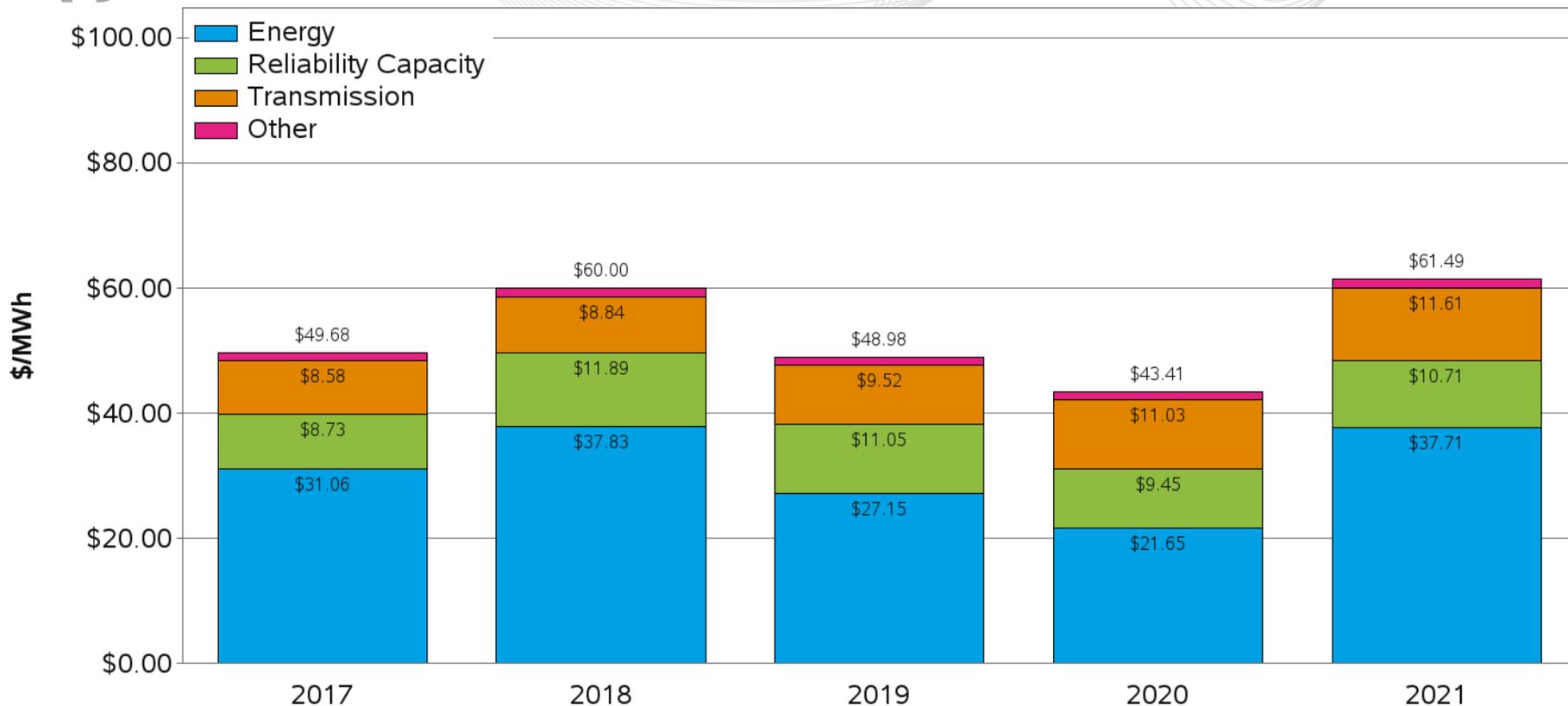
MC Webinar

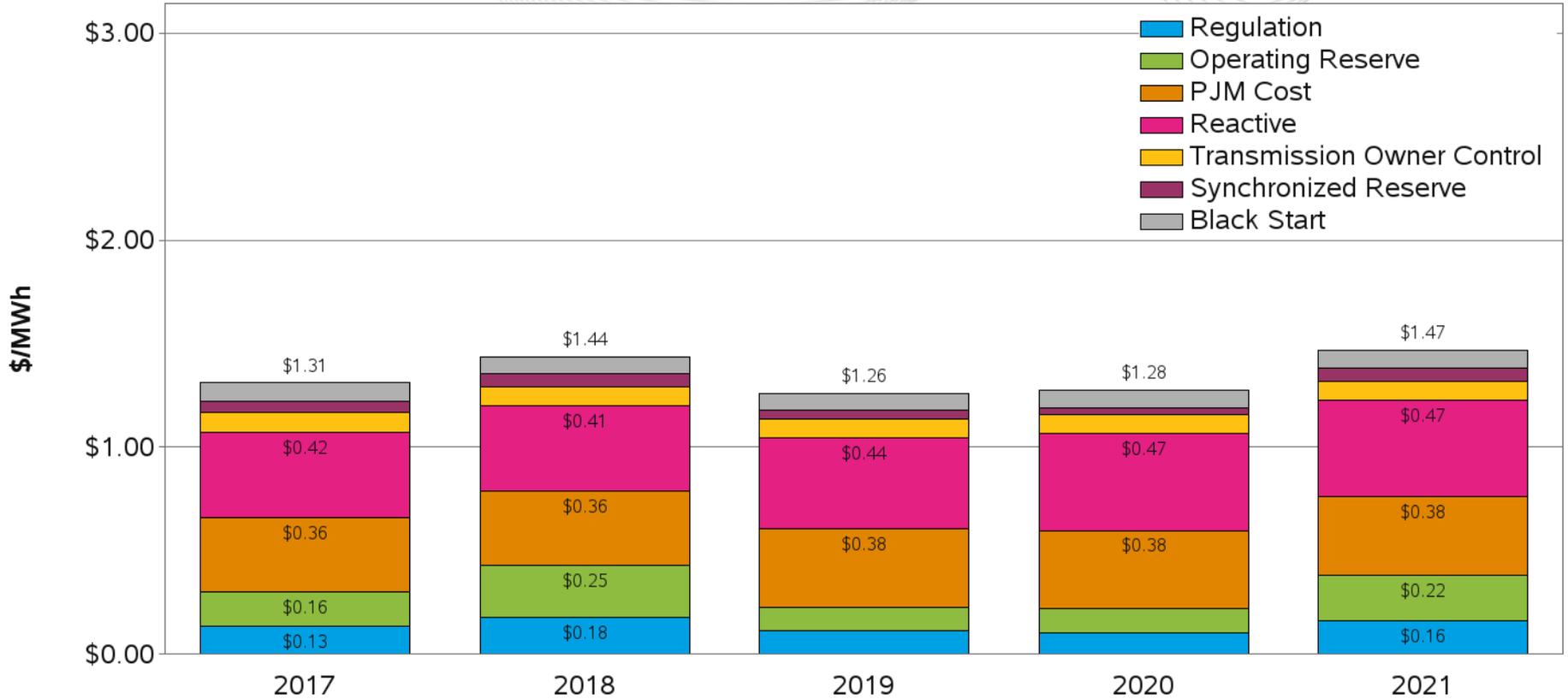
October 15, 2021

- PJM Wholesale Cost for 2021 is \$61.49/MWh, up from full-year 2020 costs of \$43.41/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 October, temperatures were above average throughout the month. Thus, the sum of Cooling and Heating Degree Days was below their historic average. (Slides 8-10)
- Energy use was below its historic average for October. (Slides 8-10)
- In October, uplift exceeded \$800,000 on one days.(Slides 24 & 25)

- Load-weighted average LMP for 2021 is \$37.71/MWh: (Slides 33 & 34)
 - October 2021 was \$58.40/MWh, which is higher than October 2020 (\$22.20/MWh) and also higher than October 2019 (\$27.90/MWh).
- There were two 5-minute intervals that experienced shortage pricing in October. (Slides 31 & 32)
- FTR revenue adequacy for the month of October is 89% and the 2021-2022 Planning Year is currently funded at 95%. (Slides 49-52)
- Congestion values have been trending upwards with October's level being similar to those seen in August and September, and the highest level in the last several years. (Slide 50)
- Regulation and Synchronized Reserve market costs have generally tracked with energy prices over time. (Slides 65-67)

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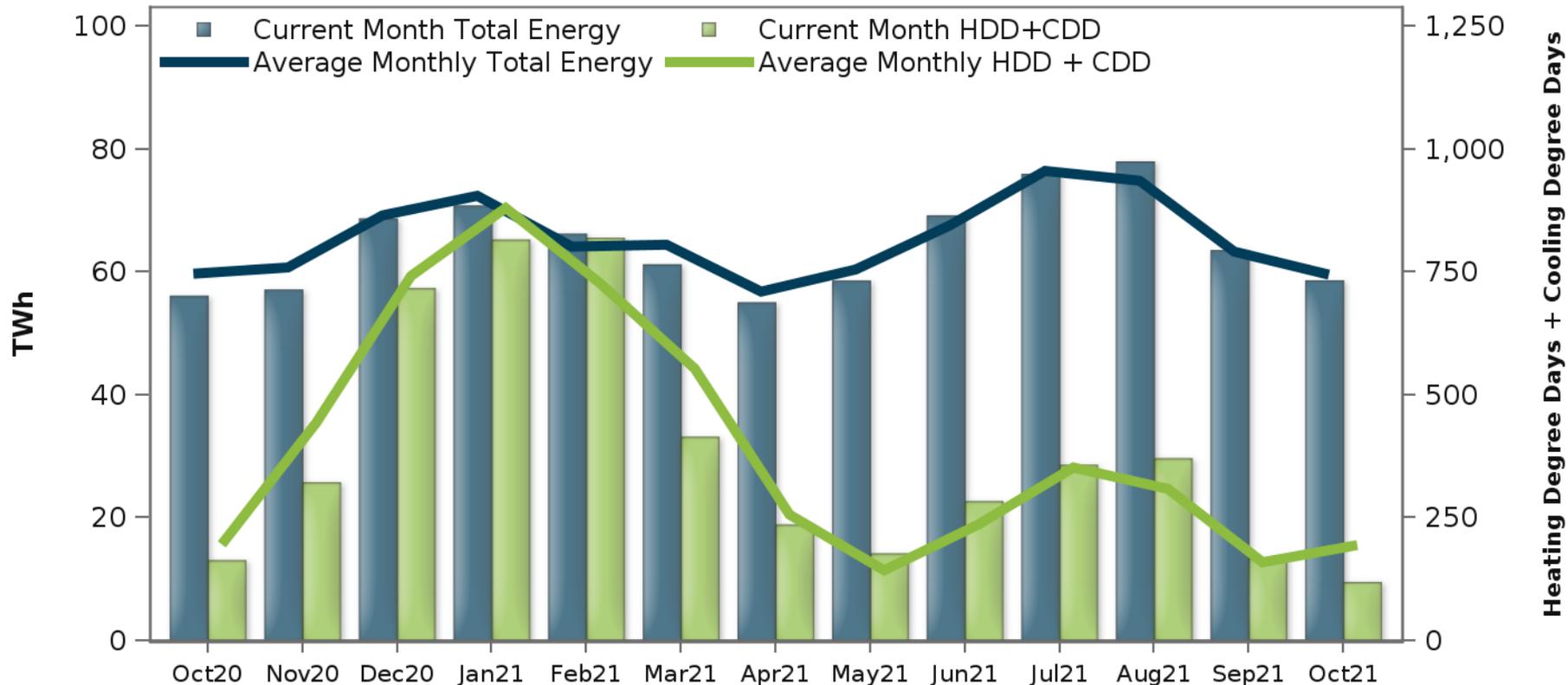




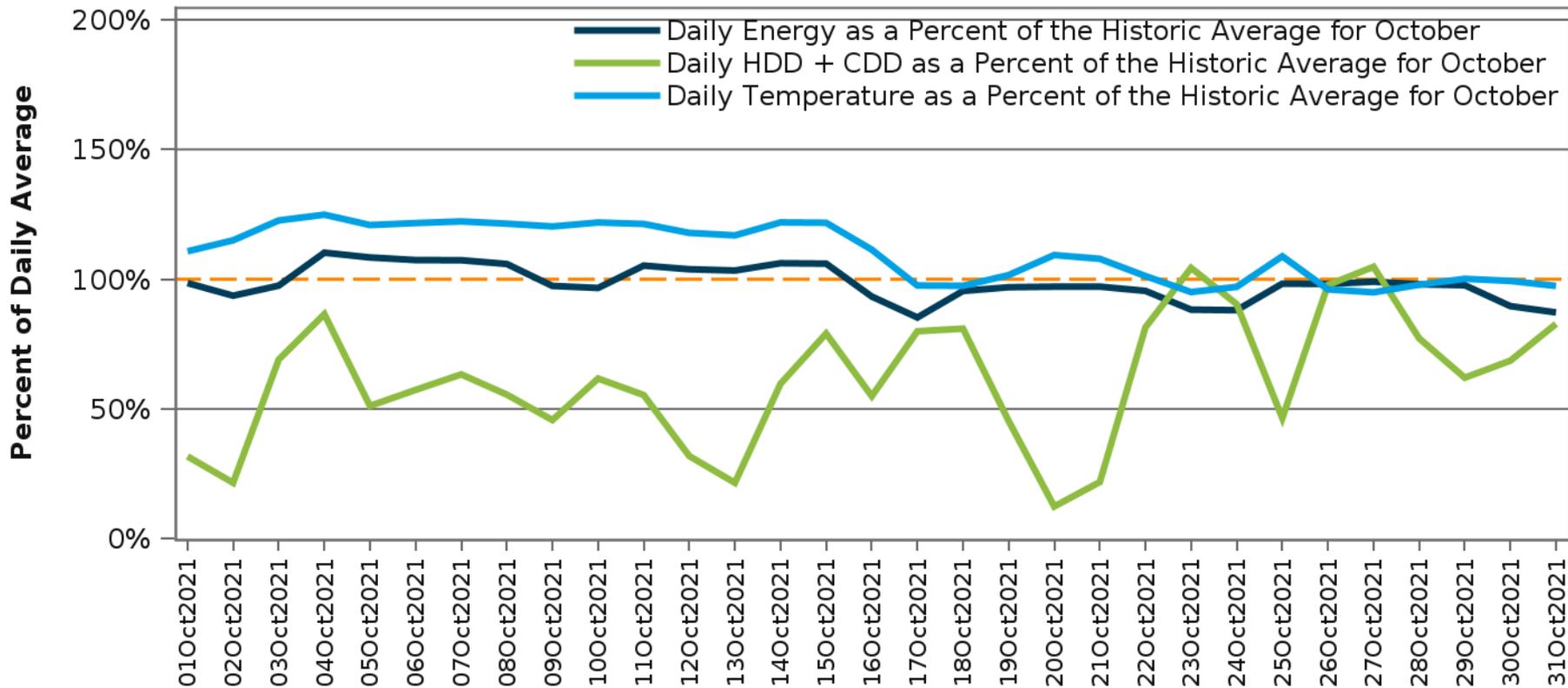
Market Conditions

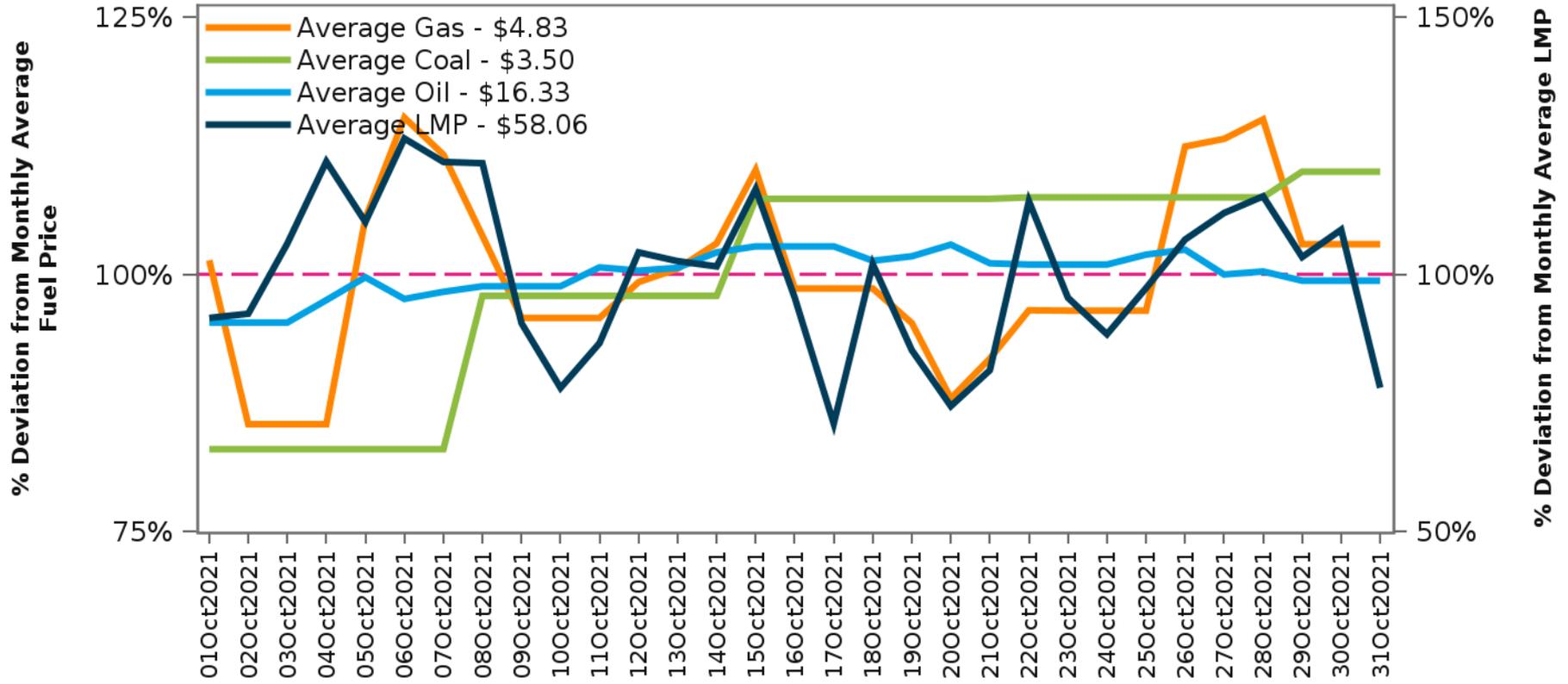
- The weather parameter shown in the following slide is a monthly sum of daily Heating Degree Days (HDD) and Cooling Degree Days (CDD).
- Degree days represent a deviation from a baseline temperature, in this case 60 degrees for HDD and 65 degrees for CDD. As temperatures get more extreme, colder or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

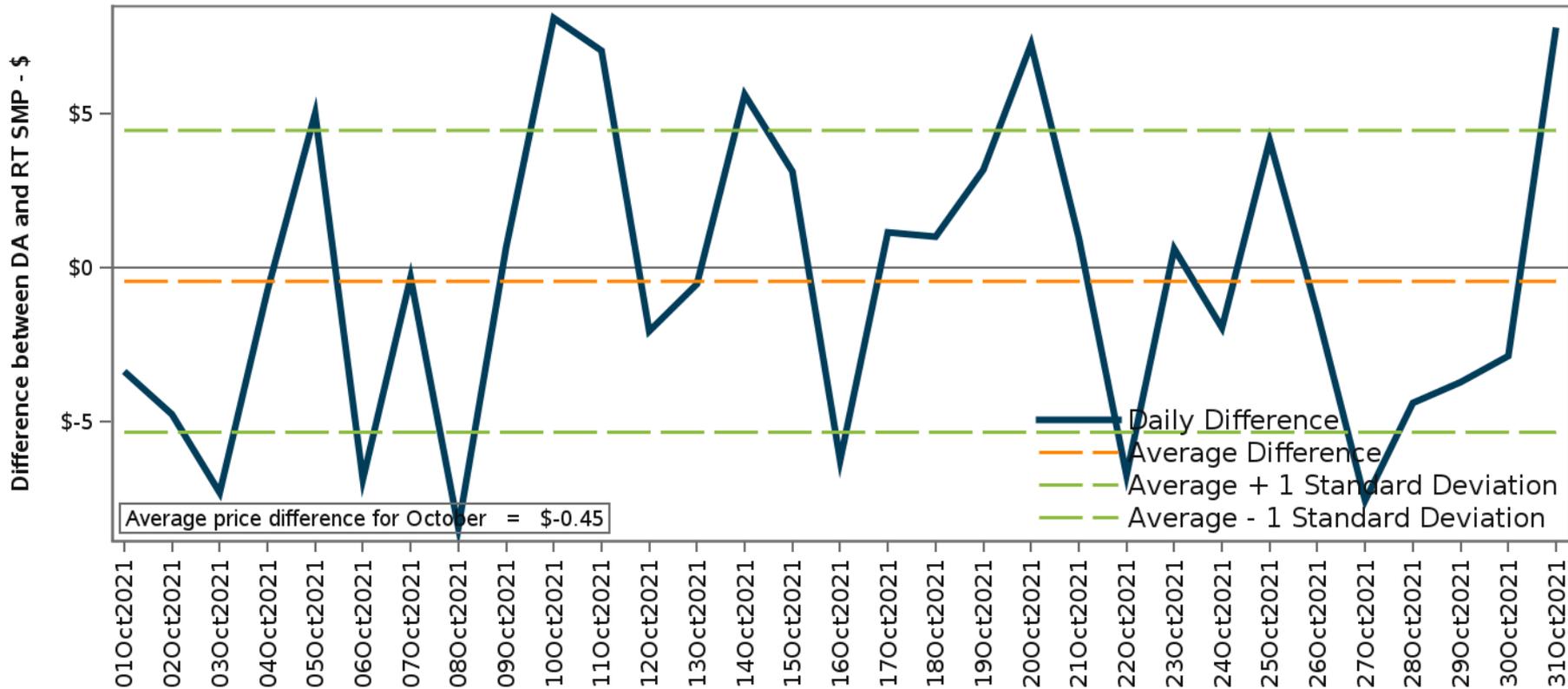




Fuel Price Source: S&P Global Platts



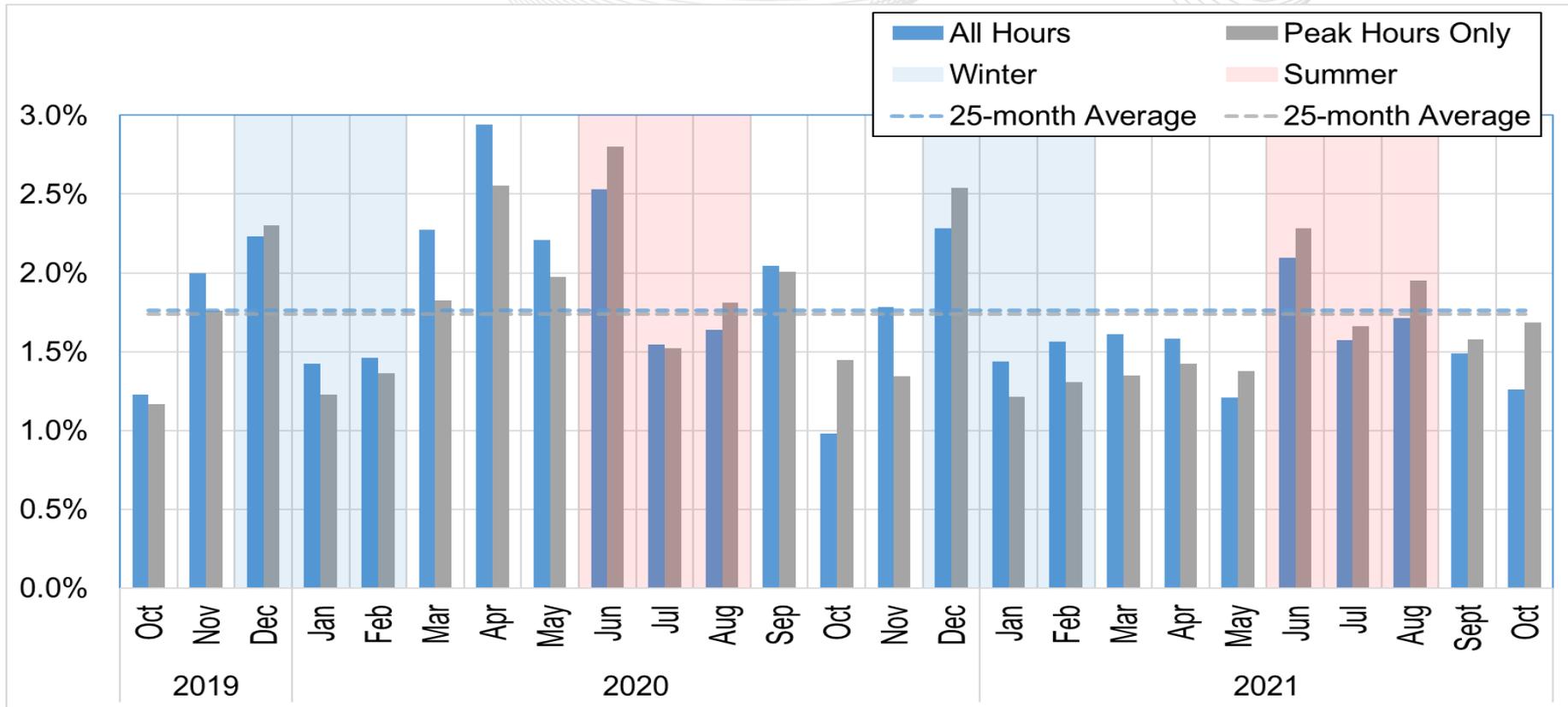
Daily Difference Between Day-Ahead and Real-Time System Marginal Prices



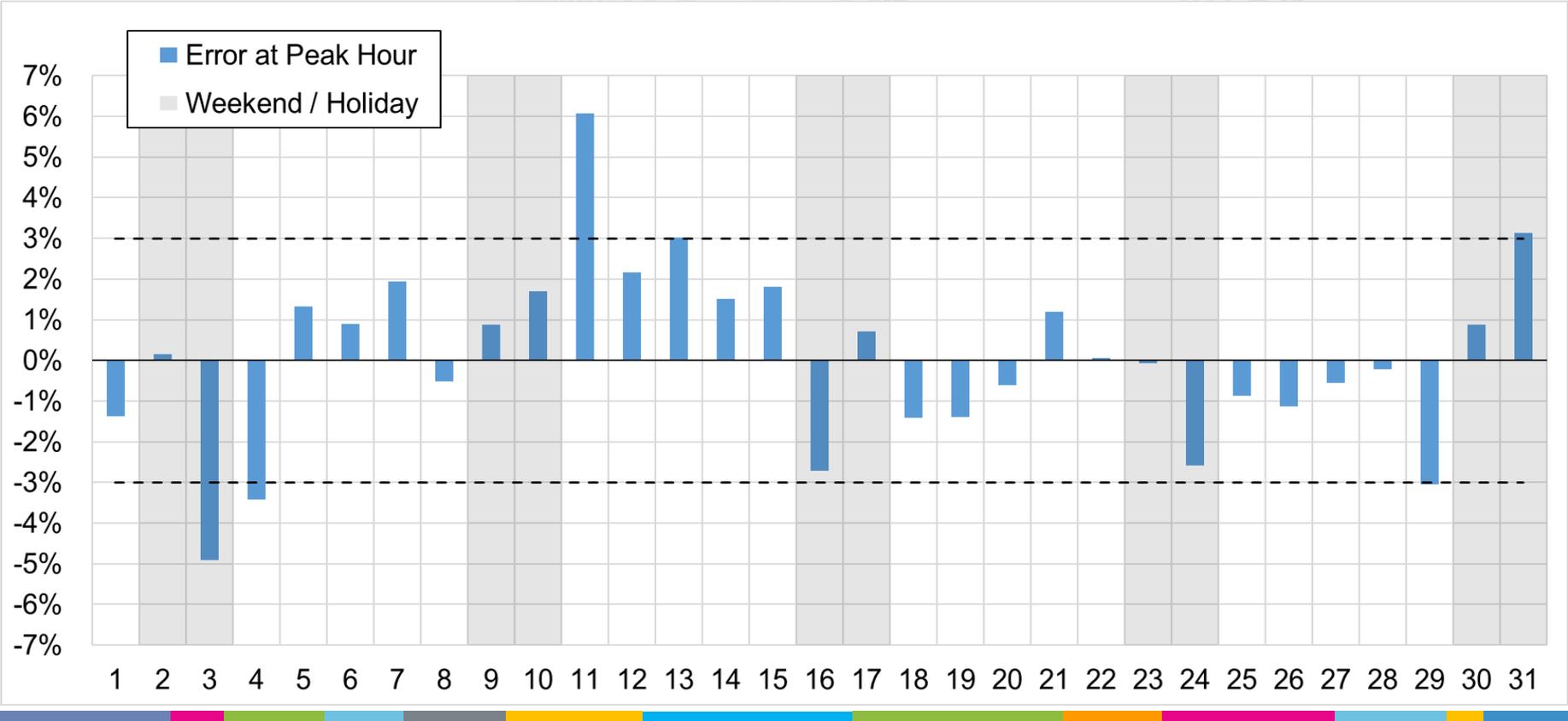
Positive values represent days when the DA daily average price was higher than RT. Negative values represent days when the DA price was lower.



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



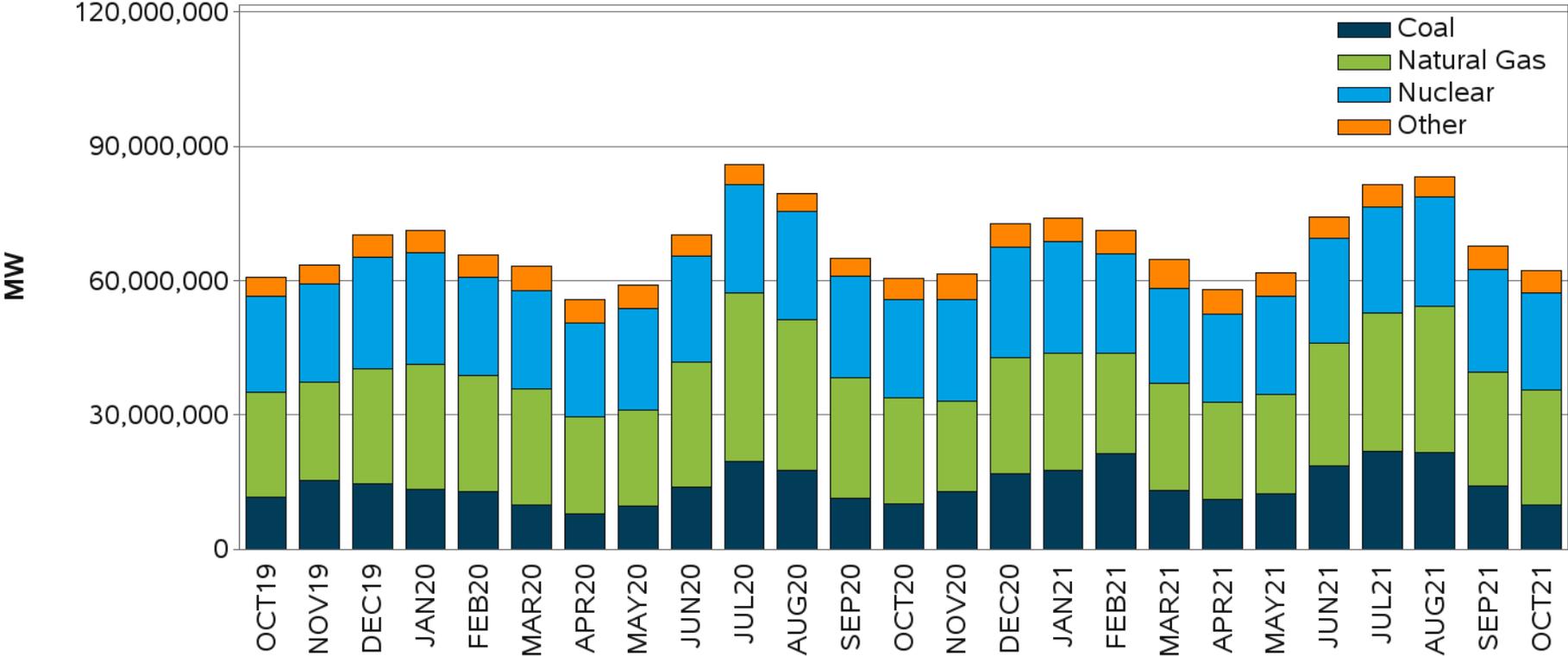
Load Forecast Error – October Daily Peaks, 10:00 Forecast



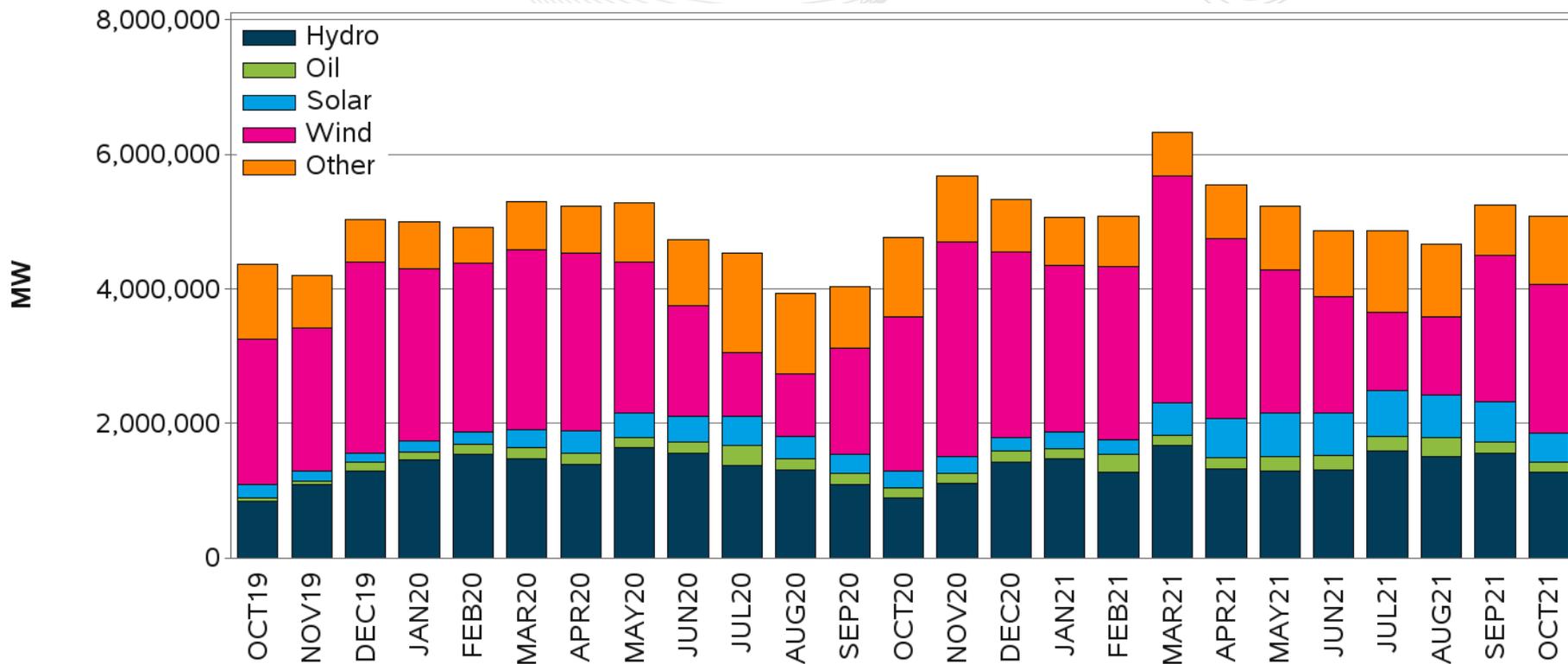
PJM prepares a day-ahead load forecast at 10:00 am for use by our members.

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.

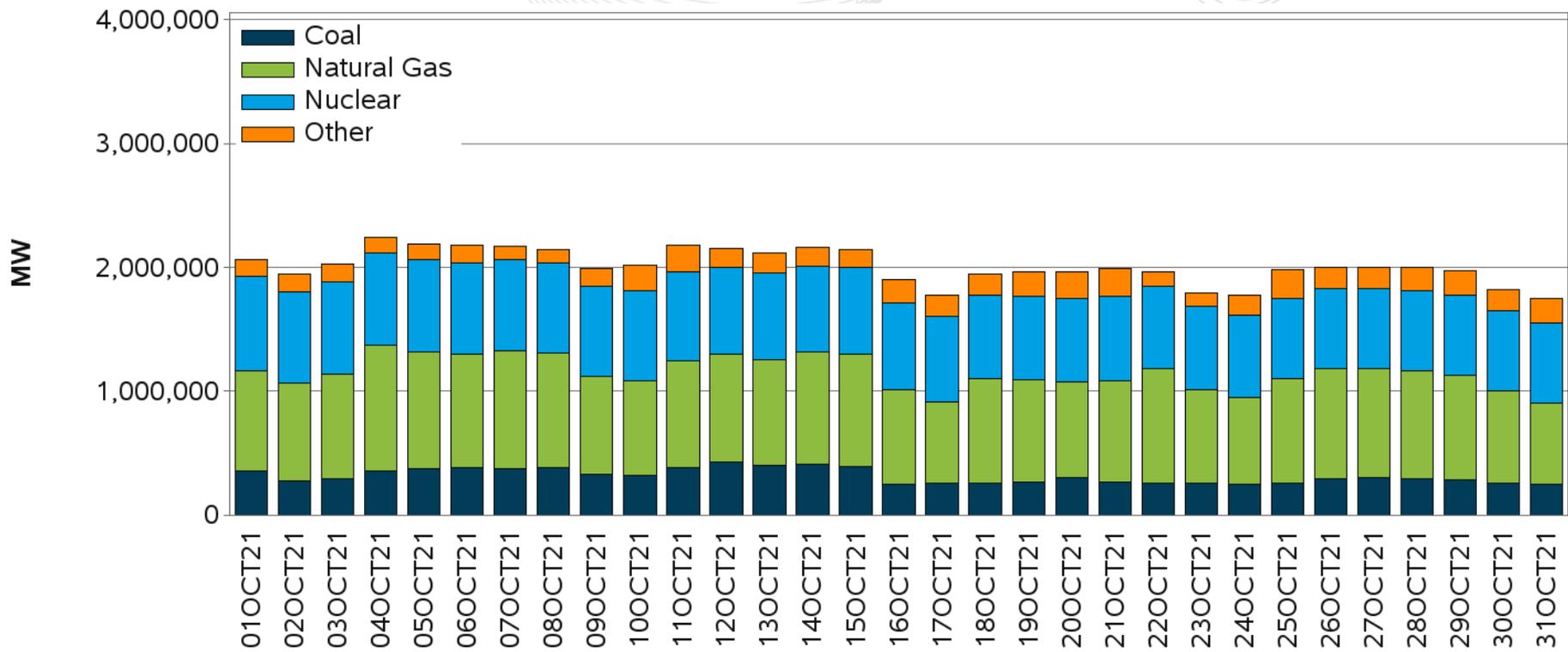
The load forecast performed well for much of October, but it experienced some challenges during the first half of the month due to weather forecast error. Temperatures during this time were warmer than average throughout the RTO. On October 3 and 4, temperatures came in hotter than expected, leading to the peak loads being under-forecasted. On October 11, temperatures came in cooler than expected, leading to the peak load being over-forecasted. On October 16, the peak load was under-forecasted as a cool front quickly entered the PJM region, leading to an unexpected early afternoon peak. Temperatures remained cooler following the arrival of this cold front, and the load forecast performed well in the second half of the month. On October 31, the evening load was over-forecasted despite temperature forecasts, being accurate likely as the result of irregular human behavior patterns due to the holiday.



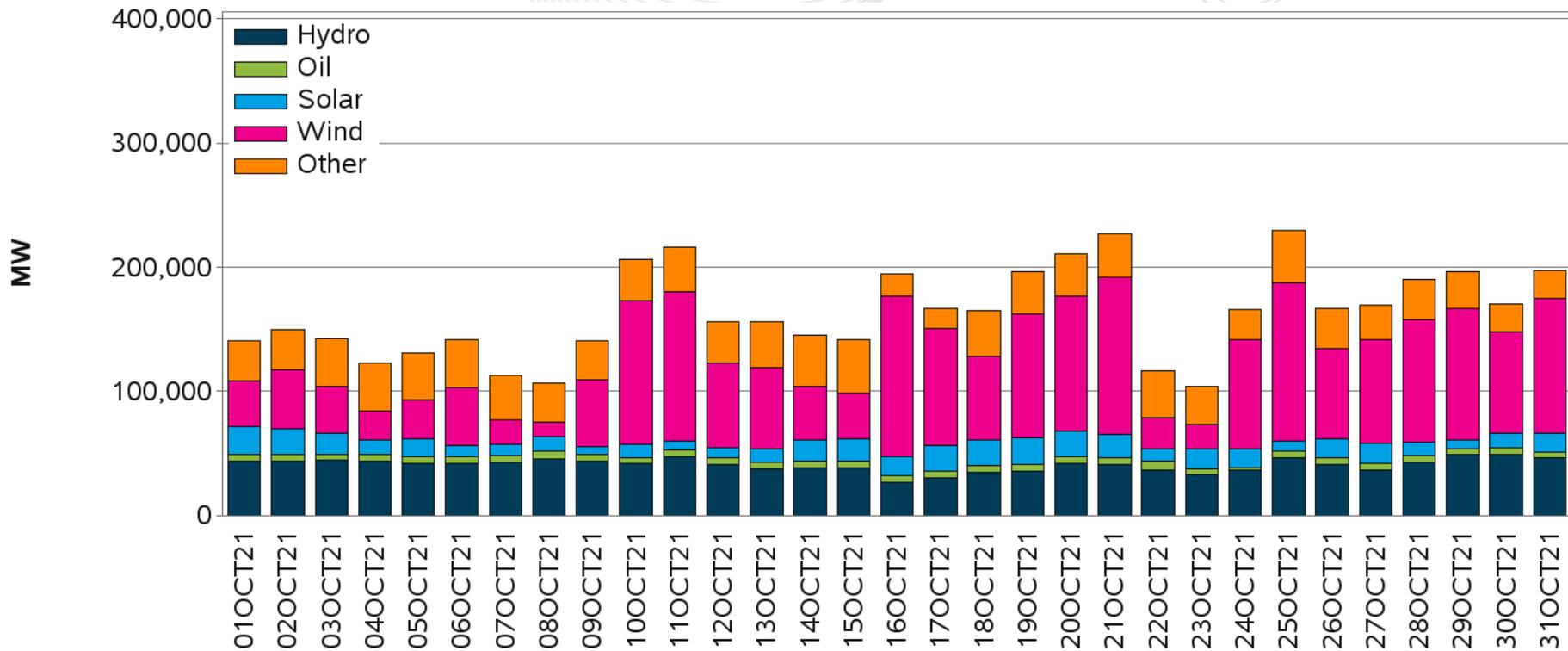
Other includes Hydro, Oil, Solar, Wind, and Other



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

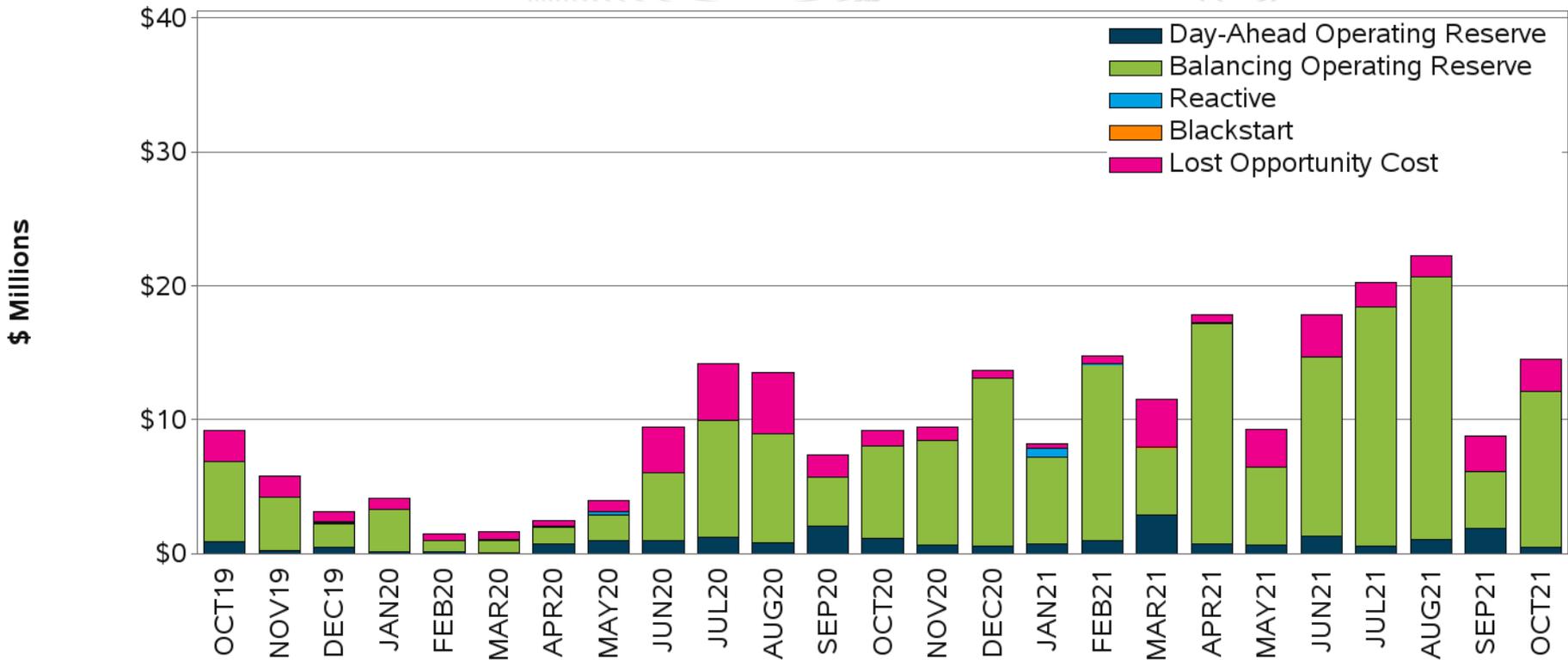


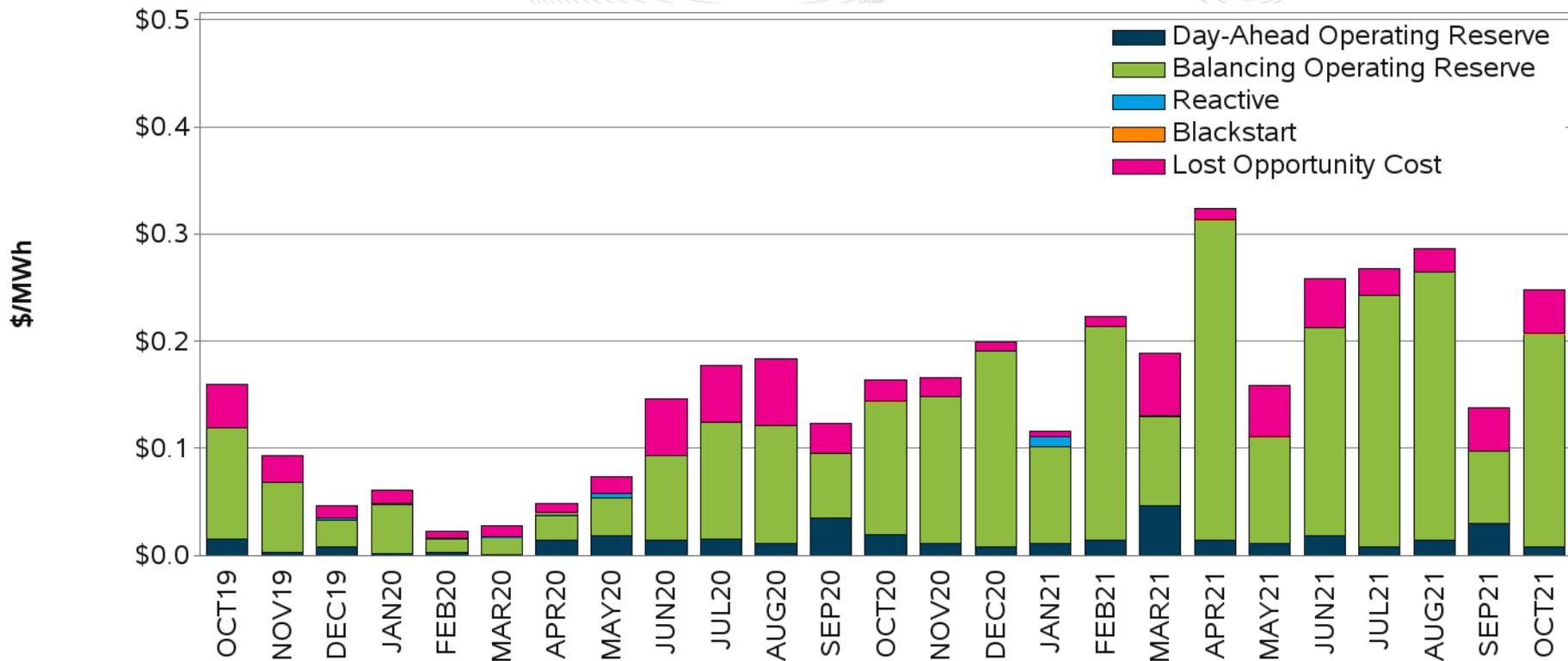
'Other' includes Hydro, Oil, Solar, Wind, and Other

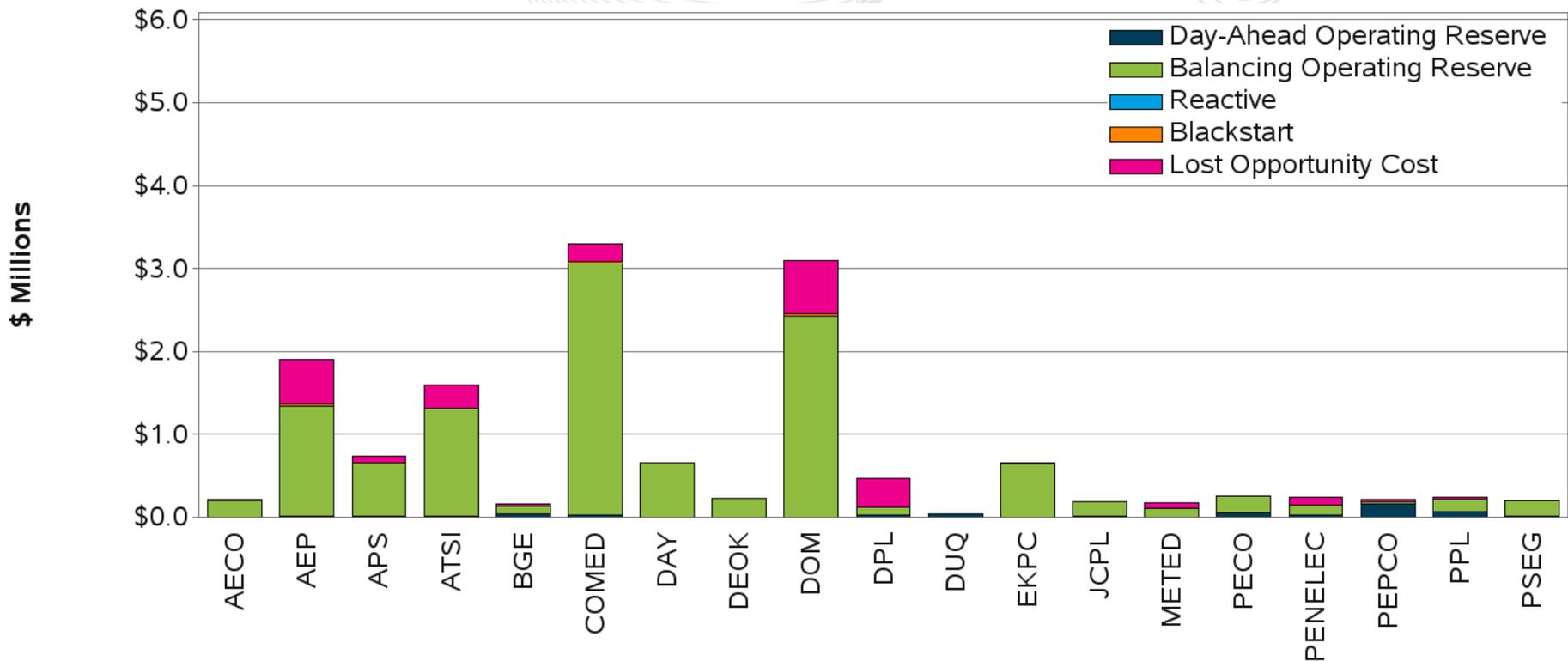


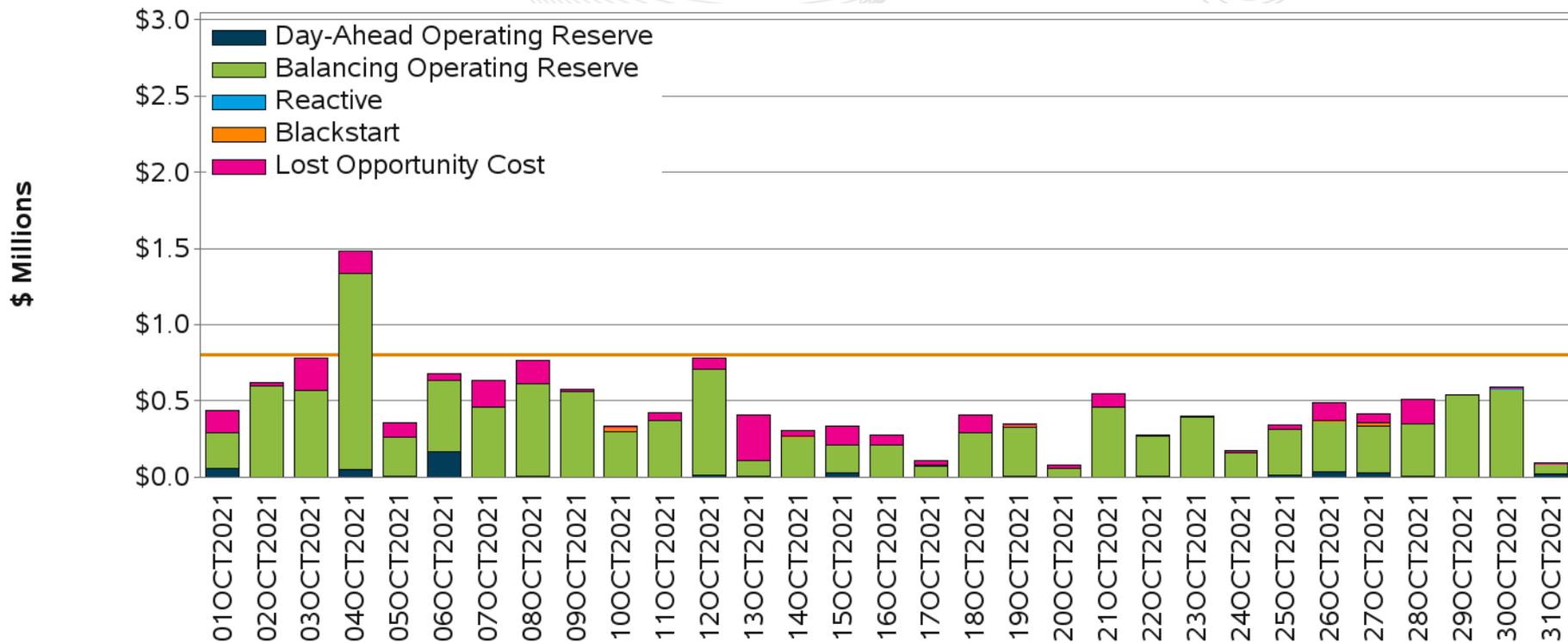
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Operating Reserve (Uplift)







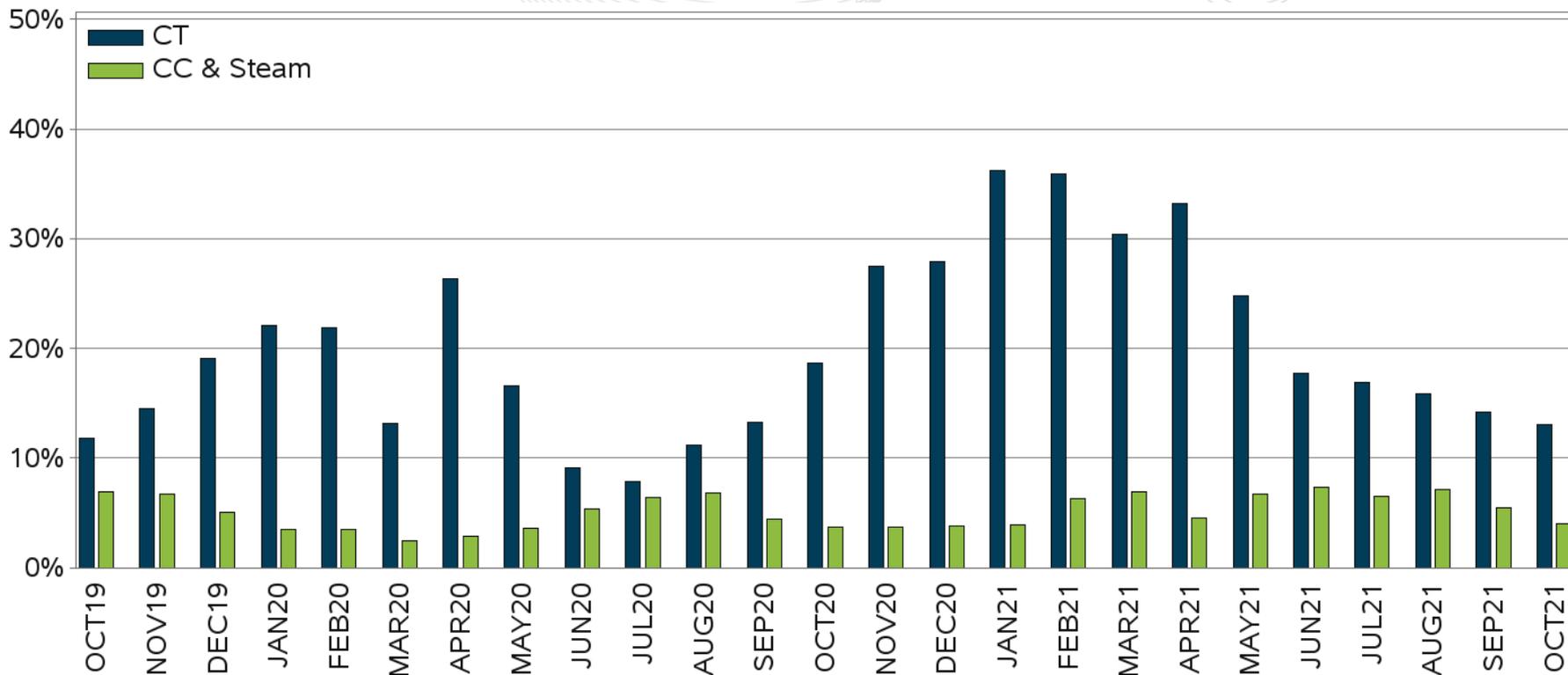


In October, uplift exceeded \$800,000 on one day – October 4th.
Contributing factors to uplift were:

- Higher than forecasted load and localized congestion

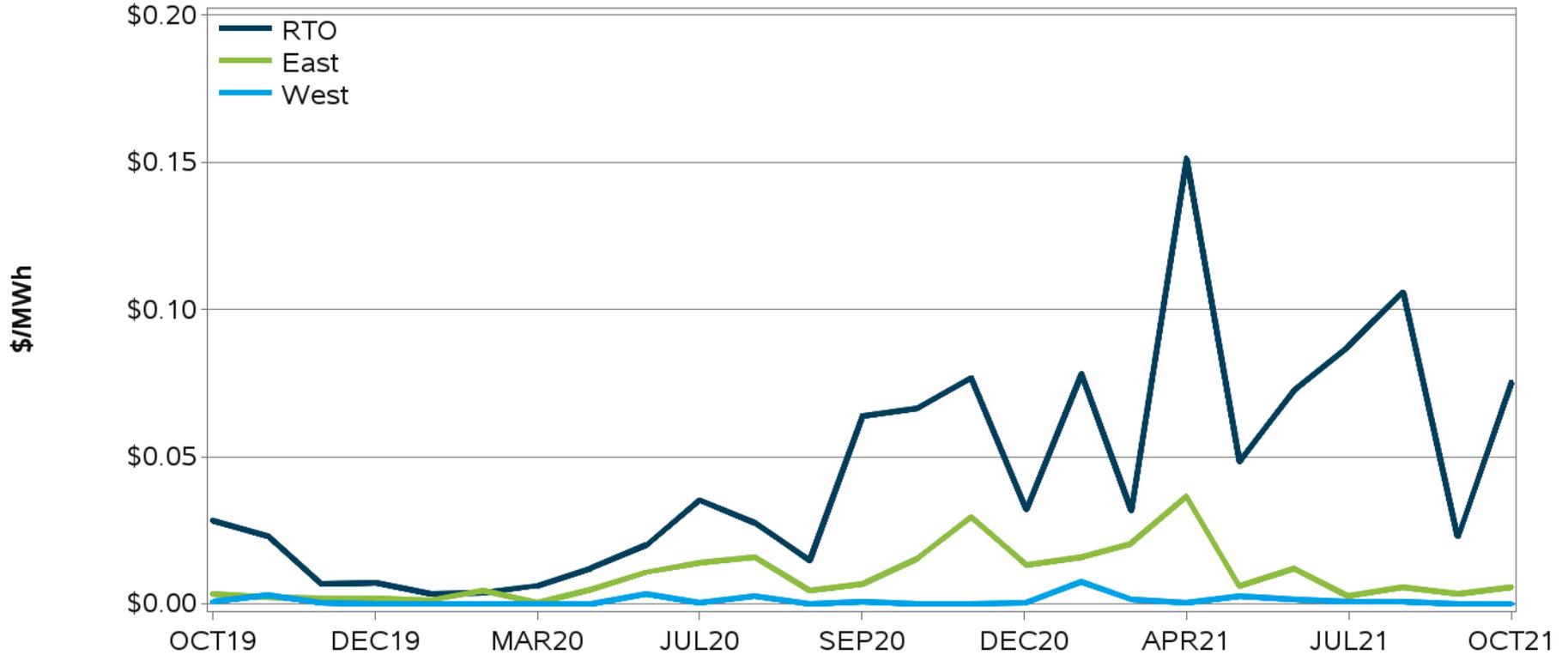
More information on Uplift can be found on PJM's
website at [Drivers of Uplift](#)

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

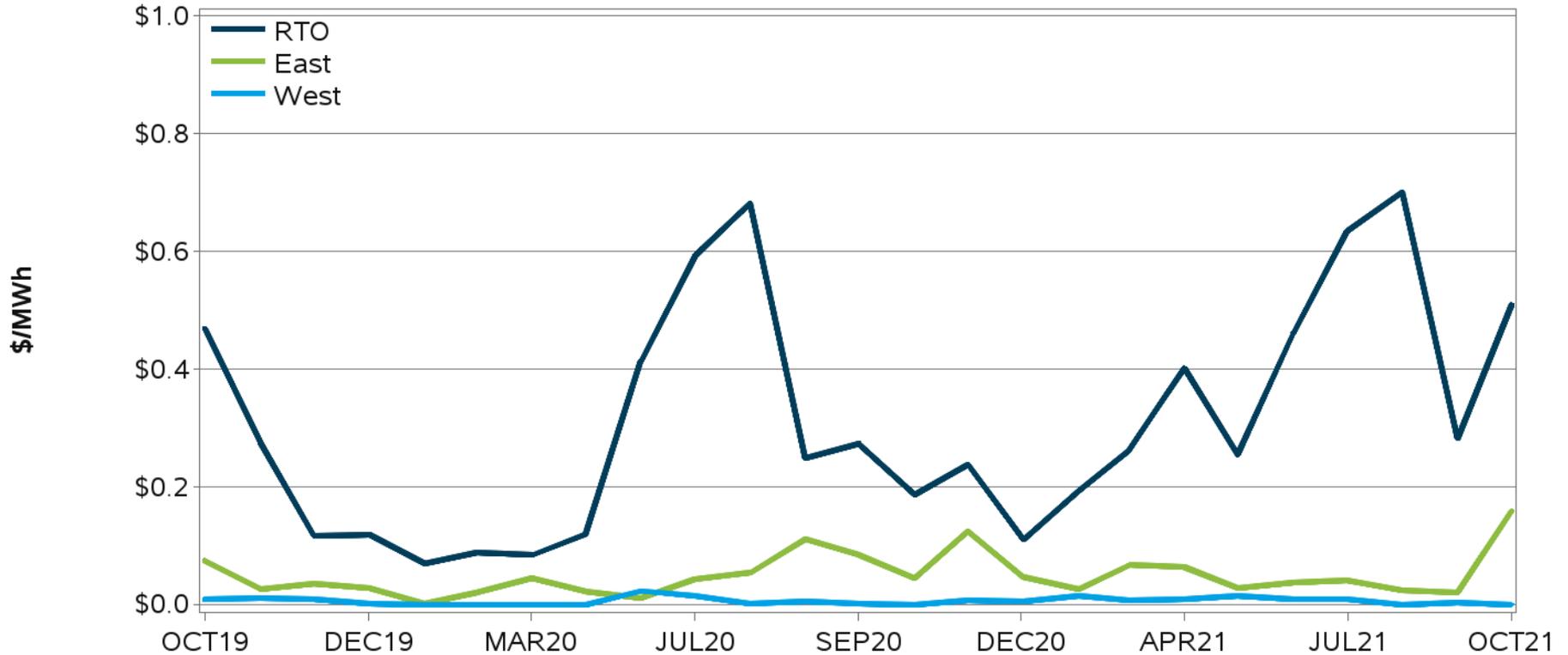


- Beginning in December 2008, the daily Balancing Operating Reserves (BOR) rate was replaced with six different BOR rates: RTO BOR for Reliability Rate, RTO BOR for Deviations Rate, East BOR for Reliability Rate, East BOR for Deviations Rate, West BOR for Reliability Rate, West BOR for Deviations Rate.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

Reliability Balancing Operating Reserve Rates

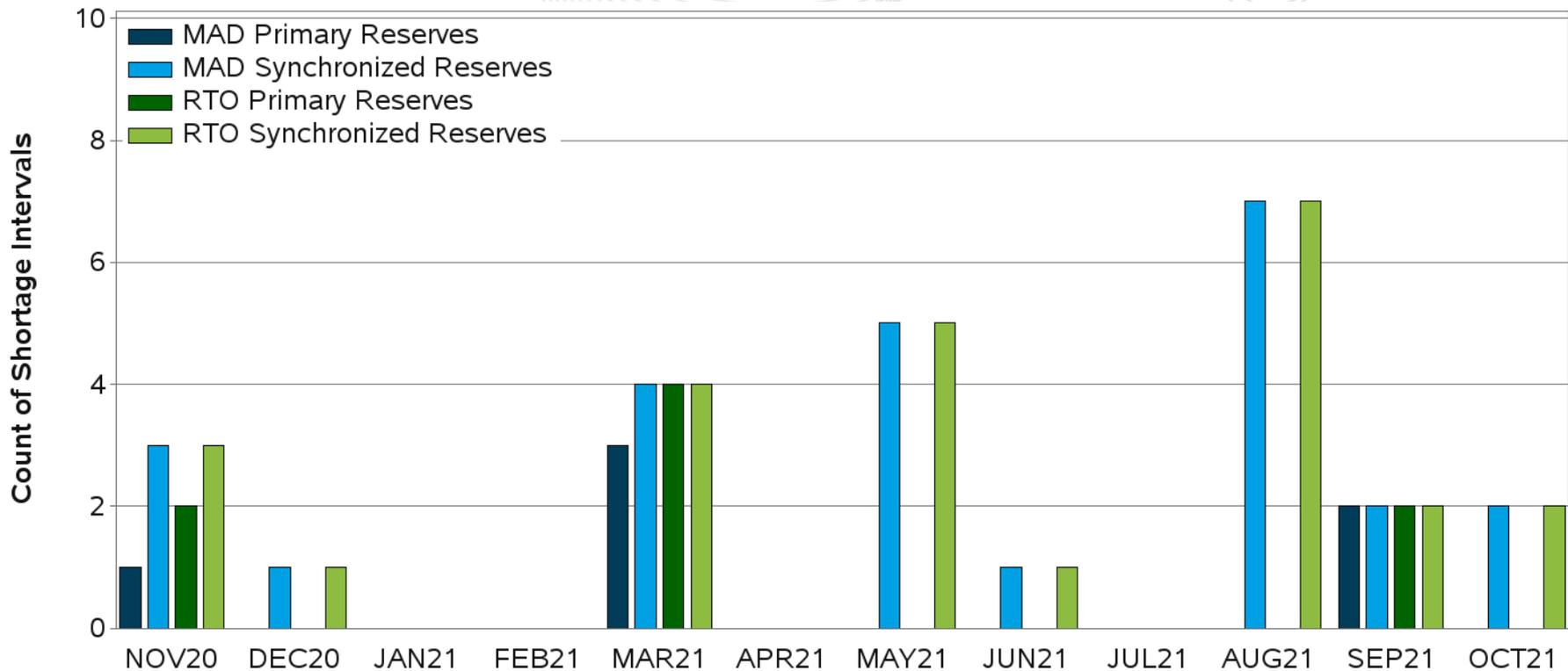


Deviations Balancing Operating Reserve Rates



Energy Market

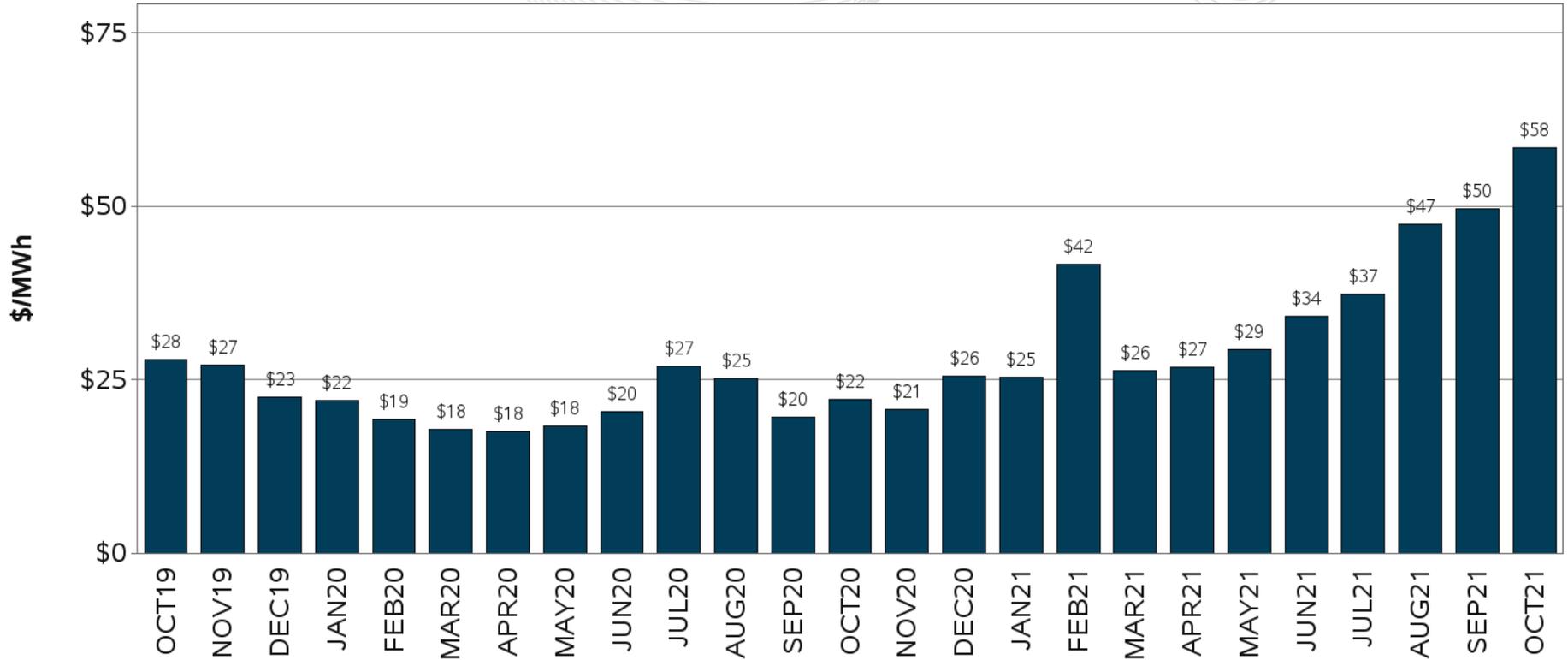
LMP Summary



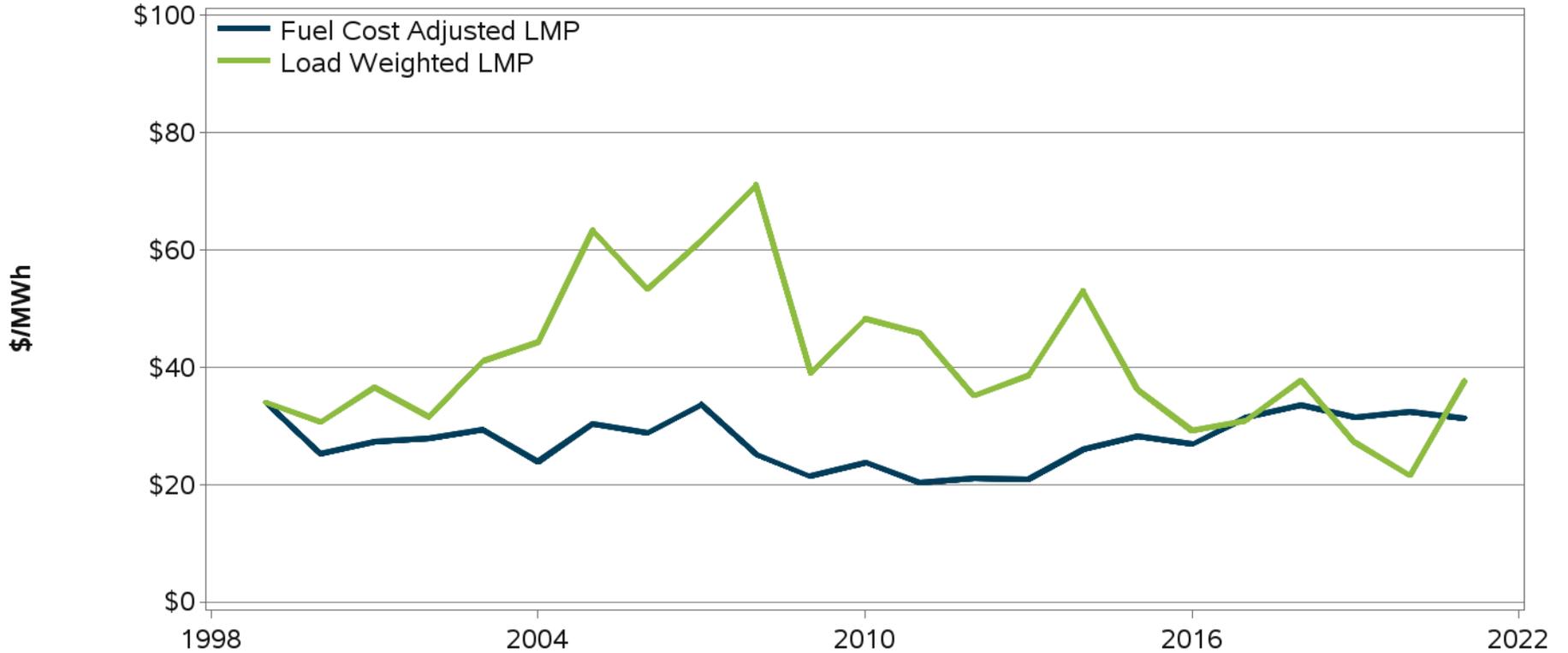
Date	5-minute Interval	Reserve Penalty Factors	5-minute Interval SMP	Hourly Integrated SMP
Thursday, October 28, 2021	18:35 - 18:40	2nd step penalty for Synchronized Reserve deficiencies in MAD	\$673.47	\$170.24
Thursday, October 28, 2021	18:40 - 18:45	2nd step penalty for Synchronized Reserve deficiencies in MAD	\$673.62	\$170.24

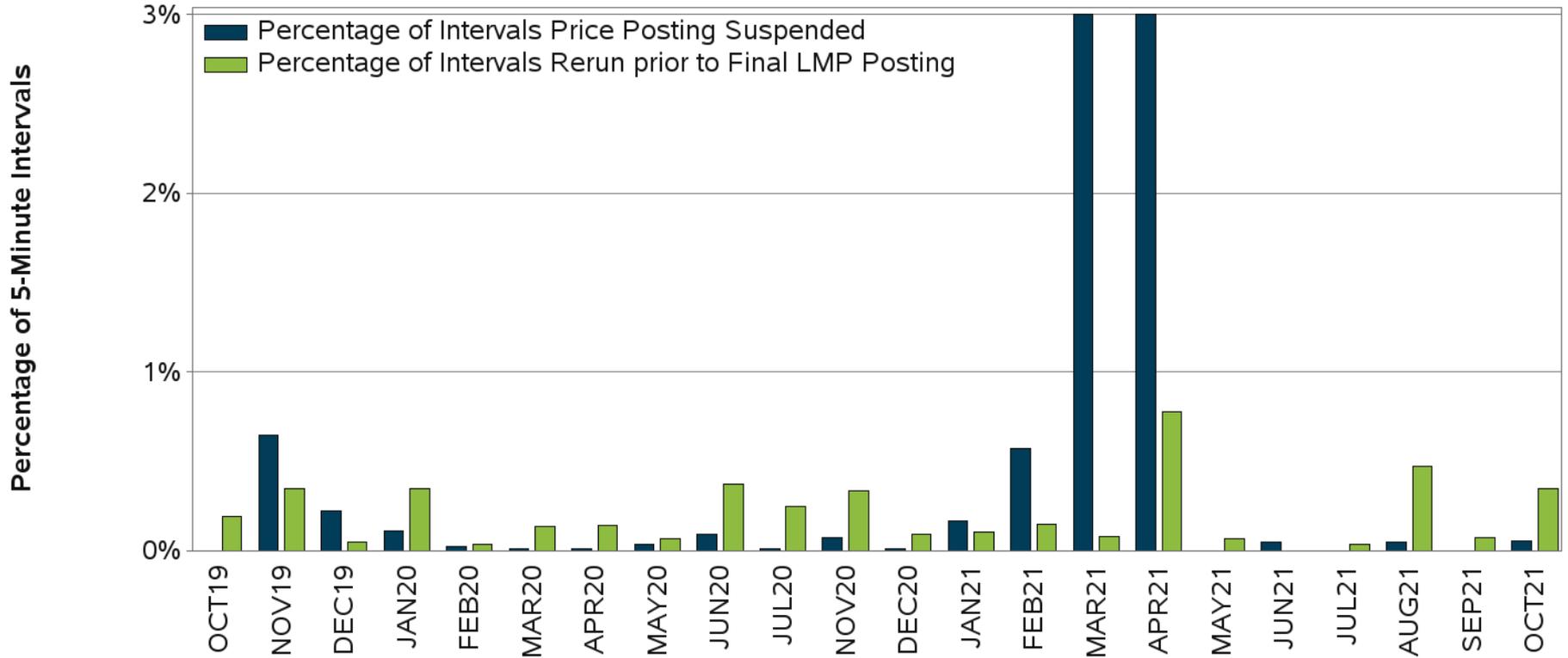
Information on constraints and shadow prices can be found here:

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



Fuel Cost Adjusted LMP (Referenced to 1999 Fuel Prices)

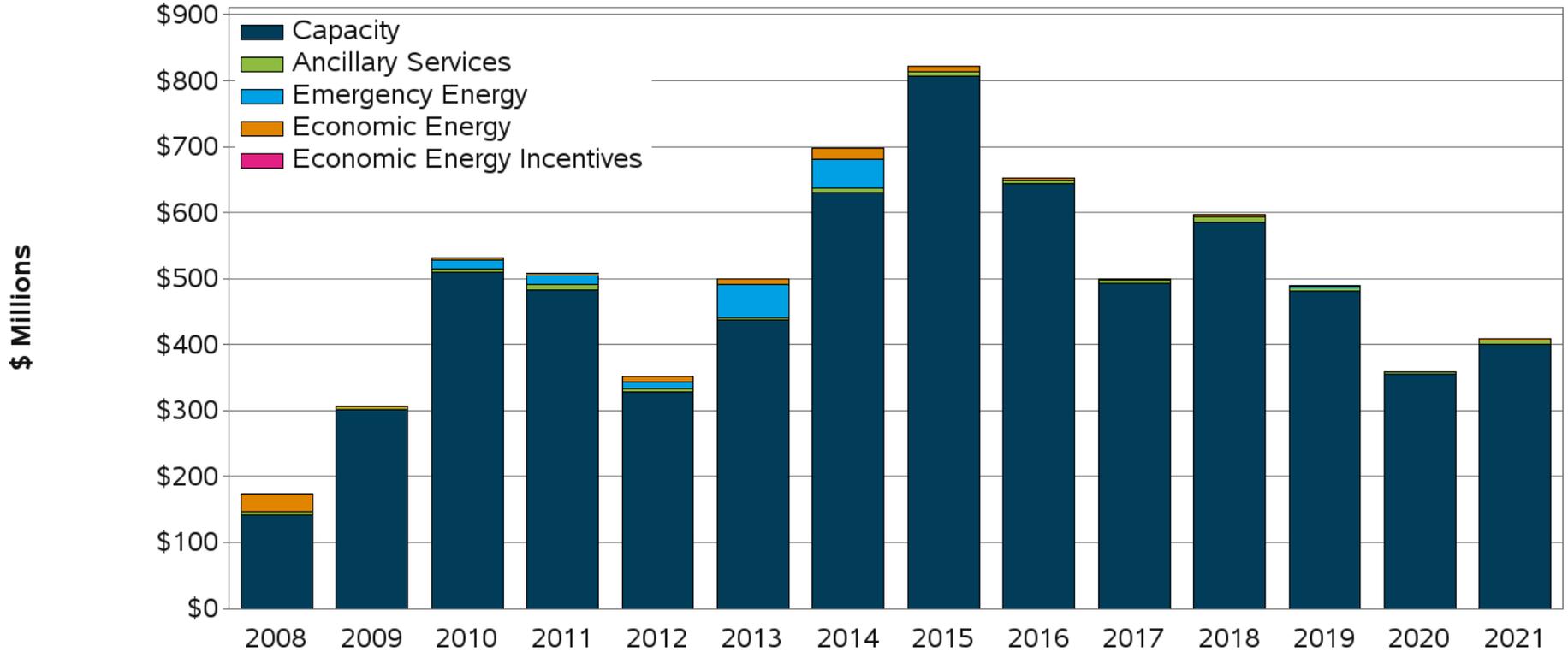


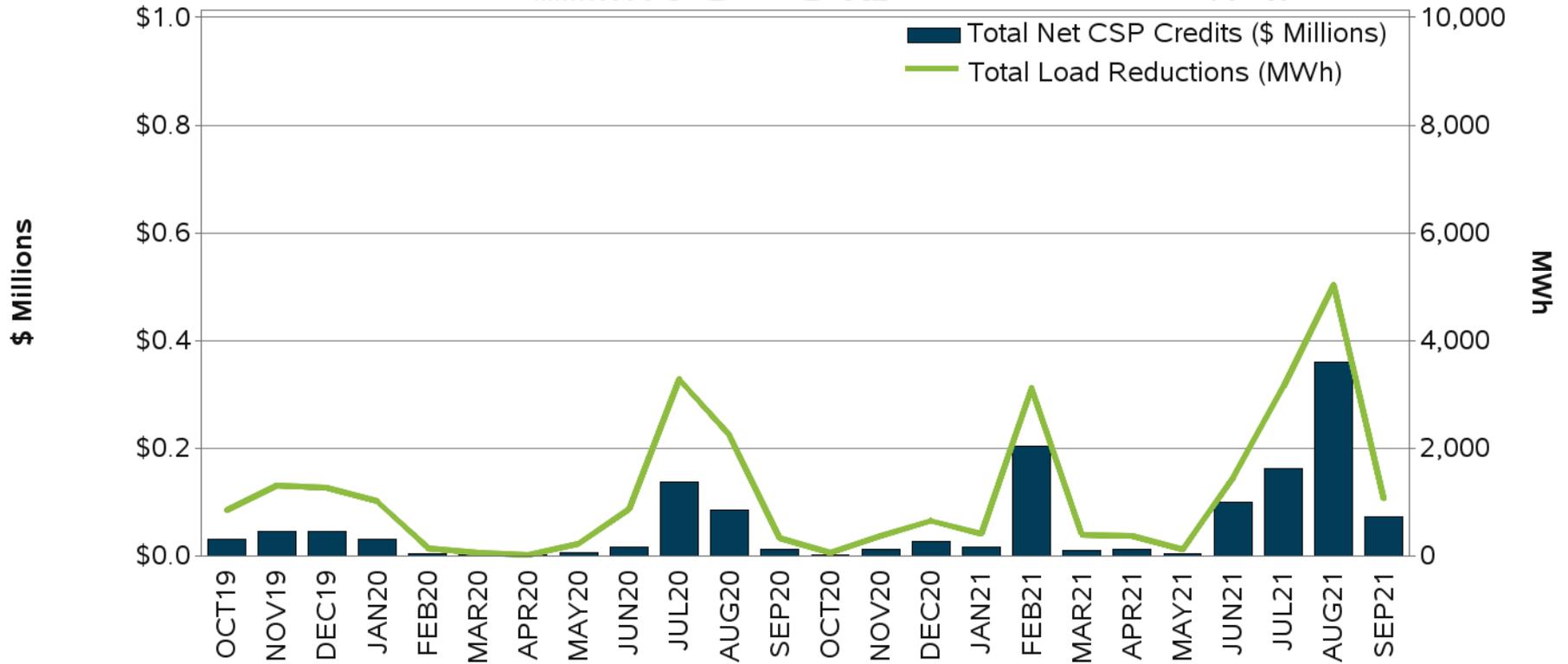


Spikes seen in March and April 2021 are incorrect and due to a software bug which has since been fixed.

Energy Market

Demand Response Summary

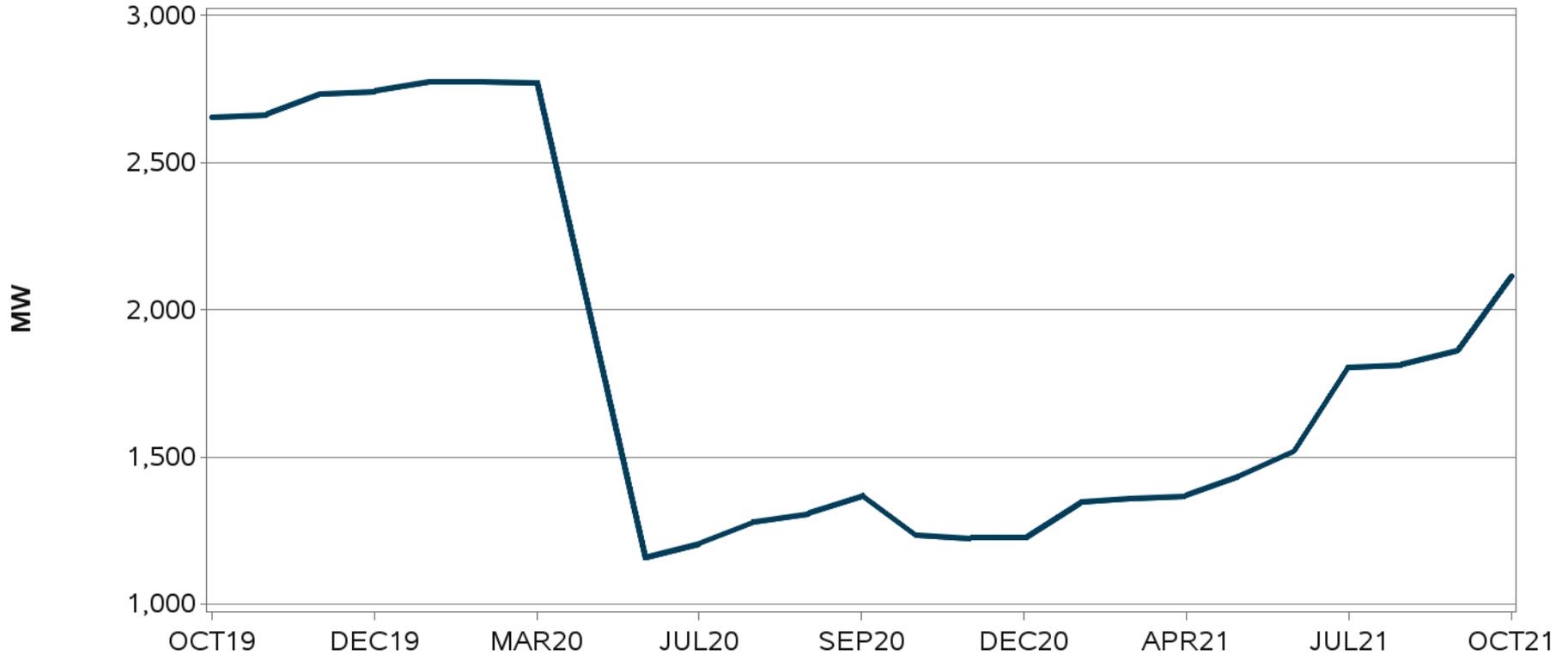




*Data for the last few months are subject to significant change due to the settlement window.



Total Registered MW in PJM's Economic Demand Response

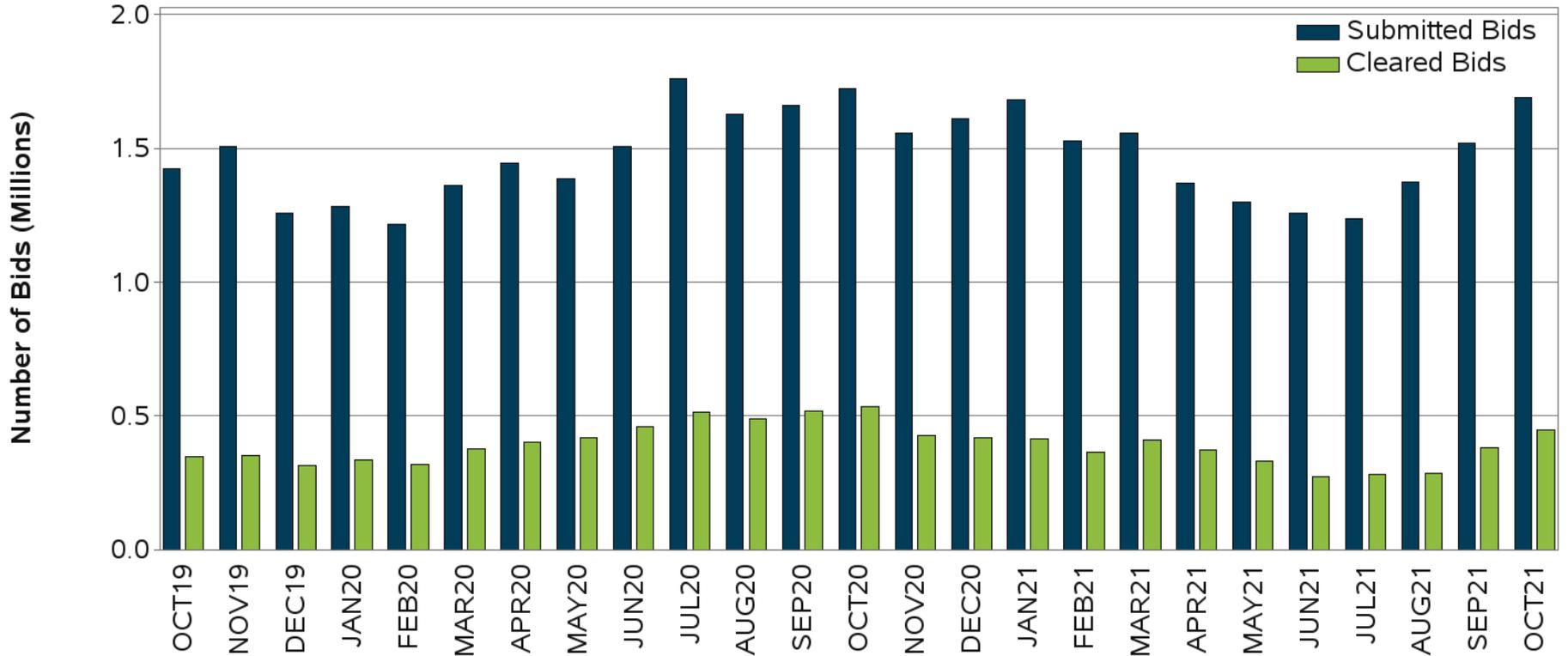


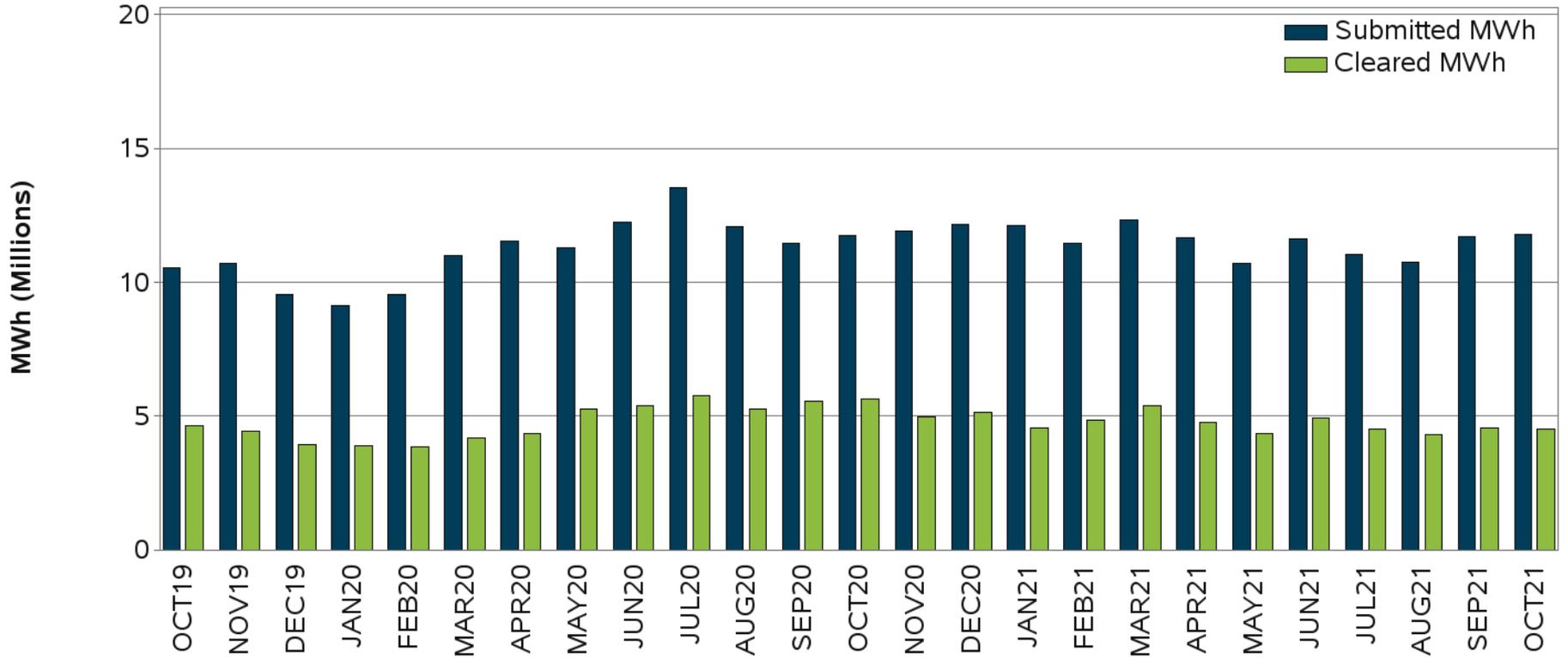
Energy Market

Virtual Activity Summary

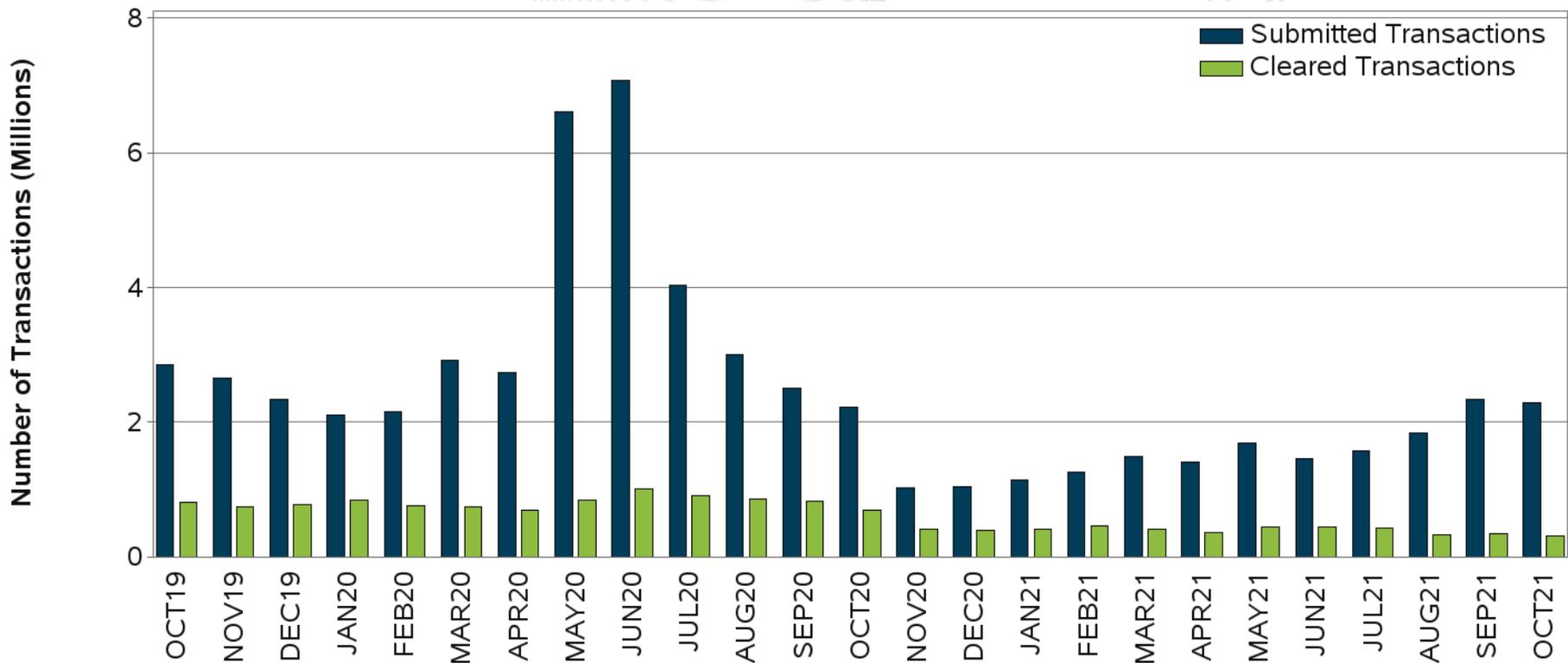
- The following six charts depict trends in submitted and cleared virtual and up-to-congestion transactions, in terms of number and volume, into the PJM Energy Market. The first two of these charts show the submitted and cleared increment and decrement bids (virtual transactions or virtuals) and they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

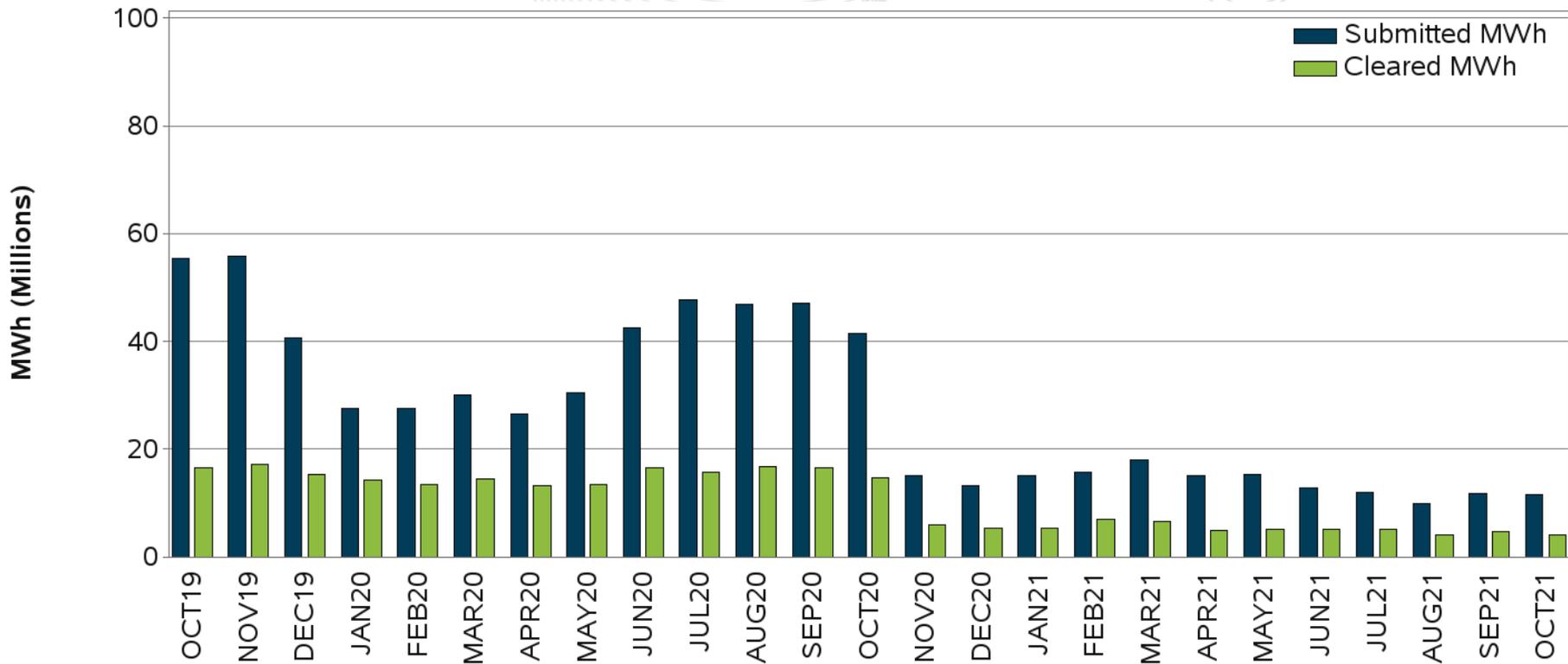




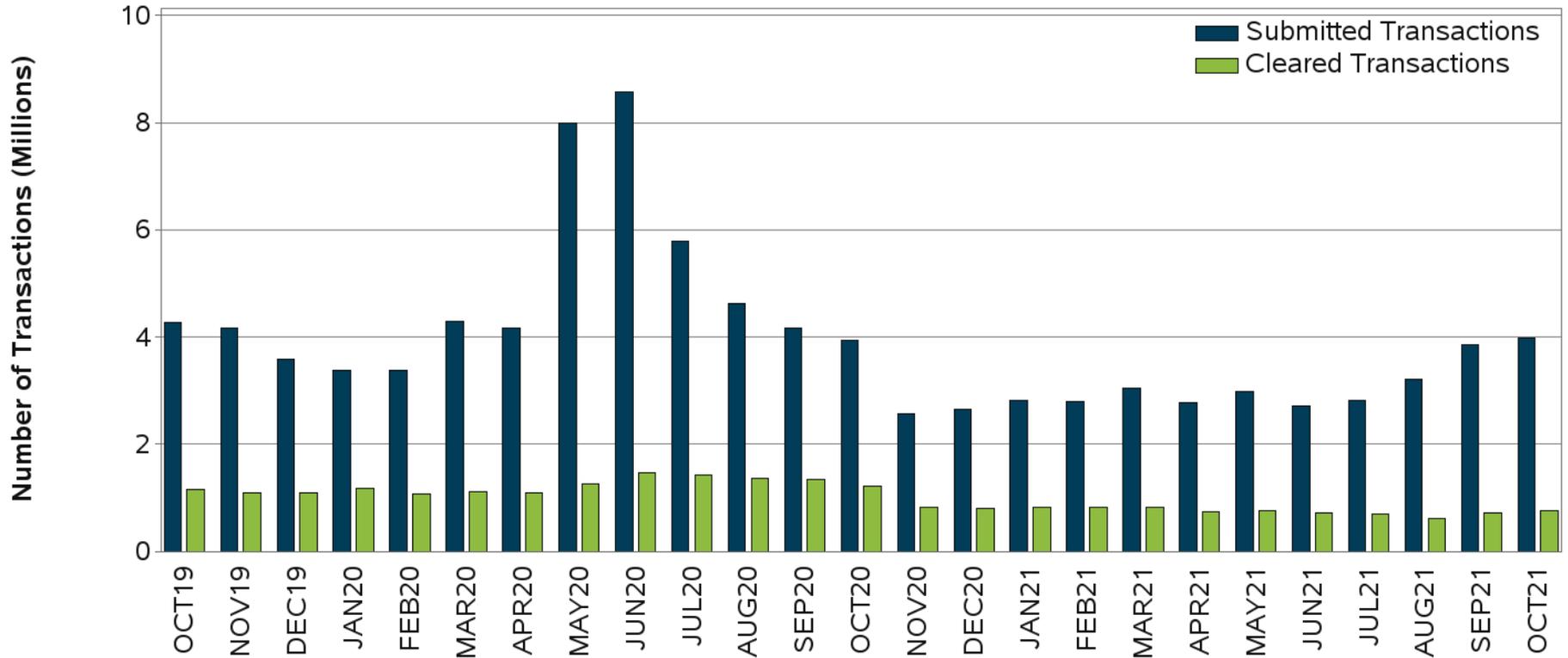
Up-To-Congestion Transactions - Total Number



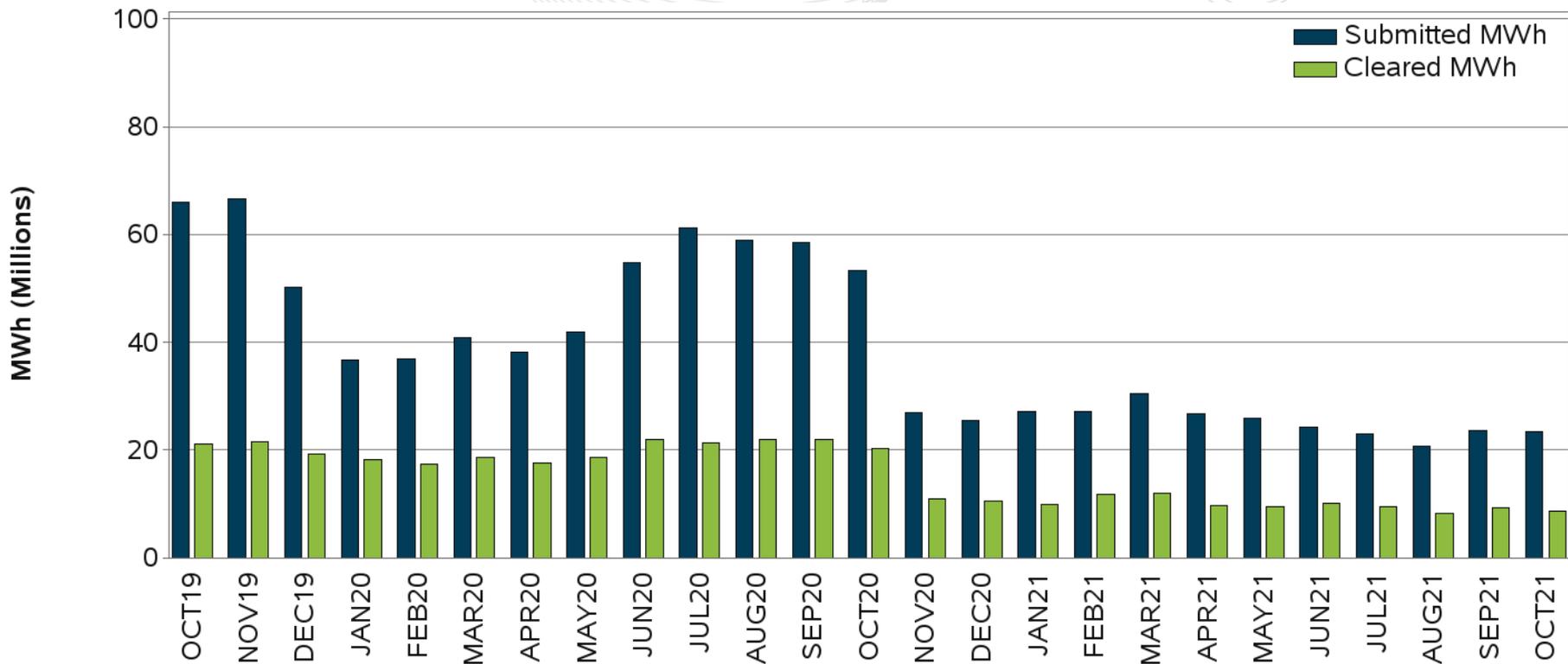
Up-To-Congestion Transactions - Total Volume



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



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

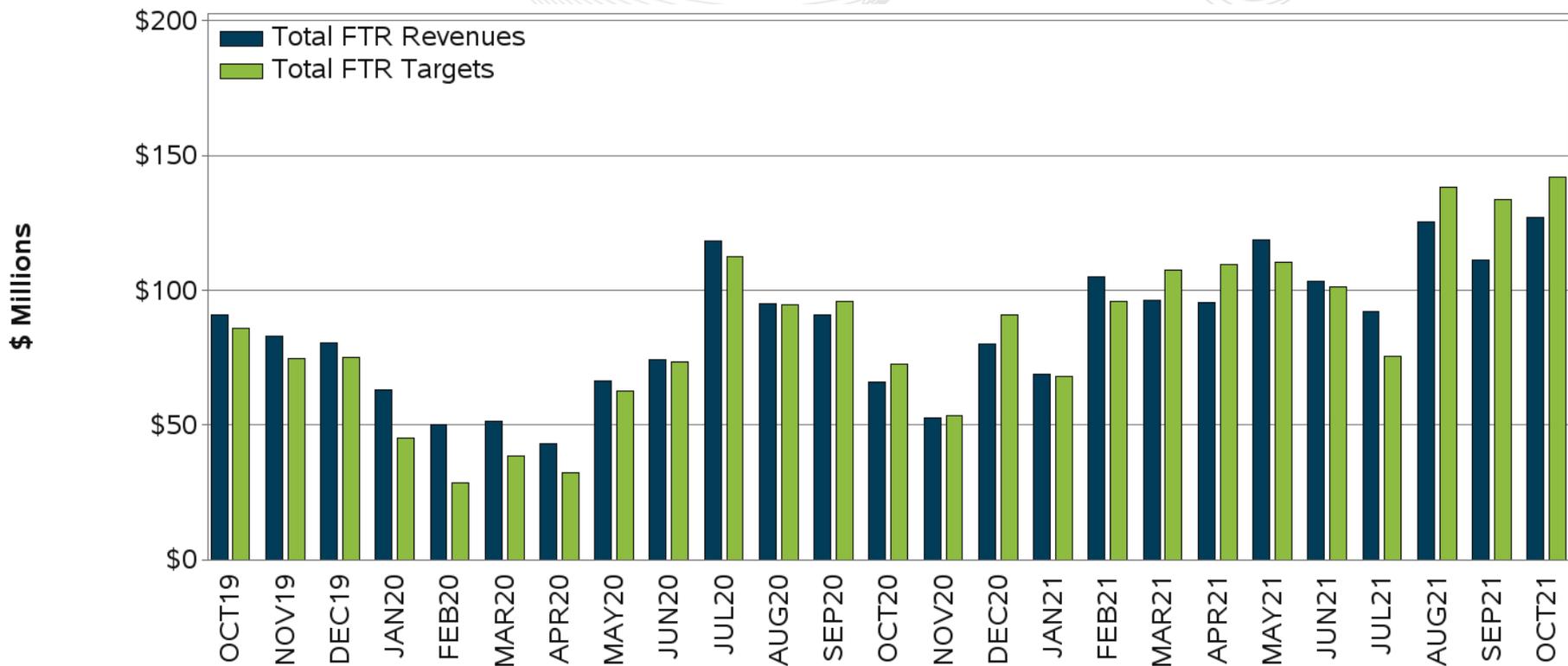


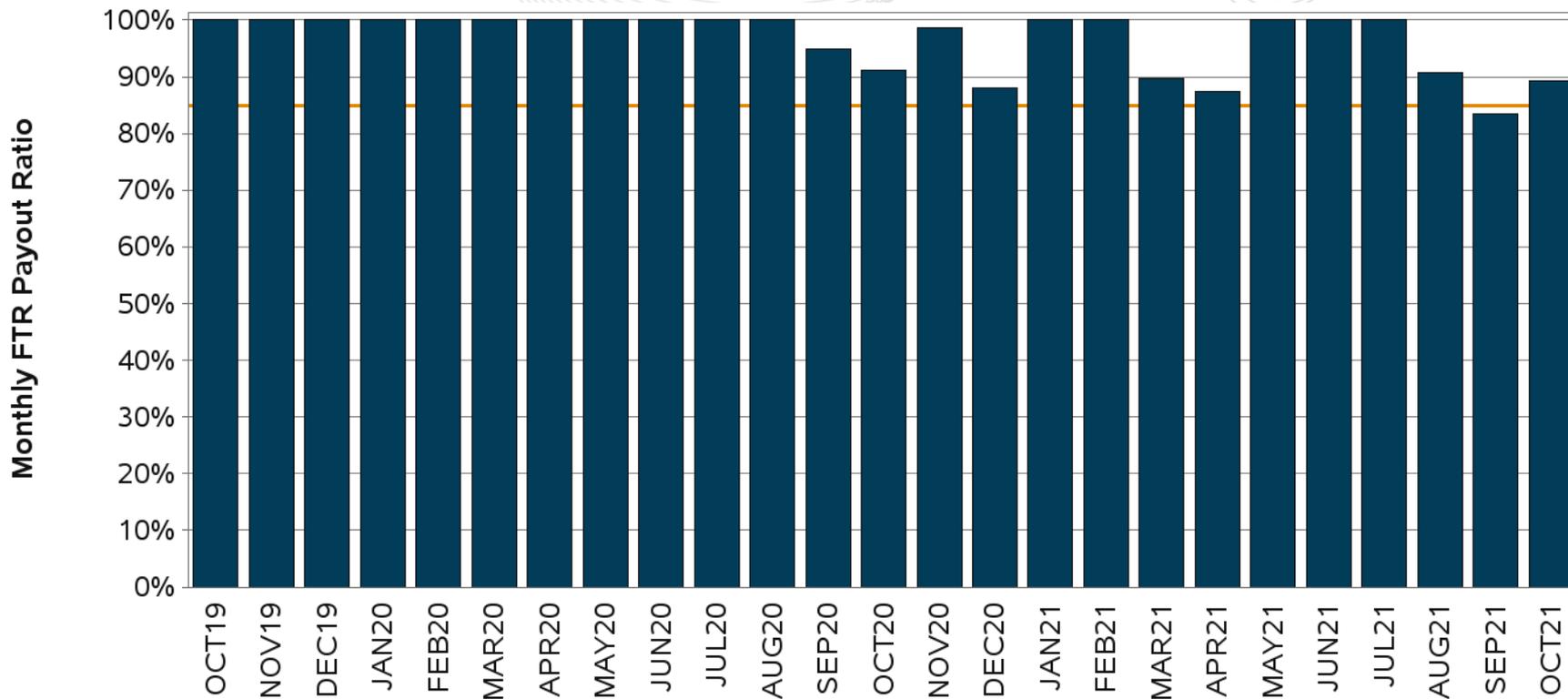
Energy Market

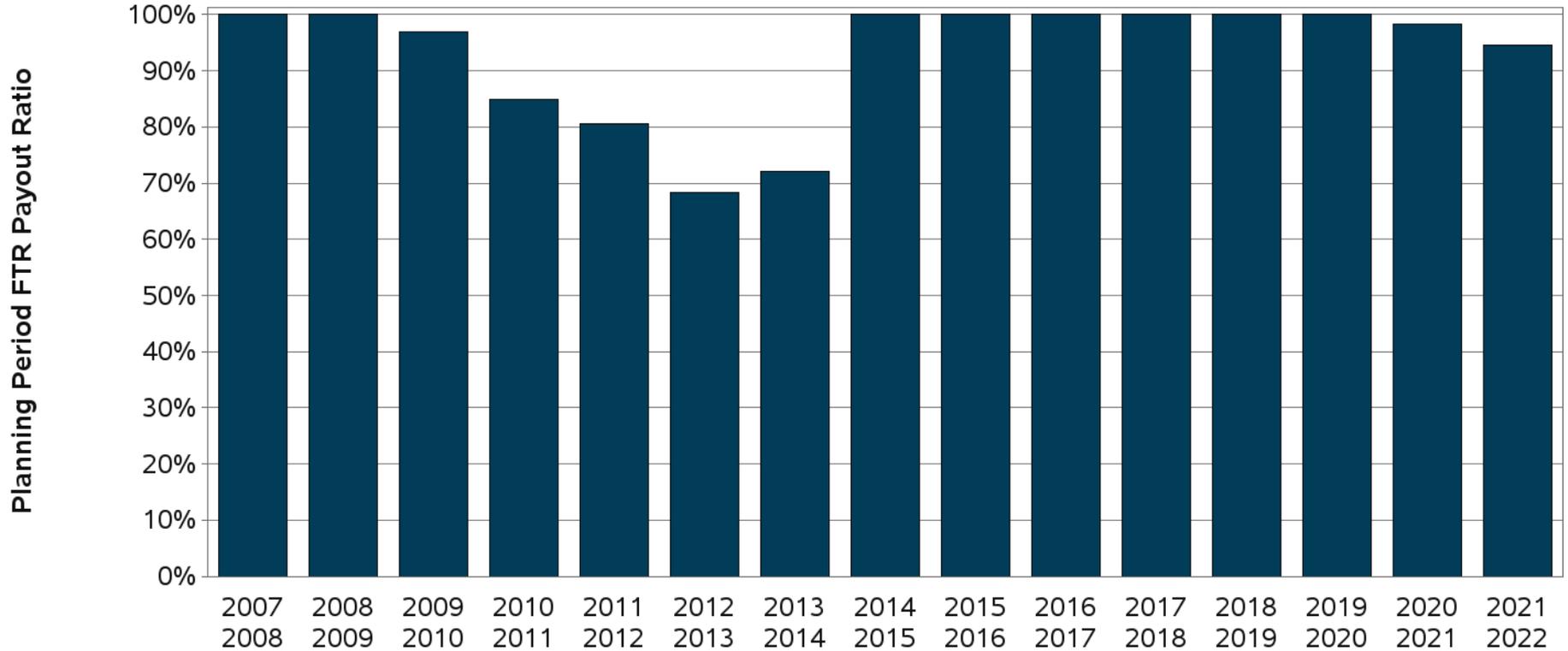
Congestion and FTR Summary

Period	Surplus / Underfunding	Payout Ratio
October, 2021	\$-15,118,261	89%
2021	\$-37,982,612	96%
2021/2022	\$-31,585,041	95%

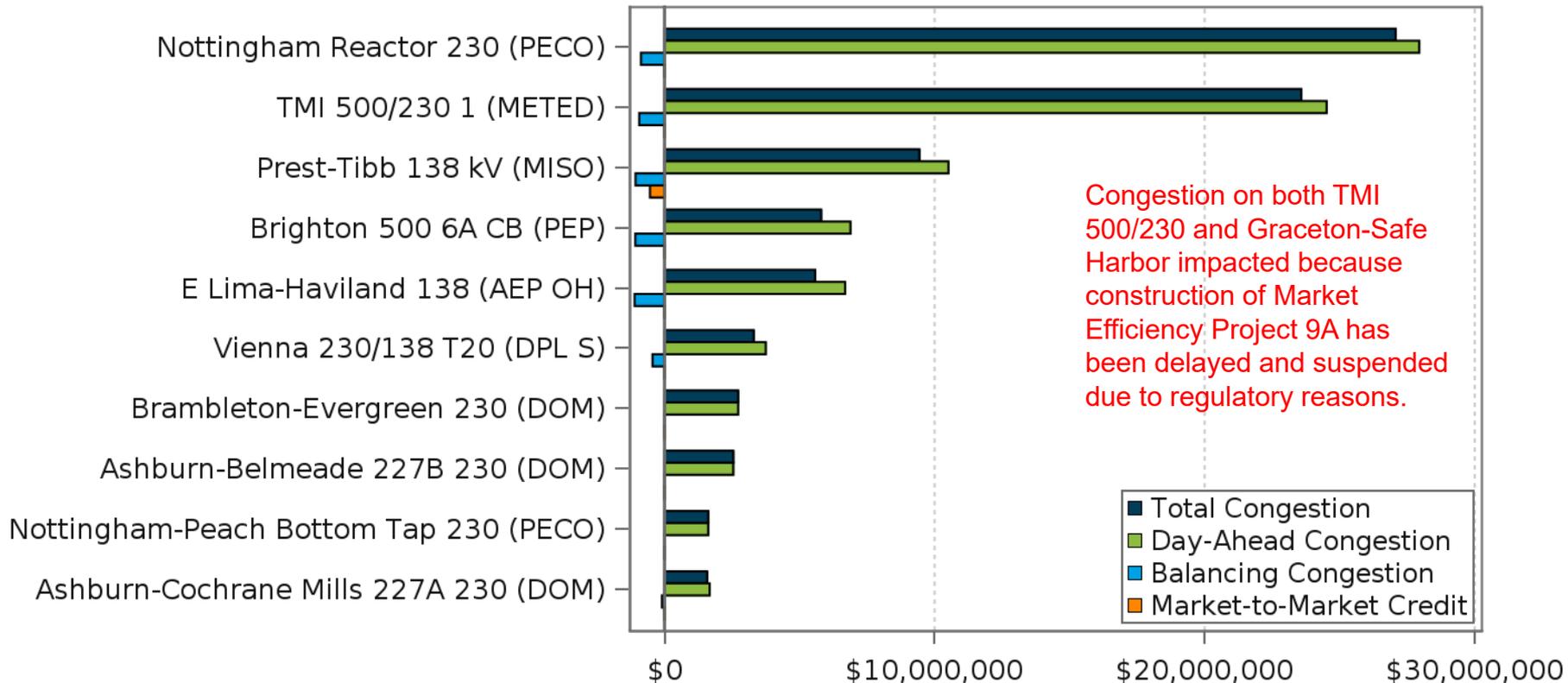
FTR Revenue vs. FTR Target Allocation





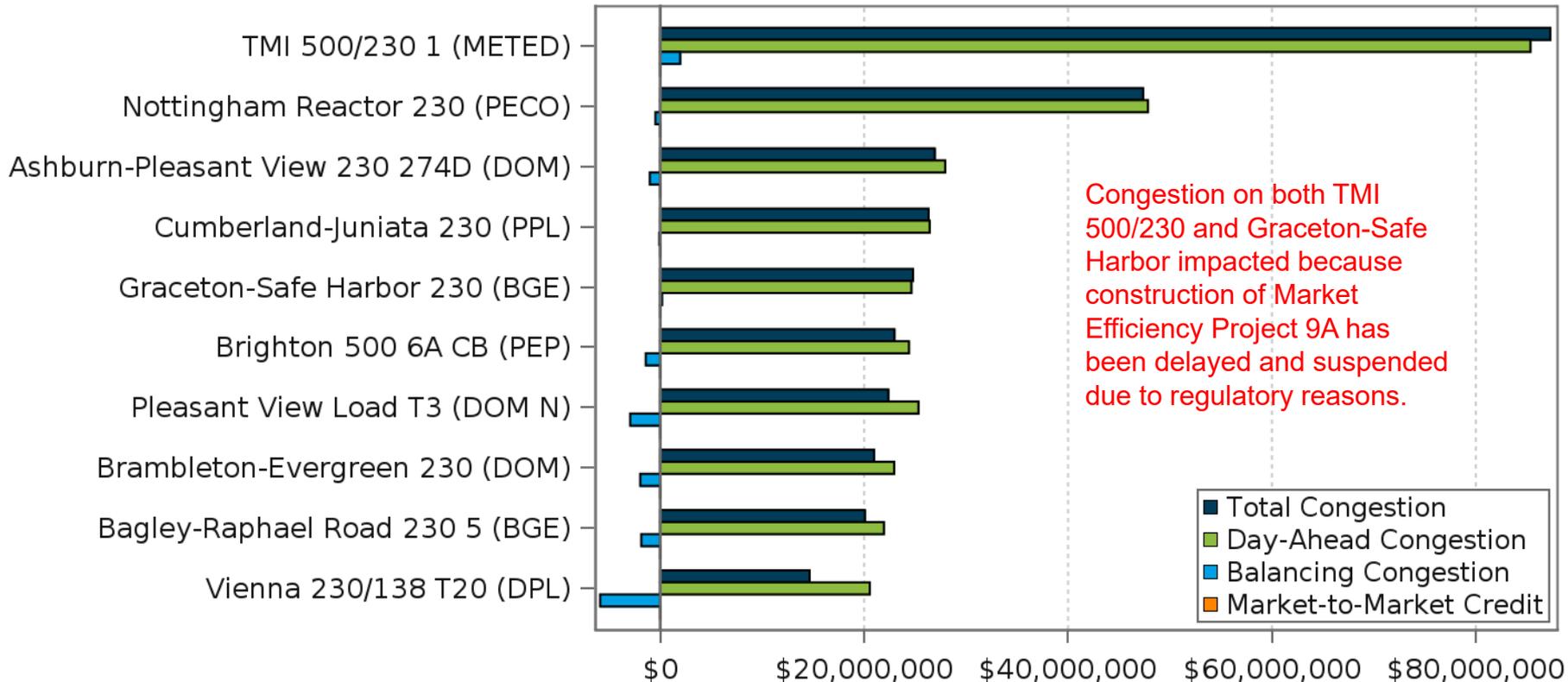


Ten Most Heavily Congested Transmission Facilities - Overall, October



The ten most heavily congested facilities account for 83% of total congestion for October.

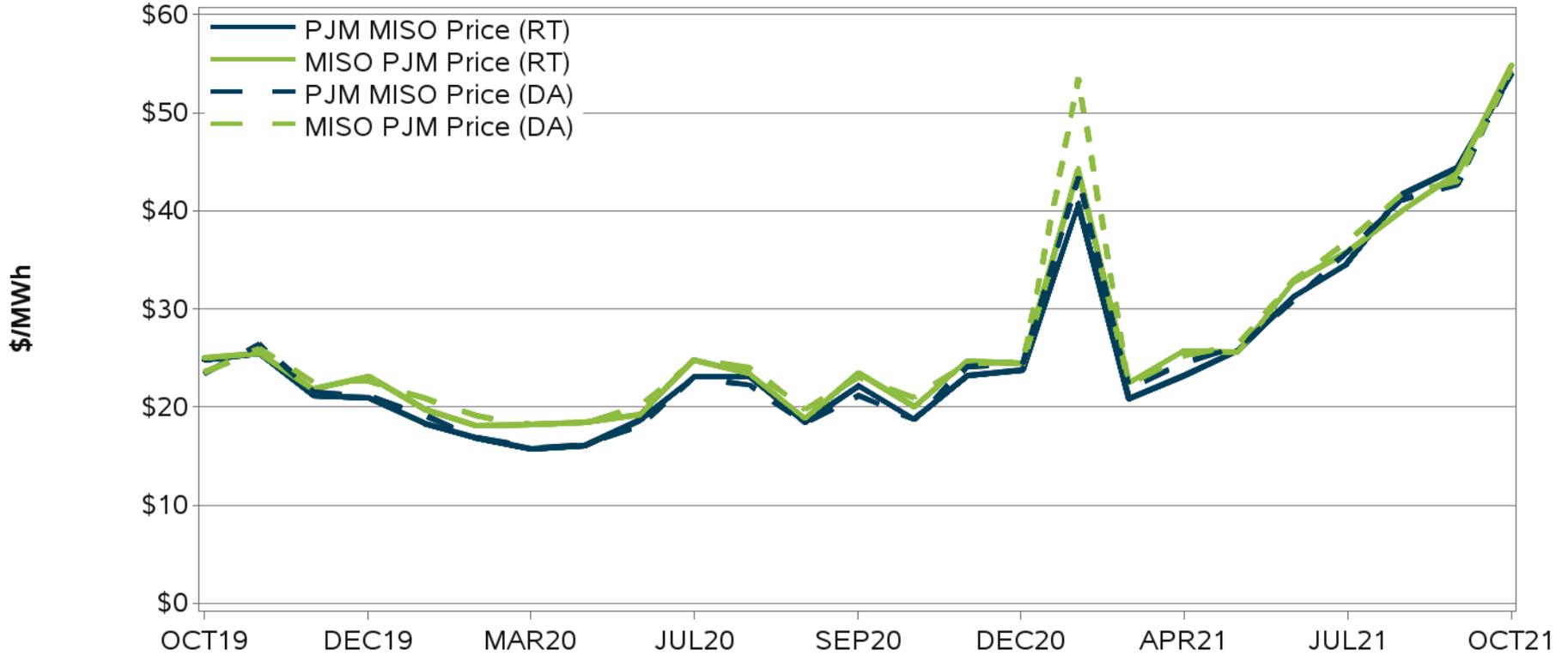
Ten Most Heavily Congested Transmission Facilities - Overall, 2021

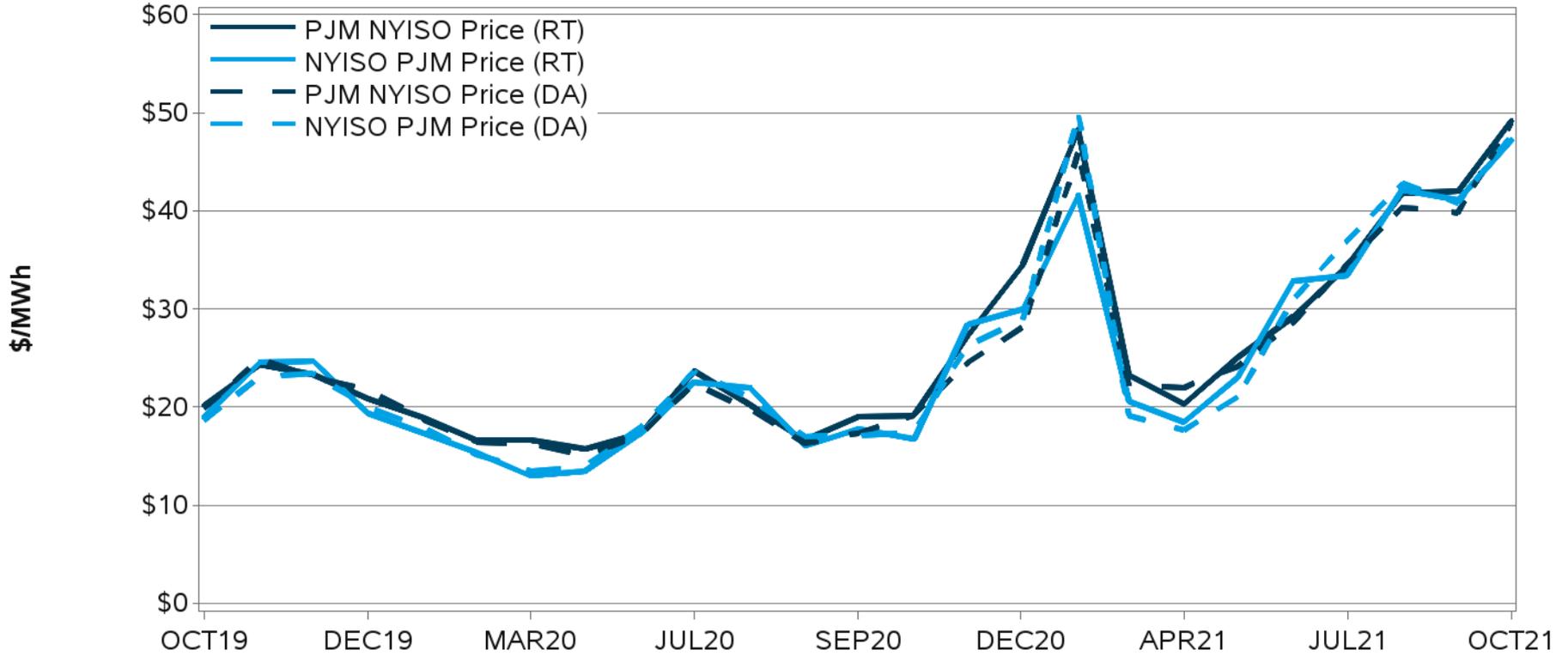


The ten most heavily congested facilities account for 44% of total congestion for 2021.

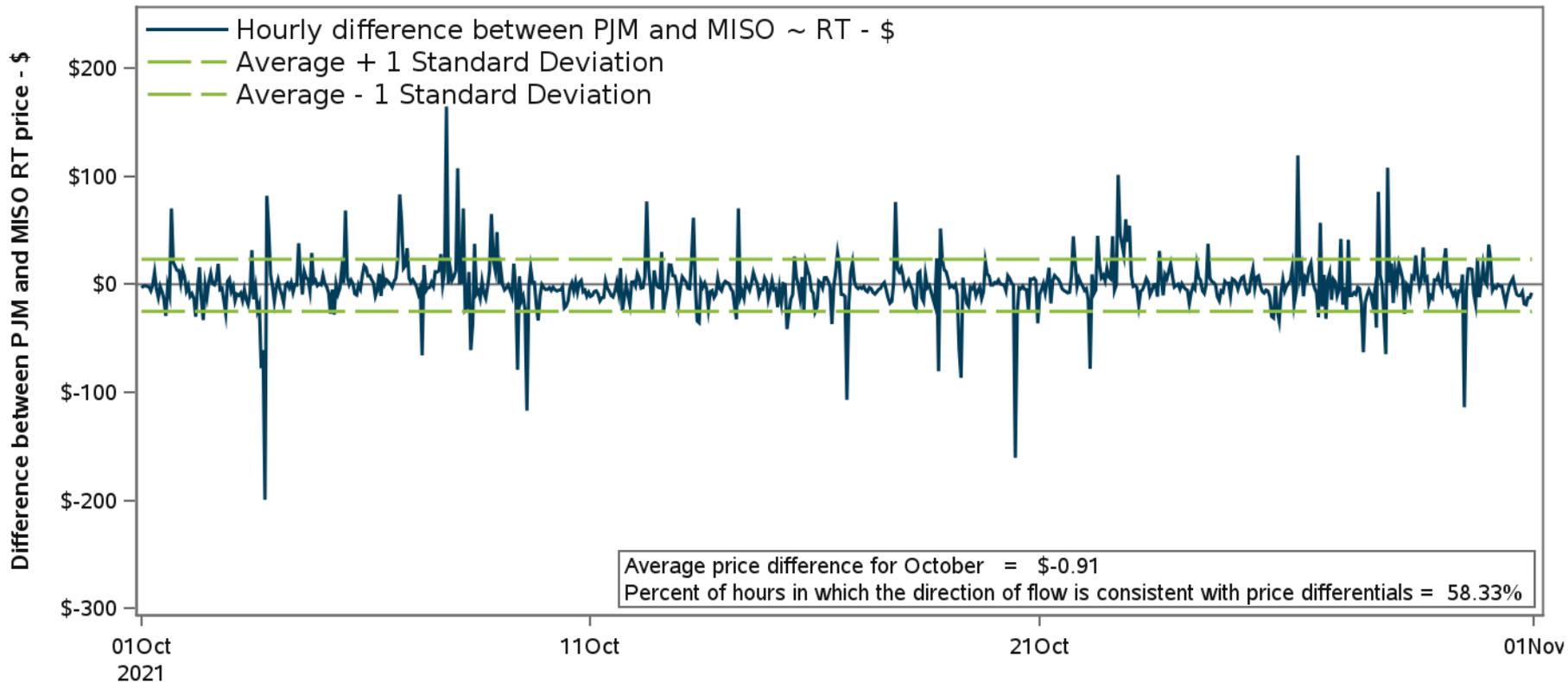
Energy Market

Interchange/Seams Summary



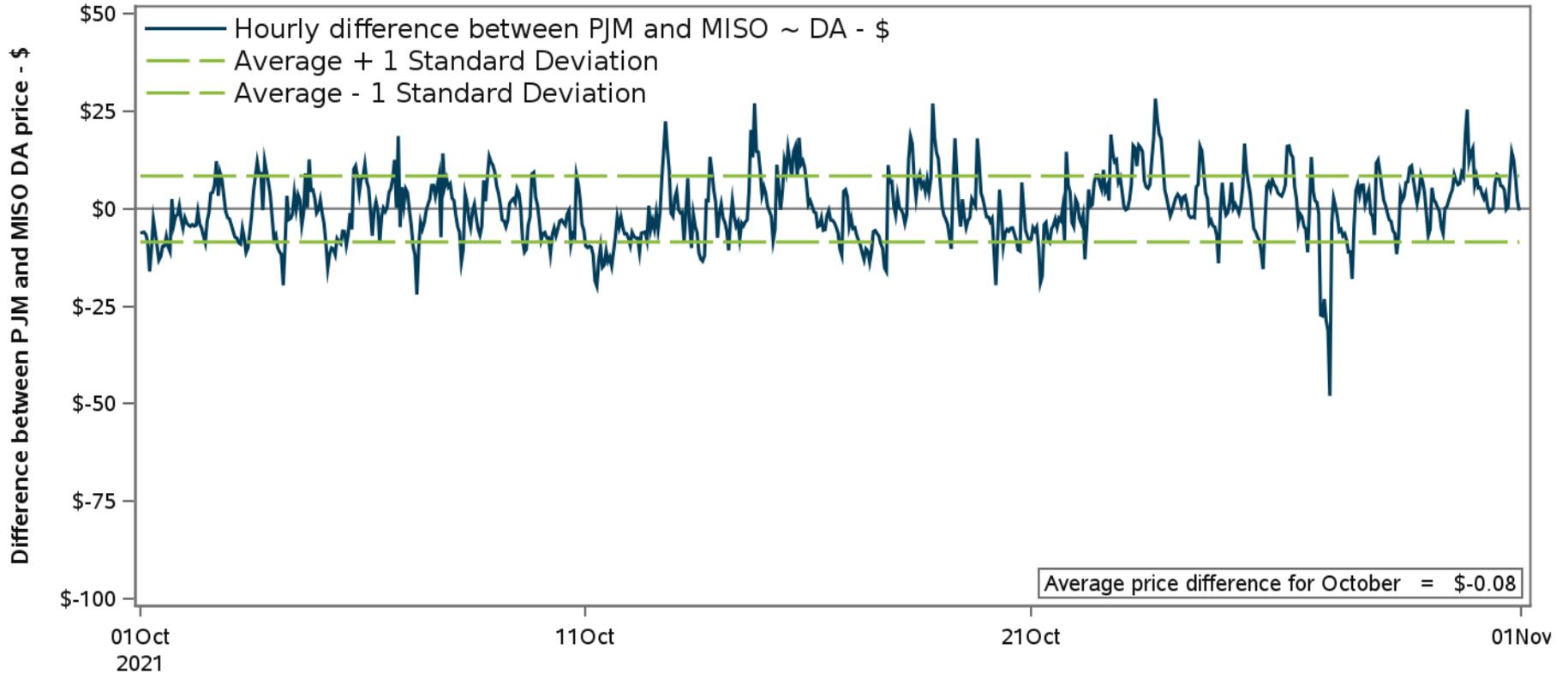


Hourly Difference Between PJM and MISO Real-Time Prices



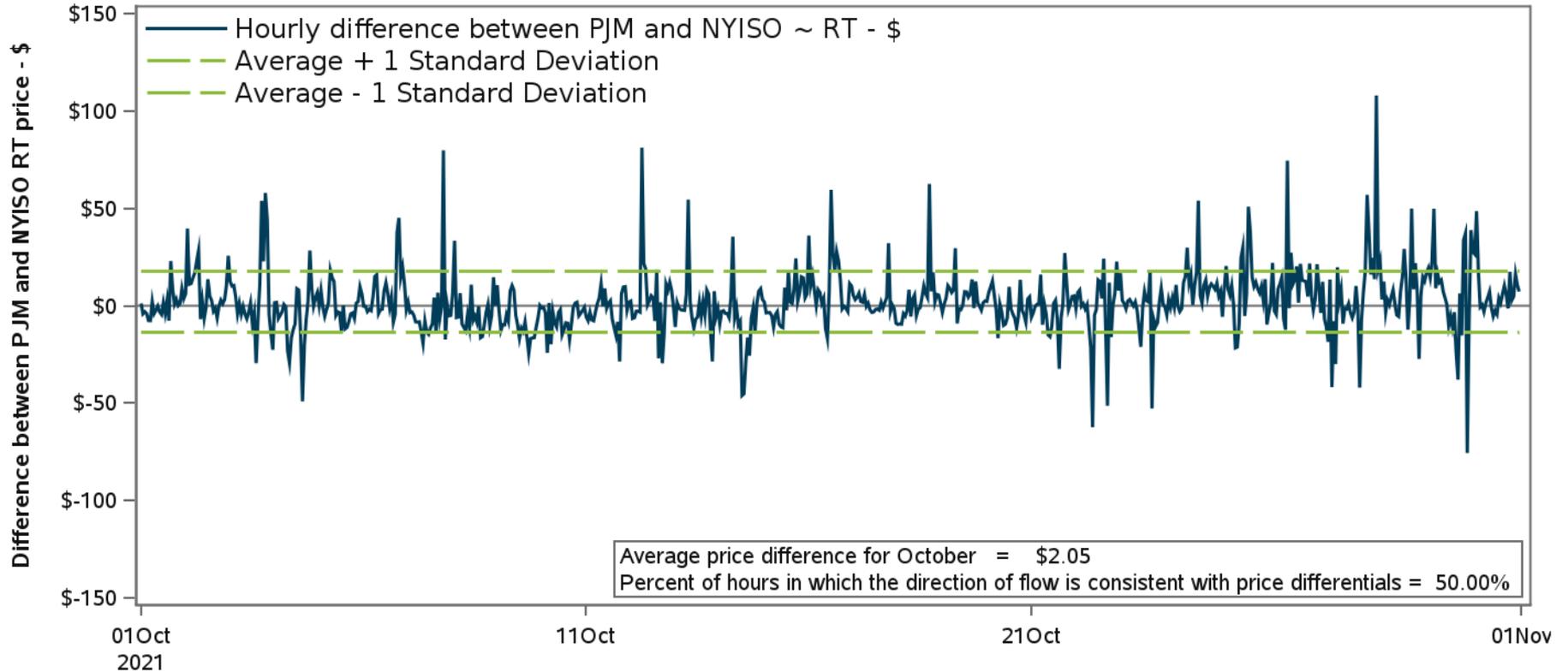
Positive values represent hours when the PJM price was higher. Negative values represent hours when the PJM price was lower.

Hourly Difference Between PJM and MISO Day-Ahead Prices



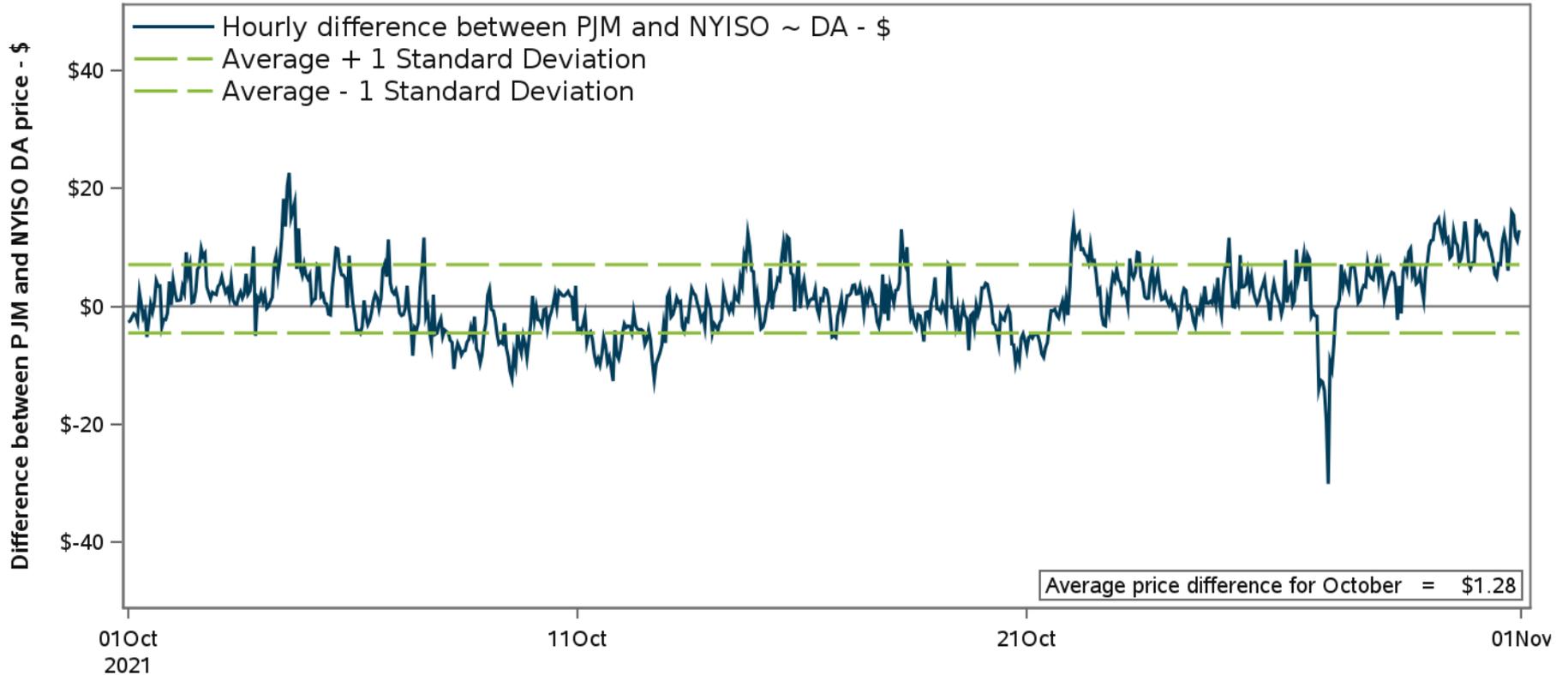
Positive values represent hours when the PJM price was higher. Negative values represent hours when the PJM price was lower.

Hourly Difference Between PJM and NYISO Real-Time Prices

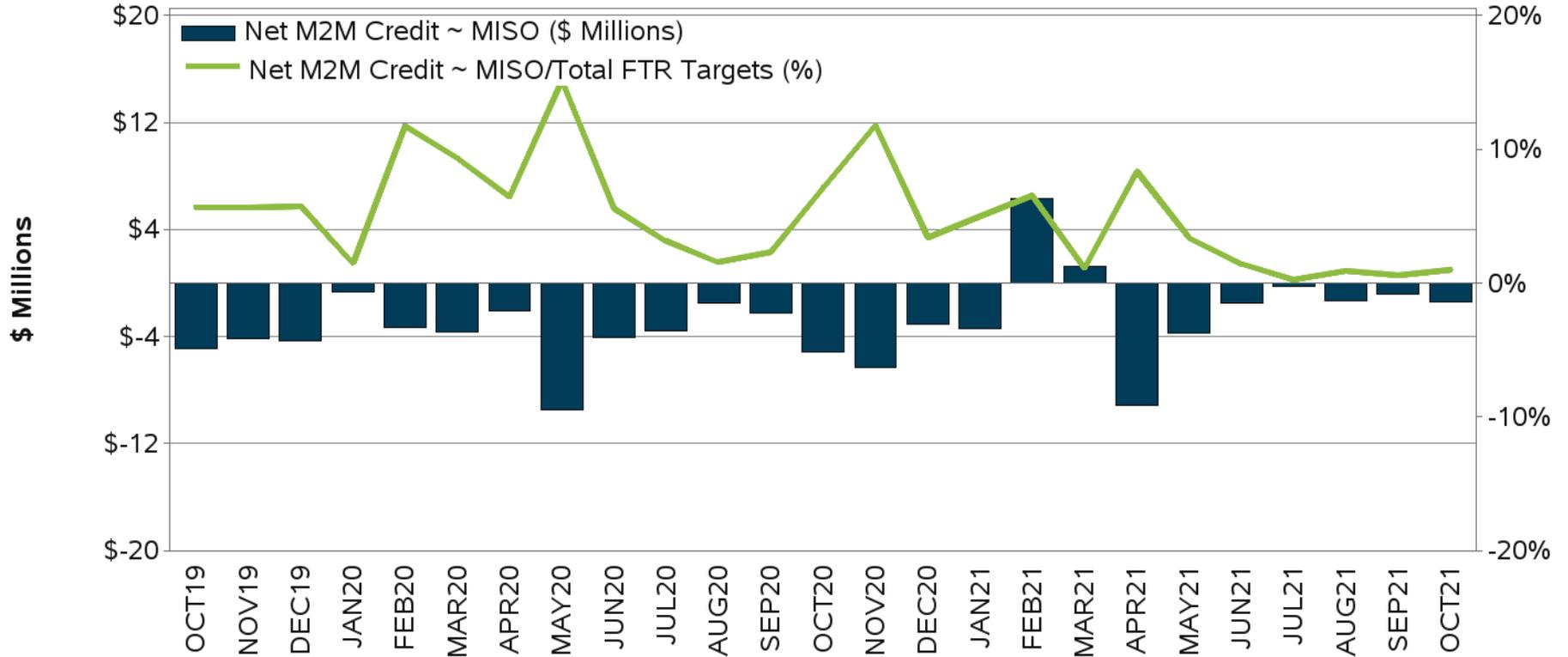


Positive values represent hours when the PJM price was higher. Negative values represent hours when the PJM price was lower.

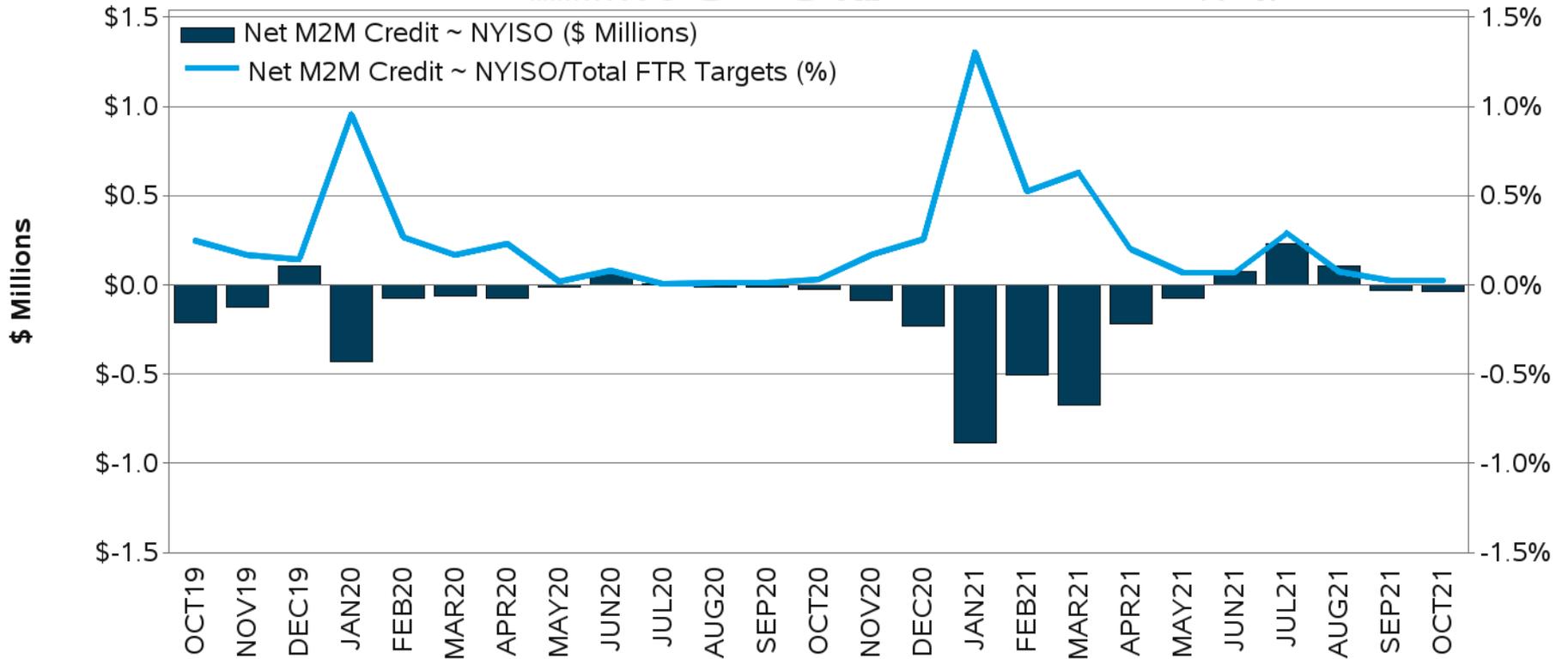
Hourly Difference Between PJM and NYISO Day-Ahead Prices



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

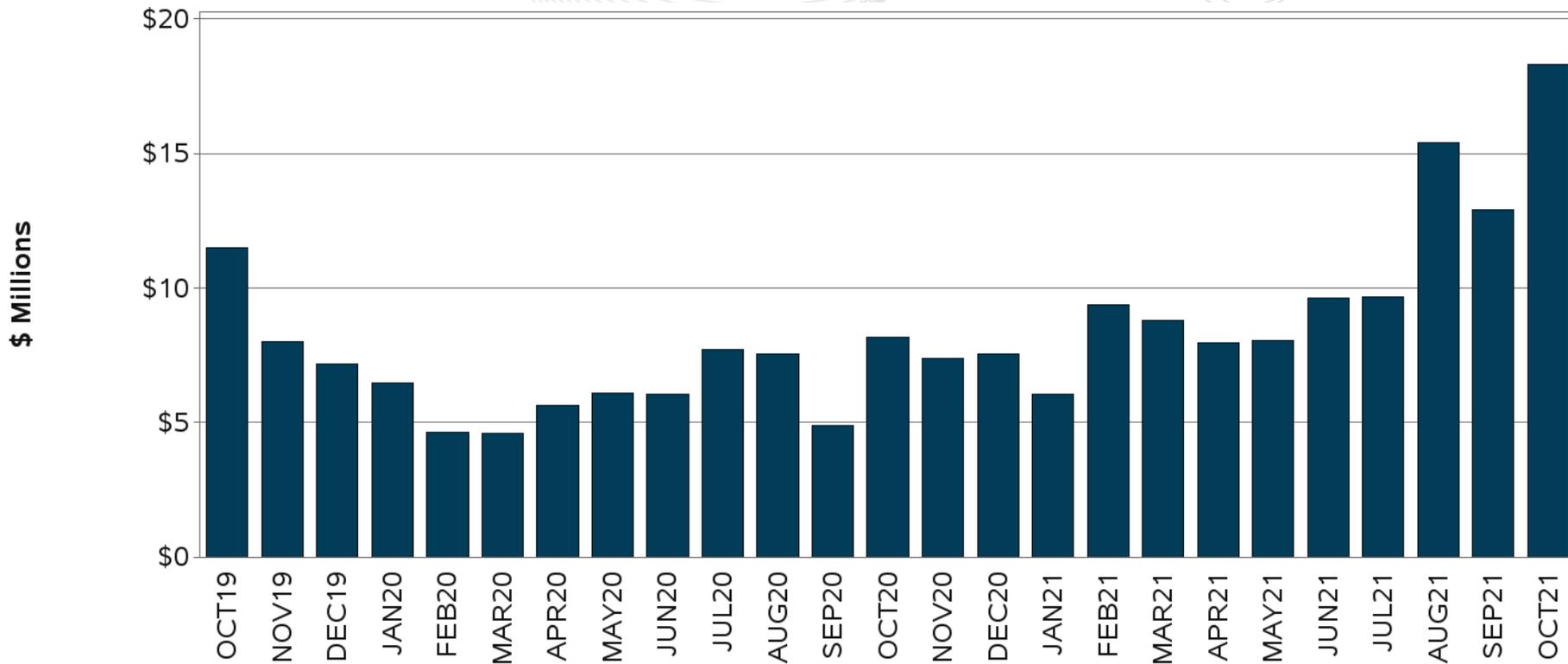


Negative M2M Credit represents PJM payment to MISO

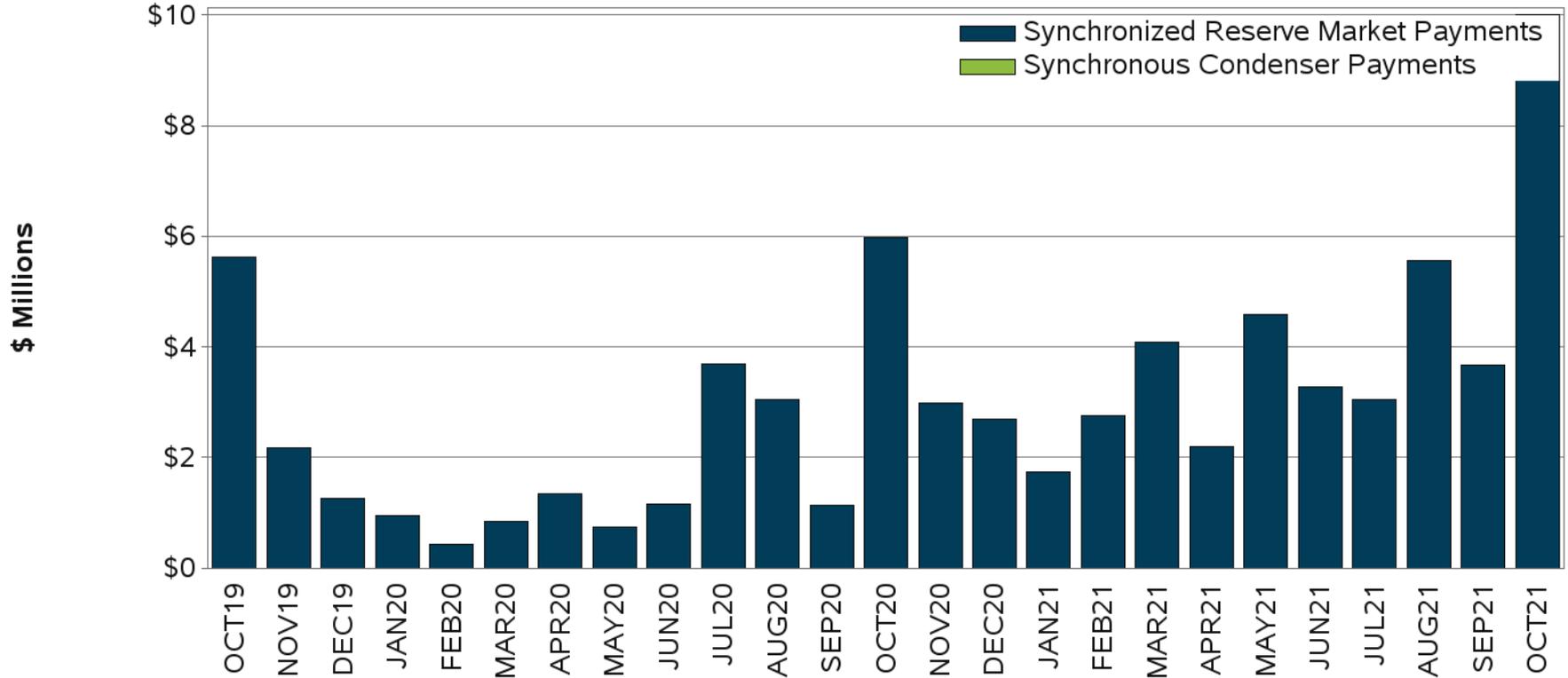


Negative M2M Credit represents PJM payment to NYISO

Ancillary Service Market Summary

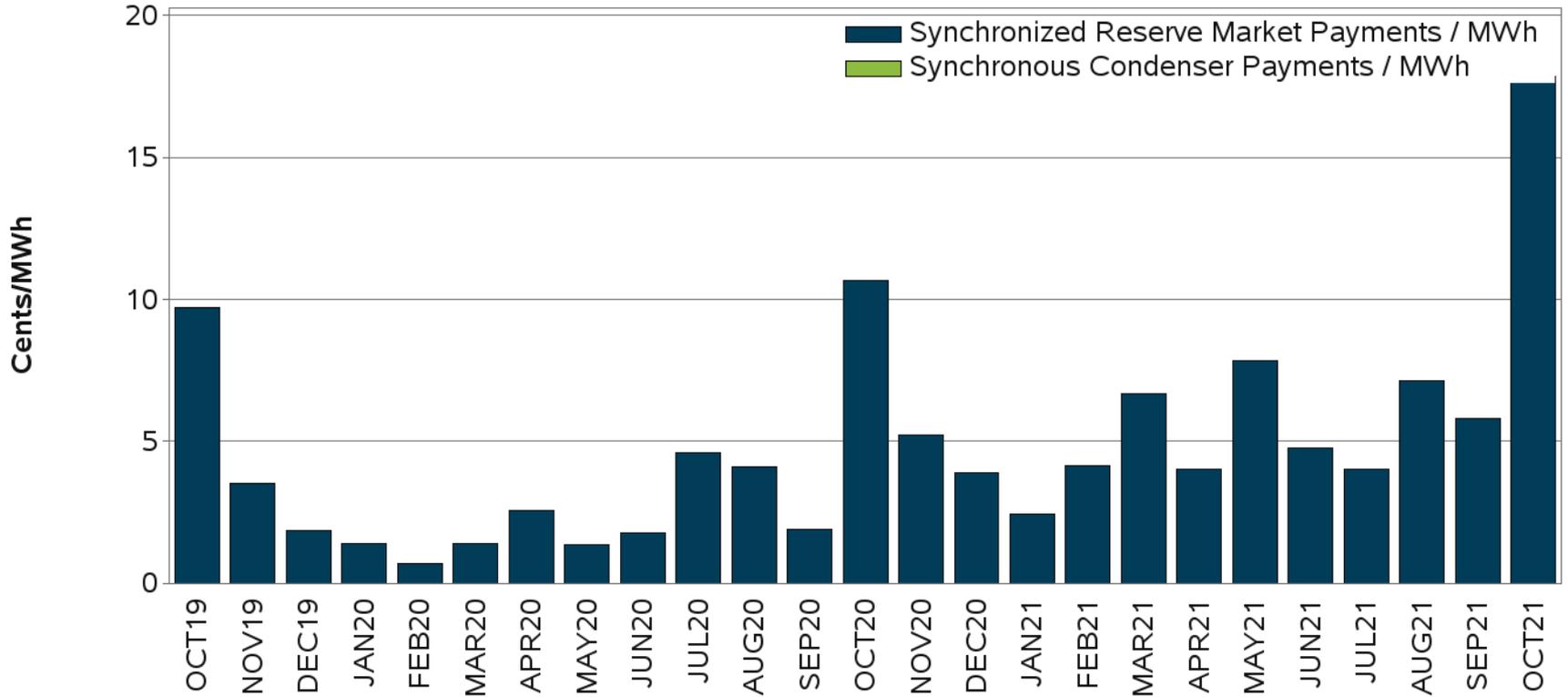


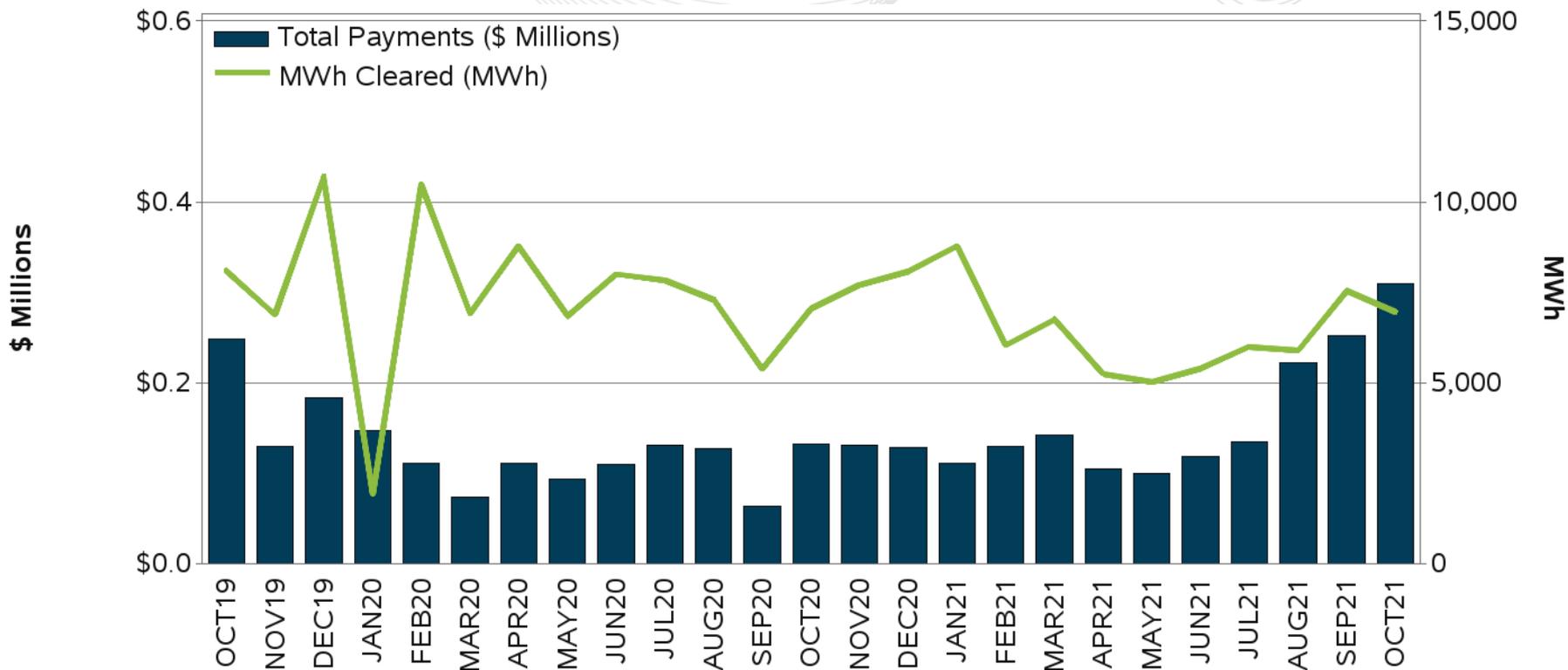
Synchronized Reserve and Synchronous Condenser Costs



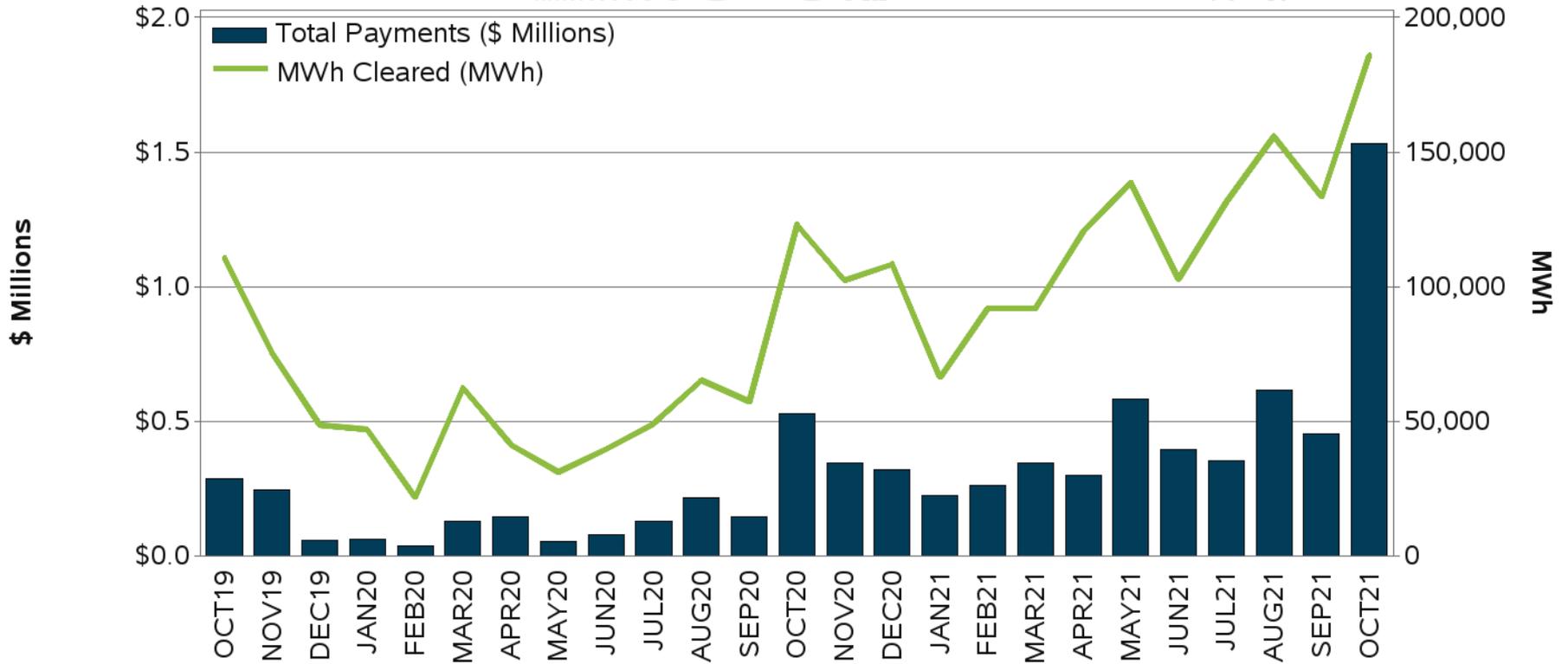


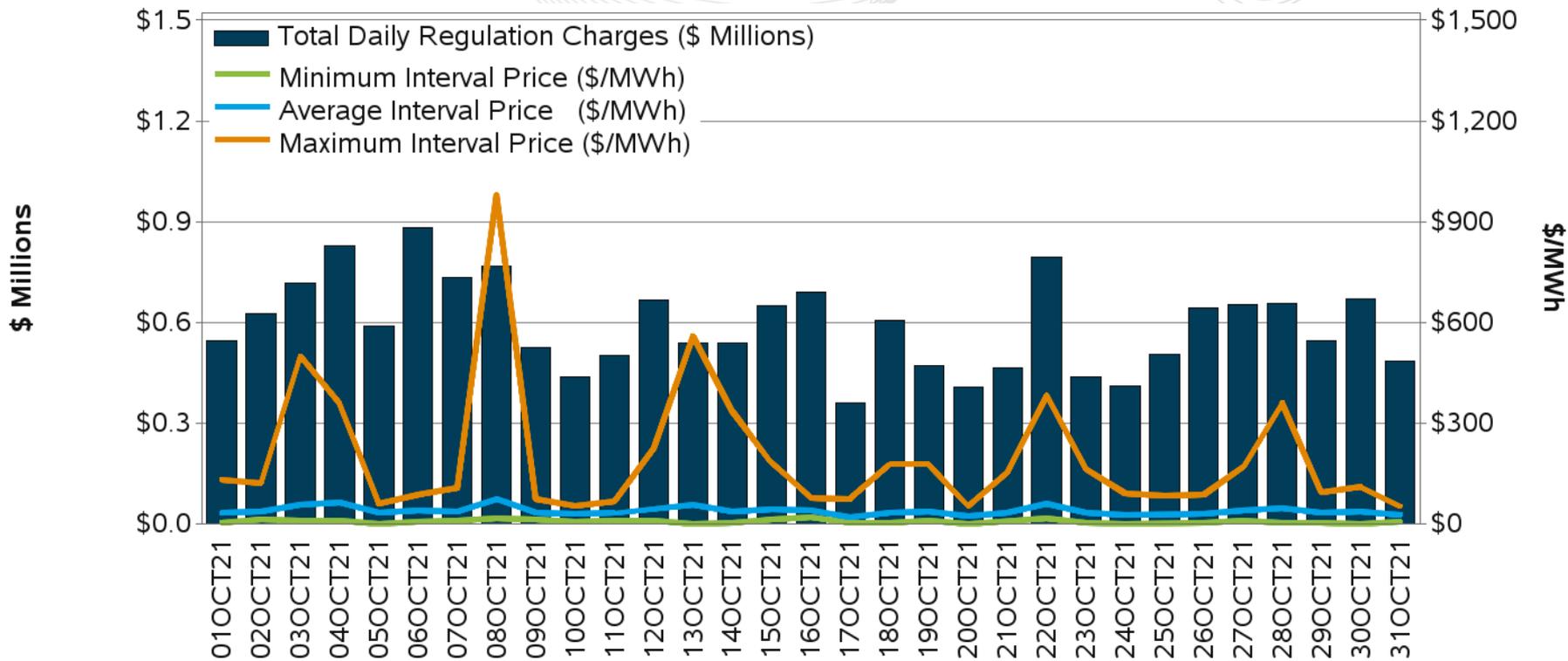
Load-Adjusted Synchronized Reserve and Synchronous Condenser Costs



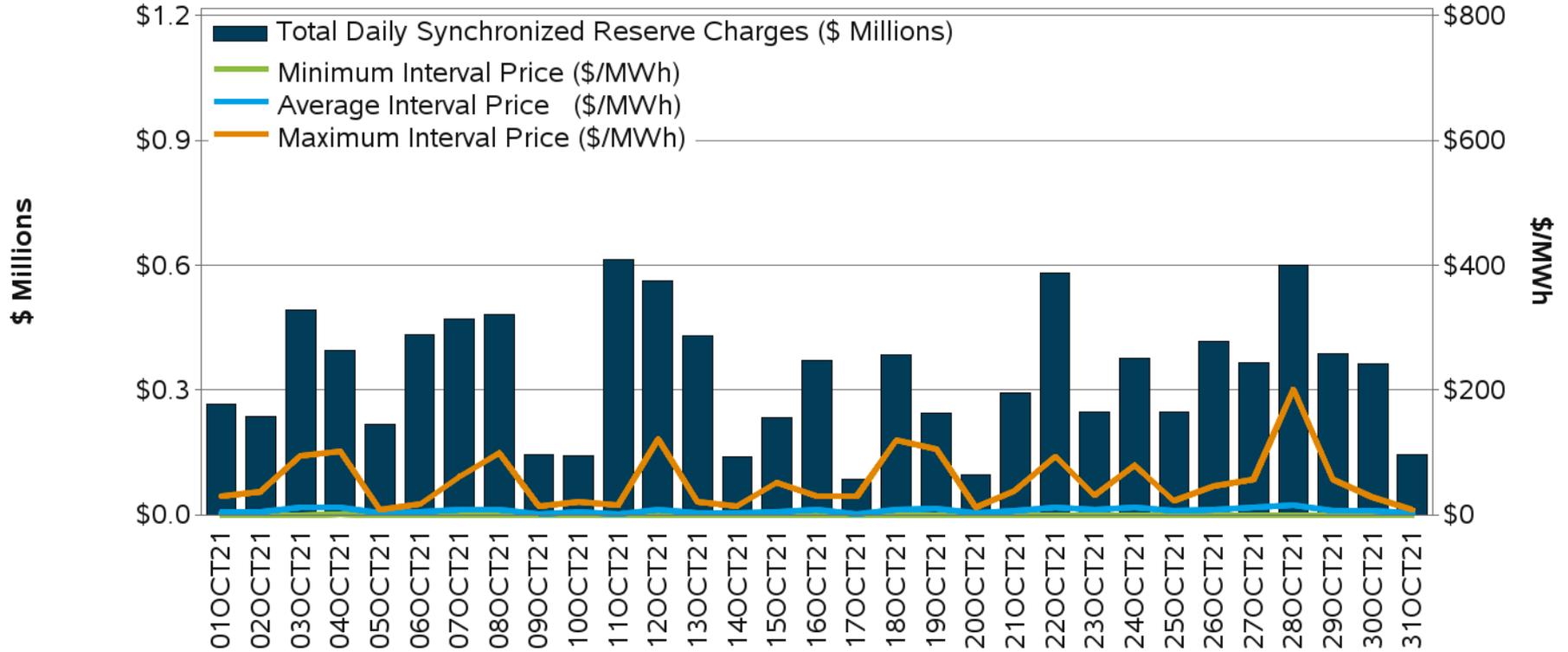


DR Participation in PJM Synchronized Reserve Markets





Synchronized Reserve Market Daily Prices and Charges



Jennifer Warner-Freeman
Jennifer.Freeman@pjm.com



Member Hotline

(610) 666 – 8980

(866) 400 – 8980

custsvc@pjm.com