



Markets Report

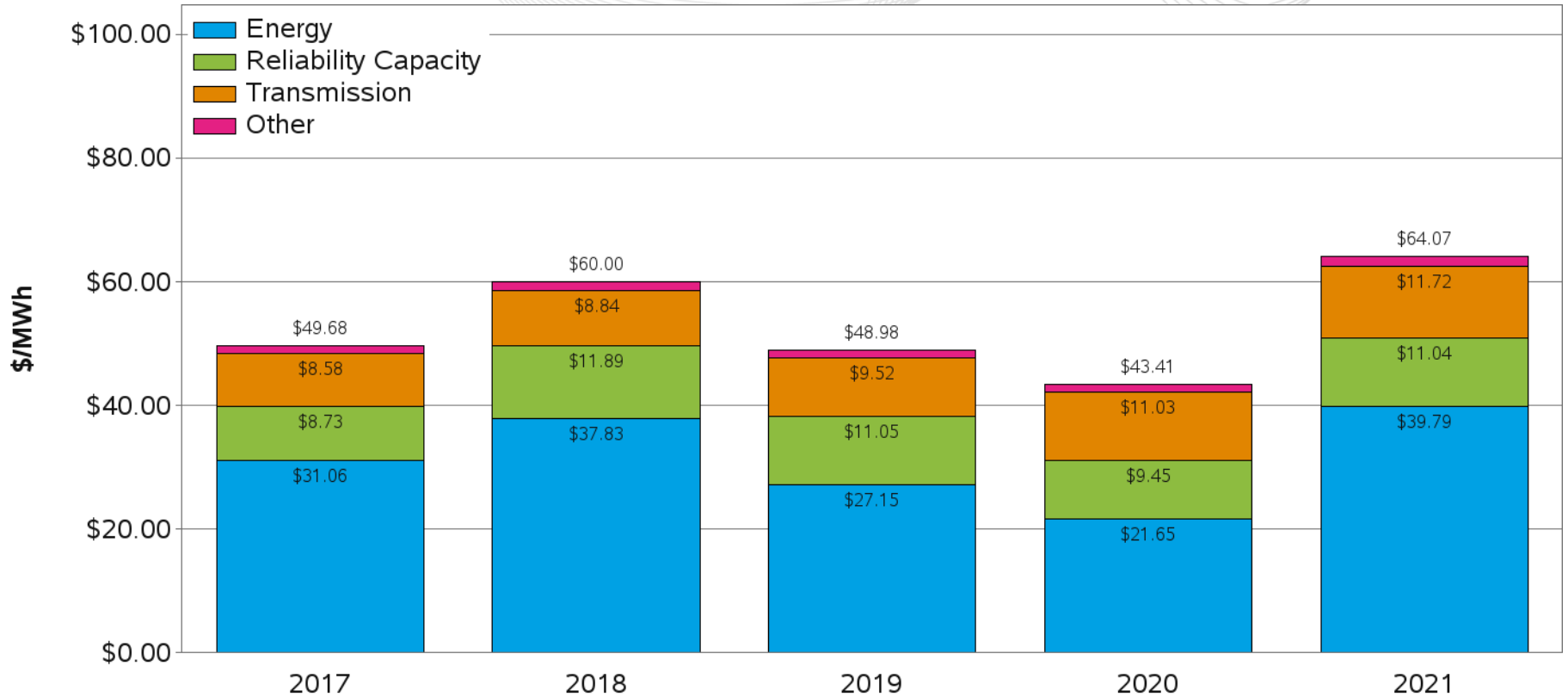
MC Webinar

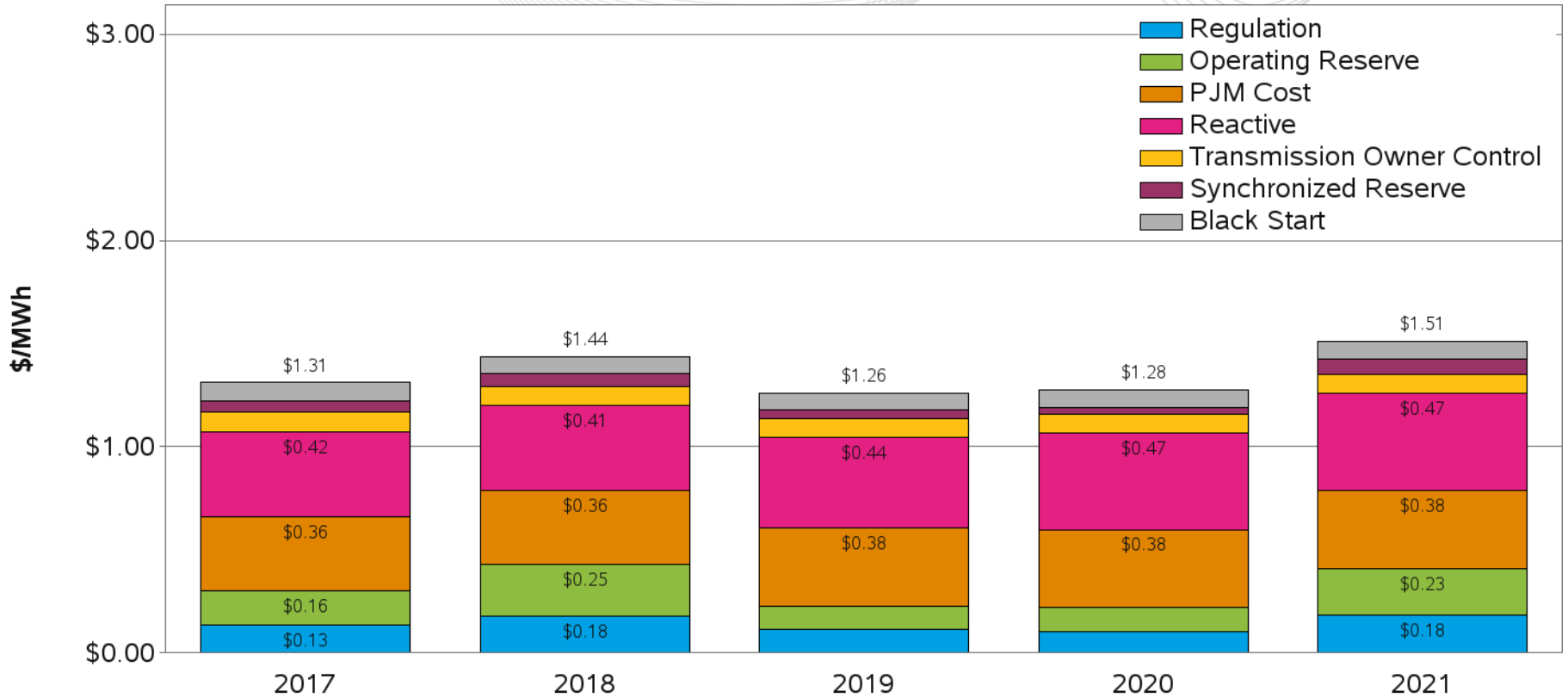
January 24, 2022

- PJM Wholesale Cost for 2021 is \$64.07/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 December, temperatures were above average throughout the month. Thus, the sum of Heating Degree Days was below its historic average. (Slides 8-10)
- Energy use was somewhat below its historic average for December. (Slides 8-10)
- In December, uplift exceeded \$800,000 on three days.(Slides 24 & 25)

- Load-weighted average LMP for 2021 is \$39.79/MWh: (Slides 33 & 34)
 - December 2021 was \$63.00/MWh, which is higher than December 2020 (\$25.50/MWh) and also higher than December 2019 (\$22.50/MWh).
- There were three 5-minute intervals that experienced shortage pricing in December. (Slides 31 & 32)
- FTR revenue adequacy for the month of December is 87% and the 2021-2022 Planning Year is currently funded at 90%. (Slides 49-52)
- Congestion values have been trending upwards however December's level is significantly lower than November. (Slide 50)
- Regulation and Synchronized Reserve market costs have generally tracked with energy prices over time. (Slides 65-67)

Markets Report

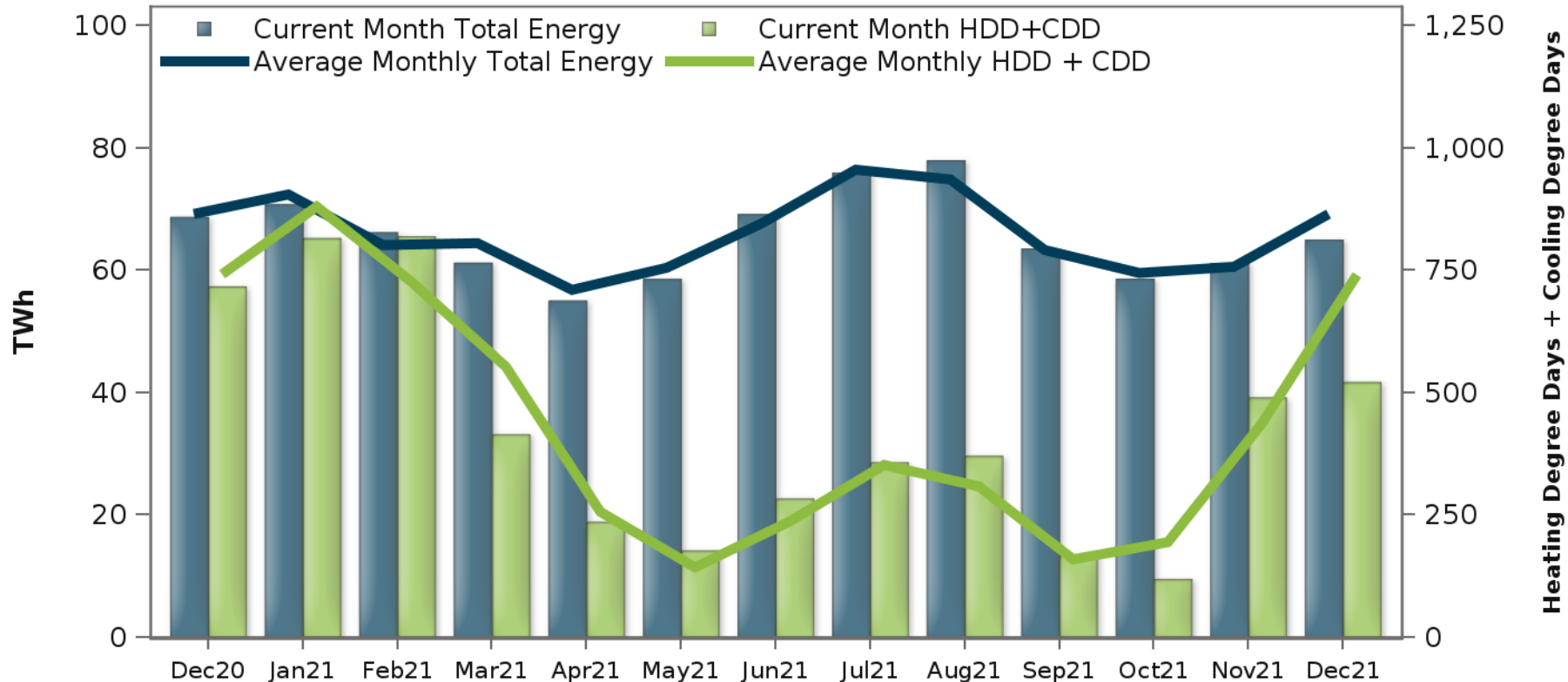




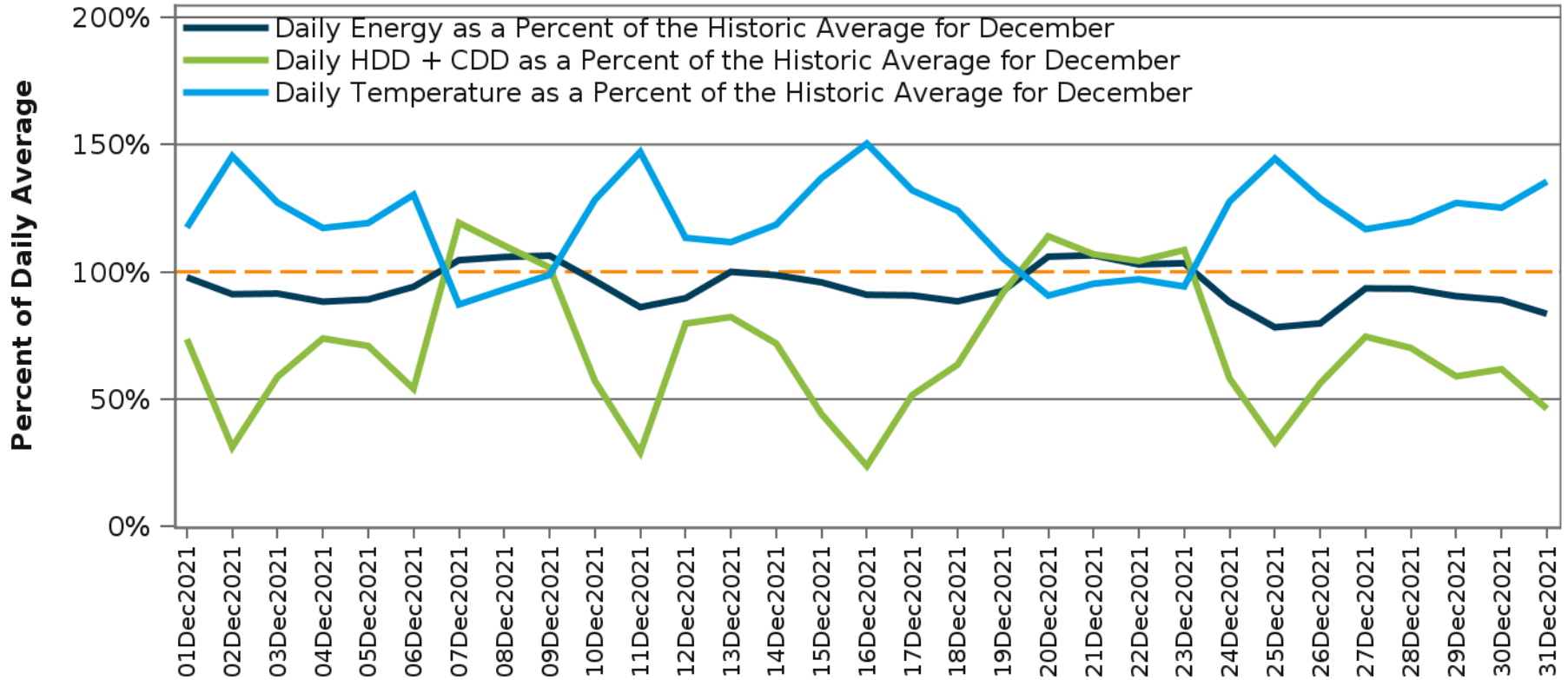
Market Conditions

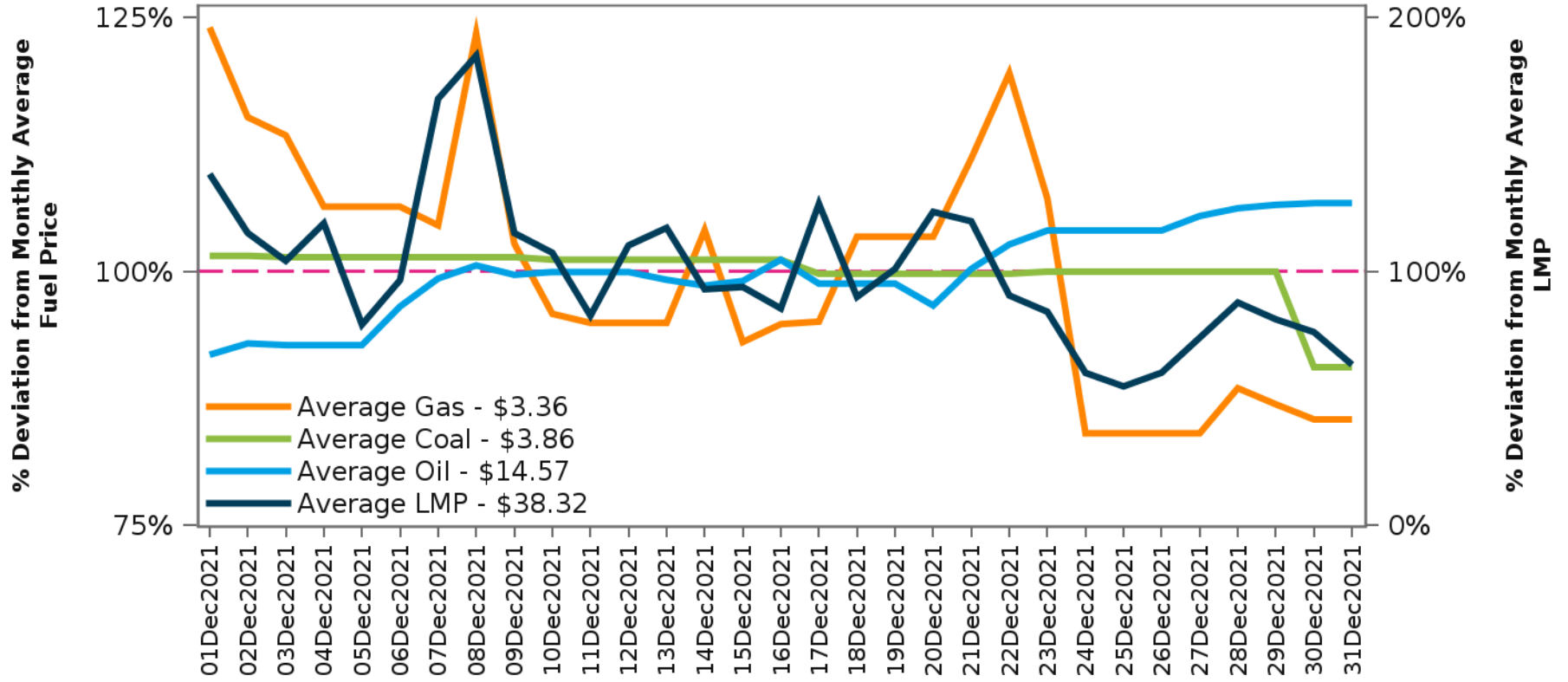
- The weather parameter shown in the following slide is a monthly sum of daily Heating Degree Days (HDD) and Cooling Degree Days (CDD).
- Degree days represent a deviation from a baseline temperature, in this case 60 degrees for HDD and 65 degrees for CDD. As temperatures get more extreme, colder or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

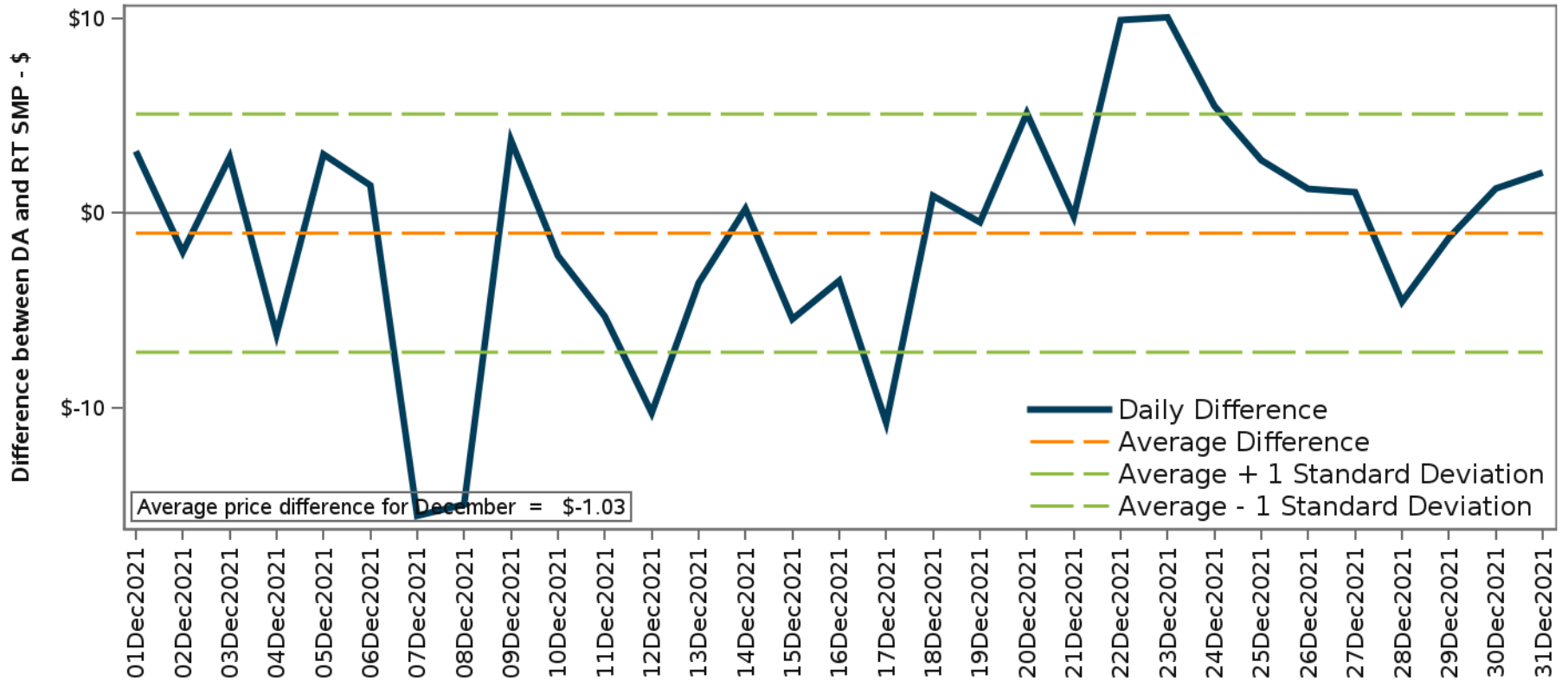




Fuel Price Source: S&P Global Platts



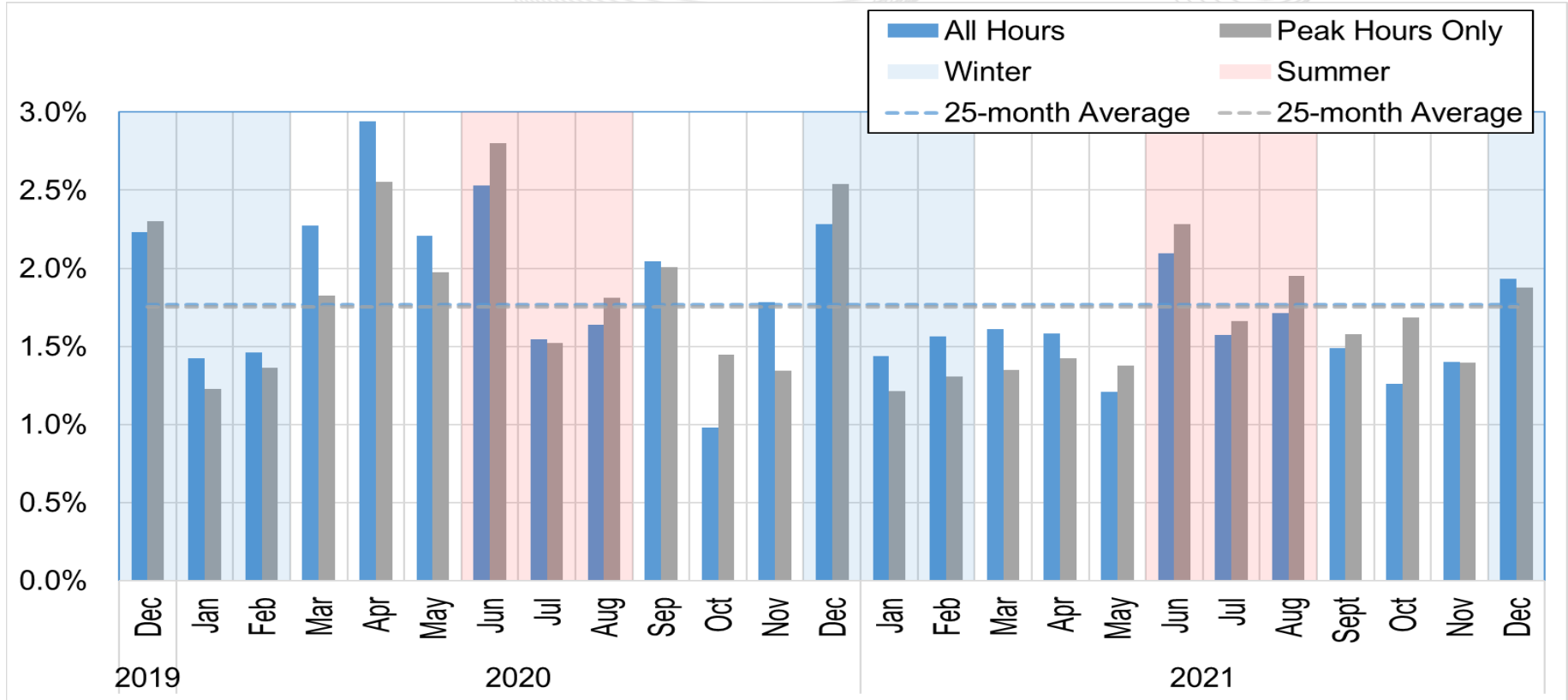
Daily Difference Between Day-Ahead and Real-Time System Marginal Prices

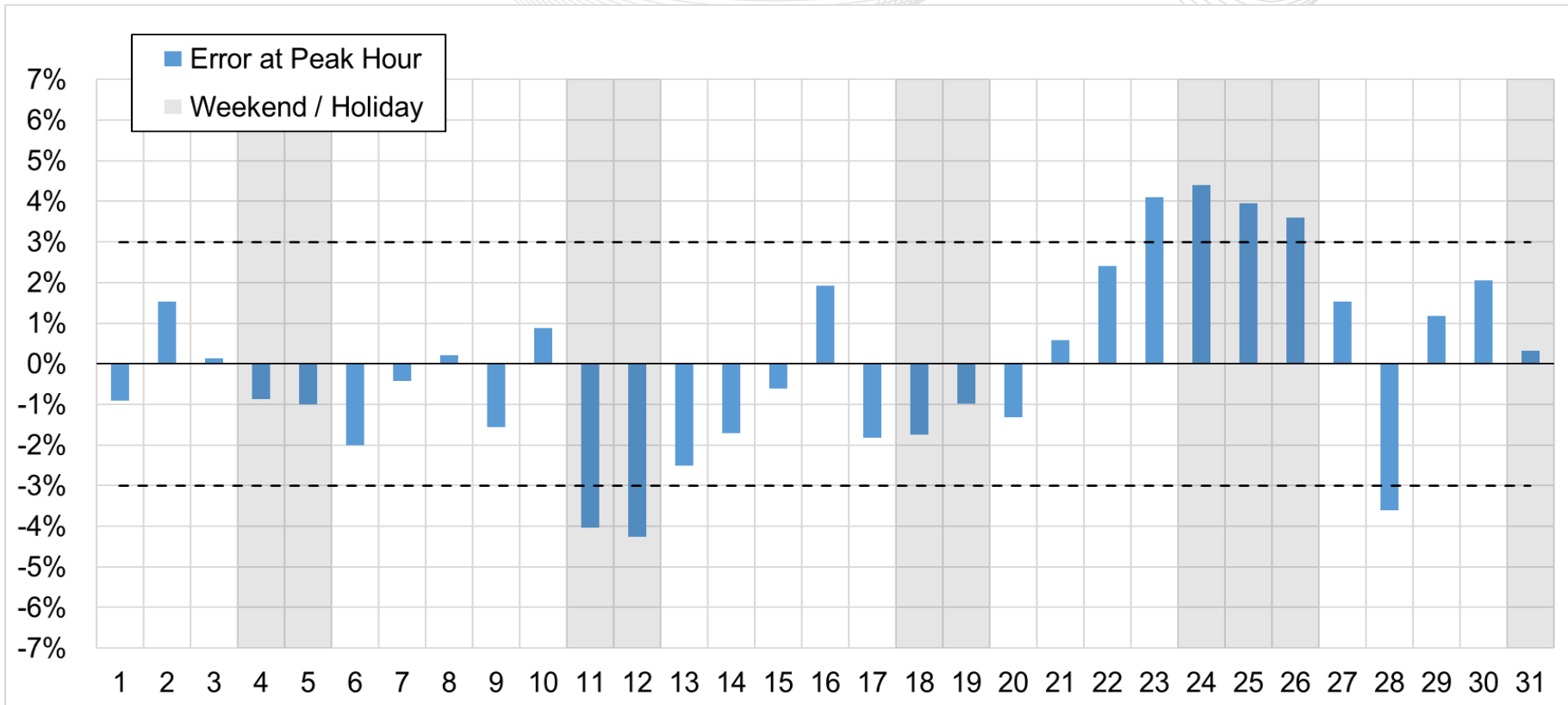


Positive values represent days when the DA daily average price was higher than RT. Negative values represent days when the DA price was lower.



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

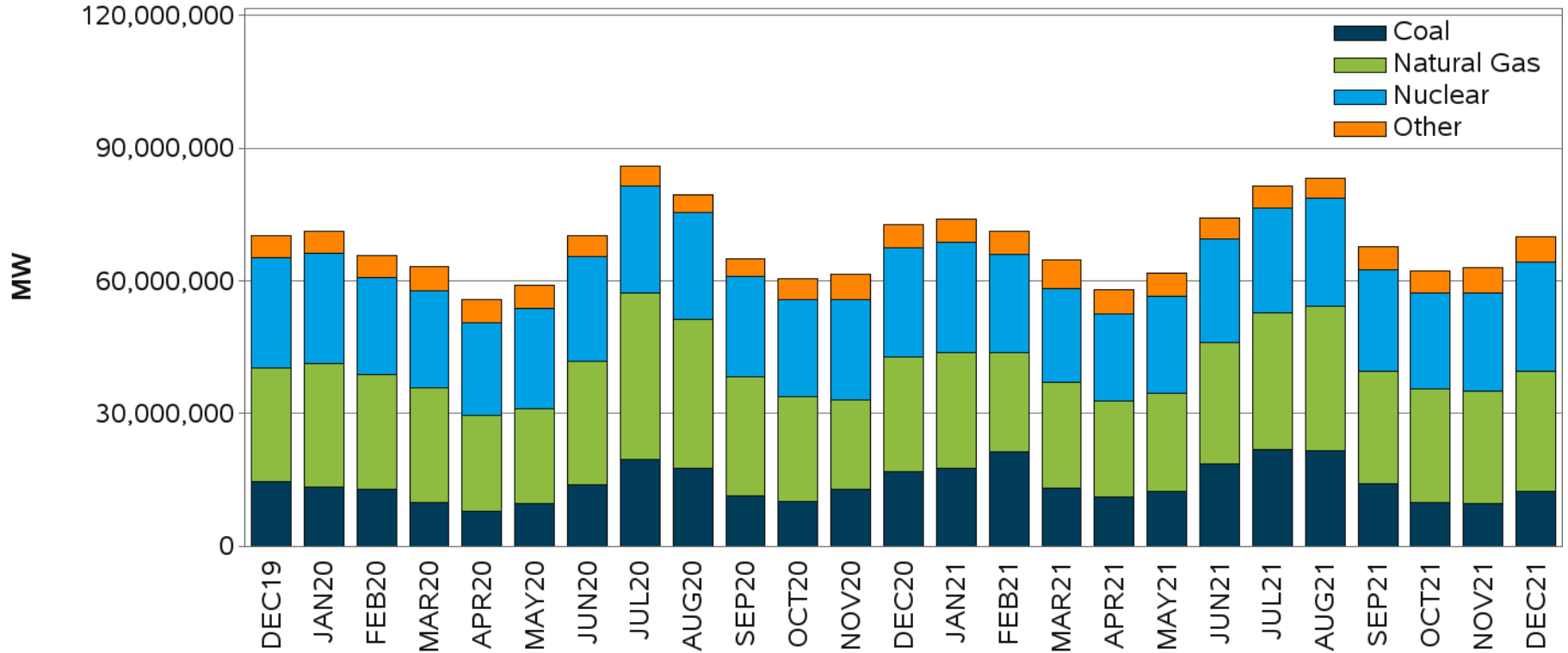




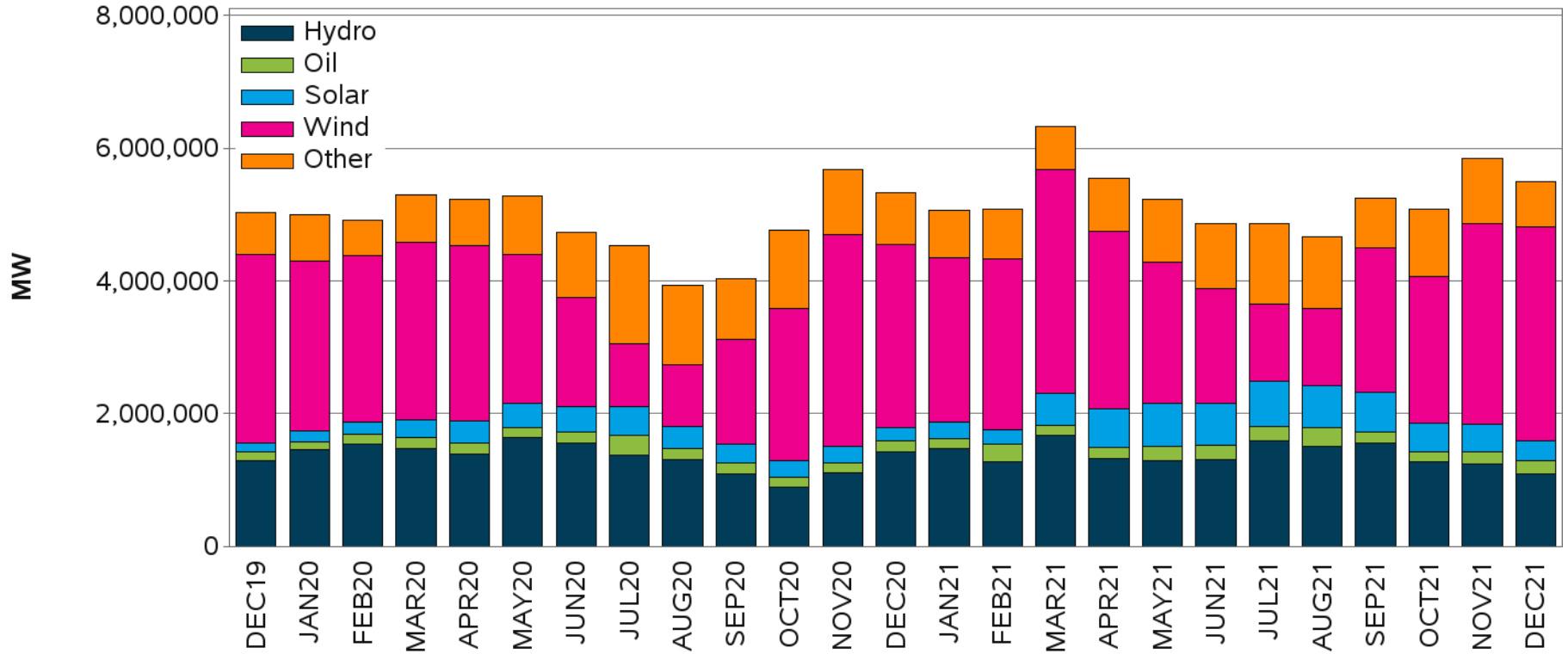
PJM prepares a day-ahead load forecast at 10:00 am for use by our members.

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.

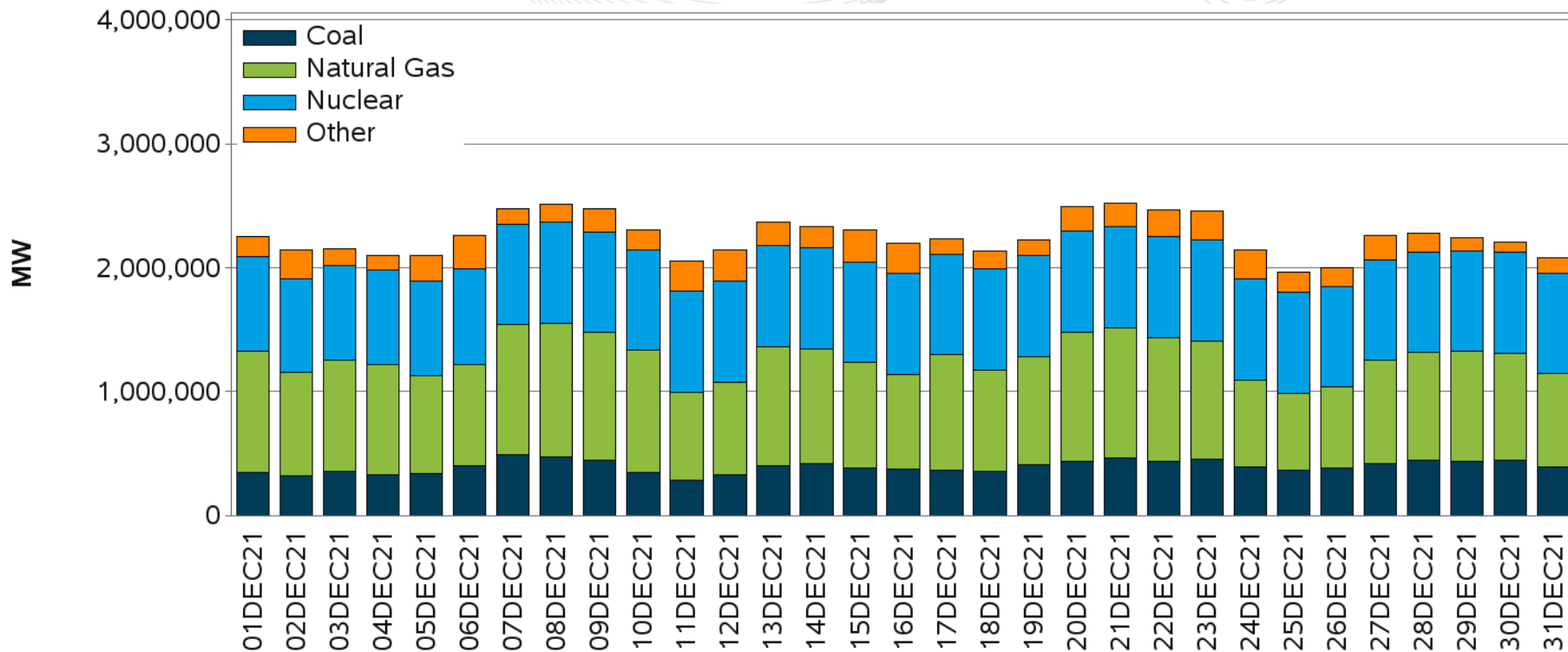
- *Overall load forecast performance was better this December than the last two years, though unusually warm weather, especially around the holidays, provided a challenge. PJM under-forecasted the load on December 11 and 12, when the RTO experienced unusually warm weather combined with high winds, which kept the load above what would normally be expected for such temperatures. Load forecast error decreased the following week, even as warm temperatures returned, as PJM staff adjusted forecasts based on lessons learned from December 11 and 12.*
- *Historically, days surrounding the holidays have been challenging to forecast due to minimal data for model training and unique human behavior. Forecast error was higher on December 23, when load reductions typically associated with the holidays appeared sooner than anticipated. PJM staff applied new forecasting methods this year that reduced the peak error from over 10% in the default forecast model to under 4% on Christmas Day. Load was also over-forecasted on December 26 when, despite cooling temperatures in the western zones, load continued to come in low following the over-forecasting on Christmas evening.*
- *During the following week, PJM staff applied manual adjustments to account for the delayed morning peaks and decreased load typically observed during post-holiday weekdays and, for New Year's Eve, ensured proper holiday treatment by the models, resulting in a significant reduction in forecast error for four of the last five days of the year.*



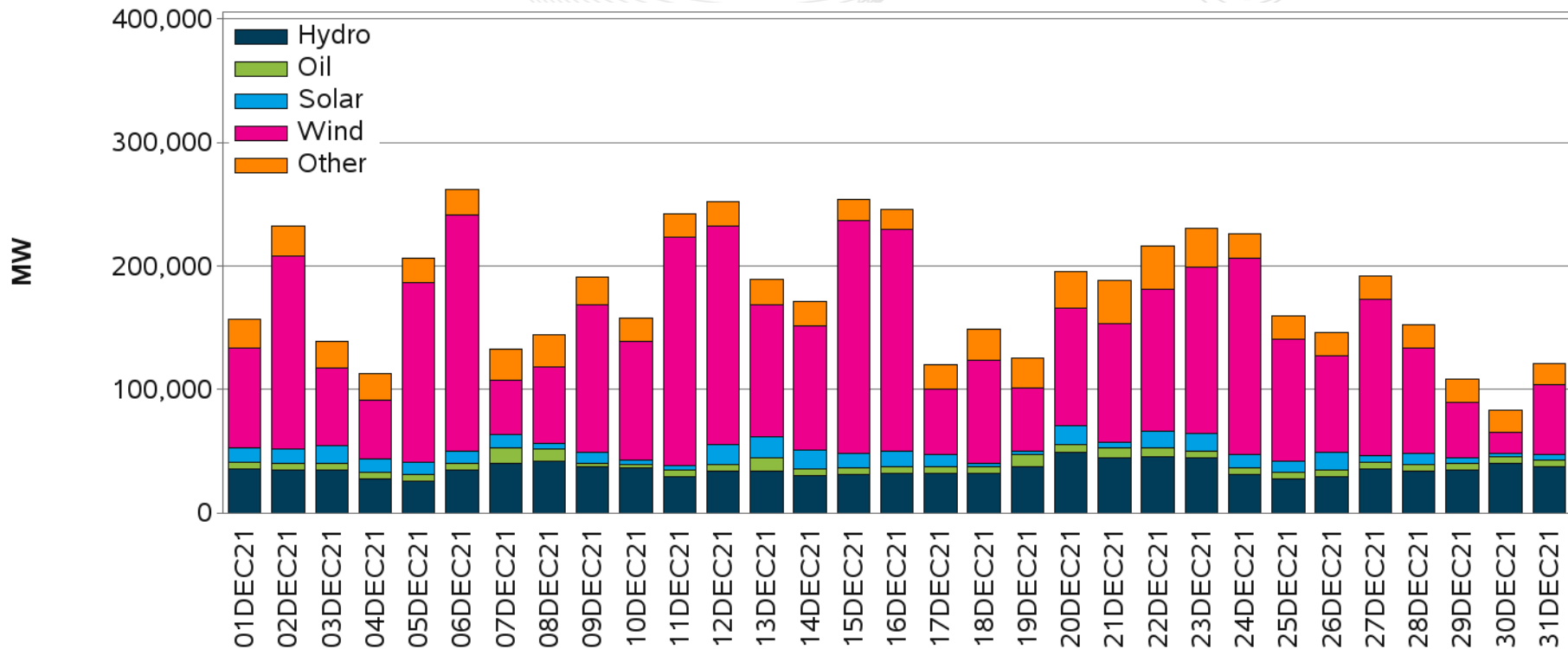
Other includes Hydro, Oil, Solar, Wind, and Other



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

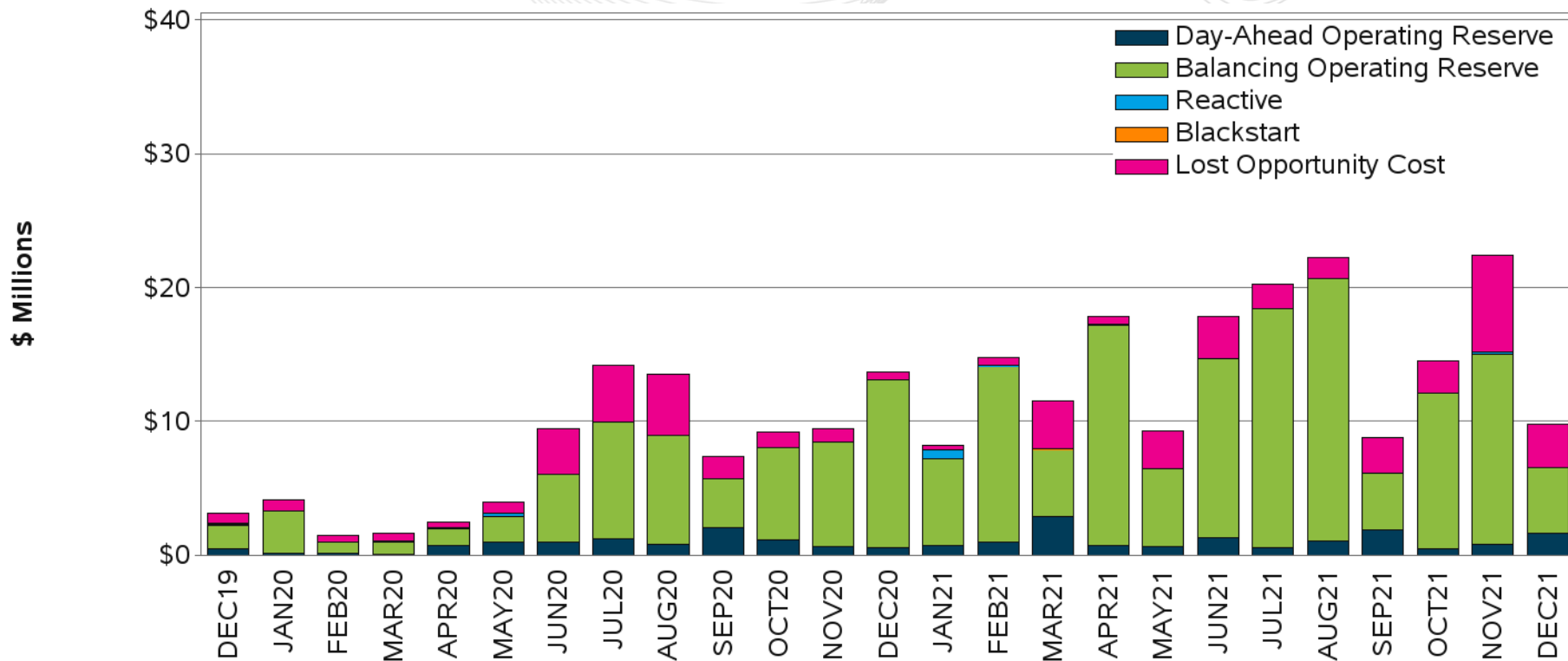


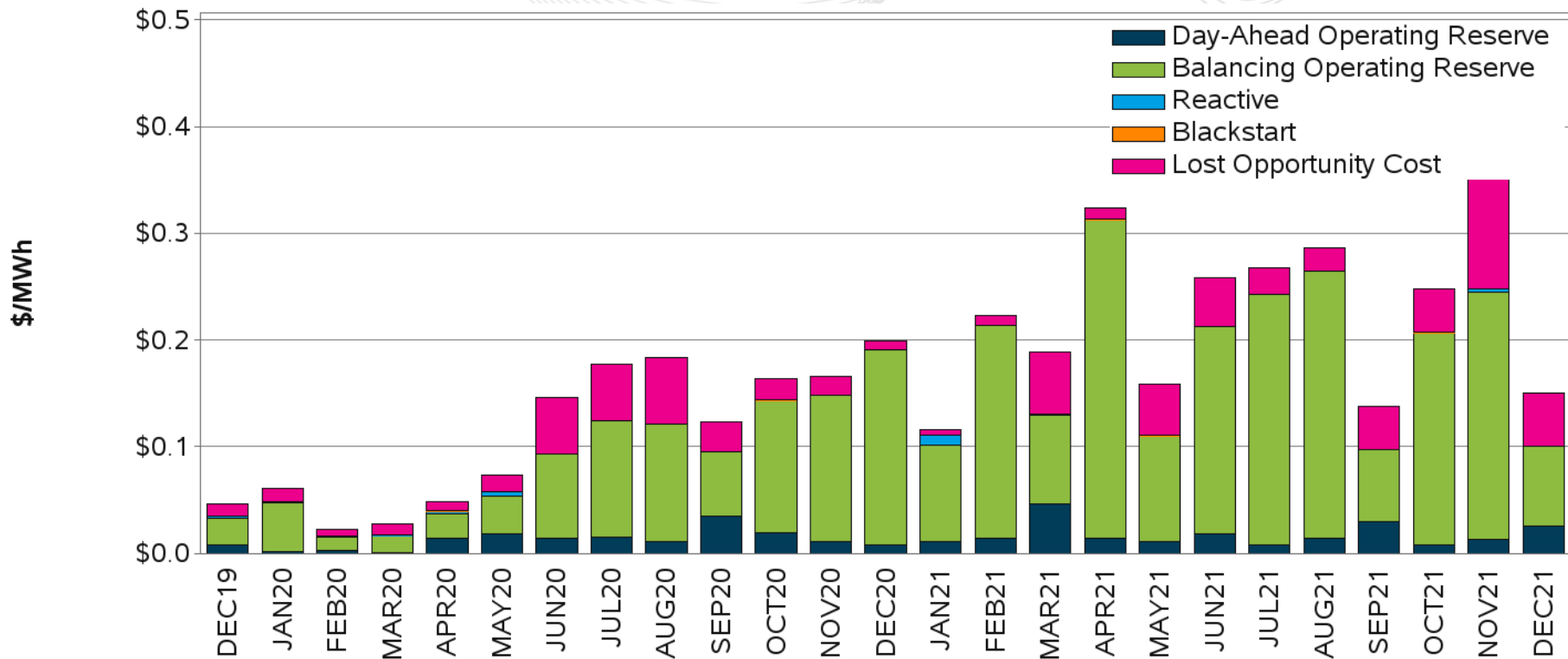
'Other' includes Hydro, Oil, Solar, Wind, and Other

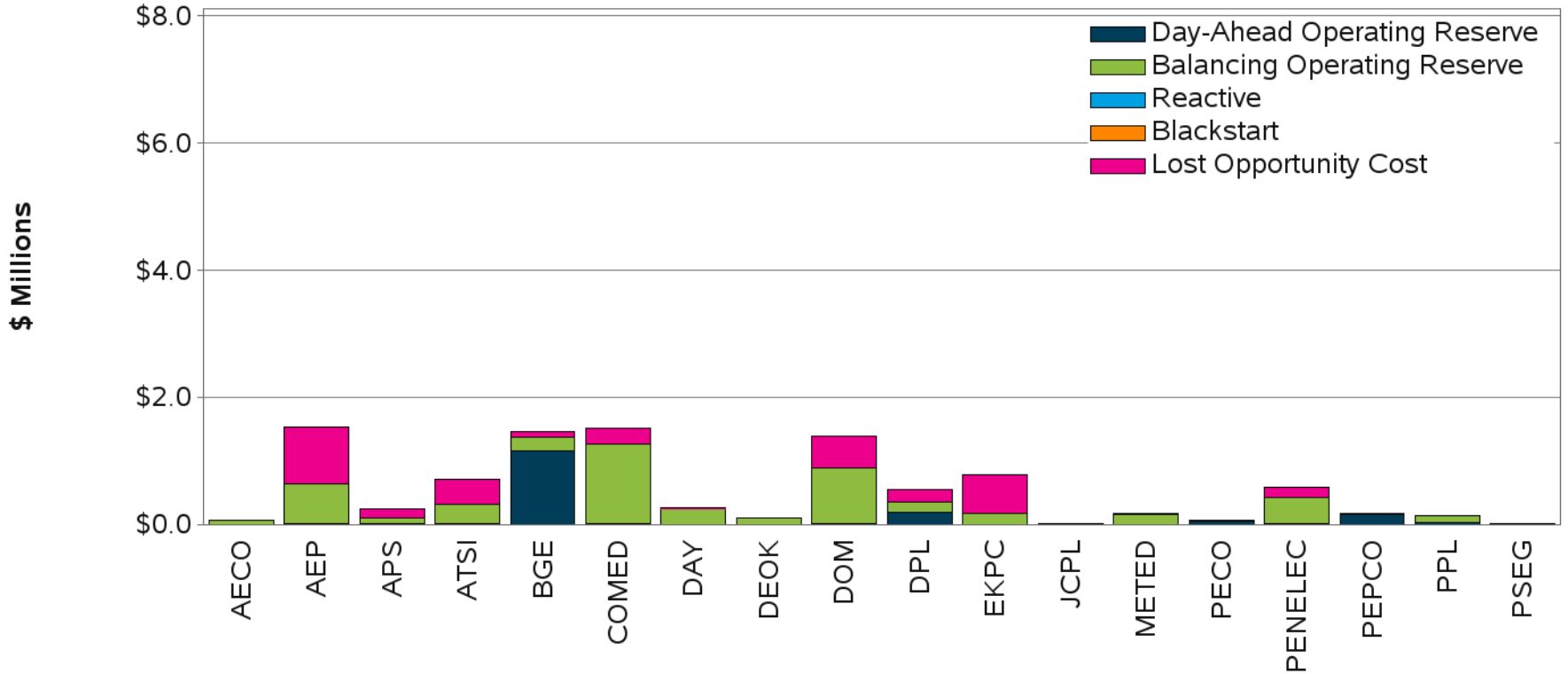


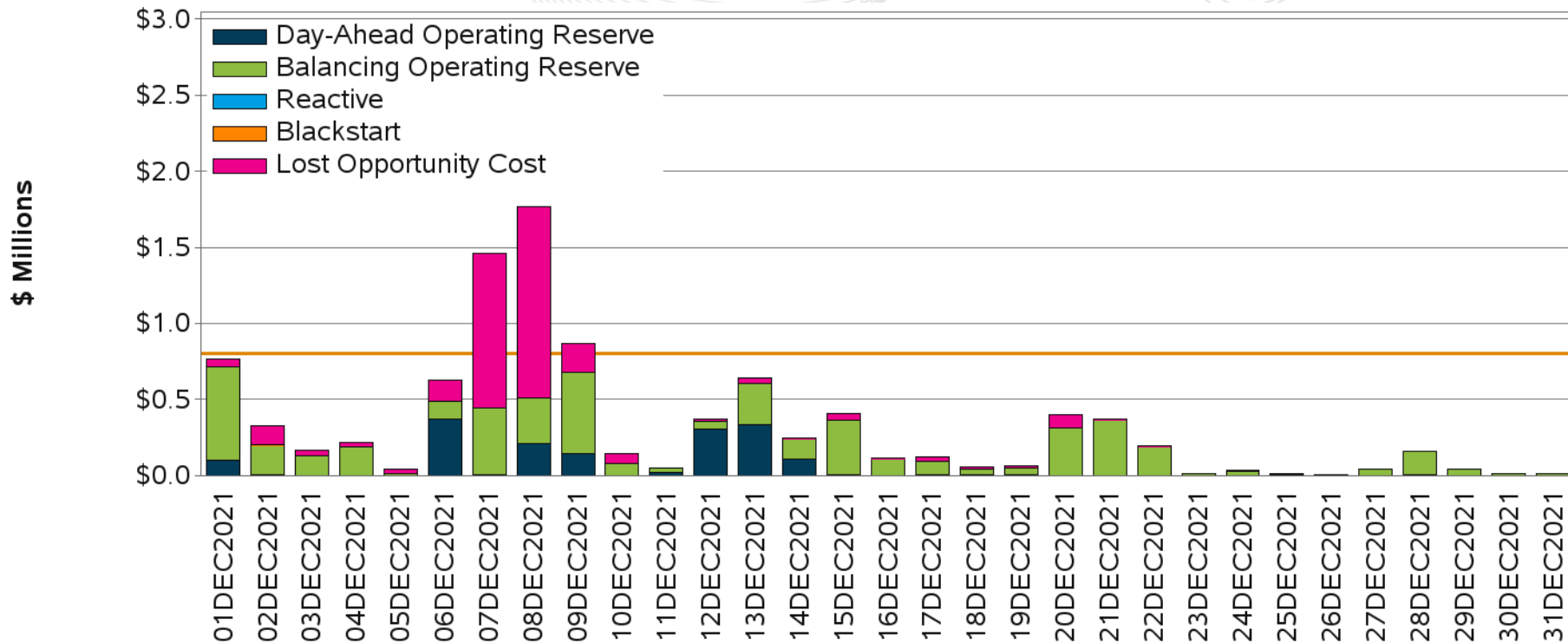
'Other' includes Flywheels, Multiple Fuels, Storage, and Other Renewables

Operating Reserve (Uplift)









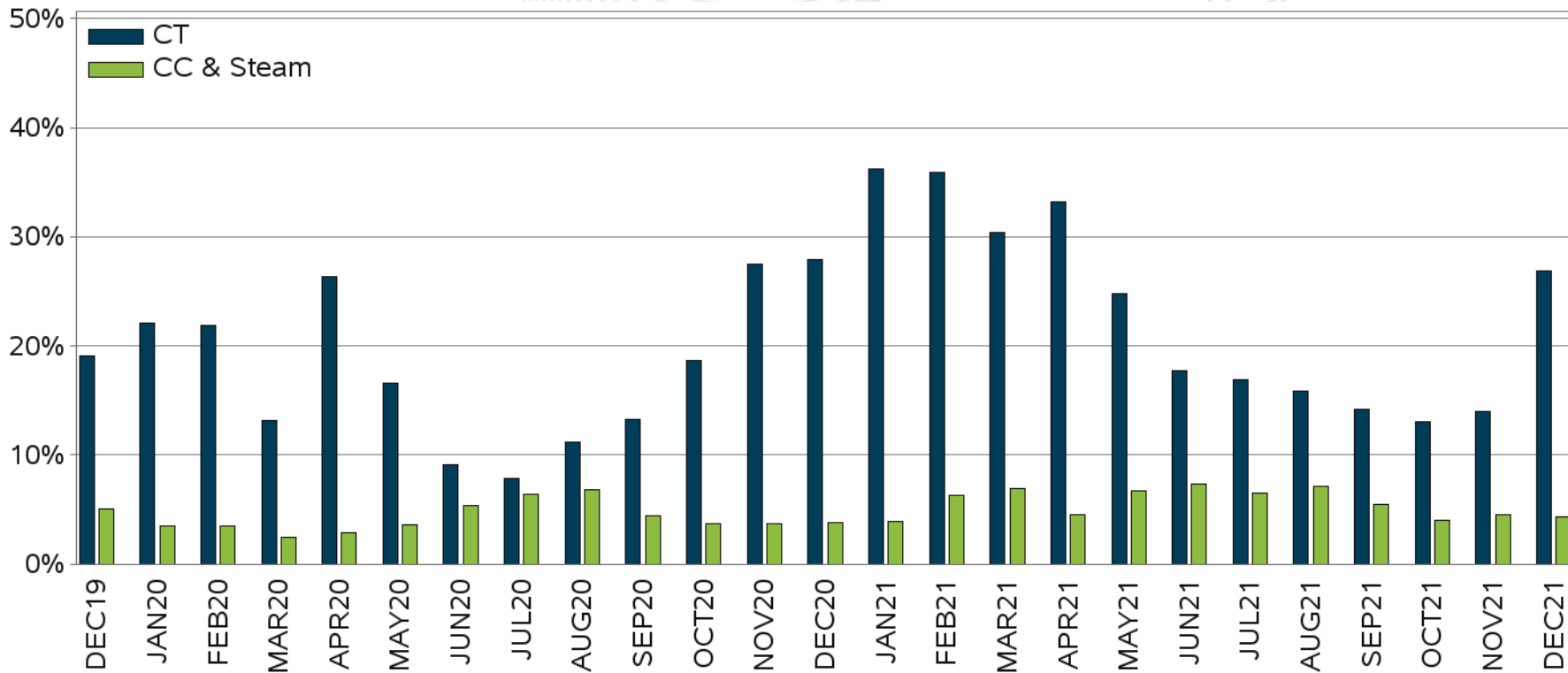
In December, uplift exceeded \$800,000 on three days – December 7th-9th.

Contributing factors to uplift were:

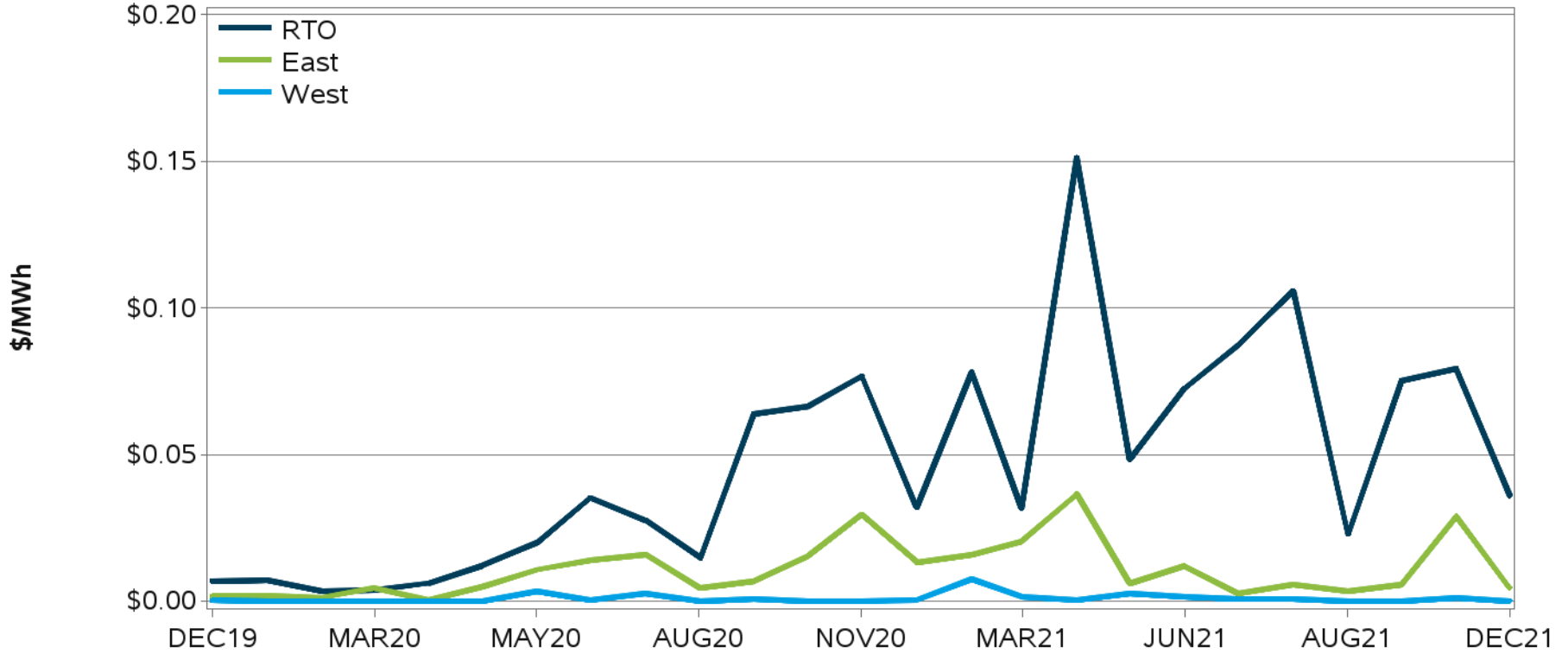
- Shortage pricing intervals and loads coming in higher than forecasted.

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

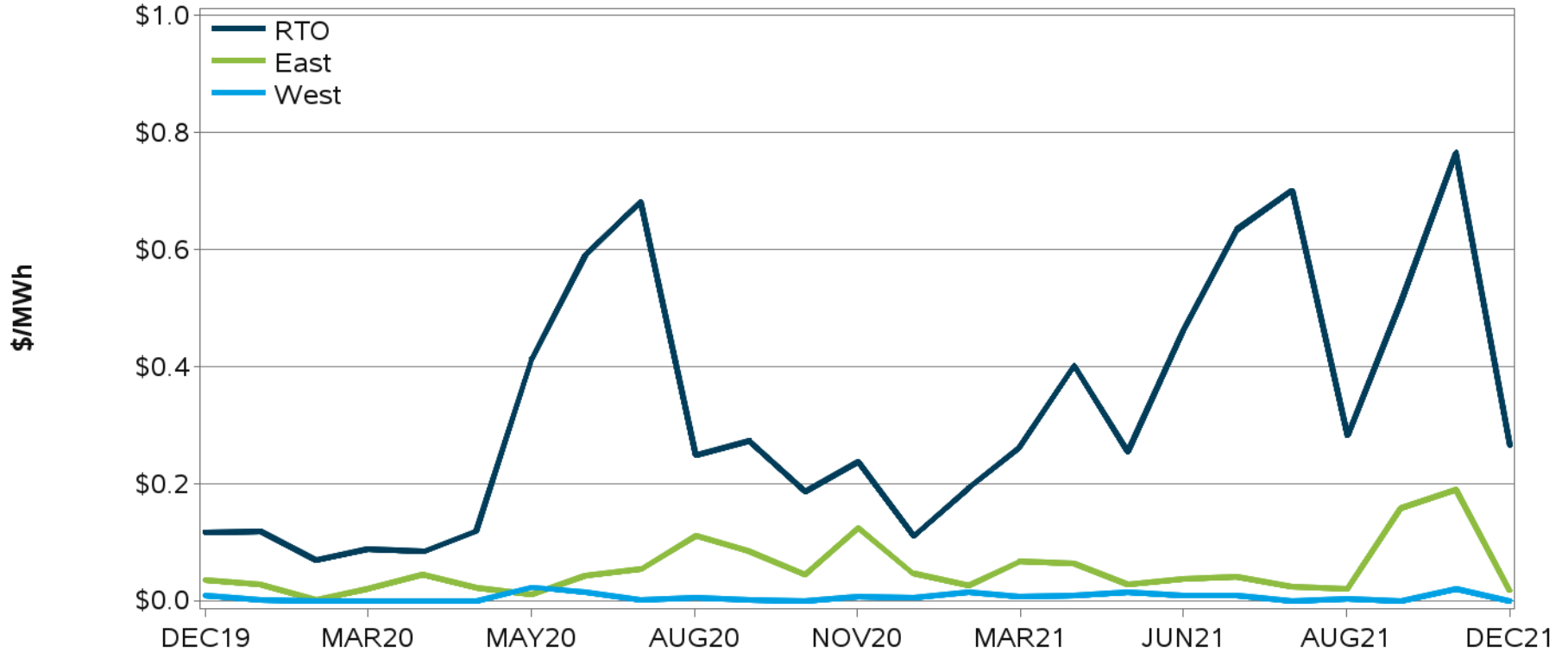
Percent of Total CT, CC and Steam Hours with LMP < Offer



- 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.

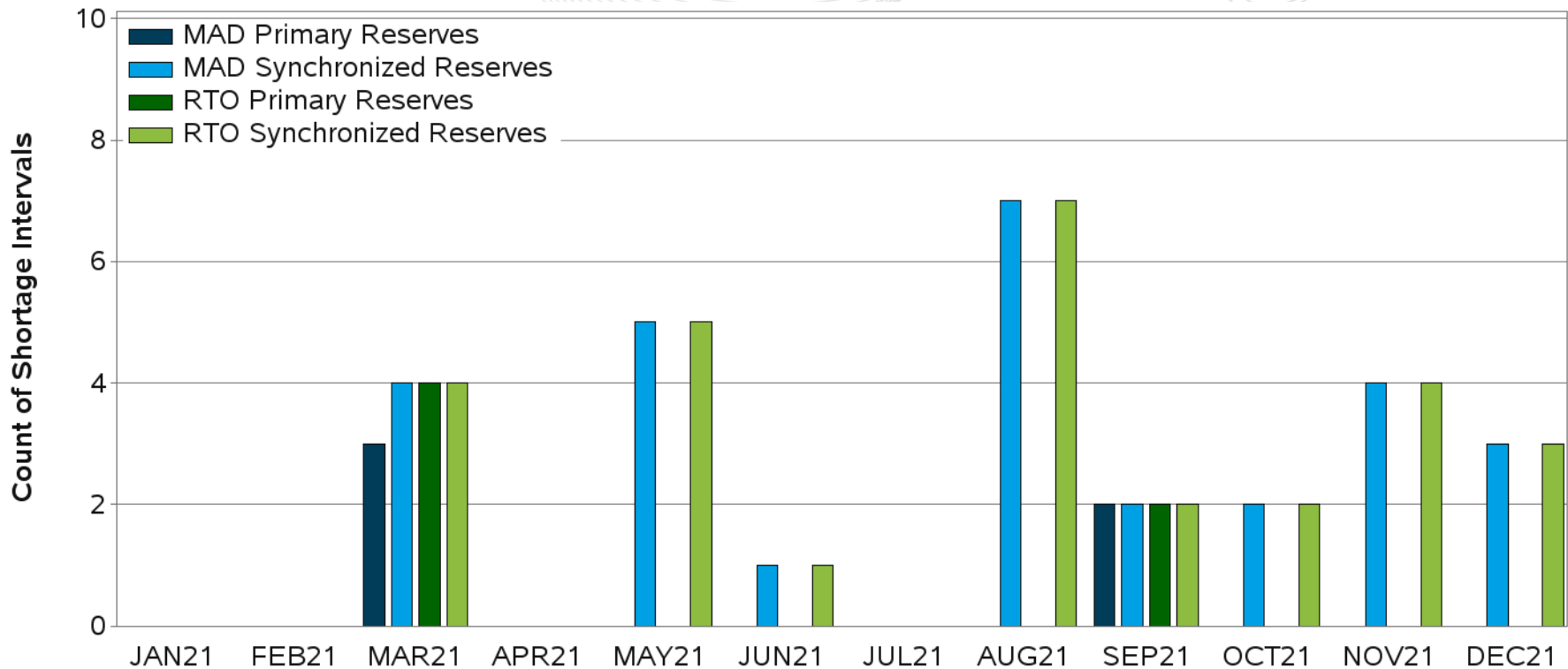


Deviations Balancing Operating Reserve Rates



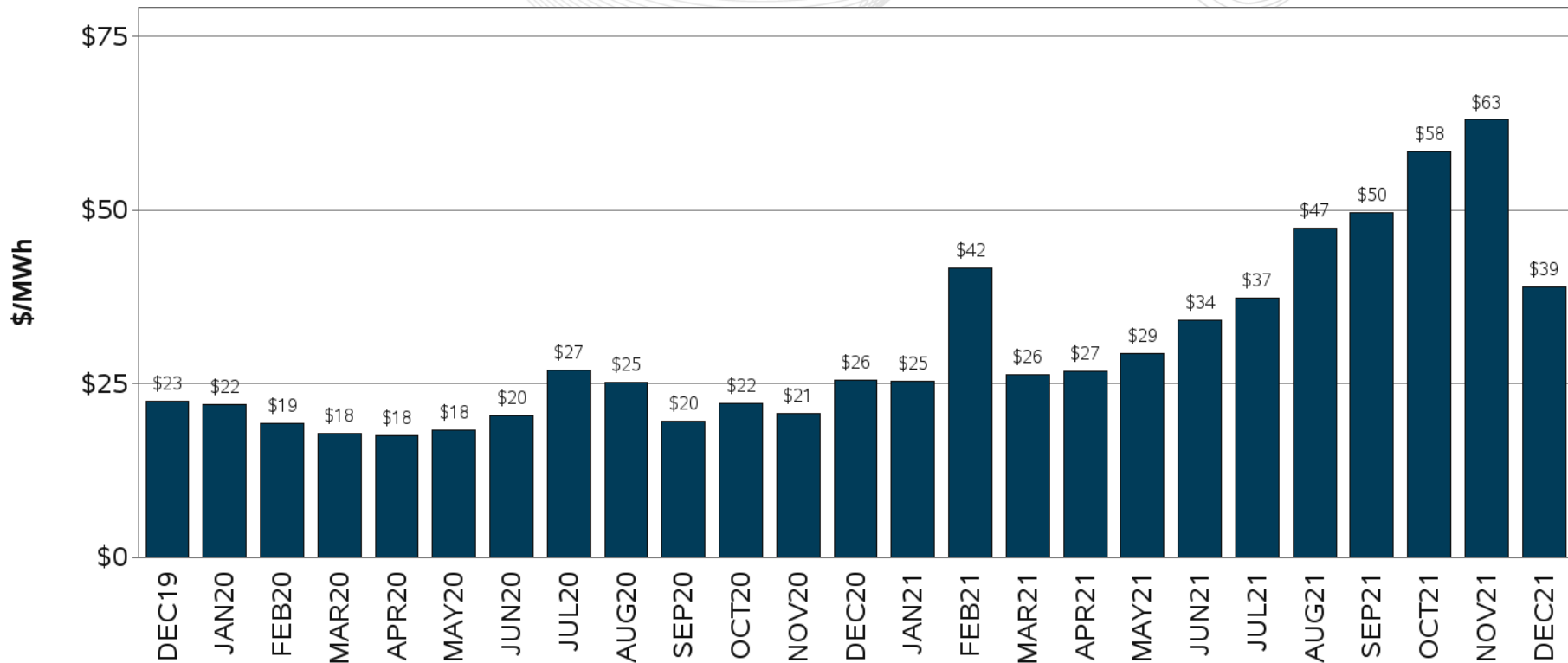
Energy Market

LMP Summary

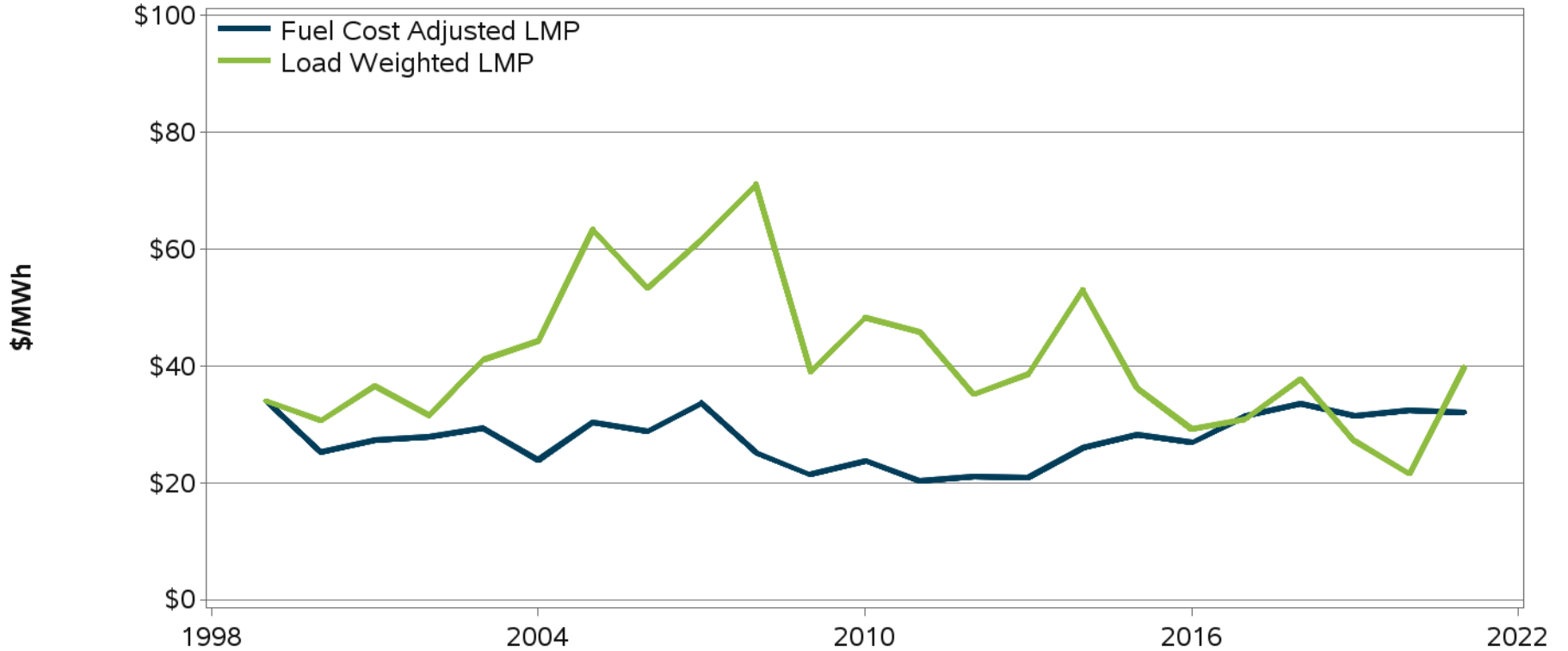


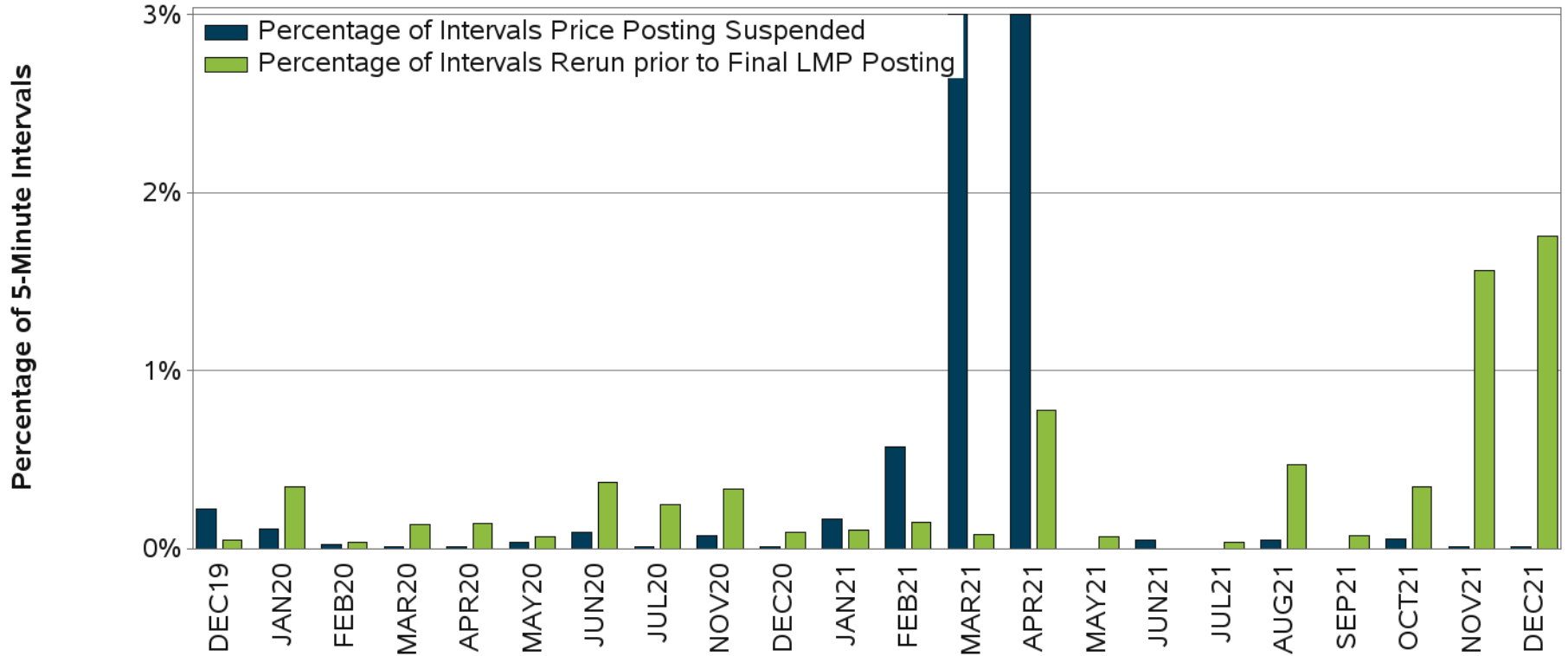
Date	5-Minute Interval	Reserve Penalty Factors	5-Minute Interval SMP	Hourly Integrated SMP
Tuesday, December 7, 2021	17:25 - 17:30	RTO Synchronized Reserves; MAD Synchronized Reserves	\$759.73	\$198.12
Wednesday, December 8, 2021	9:05 - 9:10	RTO Synchronized Reserves; MAD Synchronized Reserves	\$1,814.64	\$448.80
Wednesday, December 8, 2021	9:10 - 9:15	RTO Synchronized Reserves; MAD Synchronized Reserves	\$2,708.46	\$448.80

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)

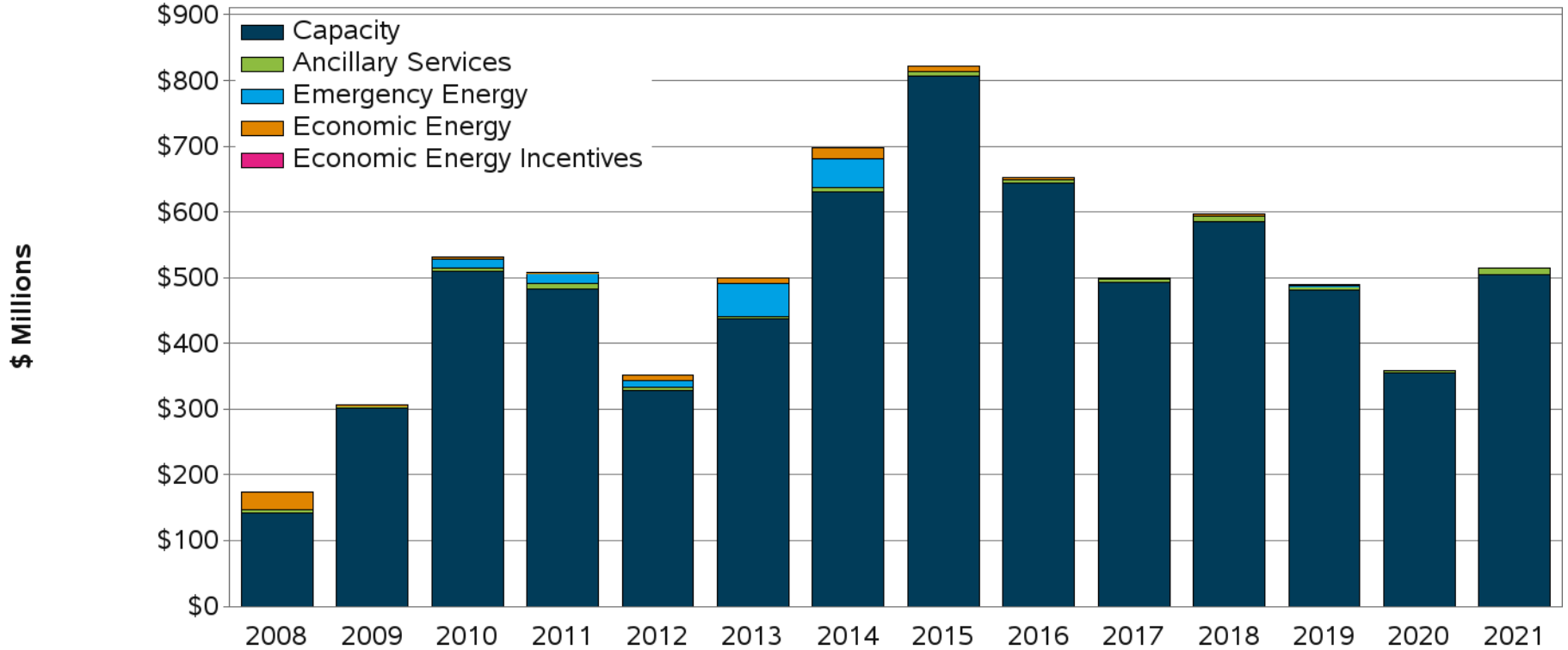


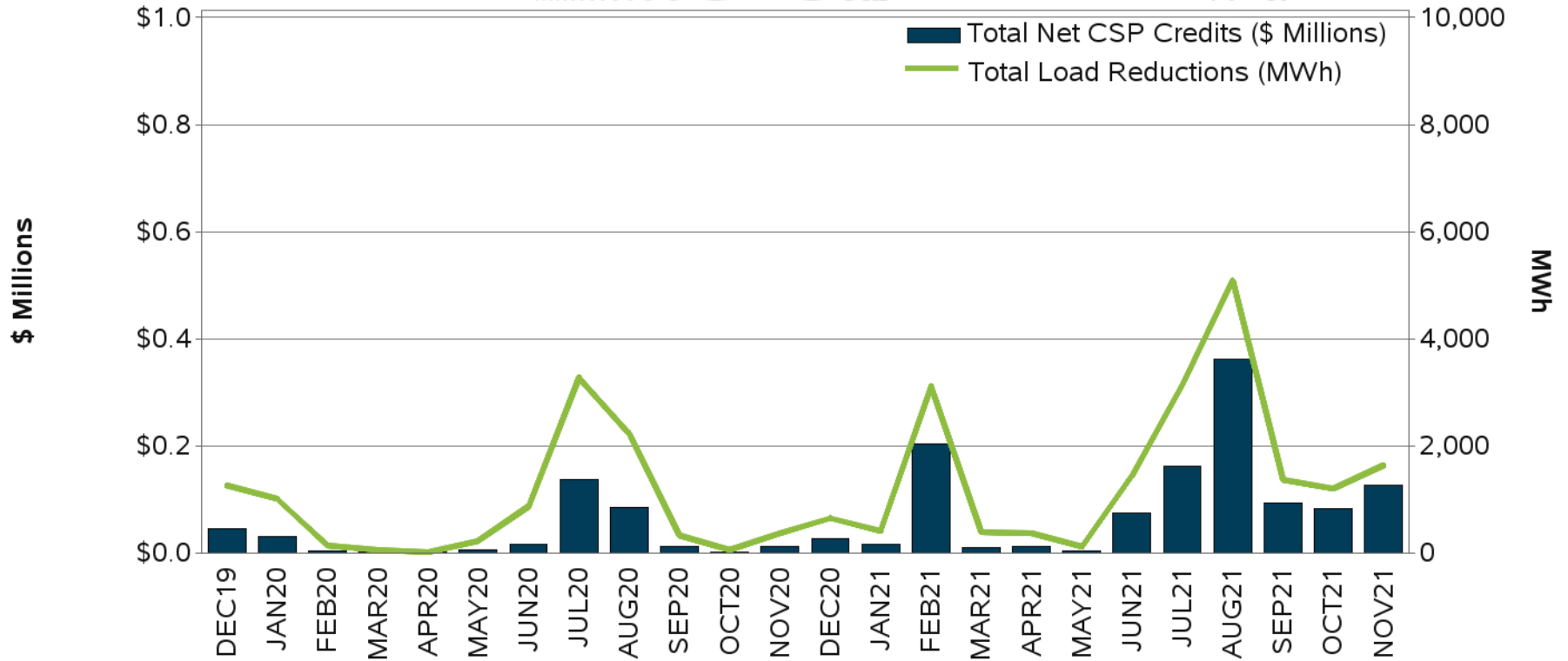


Spikes seen in March and April 2021 are incorrect and due to a software bug which has since been fixed.

Energy Market

Demand Response Summary

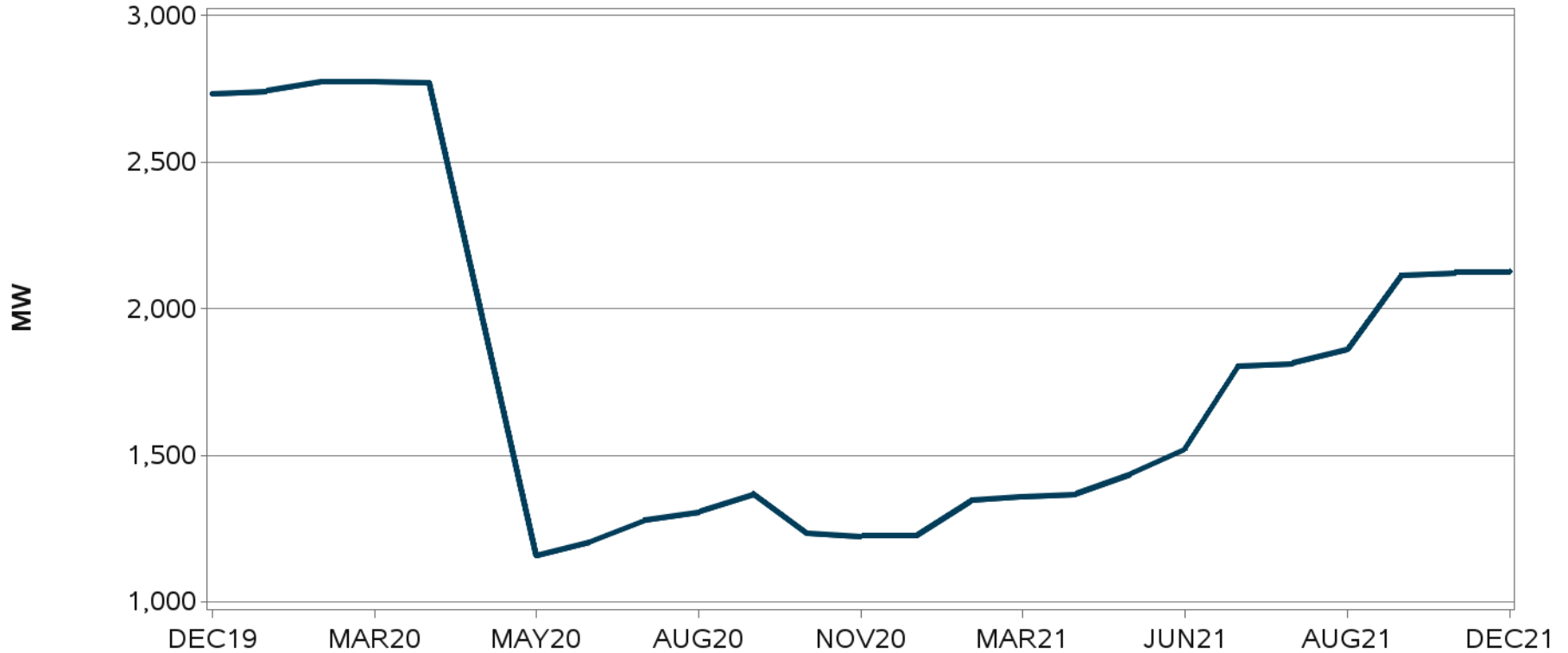




*Data for the last few months are subject to significant change due to the settlement window.



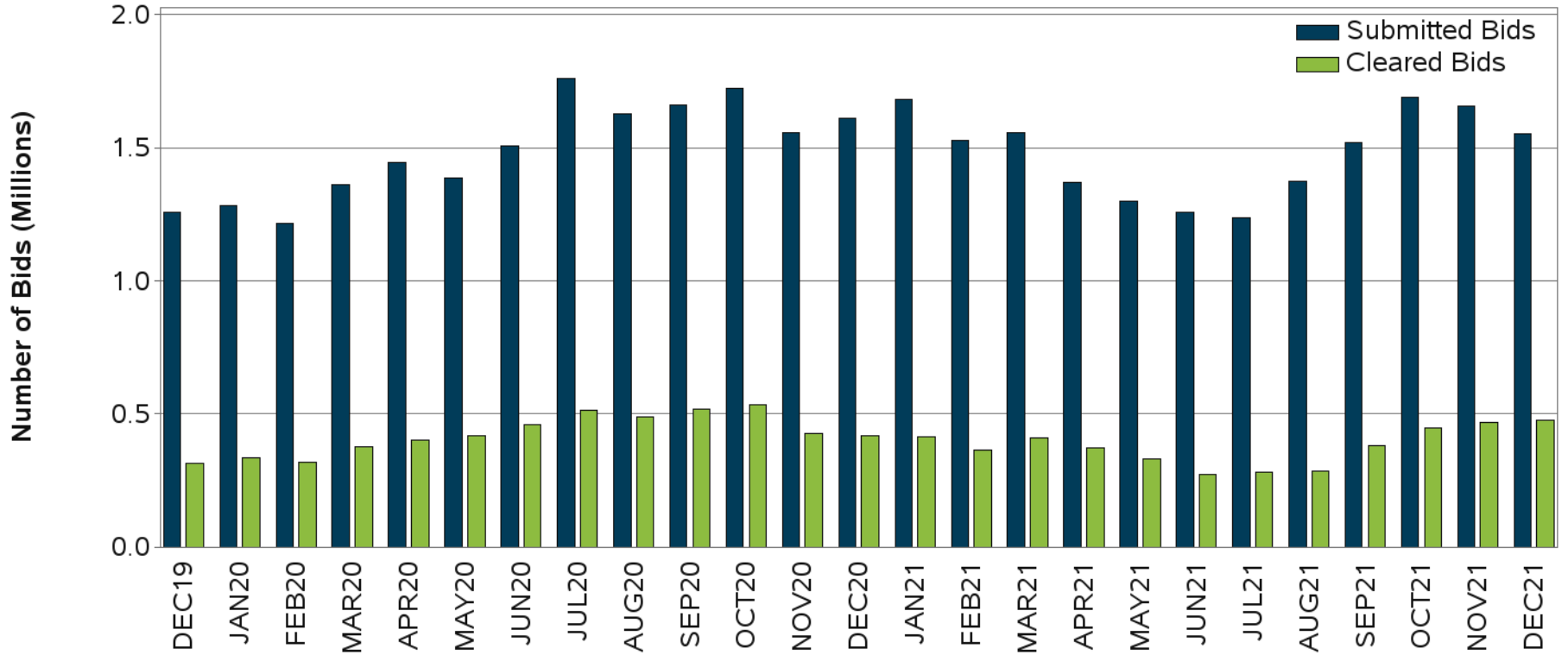
Total Registered MW in PJM's Economic Demand Response

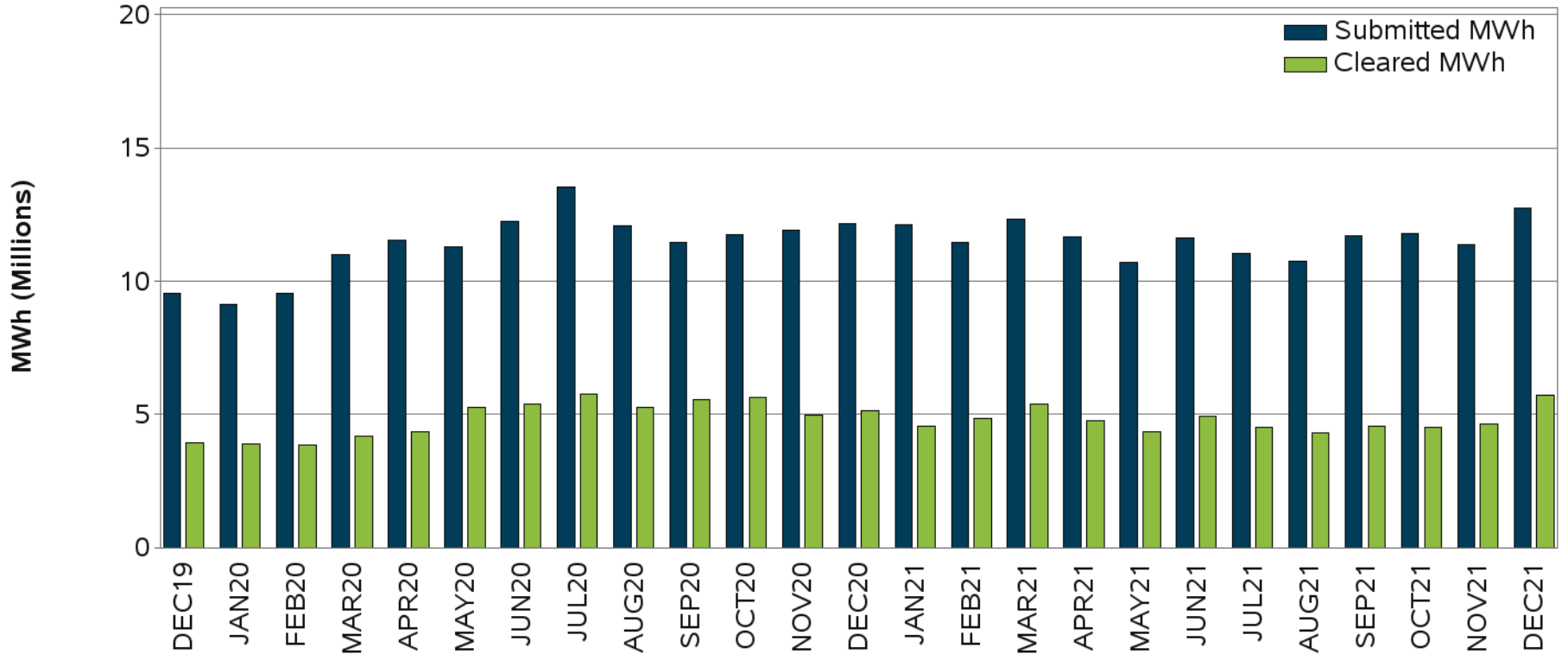


Energy Market

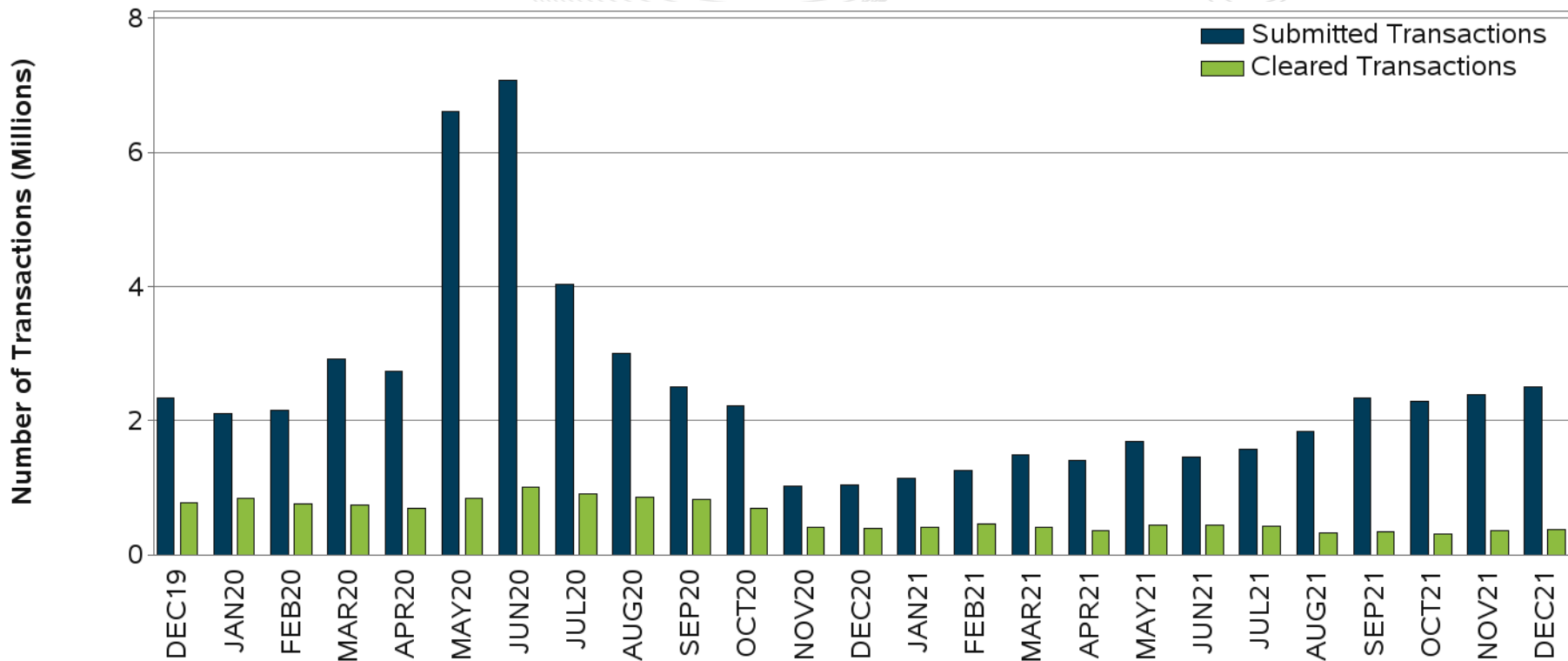
Virtual Activity Summary

- 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.

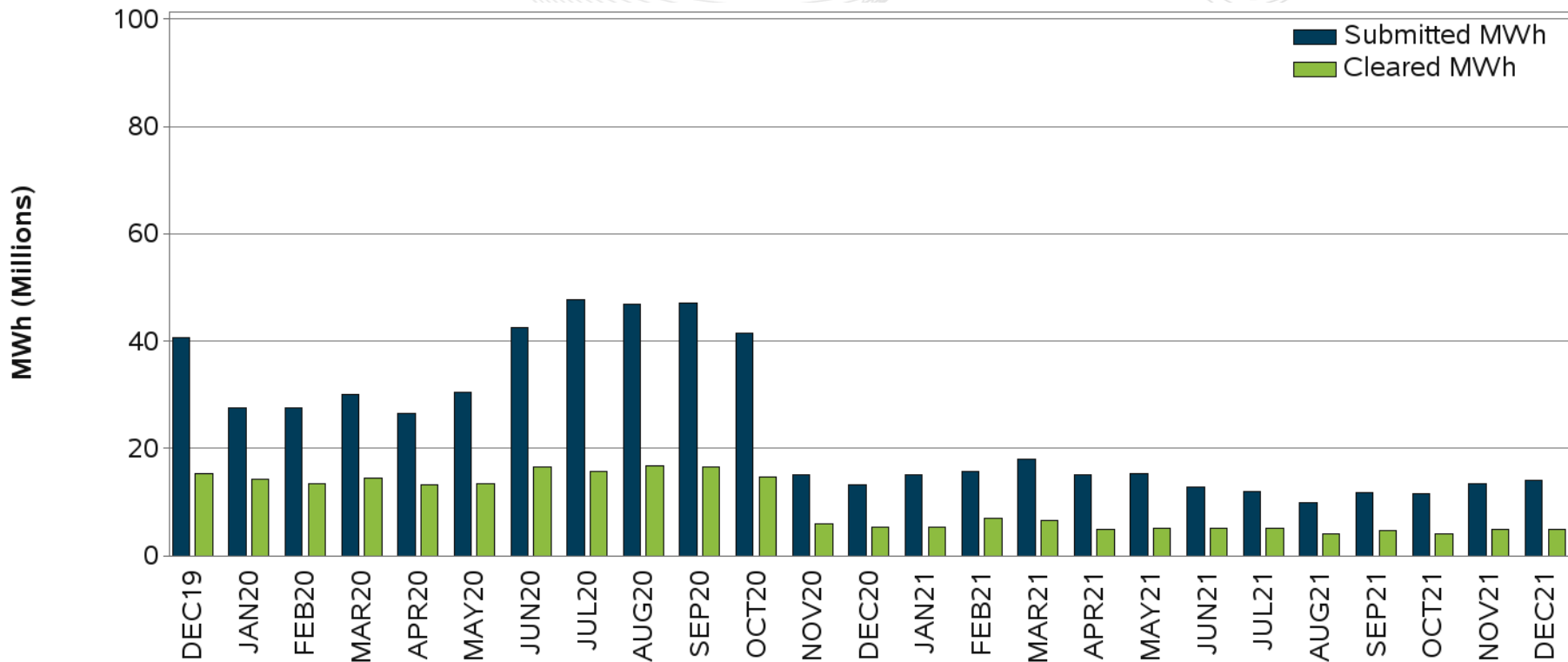




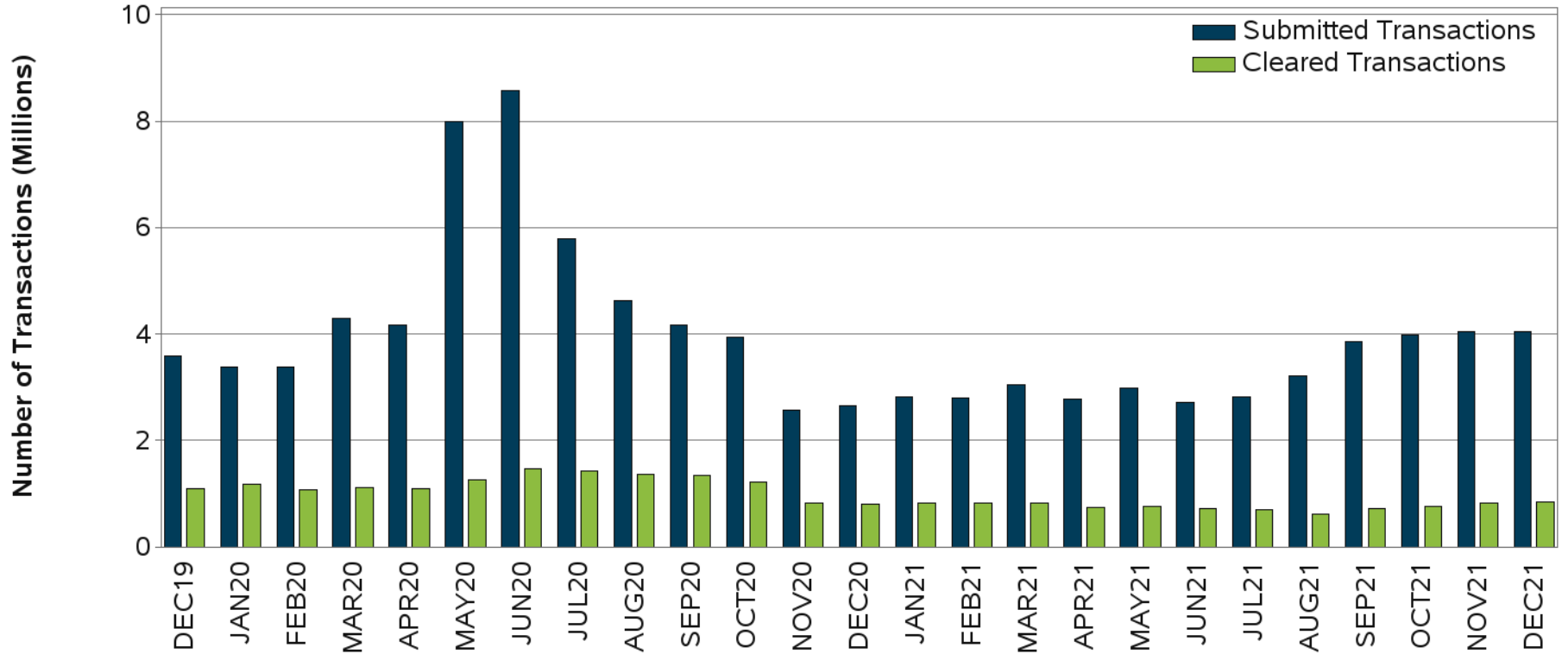
Up-To-Congestion Transactions - Total Number



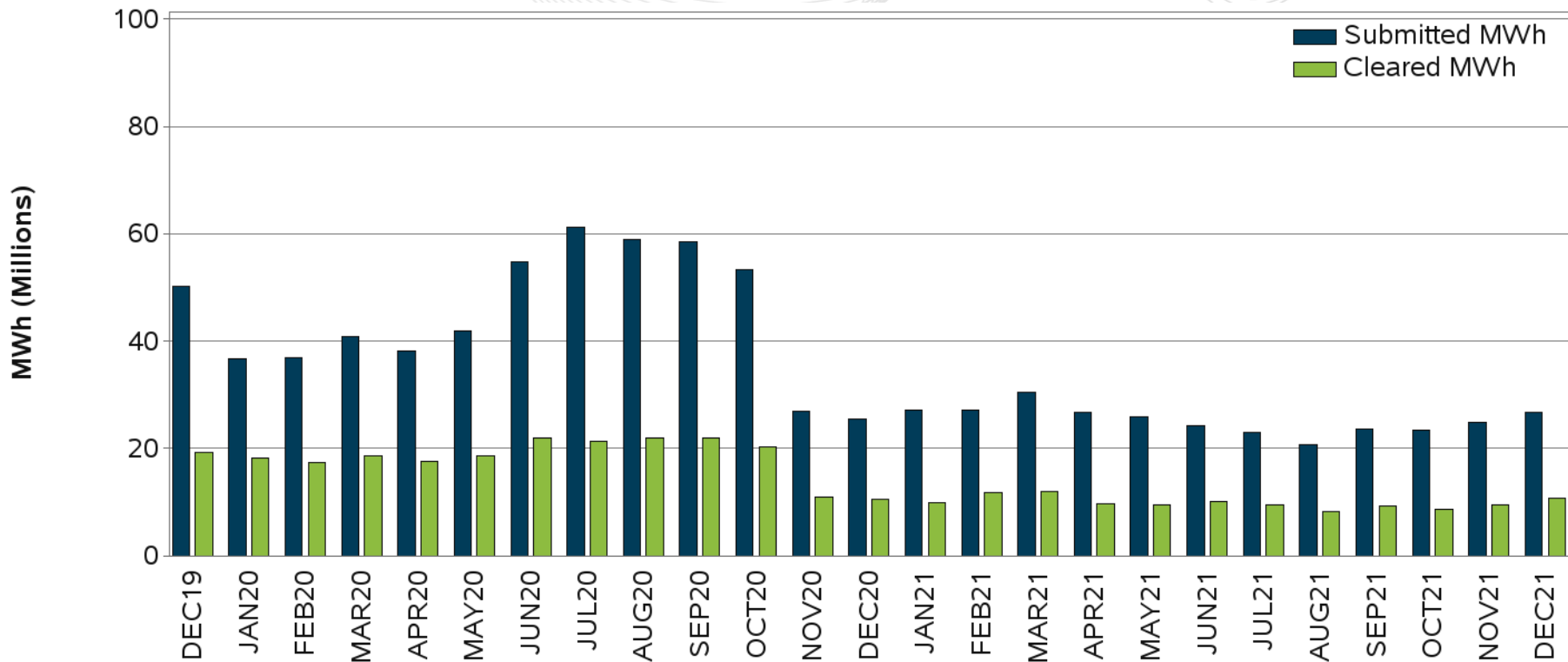
Up-To-Congestion Transactions - Total Volume



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



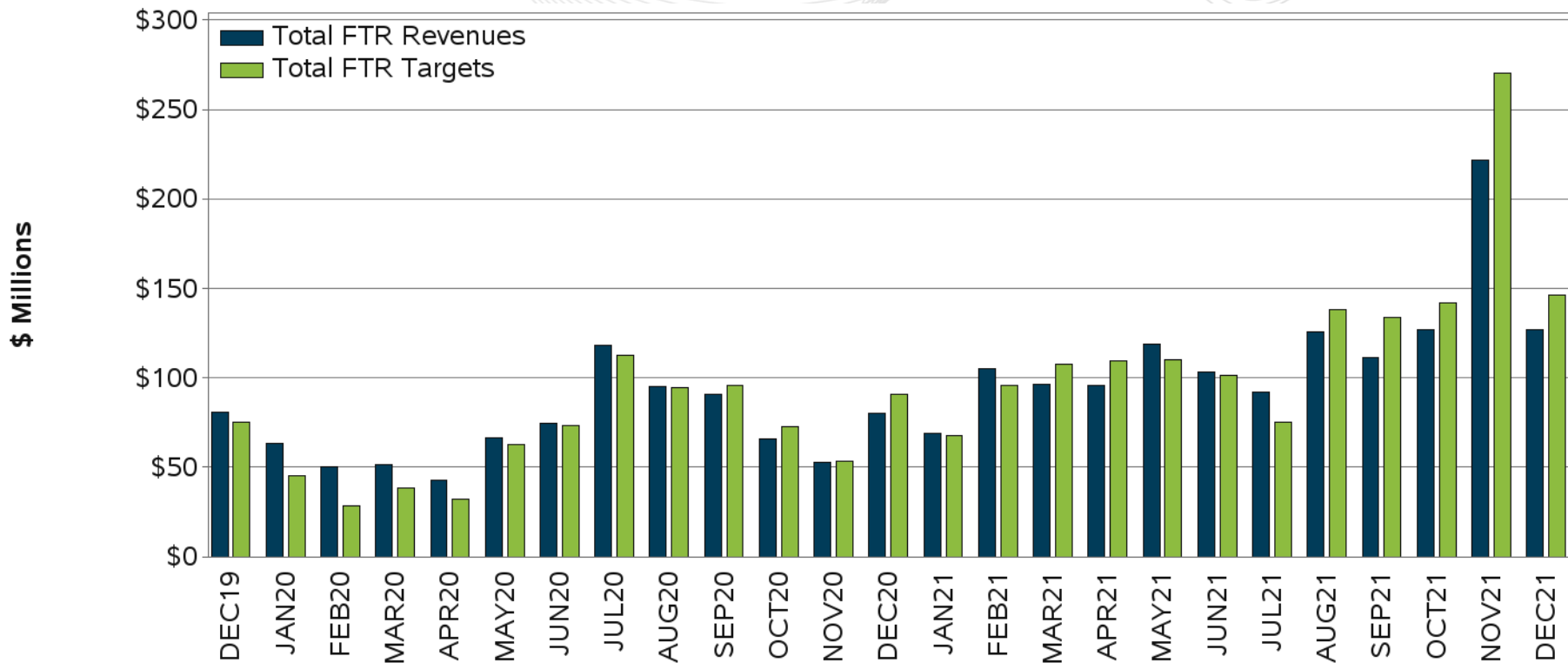
INCs, DECs and Up-To-Congestion Transactions - Total Volume

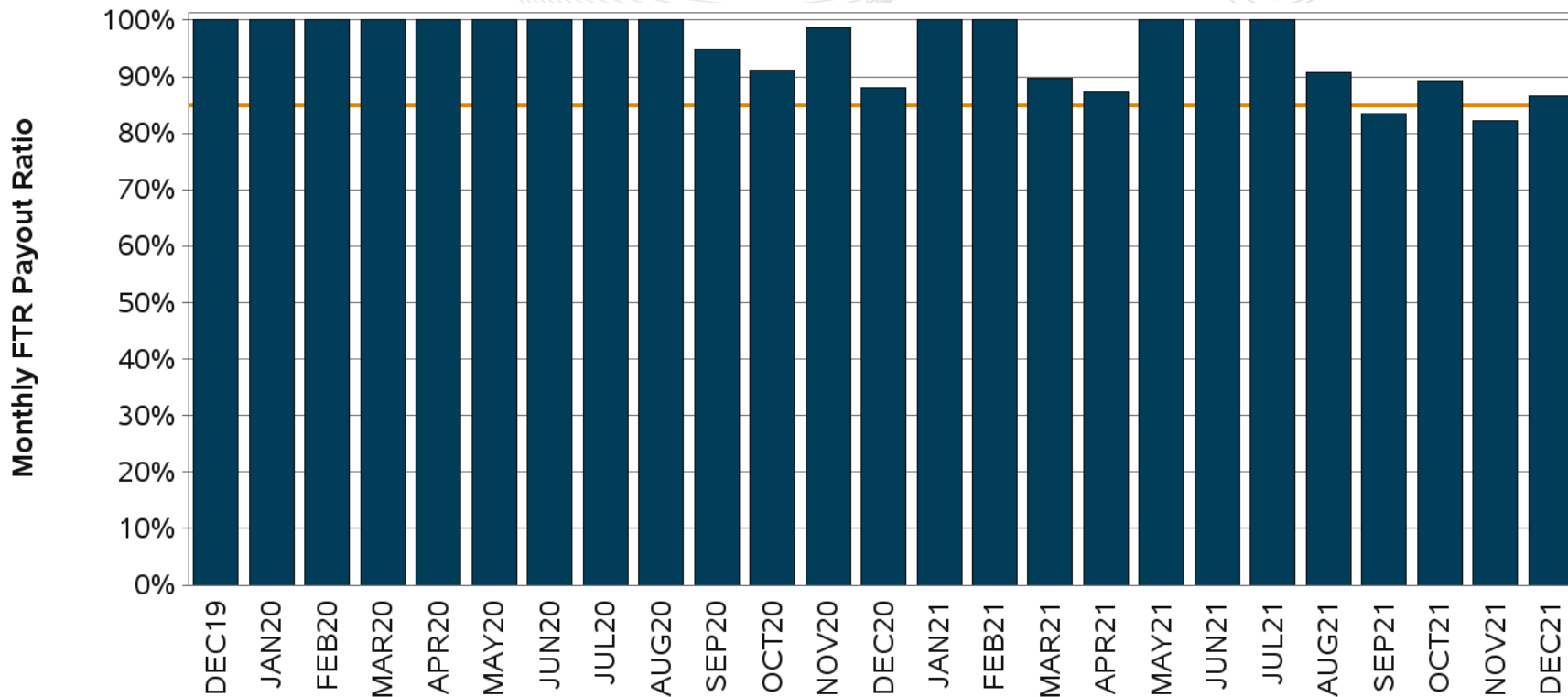


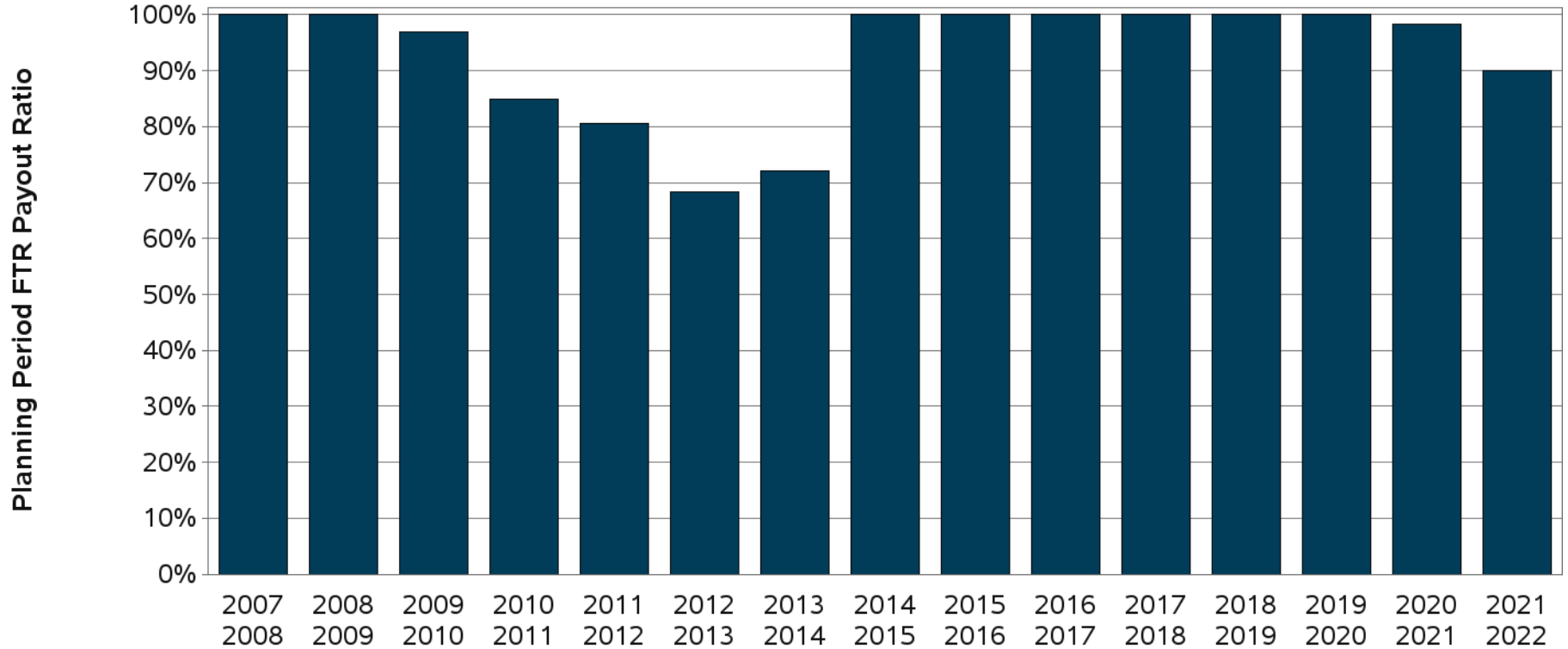
Energy Market

Congestion and FTR Summary

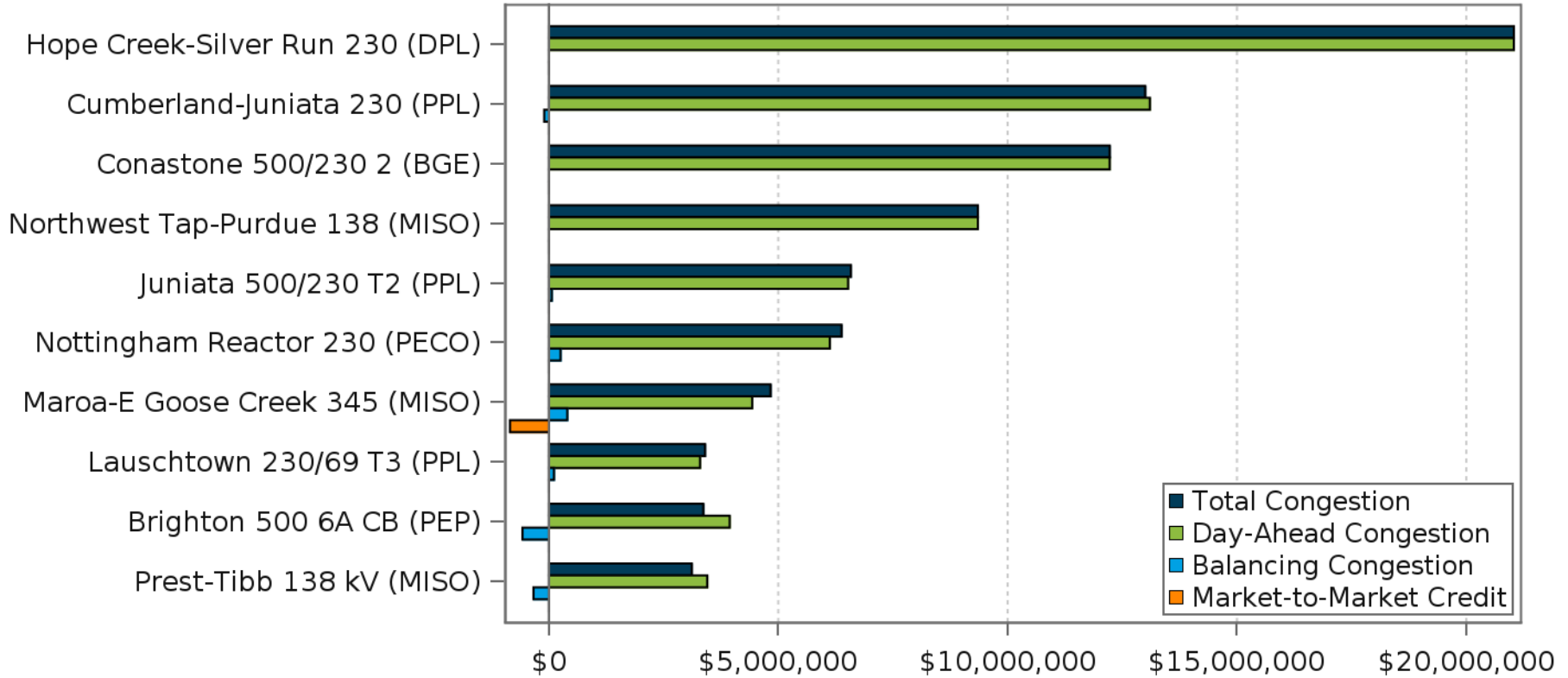
Period	Surplus / Underfunding	Payout Ratio
December, 2021	\$-19,727,019	87%
2021	\$-105,882,972	93%
2021/2022	\$-99,485,401	90%





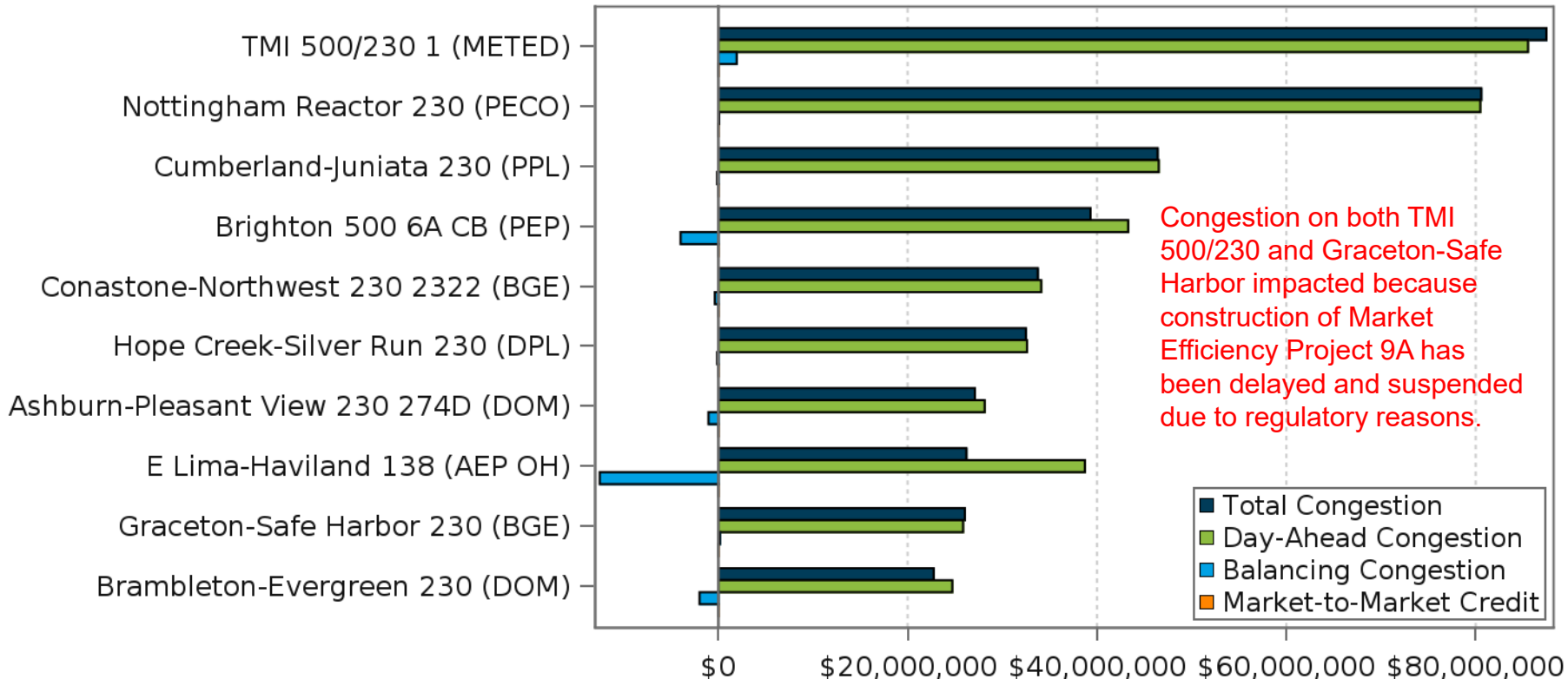


pjm® Ten Most Heavily Congested Transmission Facilities - Overall, December



The ten most heavily congested facilities account for 77% of total congestion for December.

Ten Most Heavily Congested Transmission Facilities - Overall, 2021

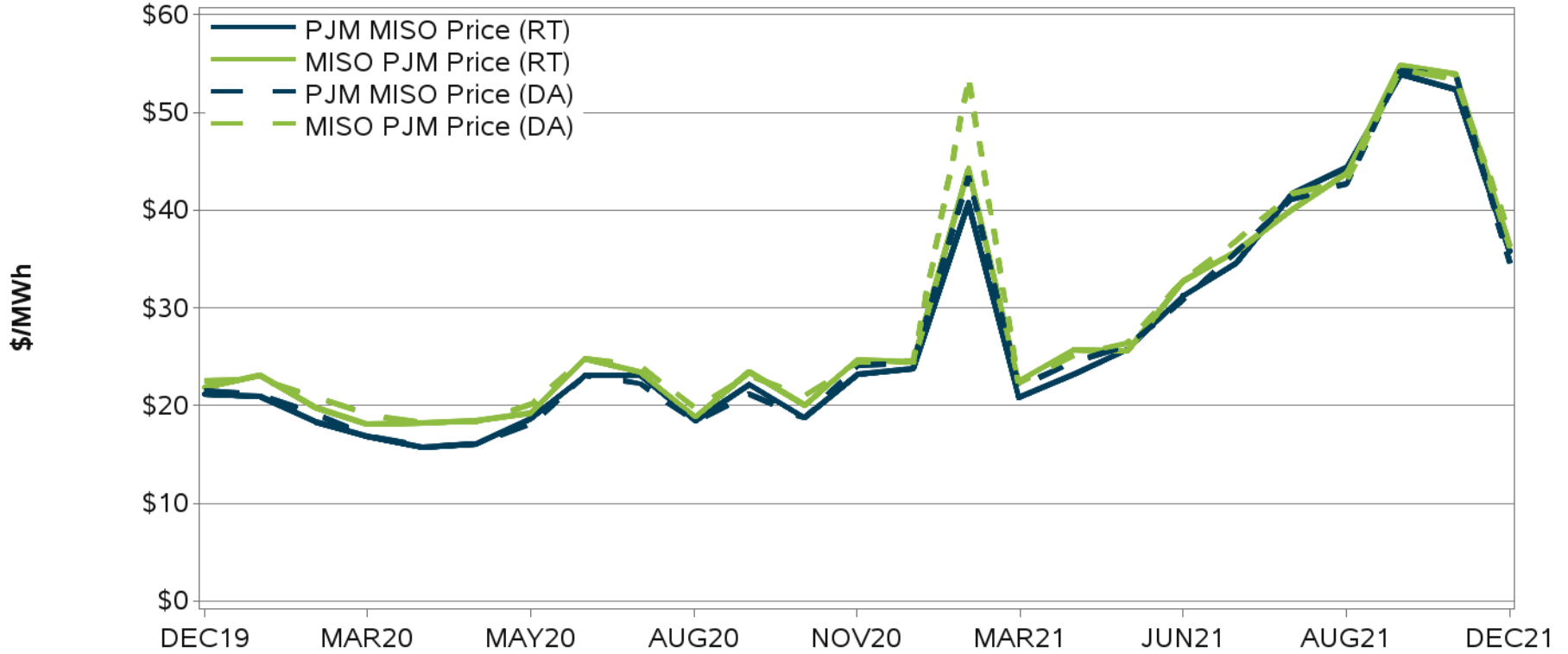


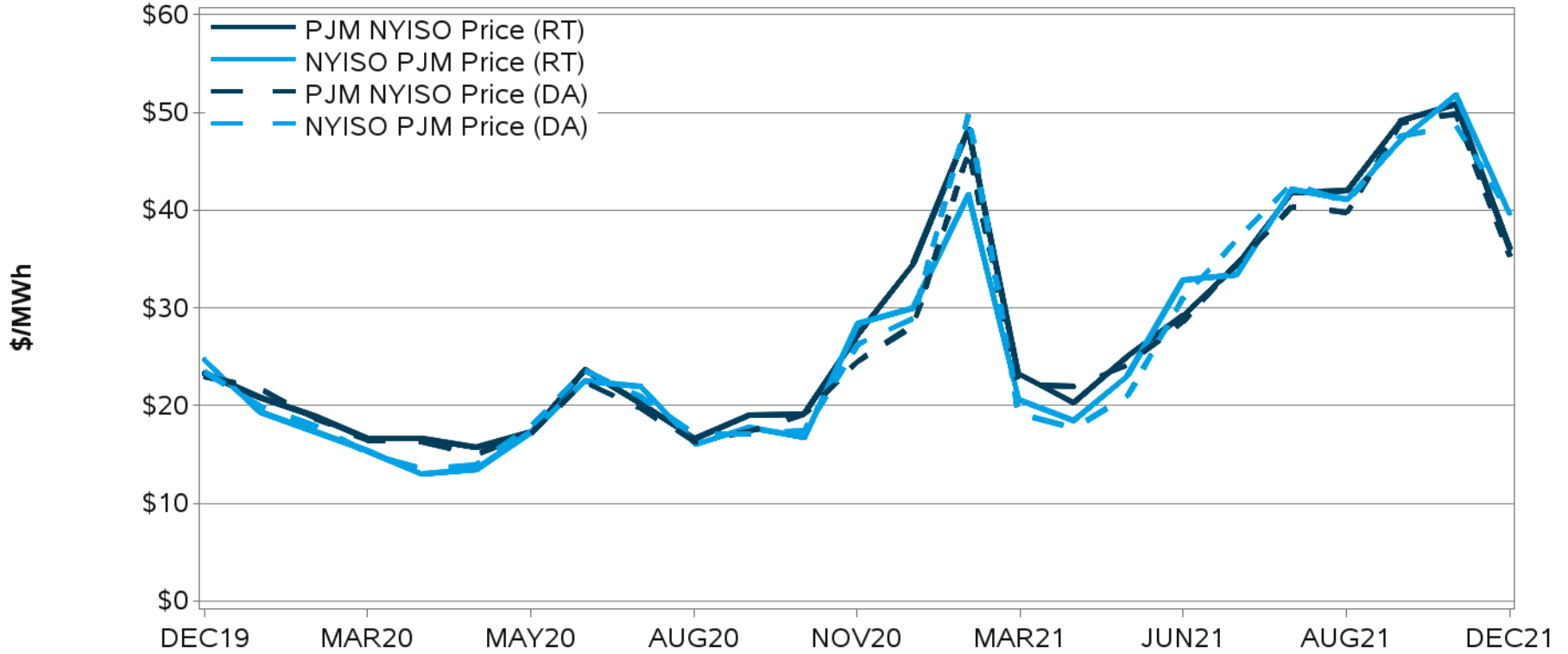
The ten most heavily congested facilities account for 43% of total congestion for 2021.

Energy Market

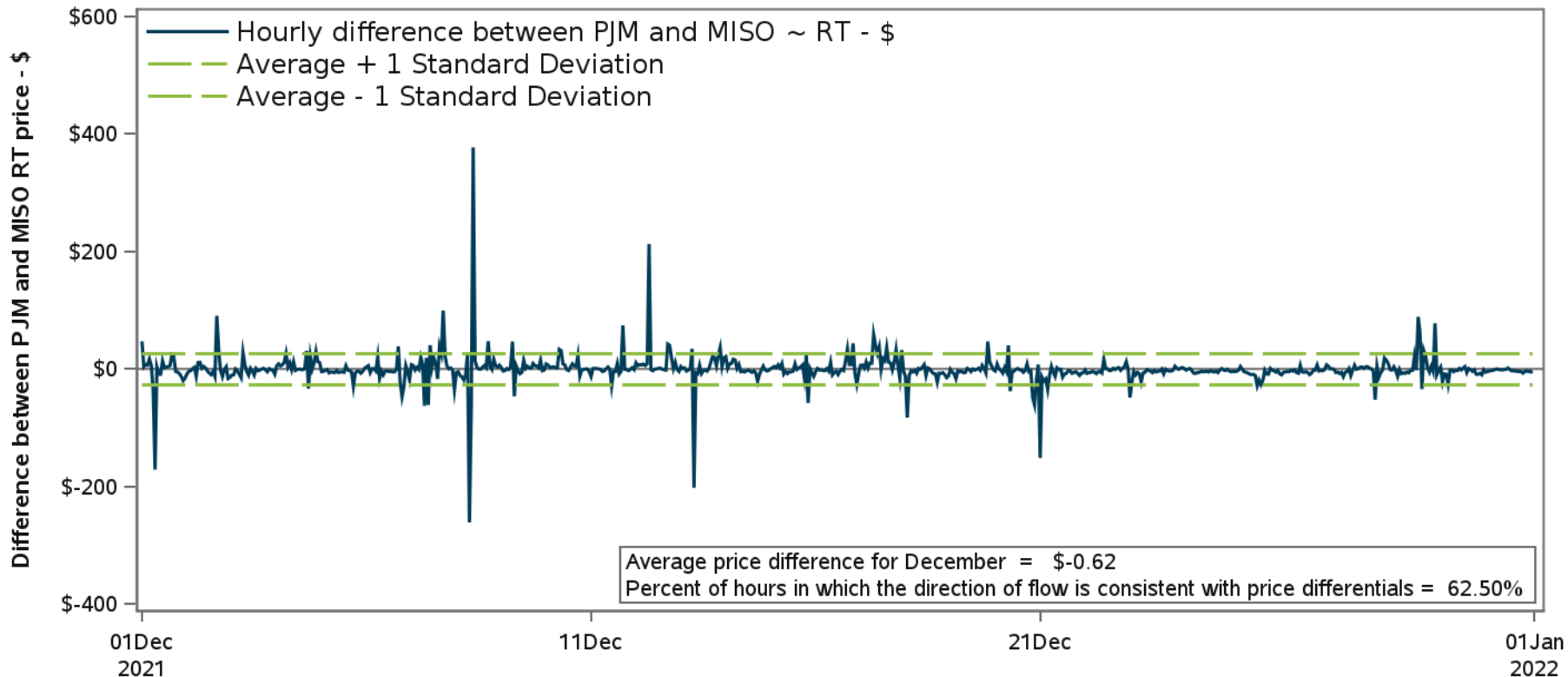
Interchange/Seams Summary

Monthly Average MISO Interface Pricing



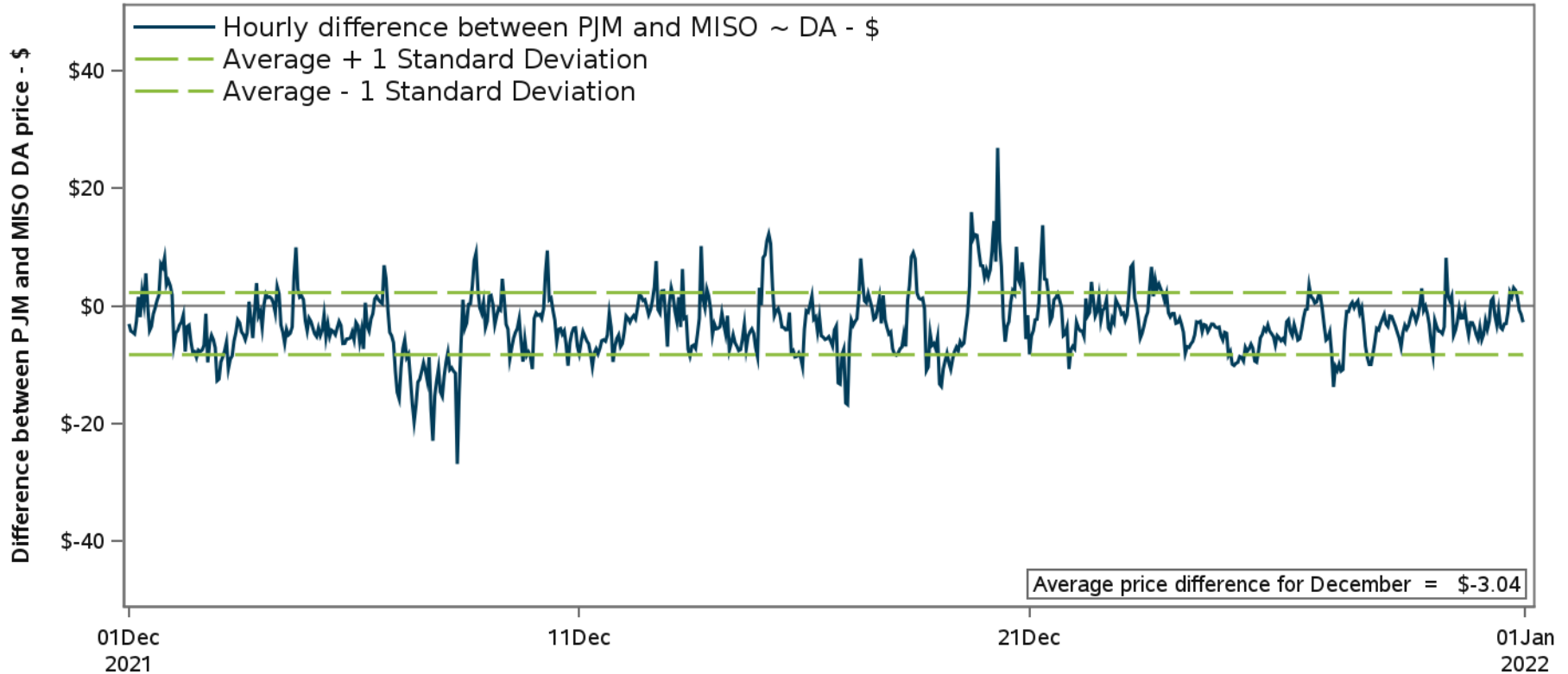


Hourly Difference Between PJM and MISO Real-Time Prices



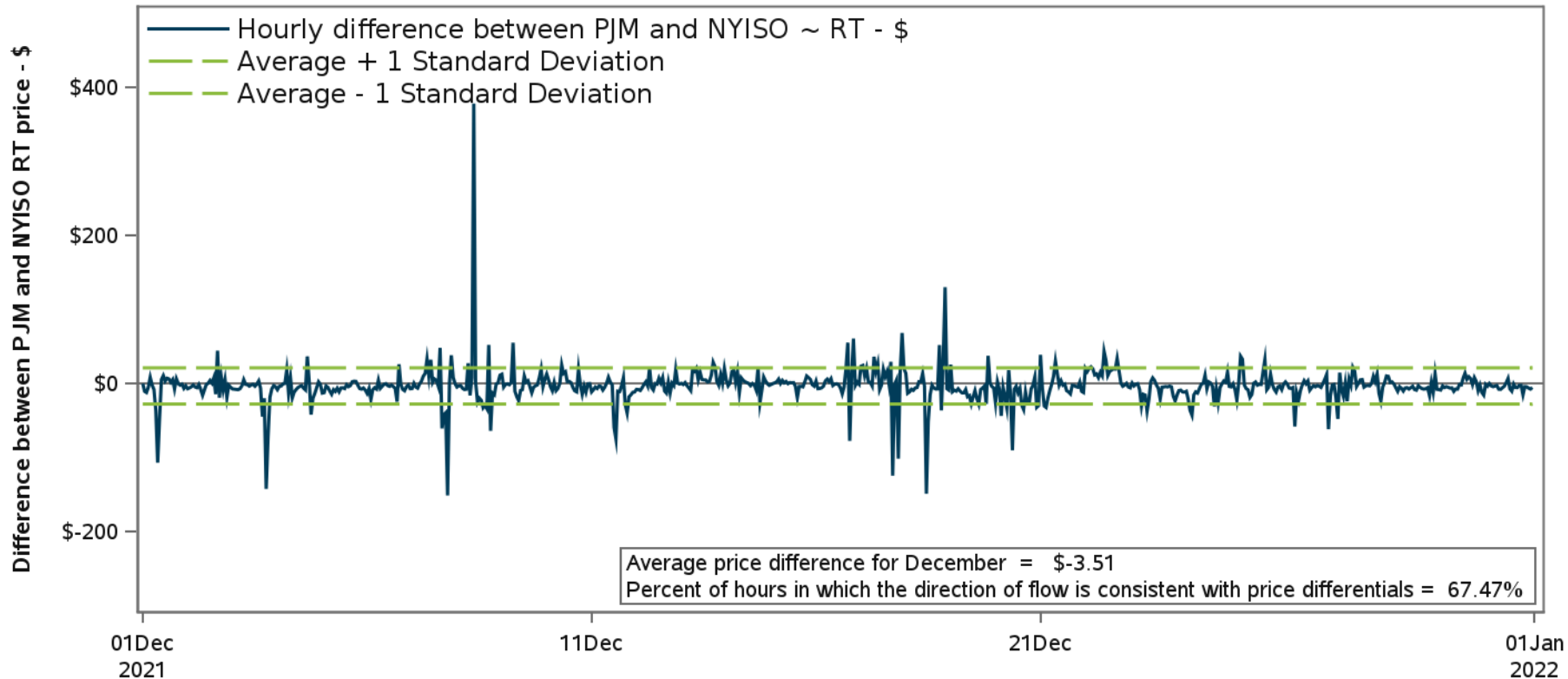
Positive values represent hours when the PJM price was higher. Negative values represent hours when the PJM price was lower.

Hourly Difference Between PJM and MISO Day-Ahead Prices



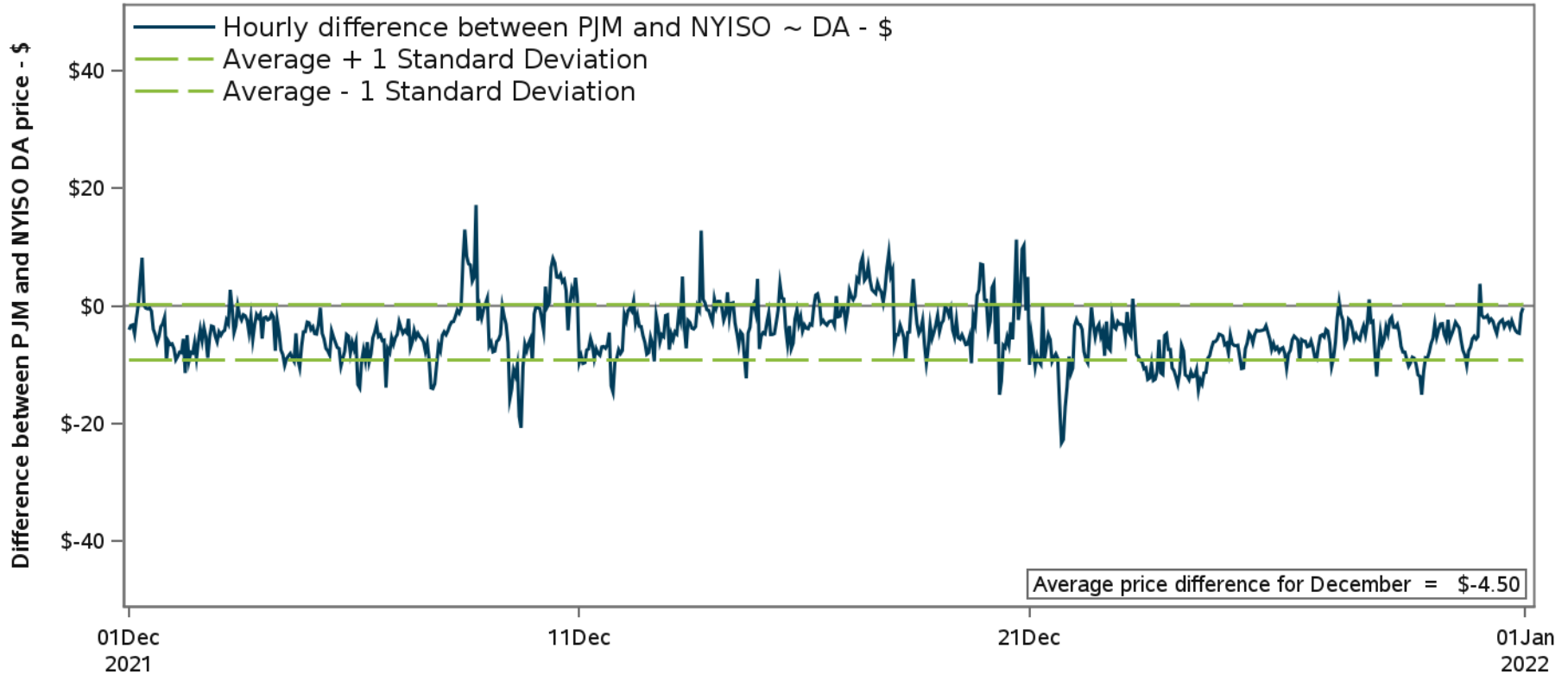
Positive values represent hours when the PJM price was higher. Negative values represent hours when the PJM price was lower.

Hourly Difference Between PJM and NYISO Real-Time Prices

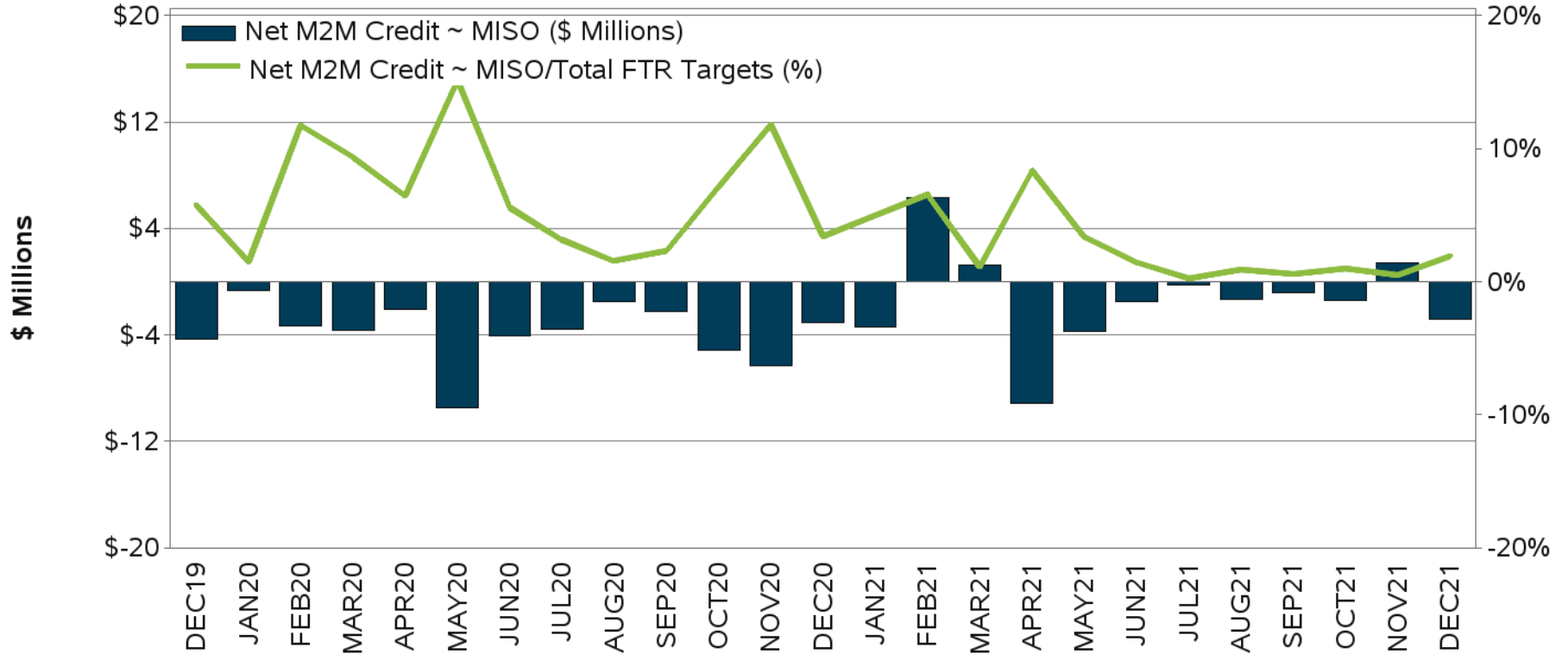


Positive values represent hours when the PJM price was higher. Negative values represent hours when the PJM price was lower.

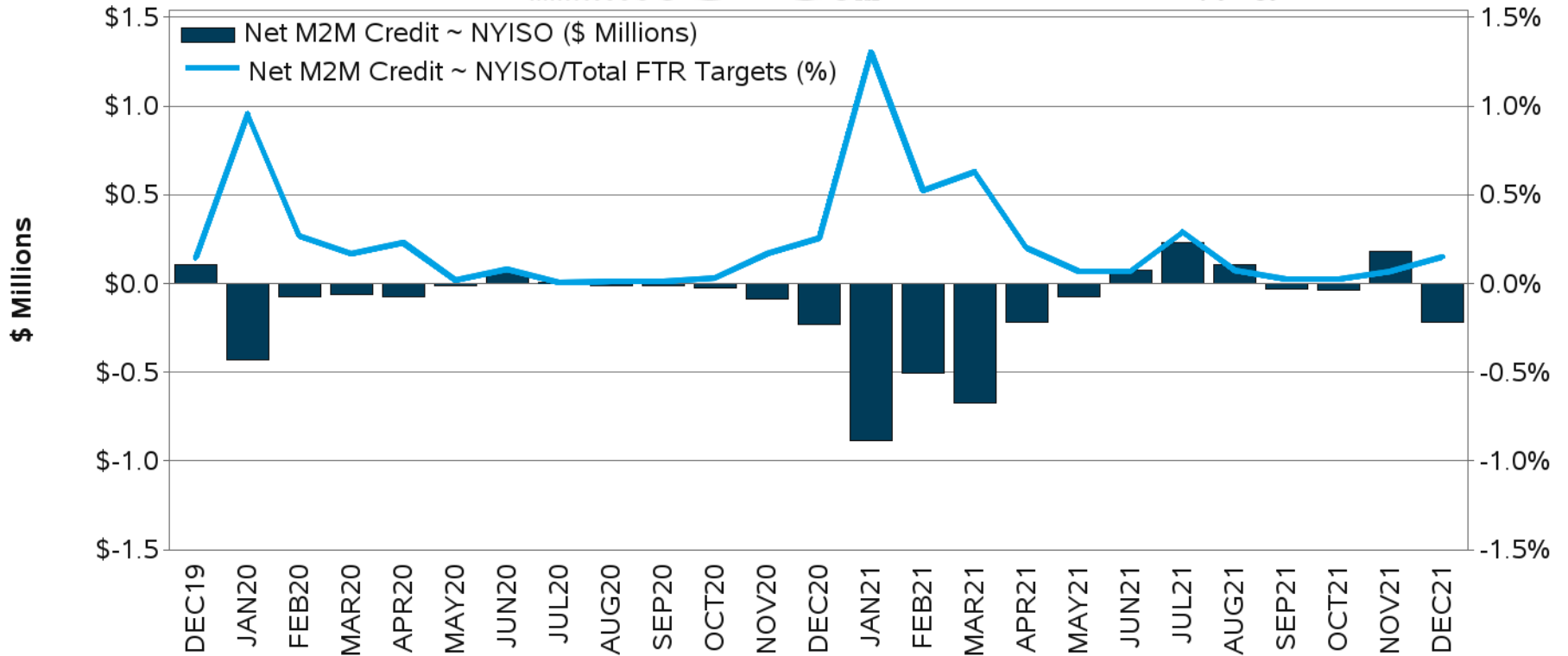
Hourly Difference Between PJM and NYISO Day-Ahead Prices



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

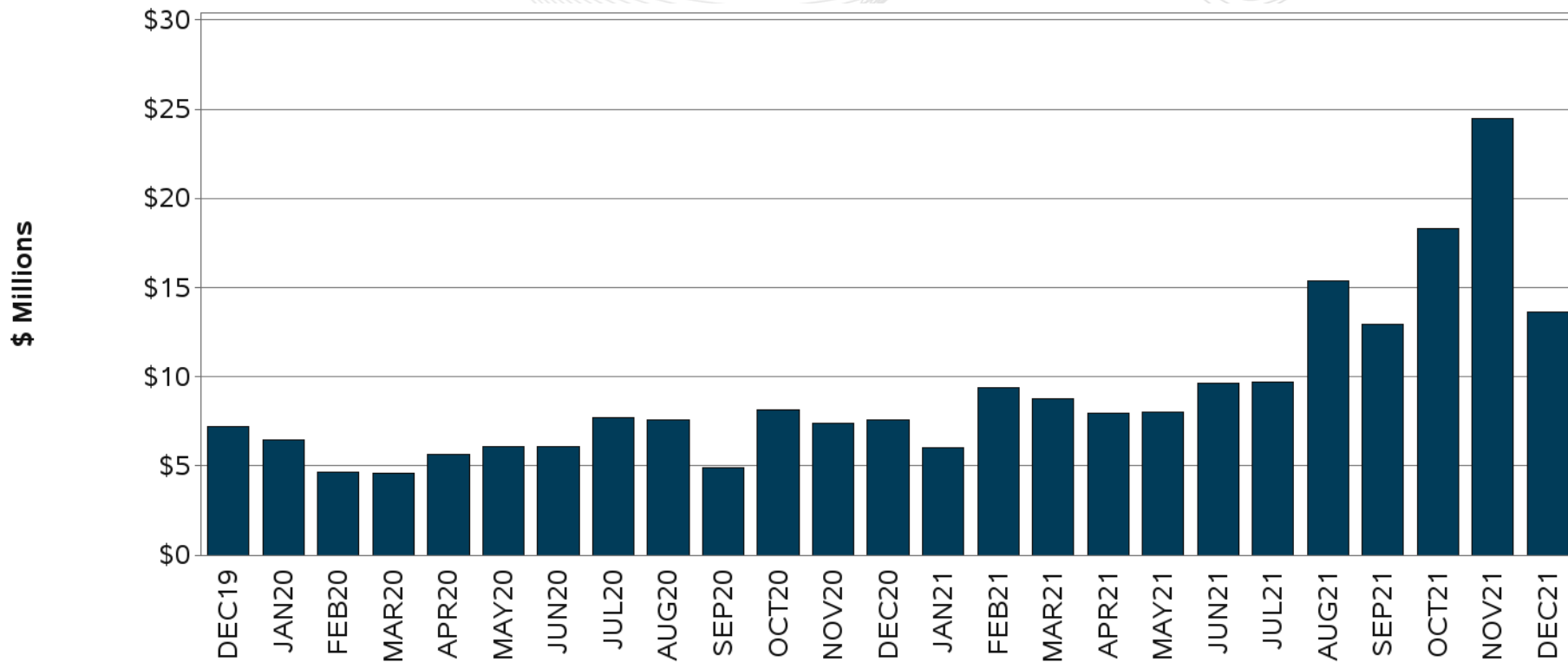


Negative M2M Credit represents PJM payment to MISO

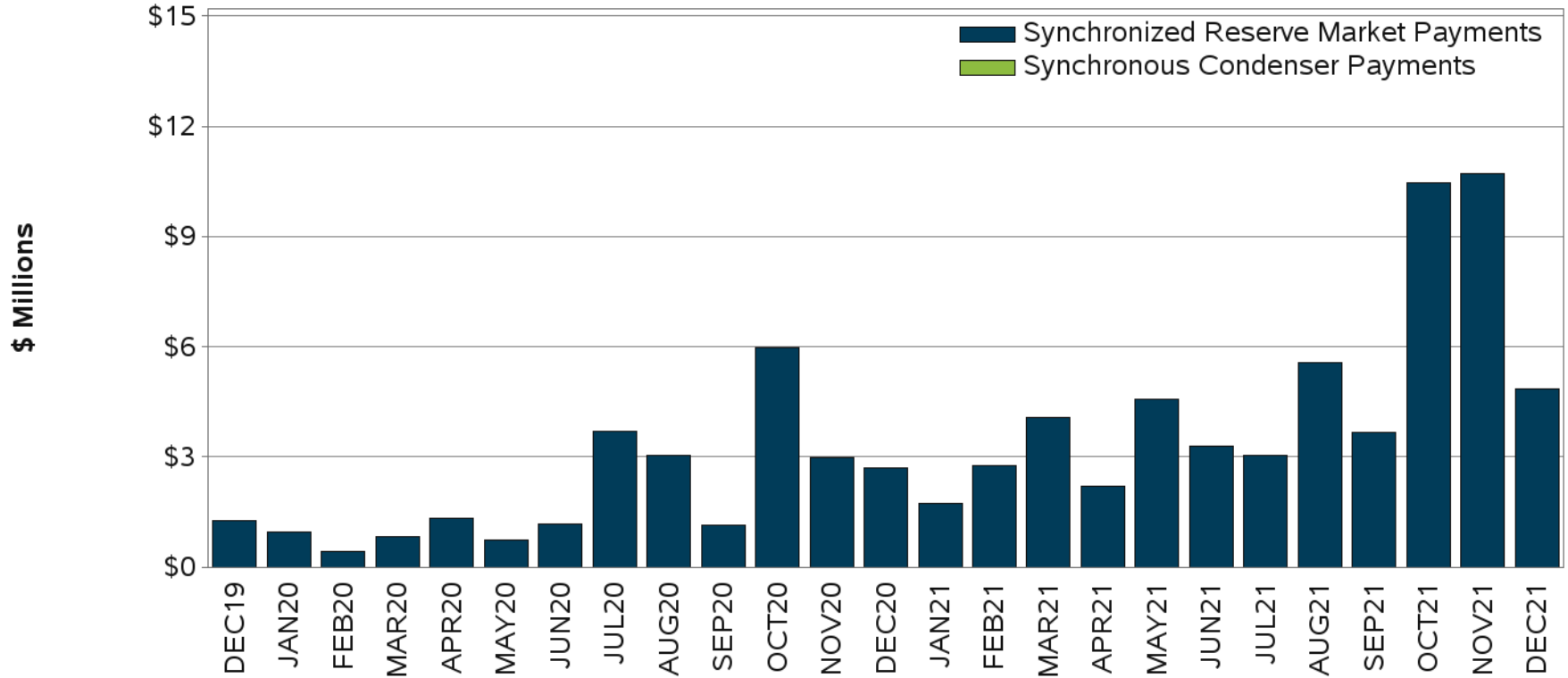


Negative M2M Credit represents PJM payment to NYISO

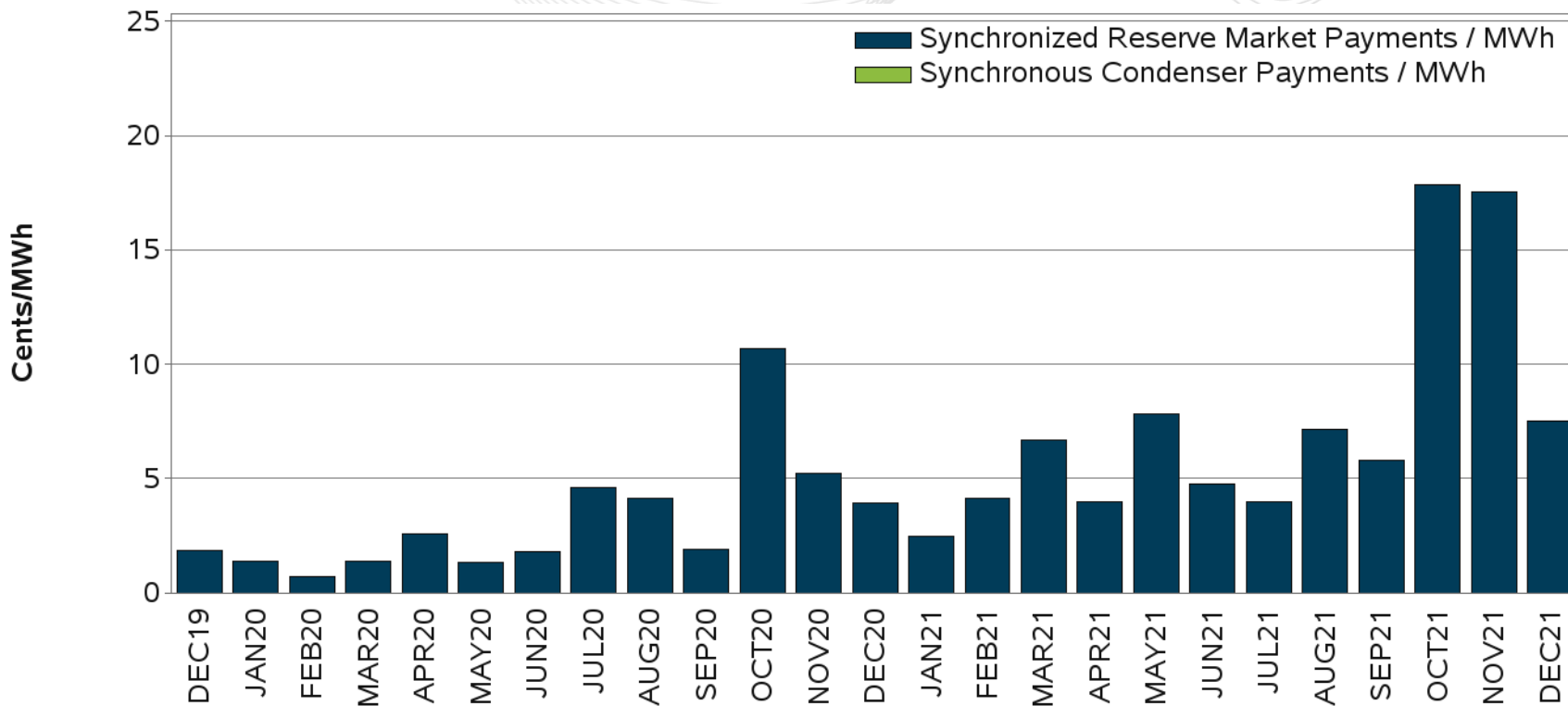
Ancillary Service Market Summary

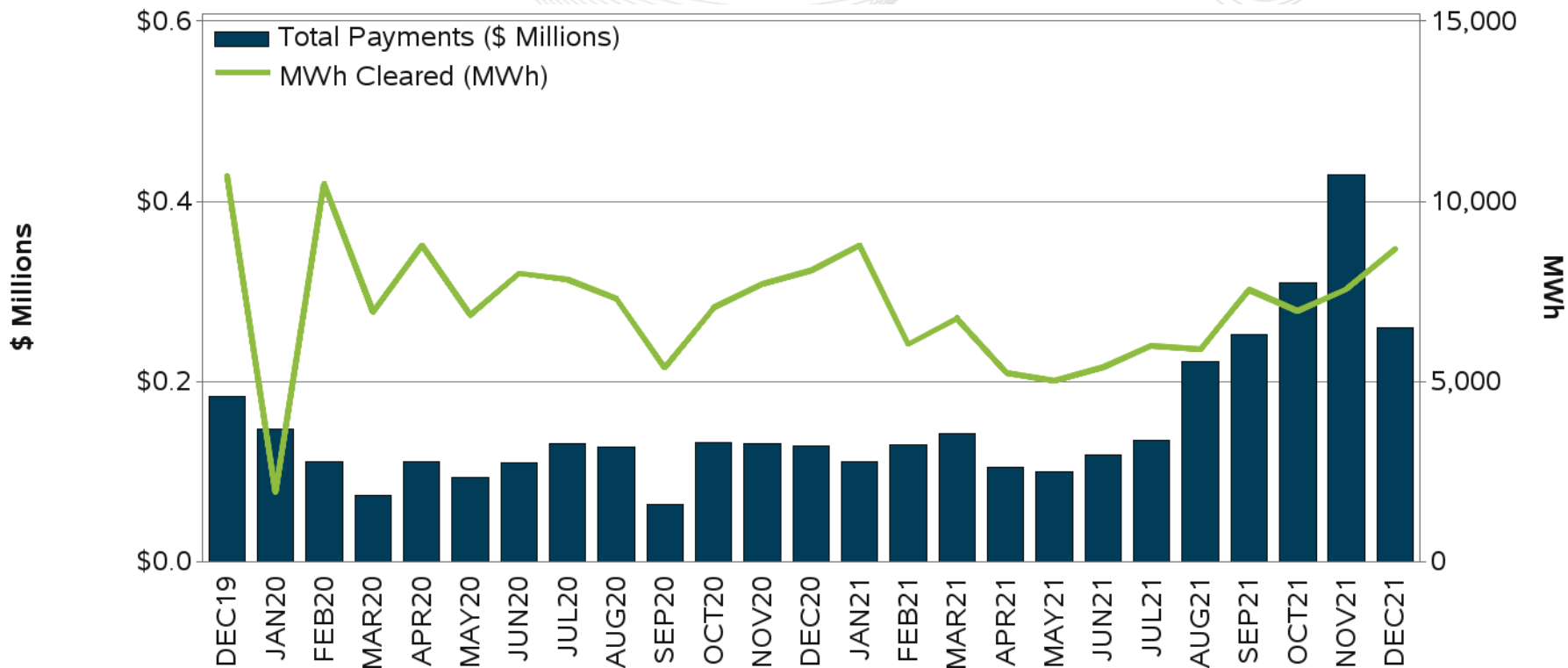


Synchronized Reserve and Synchronous Condenser Costs

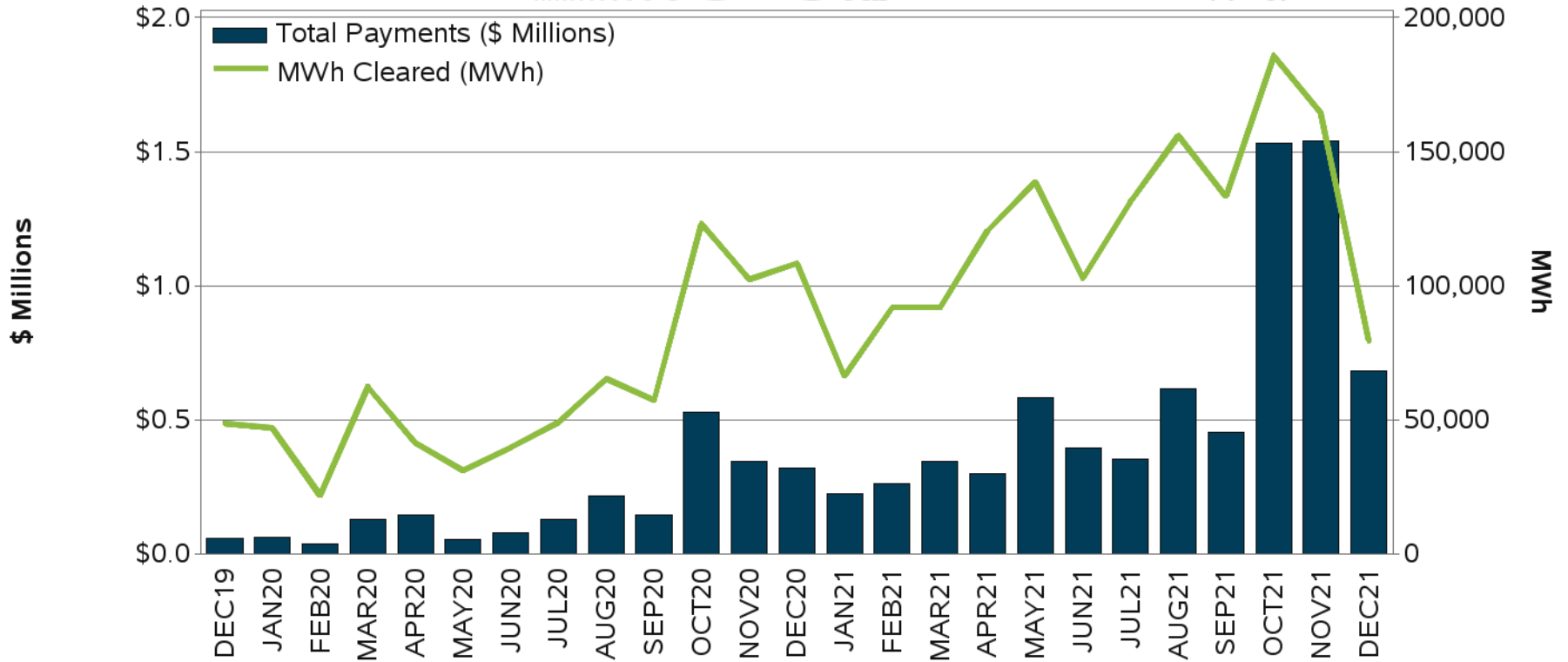


pjm Load-Adjusted Synchronized Reserve and Synchronous Condenser Costs

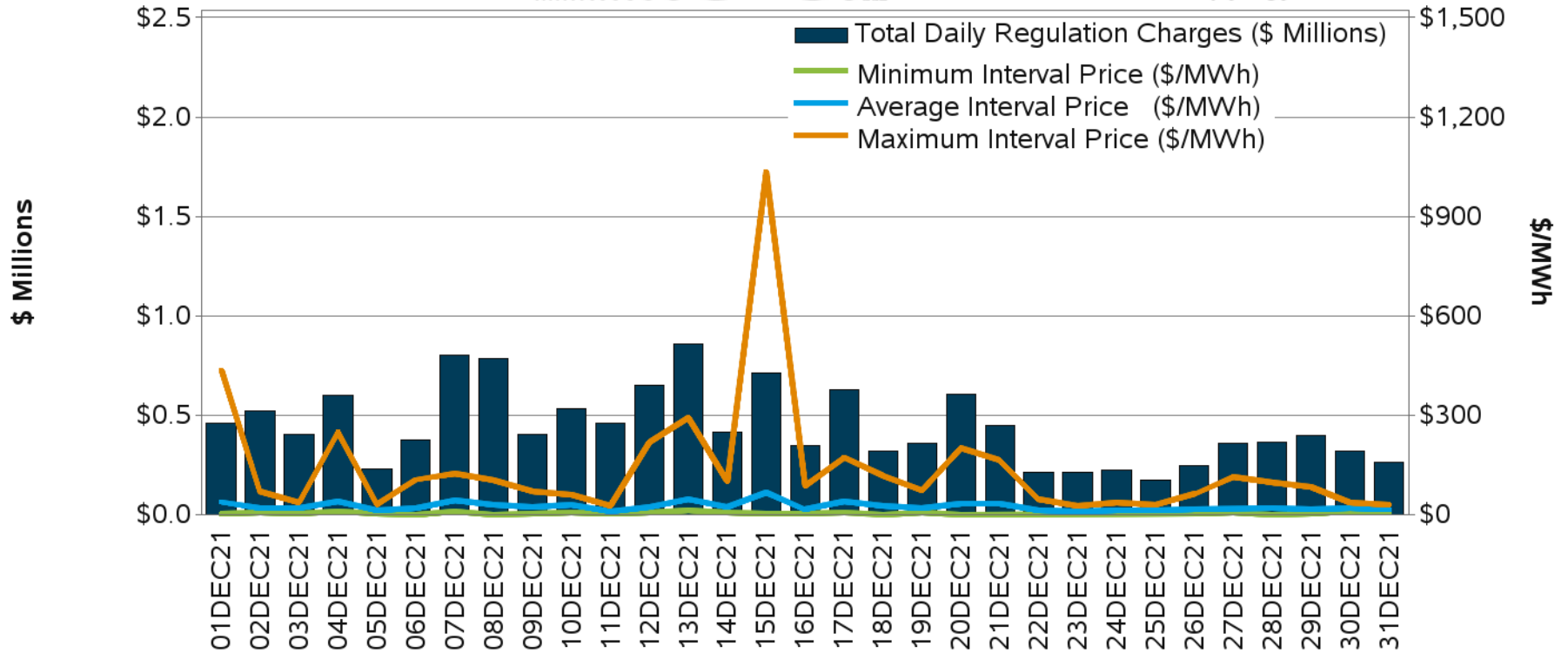




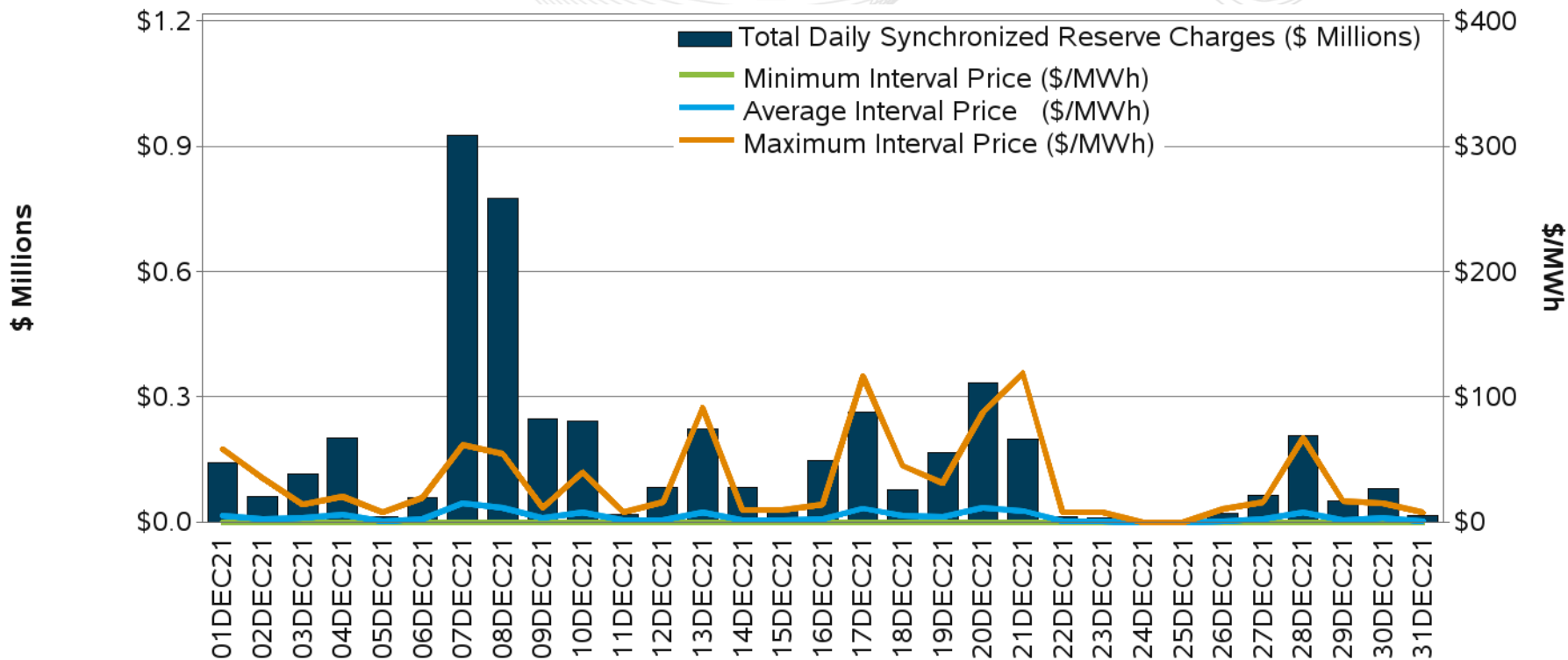
DR Participation in PJM Synchronized Reserve Markets



Regulation Market Daily Prices and Charges



Synchronized Reserve Market Daily Prices and Charges



Jennifer Warner-Freeman
Jennifer.Freeman@pjm.com



Member Hotline

(610) 666 – 8980

(866) 400 – 8980

custsvc@pjm.com

**PROTECT THE
POWER GRID
THINK BEFORE
YOU CLICK!**



Be alert to
malicious
phishing emails.

Report suspicious email activity to PJM.
(610) 666-2244 / it_ops_ctr_shift@pjm.com

