



# Markets Report

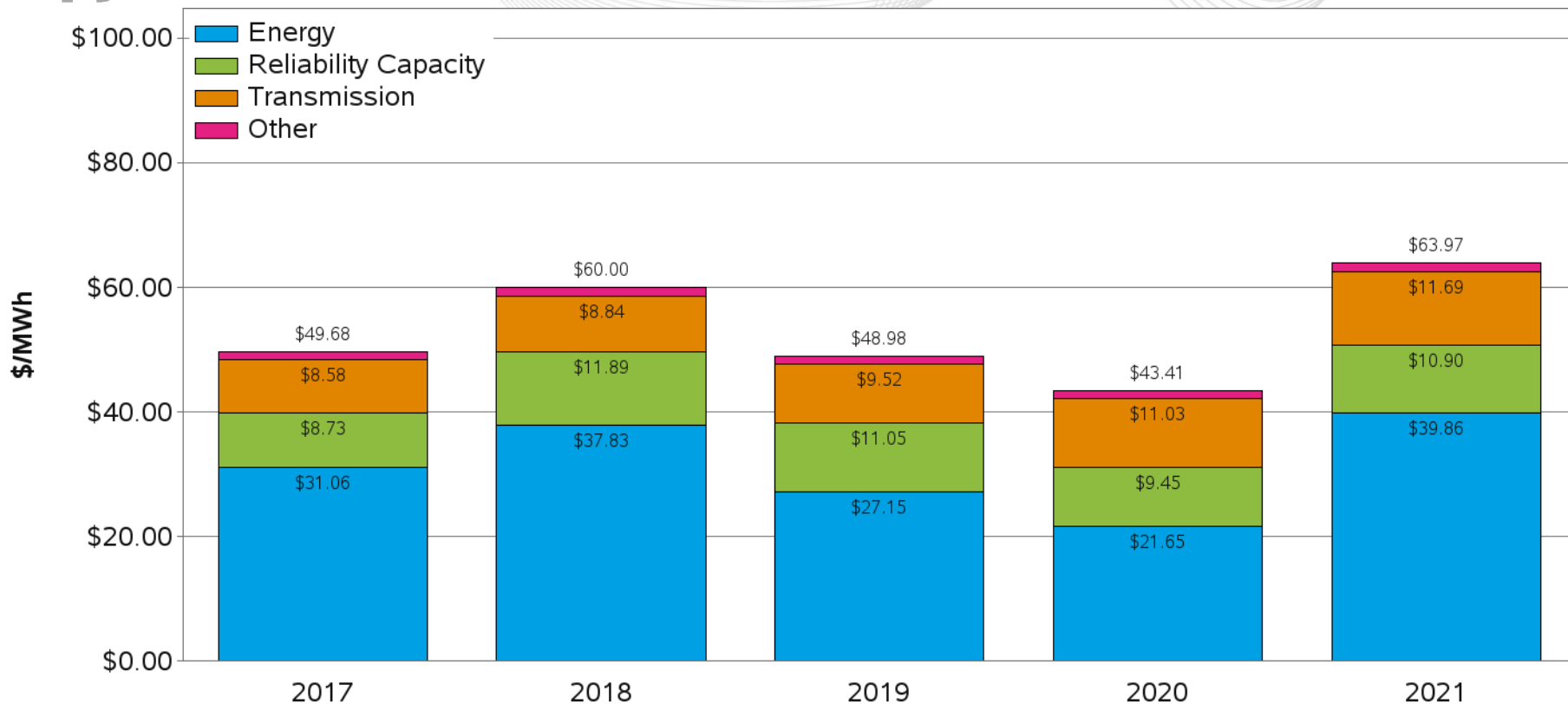
MC Webinar

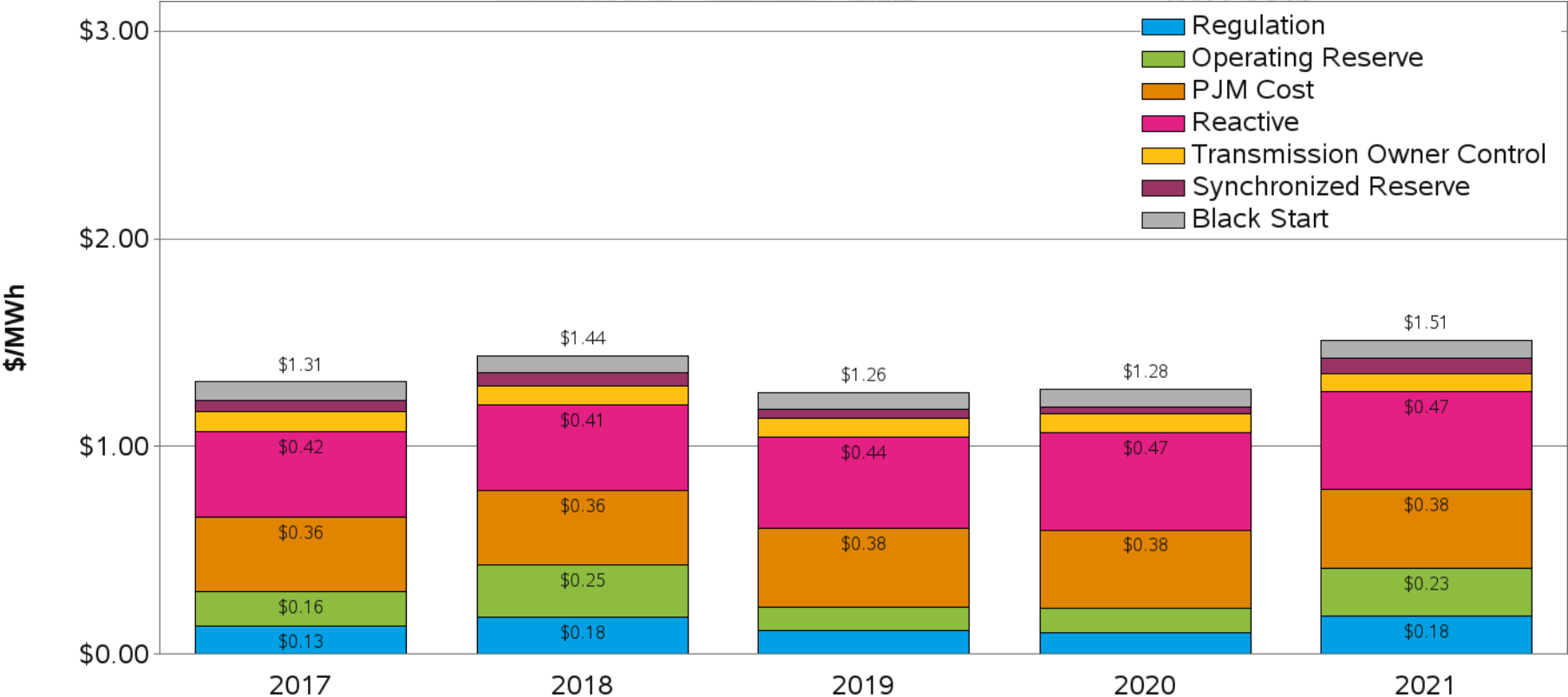
December 13, 2021

- PJM Wholesale Cost for 2021 is \$63.97/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 November, temperatures were below average throughout the month. Thus, the sum of Heating Degree Days was above their historic average. (Slides 8-10)
- Energy use was approximately equal to its historic average for November. (Slides 8-10)
- In November, uplift exceeded \$800,000 on eleven days.(Slides 24 & 25)

- Load-weighted average LMP for 2021 is \$39.86/MWh: (Slides 33 & 34)
  - November 2021 was \$63.00/MWh, which is higher than November 2020 (\$20.70/MWh) and also higher than November 2019 (\$27.20/MWh).
- There were four 5-minute intervals that experienced shortage pricing in November. (Slides 31 & 32)
- FTR revenue adequacy for the month of November is 81% and the 2021-2022 Planning Year is currently funded at 95%. (Slides 49-52)
- Congestion values have been trending upwards with November's level being 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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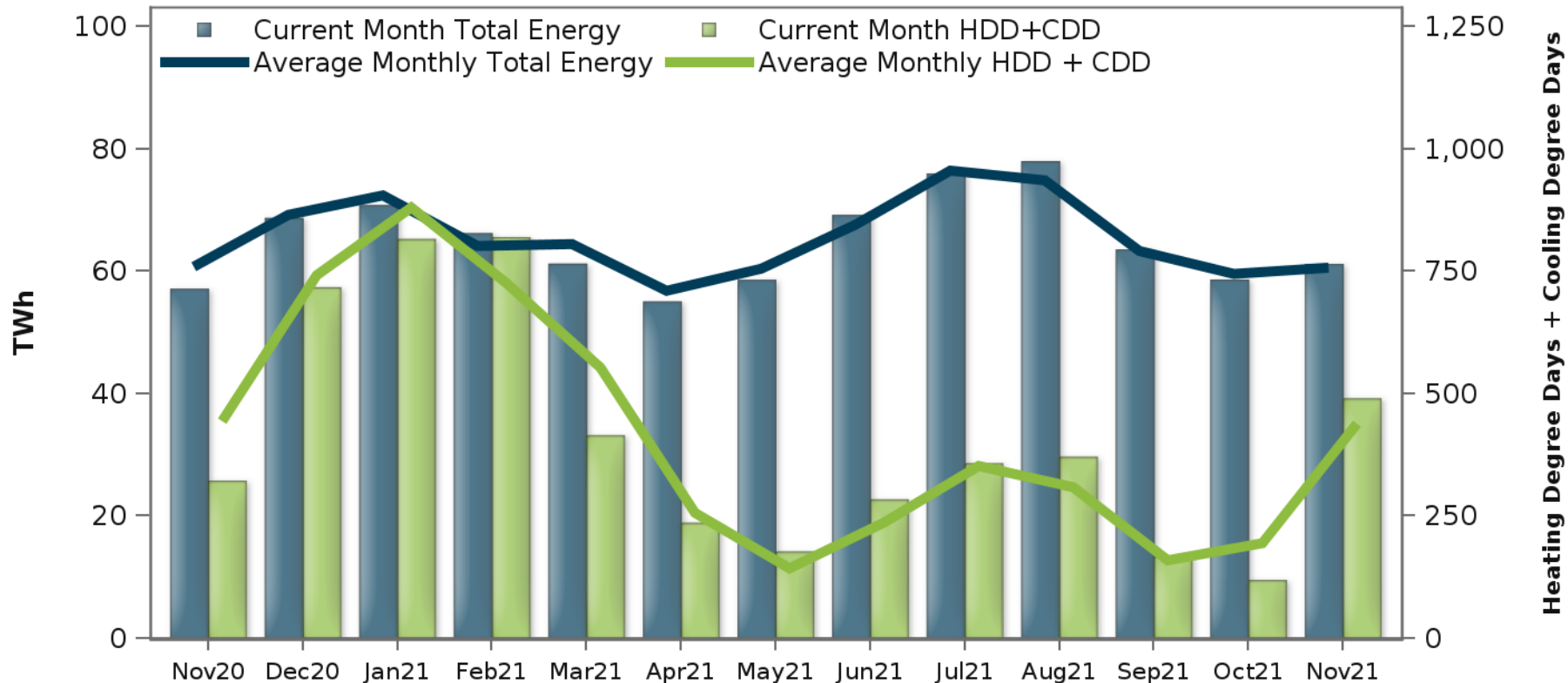


# Market Conditions

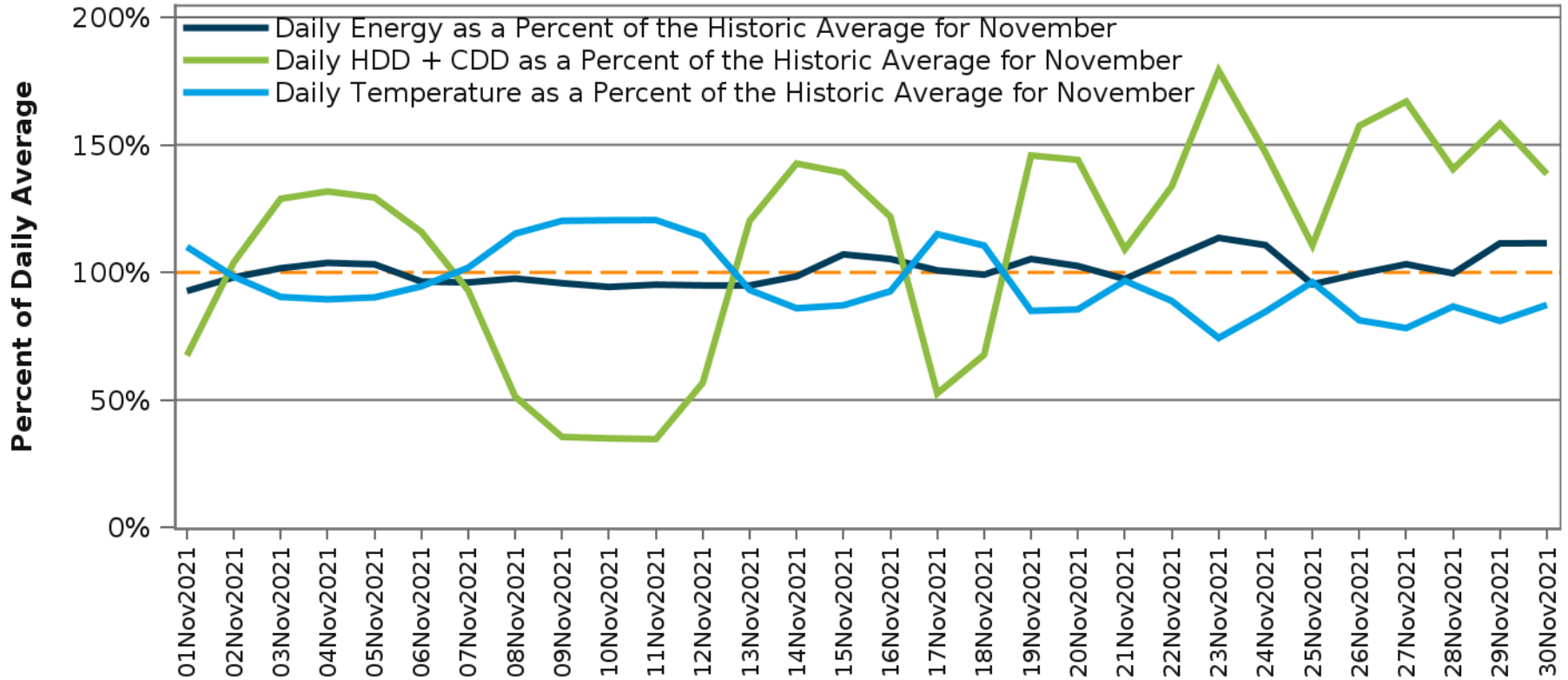
- The weather parameter shown in the following slide is a monthly sum of daily Heating Degree Days (HDD) and Cooling Degree Days (CDD).
- Degree days represent a deviation from a baseline temperature, in this case 60 degrees for HDD and 65 degrees for CDD. As temperatures get more extreme, colder or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

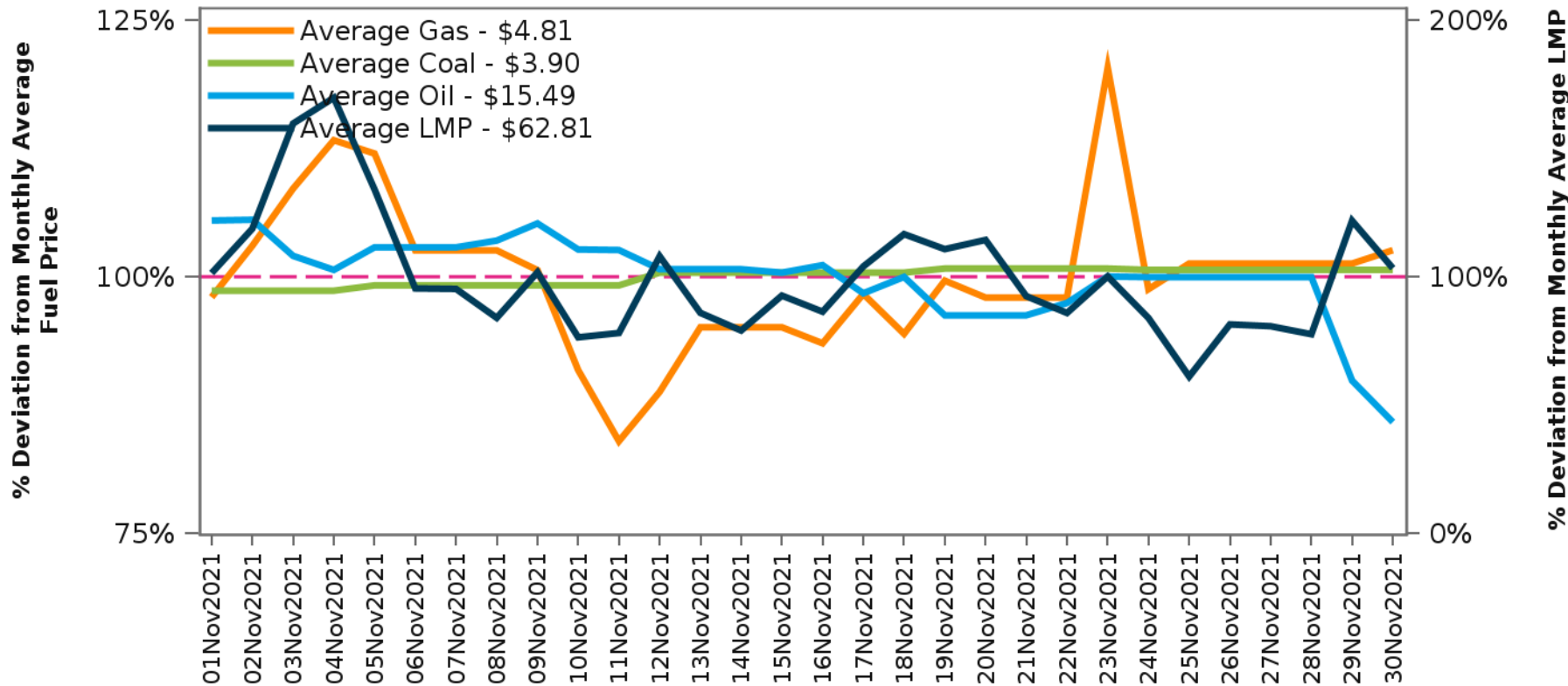


# Historic Average Weather and Energy versus Current Month



# Historic Average Weather and Energy versus Current Month - Daily

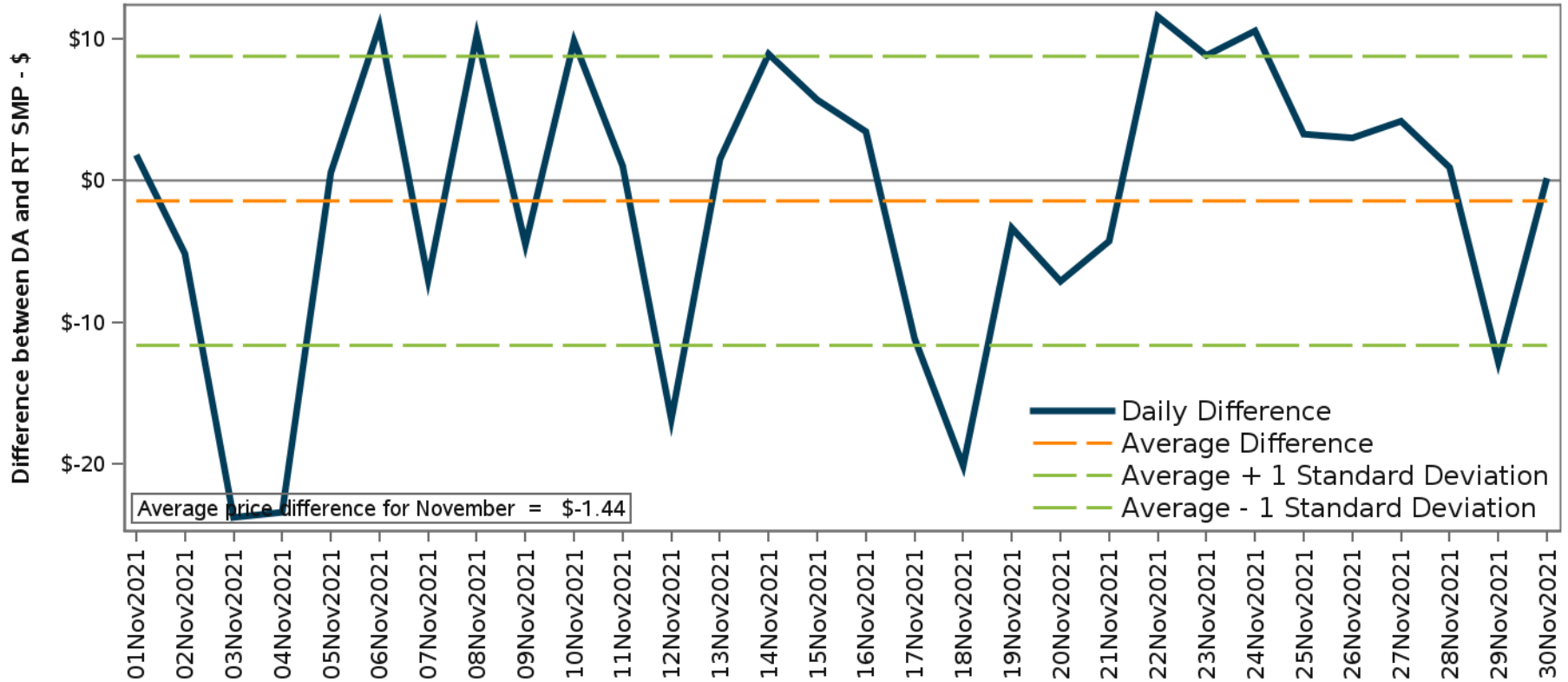




Fuel Price Source: S&P Global Platts



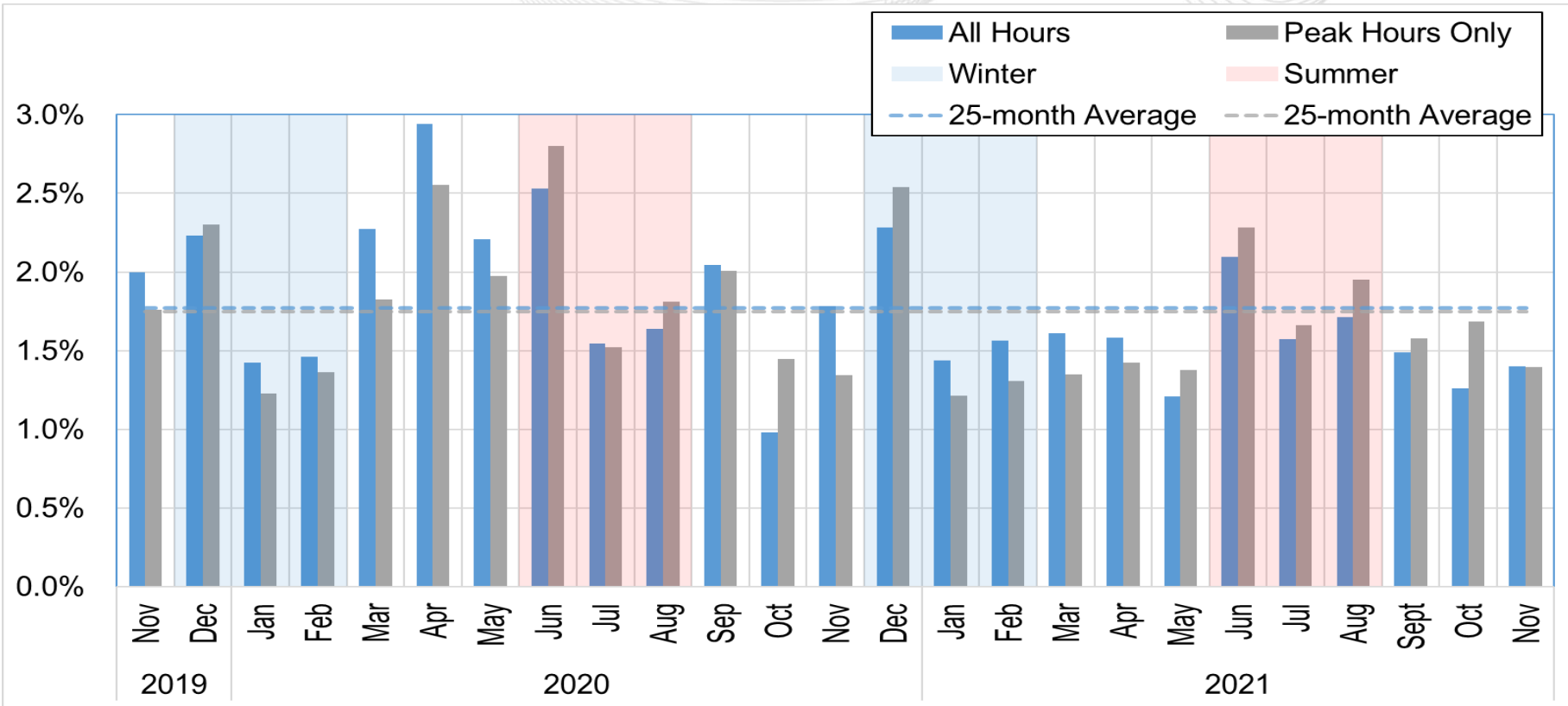
# Daily Difference Between Day-Ahead and Real-Time System Marginal Prices



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

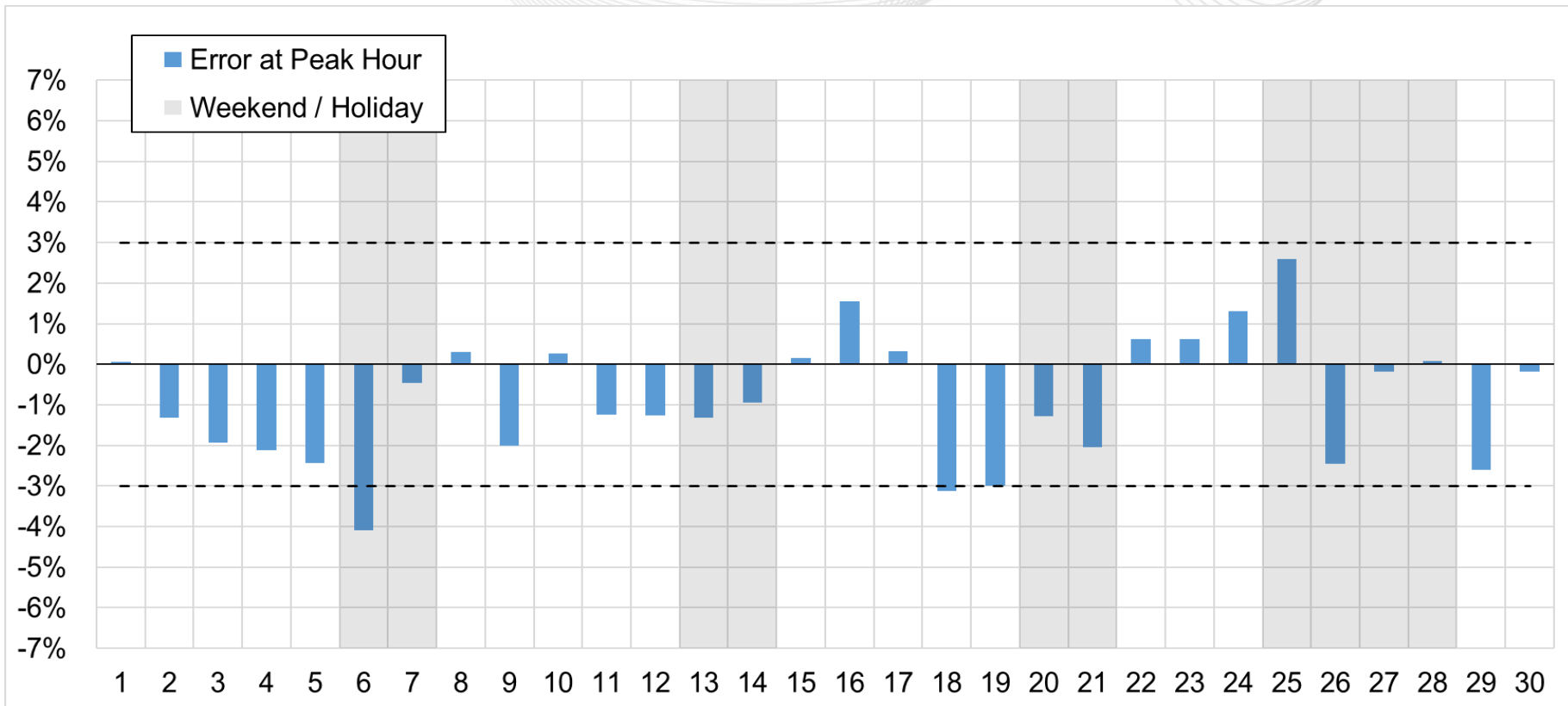


# Load Forecast Error – Monthly Absolute Error, 10:00 Forecast





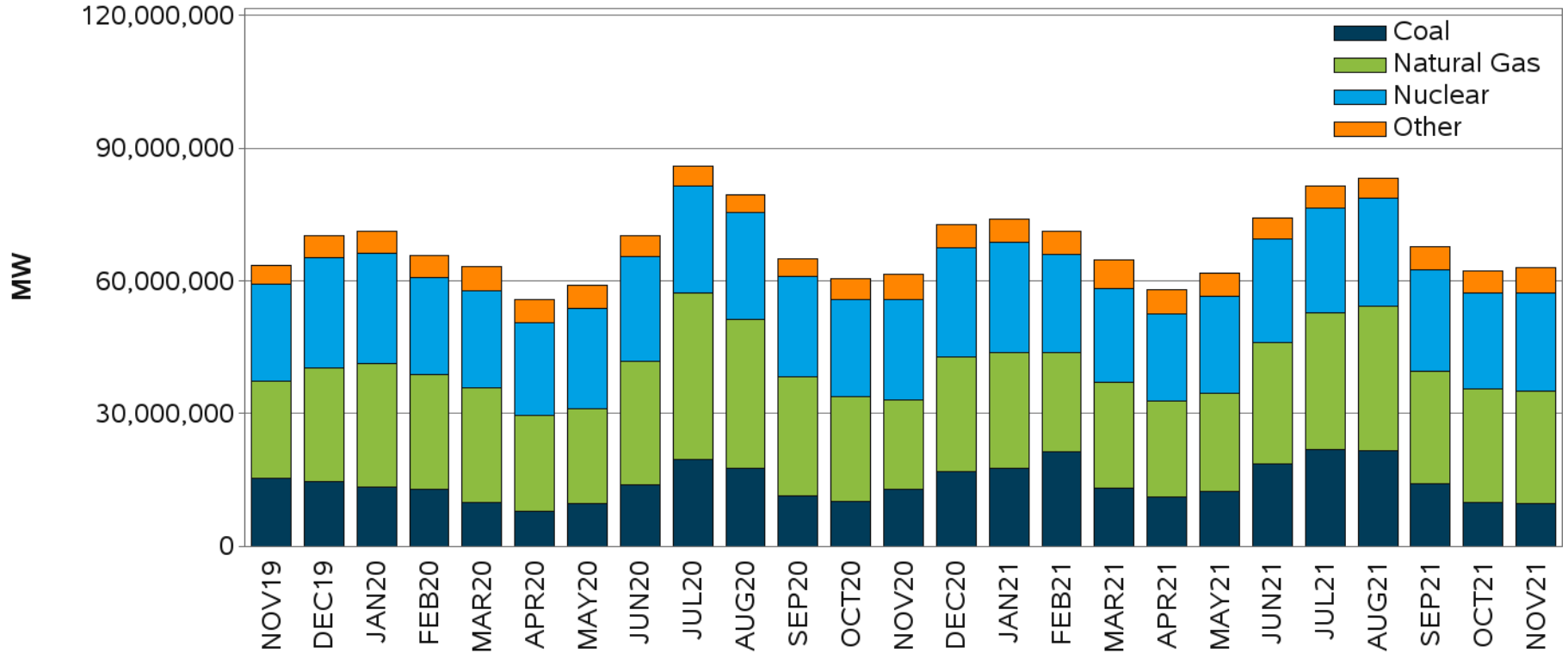
# Load Forecast Error – November Daily Peaks, 10:00 Forecast



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

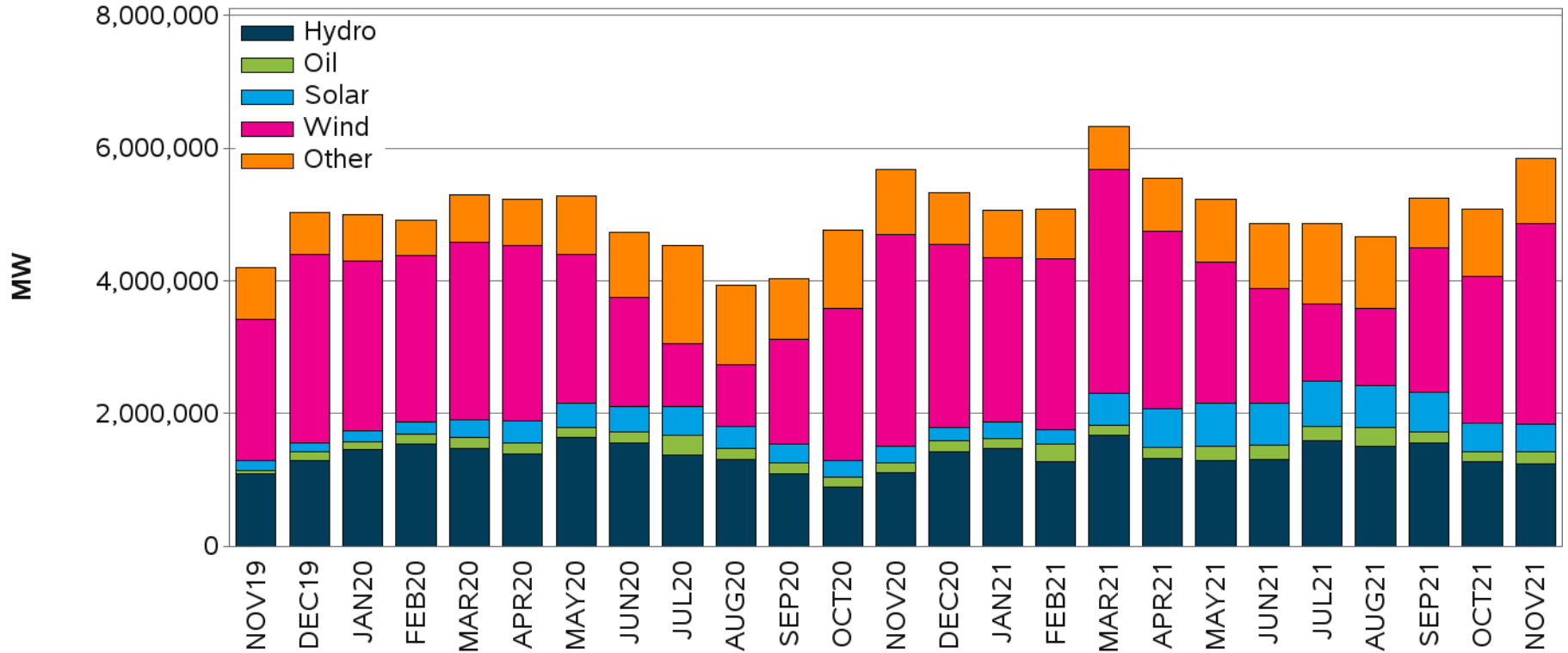
This forecast is not used to clear the day-ahead market and is not utilized for the reliability tools that run subsequent to the day-ahead market.

- *PJM experienced some of the first cold weather of the season early in the month of November, contributing to the load forecast model error observed on the morning of November 6<sup>th</sup>. The most significant outliers in the hourly error this month occurred over Thanksgiving and Black Friday during non-peak hours. The unique and highly weather-dependent nature of this holiday load paired with a passing cold front made this year's shape particularly difficult to forecast, though manual adjustments made to the model output were beneficial.*

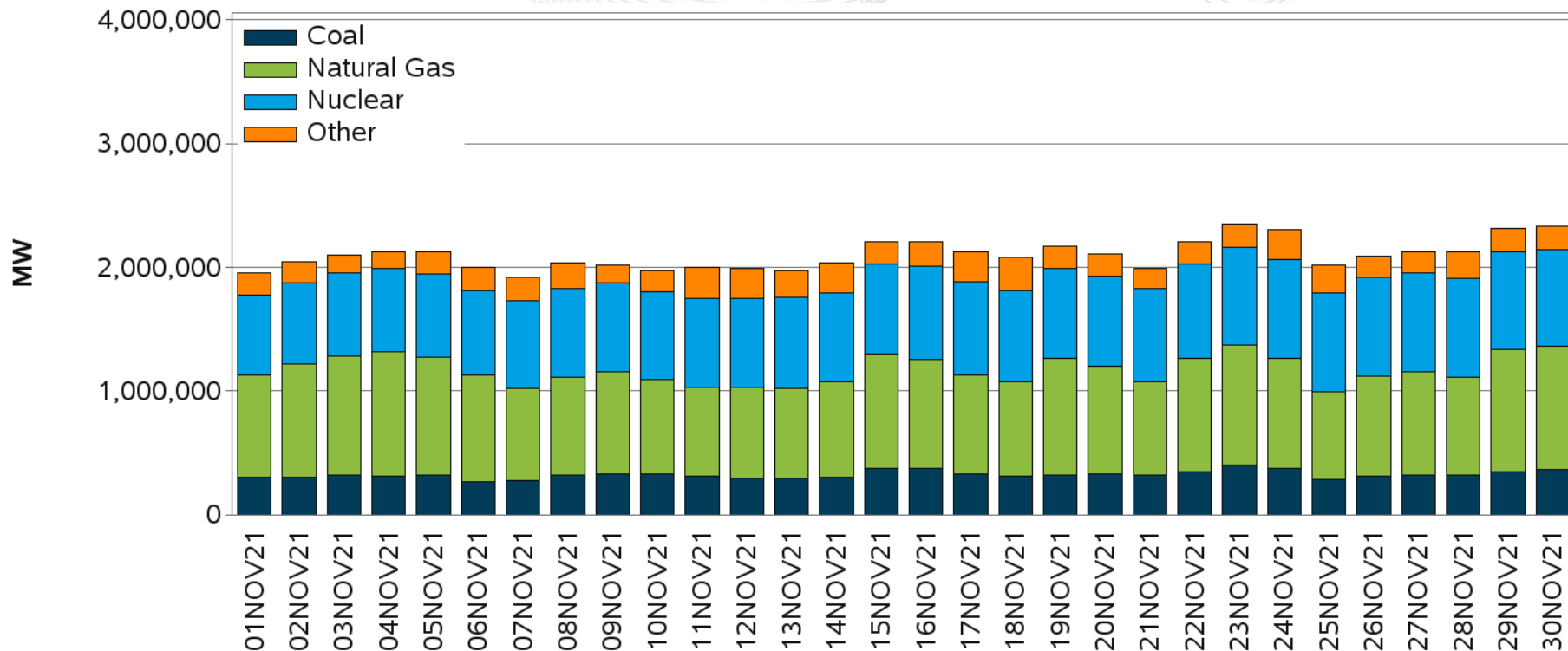


\*Other\* includes Hydro, Oil, Solar, Wind, and Other



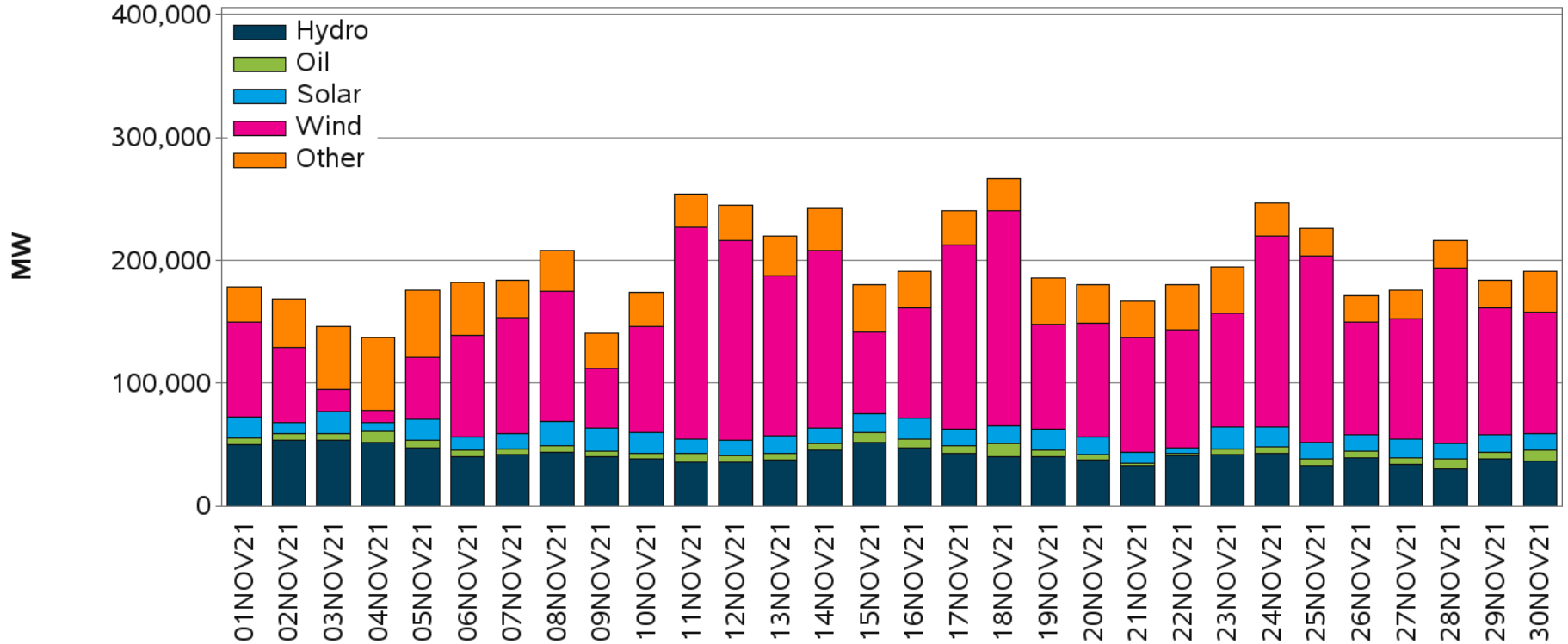


'Other' includes Flywheels, Multiple Fuels, Storage, and Other Renewables



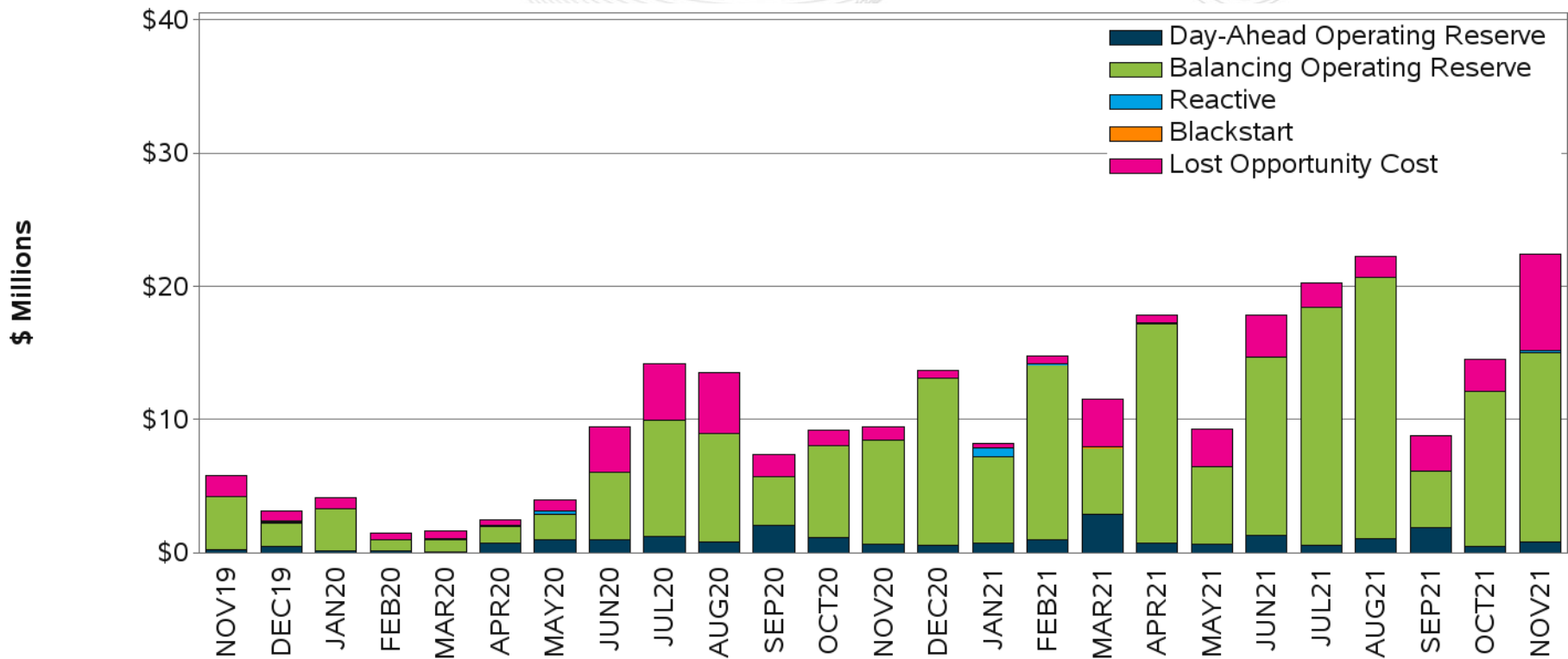
\*Other\* includes Hydro, Oil, Solar, Wind, and Other

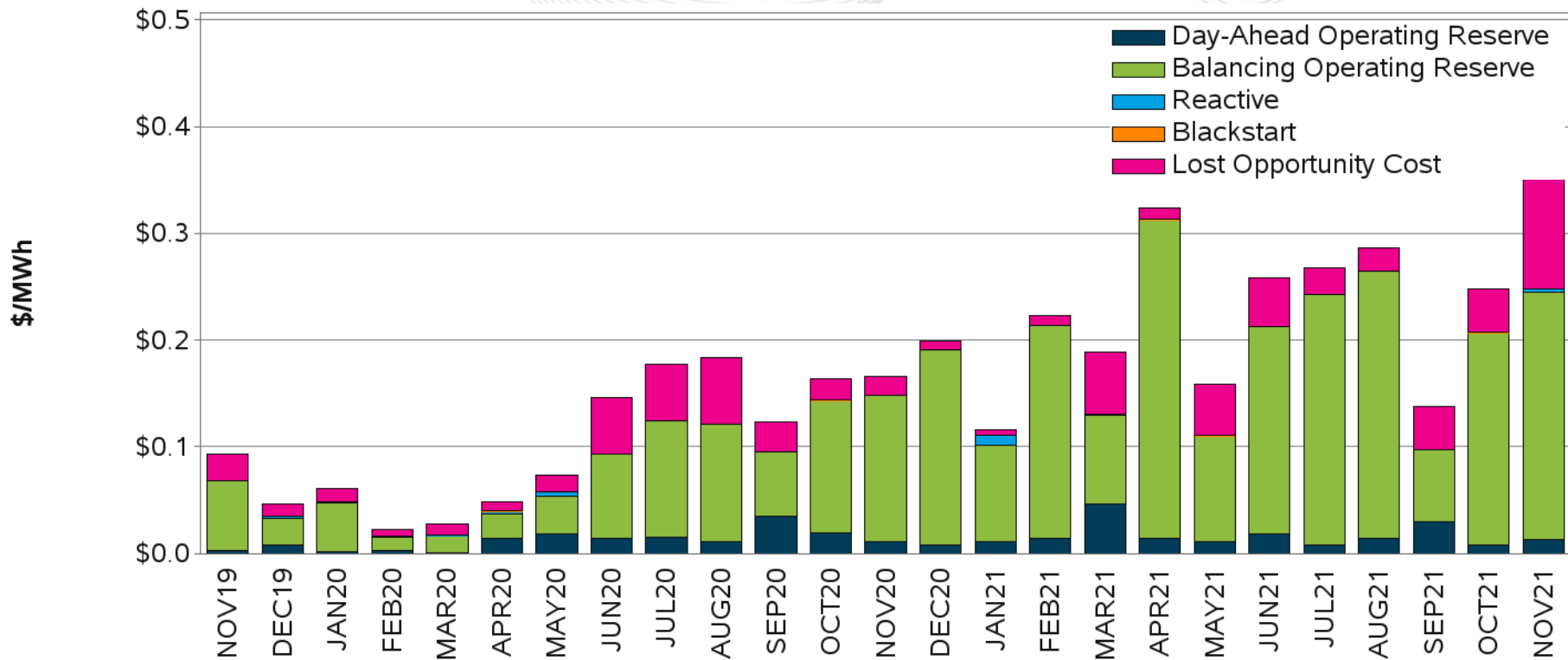
# Daily Generation by Fuel, Other - November

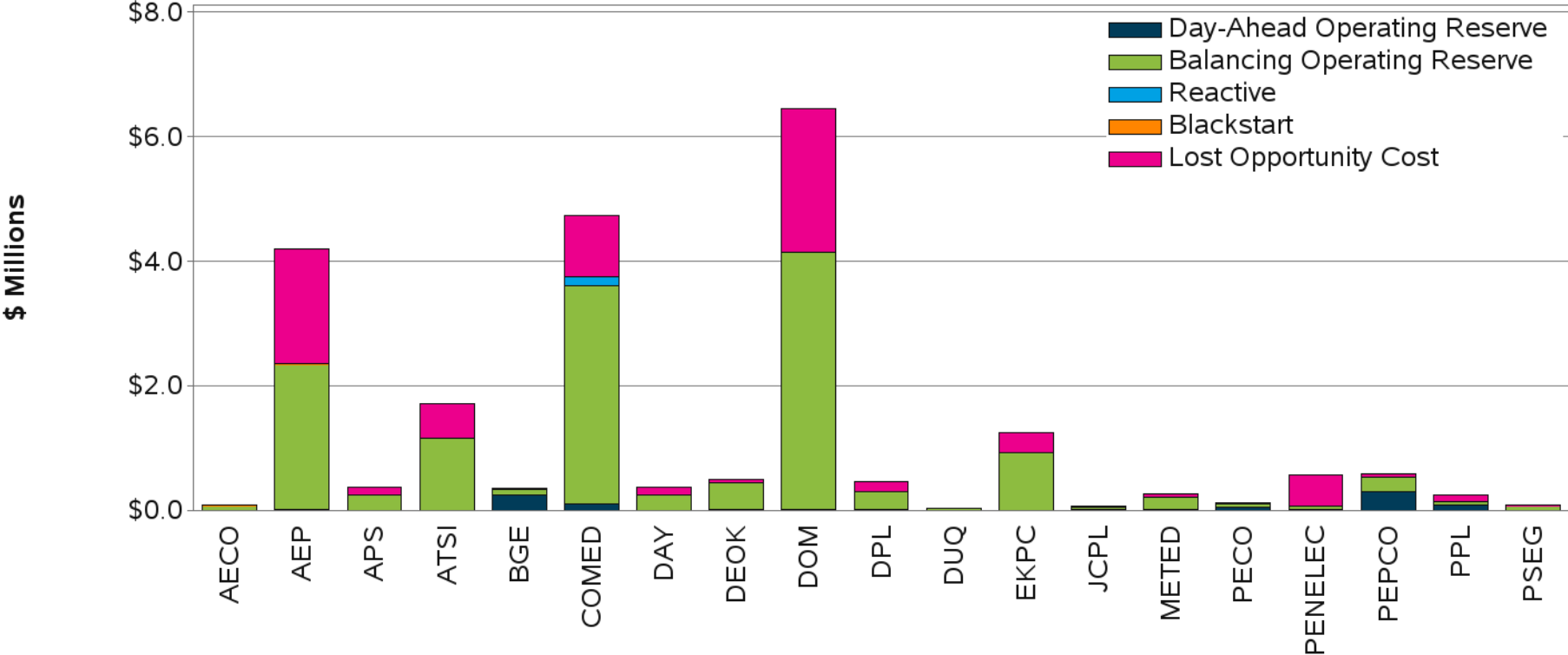


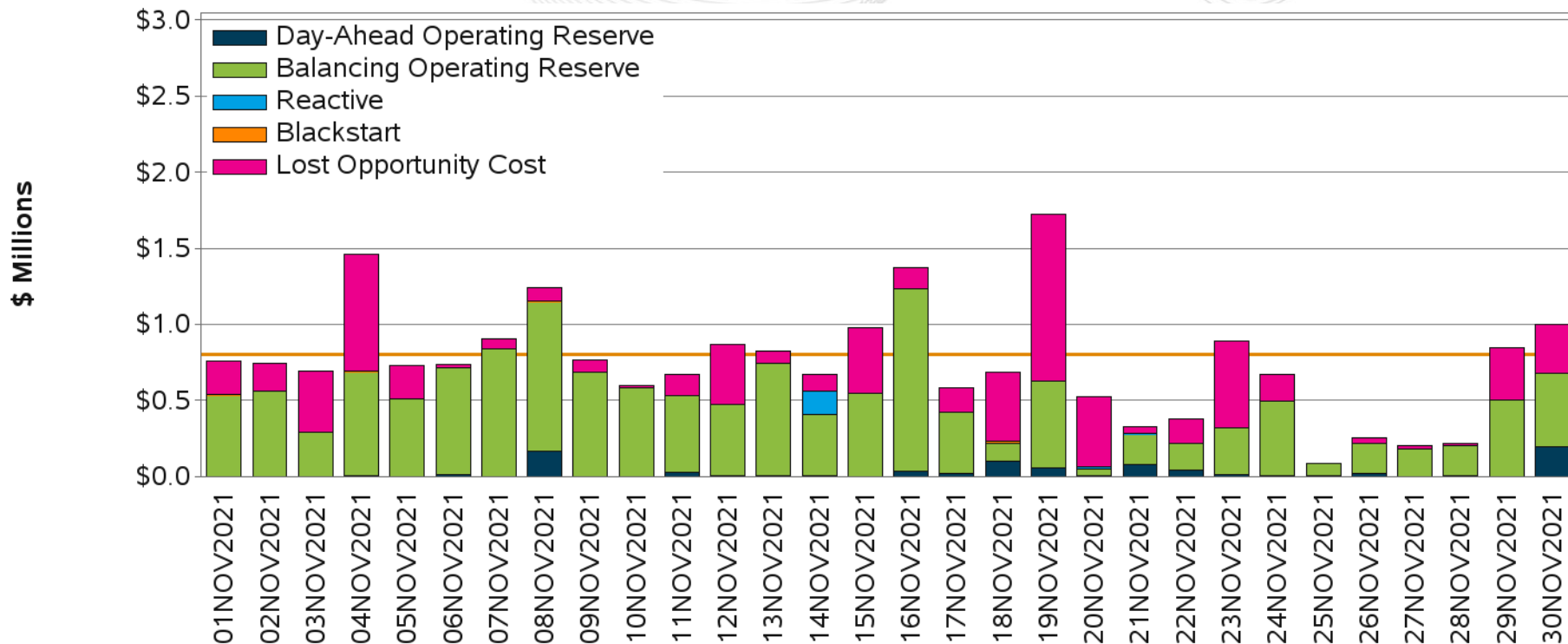
'Other' includes Flywheels, Multiple Fuels, Storage, and Other Renewables

# Operating Reserve (Uplift)











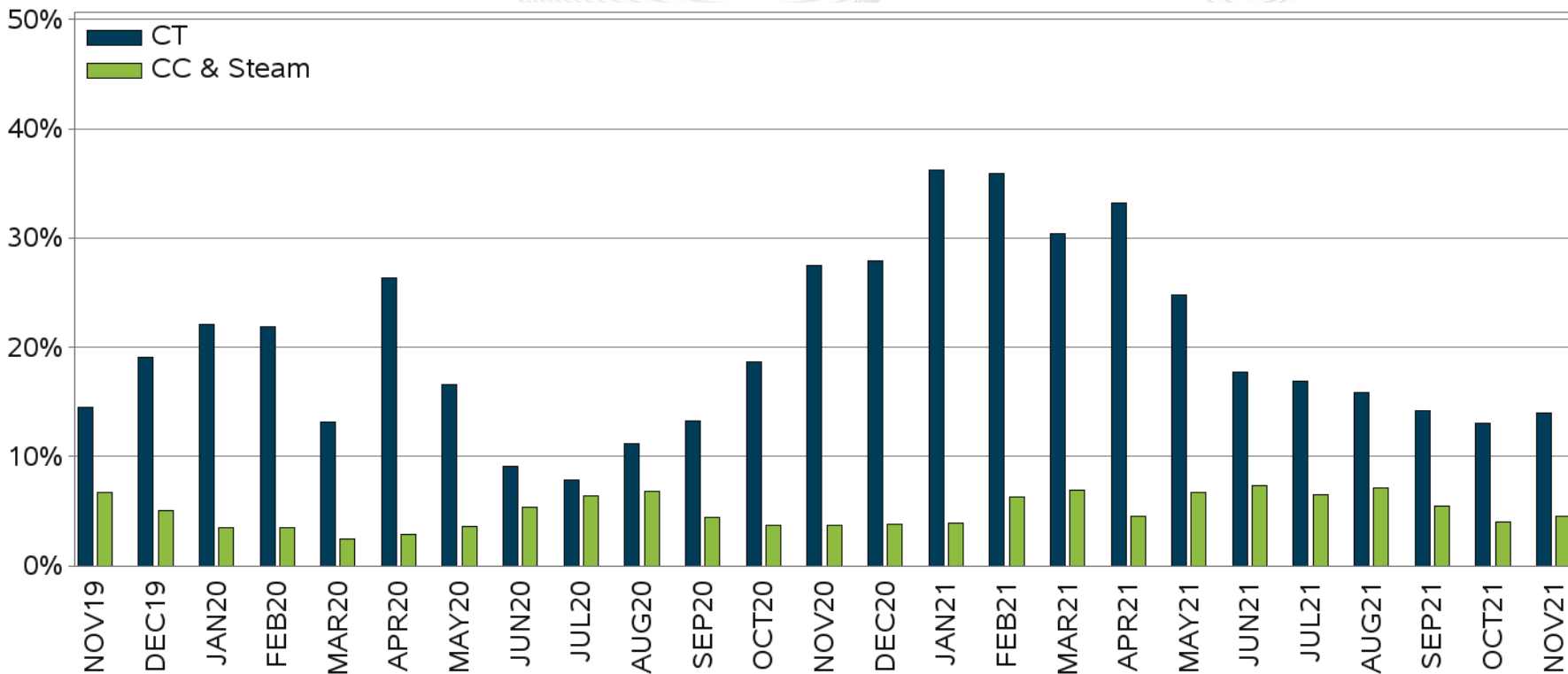
In October, uplift exceeded \$800,000 on eleven days.

Contributing factors to uplift were:

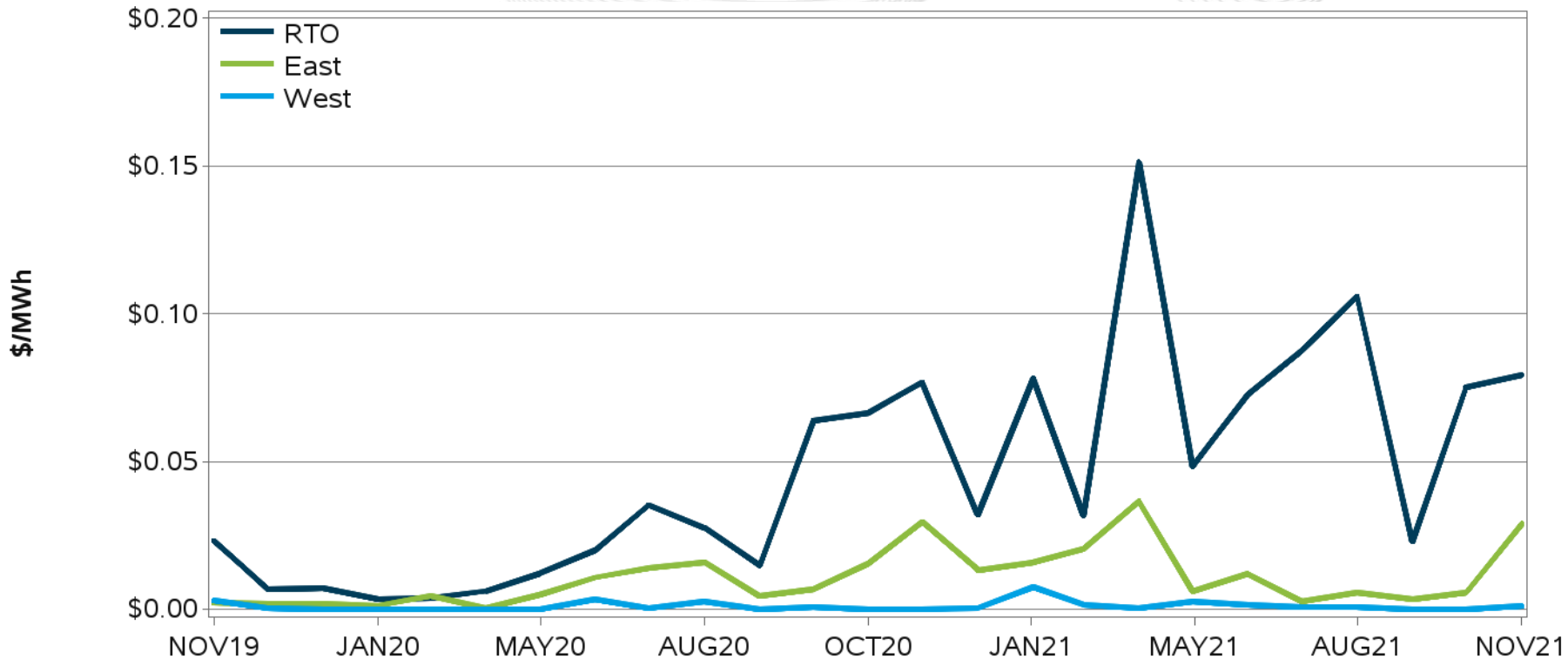
- Constraint volatility is contributing to the more recent trend of higher BOR/LOC.

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

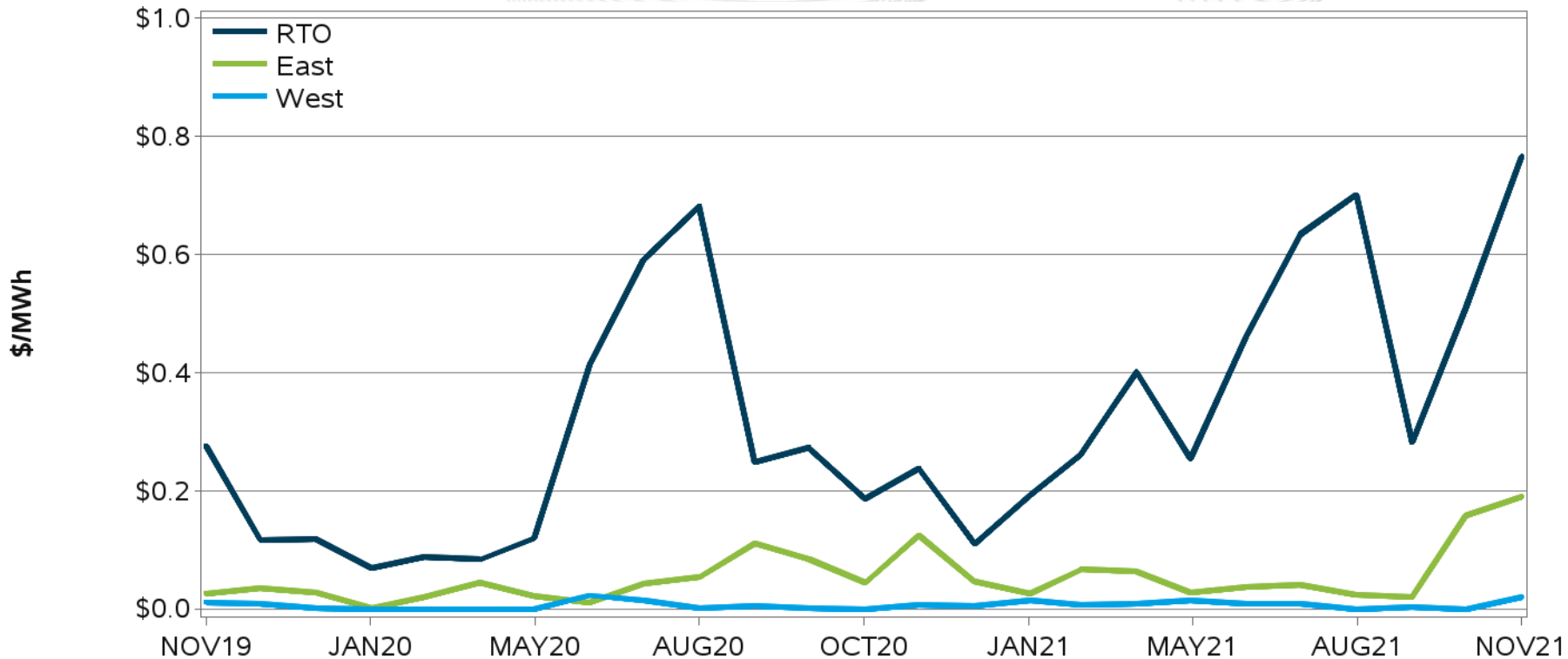
# Percent of Total CT, CC and Steam Hours with LMP < Offer



- 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.

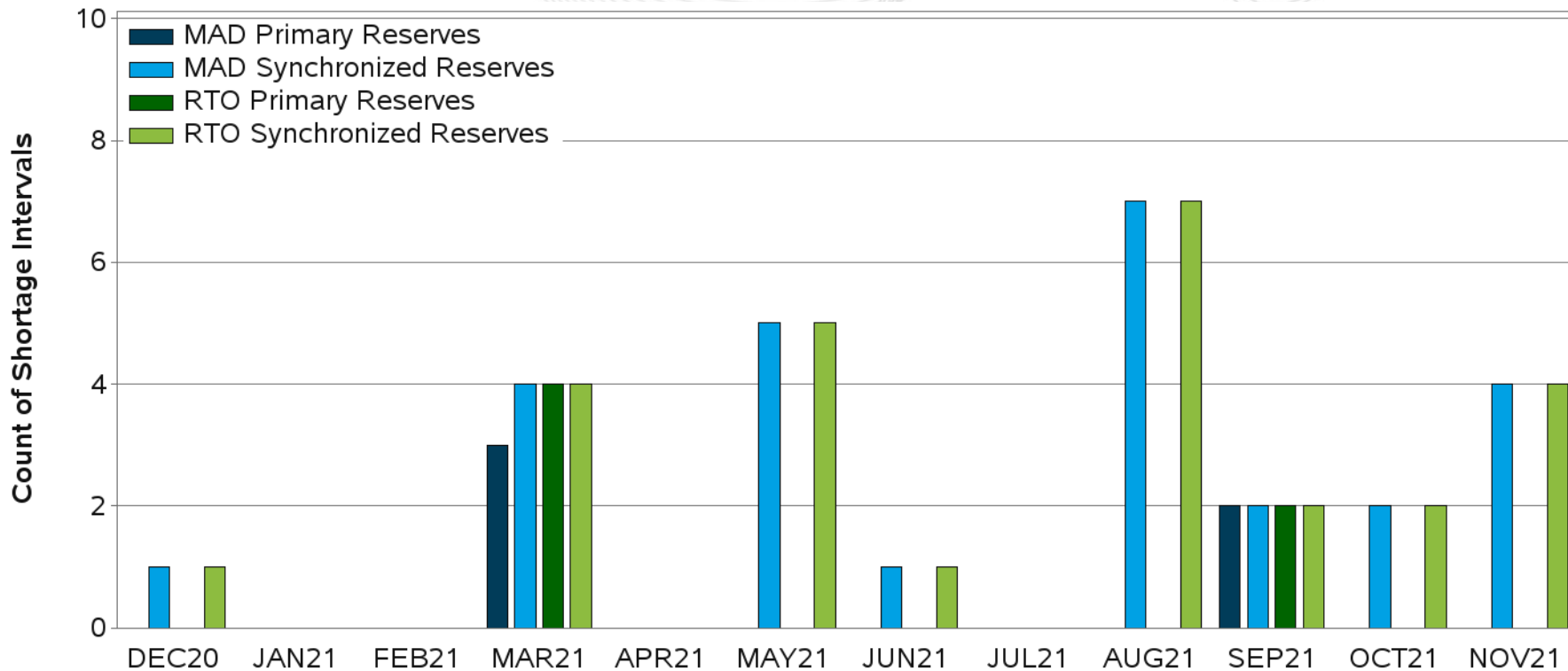


# Deviations Balancing Operating Reserve Rates



# Energy Market

# LMP Summary

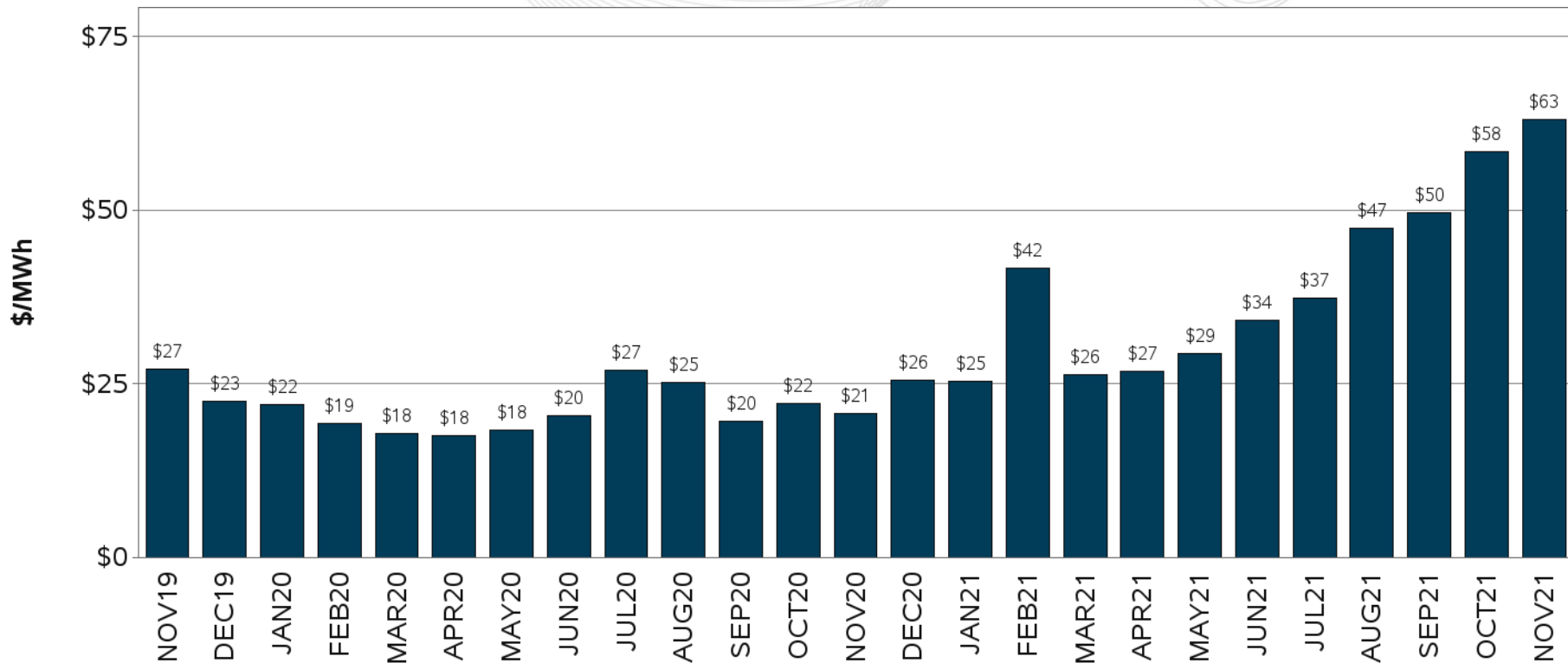


Date	5-minute Interval	Reserve Penalty Factors	5-minute Interval SMP	Hourly Integrated SMP
Friday, November 12, 2021	17:20 - 17:25	2nd step penalty for Synchronized Reserve deficiencies in MAD	\$710.58	\$346.46
Friday, November 12, 2021	17:25 - 17:30	2nd step penalty for Synchronized Reserve deficiencies in MAD	\$702.09	\$346.46
Friday, November 12, 2021	17:30 - 17:35	2nd step penalty for Synchronized Reserve deficiencies in MAD	\$918.17	\$346.46
Friday, November 12, 2021	17:35 - 17:40	2nd step penalty for Synchronized Reserve deficiencies in MAD	\$918.17	\$346.46

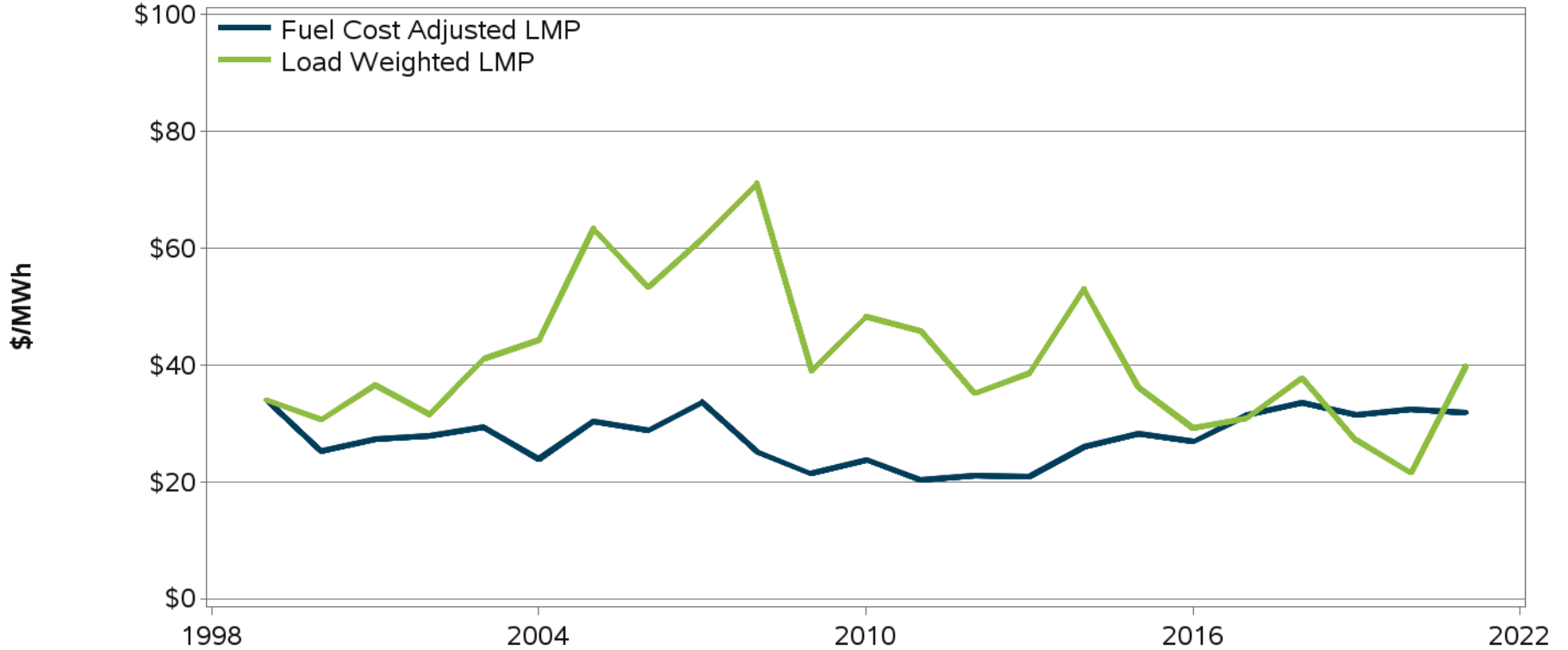
Information on constraints and shadow prices can be found here:

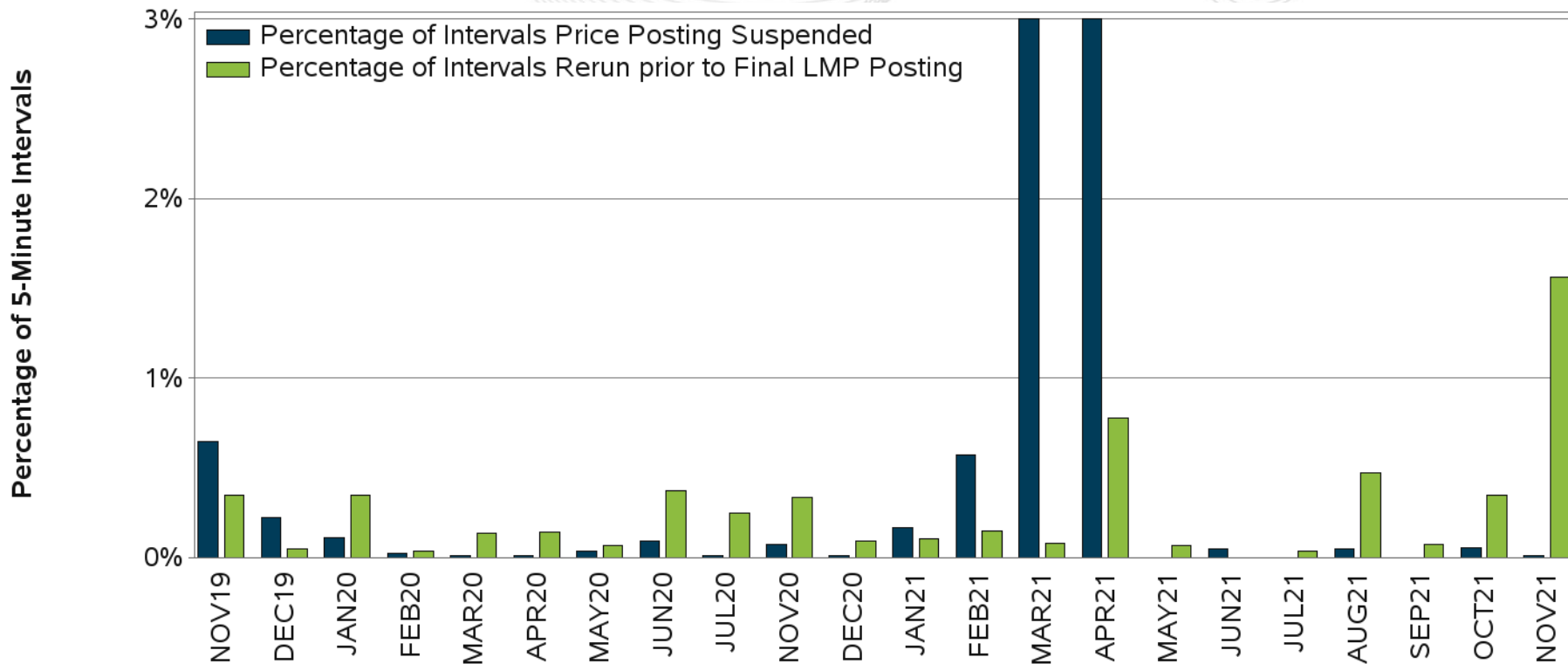
[http://dataminer2.pjm.com/feed/rt\\_marginal\\_value](http://dataminer2.pjm.com/feed/rt_marginal_value)





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

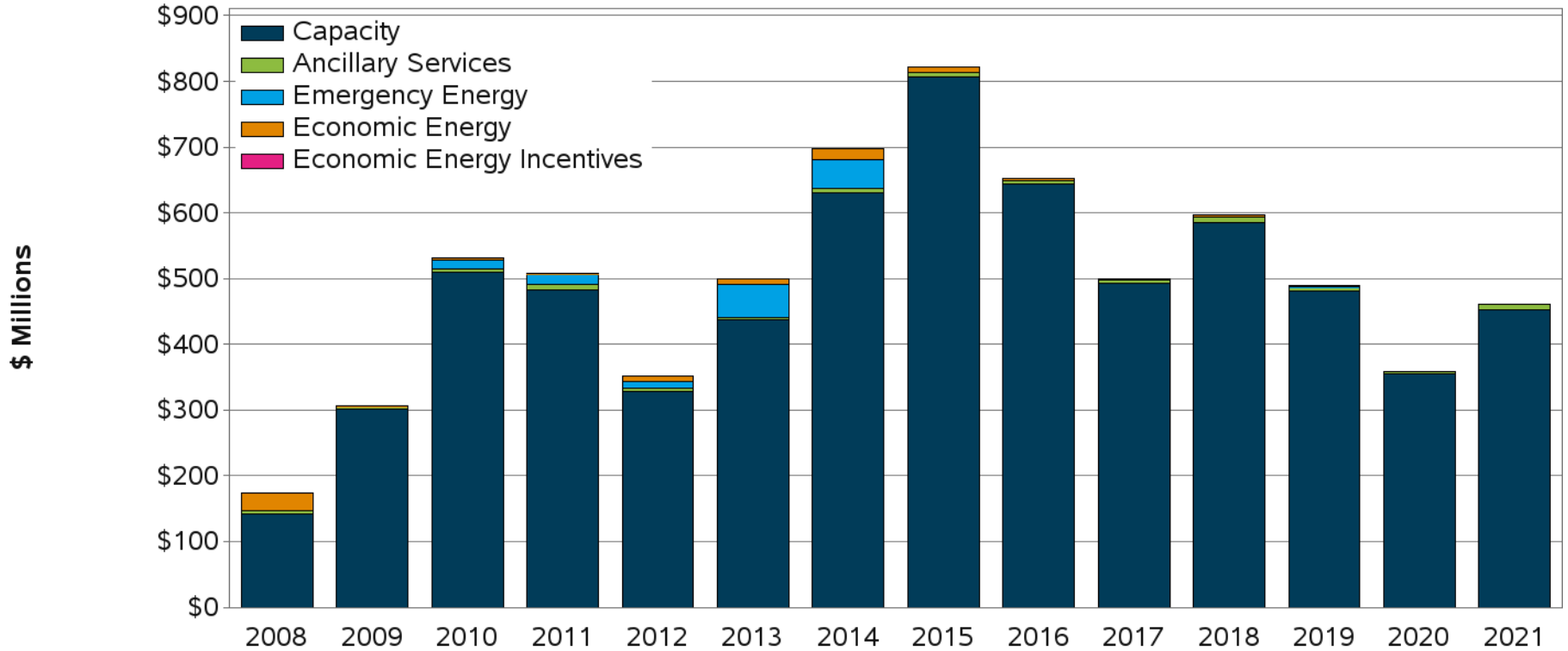


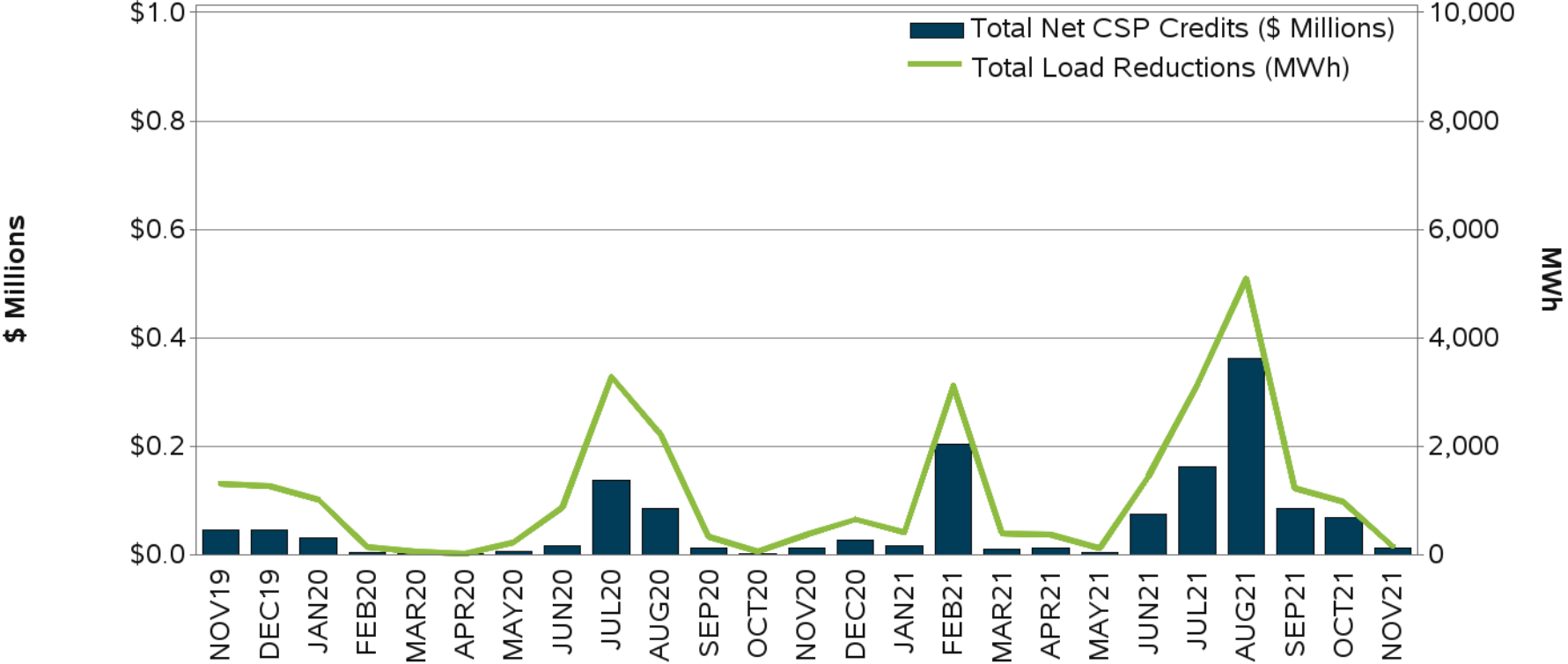


Spikes seen in March and April 2021 are incorrect and due to a software bug which has since been fixed.

# Energy Market

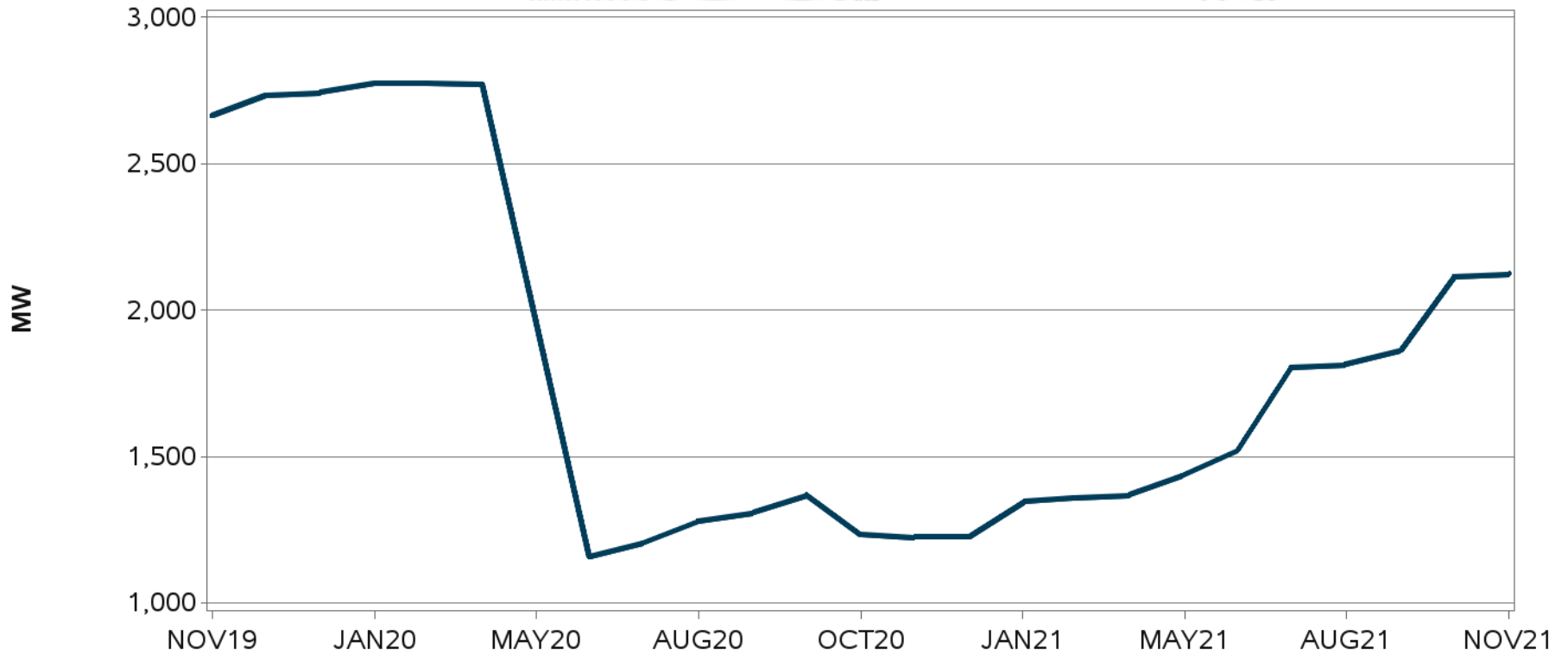
# Demand Response Summary





\*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



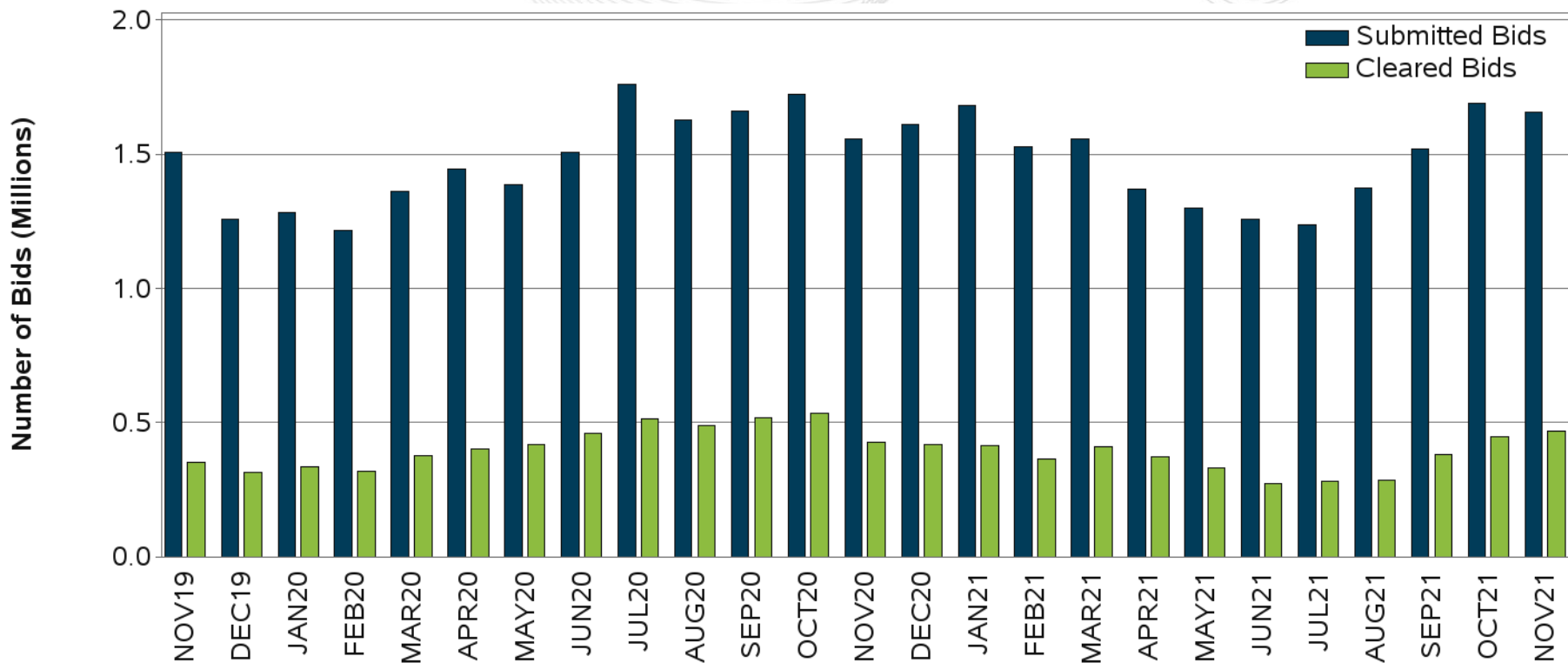
# Energy Market

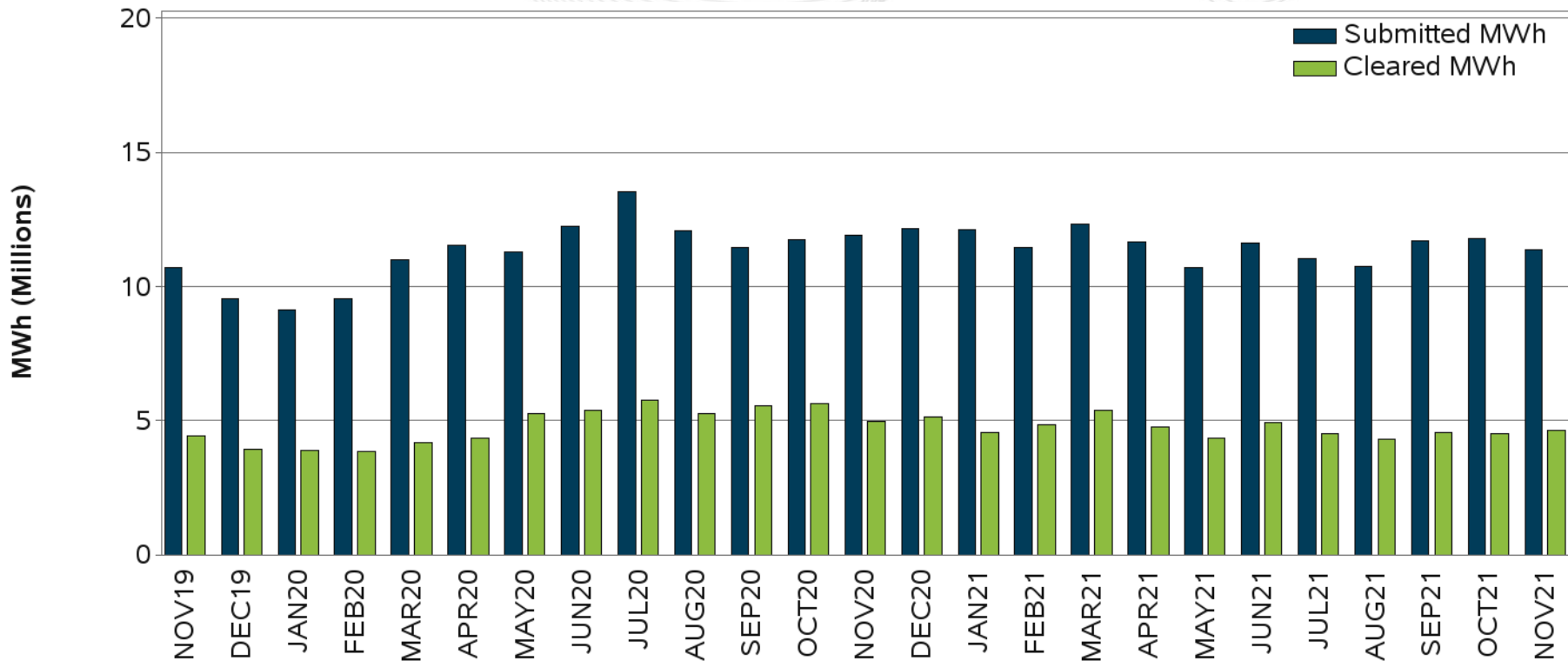
## Virtual Activity Summary



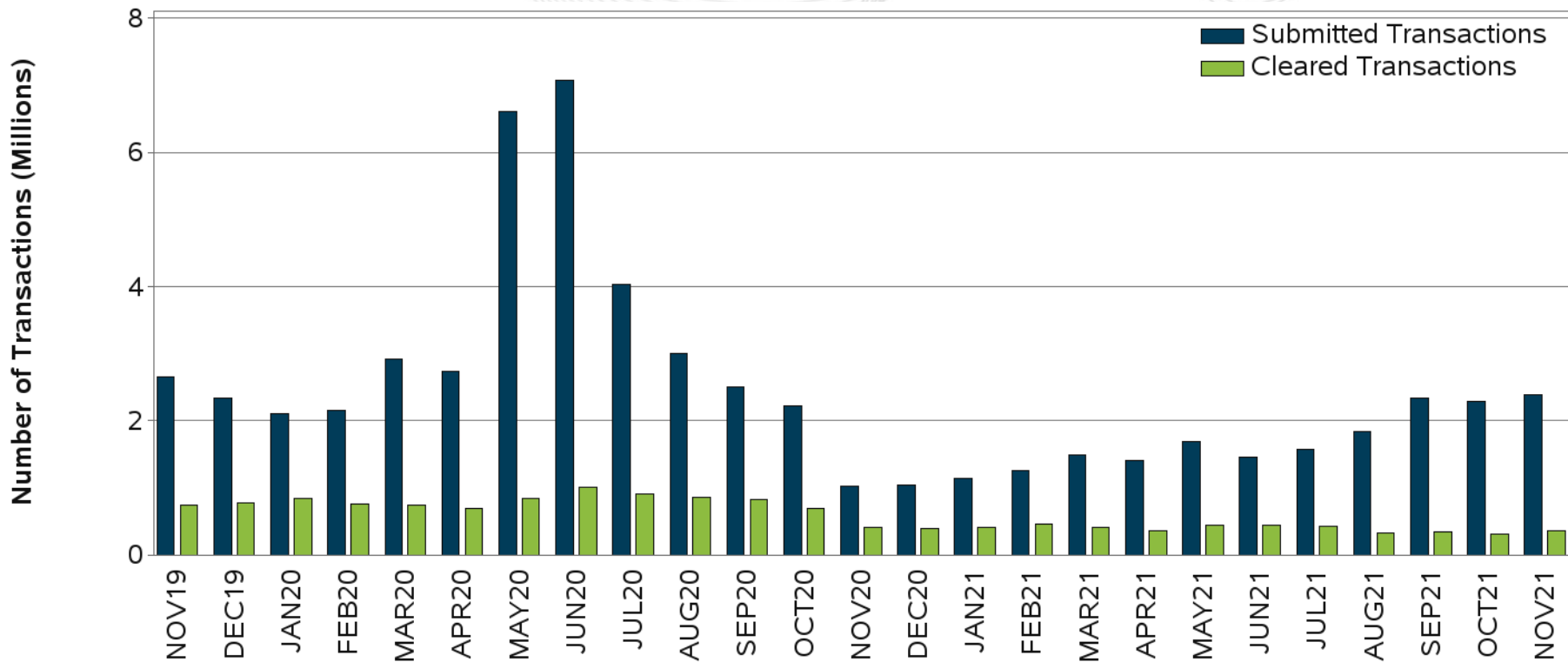
- The following six charts depict trends in submitted and cleared virtual and up-to-congestion transactions, in terms of number and volume, into the PJM Energy Market. The first two of these charts show the submitted and cleared increment and decrement bids (virtual transactions or virtuals) and they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

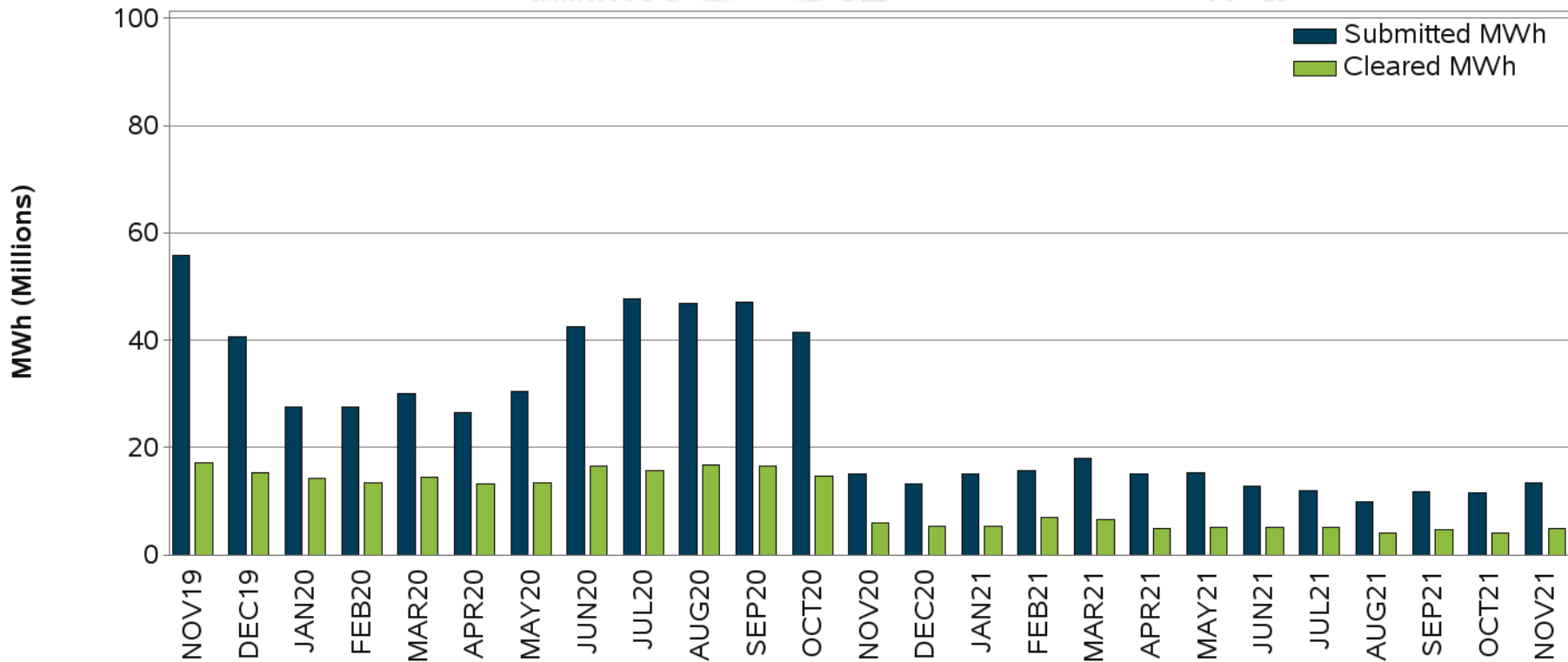




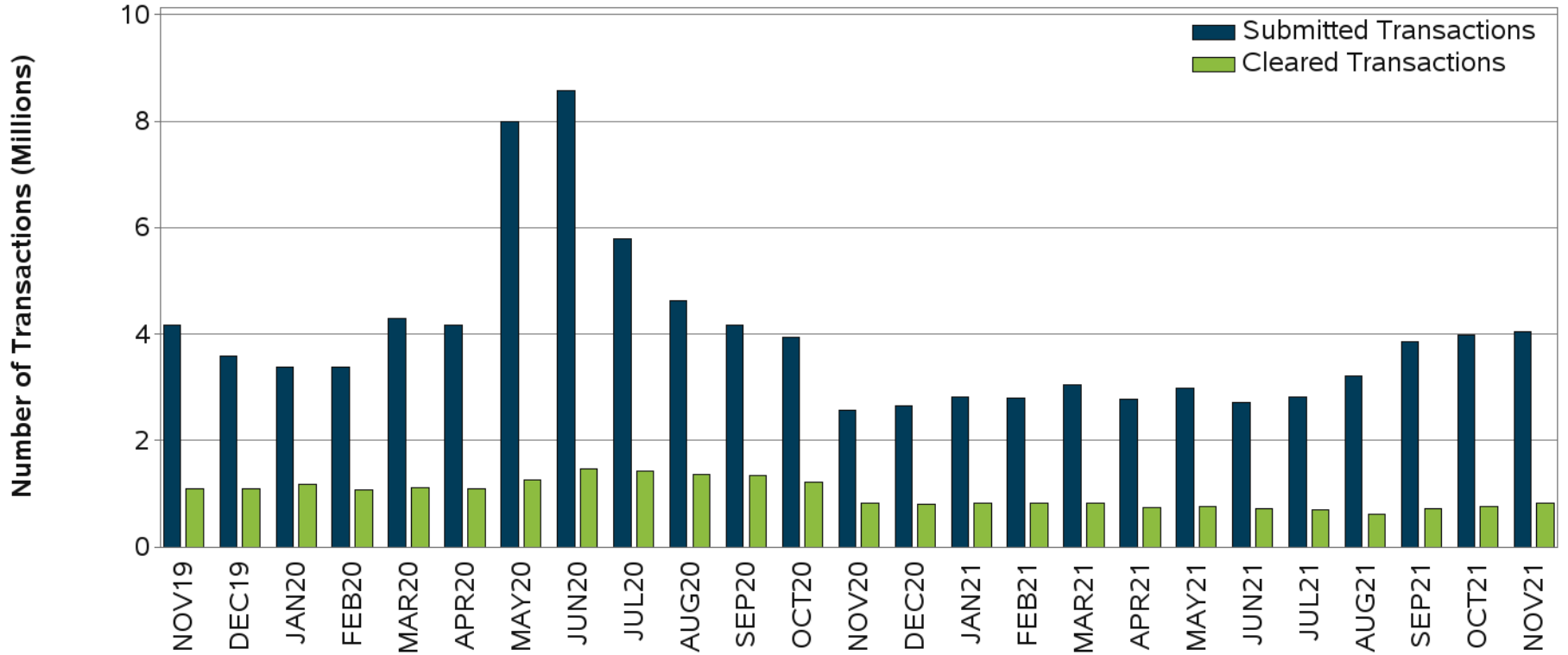
# Up-To-Congestion Transactions - Total Number



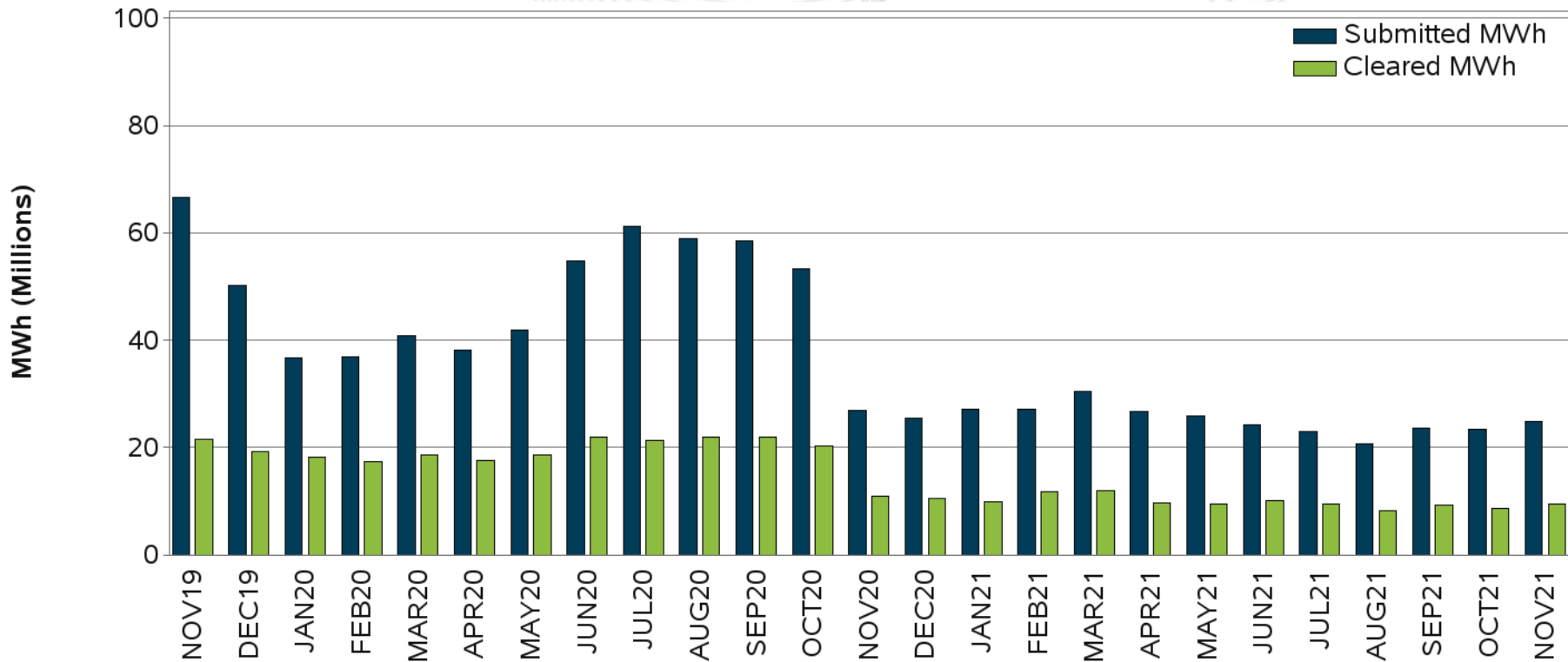
# Up-To-Congestion Transactions - Total Volume



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



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

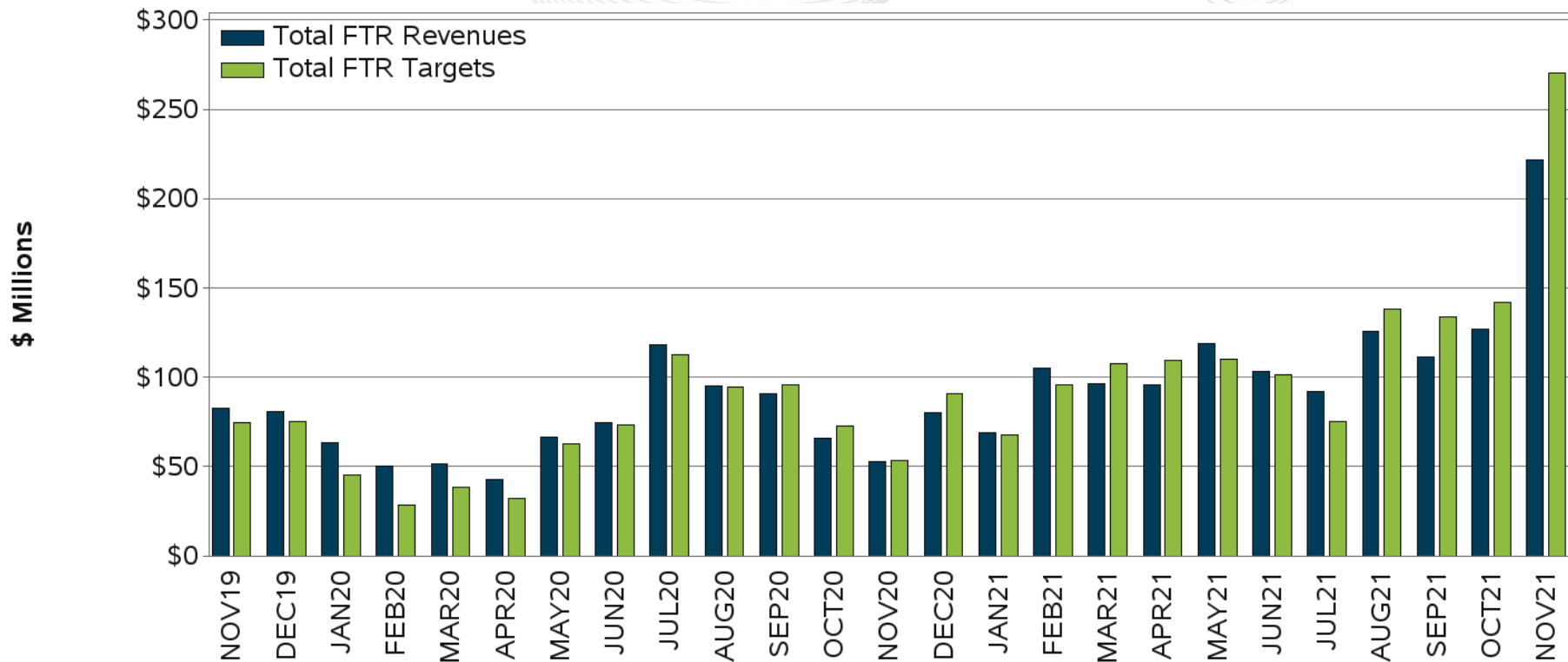


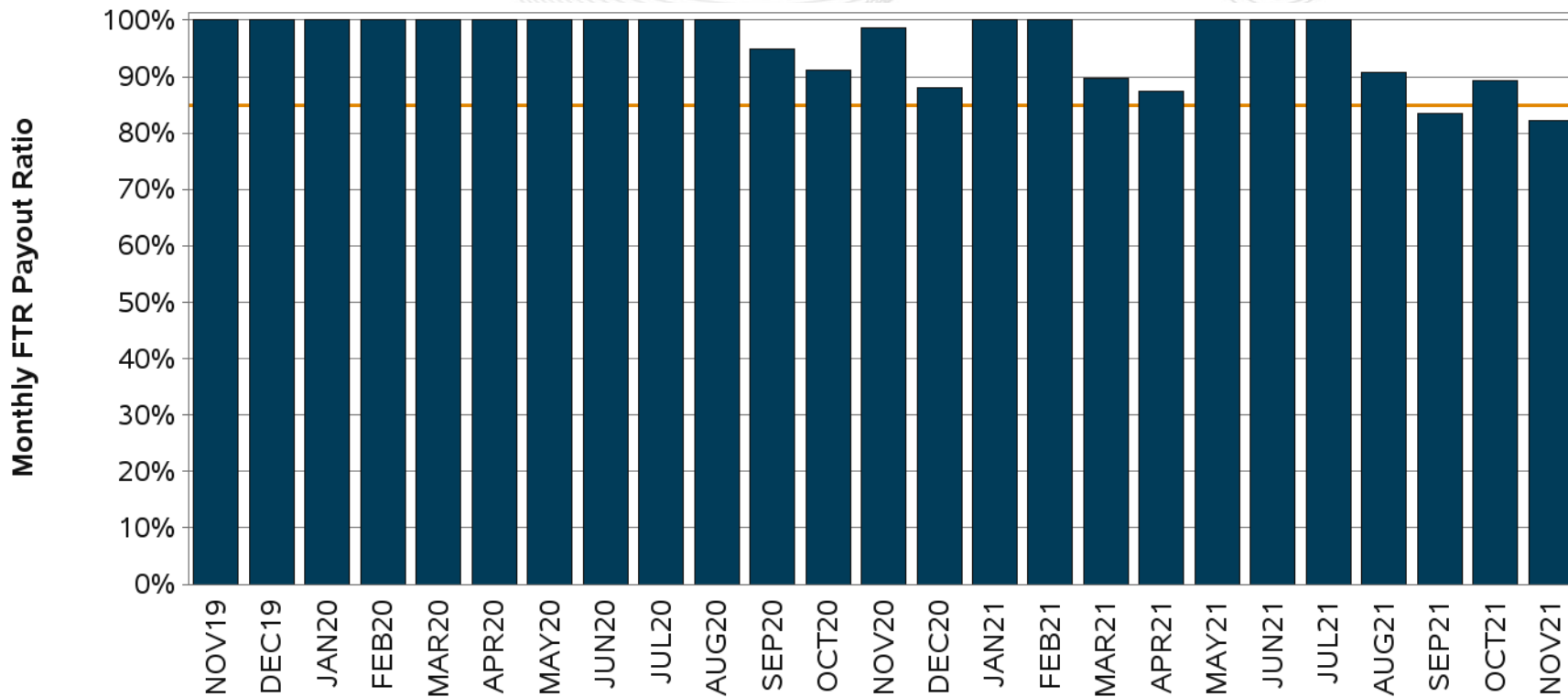
# Energy Market

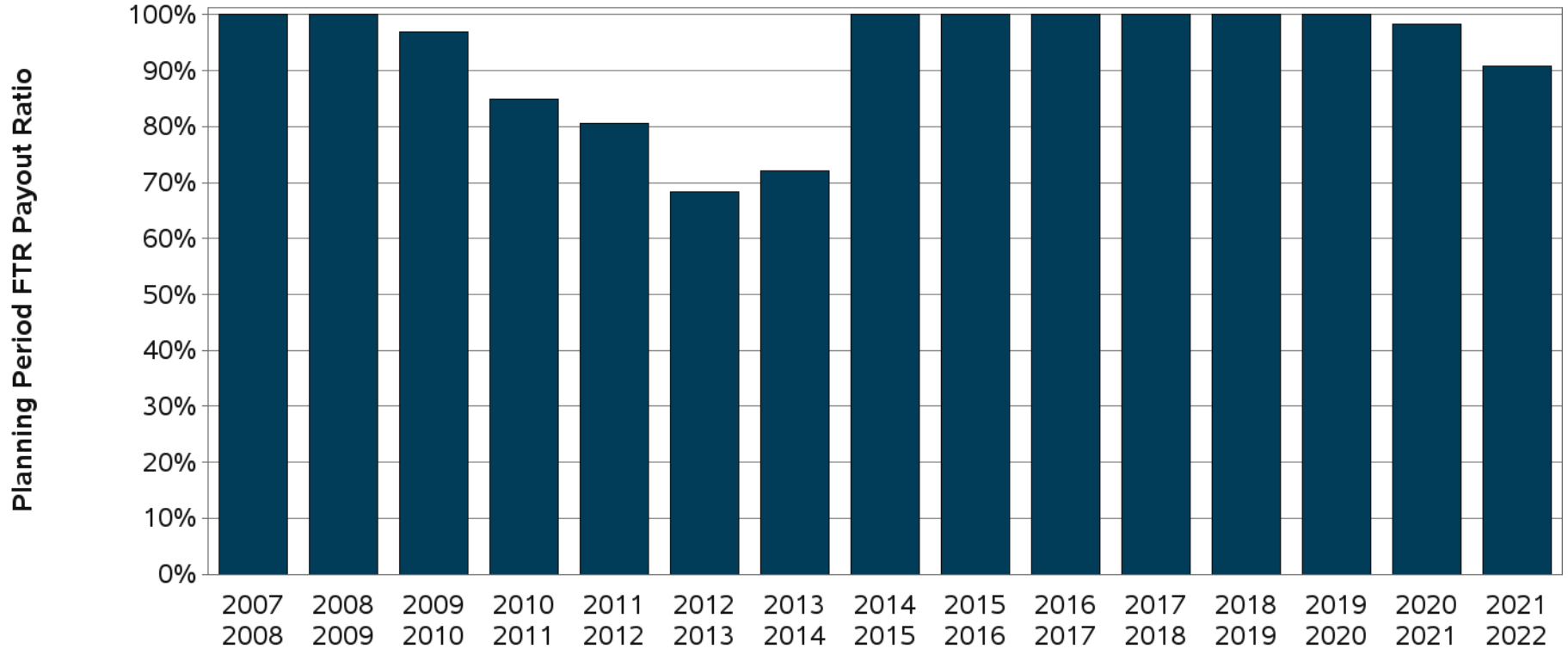
# Congestion and FTR Summary



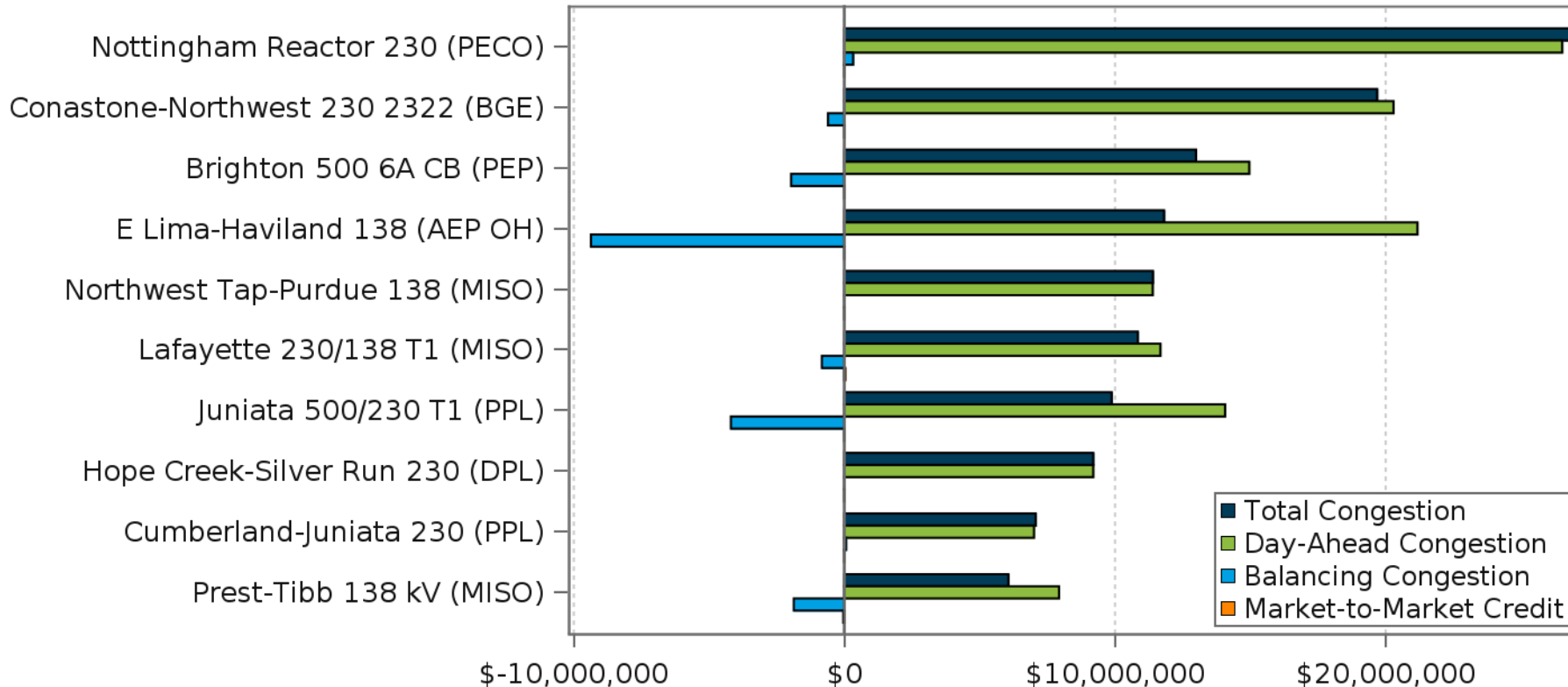
Period	Surplus / Underfunding	Payout Ratio
November, 2021	\$-48,173,341	82%
2021	\$-86,155,953	94%
2021/2022	\$-79,758,383	91%





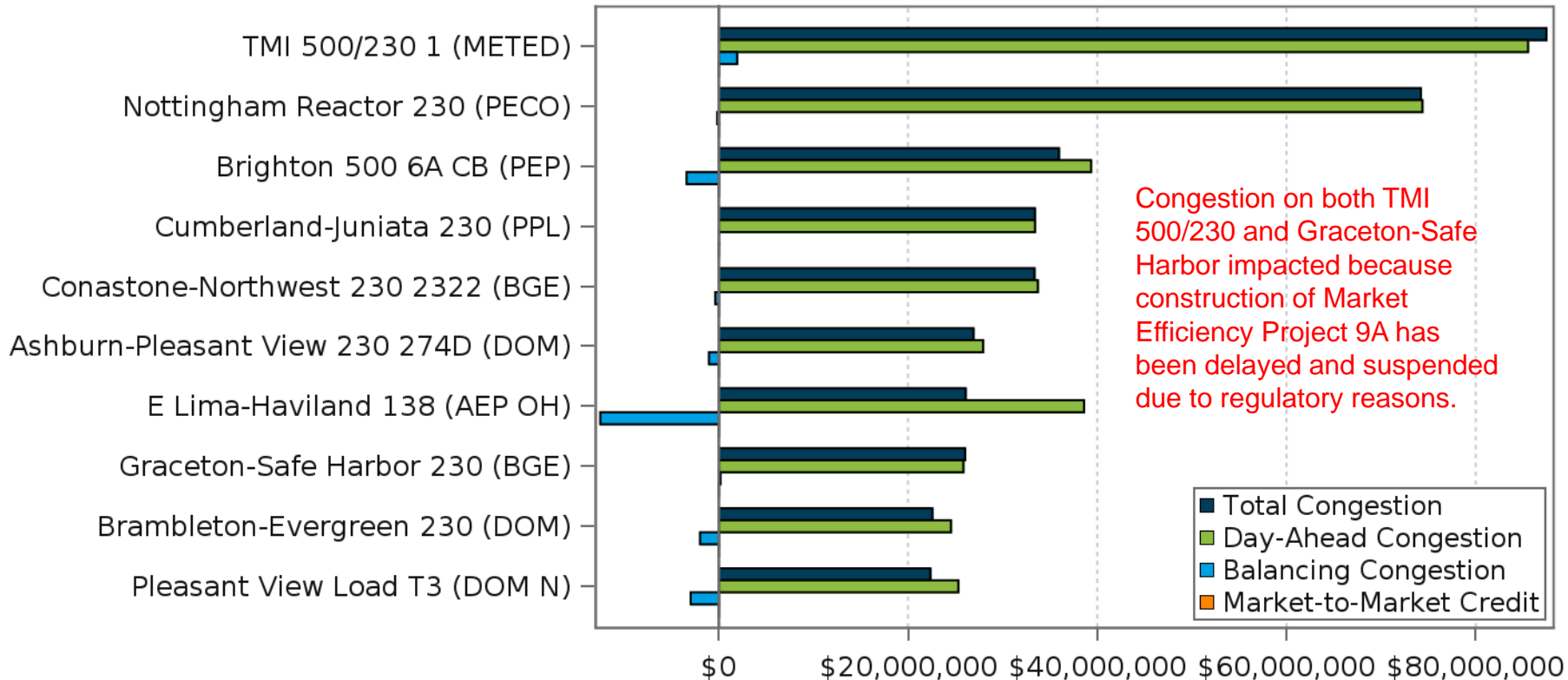


# pjm® Ten Most Heavily Congested Transmission Facilities - Overall, November



The ten most heavily congested facilities account for 72% of total congestion for November.

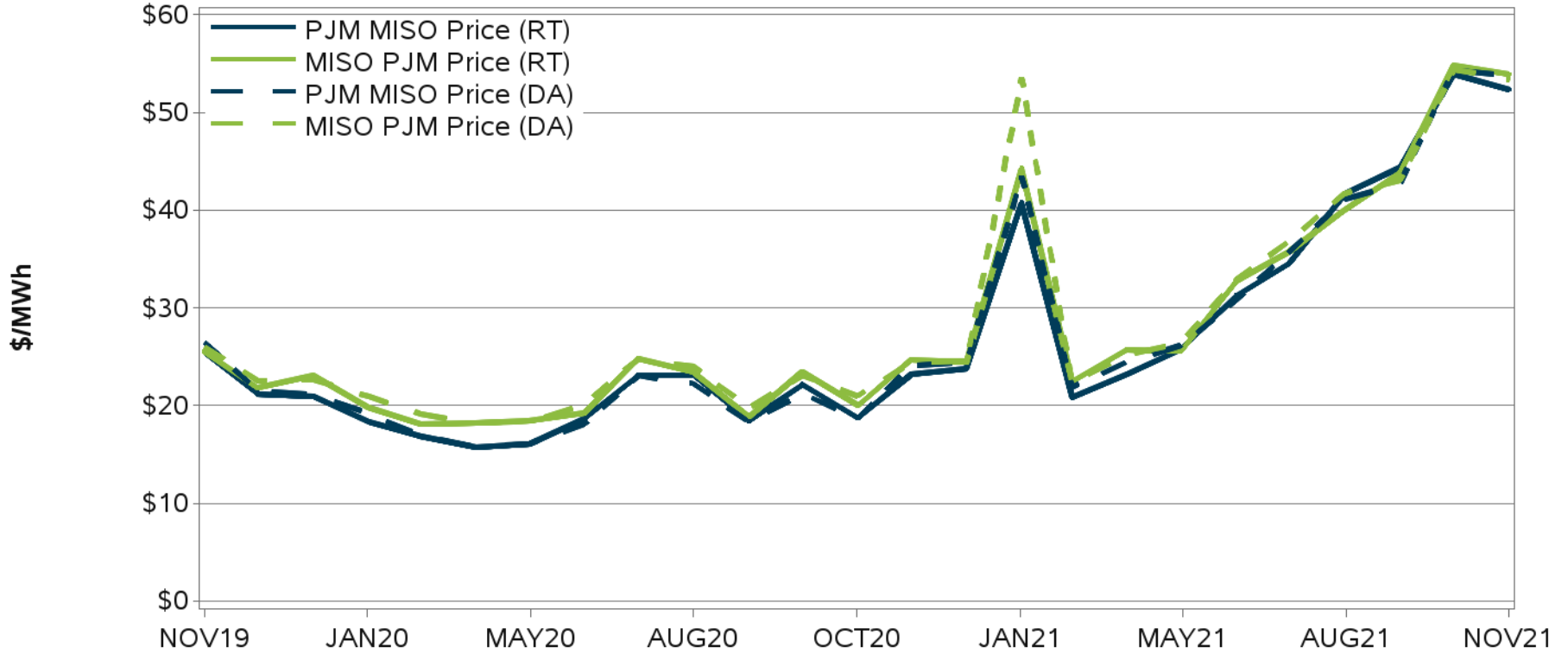
# Ten Most Heavily Congested Transmission Facilities - Overall, 2021



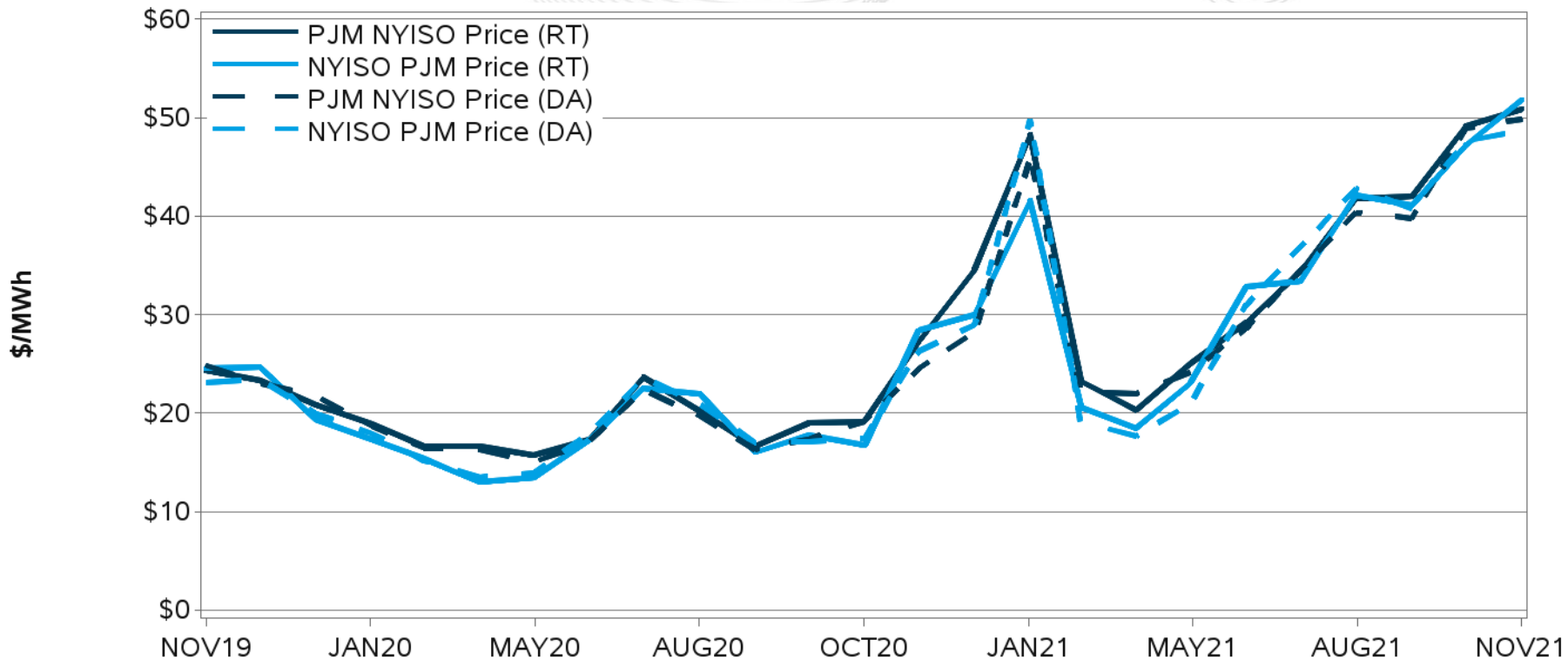
The ten most heavily congested facilities account for 44% of total congestion for 2021.

# Energy Market

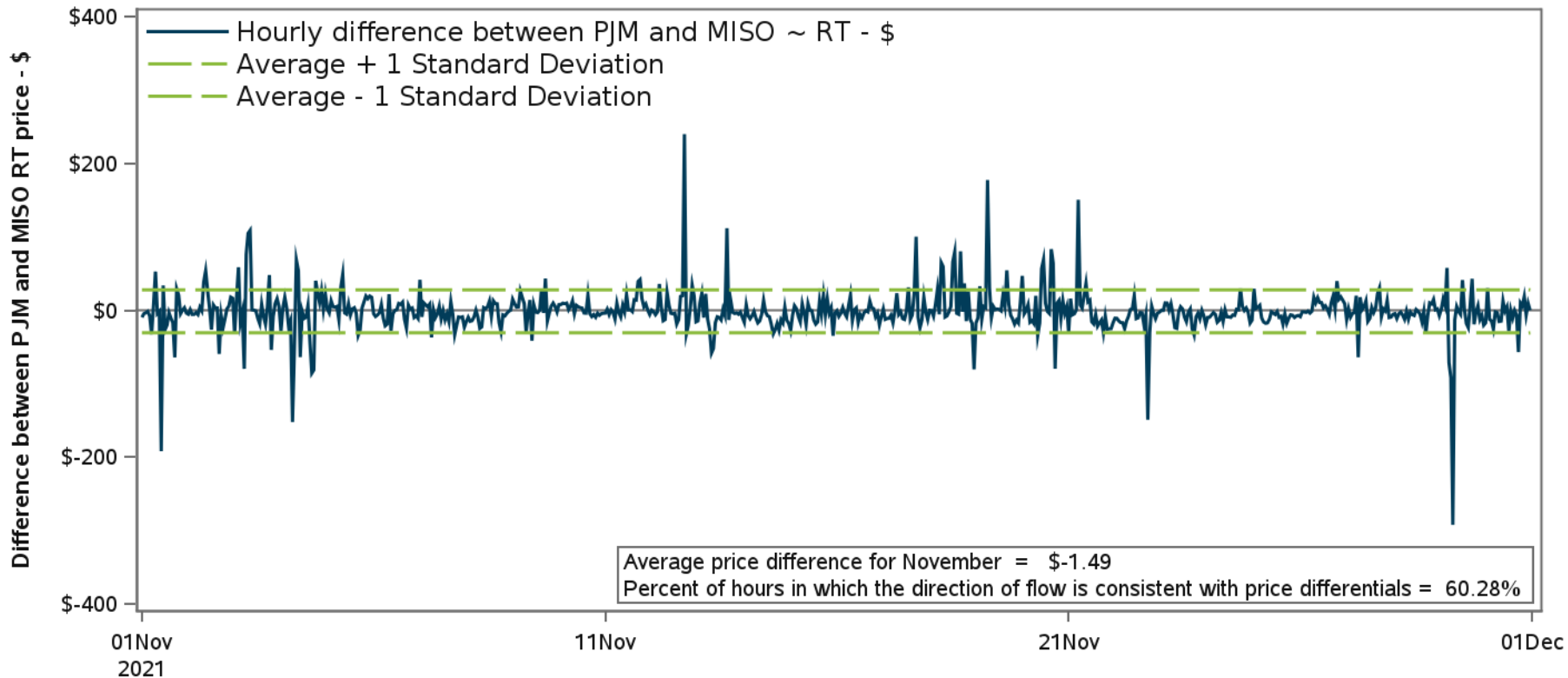
## Interchange/Seams Summary





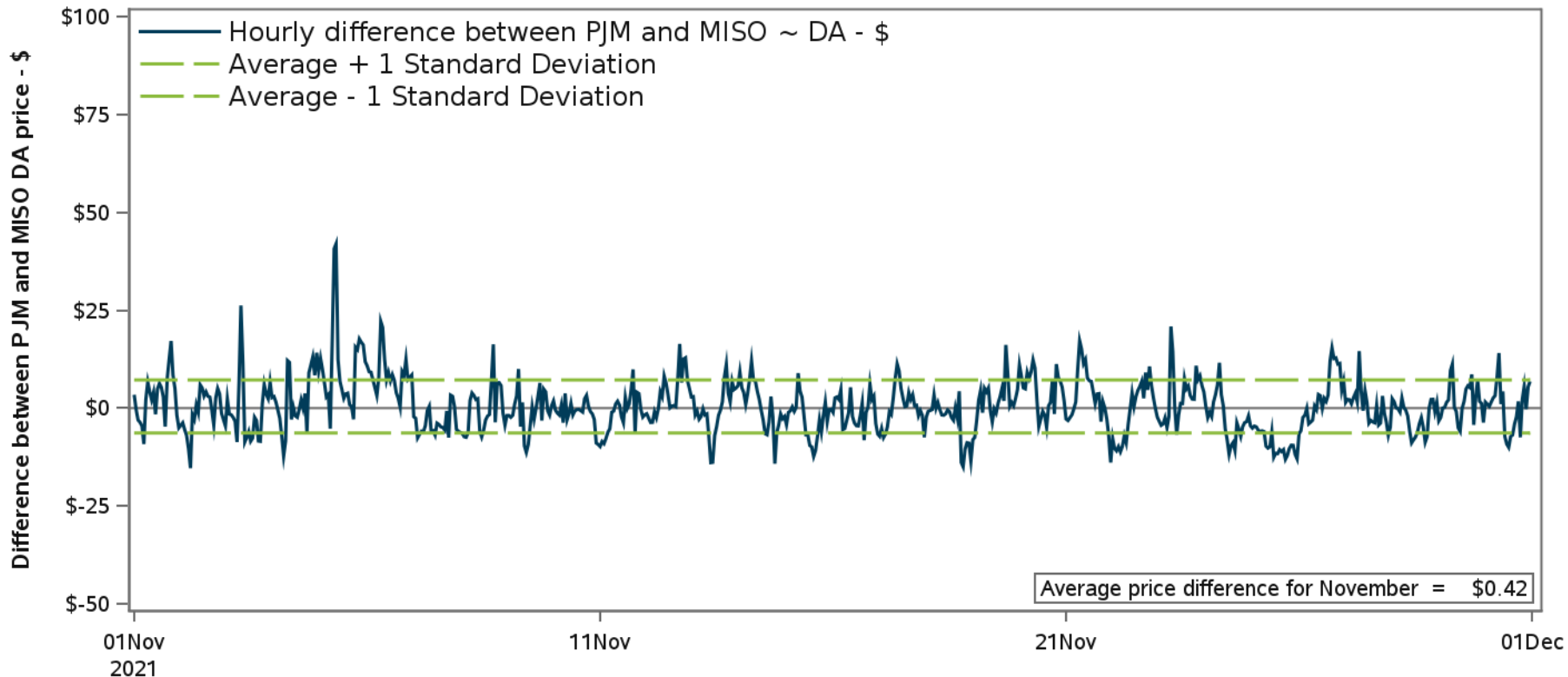


# Hourly Difference Between PJM and MISO Real-Time Prices



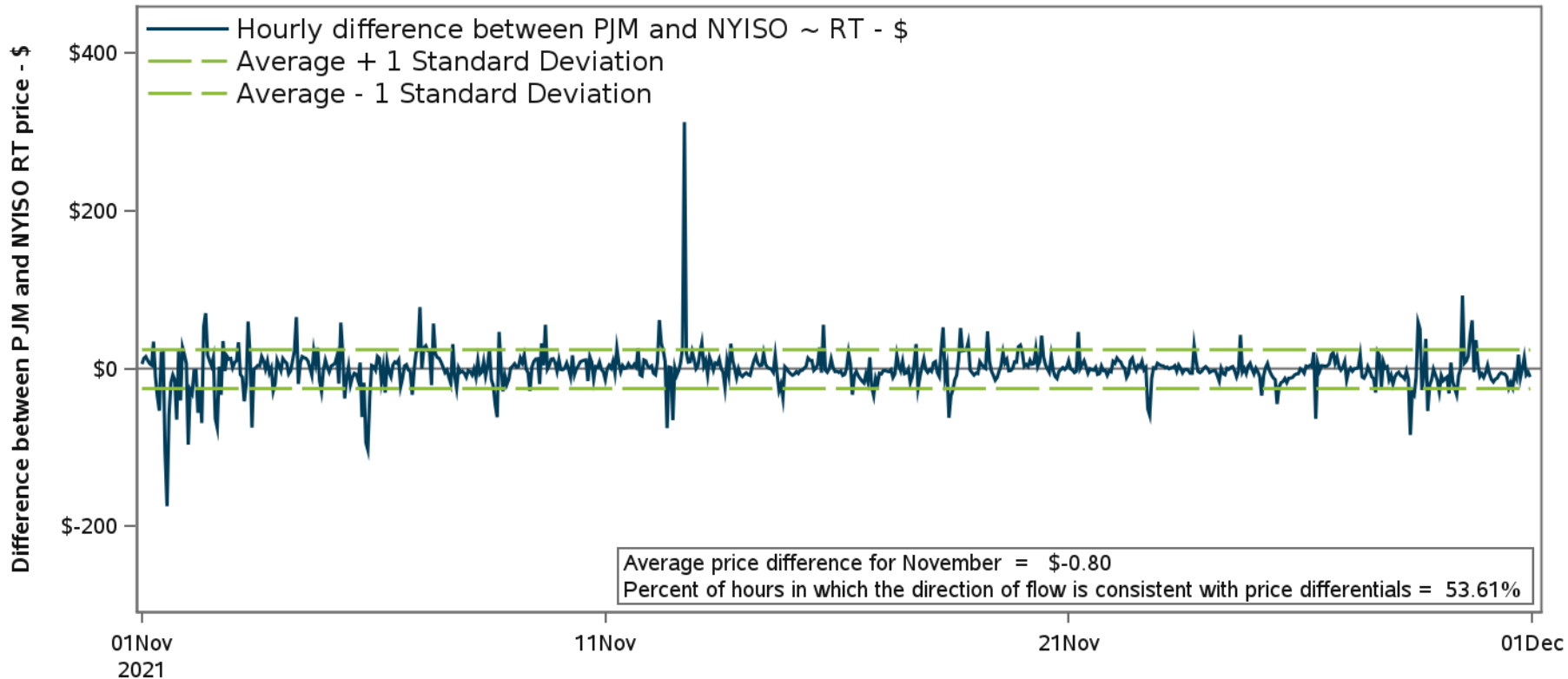
Positive values represent hours when the PJM price was higher. Negative values represent hours when the PJM price was lower.

# Hourly Difference Between PJM and MISO Day-Ahead Prices



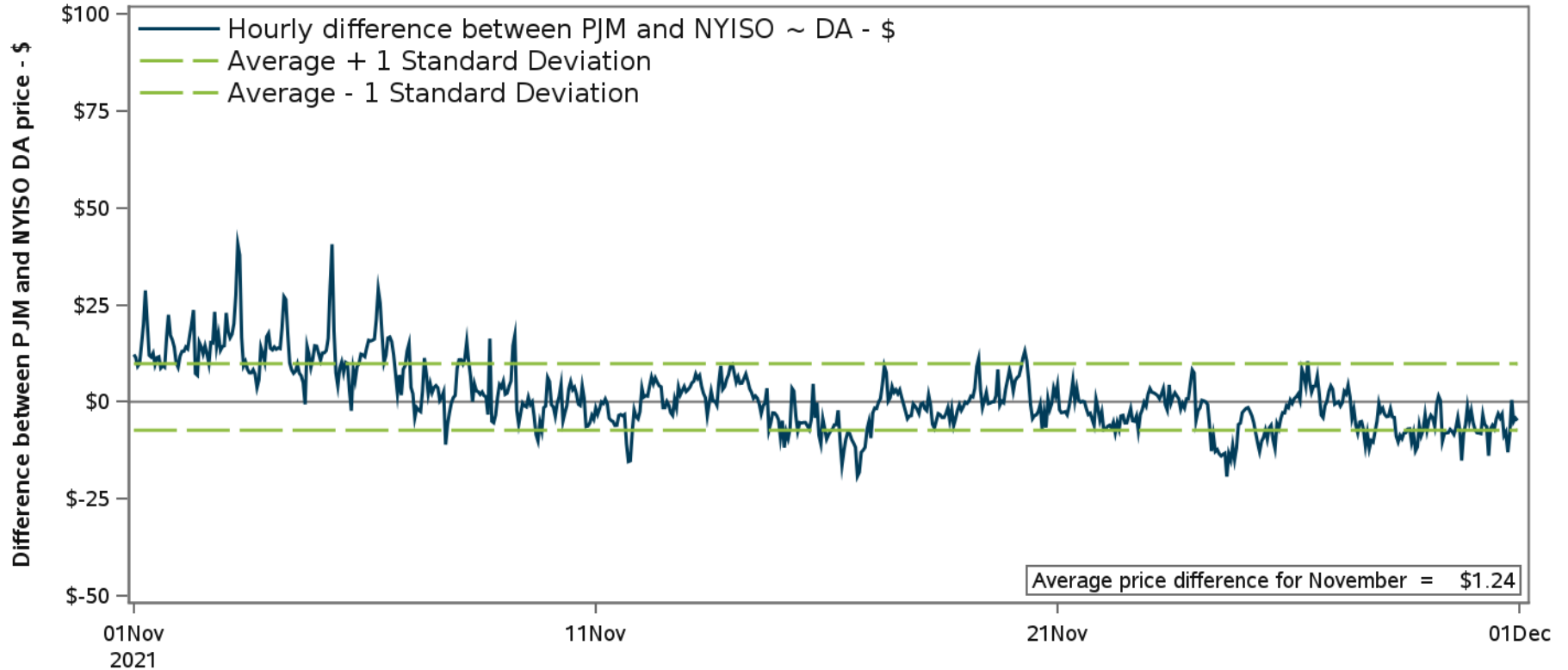
Positive values represent hours when the PJM price was higher. Negative values represent hours when the PJM price was lower.

# Hourly Difference Between PJM and NYISO Real-Time Prices

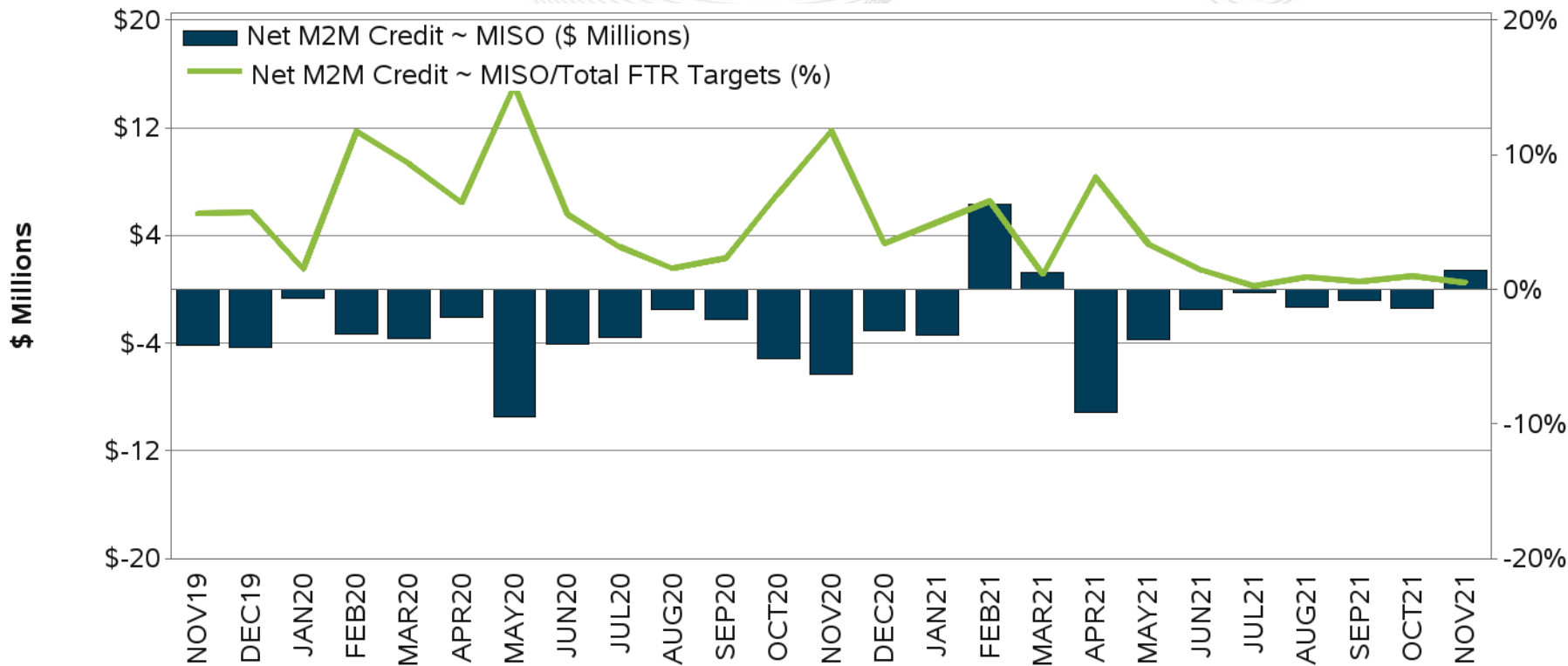


Positive values represent hours when the PJM price was higher. Negative values represent hours when the PJM price was lower.

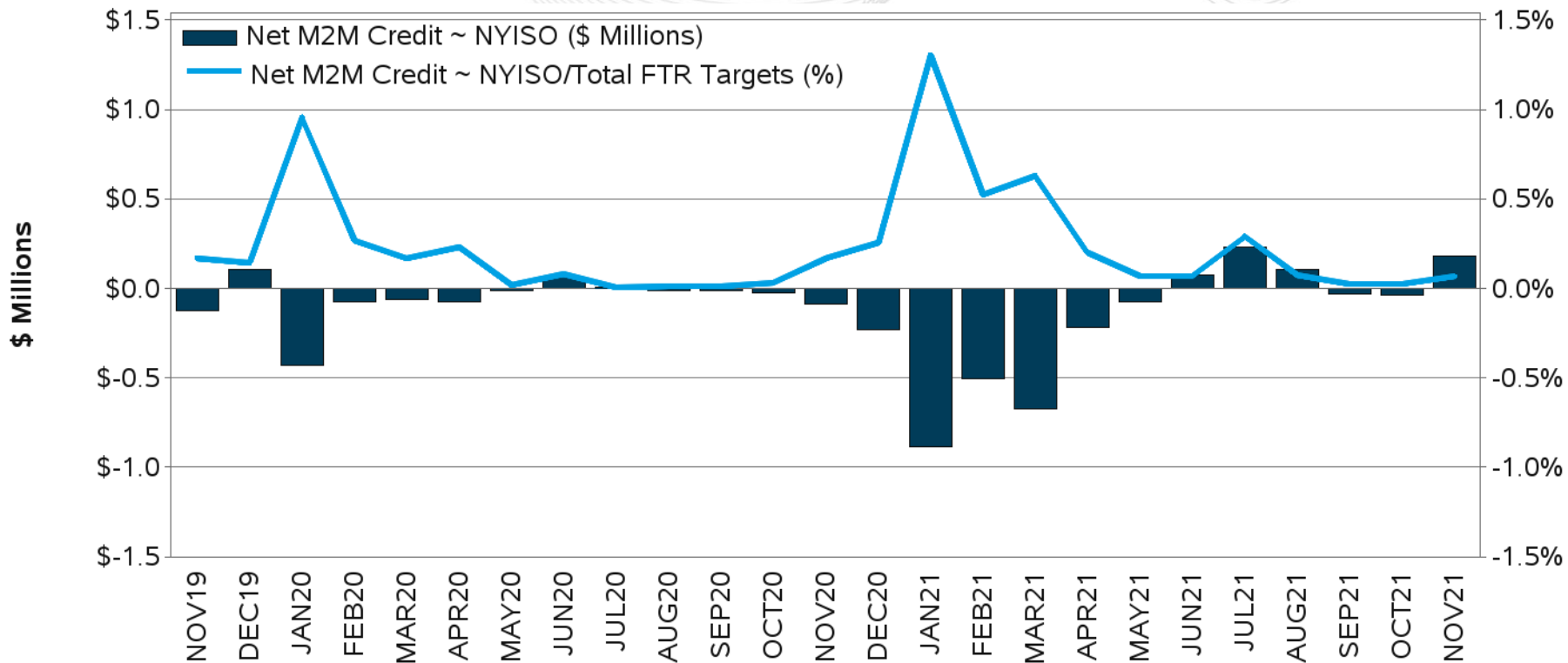
# Hourly Difference Between PJM and NYISO Day-Ahead Prices



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



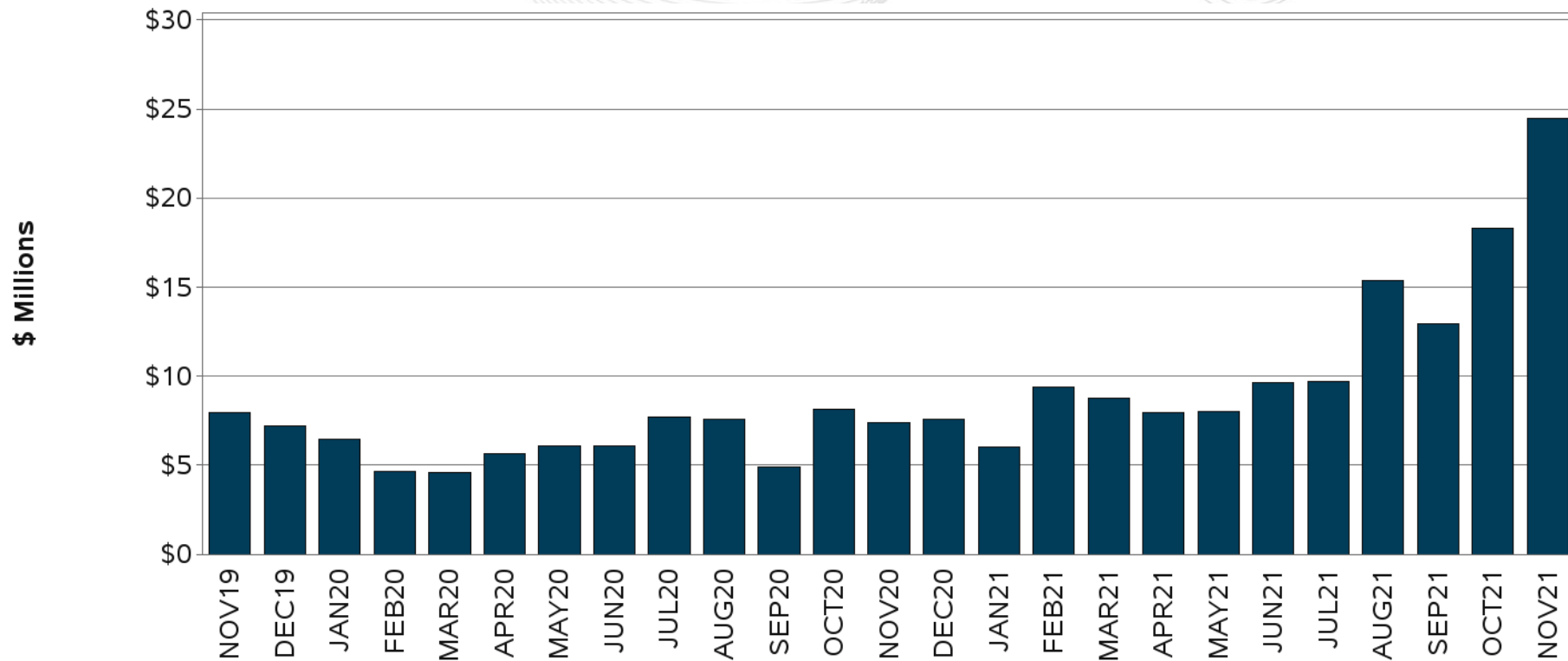
Negative M2M Credit represents PJM payment to MISO



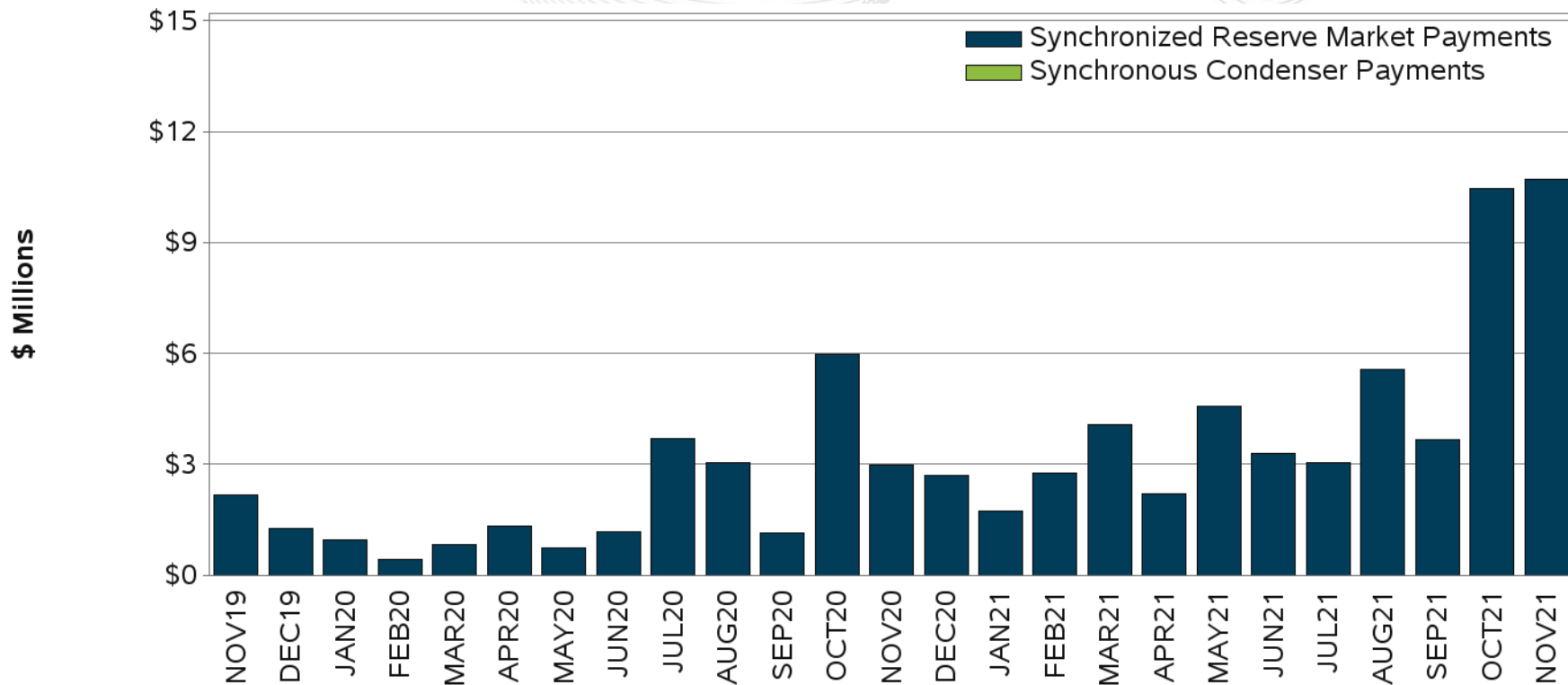
Negative M2M Credit represents PJM payment to NYISO

# Ancillary Service Market Summary

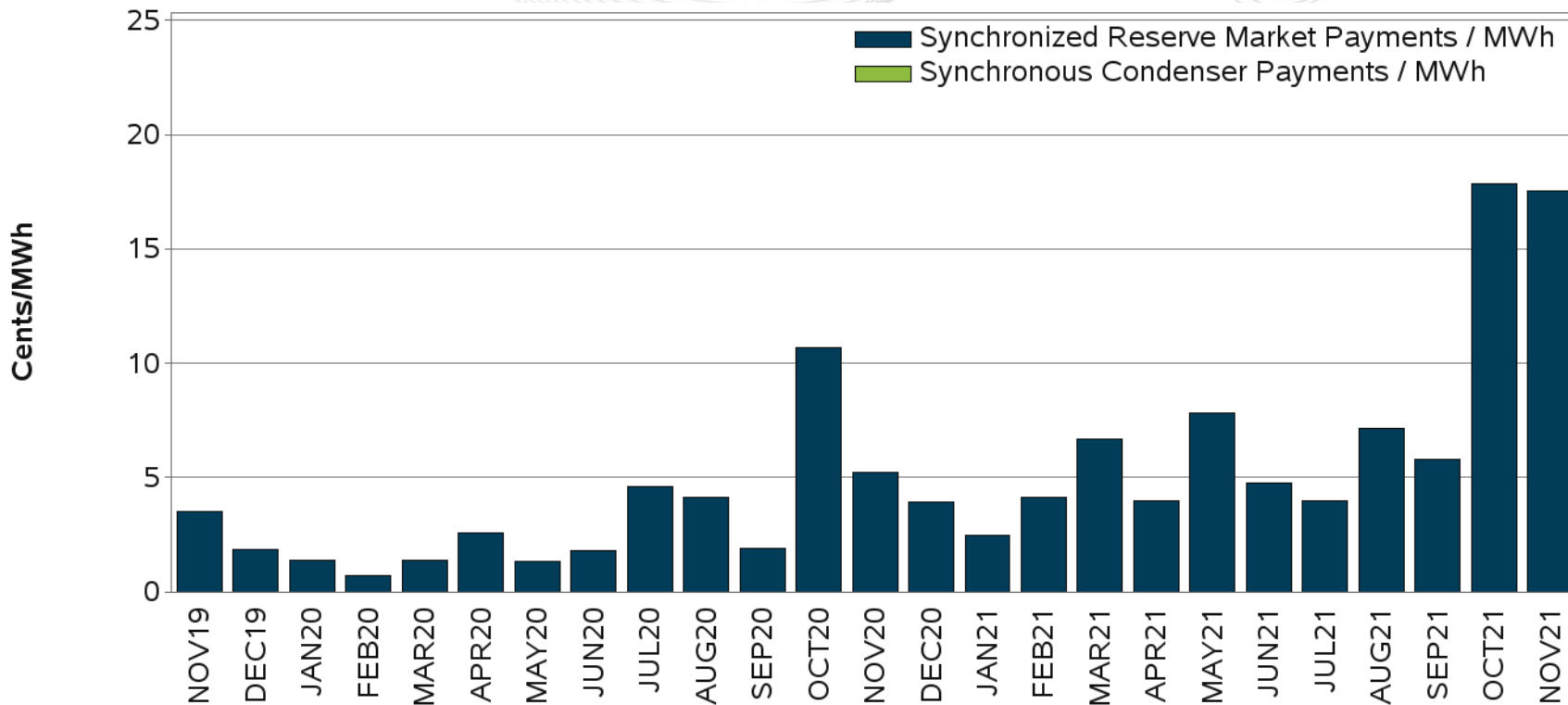


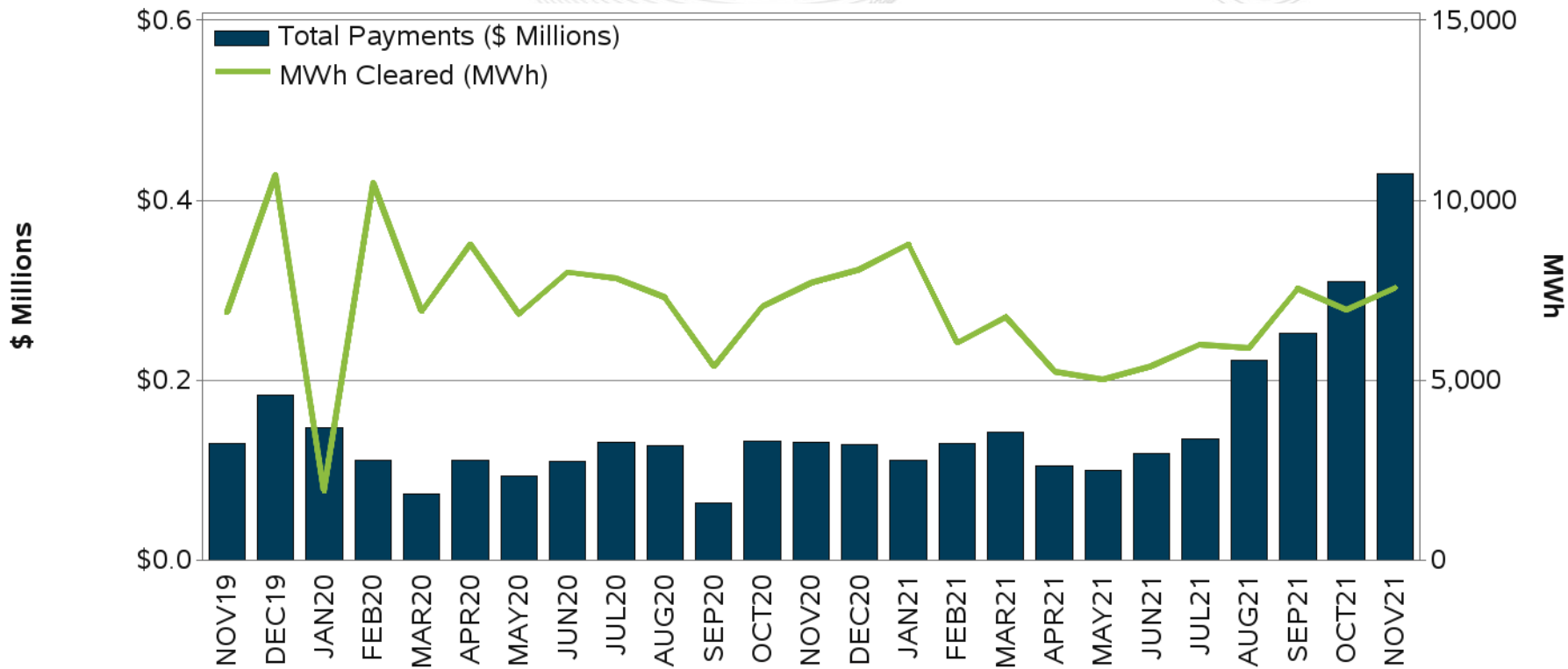


# Synchronized Reserve and Synchronous Condenser Costs

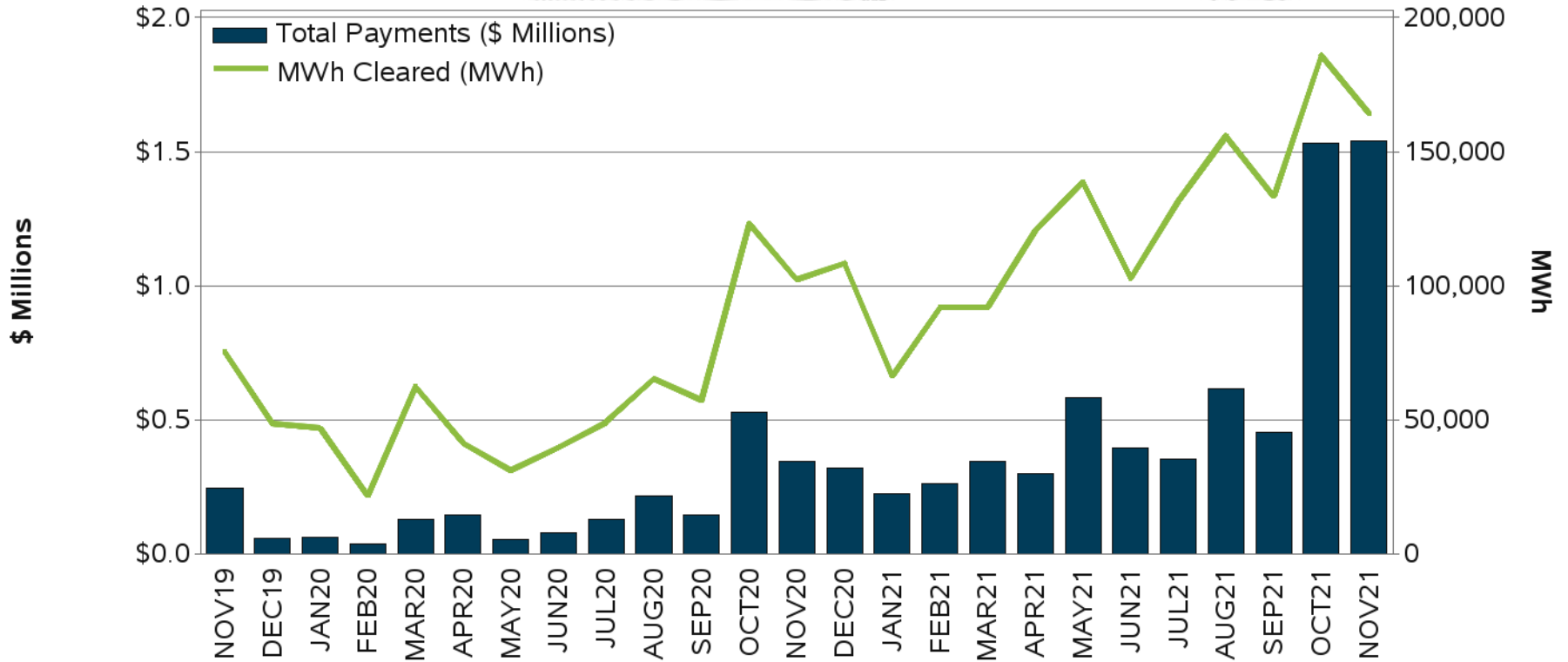


# pjm Load-Adjusted Synchronized Reserve and Synchronous Condenser Costs

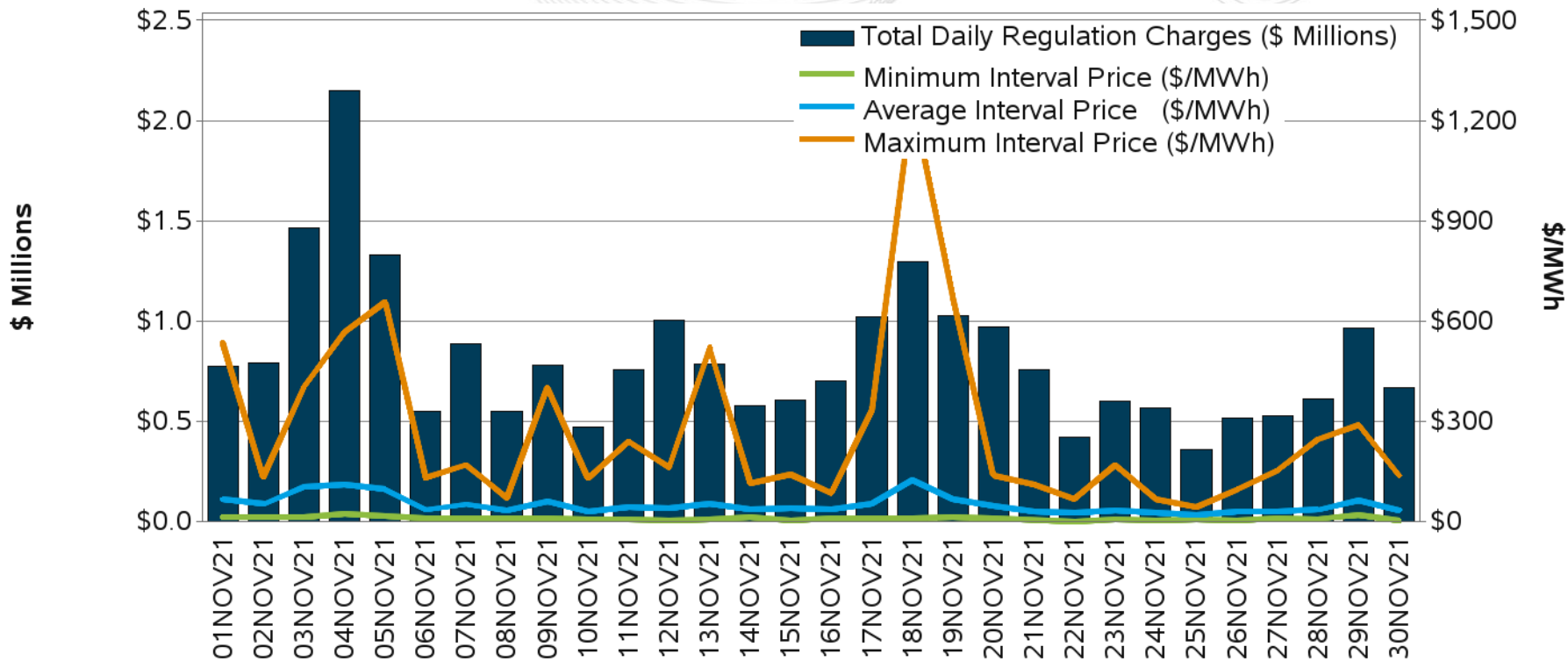




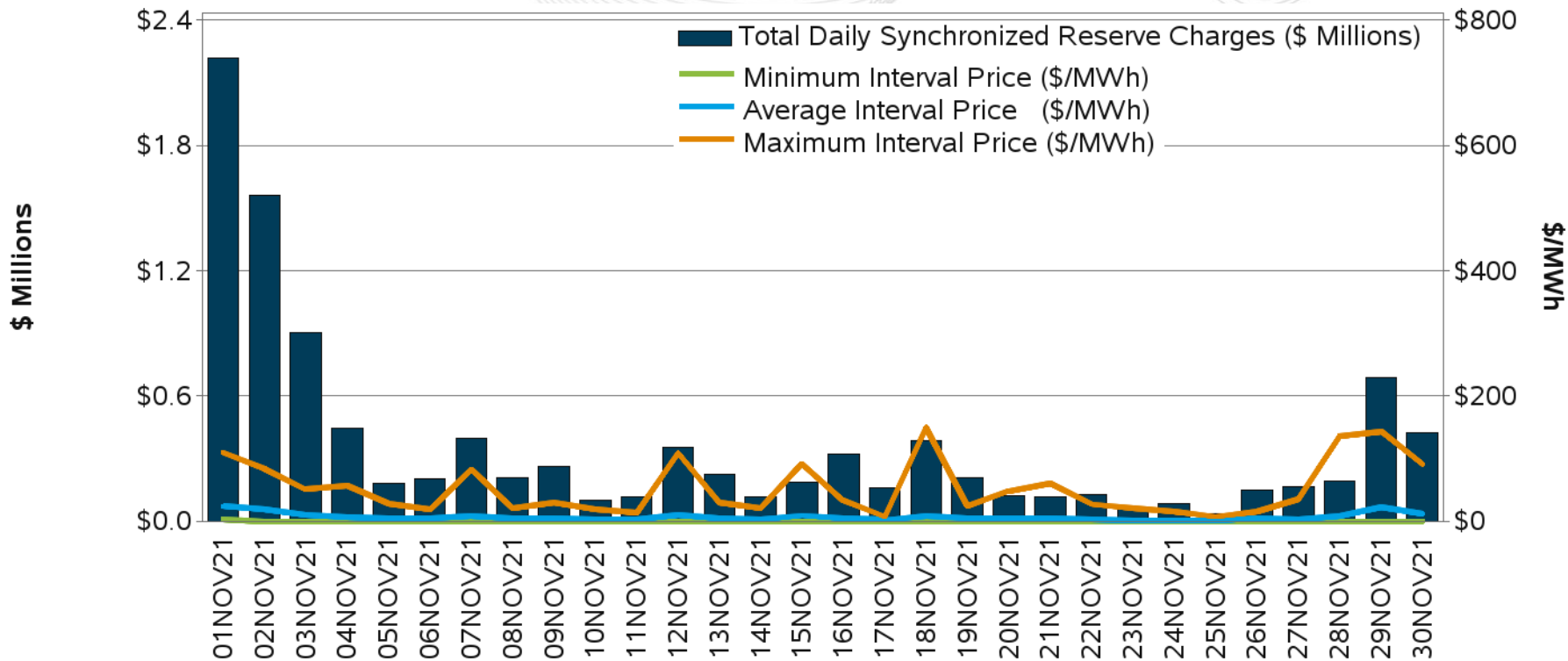
# DR Participation in PJM Synchronized Reserve Markets



# Regulation Market Daily Prices and Charges



# Synchronized Reserve Market Daily Prices and Charges



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Jennifer.Freeman@pjm.com



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