



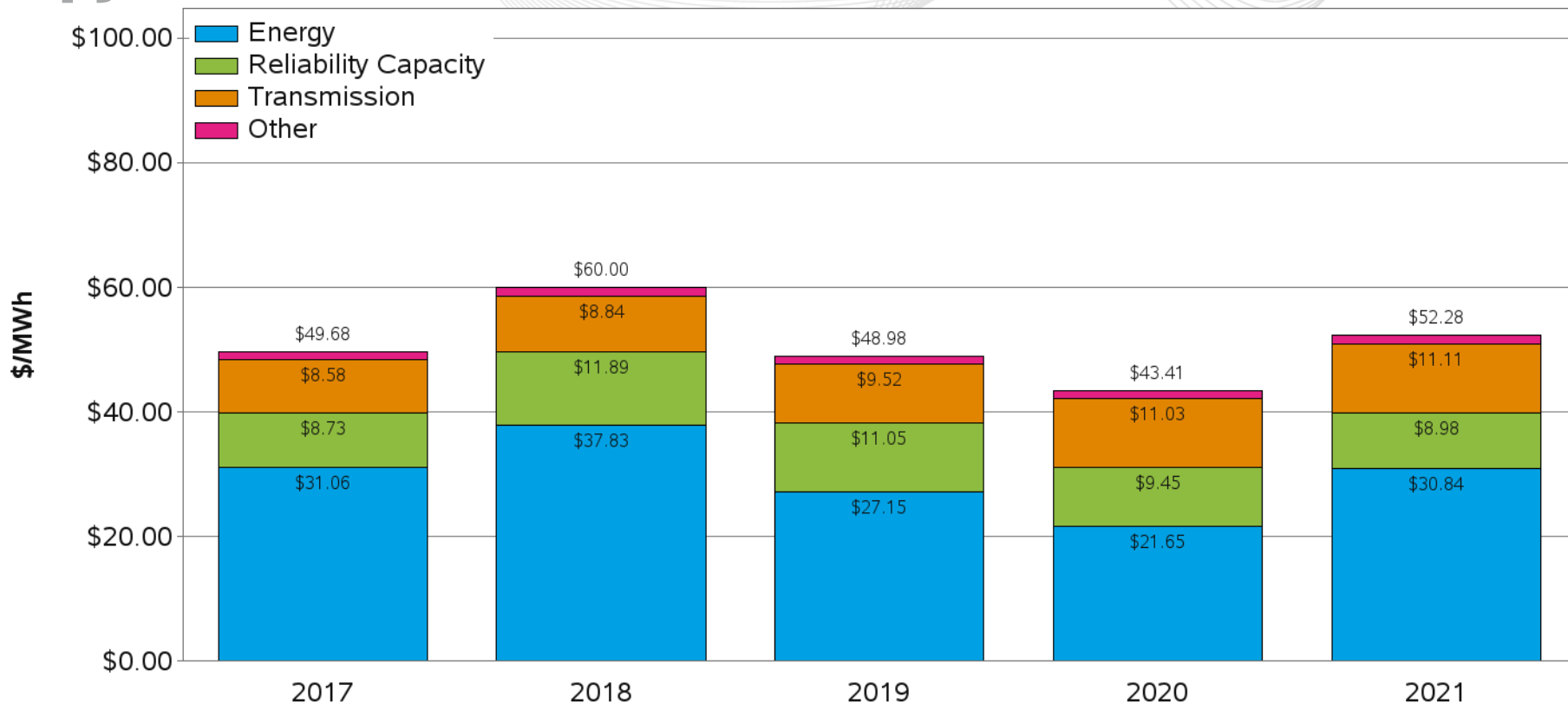
# Markets Report

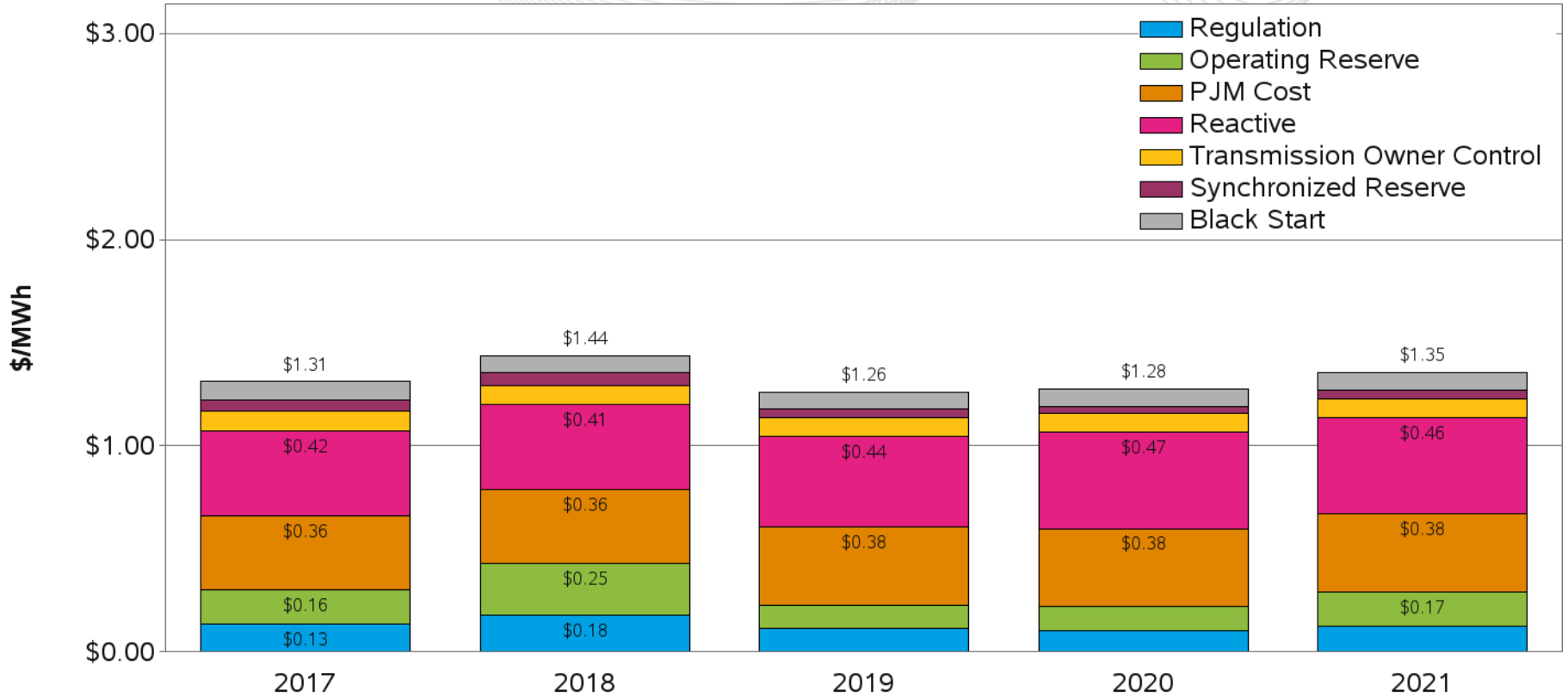
MC Webinar  
April 19, 2021

- PJM Wholesale Cost for 2021 is \$52.28/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 March, temperatures were mild 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 three days – March 6<sup>th</sup>, 8<sup>th</sup> and 25<sup>th</sup>. (Slides 24 & 25)
- Load-weighted average LMP for 2021 is \$30.84/MWh: (Slides 31 & 32)
  - March 2021 was \$26.30/MWh, which is higher than March 2020 (\$17.90/MWh) and lower than March 2019 (\$29.90/MWh).
- There were three 5-minute intervals that experienced shortage pricing in March. (Slide 31 & 32)
- FTR revenue adequacy for the month of March is 90% and the 2020-2021 Planning Year is currently funded at 98%. (Slides 49-52)
- Congestion remains low, however, higher than values observed last March. (Slide 50)
- Regulation and Synchronized Reserve market costs have generally tracked with energy prices over time. (Slides 65-67)

# Markets Report



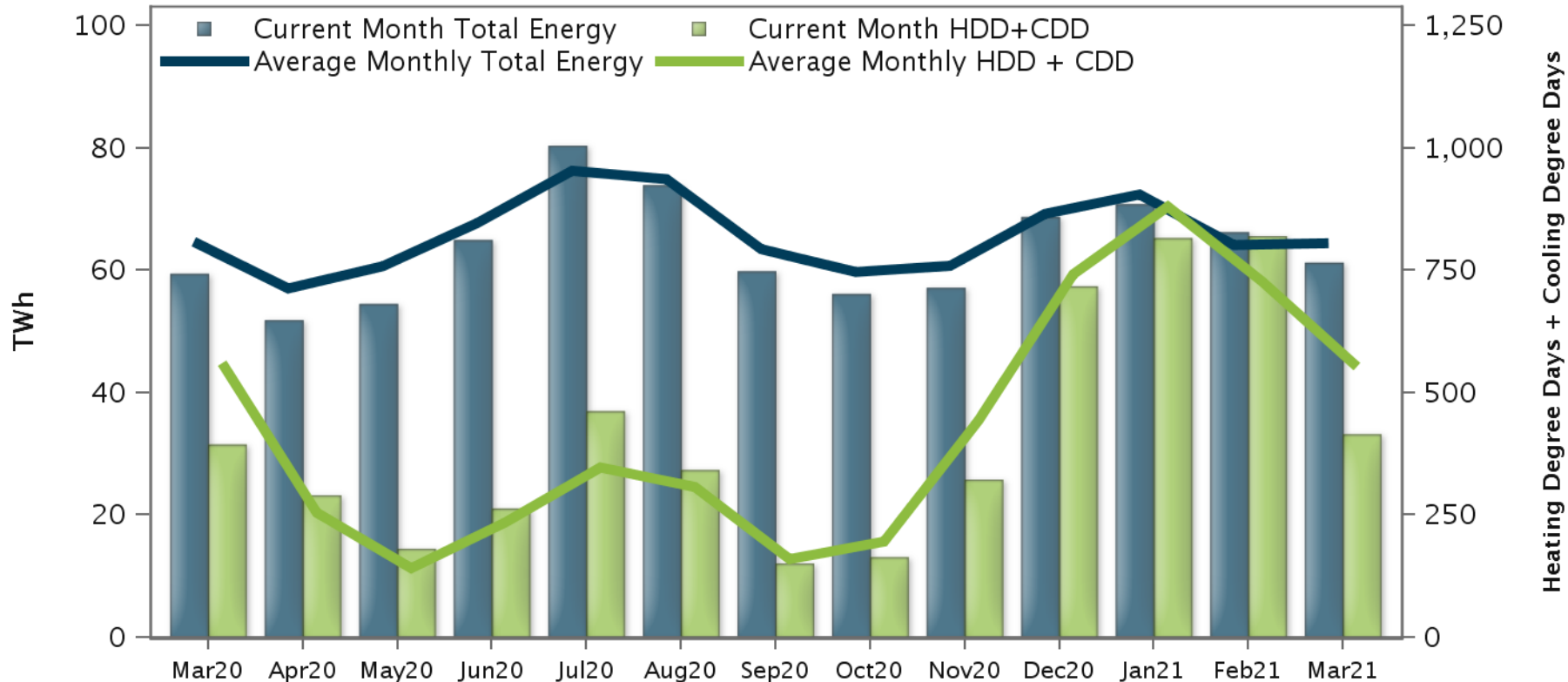


# Market Conditions

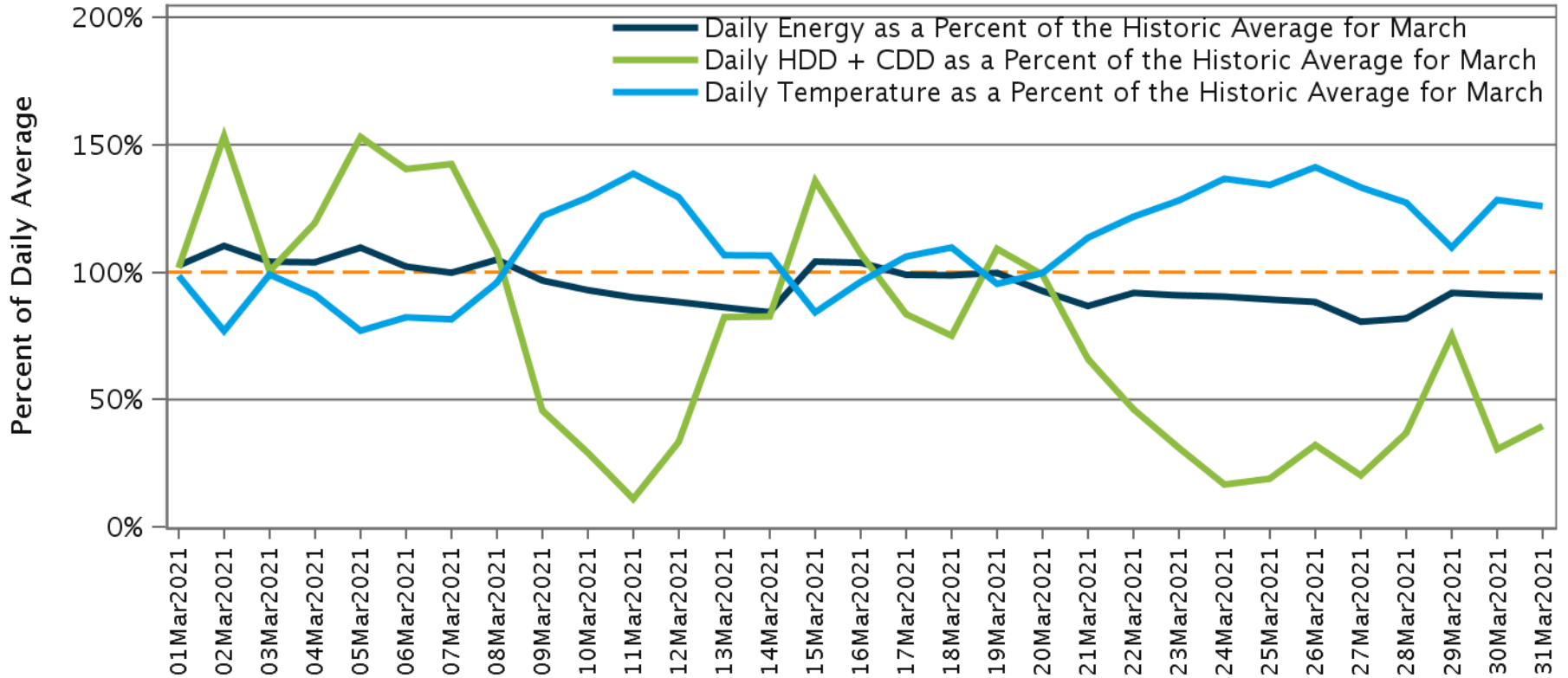
- The weather parameter shown in the following slide is a monthly sum of daily Heating Degree Days (HDD) and Cooling Degree Days (CDD).
- Degree days represent a deviation from a baseline temperature, in this case 60 degrees for HDD and 65 degrees for CDD. As temperatures get more extreme, colder or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

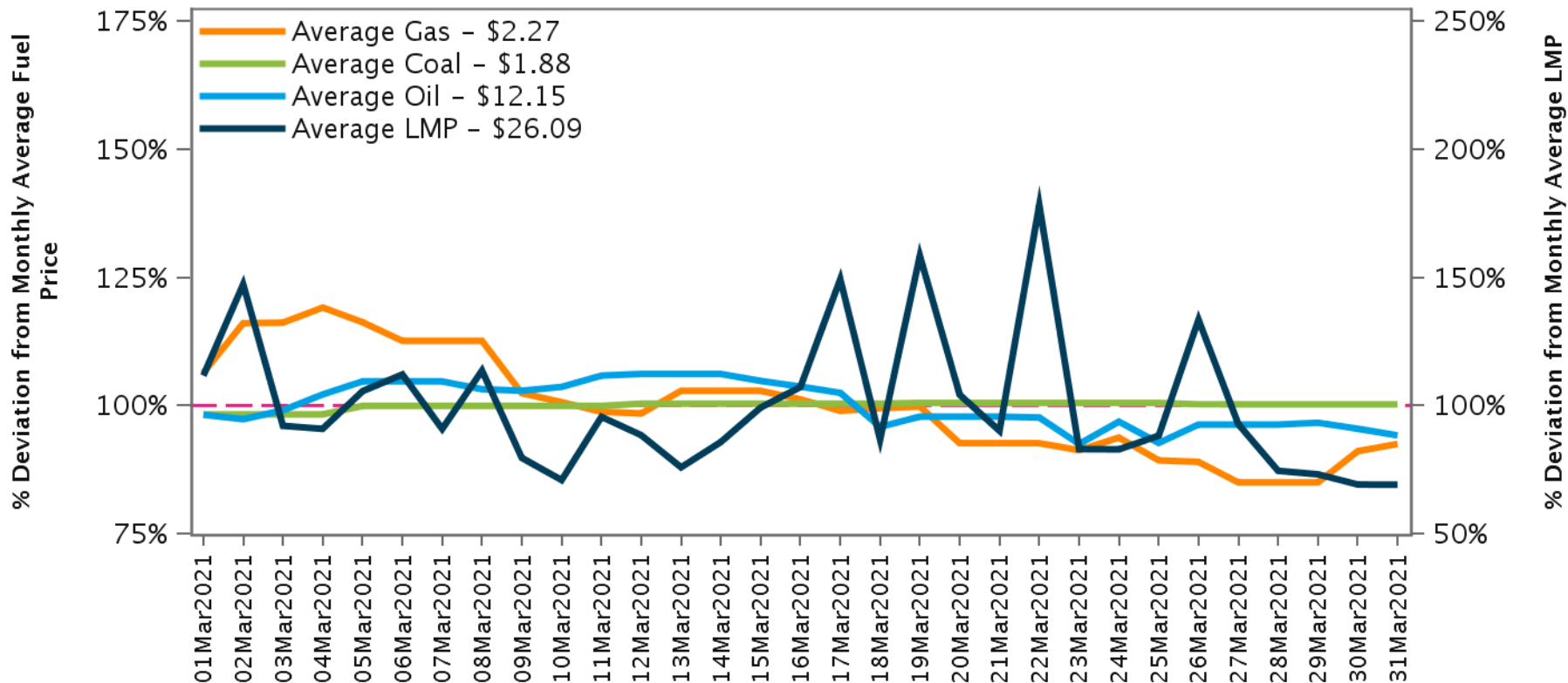


# Historic Average Weather and Energy versus Current Month



# Historic Average Weather and Energy versus Current Month - Daily

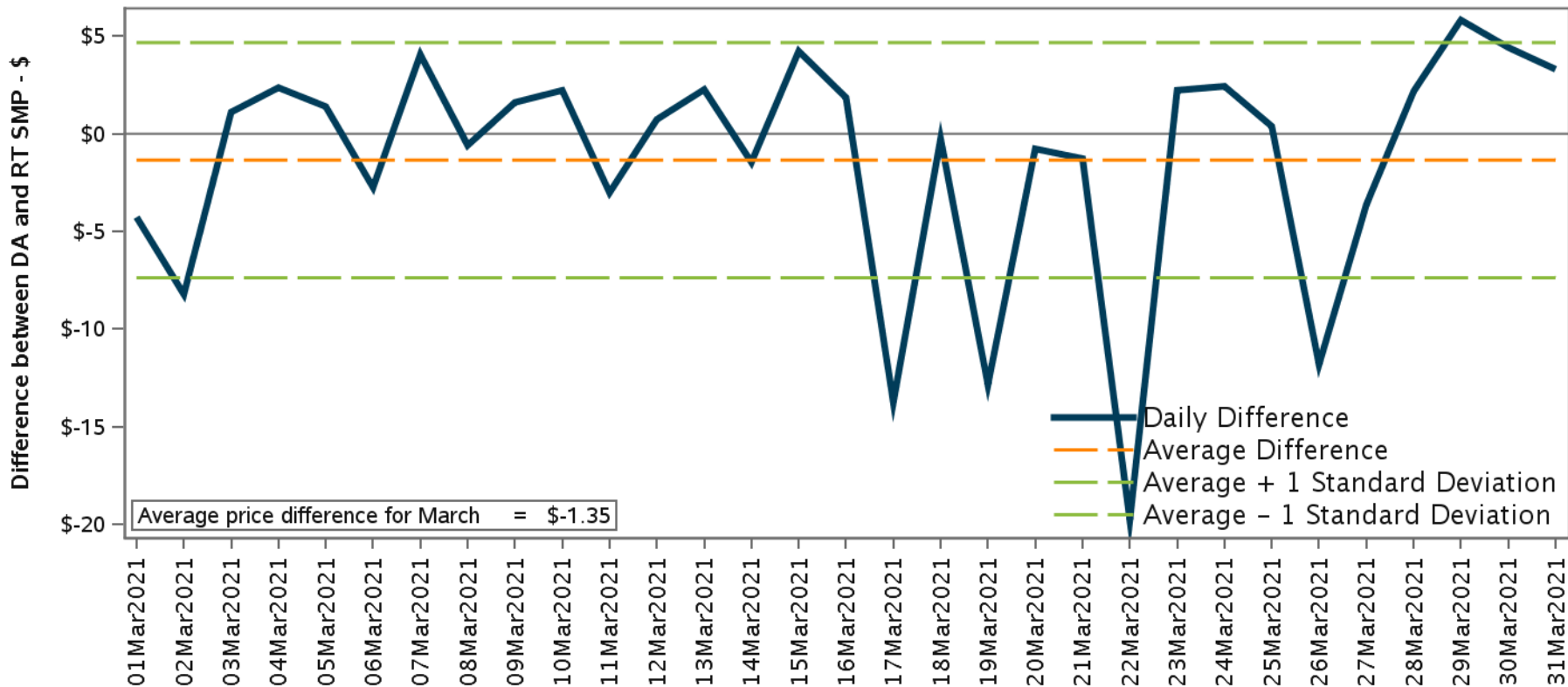




Fuel Price Source: S&P Global Platts



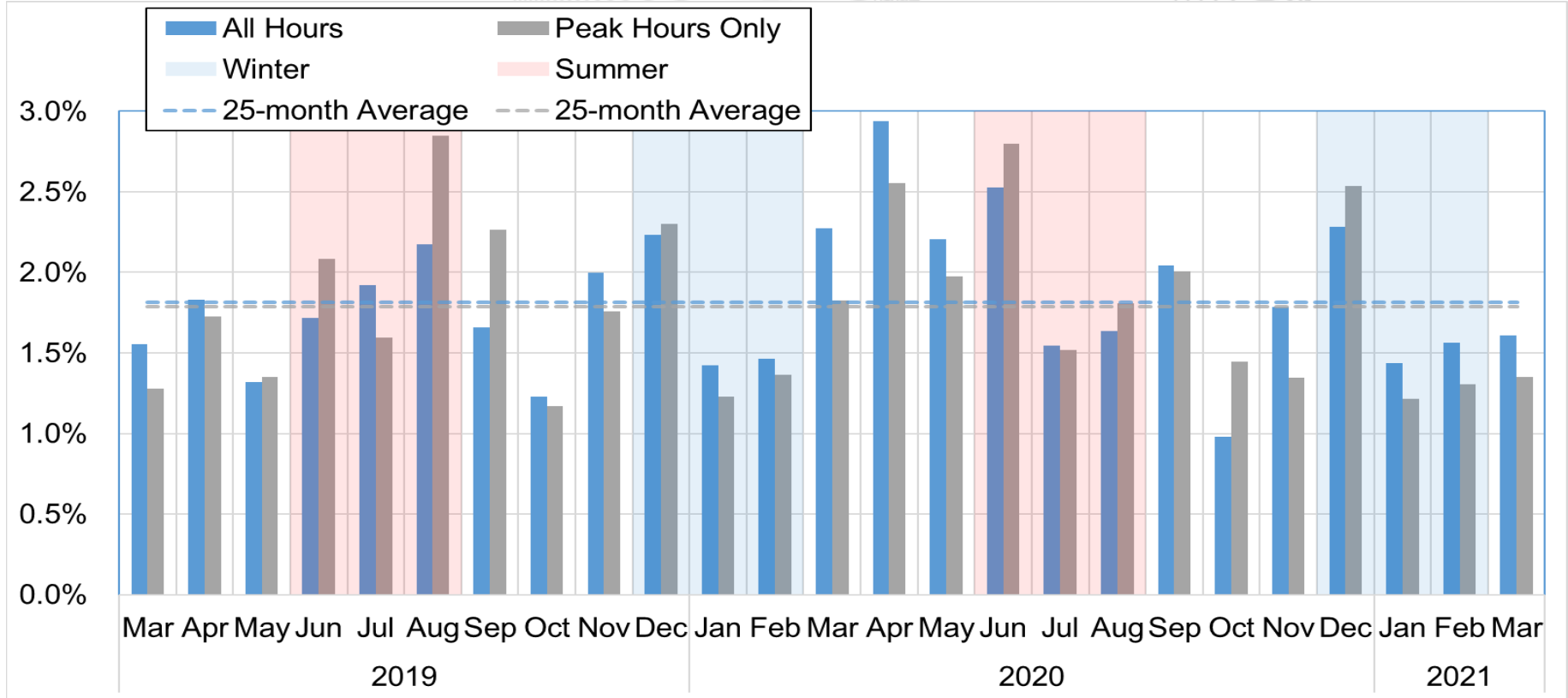
# Daily Difference Between Day-Ahead and Real-Time System Marginal Prices



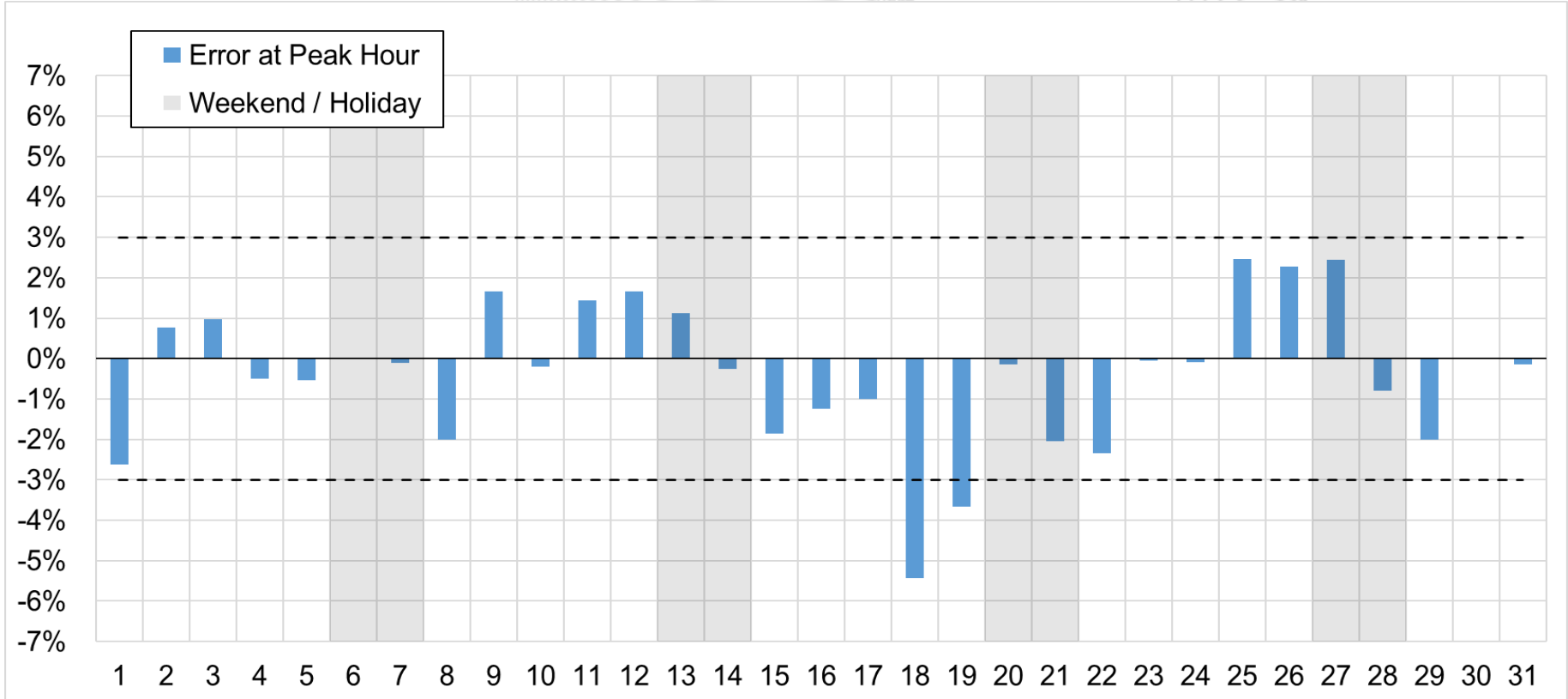
Positive values represent days when the DA daily average price was higher than RT. Negative values represent days when the DA price was lower.



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



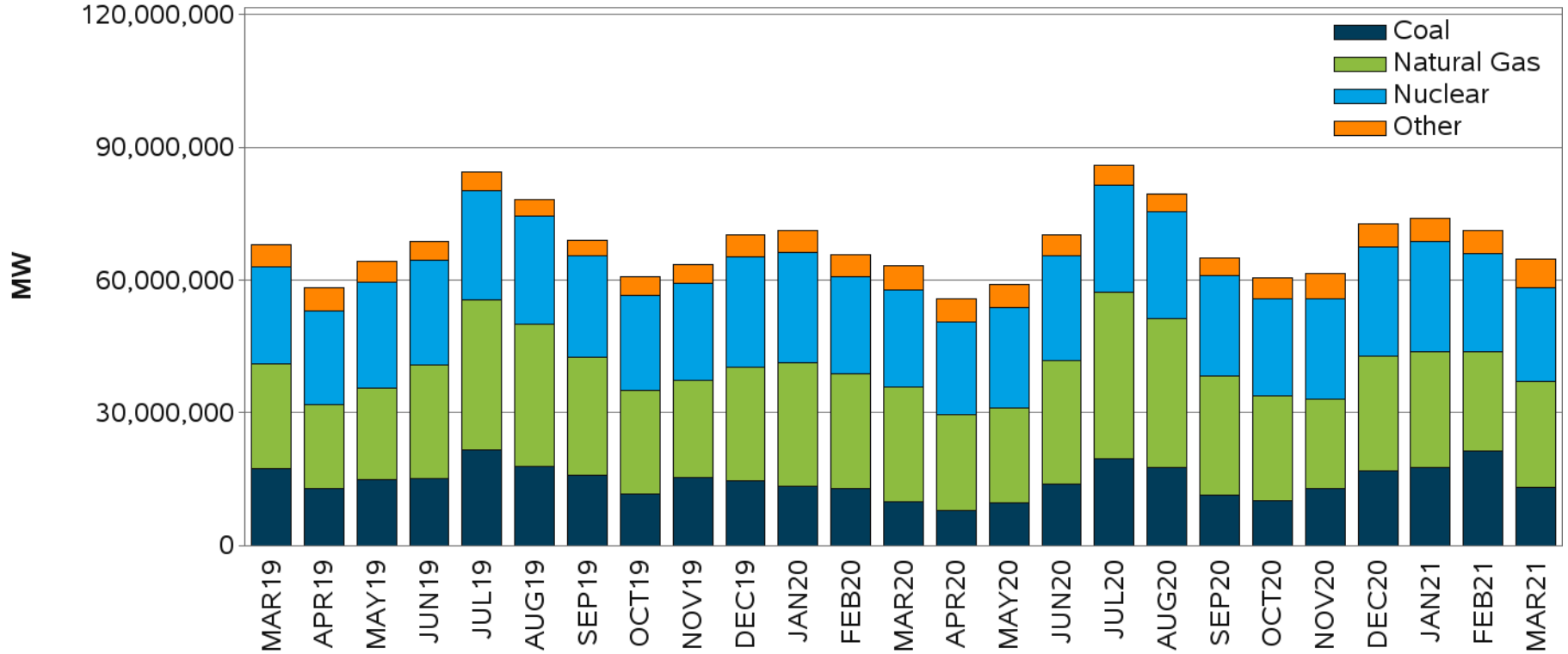
# Load Forecast Error – March Daily Peaks, 10:00 Forecast



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

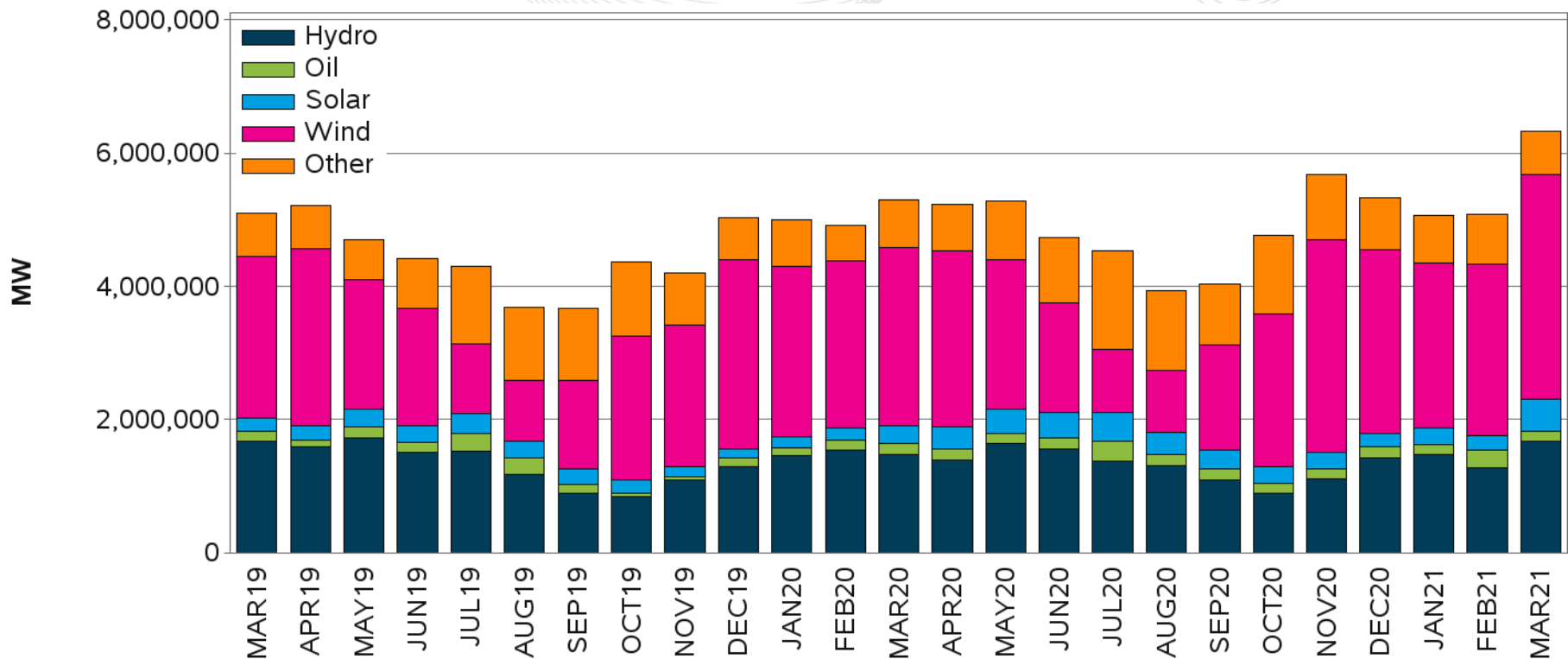
This forecast is not used to clear the day-ahead market and is not utilized for the reliability tools that run subsequent to the day-ahead market.

- Load forecast accuracy was generally high in March, as weather conditions in PJM turned mild. On March 18 and 19, stormy weather conditions and falling temperatures caused load forecast models to under-forecast the peaks.

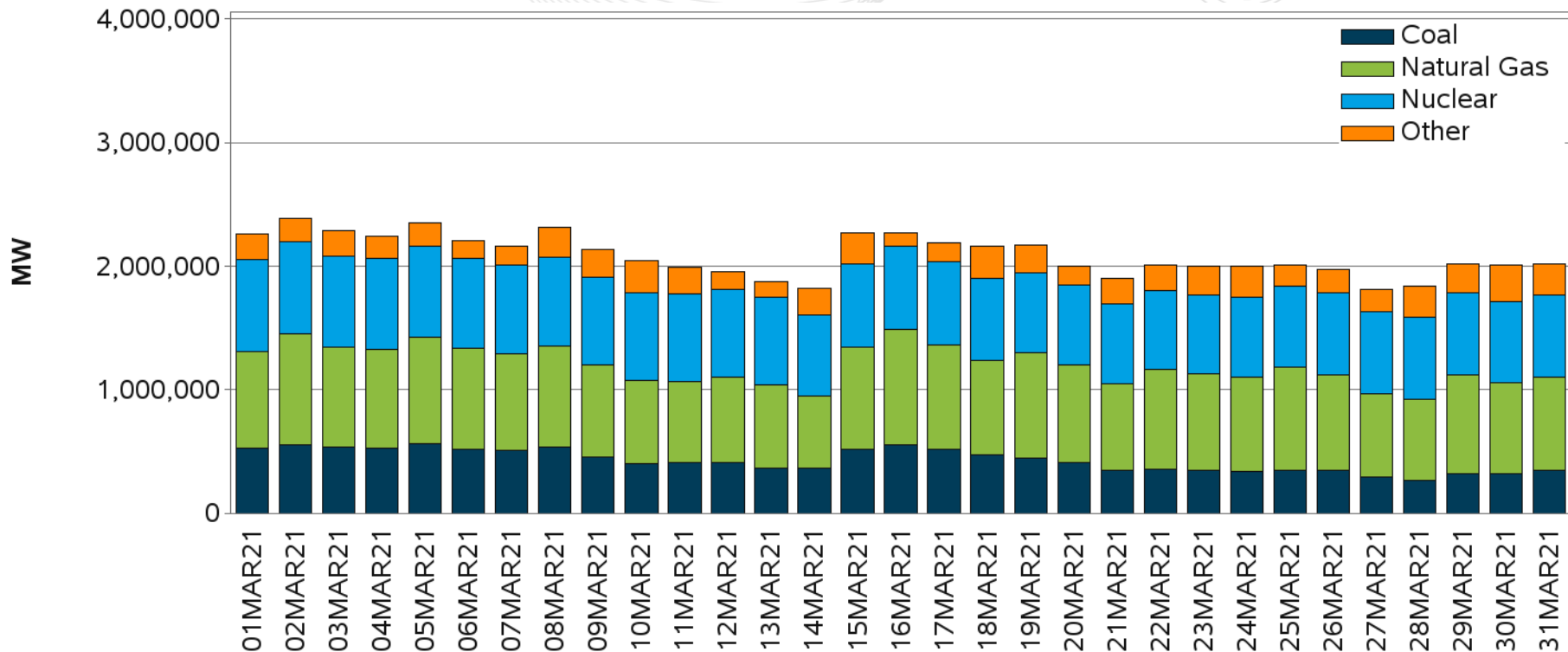


\*Other includes Hydro, Oil, Solar, Wind, and Other

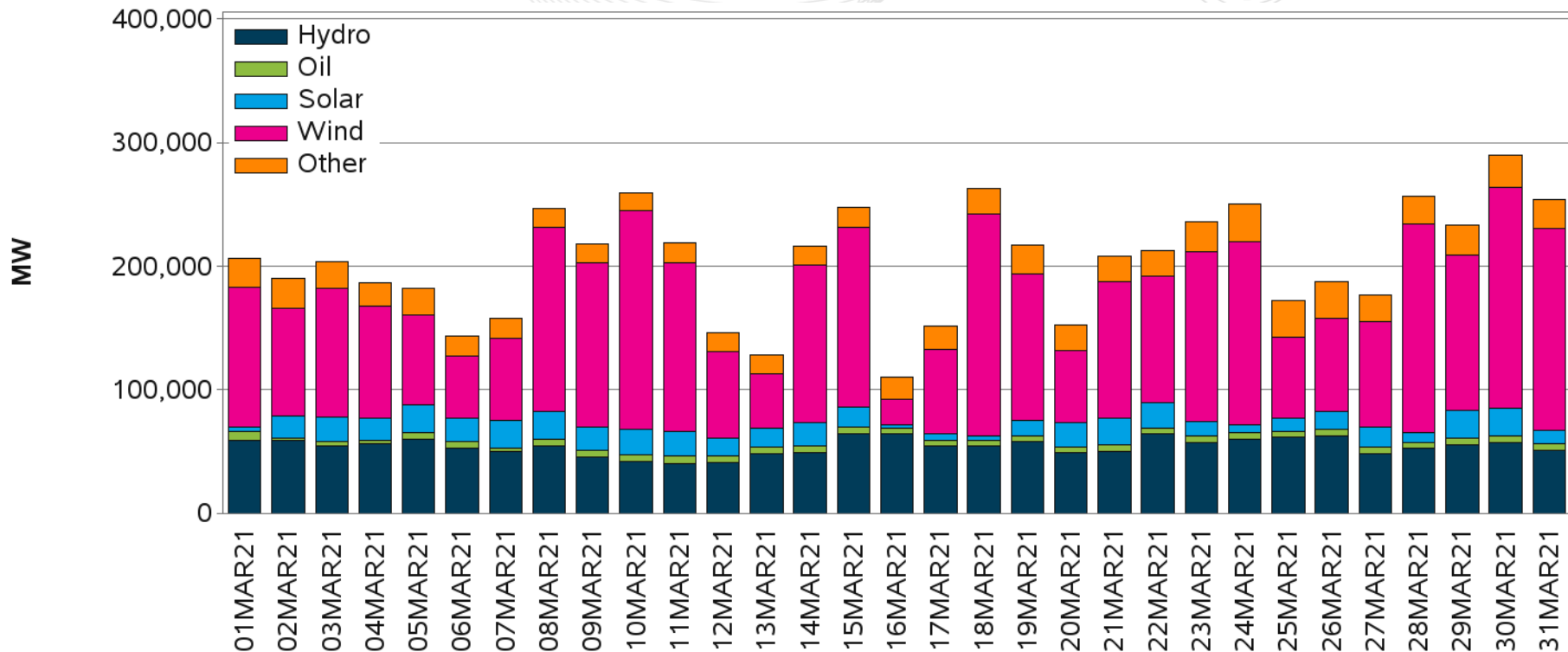




'Other' includes Flywheels, Multiple Fuels, Storage, and Other Renewables

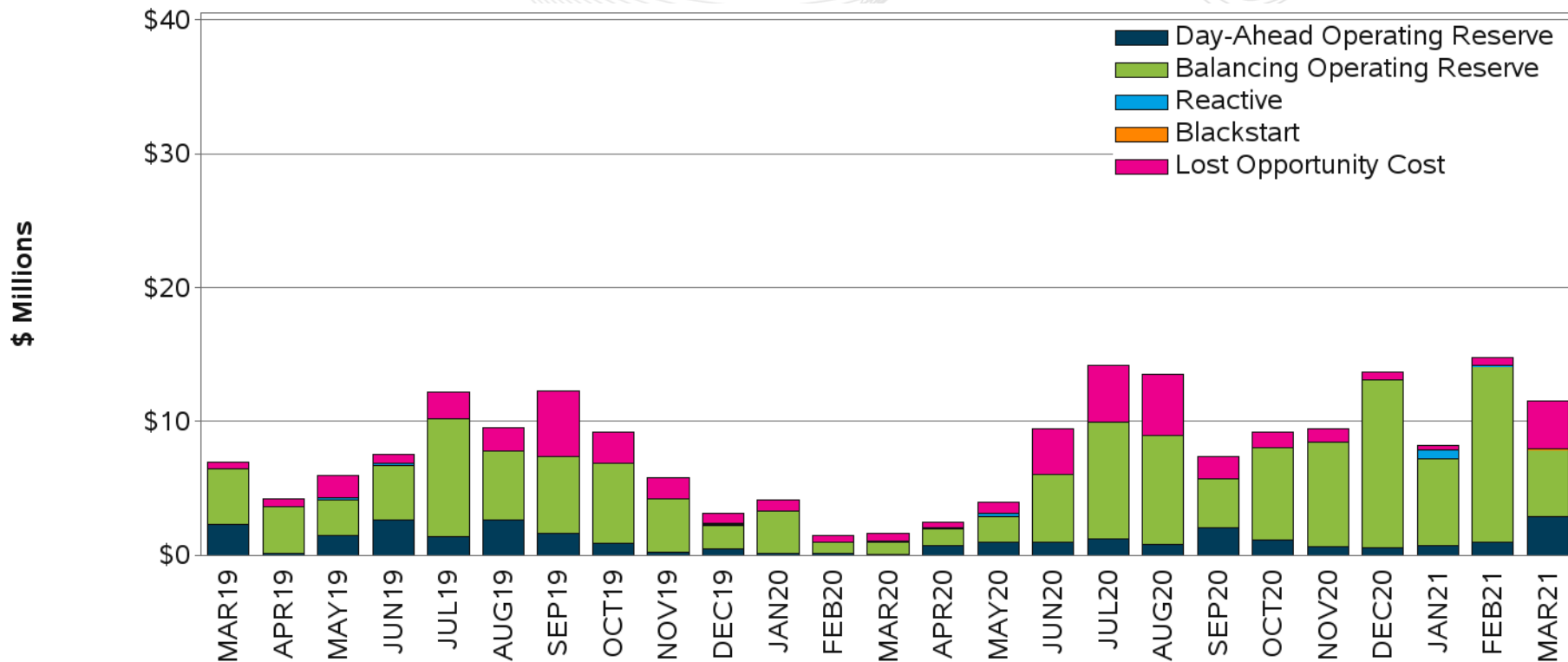


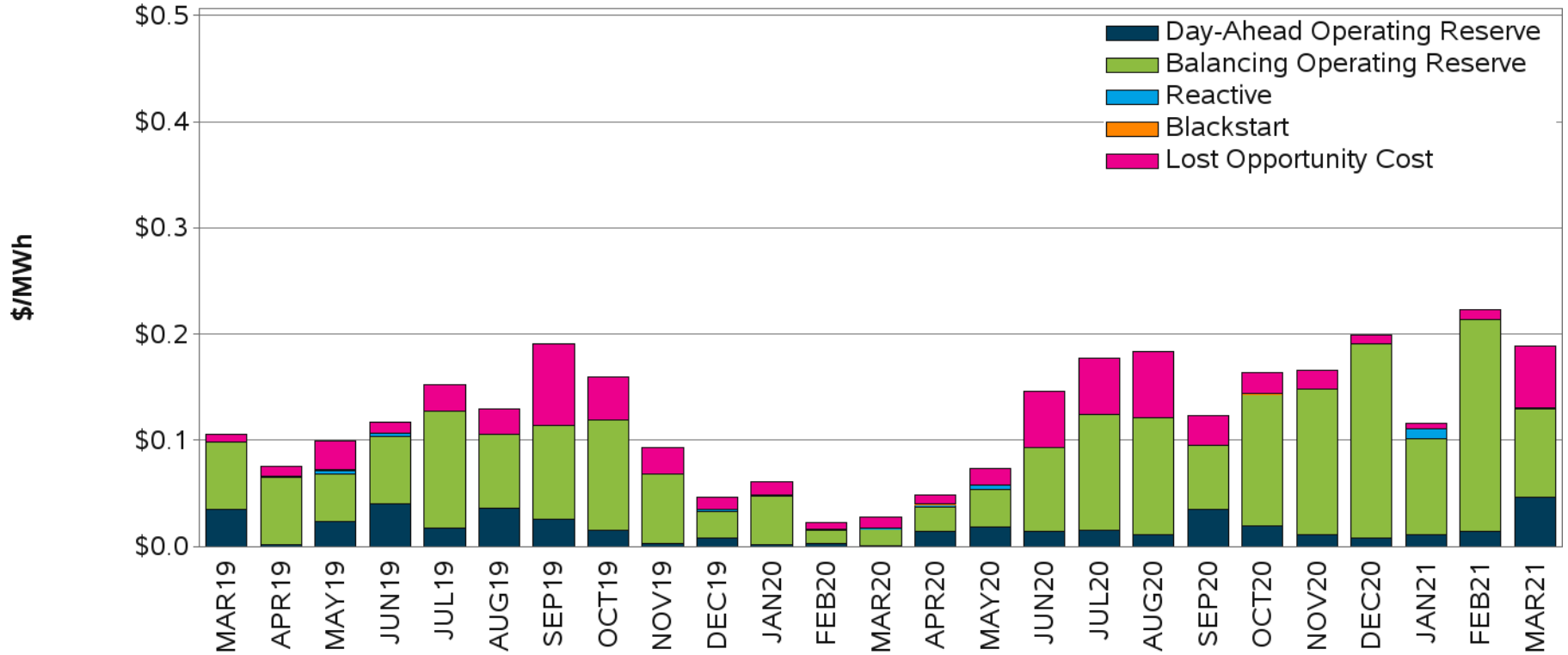
\*Other includes Hydro, Oil, Solar, Wind, and Other

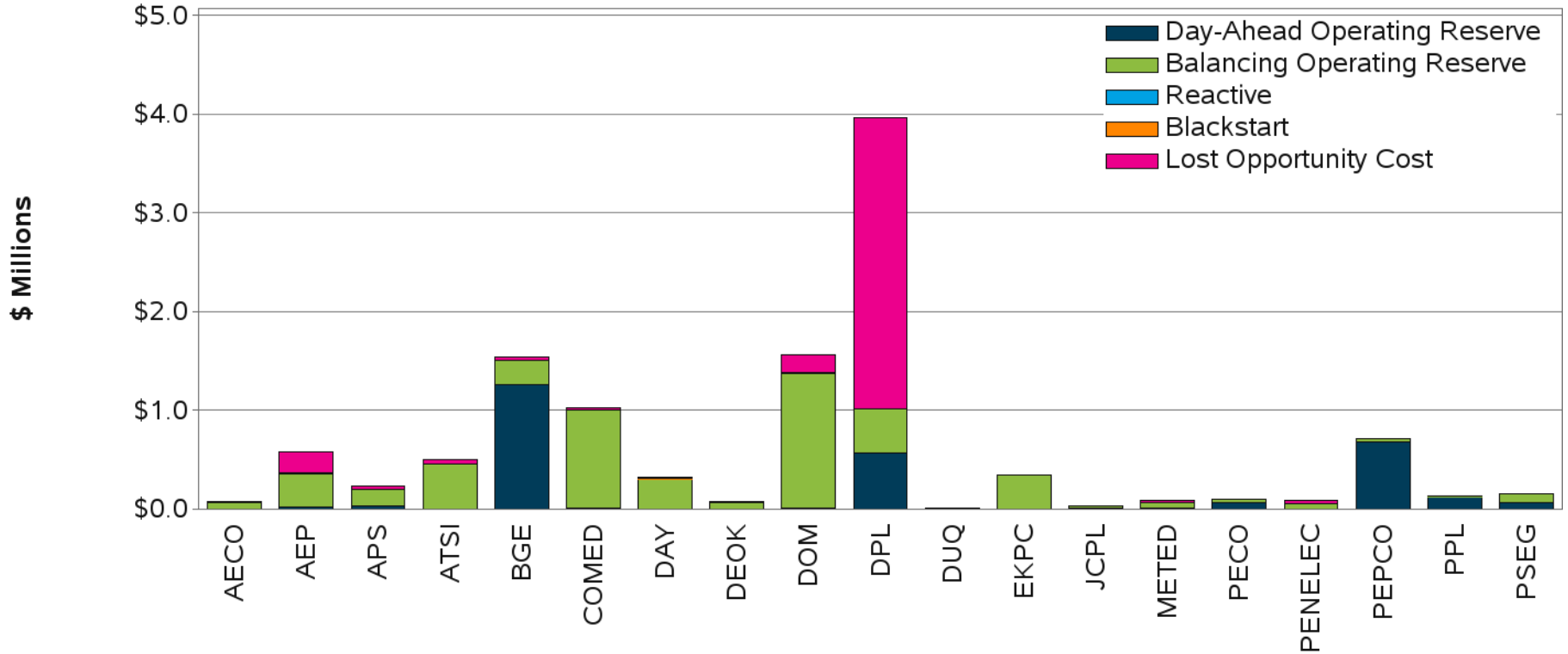


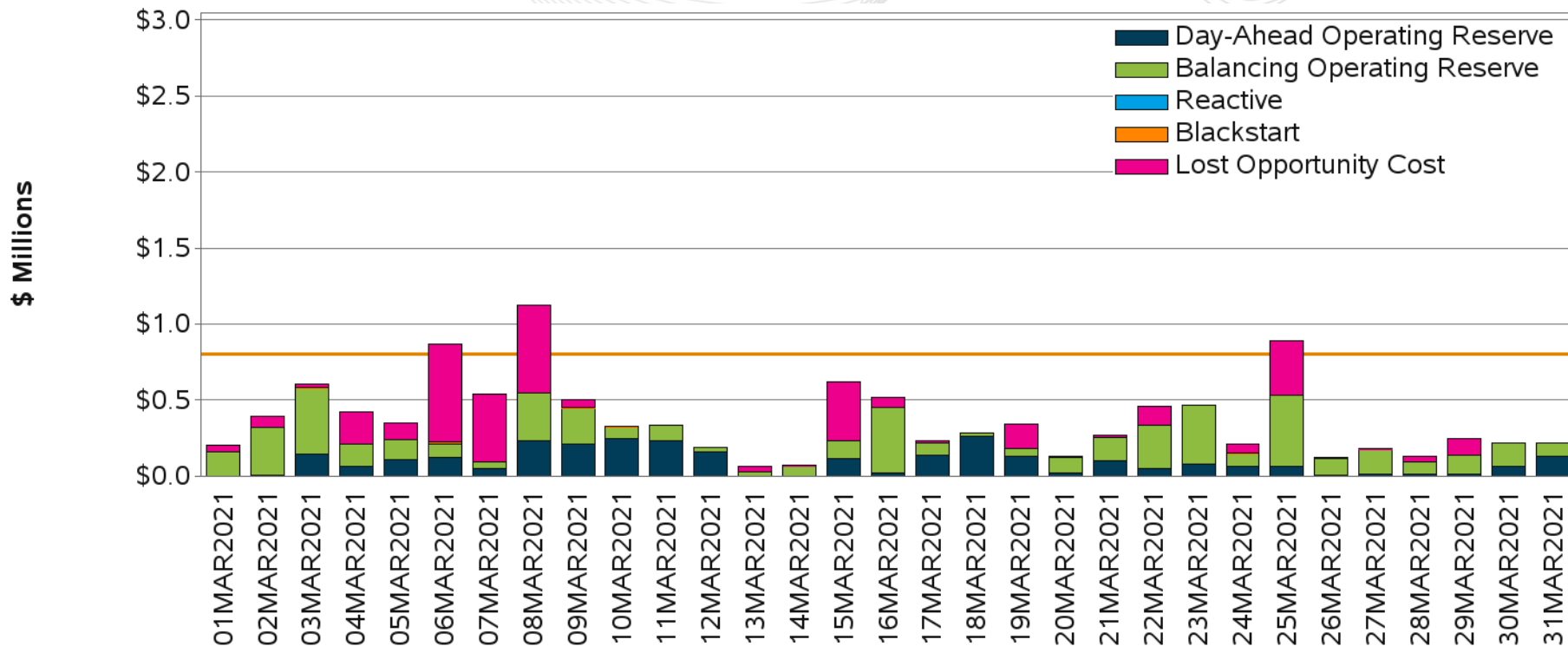
'Other' includes Flywheels, Multiple Fuels, Storage, and Other Renewables

# Operating Reserve (Uplift)











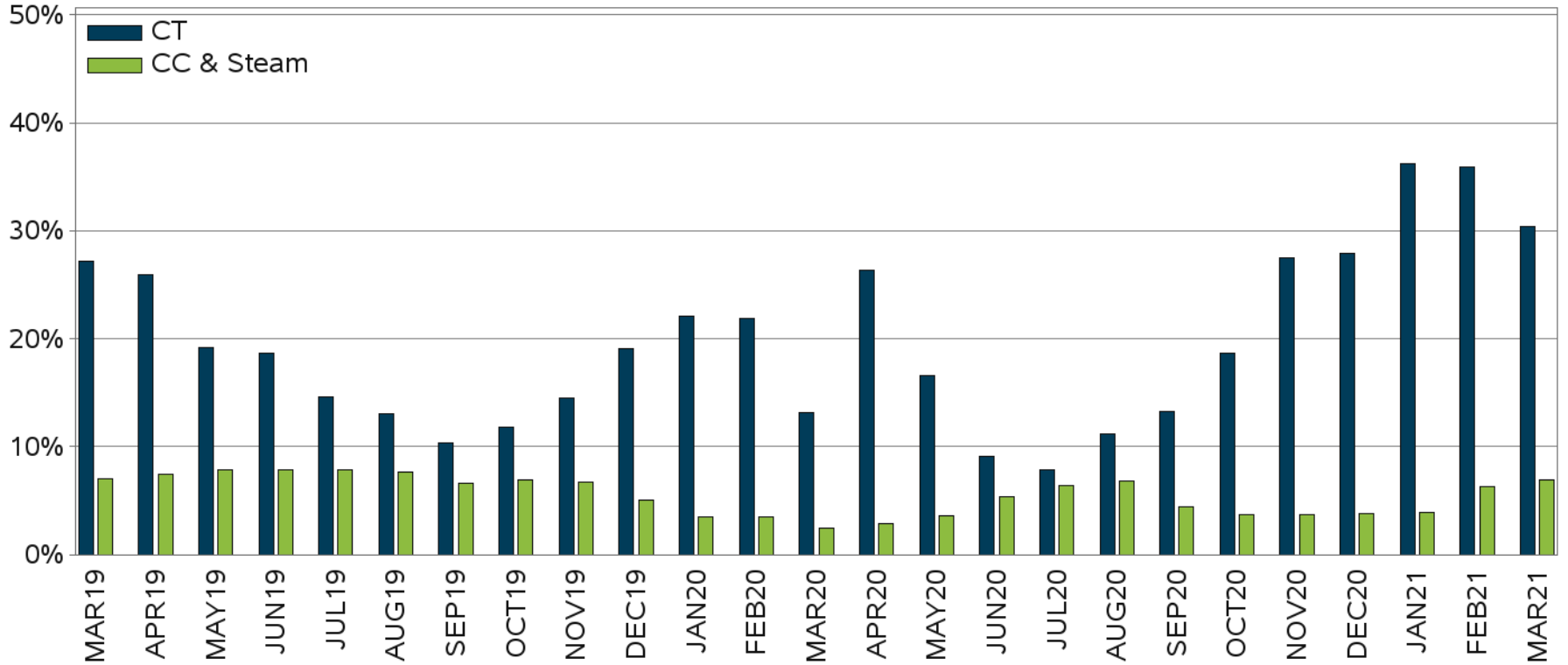
In March, uplift exceeded \$800,000 on three days – March 6<sup>th</sup>, 8<sup>th</sup> and 25<sup>th</sup>.

Contributing factors to uplift were:

- Uplift on all three days was a result of localized congestion in the DPL zone.

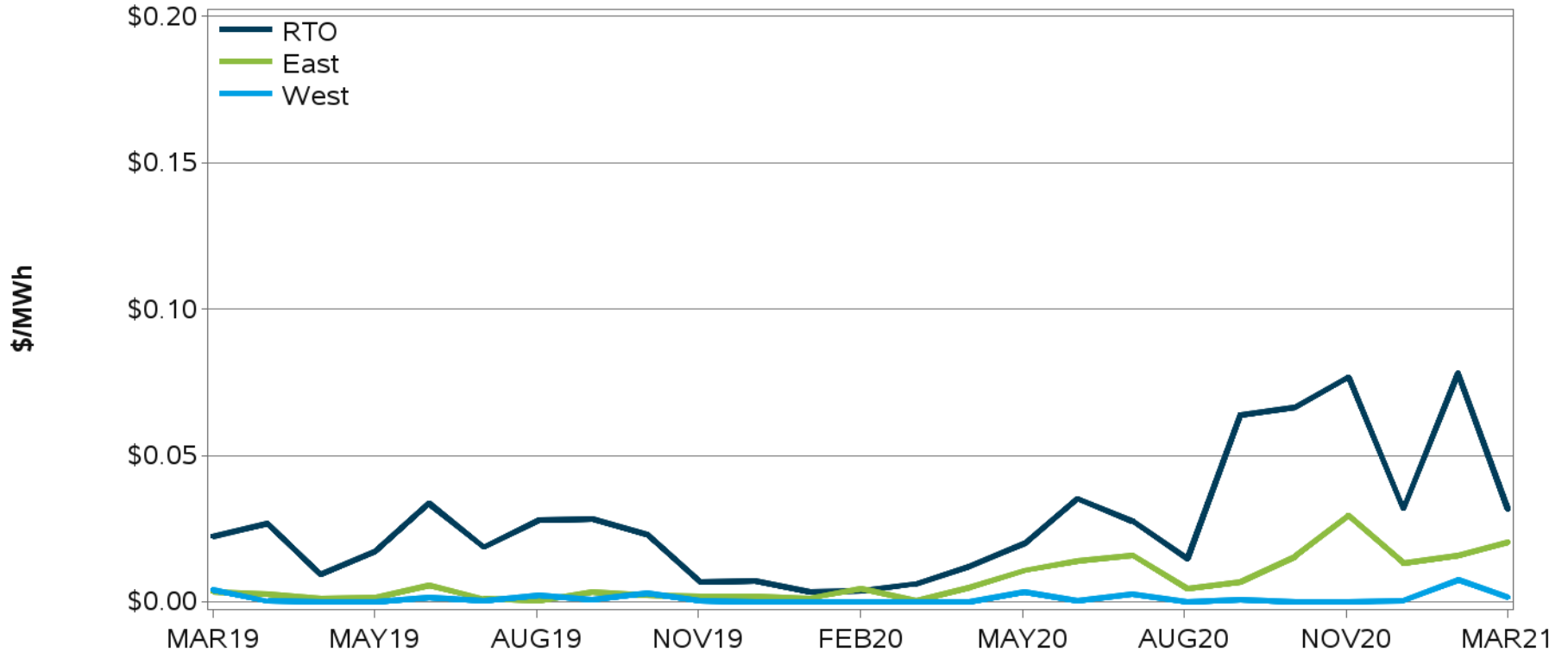
More information on Uplift can be found on PJM's website at [Drivers of Uplift](#)

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

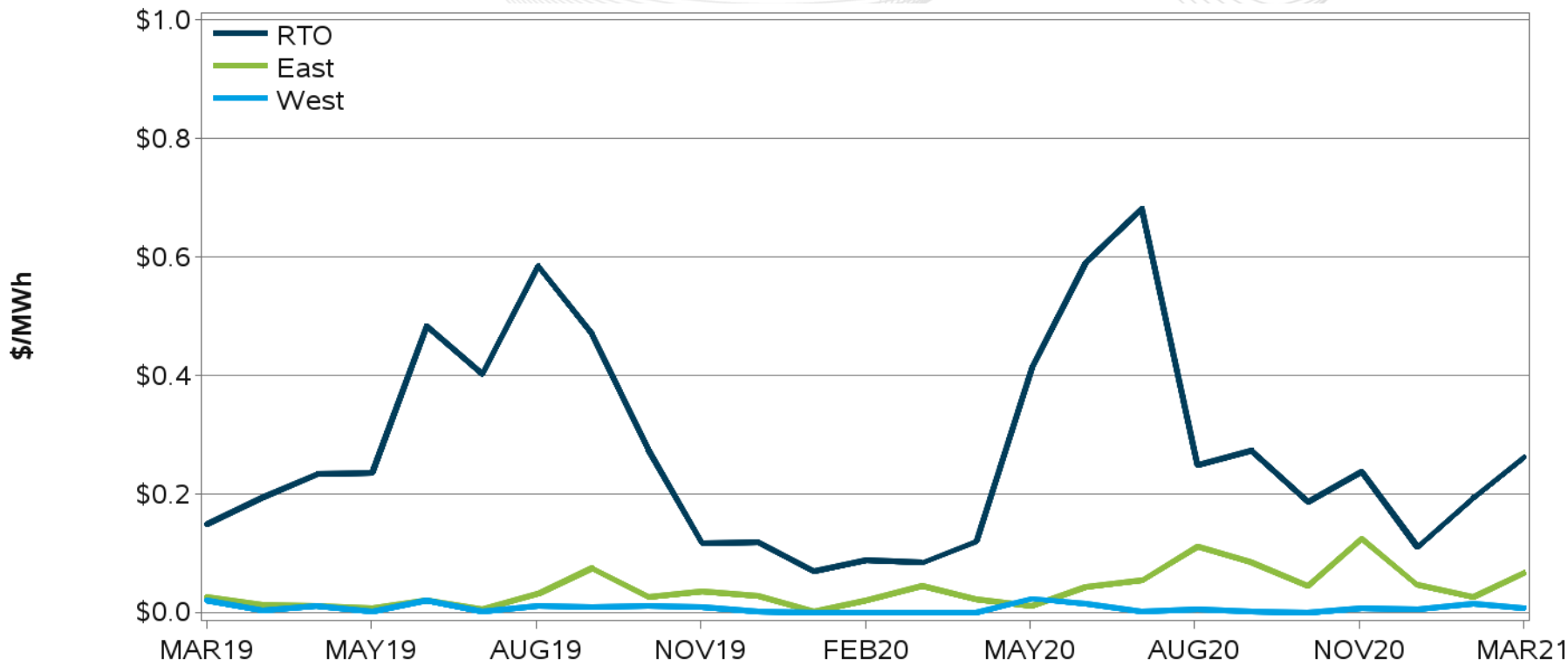


- Beginning in December 2008, the daily Balancing Operating Reserves (BOR) rate was replaced with six different BOR rates: RTO BOR for Reliability Rate, RTO BOR for Deviations Rate, East BOR for Reliability Rate, East BOR for Deviations Rate, West BOR for Reliability Rate, West BOR for Deviations Rate.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



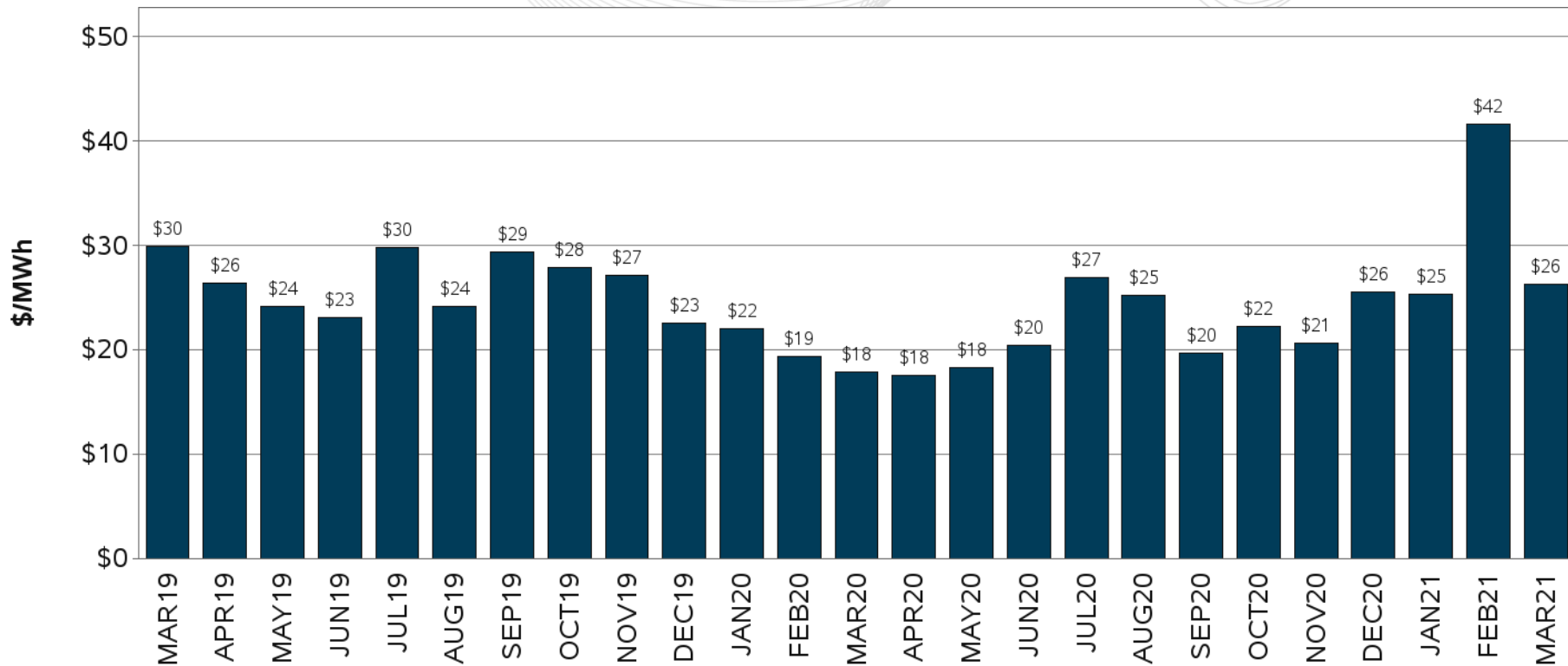
# Energy Market

# LMP Summary

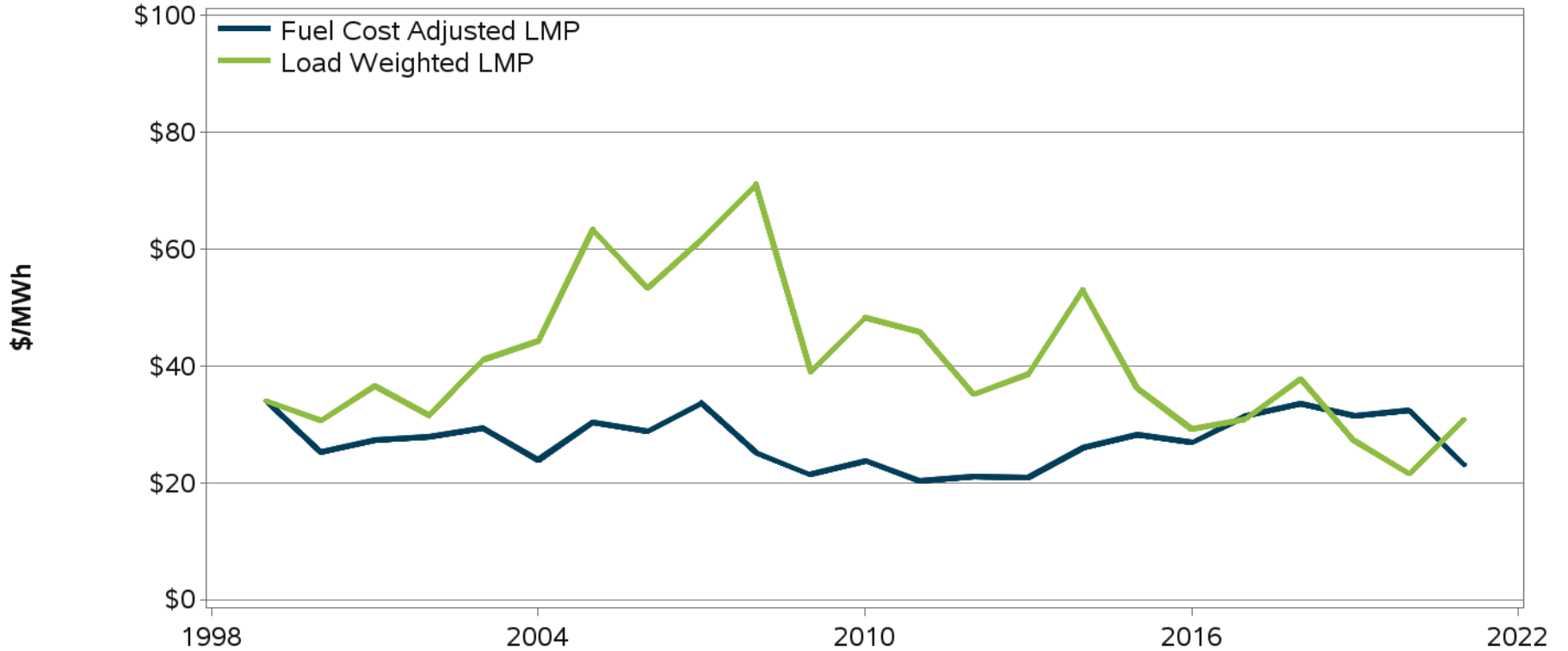
- A 5-minute shortage pricing interval occurred on March 17<sup>th</sup> between 10:10 and 10:15.
- PJM experienced the following reserve penalty factors:
  - 1<sup>st</sup> step penalty for Primary Reserve deficiencies in the RTO and MAD
  - 2<sup>nd</sup> step penalty for Synchronized Reserve deficiencies in the RTO and MAD
- System Marginal Price (SMP) for the 5-minute interval was \$3,653.98, and the hourly integrated SMP was \$343.70.

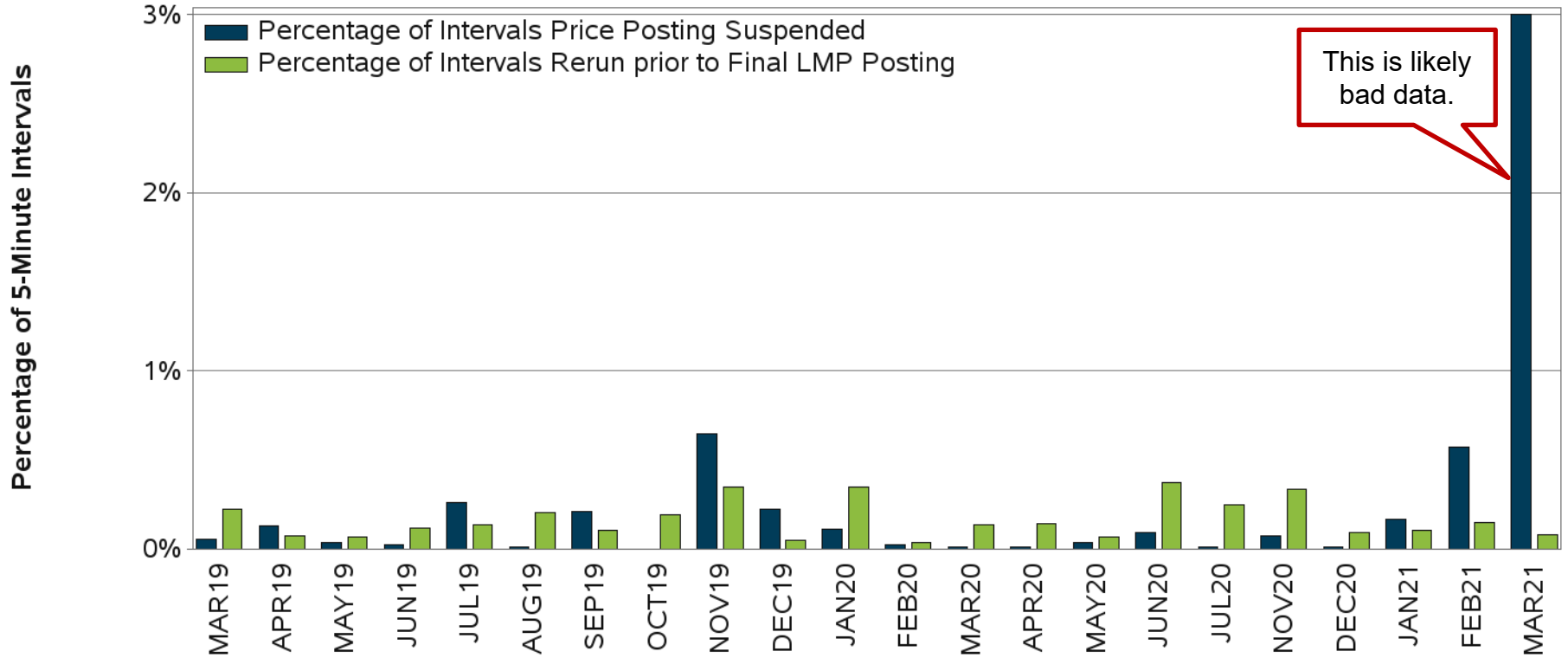
- Two 5-minute shortage pricing intervals occurred on March 22<sup>nd</sup> between 19:45 and 19:55.
- PJM experienced the following reserve penalty factors:
  - 19:45-19:50 interval
    - 2<sup>nd</sup> step penalty for Primary Reserve deficiencies in the RTO and MAD
    - 2<sup>nd</sup> step penalty for Synchronized Reserve deficiencies in the RTO and MAD
  - 19:50-19:55 interval
    - 1<sup>st</sup> step penalty for Primary Reserve deficiencies in the RTO and MAD
    - 2<sup>nd</sup> step penalty for Synchronized Reserve deficiencies in the RTO and MAD
- SMPs for the 5-minute intervals were \$3,688.68 and \$2,431.68, respectively and the hourly integrated SMP was \$542.37.





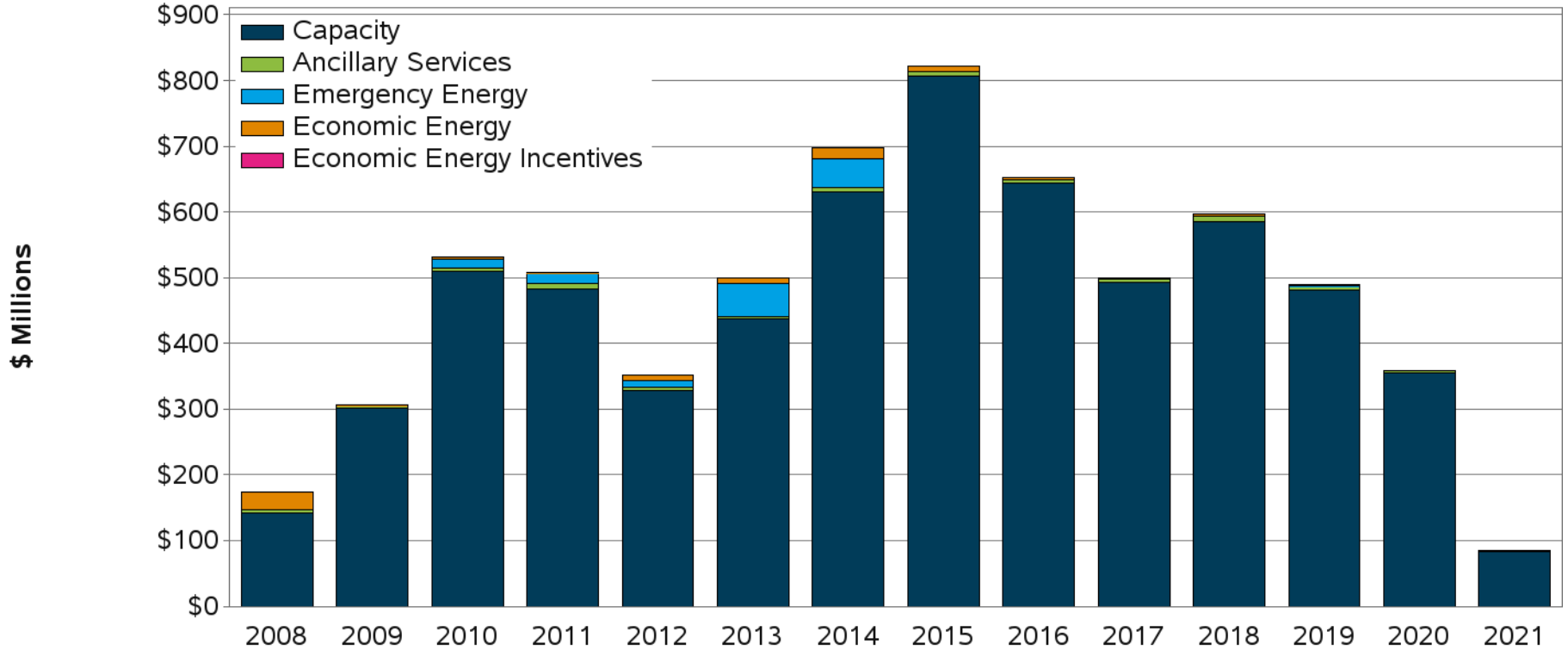
# Fuel Cost Adjusted LMP (Referenced to 1999 Fuel Prices)

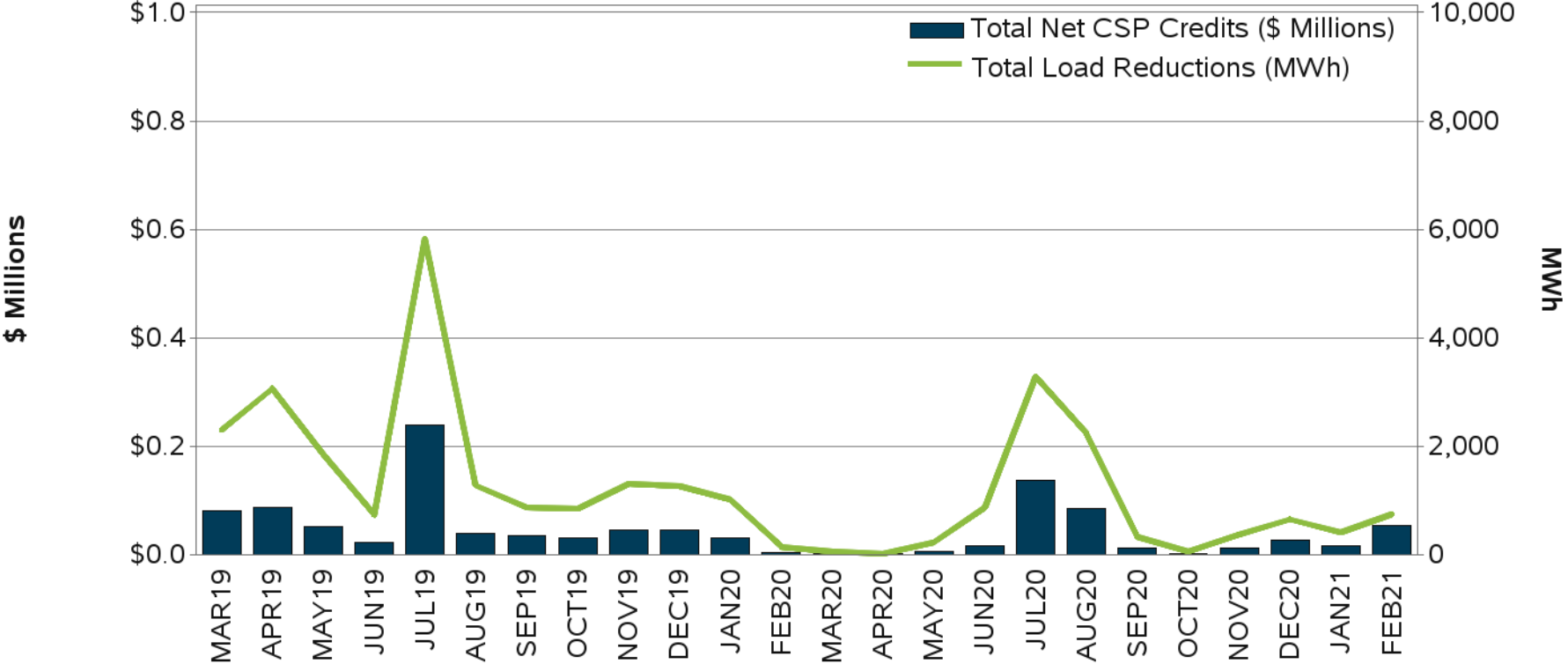




# Energy Market

# Demand Response Summary

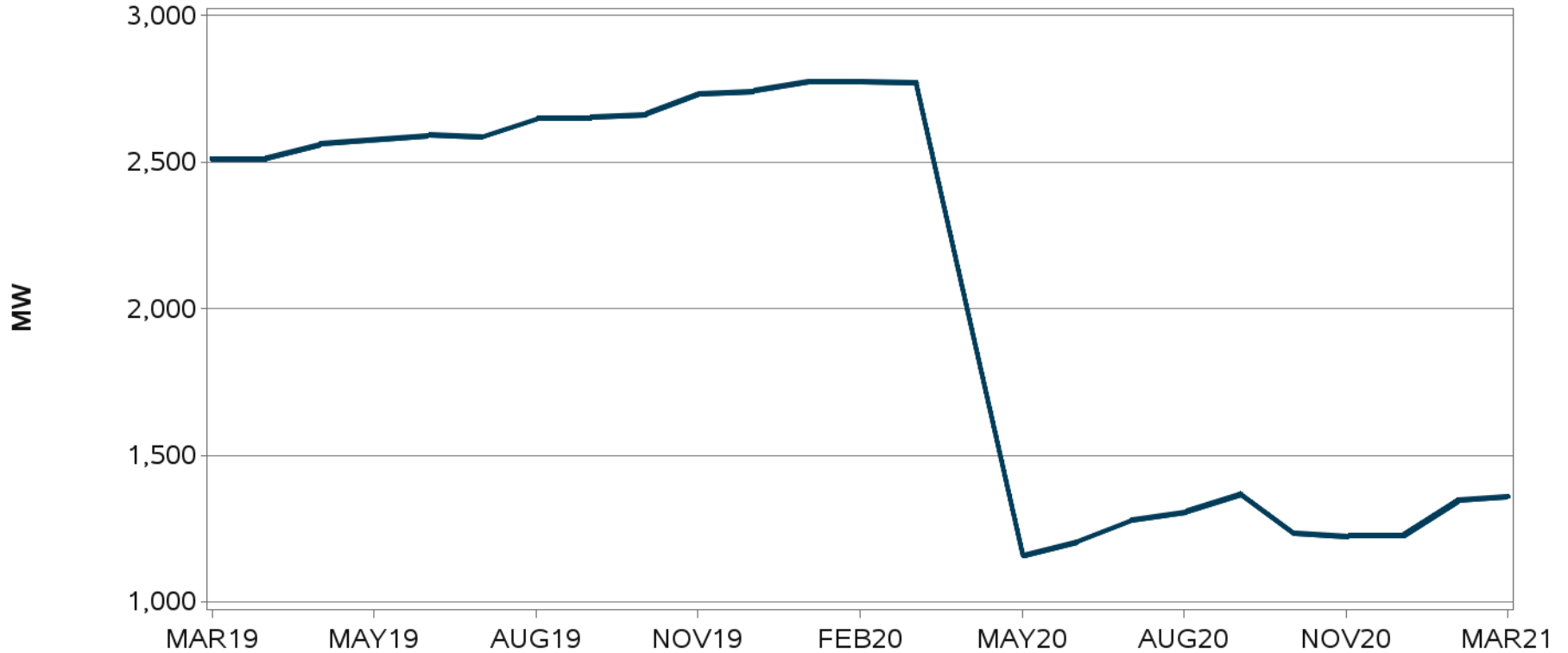




\*Data for the last few months are subject to significant change due to the settlement window.



# Total Registered MW in PJM's Economic Demand Response



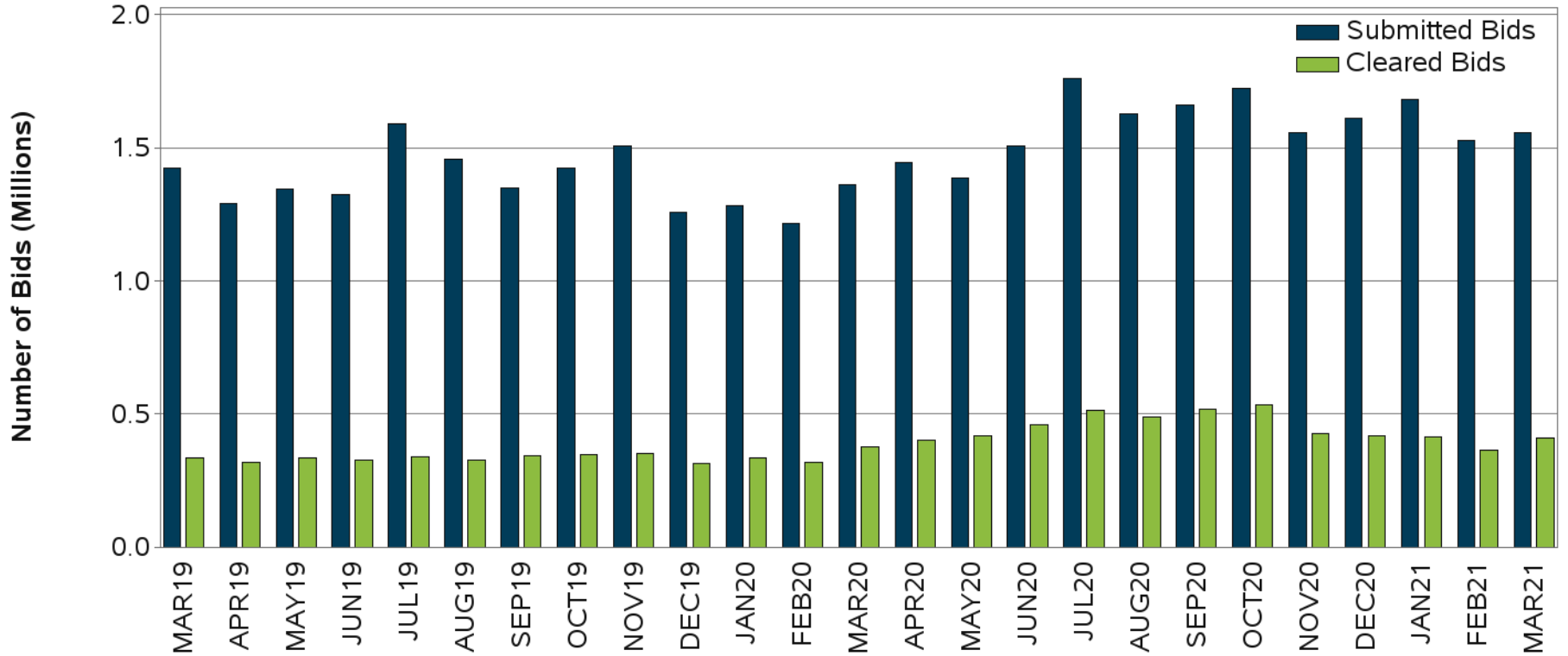
# Energy Market

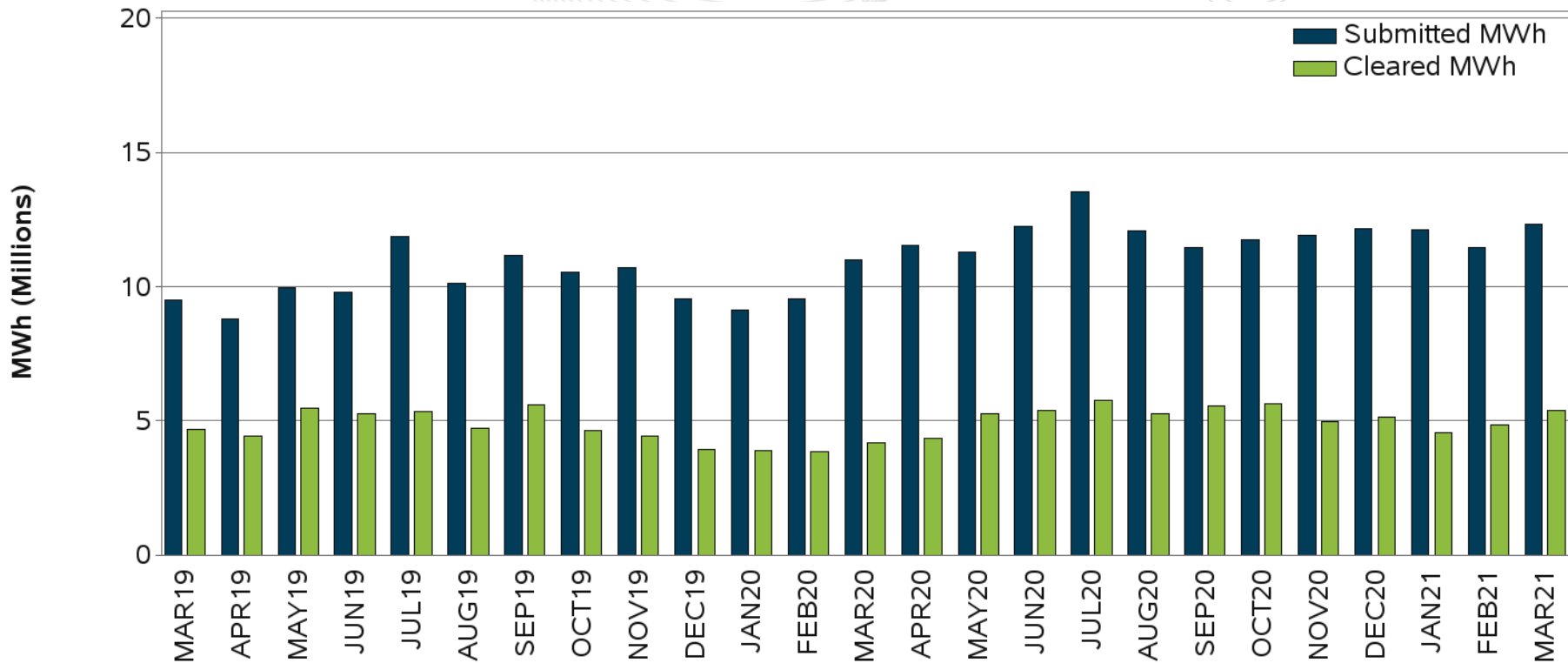
# Virtual Activity Summary



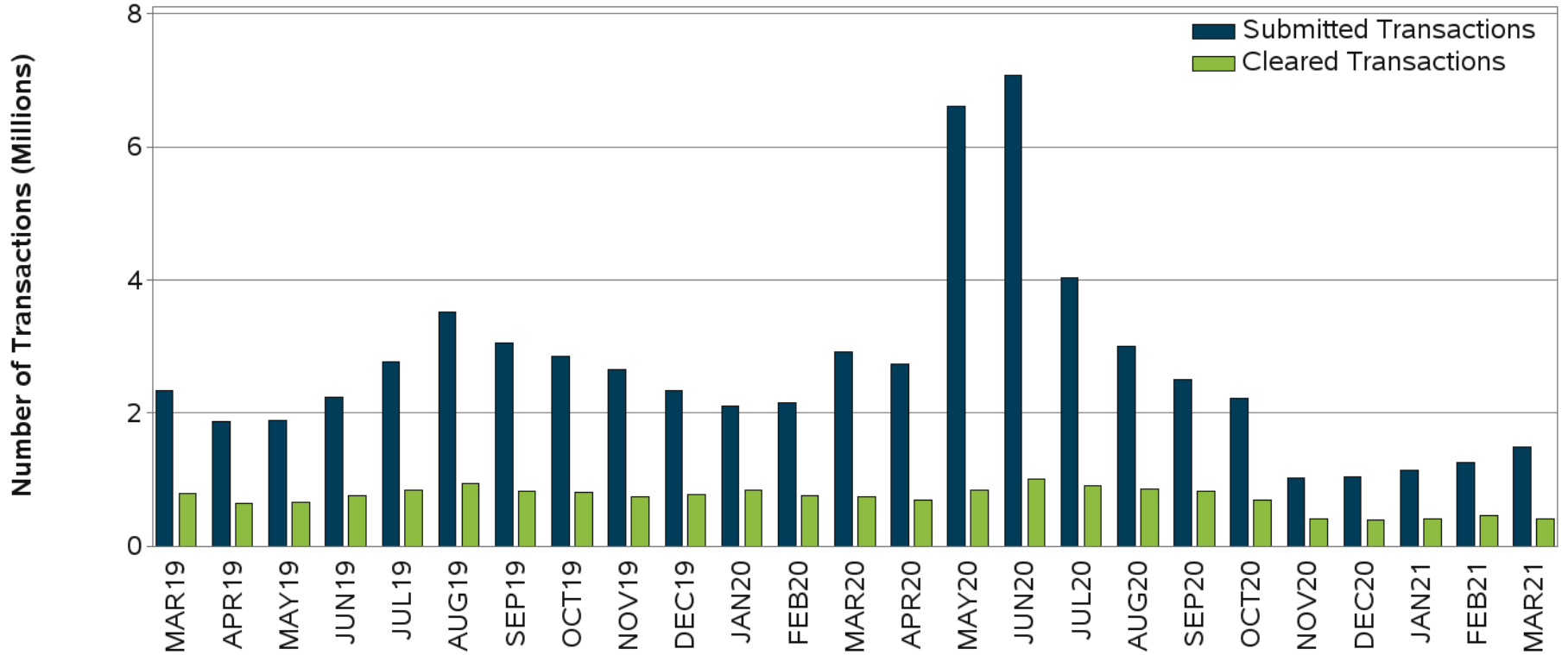
- The following six charts depict trends in submitted and cleared virtual and up-to-congestion transactions, in terms of number and volume, into the PJM Energy Market. The first two of these charts show the submitted and cleared increment and decrement bids (virtual transactions or virtuals) and they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

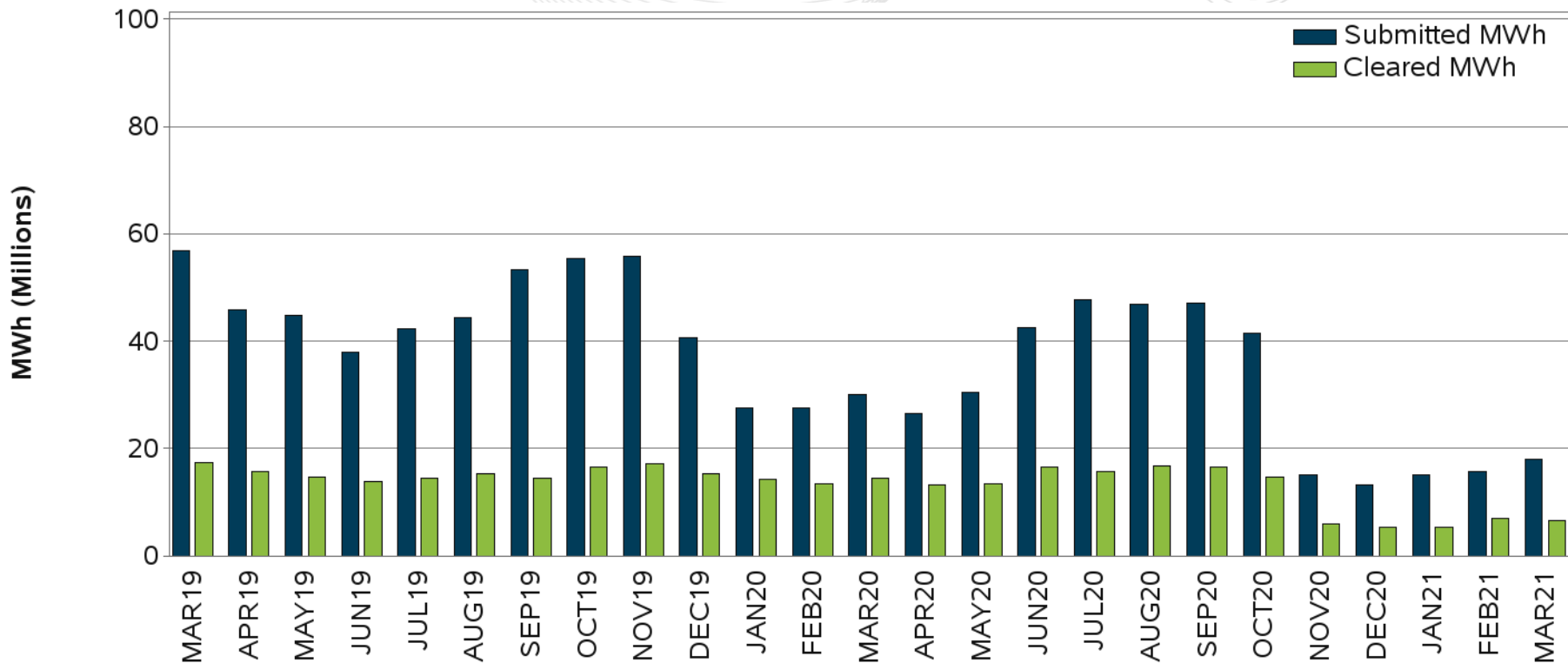




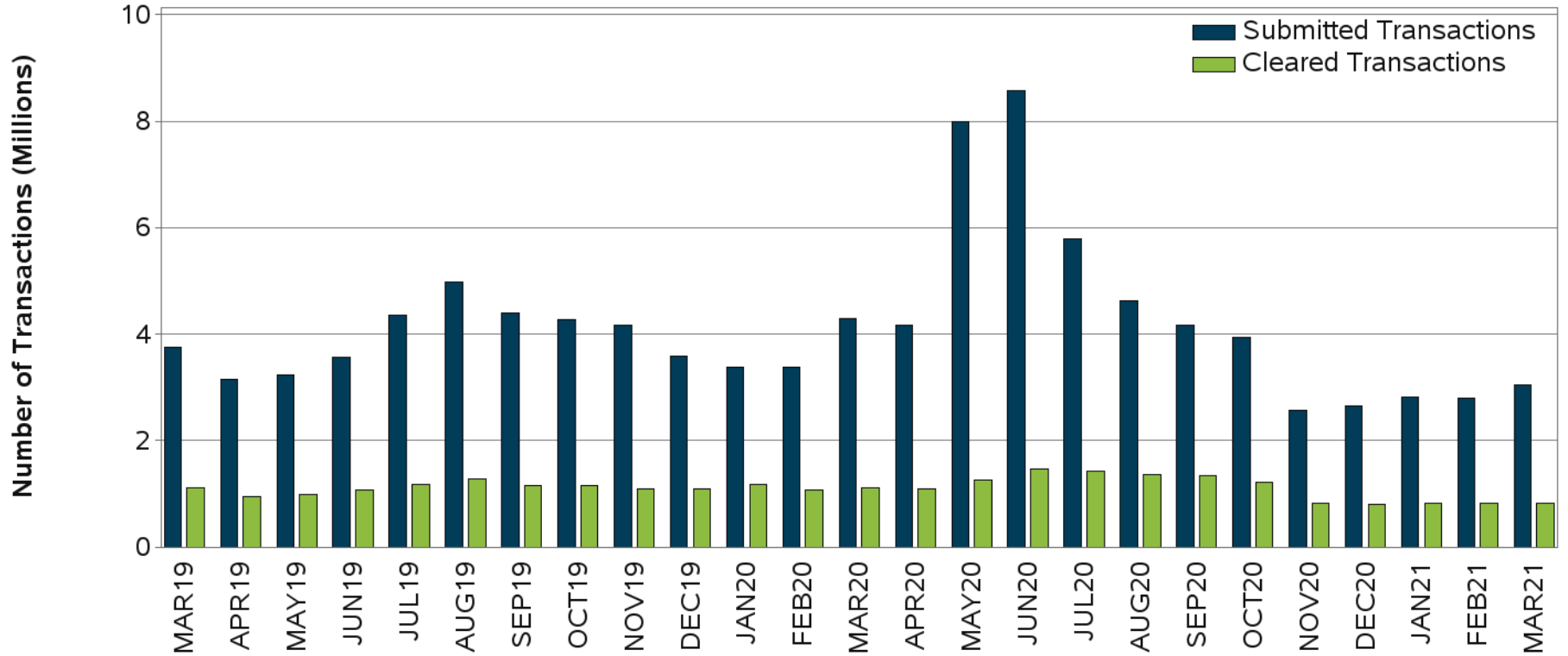
# Up-To-Congestion Transactions - Total Number



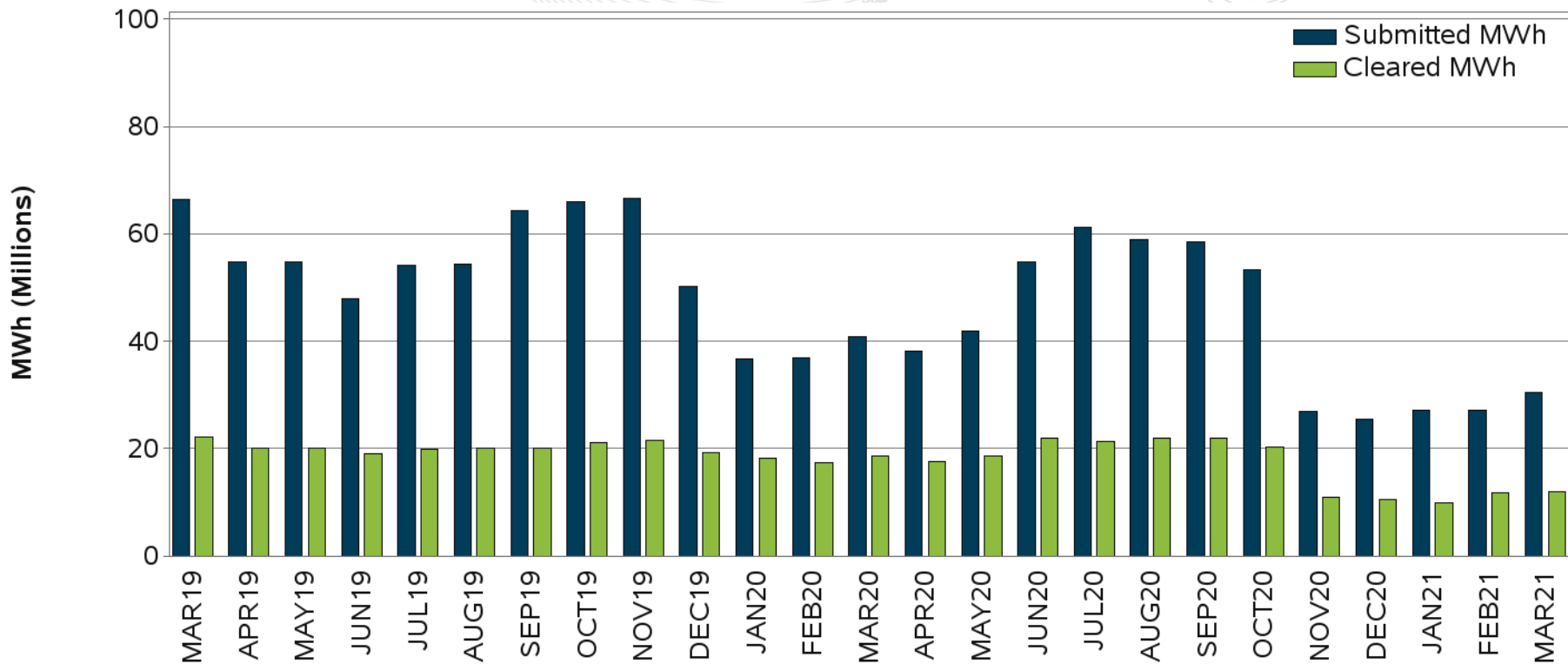
# Up-To-Congestion Transactions - Total Volume



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



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

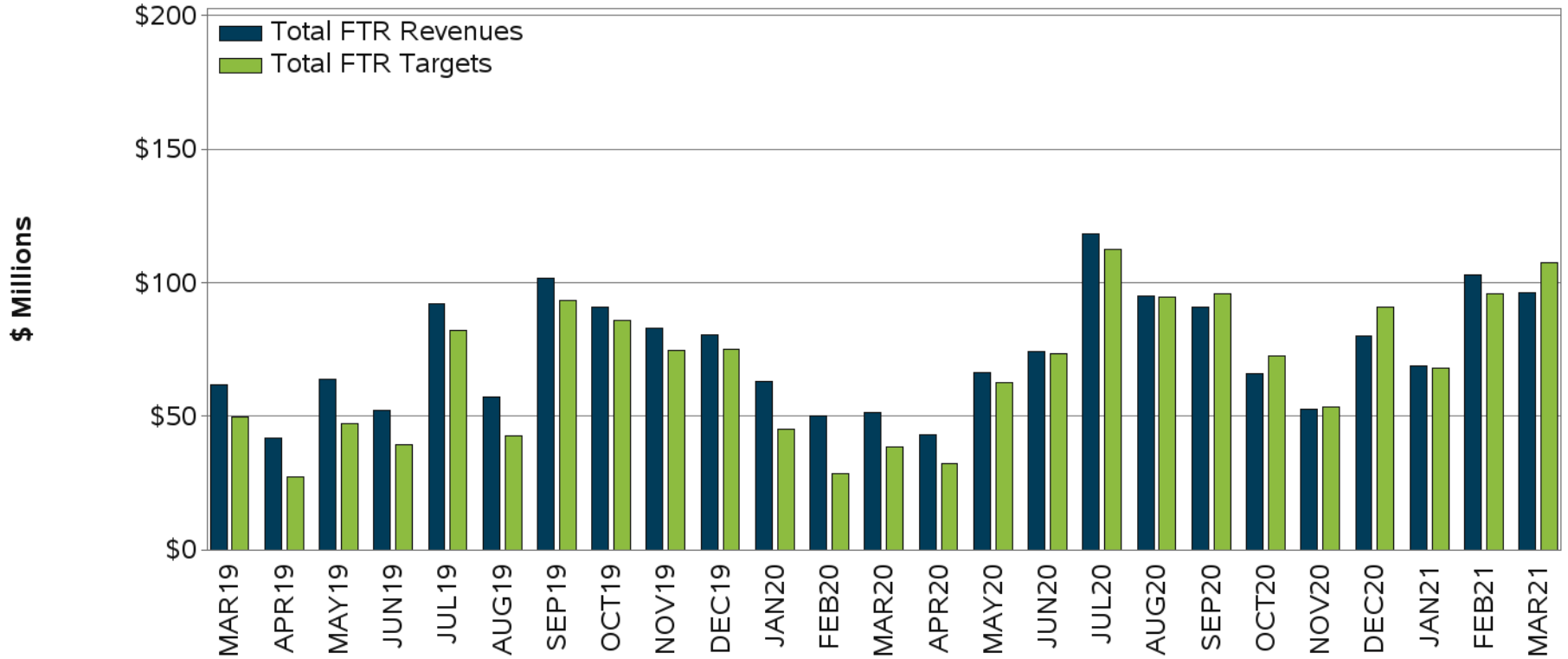


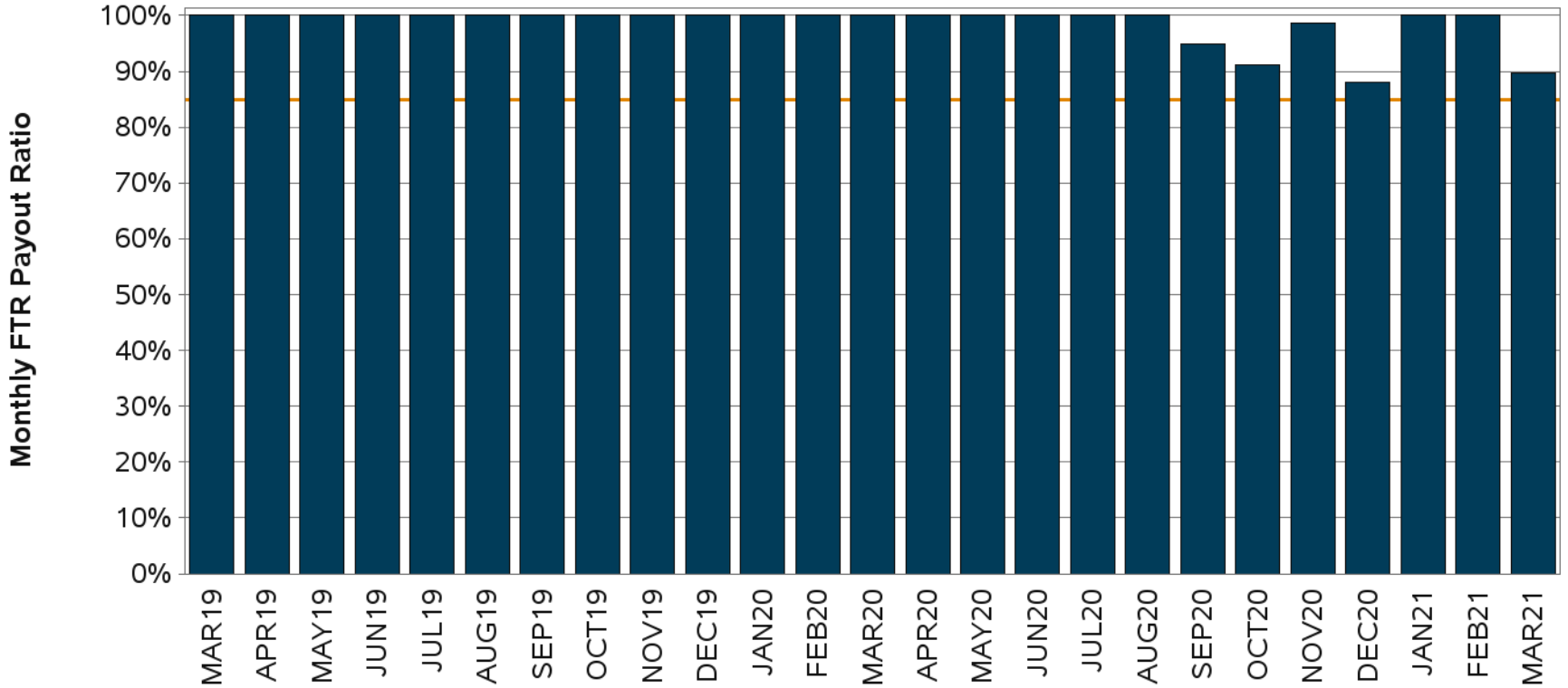
# Energy Market

# Congestion and FTR Summary

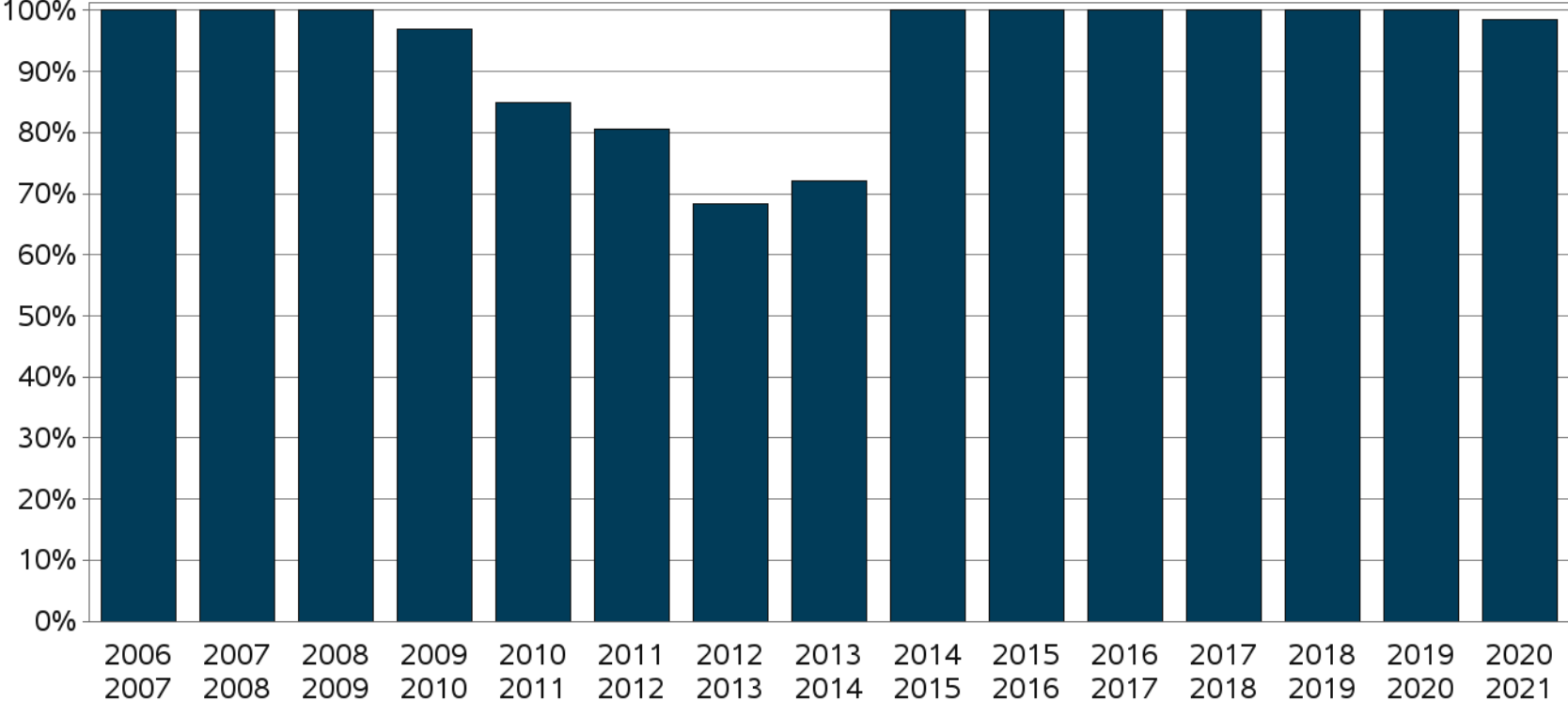


Period	Surplus / Underfunding	Payout Ratio
March, 2021	\$-11,167,382	90%
2021	\$-1,166,903	100%
2020/2021	\$-13,339,062	98%

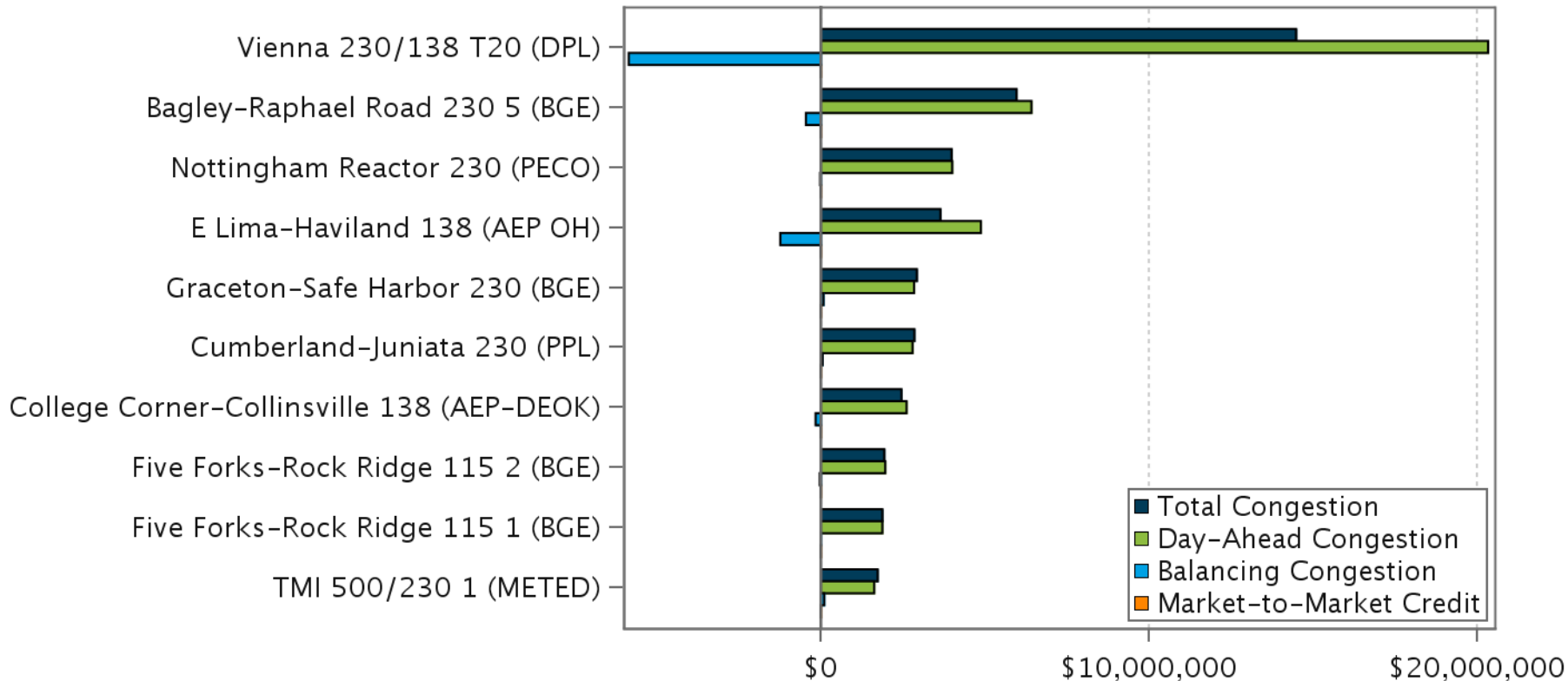




Planning Period FTR Payout Ratio

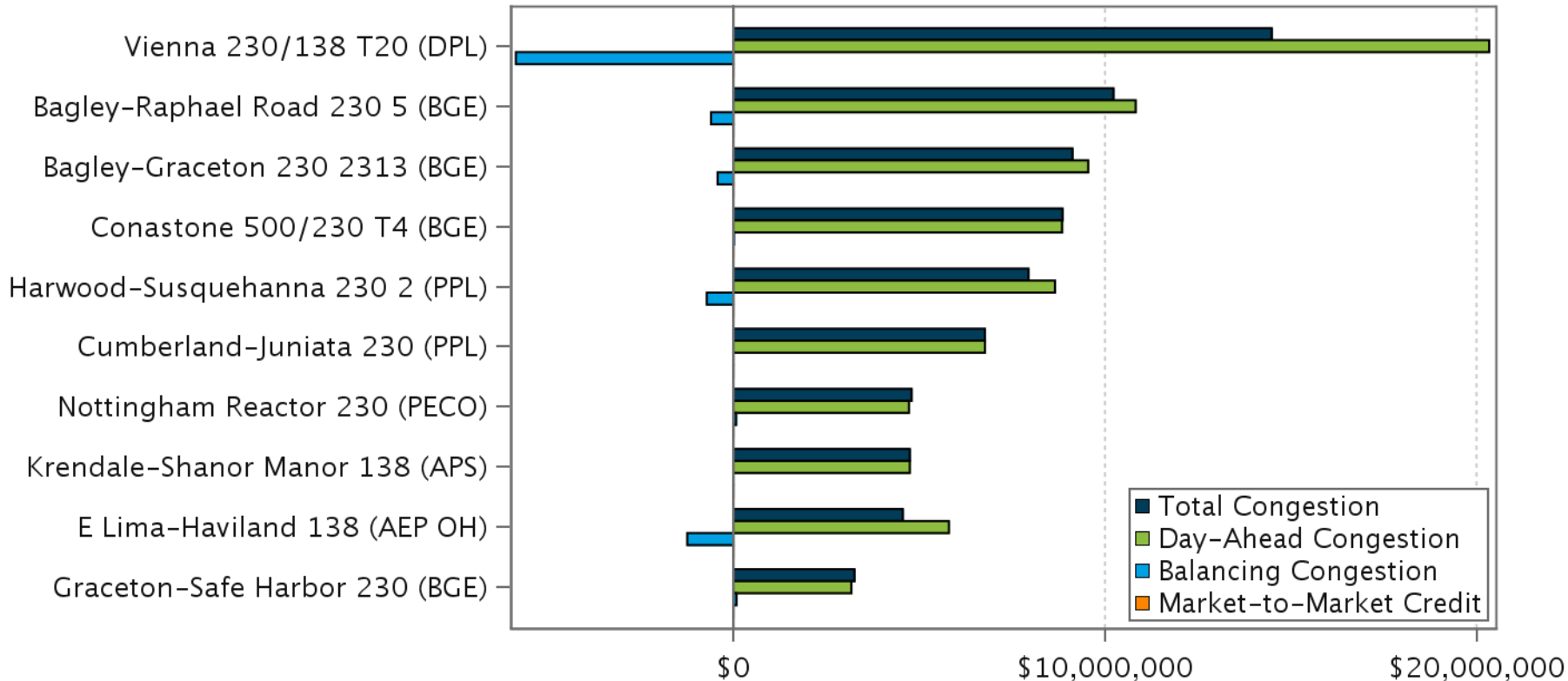


# Ten Most Heavily Congested Transmission Facilities - Overall, March



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

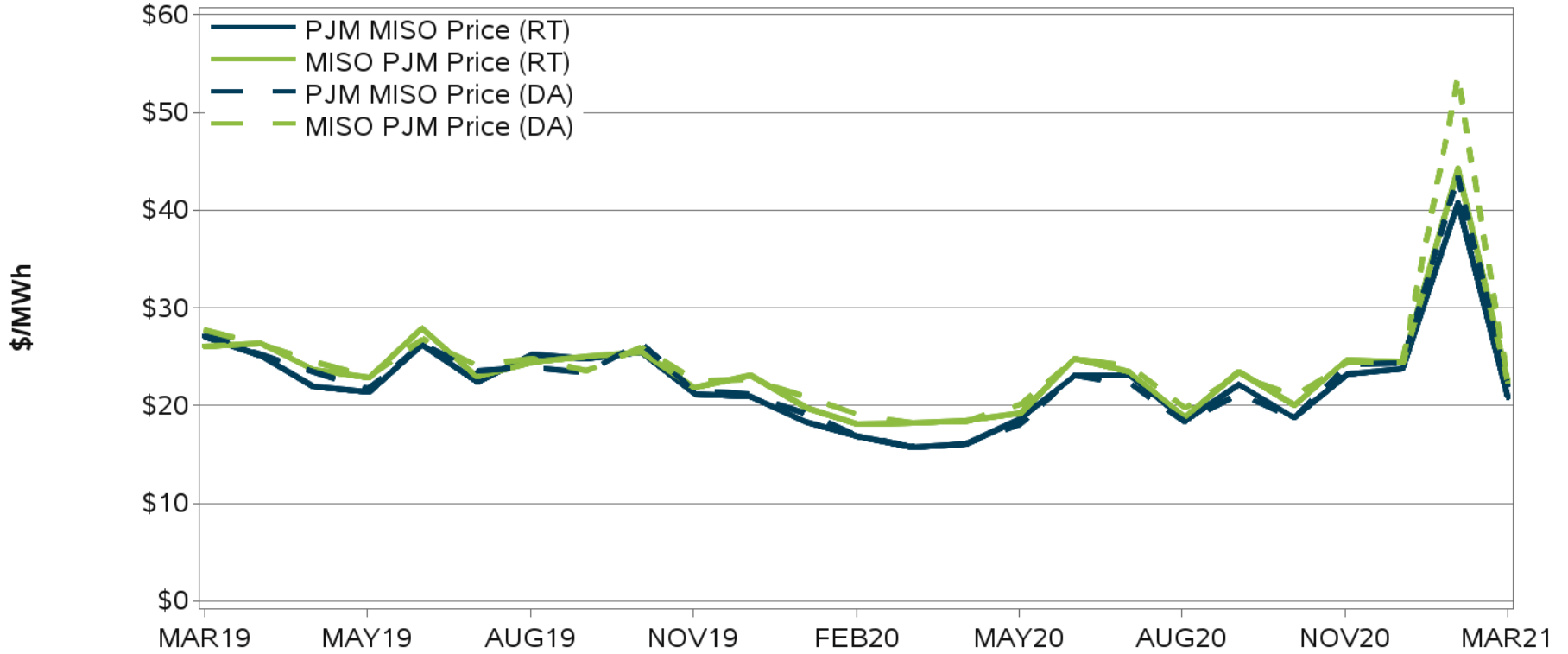
# Ten Most Heavily Congested Transmission Facilities - Overall, 2021



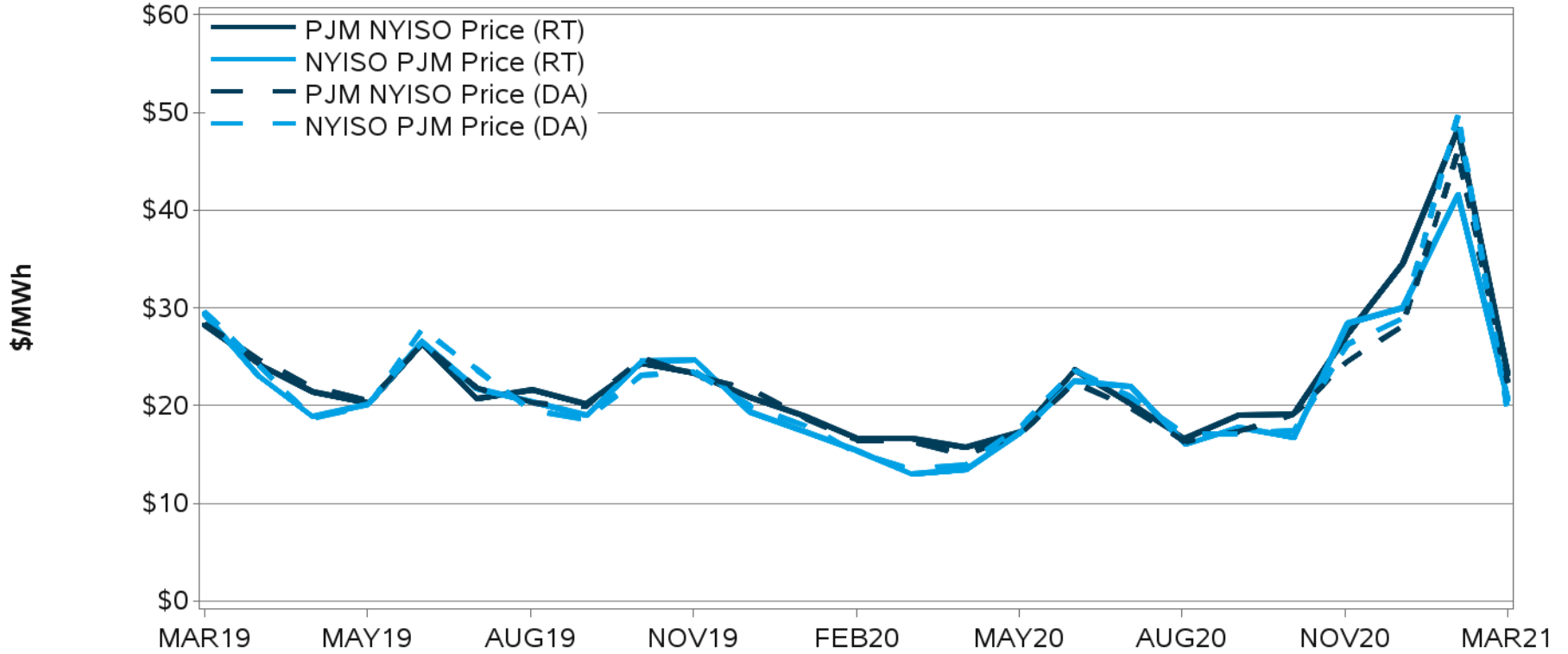
The ten most heavily congested facilities account for 54% of total congestion for 2021.

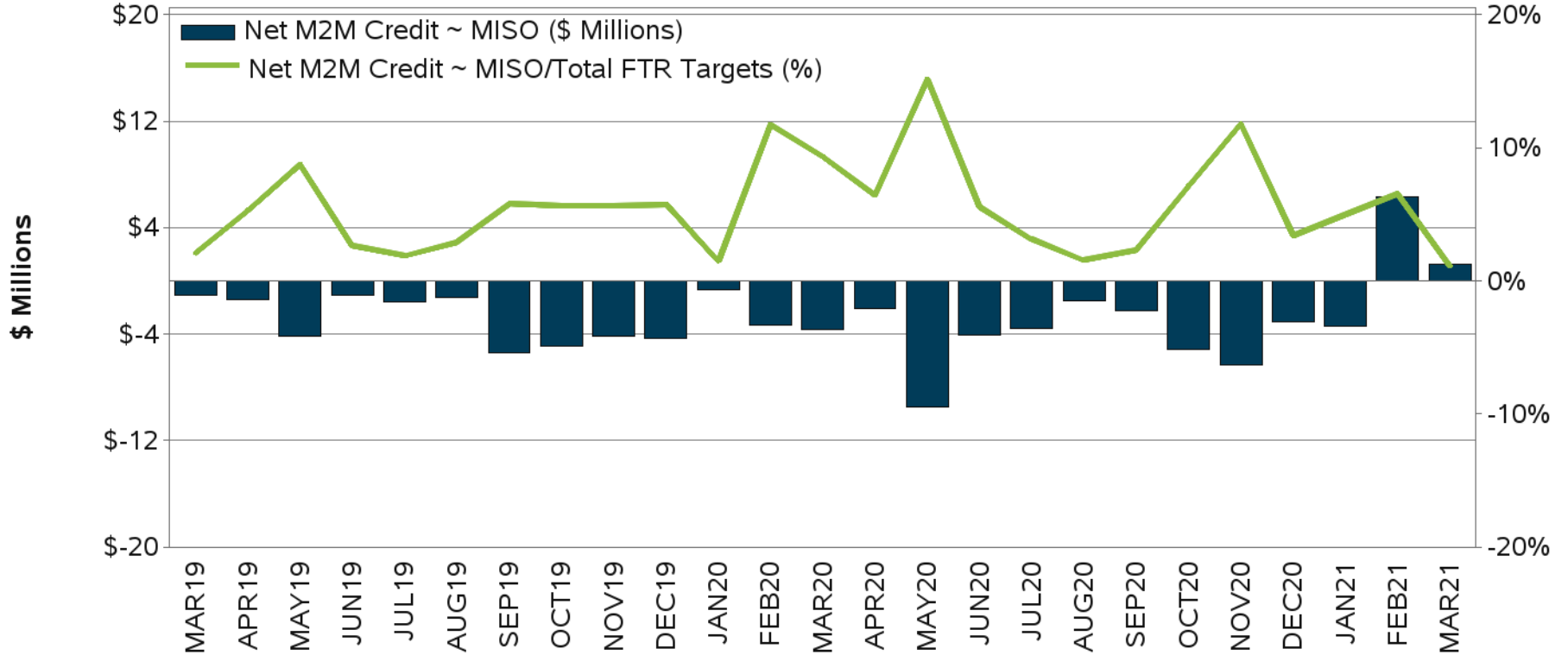
# Energy Market

# Interchange/Seams Summary



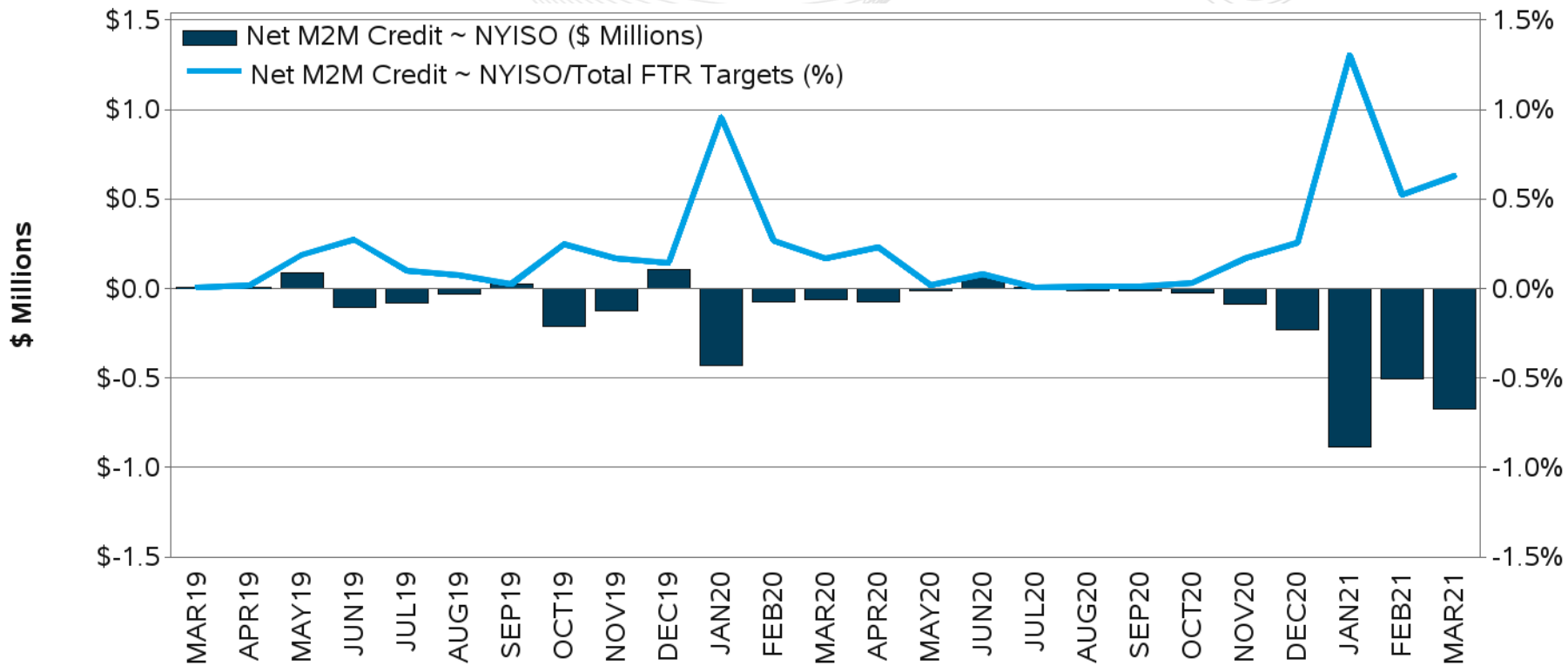






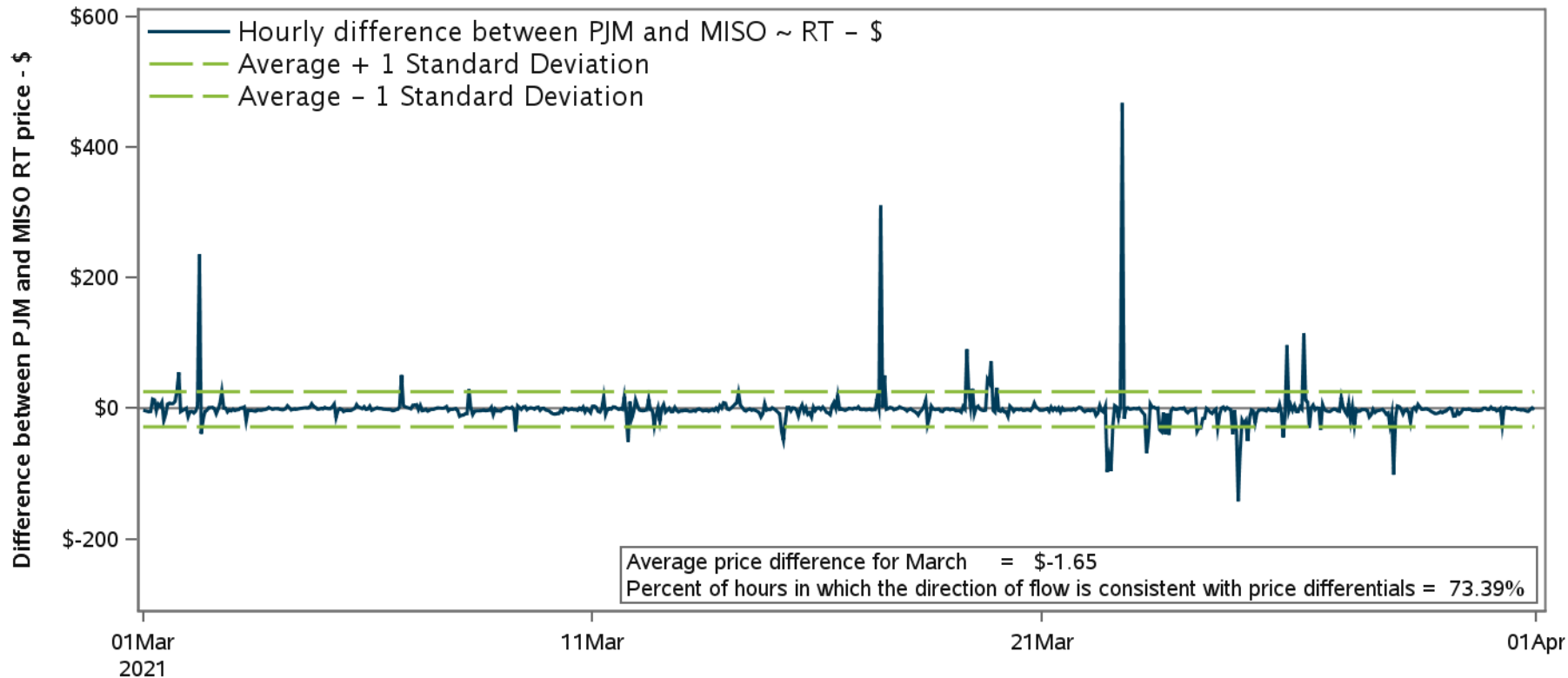
Negative M2M Credit represents PJM payment to MISO

# PJM-NYISO Market-to-Market Coordination Settlement



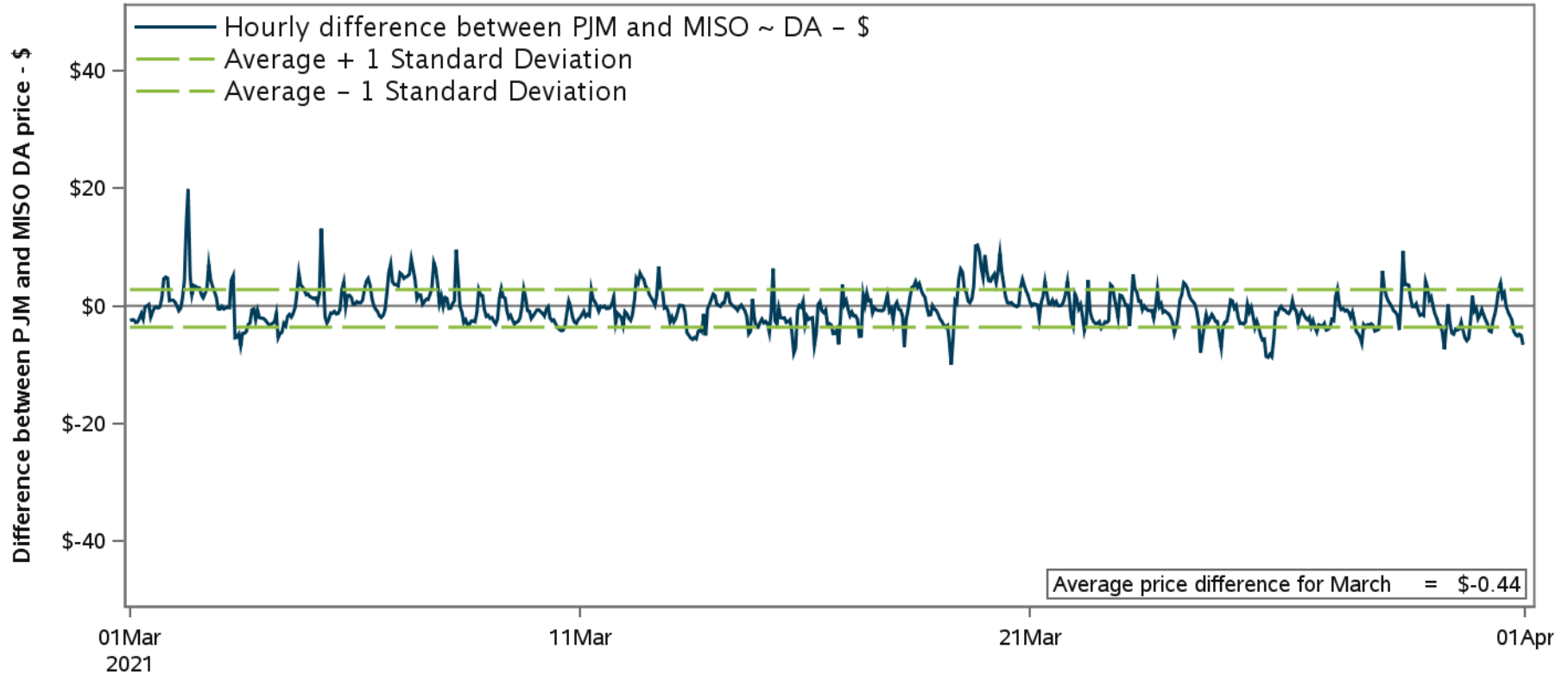
Negative M2M Credit represents PJM payment to NYISO

# Hourly Difference Between PJM and MISO Real-Time Prices



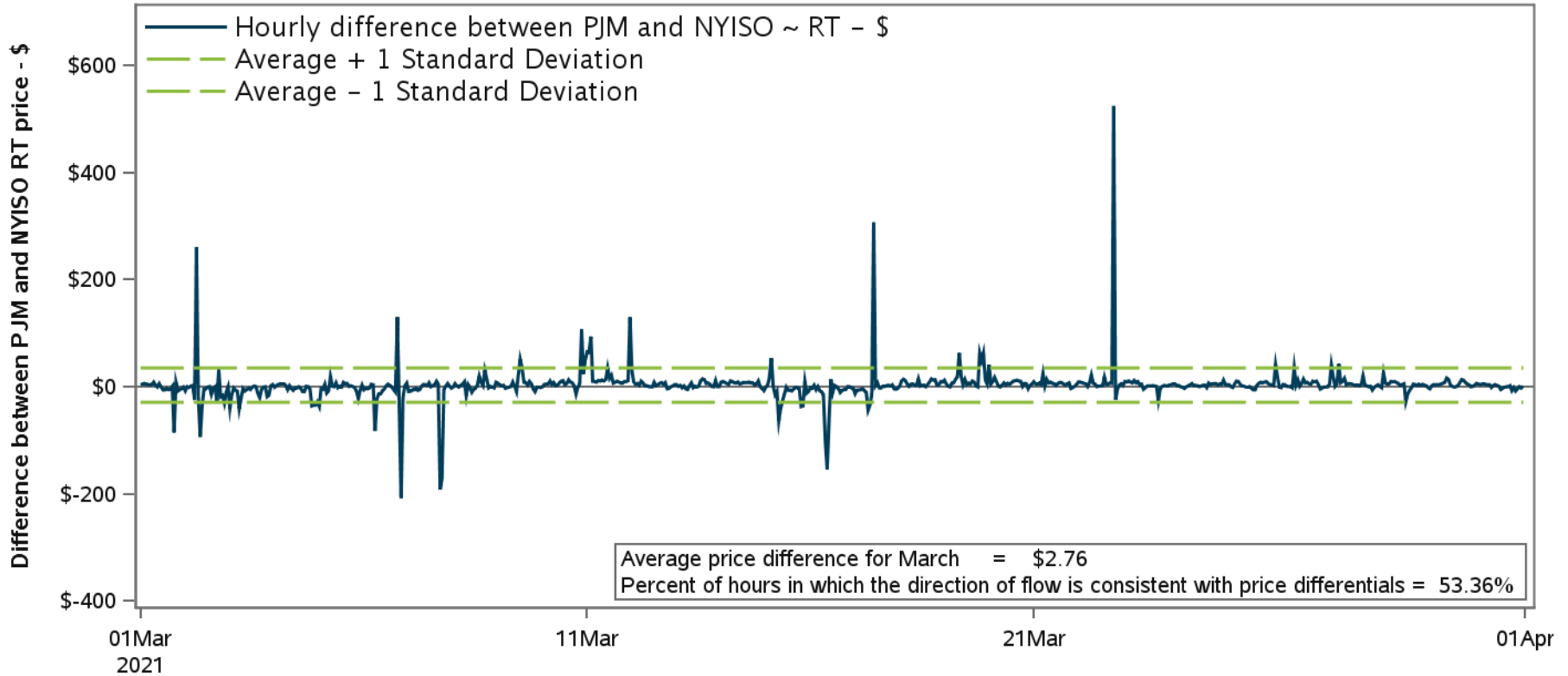
Positive values represent hours when the PJM price was higher. Negative values represent hours when the PJM price was lower.

# Hourly Difference Between PJM and MISO Day-Ahead Prices



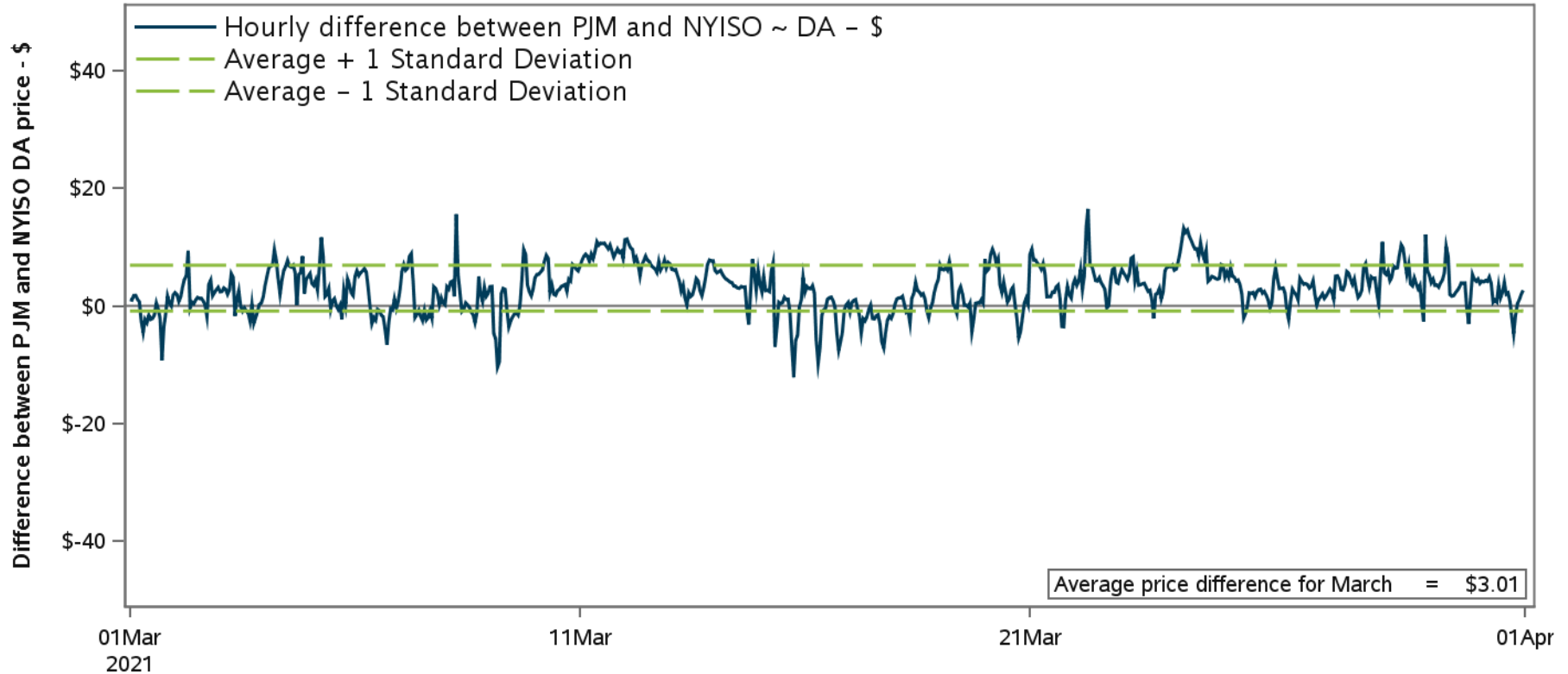
Positive values represent hours when the PJM price was higher. Negative values represent hours when the PJM price was lower.

# 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.

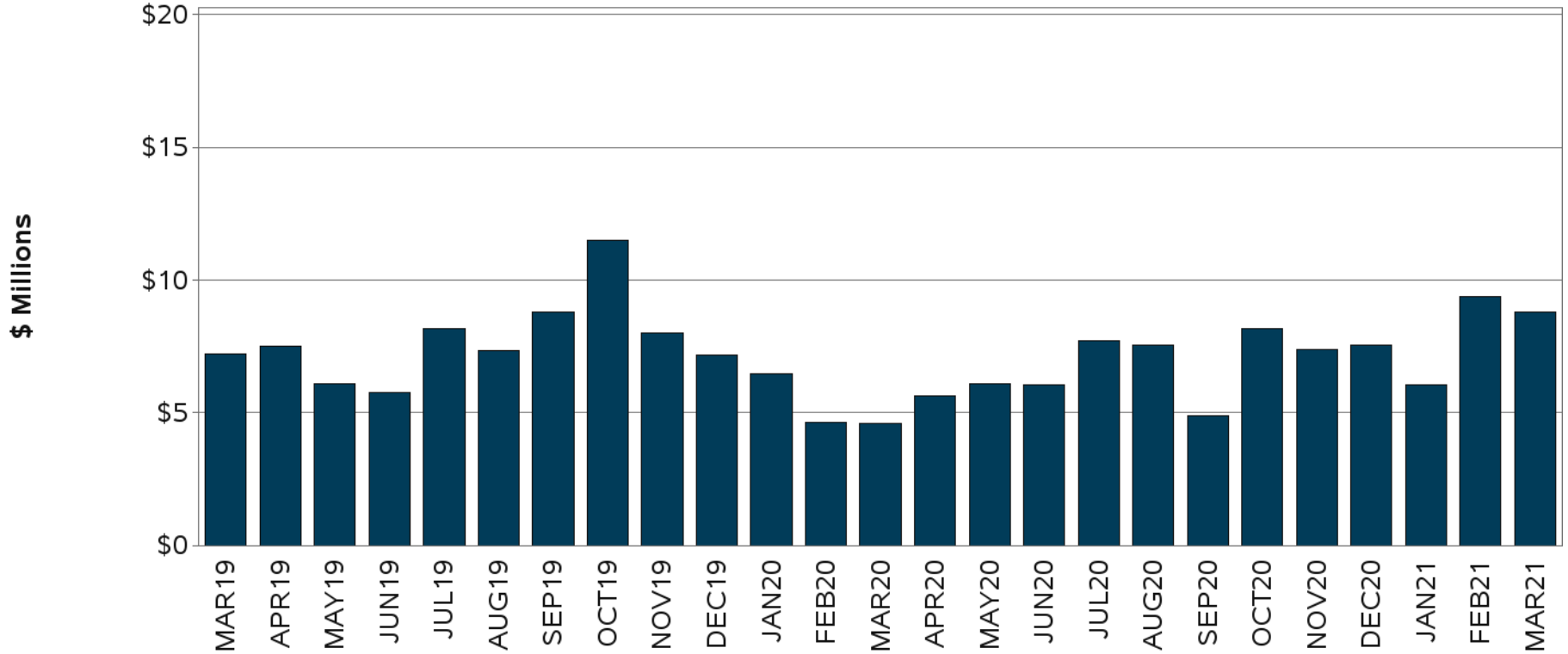
# Hourly Difference Between PJM and NYISO Day-Ahead Prices



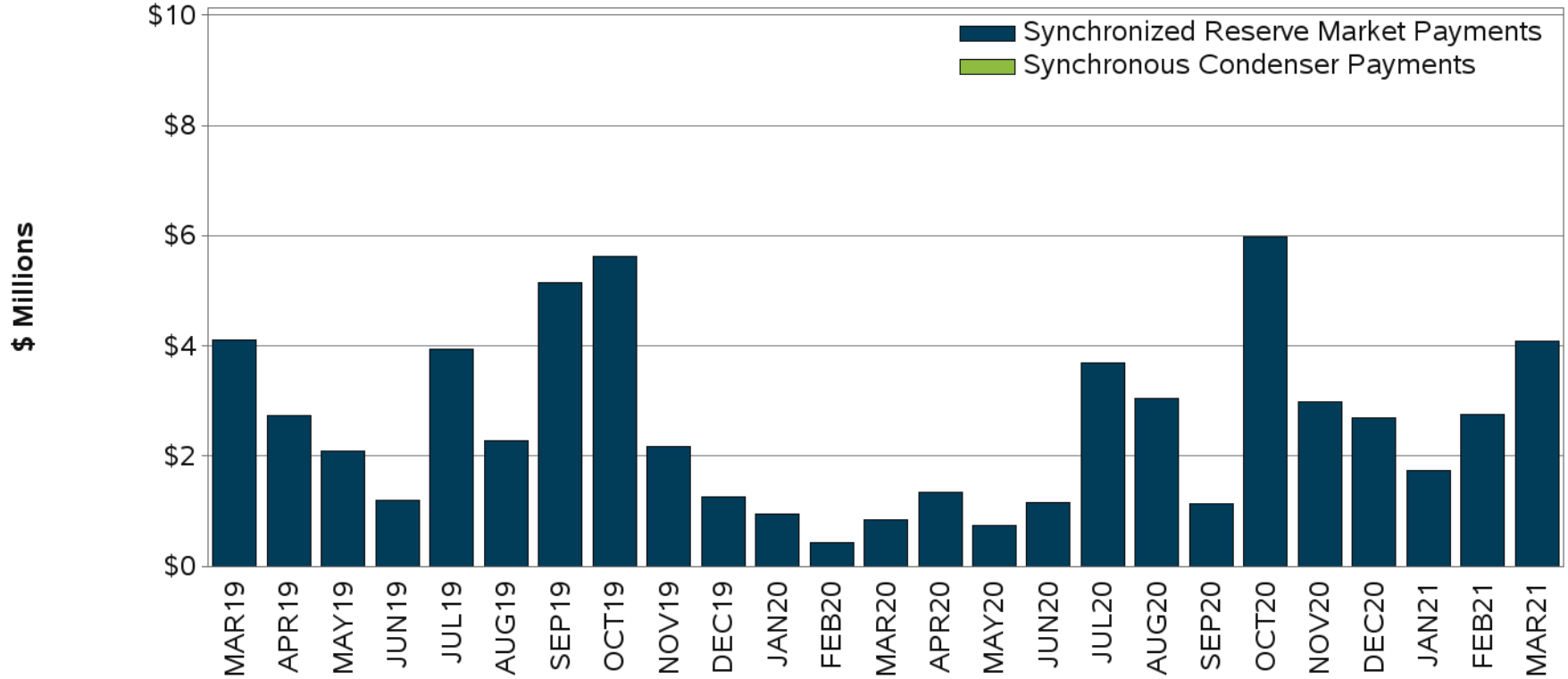
Positive values represent hours when the PJM price was higher. Negative values represent hours when the PJM price was lower.

# Ancillary Service Market Summary



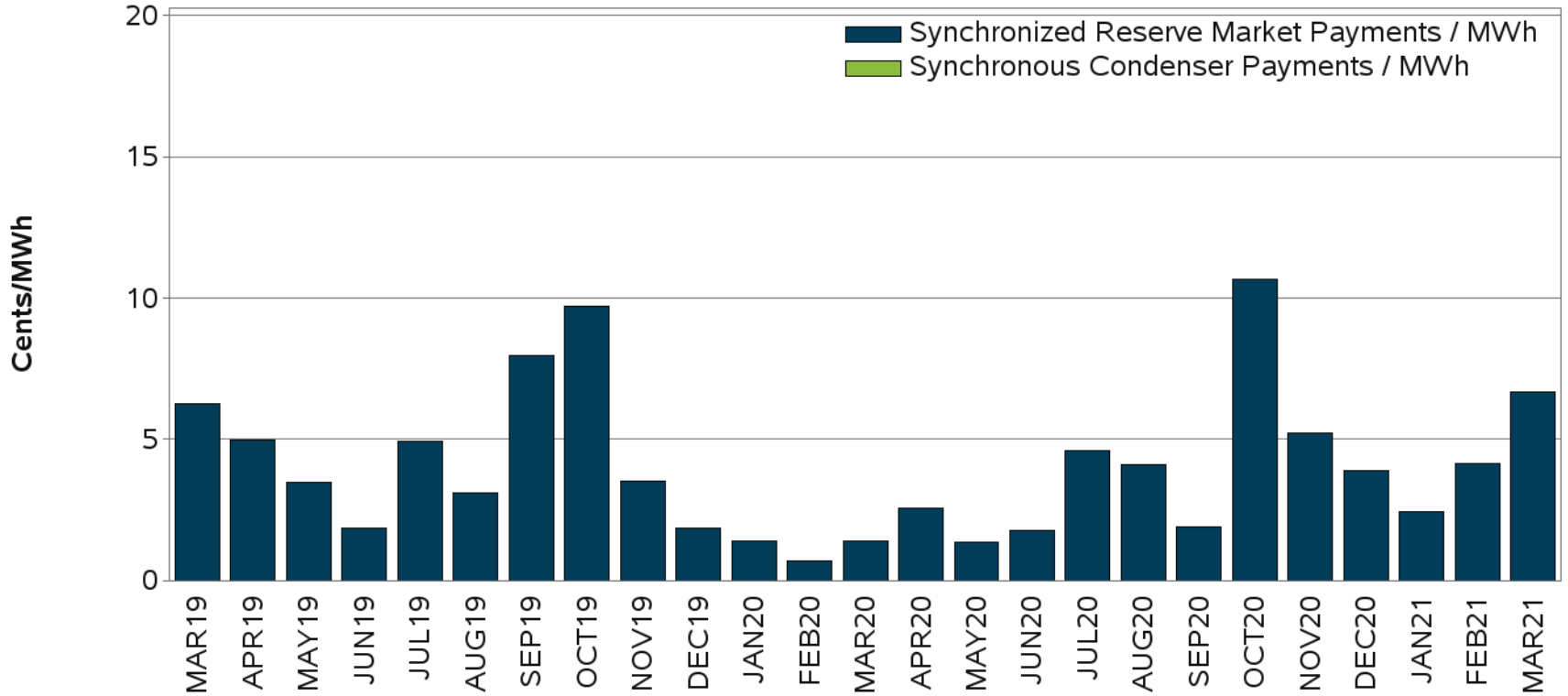


# Synchronized Reserve and Synchronous Condenser Costs

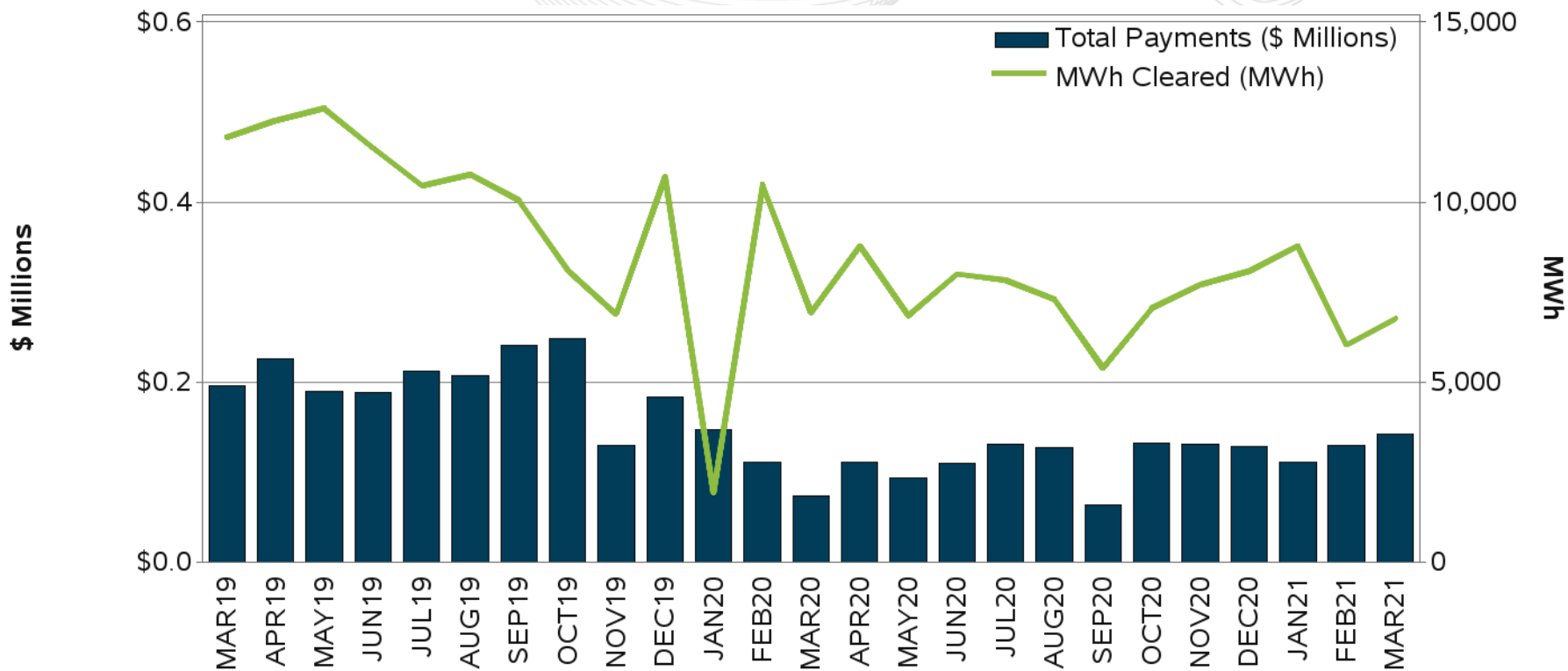




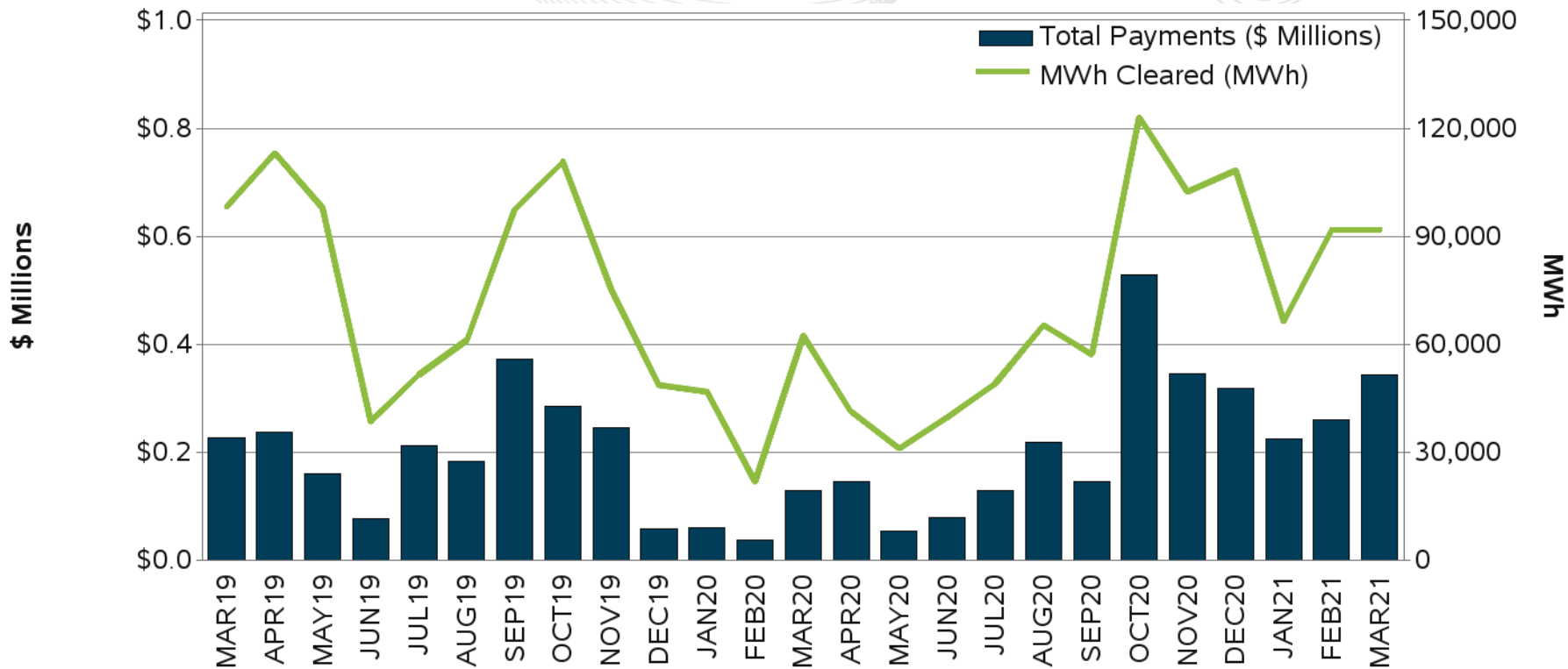
# Load-Adjusted Synchronized Reserve and Synchronous Condenser Costs

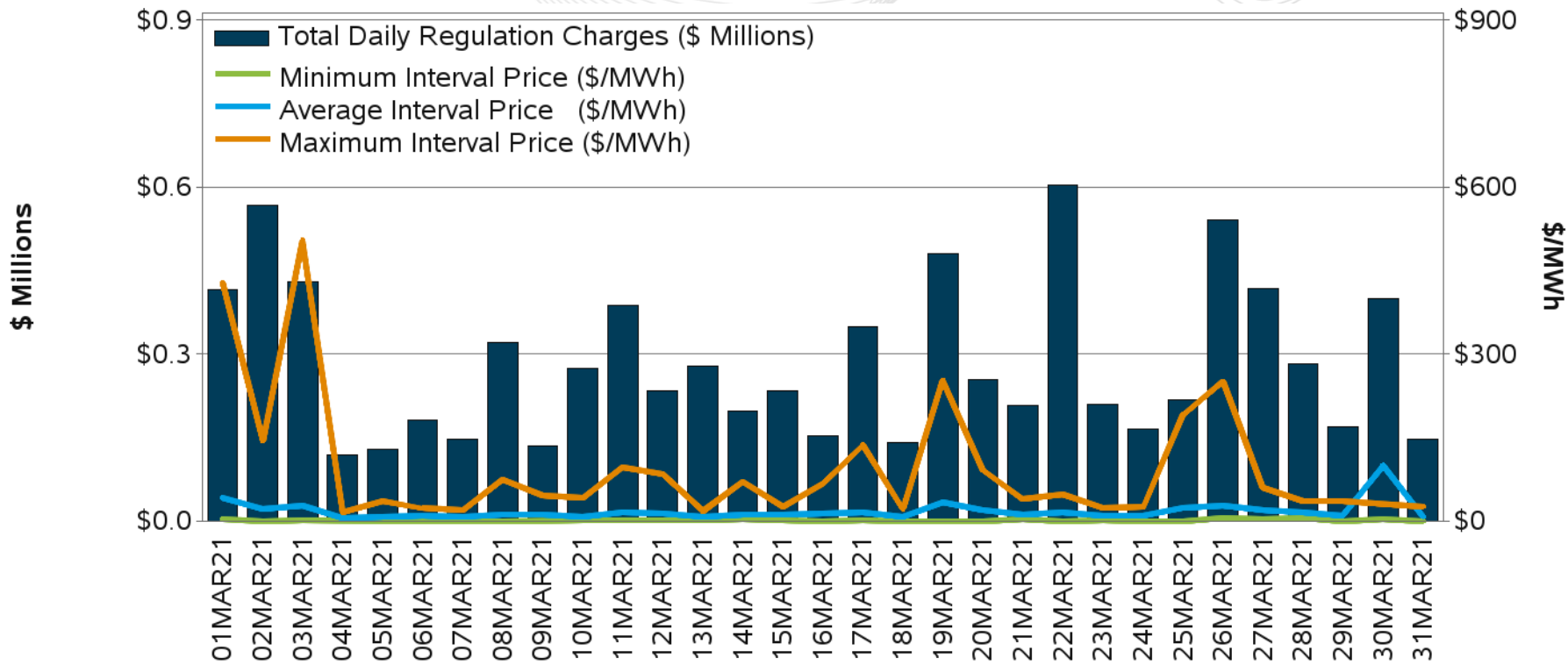


# DR Participation in PJM Regulation Markets

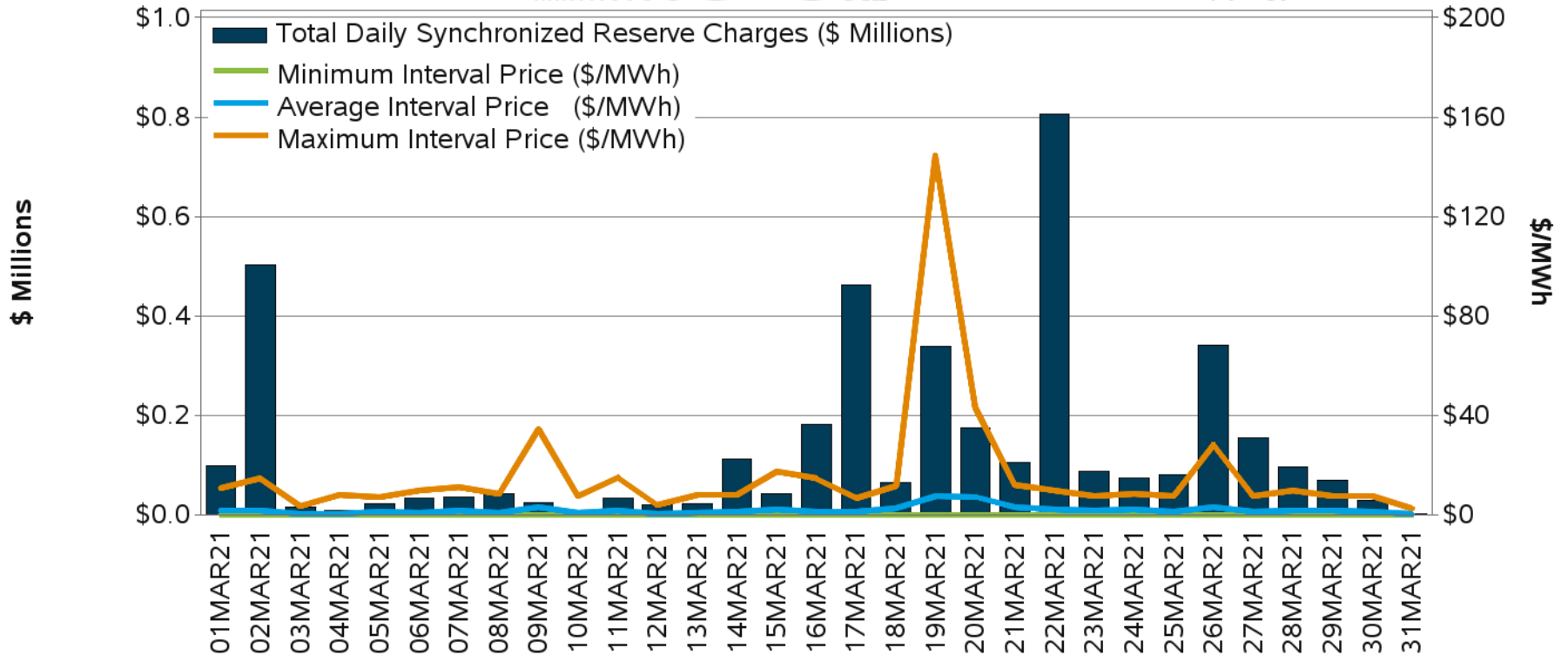


# DR Participation in PJM Synchronized Reserve Markets





# Synchronized Reserve Market Daily Prices and Charges



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