



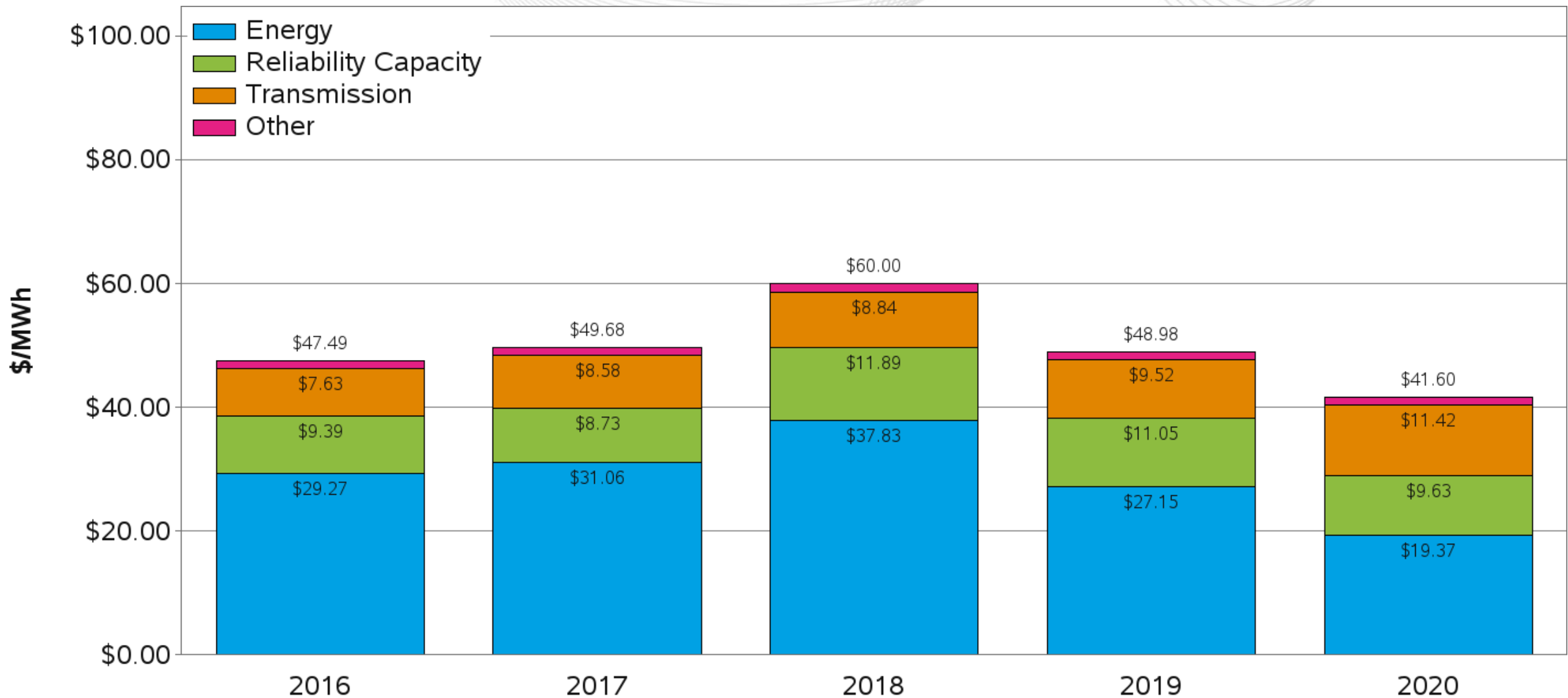
Markets Report

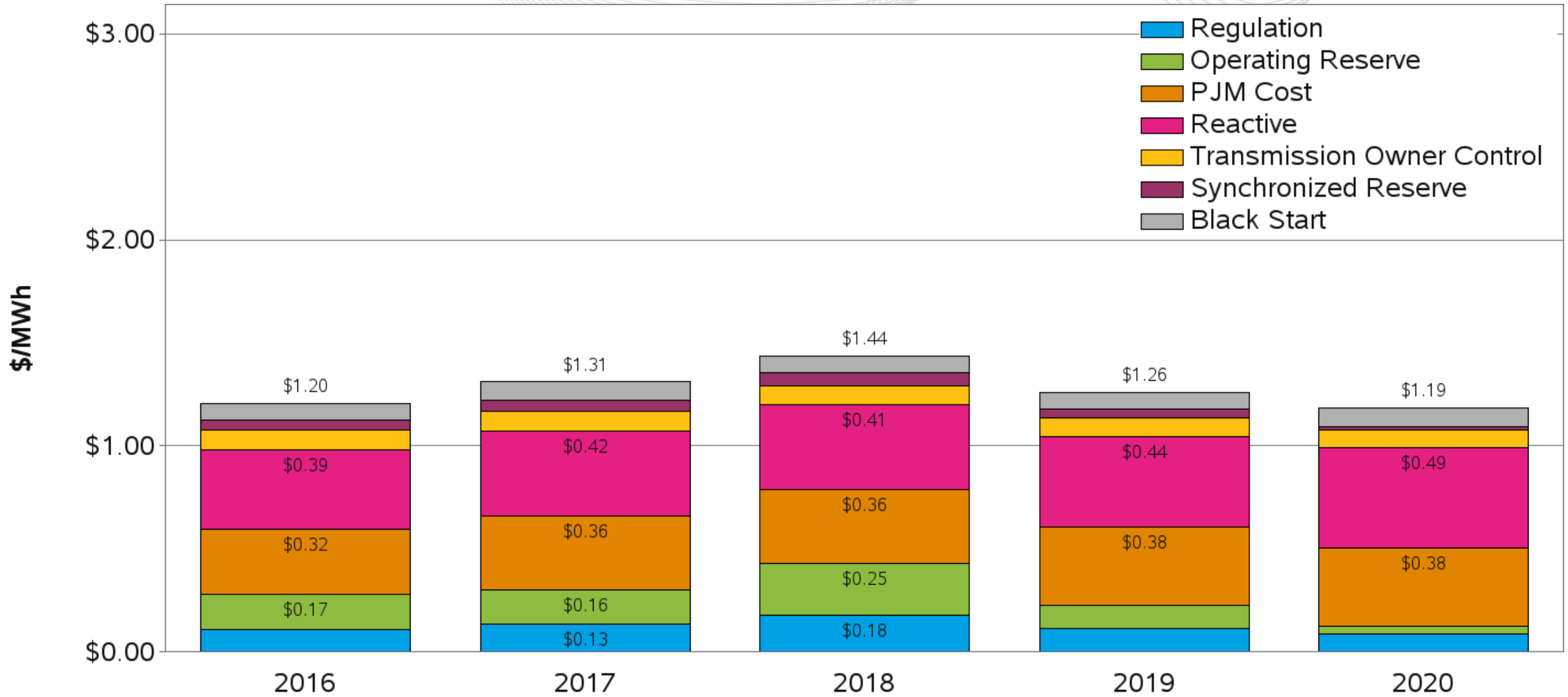
MC Webinar
May 26, 2020

- PJM Wholesale Cost through April 2020 is \$41.60/MWh, down from full-year 2019 costs of \$48.98/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 7- 18)
- In April, temperatures were somewhat below average for most of the month. Thus, the sum of Heating and Cooling Degree Days was above its historic average. (Slides 8-10)
- Despite cooler than average temperatures, because of Corona Virus shelter-in-place impacts, Energy use was below the historic average. (Slides 8-10)
- Load forecast error was higher this April than what is typically observed in April. This is primarily due to over forecasting due to the Corona Virus in the first half of the month. (Slides 13 & 14)

- In April, uplift did not exceed \$800,000 on any days. (Slides 24 & 25)
- Load-weighted average LMP through April 2020 is \$19.37/MWh: (Slides 31 & 32)
 - April 2020 was \$17.60/MWh, which is significantly lower than both April 2019 (\$26.40/MWh) and April 2018 (\$35.20/MWh).
- FTR revenue adequacy for the month of April is 100% and the 2019-2020 Planning Year is currently fully funded. (Slides 47-50)
- Congestion remains low and lower than the values observed last April. (Slide 48)
- Regulation and Synchronized Reserve market costs have generally tracked with energy prices over time. (Slides 63-65)

Markets Report

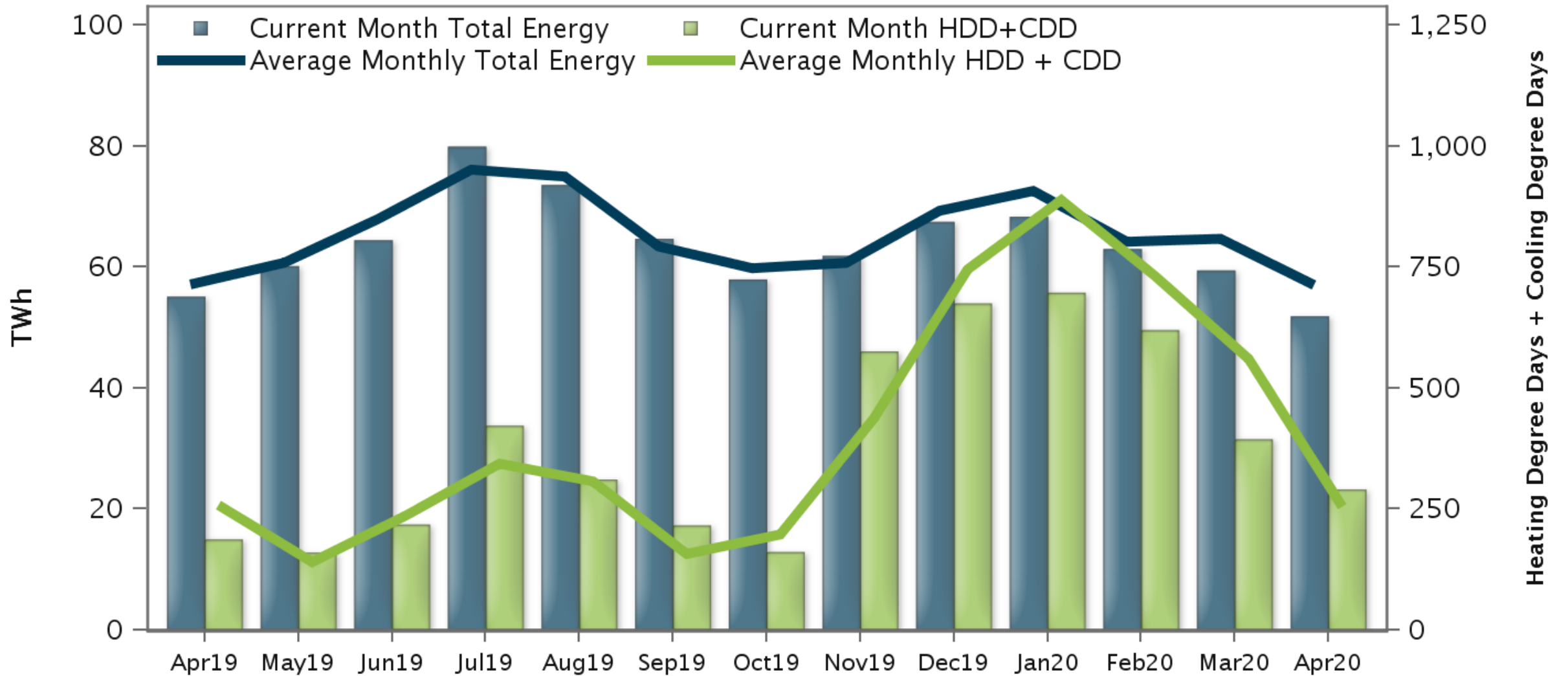




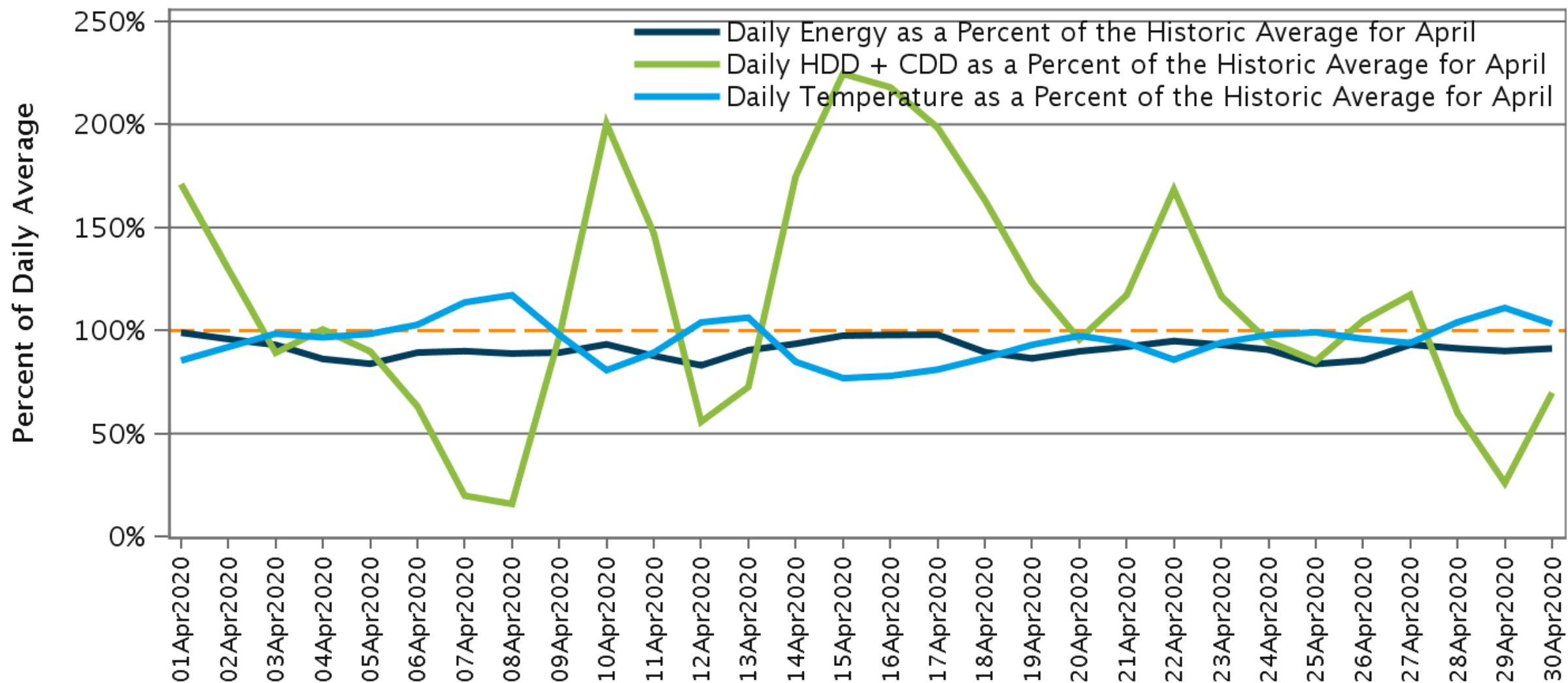
Market Conditions

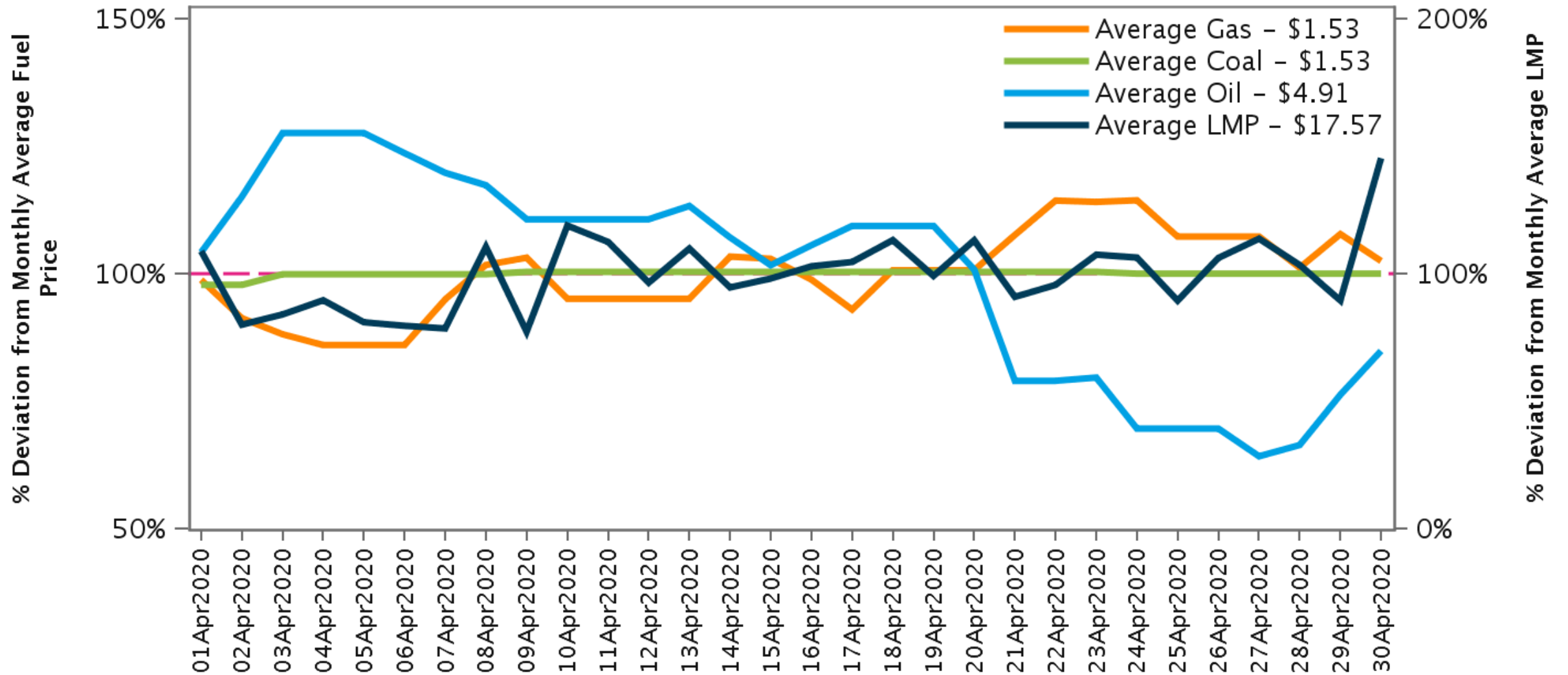
- The weather parameter shown in the following slide is a monthly sum of daily Heating Degree Days (HDD) and Cooling Degree Days (CDD).
- Degree days represent a deviation from a baseline temperature, in this case 60 degrees for HDD and 65 degrees for CDD. As temperatures get more extreme, colder or 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, 2019. 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

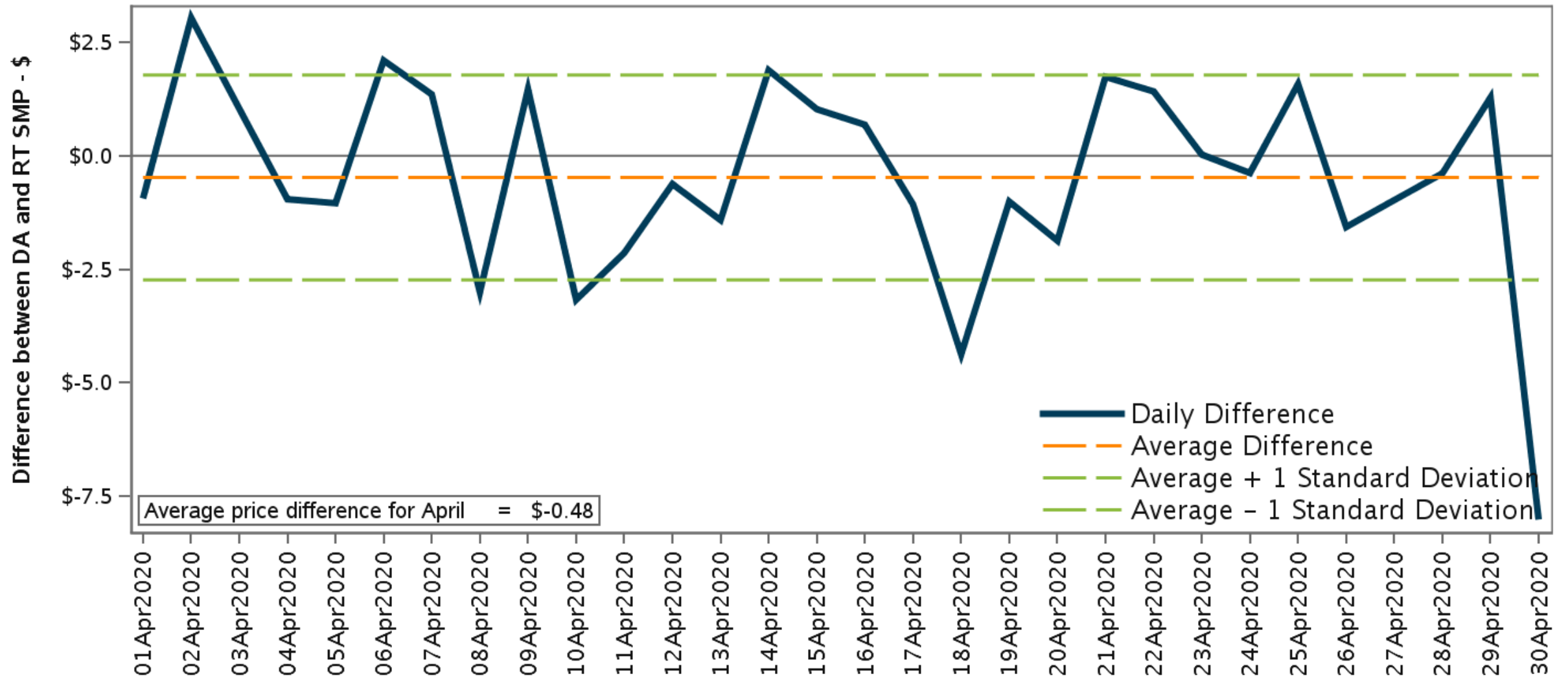




Fuel Price Source: S&P Global Platts

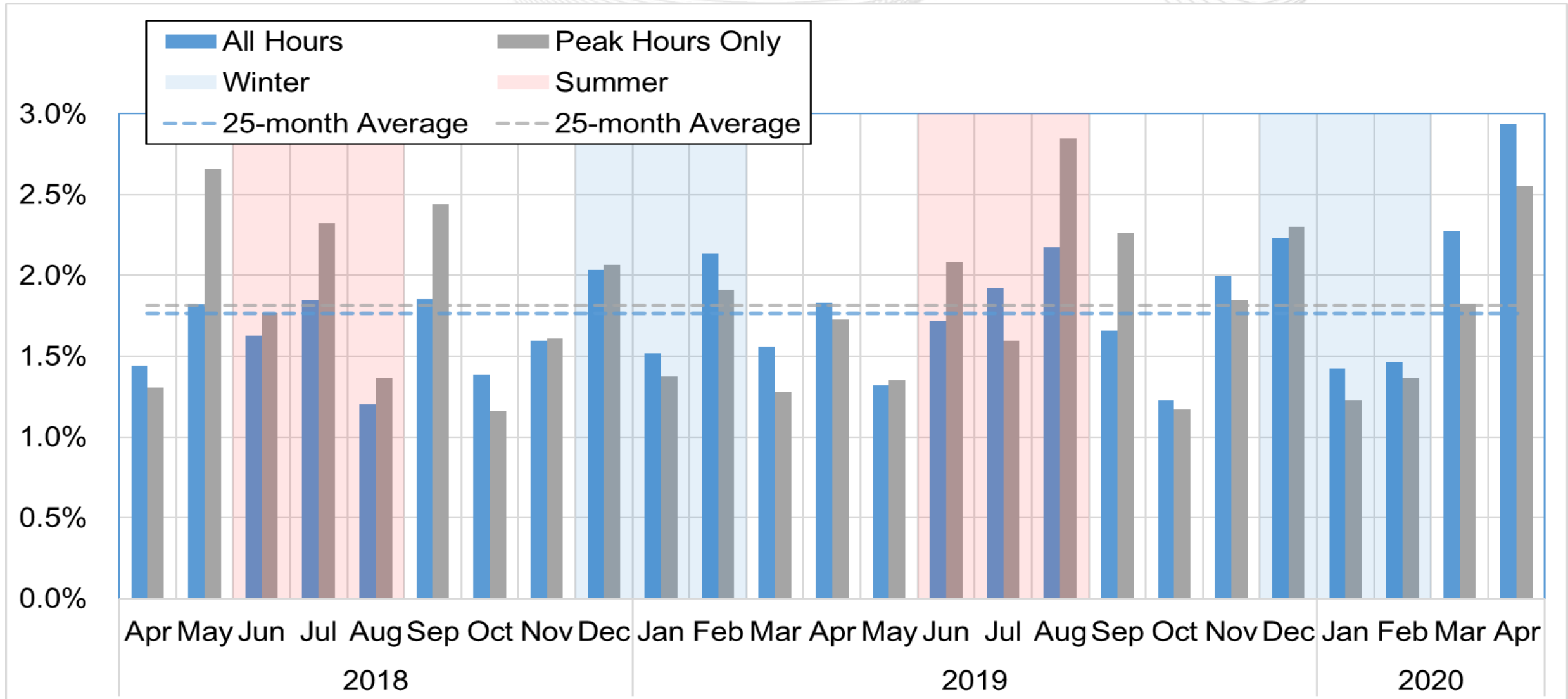


Daily Difference Between Day-Ahead and Real-Time System Marginal Prices

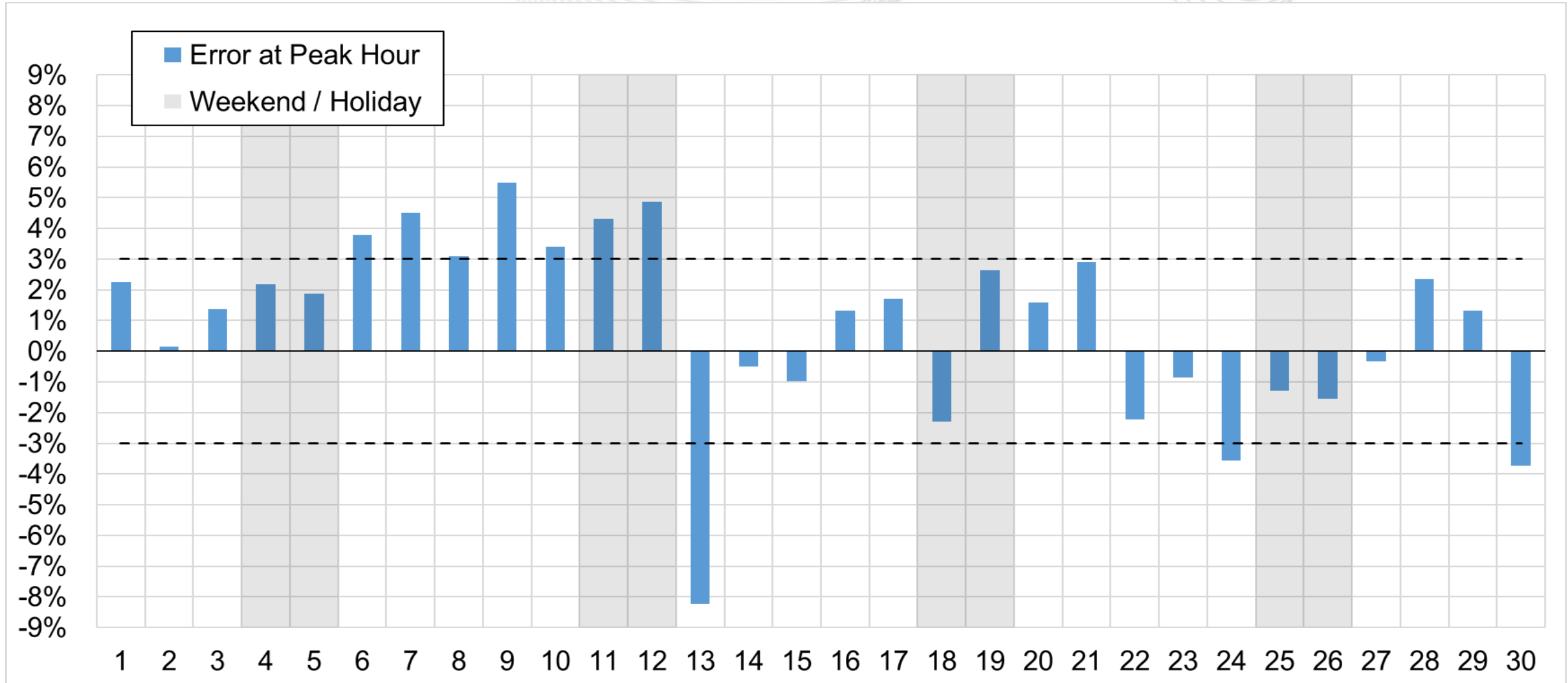


Positive values represent days when the DA daily average price was higher than RT. Negative values represent days when the DA price was lower.

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



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

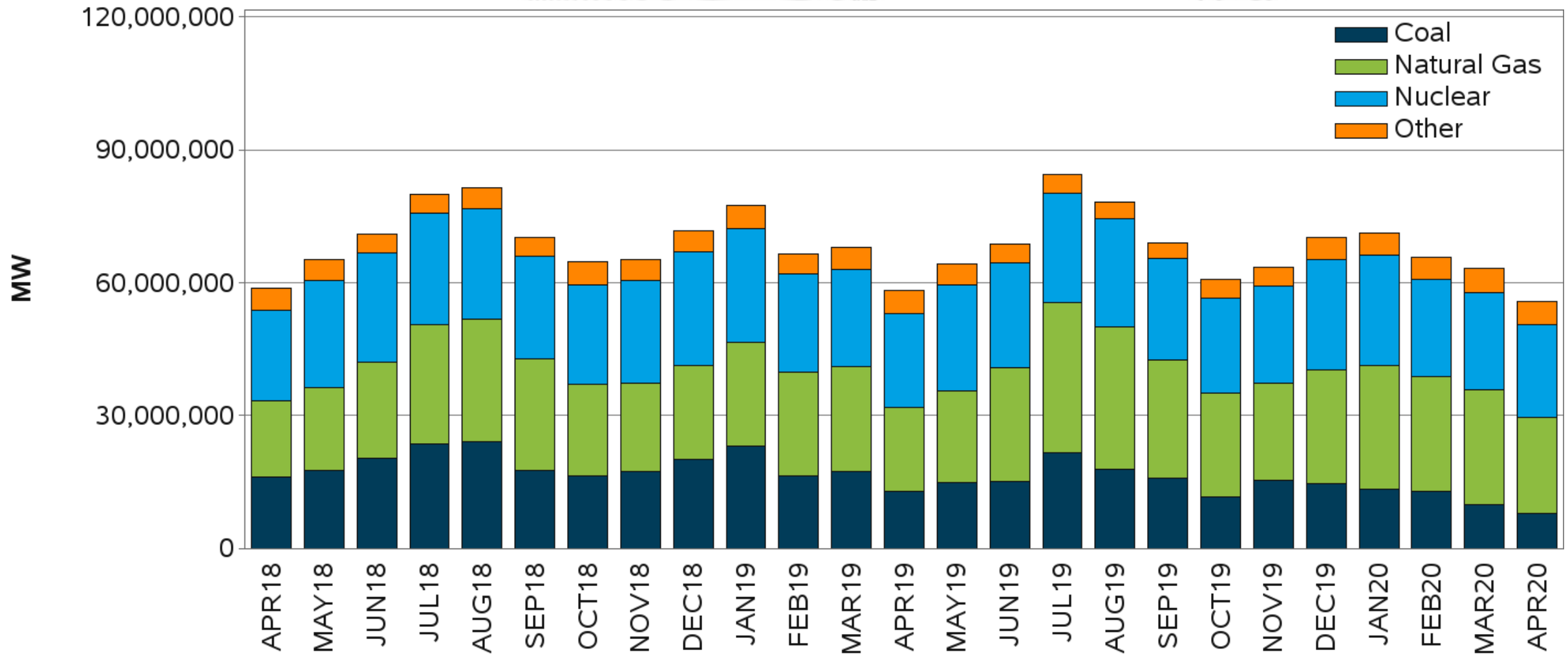


PJM prepares a day-ahead load forecast at 10:00 am for use by our members.

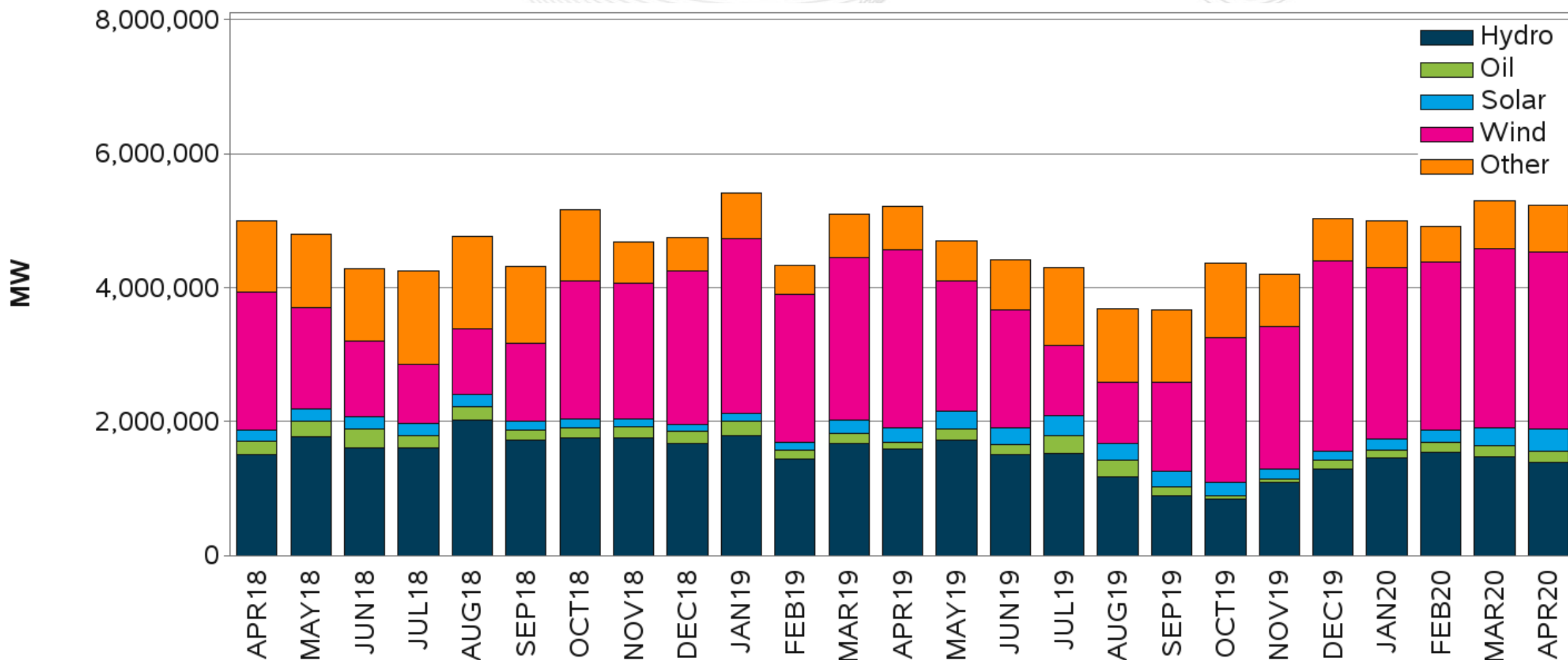
This forecast is not used to clear the day-ahead market and is not utilized for the reliability tools that run subsequent to the day-ahead market.

The following days had load forecast error exceeding 3%:

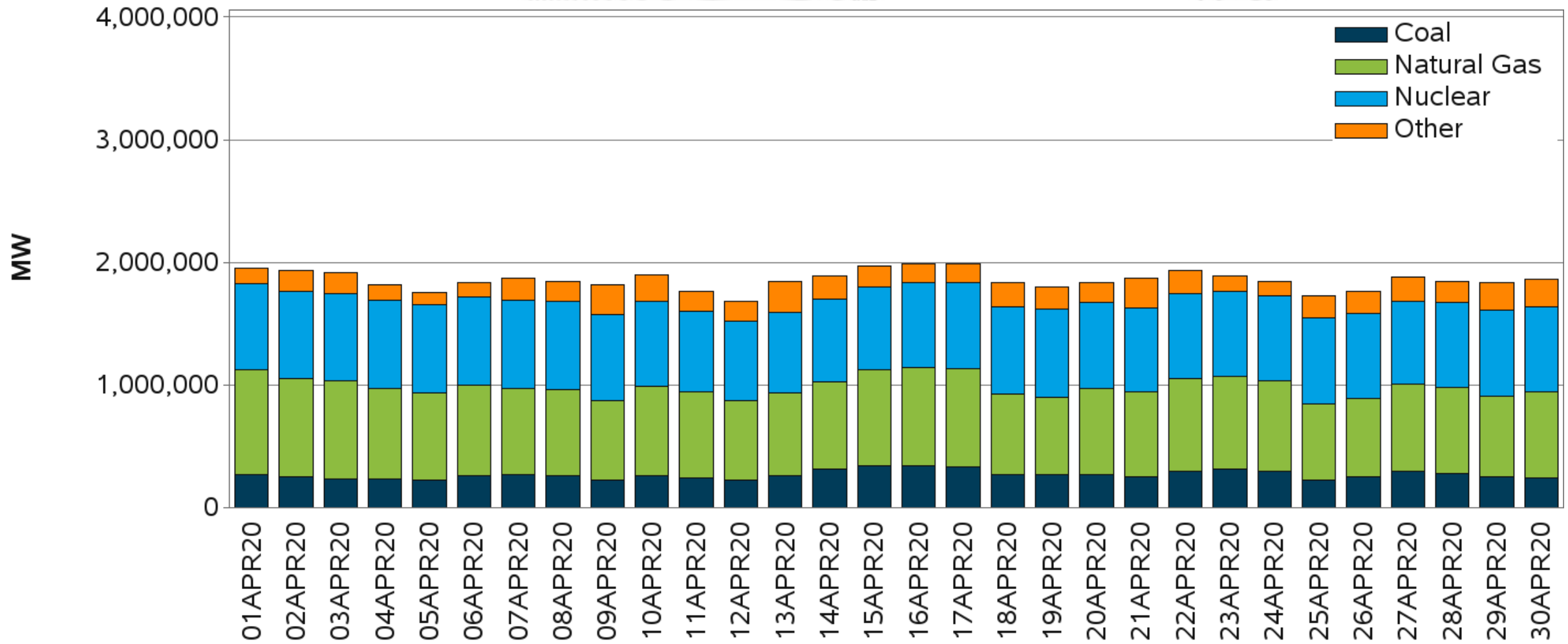
- 4/6/2020 – COVID-19, warmer than expected temps
- 4/7/2020 – COVID-19, warmer than expected temps
- 4/10/2020 – COVID-19
- 4/12/2020 – COVID-19
- *4/13/2020 – COVID-19, unexpected morning peak in MidAtl, overcorrection for models that were improving
- 4/24/2020 – COVID-19, cooler than expected temps
- 4/30/2020 – COVID-19, model error (esp in AEP)



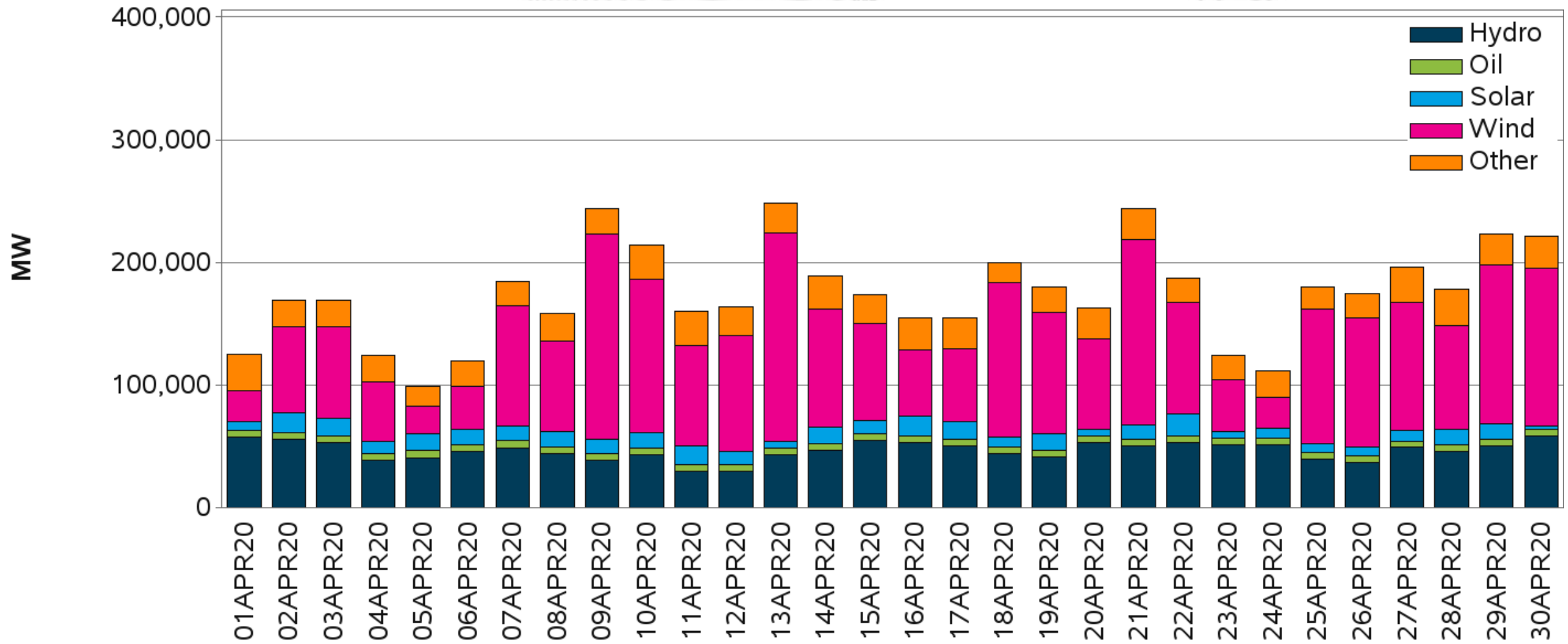
'Other' includes Hydro, Oil, Solar, Wind, and Other



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

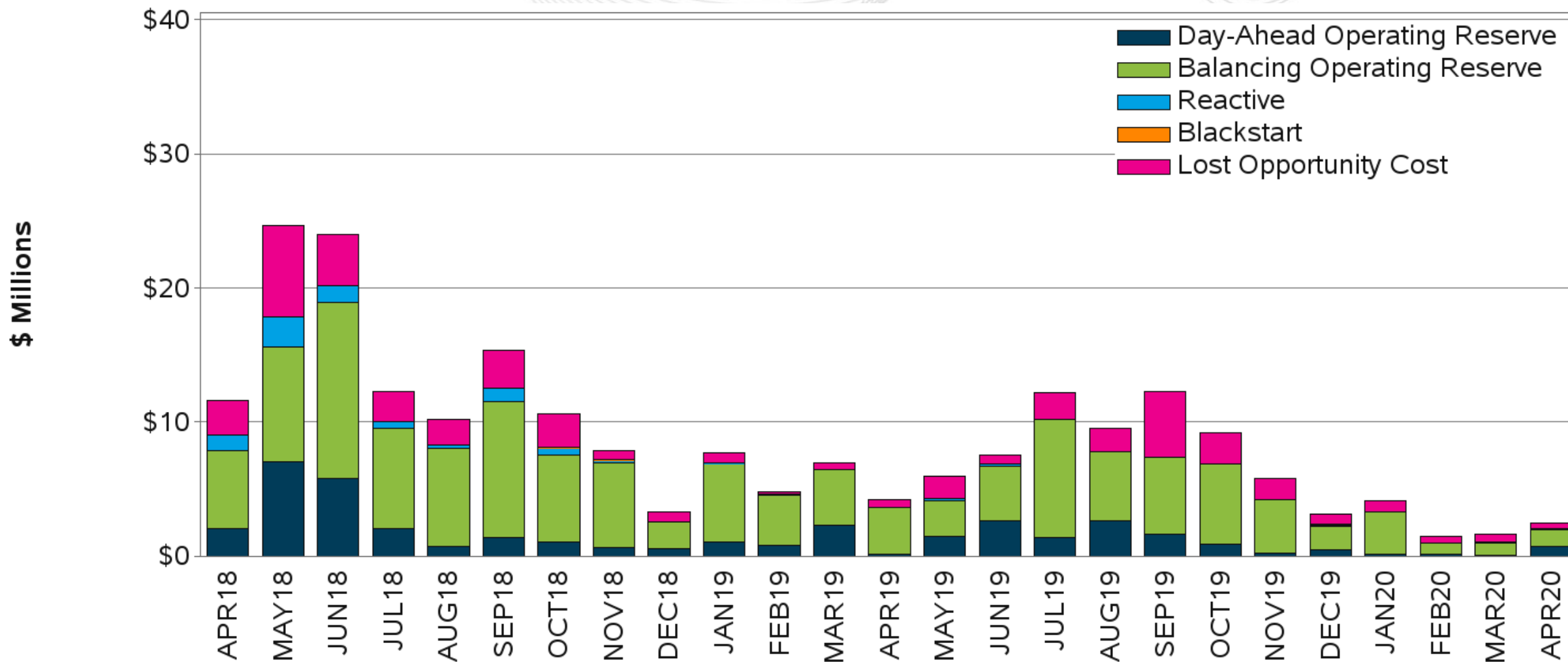


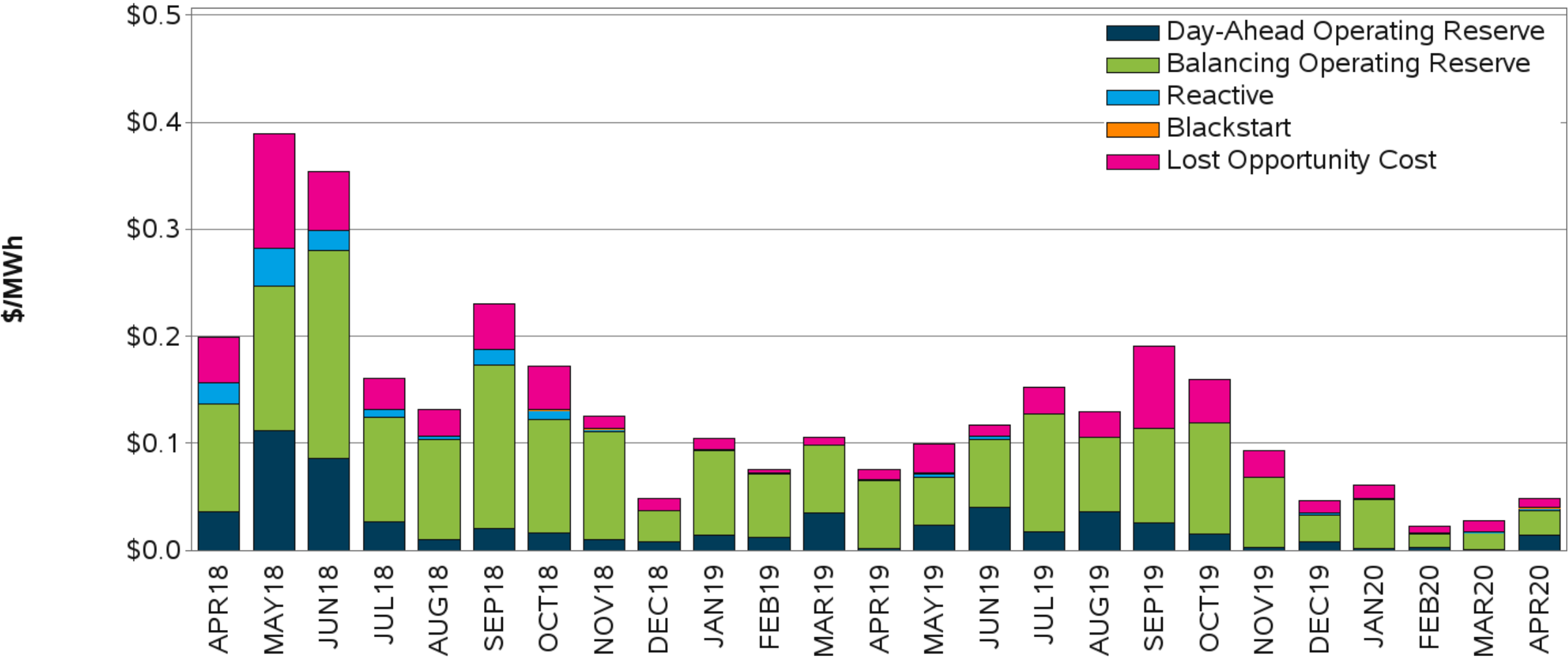
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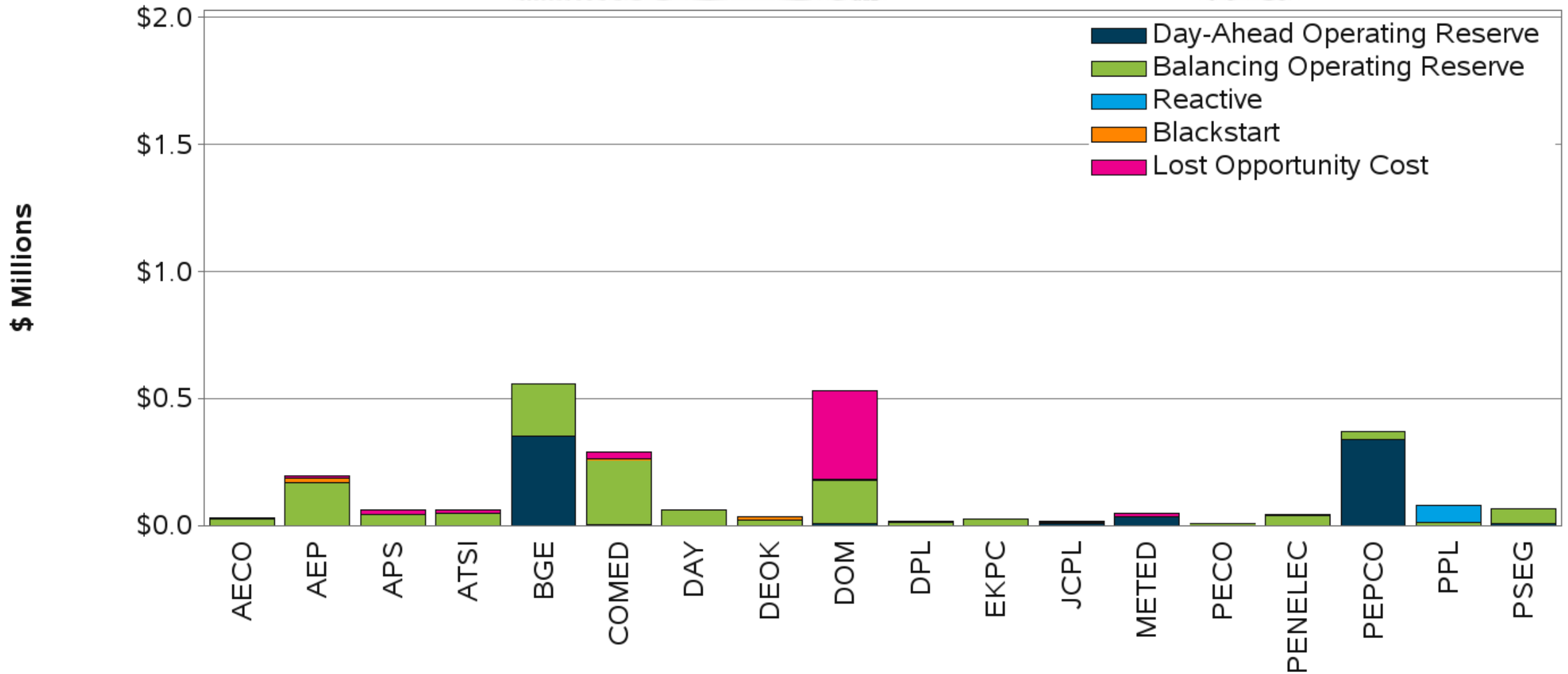


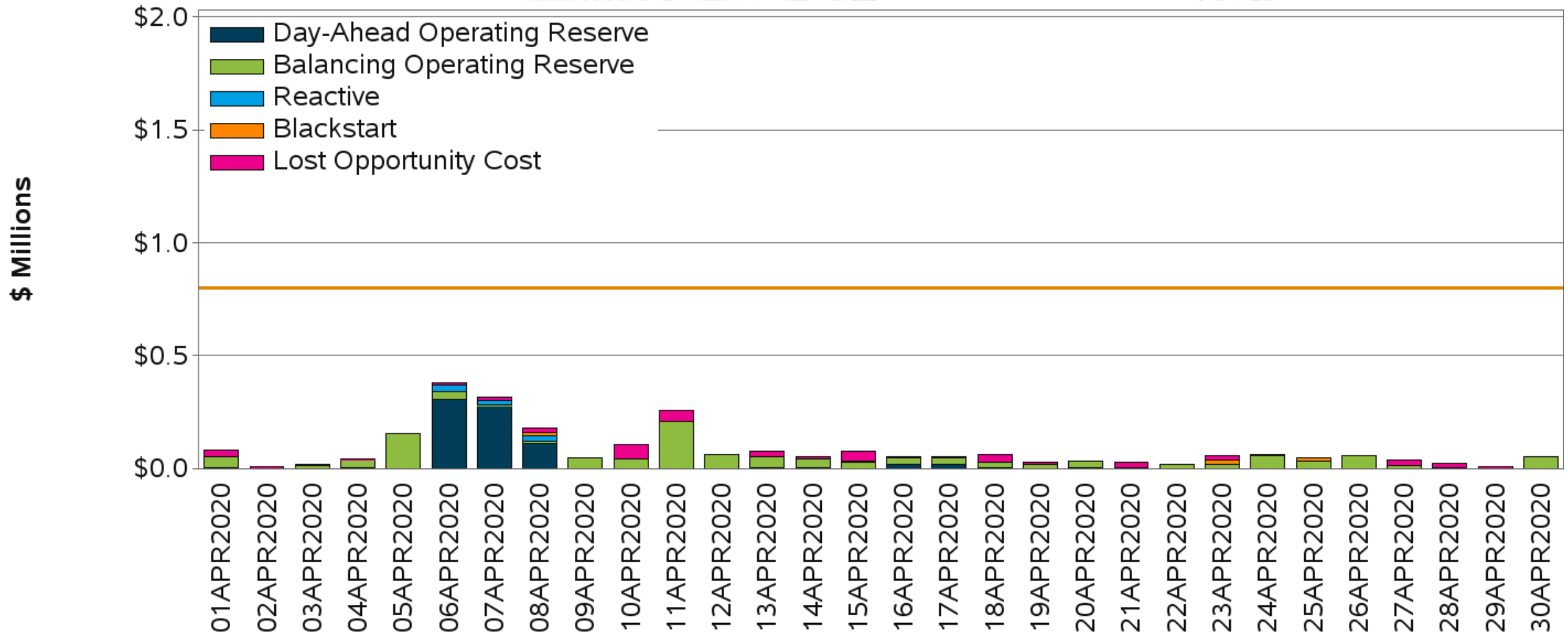
'Other' includes Flywheels, Multiple Fuels, Storage, and Other Renewables

Operating Reserve (Uplift)





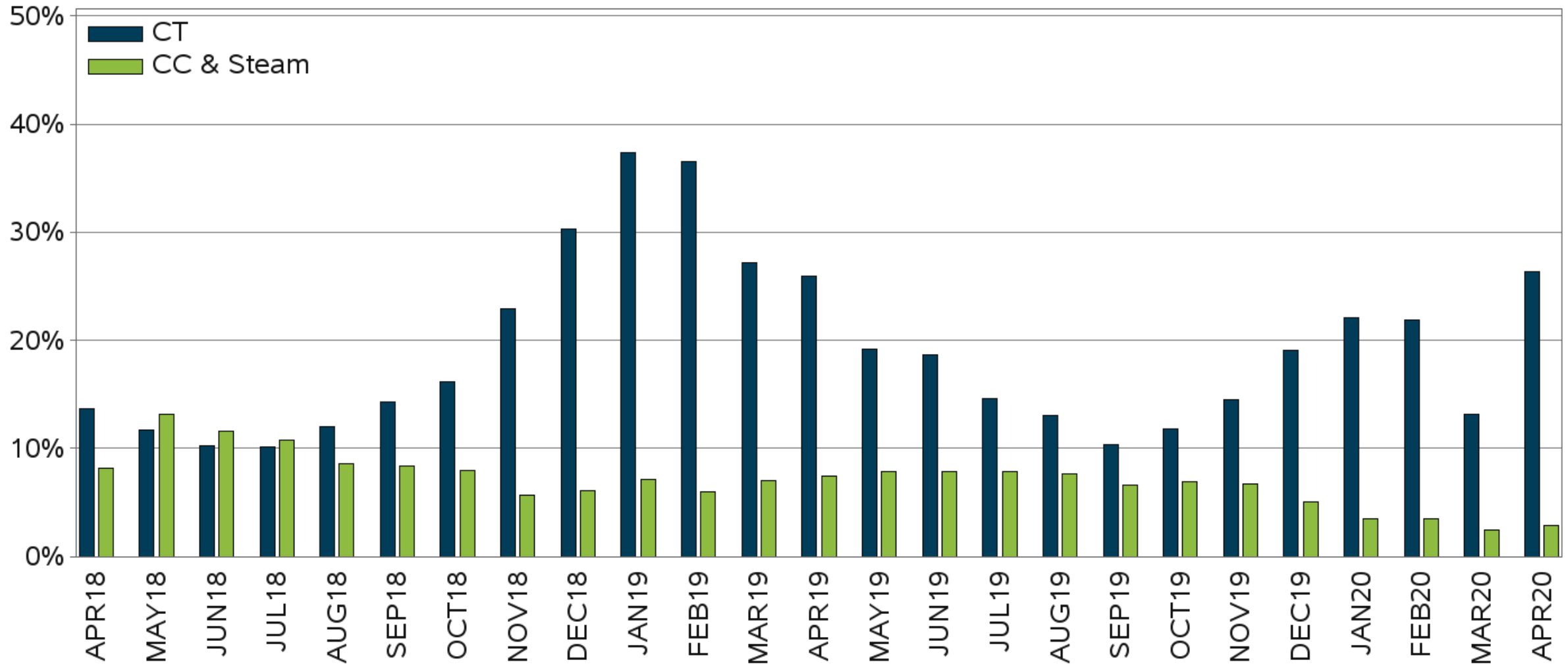




- In April, uplift did not exceed \$800,000 on any days.

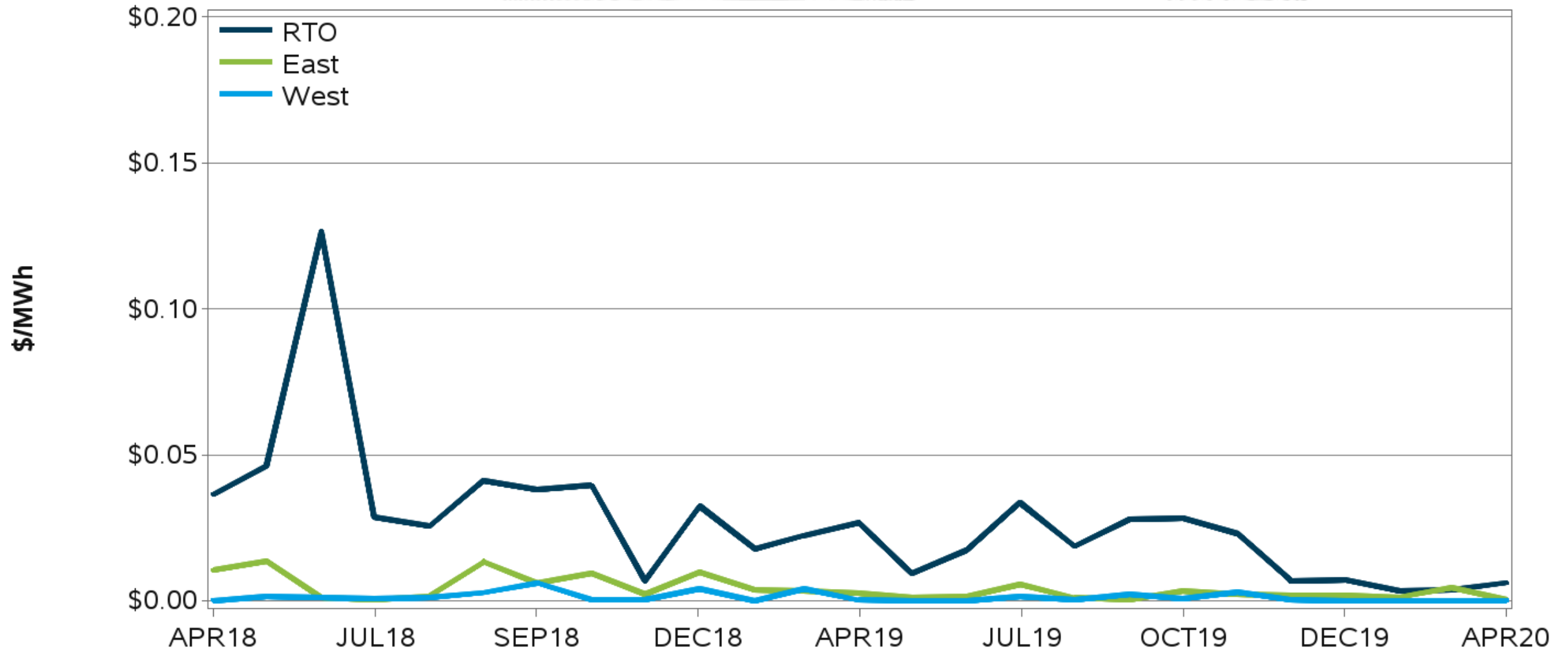
More information on Uplift can be found on PJM's website at [Drivers of Uplift](#)

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

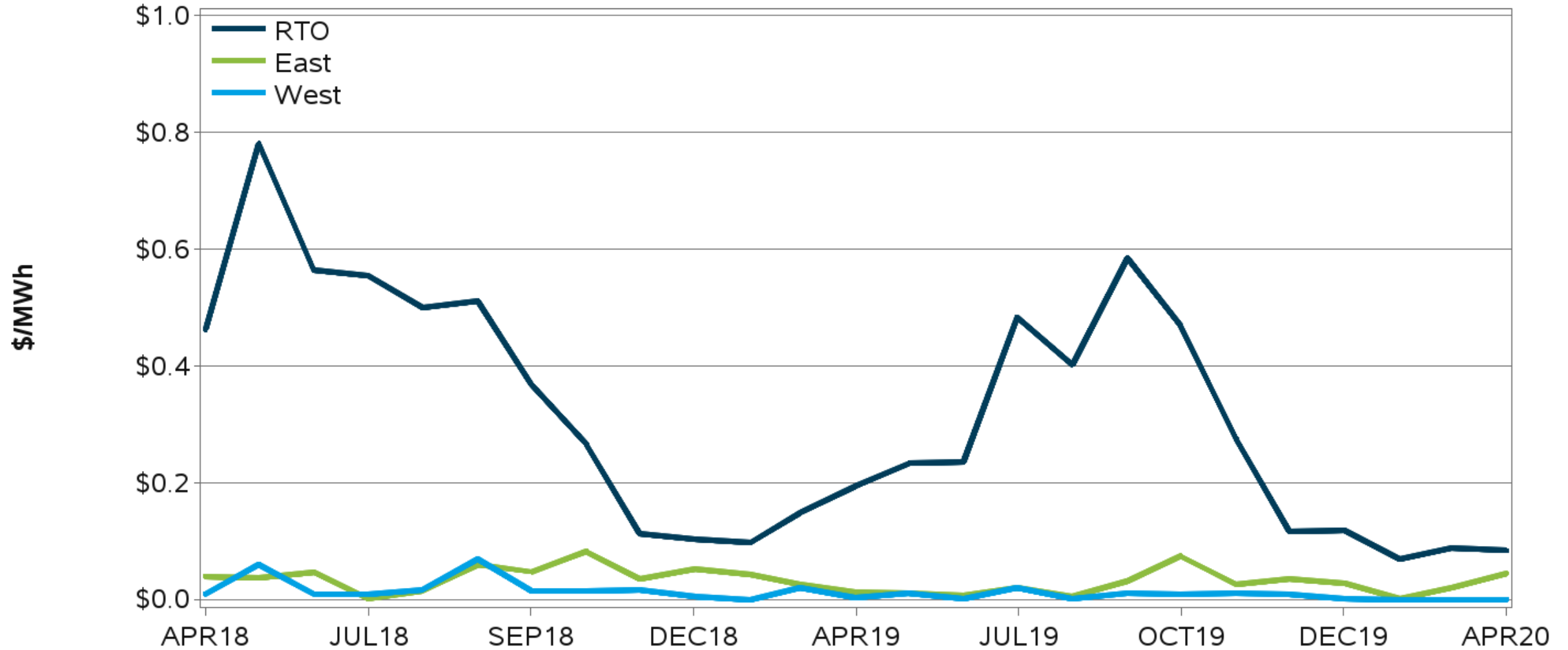


- Beginning in December 2008, the daily Balancing Operating Reserves (BOR) rate was replaced with six different BOR rates: RTO BOR for Reliability Rate, RTO BOR for Deviations Rate, East BOR for Reliability Rate, East BOR for Deviations Rate, West BOR for Reliability Rate, West BOR for Deviations Rate.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

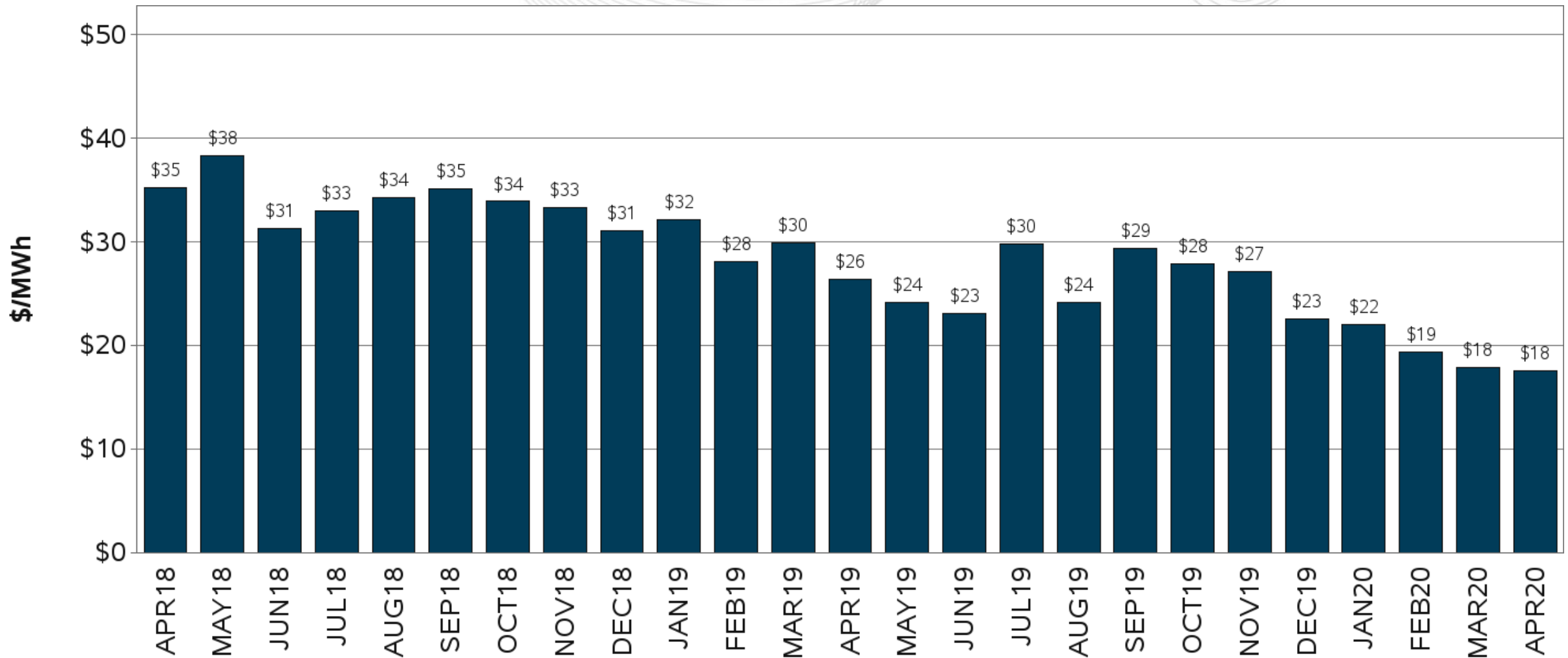


Deviations Balancing Operating Reserve Rates

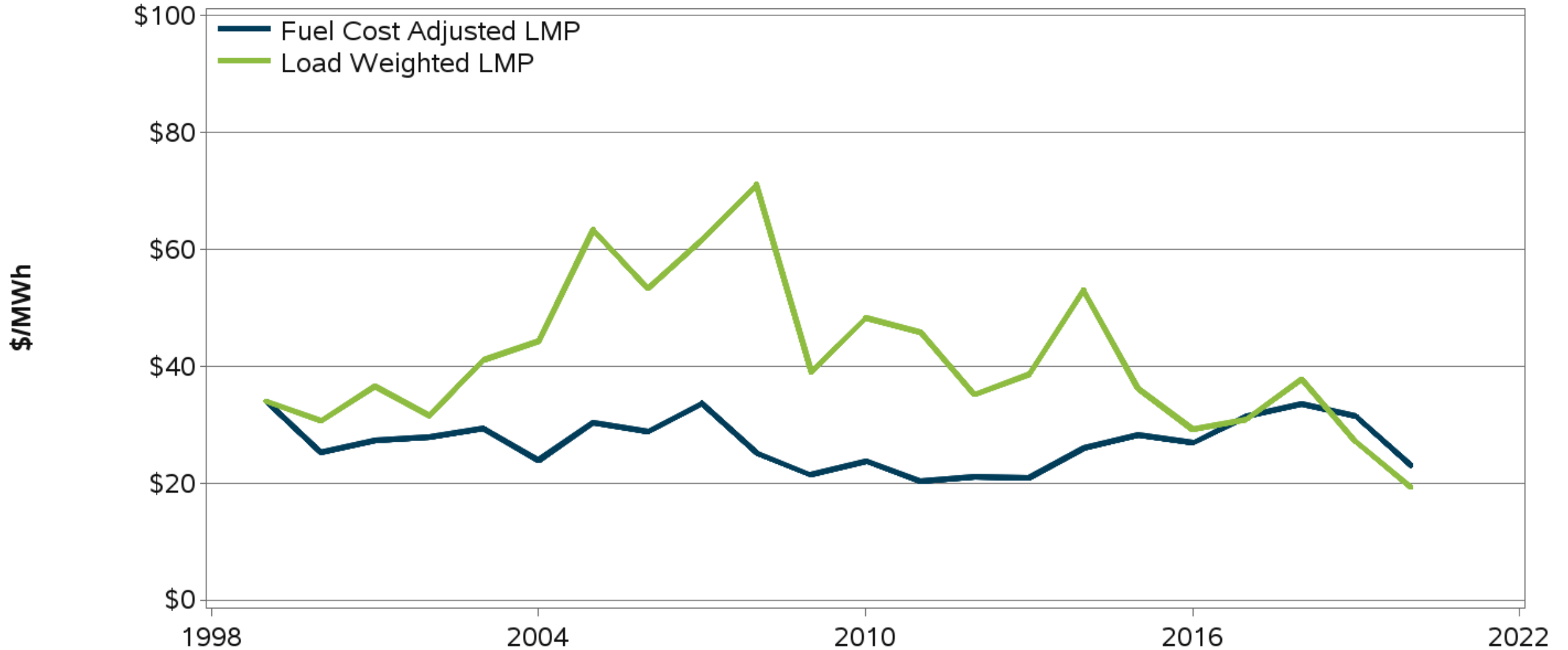


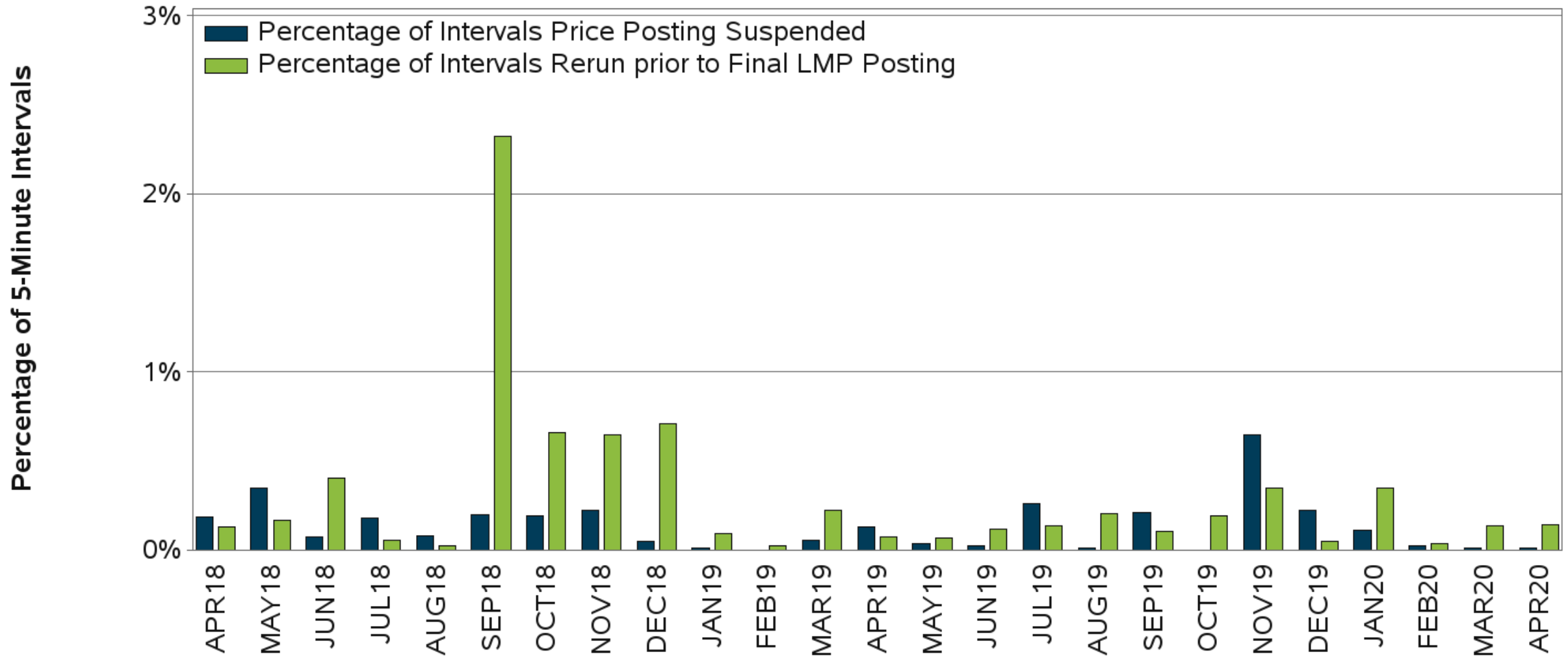
Energy Market

LMP Summary



Fuel Cost Adjusted LMP (Referenced to 1999 Fuel Prices)

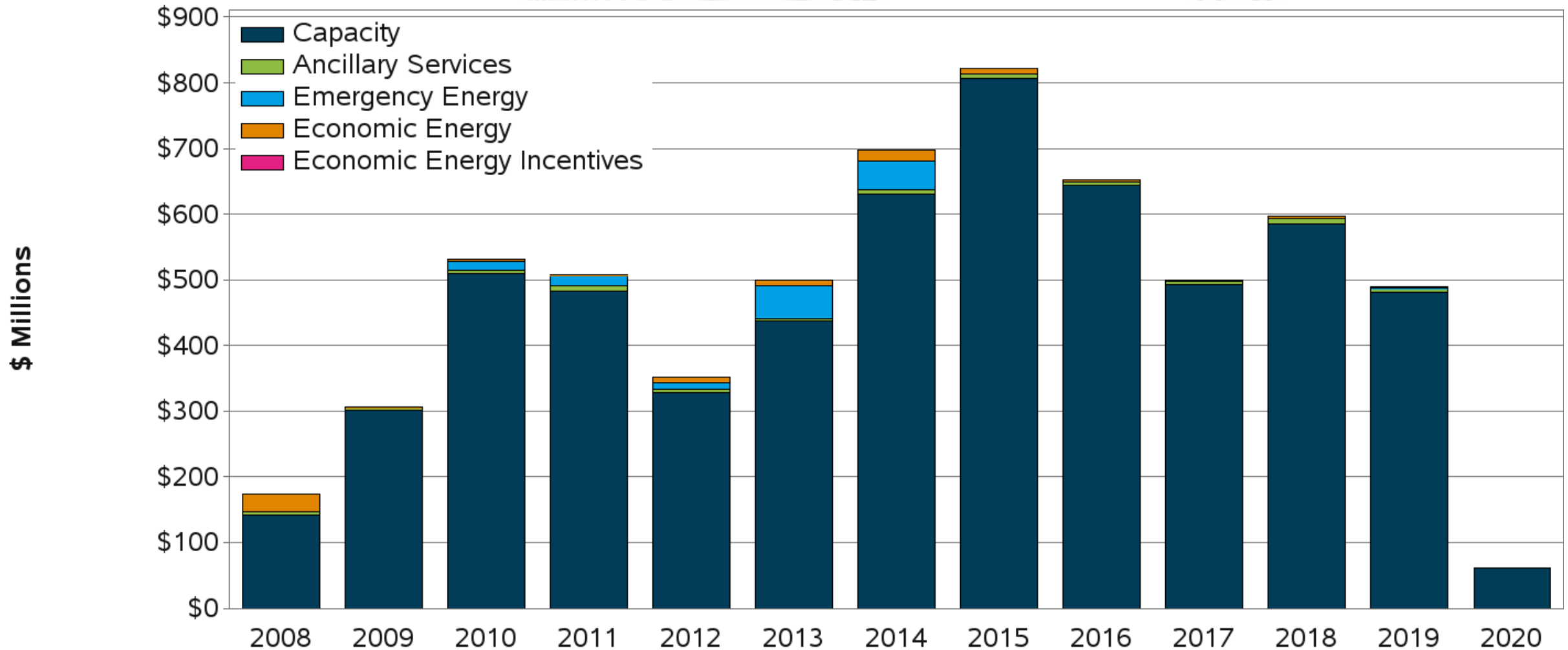


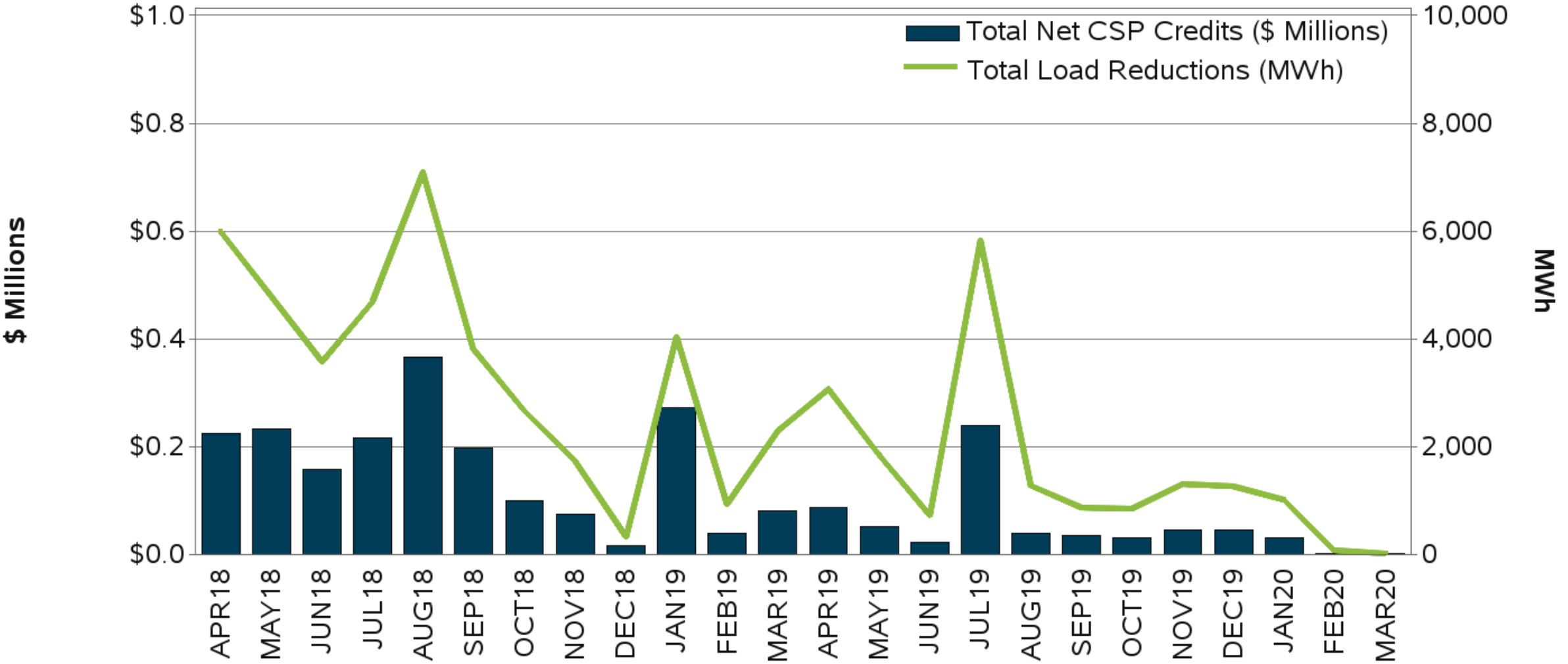


Energy Market

Demand Response Summary

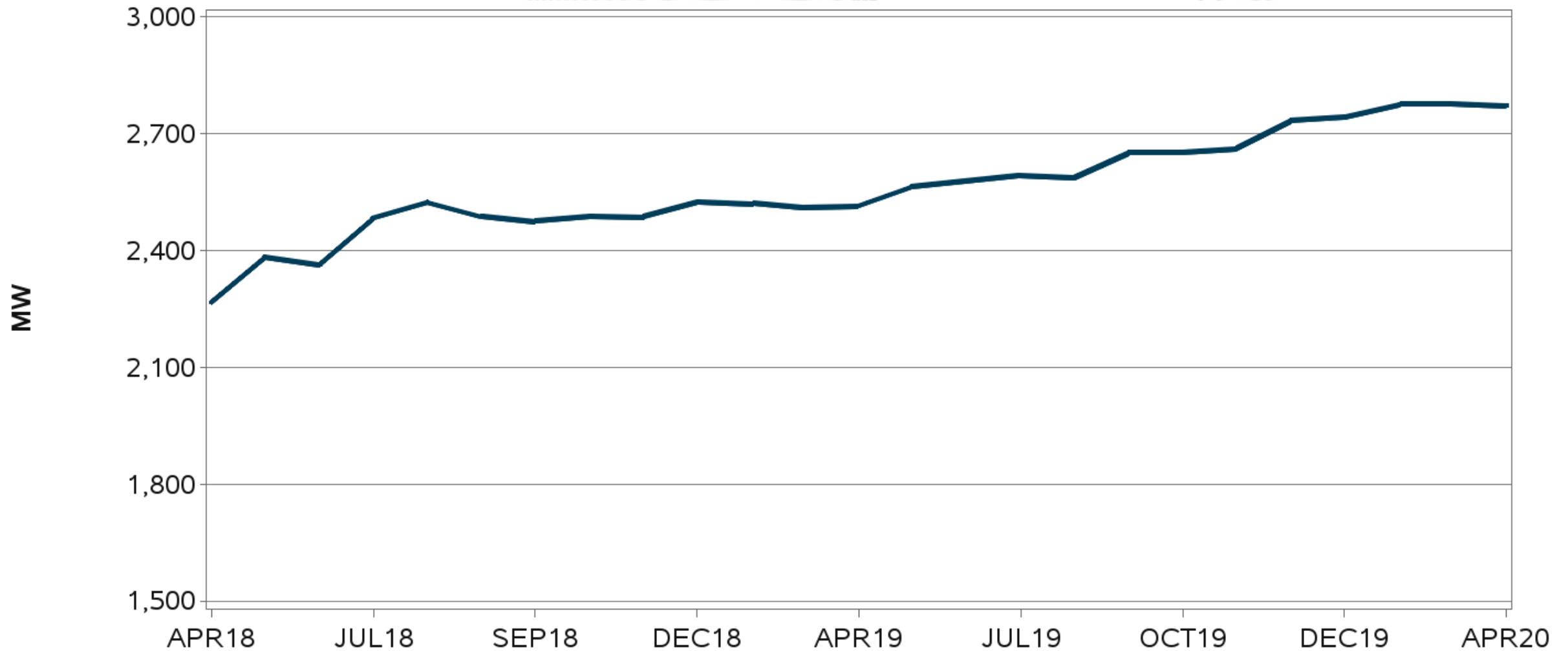
Demand Side Response Estimated Revenue





*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

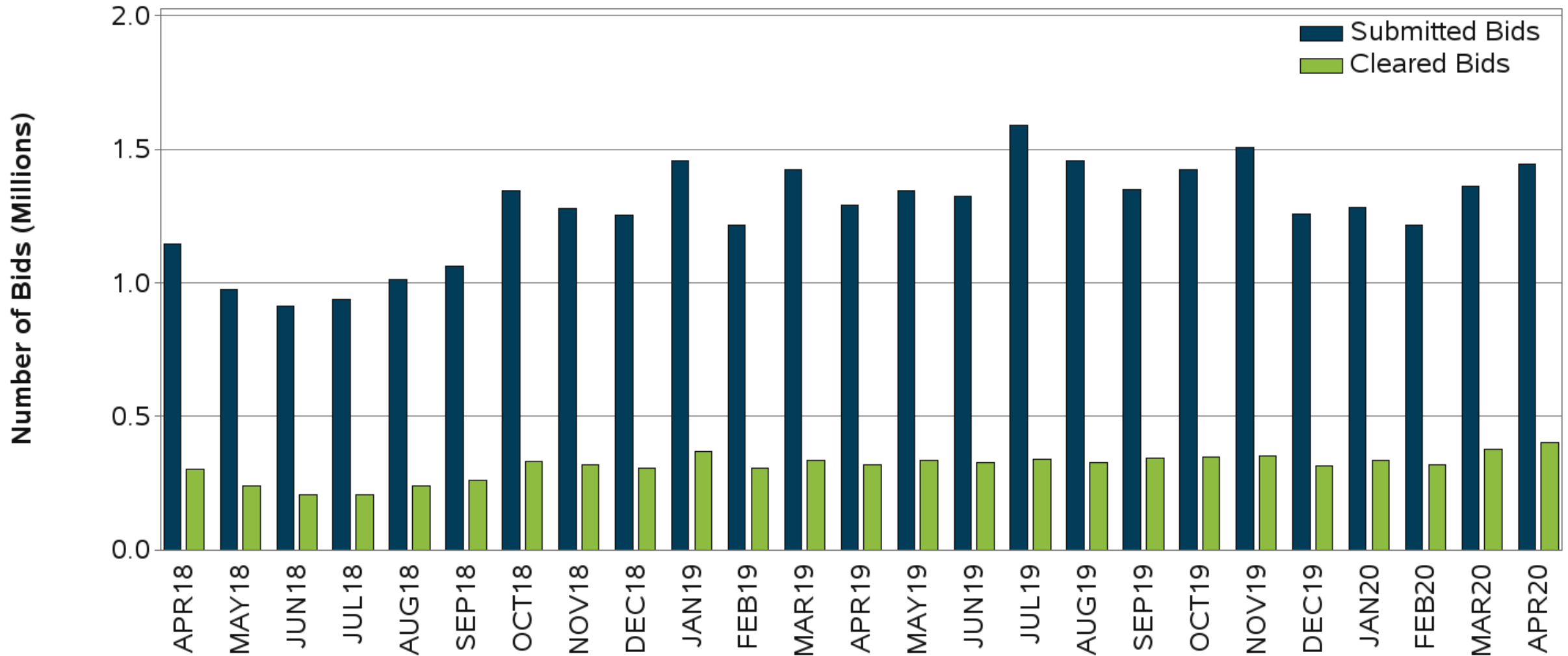


Energy Market

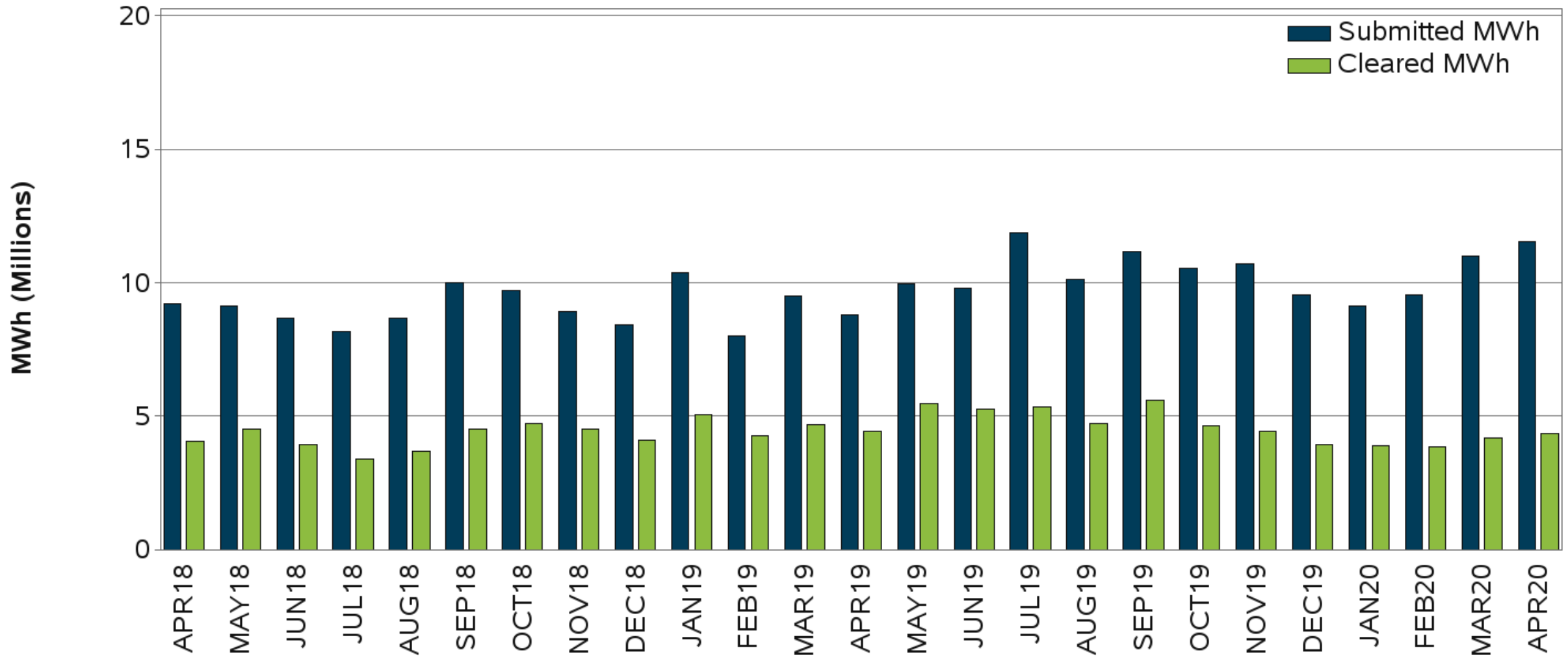
Virtual Activity Summary

- 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.

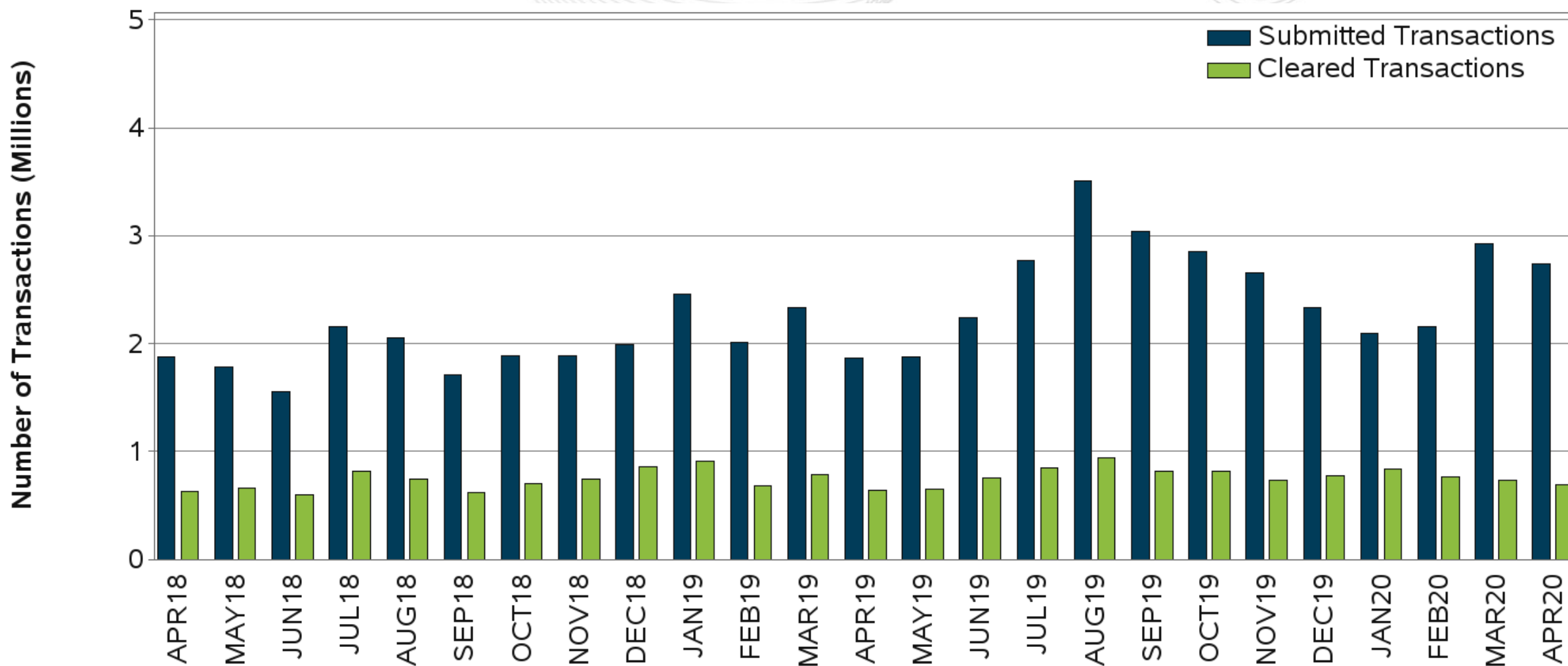
Virtual Bids (INCs & DECIs) - Total Number



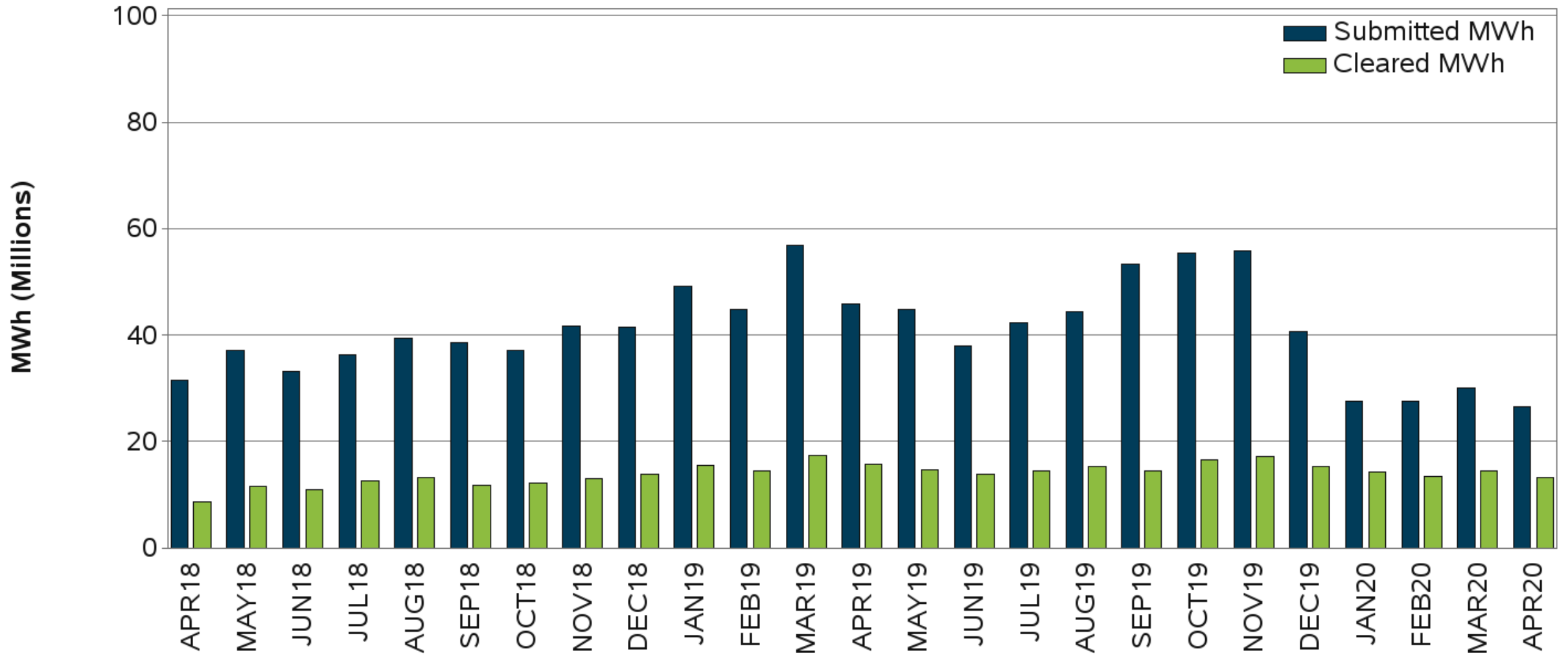
Virtual Bids (INCs & DEC)s - Total Volume



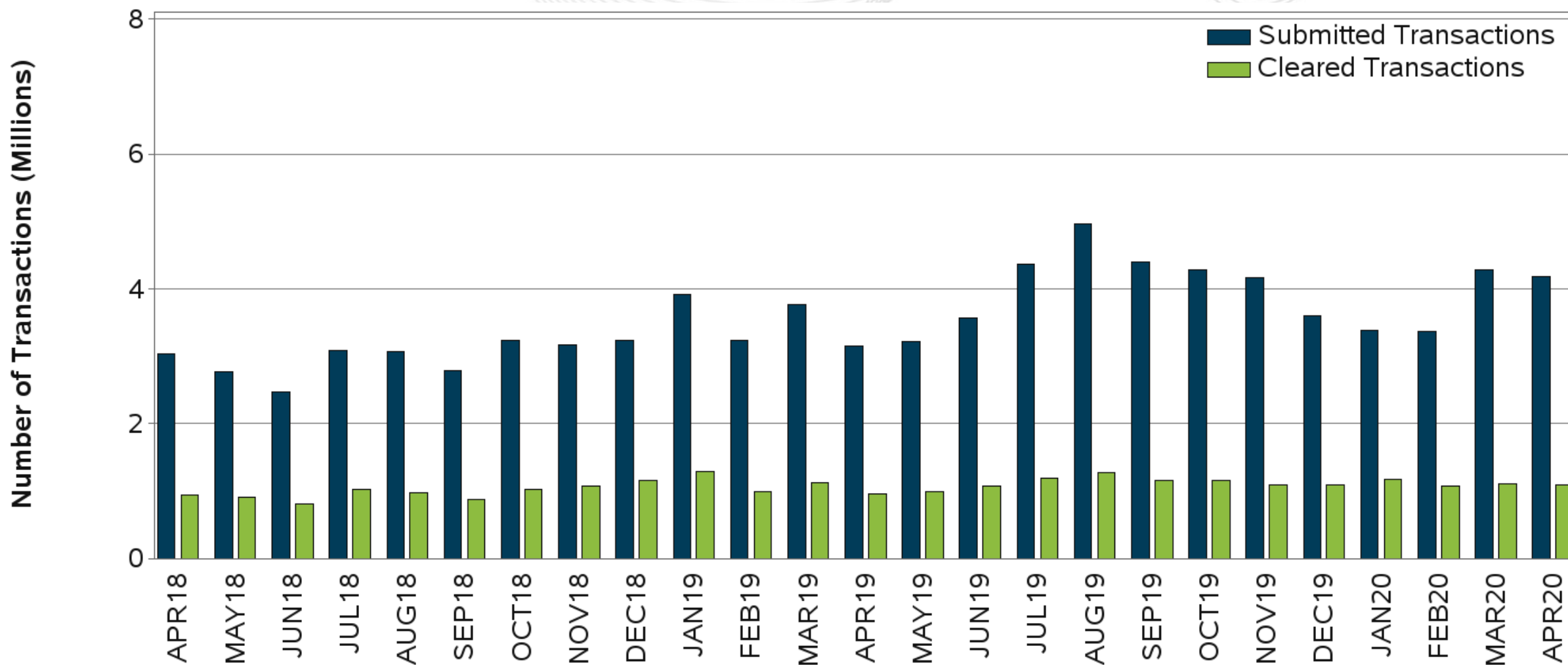
Up-To-Congestion Transactions - Total Number



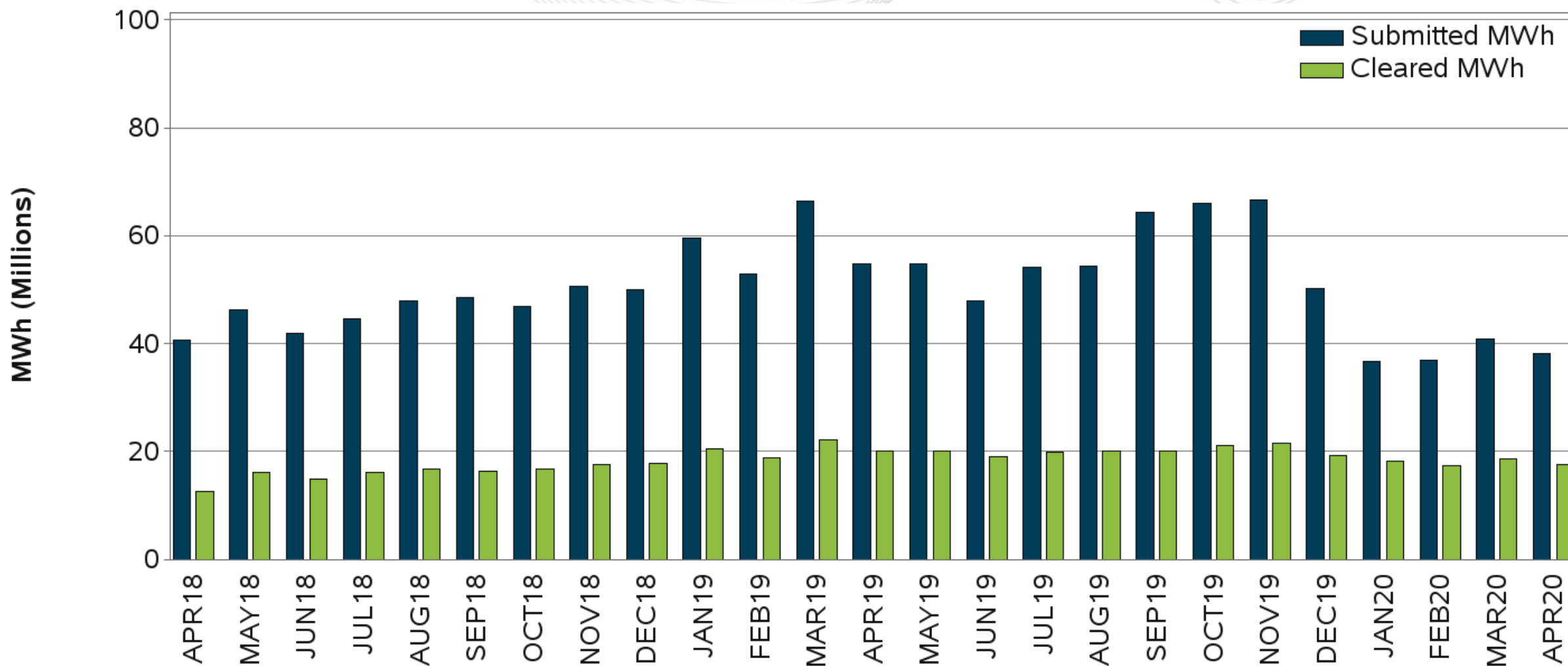
Up-To-Congestion Transactions - Total Volume



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



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

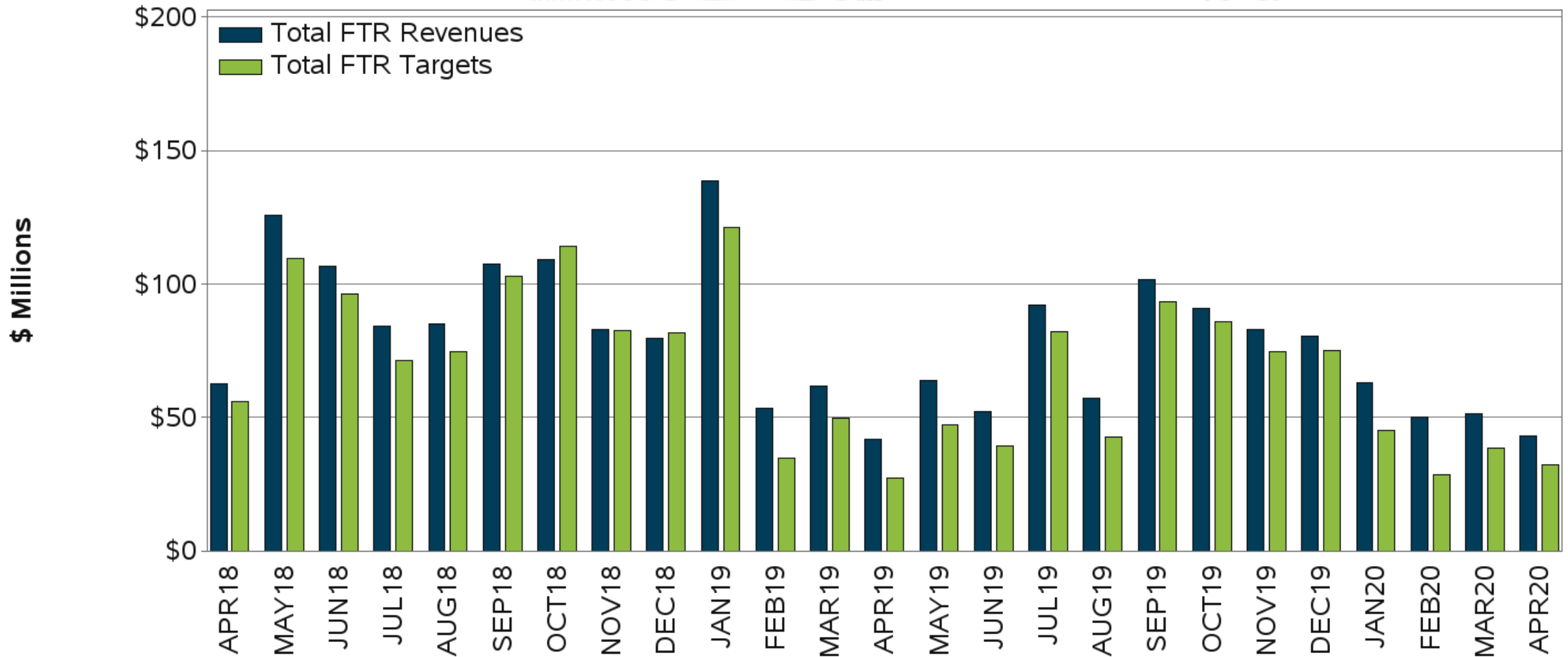


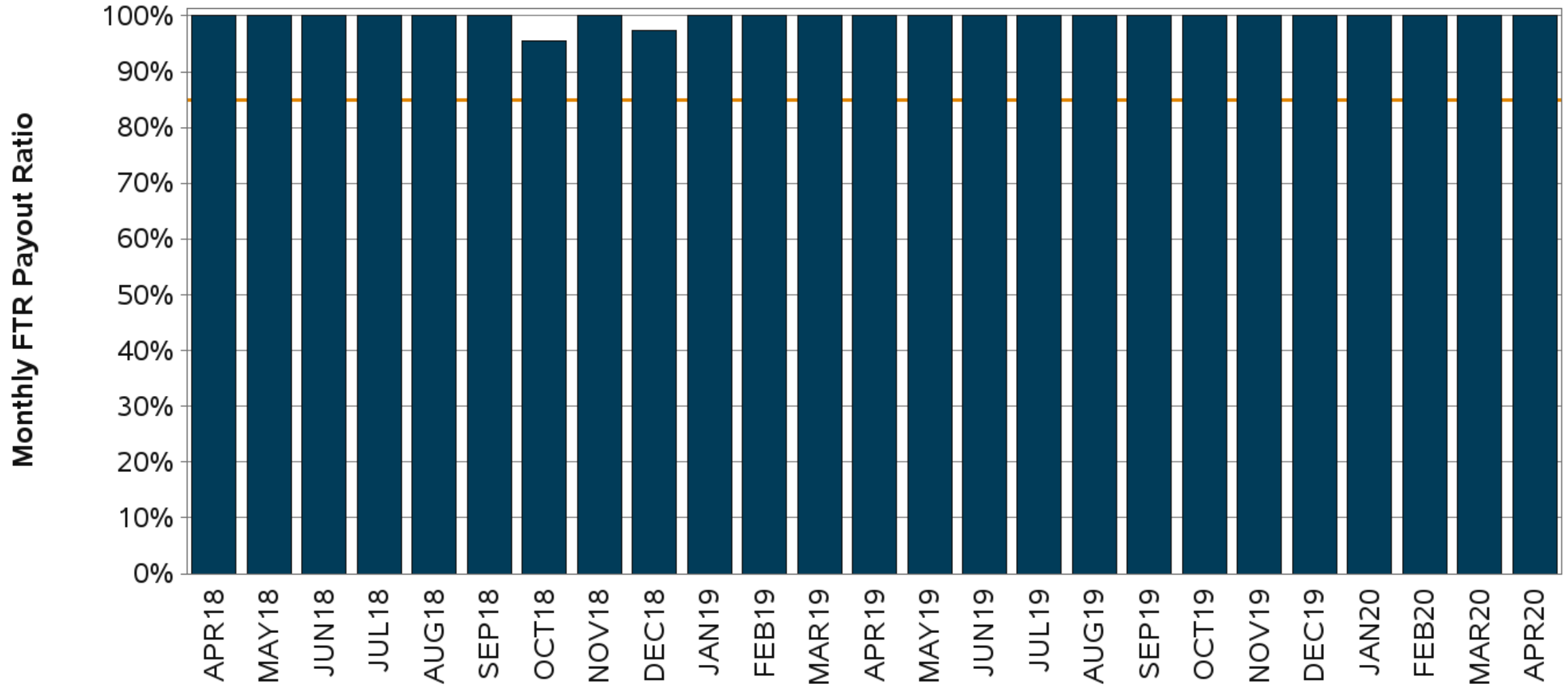
Energy Market

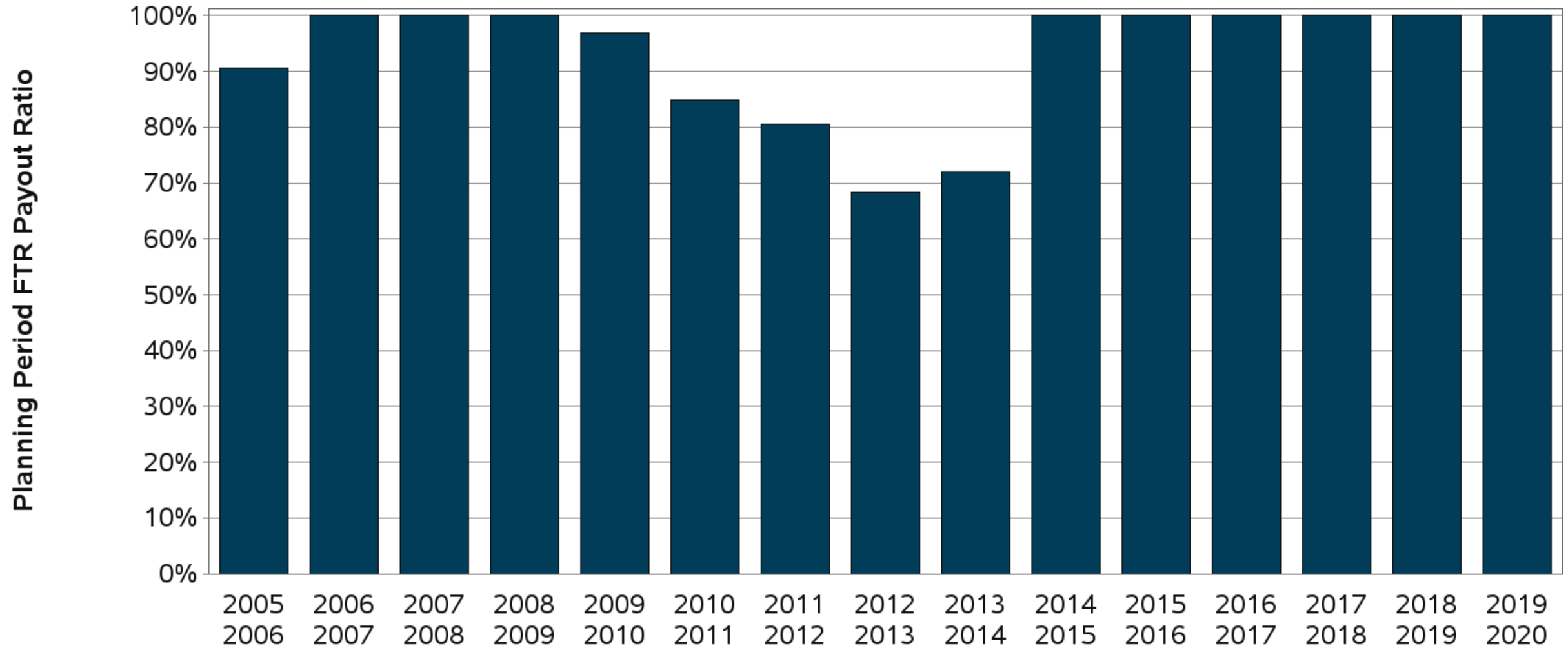
Congestion and FTR Summary

Period	Surplus / Underfunding	Payout Ratio
April, 2020	\$10,869,473	100%
2020	\$63,434,966	100%
2019/2020	\$129,286,679	100%

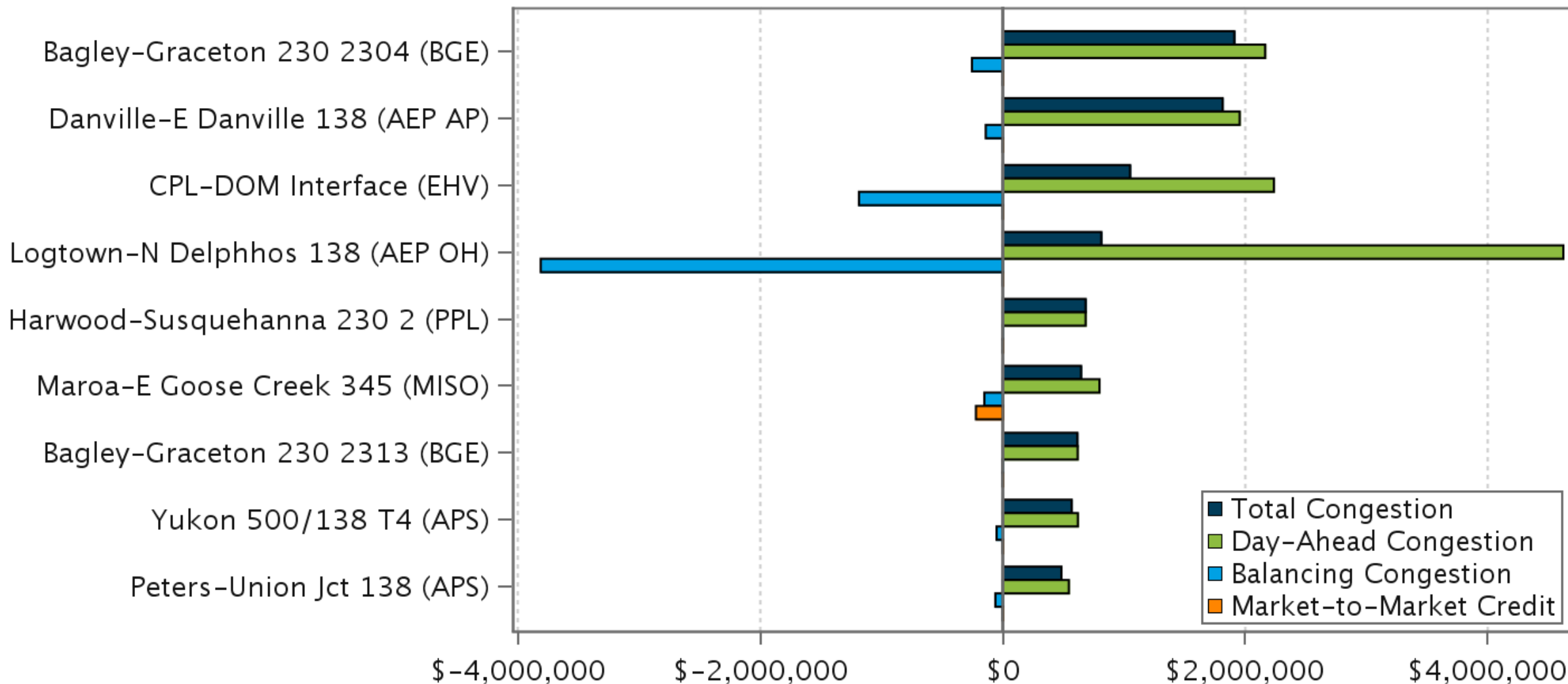
FTR Revenue vs. FTR Target Allocation





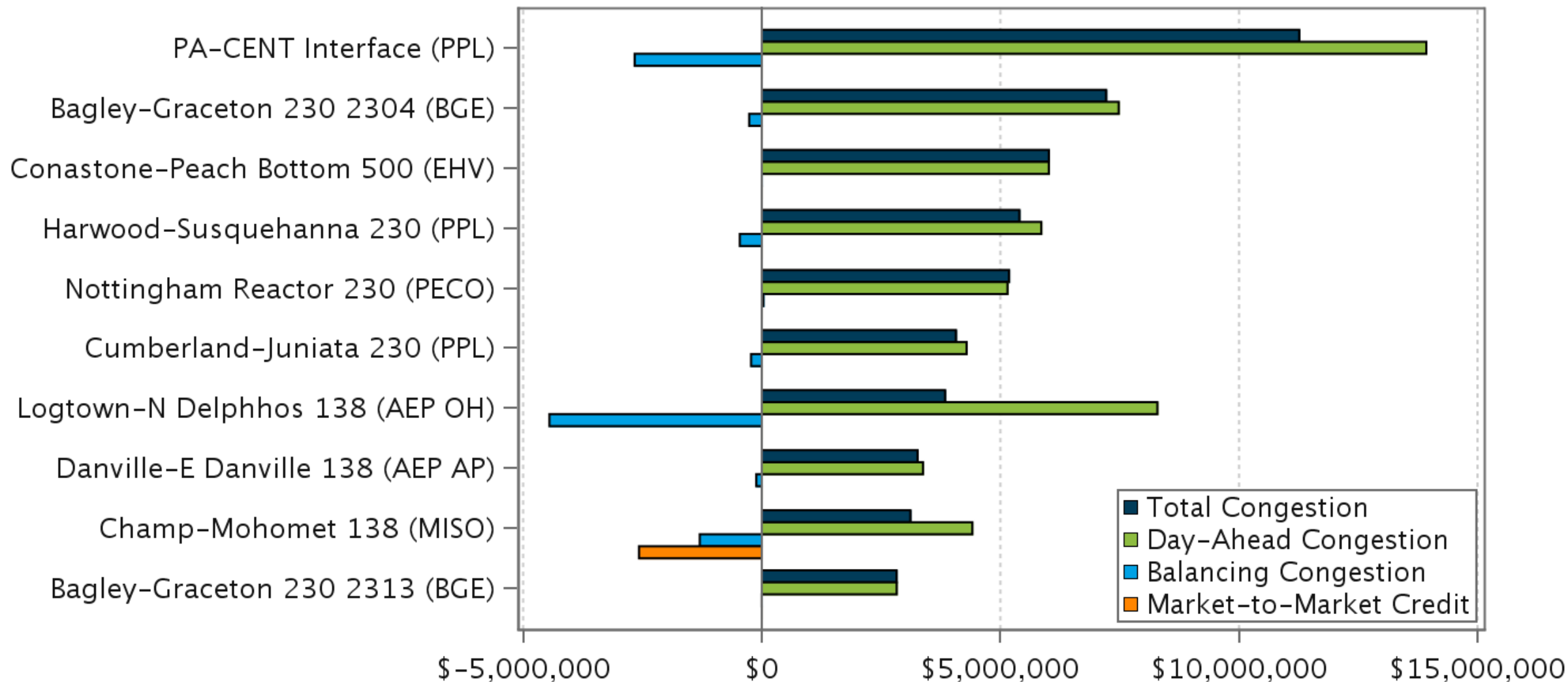


Ten Most Heavily Congested Transmission Facilities - Overall, April



The ten most heavily congested facilities account for 67% of total congestion for April.

Ten Most Heavily Congested Transmission Facilities - Overall, 2020

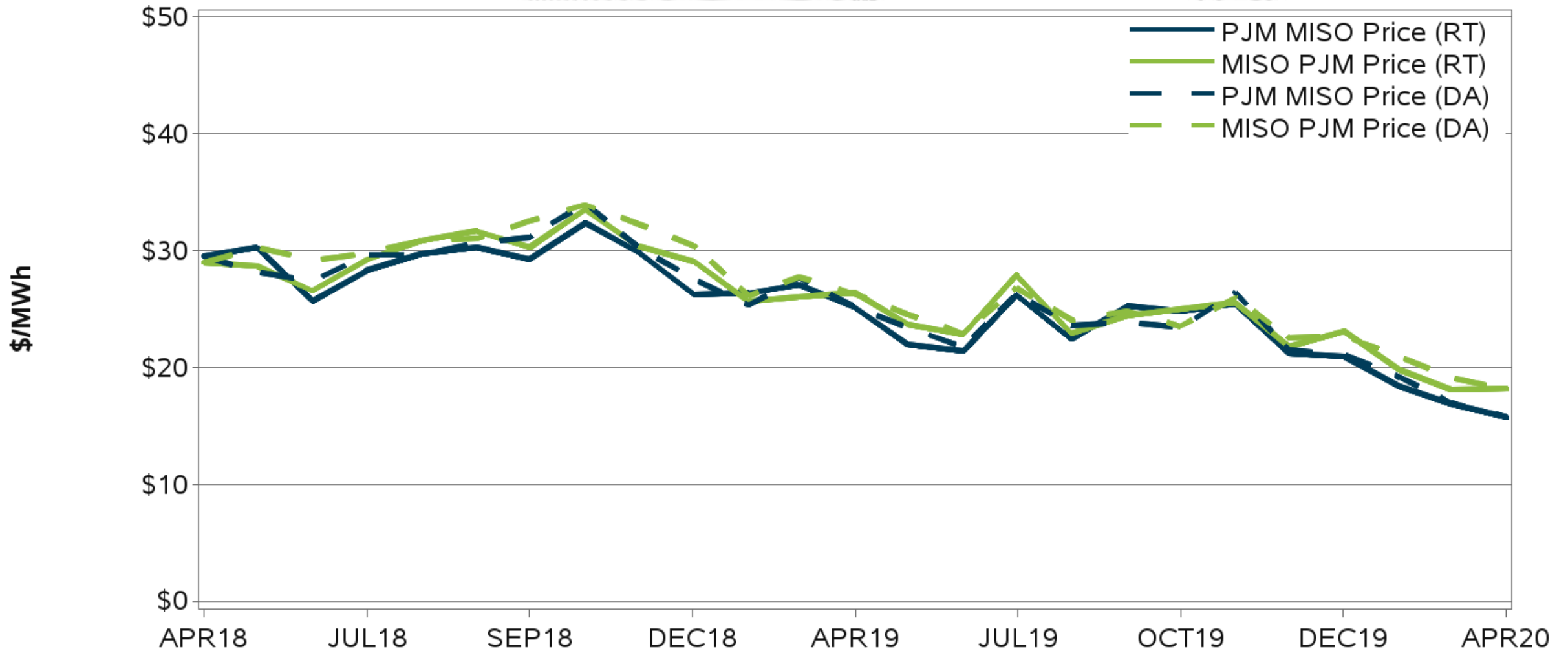


The ten most heavily congested facilities account for 53% of total congestion for 2020.

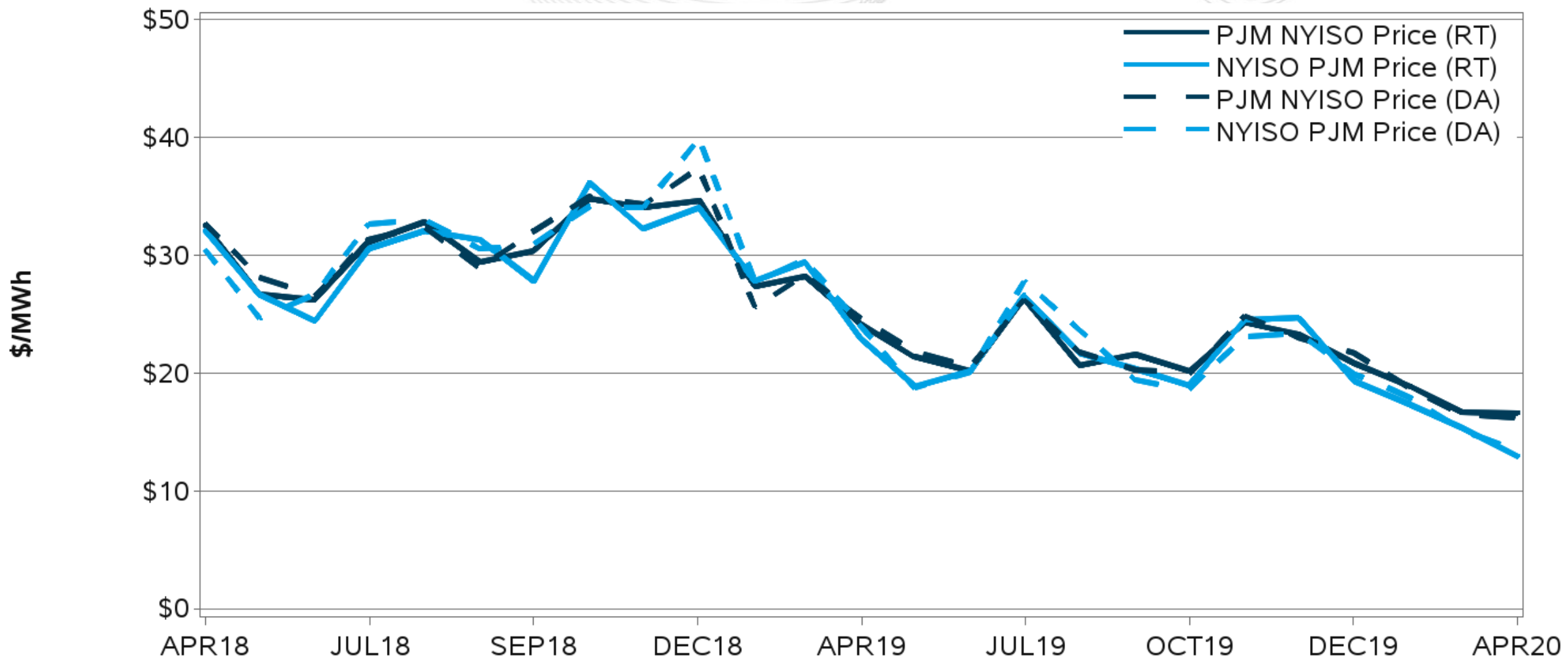
Energy Market

Interchange/Seams Summary

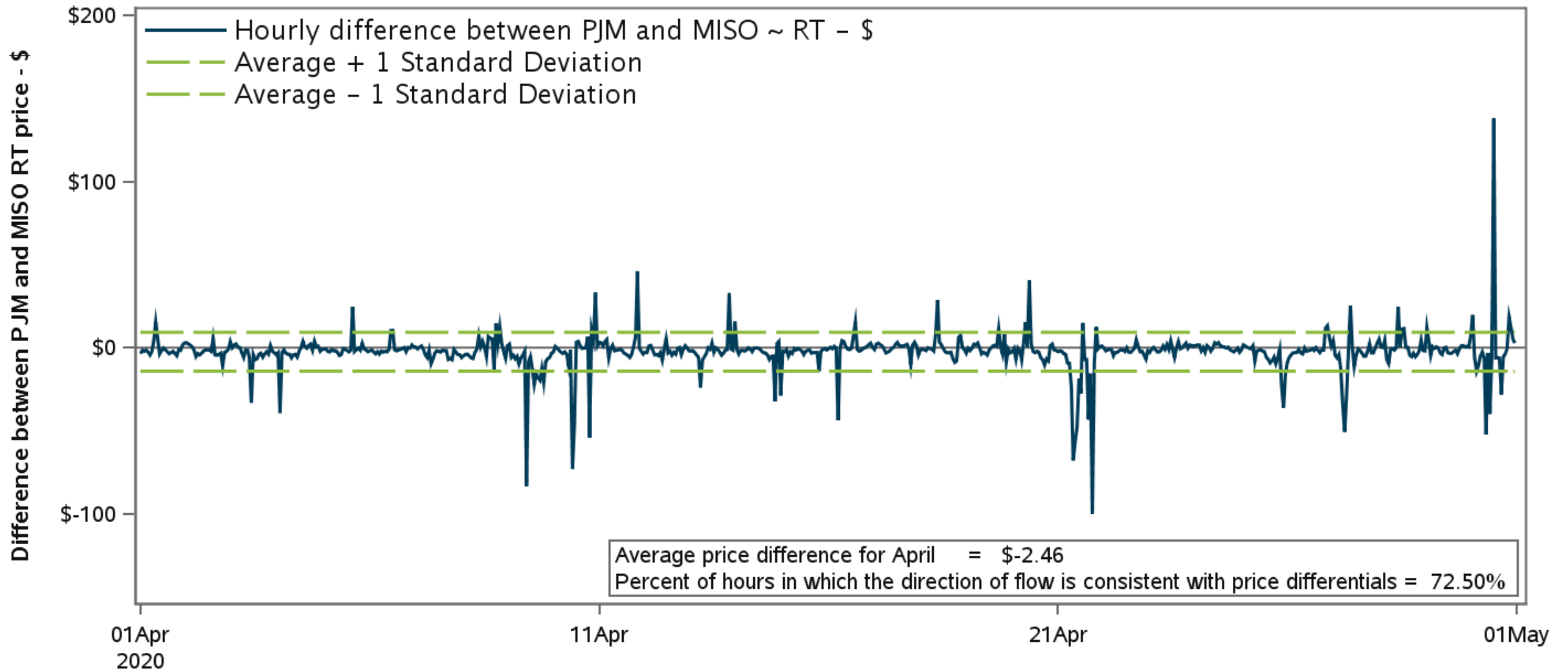
Monthly Average MISO Interface Pricing



Monthly Average NYISO Interface Pricing

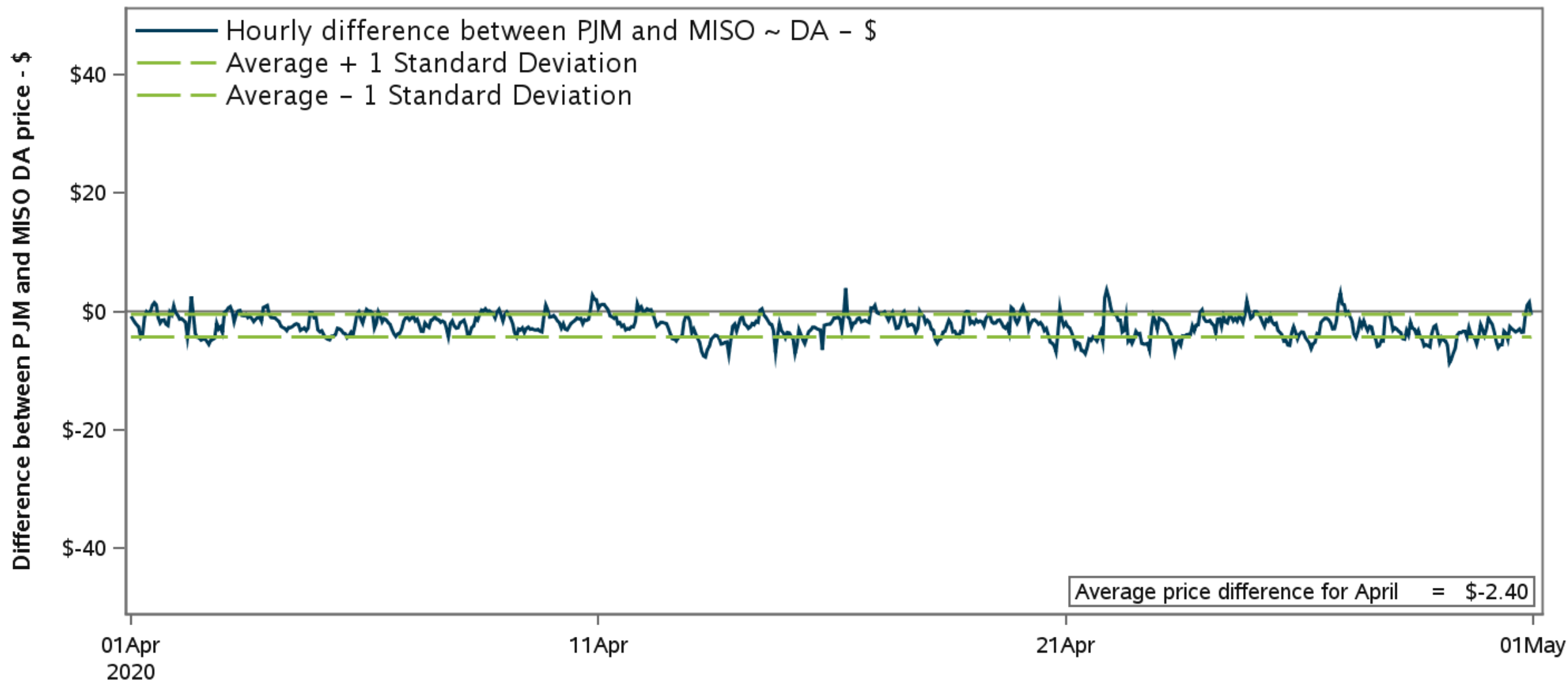


Hourly Difference Between PJM and MISO Real-Time Prices



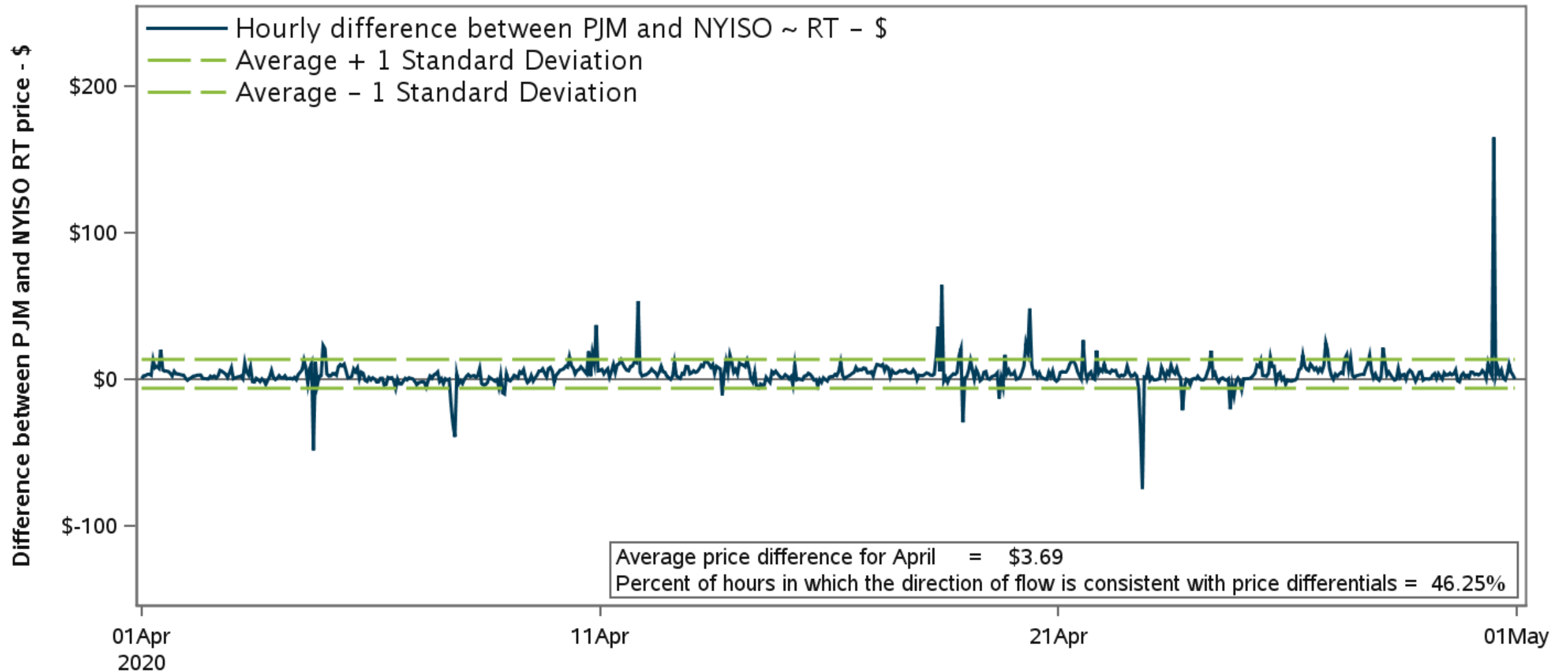
Positive values represent hours when the PJM price was higher. Negative values represent hours when the PJM price was lower.

Hourly Difference Between PJM and MISO Day-Ahead Prices



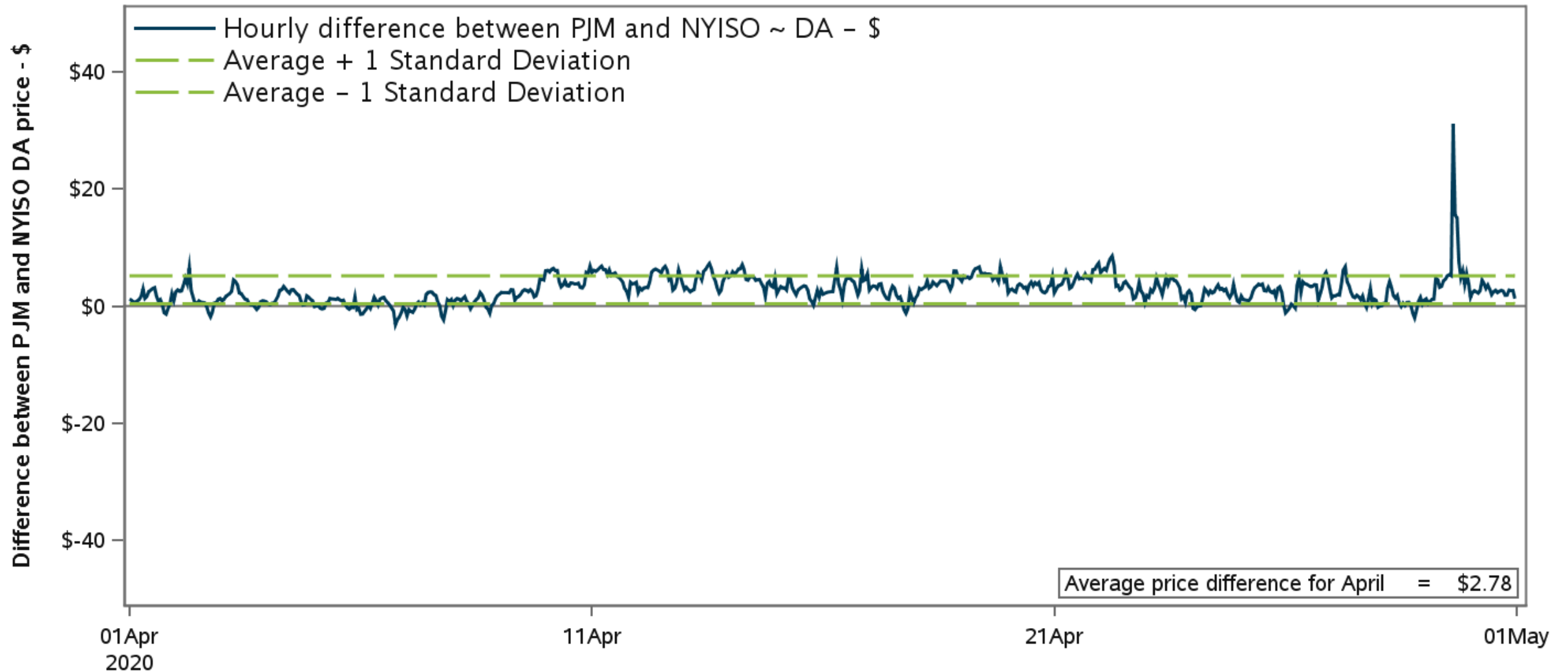
Positive values represent hours when the PJM price was higher. Negative values represent hours when the PJM price was lower.

Hourly Difference Between PJM and NYISO Real-Time Prices



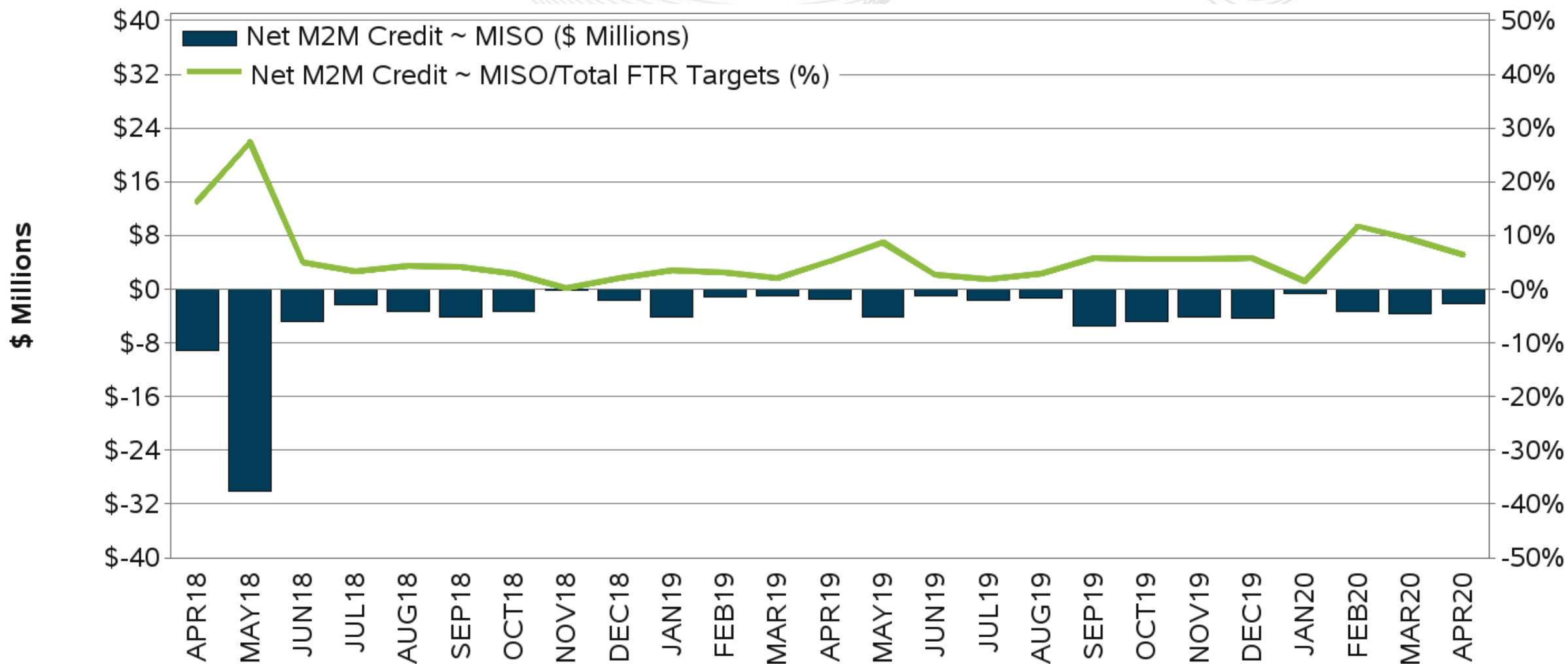
Positive values represent hours when the PJM price was higher. Negative values represent hours when the PJM price was lower.

Hourly Difference Between PJM and NYISO Day-Ahead Prices



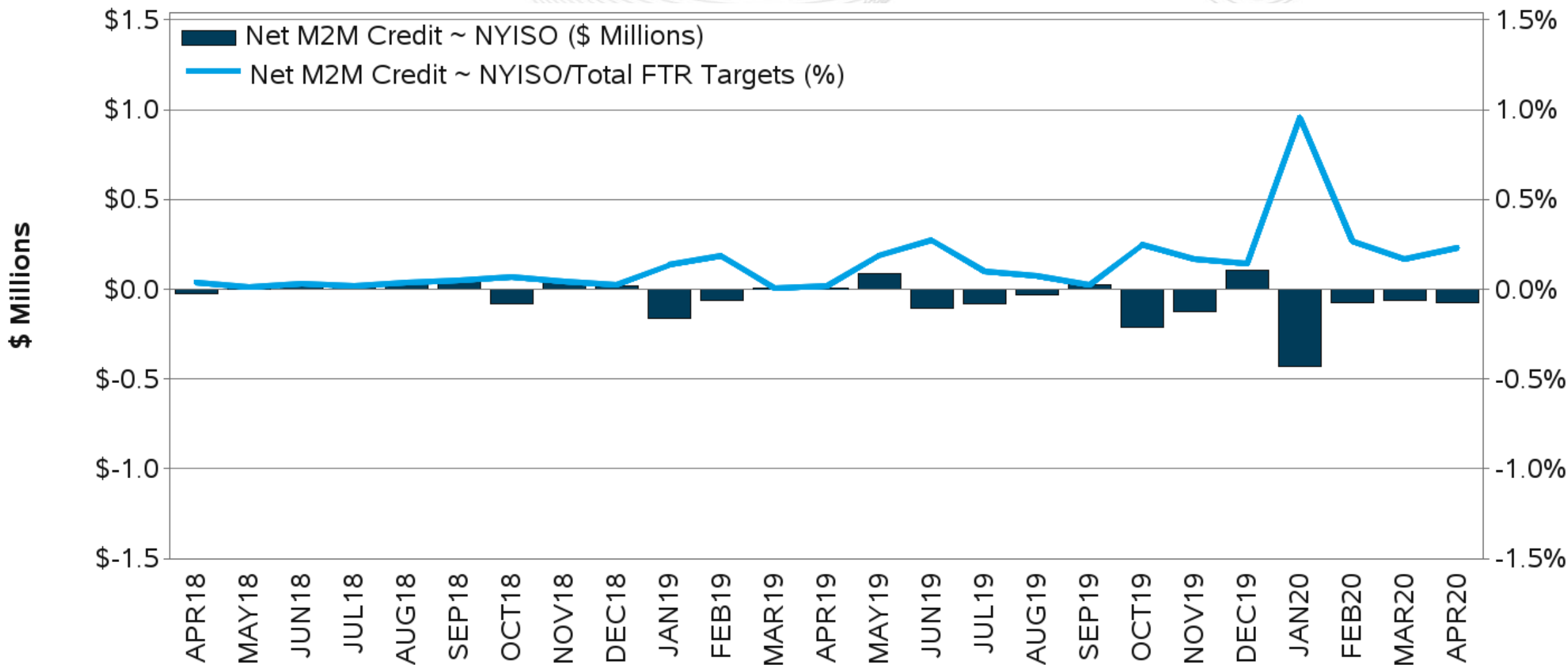
Positive values represent hours when the PJM price was higher. Negative values represent hours when the PJM price was lower.

PJM-MISO Market-to-Market Coordination Settlement



Negative M2M Credit represents PJM payment to MISO

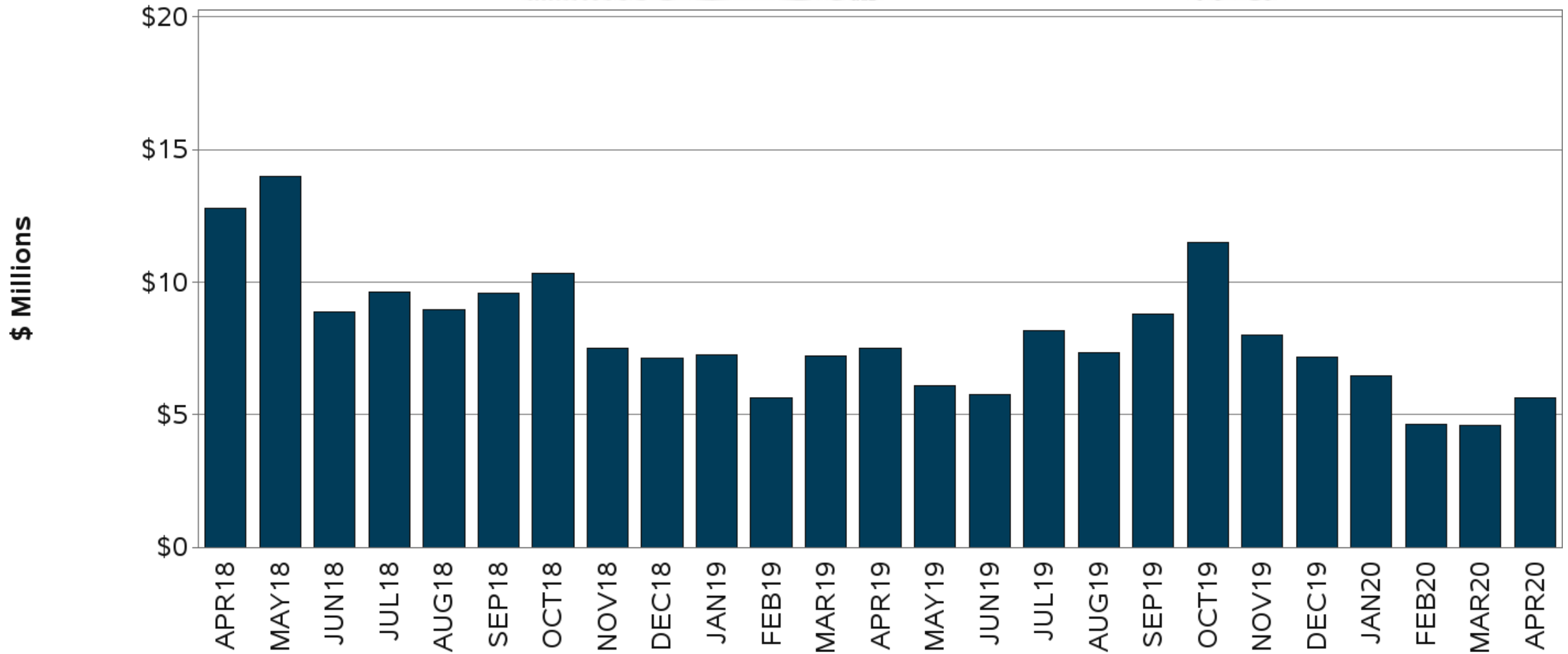
PJM-NYISO Market-to-Market Coordination Settlement



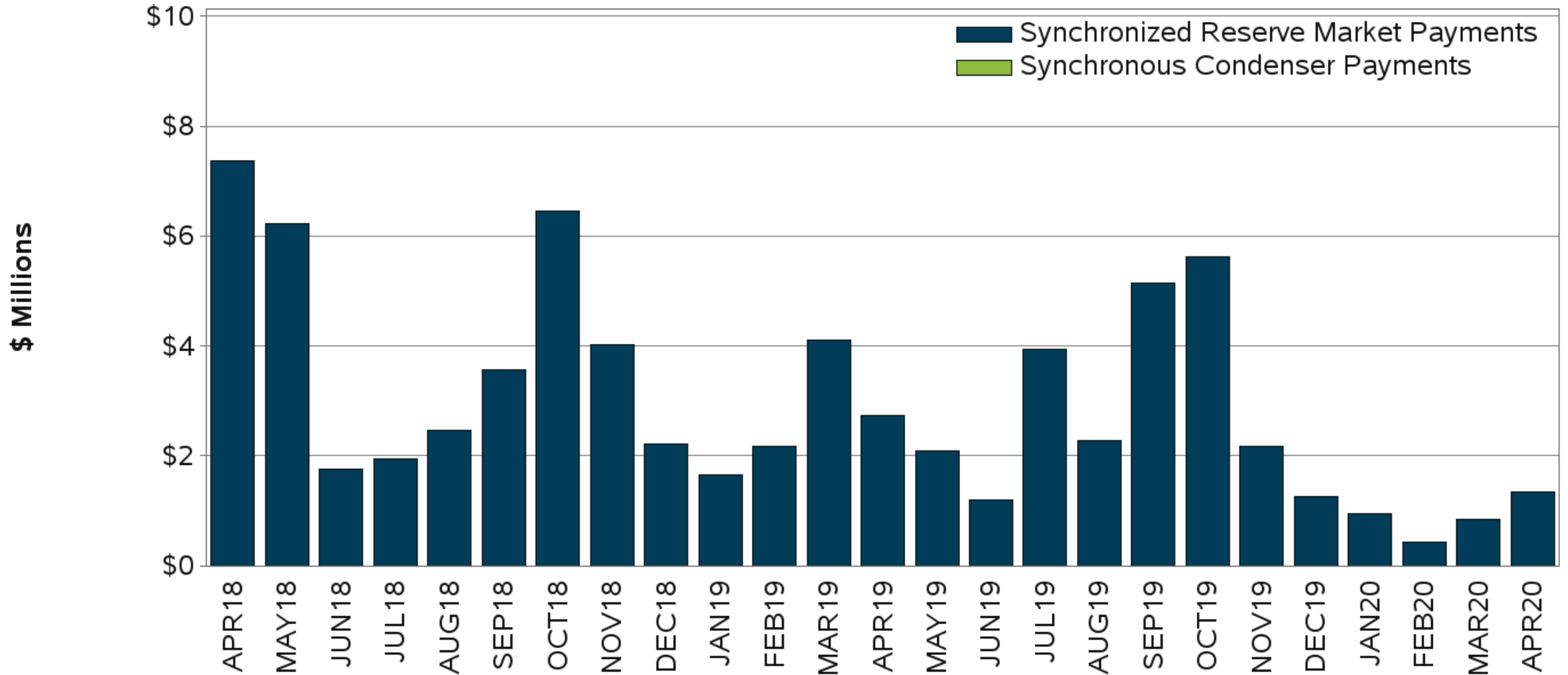
Negative M2M Credit represents PJM payment to NYISO

Ancillary Service Market

Summary

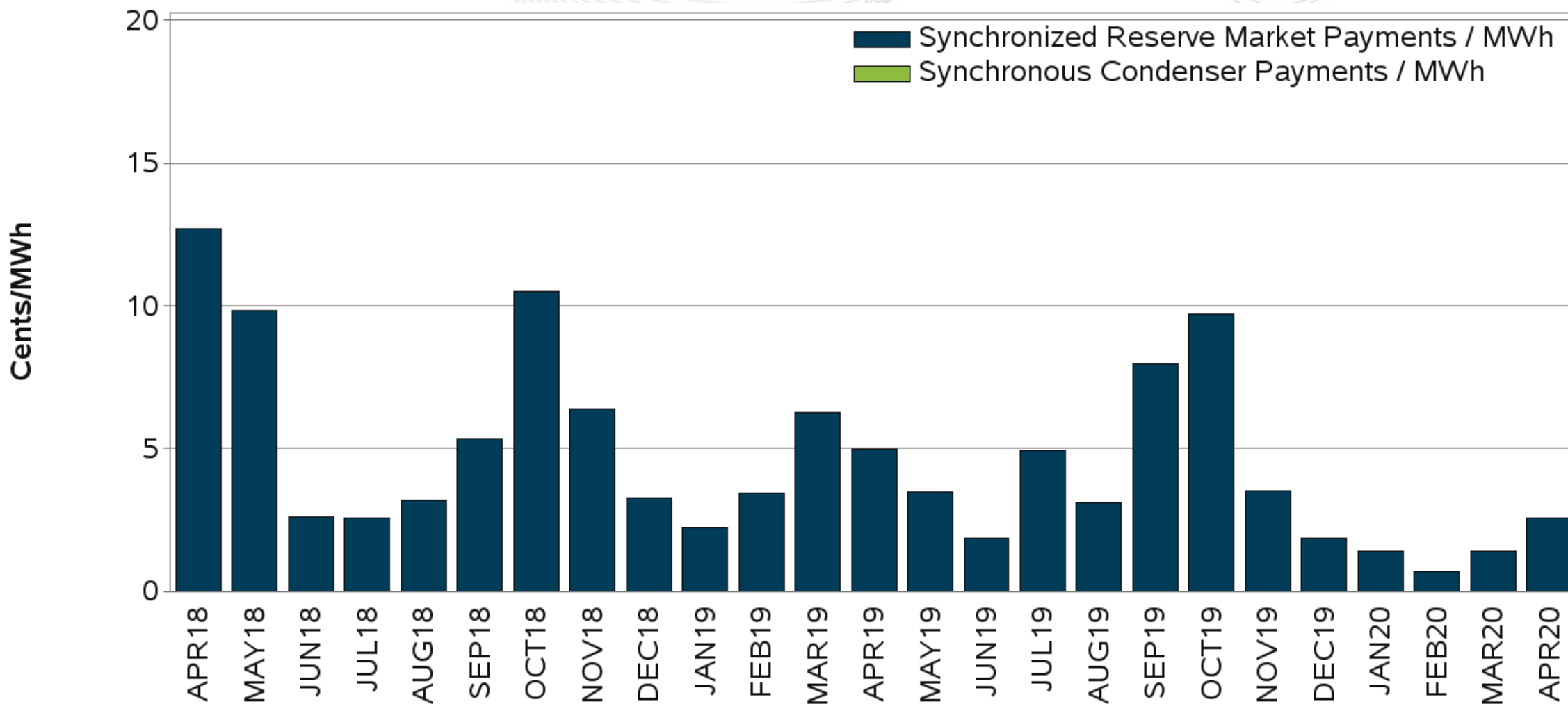


Synchronized Reserve and Synchronous Condenser Costs

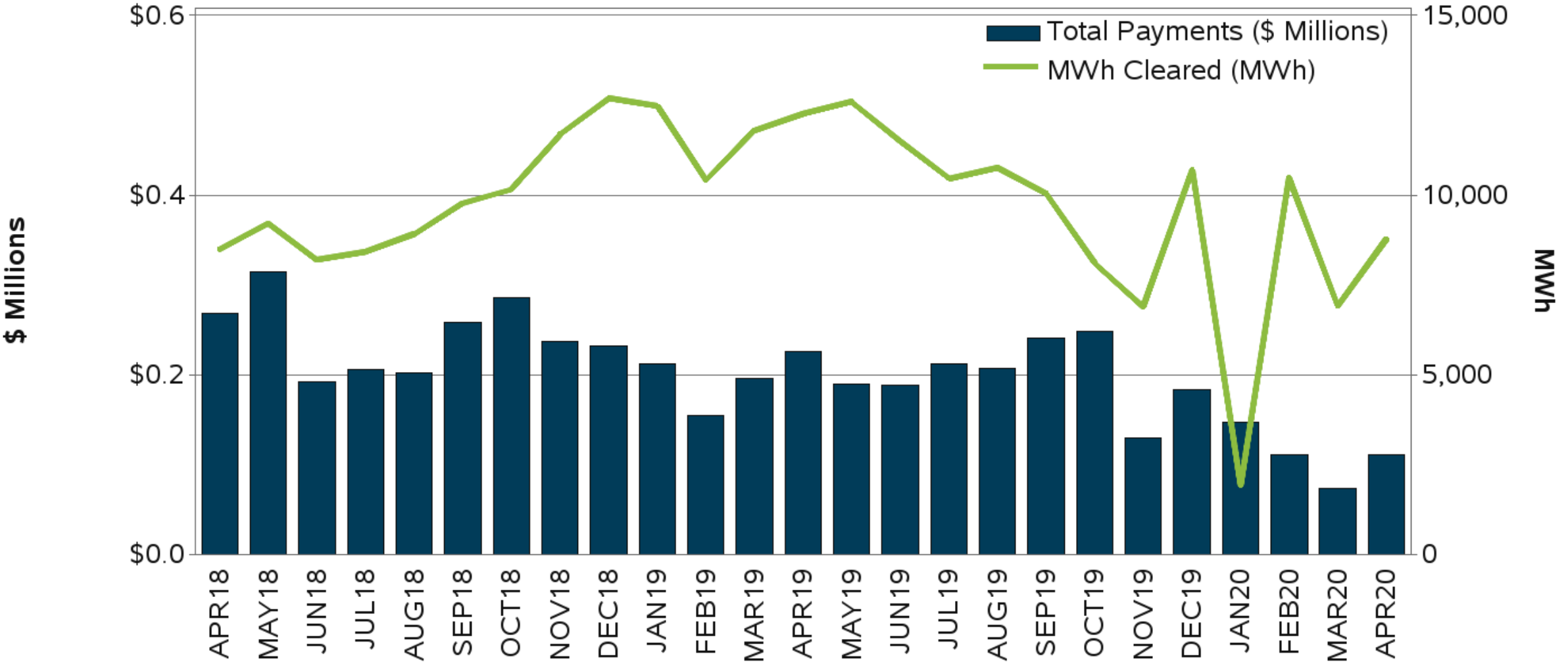




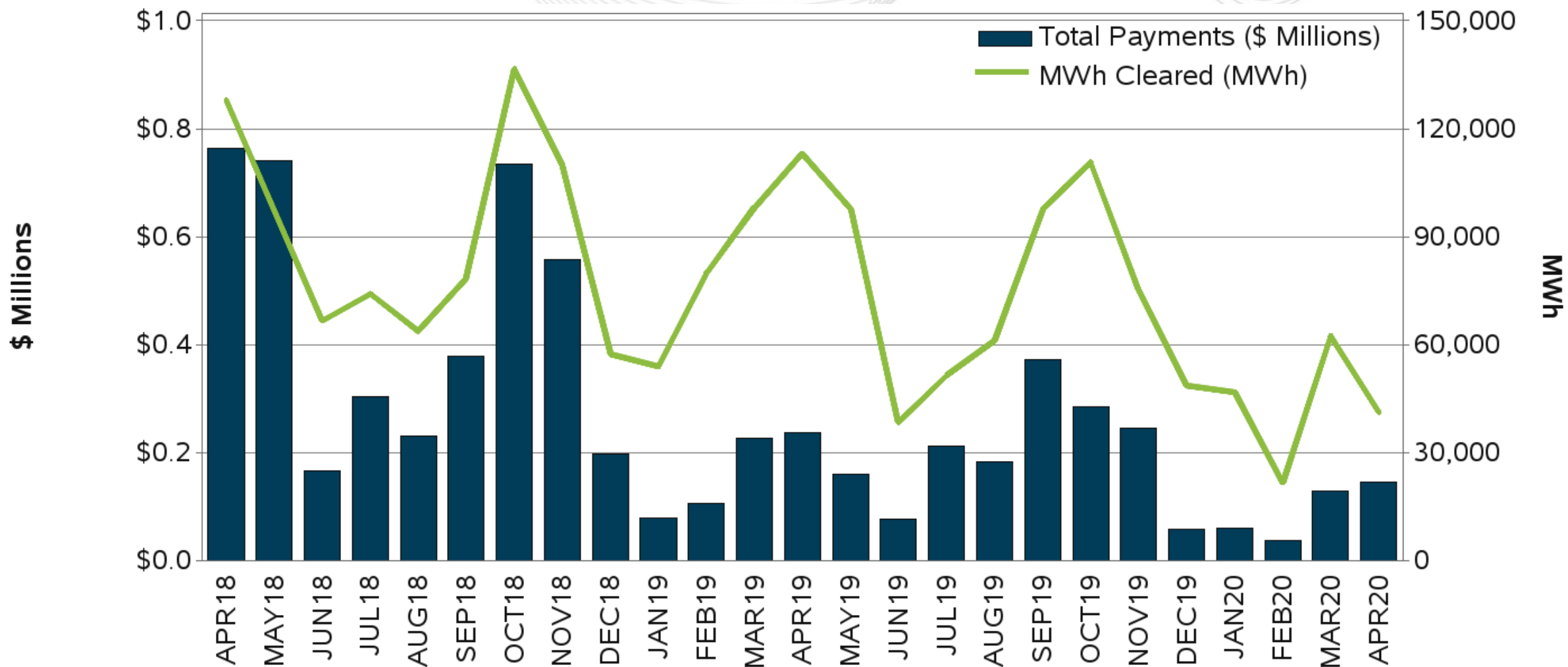
Load-Adjusted Synchronized Reserve and Synchronous Condenser Costs



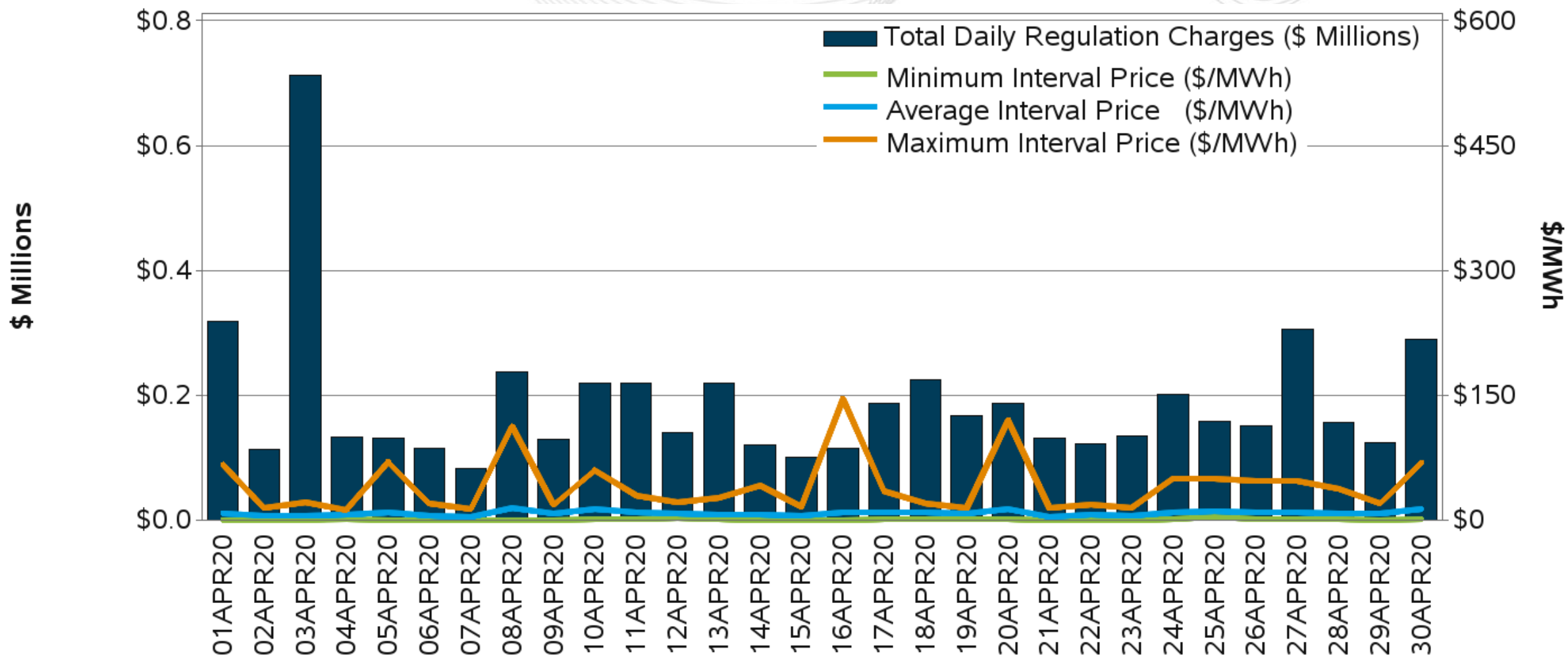
DR Participation in PJM Regulation Markets



DR Participation in PJM Synchronized Reserve Markets



Regulation Market Daily Prices and Charges



Synchronized Reserve Market Daily Prices and Charges

