



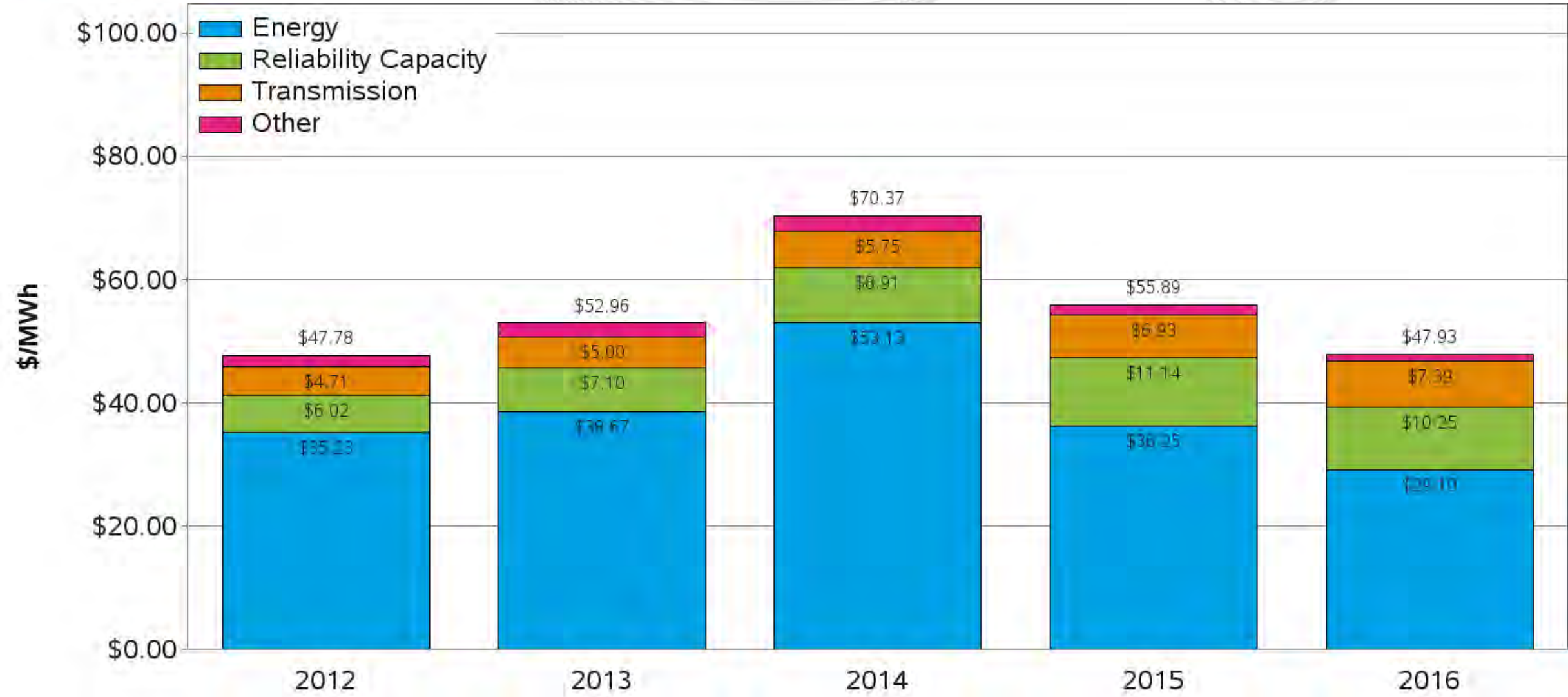
Markets Report

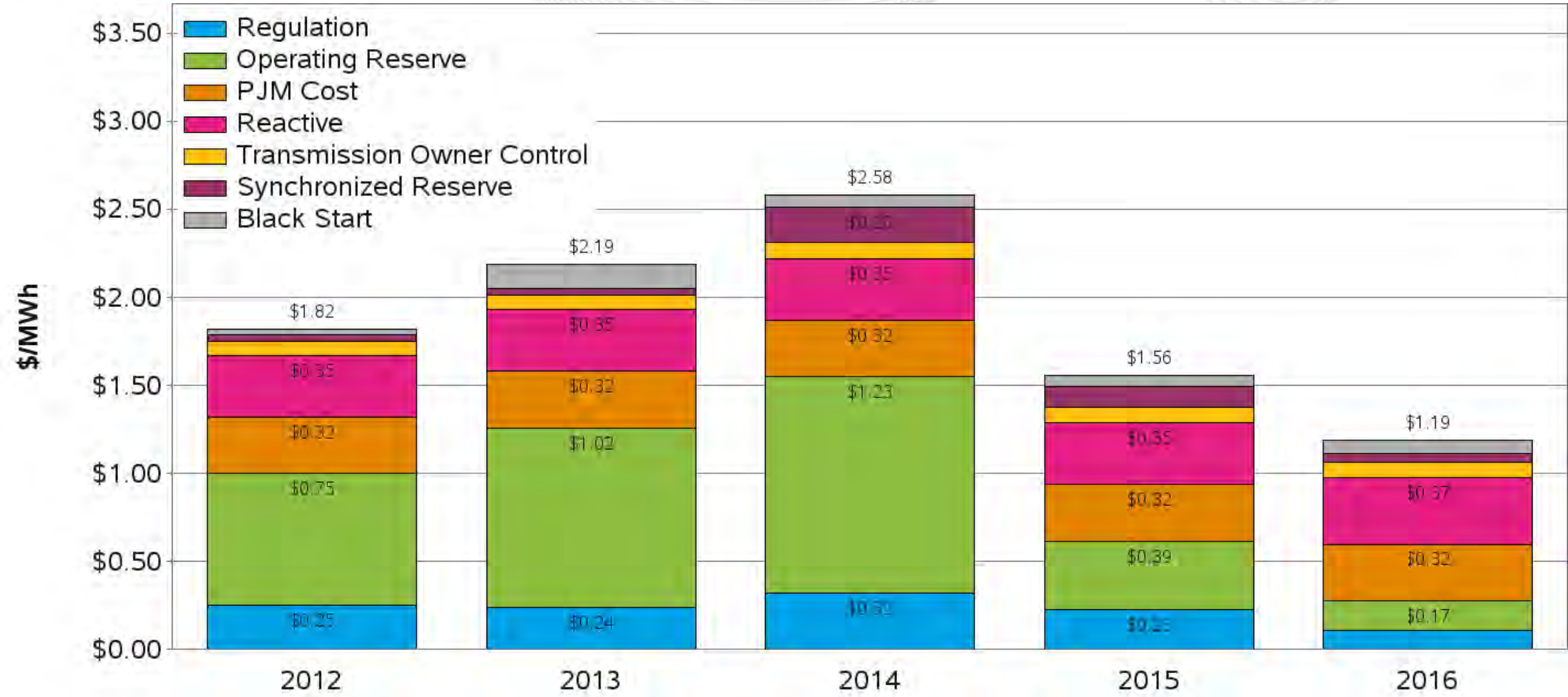
Jennifer Freeman
Senior Economist, Market Analysis
MC Webinar
September 26, 2016

- PJM Wholesale Cost through August, 2016 was \$47.93/MWh, down from full-year 2015 costs of \$55.89/MWh. The bulk of the decrease is made up of Energy costs down over \$7/MWh from 2015. (Slides 5 & 6)
- Operating Reserve cost contribution to wholesale energy costs are at their lowest level in the 2011-2016 time period. (Slide 6)
- Balancing Operating Reserves were higher than usual this month due to very hot weather. (Slides 8 & 9)
- Load-weighted average LMP for 2016 YTD is \$29.10/MWh: (Slide 18)
 - August 2016 was \$35.6/MWh, which is seasonally in line with, but higher than, August 2015 (\$30.1) and August 2014 (\$34.4).
- In August, both Energy and the sum of Heating and Cooling Degree Days were well above their historic averages. (Slides 16-17)

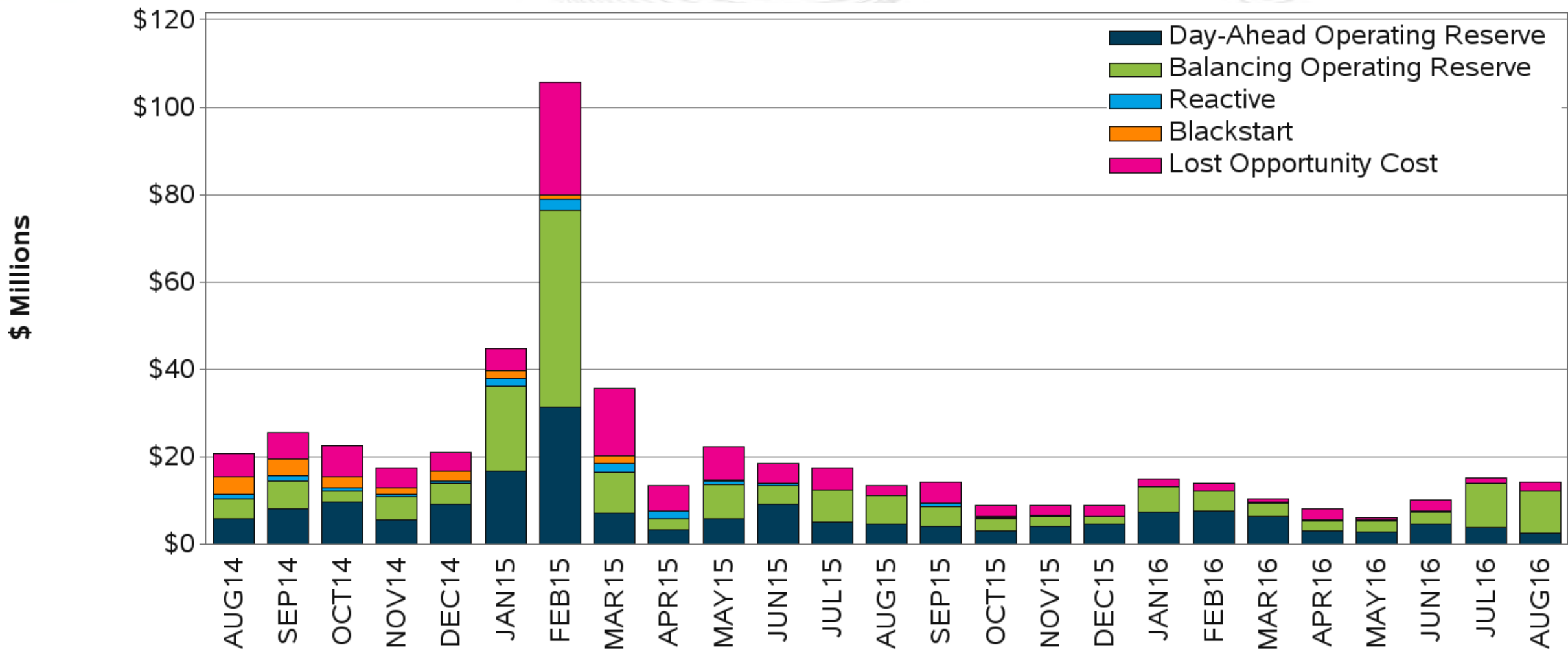
- After a significant increase in July through September 2015, the MWs registered in PJM's Economic Demand Response leveled off in October, and remained relatively level through May 2016. The large decrease seen starting in June and continuing through August is mainly administrative and due to registrations expiring at the end of the planning period. (Slide 23)
- Total cleared MWh of virtual bids (INCs and DECAs) have remained essentially flat from their October 2014 levels. After trending down since January, total cleared MWh of UTC transactions have been increasing since April. (Slides 27-32 and data appendix)
- FTR revenue adequacy for the month of August is 100%. The 2016-2017 Planning Year is fully funded. (Slides 33-36)
- Regulation and Synchronized Reserve market costs have generally tracked with energy prices over time. (Slides 48-50)

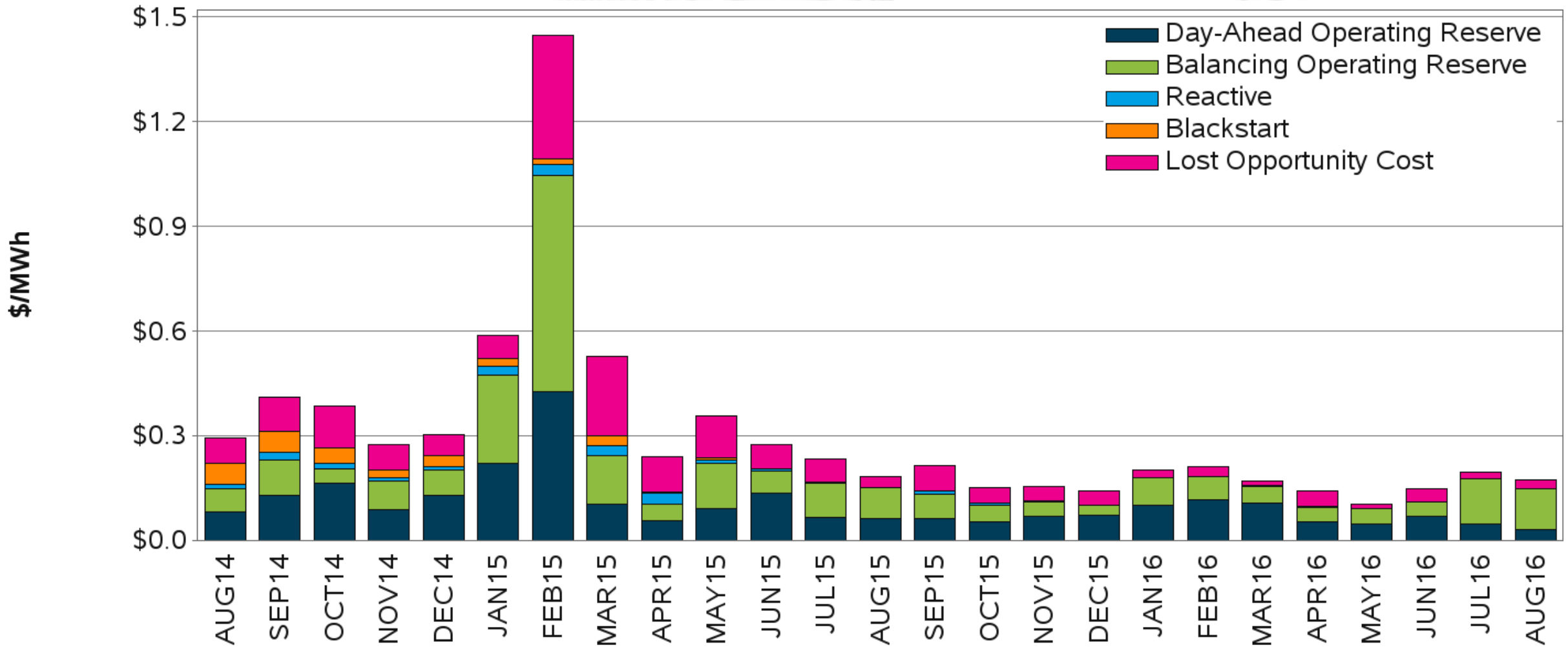
Markets Report





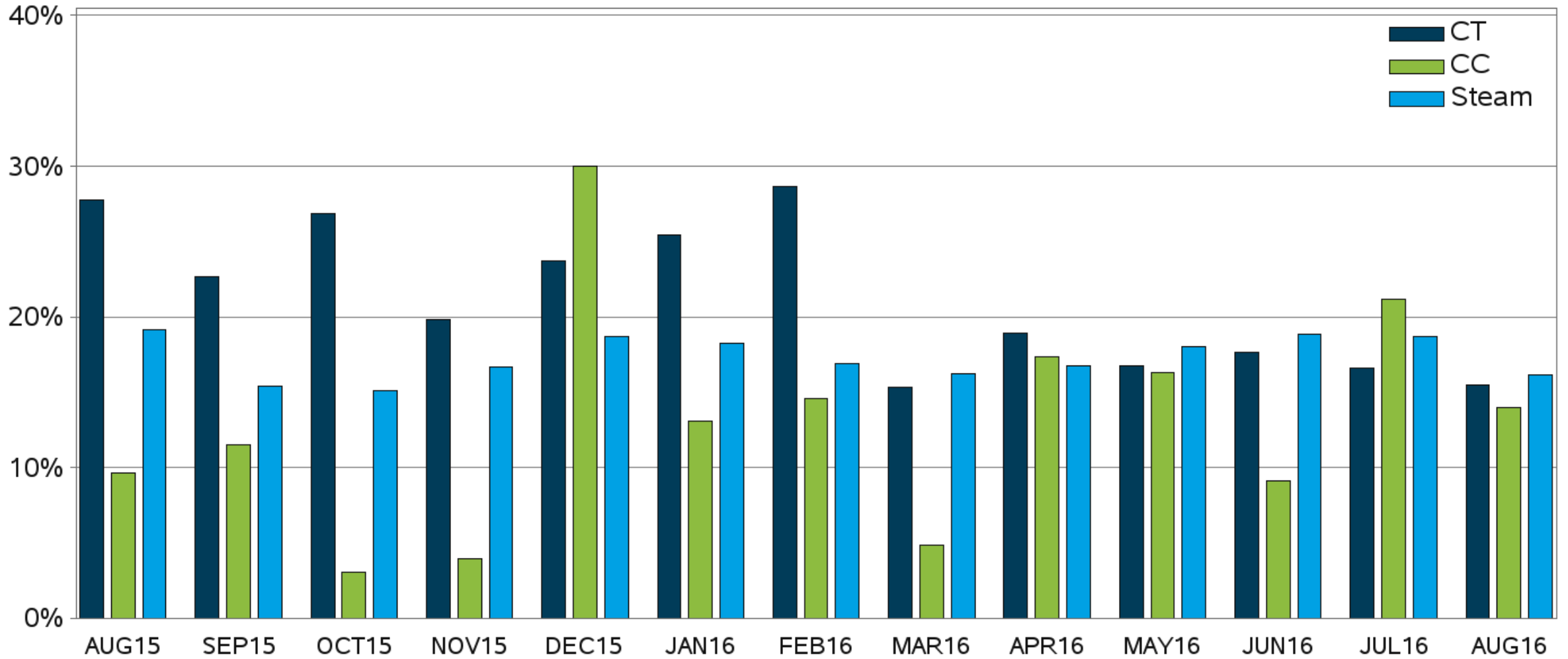
Operating Reserve





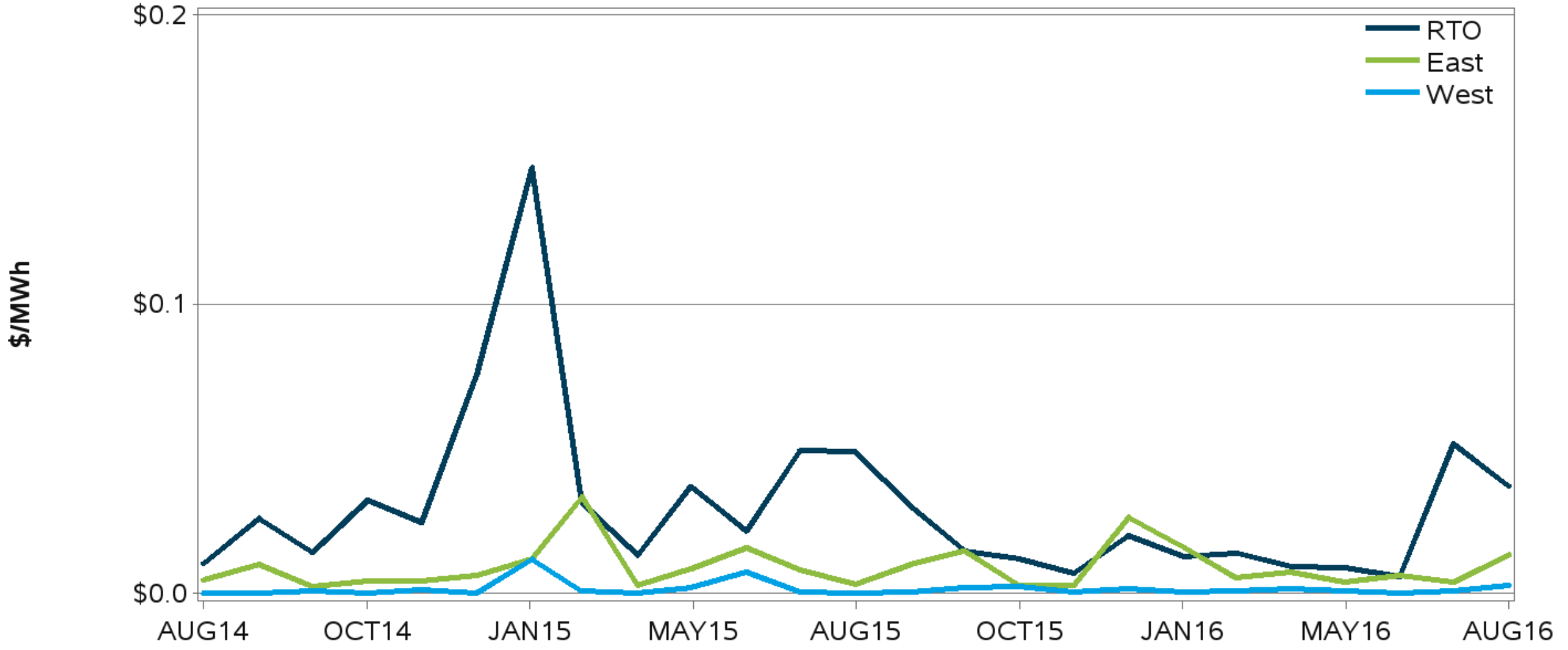


Percent of Total CC, CT and Steam Hours with LMP < Offer

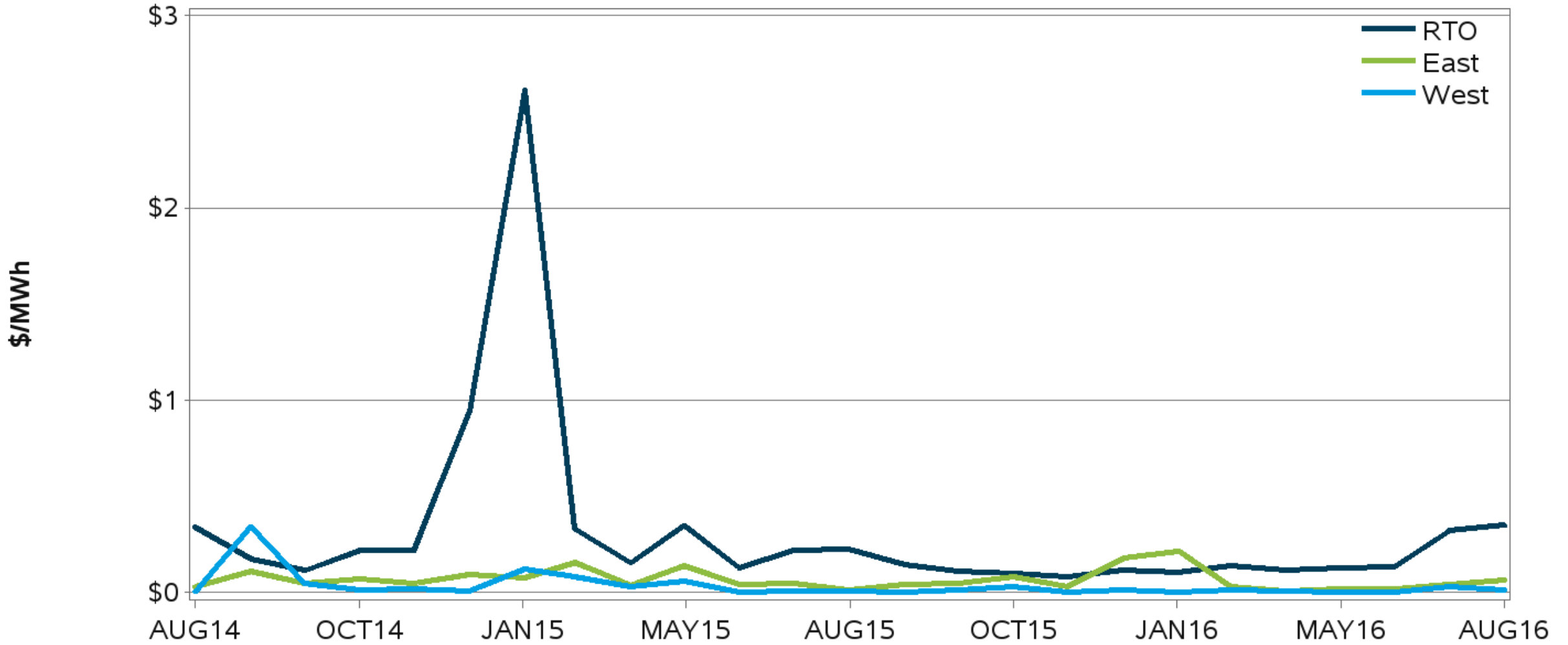


- Beginning in December 2008, the daily Balancing Operating Reserves (BOR) rate was replaced with six different BOR rates: RTO BOR for Reliability Rate, RTO BOR for Deviations Rate, East BOR for Reliability Rate, East BOR for Deviations Rate, West BOR for Reliability Rate, West BOR for Deviations Rate.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

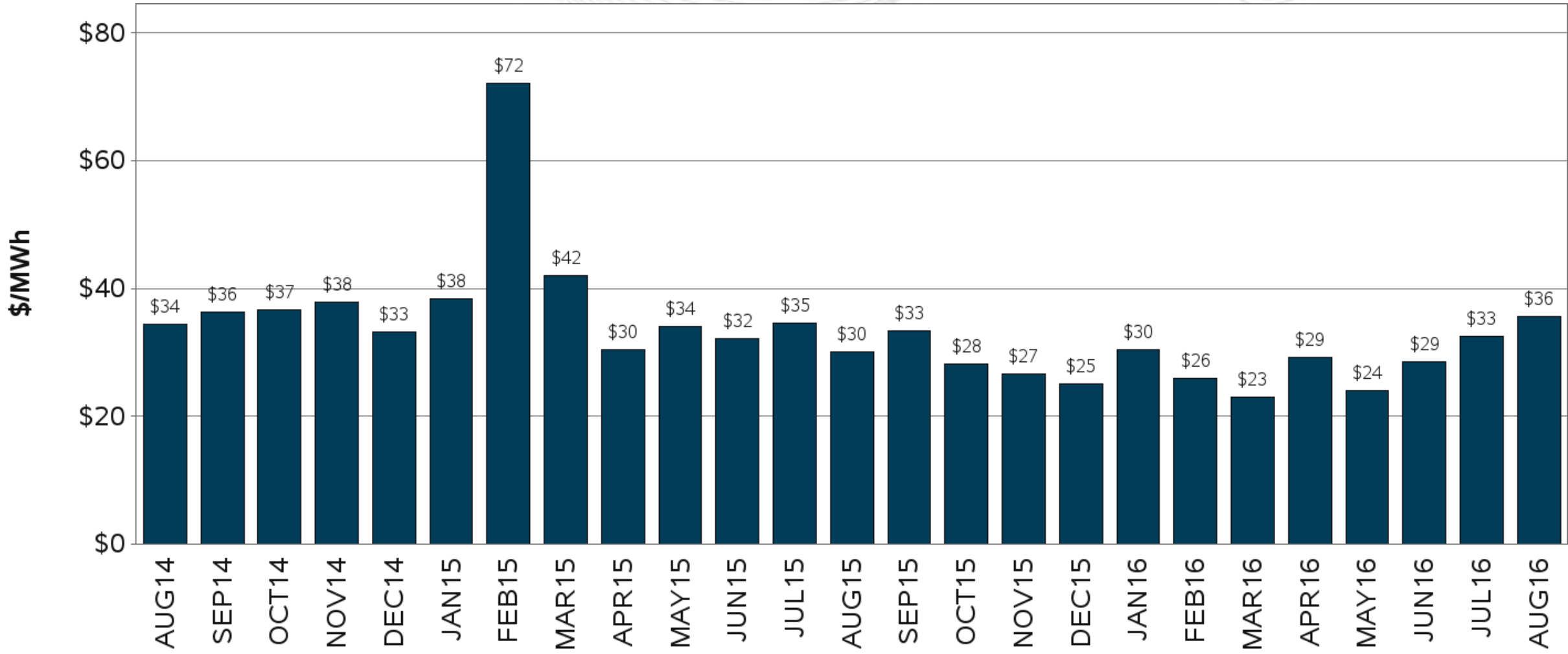
Reliability Balancing Operating Reserve Rates



Deviations Balancing Operating Reserve Rates

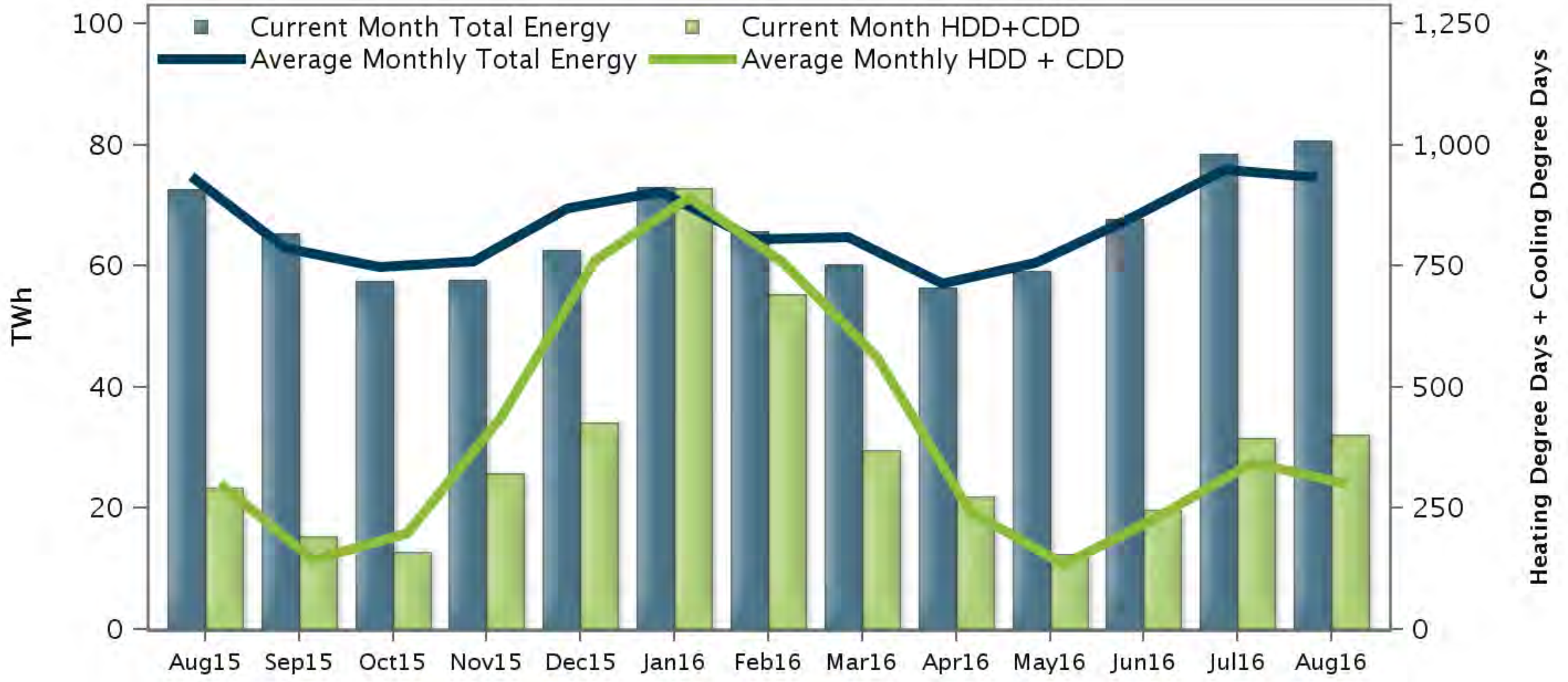


Energy Market LMP Summary



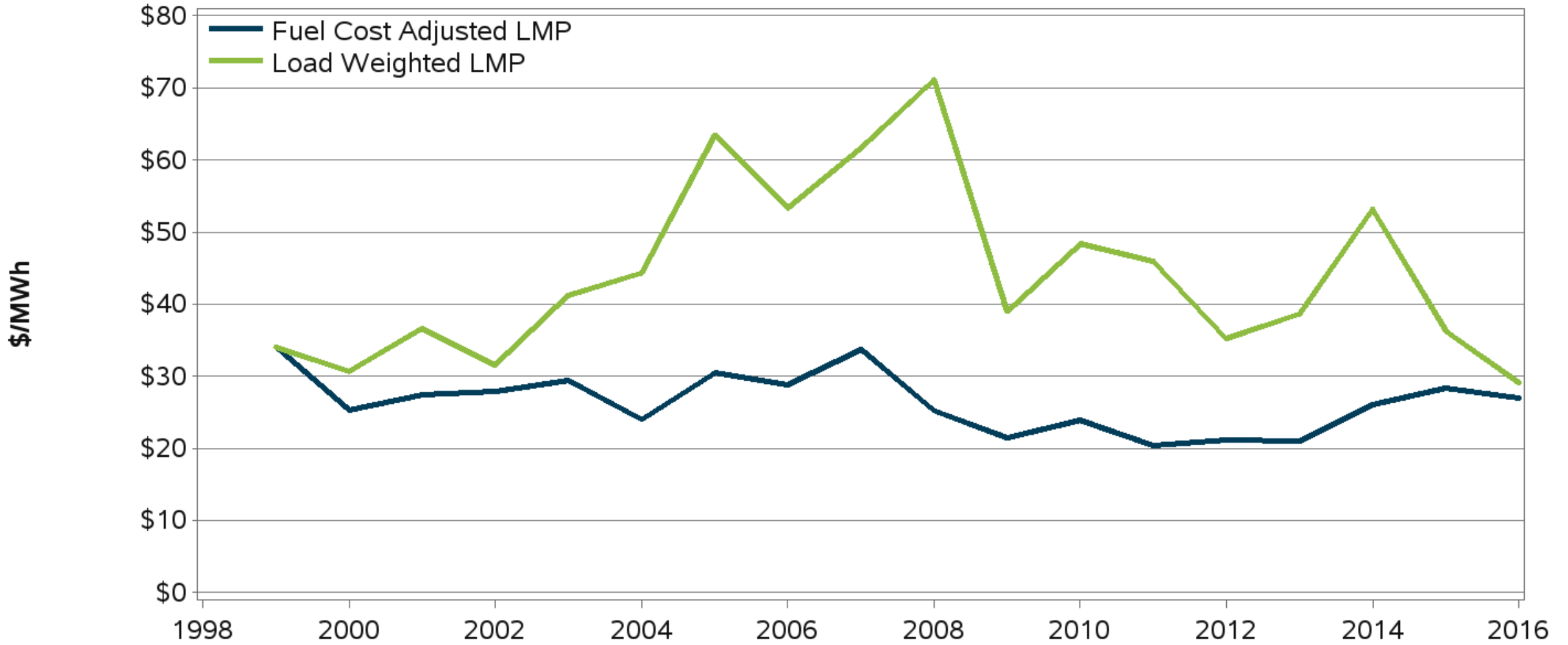
- The weather parameter shown in the following slide is a monthly sum of daily Heating Degree Days (HDD) and Cooling Degree Days (CDD).
- Degree days represent a deviation from a baseline temperature, in this case 60 degrees for HDD and 65 degrees for CDD. As temperatures get more extreme, colder or 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, 2013. Averages include load data for all of TO zones in the current RTO footprint.

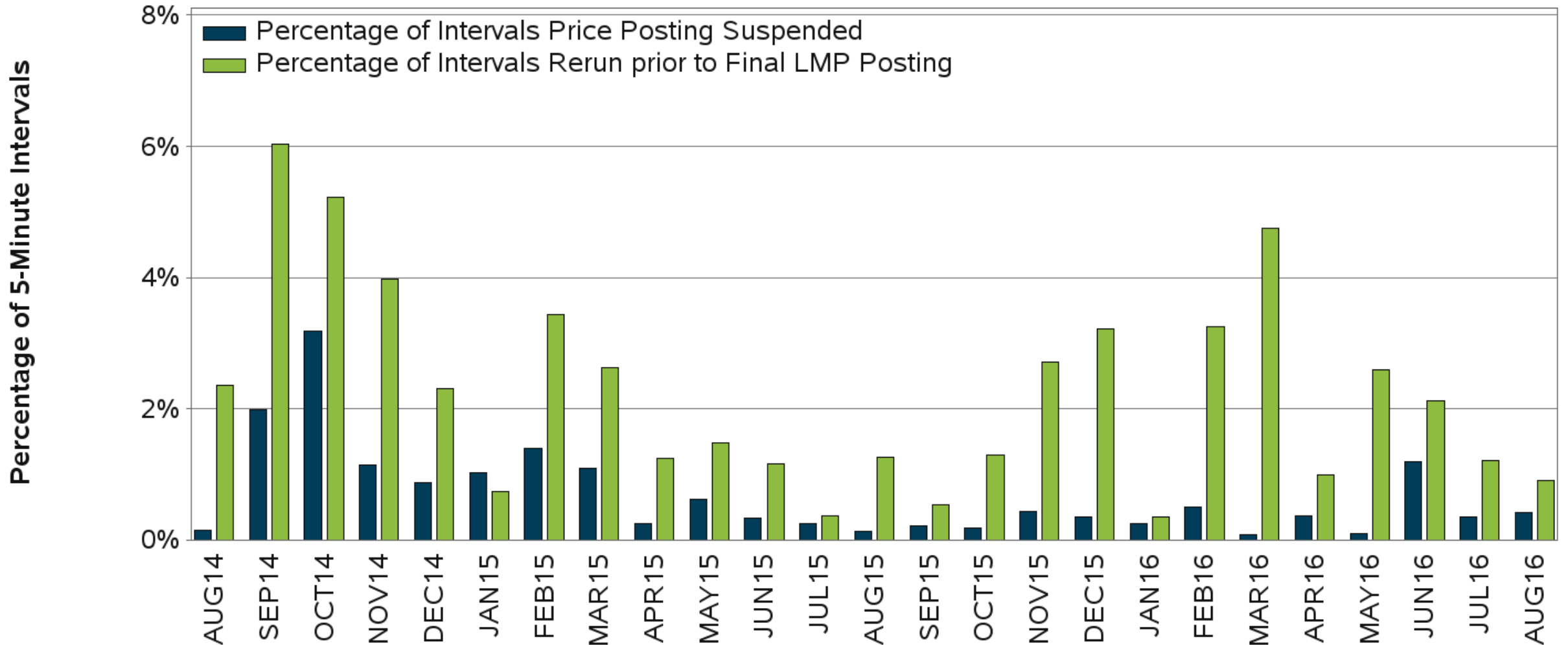
Historic Average Weather and Energy versus Current Month





Fuel Cost Adjusted LMP (Referenced to 1999 Fuel Prices)



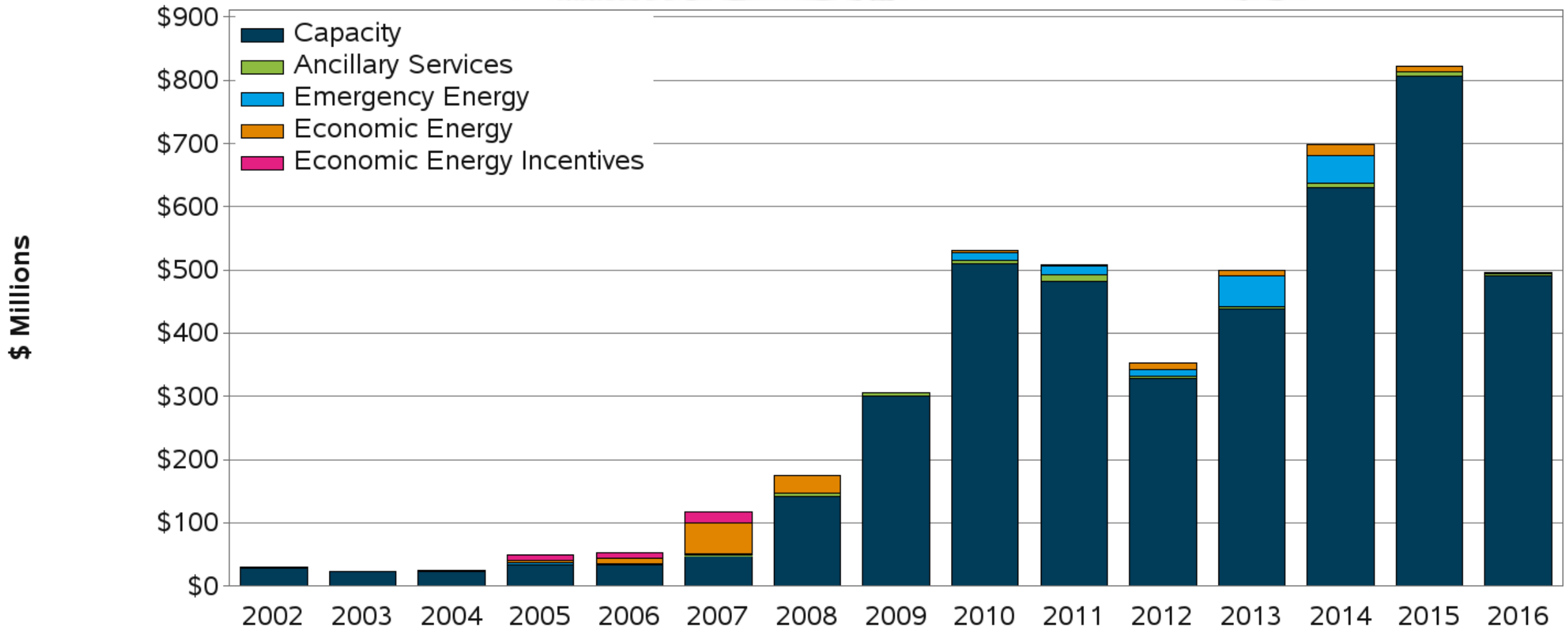


In September 2014 the method for calculating LMP re-run intervals was changed to only include intervals that actually impacted LMP.

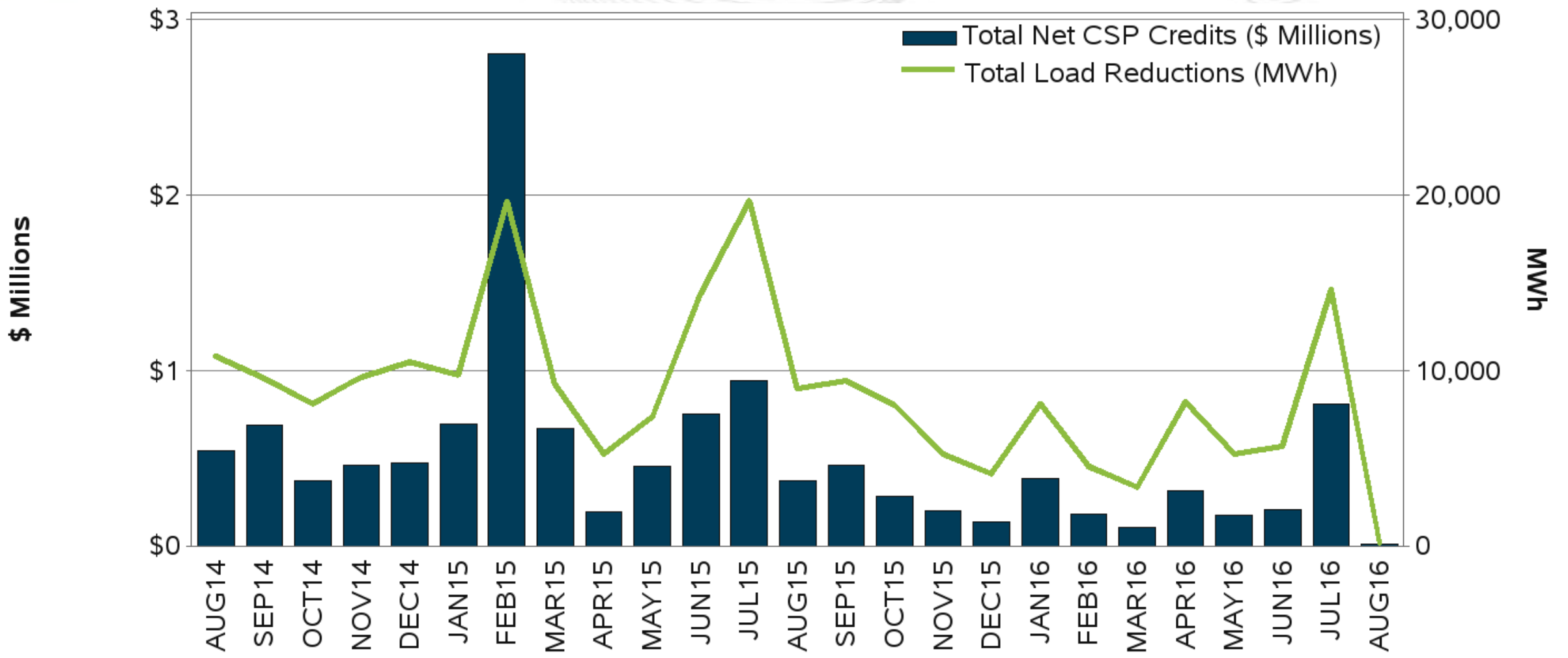
Energy Market

Demand Response Summary

Demand Side Response Estimated Revenue



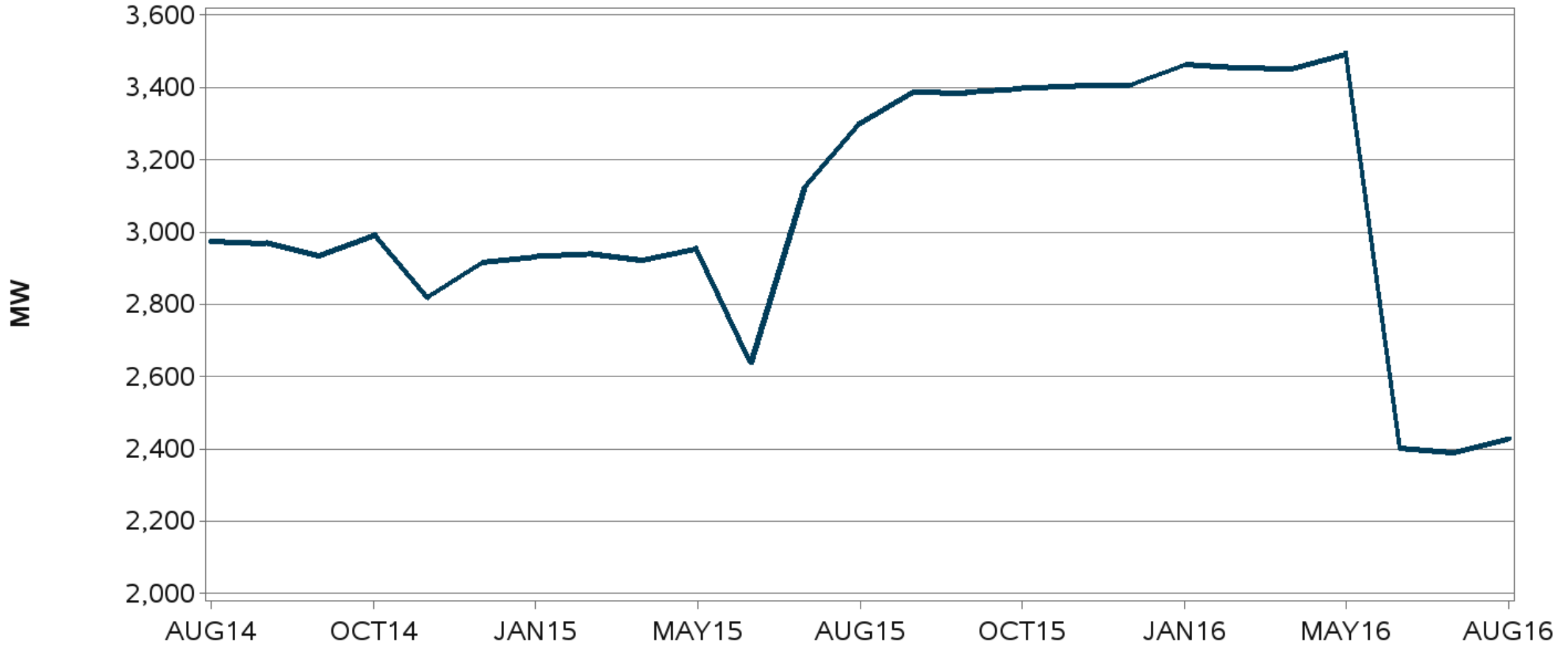
Capacity revenue prior to RPM implementation on 6-01-2007 estimated based on average daily ALM capacity credits and weighted average daily PJM capacity market clearing price.



*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

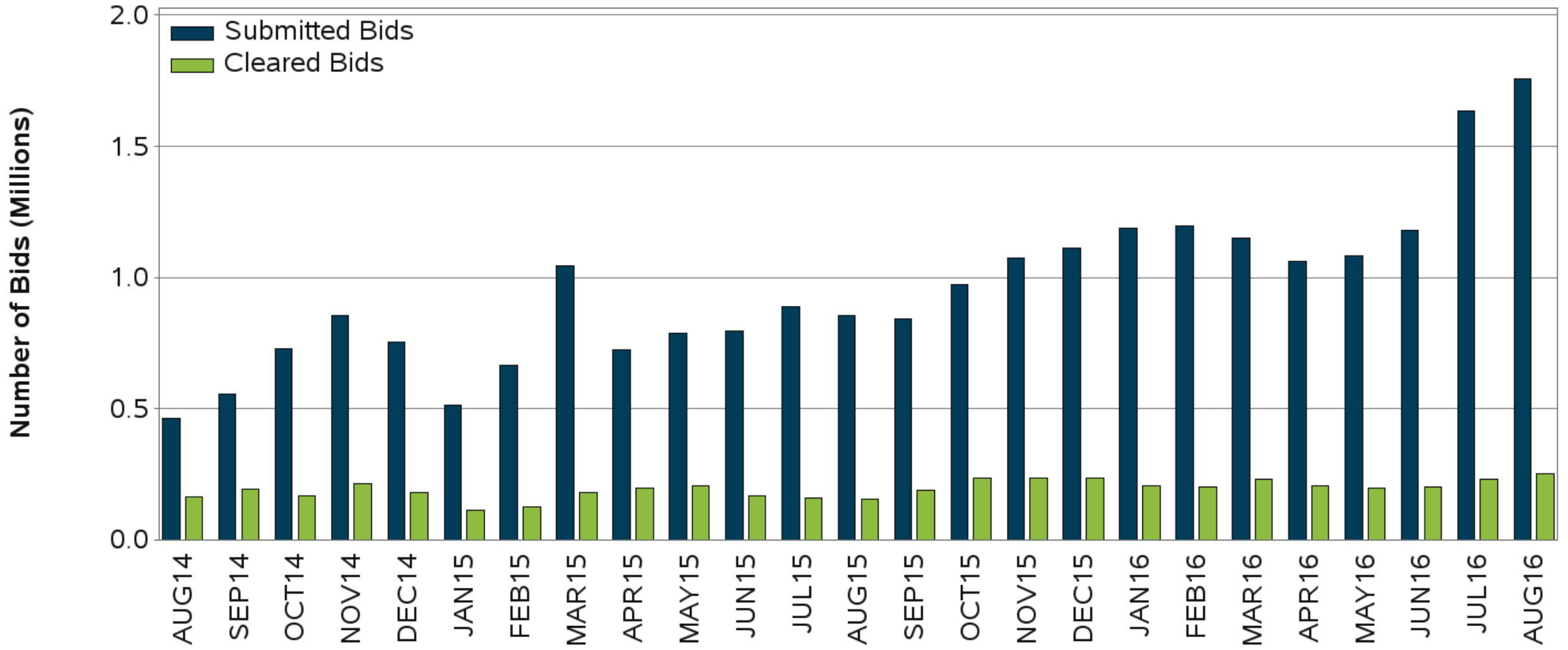


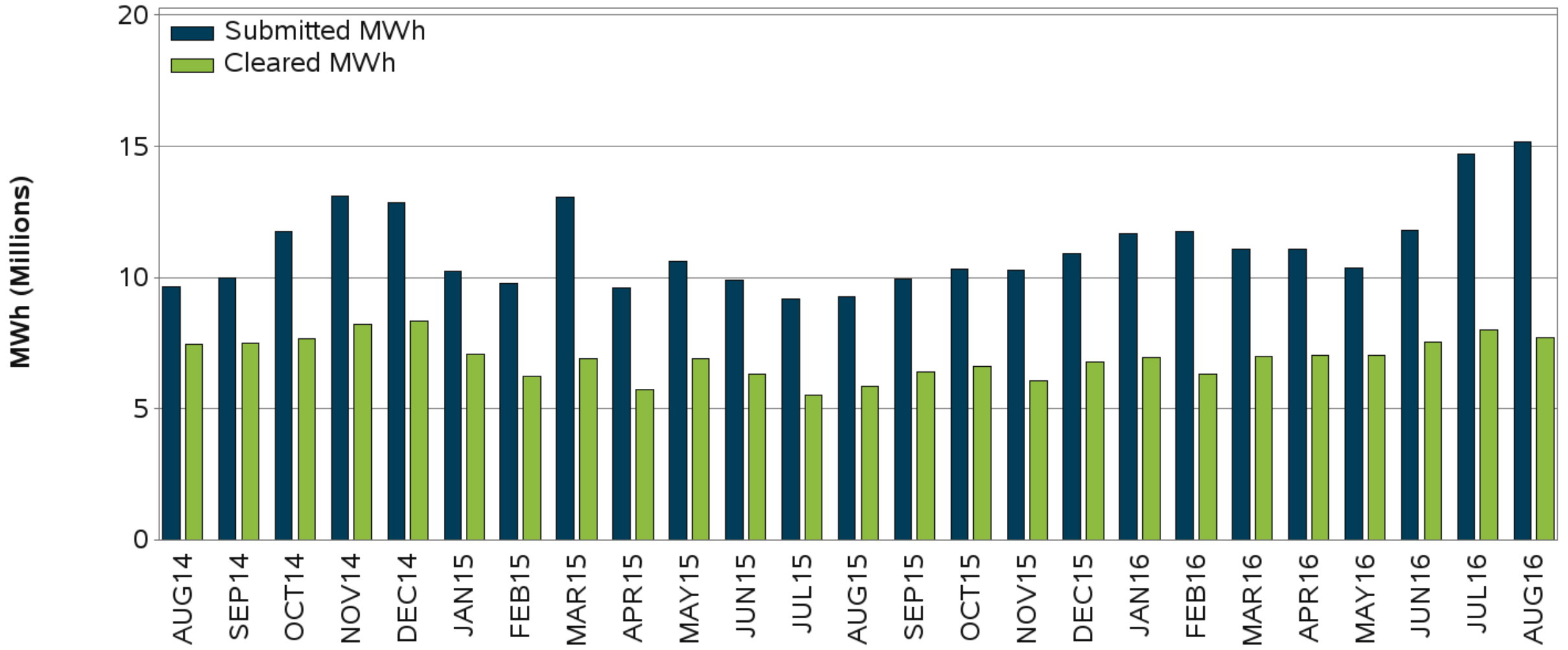
Energy Market

Virtual Activity Summary

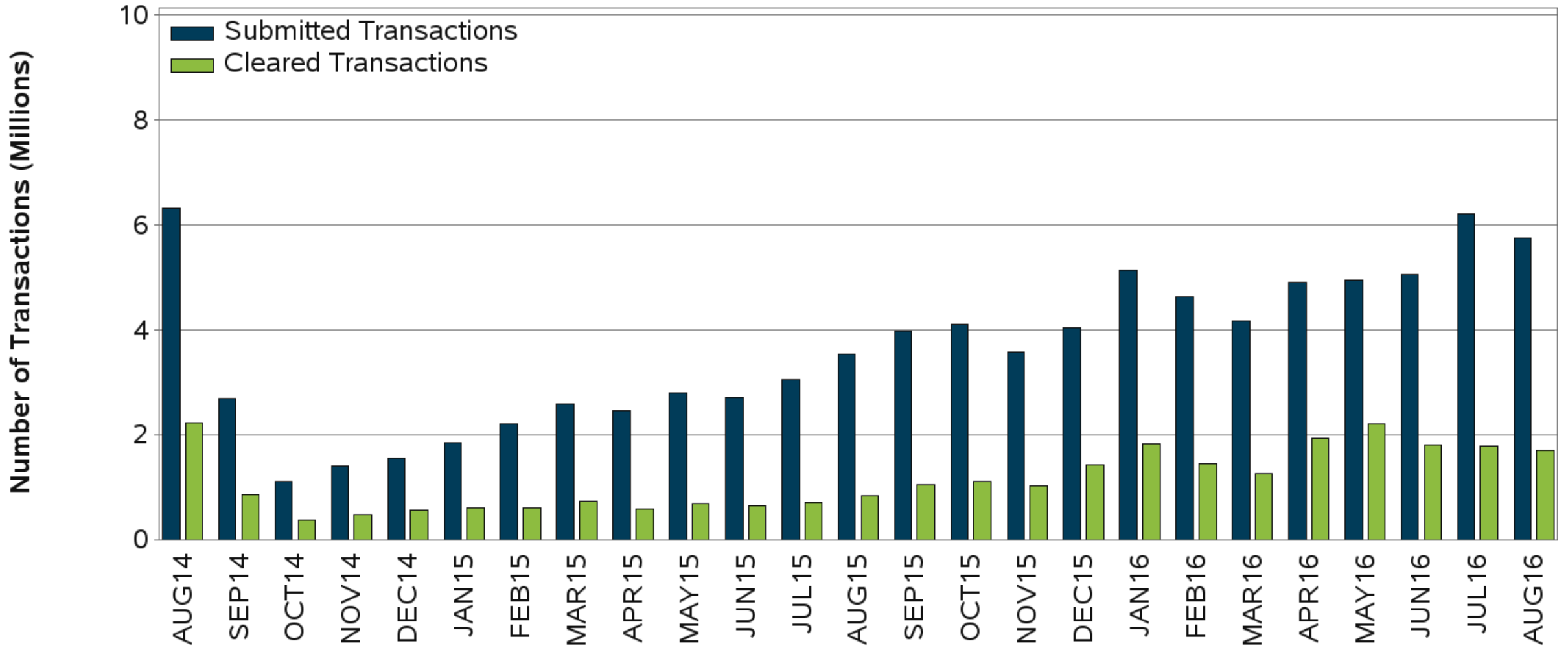
- The following six charts depict trends in submitted and cleared virtual and up-to-congestion transactions, in terms of number and volume, into the PJM Energy Market. The first two of these charts show the submitted and cleared increment and decrement bids (virtual transactions or virtuals) and they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

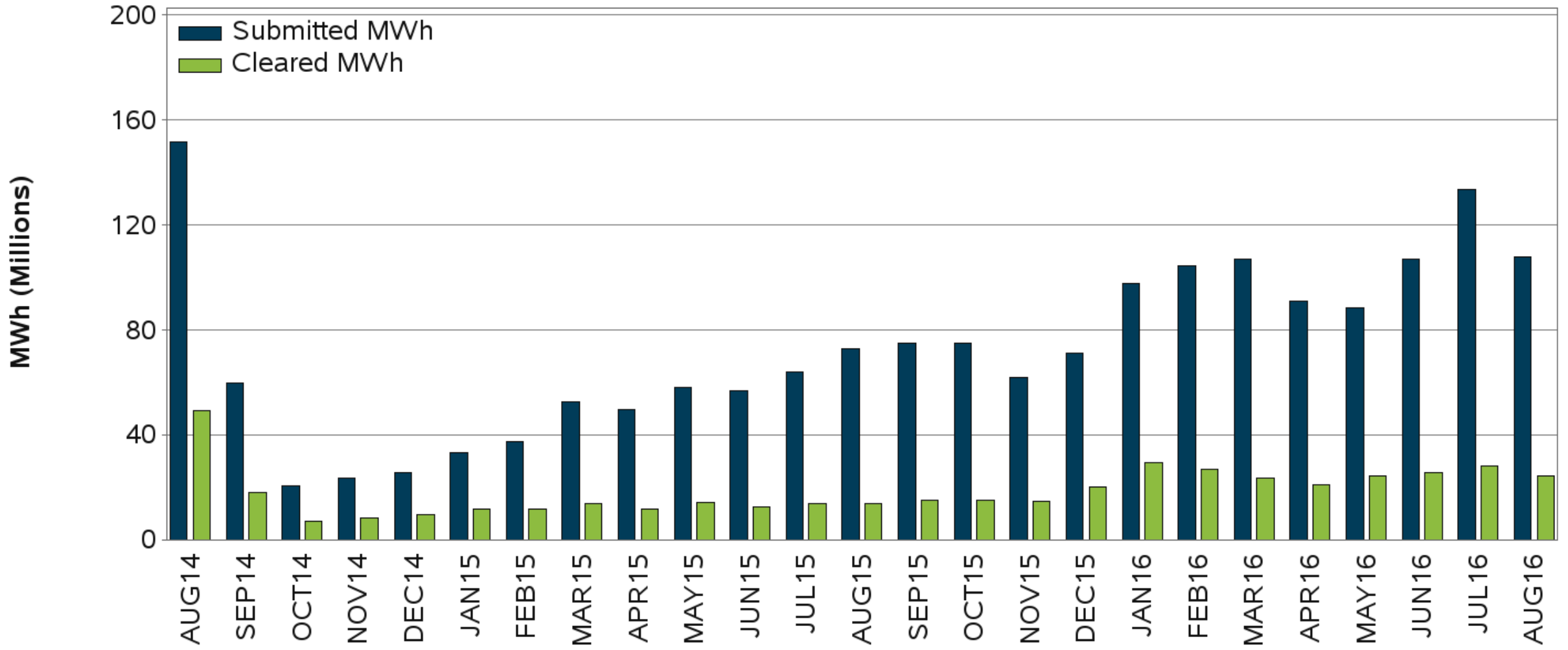




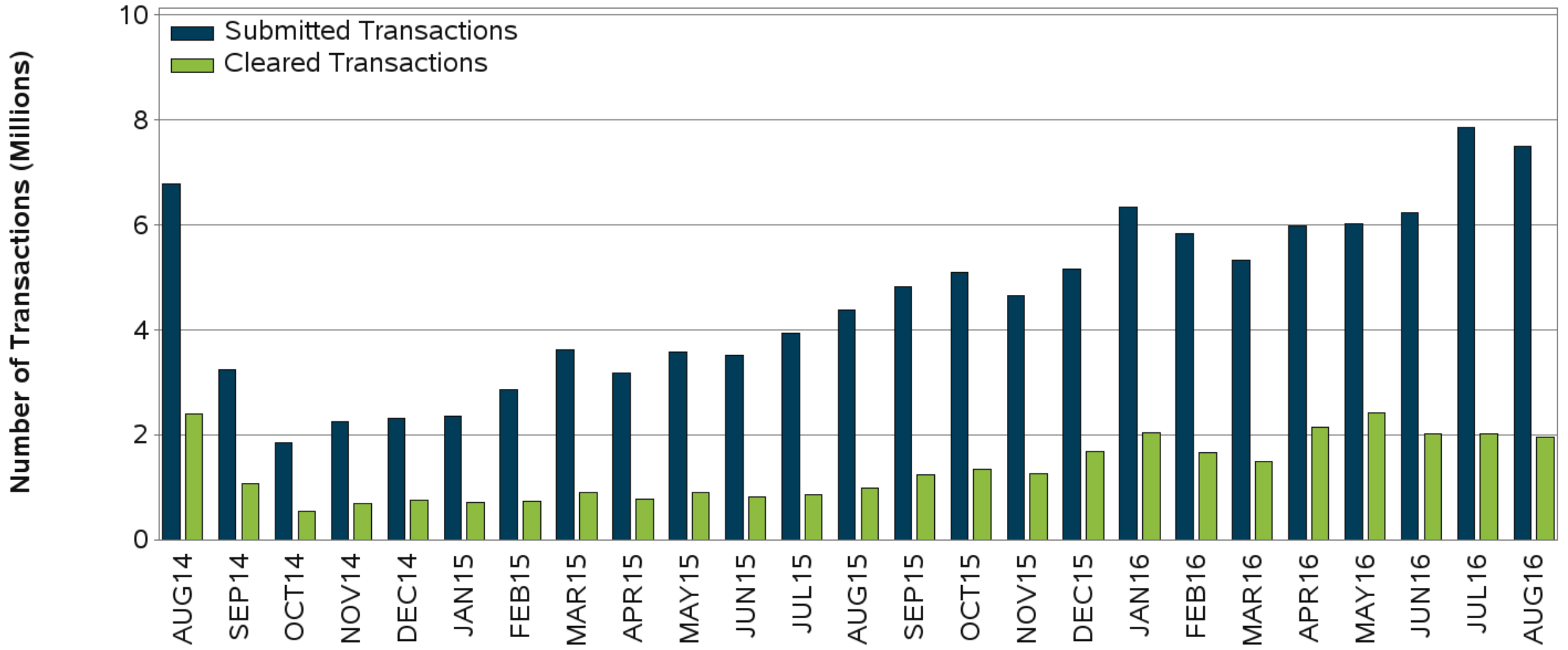
Up-To-Congestion Transactions - Total Number



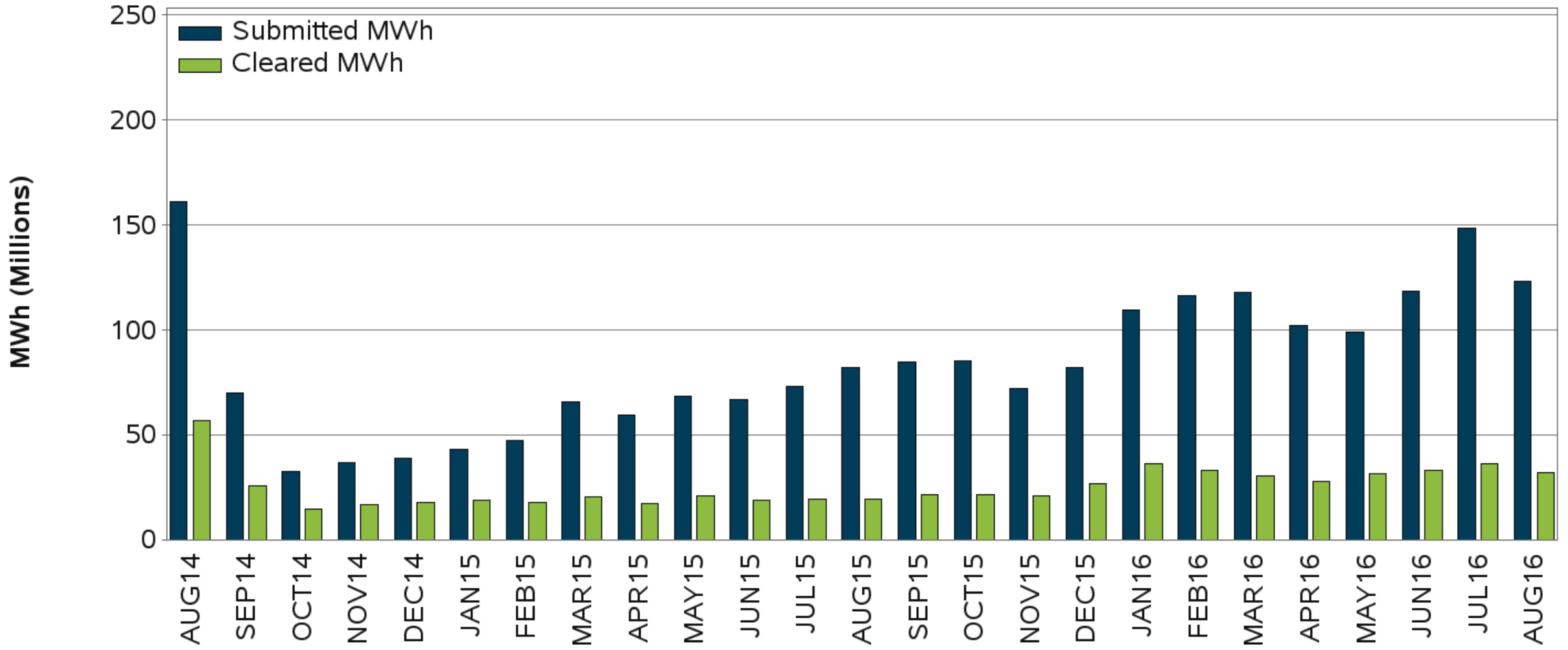
Up-To-Congestion Transactions - Total Volume



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



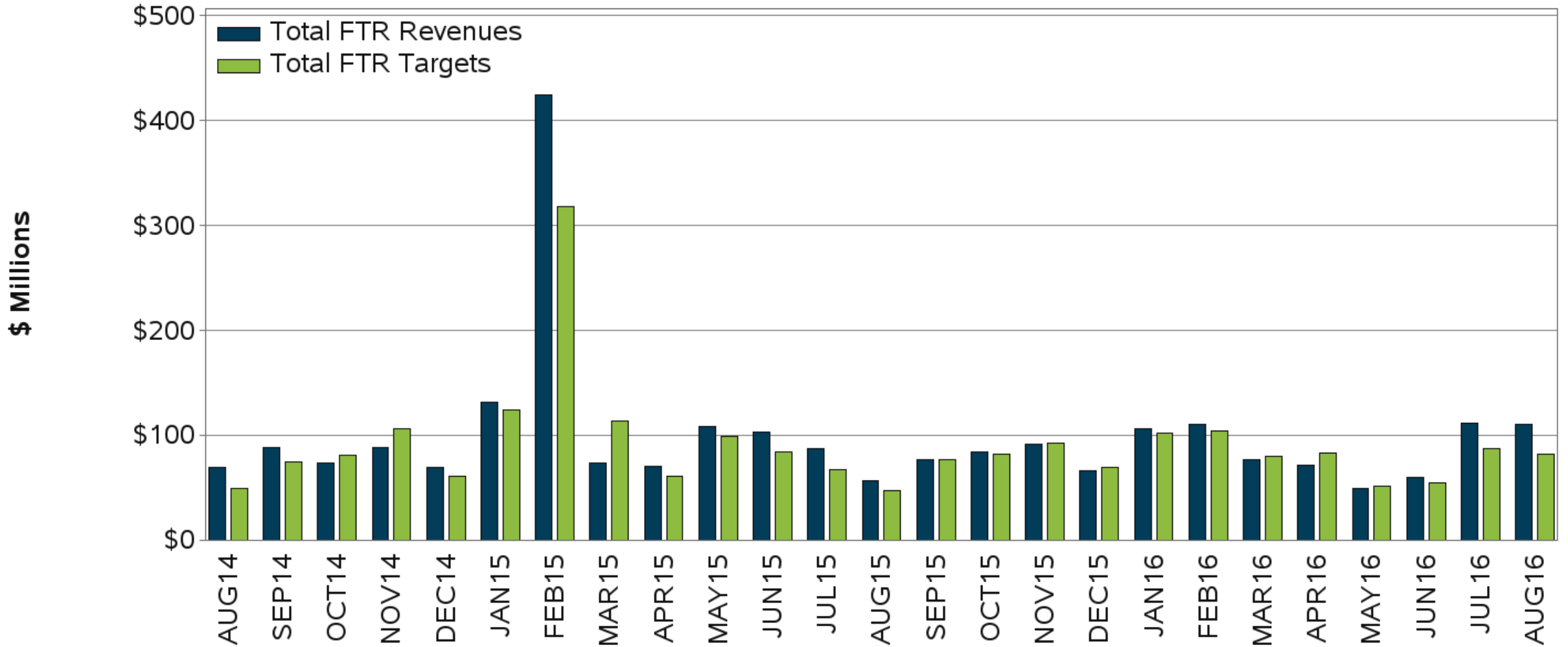
INCs, DECs and Up-To-Congestion Transactions - Total Volume

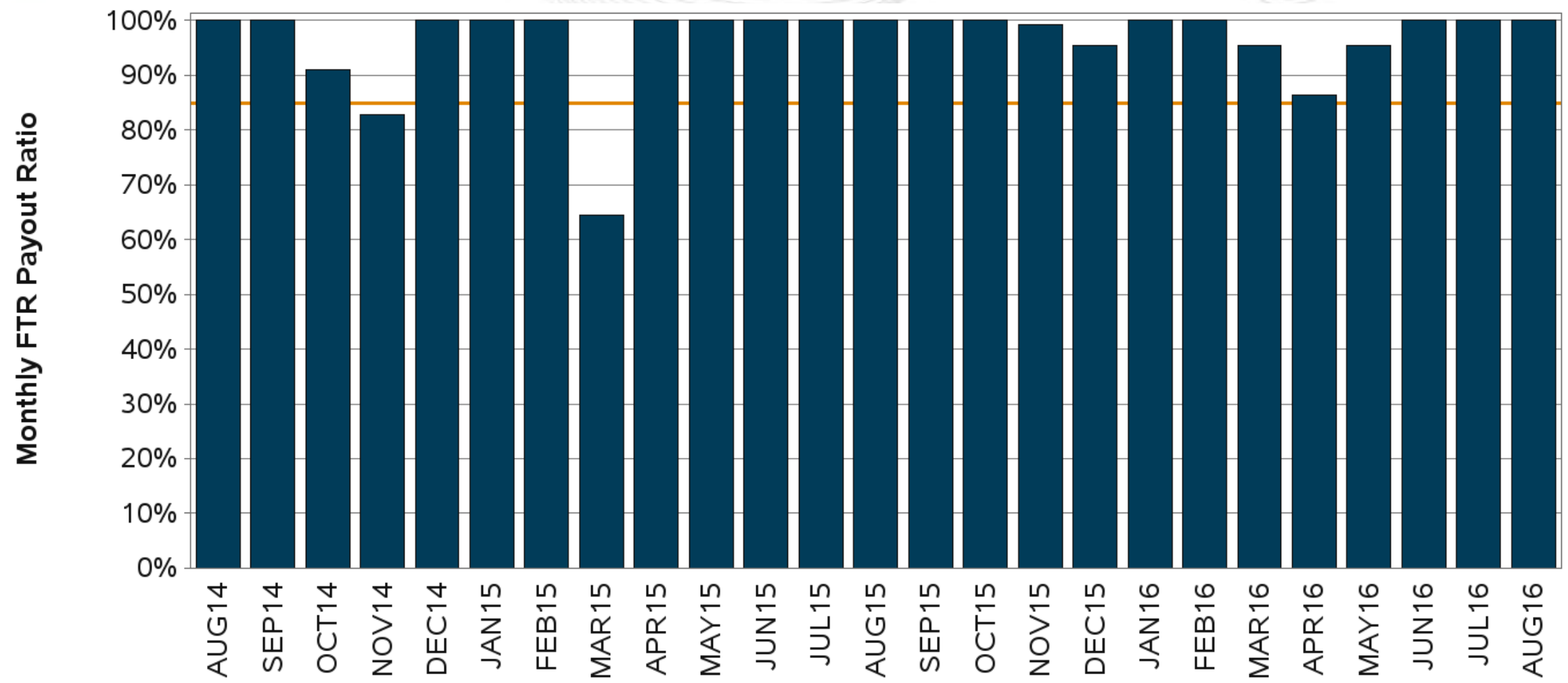


Energy Market

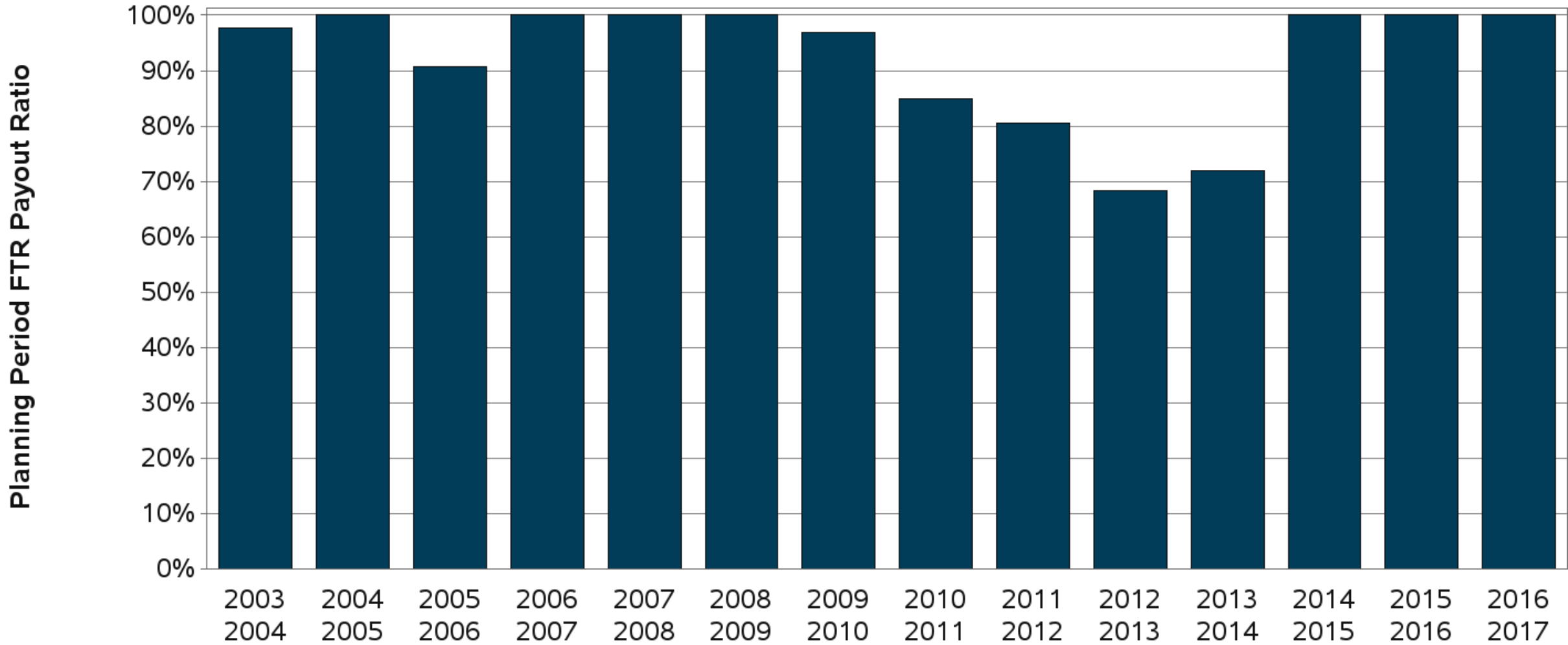
Congestion and FTR Summary

FTR Revenue vs. FTR Target Allocation



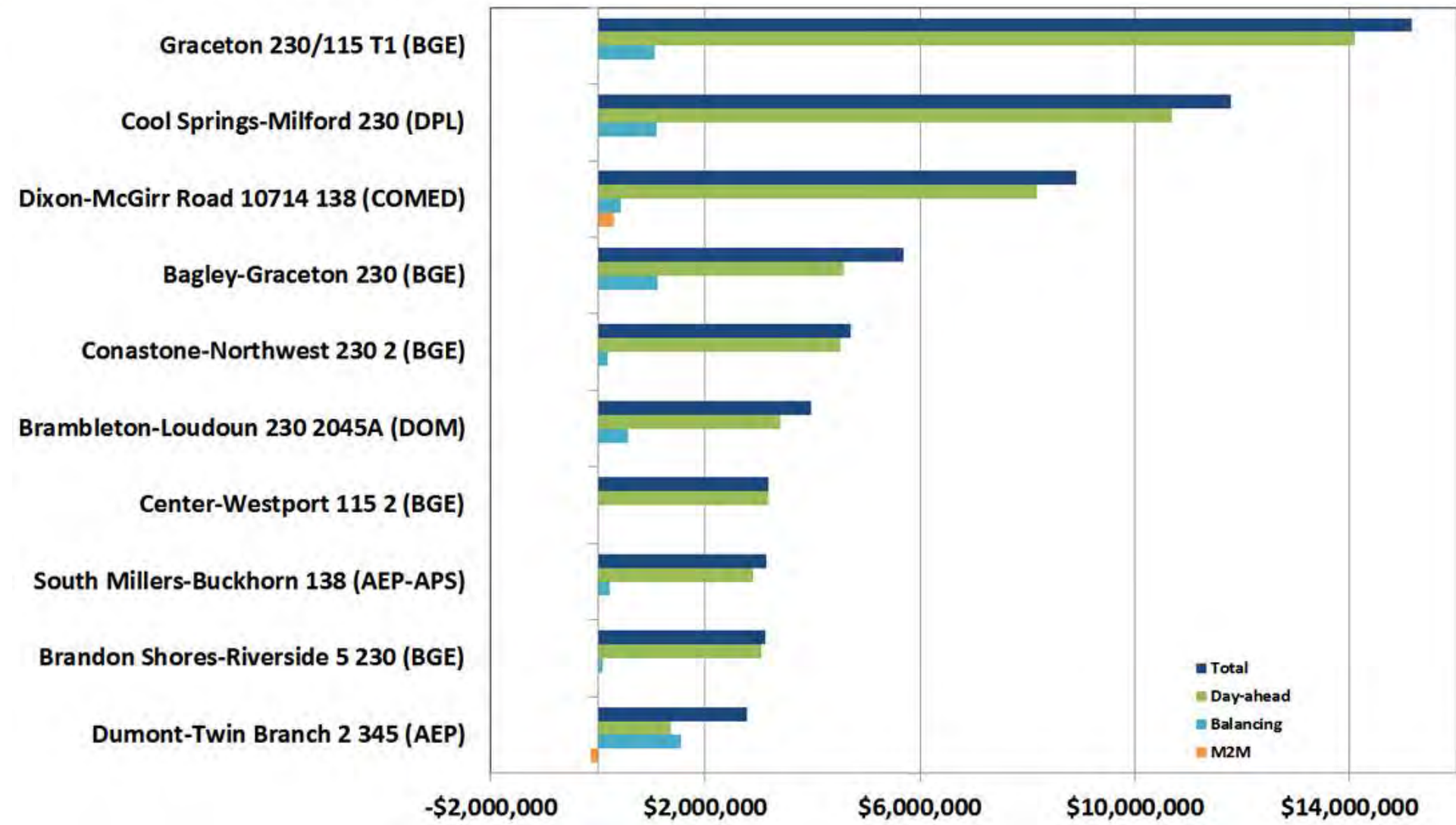


| Period | Surplus / Underfunding | Payout Ratio |
|--------------|------------------------|--------------|
| August, 2016 | \$28,222,775 | 100% |
| 2016 | \$52,449,818 | 100% |
| 2016/2017 | \$57,690,257 | 100% |





Ten Most Heavily Congested Transmission Facilities - Overall, August

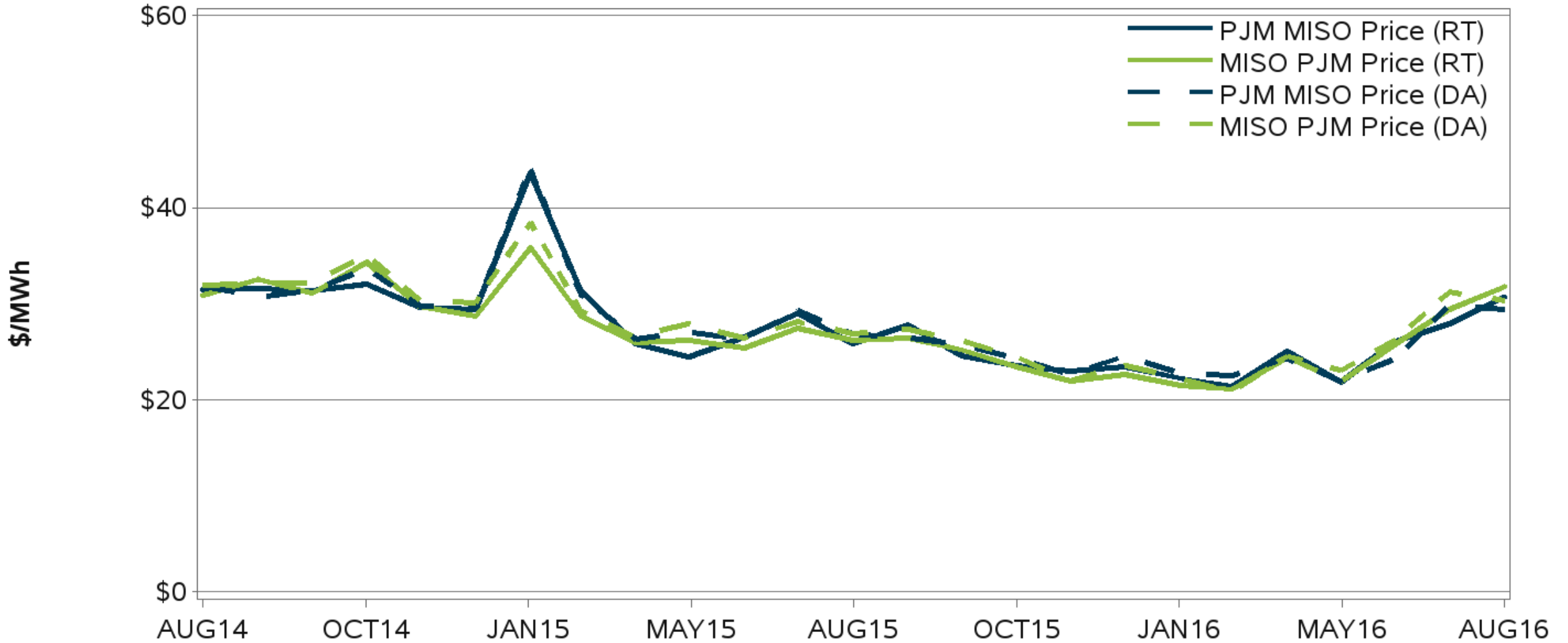


Energy Market

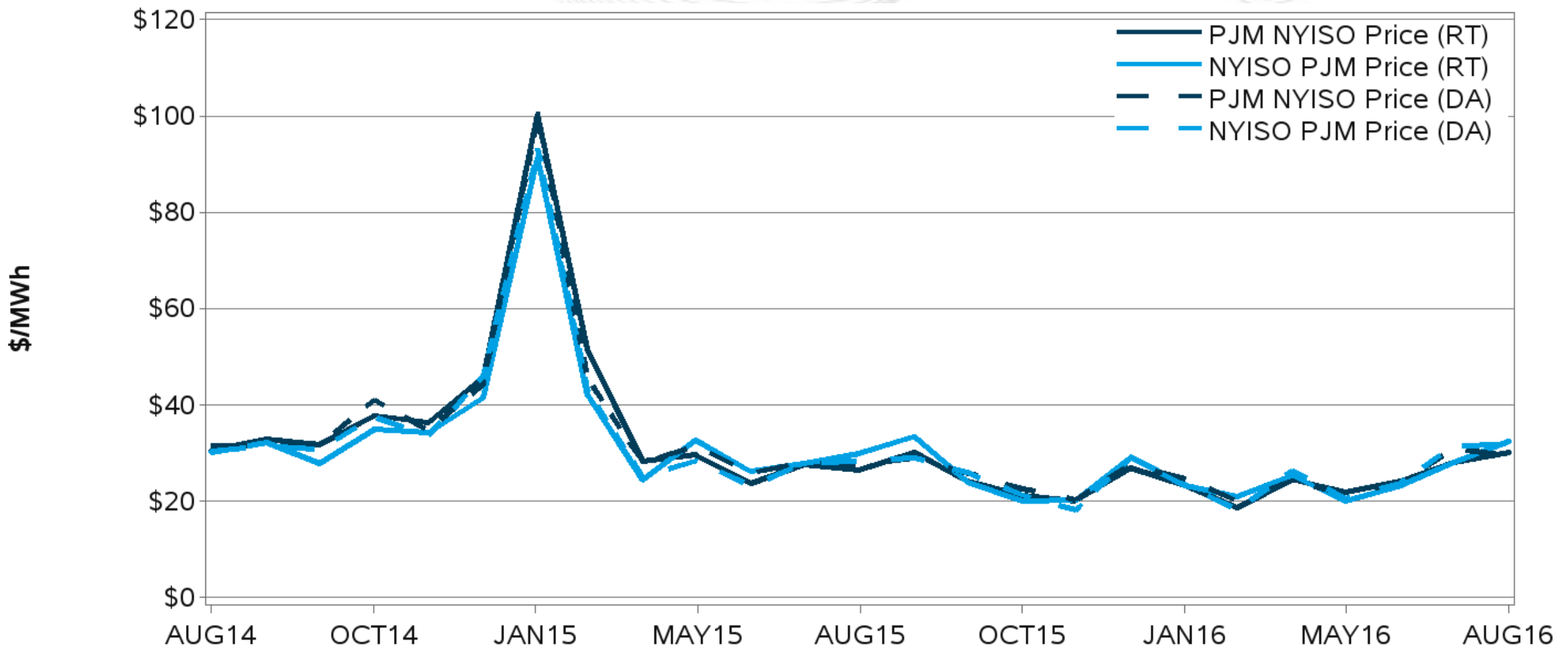
Interchange/Seams Summary



Monthly Average MISO Interface Pricing

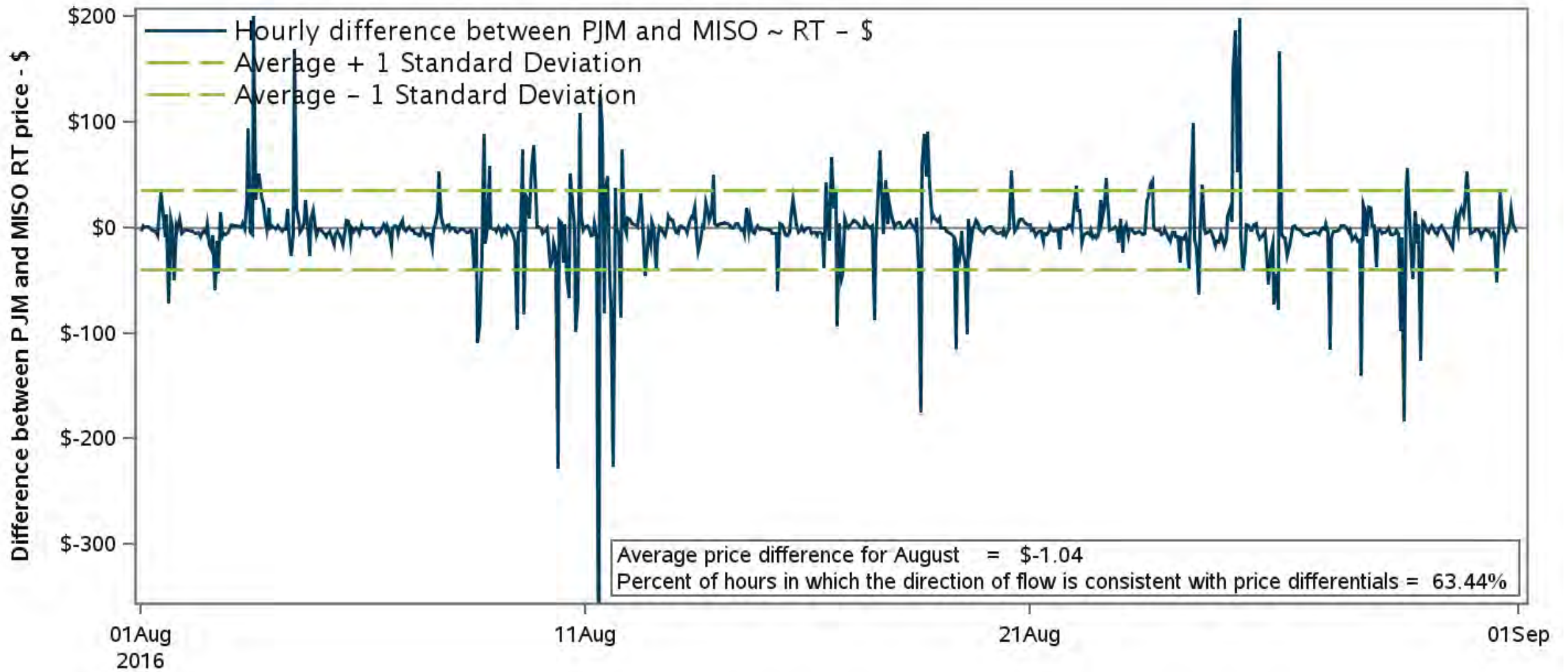


Monthly Average NYISO Interface Pricing





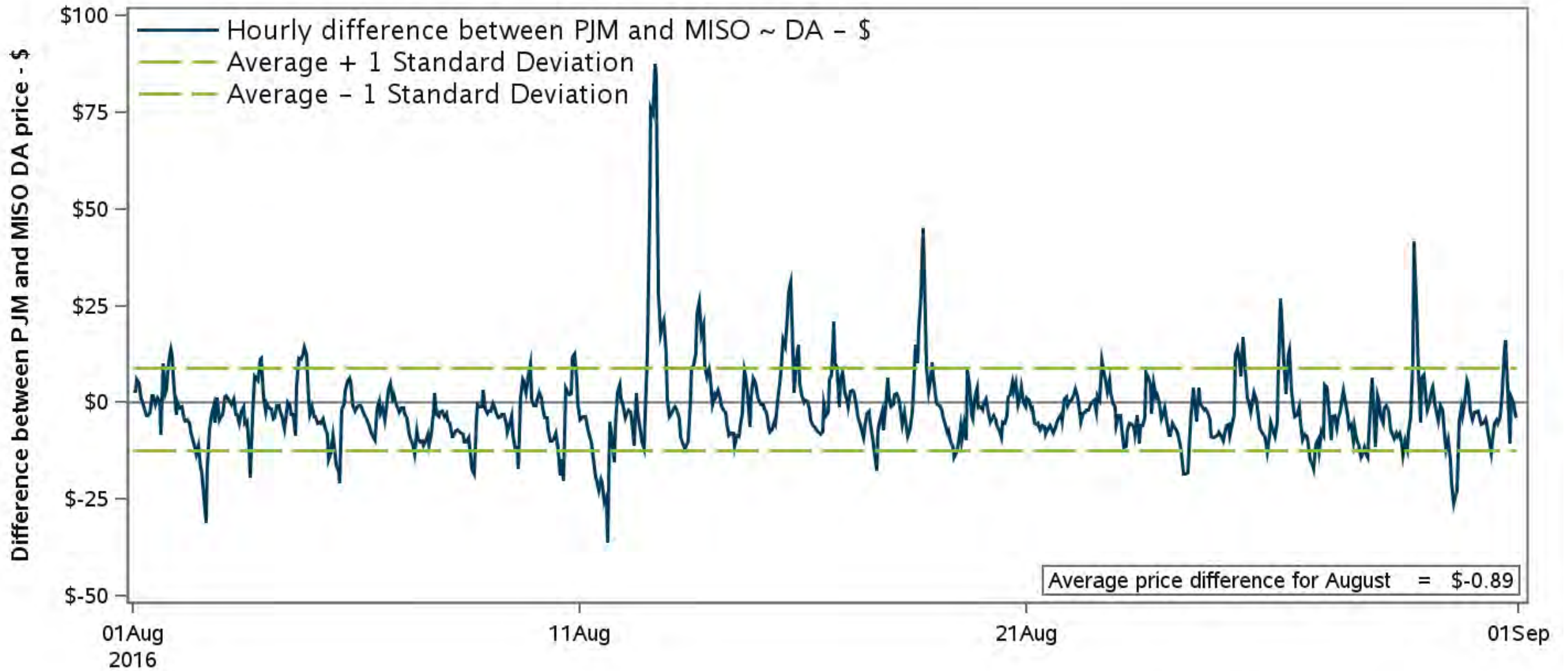
Hourly Difference Between PJM and MISO Real-Time Prices



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



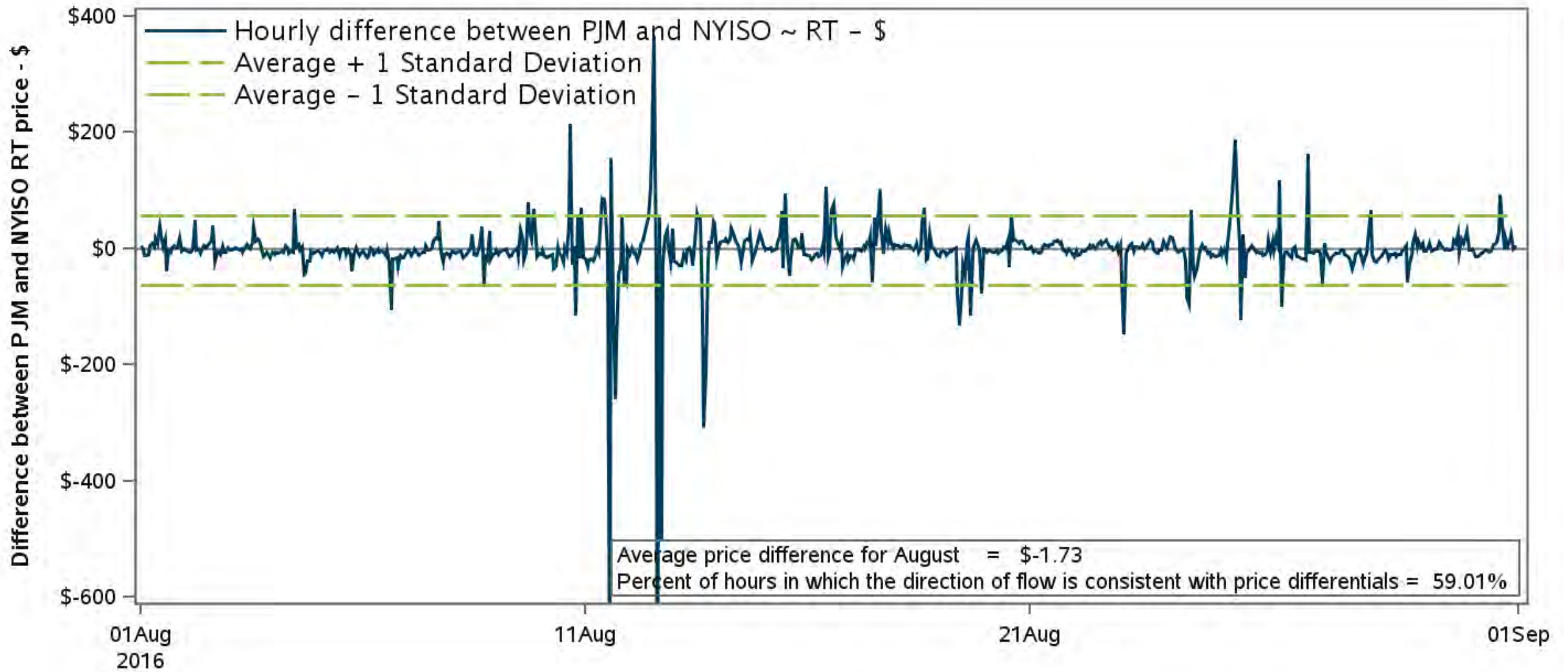
Hourly Difference Between PJM and MISO Day-Ahead Prices



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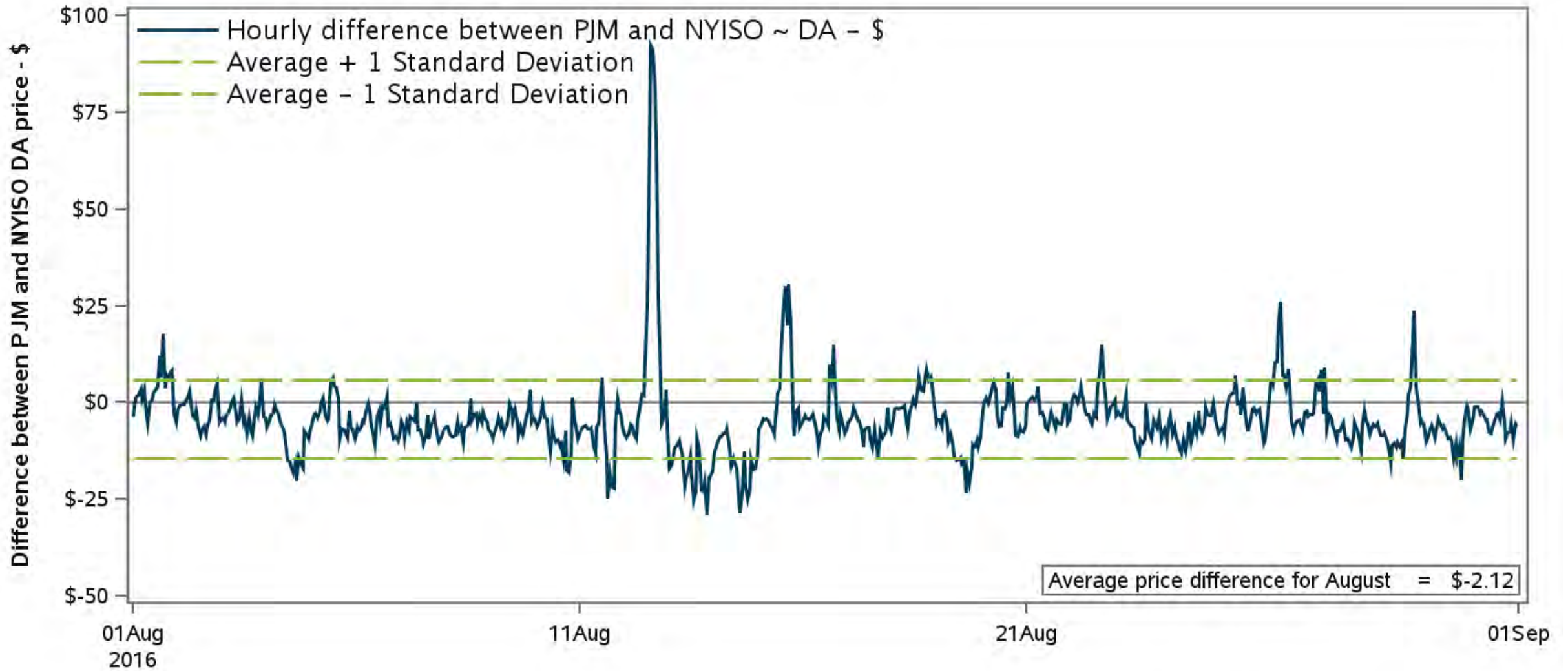
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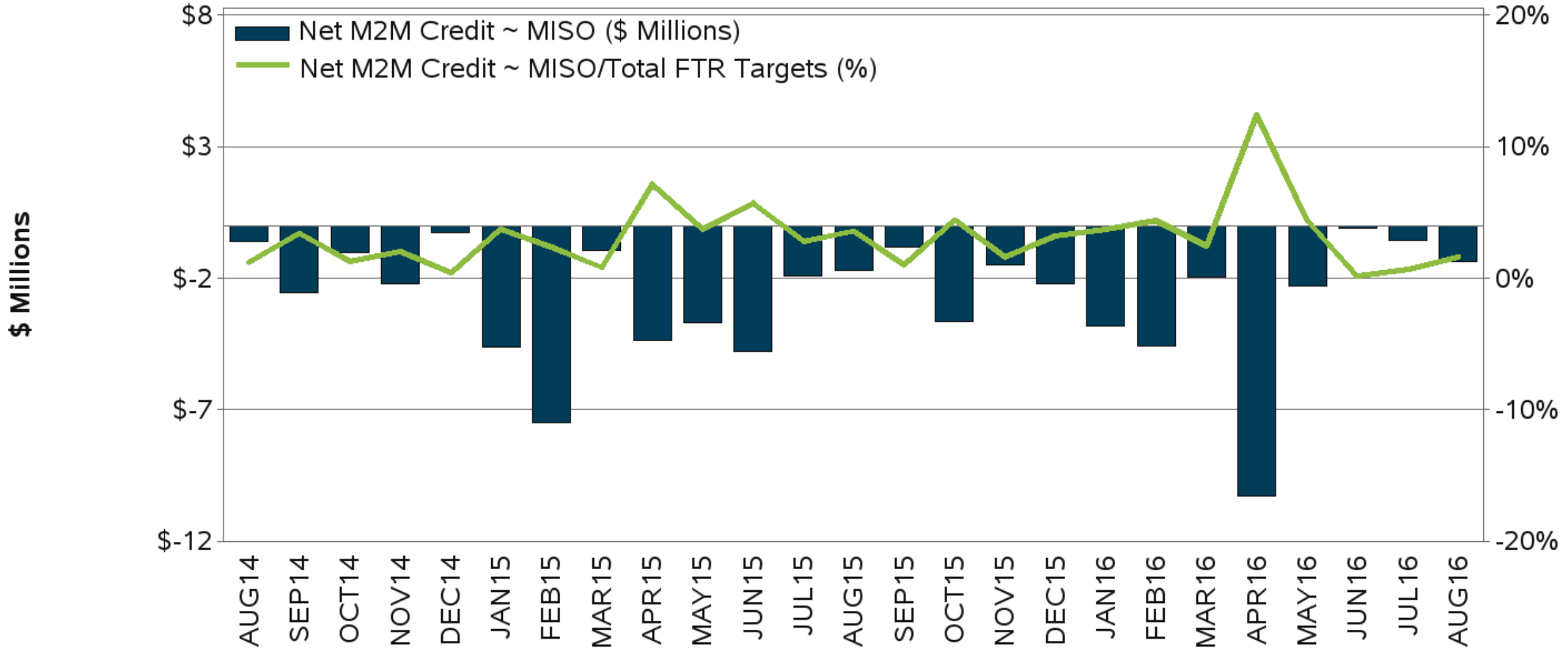
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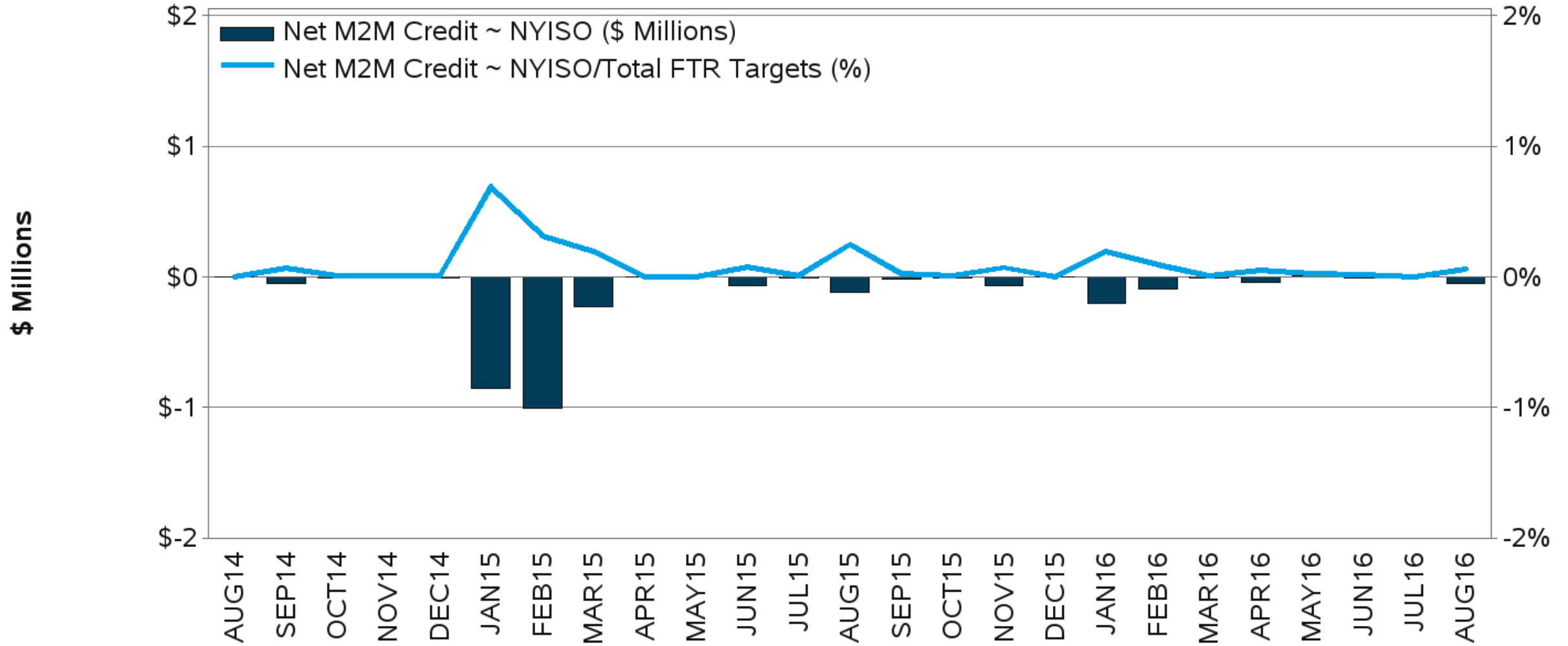
PJM-MISO Market-to-Market Coordination Settlement



Negative M2M Credit represents PJM payment to MISO



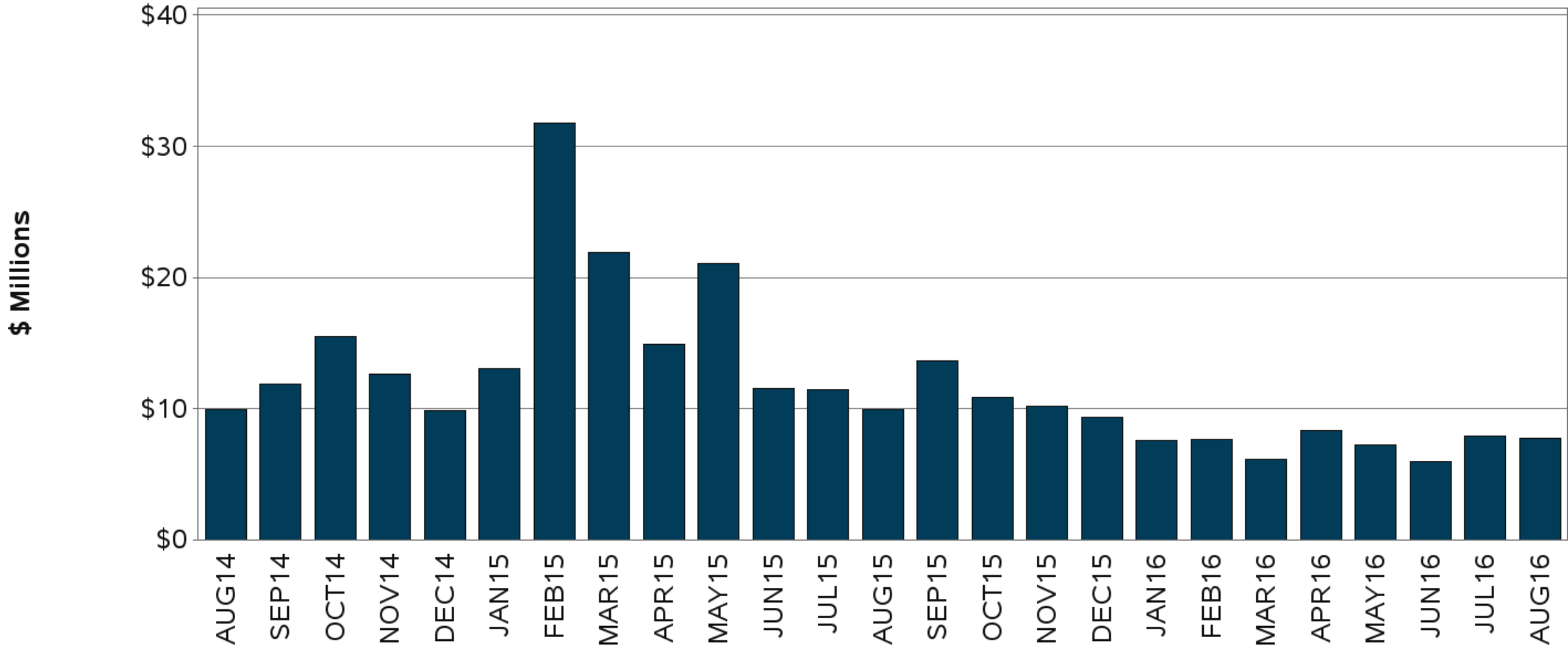
PJM-NYISO Market-to-Market Coordination Settlement



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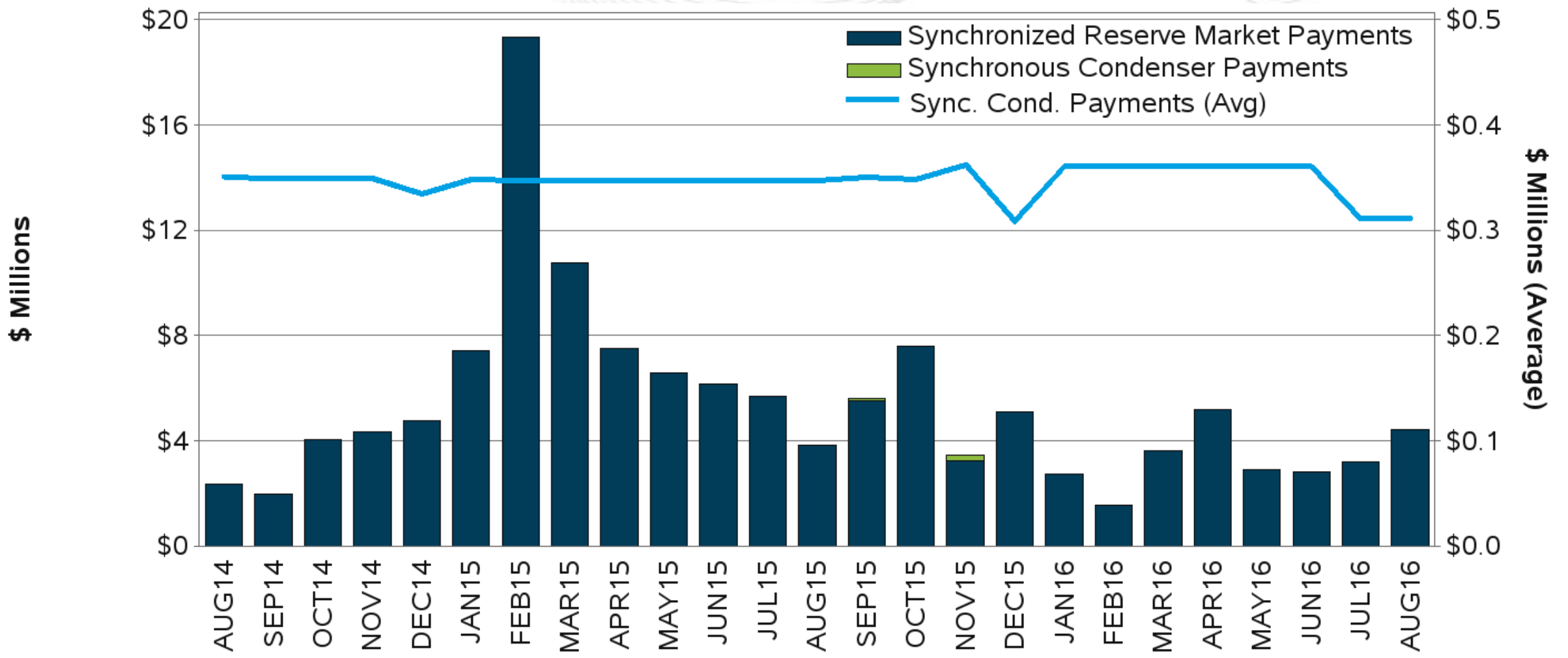
Ancillary Service Market

Summary





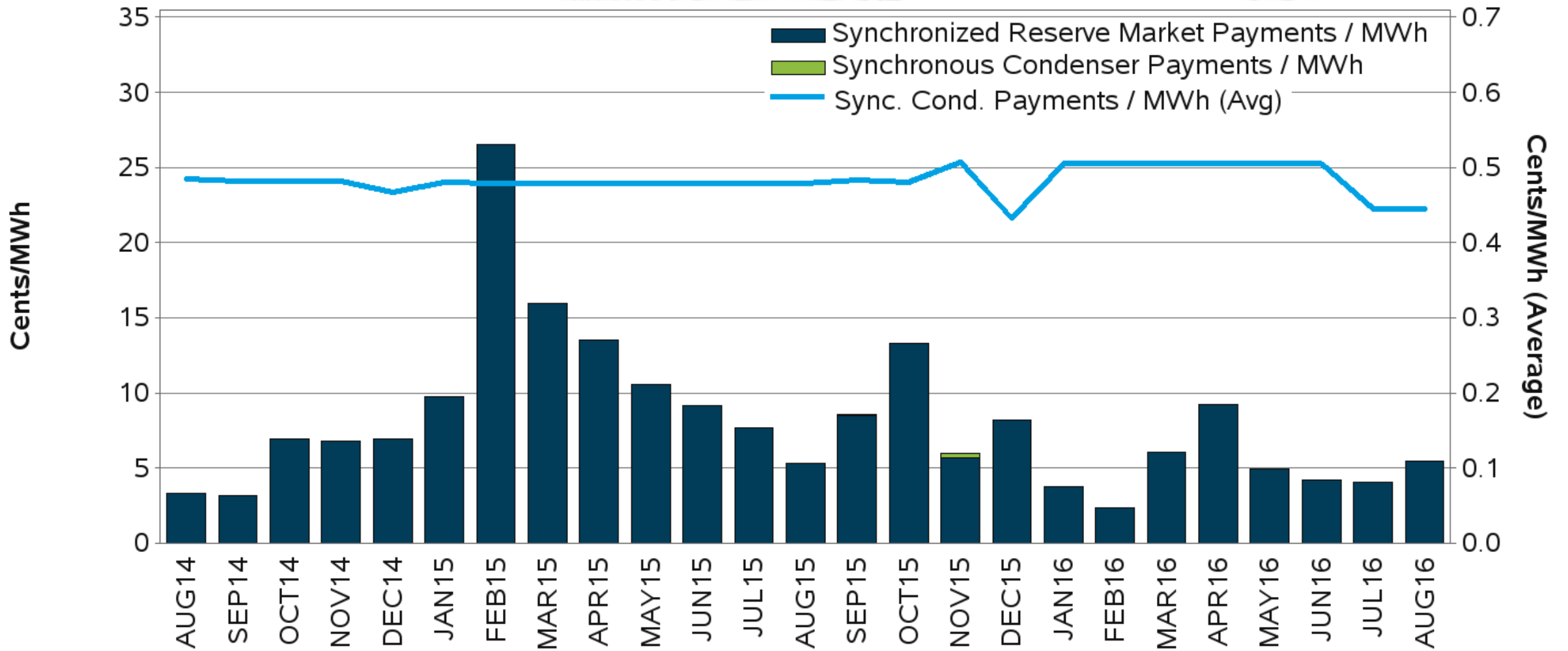
Synchronized Reserve and Synchronous Condenser Costs



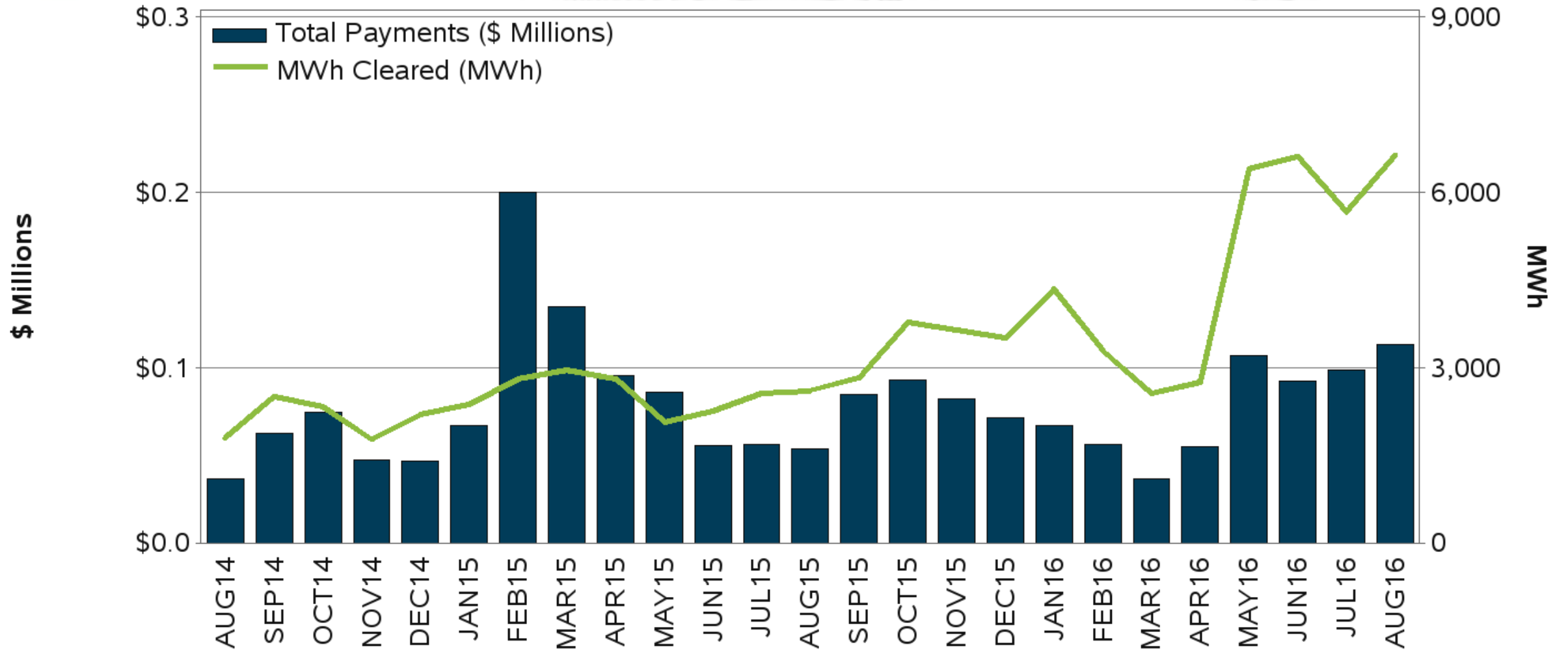
Average Synchronous Condenser Payments equals the 36-month rolling average plus one standard deviation.



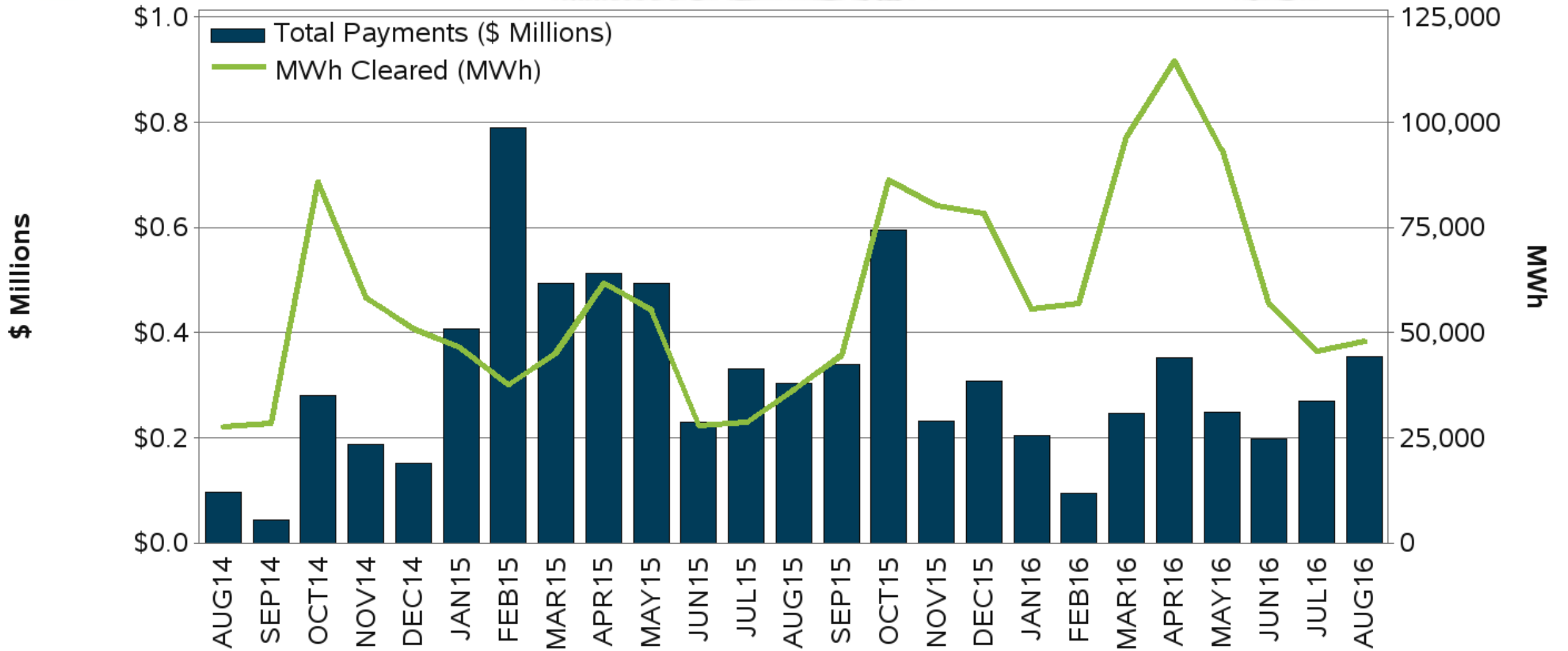
Load-Adjusted Synchronized Reserve and Synchronous Condenser Costs

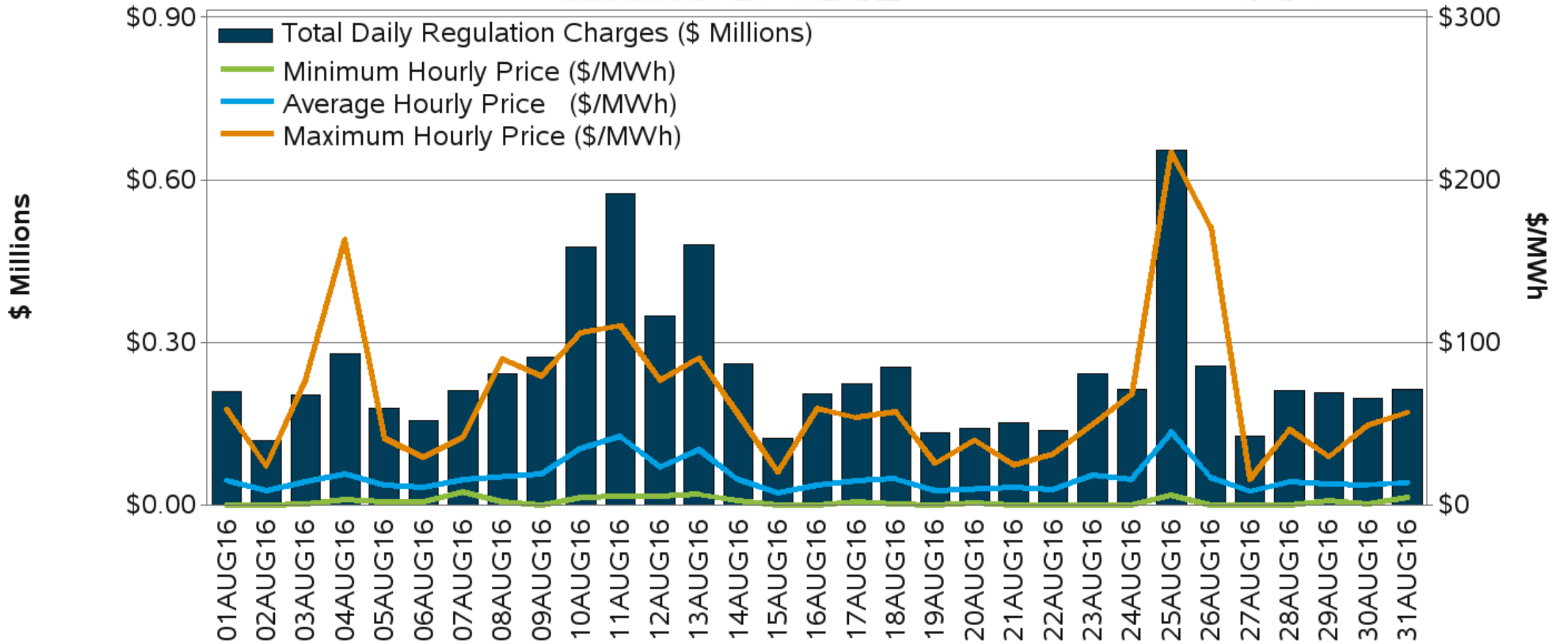


Average Synchronous Condenser Payments equals the 36-month rolling average plus one standard deviation.



DR Participation in PJM Synchronized Reserve Markets





Synchronized Reserve Market Daily Prices and Charges

