Operations Report

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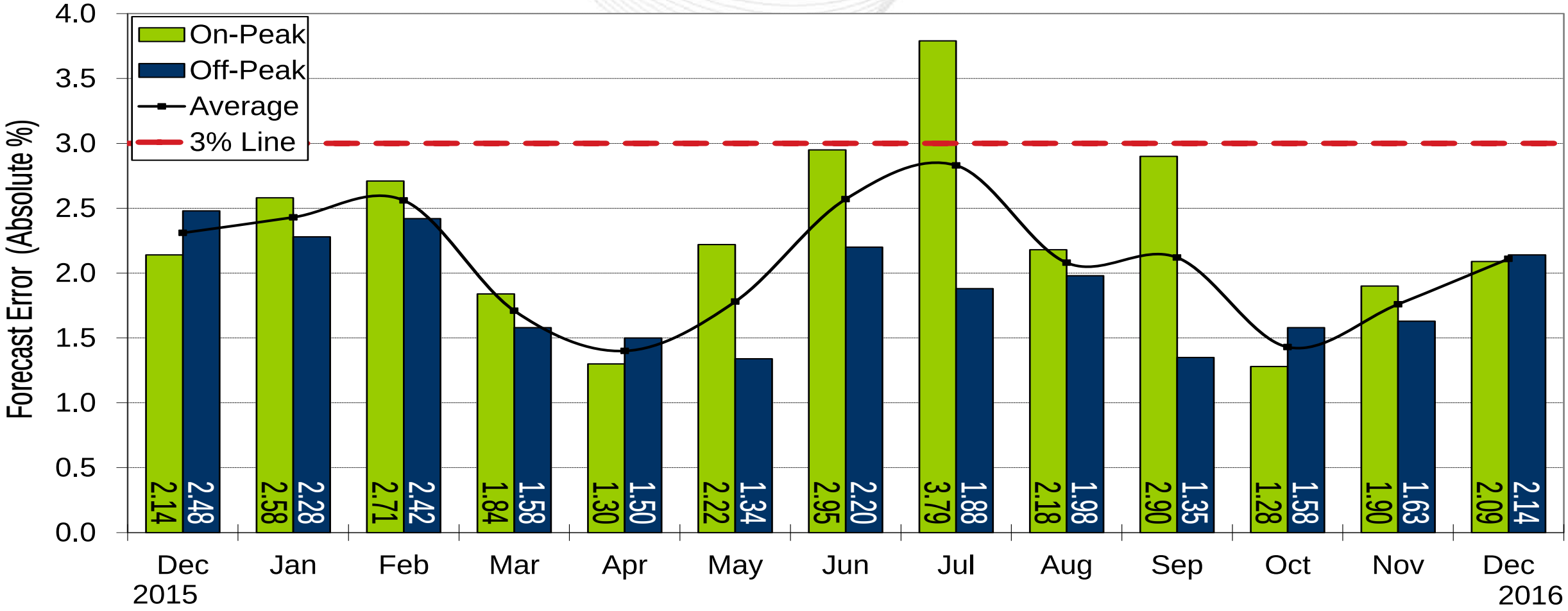
Members Committee

January 23, 2017

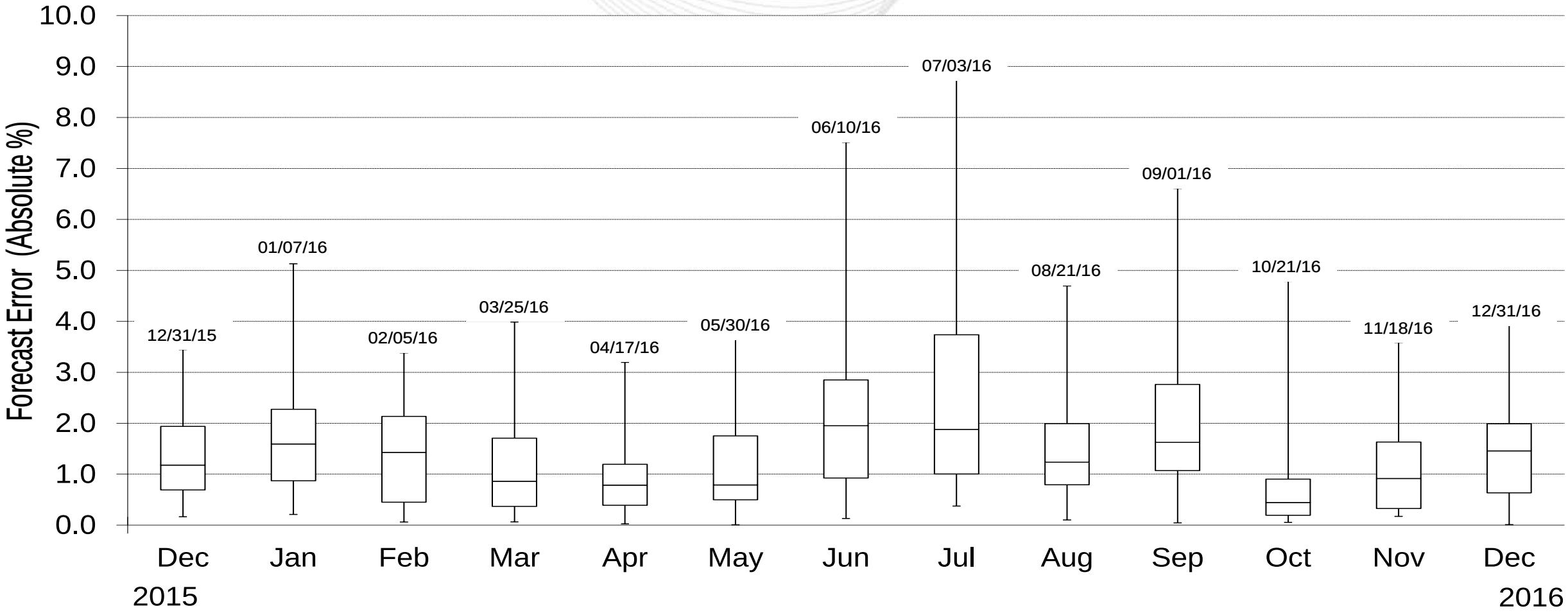
Load Forecasting Error (Achieved 80% of the Time)



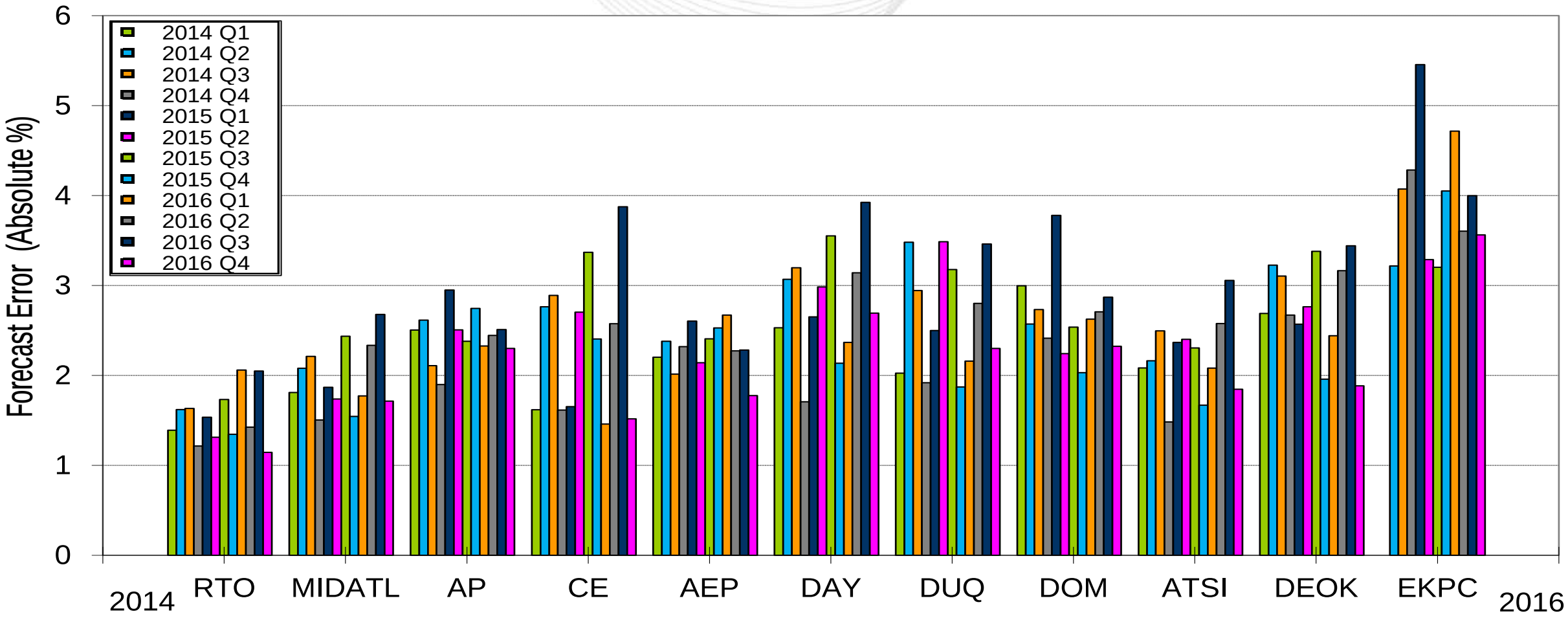
PJM RTO Load Forecasting Analysis

Average RTO load forecast error performance for December was 2.11%, within the goal of 3%.

Peak Load Forecasting Error Outlier Days



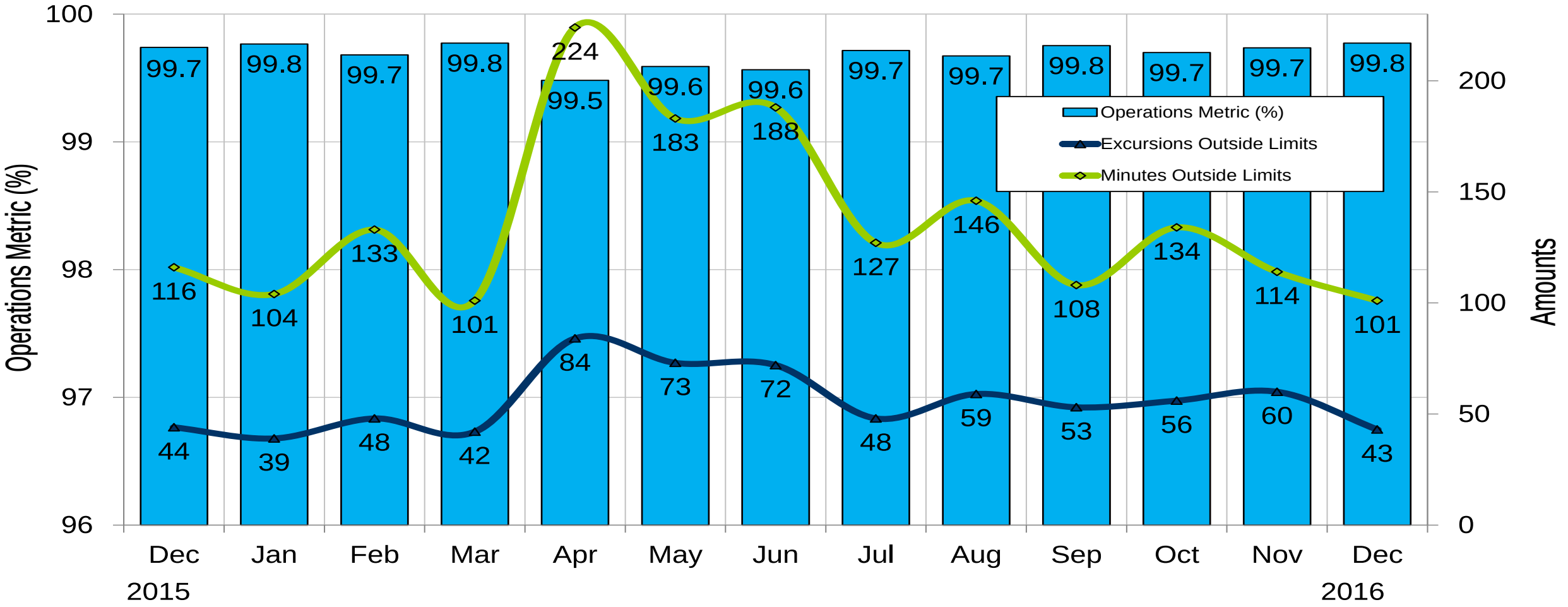
Peak Load Average Forecast Error by Zone



Peak Load Average Forecast Error by Zone

Quarter	RTO	MIDATL	AP	CE	AEP	DAY	DUQ	DOM	ATSI	DEOK	EKPC
2014 Q1	1.4%	1.8%	2.5%	1.6%	2.2%	2.5%	2.0%	3.0%	2.1%	2.7%	4.2%
2014 Q2	1.6%	2.1%	2.6%	2.8%	2.4%	3.1%	3.5%	2.6%	2.2%	3.2%	3.2%
2014 Q3	1.6%	2.2%	2.1%	2.9%	2.0%	3.2%	2.9%	2.7%	2.5%	3.1%	4.1%
2014 Q4	1.2%	1.5%	1.9%	1.6%	2.3%	1.7%	1.9%	2.4%	1.5%	2.7%	4.3%
2015 Q1	1.5%	1.9%	2.9%	1.7%	2.6%	2.7%	2.5%	3.8%	2.4%	2.6%	5.5%
2015 Q2	1.3%	1.7%	2.5%	2.7%	2.1%	3.0%	3.5%	2.2%	2.4%	2.8%	3.3%
2015 Q3	1.7%	2.4%	2.4%	3.4%	2.4%	3.6%	3.2%	2.5%	2.3%	3.4%	3.2%
2015 Q4	1.3%	1.5%	2.7%	2.4%	2.5%	2.1%	1.9%	2.0%	1.7%	2.0%	4.0%
2016 Q1	2.1%	1.8%	2.3%	1.5%	2.7%	2.4%	2.2%	2.6%	2.1%	2.4%	4.7%
2016 Q2	1.4%	2.3%	2.4%	2.6%	2.3%	3.1%	2.8%	2.7%	2.6%	3.2%	3.6%
2016 Q3	2.0%	2.7%	2.5%	3.9%	2.3%	3.9%	3.5%	2.9%	3.1%	3.4%	4.0%
2016 Q4	1.1%	1.7%	2.3%	1.5%	1.8%	2.7%	2.3%	2.3%	1.8%	1.9%	3.6%

Monthly BAAL Performance Score

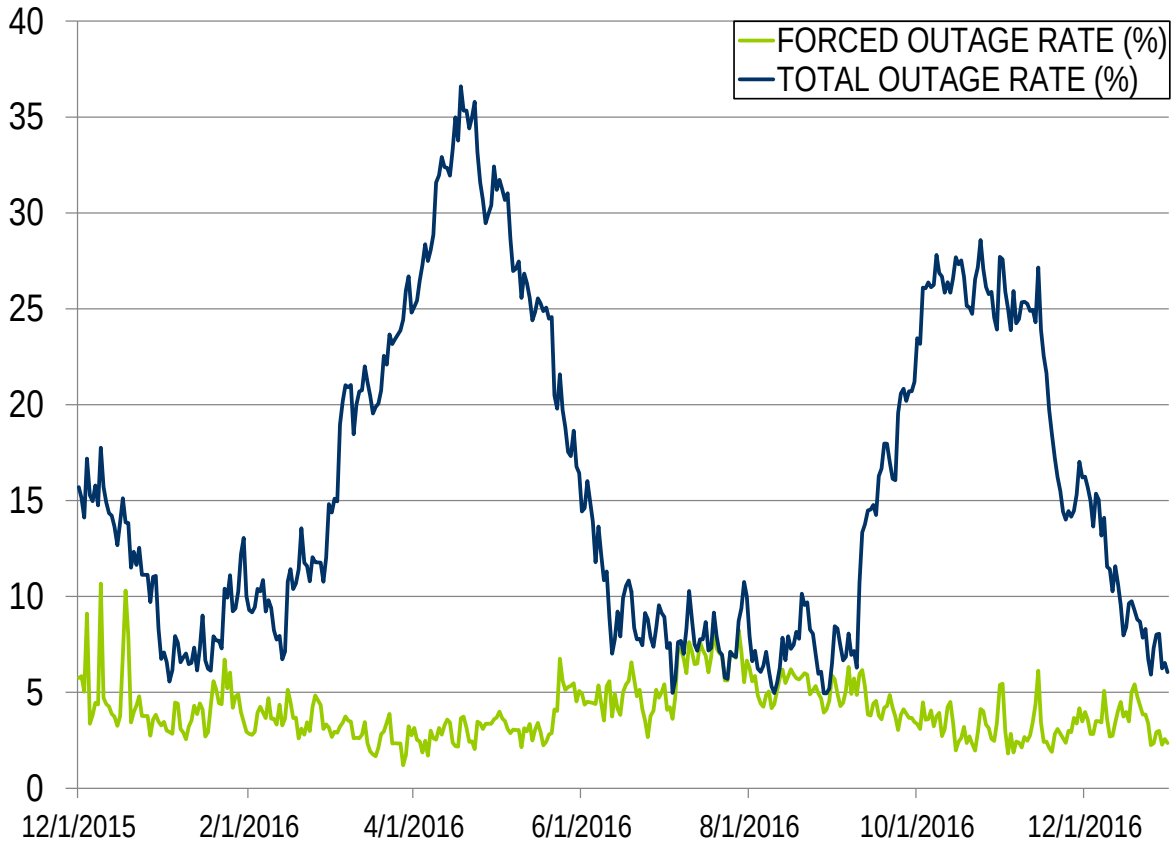


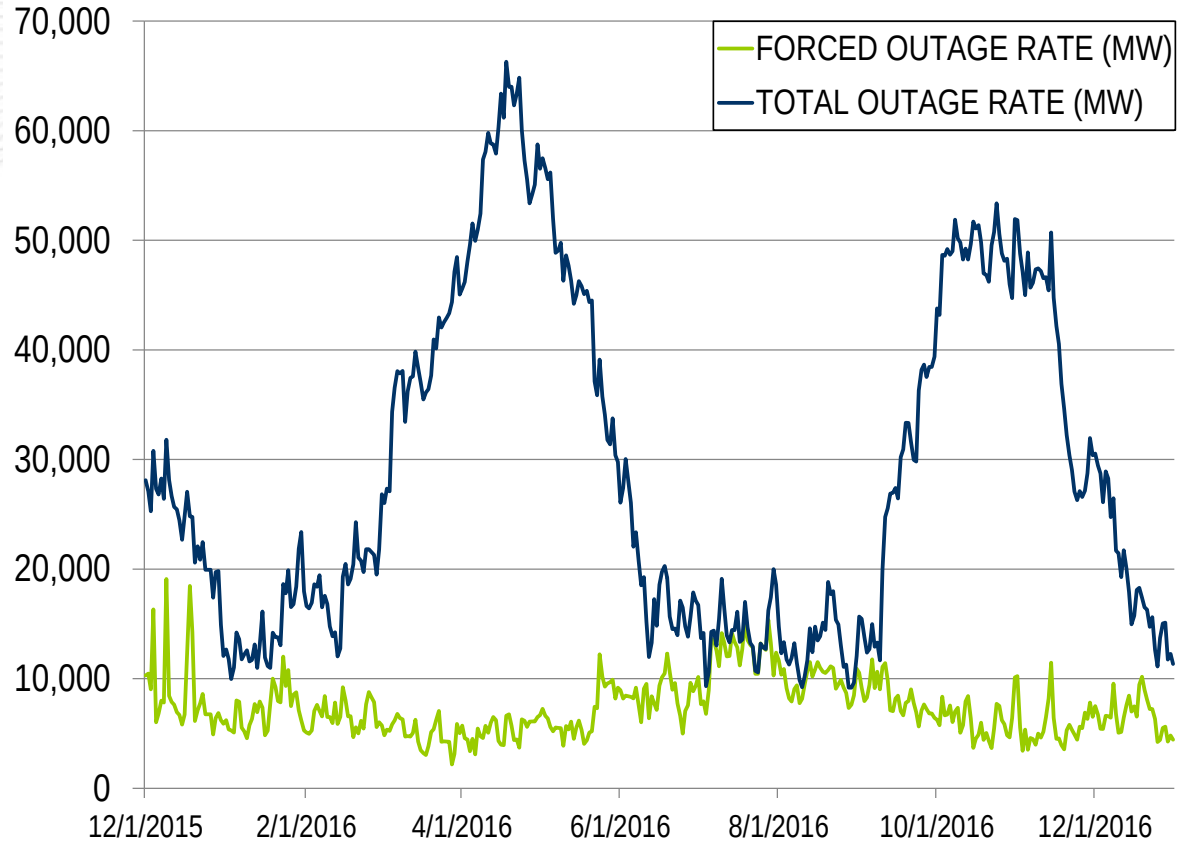
PJM's BAAL performance has exceeded the goal of 99% for each month in 2016.

Emergency Procedure Summary

- Two spinning events in the month of December
- Five reserve sharing events with NPCC
- The following Emergency Procedures occurred in December:
  - 53 Post-Contingency Local Load Relief Warnings (PCLLRW)
  - 1 High System Voltage
  - 1 Minimum Generation Alert
  - 3 Cold Weather Alerts

RTO Generation Outage Rate - Daily

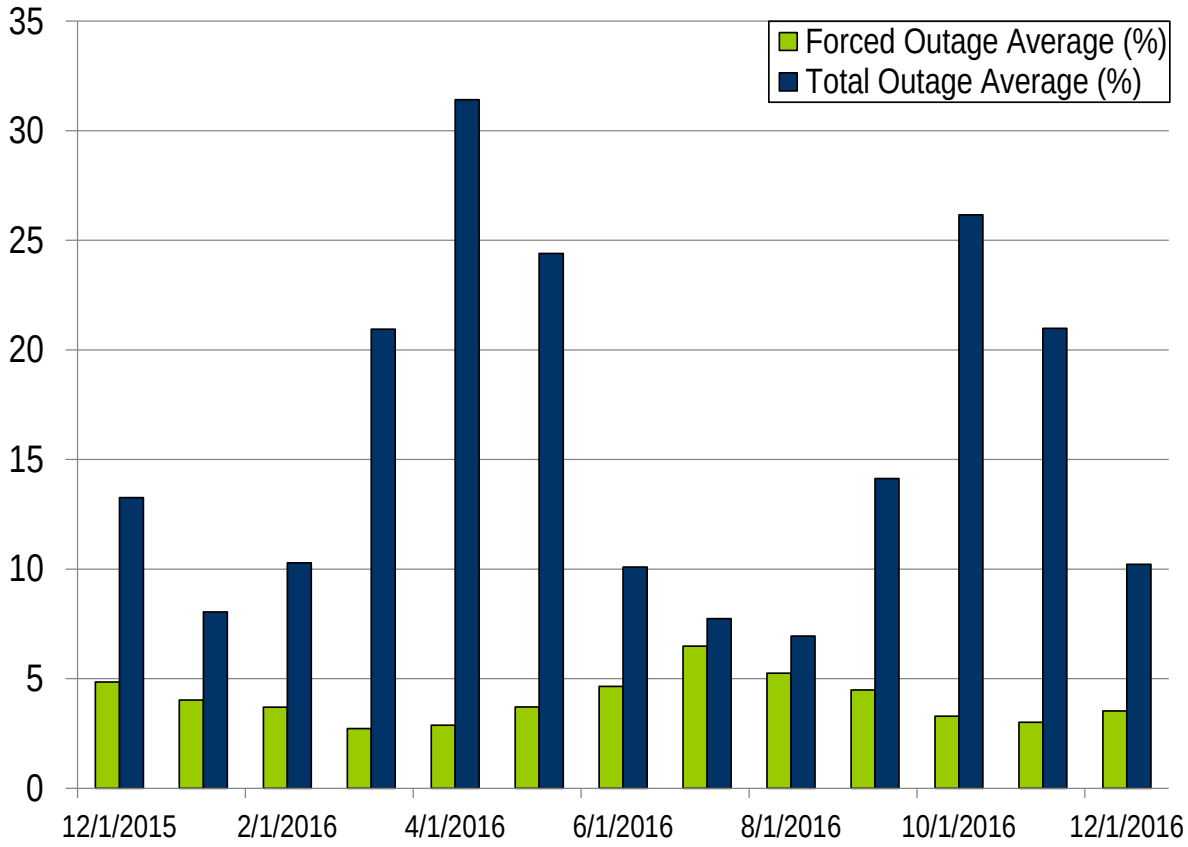


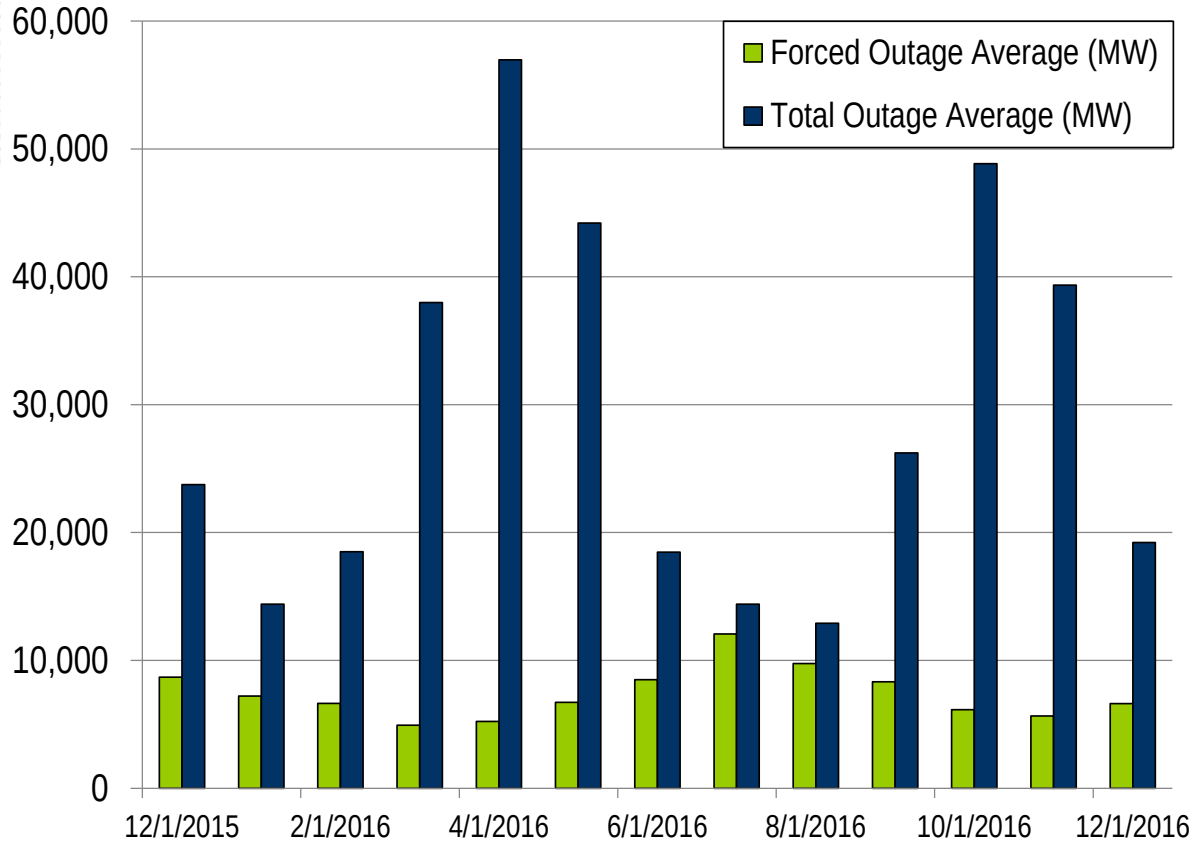


The average forced outage rate YTD is 3.98% or 7,320 MW.

The average total outage rate YTD is 15.96% or 29,315 MW.

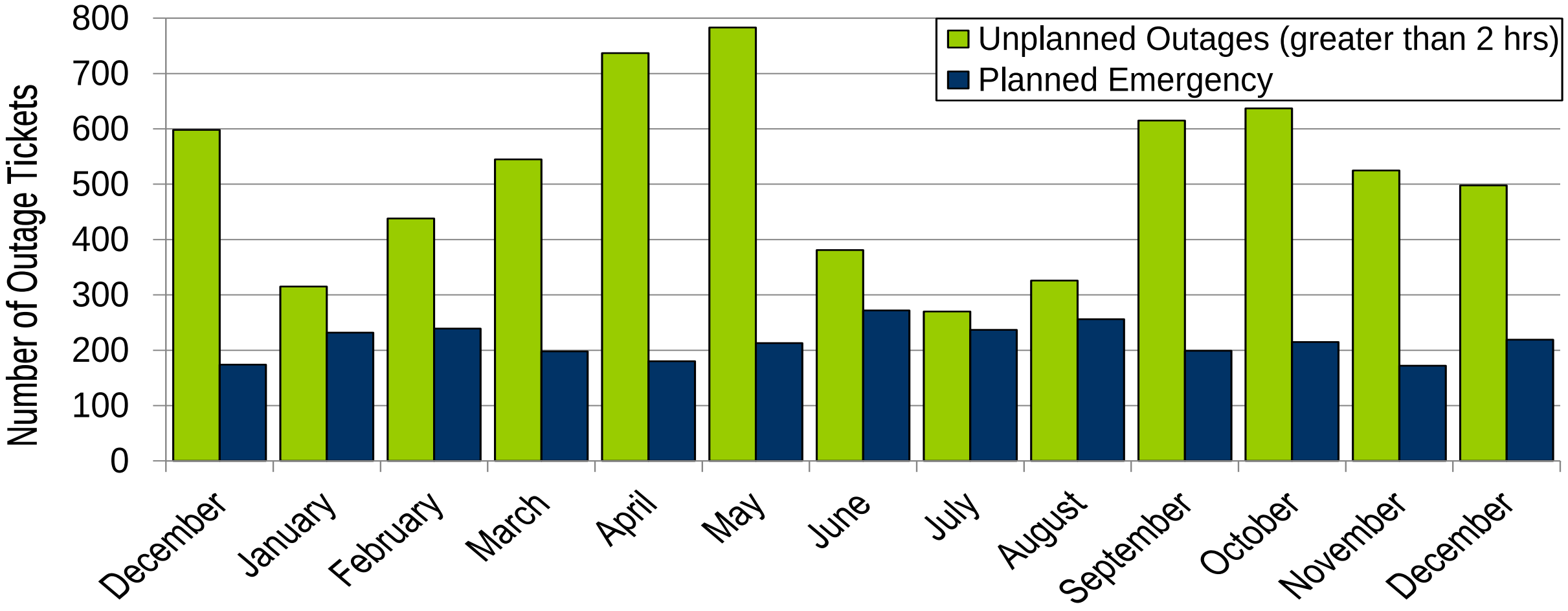
RTO Generation Outage Rate - Monthly





The average forced outage rate YTD is 3.98% or 7,320 MW.
The average total outage rate YTD is 15.96% or 29,315 MW.

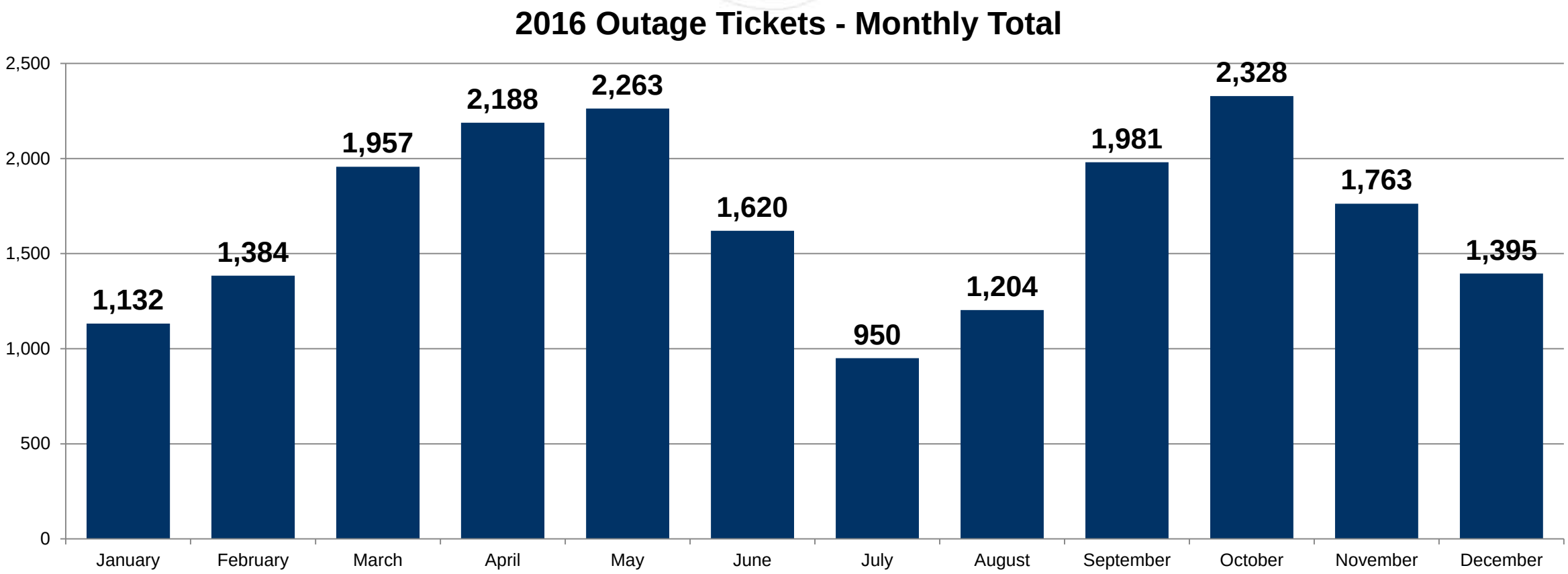
2016 Planned Emergency & Unplanned Transmission Outage Summary



Note: “Unplanned Outages" include tripped facilities. One tripping event may involve multiple facilities.

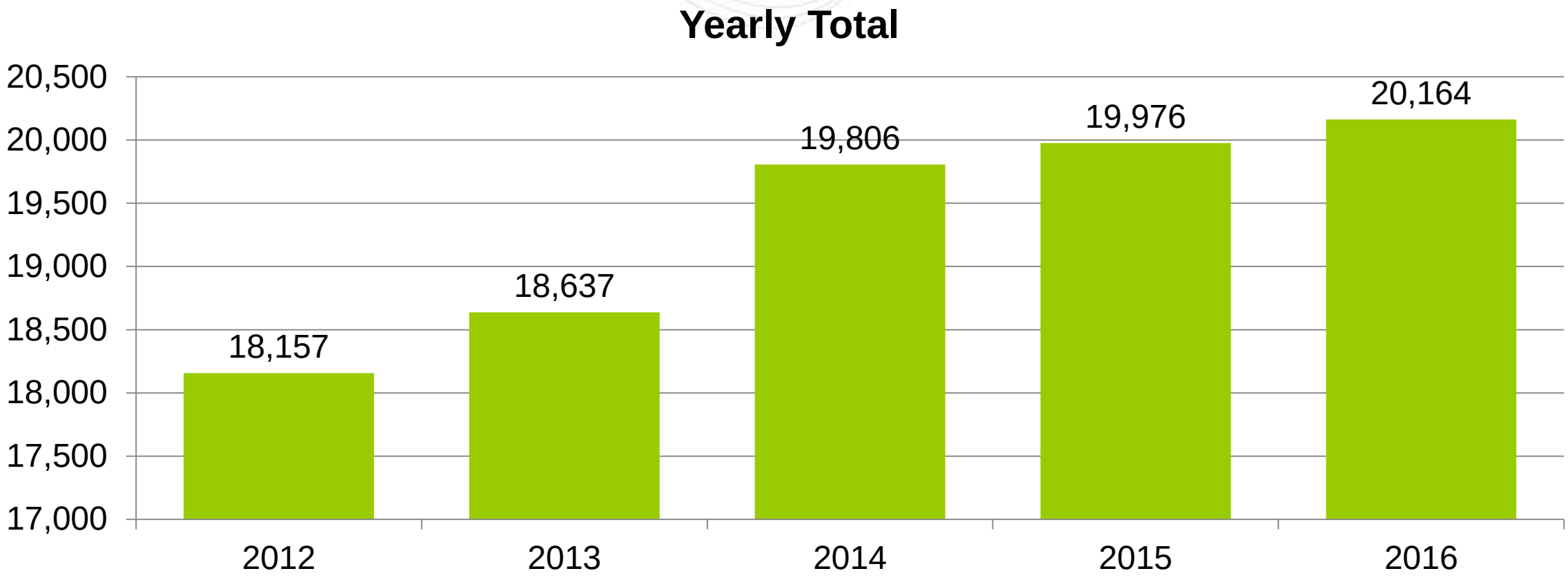
Total Number of Outage Tickets

In 2016, there were 20,164 transmission outage requests, excluding hotline tickets. Approximately twice as many tickets are processed in the Spring and Fall than in the Summer and Winter.

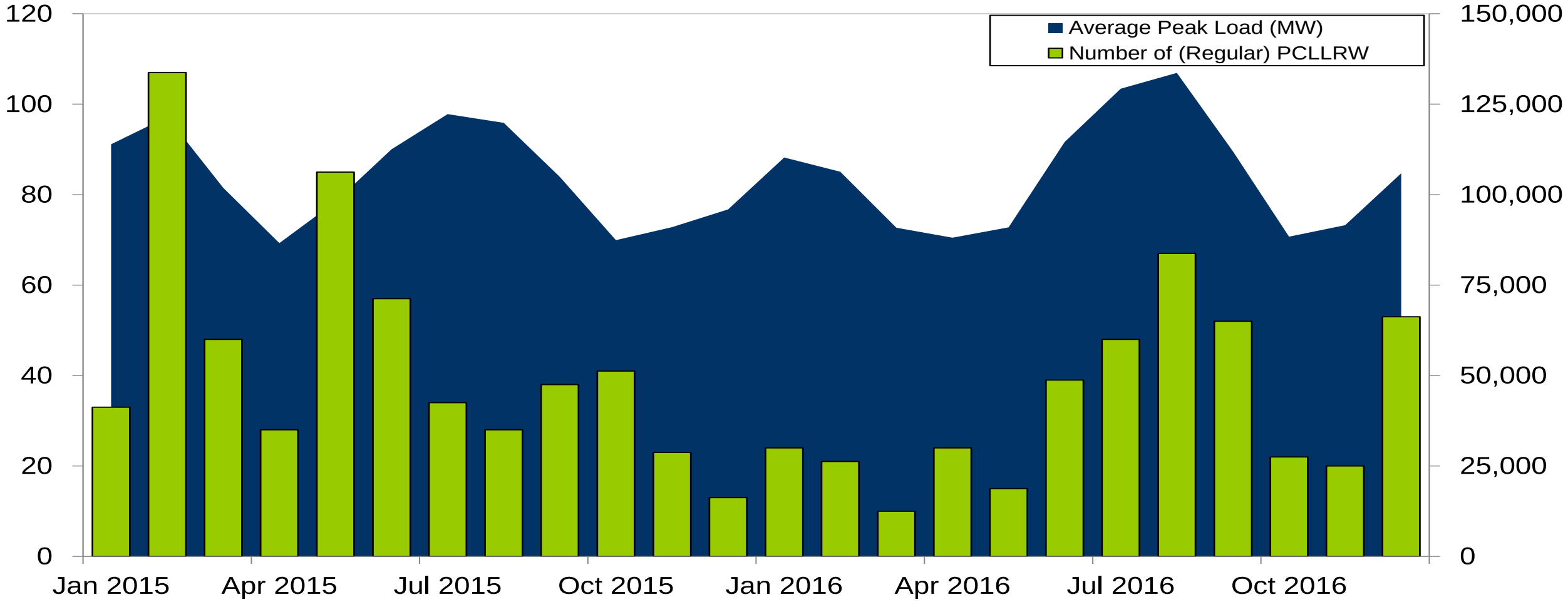


Yearly Ticket Total

The ticket volume has increased by about 1% from 2015



PCLLRW Count Vs. Average Load – 24 Months

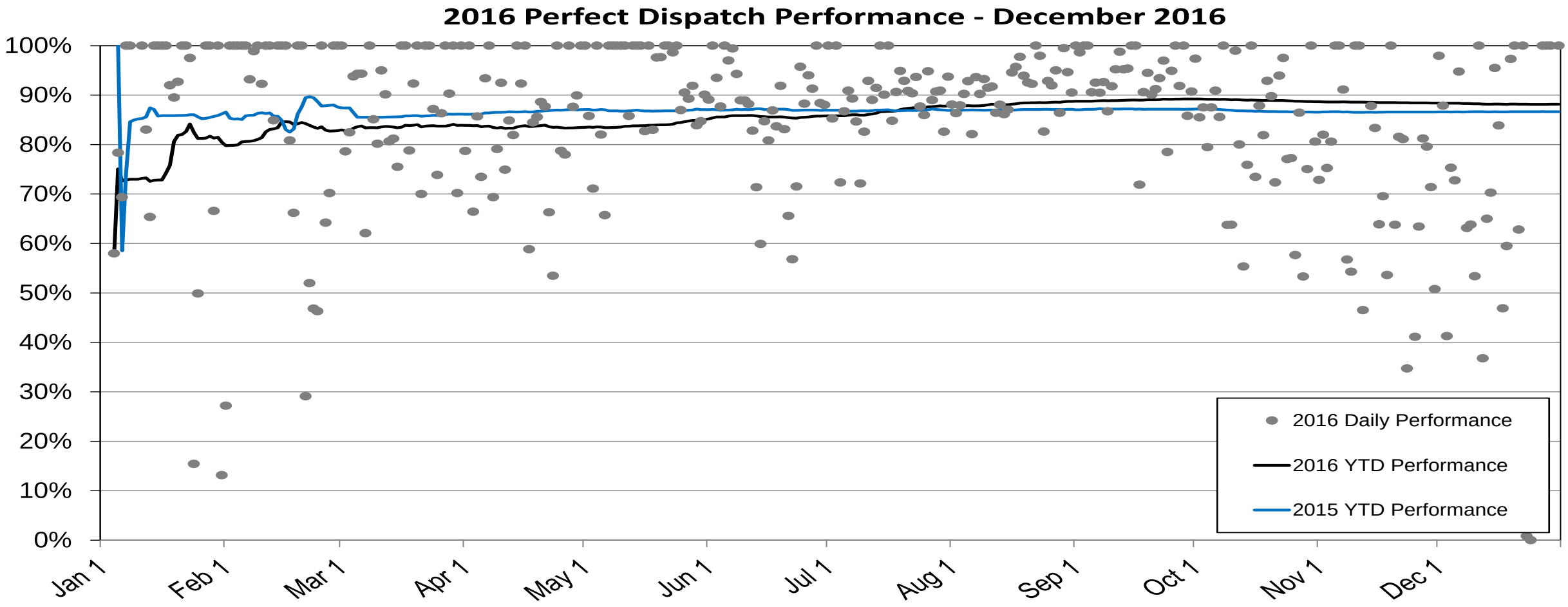


Spin Response

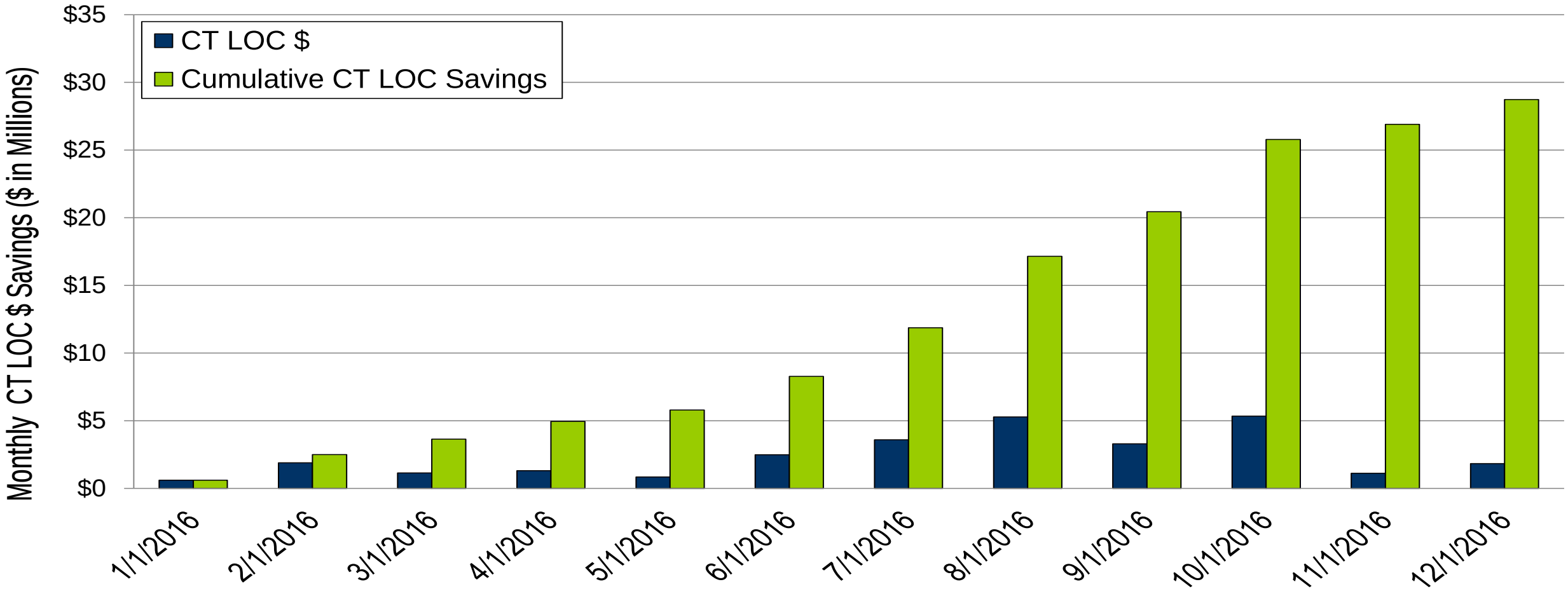
Event	Date	Start Time	End Time	Duration	Region	Tier 1 Estimate (MW)	Tier 1 Response (MW)
1	12/03/2016	00:11	00:18	00:07	RTO	1522.4	570.3
2	12/31/2016	05:10	05:22	00:12	RTO	971.2	585.0

Event	Date	Start Time	End Time	Duration	Region	Tier 2 Assigned (MW)	Tier 2 Response (MW)	Tier 2 Penalty (MW)
1	12/03/2016	00:11	00:18	00:07	RTO	1005.4	1005.4	0.0
2	12/31/2016	05:10	05:22	00:12	RTO	594.4	485.7	108.7

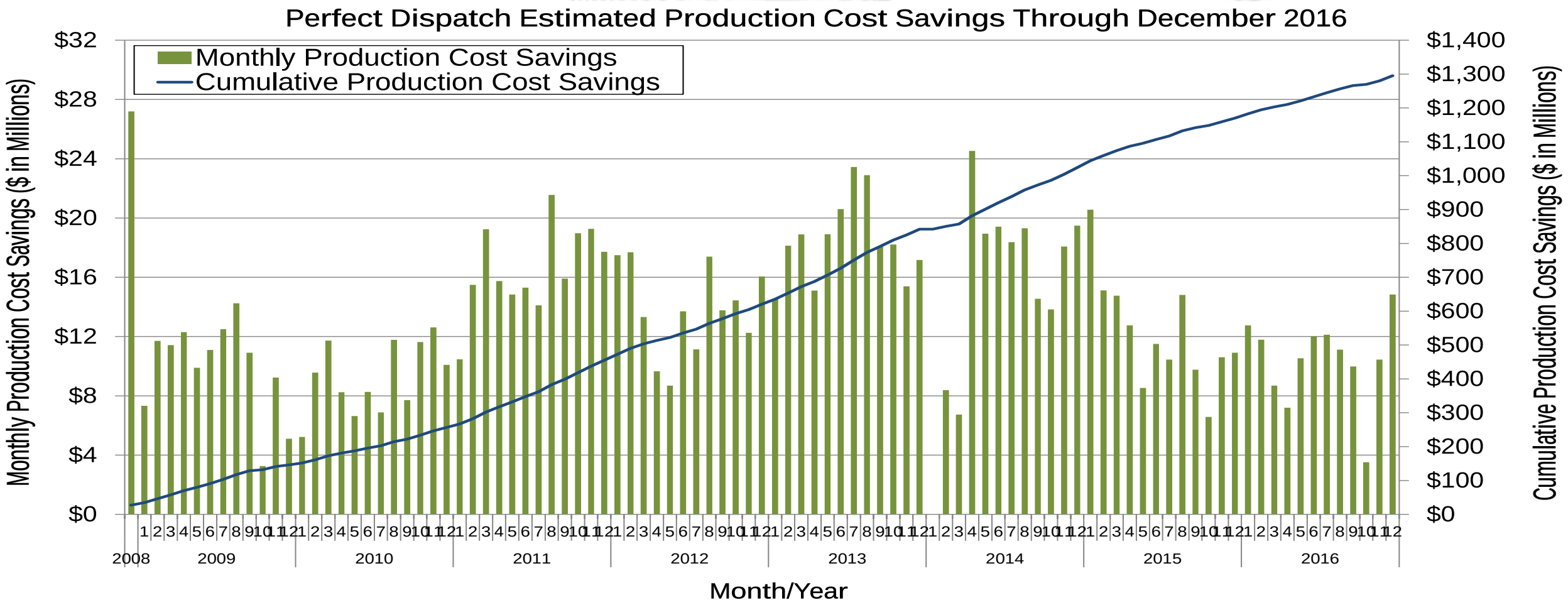
Perfect Dispatch – Performance



CT LOC $ Estimated Savings



Perfect Dispatch – Performance



Perfect Dispatch Analysis

The year-to-date Perfect Dispatch performance score through December 2016 is 88.15%.

The estimated cumulative production cost savings through December 2016 is over $1.2 billion with over $125 million in savings in 2016.

Appendix

Balancing Authority ACE Limit - Performance Measure

Goal Measurement: Balancing Authority ACE Limit (BAAL)

- The purpose of the new BAAL standard is to maintain interconnection frequency within a predefined frequency profile under all conditions (normal and abnormal), to prevent frequency-related instability, unplanned tripping of load or generation, or uncontrolled separation or cascading outages that adversely impact the reliability of the interconnection. NERC requires each balancing authority demonstrate real-time monitoring of ACE and interconnection frequency against associated limits and shall balance its resources and demands in real time so that its ACE does not exceed the BAAL (BAALLOW or BAALHIGH) for a continuous time period greater than 30 minutes for each event.

- PJM directly measures the total number of BAAL excursions in minutes compared to the total number of minutes within a month. PJM has set a target value for this performance goal at 99% on a daily and monthly basis. In addition, current NERC rules limit the recovery period to no more than 30 minutes for a single event.

Perfect Dispatch – Performance Measure

Perfect Dispatch refers to the hypothetical least production cost commitment and Dispatch, achievable only if all system conditions (load forecast, unit availability / performance, interchange, transmission outages, etc.) were known and controllable in advance. While being hypothetical and not achievable in reality, this is useful as a baseline for performance measurement.

The Perfect Dispatch performance goal is designed to measure how well PJM commits combustion turbines (CTs) in real time operations compared to a calculated optimal CT commitment profile.

The Perfect Dispatch performance measure is calculated as 100% x (The accumulative year-to-date optimal CT production cost in Perfect Dispatch / The accumulative year-to-date actual real-time CT production cost).

The Perfect Dispatch performance goal was removed as a goal beginning in 2015. Currently Perfect Dispatch does not have a performance goal, but the metric will continue to be tracked.

The cumulative Estimated Production Cost Savings helps to demonstrate the savings that result from PJM's process changes since the inception of the Perfect Dispatch analysis in 2008. This estimate is determined by comparing the Perfect Dispatch performance for all resources to benchmarks set at the beginning of the Perfect Dispatch analysis. A benchmark of 98.18% is used for comparison of the 2016 metric which is 99.18% through the end of December.