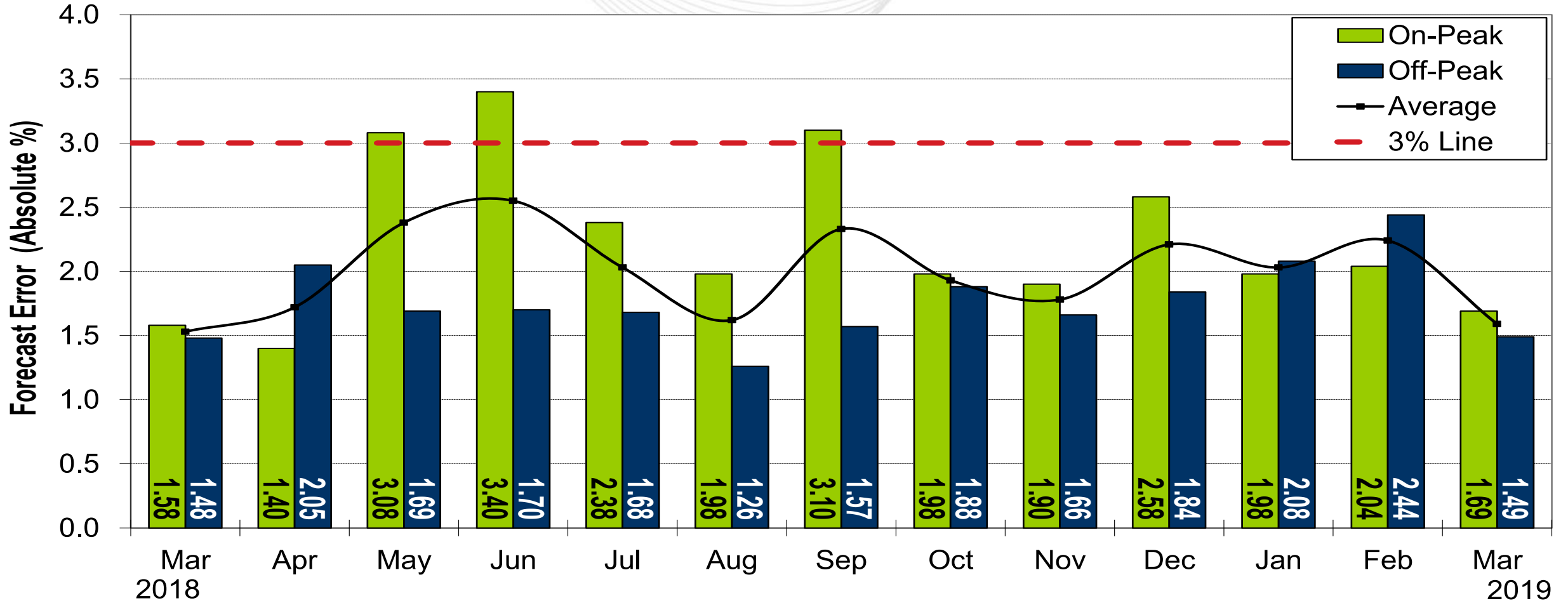




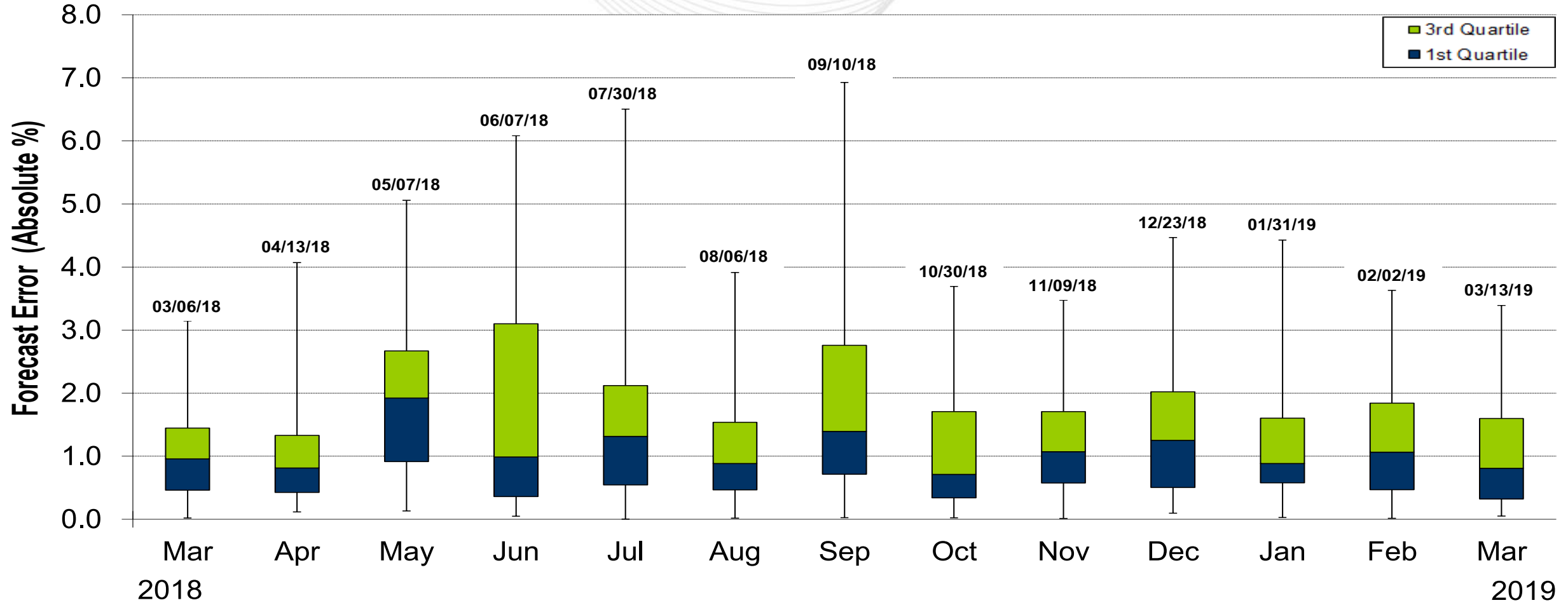
Operations Report

Hong Chen
Senior Lead Engineer, Markets Coordination
MC Information Webinar
April 22, 2019

Load Forecasting Error (Achieved 80% of the Time)



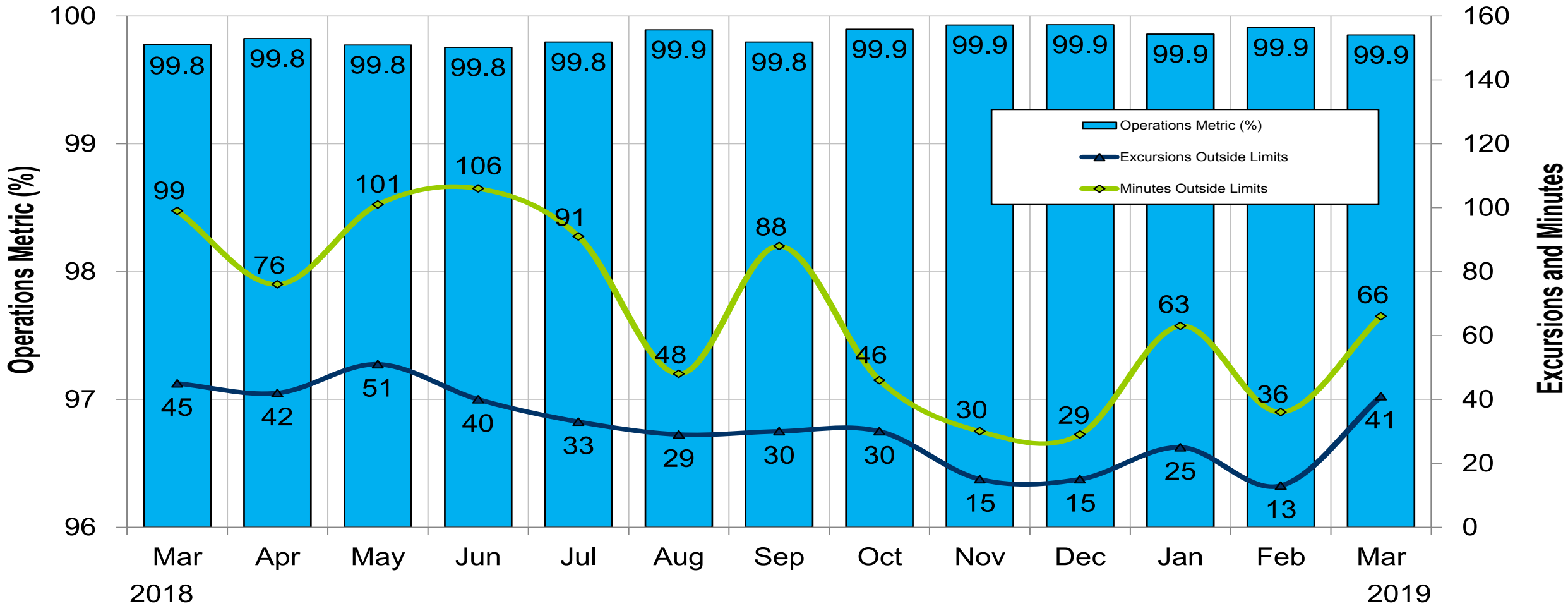
Average RTO load forecast error performance for March was 1.59%, within the goal of 3%.





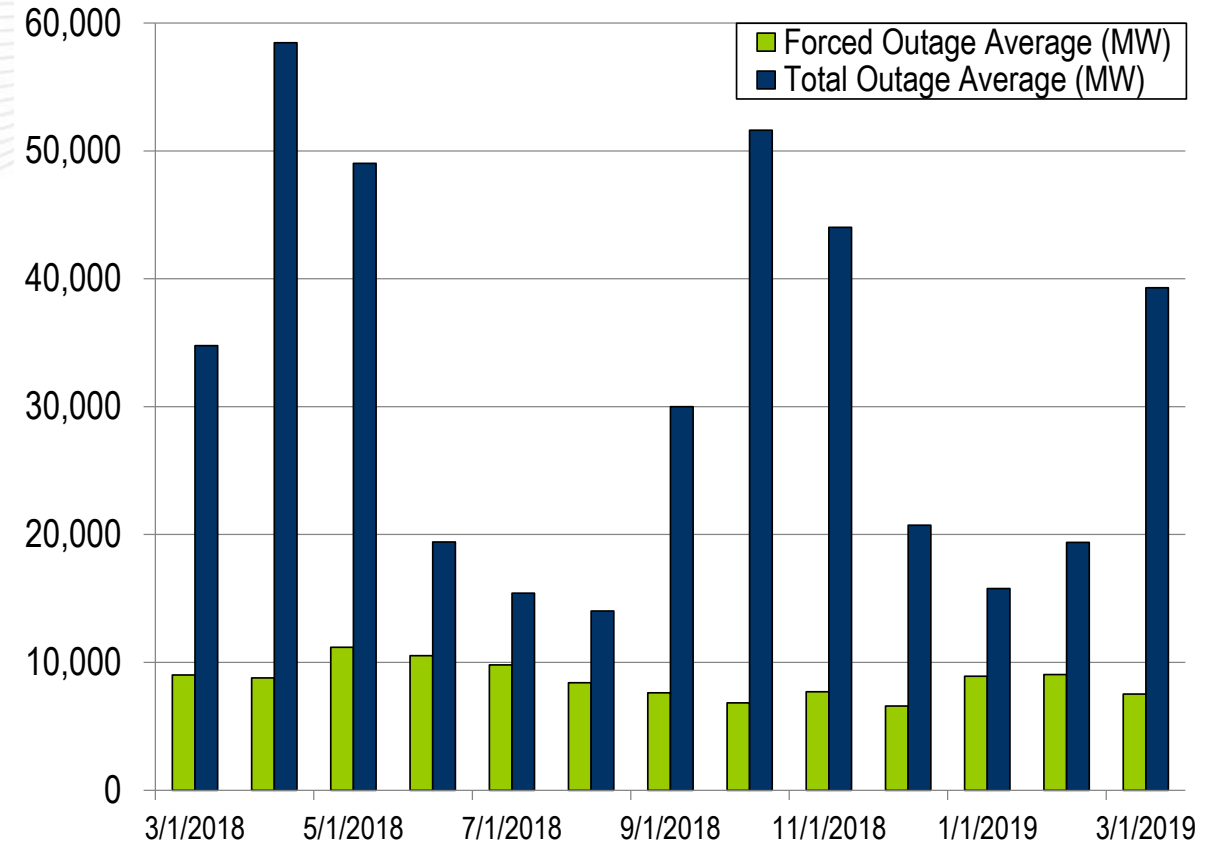
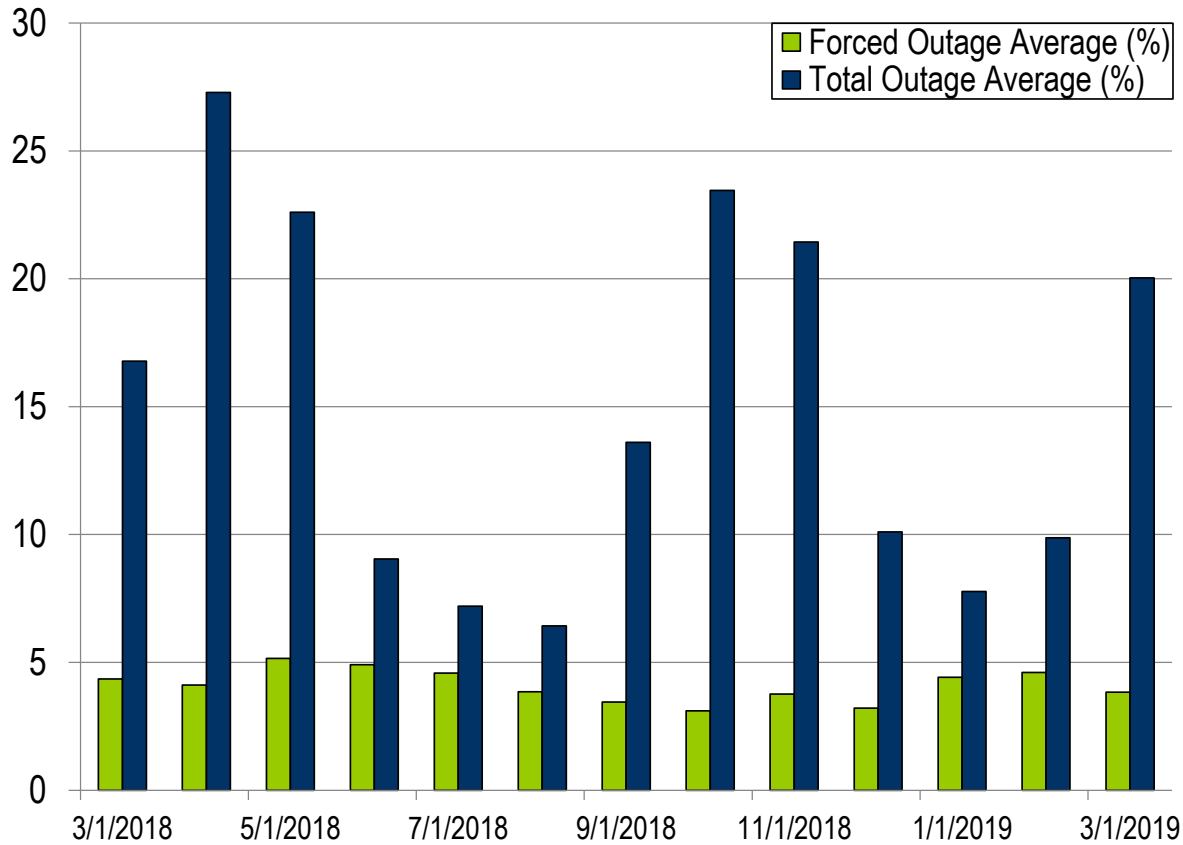
Peak Load Average Forecast Error by Zone

Quarter	RTO	MIDATL	AP	CE	AEP	DAY	DUQ	DOM	ATSI	DEOK	EKPC
2017 Q1	1.0%	1.6%	2.1%	1.6%	1.8%	2.1%	1.6%	2.2%	1.4%	2.0%	3.7%
2017 Q2	1.3%	1.8%	2.2%	2.2%	2.2%	4.4%	2.7%	2.5%	2.0%	4.8%	3.6%
2017 Q3	1.9%	2.8%	2.7%	3.0%	2.2%	3.0%	3.0%	2.4%	2.8%	3.6%	3.5%
2017 Q4	1.1%	1.5%	2.2%	1.6%	2.4%	2.5%	2.4%	2.3%	2.1%	2.3%	3.5%
2018 Q1	1.3%	2.1%	2.0%	1.5%	2.1%	1.9%	1.5%	2.8%	1.3%	2.3%	3.5%
2018 Q2	1.5%	2.4%	2.3%	2.9%	2.5%	3.0%	2.9%	2.5%	2.3%	3.4%	3.7%
2018 Q3	1.6%	2.5%	2.6%	3.5%	2.1%	3.2%	3.4%	2.4%	2.8%	3.2%	3.7%
2018 Q4	1.3%	1.5%	2.3%	1.7%	2.1%	2.3%	2.0%	2.2%	1.5%	2.0%	3.3%
2019 Q1	1.2%	1.6%	2.5%	1.8%	1.9%	1.6%	1.7%	2.2%	1.5%	1.7%	3.8%



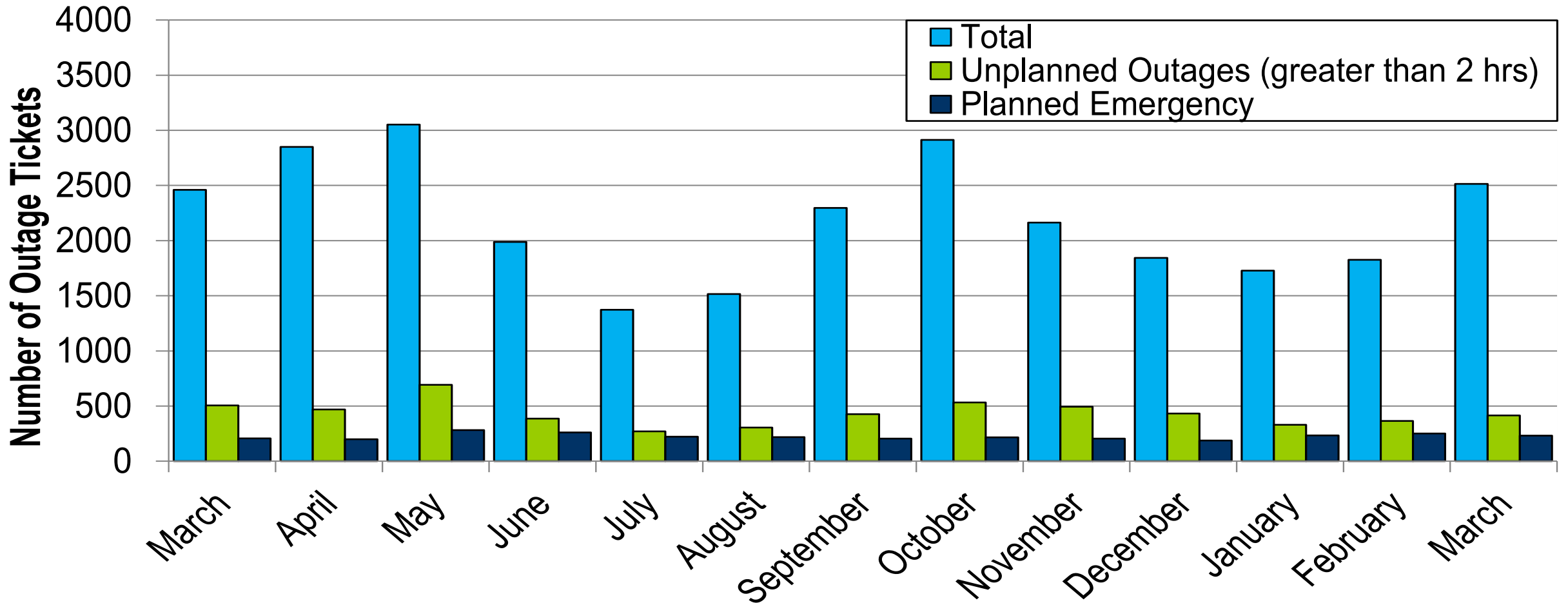
PJM's BAAL performance has exceeded the goal of 99% for each month in 2019.

- Two spinning events in the month of March
- Six sharing events with the Northeast Power Coordinating Council (NPCC)
- The following Emergency Procedures occurred in March:
 - 18 Post-Contingency Local Load Relief Warnings (PCLLRW)
 - 1 Cold Weather Event

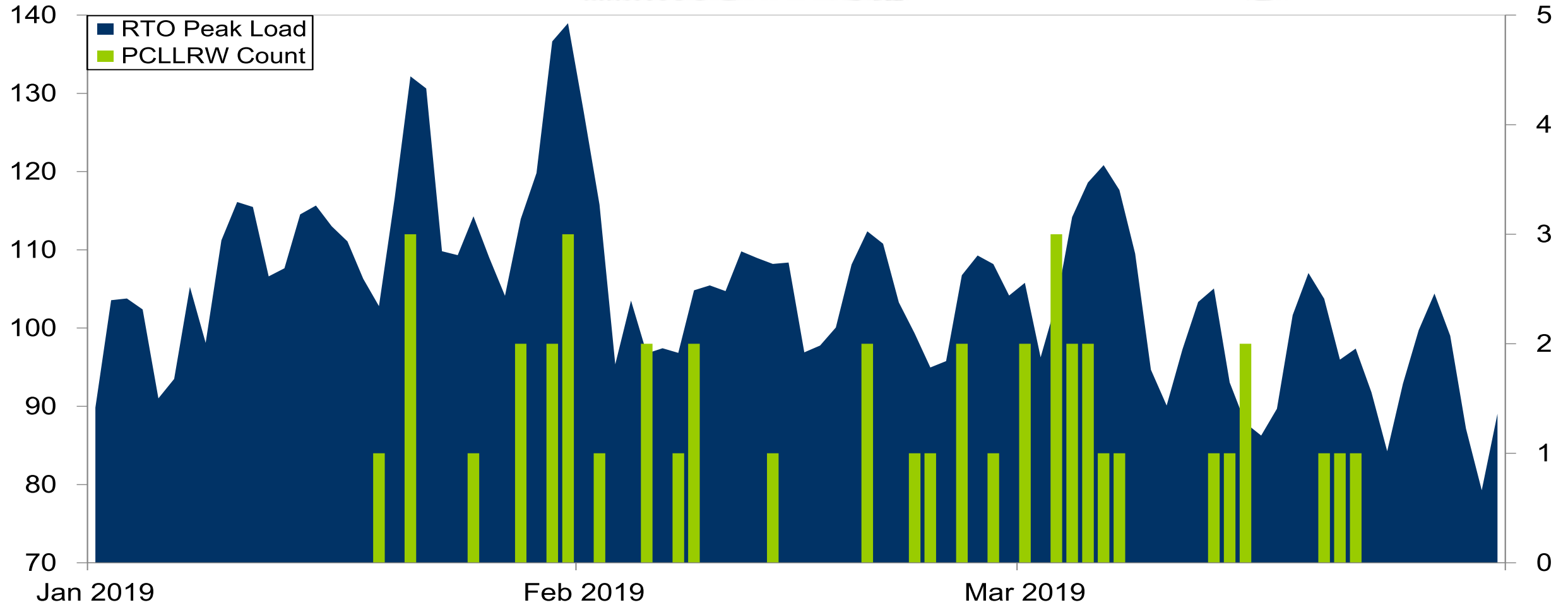


The 13-month average forced outage rate is 4.10% or 8,609 MW.
 The 13-month average total outage rate is 15.08% or 31,764 MW.

2018-2019 Planned Emergency, Unplanned Transmission Outage Summary, and Total



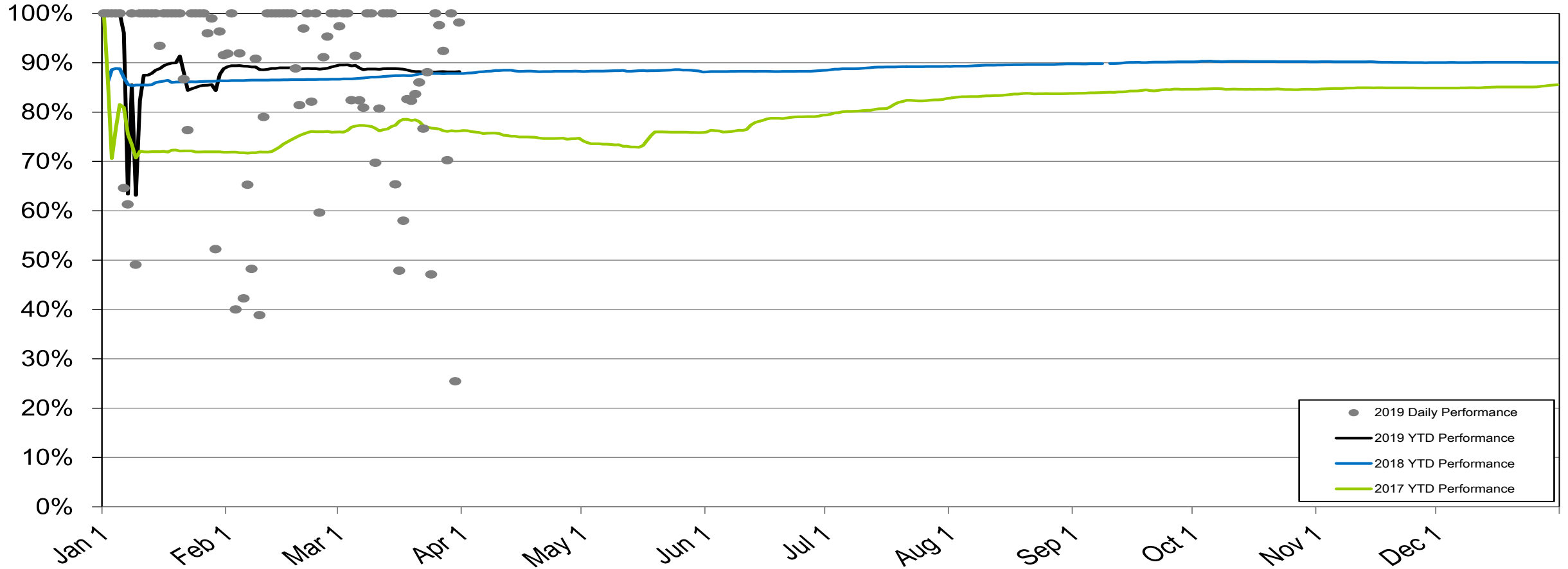
Note: "Unplanned Outages" include tripped facilities. One tripping event may involve multiple facilities.



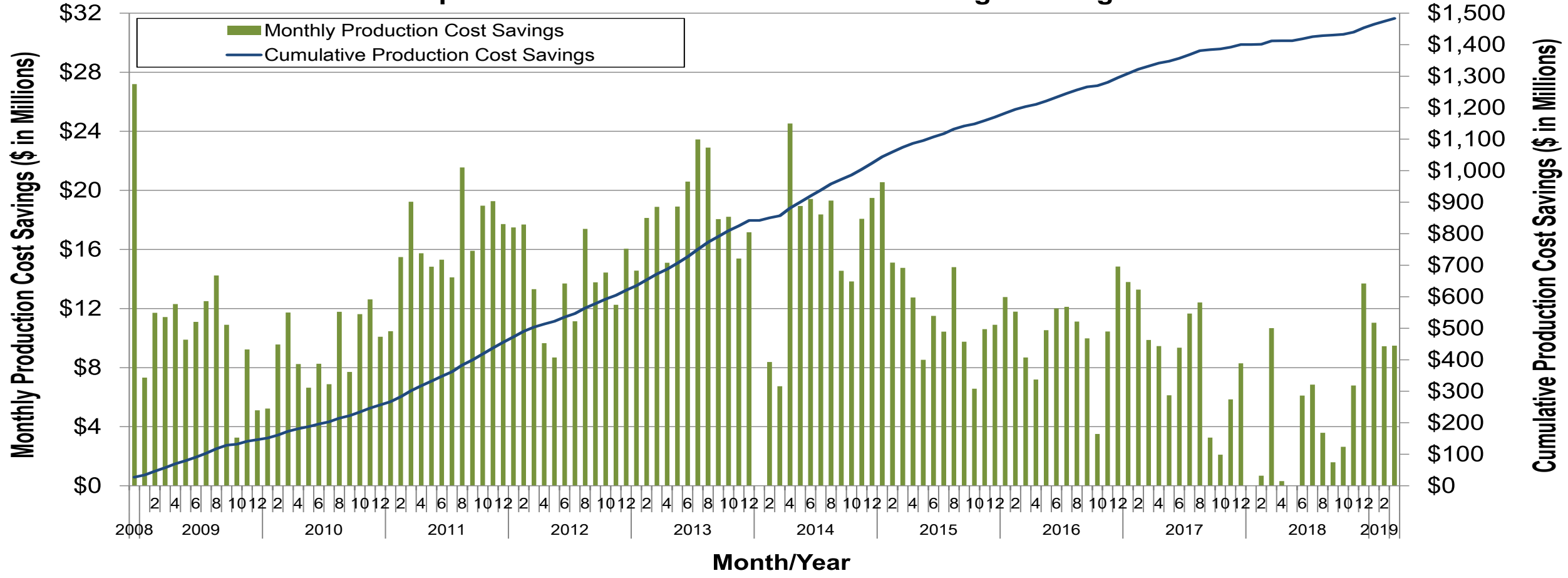
Event	Date	Start Time	End Time	Duration	Region	Tier 1 Estimate (MW)	Tier 1 Response (MW)
1	03/03/19	12:31	12:40	00:09	RTO	2915.2	1332.2
2	03/06/19	22:06	22:15	00:09	RTO	1874.2	811.9

Event	Date	Start Time	End Time	Duration	Region	Tier 2 Assigned (MW)	Tier 2 Response (MW)	Tier 2 Penalty (MW)
1	03/03/19	12:31	12:40	00:09	RTO	70.0	70.0	0
2	03/06/19	22:06	22:15	00:09	RTO	738.1	738.1	0

2019 Perfect Dispatch Performance - March 2019



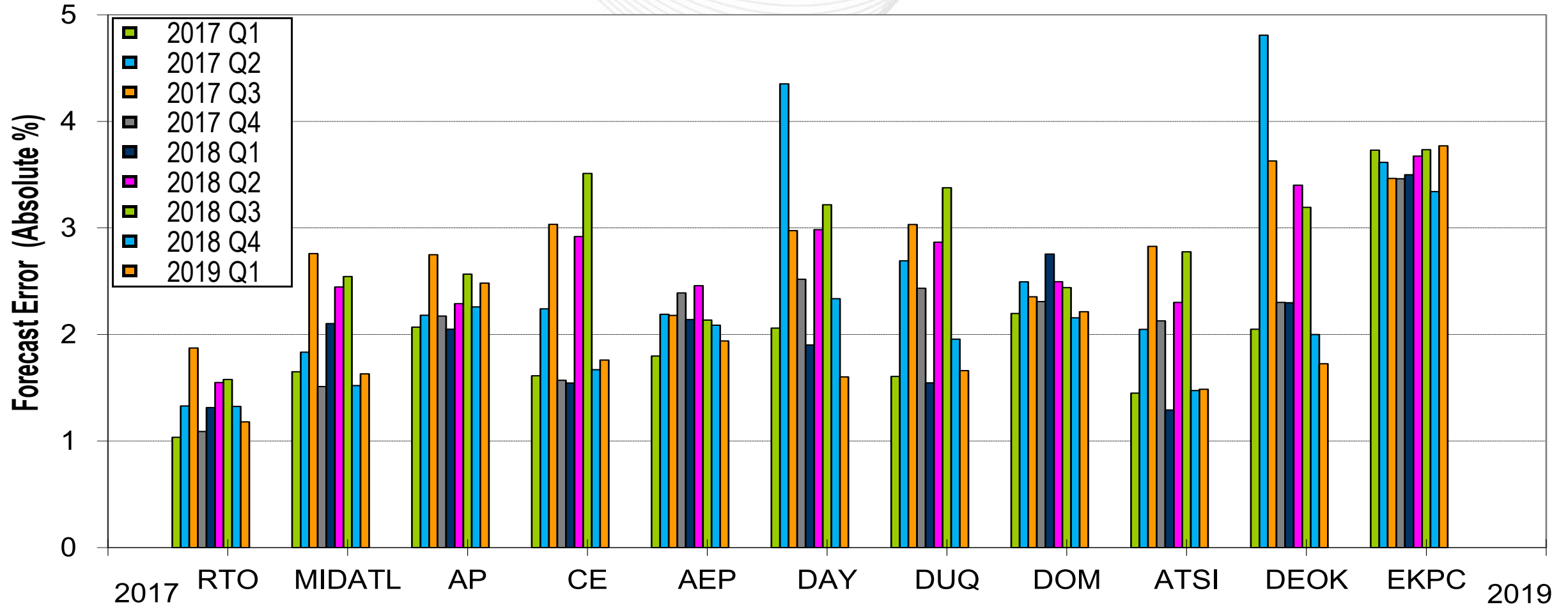
Perfect Dispatch Estimated Production Cost Savings Through March 2019



The year-to-date Perfect Dispatch performance score through March 2019 is 88.21%.

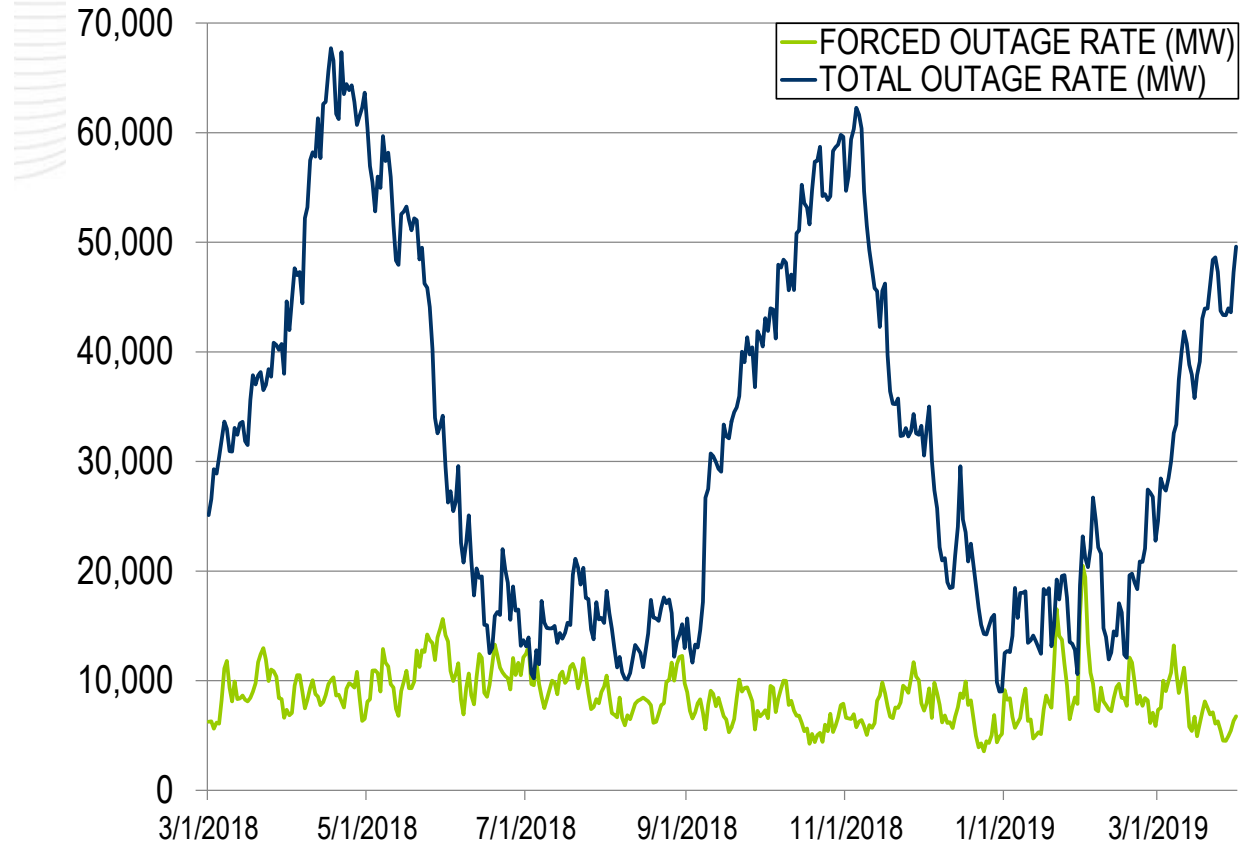
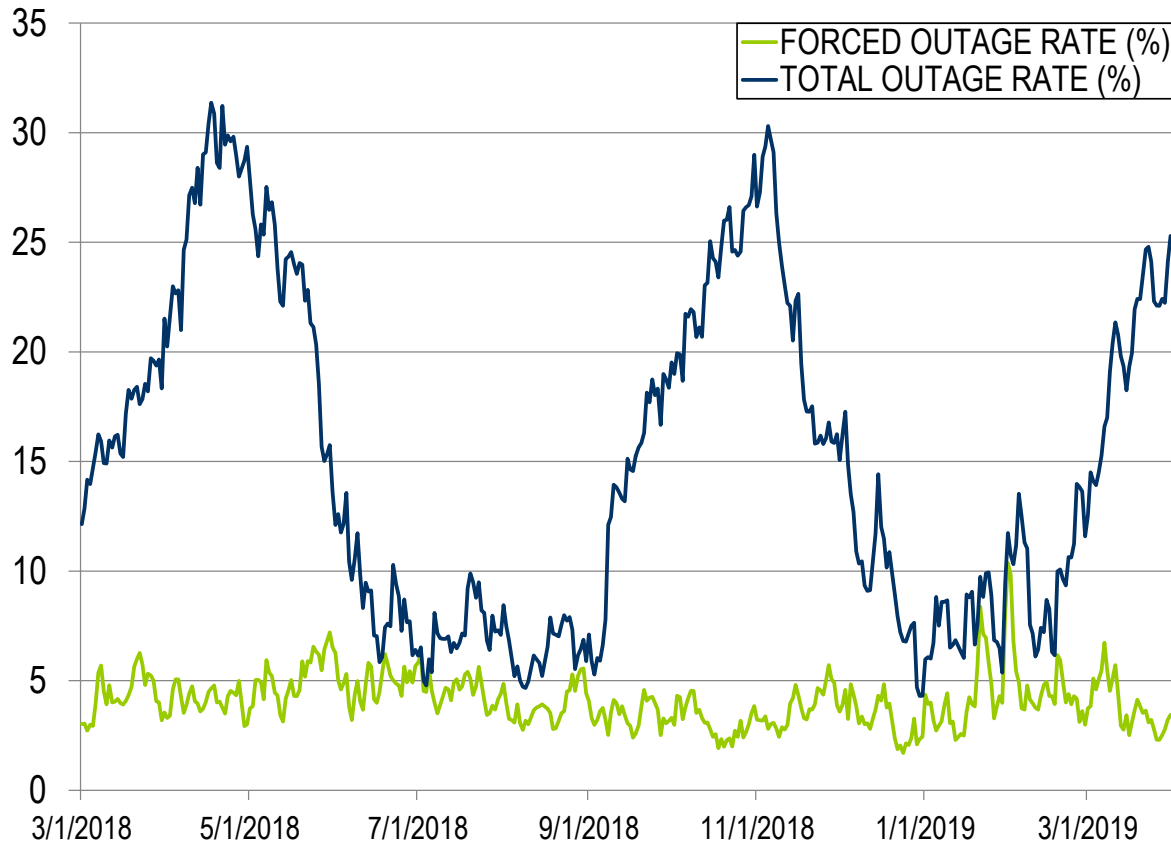
The estimated cumulative production cost savings through March 2019 is over \$1.4 billion with over \$29 million in savings in 2019.

Appendix



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.



The 13-month average forced outage rate is 4.10% or 8,609 MW.
 The 13-month average total outage rate is 15.08% or 31,764 MW.

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 $100\% \times (\text{The accumulative year-to-date optimal CT production cost in Perfect Dispatch} / \text{The accumulative year-to-date actual real-time CT production cost})$.

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 2019 metric which is 99.16% through the end of March.