



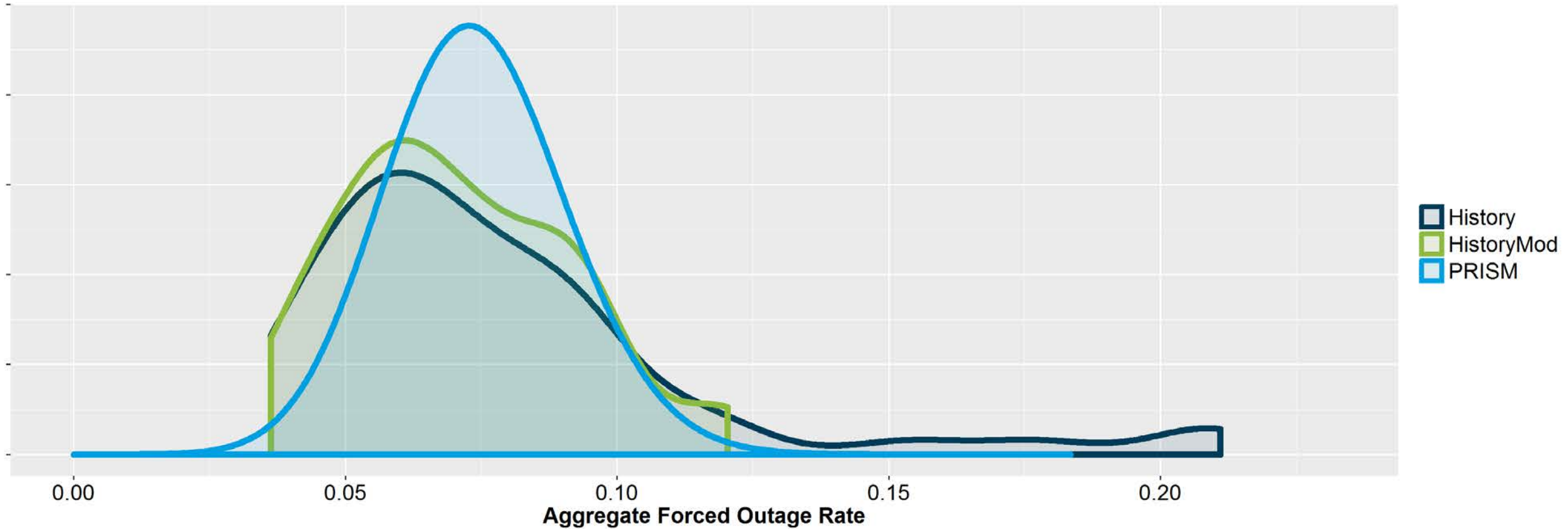
Manual 20 Updates

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- Update to PJM Manual 20: PJM Resource Adequacy Analysis
 - Section 3.3: PJM Installed Reserve Margin and Reliability Analysis
 - Reliability Calculations and Analysis
 - Objective:
 - To reflect changes to the methodology for developing the winter peak week's capacity model.

- The new methodology for developing the winter peak week's capacity model was used as part of PJM's preliminary response to the MRC-approved problem statement / issue charge on Winter Resource Adequacy.
 - Preliminary response was reviewed with RAAS, PC and MRC
- The new methodology is needed because PRISM's theoretical approach to derive RTO-aggregate outage levels during the winter peak week is not representative of actual RTO-aggregate historical outage levels.
 - PRISM uses historical outage data at the individual unit level, not at the RTO-aggregate level
- The new methodology uses RTO-aggregate actual historical outage levels to build the winter peak week's capacity model

RTO Aggregate Forced Outages at Winter Peak - Density/Frequency plot (DY 2007 – DY 2017)



3.3 Reliability Calculations and Analysis

The capacity model used in PRISM, GEBGE and MARS is probabilistic. For each week of the year, except the winter peak week, the PRISM model uses each individual generating unit's capacity, forced outage rate, and planned maintenance outages to develop a cumulative capacity outage probability table for each week. For the winter peak week, to better account for the risk caused by the large volume of concurrent outages observed historically during this week, the cumulative capacity outage probability table is created using historical forced outage data, aggregated across the RTO. Also for the winter peak week, the amount of planned generator outages will be based on the average historical planned outages aggregated across the RTO.

The specific historical period to be used for the winter peak week modeling will be reviewed by the Planning Committee on an annual basis as part of the Reserve Requirement Study process.

Planned maintenance scheduling can be specified by the user or performed by the program based on one of two approaches:

- *Levelized Reserves Option* — uses the capacity of units on planned maintenance to attempt to levelize the MW amount of available reserves for each week.
- *Levelized Risk Option* — follows the same approach but uses a modified MW value for each unit based in part on the reliability of the unit. This method results in scheduling units on maintenance that are less reliable for the more critical weeks.

- The Manual update focuses on the changes to the methodology for developing the capacity model during the winter peak week
- The actual historical period utilized to derive the capacity model during the winter peak week will be included in the Reserve Requirement Study (RRS) Assumptions
 - Subject to RAAS and PC endorsement every year
 - This year, the draft RRS Assumptions state:
 - For the winter peak week, the cumulative capacity outage probability table is created using historical actual RTO-aggregate outage data from time period DY 2007/08 – DY 2017/18 (in addition, data from DY 2013/14 will be dropped and replaced with data from DY 2014/15)

- PC Endorsement: 06/07/18
- MRC Endorsement: 06/21/18

Appendix

RTO Aggregate Forced Outages at Winter Peak - Density/Frequency plot

