

Winter Season Resource Adequacy Analysis

Tom Falin
Intermittent Resource Subcommittee
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Winter Season Resource Adequacy and Capacity Requirements

Issue Charge is posted at:

<http://www.pjm.com/~media/committees-groups/committees/mrc/20161117/20161117-item-09-winter-reliability-requirement-ps-ic-clean.ashx>

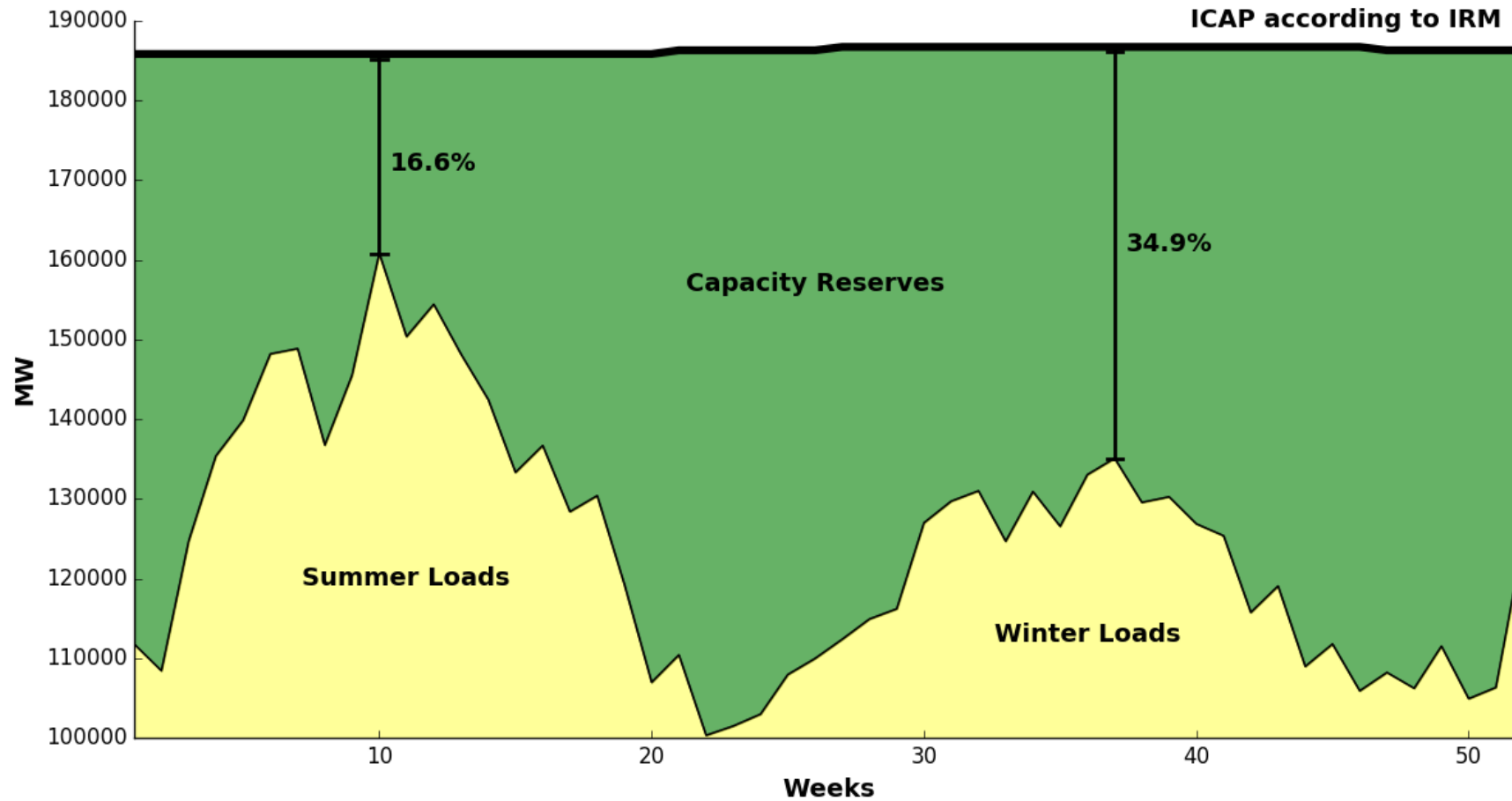
The Issue Charge has three Key Work Activities

- Winter peak load forecasting
- Winter season resource adequacy
- Winter season reliability requirements

Areas of Investigation

- Winter Load Forecast Accuracy
 - Monthly load profile and forecast distribution
- Winter Generation Performance
 - Common mode failures
 - Correlation with load level
 - Maintenance scheduling

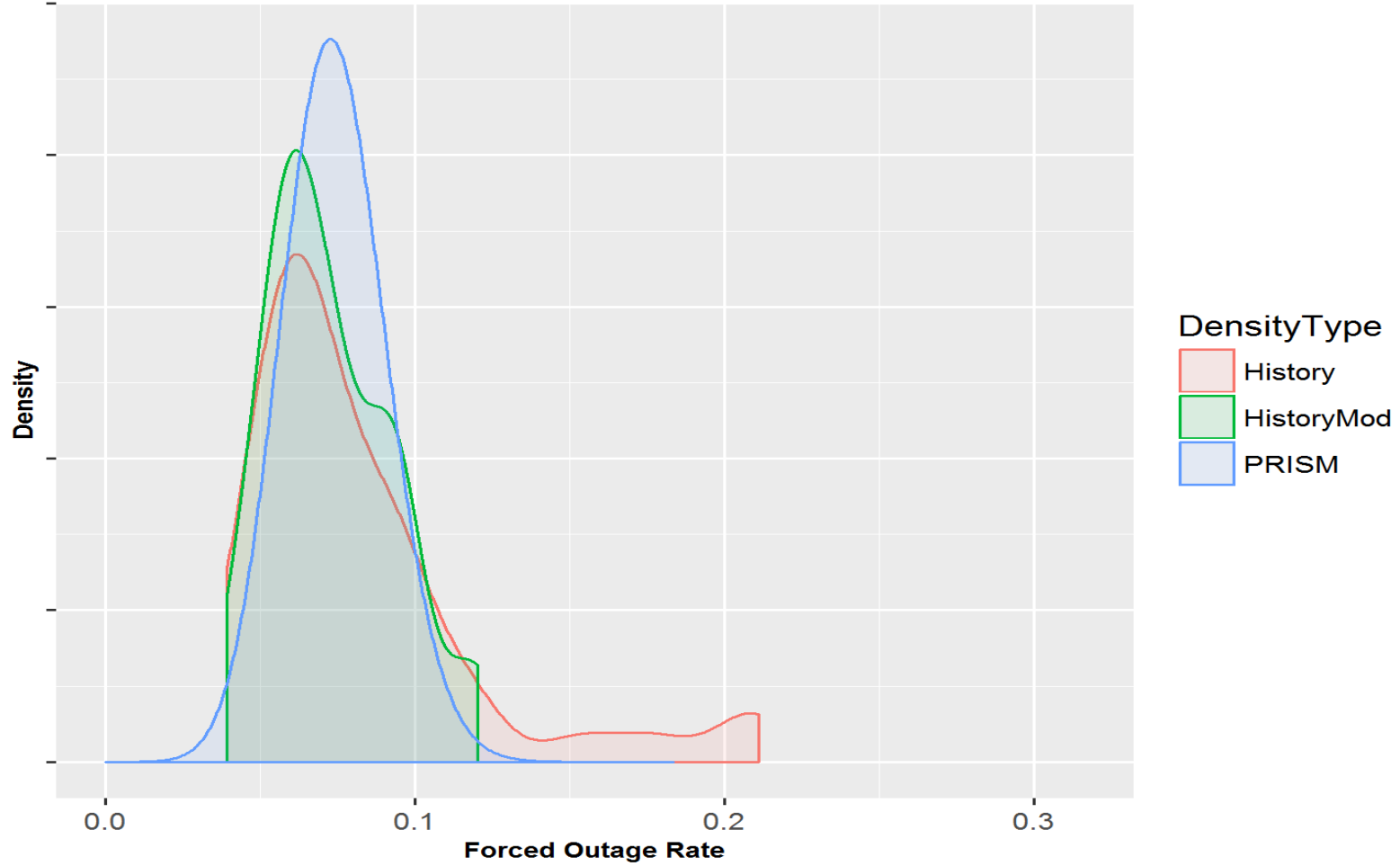
PJM Weekly Installed Capacity (ICAP) Reserves

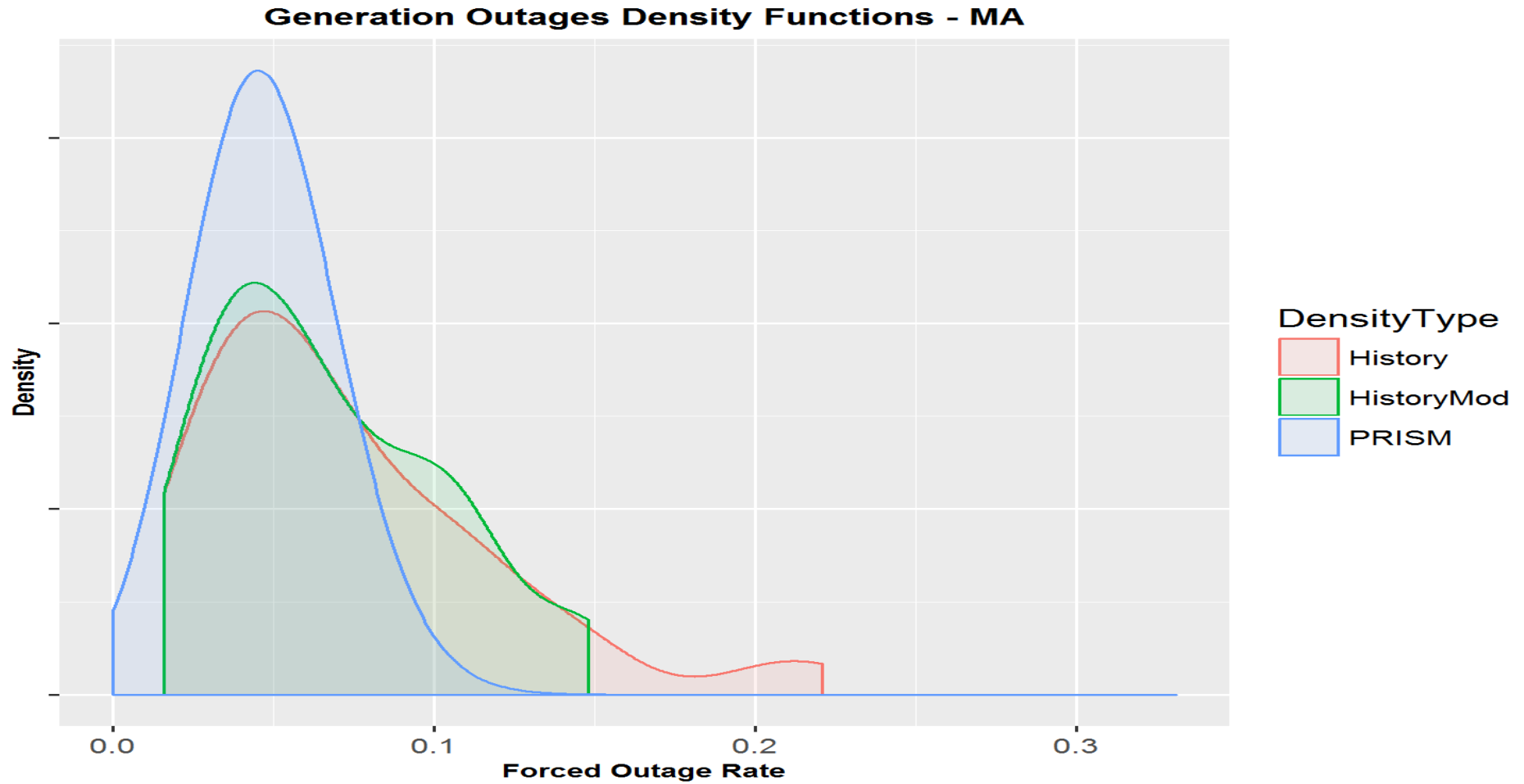


Description of Curves Plotted on Slides 6 and 7

- **PRISM Curve** - Based on individual unit EFORd's that are assumed to be mutually independent.
- **History Curve** – Based on system-wide forced outages from the five weekdays of the peak load week of each of the winters over the 9-yr period (DY2007/08-DY2015/16). (45 data points.)
- **History Mod Curve** – Same as History Curve but removes Winter 2014/15 peak week data (first polar vortex) and replaces it with Winter 2015/16 peak week data (second polar vortex).

Generation Outages Density Functions - PJM







Seasonal Unforced Capacity (UCAP) Requirements

The table below shows the summer and winter reliability requirements for the RTO and for three LDAs. The requirements are shown under four different allocations of LOLE risk between the summer and winter seasons.

The analysis includes generator performance data from both the 2014 and 2015 Polar Vortex events.

Zone	Annual RelReq	100 / 0 Allocation		90 / 10 Allocation		80 / 20 Allocation		70 / 30 Allocation	
		Delta Summer RelReq	Delta Winter RelReq	Delta Summer RelReq	Delta Winter RelReq	Delta Summer RelReq	Delta Winter RelReq	Delta Summer RelReq	Delta Winter RelReq
RTO	167393	0	0	433	-2	913	-1203	1461	-4193
MAAC	66385	0	0	190	-2727	410	-3957	660	-3957
EMAAC	36921	0	-2639	120	-4439	270	-4639	460	-5039
SWMAAC	15486	0	0	40	-698	90	-918	150	-1068

All numbers are in UCAP MW

Conclusion: The RTO winter requirement must be equal to the RTO summer requirement to satisfy the “1 in 10” LOLE criterion under both the 100/0 and 90/10 seasonal risk allocations.



Seasonal Unforced Capacity (UCAP) Requirements

The table below shows the summer and winter reliability requirements for the RTO and for three LDAs. The requirements are shown under four different allocations of LOLE risk between the summer and winter seasons.

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		100 / 0 Allocation		90 / 10 Allocation		80 / 20 Allocation		70 / 30 Allocation	
Zone	Annual RelReq	Delta Summer RelReq	Delta Winter RelReq	Delta Summer RelReq	Delta Winter RelReq	Delta Summer RelReq	Delta Winter RelReq	Delta Summer RelReq	Delta Winter RelReq
RTO	167393	0	0	433	-9202	913	-11798	1461	-12365
MAAC	66385	0	-3767	190	-6617	410	-7457	660	-7807
EMAAC	36921	0	-4209	120	-6019	270	-6359	460	-6619
SWMAAC	15486	0	0	40	-698	90	-928	150	-1068

All numbers are in UCAP MW

Conclusion: The RTO winter requirement must be equal to the RTO summer requirement to satisfy the “1 in 10” LOLE criterion under the 100/0 seasonal risk allocation. If the RTO summer requirement is increased by 433 MW, the RTO winter requirement could be reduced by 9,202 MW (90/10 Risk Allocation).

- Review summer and winter reliability requirements with the MRC on 9/28.
- Continue to evaluate operational risks in winter such as increasing penetration of gas generation.
- Continue to investigate winter load forecast model.
- Finalize Deliverables for the 10/26 MRC meeting.