Winter 2020-2021 Resource Assessment for the RF Region

ReliabilityFirst performs an annual seasonal winter assessment to ensure its footprint has adequate resources to serve anticipated load demand. RF developed this assessment collaboratively with data provided from both PJM and MISO. This article shares some highlights from the completed assessment.

For the upcoming 2020-2021 winter, MISO and PJM expect to have an adequate amount of resources to satisfy their respective planning reserve requirements based on anticipated load demand. The statistics supporting the resource outage risk analysis, which concludes that there should not be an issue supplying demand within the RF footprint this winter, are included in the following charts. However, if winter 2020-2021 experiences a higher than anticipated load demand, there is a small likelihood that the MISO area will need to utilize Demand Response (DR) to meet resource adequacy.

Due to the COVID-19 pandemic, RF has monitored challenges focusing around forecasting load and resources in the near-term. The generator maintenance outages that were deferred from spring of this year due to the pandemic look to be on track for completion in fall. Any extreme warm fall weather may affect scheduled maintenance outages, but there is no current indication that this maintenance work will be pushed into the peak of the winter season.

PJM Capacity and Reserves

Net Capacity Resources[1]	185,624 MW
Projected Peak Reserves	61,496 MW
Net Internal Demand (NID)	124,128 MW
Planning Reserve Margin	49.5%

The PJM forecast planning reserve margin of 49.5%is greater than the 15.5% margin requirement for the 2019 planning year. The planning reserve margin for this winter is higher than the 2019 forecast level of 43.6%. This is due to an increase in Demand Response Management, which in-turn reduces the Net Internal Demand (NID).

[1] Net capacity resources include existing certain generation and net scheduled interchange.

MISO Capacity and Reserves

Net Capacity Resources	146,445 MW
Projected Peak Reserves	47,814 MW
Net Internal Demand (NID)	98,631 MW
Planning Reserve Margin	48.5%

The MISO forecast planning reserve margin of 48.5% is greater than their margin requirement of 18.0% for the 2020 planning year. The planning reserve margin for this winter is higher than the 2019 forecast level of 39.1%. This is mostly due to an increase in Net Capacity Resources in MISO's footprint and a decrease in the sales of generation to entities outside of MISO.

RF Footprint Resources

Net Capacity Resources	202,533 MW
Projected Peak Reserves	68,255 MW
Net Internal Demand (NID)	134,278 MW
Total Internal Demand (TID)	144,437 MW

Since PJM and MISO projections have adequate resources to satisfy their forecasted planning reserve margin requirements, the RF region is projected to have sufficient resources for the winter.

The following analysis evaluates the risk associated with planned and random forced outages that may reduce the available capacity resources below the load demand obligations of PJM or MISO. Reports and/or other data released by PJM, MISO or NERC for this same period may differ from the data reported in this assessment due to different assumptions that were made by RF from the onset of the report. This analysis differs from NERC's in that RF uses actual historical Generator Availability Data System (GADS) data from a rolling five year period which provides a range of outages that occur during the winter period. The forecasted maintenance outages used in this analysis are derived from PJM and MISO GADS data for the winter months.

Exhibits 1 and 2 include the daily operating reserve requirement for PJM and MISO at the time of the peak demand as a load obligation. The range of expected generator outages is included for scheduled and random forced outages. The random forced

outages are based on actual NERC GADS outage data from December, January, and February of 2015 through 2019.

The committed resources in PJM and MISO are represented by the Resources bar in shades of blue and only include the net interchange that is a capacity commitment to each market. Additional interchange transactions that may be available at the time of the peak are not included, as they are not firm commitments to satisfying each areas reserve margin requirement.

The firm demand and the demand that can be contractually reduced as a DR are shown in shades of green. The firm demand constitutes the NID, with Total Internal Demand including the effects of DR. For the two sets of Demand bars, the 50/50 forecast projects a 50% likelihood that demand exceeds the forecast (e.g., 124,128 MW for PJM). The 90/10 forecast is a more conservative model, projecting a 10% chance of exceeding the forecast (e.g., 133,321 MW for PJM). Since DR is utilized first to reduce the load obligation when there is insufficient capacity, this part is at the top of the Demand bar. In the event that utilization of all DR is not sufficient to balance capacity with load obligations, system operators first may reduce operating reserves prior to interrupting firm load customers.

Exhibit 1 - 2020/2021 Winter PJM Resource Availability Risk Chart

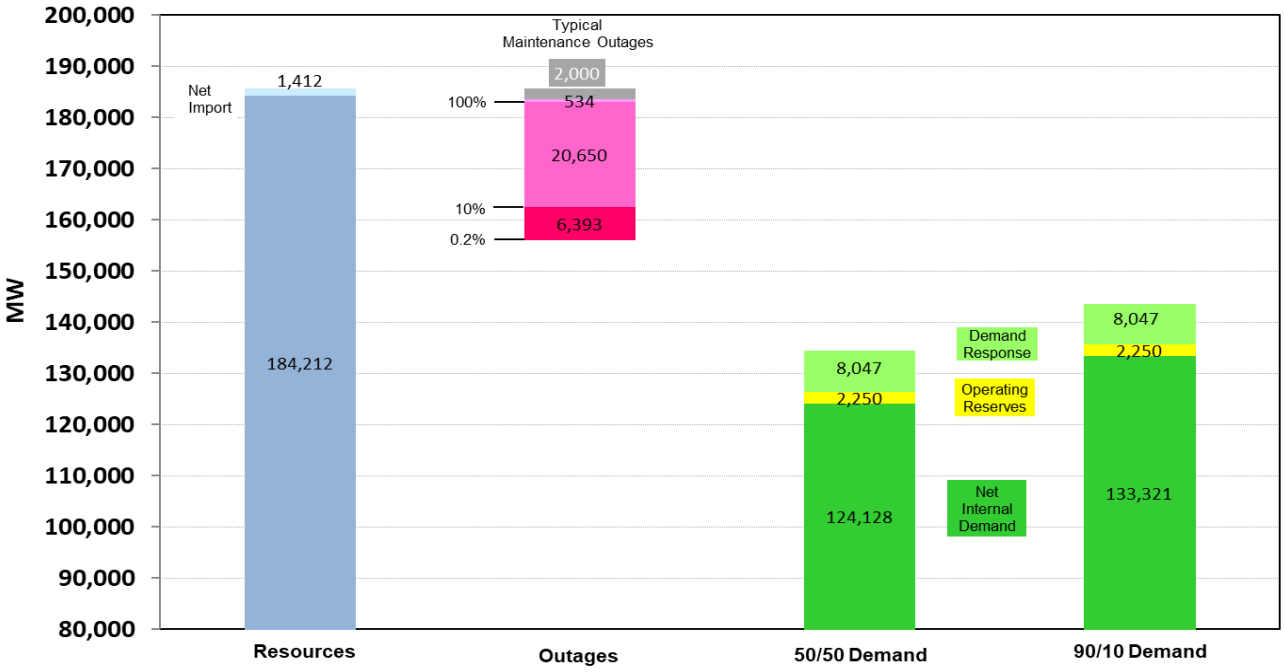
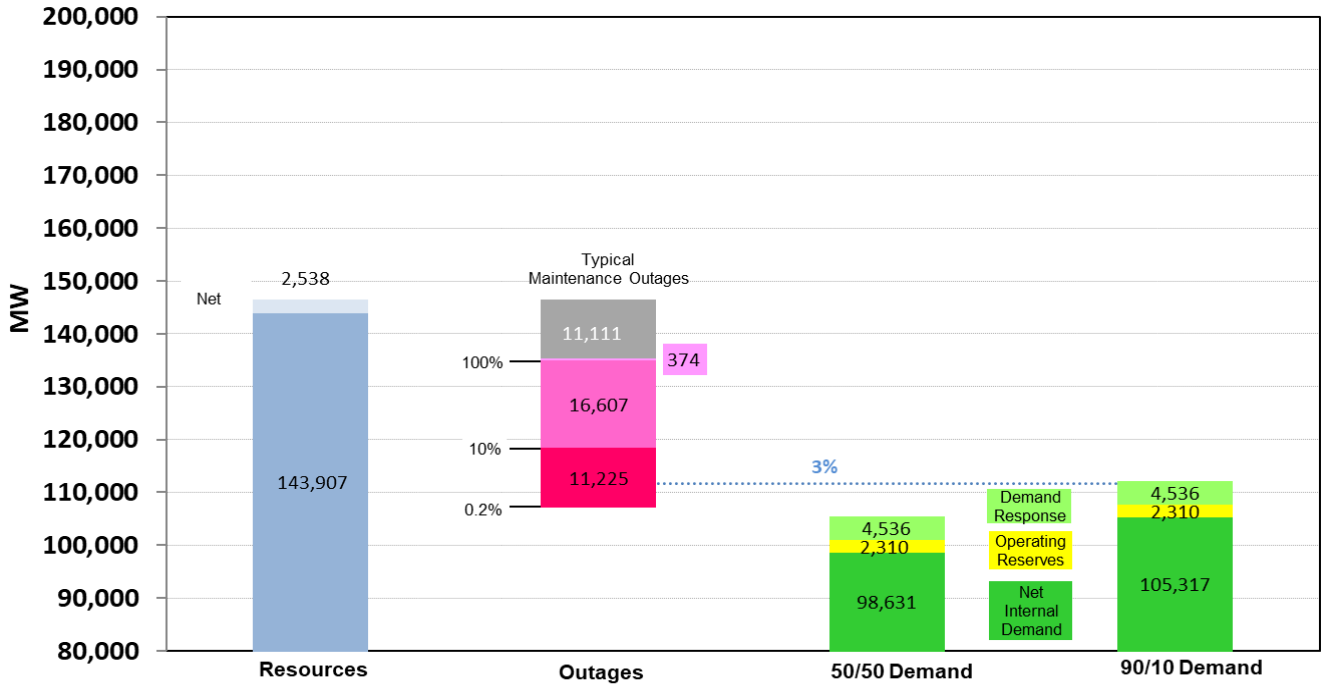


Exhibit 2 - 2020/2021 Winter MISO Resource Availability Risk Chart



While scheduled outages during the winter are generally minimal, there are a small number of outages that extend during the winter, which are reflected in the Scheduled Maintenance (colored gray) in the Outage bar. The remainder of the Outage bar represents the entire range of random forced outages. Pink shows 100% of the random forced outages while rose shows less than 100% down to 10% of the random forced outages. Additionally red shows less than 10% down to 0.2% of the random forced outages on the chart. All of the above occurred during the five-year reference period.

In the following discussion of the random forced outages, the analysis of random forced outages exceeding certain reserve margin targets is presented as a possibility. These are not based on a true statistical analysis of the available daily random outage data. Rather than statistical probabilities, these numbers represent the percentage of the daily outages during the five prior winter periods that would have exceeded the reserve margin that is listed. They are discussed as probabilities as a matter of convenience in describing the analysis results.

To the left side of the range of random forced outages are the probability percentages related to the amount of random forced outages that equal or exceed the amount of outages shown above that line on the Outage bar. Moving from top to bottom of the Outage bar represents an increasing amount of random forced outages, with a

decreasing probability for the amount of random forced outages. In the PJM chart, the random forced outages represented by the bar above the 100% point is 534 MW. This means that the probability of there being at least 534 MW of random generation outages is 100%. Similarly, at 10%, the outages represented by the bar above the 10% point is 21,184 MW (534 MW + 20,650 MW). There is a 10% probability that there will be at least 21,184 MW of outages. As shown by the probabilities and corresponding amounts of random forced outages, the distribution of is not linear throughout the range of outages observed.

To the right of the Outage bar are the probabilities of the random generation outages that correspond to different levels of demand obligation.

Exhibit 2 contains the information to perform the same analysis for MISO. The top of the 90/10 demand obligation with the operating reserves has a 3% probability that DR will be required.