Reliability Resource Risk Assessment

RF annually performs a seasonal winter reliability assessment to ensure that its footprint has adequate resources to serve anticipated demand. This assessment is comprised of two distinct types of analysis for each assessment area, PJM and MISO, which are defined below.

1. Capacity and Reserve Analysis – this is a review of additional capacity resources, called Planning Reserve Margin, compared to the resources needed to meet a loss of load expectation of one day in 10 years, called the Reserve Margin Requirement.
2. Random Generator Outage Risk Analysis – this is a review of the potential for large amounts of resource unavailability combined with expected and higher than anticipated demand (associated with historical worst-case scenarios).

RF developed this assessment collaboratively with data provided from both PJM and MISO. This article shares some highlights from the analysis.

Capacity and Reserves Analysis

For the upcoming winter of 2023-2024, both MISO and PJM are expected to have adequate resources to satisfy their respective Reserve Margin Requirements.

- However, if the upcoming winter experiences a higher than anticipated number of resource outages, there is a likelihood that PJM and MISO areas will need to utilize operating measures to serve forecasted load demand and maintain reliability. These operating measures include Load Modifying Resources, non-firm transfers into the system, and energy-only interconnection service resources not receiving capacity credit.
- Note that this risk increases in probability when the forecasted load demand for the 2023-2024 winter is higher than expected.
- In addition to these operating measures, MISO has additional resources in the southern portion of its footprint that can be called upon for increased internal transfers. This step could be considered in case of emergency only, as it would mean exceeding the Sub-Regional Import/Export Constraint between the MISO North/Central and South regions.
- The resource outage risk assessment, outlined below, further assesses the capability of both MISO and PJM to meet their anticipated load demand under random resource outage scenarios based on actual Generator Availability Data System (GADS) outage data.

Additional factors

Reliable operation of the thermal generating fleet is critical to winter reliability. That, coupled with assuring adequate fuel supplies, are ongoing winter reliability concerns. Present domestic and global affairs warrant even greater attention on generator fuel supplies, including natural gas, fuel oil, and coal, for the upcoming winter.

While many factors that contributed to uncertain rail shipment of coal to electric generators prior to the 2022-23 Winter Resource Reliability Risk Assessment have subsided, other transport issues have emerged for this winter. Drought conditions impacting the Missouri River and other major navigable rivers could restrict coal availability and cause units to run at a derated level to conserve coal inventory. Low water levels can also affect generators that rely on once-through cooling processes by limiting the generator's capacity output. Careful attention to periodic fuel surveys is needed to provide early indication of fuel supply risks.

PJM Capacity and Reserves

Net capacity Resources [1]	178,188 MW
Projected Peak Reserves	50,710 MW
Net Internal Demand (NID)	127,478 MW
Planning Reserve Margin	39.8%

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

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The PJM forecast Planning Reserve Margin of 39.8% is greater than the 27% Reserve Margin Requirement for the 2023 planning year. However, the Planning Reserve Margin for this winter is lower than the 2022 forecast level of 45.9%. This is due to a decrease in existing certain generation and the increase in Net Internal Demand (NID). Based on the numbers provided, under expected operating conditions PJM will satisfy its reserve margin requirement.

MISO Capacity and Reserves

The MISO forecast Planning Reserve Margin of 55.8% is greater than their Reserve Margin Requirement of 25.5% for the 2023 planning year. The Planning Reserve Margin for this winter is higher than the 2023 forecast level of 43.1%.

Net Capacity Resources	147,097 MW
Projected Peak Reserves	52,703 MW
Net Internal Demand (NID)	94,394 MW
Planning Reserve Margin	55.8%

MISO has filed and implemented a seasonal resource adequacy construct and seasonal unit accreditation to better affirm adequate supply in all seasons. As a result, MISO has raised Reserve Margin Requirement levels for the 2023-24 Winter season. The 2023-2024 Planning Resource Auction conducted in April 2023 was the first implemented under the seasonal construct.

With the transition to seasonal capacity auctions, shifting risk across the seasons appropriately and seasonal accreditation, MISO is projecting sufficient capacity margins in excess of the reserve margin requirements for this winter season.

RF Footprint Resources

Since both PJM and MISO projections have adequate resources to satisfy their respective forecasted Planning Reserve Margin requirements, the RF region is projected to have sufficient resources for the 2023-2024 winter period.

Random Generator Outage Risk Analysis

The following analysis evaluates the risk associated with planned and random forced generation resource outages that may reduce the available capacity resources to a level that is below the load demand obligations of both PJM and MISO. Reports and/or other data released by PJM, MISO and NERC for this same period may differ from the data reported in this assessment due to different assumptions that were made by RF.

Net Capacity Resources	195,083 MW
Projected Peak Reserves	60,718 MW
Net Internal Demand (NID)	134,365 MW
Total Internal Demand (TID)	141,738 MW

This analysis differs from NERC's in that RF uses actual historical GADS data from a rolling five-year period, which provides a range of outages that occur during the winter period.

RF created a Resource Availability Risk Chart for both PJM and MISO based on the anticipated conditions for the upcoming 2023-2024 winter

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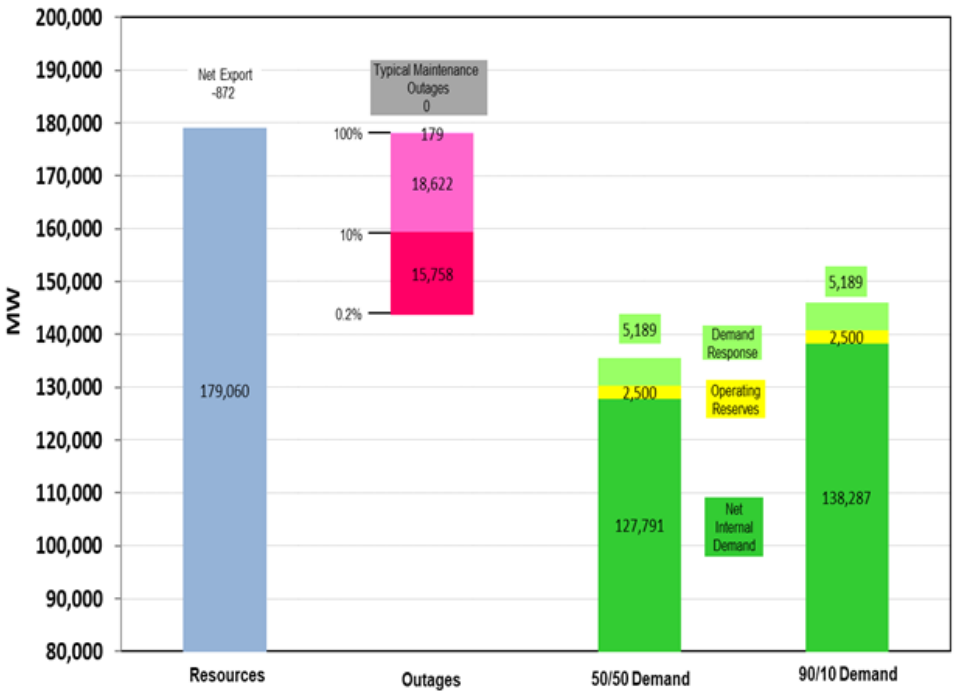
Exhibit 1 - 2023/2024 Winter PJM Resource Availability Risk Chart



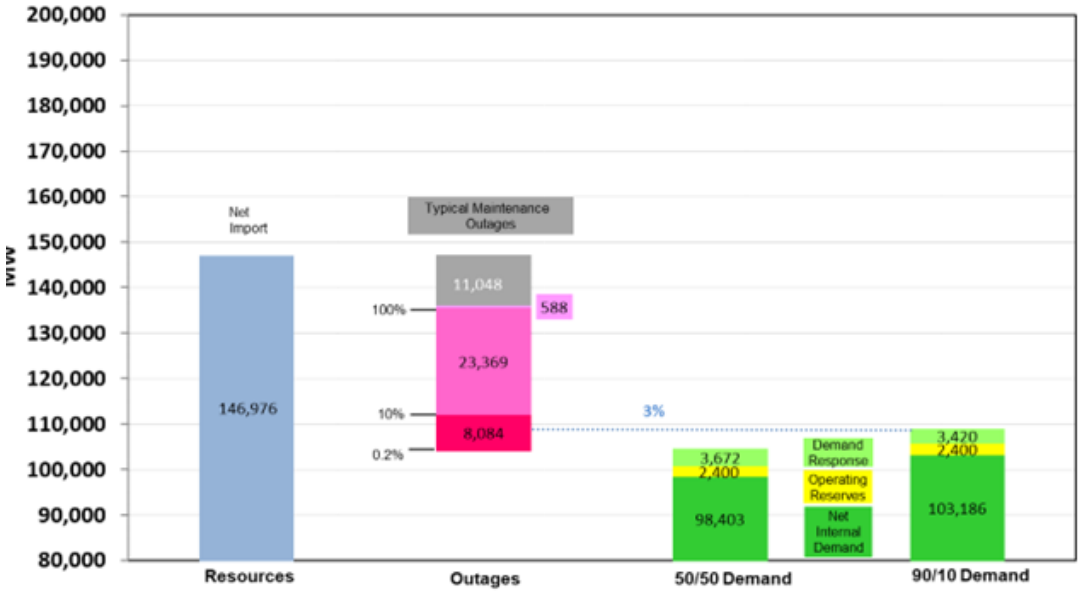
season[1]. The intent of these charts is to identify potential risks with having enough resources[2] available to serve demand.

A risk indicator from the charts is when the Outages[3] (gray and red tinted bars) overlap with Demand (green and yellow bars). Outages are presented as a probability[4] of occurrence. This risk will likely result in conservative operations, initiation of Load Modifying Resources/Demand Response programs, and/or utilization of operating reserves. In the event that utilization of all Demand Response is not sufficient to balance resources with demand, system operators may first reduce operating reserves prior to interrupting firm load.

In Exhibit 1 for PJM, there is a minimal risk that the amount of outages would require Demand Response for both the 50/50 and the 90/10 demand forecast for the upcoming winter.

In Exhibit 2 for MISO,there is a 3% probability that Demand Response will be required during high demand (90/10 demand).

Exhibit 2 - 2023/2024 Winter MISO Resource Availability Risk Chart



[1]Winter constitutes the months of December, January, and February.

[2]Resources 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 area's reserve margin requirement.

[3]Outages include planned maintenance outages (gray bar) and random forced outages (red tinted bar).

[4]Probability is 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.