



Winter Assessment

Reliability Subcommittee (RSC)

Winter Readiness Forum

October 28, 2021

Purpose & Key Takeaways



Purpose: Provide an overview of projected system conditions from a generation perspective for the upcoming winter season

Key Takeaways:

- In a low generation, high outage scenario, January appears most at risk for capacity shortages
- Under probable generation scenarios, MISO projects sufficient capacity to cover most peak periods, although LMR support may be needed if sufficient non-firm imports are unavailable

Under typical demand and outage scenarios, adequate firm resources are projected to be available to cover Winter months, although January may be challenging in an extreme weather event

MISO 2021-2022 Winter Forecast	
December 50/50 Peak Forecast	94 GW
December Projected Available Capacity*	105 GW
January 50/50 Peak Forecast	101 GW
January Projected Available Capacity*	106 GW
February 50/50 Peak Forecast	95 GW
February Projected Available Capacity*	108 GW

2021-22 Winter monthly projected available capacity is net of 5-year average monthly historical generation outages during peak periods

**Includes Installed Capacity of Planning Resource Auction cleared resources, with wind and solar at capacity credit, net of historical generator outages*

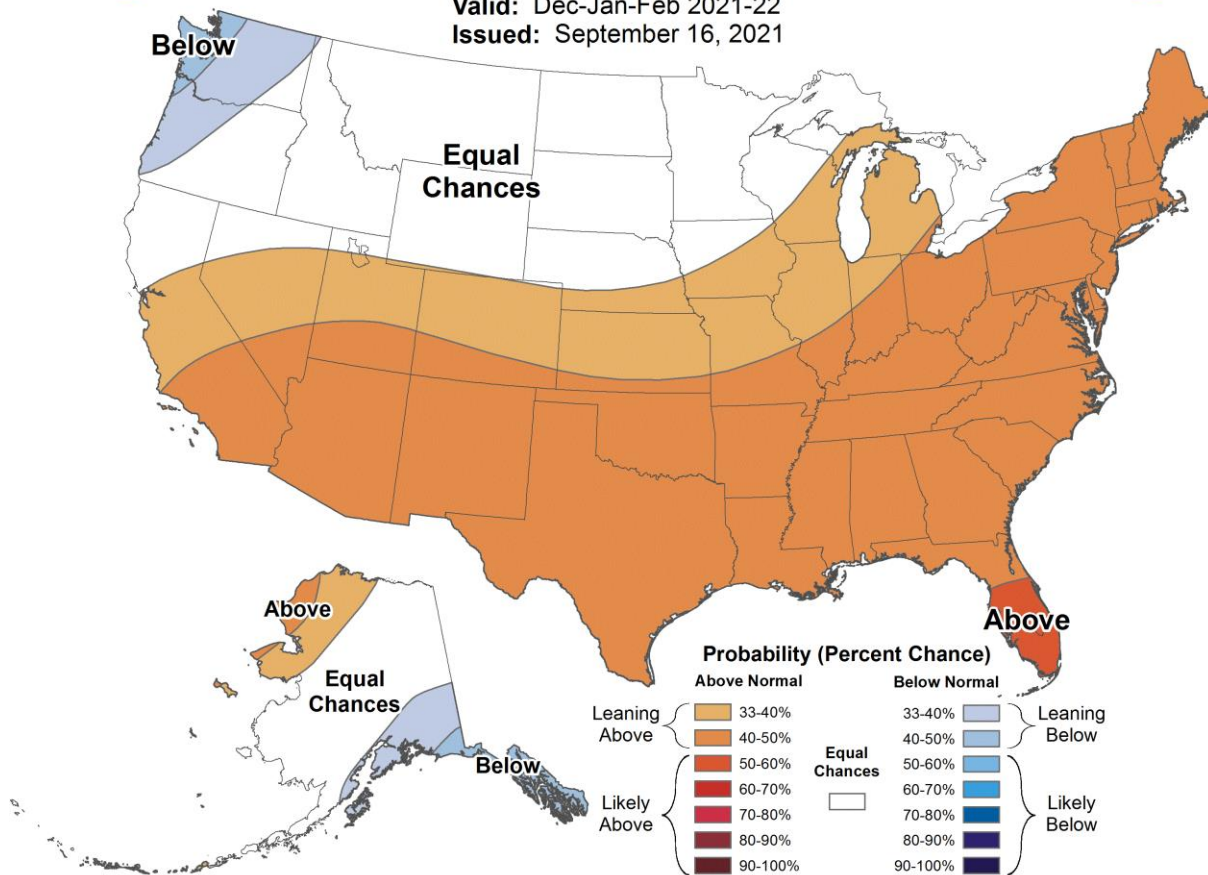
NOAA Temperature and Precipitation Forecasts



Seasonal Temperature Outlook



Valid: Dec-Jan-Feb 2021-22
 Issued: September 16, 2021

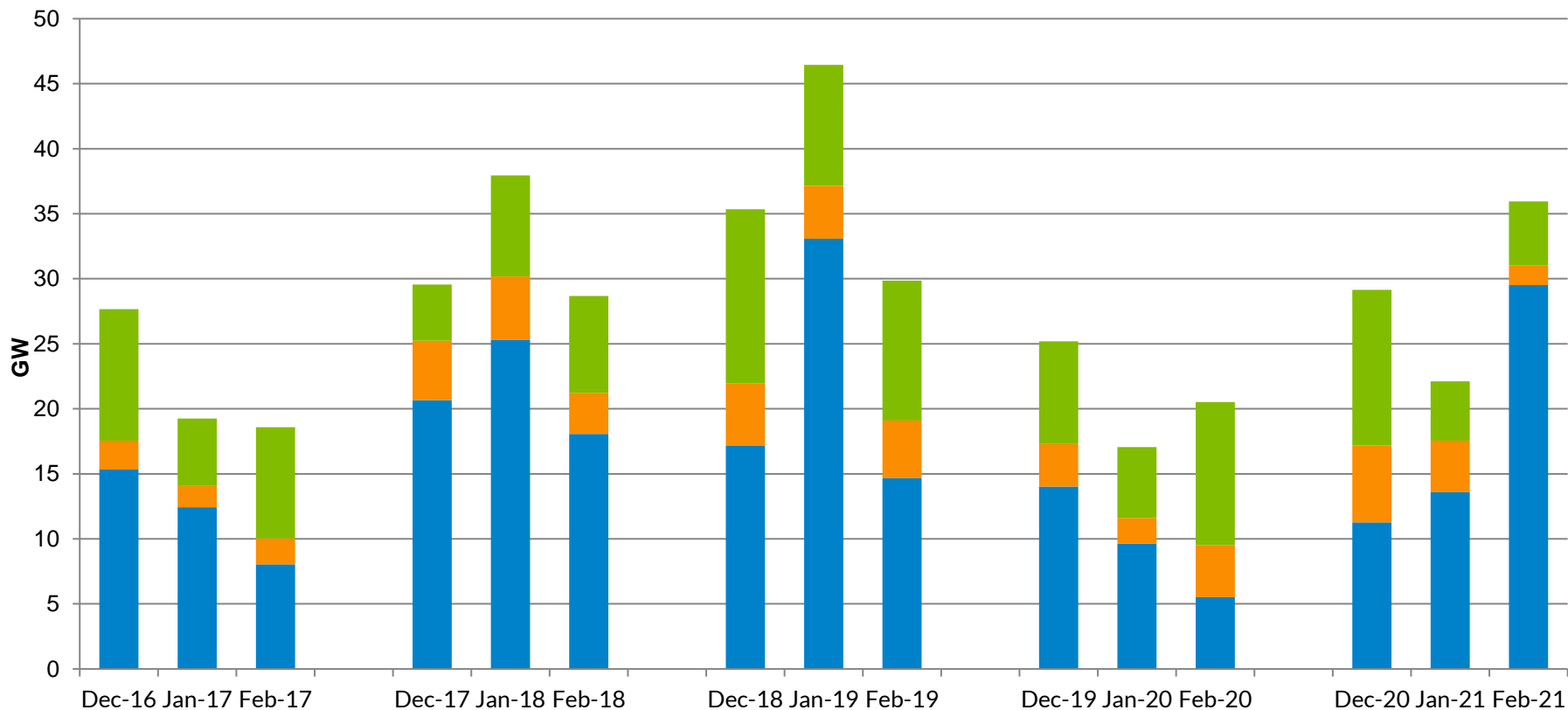


All-time Winter Peak
 109 GW on January 6th, 2014

Precipitation Forecast

NOAA forecasts above average precipitation across most of Zones 2, 4, 6 and 7 while it is expected that parts of Zones 9 and 10 will be slightly below normal

During the monthly peaks of the last winter season, historical outages varied above and below average for each of the months in the season



- Forced Outages
- Maintenance Outages
- Planned Outages

	Forced Outages (GW)	Total Outages (GW)
Average of 15 monthly peaks	16.6	28.2
Maximum seasonal peak	33.1	46.4

Two deterministic scenarios (typical and worst case) are evaluated to capture potential risk this upcoming winter

Generation

Probable Capacity

- Removes an **average** volume of resource outages¹ (forced, planned, and maintenance)

Low Generation Capacity (Worst Case Outage)

- Removes a **worst case** volume of resource outages¹ (forced, planned, and maintenance), typically because of non-normal weather conditions

Load

Probable Load Forecast

- 50/50 forecast², provided by Market Participants

High Load Forecast

- 90/10 forecast³



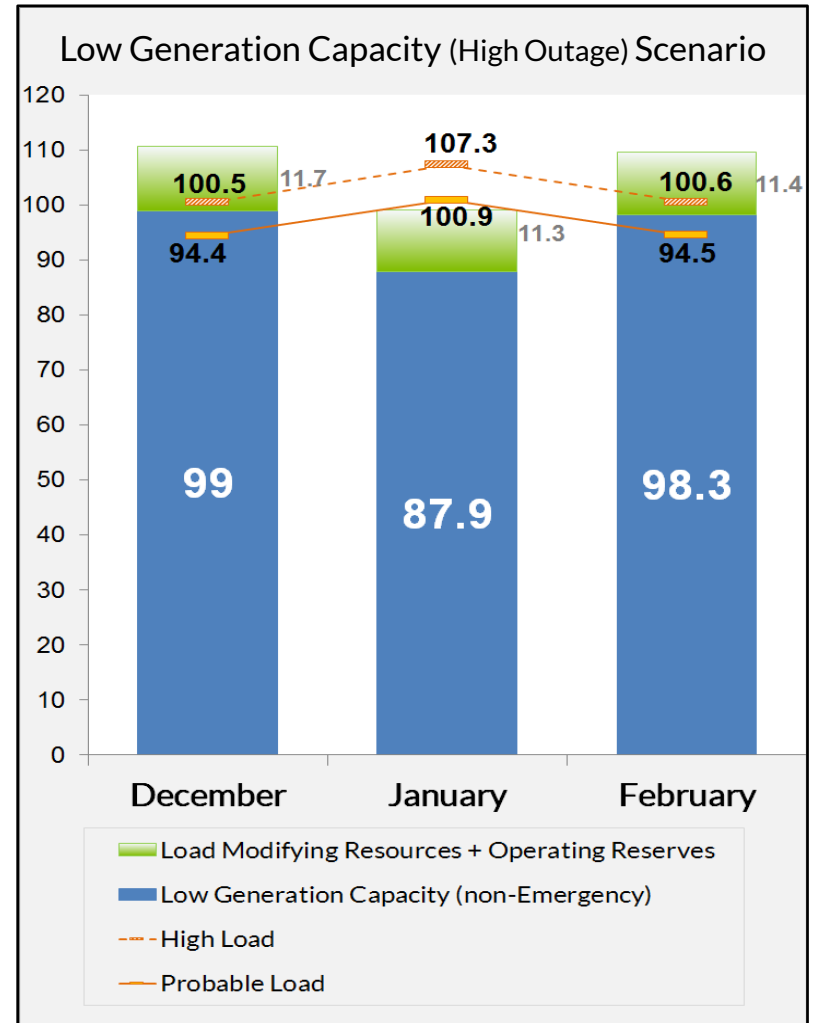
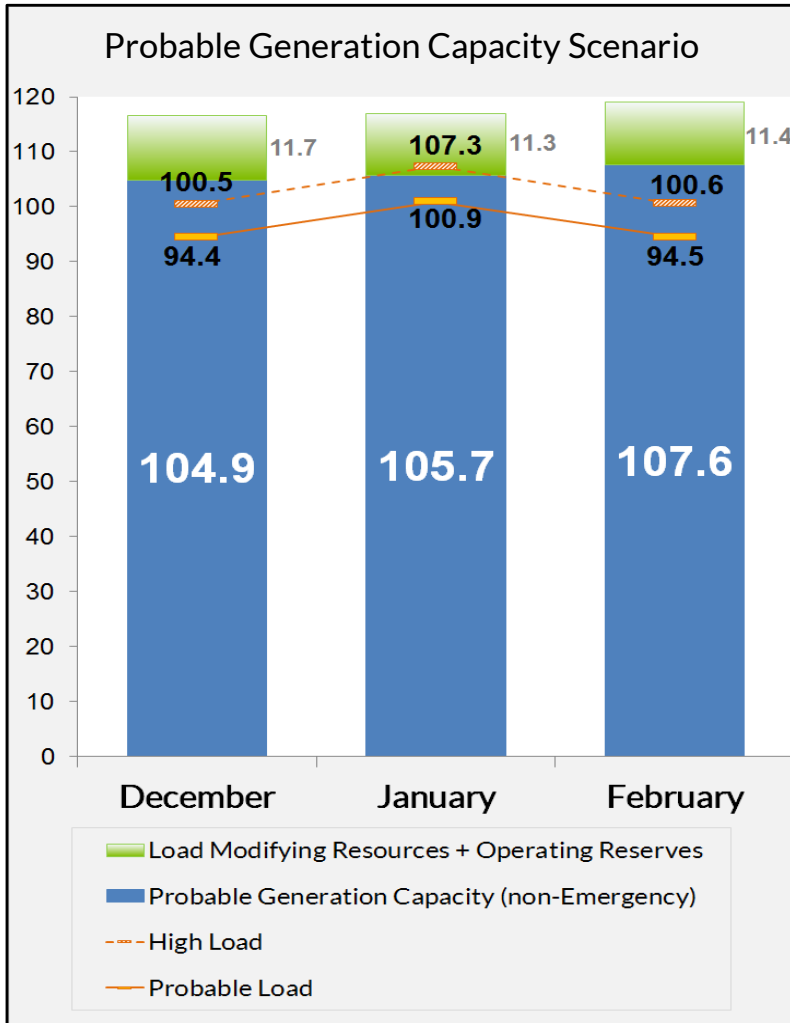
¹ Based on 5-year historical outage information provided by Resource Owners

² 50% chance of the actual load being lower and 50% chance of the actual load being higher

³ 90% of the actual load being lower and 10% chance of the actual load being higher

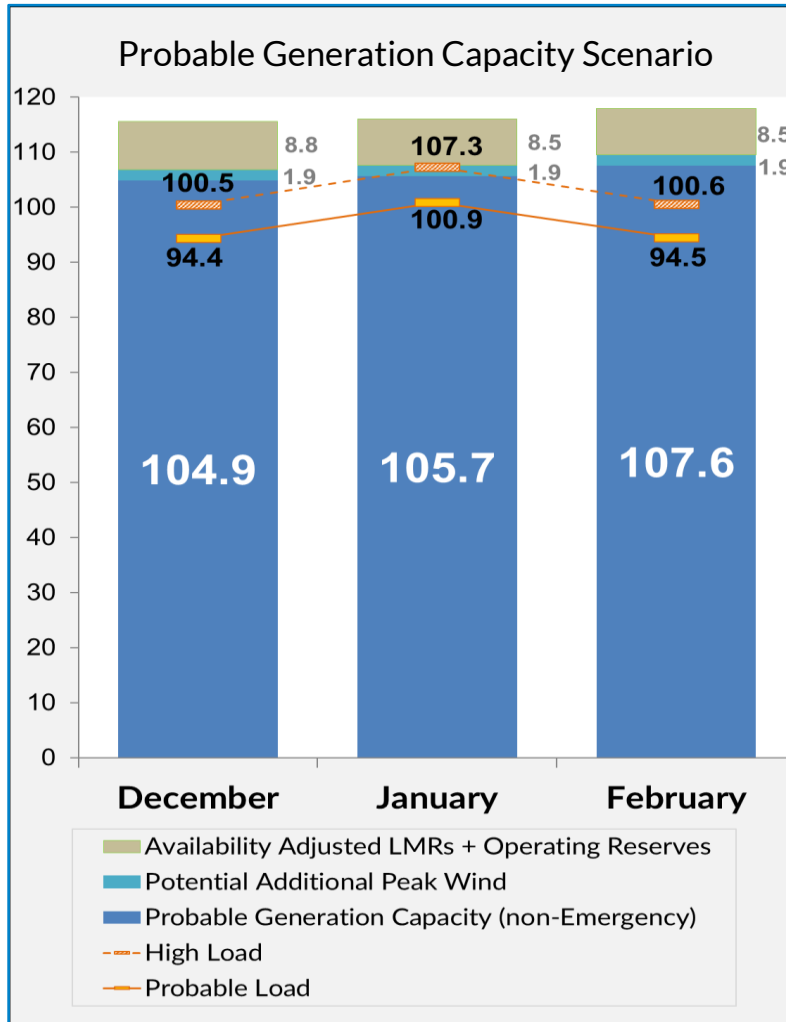
A combination of both high load and high outages could drive operational challenges for the Winter 2021-22 season

Winter 2021-22 Resource Adequacy Projections – System-wide



Alternative Probable Generation scenario showing LMR values at expected contribution levels and including potential additional wind generation

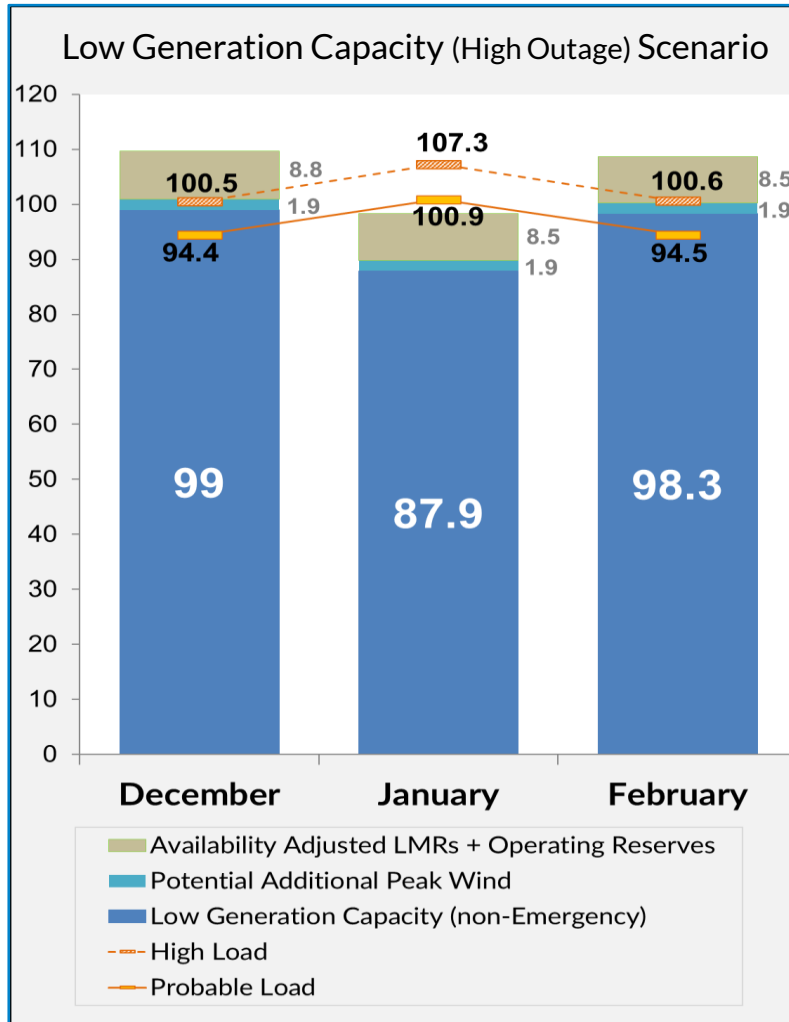
Winter 2021-22 Resource Adequacy Projections – System-wide



- Availability Adjusted LMRs calculated by applying the ratio of expected vs. available LMRs in Winter 2020 to the expected LMR amounts in Winter 2021 – Source: MISO Monthly Operations Report
- Additional wind generation of 1.9 GW is a rough assumption of potentially available additional wind capacity in the Winter season
- Operating Reserves maintained at 2.4 GW

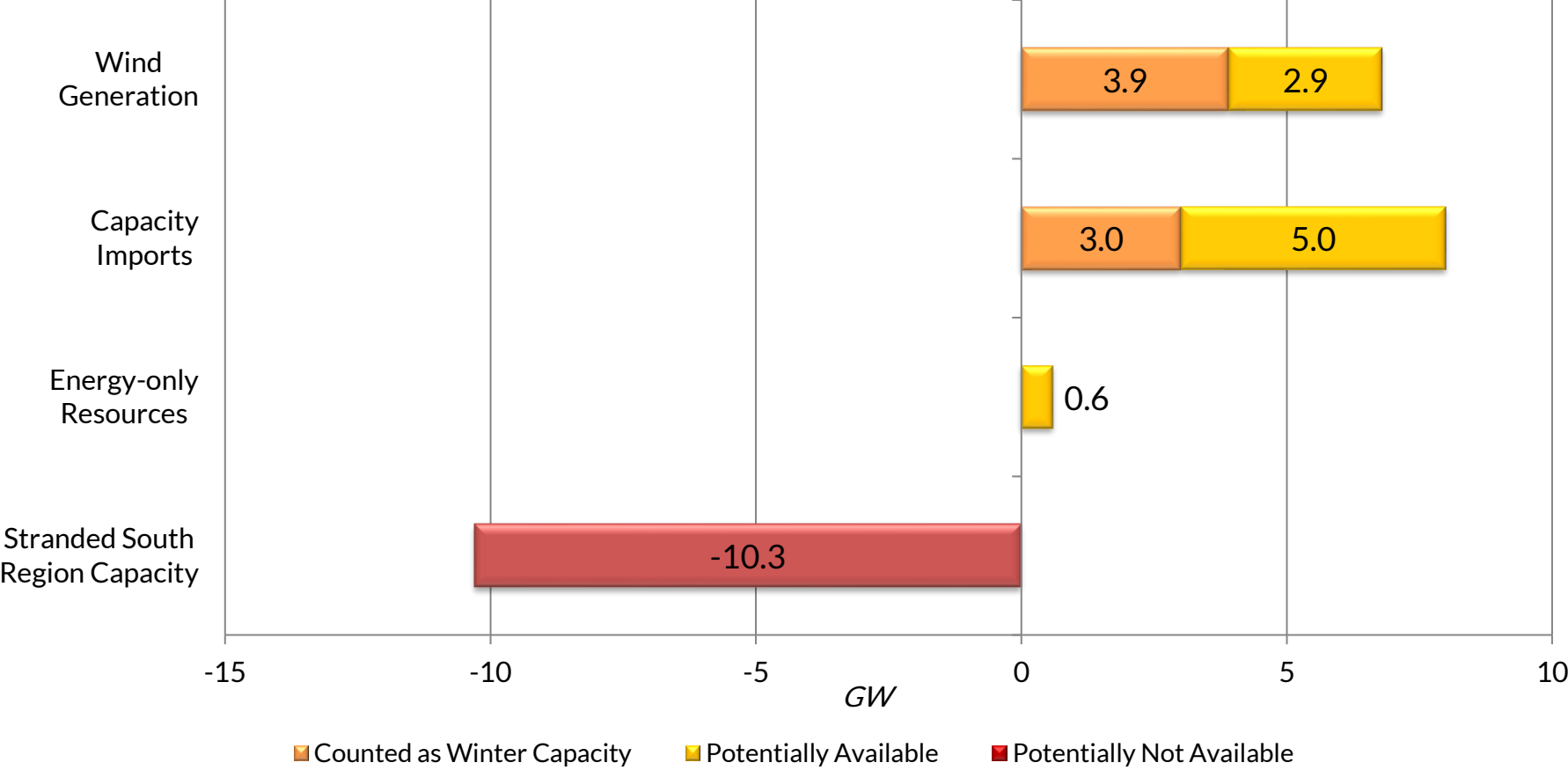
Alternative Low Generation/High Outage scenario showing LMR values at expected contribution levels and potential additional wind generation

Winter 2021-22 Resource Adequacy Projections – System-wide



- Availability Adjusted LMRs calculated by applying the ratio of expected vs. available LMRs in Winter 2020 to the expected LMR amounts in Winter 2021 – Source: MISO Monthly Operations Report
- Additional wind generation of 1.9 GW is a rough assumption of potentially available additional wind capacity in the Winter season
- Operating Reserves maintained at 2.4 GW

The need for emergency procedures will be impacted by the availability of non-firm resources



Contact Information

- Contact Tim Bachus in MISO Resource Adequacy Operations at tbachus@misoenergy.org with questions or comments

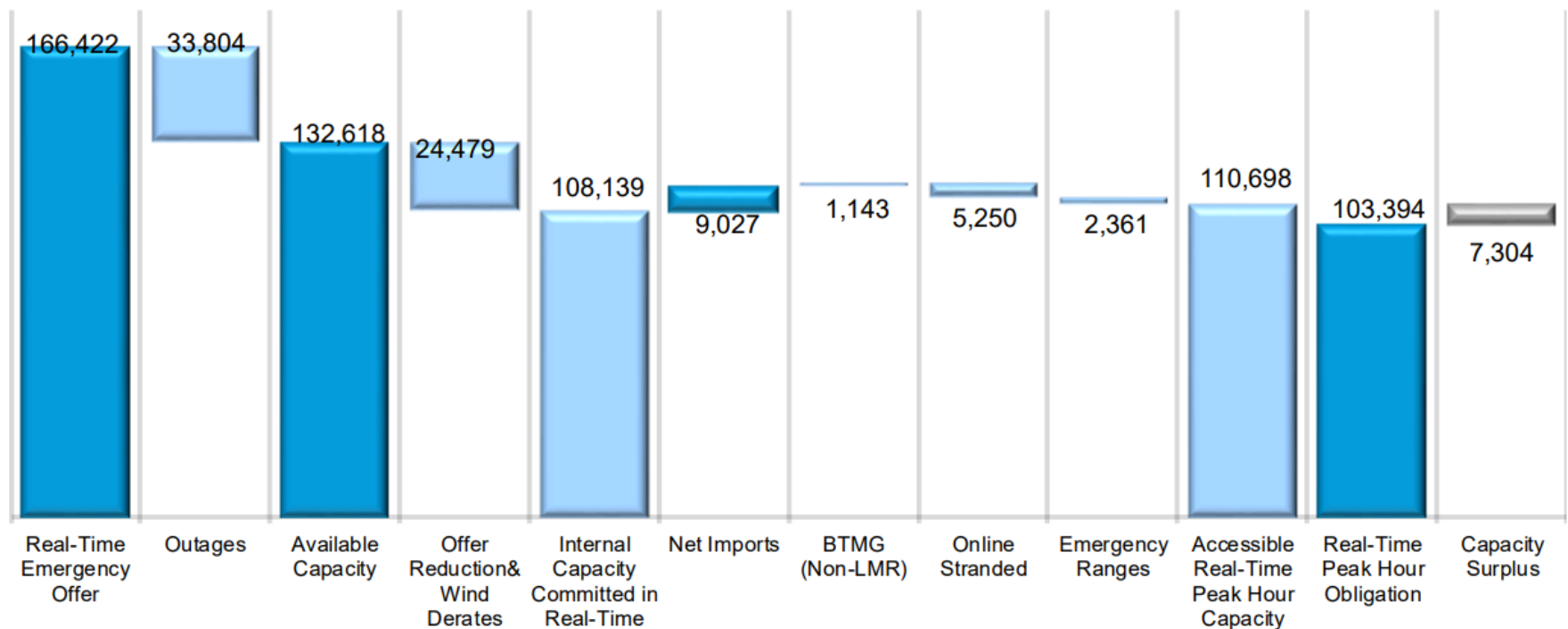
Generation Resource Assessment Appendix

After the fact review of a recent winter peak

Figure II-1: Demand and Capacity Analysis for the Peak Hour of the 2019 Winter

Peak Load Hour: January 30th, 2019 HE 20

Values in MW



MISO Max Gen Alerts History

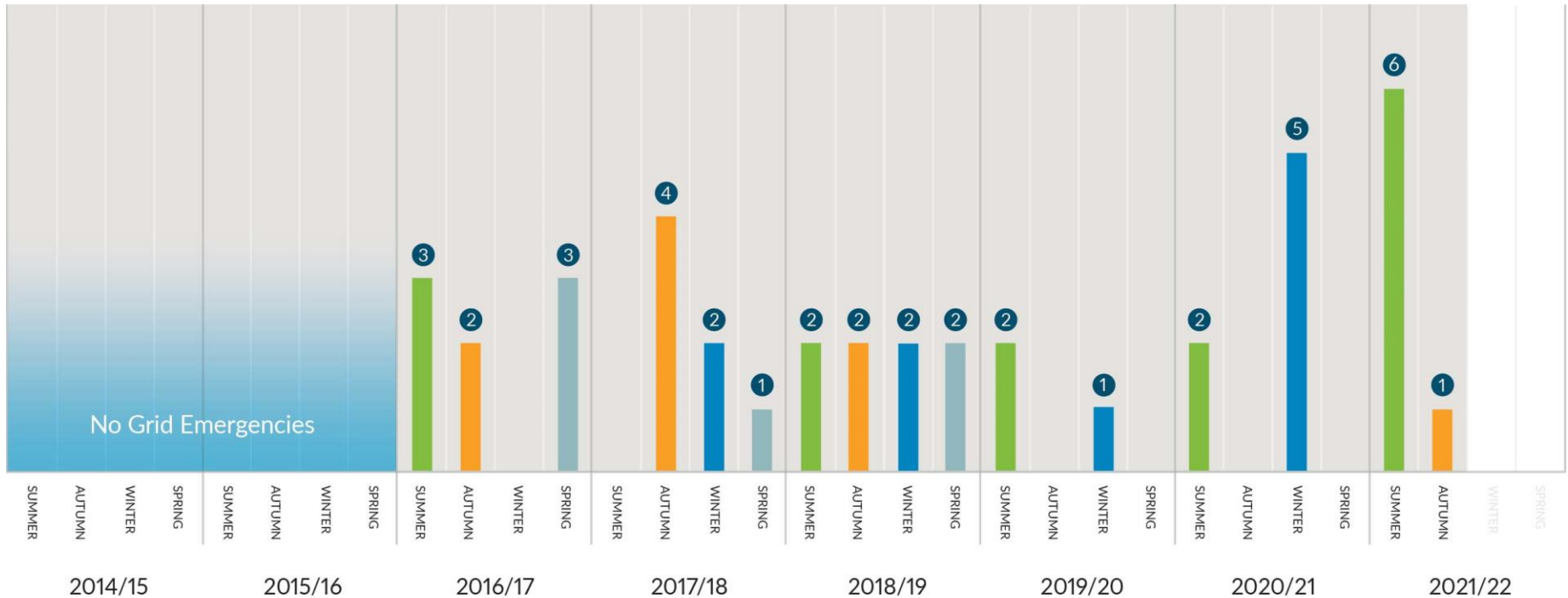


Chart indicates the number of days under a max gen alert, warning or event.

Planning generation outages outside of projected peak times is critical to maintaining reliability

Winter 2021-2022 Planned Generation Outages

