2024 RTO Membership Analysis
Appendix 5

2024 OMS-MISO Survey Results

Furthering our joint commitment to regional resource adequacy, OMS and MISO are pleased to announce the results of the 2024 OMS-MISO Survey

CORRECTIONS
Reposted 6/20/2024
Slide 11 PRM% Updated

June 20, 2024

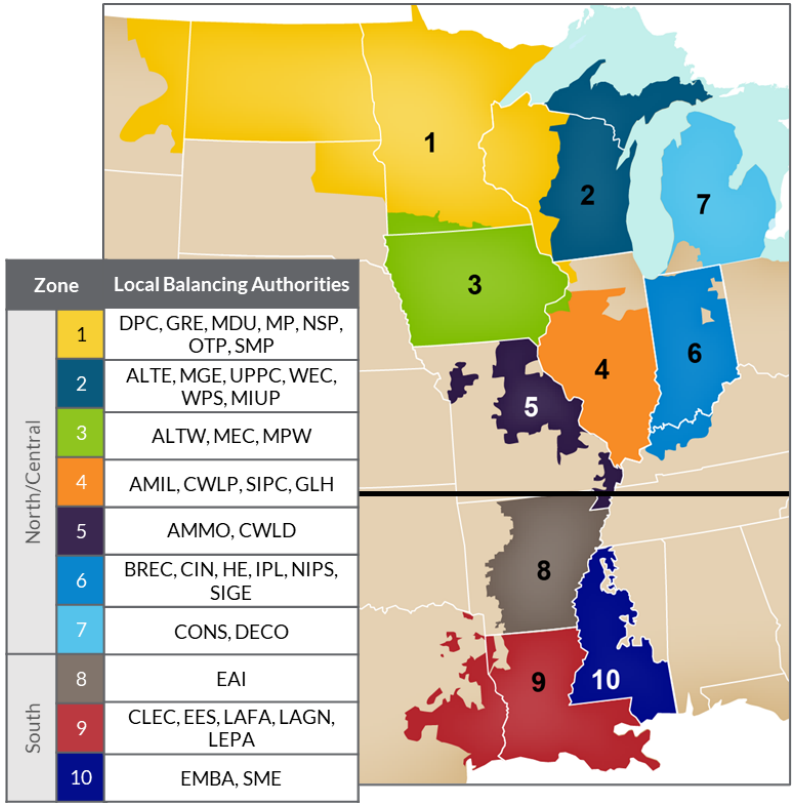
The 2024 OMS-MISO Survey reinforces near-term risks and highlights key uncertainties impacting resource adequacy in the MISO region

- Results indicate a potential surplus of 1.1 GW to a deficit of 2.7 GW for the summer of PY2025/26, depending on critical, yet uncertain, drivers such as the pace and quantity of new resource additions and projected resource retirements.
- Resource Adequacy risks could grow over time across all seasons, absent increased new capacity additions and actions to delay capacity retirements.
- Significant economic development activities are spurring new, large spot-load additions (e.g., data centers, onshoring of manufacturing, new industrials) and increasing pressures on resource adequacy and requiring improved abilities for the timely addition of new resources.
- Recent reforms to MISO's resource adequacy construct will enhance MISO's ability to accurately assess the changing resource adequacy risks driven by extreme weather, the rapid growth of weather-dependent resources, and the retirement of dispatchable resources.
- Results highlight resource adequacy challenges in the MISO region and the need for continued collaboration between OMS, MISO, and its Members to maintain a reliable electricity system.

All presentation references to capacity indicate Seasonal Accredited Capacity (SAC)

The OMS-MISO Survey provides a resource adequacy view over a five-year horizon based on currently available information

- The survey results indicate the degree to which expected capacity resources satisfy planning reserve margin requirements with either a surplus or a deficit.
- The survey considers that Load Serving Entities (LSEs) within each zone must have sufficient resources to meet load and required reserves.
- Surplus resources may be shared among LSEs with resource deficits to meet reserve requirements.



	Zone	Local Balancing Authorities
North/Central	1	DPC, GRE, MDU, MP, NSP, OTP, SMP
	2	ALTE, MGE, UPPC, WEC, WPS, MIUP
	3	ALTW, MEC, MPW
	4	AMIL, CWLP, SIPC, GLH
	5	AMMO, CWLD
	6	BREC, CIN, HE, IPL, NIPS, SIGE
	7	CONS, DECO
South	8	EAI
	9	CLEC, EES, LAFA, LAGN, LEPA
	10	EMBA, SME

This year's survey includes an updated baseline methodology to reflect the changing pace of new resource additions. Various scenarios for projected capacity and anticipated large spot-load additions across the MISO region are also included to highlight the increasing uncertainty and evolving risk.

90% of existing generation capacity participated in OMS-MISO Survey in 2024.

Additional factors can impact projected deficits or surpluses that are observed in the survey

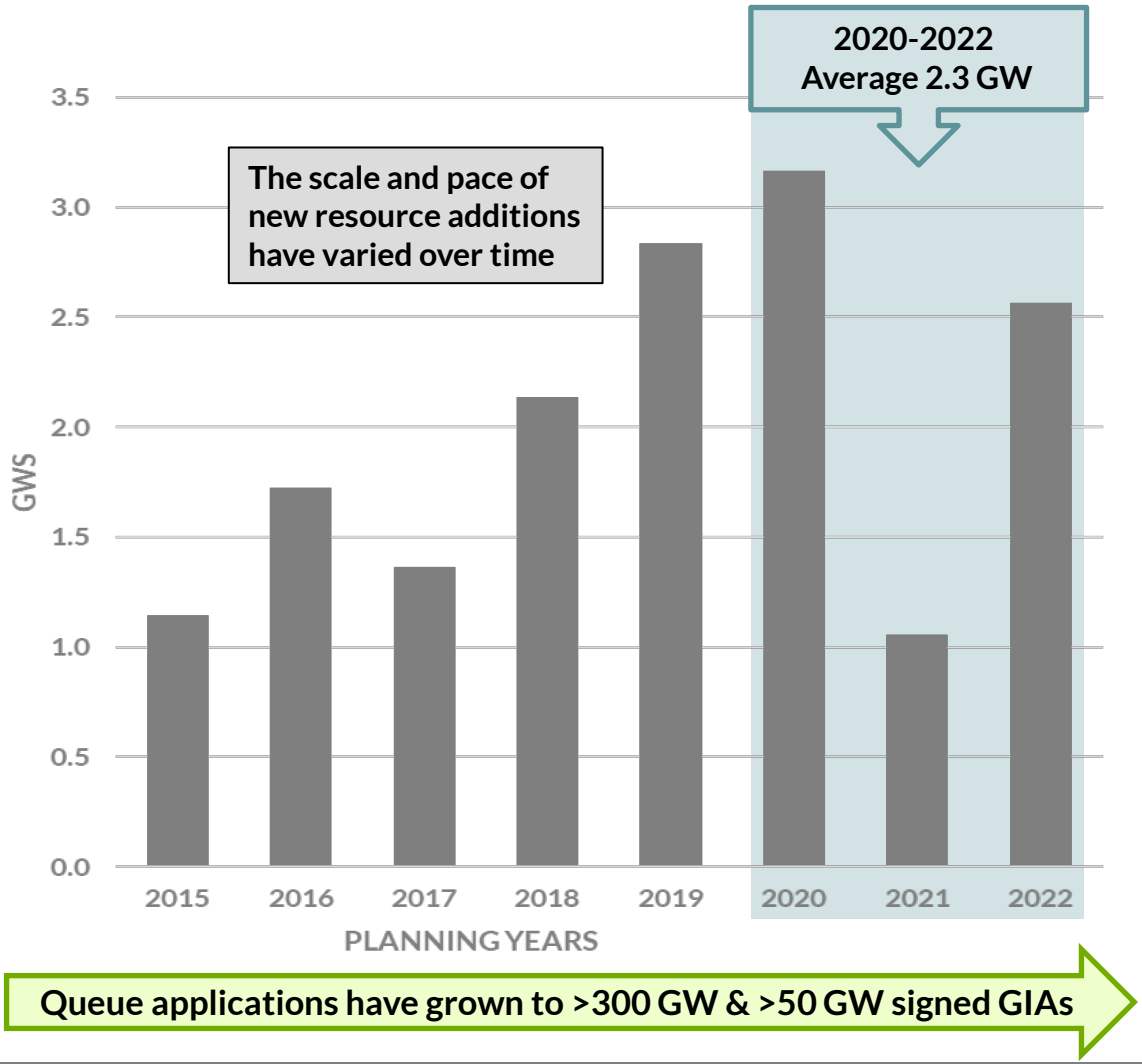
Downside Risks

- Continuing rapid pace of resource retirements
- EPA regulations further accelerating resource retirements
- Ongoing delays to capacity additions due to supply chain bottlenecks, permitting delays, and commercial challenges
- Continued queue challenges due to exceptionally large accumulated backlog and expectations for high quantities of future applications
- Higher load growth due to economic development and new, large spot-load additions (e.g., data centers and onshoring of manufacturing/new industrials), absent an improved ability to concurrently add new resources

Upside Possibilities

- Substantial new capacity enabled by the easing of supply chain bottlenecks, permitting constraints, and labor shortages
- Continued queue improvements to reduce speculative quantities and associated delays
- Market responses to local capacity deficits
- Improved price signals through market reforms, such as the Reliability Based Demand Curve, incentivizing additional capacity
- Improved ability to add new resources and support economic development and related new, large spot-load additions

Trends and market pressures related to new capacity additions suggest refinements are needed to better reflect uncertainty



In the past, it was reasonable to use probability-adjusted estimates applied to quantities of projects in various phases of queue development.

That's no longer applicable due to the larger queue and constraints faced by projects with signed generation interconnection agreements (GIAs). The 2024 survey uses a range of estimates for new resource additions:

1. **Three-Year Historical Average:** based on the historical rate of additions per planning year*
2. **Alternative Projection:** based on MISO's updated timing estimates from interconnection customers with GIAs*

Note: 2023 data unavailable during time of analysis. Including 2023 projects would change the 3-year average to 2.2 GW.
**Based on Historical averages defined on slide 6*

Understanding Resource Categories

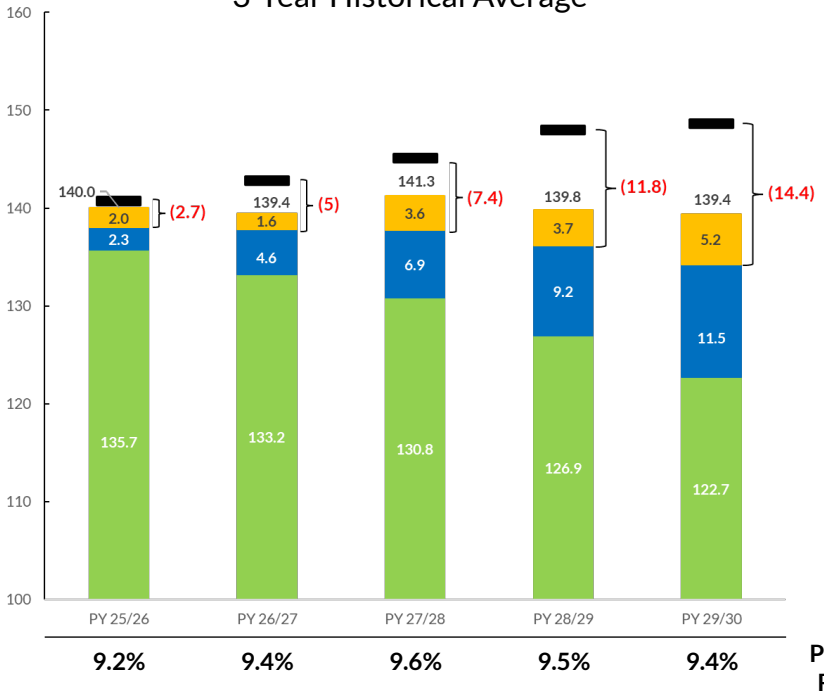
Resource Category	Past Practice	2024 Survey
Committed Capacity *Resources committed to serving MISO's load*	• Existing generation resources • Signed Generation Interconnection Agreement Projects • External resources with firm contracts to MISO load • Assumes resources will be used to meet PRMR	• **Same, except does not include signed Generation Interconnection Agreement (GIA) projects (Signed GIA projects moved to 'Potential New')**
Potential New Capacity	• Projects in the MISO Generator Interconnection Queue adjusted for queue phase and related probabilities for projects reaching commercial operations • Assumes resources will **NOT** be used to meet PRMR	• **Using 3-Year Historical Average: Capacity addition based (2.3 GW/year) based on the average new capacity built in Planning Years 2020-2022** • **Using Alternative Projection: Informed by timing estimates from interconnection customers with signed GIA projects* (6.1 GW/year)** • **Assumes resources <u>WILL</u> be used to meet PRMR**
Potentially Unavailable Resources *May be available to serve MISO's load but may not have firm commitments*	• Indicated as Low Certainty in survey results by Market Participants • Includes potential retirements or suspensions • Assumes resources will **NOT** be used to meet PRMR	• **No Changes**

***MISO Alternative Projection**: Responses indicate 6.8GW can be built for PY 2025/26. MISO data shows 90% of GIAs get built.*
PRMR: Planning Reserve Margin Requirement

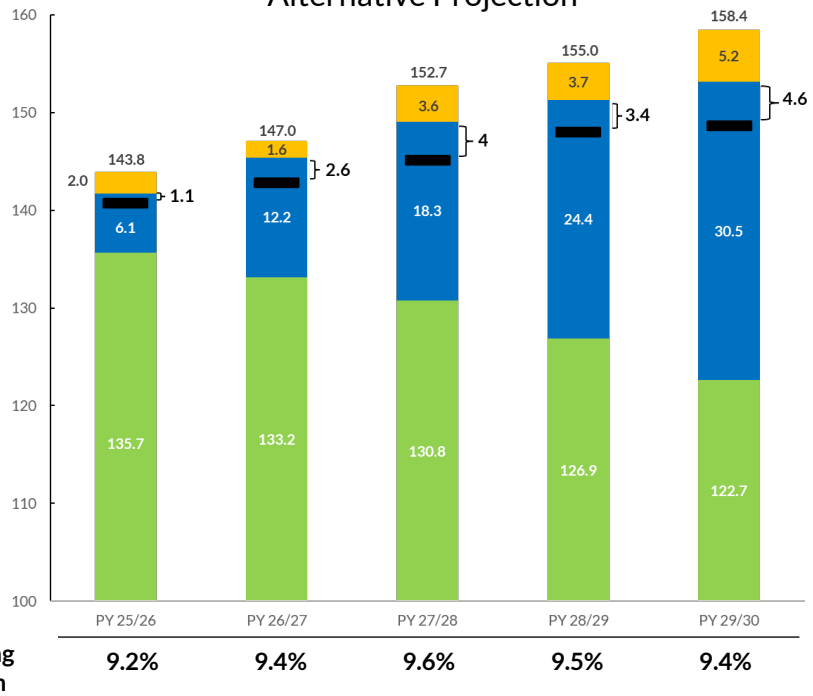
The 2024 OMS-MISO Survey illustrates a strong sensitivity to the pace of new capacity additions, with PY 2025/26 showing a range from a 2.7 GW deficit to a 1.1 GW surplus and widening thereafter

MISO Resource Adequacy Projection – Summer (GW)

Assuming 2.3 GW/yr of Potential New Capacity added
3-Year Historical Average*



Assuming 6.1 GW/yr of Potential New Capacity added
Alternative Projection*



PRM% - Planning Reserve Margin

Projected PRMR with LSE forecast
Potentially Unavailable Resources
Potential New Capacity
Committed Capacity

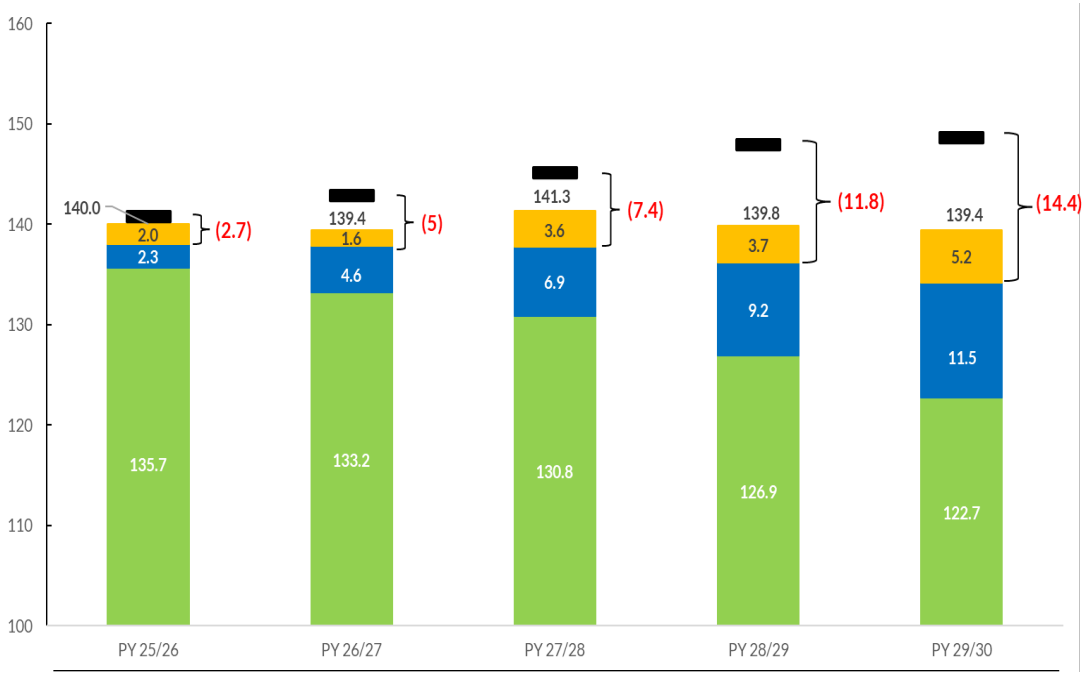
- Bracketed values indicate difference between Committed + Projected New Capacity and Projected PRMR with LSE forecast
- Capacity accreditation values and PRM projections based on current practices
- Regional Directional Transfer (RDT) limit of 1900 MW is reflected in this chart

Note: Y-axis truncated in all capacity projection charts to accentuate capacity sufficiency/deficiency.
PRMR: Planning Reserve Margin Requirement
**Using methods for potential New Capacity described on Slide 6*

Continued pace of retirements and pressures on generation development could potentially result in deficits as early as PY 2025/26

MISO Resource Adequacy Projection – Summer (GW)

*Assuming **2.3 GW/yr** of Potential New Capacity added*
3-Year Historical Average*



PRM% - Planning Reserve Margin	9.2%	9.4%	9.6%	9.5%	9.4%

Projected PRMR with LSE forecast
Potentially Unavailable Resources
Potential New Capacity
Committed Capacity

- Bracketed values indicate difference between Committed+ Projected New Capacity and Projected PRMR with LSE forecast
- Capacity accreditation values and PRM projections based on current practices
- Regional Directional Transfer (RDT) limit of 1,900 MW is reflected in this chart

Projection of 2.3 GW of new capacity per year derived from:

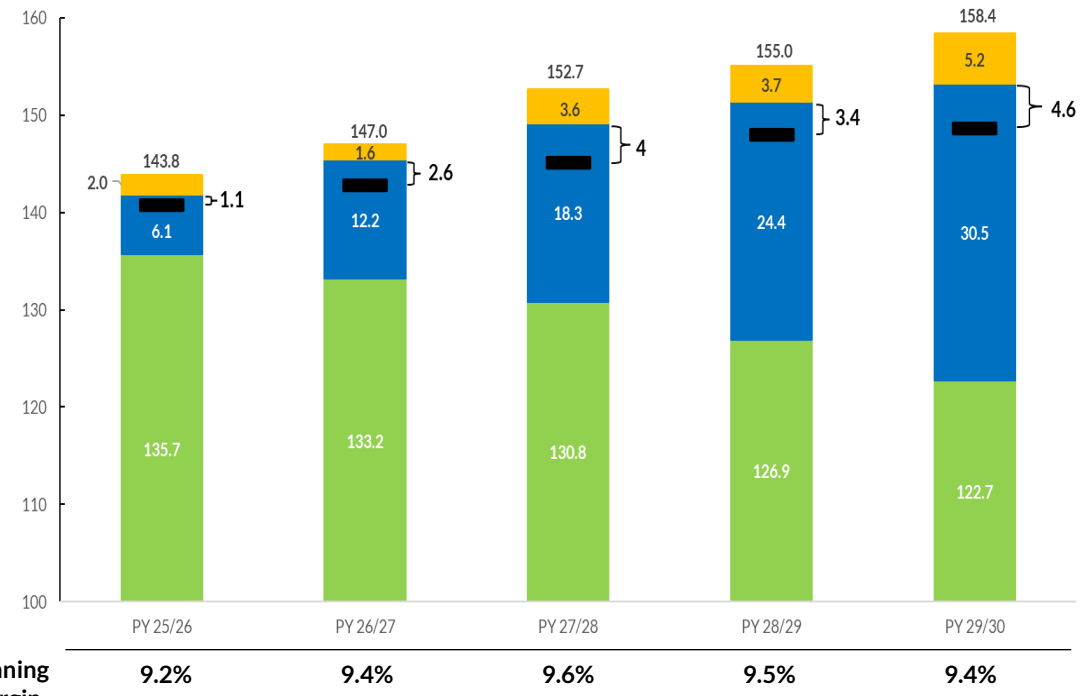
- Actual buildout over PYs 2020-2022
- Projected capacity buildout in line with historical rate
- Reflects impacts from COVID slowdown, such as continuing supply-chain bottlenecks, commercial uncertainty and permitting/labor delays

Note: Y-axis truncated in all capacity projection charts to accentuate capacity sufficiency/deficiency.
All references to capacity indicate Seasonal Accredited Capacity (SAC)
**Using Potential New Capacity as described on slide 6*

Favorable changes in development drivers could accelerate capacity additions necessary to cover projected growth

MISO Resource Adequacy Projection – Summer (GW)

*Assuming **6.1 GW/yr** of Potential New Capacity added*
Alternative Projection*



PRM% - Planning Reserve Margin	9.2%	9.4%	9.6%	9.5%	9.4%

Projected PRMR with LSE forecast
Potentially Unavailable Resources
Potential New Capacity
Committed Capacity

- Bracketed values indicate difference between Committed+ Projected New Capacity and Projected PRMR with LSE forecast
- Capacity accreditation values and PRM projections based on current practices
- Regional Directional Transfer (RDT) limit of 1,900 MW is reflected in this chart

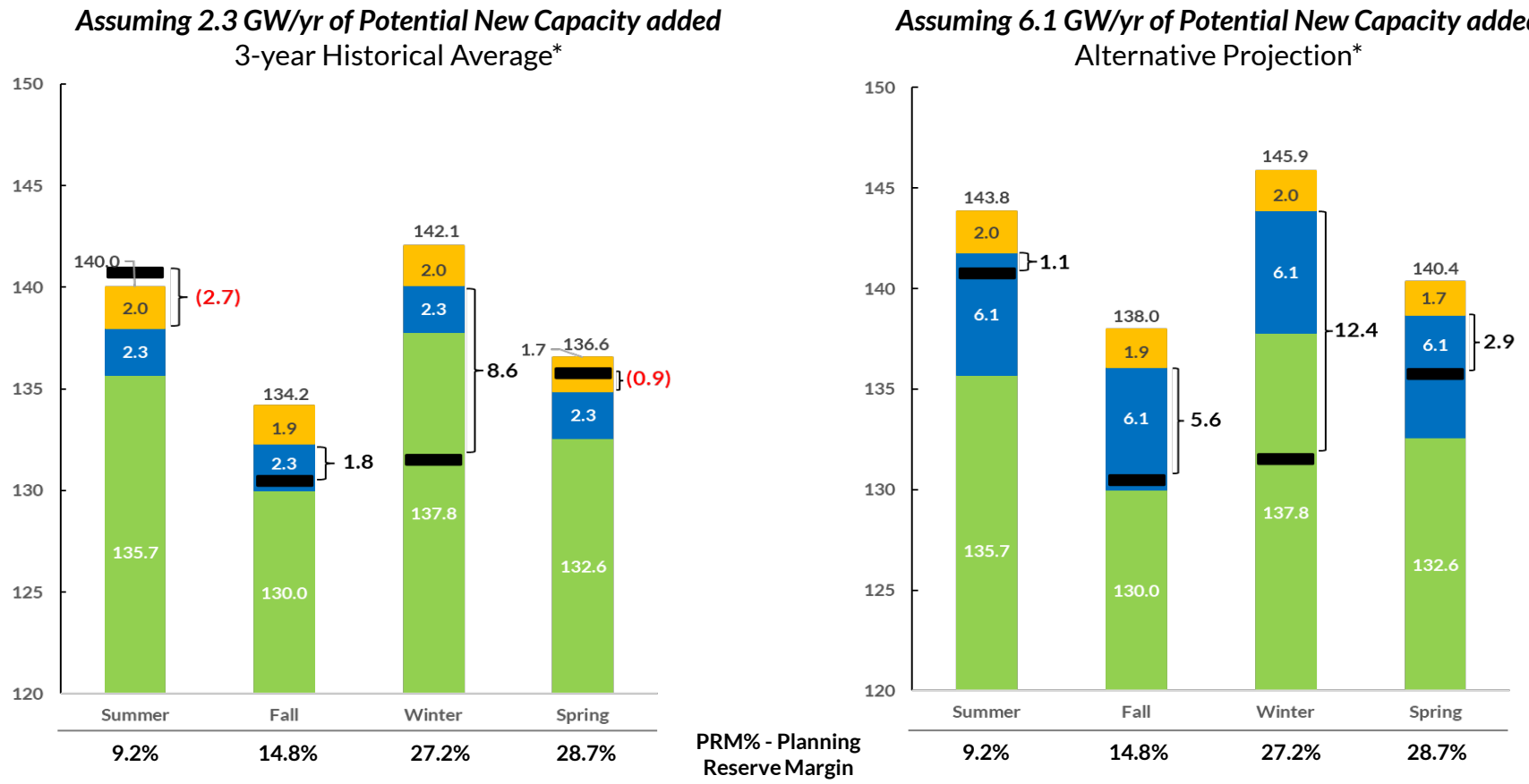
Projection of 6.1 GW of new capacity per year dependent upon:

- Easing of supply chain bottlenecks
- Reduced permitting-related delays
- Adequate supply of skilled labor
- Supportive commercial viability
- Continued queue improvements to reduce speculative quantities and associated delays

Note: Y-axis truncated in all capacity projection charts to accentuate capacity sufficiency/deficiency.
All references to capacity indicate Seasonal Accredited Capacity (SAC)
**Using Potential New Capacity as described on slide 6*

Seasonal comparison for PY 2025-26 shows the greatest risk in summer and spring

MISO Resource Adequacy Projection 2025/26 (GW)



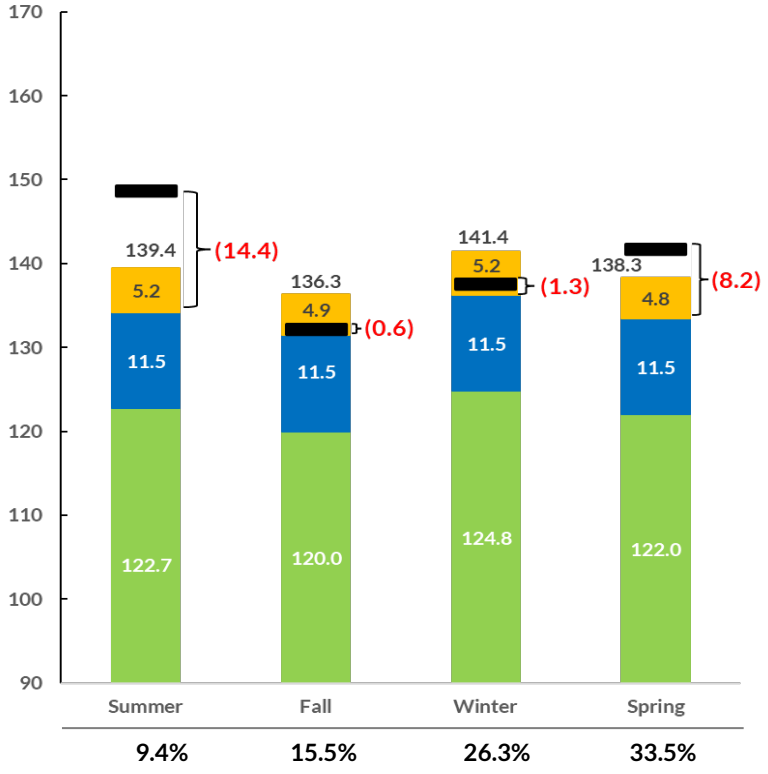
- Bracketed values indicate difference between Committed+ Projected New Capacity and Projected PRMR with LSE forecast
- Capacity accreditation values and PRM projections based on current practices
- Regional Directional Transfer (RDT) limit of 1,900 MW is reflected in this chart

Note: Y-axis truncated in all capacity projection charts to accentuate capacity sufficiency/deficiency.
PRMR: Planning Reserve Margin Requirement
**Using Potential New Capacity as described on slide 6*

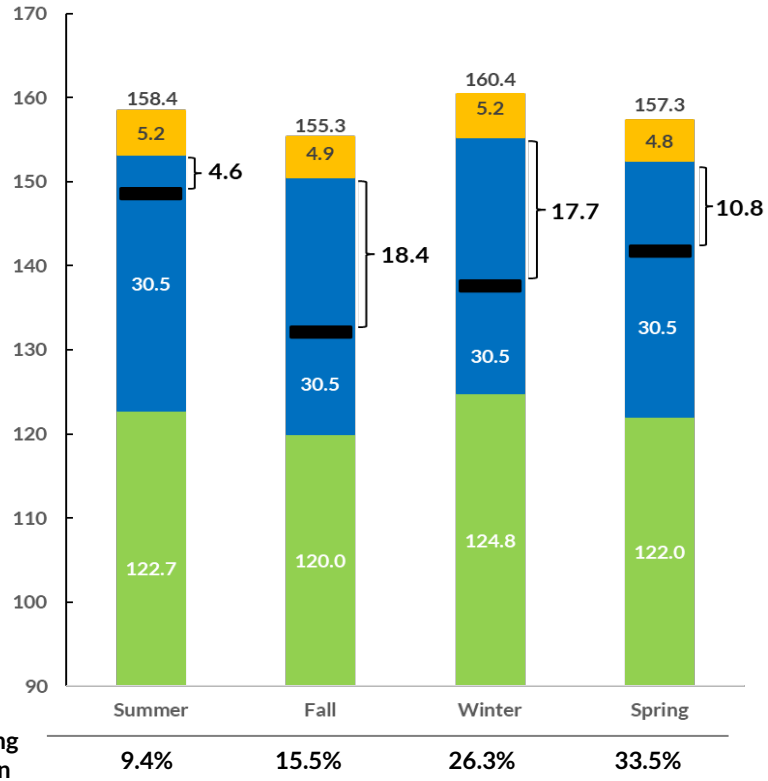
Projections for PY 2029/30 show increased reliance on new resources to meet PRMR

MISO Resource Adequacy Projection 2029/30 (GW)

Assuming 2.3 GW/yr of Potential New Capacity added
3-Year Historical Average*



Assuming 6.1 GW/yr of Potential New Capacity added
Alternative Projection*



PRM% - Planning Reserve Margin

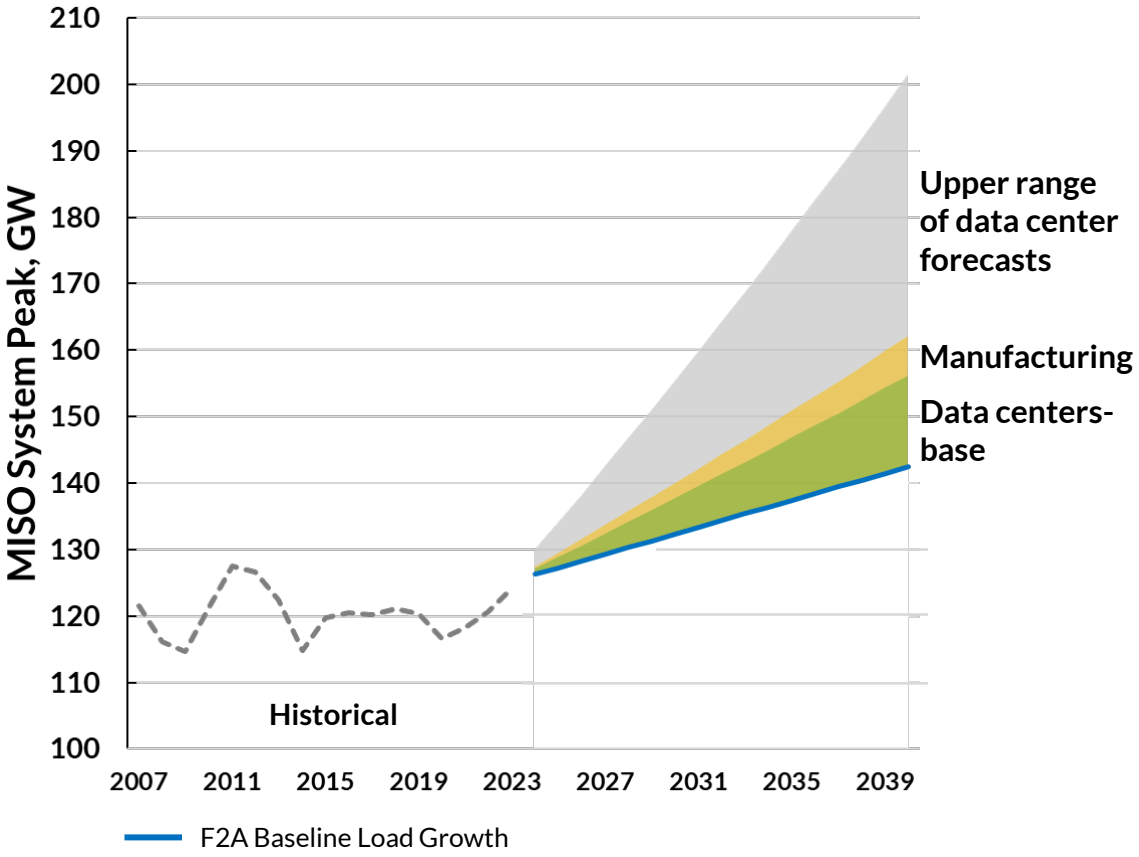
Projected PRMR with LSE forecast
Potentially Unavailable Resources
Potential New Capacity
Committed Capacity

- Bracketed values indicate difference between Committed+ Projected New Capacity and Projected PRMR with LSE forecast
- Capacity accreditation values and PRM projections based on current practices
- Regional Directional Transfer (RDT) limit of 1,900 MW is reflected in this chart

Note: Y-axis truncated in all capacity projection charts to accentuate capacity sufficiency/deficiency.
PRMR: Planning Reserve Margin Requirement
**Using Potential New Capacity as described on slide 6*

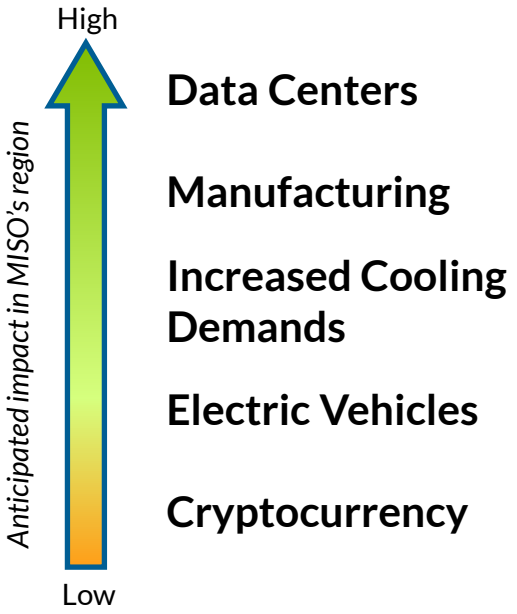
MISO's future long-term load forecasts will account for emerging digital demands, industrial expansion and climate changes

EPRI and Grid Strategies[1] anticipate manufacturing growth to favor MISO's service area



Note: *All figures shown are PRELIMINARY*

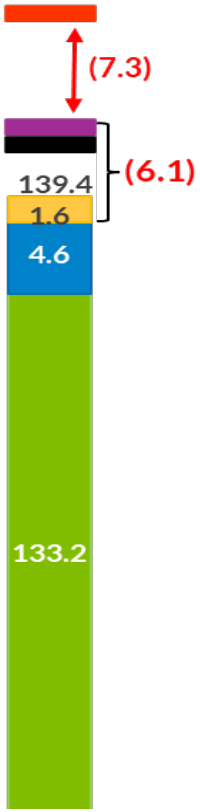
- Grid planners nearly *doubled* their 5-year peak load growth forecasts since last year
- MISO anticipates strong *long-term* load growth driven primarily by:



See appendix slide 31 with load forecast updates of other grid operators, potential new data centers in MISO and other commentary

1: https://www.epri.com/research/products/000000003002027930; https://gridstrategiesllc.com/wp-content/uploads/2023/12/National-Load-Growth-Report-2023.pdf

NEW: The 2024 OMS-MISO Survey includes sensitivities considering a range of new, large spot-load additions



Illustrative Example: PY 2026/27 Using Three-Year Historical Average

PRMR based on a higher range of large spot-load additions

- Uses MISO Future 2A as starting point[1]
- Models higher load-growth scenario using data from third-party consultants based on aggressive buildout of large load spot additions[2]

PRMR considering large spot-load additions

- Uses MISO Future 2A as starting point[1]
- Models increased demand based on public announcements for proposed data centers and manufacturing facilities within the MISO region[2]

PRMR based on LSE submitted load forecast

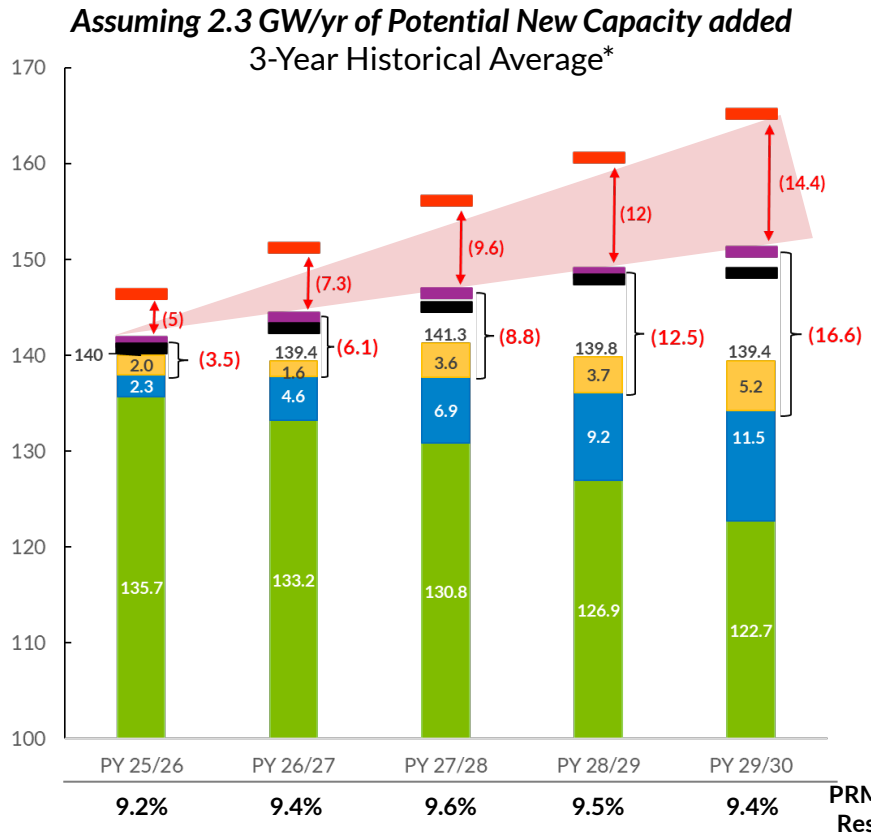
- LSE-submitted Non-Coincident Peak Forecast (NCPF) converted to Coincident Peak Forecast (CPF) using MISO posted Coincidence Factors
- Transmission losses added
- PRMR calculated using out year PRM% from PY 2024/25 LOLE Study

[1] https://cdn.misoenergy.org/Series1A_Futures_Report630735.pdf, [2] *See slides 12 & 31 for more information*

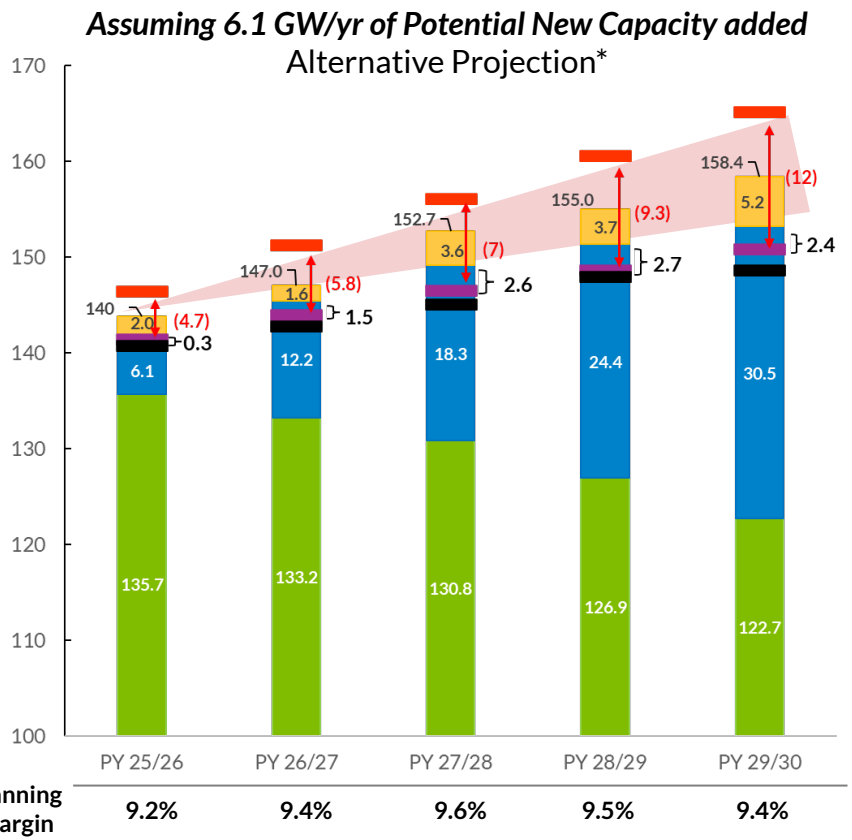
PRMR: Planning Reserve Margin Requirement LSE: Load Serving Entity LOLE: Loss of Load Expectation

Capacity deficits continue to grow in the near and long term under a large spot-load additions scenario

MISO Resource Adequacy Projection – Summer (GW)



PRM% - Planning Reserve Margin



- Projected PRMR for high range of Large Spot-Load Additions
- Projected PRMR with Large Load Spot Additions
- Projected PRMR with LSE forecast
- Potentially Unavailable Resources
- Potential New Capacity
- Committed Capacity

- Bracketed values indicate difference between Committed + Projected New Capacity and Projected PRMR with large spot-load additions
- Red arrow values indicate the additional potential deficit with high-range large load growth case
- Capacity accreditation values and PRM projections based on current practices
- Regional Directional Transfer (RDT) limit of 1900 MW is reflected in this chart

Note: Y-axis truncated in all capacity projection charts to accentuate capacity sufficiency/deficiency.
PRMR: Planning Reserve Margin Requirement
**Using Potential New Capacity as described on slide 6*

MISO's existing accreditation methods can overstate a resource's capacity value during the highest risk periods, especially as the region's risk profile changes, leading to understated risk

- Increased reliance on wind, solar and storage, projected large-load additions and electrification, and frequent large-scale weather events are decoupling periods of risk from periods of high demand.
- These drivers are upending traditional methods for establishing reliability requirements and resource accreditation.
- MISO's proposed resource accreditation methodology* (Direct Loss of Load) will value a resource's marginal contribution to reliability during the highest risk periods.

MISO's proposed accreditation reforms, on file at FERC and targeted for implementation in PY 2028/29, will better measure a resource's contribution to reliability.

*See Resource Accreditation White Paper, published March 2024: https://cdn.misoenergy.org/Resource%20Accreditation%20White%20Paper%20Version%202.1630728.pdf

The 2024 Survey shows that the near-term resource decisions made by utilities, regulators, MISO and its Members will determine whether the region's resources remain adequate

- Continued collaboration between OMS and MISO is necessary to maintain a reliable electricity system.
- The survey shows a range of potential resource adequacy outcomes, reinforcing near-term risks and illustrating key uncertainties impacting resource adequacy in the MISO region.
- Immediate actions are needed to expedite the addition of new capacity, coordinate resources for new load additions, and potentially moderate the pace of resource retirements.
- MISO's reforms under the Reliability Imperative are timely and responsive to the drivers contributing to resource adequacy challenges.
    - Implemented: Seasonal construct and thermal accreditation
    - Filed at FERC: 1) Reliability-Based Demand Curve, 2) resource accreditation
    - Ongoing reforms: 1) Load Modifying Resource accreditation, 2) Resource adequacy risk modeling improvements, 3) Attributes Roadmap, 4) LRTP, 5) JTIQ, 6) Queue Reforms

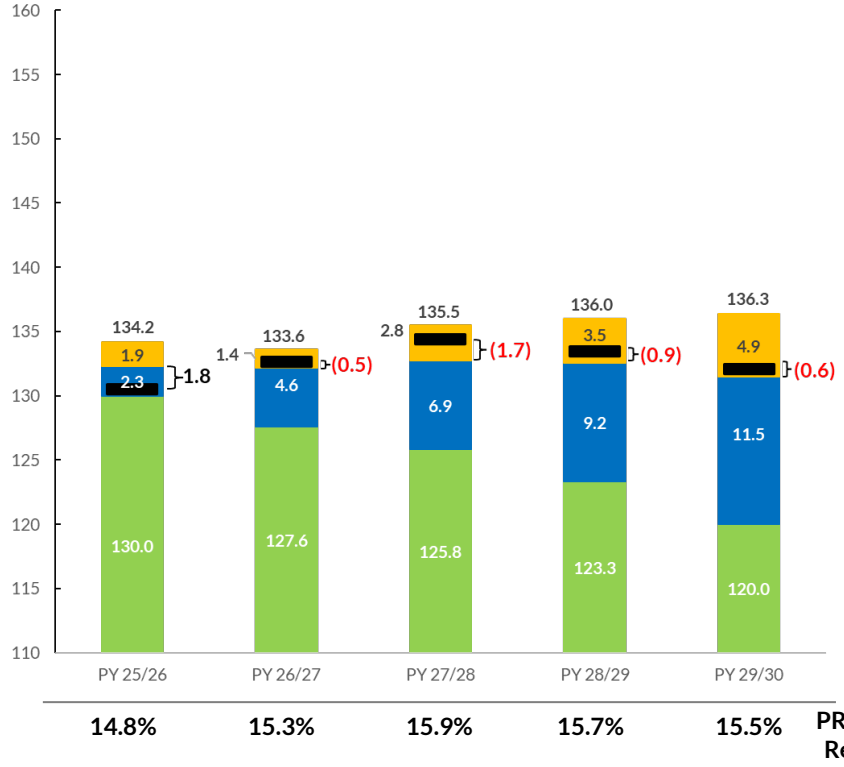
Appendix

Appendix Table of Contents

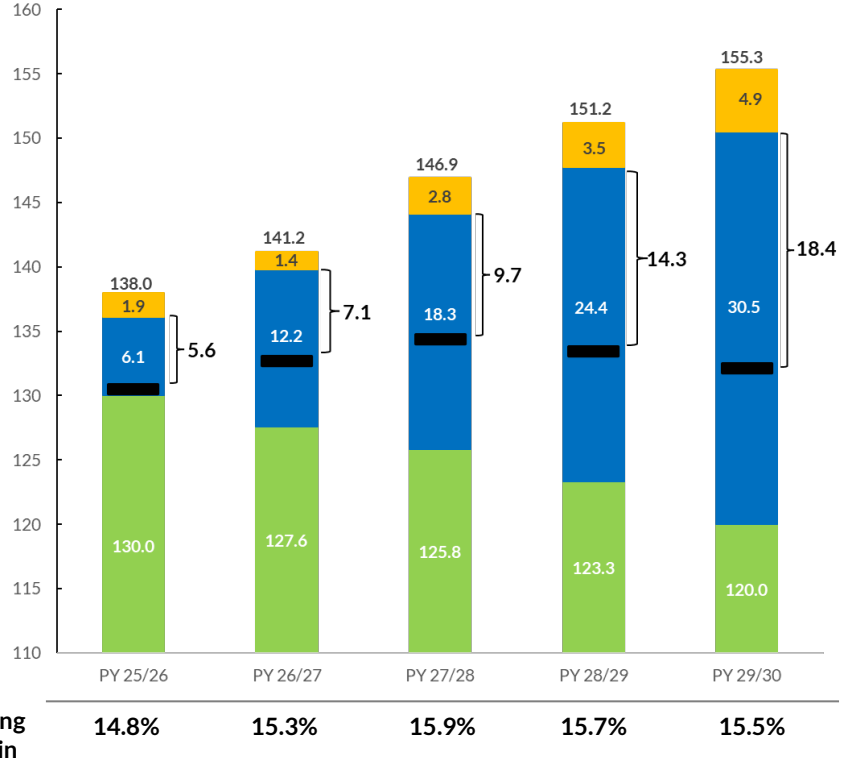
Fall capacity ranges from 1.8 GWs to 5.6 GWs surplus in the prompt year

MISO Resource Adequacy Projection – Fall (GW)

Assuming 2.3 GW/yr of Potential New Capacity added
3-Year Historical Average*



Assuming 6.1 GW/yr of Potential New Capacity added
Alternative Projection*



PRM% - Planning Reserve Margin

Projected PRMR with LSE forecast
Potentially Unavailable Resources
Potential New Capacity
Committed Capacity

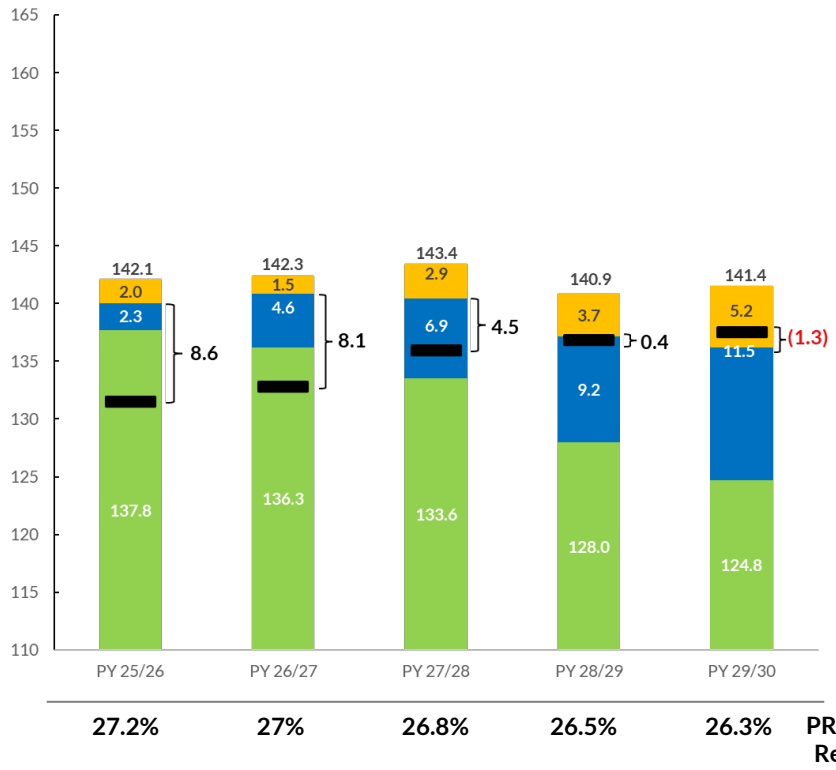
- Bracketed values indicate difference between Committed+ Projected New Capacity and Projected PRMR with LSE forecast
- Capacity accreditation values and PRM projections based on current practices
- Regional Directional Transfer (RDT) limit of 1900 MW is reflected in this chart
- Fall demand and PRMR calculated by using summer and winter demand forecast percent change seen year-over-year since out year Non- Coincident Peak Forecast (NCPF) is not submitted for out years for fall and spring

Note: Y-axis truncated in all capacity projection charts to accentuate capacity sufficiency/deficiency.
PRMR: Planning Reserve Margin Requirement
**Using Potential New Capacity as described on slide 6*

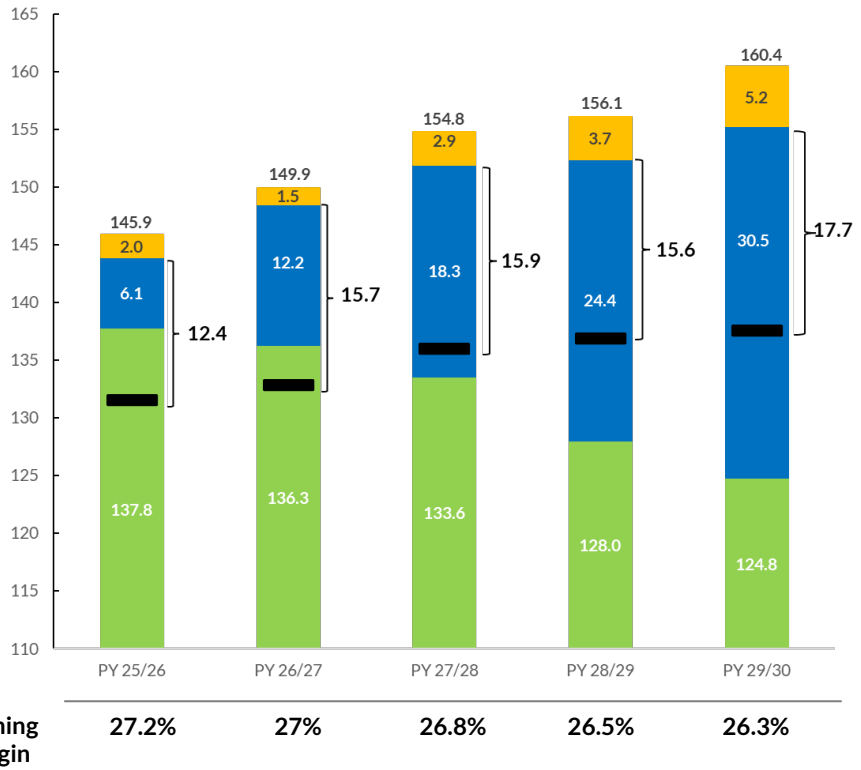
Winter capacity ranges from 8.6 GWs to 12.4 GWs surplus in the prompt year

MISO Resource Adequacy Projection – Winter (GW)

Assuming 2.3 GW/yr of Potential New Capacity added
3-Year Historical Average *



Assuming 6.1 GW/yr of Potential New Capacity added
Alternative Projection*



Projected PRMR with LSE forecast
Potentially Unavailable Resources
Potential New Capacity
Committed Capacity

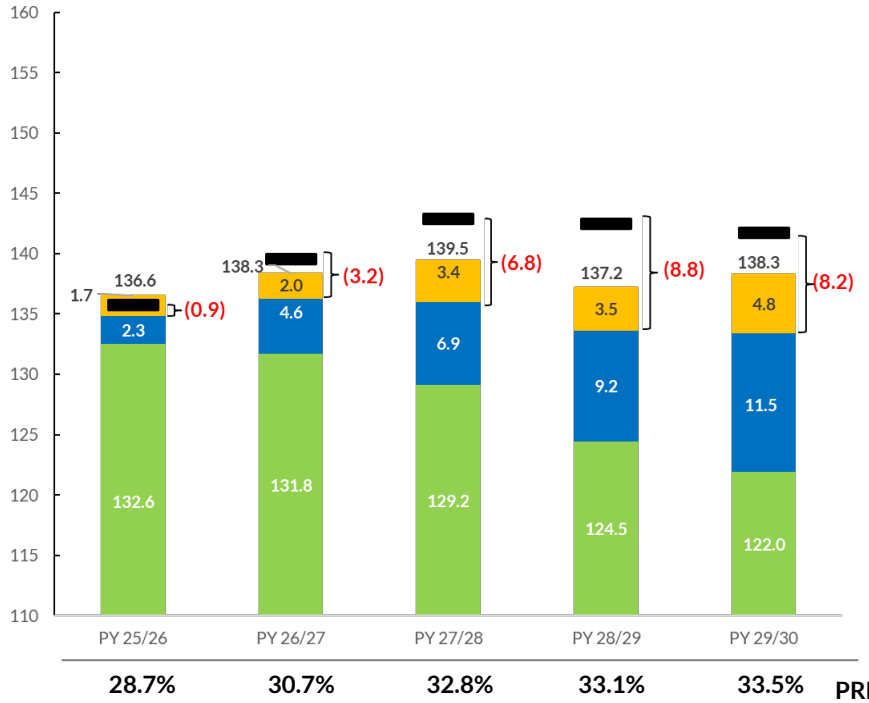
- Bracketed values indicate difference between Committed+ Projected New Capacity and Projected PRMR with LSE forecast
- Capacity accreditation values and PRM projections based on current practices
- Regional Directional Transfer (RDT) limit of 1900 MW is reflected in this chart

Note: Y-axis truncated in all capacity projection charts to accentuate capacity sufficiency/deficiency.
PRMR: Planning Reserve Margin Requirement
**Using Potential New Capacity as described on slide 6*

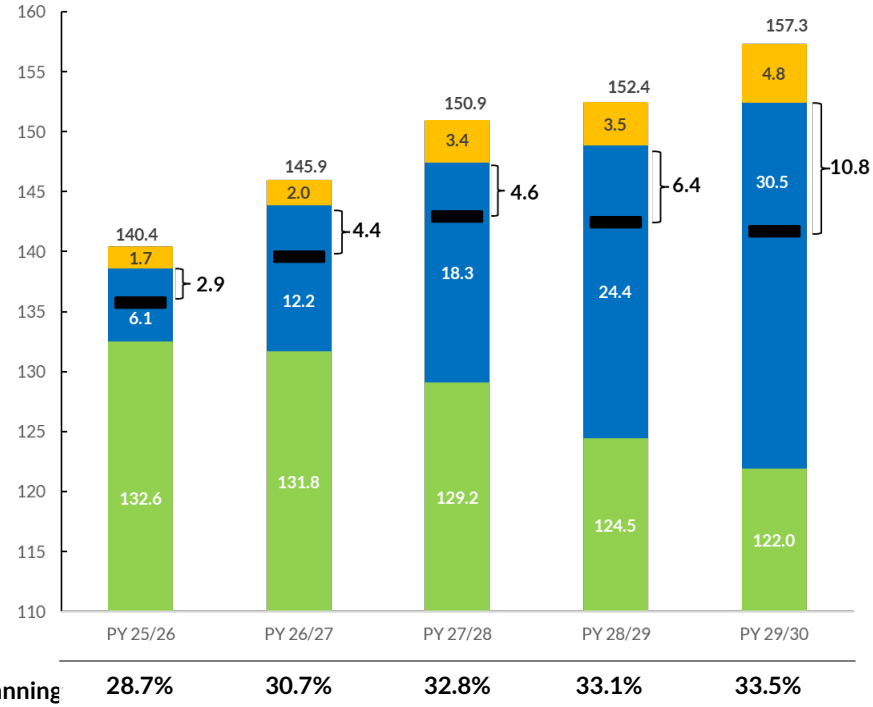
Spring capacity ranges from 0.9 GWs deficit to 2.9 GWS surplus in the prompt year

MISO Resource Adequacy Projection – Spring (GW)

Assuming 2.3 GW/yr of Potential New Capacity added
3-Year Historical Average *



Assuming 6.1 GW/yr of Potential New Capacity added
Alternative Projection*



PRM% - Planning Reserve Margin

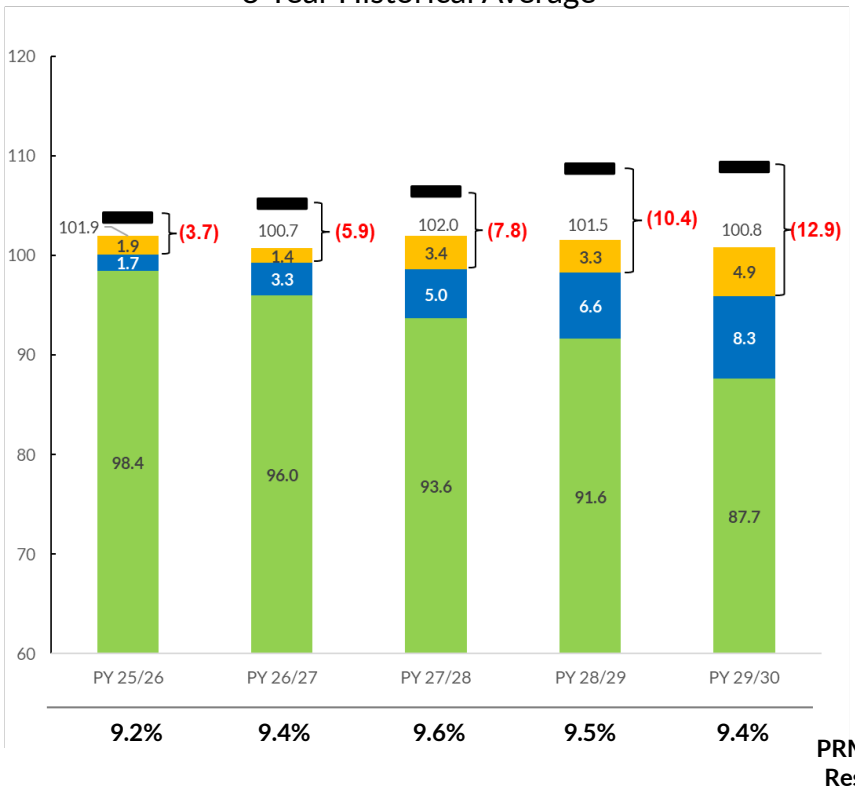
Projected PRMR with LSE forecast
Potentially Unavailable Resources
Potential New Capacity
Committed Capacity

- Bracketed values indicate difference between Committed+ Projected New Capacity and Projected PRMR with LSE forecast
- Capacity accreditation values and PRM projections based on current practices
- Regional Directional Transfer (RDT) limit of 1900 MW is reflected in this chart
- Spring demand and therefore PRMR is calculated by using Summer and Winter demand forecast percent change seen year over year since out year NCPF is not submitted for out years for Fall and Spring

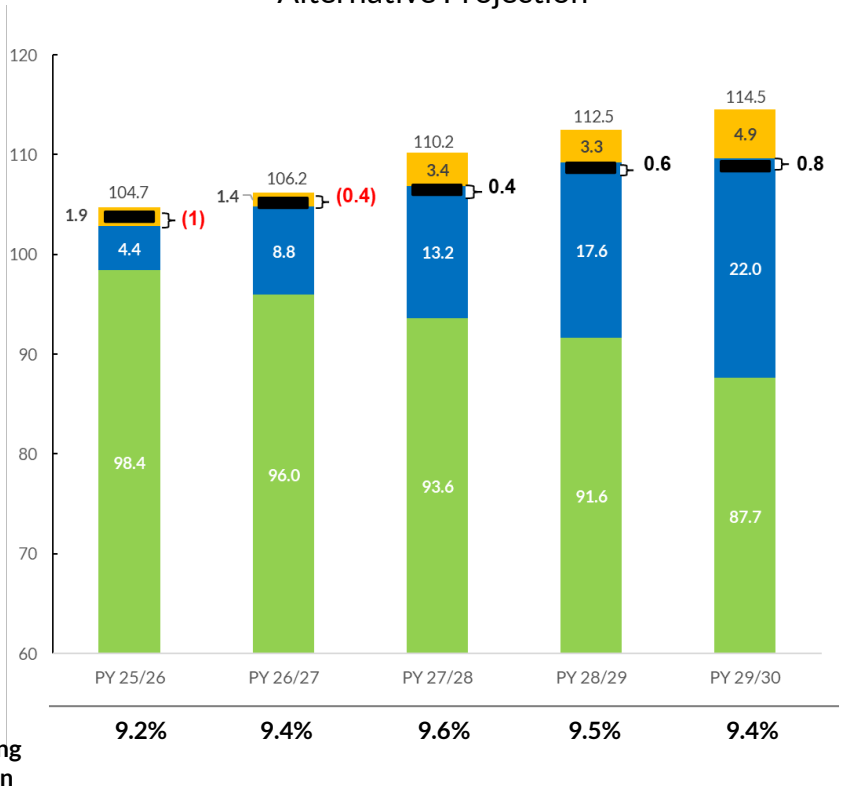
Note: Y-axis truncated in all capacity projection charts to accentuate capacity sufficiency/deficiency.
PRMR: Planning Reserve Margin Requirement
**Using Potential New Capacity as described on slide 6*

The North/Central subregion capacity for Summer ranges from 3.7 GWs to 1 GW deficit in the prompt year

Assuming 2.3 GW/yr of Potential New Capacity added
3-Year Historical Average *



Assuming 6.1 GW/yr of Potential New Capacity added
Alternative Projection*



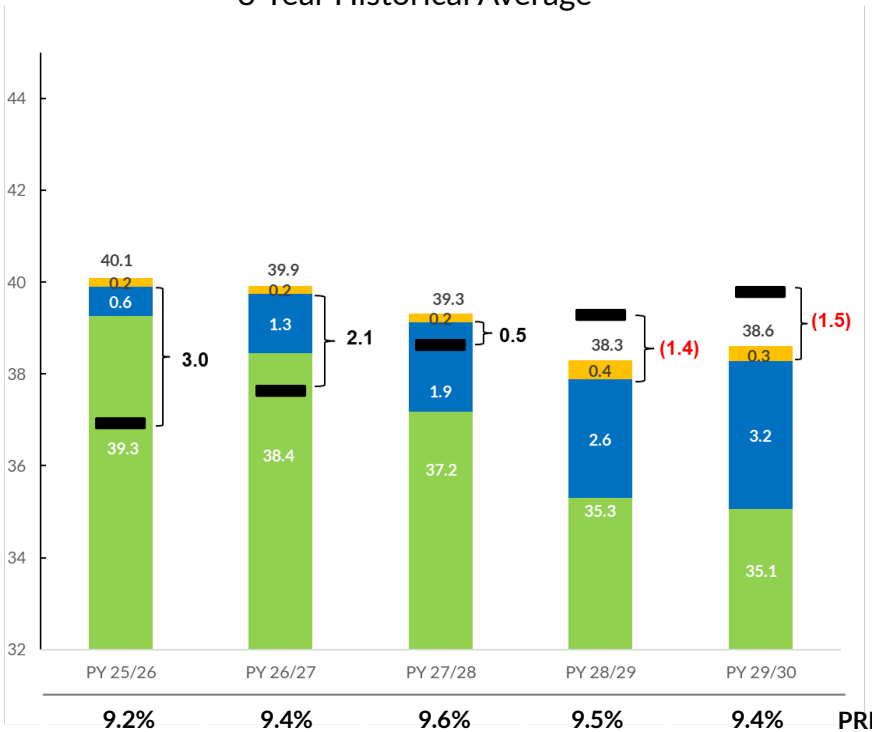
PRM% - Planning Reserve Margin

Projected PRMR with LSE forecast
Potentially Unavailable Resources
Potential New Capacity
Committed Capacity

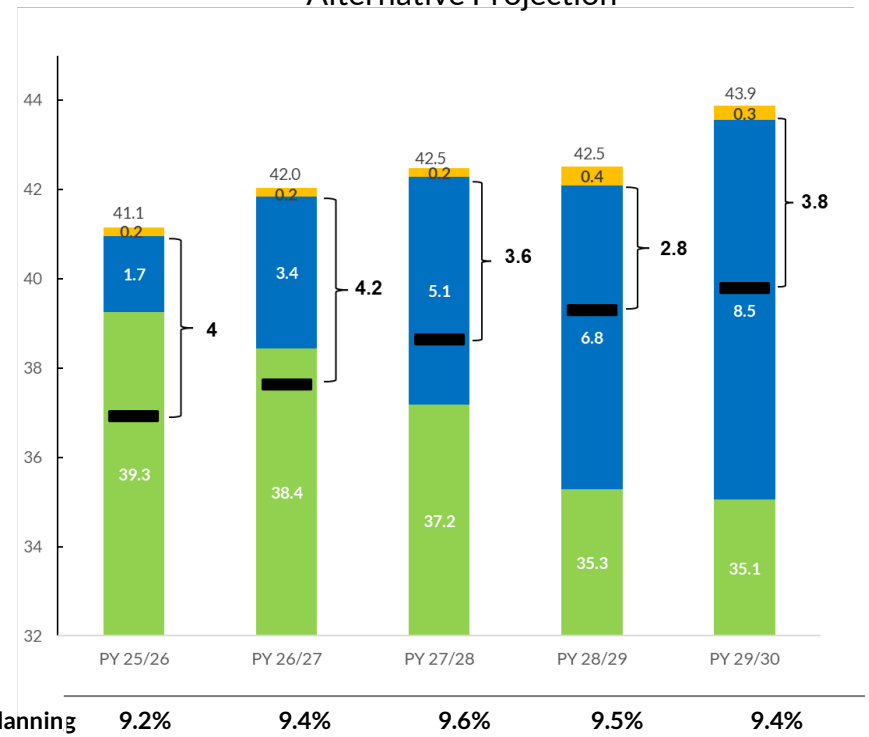
Using Potential New Capacity as described on slide 6
Note: Y-axis truncated in all capacity projection charts to accentuate capacity sufficiency/deficiency. While RDT is not reflected in these charts the limit is currently modeled at 1900 MW in Resource Adequacy. PRMR: Planning Reserve Margin Requirement.

The South subregion capacity for Summer ranges from 3 GWs to 4 GWs of surplus in the prompt year

Assuming 2.3 GW/yr of Potential New Capacity added
3-Year Historical Average *



Assuming 6.1 GW/yr of Potential New Capacity added
Alternative Projection*



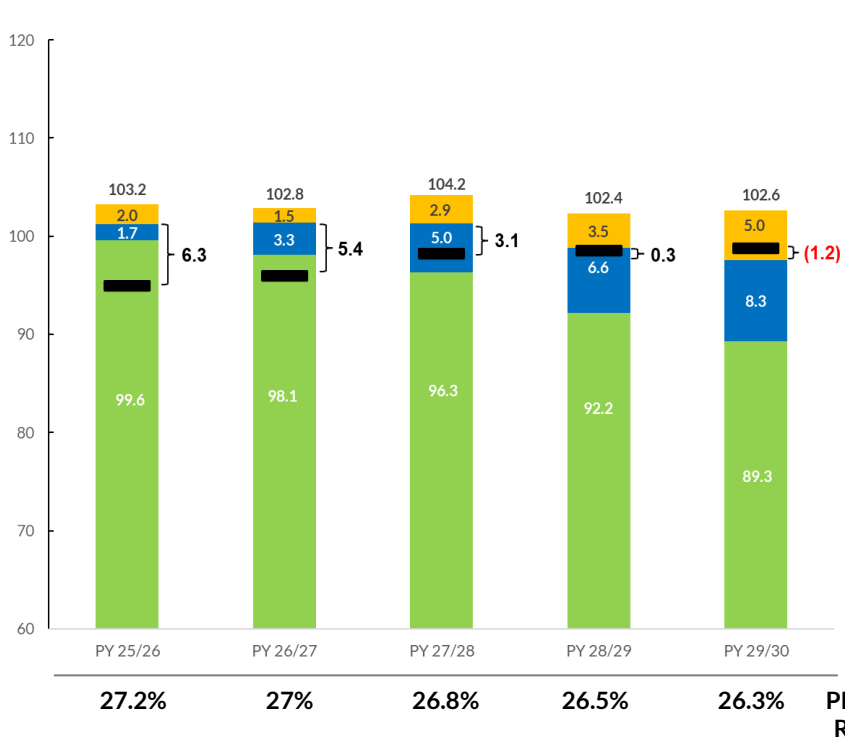
PRM% - Planning Reserve Margin

Projected PRMR with LSE forecast
Potentially Unavailable Resources
Potential New Capacity
Committed Capacity

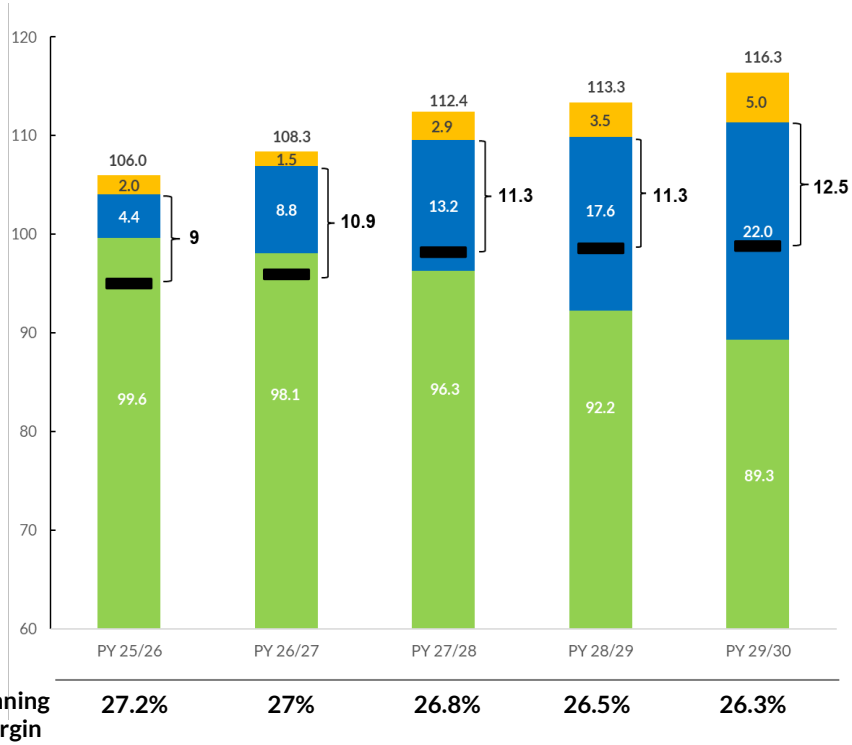
Using Potential New Capacity as described on slide 6
Note: Y-axis truncated in all capacity projection charts to accentuate capacity sufficiency/deficiency. While RDT is not reflected in these charts the limit is currently modeled at 1900 MW in Resource Adequacy. PRMR: Planning Reserve Margin Requirement.

The North/Central subregion capacity for Winter ranges from 6.3 GWs to 9 GWs of surplus in the prompt year

Assuming 2.3 GW/yr of Potential New Capacity added
3-Year Historical Average *



Assuming 6.1 GW/yr of Potential New Capacity added
Alternative Projection*



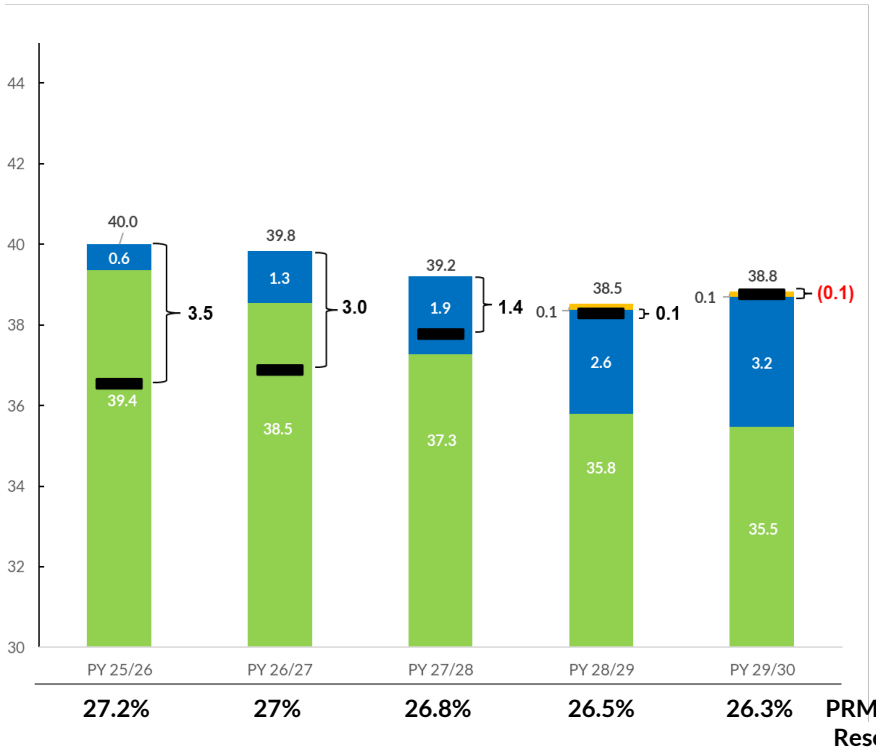
PRM% - Planning Reserve Margin

Projected PRMR with LSE forecast
Potentially Unavailable Resources
Potential New Capacity
Committed Capacity

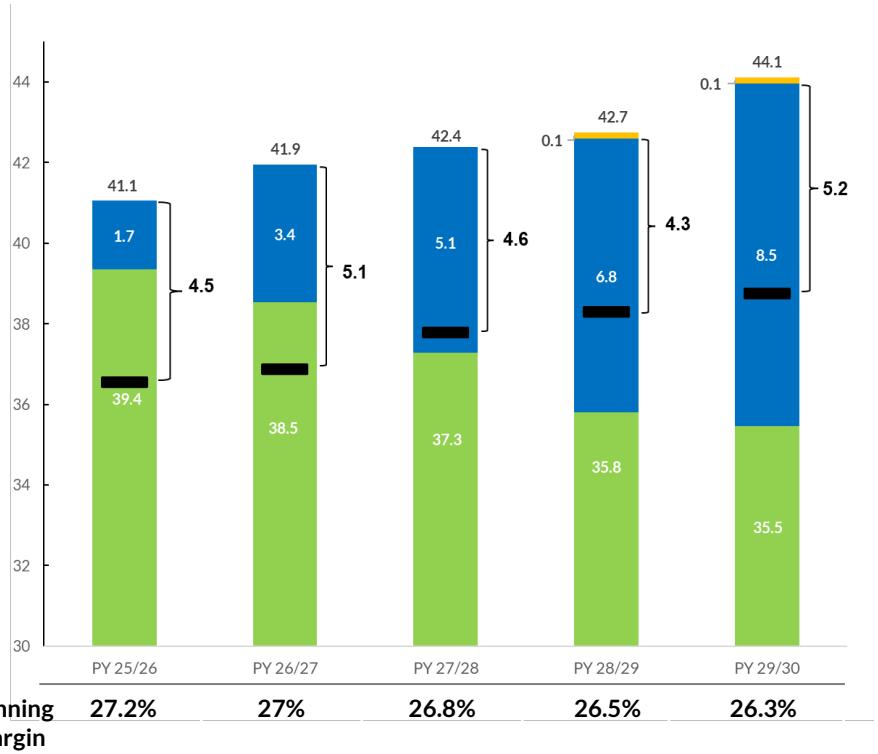
Using Potential New Capacity as described on slide 6
Note: Y-axis truncated in all capacity projection charts to accentuate capacity sufficiency/deficiency. While RDT is not reflected in these charts the limit is currently modeled at 1900 MW in Resource Adequacy. PRMR: Planning Reserve Margin Requirement.

The South subregion capacity for Winter ranges from 3.5 GWs to 4.5 GWs of surplus in the prompt year

Assuming 2.3 GW/yr of Potential New Capacity added
3-Year Historical Average *



Assuming 6.1 GW/yr of Potential New Capacity added
Alternative Projection*



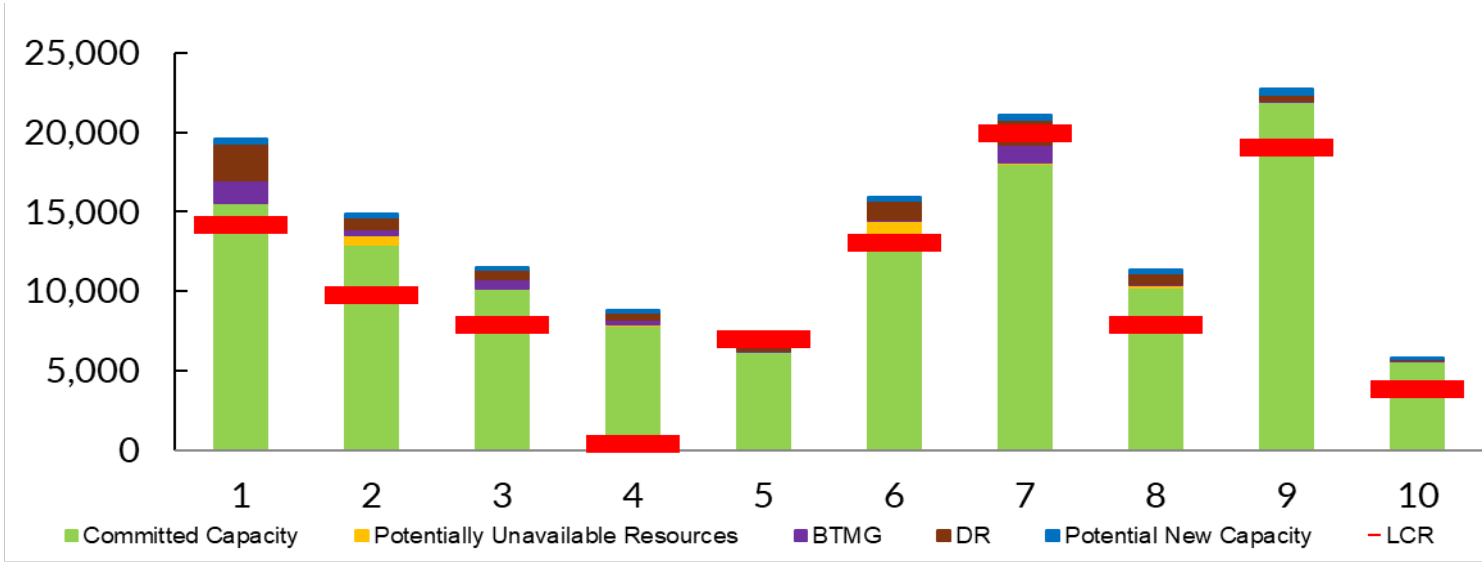
PRM% - Planning Reserve Margin

Projected PRMR with LSE forecast
Potentially Unavailable Resources
Potential New Capacity
Committed Capacity

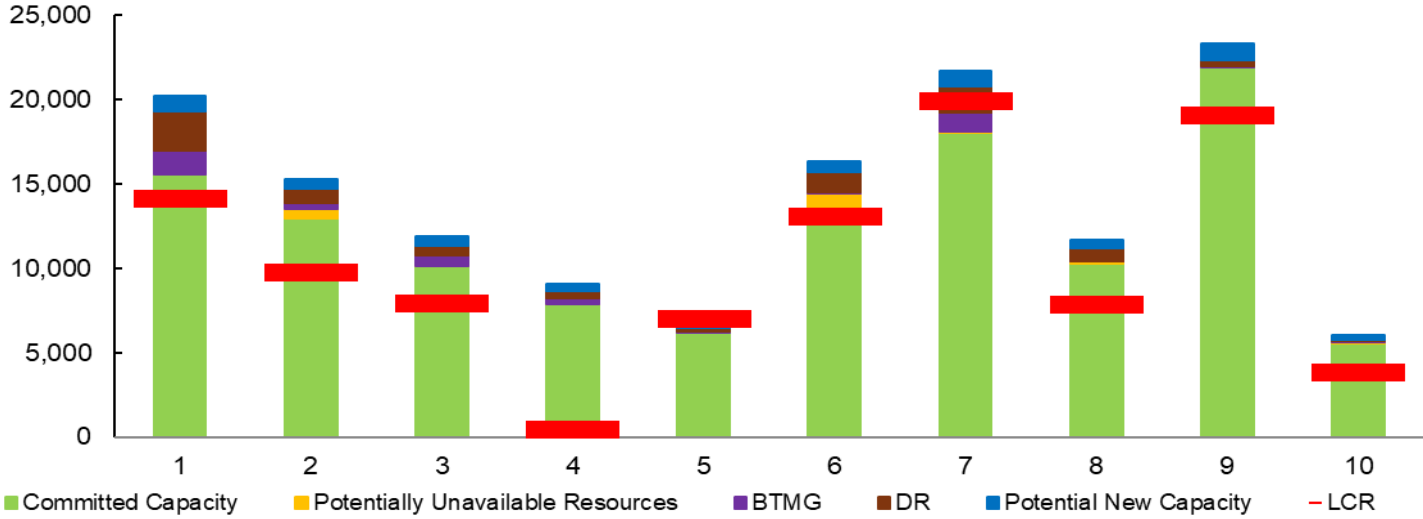
**Using Potential New Capacity as described on slide 6*
Note: Y-axis truncated in all capacity projection charts to accentuate capacity sufficiency/deficiency. While RDT is not reflected in these charts the limit is currently modeled at 1900 MW in Resource Adequacy. PRMR: Planning Reserve Margin Requirement.

Summer PY 2025/26 Load Clearing Requirement (LCR) by zone

PY 2025/26 Summer by Zone vs. LCR (MW) Using 3-Year Historical average for new capacity*



PY 2025/26 Summer by Zone vs. LCR (MW) Using Alternative Projection for new capacity*

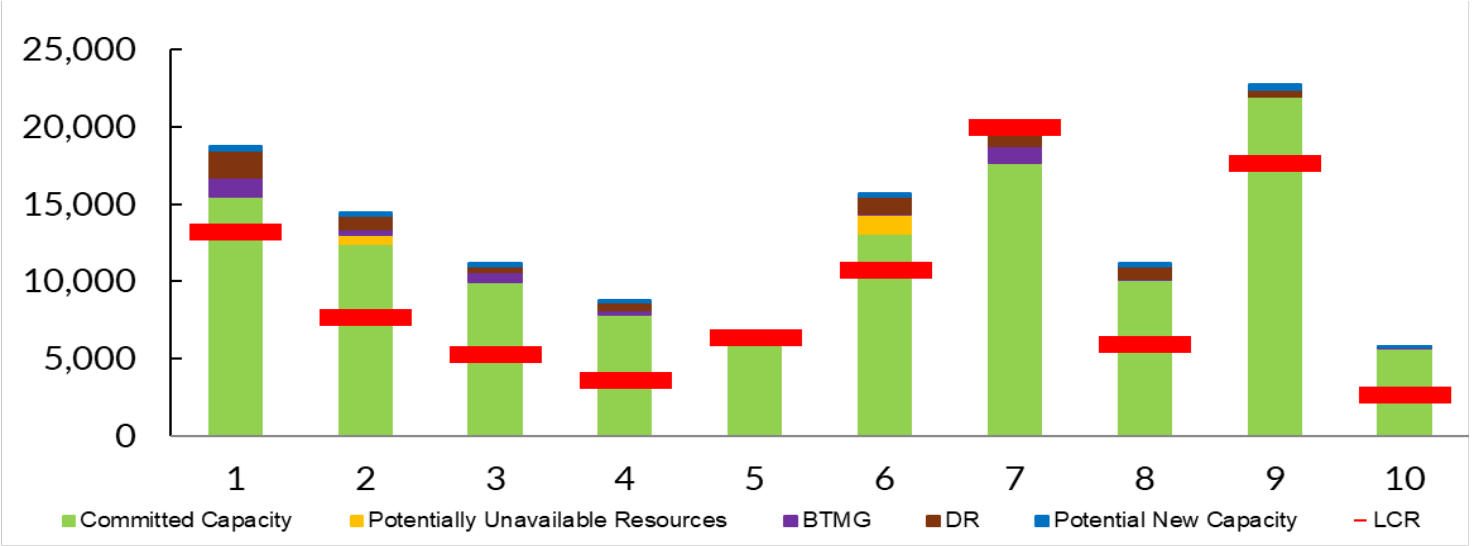


*Using Potential New Capacity as described on slide 6

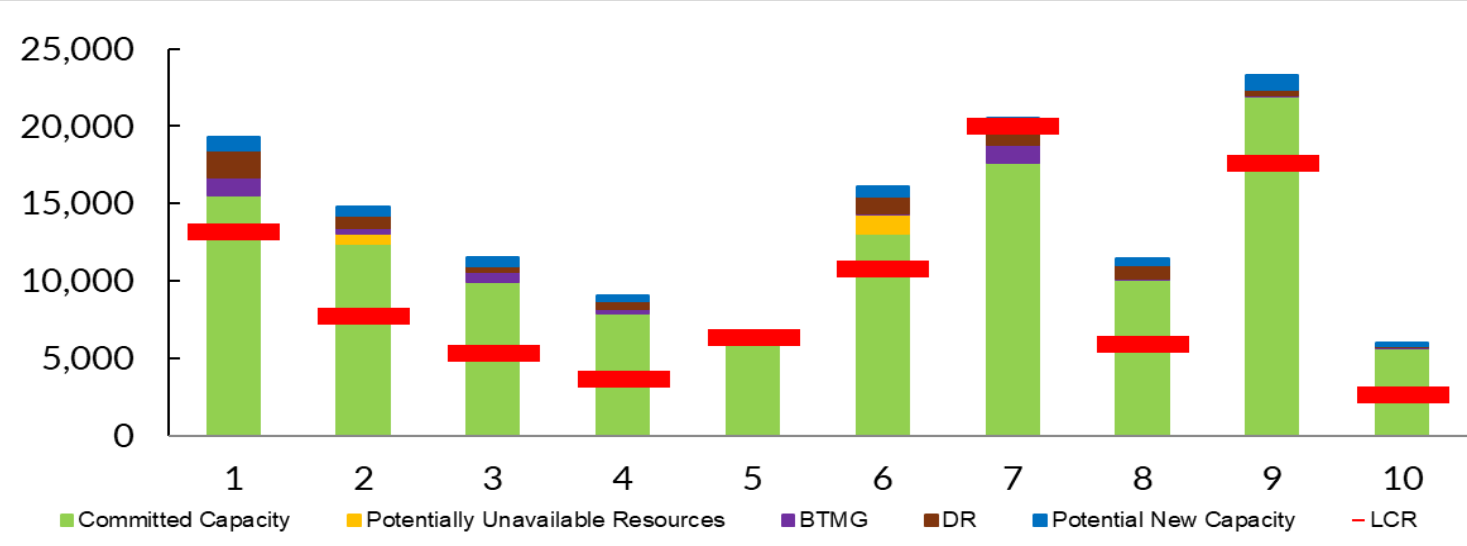
Includes only projected capacity resources within the zone (not imports and interzonal transfers). Potential Capacity for each zone is the average actual installed New Capacity used in the MISO overview slide proportional to that zones existing generation.

Fall PY 25/26 Load Clearing Requirement (LCR) by Zone

PY 2025/26 Summer by Zone vs. LCR (MW) Using 3-Year Historical average for new capacity*



PY 2025/26 Summer by Zone vs. LCR (MW) Using Alternative Projection for new capacity*

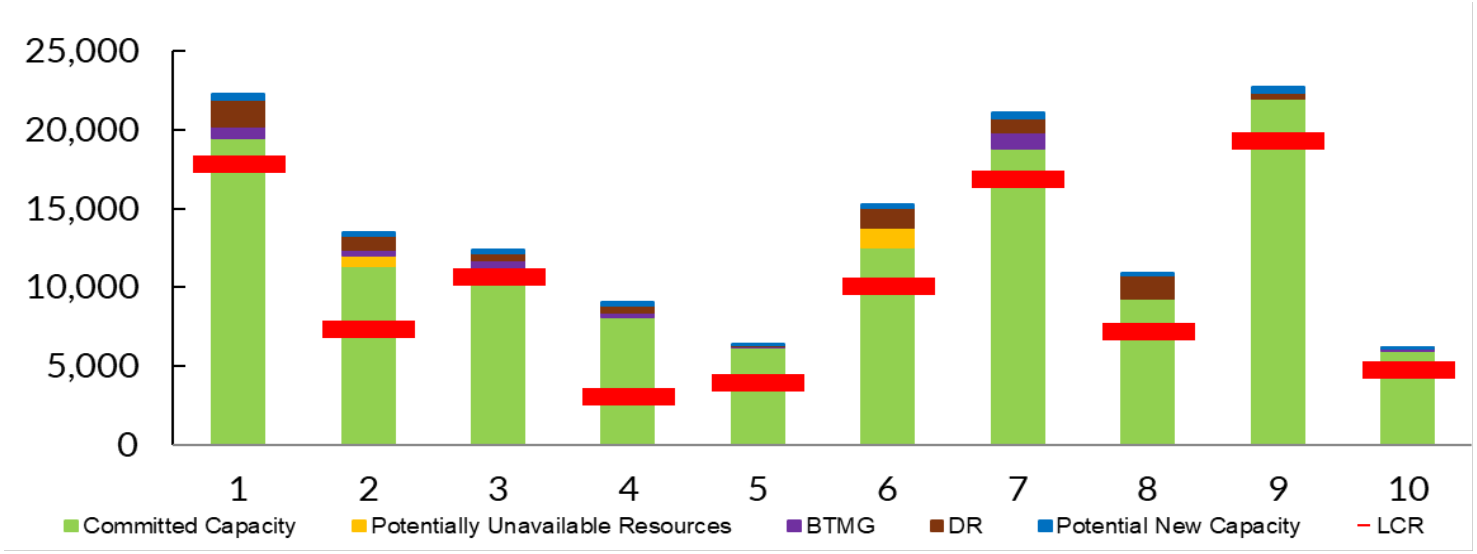


*Using Potential New Capacity as described on slide 6

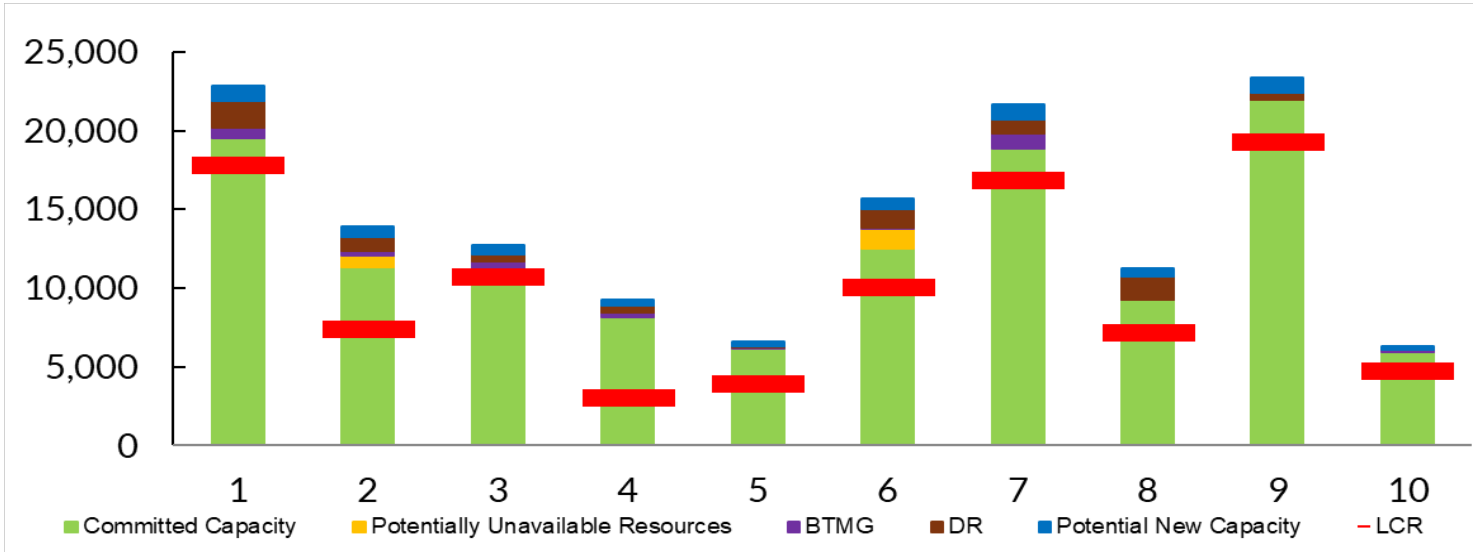
Includes only projected capacity resources within the zone (not imports and interzonal transfers). Potential Capacity for each zone is the average actual installed New Capacity used in the MISO overview slide proportional to that zones existing generation.

Winter PY 25/26 Load Clearing Requirement (LCR) by Zone

PY 2025/26 Summer by Zone vs. LCR (MW) Using 3-Year Historical average for new capacity*



PY 2025/26 Summer by Zone vs. LCR (MW) Using Alternative Projection for new capacity*

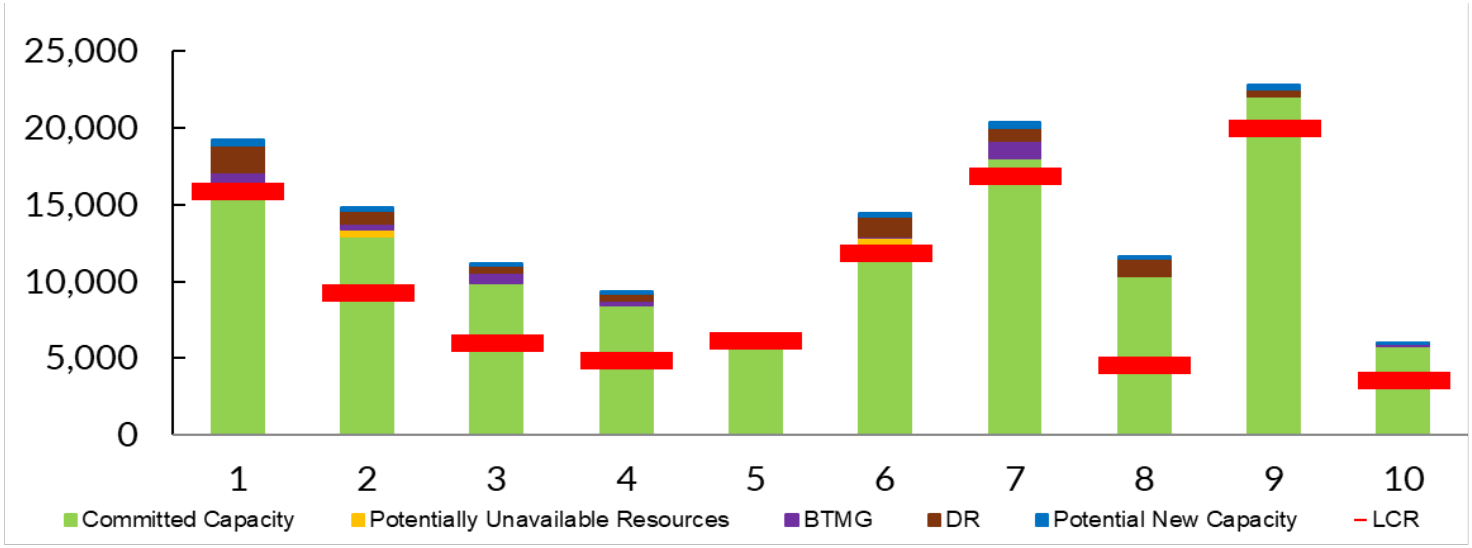


*Using Potential New Capacity as described on slide 6

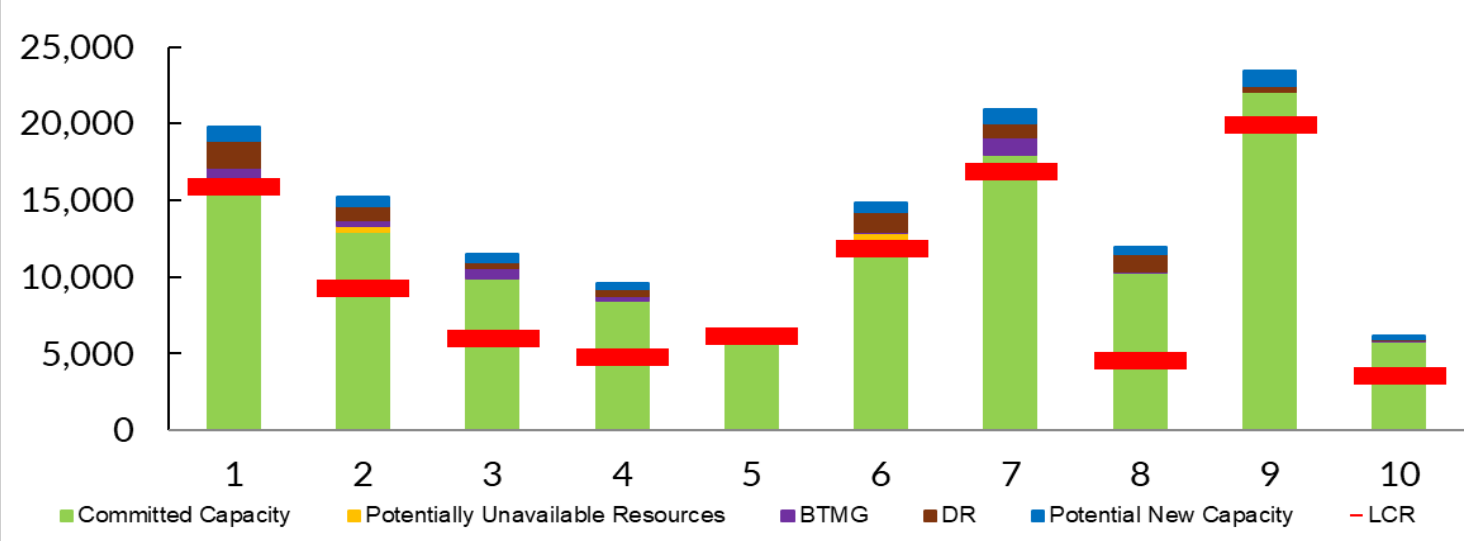
Includes only projected capacity resources within the zone (not imports and interzonal transfers). Potential Capacity for each zone is the average actual installed New Capacity used in the MISO overview slide proportional to that zones existing generation.

Spring PY 25/26 Load Clearing Requirement (LCR) by Zone

PY 2025/26 Summer by Zone vs. LCR (MW) Using 3-Year Historical average for new capacity*



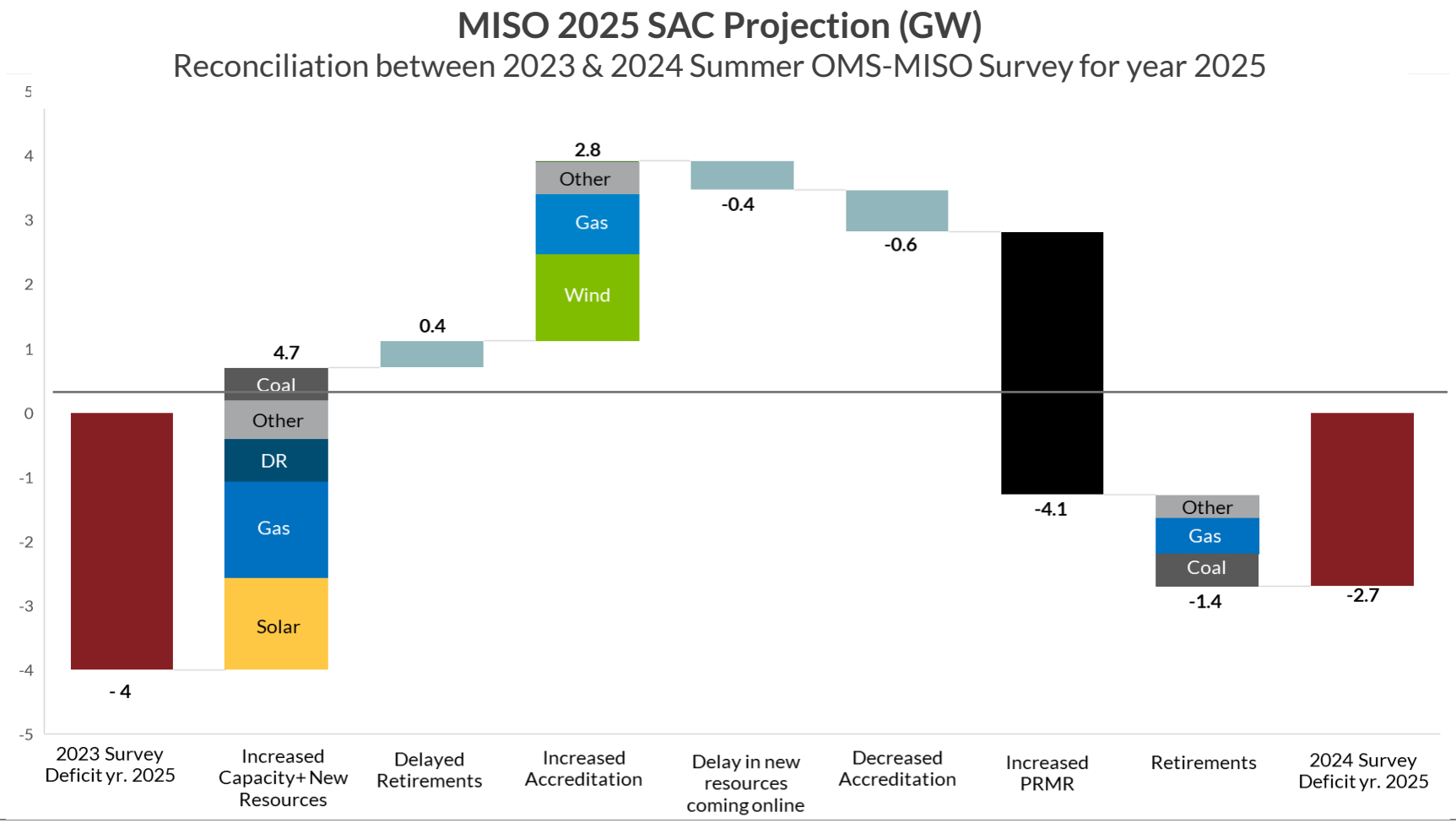
PY 2025/26 Summer by Zone vs. LCR (MW) Using Alternative Projection for new capacity*



*Using Potential New Capacity as described on slide 6

Includes only projected capacity resources within the zone (not imports and interzonal transfers). Potential Capacity for each zone is the average actual installed New Capacity used in the MISO overview slide proportional to that zones existing generation.

Year-over-year, the OMS-MISO Survey results show a decreased deficit due to increased response/new resources and increased accreditation, but a deficit remains largely driven by an increased Planning Reserve Margin Requirement



Higher load forecast included in 'Increased PRMR (Planning Reserve Margin Requirement)'
Other in 'Increased Response +New Resources': Wind, Battery, Hydro, and Oil
Other in 'Increased Accreditation' and Retirements: Other-Gas(CU ft), Water, Wood, Waste Heat