MISO Update for Michigan Public Service Commission

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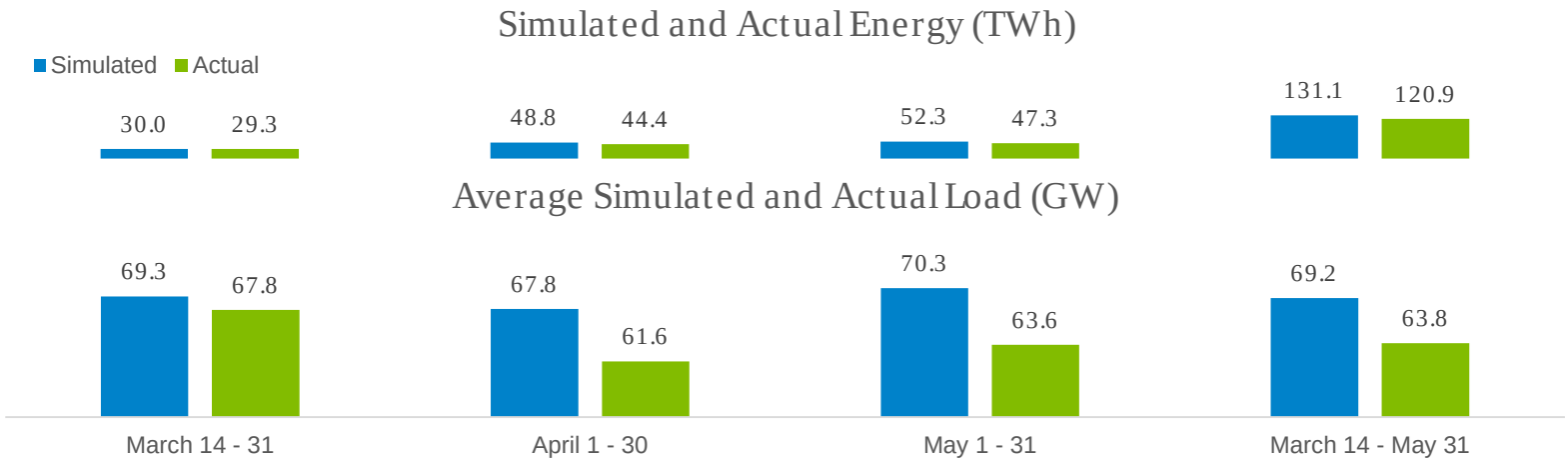
June 10, 2020

Agenda

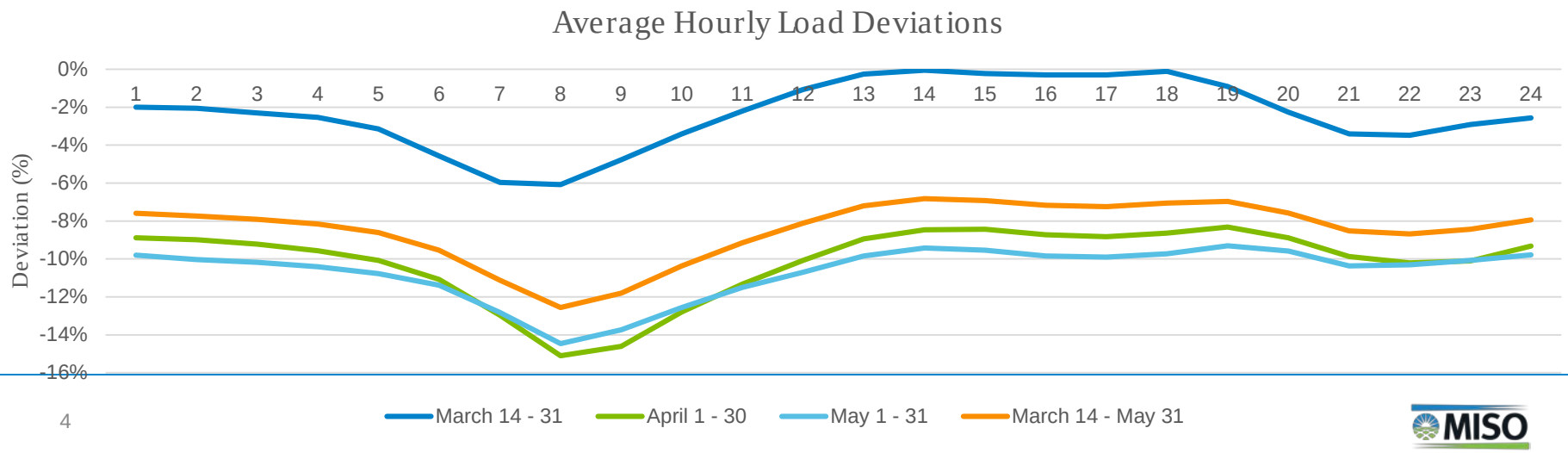
- COVID-19 Operational Update
- 2020-2021 Planning Resource Auction Results
- 2020 OMS-MISO Survey
- Michigan Import/Export Transmission Study

COVID-19 – Operational Update

COVID-19 related closures are progressively contributing to a larger energy and load deviation

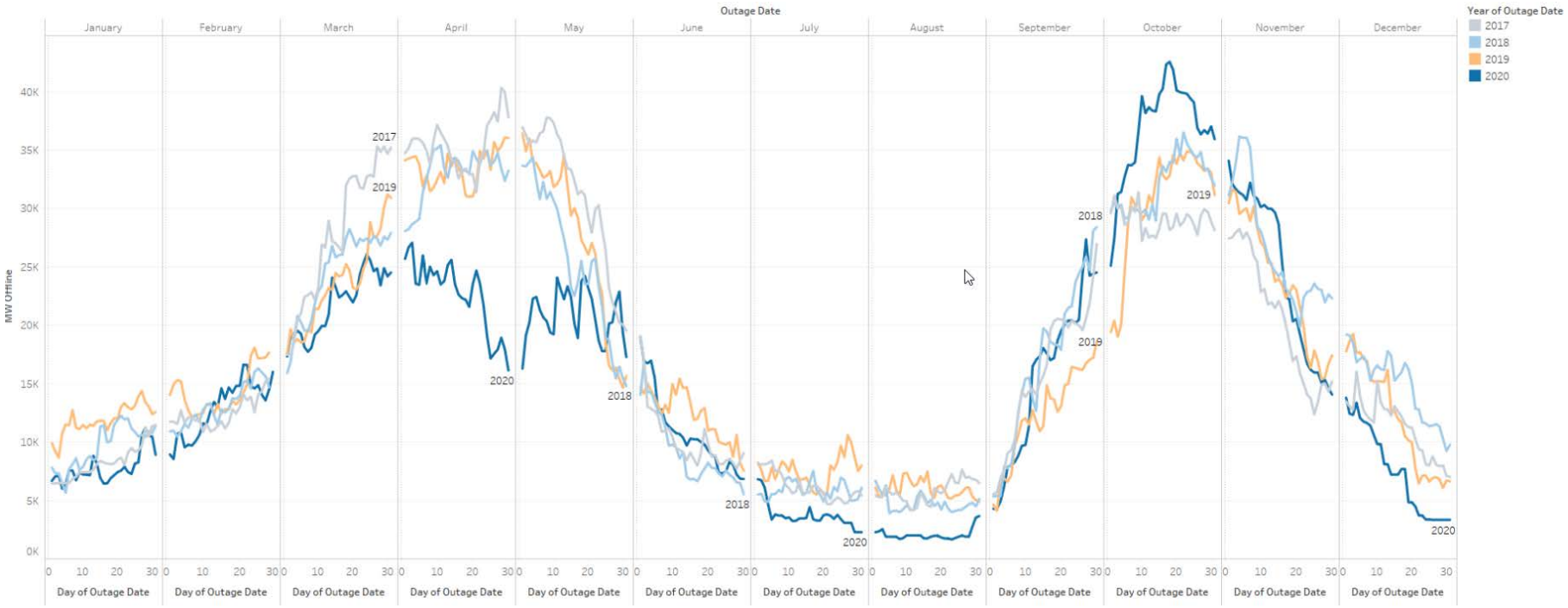


Since March 14th Energy and Load are trending 8% lower than normal; May, Energy and Load are trending at ~10.6% lower.



Planned MW offline in April and May is well below prior year values.

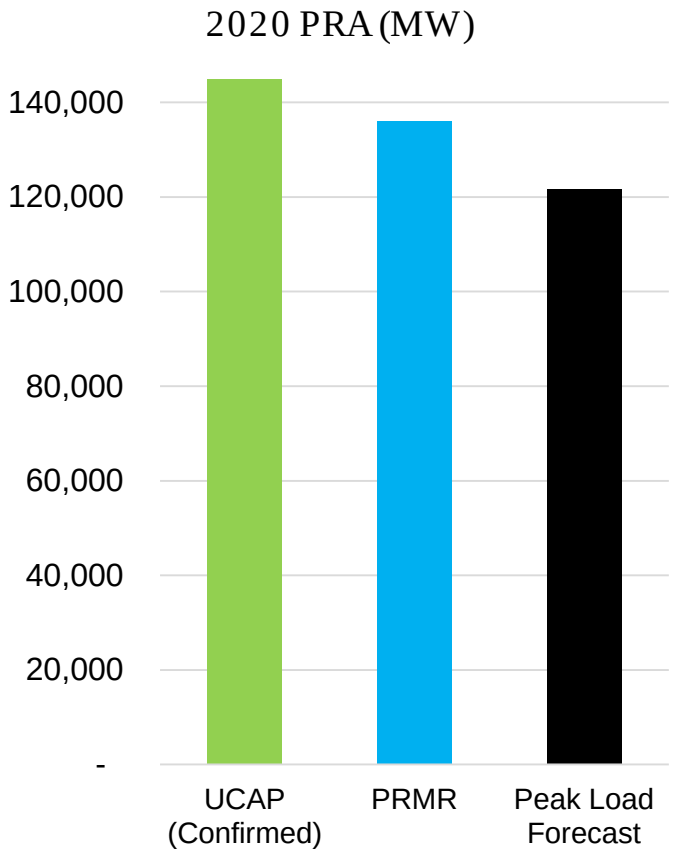
Additionally, we are seeing a large number of outages being submitted for October compared to prior years.



Planning Resource Auction

The MISO region has adequate reserves to meet its 136 GW Planning Reserve Requirement

- Most zones cleared **$4.75-$6.88**/MW-day
- Zone 7 (MI) cleared at Cost of New Entry of **$257.53**/MW-day - insufficient zonal capacity to meet Zone 7 Local Clearing Requirement (LCR)
- South to North capacity reached limit causing price separation of $0.25
- Regional generation supply consistent with the 2019 OMS-MISO Survey
- Cleared resources show the continued growth of gas, renewables, and demand side resources. This trend is the primary basis for Resource Availability and Need initiatives around the timely and efficient conversion of capacity into energy across all hours of the year



2020/21 PRA Results for lower Michigan

	Z7
PRMR	21,945.3
Offer Submitted (Including FRAP)	21,727.5
FRAP	12,034.4
Self Scheduled (SS)	9,619.9
Non-SS Offer Cleared	73.2
Committed (Offer Cleared + FRAP)	21,727.5
LCR	21,850.7
CIL	3,200
ZIA	3,200
Import	217.8
CEL	-
Export	0.0
ACP ($/MW-Day)	257.53

Zone 7 fell 123 MW short of its Local Clearing Requirement (LCR) for procuring resources within its own borders

Load Serving Entities will pay the capacity price for about 5% of wholesale demand in the lower peninsula

Zone 7 has 7.4% (1,490 MW) more local capacity than its forecasted peak-load level, and can rely on the MISO region to maintain reliability throughout the Planning Year

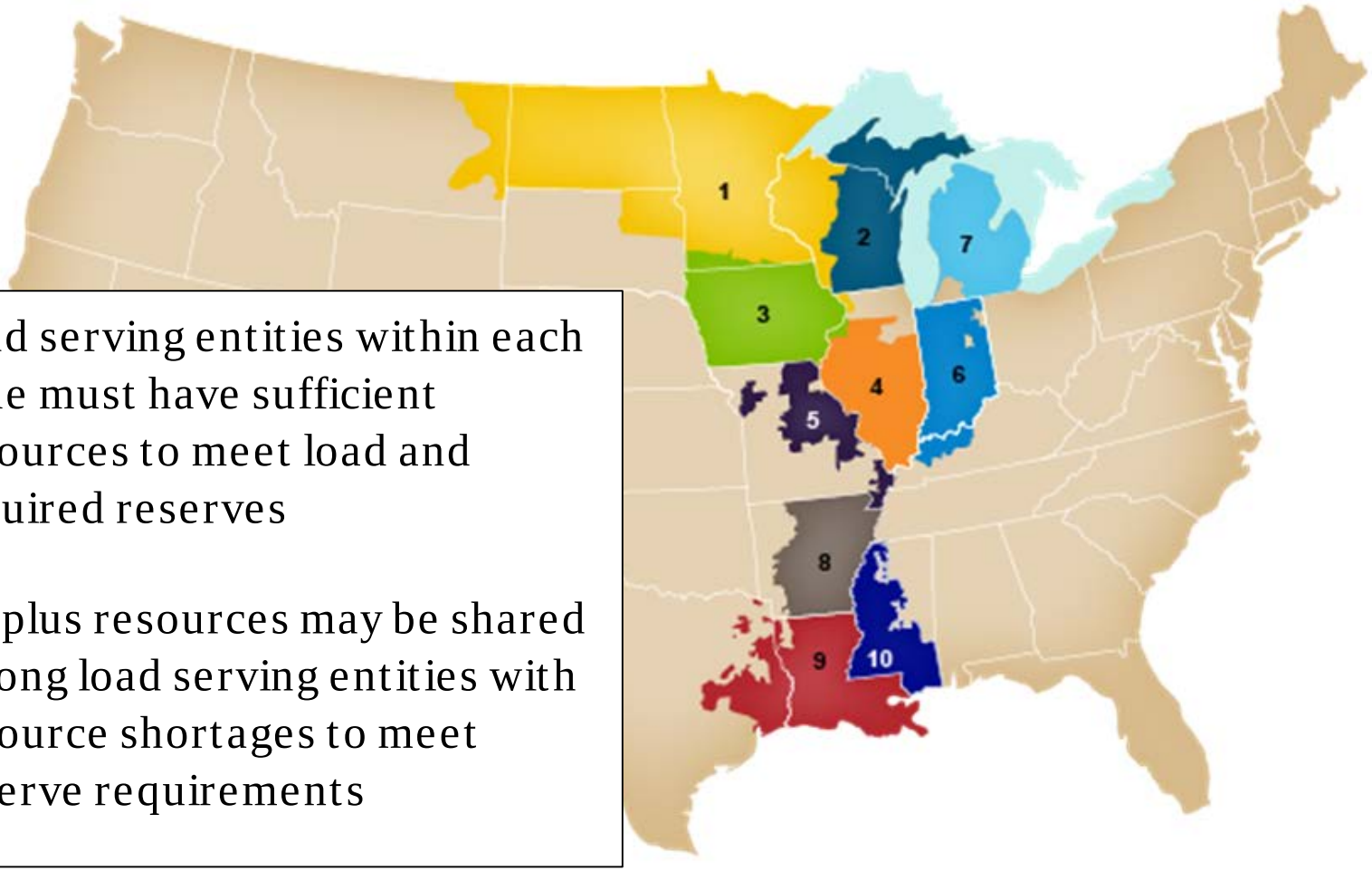
Values displayed in MW UCAP

2020 OMS-MISO Resource Adequacy Survey

Region projected to have adequate resources in 2021, but continued action needed to ensure sufficiency going forward

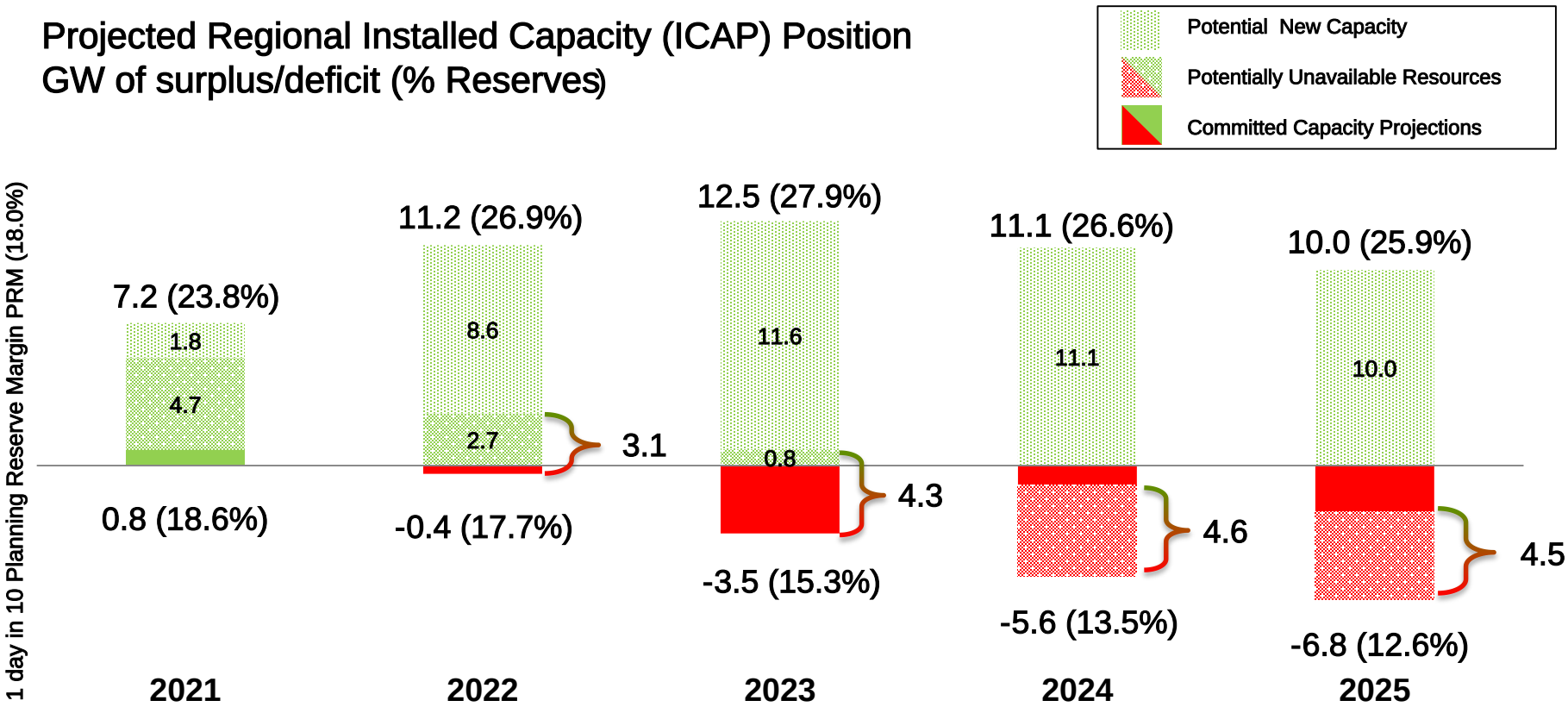
- MISO is projected to have 0.8 GW of firm capacity in excess of the 2021 regional Planning Reserve Margin (PRM), based on responses from over 94% of MISO load and other non-LSE market participants. This range could reach 7.2 GW if all potential resources are realized.
- Compared to last year, margins are tighter for both the first year and the full-five year period of the survey. This is primarily driven by an increased PRM and modest load growth.
- Since the 2019 Survey, additional resources help maintain the *regional* balance, but some zones (2, 4, 6, and 7) show potential risk
- Projected demand growth rate rose just slightly, averaging over 0.3% per year compared to 0.2% in 2019 Survey
- 2020 Survey marks first year using new OMS-MISO Survey module in the Module E Capacity Tracking tool, which streamlines process for respondents and MISO and improves data security

MISO Resource Adequacy Requirements



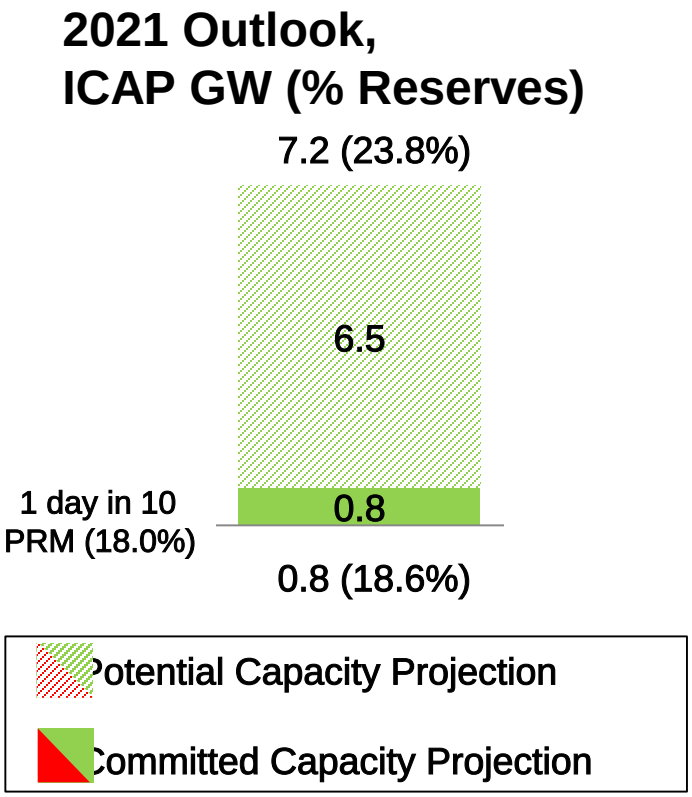
- Load serving entities within each zone must have sufficient resources to meet load and required reserves
- Surplus resources may be shared among load serving entities with resource shortages to meet reserve requirements

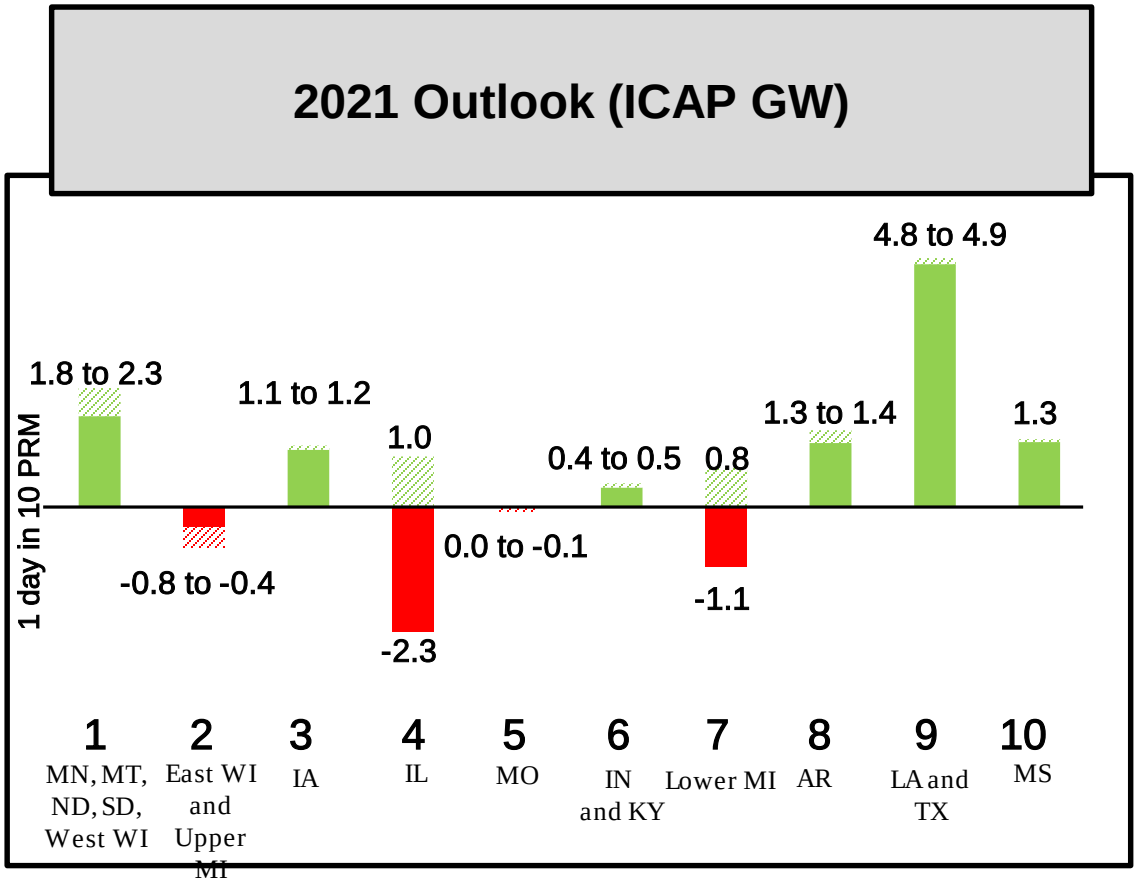
Projected 0.8 GW regional surplus of committed resources in 2021, increasing need for firming additional resources thereafter



- Regional outlook includes projected constraints on capacity, including the Sub-regional Power Balance Constraint (SRPBC)
- These figures will change as future capacity plans are solidified by load serving entities, state commissions, and local regulators
- **Potential New Capacity** represents capacity in the MISO Generator Interconnection Queue at projected queue certainty factors, updated since the 2019 Survey (see slides 14 and 15), as of April 23, 2020
- **Potentially Unavailable Resources** includes potential retirements and capacity which may be constrained by future firm sales across the SRPBC

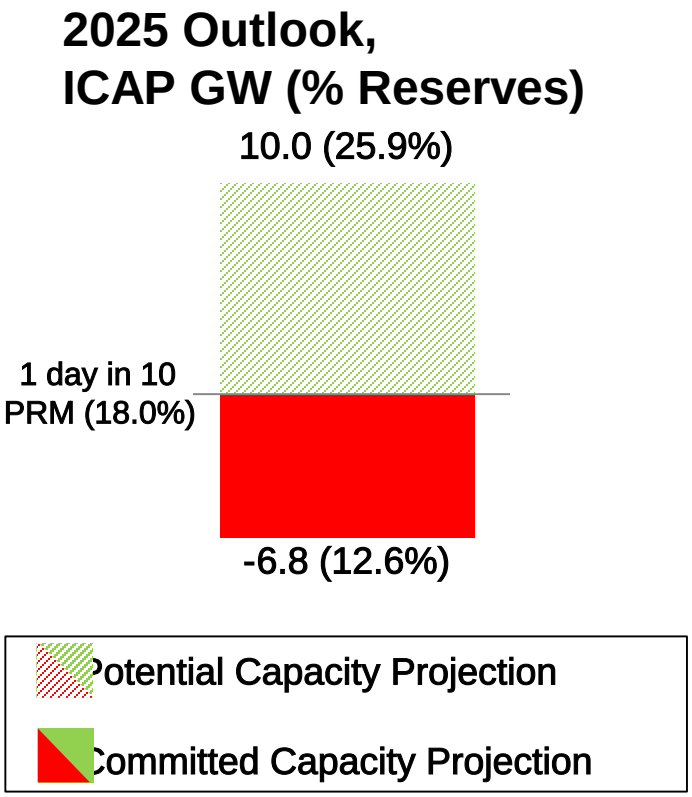
In 2021, regional surpluses and transmission are sufficient to cover zones with potential resource deficits

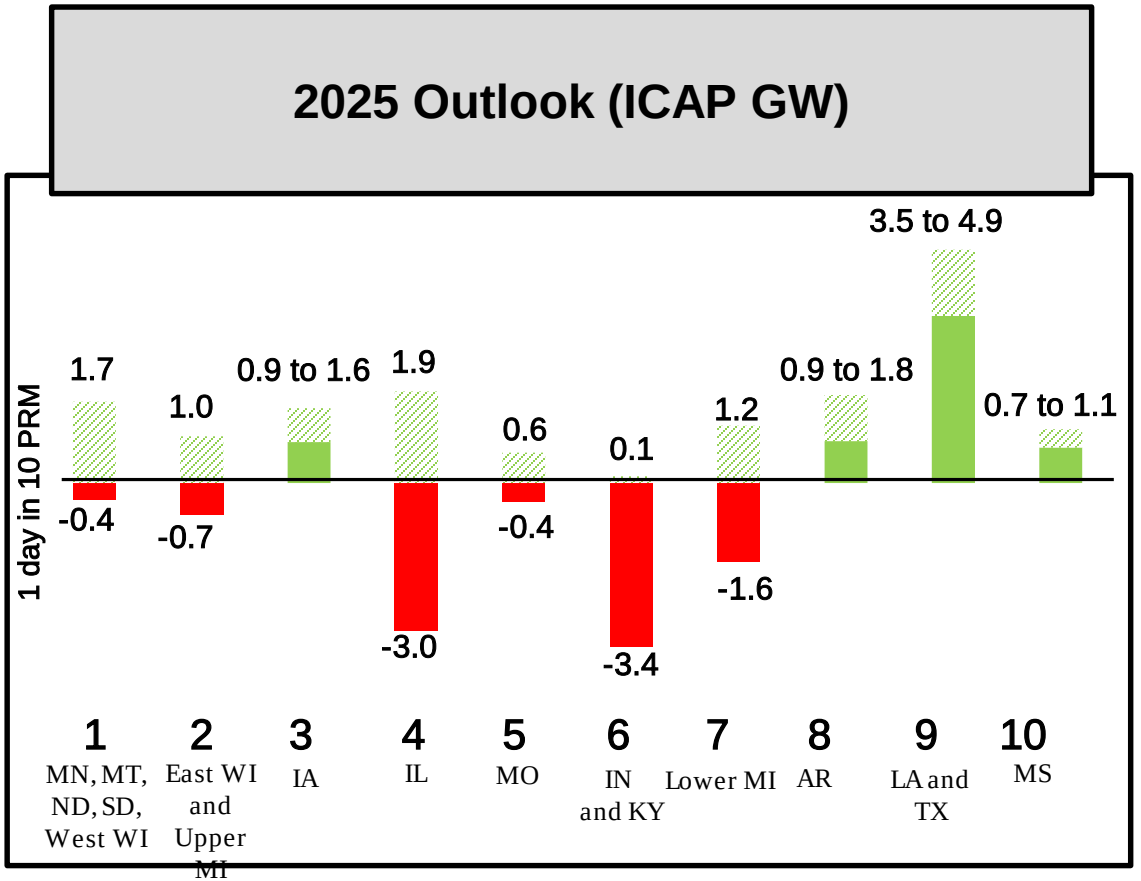




- Regional surpluses and potential resources will be critical for all zones to serve their deficits while meeting local requirements
- Positions include reported inter-zonal transfers, but do not reflect other possible transfers between zones
- Exports from Zones 8, 9, and 10 were limited by the Sub-regional Power Balance Constraint

Continued focus on load growth changes and generation additions and retirements will improve out-year uncertainty





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Michigan Import/Export Transmission Study

MISO is conducting a study to inform the Michigan PSC on approaches to accommodate more energy imports and exports to/from Michigan

- Three scenarios to evaluate different possibilities for increased energy imports
  - Five year outlook with goals of +500 and +1500 MW increases
  - 10+ year outlook with announced resource portfolio changes, up to +3000MW increase
  - High Renewables in 2035

At the conclusion of the study, MISO will provide a final report and summary presentation

- Deliverables will detail study results as well as study process and assumptions
- Study results will include transmission expansion options (facilities, scope, and voltages), estimated cost for each transmission expansion option, the associated increase in capacity import and export limits under each scenario, and qualitative benefits as applicable
- Local reliability requirements (LRR) for LRZ7 will be calculated using the generation fleet in Scenario 2 and Scenario 3
- MISO will not make any project recommendations to MTEP Appendix A based on the outcome from this study

Five-Year CIL Results: Summary

Load-Load Voltage Analysis

- CIL = 4715 MW
- Limiting Element = Diesel 120 kV (4 projects implemented)
- Contingency = P12

Thermal Analysis

- CIL = 5100 MW
- Limiting Element = Monroe – Brownstone 345 kV
- Contingency = P12

Gen-Gen Voltage Analysis

- No constraint identified – default to Thermal CIL of 5100 MW

Questions