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Strengthening Resource Adequacy with FTM Distributed Batteries: **A MISO Case Study**

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Executive Summary

MISO utilities are facing resource adequacy challenges

- MISO has lost ~9.5 GW of accredited capacity over the past decade as thermal plants retire. Simultaneously, increasing load growth drives utility load-serving obligations up.
    - The trends point to critical reliability challenges facing the industry: satisfying escalating energy growth, managing generator retirements, and accelerating resource and transmission development.
- Seasonal accreditation is changing the capacity credit resources receive, especially impacting renewables and altering resource adequacy requirements across seasons.
- MISO's upcoming Direct Loss of Load (DLOL) methodology (set for 2028/29) will significantly reduce the accredited capacity of renewables, particularly wind and solar, with solar falling from 50% accreditation today to as low as 21% in certain seasons — tightening reserve margins, even as nameplate capacity grows.

The DCP model deploys FTM distributed batteries now, capturing wholesale market value without Order 2222

- With Distributed Capacity Procurement (DCP), utilities can plan, deploy, and dispatch medium-sized (e.g., 1-3 MW), front-of-the-meter (FTM) distributed batteries at scale.
- Beginning now, a DCP can deploy 200 MW of battery storage participating in MISO using LMR and DRR Type 1 participation models without needing telemetry.
- DCP is a strategic portfolio product that delivers critical local grid services — including congestion relief and targeted capacity additions exactly where needed — while creating synergies with larger storage systems and Virtual Power Plants for increased grid utilization and maximized asset value across the entire storage ecosystem.
- Modeling of a 200 MW DCP deployment of nameplate distributed battery capacity — completion by 2028 — increases a MISO utility's accredited capacity buffer by 2.4 percentage points and increases the 2024 summer reserve margin in Local Resource Zone (LRZ) 1 by 1.1 percentage points.
- Under projected DLOL standards, a full DCP deployment completed by 2031 (500 MW ICAP) increases accredited capacity for a MISO utility by 4.2%.

MISO BPM 001, 6.2.3.6, ("An ESR must: a) be capable of injecting and withdrawing a minimum of 0.1 MW. b) Be capable of complying with the Transmission Provider's Setpoint Instructions. c) have the appropriate metering equipment installed; and d) be physically located within the MISO Balancing Authority Area. • Distribution ESR's must execute an Attachment HHH prior to submitting information in Model Manager.")
BESS do not need a telemetry stream with MISO when using the LMR and DRR Type 1 participation models.

Utility Co 2024-2040 Integrated Resource Plan: Physical generating assets owned by the Company have a net capacity of approximately 9,500 MWs, including about 2,300 MWs of wind, this is not including customer-owned assets that provide additional portfolio diversity.

Introduction

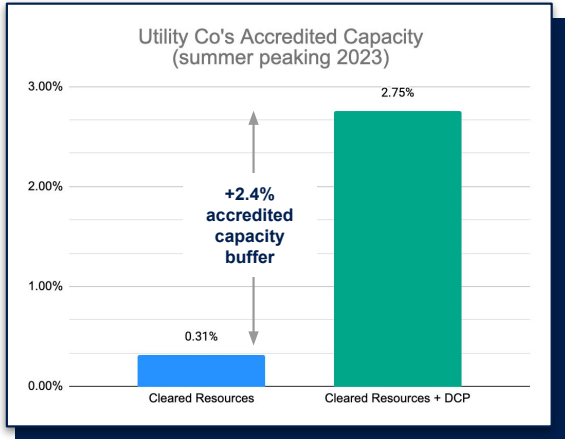
Utilities across the MISO region face growing resource adequacy challenges, driven by the rapid retirement of thermal generation plants and an increase in both load and variable generation resources. At the same time, MISO is evolving its resource adequacy market construct to reflect better when reliability risk occurs, reshaping how capacity value is determined.

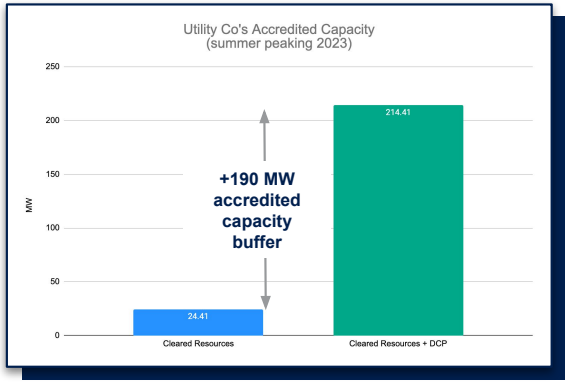
To meet peak capacity requirements under these unprecedented conditions, utilities must explore new approaches to procurement and planning. With the DCP model, which brings distributed energy storage into core system planning, utilities can procure flexible, dispatchable capacity that meaningfully contributes to resource adequacy.

What is Distributed Capacity Procurement (DCP)?
A model for utilities to plan, deploy, and dispatch front-of-the-meter distributed batteries at scale for grid benefit.

This market analysis evaluates the potential resource adequacy impact of DCP in the MISO region. It uses a major regional utility company (Utility Co) as a case study to explore how 200MW of 1–3 MW distributed batteries strengthen a utility's resource adequacy position when deployed FTM as part of core planning.

DCP Impact on Resource Adequacy





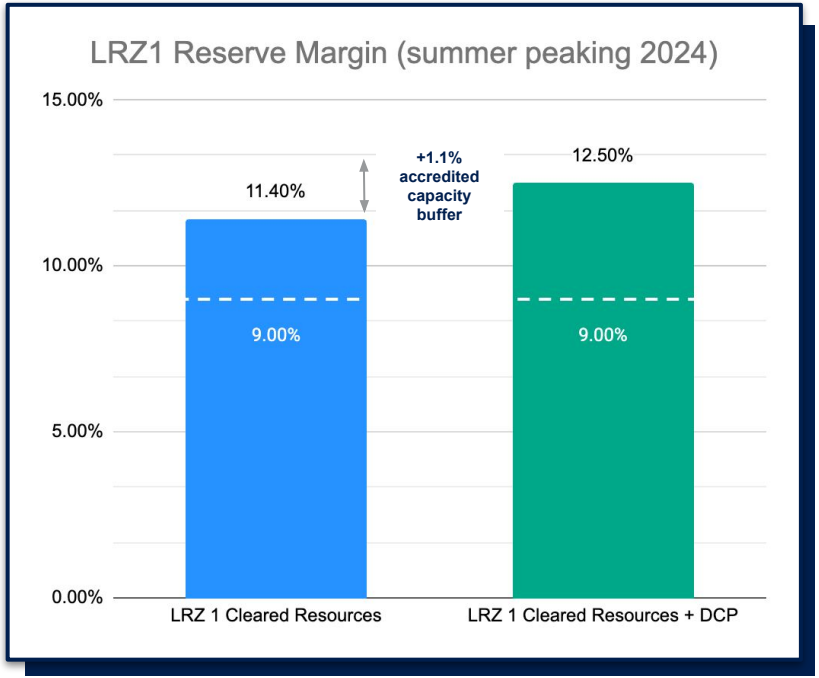
DCP allows a utility to rapidly and materially strengthen its resource adequacy position

Between rising demand and planned retirements, Utility Co will take on a greater risk of a capacity shortfall unless additional resources are procured in time. By 2035, peak load in MISO is expected to grow to ~130 GW, with renewables representing ~40% of the region's generation capacity. From 2026 to 2030, 1,708 MW of coal generation in Utility Co's portfolio is projected to retire. Through DCP, Utility Co could materially strengthen its resource adequacy position.

In 3 years, a 200 MW FTM distributed battery deployment provides 190 MW of accredited capacity, increasing Utility Co's reserve margin by 2.4 percentage points (excluding PPA capacity). **This results in approximately 780% more MWs in Utility Co's capacity buffer, thereby reducing the amount of capacity the utility would otherwise need to procure to meet resource adequacy requirements.**

*The 200 MW is accredited at a 95%, attributing 190 MW of actual capacity.
*Cleared resources indicate the extra accredited capacity above forecasted load.
*Data unavailable for LSE load obligations, however ((Utility Co peak)/(LRZ 1 peak)) * (LRZ 1 peak) * (1+PRM) = 577.64 Utility Co's PRMR UCAP using LRZ 1 Summer 2023 PRM UCAP base obligation.
*The utilities peak will likely occur at the exact moment of MISO's system wide peak, therefore we will assume for this analysis that it is nearly coincident.
*Converted total available capacity (ICAP) to UCAP through an estimate using MISOs Capacity Credit Report.
*Wind and Solar PPA's calculated with derates used 2023 DLOL methodology.

By deploying FTM distributed batteries as planning resources, DCP meaningfully contributes to resource adequacy within a given LRZ

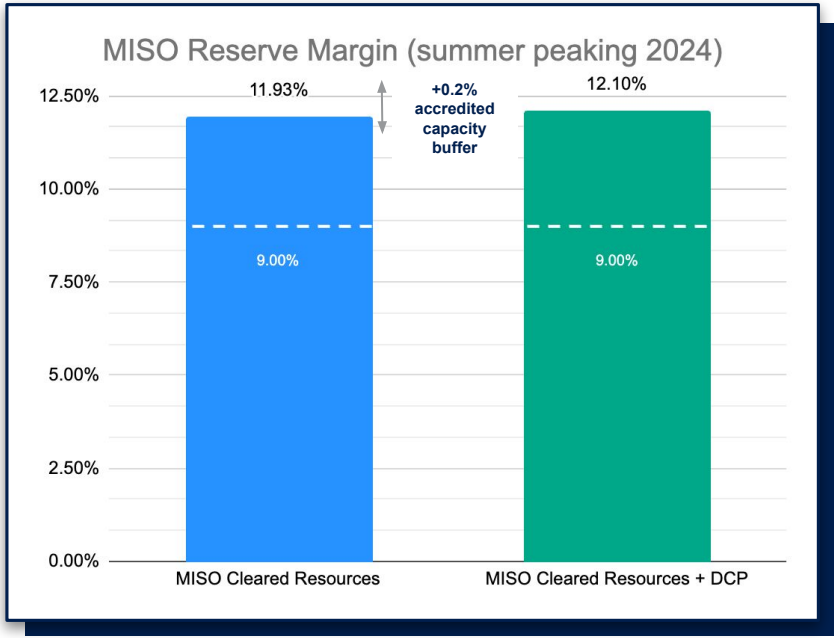


MISO's Planning Reserve Margin Requirement (PRMR) requires each LRZ to maintain at least 109% of peak load, applying resource UCAP ratings. MISO's 2024 summer peak resources planning reserve auction cleared at 11.9% (MISO wide) and 11.4% (LRZ 1) above the projected peak load.

The incremental impact of the DCP's 200 MW aggregated output by Utility Co adds around 1.1% on the reserve margin. The capacity buffer rises from 1,953 MW to 2,143 MW, which is a 9.7% increase in MWs of reserves.

*PY 24-25 Summer 2024 PRM UCAP is 9%. In Cleared Resources + DCP, the 9% UCAP base requirement may adjust slightly based LOLE simulation.
*This is a DCP deployment of 200MW over 2 years before evolving DLOL standards change BESS accreditation value.
*The 200 MW is accredited at a 95%, attributing 190 MW of actual capacity.
*The utilities peak will likely occur at the exact moment of MISO's system wide peak, therefore we will assume for this analysis that it is nearly coincident.

By deploying FTM distributed batteries as planning resources, DCP meaningfully contributes to resource adequacy within MISO



A 200 MW DCP deployment increases the 2024 MISO reserve margin by approximately 0.2% percentage points.

Medium-sized distributed batteries (e.g., 1-3 MW) deployed through a DCP offer increased system utilization and grid support capabilities (e.g., transmission and distribution congestion relief, production cost savings, ancillary services), delivering additional value to the system and to ratepayers on all non-peaking hours. A DCP deployed by a major regional utility maximizes the use of every deployed asset while expanding the services available to customers.

*PY 24-25 Summer 2024 PRM UCAP is 9%. In Cleared Resources + DCP, the 9% UCAP base requirement may adjust slightly based LOLE simulation.
*This is a DCP deployment of 200MW over 2 years before evolving DLOL standards change BESS accreditation value.
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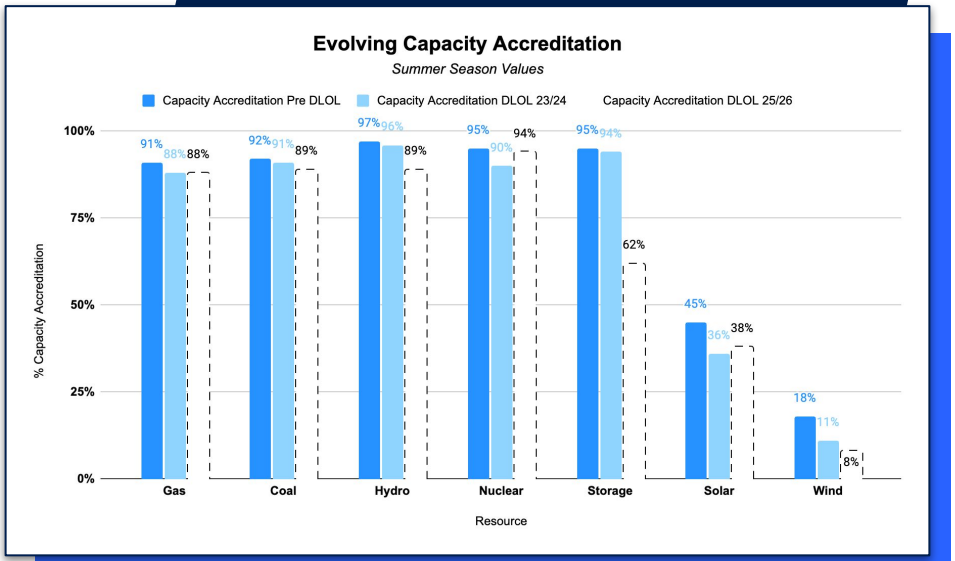
DCP Impact on Accredited Capacity

MISO is evolving its resource adequacy market construct to better reflect when reliability risk occurs, which reshapes how capacity value is determined

In anticipation of the 2028/29 DLOL implementation, MISO annually revises its DLOL values, and the 2025–26 planning year dropped energy storage accreditation sharply, from 95% to 62%. However, individual storage resources will eventually be assigned their own DLOL value based on system performance, once sufficient historical data is available.*

DCP's FTM distributed storage is well-positioned within this evolving construct. Because DCP assets are strategically sited on Utility Co feeders that peak at the same times as the MISO system, dispatching the batteries for local peak reduction simultaneously benefits the bulk system.

In contrast to customer-owned, behind-the-meter storage, DCP assets are devoted to system needs, which positions these resources to capture unit-level accredited capacity at levels higher than 62% class-level allocation, despite changes to MISO's framework.



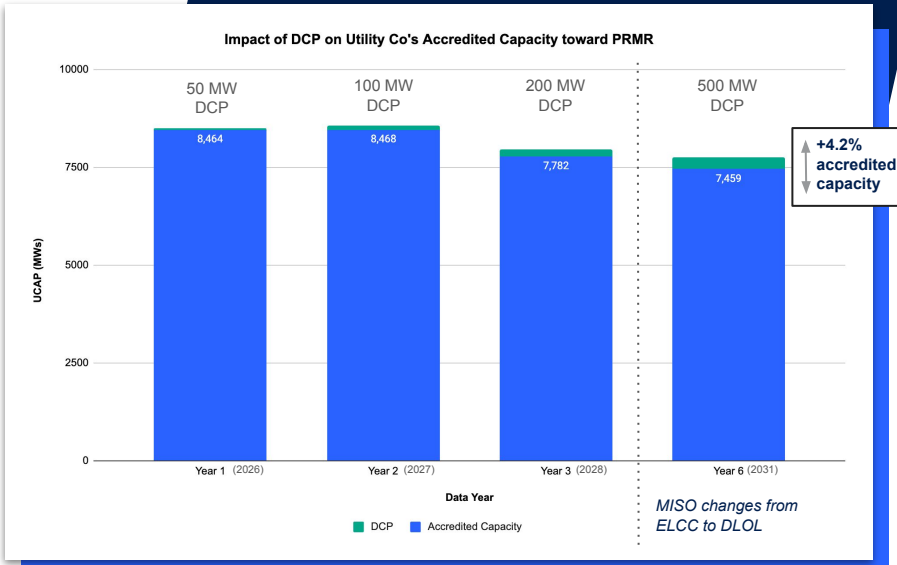
*Evaluates resource availability during both actual loss of load hours and near-miss hours from the MISO LOLE, adversely affecting intermittent resources.

Note: As of October 2024, MISO has 21 BESS. Until MISO reaches 30 BESS, storage accreditation remains fixed at 95%.

DCP increases accredited capacity within an evolving framework

Even with MISO's change to DLOL, a fully completed DCP deployment of 500 MW increases Utility Co's accredited capacity by 4.2%, at minimum, in 2031.

DCP storage remains favorably positioned under MISO's evolving accreditation framework because it is dispatchable during peak risk hours, ensuring its consistent capacity value.



Historical EAI data from Utility Co using respective accreditation values

*Years 1-3 represents the hypothetical DCP contribution to PRMR UCAP using 95% capacity credit.
*Year 6 represents the hypothetical DCP contribution to PRMR UCAP DLOL using Even Loss method capacity credit of 62%.

DCP’s Role in Utility Co’s Portfolio

Conclusion: Within Utility Co's portfolio, DCP delivers unique value streams that only FTM distributed batteries can provide

	Distributed BESS (DCP)	Gas Peaker	Bulk BESS
Increases System Utilization	✓	✓	✓
Provides Power in 9-18 Months	✓	✗	✗
Fast Frequency Response	✓	✗	✓
Provides Ancillary Services	✓	✓	✓
Distribution Power Quality	✓	✗	✗
Distribution System Benefits for Deferred Upgrades	✓	✗	✗
Transmission Congestion Relief / Avoidance	✓	✓	✓
System-wide Resource Adequacy	✓	✓	✓
Generates Energy	✗	✓	✗

Over 3 years, a 200 MW DCP delivers strategic distribution system value:

- **Boosts reserve margin**: 200 MW aggregated output increases LRZ 1's summer 2024 reserve margin by approximately 1.1 percentage points.
- **Adds distribution capacity value:** Distribution capacity value averages $30 to $100/kW-yr across identified circuits.
- **Provides incremental capacity:** 200 MW of nameplate capacity delivers value to the distribution system across a 36-month timeline.
- **Deploys prior to 2028 DLOL:** A DCP deploys storage assets before DLOL implementation and capacity accreditation changes in 2028.

Appendix

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