sparkfund

March 19, 2026

Deploying Distributed Batteries for Integrated System Capacity

ESIG Spring Technical Conference

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Delivering the Distributed Grid

We are a utility services company unlocking capacity on the grid. Through our Distributed Capacity Procurement (DCP) model, we enable utilities, energy majors, and large-load customers to deploy front-of-the-meter batteries as distribution infrastructure.

With over a decade of experience, our battery deployment services support program design, grid value assessments, asset host engagement, and procurement manage to ensure on-time, on-budget to maximize system value and lowest cost.

CUSTOMERS

Xcel Energy® · SDGE · PSEG · Constellation · Southern Company · Dominion Energy®

Building Minnesota's First Distributed Battery Storage Network

The Capacity*Connect program regulatory filing optimizes the grid with an up to 200 MW of distributed storage to help meet increasing demands for electricity.

THE FOUNDATION

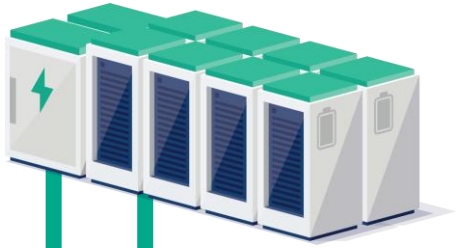
Xcel Energy
Utility adding front-of-the-meter distributed BESS to its integrated system planning process to modernize the grid and unlock capacity.

Sparkfund
Deployment service provider executing the DCP model, bringing over a decade of DER experience.

Google
Providing a direct investment into Capacity*Connect to unlock capacity in a new way for their data center, while improving grid resilience.

THE MECHANISM

Up to
200 MW
Front-of-the-meter assets deployed across the network by 2028.



1-3 MW

Capacity

Charges when energy is abundant and inexpensive; dispatches stored energy during peak demand.

THE IMPACT

Grid Utilization
Maximizes existing infrastructure efficiency and reliably powers expanding loads while putting downward pressure on rates for all customers.

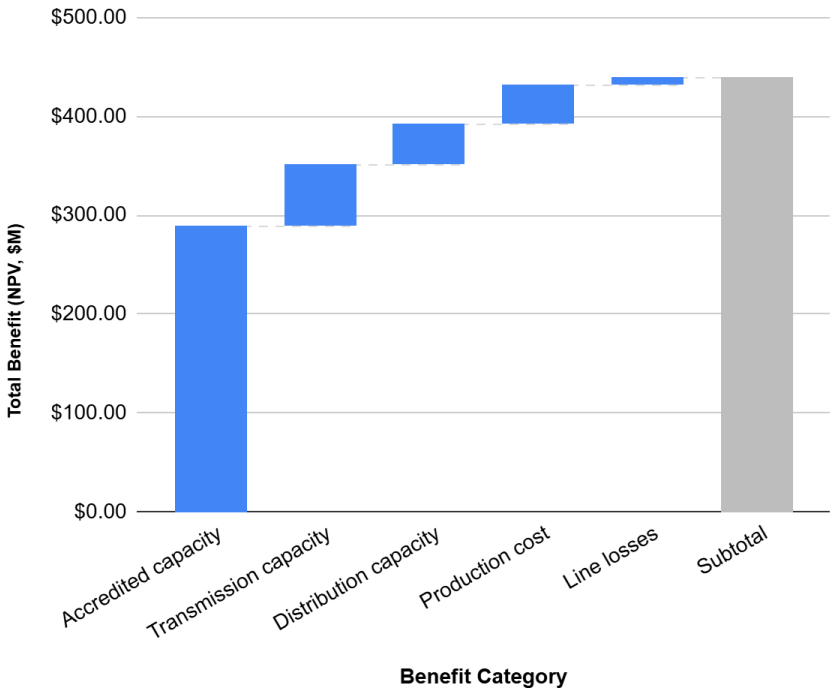
Economic & Host Value
Provides direct financial payments to local host sites, with a strategic focus on deploying assets in environmental justice communities.

Labor & Sustainability
Prioritizes local workers while supporting Minnesota's power mix beyond its current baseline of 70% carbon-free electricity.

Integrated BESS Delivers a Range of Quantitative and Qualitative Values

DCP BESS

- ✓ Meaningful utility-grade accredited capacity with rapid deployment
- ✓ Monthly host payments
- ✓ Improved grid utilization
- ✓ Speed-to-power
- ✓ Co-benefits to all ratepayers put downward pressure on rates, aligns with affordability



Objective 1: Discharge for bulk system capacity scarcity

Objective 2: Discharge for T&D peaks

Objective 3: Charge during low LMP / discharge during high LMP

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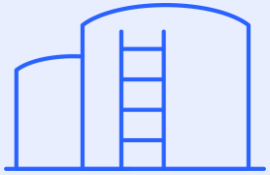
Source: Chart data from Xcel Energy October 3rd filing under Docket 25-378. Document: 202510-223594-01

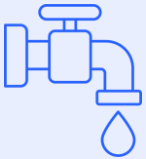
The Grid's Missing Middle

Unlike water and gas networks, scaled distributed storage does not come with the system

WATER
Storage Throughout Distribution

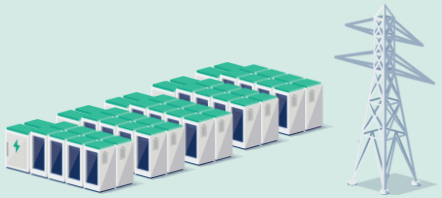


Water Towers
Sit between regional pumping stations and end users, storing water locally to buffer demand spikes, maintain pressure, and provide continuity if upstream supply is interrupted — without requiring the central system to react in real time.



ELECTRIC GRID

✓ **Transmission Level:**
50 - 500 MW utility-scale batteries



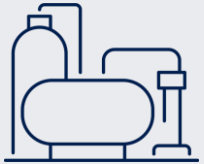
✗ **FTM BESS Distribution Level:** Almost Nothing

✓ **What's Possible**

- **Utility dispatched for system-wide benefit**
- **1-3 MW, FTM distributed batteries at feeders/substation matches feeder peak capacity**
- **Voltage support, upgrade deferral, and peak shaving**

✓ **Demand Response**
5-20 kWh residential and community batteries.

GAS
Inherent + Active Distributed Storage



Gas District Storage & Pressure Zones
Sit between high-pressure lines and customer connections, absorbing local demand variability and bridging short supply interruptions so upstream infrastructure can operate steadily and efficiently.

Advancing the Integrated Grid: From Planning to Operations

PLAN

Visible, resourced & progressing

- Co-optimization or integrated models
- Grid needs and DER valuations
- Integrated resource and distribution plans

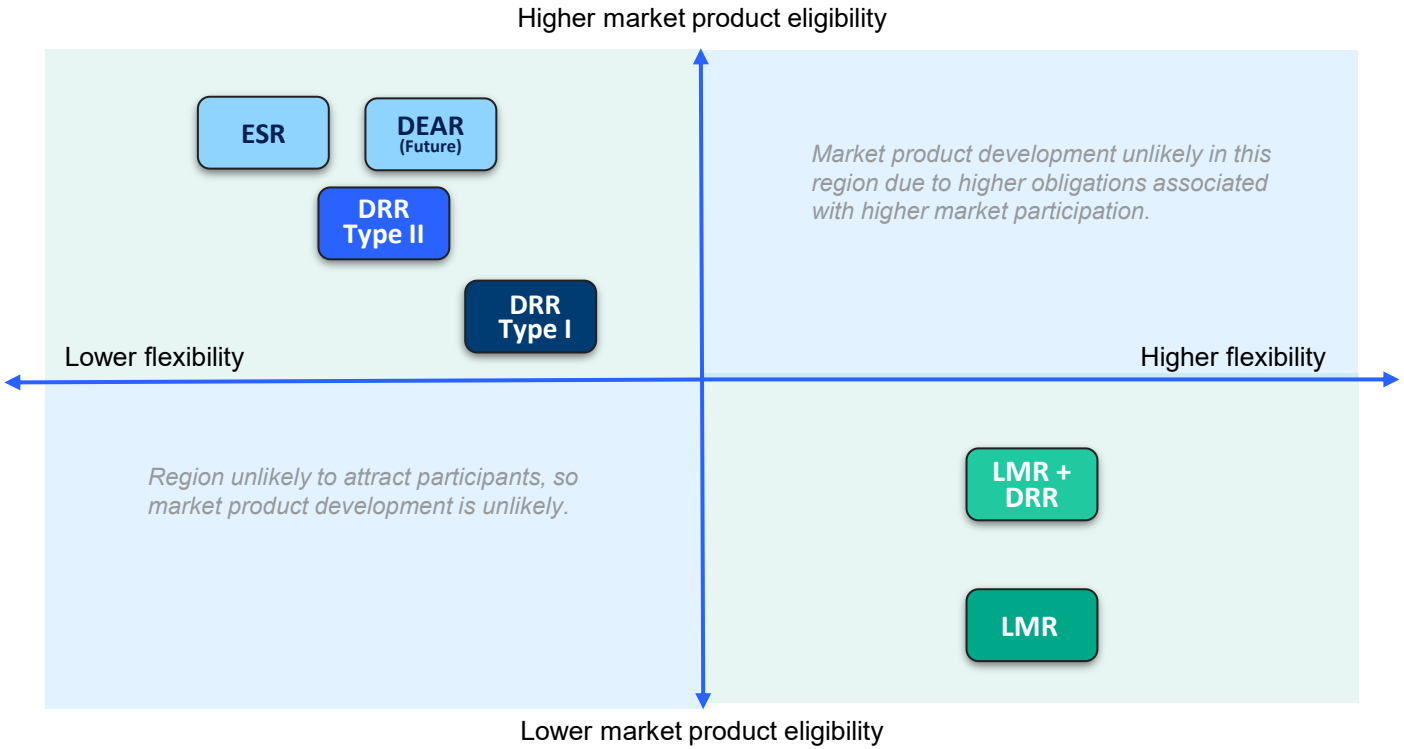
OPERATE

Less visible, bespoke, maturing

- Aligned planning-to-operations handoff
- Real-time dispatch coordination
- Market optionality across G, T & D

Design > Deploy > Dispatch

Market participation selection offers structured tradeoffs between market product access and distributed resource flexibility



The objectives and level of distribution system constraints can drive decisions on level of flexibility needed.

ESR: Energy Storage Resource

DRR: Demand Response Resource

LMR: Load Modifying Resource

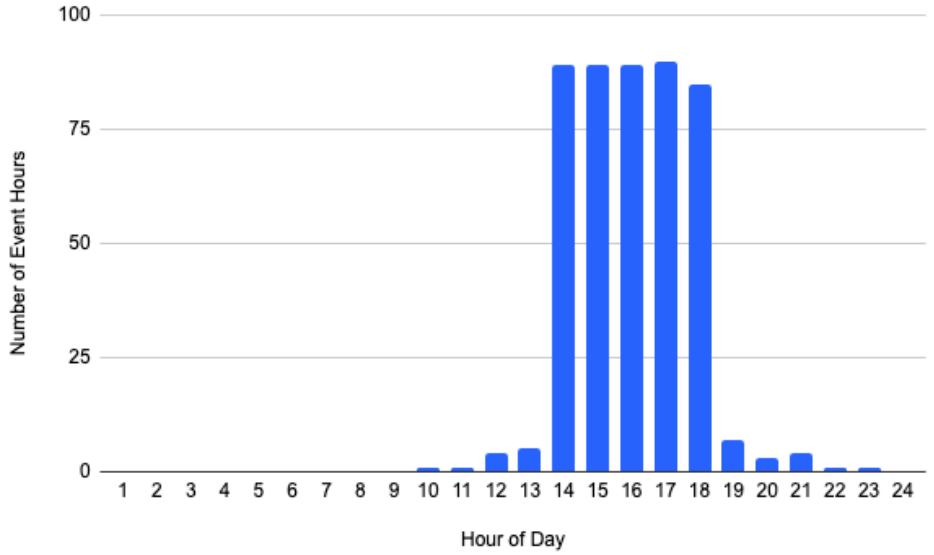
DEAR: Distributed Energy Aggregated Resource (Order 2222)

Historical Capacity Risk Patterns Inform Dispatch—Even as the System Evolves

In recent years, system stress has most frequently emerged in late-afternoon and early-evening hours.

While resource mix and load characteristics are evolving, these patterns remain informative for near-term dispatch design and risk management.

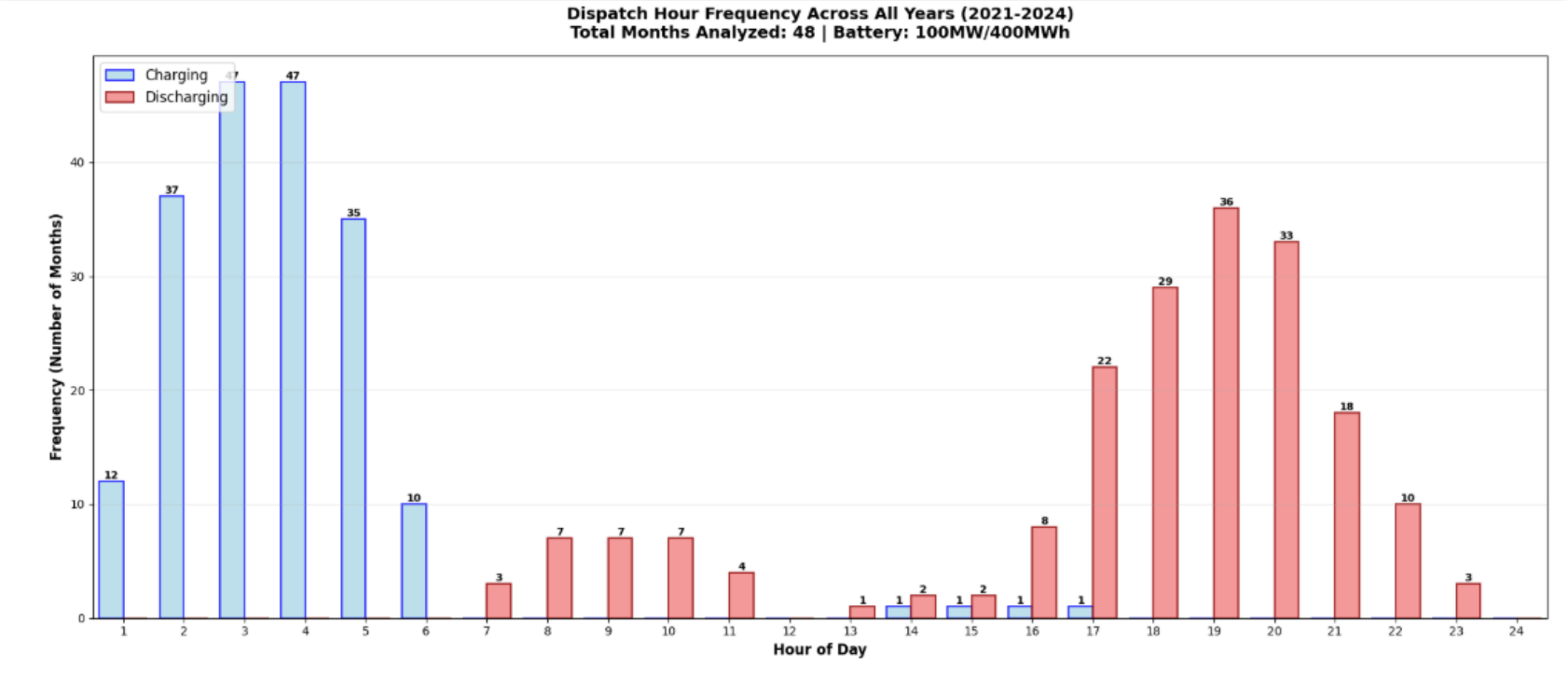
Number of Event Hours vs. Hour of Day

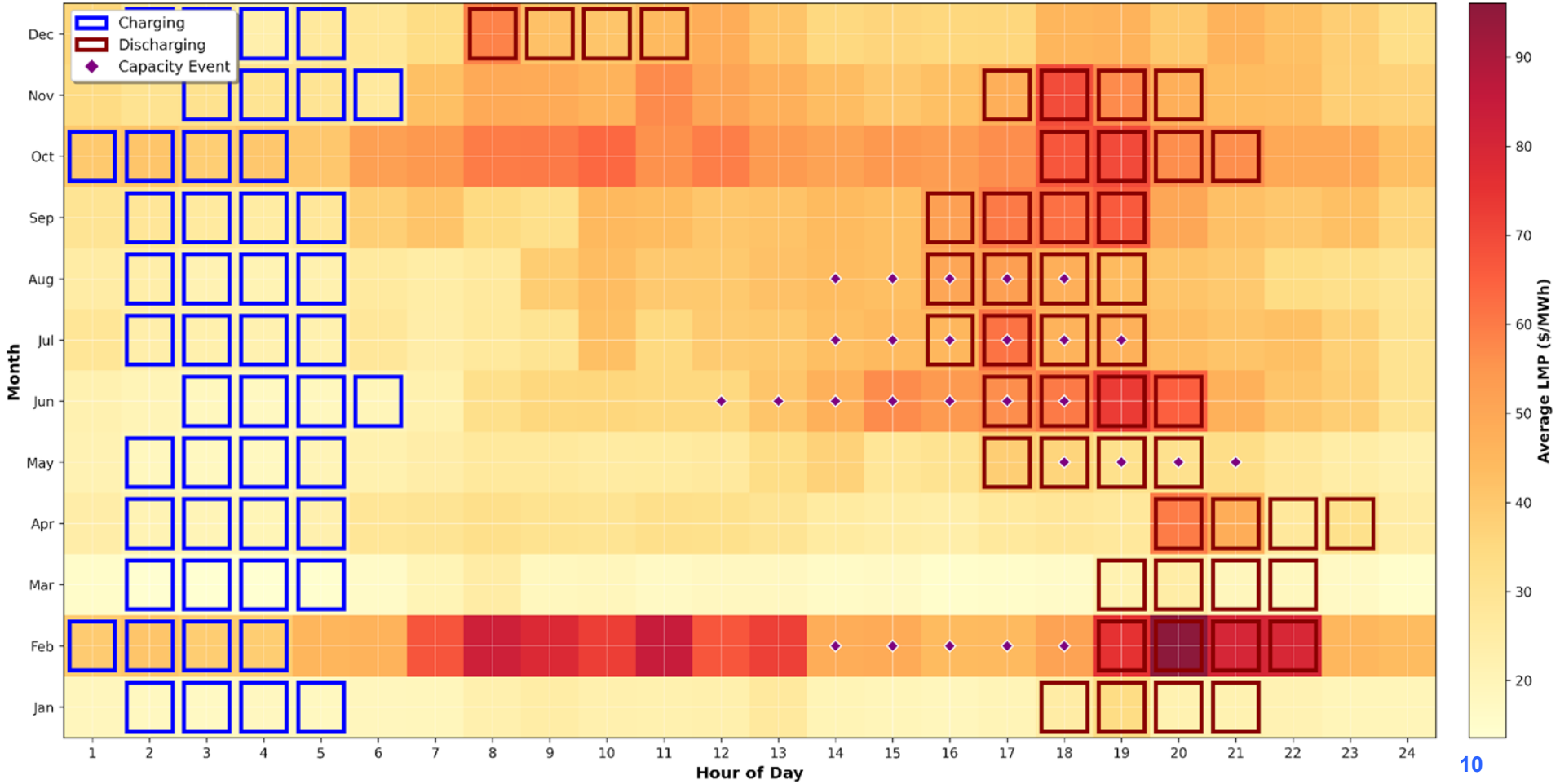


Source: Sparkfund analysis of MISO publicly available capacity alerts, warnings, and events, 2019 through June 2024

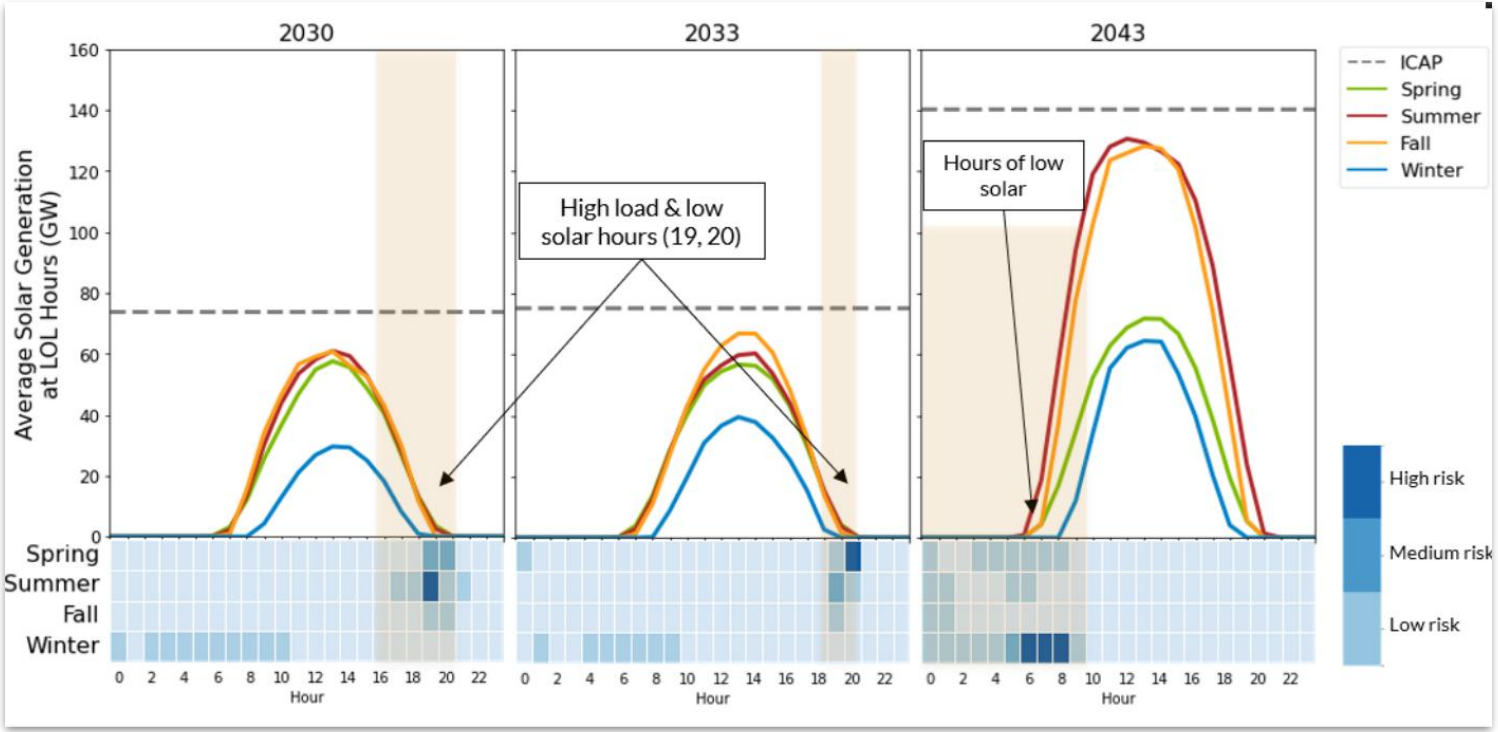
Economic energy signals favor charge and discharge outside midday hours

Discharge frequency is concentrated in late-afternoon and evening hours, reflecting where energy value is highest.




Minnesota Hub - 2021 BESS Dispatch Strategy
100MW/400MWh Battery | 90% Efficiency | 13 Capacity Events
Charging
Discharging
Capacity Event
Month
Dec
Nov
Oct
Sep
Aug
Jul
Jun
May
Apr
Mar
Feb
Jan
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
Hour of Day
Average LMP ($/MWh)
20 30 40 50 60 70 80 90

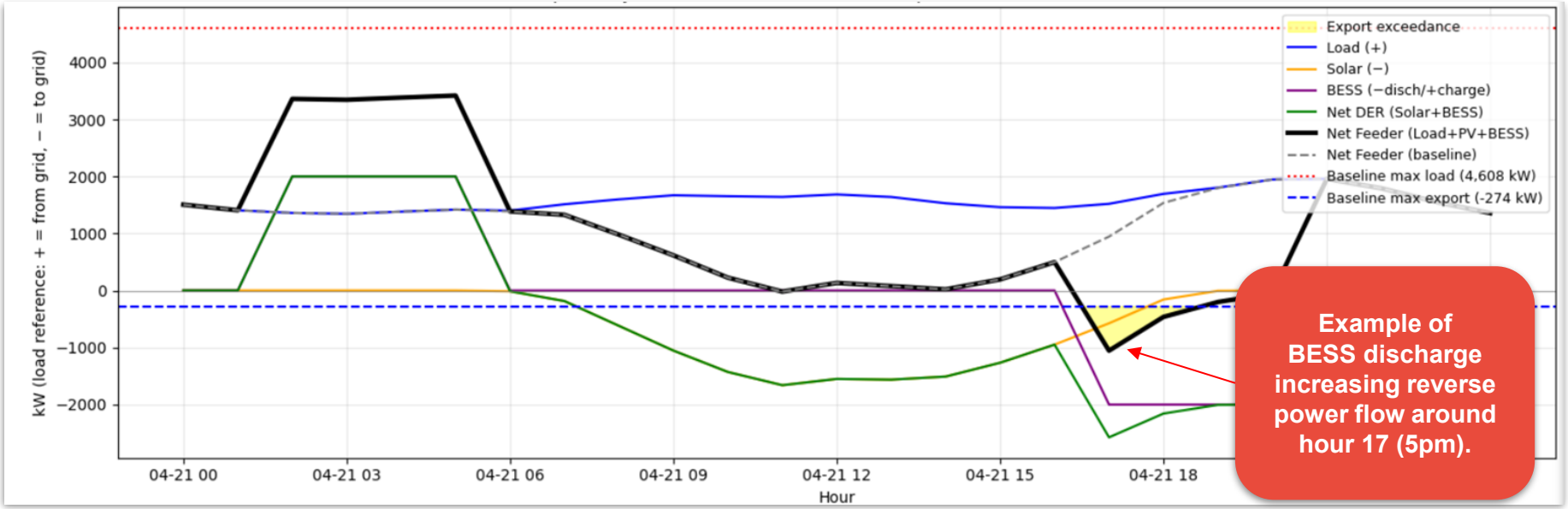
Increasing bulk-system solar is shifting capacity risk outside high-production hours



Source: MISO, 2024 Regional Resource Assessment

Dispatch can be achieved for bulk system capacity with minimal implications on hosting capacity in near term

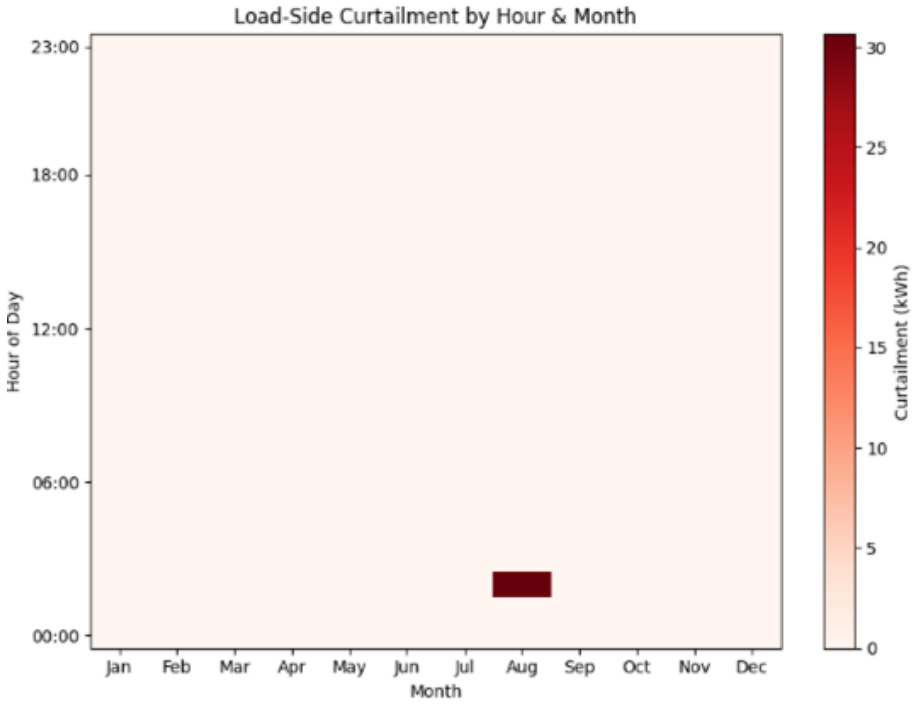
On individual light-load days, overlap between BESS discharge and hosting constraints is brief and concentrated in early-evening hours.

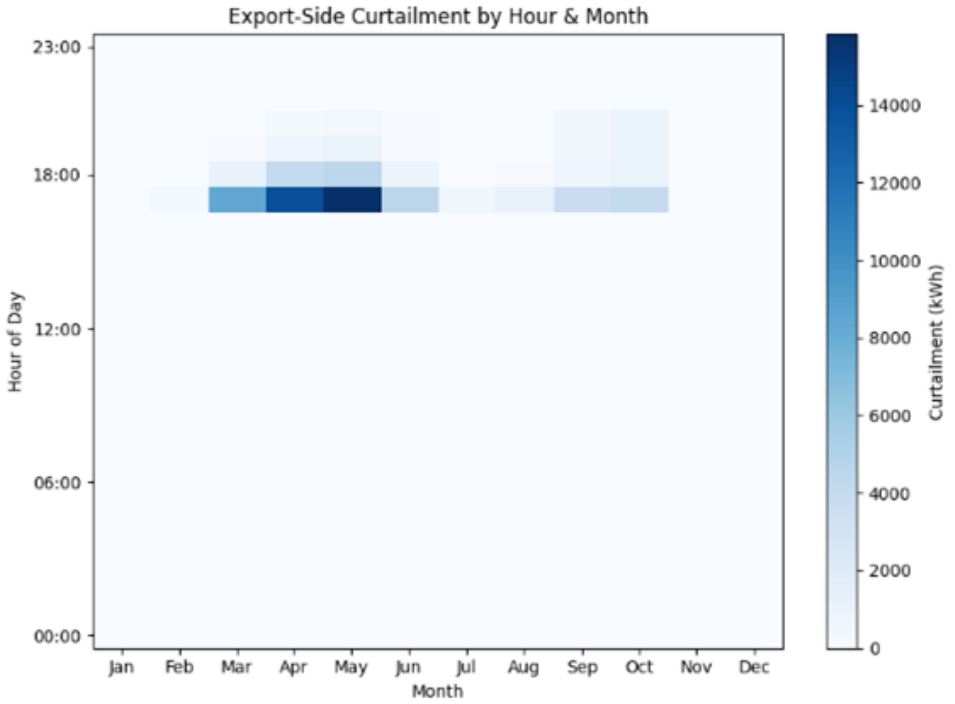


Illustrative plot for feeder Assumptions: 4.5 MW peak load; 275 kW peak reverse low due to 1.5 MW PV. C&I type load.

Source: Synthetic feeder level load data based on past modeling experience. Solar profile curve pulled from PVGIS API.

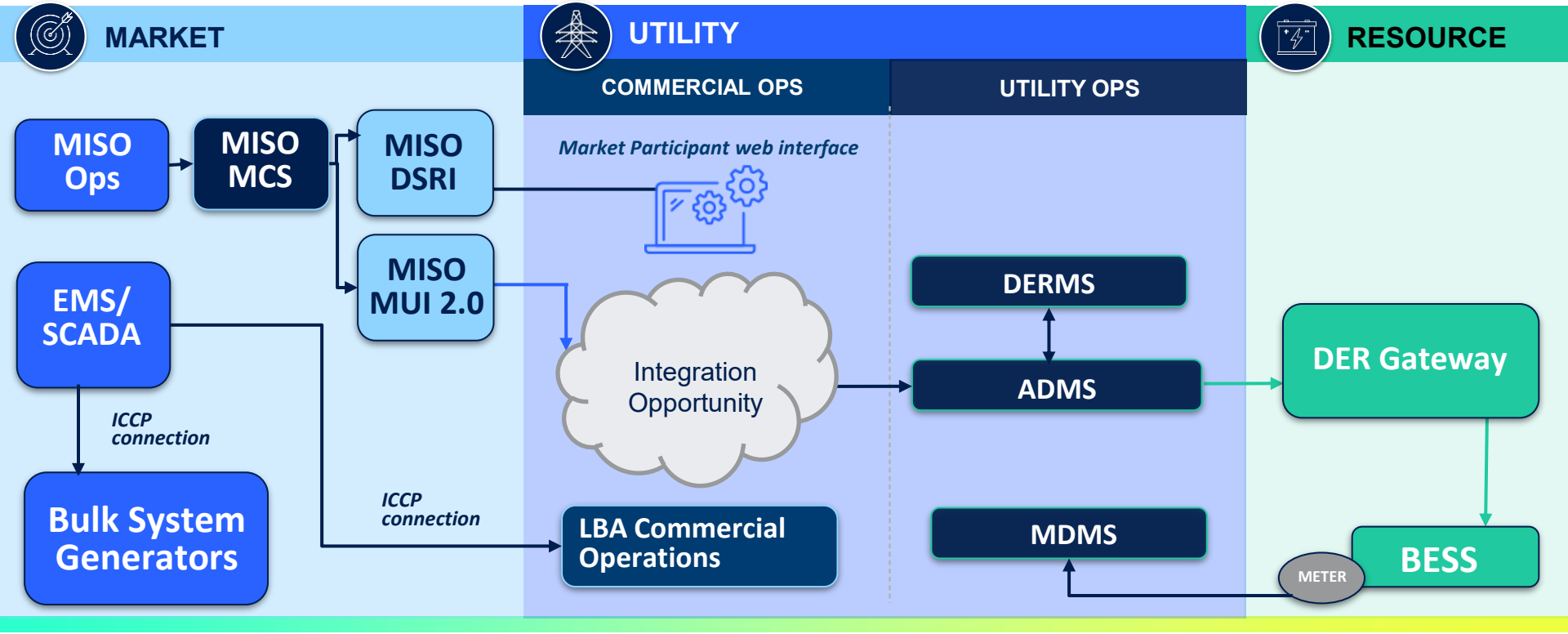
Flexible interconnection capabilities will be key in supporting scaled distributed BESS that also unlocks new, scaleable DER capacity





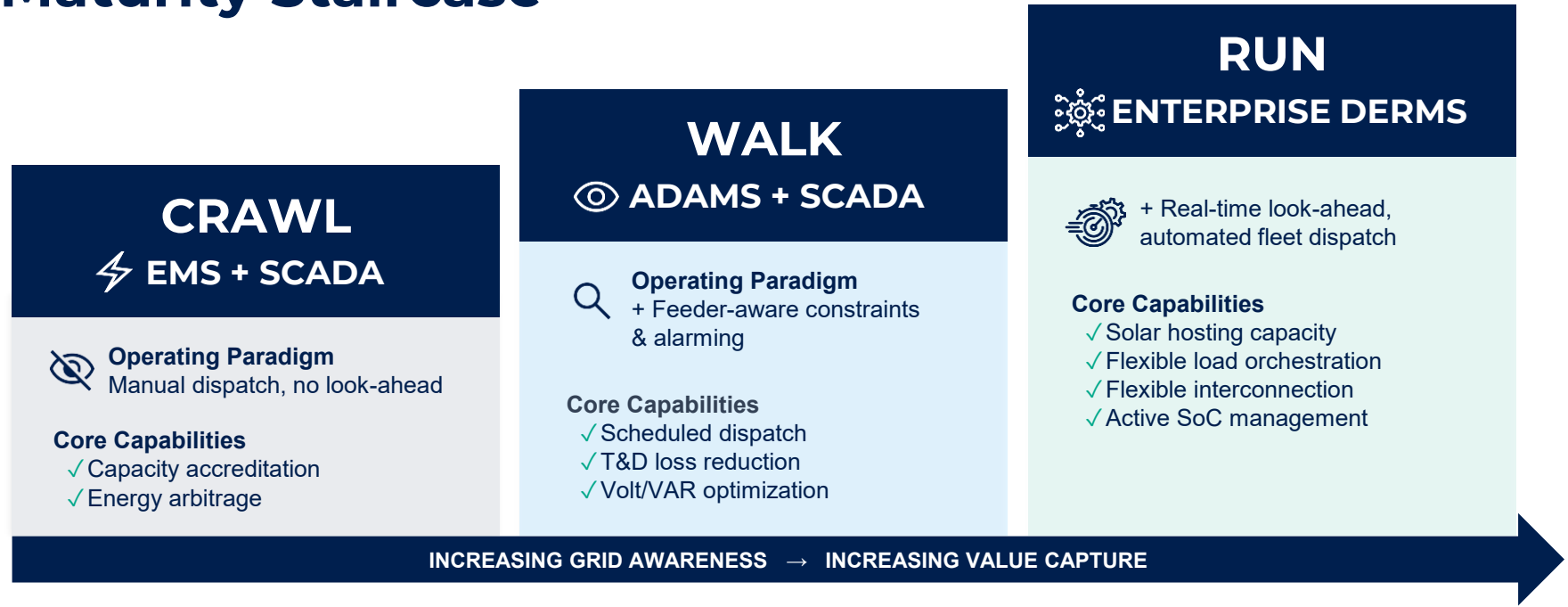
BESS dispatch assumed to be 17:00 to 21:00; 1.5 MW PV; 4.6 MW peak; C&I load

Across the industry, integrated operational systems are needed to meet dynamic integrated planning objectives



MCS: Market Communication System; DSRI: Demand Side Resource Integration;
MUI: Market User Interface; MDMS: Meter Data Management System

The Operational Technology Maturity Staircase



Key Takeaways

1

Planning and operations must be synchronized – not sequential
Planning assumptions and operational capabilities need to be synced to deliver integrated value. Study results that don't flow into dispatch tools remain theoretical.

2

Market participation requires structured tradeoffs
Product eligibility and participation requirements create real constraints. Accessing wholesale market products means accepting tradeoffs against distributed resource flexibility.

3

BESS flexibility demands integrated dispatch strategies
The ability of storage to deliver value simultaneously across G, T, and D is the asset – but only if operational strategies are designed to capture it.