

# Miso energy storage





## Overview

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MISO initiated the Energy Storage Study to explore the benefits that pumped hydro storage, compressed air energy storage, and battery storage technologies could provide as well as their economic potential in the MISO region. This study is part of MISO's involvement in GO15, an initiative with the largest power grid operators in the world. What is the MISO Energy Storage study?

MISO Energy Storage Study Background • MISO initiated the Energy Storage Study to explore the benefits that pumped hydro storage, compressed air energy storage, and battery storage technologies could provide as well as their economic potential in the MISO region.

Is MISO's SATOA impact on energy storage a transmission asset?

Energy Storage Association (ESA) is concerned about MISO's SATOA impact on energy storage as a transmission asset function. ESA is in favor of a more holistic approach towards storage's function as a transmission asset. PJM's Planning Committee is having special sessions on SATOA.

What does MISO's integration of storage resources mean for the grid?

MISO's integration of storage resources comes at the direction of the Federal Energy Regulatory Commission, which in its Order 841 directed grid operators to remove barriers to market participation for storage resources. The Midcontinent grid operator had asked to delay the compliance deadline until 2025, but regulators denied that request.

Why should MISO adopt new resource capabilities?

MISO and stakeholders have an opportunity to adopt new resource capabilities that bring needed system attributes. The opportunity arises from a combination of current control technology availability and increasing level of energy storage interconnection requests within MISO.

What should storage developers know about MISO's SATOA filing?



There are a few salient features in MISO's SATOA filing that storage developers should familiarize themselves with: 1) The criteria to evaluate and select SATOA - When evaluating a storage project as a transmission-only asset, the storage project must follow transmission planning protocols.

What does MISO do?

MISO proposes an initial draft framework of capability and performance requirements with supporting simulations tests to determine conformity. MISO's current effort aligns with the general direction of industry to anticipate advancements in grid-forming inverter technology capabilities and standard maturity.



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### Potential Arbitrage Revenue of Energy Storage System for MISO ...

This study investigates price fluctuations in the Midcontinent Independent System Operator (MISO) energy market in order to find high-volatility nodes that may offer revenue ...

### Michigan energy storage target sets pace for Midwest ...

As to what that storage might look like, it's a little early to tell, but MISO, which added energy storage to its market portfolio fairly recently, incentivises 4-hour duration projects, and that will likely be what most parties ...

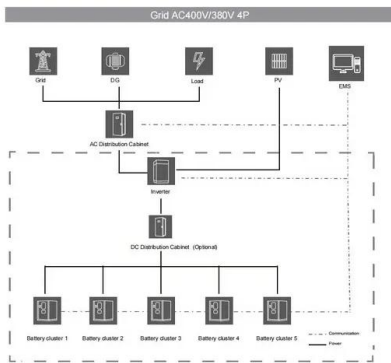


### Use of Energy Storage to Mitigate Constraints in GI Studies

MISO should develop and clarify a process by which storage can be used to address constraints that show up in the interconnection process for interconnection customers. This option should be allowed for both generator owned ...

### MISO leads the way with energy storage as a transmission only ...

Energy Storage Association (ESA) is concerned about MISO's SATOA impact on energy storage as a transmission asset function. ESA is in favor of a more holistic approach ...



### Maximizing revenue from electrical energy storage in MISO ...

This paper focuses on the MISO's implementation and presents the calculations to maximize the potential revenue of electrical energy storage (EES) from participation in arbitrage and ...

### Storage As Transmission-Only Asset (PAC004) Business ...

to Business Practice Manual 20 that implement Storage As Transmission-Only Asset (SATO) -feedback table with all MISO's responses are included in the meeting materials 2. Based on Stakeholder feedback, MISO revised Business Practice Manual 20 and



### MISO opens energy, operating reserve markets to storage with ...

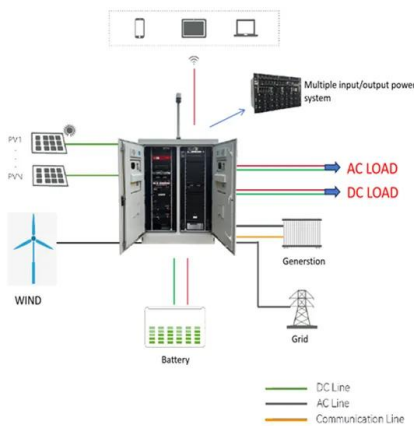
MISO will be looking for energy storage resources to help reduce peak demand, manage congestion and provide backup power in case of major generator disruptions.





### 524MWh BESS project proposed in Indiana MISO territory

The local Board of Zoning and Appeals is assessing the proposal. It would serve Indiana's electric grid in LaPorte County and surrounding areas, part of the grid operated by MISO (Midcontinent Independent System Operator). In a statement provided to Energy-storage.news, President Cyrus Tashakkori said: "Monroe Power is planned as 131 MW/524 MWh using ...



### MISO's energy storage model increases the market ...

This summer, MISO will turn on the anticipated storage market model switch. It has been a long journey for storage companies and renewable developers to address climate change with battery technology. CEEM and its ...

### Storage Resource as a Transmission Asset Also Providing ...

Storage as Transmission & Market Assets (Potential Issues) Potential Issues: o Address Generator Interconnection issues o Address operating practices: how the resource can address the transmission need and also participate in markets o Address which MISO



### MISO Now Includes Energy Storage As An Eligible

However, the new model positions MISO ahead of the increased storage participation anticipated with higher penetration of renewables and distributed energy resources over the next five to 10 years, the ISO said. In 2021, applications of energy storage projects





### MSC: Electric Storage and Offline Short-Term Reserves (20211104)

WPPI offers the following feedback on the two issues posed by MISO re Stored Energy Resource - Type II, Demand Response Resources - Type II, and Electric Storage Resources and offline reserves: 1. Proposed FERC filing (Tariff change and/or waiver) to



### Black Mountain CCO talks storage in MISO and SPP ahead of ...

2 ???· Standalone storage developer Black Mountain Energy Storage has pivoted its development expertise to SPP and MISO as its home market of ERCOT has continued to get over-saturated. BMES presently has over a 1 GW of storage projects collectively across both grid operators and both regions offer attractive attributes for the developer, said the company's ...

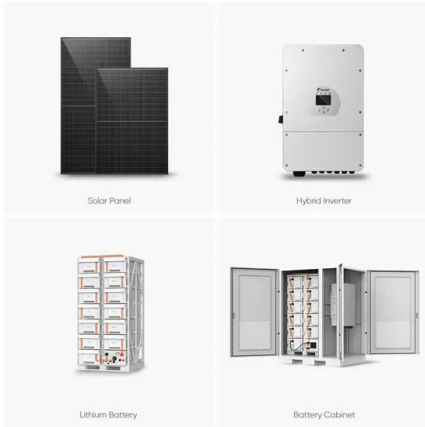
### MSC: Storage as Transmission Asset to Provide Market Services ...

Savion, LLC ("Savion") would like to thank MISO for bringing this item to stakeholders for discussion. During the June 10, 2021 Market Subcommittee (MSC) meeting, MISO discussed Storage as Transmission and Market Assets potential issues. MISO requested



### REDEFINING ENERGY AND ANCILLARY SERVICES MARKETS

2000 MISO Formed 2005 Energy Markets Launch 2009 Ancillary Services Launch 2014 Market Vision 2020 Redefining Markets Resource Mix  
COAL GAS NUCLEAR WINDSOLAR OTHER 33% 35% 17% 55% 20% 13% 5% 44% 35% 10% 8% 3% 7% 12% 4%



### MISO on challenges of integrating energy storage as market booms

Transmission lines in Illinois, one of 15 states where MISO operates the high-voltage network. Image: Corey Coyle. A senior executive from the US' second-largest grid operator MISO sat down with Energy-Storage.news to discuss the challenges that come with a soaring energy storage market.



### [Energy Storage Study Presentation](#)

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Background o MISO initiated the Energy Storage Study to explore the benefits that pumped hydro storage, compressed air energy storage, and battery storage technologies could provide as well as their economic potential in the MISO region. o This ...





### Ørsted, Mission Clean Energy to build 1 GW of grid storage in MISO

Ørsted is partnering with Mission Clean Energy to develop 1 GW of standalone energy storage projects in the Central and Northern regions of the Midcontinent Independent System Operator's



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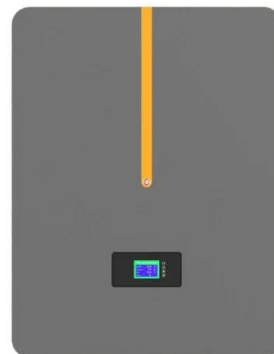
### DTE Energy issues standalone energy storage RFP in Michigan

Michigan's governor Gretchen Whitmer signed the state's climate legislation including a 2,500MW energy storage target into law last year. Image: Gretchen Whitmer via X/Twitter Utility DTE Energy has launched a request for proposals (RFP), seeking approximately



### Grid connection backlog grows by 30% in 2023, dominated by

Energy storage is particularly well-suited to provide needed reliability services and is surging in interconnection queues nationwide. MISO and PJM. Due to the massive influx of new interconnection requests in 2022, MISO did not accept any new requests in





### 'Midwest needs BESS': KCE's CEO on Michigan's storage target

MISO needs it. Energy-Storage.news' publisher Solar Media will host the 5th Energy Storage Summit USA, 19-20 March 2024 in Austin, Texas. Featuring a packed programme of panels, presentations and fireside chats from industry leaders focusing on coal,,



### [2014 Energy Storage Study Report](#)

The following sensitivities are evaluated in the MISO Energy Storage Study: o Natural gas (Henry Hub) starting year prices @ \$4, \$6, \$8, \$10 and \$12 / MMBTU o Retirements (12.6 GW Coal, 12.6 GW Coal + 11 GW age related, 23 GW Coal) o RPS (State



### Using Storage as a Transmission Asset to Provide Market ...

Since April 2018, MISO and stakeholders have developed tariff revisions to acknowledge FERC policy that enables storage to be treated as a transmission asset. This issue largely was addressed in the Planning Advisory Committee, but also was discussed in such stakeholder groups as the Market Subcommittee and Reliability Subcommittee.

### Midcontinent Independent System Operator (MISO)

This chart represents the percentage of total megawatts supplied by the listed resources in the MISO footprint. The category listed as "Other" is the combination of Hydro, Pumped Storage Hydro, Diesel, Demand Response Resources, External Asynchronous Resources and a varied assortment of solid waster, garbage and wood pulp burners.





### Energy Storage as a Transmission Asset in MISO

PRESENTED BY November 3, 2020 Energy Storage as a Transmission Asset in MISO MIPSYCON 2020 Virtual Conference Randy Johanning, Senior Transmission Planning Engineer 2 atcllc Agenda o ATC Background o Storage as Transmission Benefits

### MISO Grid-Forming Battery Energy Storage Capabilities, ...

The opportunity arises from a combination of current control technology availability and increasing level of energy storage interconnection requests within MISO. Given ...



### MISO and its market monitor differ on storage's role in ...

In the Future 2 model, MISO assumed 80.4 GW will retire and 179.4 GW will be added. Storage is assumed at 0.6 GW in Future 1 and 3.4 GW in Future 2, respectively. This low amount of storage in MISO Future models is the point of contention between MISO



### PSC: Dispatch of Energy Storage in MTEP and DPP Studies ...

Alliant Energy appreciates MISO taking up the issue of storage dispatch in MTEP and DPP studies. As noted in previous comments to MISO, Alliant Energy strongly supports this effort and believes that improvements to the way that storage is modeled will better





## Transmission Service Requirements for Charging Electric Storage

There are multiple issues associated with the requirements for an Electric Storage Resource (ESR) to charge from the grid that require resolution and include, but are not necessarily limited to: 1. It is not clear from the language in BPM-012 whether firm, non-firm



### MISO Economic Planning Model

, with a focus on Future 2A. MISO's Series 1A Futures identified a large amount of Battery Energy Storage Systems (BESS) that need to be modeled and simulated in all of MISO's transmission planning study tools that utilize MISO Futures. These study tools



## Stakeholder feedback and MISO responses BPM-020 revisions for Storage

MISO will add revisions to BPM-015 to include "SATO" in the list of potential mitigation methods. These BPM-015 revisions will be included when MISO presents BPM-020 revisions at the August PAC. At the August PSC, a stakeholder is introducing a new

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