



Arctic Weather Event

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MISO is responsible for delivering safe, reliable and economic power across the high-voltage electric transmission system

- 15 states and one Canadian Province
- 42 million end-use customers
- 175,000 MW* of generation
- 65,800 miles of transmission lines
- ~ 180 members
- ~ 471 market participants



QUANTITATIVE BENEFITS

MISO provides approximately
\$3.5 billion in annual benefits to members

MISO's Role as Reliability Coordinator

Overview of the Bulk Electric System

1. Generation

Power is generated by turning an energy source into electricity. In MISO, sources include coal, natural gas, nuclear and renewable power.



2. Transmission

Allowing the flow of electricity to bridge long distances, MISO's member transmission lines and towers support more than 65,787 miles of electricity flow.

3. Distribution

Allows energy to be moved from transmission lines closer to end users, ensuring reliability and power quality.

4. Final Delivery

As travel distance increases, smaller power lines are used to reach business, industrial and residential end use customers.

What is load shed and how/when does it occur?



Load Shedding Process

2. Emergency Demand Reduction- Energy Emergency Alert, Level 2

To help balance the demand and supply of electricity, Demand Response and Emergency Demand Reduction customers are called on to reduce their demand. Utilities will also initiate public appeals for conservation.

1. Tight Supply

The demand for electricity is high, putting pressure on supply. Emergency resources have been depleted, or there is an unexpected event such as technical issues at power stations or on major power generation stations.

3. Load Shedding- Energy Emergency Alert, Level 3

As a last resort and preventative measure to protect the electric grid from a blackout scenario, power to consumers may be temporarily disrupted on a rotational basis. In this stage, MISO instructs its Load Balancing Authorities to implement load shedding according to their schedules.

4. Blackout

If preventive measures, including load shedding, are insufficient – the electric grid will collapse. This incident is referred to as unforeseen and therefore the System Operator will not be able to make an announcement in advance.

A regional blackout will have massive implications and every effort is made to avoid this occurrence.

5. Recovery

Depending on the nature of the emergency, it **could take a few weeks** for the grid to recover from a blackout.



Communication Timeline

February 13-15

02/13/2021 00:00 EST Cold Weather Alert

02/14/2021 12:00 EST Conservative Operations

02/15/2021 09:00 EST MISO Capacity Advisory for the South Region

02/15/2021 07:00 EST MISO South Region Max Gen ALERT

02/15/2021 18:00 EST South Region Max Gen Warning

02/15/2021 18:00 EST Max Gen Event - EEA 2

02/15/2021 18:00 EST MISO is EXTENDING Max Gen Event - EEA 2

February 16-17

02/16/2021 00:00 EST MISO South Region Max Gen Warning

02/16/2021 08:00 EST Max Gen Event - EEA 2

02/16/2021 07:30 EST North/Central Region Max Gen Event - EEA 1

02/16/2021 07:30 EST Max Gen Event 1b - EEA 1 for North/Central Region

02/16/2021 13:32 PM Extending South Region Max Gen Event - EEA 2

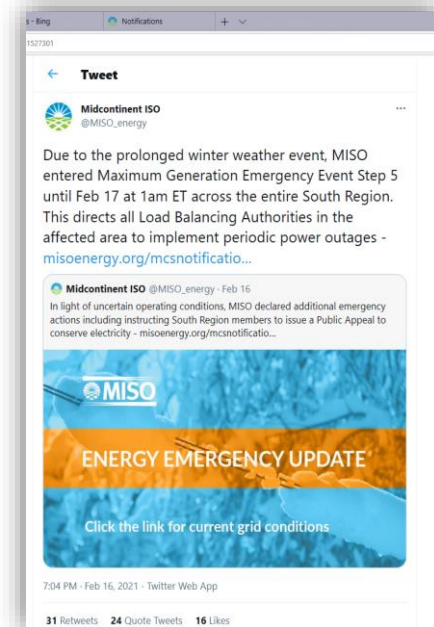
02/16/2021 14:00 EST North and Central Max Gen Termination

02/16/2021 18:35 EST Max Gen Event - EEA 2

02/16/2021 19:40 EST Max Gen Event - EEA 3 (Load Shed Notice)

02/16/2021 22:00 EST Max Gen Event - EEA 2

02/17/2021 00:00 EST Max Gen Event - EEA 0



MISO's Emergency Actions



General Guide to MISO's Emergency Operations Messaging

MISO's Emergency Operations messages define the area(s) involved, duration, and projections of system conditions. The table below is a summary, and does not replace or redefine MISO's Emergency Operations messages.

Message	Communication Intent	Potential Member/MISO Actions
Conservative Operations Declaration	Alert for Situational Awareness: Reliability issue possible for defined area.	<ul style="list-style-type: none"> • Potentially suspend transmission maintenance • Review outage plans for deferral, cancellation
Hot Weather, Cold Weather or Severe Weather Alert	Alert for Situational Awareness: MISO could be approaching tight supply conditions.	<ul style="list-style-type: none"> • Review outage plans for deferral, cancellation
Capacity Advisory	Advisory for Situational Awareness: Potential for limited operating capacity margins (<5%) in the next 2-3 days.	<ul style="list-style-type: none"> • Update facility and generation outages, including de-rates • Update generation offers • Update Load Forecast Values • Update LMR Availability and Self Scheduled MW values • Update EDR offers
Min Gen Alert	Alert for Situational Awareness: MISO is forecasting a potential supply surplus.	<ul style="list-style-type: none"> • Prepare for de-commitment (taking generation off line), reduction in purchases or other actions
Max Gen Alert	Alert for Situational Awareness: MISO is forecasting a potential capacity shortage.	<ul style="list-style-type: none"> • Declare Conservative System Operations • Prepare for possible Max Gen Event
Max Gen Warning	Warning to Prepare for Possible Event	<ul style="list-style-type: none"> • Curtail non-firm exports • Schedule all available external resources into the MISO Market • Implement Emergency Pricing Offer Tier 1. This is an ex-post pricing change, and does not affect system commitment or dispatch.
Max Gen Event (Step 1)	Actions Taken to Preserve Operating Reserves: NERC Emergency Alert 1	<ul style="list-style-type: none"> • All available resources in use • Generators instructed to start off-line resources. • Use of reserves not yet implemented. • Emergency Pricing Offer Tier 1 is still effective.
Max Gen Event (Steps 2, 3, 4)	Actions Taken to Preserve Firm Load: NERC Emergency Alert 2 (Step 3 declaration)	<ul style="list-style-type: none"> • Implement demand management programs • Utilize Contingency Reserves • Purchase Emergency Energy • Issue Public Appeals • Prepare for possible firm load shed • Implement Emergency Pricing Offer Tier 2. This is an ex-post pricing change, and does not affect system commitment or dispatch.
Max Gen Event (Step 5)	Event Occurring: NERC Energy Emergency Alert 3	<ul style="list-style-type: none"> • Shed firm load • Rolling brownouts or blackouts for defined area • Emergency Offer Tier 2 is still effective.