



2021 MISO Summer Readiness Workshop

May 4, 2021

Housekeeping

- All lines are muted and video is disabled
- **If you are dialed in via phone: *6 to mute and unmute**
- **If you are dialed in through your computer: Click on phone icon to mute and unmute**
- Do **not** put your call on hold
- We will pause after each topic for questions / discussion
- Announce name and affiliation when speaking
- WebEx Chat and Raised Hand features are not monitored

Welcome & Agenda

- 2:05 – 2:10 Opening Remarks – JT Smith
- 2:10 – 2:20 Lessons Learned: Summer 2020 – Trevor Hines
- 2:20 – 2:40 Summer Resource Assessments
 - a. Generation - Eric Rodriguez
 - b. Transmission - Tamal Paul
- 2:40 – 3:00 Readiness
 - a. Summer Readiness – Joe Riels, Cooperative Energy
 - b. Drills & Training - Anita Hurst
- 3:00 – 3:10 Market Capacity Emergency Procedures - Mike Carrion
- 3:10 – 3:20 RAN filings - Davey Lopez
- 3:20 – 3:30 Guest Speaker - Tim Ponseti, SERC
- Q&A

Summer 2020: Lessons Learned

Trevor Hines
MISO South Region



MISO reliably managed through the summer of 2020, experiencing abnormal weather events that highlighted the benefits of stakeholder drills and operator training



Lessons learned from the summer of 2020 provide additional input into the Reliability Imperative

LESSONS LEARNED

MISO and members must align expectations for price formation, cost allocation, customer communication, and roles and responsibilities to support the shared goal of system reliability

More robust preparation for severe weather events and more sophisticated tactical annual hurricane drills will help in future support for members

Current software is limited in its ability to implement the needed pricing in response to events like Hurricane Laura, requiring significant manual work

Better alignment is needed between MISO's Max Gen steps and NERC's Energy Emergency Alerts



RELIABILITY IMPERATIVE

Market Redefinition

Market System Enhancement

Long Range Transmission Planning

Operations of the Future



Questions?



Contact Info

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Summer Resource Assessment: Generation

Eric Rodriguez
MISO Resource Adequacy

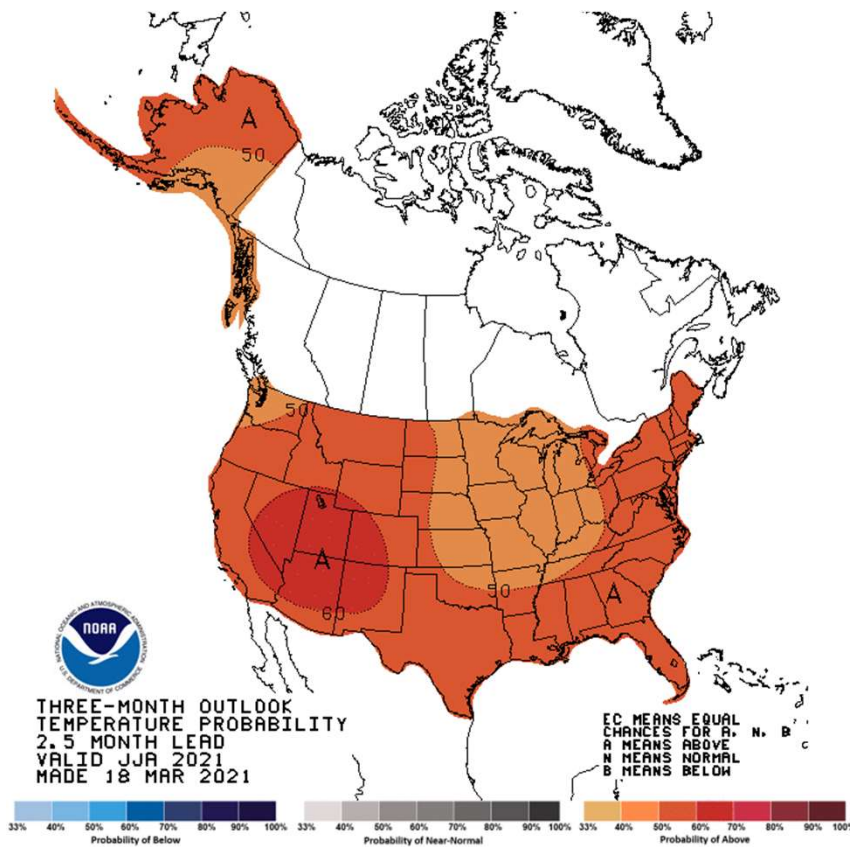


Summary



- Under typical weather and outage conditions, adequate resources are projected to be available to meet expected load this summer
- A combination of both a high load and a high outage scenario may require declarations of emergency procedures, if insufficient availability of non-firm energy resources

146 GW of resources are projected to cover demand and outages for Summer 2021 with a moderate probability for warmer than normal forecasted temperatures throughout the MISO footprint



MISO Preliminary 2021 Summer Forecast

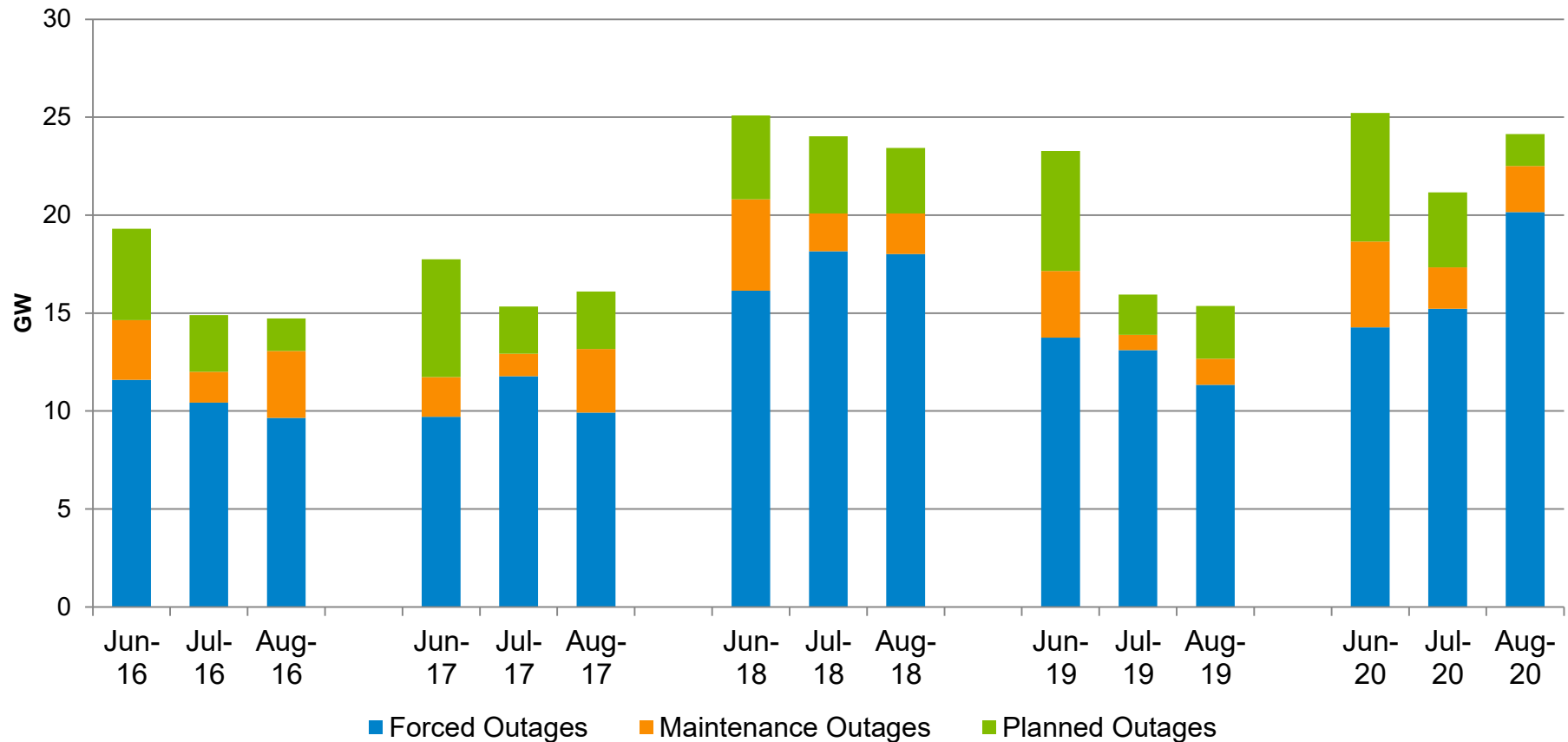
Summer Coincident Peak Forecast + <i>Transmission Losses</i>	122 GW
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Total Projected Available Capacity*	146 GW
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**All-time Summer Peak Load:
127 GW on July 20, 2011**

NOAA forecasts a 33-50% chance for below average levels of precipitation in LRZs 1-3 & a 33% chance for above average levels in the southeast pocket of the MISO footprint

Cumulative generation outages of Summer 2020 during monthly peak remain high relative to the 5-year average



	Forced Outages (GW)	Total Outages (GW)
Average of 15 monthly peak hours	13.5	19.7
Maximum peak day	20.1	25.2

Range of uncertainty in generation availability and load forecasts capture risks utilized in the Summer 2021 scenarios

Generation

- **Probable Generation Capacity**
 - Removes 5-year average volume of resource outages¹ during monthly peak (planned, maintenance, and forced)
- **Low Generation Capacity (High Outage)**
 - Removes 5-year maximum volume of resource outages during monthly peak (planned, maintenance, and forced), typically because of non-normal weather conditions

Load

- **Probable Load Forecast**
 - 50/50 forecast², provided by Market Participants
- **High Load Forecast**
 - 90/10 forecast³



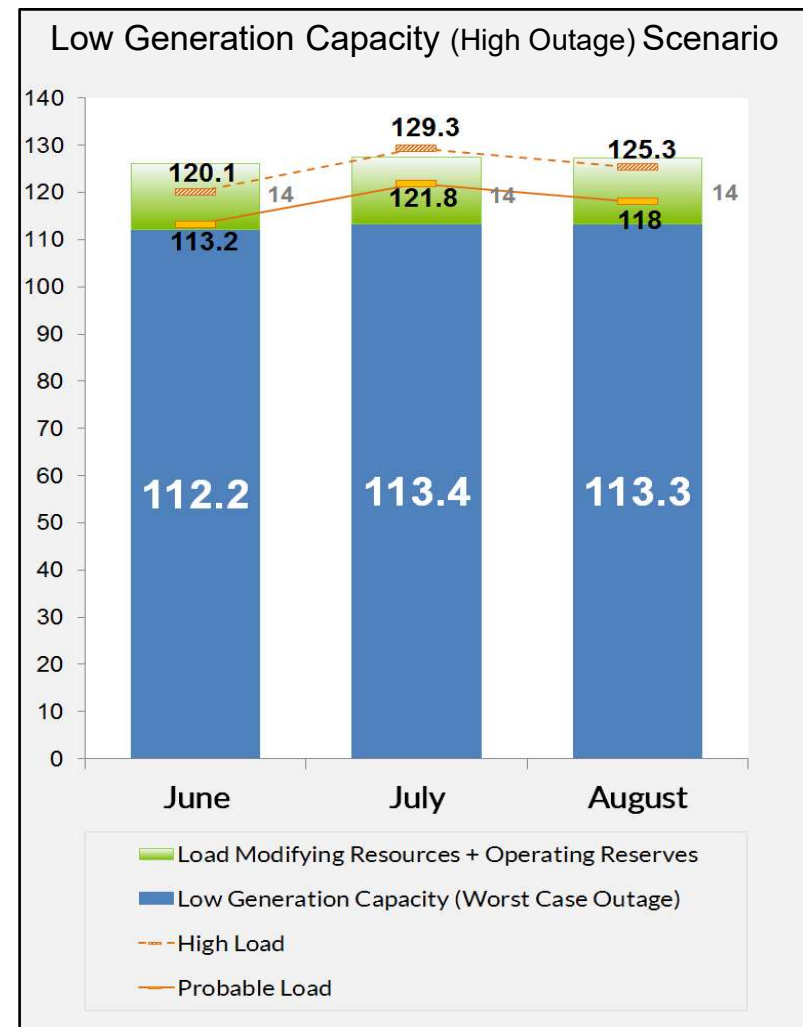
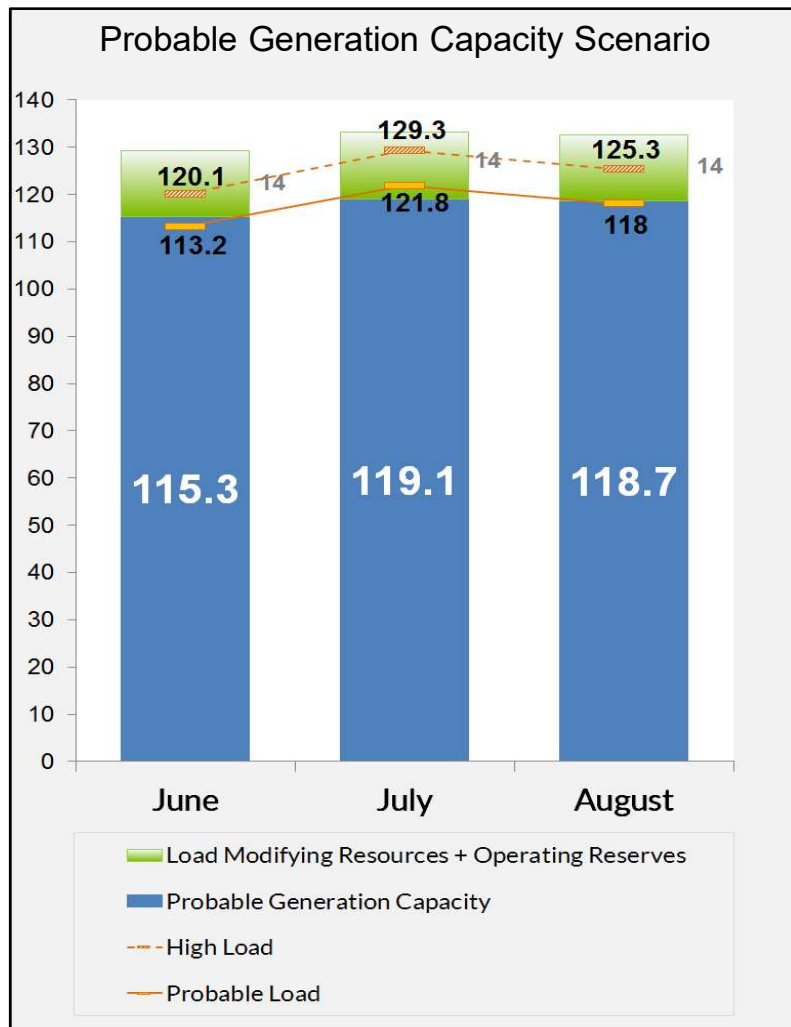
¹ Based on 5-year historical outage information provided by Resource Owners

² 50% chance of the actual load being lower and 50% chance of the actual load being higher

³ 90% of the actual load being lower and 10% chance of the actual load being higher

A combination of both high load and high outages could drive operational challenges for the Summer 2021 season

Summer 2021 Resource Adequacy Projections – System-wide



14 The *Low Generation Capacity* scenario accounts for the impact of the maximum volume of observed simultaneous resource outages during monthly peak demand of the last 5 years on projected available seasonal capacity.



Questions?



Contact Info

Eric Rodriguez

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Summer Resource Assessment: Transmission

**Tamal Paul
Ritam Misra
MISO Engineering**

The transmission limitations in the system are within the expected norms for the upcoming Summer

Steady-State AC Contingency Analysis

- Evaluate the effects of simple and complex contingencies on the MISO footprint and Tier-1 areas
- IROL review
- **No major constraints that do not have mitigations for this summer**

Regional Directional Transfer (RDT Studies)

- Evaluate the impact of RDT on MISO's neighboring entities
- Some RDT flowgates are already in MISO processes
- **8 additional RDT flowgates not previously in MISO's processes found**

Load pocket studies

- Evaluate import capability for four MISO load pockets in the South: Amite South, DSG, WOTAB, and Western load pockets
- **Study still ongoing**

Steady State AC Contingency Analysis – Contingencies Evaluated

Category P1 > 100 kV

- P1.1 – fault generator (>50 MW)
- P1.2 – fault transmission circuit
- P1.3 – fault transformer
- P1.4 – shunt device
- P1.5 – block single dc pole

P1 Contingency Files are submitted by Stakeholders

Gas-Electric Contingencies

No major constraints that do not have mitigations for this summer

RDT Flowgate Impact Studies

Criterion:

Regional Directional Transfers will be considered to impact flowgates if one or more of the flowgate criteria is met.

1. Single monitored element flowgate with $\geq 5\%$ TDF
2. Double monitored element flowgate $\geq 7.5\%$ TDF
3. Three monitored element flowgate $\geq 10\%$ TDF
4. Four or more monitored elements only by mutual agreement between MISO RC and a neighboring RC
5. 25% or more flow of a single-monitored element flowgate limit as a result of RDT and with a minimum of 1.5% TDF.

Results:

- 87 RDT flowgates were identified; 79 already identified from previous studies and in existing MISO processes
- 8 additional flowgates not previously identified sent to MISO Operations

Import Limits Study for MISO Load Pockets

Criterion:

1. Simulate peak load conditions for four MISO load pockets as shown below:
 - Amite South
 - DSG (Downstream of Gypsy)
 - WOTAB
 - Western load pocket
2. Perform transfer studies into these load pockets
3. Identify import limits for the load pockets

Results:

- Study is still ongoing; results pending



Questions?



Contact Info

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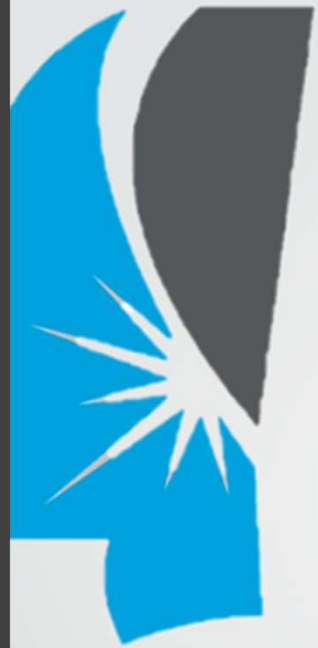
Raja Thappetaobula

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Summer Readiness

Joe Riels, Cooperative Energy

Anita Hurst, MISO Technical Development



Cooperative ENERGY

2021 Summer Preparation

Joe Riels
Director System Operations

Cooperative Energy Overview

- Cooperative Energy / G&T Cooperative founded in 1941
- 2,500 MW Resources & 1,800 Miles of 230/161/115/69 kV Transmission with 1,754 MW LBA peak load
- Operate across two BAAs and three TOPs
- Registered as GOP, TOP, BA (LBA with MISO)
- Joined MISO in 12/2013 as part of the South Integration

How do we prepare?

Transmission Outage Maintenance & Planning

- Monthly meetings focused on construction plans and maintenance needs.
- Focused on timing requirements for approving outages.
- Ensure outages are in CROW!

Generation Outage Planning

- Weekly updates provided on a 3-yr rolling bases.
- Ensure outages are in CROW!
- Review MISO Maintenance Margin, down to the subregion.

Anticipated Weather Conditions

- National Weather Service, WeatherTap, Coastal Weather Research Center.

How do we prepare?

Annual *Summer Operating Study*

- Series of solved load flow cases of contingencies with known assumptions occurring at peak summer conditions.
- Covers system improvements, topology changes, scheduled outages.
- Recommends course of actions to follow.

Delivered to System Operators in the Spring by Operations Planning via a NERC ILA approved CEH course

- Gives System Operators an opportunity to review expected summer conditions and ask questions concerning possible solutions to anticipated problems during FTLO conditions.

How do we prepare?

Load Forecast

- Dependent on weather.
 - Pattern Recognition Technologies

Staffing & Training

- Retirements of key employees
- System Operator trainees to System Operator
- Emergency plans updated, and employees are knowledgeable

Energy Management System & Corporate IT Review

- Meet and talk to these groups concerning any scheduled work during the summer


Opportunities to coordinate...

MISO

- Hurricane Drill
- Market Capacity Emergency Drill
- Power System Restoration Drill

Situational Awareness

- Monitor Weather Conditions
- LBA Participation morning RC call
- Participation in MISO Working Groups
 - Reliability Subcommittee, Resource Adequacy Subcommittee, System Restoration and Reliability Training Working Group, Balancing Authority Committee, Reliable Operations Working Group, EOP Workshops



Everyone has a plan until they get punched in the mouth...

Michael Gerard Tyson

Questions?

Summer Readiness: Drills & Training

Summer brings many challenges that must be closely monitored

Abnormal Weather

Limited transfer capability

Severe Weather Patterns

Forced Outages

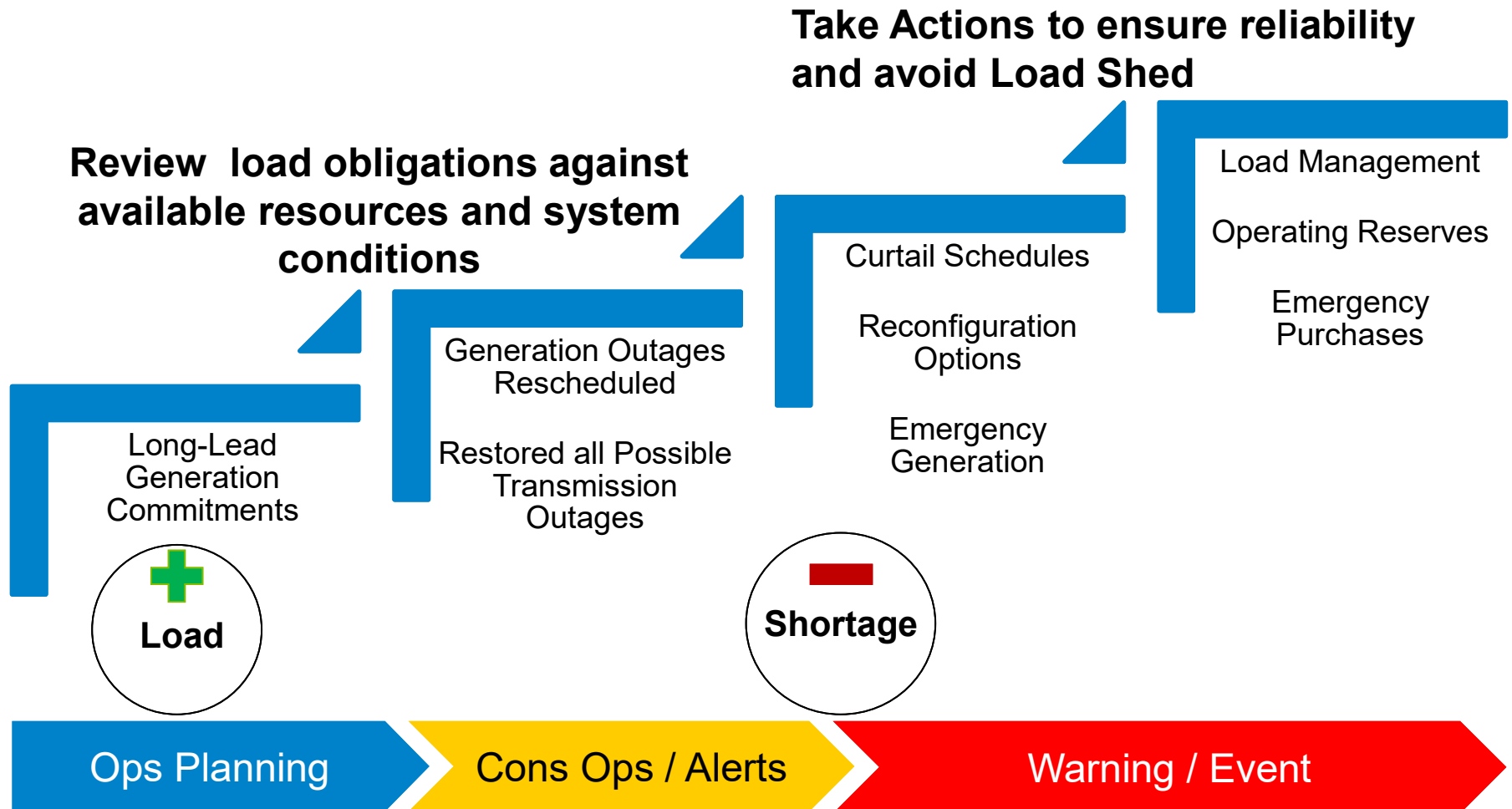
Seasonal Maintenance

Transmission Congestion

Abnormal Temperatures

Higher than average load

MISO prepares for extreme conditions in advance. In Real-Time, unplanned outages and other unknowns may require additional actions



MISO provides opportunities to drill on emergency process with members to *ensure* readiness in all operating situations

<u>MONDAY</u>	<u>TUESDAY</u>	<u>WEDNESDAY</u>	<u>THURSDAY</u>	<u>FRIDAY</u>
	<p><u>LMR DRILL:</u></p> <ul style="list-style-type: none"> • 2nd Tuesday of each month @ 10:00 EST • MPs only <p><u>LMM Drill:</u></p> <ul style="list-style-type: none"> • 2nd Tuesday of each month @ 10:00 EST • LBAs only 	<p><u>XML DRILL:</u></p> <ul style="list-style-type: none"> • Last Wednesday of each month @ 13:00 EST • LBAs only <p><u>Firm Load Shed Drill:</u></p> <ul style="list-style-type: none"> • 1st Wednesday of each month @ 13:00 EST • LBAs only 	<p><u>EDR Drill:</u></p> <ul style="list-style-type: none"> • 2nd Thursday of each month @ 10:00 EST 	

Power Restoration Drills: Two Drills held each Fall
Market Capacity Emergency Drills: 6 Drills during Cycle 2 in April and May

Upcoming 2021 Market Capacity Emergency Drills

May 6, 13 & 20

May 2021

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31					

- **Target Audience:** MISO Members (*See Your Company Drill Coordinator for participation eligibility*)
- **Registration:** Registration through the **MISO Learning Center**
- **Platform:** WebEx Only from 8:00 – 12:00 (EPT)
- **Questions:** Please contact MISO-TechnicalTraining@misoenergy.org

Early season forecasts call for an **above-normal** 2021 hurricane season

- Above average forecasted 2021 season due to:
 - Likely absence of El Niño, Tropical Atlantic Sea Surface temperatures are near their long-term averages, while Atlantic subtropical sea surface temperatures are **much** warmer than long-term average values.
- Hurricane Preparedness Week is May 9 – 15, 2021

Colorado State University is forecasting another above average tropical season...

	AVERAGE	FORECAST
NAMED STORMS	14	17
HURRICANES	7	8
MAJOR HURRICANES	3	4

Hurricane Readiness Drill Dates

Topics include:

- MISO Hurricane Action Plan
- 2020 Hurricane Season Review
- 2020 Member Lessons Learned
- Load Pockets
- Load Shed
- Transmission System Emergencies
- Neighbor Coordination

Dates: May 12 & 19

Time: 8AM-5PM ET

Location: WebEx

Registration: MISO Learning Center





Questions?



Contact Info

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MISO Market Capacity Emergency Procedures with LMR Review

Mike Carrión
MISO System Operations

MISO Procedures



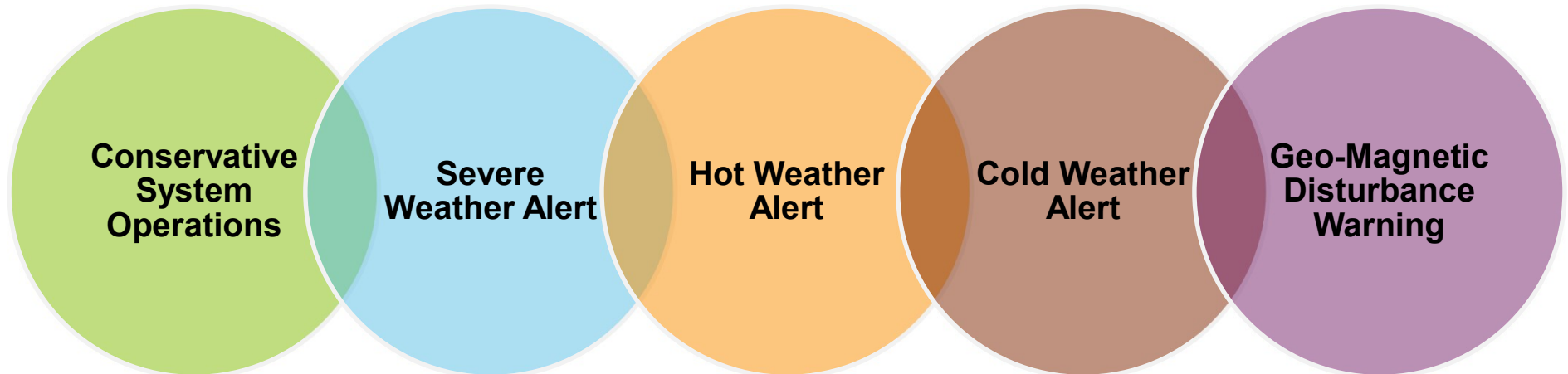
Conservative System
Operations Procedure
SO-P-NOP-00-449



Market Capacity
Emergency Procedure
SO-P-EOP-00-002

Conservative System Operations

- Five declarations are used to prepare operating personnel and facilities for extreme weather conditions or abnormal conditions that will, or have the potential to, impact the Bulk Electric System (BES):

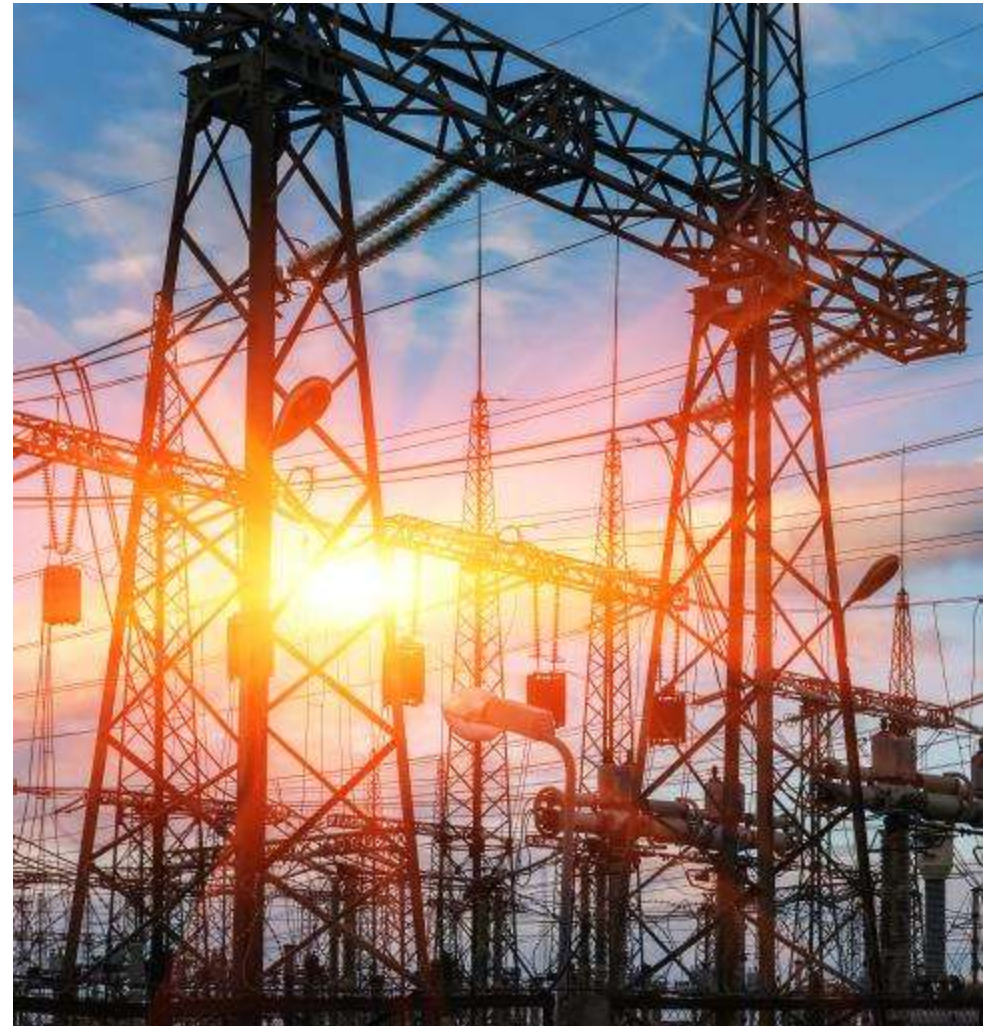
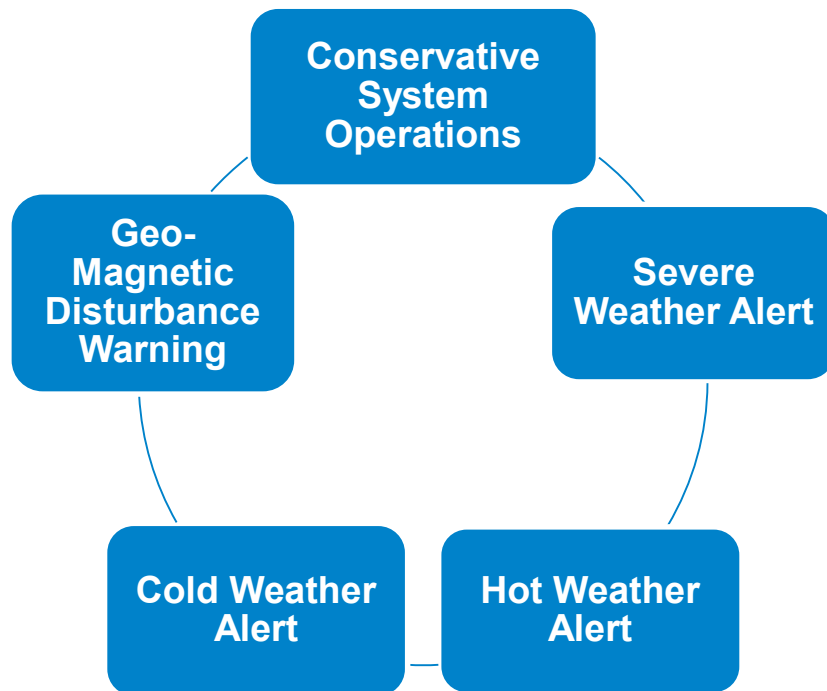


- Allows MISO & regional operators to defer or cancel transmission or generation outages to increase transfer capability and capacity .
- Provide instructions for returning planned outages/maintenance equipment to service, if possible, in the impacted areas
- Suspend all work on critical computer systems
- Prepare for the implementation of Emergency Procedures

Operators use emergency procedures to ensure reliability and gain access to required resources

Emergency Operating Procedures

guide operator actions when an event has the potential to, or actually does, negatively impact system reliability





Market Capacity Emergency Procedure Steps

Capacity Advisory	<ul style="list-style-type: none"> • Advance notice of forecasted capacity shortage, requests Stakeholders update offer data 	New in 2021
Alert	<ul style="list-style-type: none"> • Define boundaries/suspend maintenance, set Emergency Pricing Tier 0 Offer Floor 	Emergency Pricing Tier 0 Offer Floor
Warning	<ul style="list-style-type: none"> • Schedule in External Resources, Curtail export transactions, Reconfiguration, and set Emergency Pricing Tier 1 Offer Floor 	Emergency Pricing Tier 1 Offer Floor
Step 1	<ul style="list-style-type: none"> • Commit Emergency Resources, Declare NERC EEA 1, Activate Emergency Limits 	
Step 2	<ul style="list-style-type: none"> • Declare NERC EEA 2, Implement LMRs, LMMs Stage 1, Commit EDR Resources, Emergency Energy Purchases, Public Appeals, and set Emergency Pricing Tier 2 Offer Floor 	
Step 3	<ul style="list-style-type: none"> • Utilize Operating Reserves, and LMMs Stage 2 	Emergency Pricing Tier 2 Offer Floor
Step 4	<ul style="list-style-type: none"> • Reserve Call and Emergency Reserve Purchases 	
Step 5	<ul style="list-style-type: none"> • Declare NERC EEA 3, Firm Load Shed, and set LMPs and MCPs to the VOLL 	
Termination	<ul style="list-style-type: none"> • Max Gen and, possibly, Capacity Advisory Termination 	

MISO introduced a “Capacity Advisory” in 2018 to address stakeholder requests for transparency of forecasted conditions without impact to operations

Goals:

- Inform MISO stakeholders and transmission operators of potentially tight capacity conditions
- Allow forward processes to assist in mitigating capacity shortfall

Summary:

Current NERC EEA Level = 0
Current MISO Max Gen Level = Capacity Advisory
Current Emergency Pricing Level = N/A

Reliability Actions:

The MISO Reliability Coordinator is declaring a Maximum Generation Capacity Advisory effective from 03/26/2019 10:20 EST until further notice.

The MISO Reliability Coordinator instructs the following:

- Prepare to implement the MISO Market Capacity Emergency procedure and follow procedures for emergency conditions
- Ensure all market data is updated with best available information
- If notified by MISO, Implement LMRs

- **Updated Generation Availability & Parameters can significantly impact forecasted Capacity Margin**

Capacity Advisory Communication improves awareness around potential for advancement into Emergency Procedures

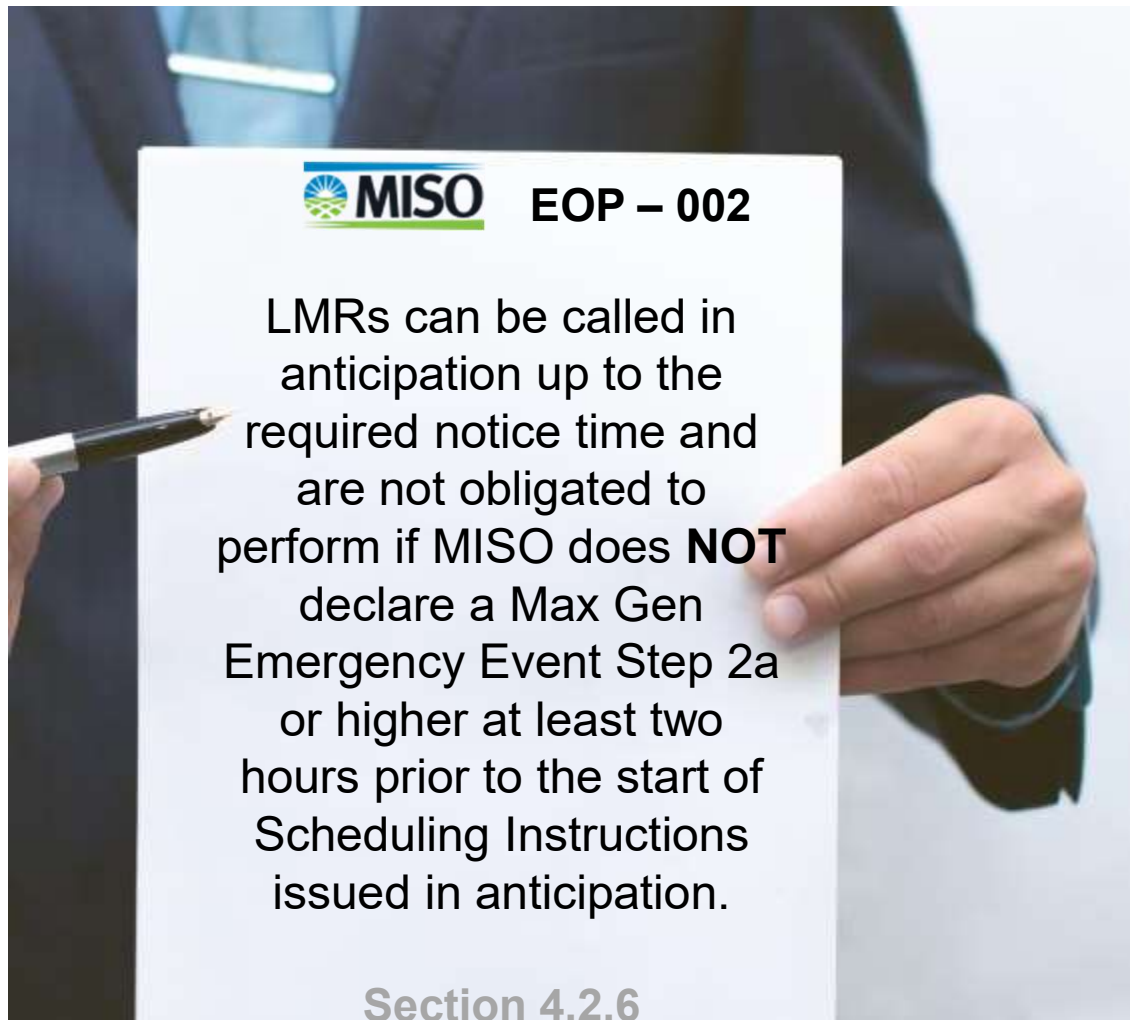
<p>Conservative Operations: If conditions warrant, MISO will transition from normal operating conditions to Conservative Operations to prepare local operating personnel for a potential event, and to prevent a situation or event from deteriorating</p>	
<p>Emergency Operations: Emergency Operating Procedures (EOPs) guide system operator actions when an event occurs on the electric system that has the potential to, or actually does, negatively impact system reliability. EOPs are communicated in escalating order as alerts, warnings, and events</p>	
<p>Capacity Advisory</p>	<p>MISO forecasts a potential capacity shortage <i>Forecasted to have less than 5% All in Sufficiency % MBAA or sub-region. When relying on a significant amount of Capacity Returning from Outage. When developing conditions warrant an update/review by Stakeholders of their Offer Parameters</i></p>
<p>Hot or Cold Weather Alert</p>	<p>Extreme temperatures forecasted</p>
<p>Severe Weather Alert</p>	<p>Adverse weather conditions within the area</p>
<p>Conservative Operations Declaration</p>	<p>Reliability issues may be possible</p>
<p>Maximum Generation Alert</p>	<p>MISO forecasts a potential capacity shortage <i>Forecasted to have less than 1% All in Sufficiency % MBAA. South Region is forecasted to have less than 500 MW plus Reserve Requirements. System conditions dictate a higher conservative margin during Day-Ahead studies and in Real-Time.</i></p>
<p>Maximum Generation Warning</p>	<p>MISO forecasts a potential capacity shortage <i>Actual or forecasted reserves are less than required for the MBAA or sub-region.</i></p>
<p>Maximum Generation Event (Step 1) / EEA*1</p>	<p>Taking steps to preserve operating reserves</p>
<p>Maximum Generation Event (Steps 2, 3, 4) / EEA*2</p>	<p>Taking steps to preserve firm load</p>
<p>Maximum Generation Event (Step 5) / EEA*3</p>	<p>Actual event occurring - shed firm load and/or perform rolling brownouts or blackouts for defined area</p>

2020 Changes to Load Modifying Resources (LMR) resulted in much more flexibility for MISO Real-Time System Operations



- LMRs submit monthly LMR Availability values to the MEECT for each planning year
- LMRs are now required to be available in non-Summer seasons if capable
- MISO's Operators can issue **Scheduling Instructions** to LMRs in **advance of anticipated Emergency events**

At any stage, including Capacity Advisory, MISO can call on long lead LMR's in anticipation of a Capacity Emergency Event



MISO **will** have to declare a Max Gen Emergency Event step 2a at least 2 hours prior to the start time of the LMR Scheduling Instruction.

COMING SOON – Demand Side Resource Interface (DSRI) will be new destination for MPs to update LMR Availability




- ✓ Updated interfaces and browser compatibility (Chrome, Edge, Firefox, etc.)
- ✓ User requested enhancements and functionality
- ✓ Simple API structure for potential future development of other tool interactions
- ✓ Able to easily update and maintain accurate LMR Availability information for future Tariff accreditation changes
- ✓ Will go live July 1, 2021

DSRI Online User Guide and Training Workshops are coming soon and will be available prior to July 1, 2021

DSRI Online User Guide
Created By Debbie Baldwin - Current Version

DSRI Online User Guide

START DETAILS



Welcome! This guide will prepare you to use MISO's new Demand Side Resource Interface (DSRI), including:

- Obtain access to the Demand Side Resource Interface (DSRI)
- Navigate the new DSRI platform to:
 - State availability of assets
 - Receive instructions from MISO
 - Respond appropriately to scheduling instructions



Questions?



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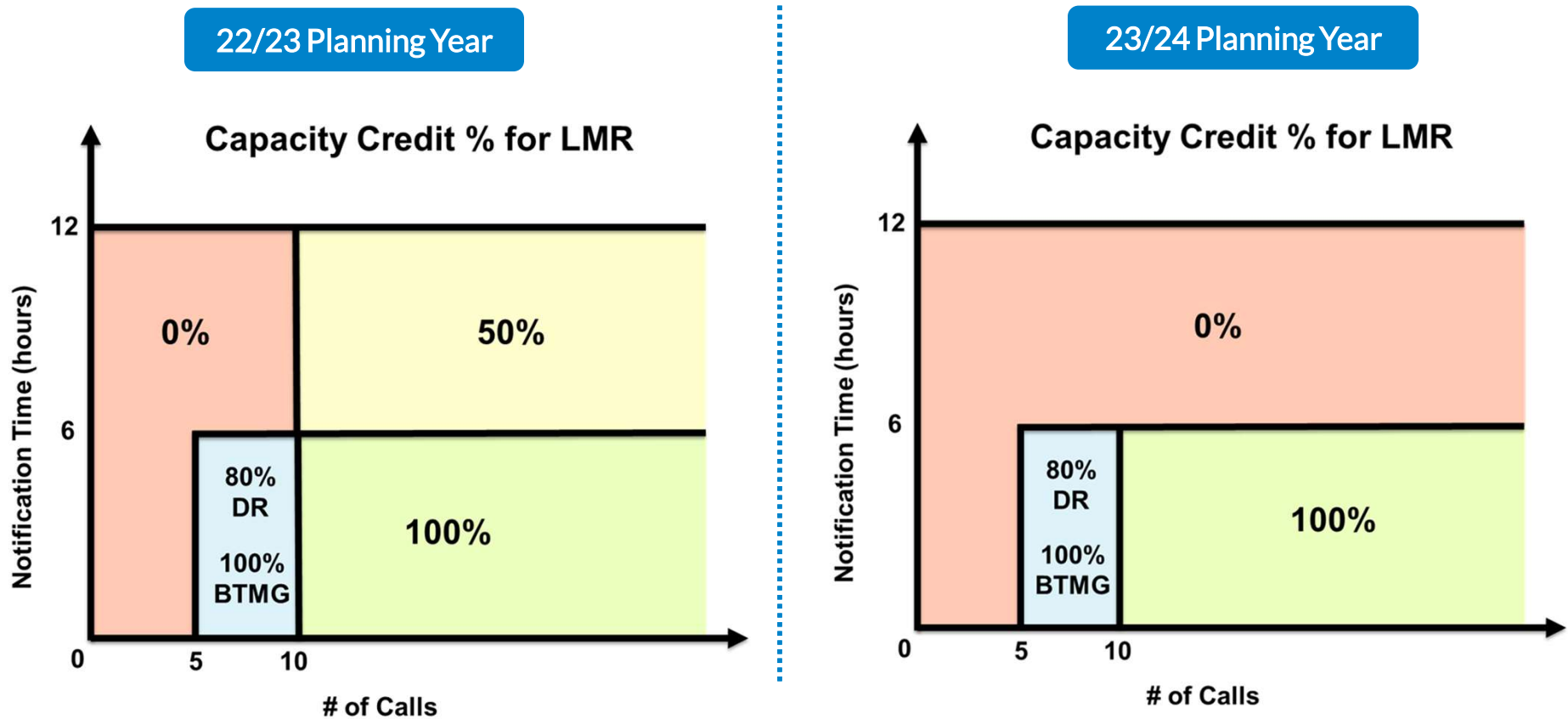
Resource Availability & Need (RAN) Filings

Davey Lopez
MISO Resource Analytics

LMR Accreditation FERC Filing and Approval

- MISO filed LMR accreditation changes at FERC on 5/18/2020 under Docket #: ER20-1846-000
 - Based on the critical factors of notification times and call limits
 - Will begin in the 2022-2023 Planning Year
 - MISO's final LMR accreditation proposal reflected a delay by 1 year of the proposed changes, as many stakeholders requested, to provide sufficient time to adjust contracts and complete required state processes
- On August 14, the Commission issued an [Order](#) accepting the LMR accreditation filing, effective August 16, 2020, as requested
- MISO continues to discuss the Resource Adequacy Construct and Resource Accreditation at the Resource Adequacy Subcommittee (RASC) with a target filing date of September 2021

As requested, MISO revised the proposal, which provided a transition to allow stakeholders time to adequately prepare



MISO encourages stakeholders that can obtain reductions in notification times or increase call limits to do so prior to the 22/23 Planning Year, especially in LRZs that have greater reliance on LMRs

ICAP Deliverability Filings & Results

- Capacity Resources are quantified by applying forced outage rates to Installed Capacity values (ICAP) to calculate the Unforced Capacity value (UCAP) for the resource.
- In 2020, FERC accepted Tariff filings to enhance the deliverability requirements for Capacity Resources and related conversion of Capacity to Zonal Resource Credits (ZRCs) in MISO's Planning Resource Auction.
- **Dockets ER19-1942** and **ER20-2005** addressed the deliverability and conversion rules applicable to conventional and intermittent resources respectfully.

Conventional ICAP

Approximately 300 units of conventional resources, considered not fully deliverable under this new policy, were able to obtain the necessary additional Transmission Service in order to near fully utilize (99%) the unforced capacity (46.5 GW) for Resource Adequacy on par with the previous auction (45.3 GW).

Intermittent ICAP

Intermittent resources considered not fully deliverable, 15.8% (600 MW) of unforced capacity was not converted into Zonal Resource Credits in this auction versus 13.2% (450 MW) in last year's auction, a difference of 150 MW or 0.1% of the footprint's PRMR.

Intermittent Deliverability ICAP

- Intermittent resources are required to demonstrate deliverability for conversion of UCAP to ZRCs in the PRA.
- Unlike with conventional where deliverability up to nameplate is required for full conversion, deliverability only up to the highest sampled observance (output during the top 8 annual peaks from the wind ELCC capacity credit study or submitted data templates for solar & run-of-river) is required for full conversion.
- Any historical system injection that exceeds demonstrated deliverability (NRIS + ERIS w/ TSR) is capped down to the amount of demonstrated deliverability for that intermittent resource.
- There was a small decline in the percentage of intermittent resource UCAP conversion, however, it is difficult to say how much of that was due to the Deliverable ICAP requirements. The actual amount of UCAP conversion for intermittent units actually increased from last year, which can be attributed to new resources coming on line for 21-22.
- Overall, it would appear that the Deliverable ICAP requirements ultimately had very little impact on the ability of MPs to convert their ERIS UCAP.



Questions?



Contact Info

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Guest speaker:
Tim Ponseti, SERC



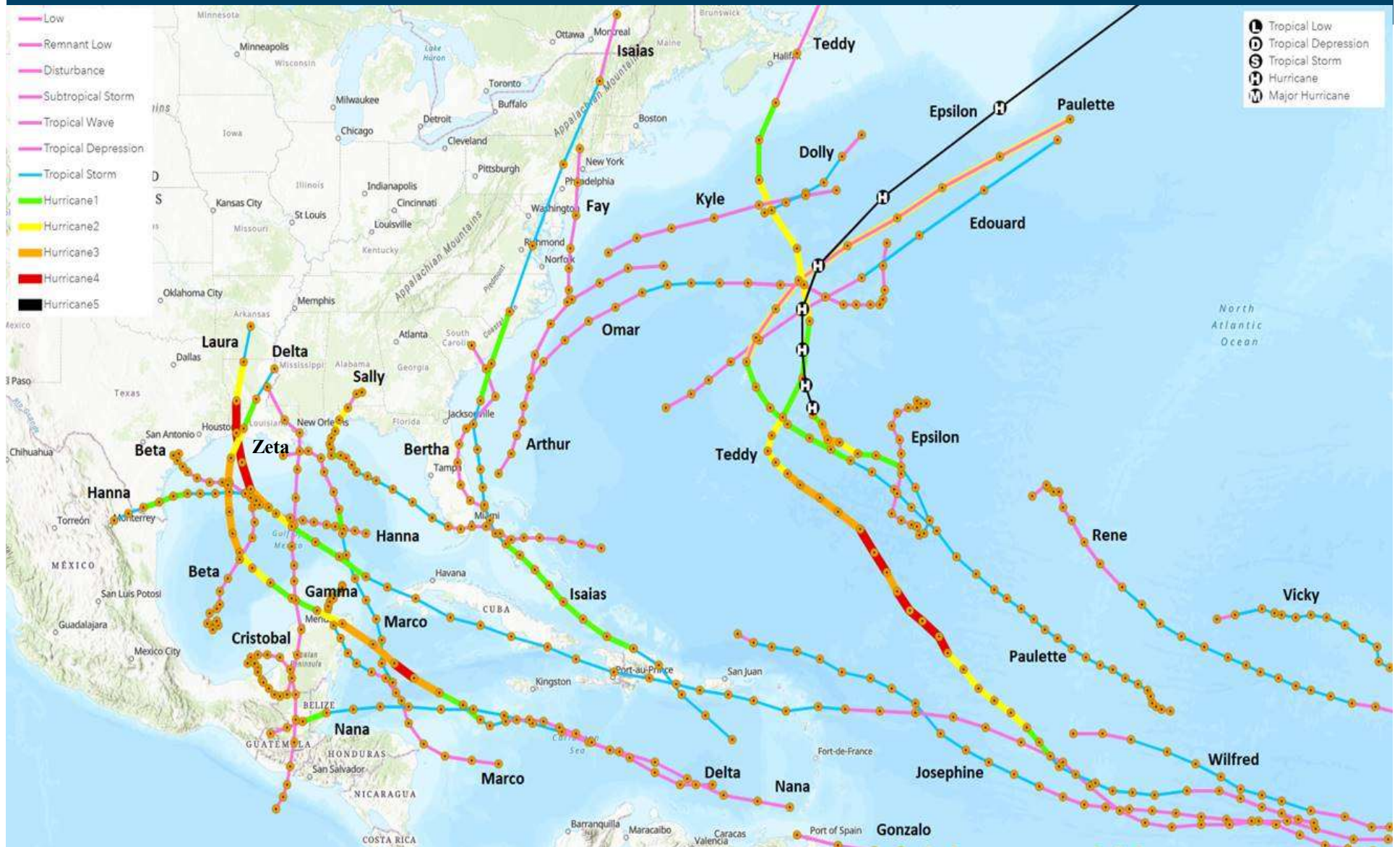
Summer Readiness

Tim Ponseti

SERC

Vice President, Operations

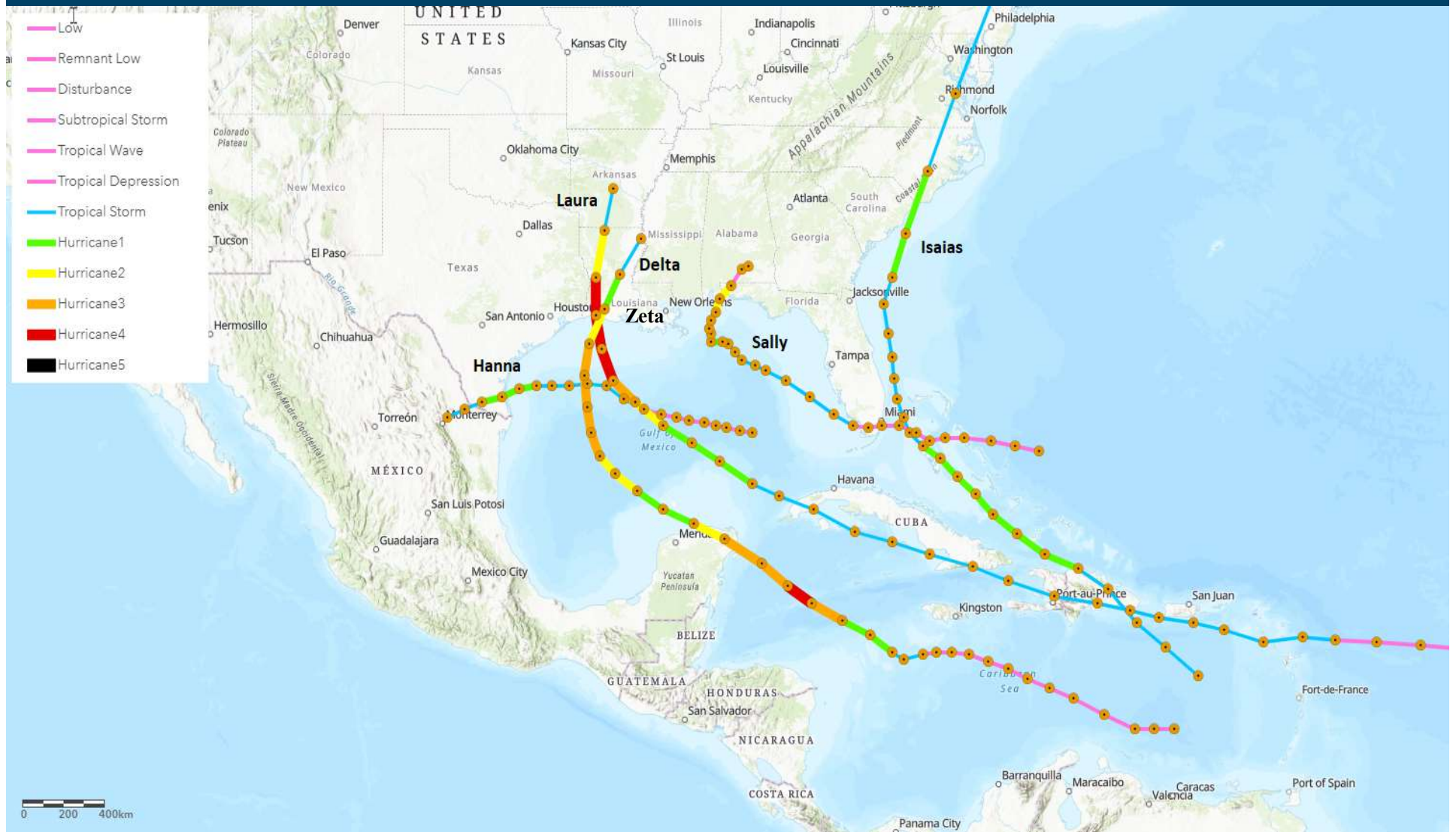
2020 Hurricane Season - Record Year



11 USA landfalls – smashes 1916 record



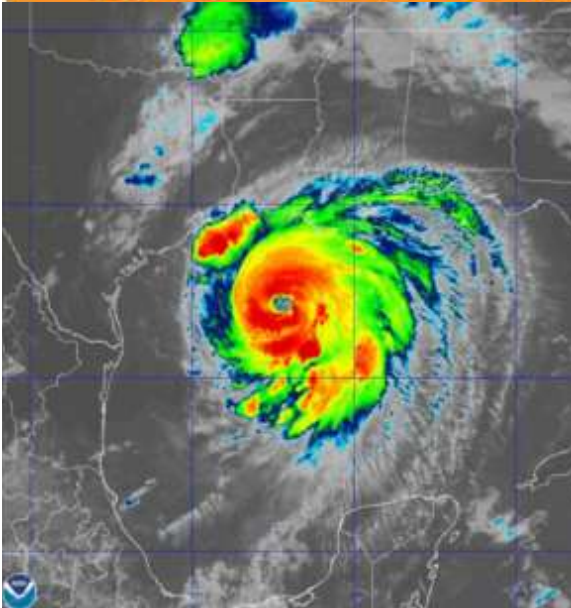
6 Hurricanes – U.S. landfall



Hurricane Laura - August 27, 2020

Hurricane Laura

Category 4 major hurricane (SSHWS/NWS)



Hurricane Laura near peak intensity while approaching southwestern Louisiana on August 26

Formed	August 20, 2020
Dissipated	August 29, 2020
Highest winds	1-minute sustained: 150 mph (240 km/h)
Lowest pressure	937 mbar (hPa); 27.67 inHg
Fatalities	77 total
Damage	≥ \$14.1 billion (2020 USD)
Areas affected	Lesser Antilles, Greater Antilles, The Bahamas, Gulf Coast of the United States, Midwestern United States, Eastern United States

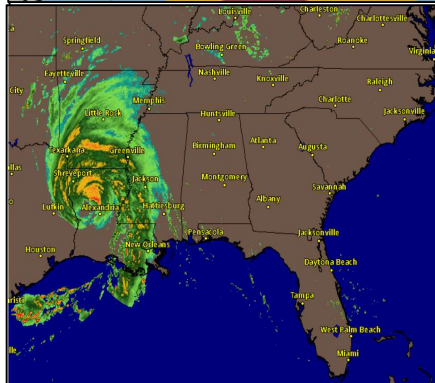
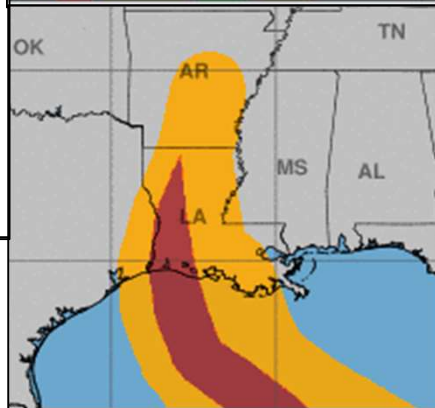
Part of the 2020 Atlantic hurricane season

Initial Sustained Transmission Line Outages

500 kv: 6
230 kv: 51
161 kv: 4
138 kv: 108
115 kv: 56
69 kv: 117
Total: 342

Initial Customers without power

LA: 615k
TX: 300k
AR: 50k
TN: 20k
MS: 15k
OK: 5k
Total: 1 million



Highlights

- Hurricane Laura made landfall near **Cameron, Louisiana** on August 27th at 0100 CDT as a **Category 4** Major Hurricane with 150 mph maximum sustained winds.
- Laura was the strongest hurricane to make Louisiana landfall since 1856. - 42 U.S. deaths associated to Hurricane Laura.
- Damage estimates approaching **~\$15B**.
- 1900+ transmission structures** were damaged or destroyed.
- 430 Substations** damaged
- Most notably were the critical 500kV and 230kV structures that feed the Western/WOTAB load pockets including the Lake Charles, Louisiana area.
- 1.5M people were under evacuation orders.**
- Reliability actions taken: On August 27th, MISO issued Operating Instructions for 500 MW's of firm load shed in the Western/WOTAB TX load pockets to preserve the ~2000 MW's of load remaining.
- All customers restored by October 1st.** A few BPS transmission lines remain out of service and repairs are ongoing. The major BPS lines feeding these load pockets were restored on October 18th.

Hurricane Sally – September 16, 2020

Hurricane Sally

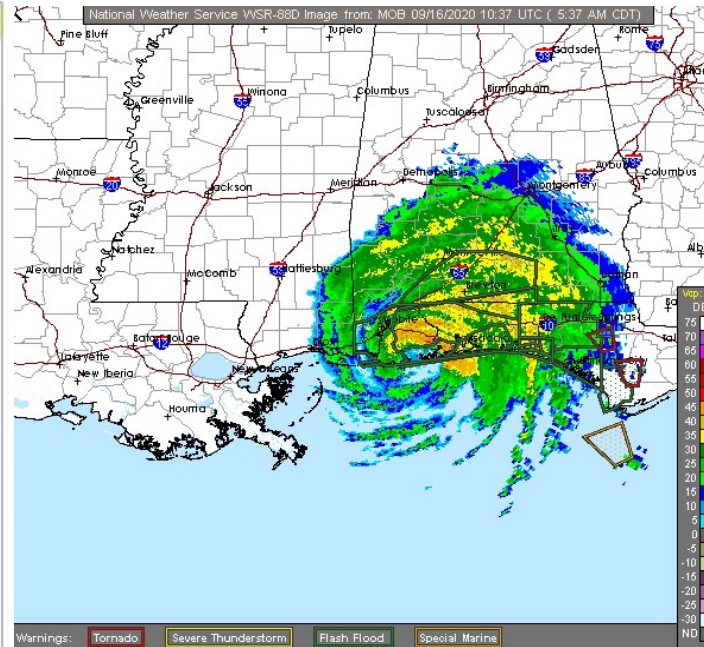
Category 2 hurricane (SSHWS/NWS)



Hurricane Sally intensifying before landfall in Alabama on September 16

Formed	September 11, 2020
Dissipated	September 18, 2020 (Remnant low after September 17)
Highest winds	1-minute sustained: 105 mph (165 km/h)
Lowest pressure	965 mbar (hPa); 28.5 inHg
Fatalities	8 total
Damage	≥ \$7 billion (2020 USD)
Areas affected	The Bahamas, Cuba, U.S. Gulf Coast, Southeastern United States

Part of the 2020 Atlantic hurricane season



Warnings: Tornado Severe Thunderstorm Flash Flood Special Marine

Initial Customers without power

AL: 293k
FL: 257k
MS: 12k
GA: 43k

Total: 605k

Initial Sustained Transmission Line Outages

230 kv: 4
115 kv: 28

Total: 32

Highlights

- Hurricane Sally** made landfall on Sept 16th at 0445 CDT near Gulf Shores, AL as **Category 2** hurricane with 105 mph maximum sustained winds.
- Slow moving system bringing **heavy rainfall** and severe flooding to Florida, Alabama, Georgia, the Carolinas and into Virginia.
- SERC communicated and collaborated closely with Reliability Coordinators and the NERC Situational Awareness Team throughout this event.
- Gulf Power **evacuated their Primary Control Center** due to loss of power relocating to their Back-Up Control Center.
- Most line outages were due to tree contact.
- Most customers were restored rather quickly.
- Half the transmission lines were restored by Sept 18th. **All transmission lines were restored by Sept 21st.**
- 1 -230kV structure needed to be replaced
- Hurricane Sally impacted oil/natural gas production. **27% oil production and 28% natural gas production was shut down as 149** platforms were evacuated.



Hurricane Delta – October 9, 2020

Hurricane Delta

Category 4 major hurricane (SSHWS/NWS)



Hurricane Delta intensifying east of Texas on October 8

Formed	October 5, 2020
Dissipated	October 12, 2020 (Remnant low after October 10)
Highest winds	1-minute sustained: 145 mph (230 km/h)
Lowest pressure	953 mbar (hPa); 28.14 inHg
Fatalities	6 total
Damage	\$2 billion (2020 USD)
Areas affected	Jamaica, Nicaragua, Cayman Islands, Yucatán Peninsula, Gulf Coast of the United States, Southeastern United States, Northeastern United States
Part of the 2020 Atlantic hurricane season	

Initial Sustained Transmission Line Outages

500 kV:	2
230 kV:	22
138 kV:	48
115 kV:	40
69 kV:	71

Total: 183

Initial Customers without power

LA: 600k

TX: 115k

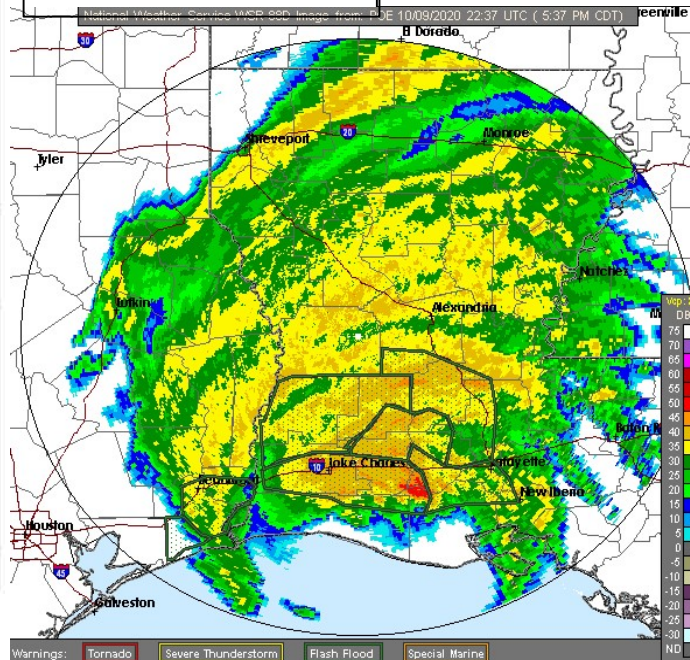
MS: 95k

AR: 10k

Total: 820k

Highlights

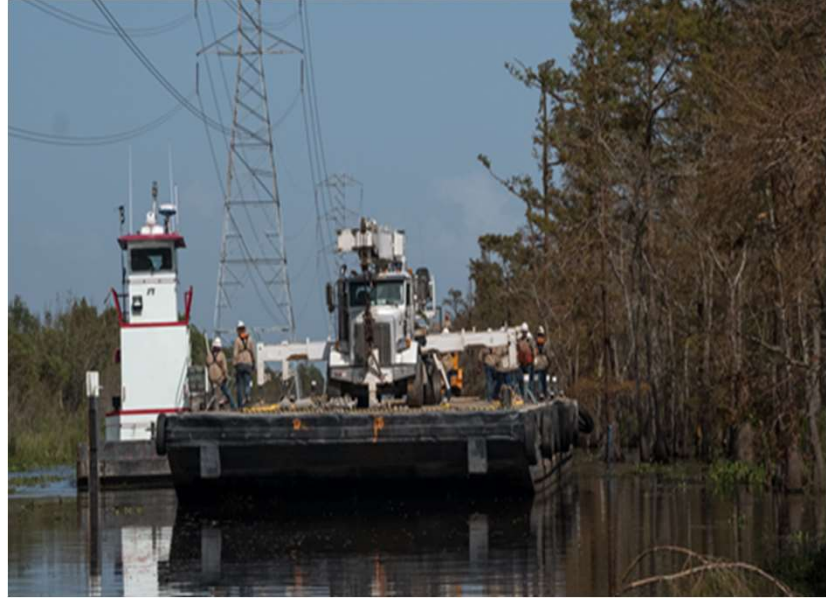
- Hurricane Delta made landfall on October 9th at 6:00 pm CDT near **Creole, Louisiana** as a **Category 2** hurricane with maximum sustained winds of 100mph.
- 12 miles east** of where Hurricane Laura made landfall 6 weeks earlier, with Hurricane Laura restoration efforts were still ongoing.
- SERC communicated and collaborated closely with RC's, TOPS, BA's and the NERC Situational Awareness Team throughout this event.
- Critical 500kV lines returned to service prior to Hurricane Delta making landfall
- Those same transmission lines were forced out of service again.
- After landfall, Hurricane Delta weakened rapidly.
- All customers were **restored by October 15th**.







Teamwork



Readiness

- Prepared
- Practice
- Pro-Active
- Personnel
- Personable



End Goal....



...Keep the Lights On





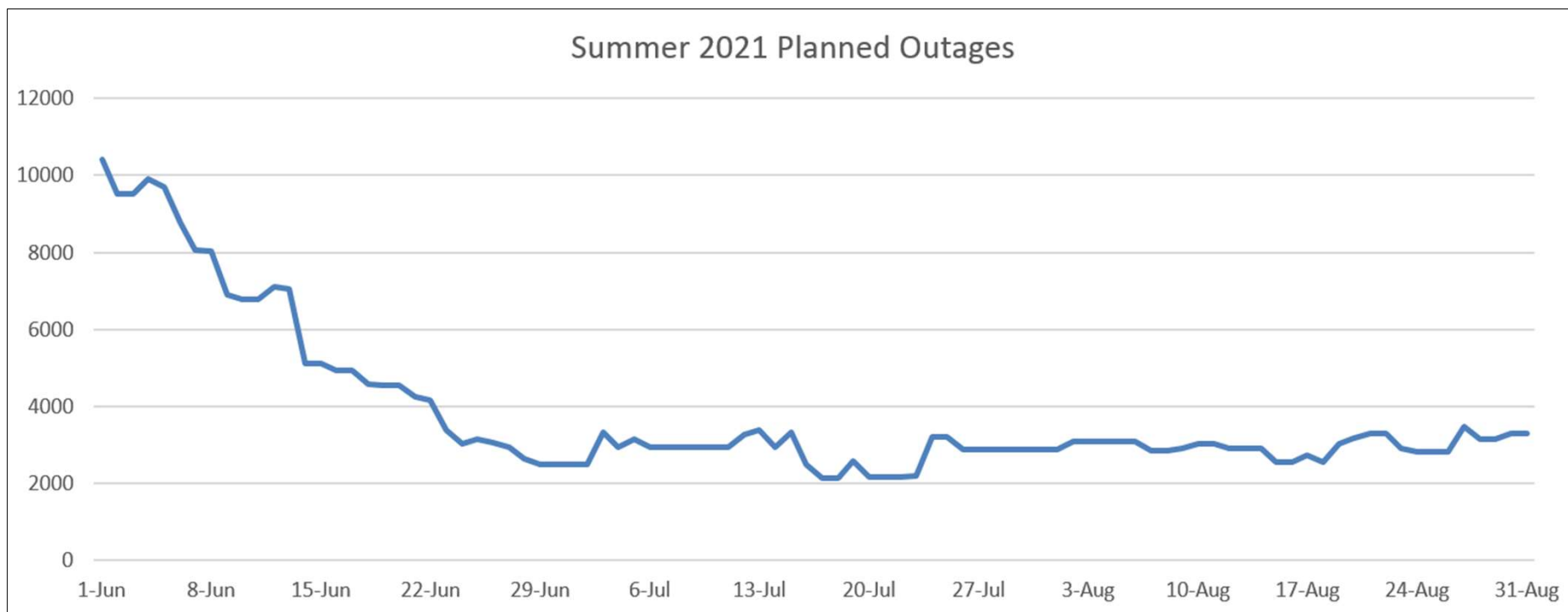
Thank you for joining us today!



Appendices

Appendix I Summer Resource Assessment - Generation

Summer 2021 Planned Outages



Base Case

Base Case		
1a	Registered Nameplate Capacity (MW)	183,318
2a	Inoperable Resources	(3,627)
3a	No GVTC	(4,851)
4a	Thermal Derates	(12,410)
5a	Other Derates	(579)
6a	GVTC-TIS	(1,004)
7a	Wind Derates	(21,679)
8a	ER w/o TSR	(633)
9a	Scheduled Outages	(3,290)
10a	Net Firm Imports	2,979
11a	Behind-the-Meter Generation	4,463
12a	Demand Response	7,152
13a	Non-Transferable to North/Central	(4,132)
a	Total Available Capacity	145,707
b	Coincident Peak Demand + Transmission Losses	122,398
a-b	Base Reserves (MW)	23,309
(a-b)/b	Base Reserves (%)	19.0%