



MISO Seasonal Readiness Workshop: Summer 2024

May 21, 2024

Housekeeping

- All audio lines are muted, and video is disabled at the start of the meeting
- **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
- Please announce your name and affiliation when speaking
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MISO Seasonal Readiness Workshop

Summer 2024 - Agenda

Welcome

- Jessica Lucas, Executive Director, MISO System Operations

Assessments

- Weather - Adam Simkowski/Brett Edwards, MISO Meteorologists
- Generation - John DiBasilio, Engineer, MISO Resource Adequacy
- Transmission – Zach Battaglia, Senior Engineer, MISO Planning

Seasonal Risk / Uncertainty Management

- Lessons Learned from August 2023 – Congcong Wang, Manager, MISO Operations Risk Management
 - Model Uncertainties
 - Unique Solar Risks
 - Sufficiency

Keynotes

- Wildfire preparedness – Brett Edwards, MISO Meteorologist
Scott McMahan, Director of Transmission Control Centers, Entergy

Open Discussion

We want to hear from you!

MISO wants your feedback and suggestions for future seasonal readiness forums.

Please take a minute to complete a short survey by scanning the QR code with your smartphone.



Scan the QR code with
your smartphone camera

Or Click [HERE](#)



Preparedness: Weather Outlook

Adam Simkowski & Brett Edwards
Meteorologists, MISO Operations

asimkowski@misoenergy.org

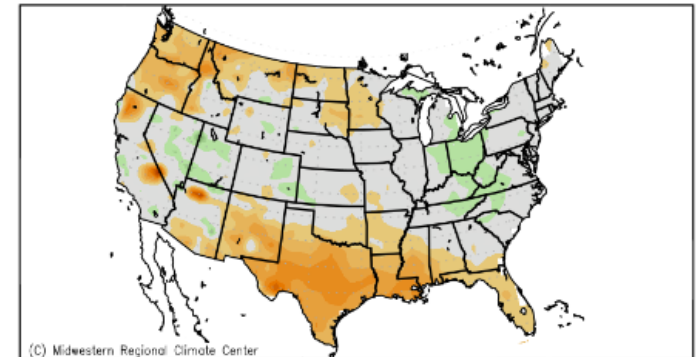
bedwards@misoenergy.org

Review of summer 2023 conditions point to it being a weak analog year for the upcoming season

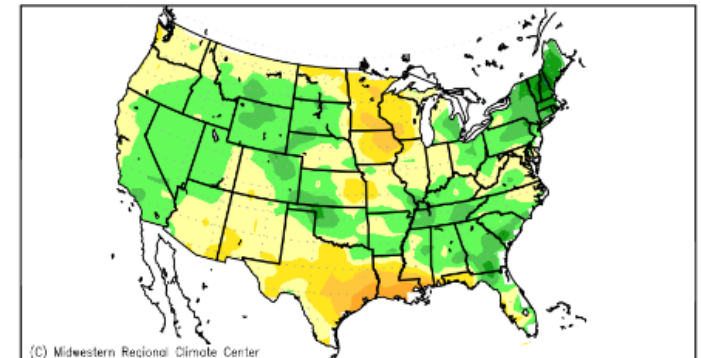
Last Summer, we experienced:

- Near normal temperatures across the Classic Region
- Above normal temperatures prevailed across the South Region
- Eight days above 90°F Systemwide temperature, all in July and August
- A mixed bag of precipitation where the Gulf Coast and North region were mostly dry, while parts of the South and Central region saw above normal precipitation

Average Temperature (°F): Departure from Mean
June 1, 2023 to August 31, 2023

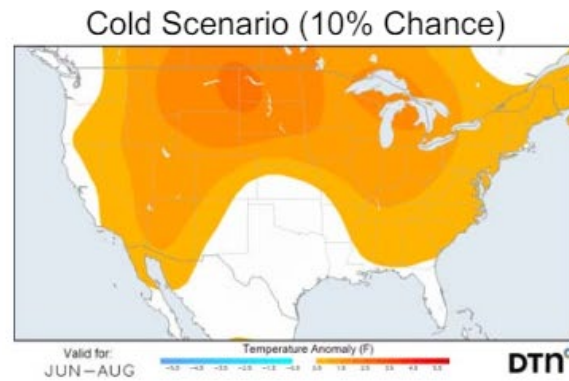
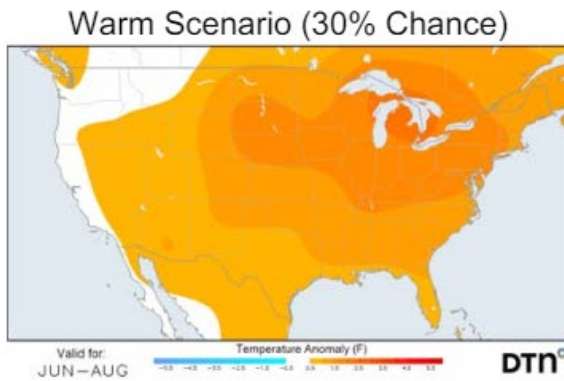
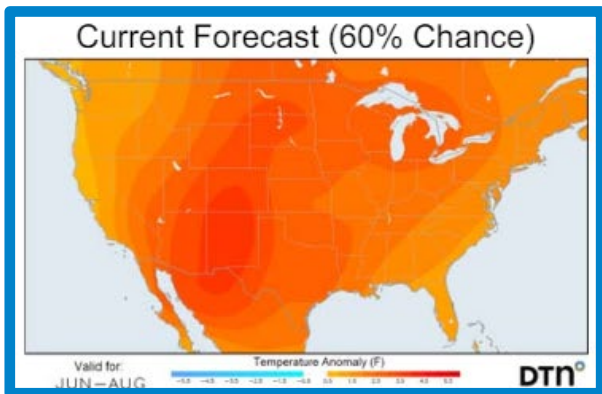


Accumulated Precipitation (in): Departure from Mean
June 1, 2023 to August 31, 2023

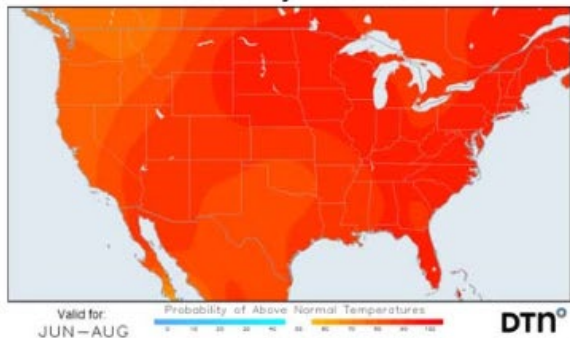


Both DTN forecasting scenarios include temperatures above normal average for MISO from June through August

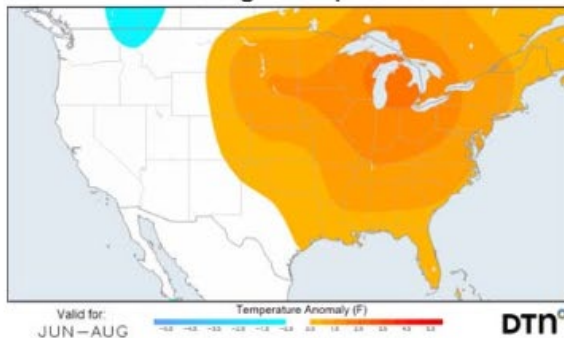
DTN Temperature Forecast



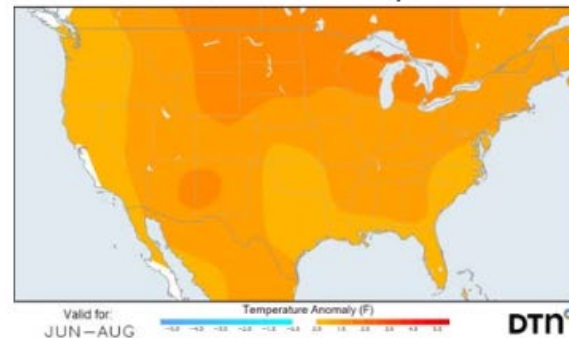
Probability Forecast



Analog Composite



Climate Model Composite



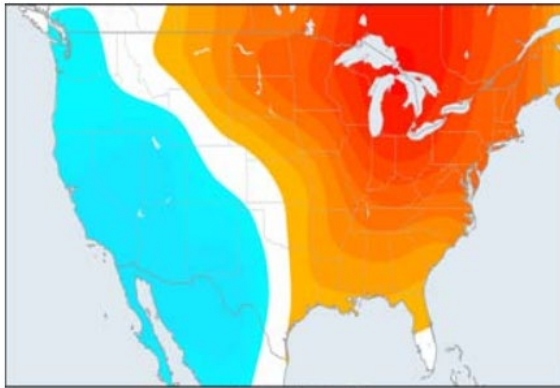
Period	Forecast	Cold Scenario	Warm Scenario	Normal	Last Year
Jun 2024 - Aug 2024	1075 (115.6%) CDDs	1021 (109.8%)	1100 (118.3%)	930	979 (105.3%)
May 2024 - Sep 2024	1421 (114.6%) CDDs	1348 (108.7%)	1462 (117.9%)	1240	1314 (106%)

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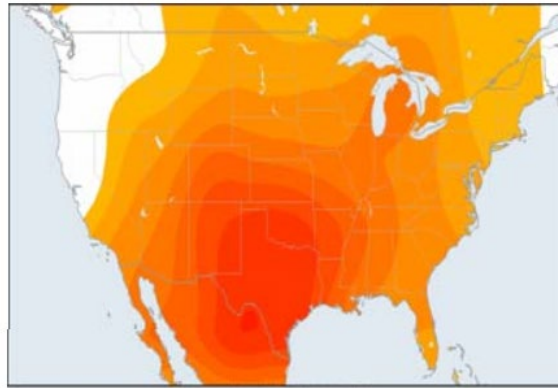
DTN is forecasting above normal to well above normal average temperatures across MISO from May through September

DTN Temperature Forecast

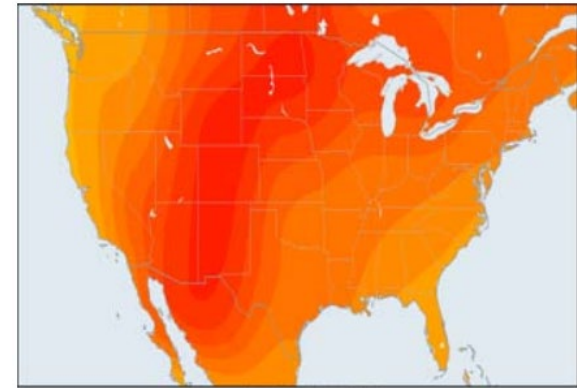
May 2024 Forecast



June 2024 Forecast



July 2024 Forecast



September 2024 Forecast

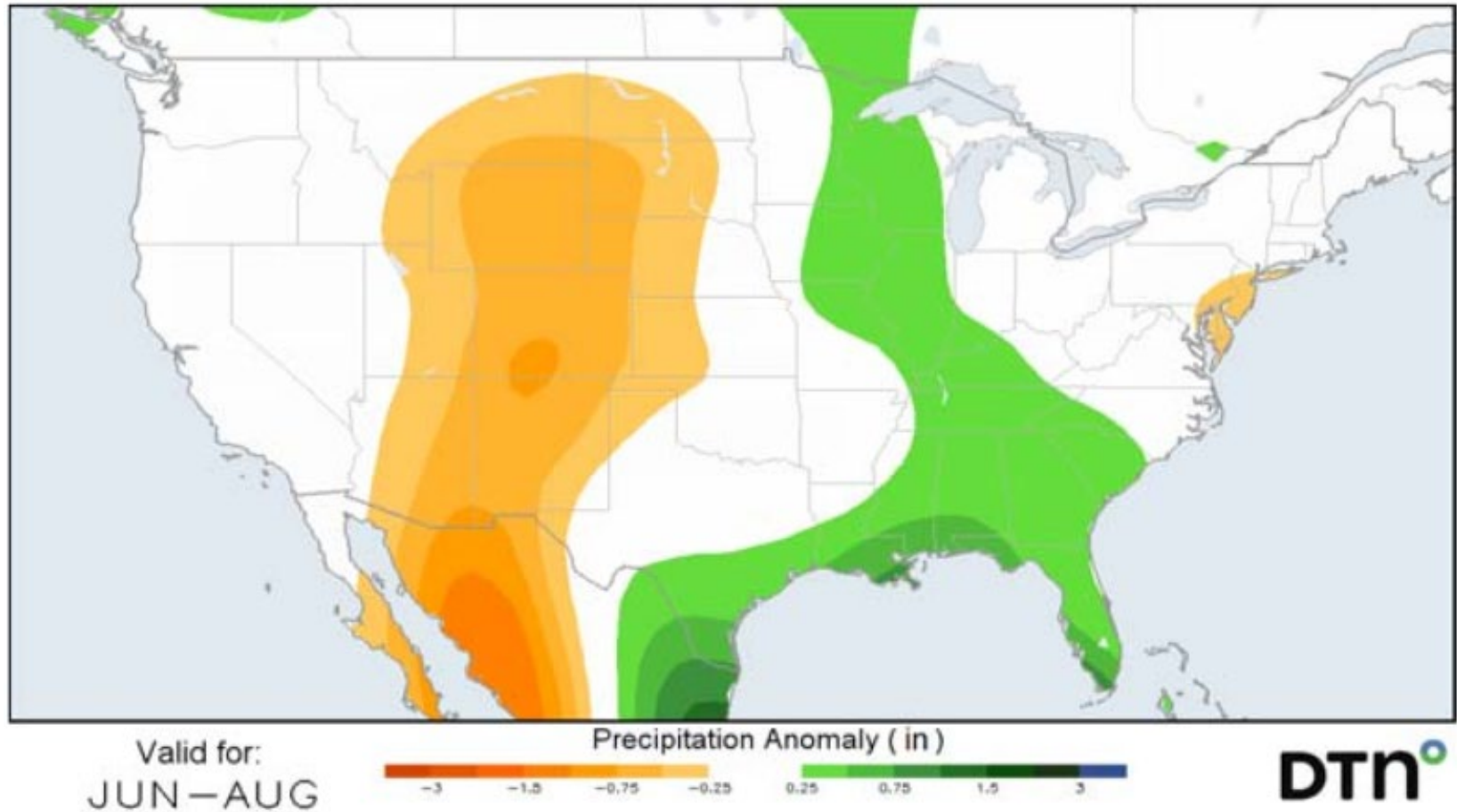


August 2024 Forecast



DTN is forecasting above normal average precipitation for portions of MISO classic region and the Gulf Coast in south region

DTN Precipitation Forecast



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MISO Second Vendor's* option is in line with what DTN is forecasting

- The summer forecast shows above normal temperatures across the MISO footprint
- Near to slightly above normal precipitation is expected across MISO, and the region of above normal precipitation matches up well with DTN
- Above normal temperatures look pervasive across the Eastern Interconnect from May through September
- July and August look to be the hottest months for MISO and the rest of the eastern Interconnect

**MISO cannot share the name or images of this vendor externally per our agreement*

NOAA is forecasting above normal average temperatures for June through August across most of the Continental U.S.

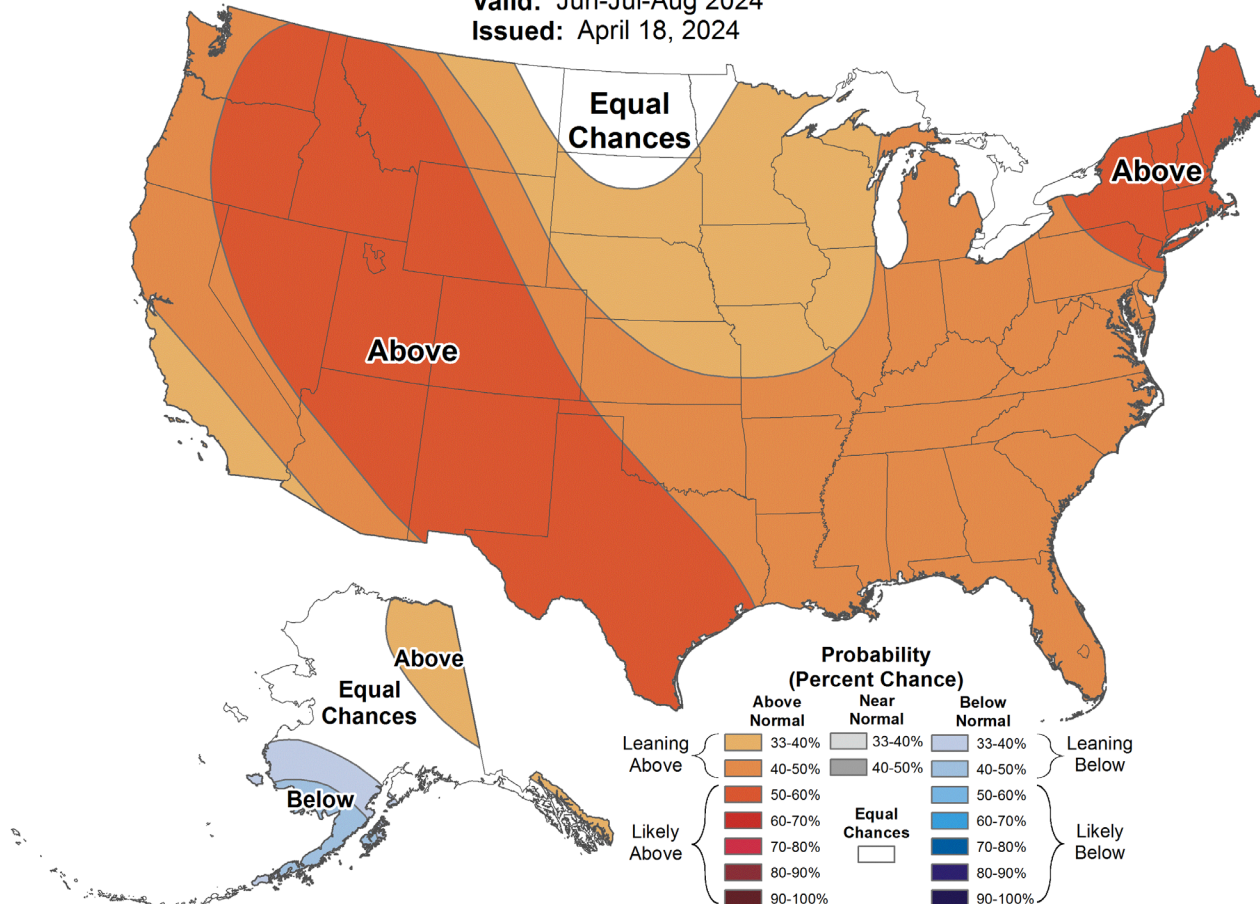


Seasonal Temperature Outlook



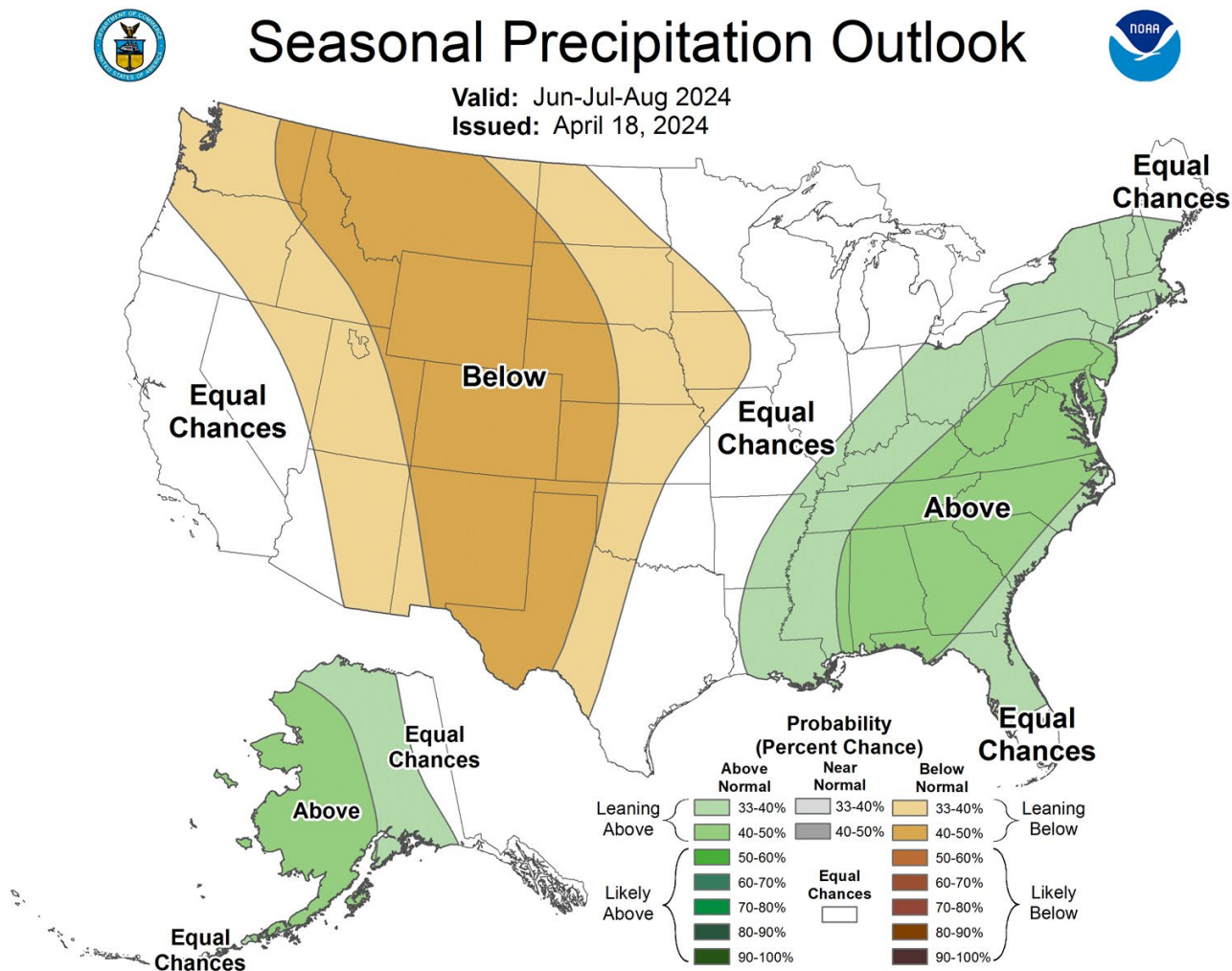
Valid: Jun-Jul-Aug 2024

Issued: April 18, 2024



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NOAA anticipates closer to normal precipitation for much of MISO this summer besides the South region



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2016 and 2010 are the best historical analog (reference) years to this upcoming summer

Analog years for Summer 2024

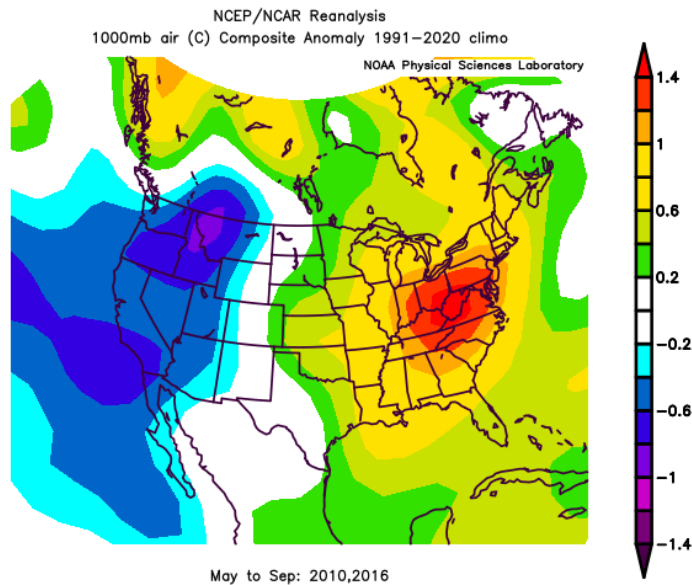
Year(s)	DTN	DTN Rank	Vendor B	Vendor B Rank
	2010	1	2016	1
	2005	2	1998	2
	2020	3	2010	3
	2016	4	2020	4
	1998	5	2023	5
	1952	6	2013	6
	2007	7	2019	7
	1995	8		
	1988	9		
	2017	10		

Cool MISO Summer
Warm MISO Summer
Normal MISO Summer

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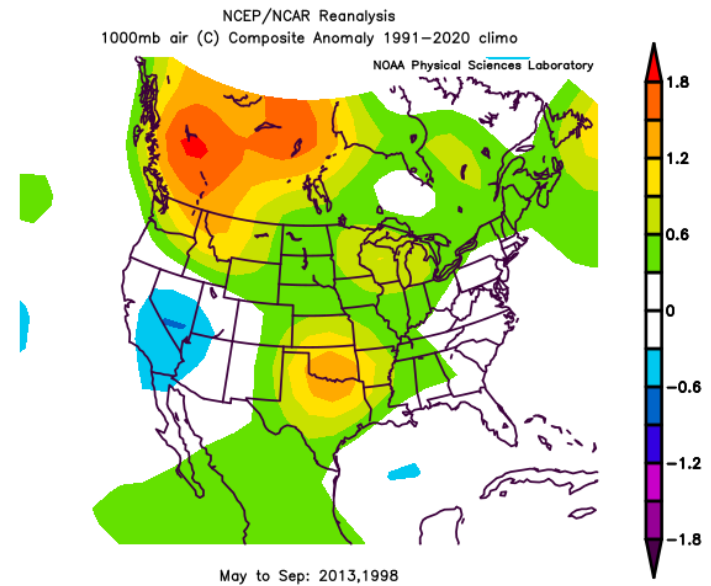
Two scenarios are possible for where MISO expects heat to occur based on forecast risks

East-Based Heat



- 2 top analog years here show better matches with multiple oceanic signals and atmospheric drivers
- Higher probability scenario

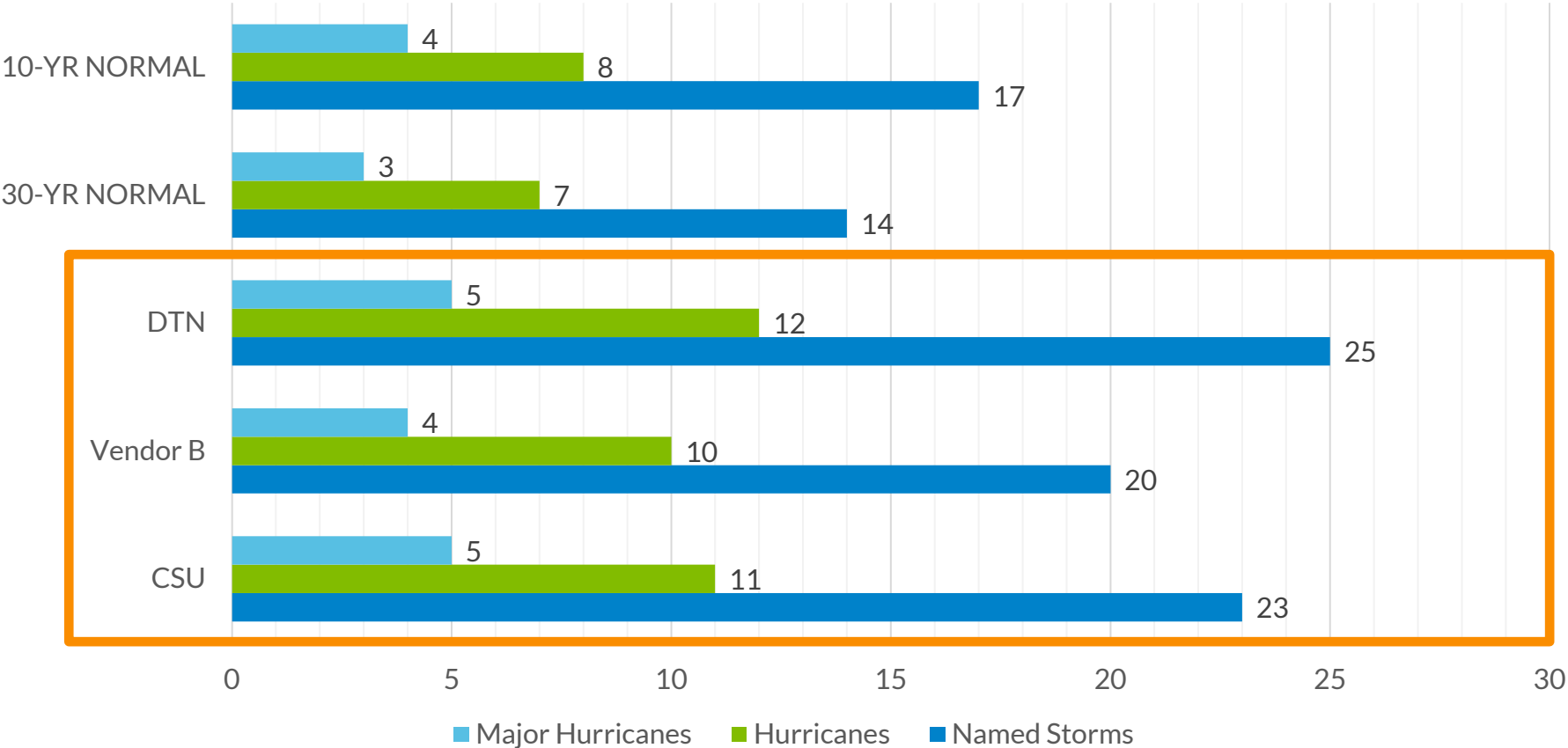
Central-Based Heat



- These years still have matching patterns, but not as clean, yet still bring heat to MISO footprint
- Lower probability scenario

An active hurricane season is expected with above normal forecasts from all vendors; threats to MISO are best evaluated using a two-week forecast window

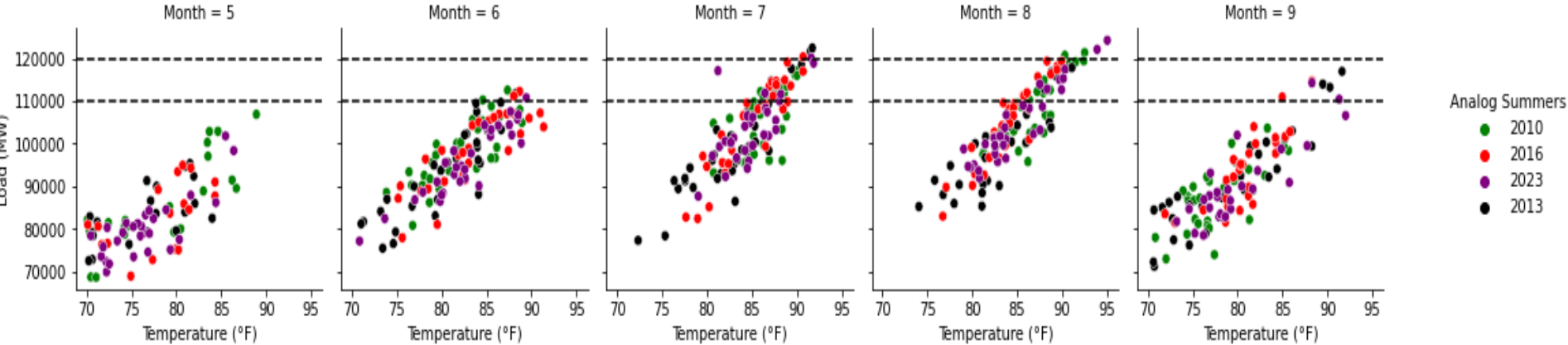
Hurricane Seasonal Forecast Atlantic Basin



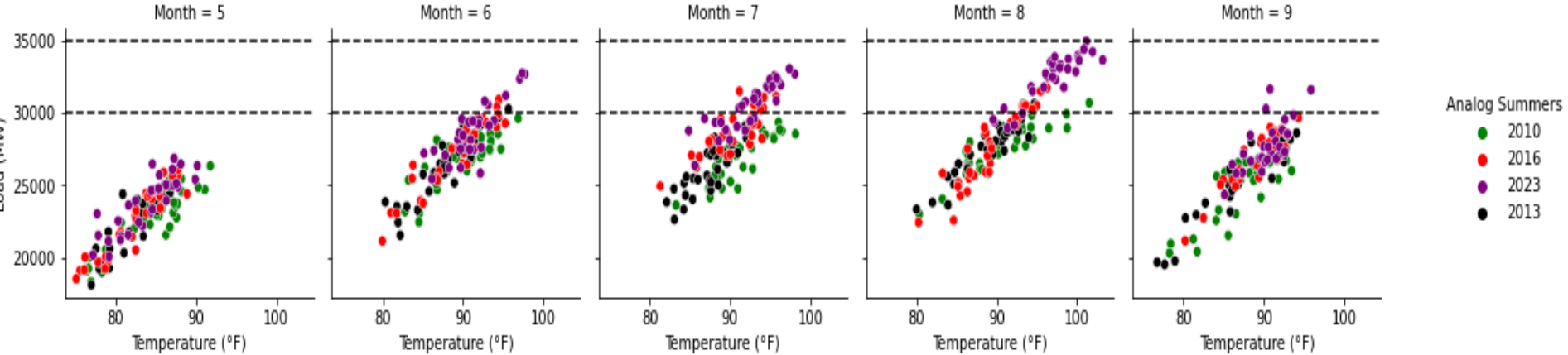
CSU: Colorado State University

All historical analog years experienced summers with load greater than 120 GW systemwide and greater than 30 GW in the South Region

MISO System Wide Load vs. Temperature Analog Summer when Temp $\geq 70^\circ\text{F}$

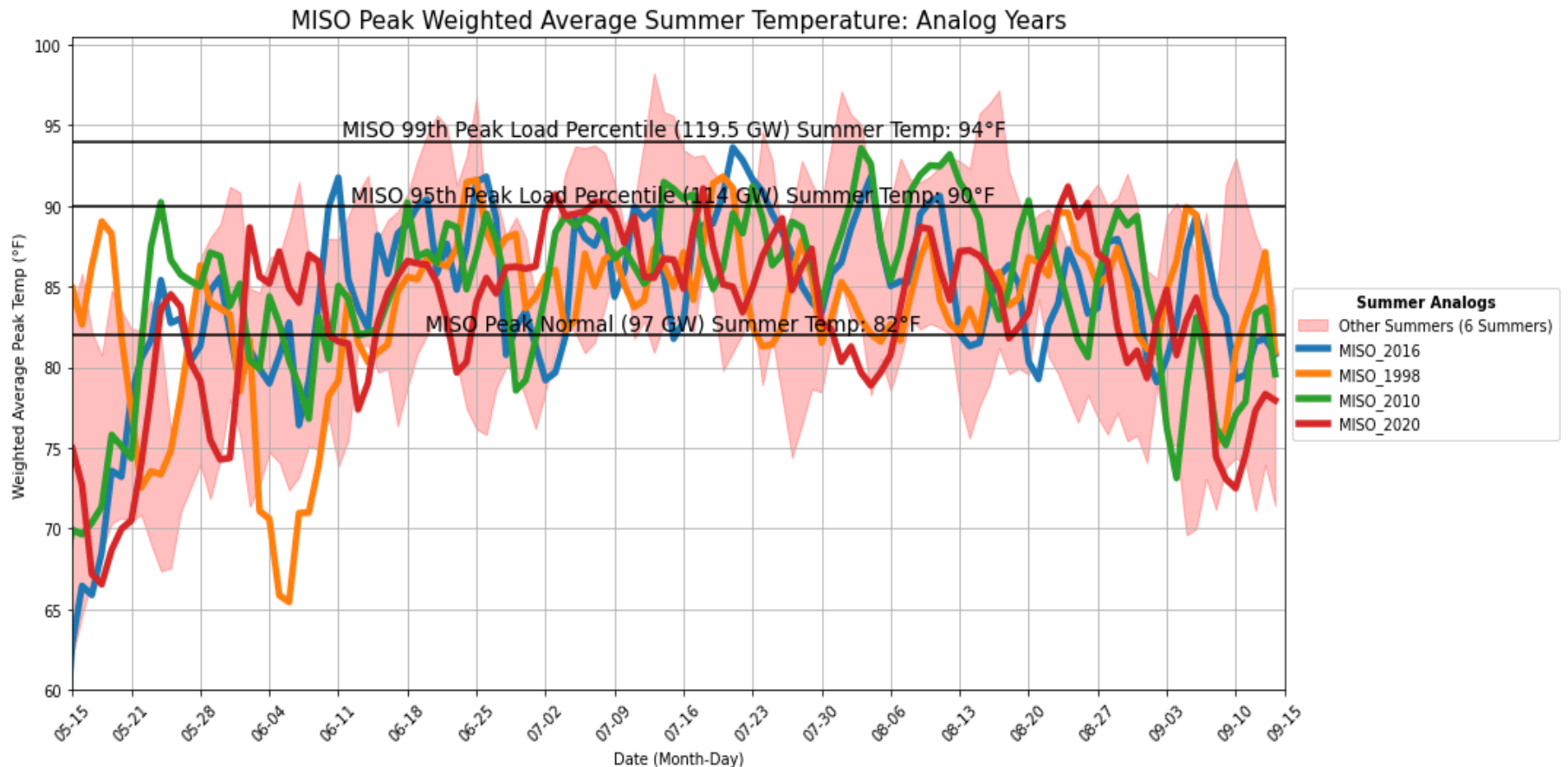


South Region Load vs. Temperature Analog Summer when Temp $\geq 75^\circ\text{F}$



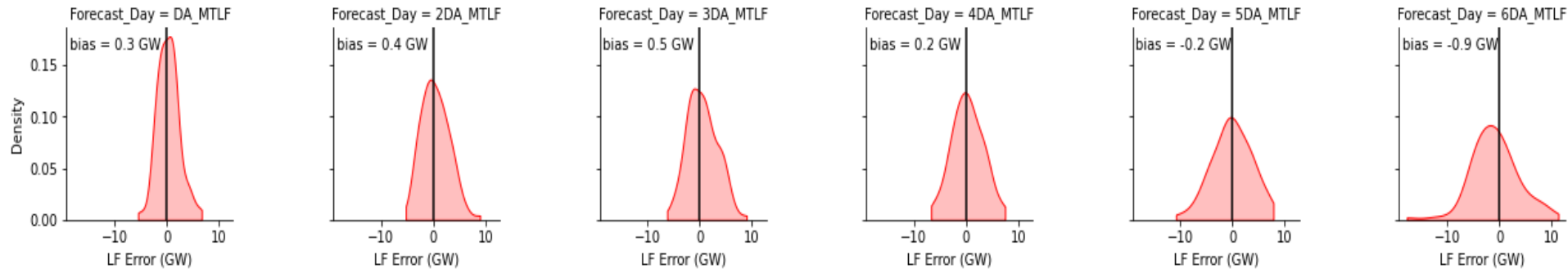
Key analog summers saw daily peak temperatures above the 95th percentile average load thresholds

Two analog years, 1995 and 1988, had major MISO heatwaves reaching above the 99th percentile average load threshold

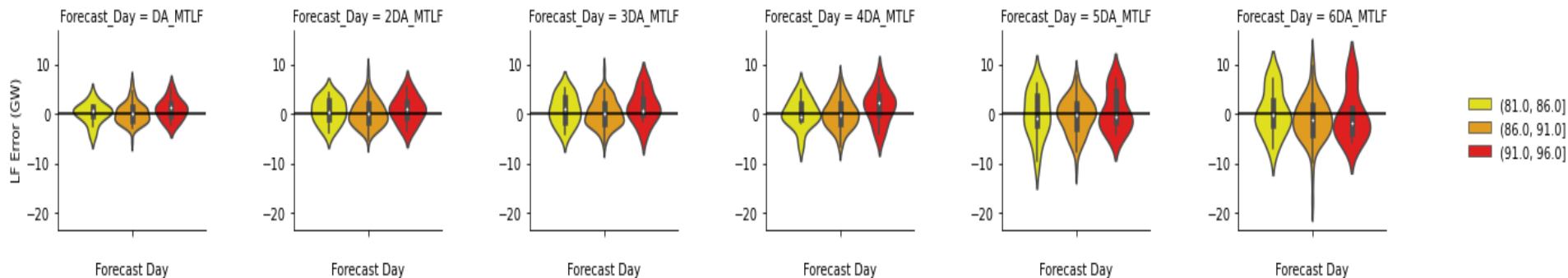


Summer load forecast bias remains evenly distributed, but a detailed risk assessment is still required for each event

MISO Peak Summer MTLF Forecast Bias (Forecast - Actual) where Actual Load \geq 110 GW (2018-2023)



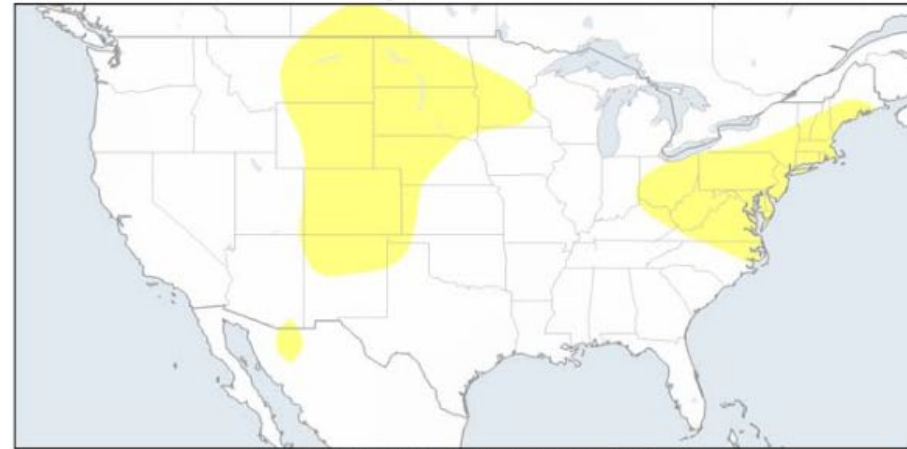
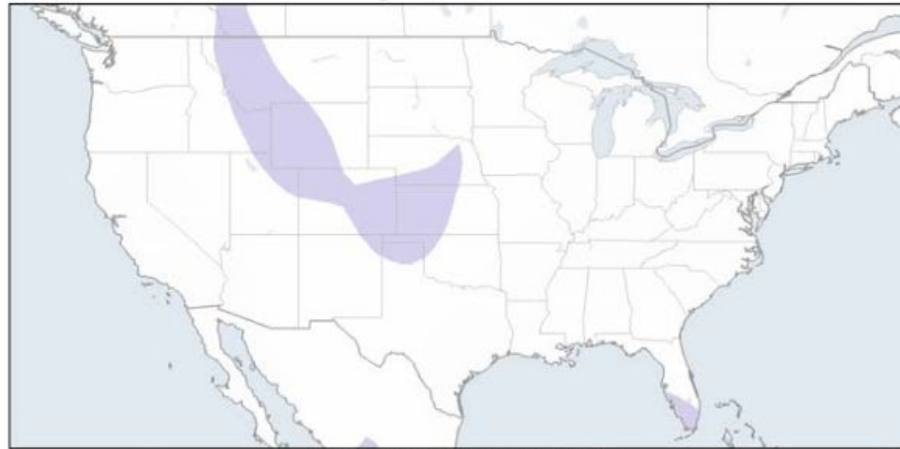
MISO Peak Summer MTLF Forecast Bias (Forecast - Actual) where Actual Load \geq 110 GW (2018-2023)



DTN is forecasting average wind generation and normal to above normal solar generation

June 2024 to August 2024 Wind Anomalies

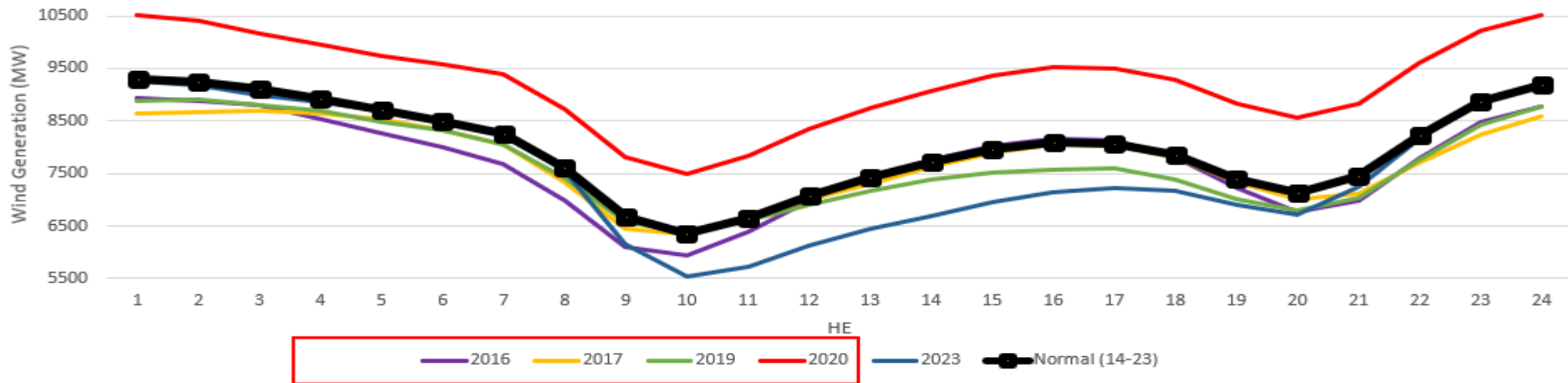
June 2024 to August 2024 Solar Anomalies



Valid for: JUN-AUG
Forecast Wind Anomalies (m/s)
-0.8 -0.4 -0.1 0.1 0.4 0.8
DTN^o

Valid for: JUN-AUG
Forecast Avg Daily Solar Anomalies (W/m²)
-10 -8 -2 2 6 10
DTN^o

MISO Summer (May-Sep) Standardized Hourly Wind Generation (2024 Pmax Base)



Summary: Adam and Brett's Opinion

- A hotter summer is expected across the entirety of the MISO footprint
- A developing La Niña weather pattern will allow for hotter conditions in July and August across the Eastern Interconnect, but May and June also pose a threat for heat waves across MISO
- East-based heat over the PJM footprint has the potential to impact Net-Scheduled Interchange
- All vendors are forecasting a very active tropical storm season in the Atlantic Basin
 - However, storms originating in the basin may move to the East coast or into the Gulf of Mexico, where they can impact the MISO footprint

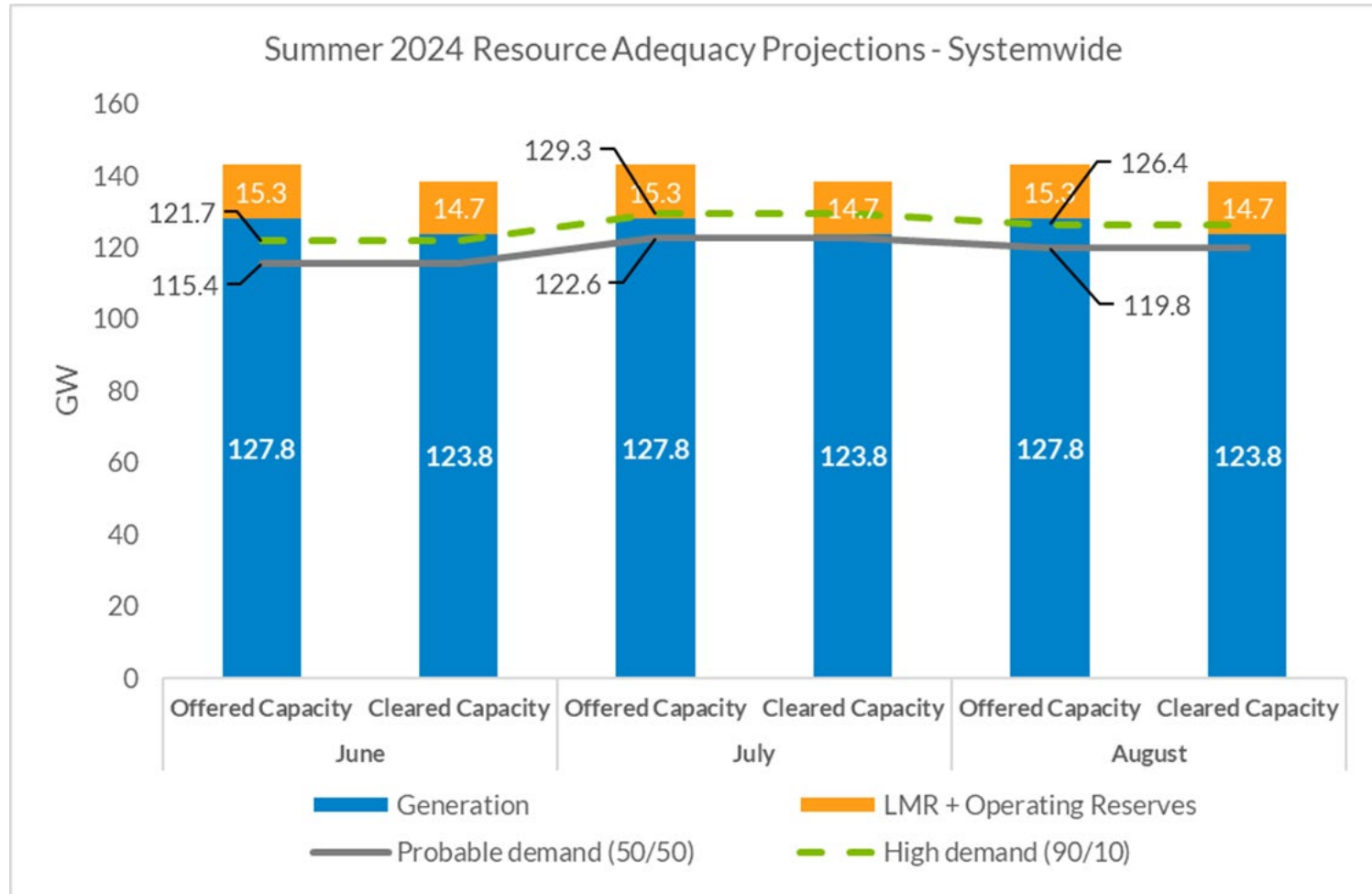
Questions?



Seasonal Assessment: Generation

*John DiBasilio, Engineer
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MISO projects sufficient capacity under probable demand, but will rely on load modifying resources (LMRs) and Operating Reserves to meet a high demand scenario



Seasonal Capacity Outlook – Summer 2024

LRZ	Price (\$/MW-Day)
1	\$30.00
2	\$30.00
3	\$30.00
4	\$30.00
5	\$30.00
6	\$30.00
7	\$30.00
8	\$30.00
9	\$30.00
10	\$30.00

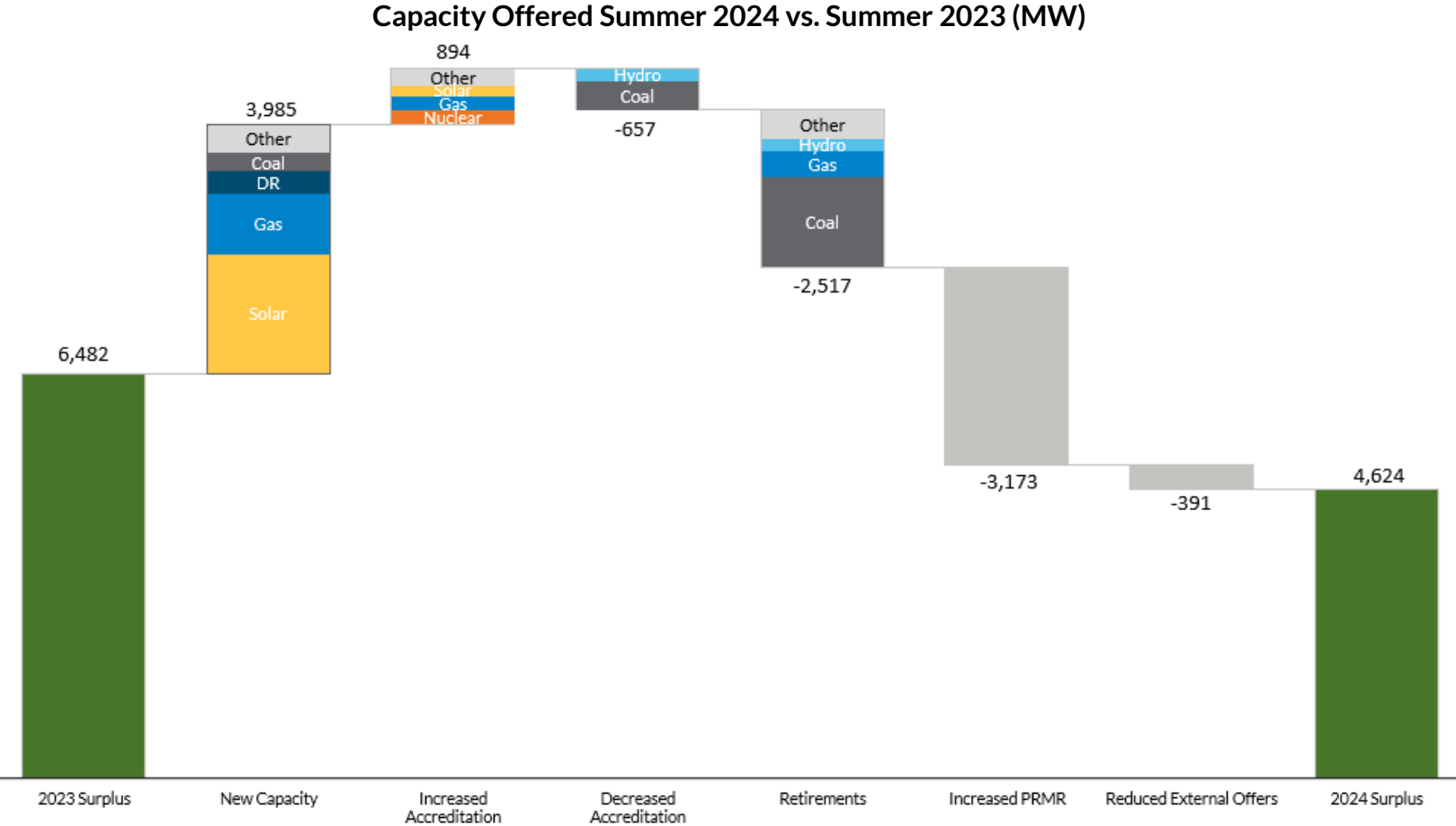
PRMR	ZRC Offered + FRAP	Surplus
136,064.4	140,688.9	4,624.5

Planning Resource	Offered (ZRC)	Cleared (ZRC)
Generation	123,395.6	119,479.2
External Resources	4,430.4	4,309.8
Behind the Meter Generation	4,180.2	4,143.5
Demand Resources	8,660.2	8,109.4
Energy Efficiency	22.5	22.5
Total	140,688.9	136,064.4

LRZ: Local Resource Zone PRMR: Planning Reserve Margin Requirement ZRC: Zonal Resource Credit FRAP: Fixed Resource Adequacy Plan

The MISO footprint showed an approximately 30% decrease in surplus from 2023 but remains adequate

Reduced surplus driven by retirements, increased PRMR and reduced external offers



DR: Demand Response

Capacity indicated is offered accredited value

PRMR: Planning Reserve Margin Requirement

Questions?



Seasonal Assessment: Transmission

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Executive Summary



- MISO is well positioned to handle unplanned events for the upcoming summer season
- Several studies simulated unplanned events on the MISO summer system
- The results were used to identify any potential adverse conditions and enable mitigations ahead of real-time operations

The Summer Coordinated Seasonal Assessment study is used to identify potential issues and develop plans ahead of real-time operations



Purpose:

Evaluate expected conditions across the MISO footprint

Inform MISO RT-Operations of potential limitations & issues on the system for the upcoming Summer Peak Season

Coordinate with other entities



Study Focus:

Steady-State Analysis

Bidirectional Transfer Studies

Load Pocket Studies

Operations Guide Affirmation

The 2024 summer model was built from the base model with MISO Transmission projects and planned outages applied

Base Case:

- Built on the 2024 Summer ERAG MMWG model.
- Submitted in MOD by the first week of 2023 with an effective date of 01/15/2024 or earlier
- Generator Retirements approved on or before December 1, 2023, are offline
- Outages: Transmission and Generator Outages are modeled if they are greater than or equal to two months between the months of June through August.
- TO's can recommend outages outside the time period if deemed necessary

MOD Projects:

- MTEP Appendix A – Planned
- All the generation interconnection projects applied
- Base case

Generation Assumptions

- Renewables dispatched at their capacity credit levels.
- Generation Dispatch = Security Constrained Economic Dispatch (SCED)
- Qualified Facilities (QFs) and MISO South Load Pocket Op Guides honored

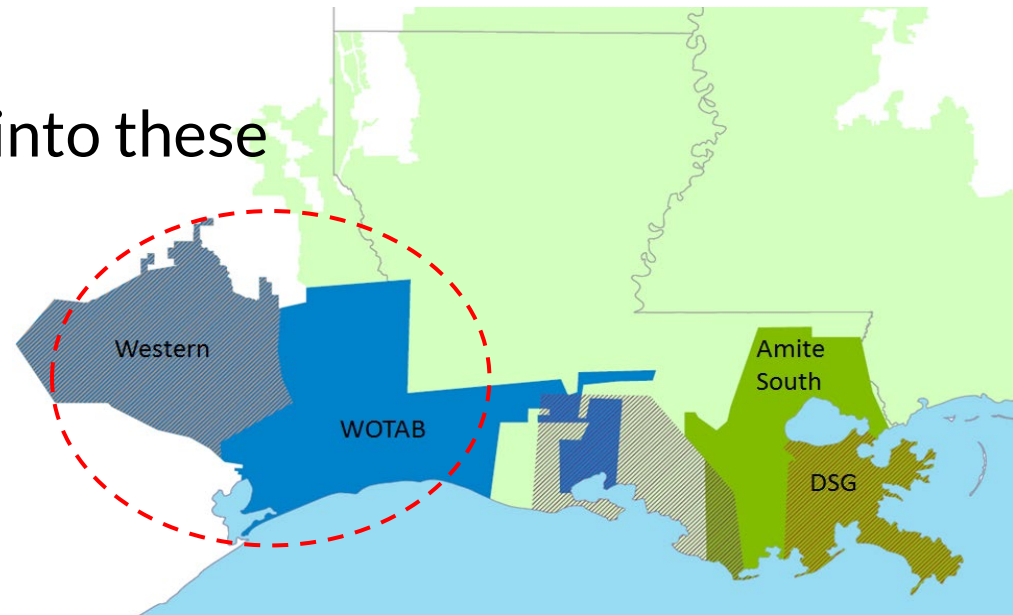
Steady State AC Contingency Analysis did not uncover any contingencies that did not have plans in place for the summer season

NERC defined Category P1 > 100 kV

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

An Import Limits Study is done regularly for MISO Load Pockets

- Simulate peak load conditions for three MISO load pockets as shown below:
 - Amite South at 7700 MWs
 - Down stream of Gypsy (DSG) at 2900 MWs
 - SETEX at 4600 MWs
- Perform transfer studies into these load pockets
- Identify import limits for the load pockets

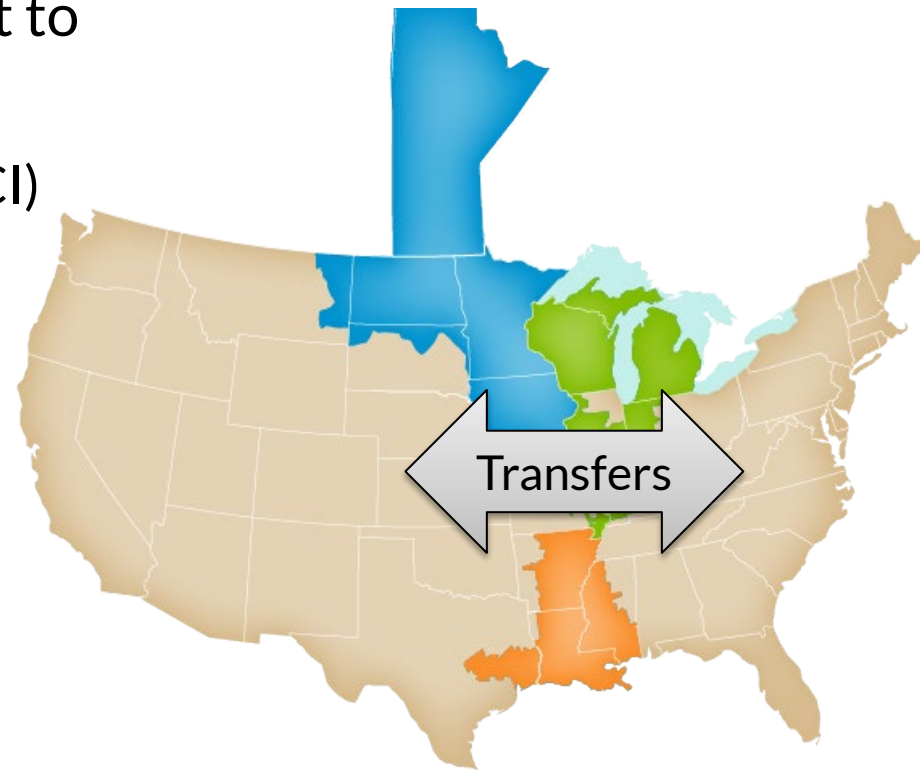


Load Pocket Transfer Results indicate that the import capabilities are in line with current operating guides

Load Pocket	Monitored Element	Limiting Contingency	Violation Type	Import Capability (MW)
AMITE SOUTH	Bayou Labutte AT1 500/230kV	Willow Glen – Bayou Labutte – Waterford Unit 3	Thermal	3560
DSG	Good Hope – Prospect 230kV	Ninemile Unit 5 + Waterford – Churchill 230 kV line	Thermal	2100
SETEX	Newton Bulk – Leach 138kV	Montgomery Power Station + Hartburg – Layfield 500kV	Thermal & Voltage	2000

Bidirectional transfer studies across the MISO footprint identify main constraints

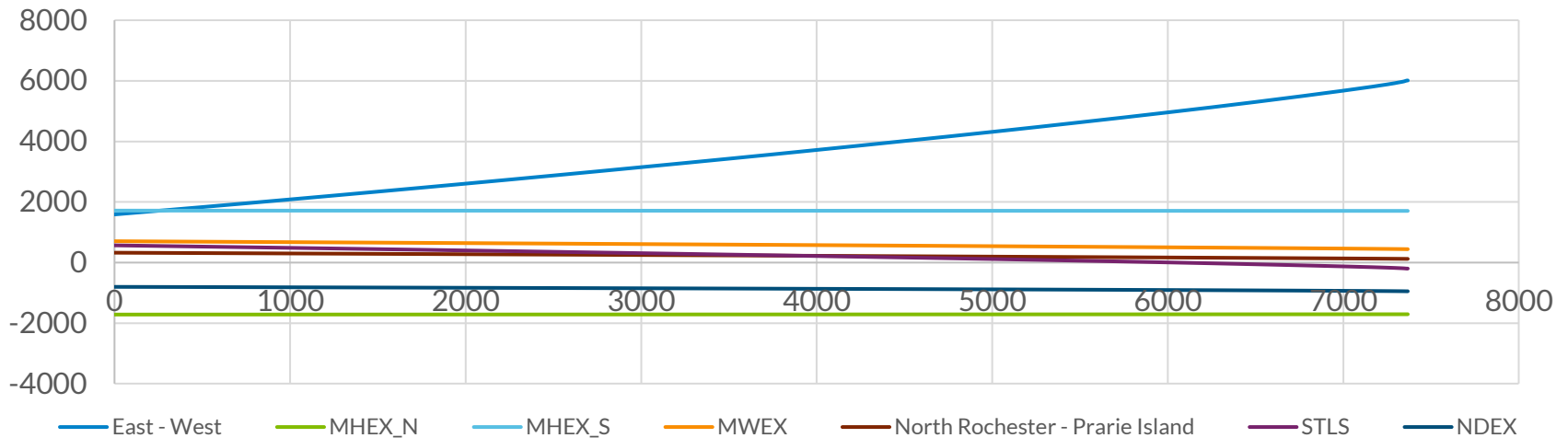
- Transfer Across MISO from East to West and Back:
 - East– PJM, SERC (without AEIC)
 - West– SPP, AEIC
- Transfer value selected above realistic transfers to identify leading constraints.
 - 15,000 MW used
- Flows measured at all tie points and lines bypassing MISO



East to West Transfer leading constraints and interface flows identified during study

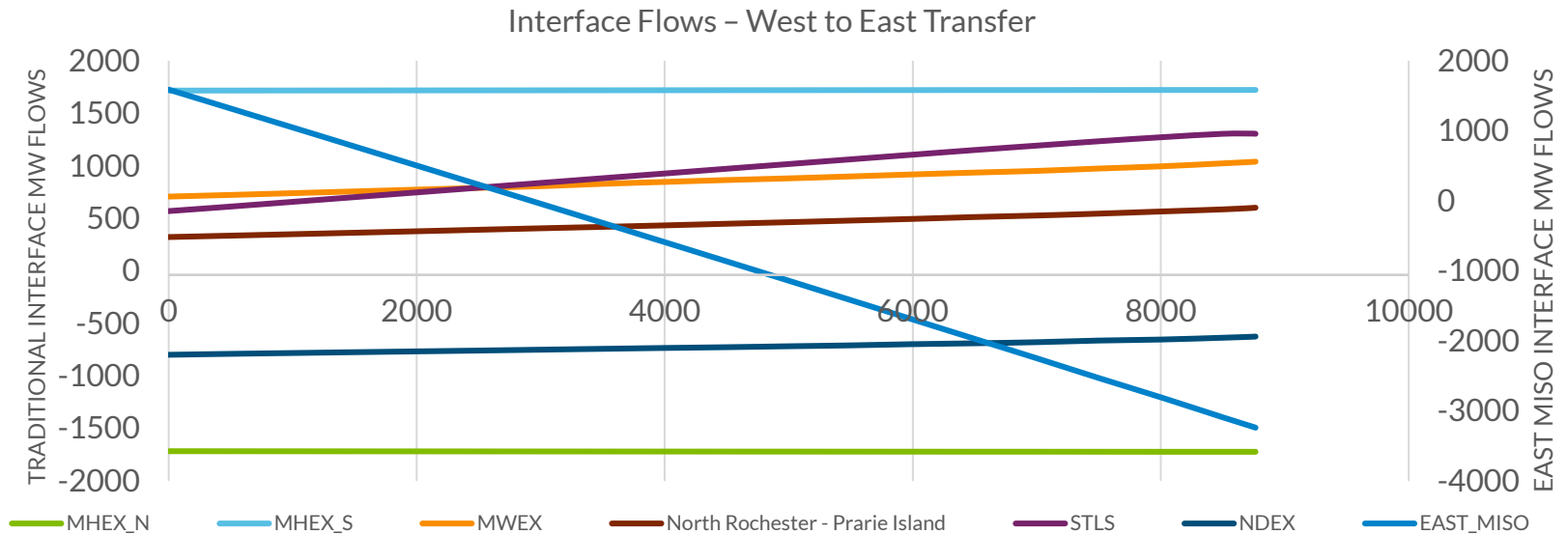
Monitored Facility	Rating	Area	Contingency Name	DC TrLim	AC TrLim
505448 NORFORK5 161 338814 5SOUTHLAND# 161 1	162	EES-EAI/SWPA	AECSPA20: BULL SHOALS -C LEVENGER COVE - TABLE ROCK 161	3100	3100
337516 3MCNEIL 115 337502 3COUCH% 115 1	239	EES-EAI	CSWGEN70: TURK POWER PLANT (469MW)	7187	6799
338875 3PATMOS 115 503912 FULTON 3 115 1	159	EES-EAI/AEPW	CSW13X51: TURK POWER PLAN XFMR 2 138/24	7567	7174

Interface Flows - East to West Transfer



West to East Transfer leading constraints and interface flows identified during study

Monitored Facility	Rating	Areas Name	Contingency Name	DC TrL im	AC TrL im
347515 4MARBHD N 138 347081 4HERLEMAN 3 138	300	AMIL	AMI34035: MAYWOOD-HERLEMAN 345	4397	5196
541201 SIBLEY7 345 345408 7OVERTON 345 1	956	AMMO/ KCPL	AEC34007: HUBEN - MORGAN 345	8793	9343
506932 EUREKA5 161 338682 5OSAGE CRK 161 1	223	EES-EAI/ AEPW	SPACSW18: EUREKA SPRINGS - GRANDVIEW TAP 161	8204	8399



Operating Guide Affirmation Studies validated the steps in four guides and indicated that two could be reviewed for retirement

- **Purpose:**
 - To evaluate the effectiveness and need for select operating guides based on the upcoming summer model. For this study six guides, two from each MISO region, were selected for review.
- **Study Process:**
 - For each operating guide, the adverse conditions described in the guide were created in the summer model by adjusting generation levels, increasing/decreasing wind in an area, etc.
 - The steps in the guide were followed to resolve the adverse conditions.
 - If the conditions were unable to be recreated it was investigated further to determine if the guide was still valid.
- **Results:**

Four of the guides were validated by the study:

- Peno Creek Interface
- Wisdom – Cayler – Triboji 345 kV
- Wabaco – Alma 161 kV
- Marblehead North 161/138 kV Transformer

Two of the guides were found to be candidates for retirement due to completed construction projects:

- Cooperative Energy – TVA Interconnection
- Horn Lake AT1

Questions?



Seasonal Risk & Uncertainty Management

Amber Alewine & Congcong Wang
MISO Operations Risk Management

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cwang@misoenergy.org

Executive Summary



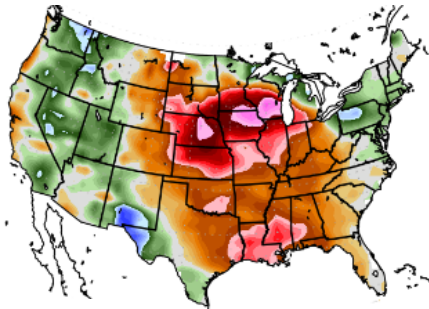
- To manage the projected summer risks, Lessons Learned from the previous heatwaves will be leveraged including last August
- Uncertainty Management Model and Dynamic Reserves will be used to reliably operate the grid with efficient market outcomes
- As its in-service capacity reaches over 6GW, solar will be more impactful for this summer Operations
- MISO will closely coordinate with its members in managing the summer risks and provides member visibility of system conditions on its website

Extreme heat, escalated demand especially coupled with low wind, highlights key summer risks as experienced last August

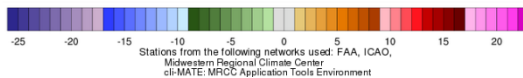
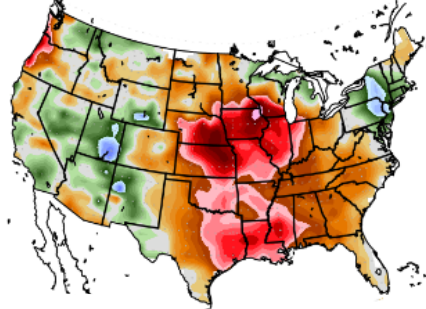
HEAT WAVE: WEEK OF AUGUST 21

Average Temperature: Departure from 30-Year Normal

AUGUST 23, 2023



AUGUST 24, 2023



OPERATIONAL HIGHLIGHTS

- Increased imports from neighbors
- Member Self-Scheduled Load-Modifying Resources
- Good fleet performance with low unplanned outages

On August 23 and 24, simultaneous heat across major cities in the MISO Footprint resulted in record-breaking demand

August 23

Demand Reaches New Highs

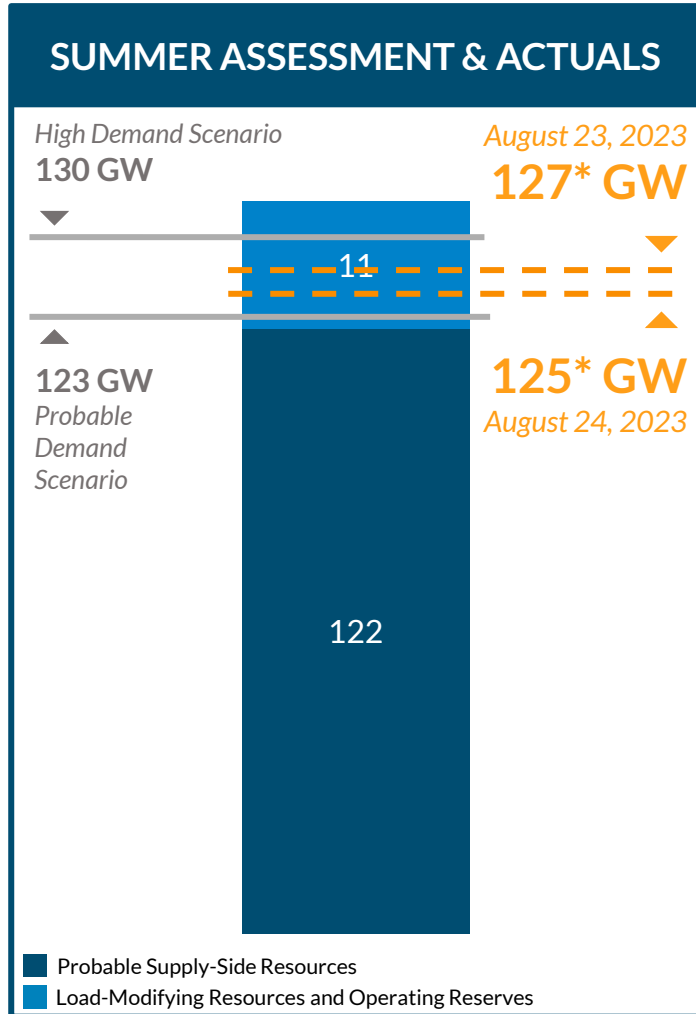
- System-wide: 125 GW
 - North region: 28 GW
 - Central region: 62 GW
 - South region: 35 GW

August 24

MISO Entered Emergency Procedures to Manage Conditions

- High-demand forecasts and low-wind output contributed to projected shortages
- Lower actual demand and member action diminished risk and the need for additional escalation

Lessons learned will be applied as we manage the changing operating landscape and new situations



WHAT WENT WELL

- Proactively prepared with members for the conditions
- Increased requirement for 30-minute reserve product
- De-committed units when not needed
- Appropriately timed Load-Modifying Resources
- Collaborated with neighbors

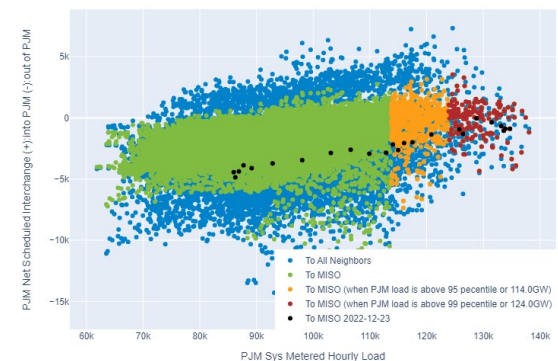
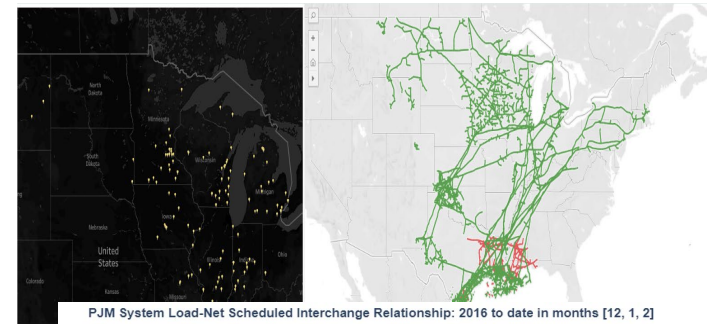
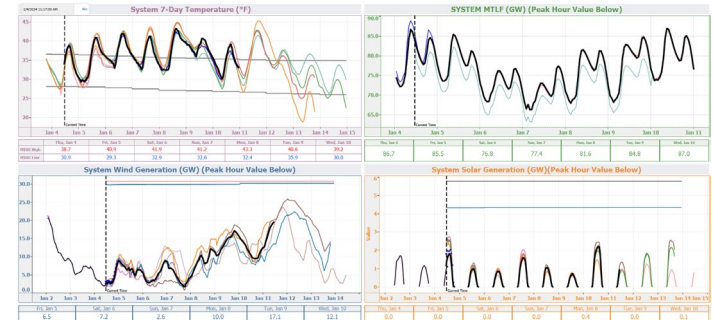
OPPORTUNITIES

- Timing of escalation into emergency procedures and de-escalation as conditions allow
- Accounting for impacts of voluntary demand reduction
- Interplay between market mechanisms and emergency declarations
- Optimizing timing of short-lead generation commitments
- Increasing public awareness on Capacity Emergency Operating Procedures

*Includes Self-Scheduled Load-Modifying Resources

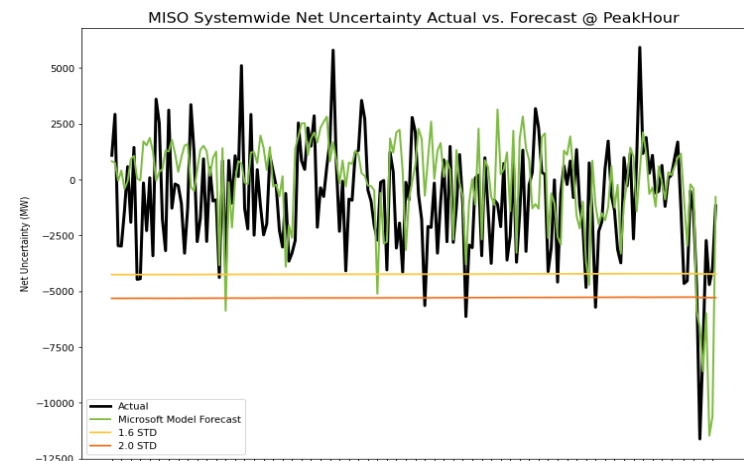
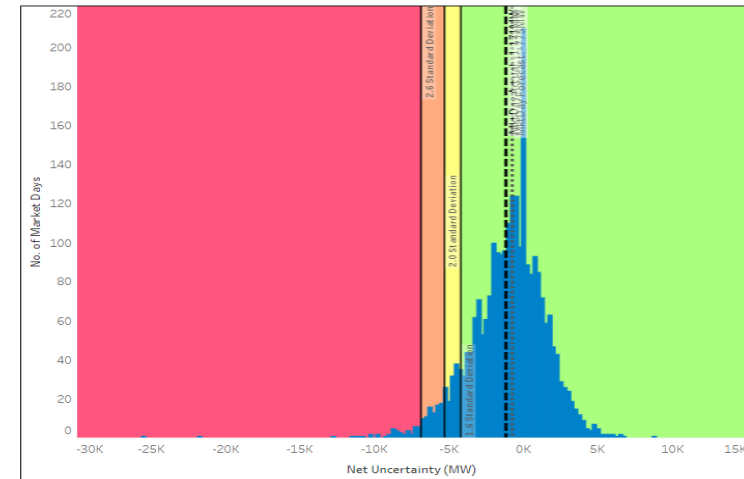
Risk analytics and monitoring tools will be used for forward situational awareness and proactive operations planning

- Weather risk assessment to identify ahead of time extreme heat, tropical weather, etc.
- Weather scenario-based load forecasting will be operationalized this summer
 - Eight high performing numerical weather prediction models: GFSO, GENS, ECMO, ECME, CANO, CANR, NAM, and HRRR
 - Day-Ahead market cleared demand and Local Balancing Authority submitted load forecasts will be referenced in load risk assessment
- Generation availability and fuel risk are analyzed especially environmental limitations such as river temperature
- Neighboring conditions are monitored to assess imports and exports risks



MISO will use its Net Uncertainty Model to manage uncertainties through dynamic reserve with market signals

- MISO developed robust methodology to quantify Net Uncertainty
 - Short-Term Reserve: 30-minute to 3-hour net uncertainty
 - Next-Day Reserve Margin Threshold: next-day net uncertainty*
- Net Uncertainty prediction machine learning model is established in Azure to predict High, Medium and Low risk profile
 - Quantified and predicted at the systemwide and sub-regional levels
- Reserve requirements are established daily based on the predicted risks
 - Upon Emergency, high Short-Term Reserve requirement will be used for a Capacity Advisory or above per EOP-002 (low risk appetite, high stake and market driven pre-position)

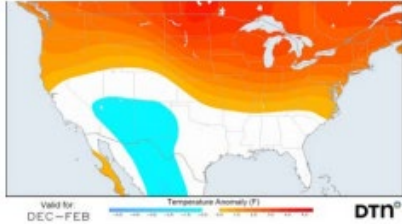


Example of risk assessments for Summer operations especially leading into extreme heat

Seasonal Outlook

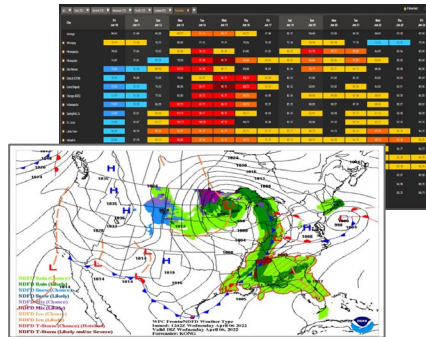
System operations review the outlook for seasonal risks and discuss readiness plan

Current Forecast (60% Chance)



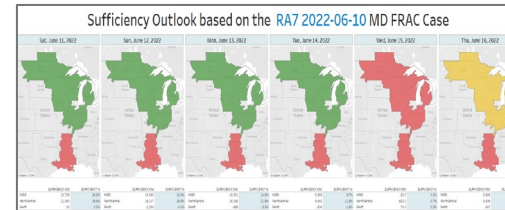
Week(s) Ahead

Monitor upcoming weather systems and conditions



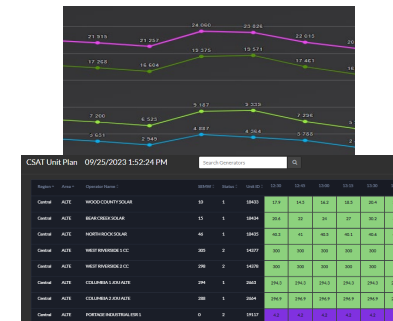
Day(s) Ahead

Evaluate Operating reserve margin, perform scenario analysis to account for uncertainty and pre-position as needed



Hour(s) Ahead

Update risks and assess resource availability
CSAT dynamically updates available uncommitted and emergency resources



MEMBER COMMUNICATIONS

Seasonal Readiness Workshop

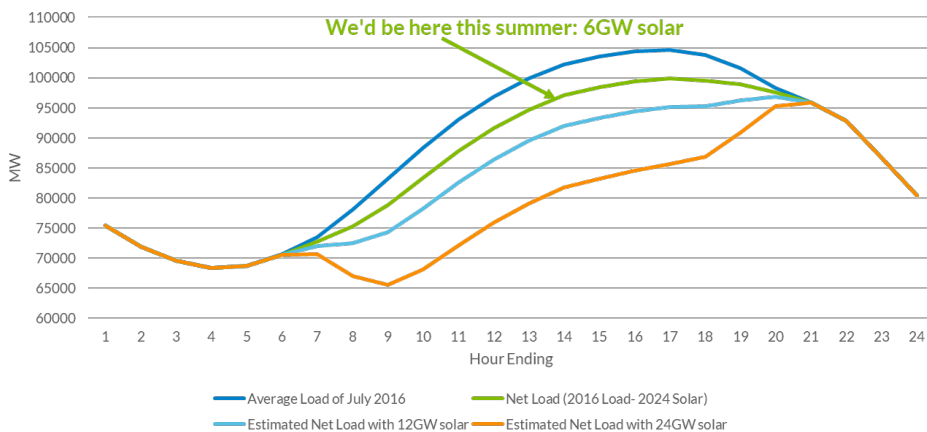
Hot/Severe Weather Alert
Informational Messages
Capacity Advisory
Conservative Ops

Max Gen Alert
Max Gen Warning
Max Gen Event EEA1
(etc.)

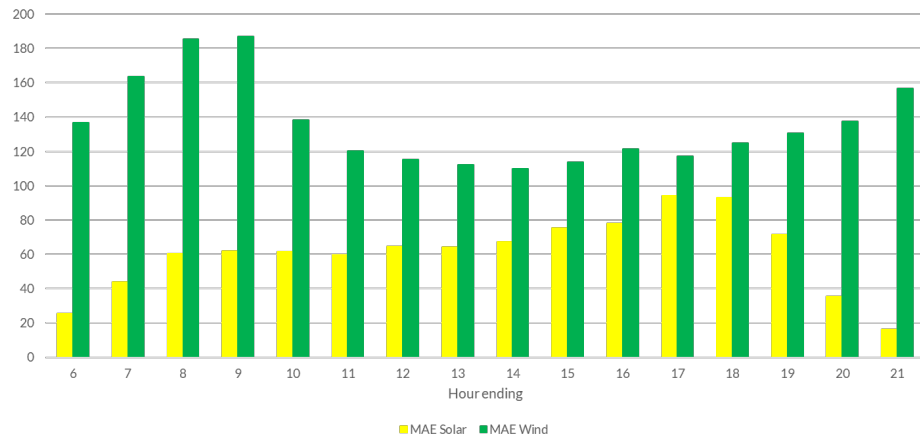
Solar will play a more active role as its in-service capacity increases to over 6GW over the summer

- In-service solar capacity exceeded 5GW and has a strong growing queue
- For summer, solar peak coincides with load peak. Solar may provide capacity relief and has less net load ramping impacts compared to winter at the current penetration level
- However, shorter timeframe solar variabilities are risks to watch especially compounded with wind and other risk factors

Average Net Load (Load - Solar): Average Load of July 2016 and "Average" Solar of July 2024



Mean Absolute Error of 10-min ahead forecast in summer of 2023: 30GW in-service wind vs. 3GW in service solar

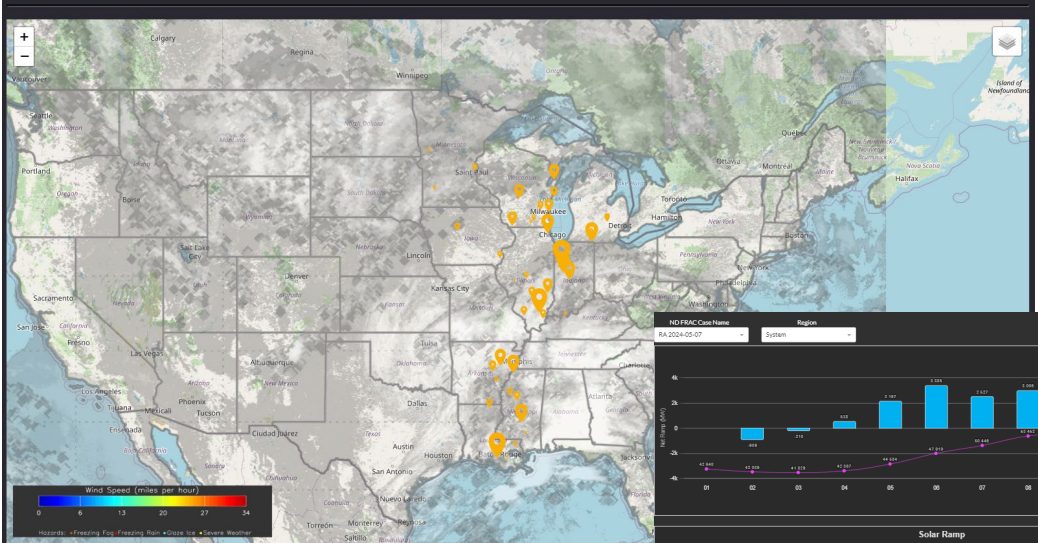


MISO expects normal/above normal solar irradiance this summer as well as the smoke risk

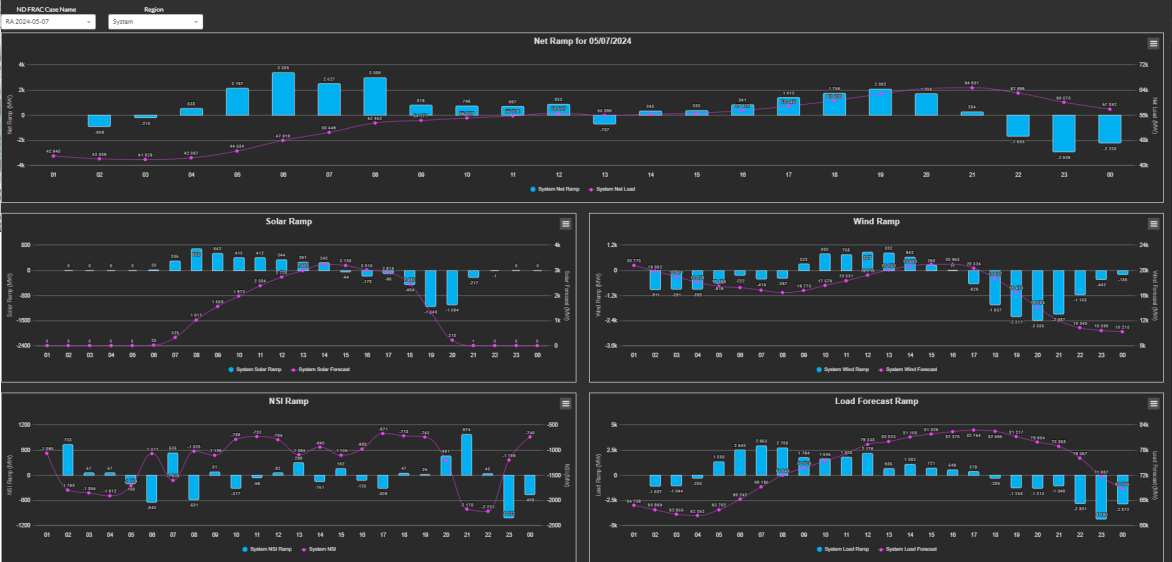
- Seasonal forecasts are hinting at above normal irradiance levels for MISO-North in July and August and near normal irradiance conditions in MISO-South over the same period
- If the drought conditions persists, wildfire smoke will be a forecast challenge for solar generating plants throughout all of MISO during the upcoming summer
- With forecasted hurricane season, impactful flood situations and depressed solar irradiance in MISO-South

Weather geographic overlay and daily net load ramp profile built for operations situational awareness

Cloud cover overlayed on solar fleet provides granular awareness of real-time solar fluctuations



Net load ramp profile provides forward awareness of solar ramp aggregated with load, wind and NSI



MISO continues to improve its market products, commitment and dispatch to manage solar variability and uncertainties


<p style="color: orange; text-align: center;">Solar Forecast Inputs</p>	<p>Hourly forecast up to 7-day ahead</p>	<p>Market Participant (MP) Offer</p>	<p>Hourly forecast Day-Ahead</p>	<p>Hourly and 5 min forecasts hours ahead</p>	<p>5min forecast by MISO or MP</p>
<p style="color: blue; text-align: center;">Commitment Dispatch Processes</p>	<p>Multi-Day Forward RAC</p>	<p>Day-Ahead Market</p>	<p>Next-Day Forward RAC</p>	<p>Intra-Day RAC and LAC</p>	<p>Real-Time Market and UDS AGC...</p>

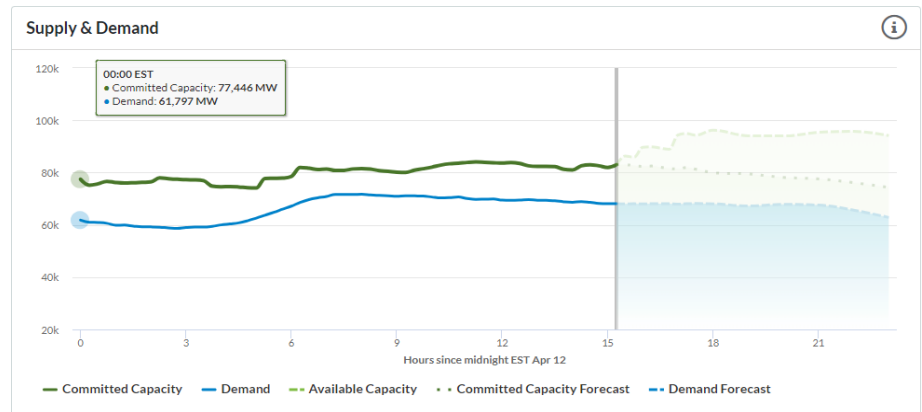
Market Products

- Next-Day Reserve: *Next Day Uncertainty (Dynamic)*
- Short Term Reserves: *30 minutes – 3 hour (Dynamic)*
- Ramp Capability: *10 – 30 minutes*
- Contingency Reserve: *Largest unit loss*
- Regulation: *4 second – 5 minutes*

MISO provides members visibility of system conditions for better coordination especially upon tight conditions

- Multi-Day Operating Reserve Margin (MOM) Forecast:
Provides forward view up to 7 days ahead
- Supply-Demand Chart:
Provides dynamic system conditions refreshed every 15 minutes

 Multiday Operating Margin Forecast Report <small>Publish Date: April 11, 2024 Market Date: April 11, 2024</small>							
	4/12/24 HE 09**	4/13/24 HE 20	4/14/24 HE 19	4/15/24 HE 18**	4/16/24 HE 17**	4/17/24 HE 18**	
RESOURCE COMMITTED	58,067	50,060	63,442	56,825	54,015	60,032	
Additional Emergency Headroom	2,462	2,579	1,491	1,419	1,439	1,454	
RESOURCE UNCOMMITTED	29,904	45,672	32,641	38,288	41,207	34,773	
Uncommitted >16 hr	2,704	15,227	11,478	11,558	13,396	12,140	
Uncommitted 12-16 hr	1,862	2,539	2,435	2,435	2,247	1,047	
Uncommitted 8-12 hr	2,534	2,291	1,358	1,640	2,190	1,610	
Uncommitted 4-8 hr	4,298	6,257	3,708	4,733	5,104	3,366	
Uncommitted < 4 hr	18,506	19,358	13,662	17,923	18,271	16,610	
Additional Emergency Headroom	1,212	1,487	577	632	614	583	
EMERGENCY RESOURCES							
Additional Emergency Headroom	0	0	0	0	0	0	
Renewable Forecast	20,734	17,923	6,803	26,249	26,963	19,294	
Wind Forecast	18,101	17,745	5,439	23,660	24,688	16,860	
Solar Forecast	2,633	178	1,365	2,589	2,276	2,434	
MISO resources available	108,705	113,655	102,886	121,362	122,185	114,098	
NSI (+ export, - import)	-1,454	-2,343	-2,344	-1,726	-1,726	-1,726	
Total Resources Available	110,159	115,998	105,230	123,088	123,911	115,824	
Projected Load	71,042	66,792	70,488	79,132	76,654	77,746	



Questions?



Keynote Speaker: Wildfire Preparedness

*Brett Edwards,
MISO Meteorologist
bedwards@misoenergy.org*

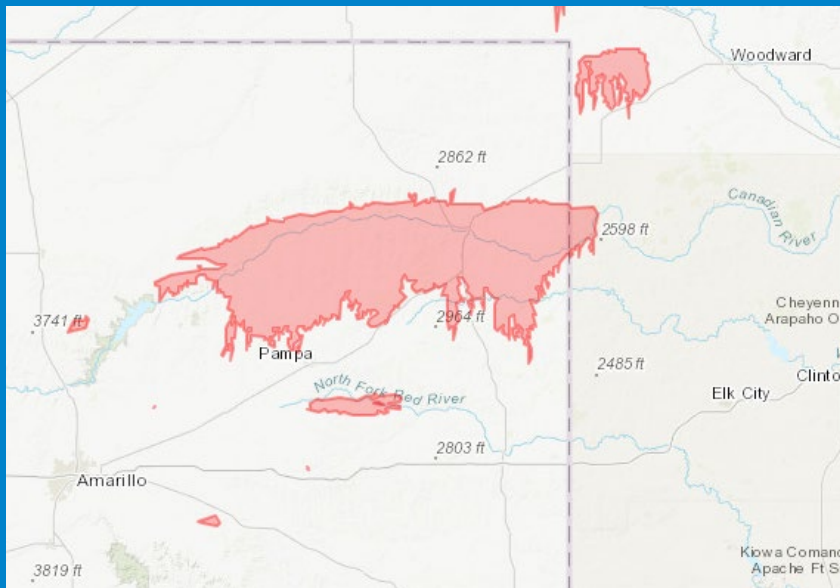
Executive Summary



- Recent significant wildfires raise questions about the risk to the MISO Footprint
- Conditions required for widespread wildfires like those seen in the west or last year in Canada are not pervasive in the MISO footprint, but evolving weather conditions increase risk
- Risk across the US is present and increasing, but utilities have plans to manage those risks

Recent significant wildfires are creating heightened awareness for wildfires across the industry

Smokehouse Creek Fire February 2024



Fire Status **CONTAINED**

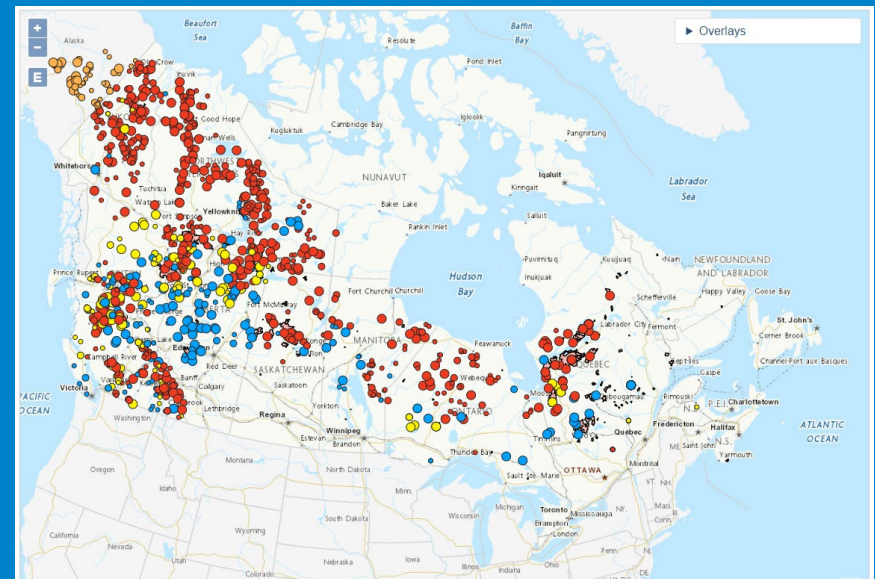
Size: 1,054,153 acres

Initial Location: 1.9 miles NNE of Stinnett, TX

Fuels: Short Grass (1 foot), Tall Grass (2.5 feet)

Dispatch Notes: Contain: 3/17/2024 02:35

Canada Wildfires August 2023



The 2023 wildfire season in Canada was the worst on record, with 6,551 fires scorching nearly 46 million acres.

The impact on the environment, particularly air quality, in both Canada and the United States was profound.

FIRES

vs.

WILDFIRES

Oxygen
/Air

Is oxygen present and able to fuel a fire?

Dry air and wind. RH (Relative Humidity) 20% or less. Sustained winds to allow rapid spread of wildfire (≥ 25 mph)

Fuel

Is there something for the fire to burn? (grass, trees, wood, etc.)

Plentiful vegetation, typically evergreen forests which are less fire resistant. Dead fuel moisture content under 15%.

Heat
(Ignition Source)

What can start the fire? A match, an electrical line sparking, dry lightning strikes, etc.

What can start the fire? A match, an electrical line sparking, dry lightning strikes, etc.

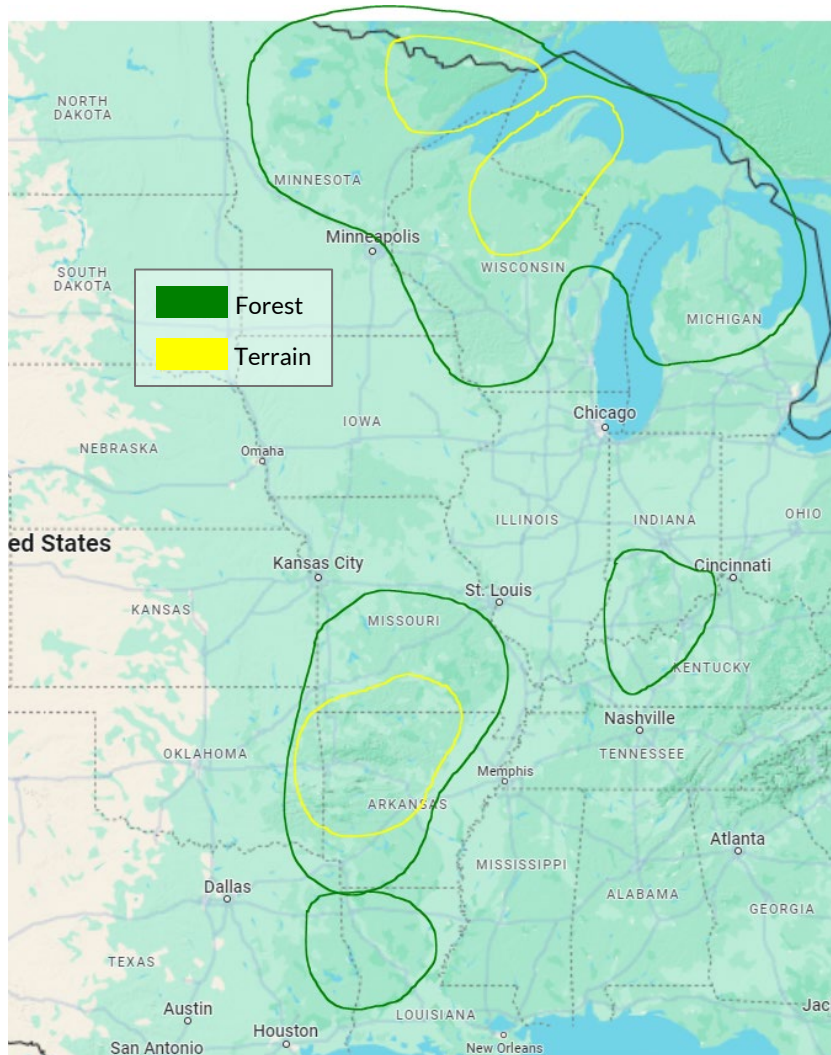
Terrain

Extreme terrain can allow for rapid spreading of wildfires due to slope valley winds. Fires spread more rapidly when traveling up hill.

Persistent Atmospheric Conditions

Persistent drought coupled with hot, dry conditions can exacerbate conditions and allow for any fires to grow and spread rapidly

In general, conditions in the MISO footprint are not generally conducive for large wildfires



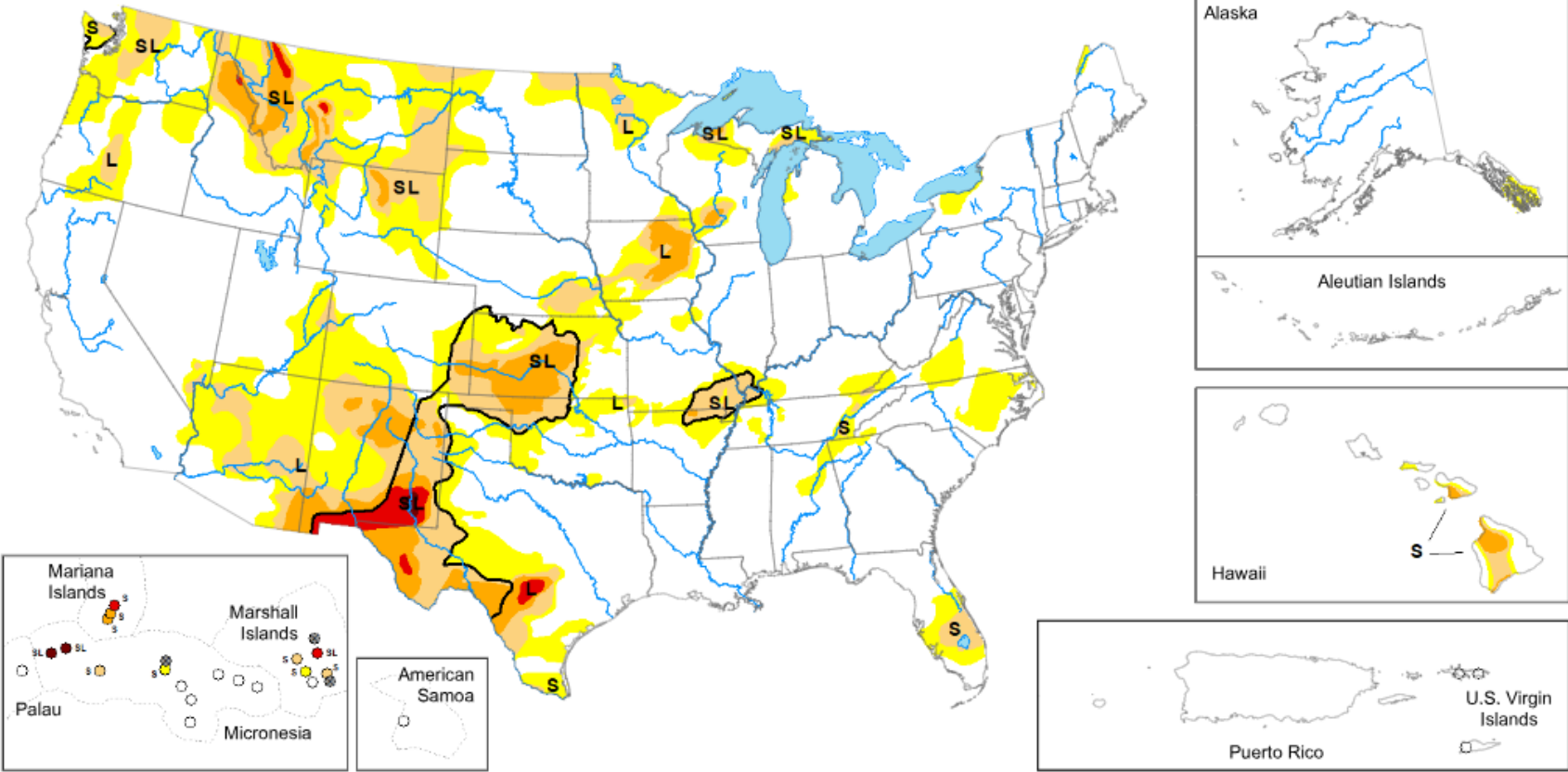
- **Fuel:** The amount of time where fuel moistures are at critical values is very low across our footprint.
- **Weather:** MISO does not have as pronounced of a wet/dry season like out west.
- **Terrain:** Lack of significant terrain prevents rapid fire spread across much of MISO
- **Agriculture:** Irrigation and the spread of agriculture artificially alters fuel moistures and can inhibit rapid fire spread

Drought is one of the many factors that can lead to increased wildfire risk

Map released: May 9, 2024

Data valid: May 7, 2024

View grayscale version of the map



National Weather Service fire-related warning criteria vary greatly by location and season

Red Flag Warning

The NWS issues a Red Flag Warning, in conjunction with land management agencies, to alert people to an ongoing or expected **critical fire weather** pattern.

Critical fire weather conditions are either **occurring now, or will shortly**. Be extremely careful with open flames.

Take action.

WILDFIRE SAFETY

Properly discard cigarettes.

Keep vehicles off of dry grass.

Avoid activities with open flames or sparks.

Avoid power equipment that creates sparks.

Obey burn bans.

Evacuate if fire/smoke is heading your way.

Evacuate if ordered to do so by local officials.

weather.gov/fire

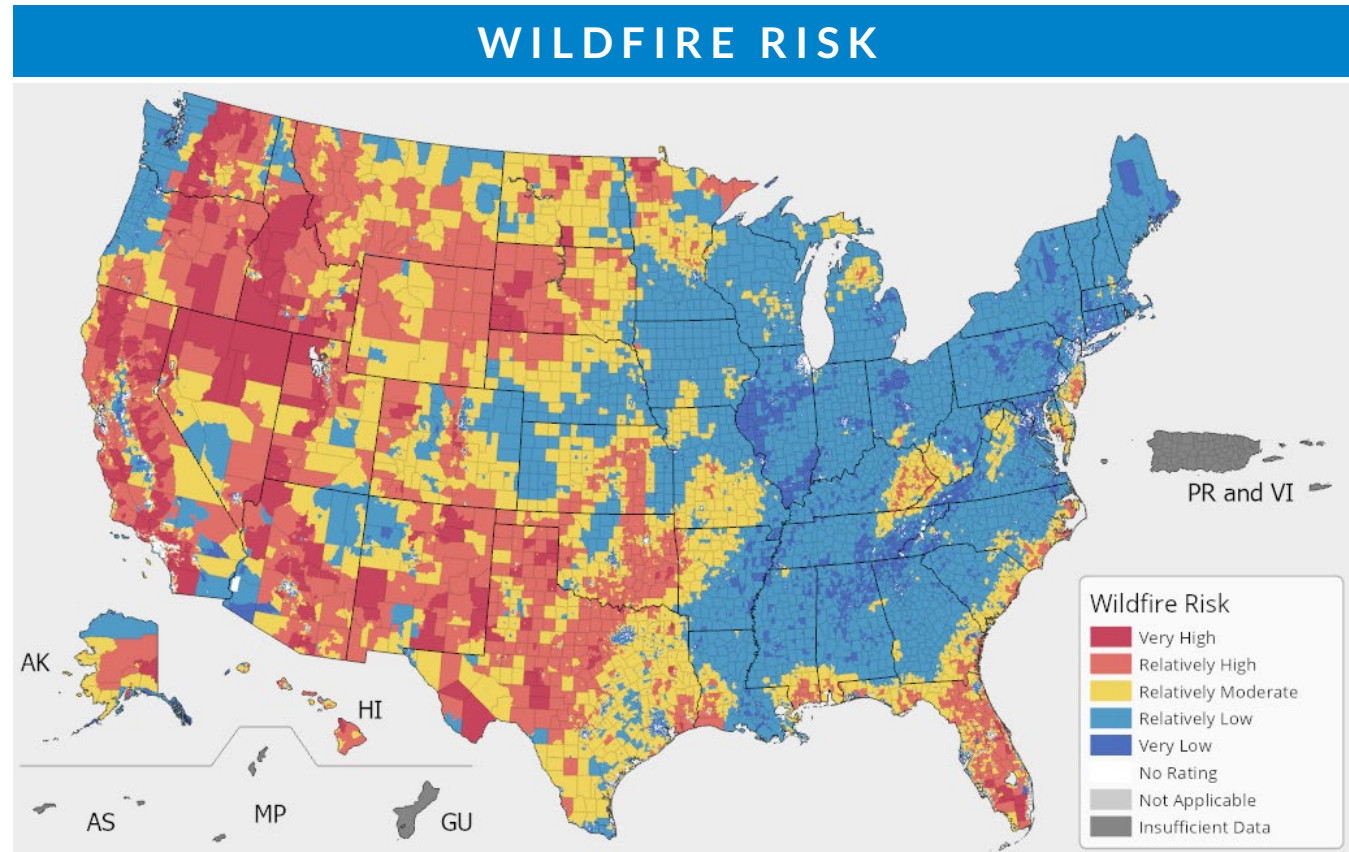


US national wildfire risk index shows risk lies mostly in the west, but does not completely exclude the MISO Footprint

How Neighboring Utilities Handle Fire Risk

Utilities out west utilize a function called Public Safety Power Shut-off (PSPS) where they de-energize lines to prevent the ignition of wildfires during high fire risk days

Some utilities east of the Rockies and in the High Plains are in the initial phases of standing up similar programs



Questions?

Thank you for joining us today!



MISO