SPP Southwest Power Pool

UPDATE OF 2021 WINTER WEATHER EVENT COMPREHENSIVE REVIEW

AUGUST 17, 2021

OKLAHOMA CORPORATION COMMISSION

Working together to responsibly and economically keep the lights on today and in the future.

SouthwestPowerPool southwest-power-pool SPPorg

RECAP OF FEB 2021 WINTER EVENT

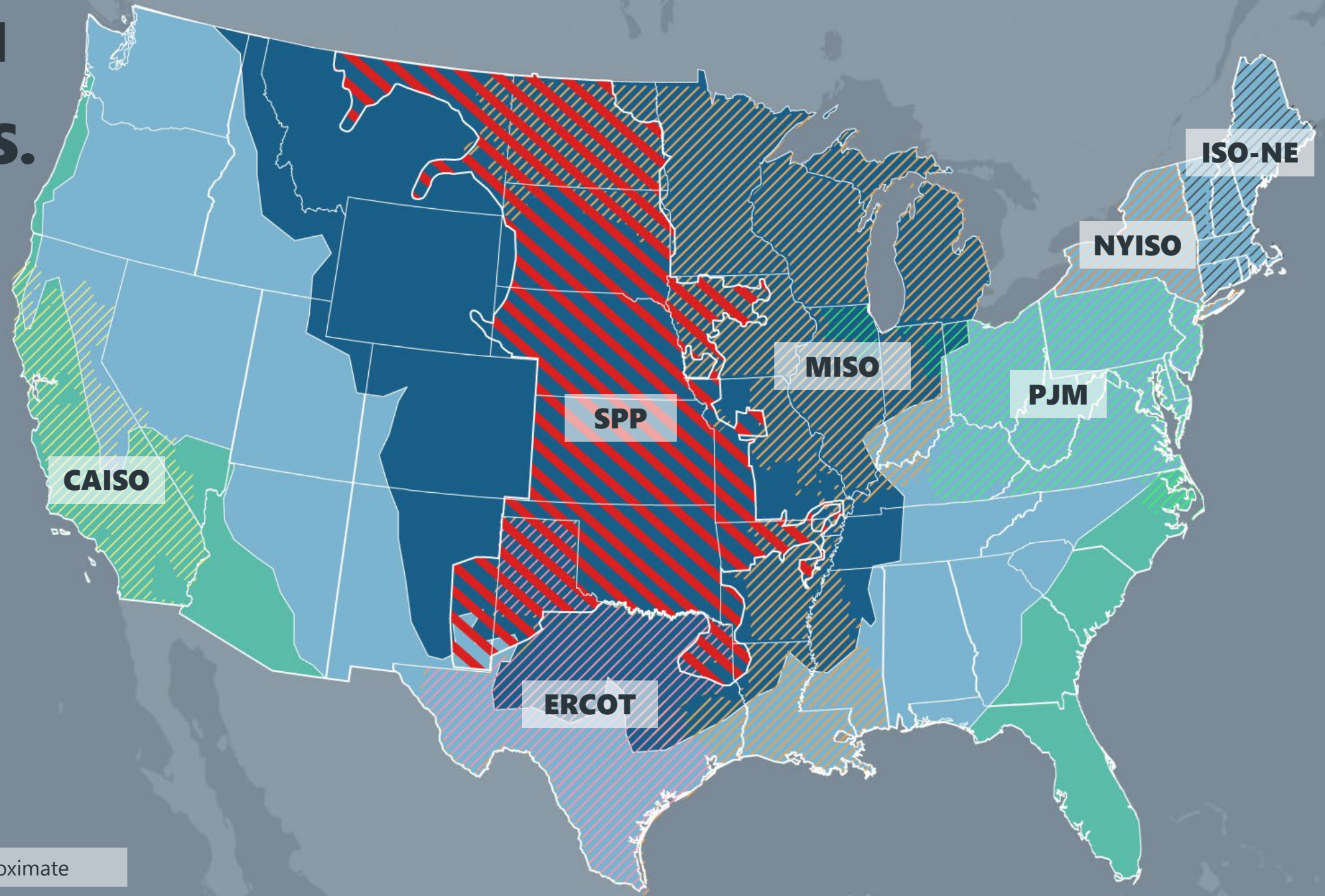
SPP REGION IN COLDEST PART OF U.S.

SPP Southwest Power Pool

Lowest temperatures forecast for Feb. 14-16, 2021

Sources: National Weather Service, Global Forecast System

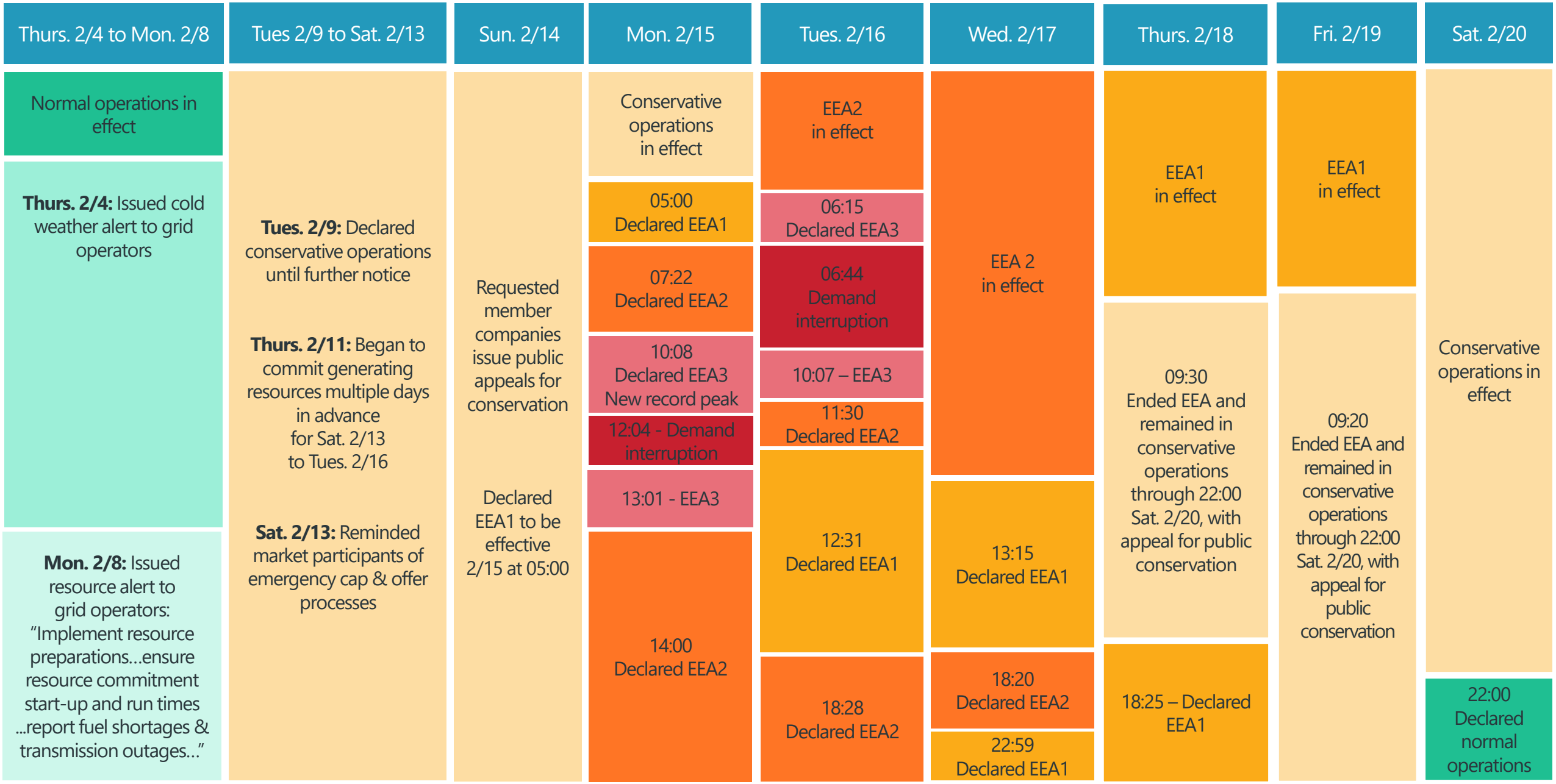
- SPP service territory/ balancing authority
- Temperatures below 0°F
- Between 0° and 32°F
- Above 32°F



* Locations of ISOs/RTOs are approximate

SPP BALANCING AUTHORITY OPERATIONS: FEB. 4-20, 2021

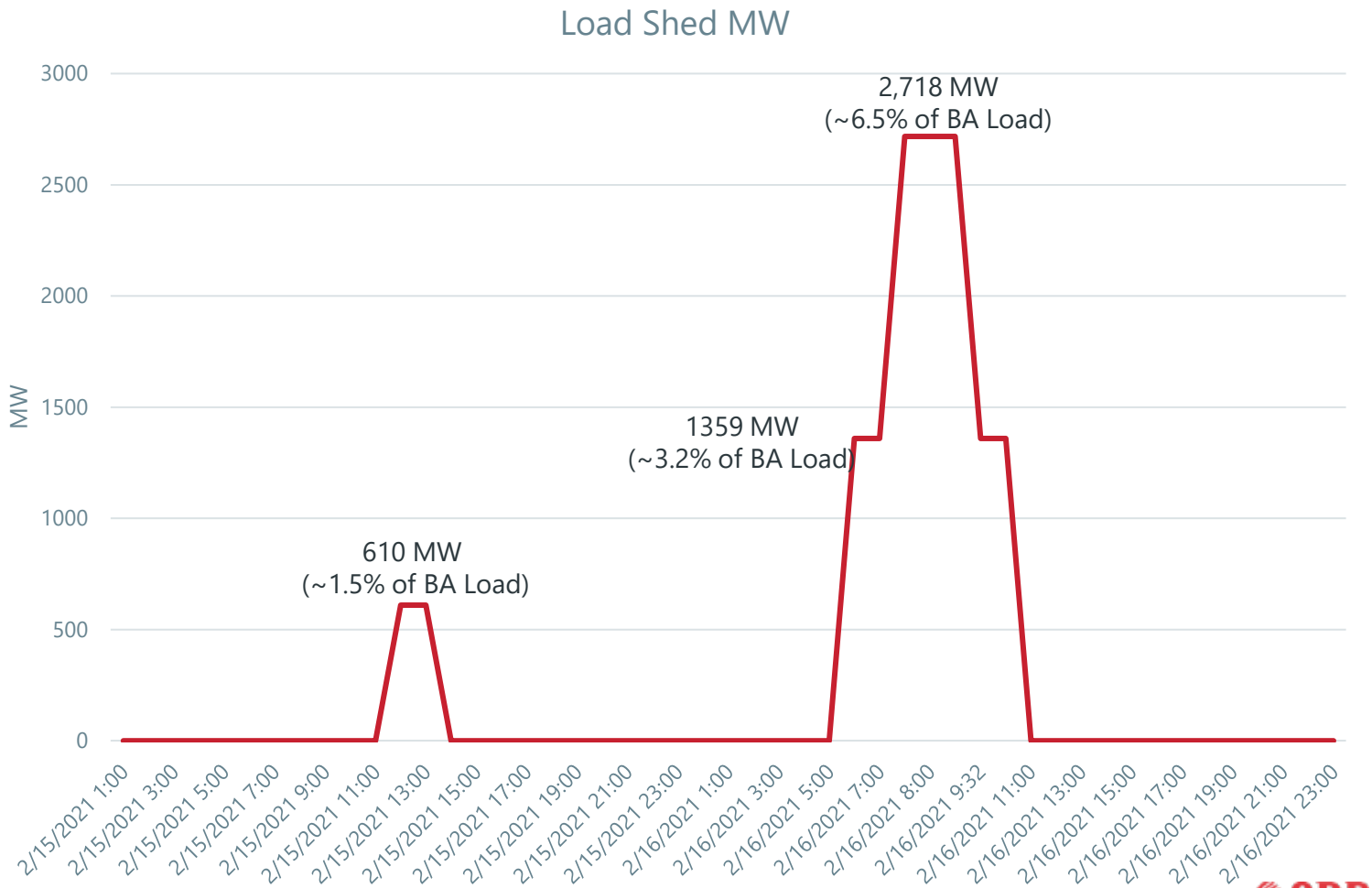
Time blocks are not to scale



INTERRUPTIONS BY ENTITY

Participating Entity	% of MW
CSWS	16.8
WAPA	13.5
SPS	12.4
OKGE	12.4
KCPL	9.68
WR	8.49
NPPD	6.57
OPPD	4.6
WFEC	3.78
GRDA	2.22
SECI	2.22
EDE	2.19
LES	1.36
SPRM	1.22
KACY_N	0.92
CBPC	0.83
INDN	0.38
SPA	0.28
TSGT	0.13
SPP Total	**100%**

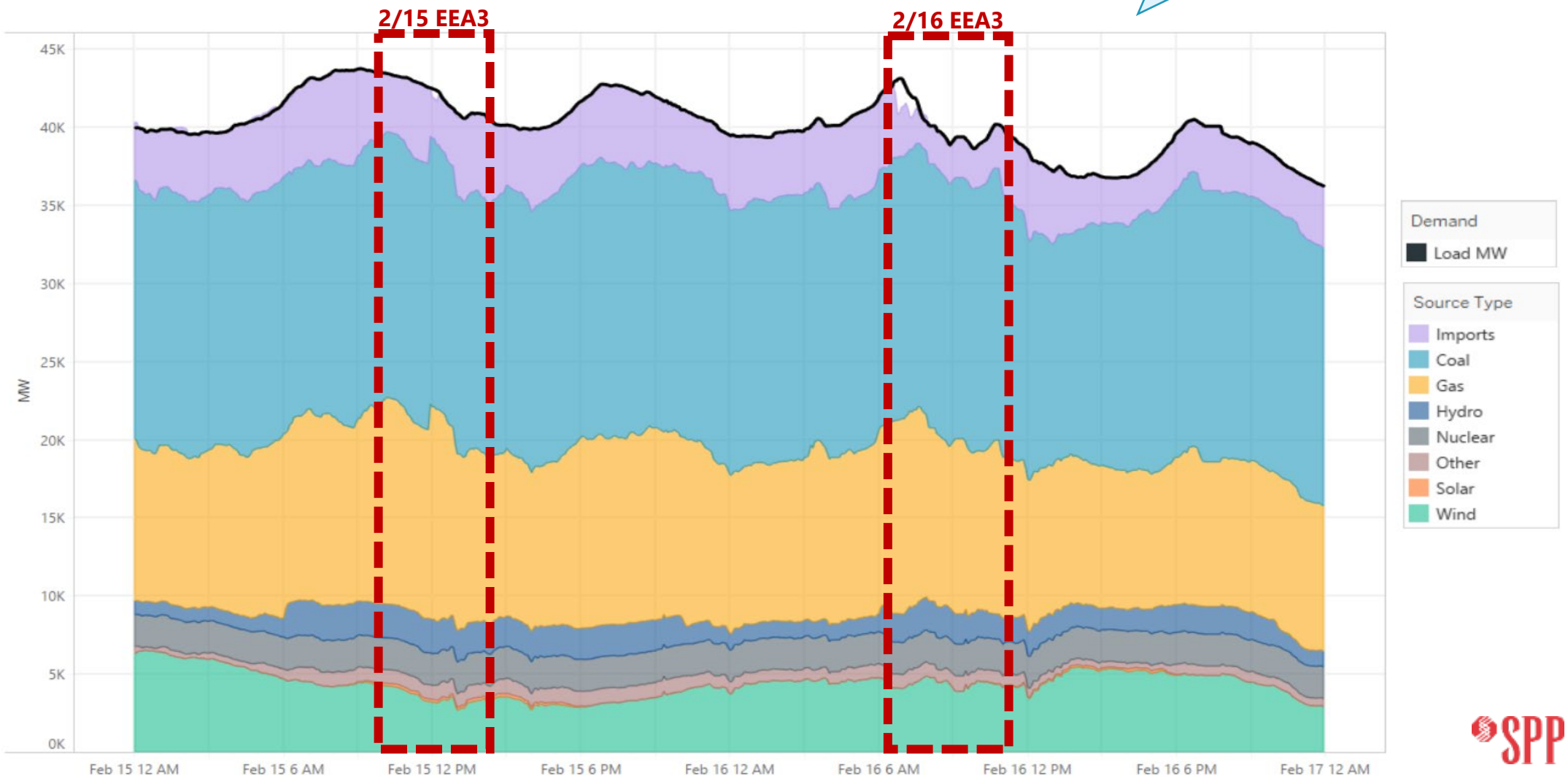
Required interruptions were allocated to transmission operators on pro-rata basis



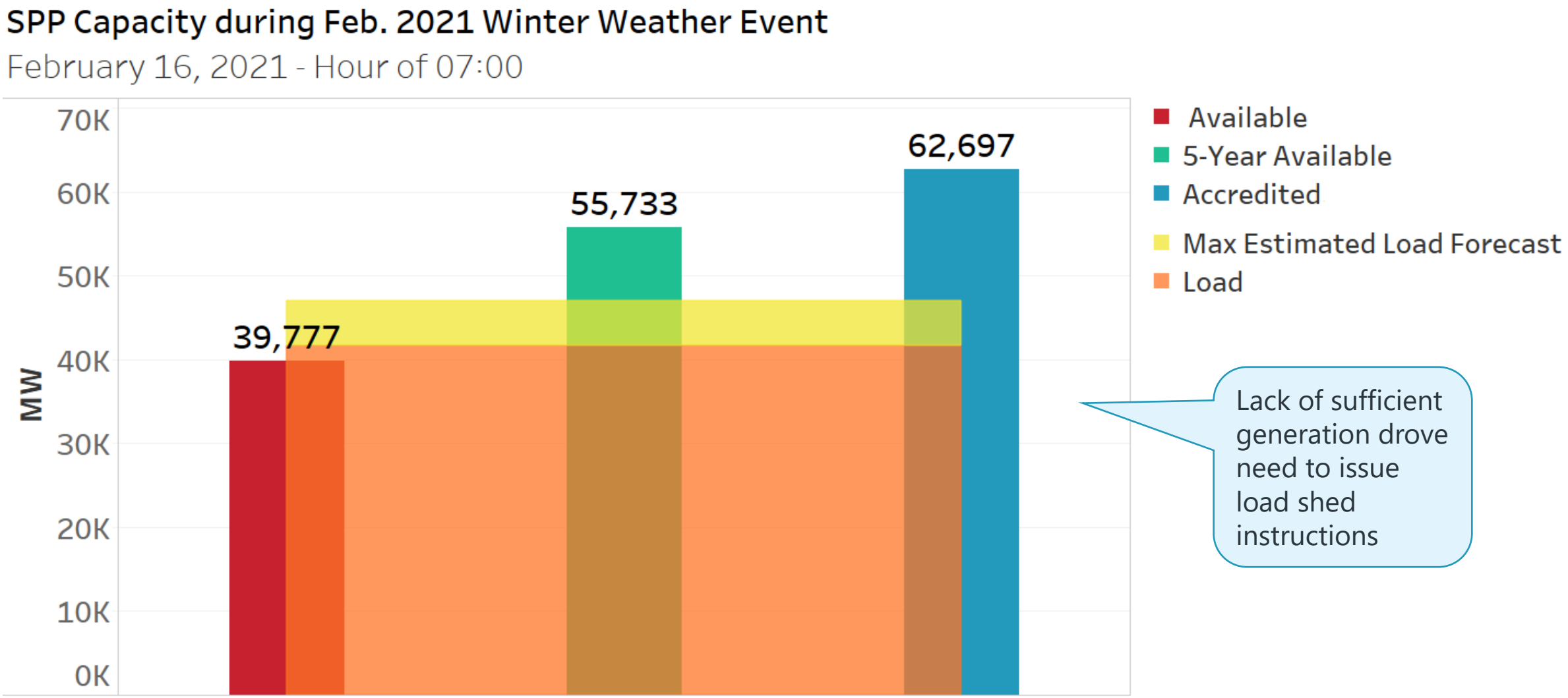
Notes: 1) Transmission operators with significant load in Oklahoma are highlighted. 2) CSWS includes PSO and SWEPCO. 3) Allocation percentages are predetermined based on pro-rata share of previous winter season's energy consumption

ENERGY THAT MET DEMAND IN REAL-TIME MARKET

SPP relied on energy from multiple sources, including imports from neighbors

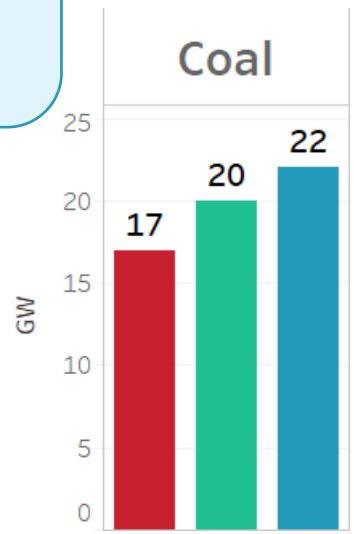


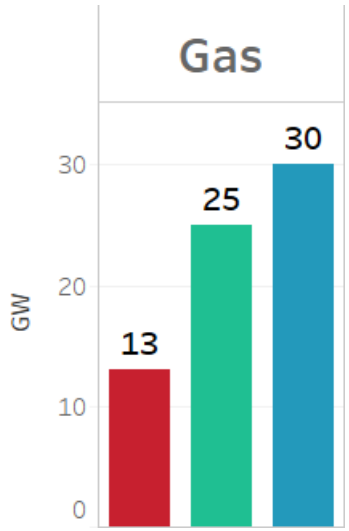
TOTAL CAPACITY BREAKDOWN VS. LOAD

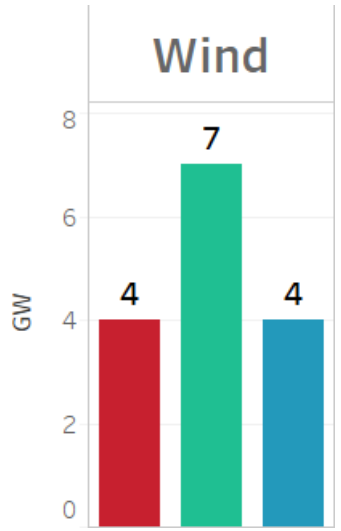


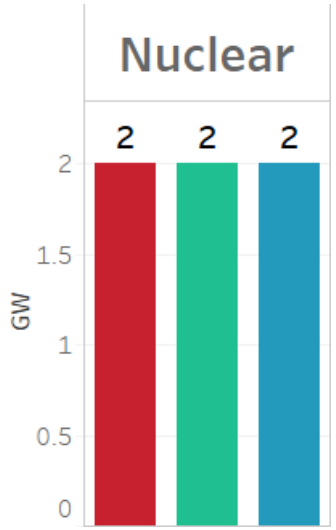
FUEL TYPE CAPACITY BREAKDOWN
02/16/2021 07:00

Largest single cause of generation unavailability attributed to fuel supply issues

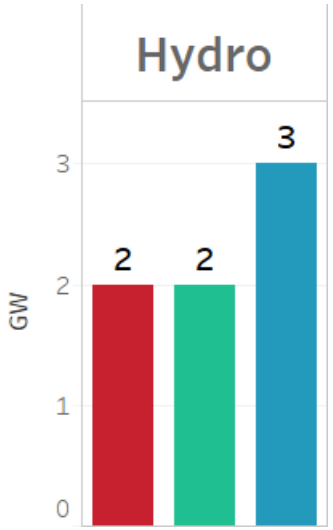


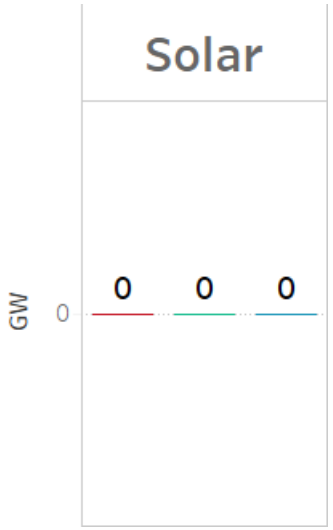


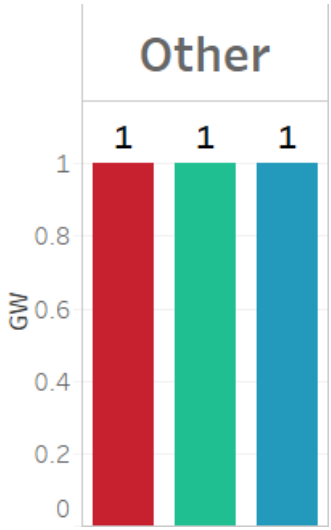


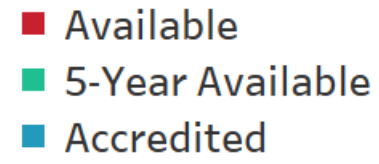


SPP's total nameplate capacity > 94,000 MW, while its winter accredited capacity > 62,000 MW









SPP Southwest Power Pool

COMPREHENSIVE REVIEW STEERING COMMITTEE

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Lanny Nickell, Chair
SPP Chief Operating Officer

Larry Altenbaumer
SPP Board Chair

Barbara Sugg
SPP President & CEO

Denise Buffington
Joe Lang
Operational Review Leads

Tom Dunn
Betsy Beck
Financial Review Leads

Kristie Fiegen
RSC Review Lead

Keith Collins
MMU Review Lead

Mike Ross
Communications Review Lead

KEY OBSERVATIONS

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1. UNAVAILABLE GENERATION AND FUEL

Lack of available generation was the primary cause of the event's reliability impacts. Lack of fuel was the biggest cause of generation unavailability.

2. HIGH GAS PRICES

Extremely high natural gas prices were the primary driver of record-high energy offers, exceeding SPP's market offer caps for the first time.

KEY OBSERVATIONS

3. INCREASED CREDIT EXPOSURE

Rapid spike in SPP's market prices raised concerns about market participants' liquidity & exponentially increased short-term credit exposure.

4. HELPFUL INTERCONNECTIONS

Relationships & interconnections with neighboring systems facilitated critical helpful assistance.

5. CONGESTED TRANSMISSION

Full use of generation in certain locations was limited by congestion on SPP's system.

KEY OBSERVATIONS

6. MINIMIZED RELIABILITY IMPACTS

Early preparation, timely decisions & effective communication helped minimize reliability impacts while effective execution of load-shed procedures mitigated the risk of uncontrolled blackouts.

7. CREDIBLE COMMUNICATIONS & RESPONSE

Stakeholders indicated general satisfaction with SPP's emergency communications, information sharing & credibility, while recognizing the need for improvements.

RECOMMENDATIONS OVERVIEW

PRIORITIZATION LEVELS

TIER 1	Necessary and urgent to avoid severe reliability, financial, operational, compliance or reputational risks. Address system-related root causes of the 2021 winter event or mitigate occurrence of future extreme system event impacts.
TIER 2	Necessary to minimize the risk of severe reliability, financial, operational, compliance or reputational consequences associated with extreme system events. Important and expected to significantly improve SPP's response to extreme system events in the future.
TIER 3	Improve SPP's response, communications and public perception during extreme system events, but are not necessary or urgent.

RECOMMENDATION TYPES

Action: Development and/or implementation of a new process, requirement, protocol or other activity.

Policy: Development of principles to be used to guide subsequent development of requirements, protocols, and/or processes using the stakeholder process in accordance with bylaws, tariff provisions and applicable regulations.

Assessment: Performance of analysis that informs development of solutions through the stakeholder process.

SUMMARY OF RECOMMENDATIONS

	Tier 1	Tier 2	Tier 3
Fuel Assurance (FA)			
Resource Planning & Availability (RPA)			
Emergency Response Process & Planning (ERP)			
Operator Tools, Communication and Processes (OTCP)			
Seams Agreements (SEAMS)			
Market Design (MKT)			
Transmission Planning (TXP)			
Credit (CR)			
Communications (COMM)			
22 TOTAL	4	13	5

RECOMMENDATIONS

FUEL ASSURANCE

#	TIER	TYPE	DRIVER	RECOMMENDATION
FA 1	TIER 1			Develop policies that enhance fuel assurance to improve generation availability & reliability in SPP region
FA 2	TIER 1			Evaluate and, as applicable, advocate for improvements in gas industry policies, including use of gas price cap mechanisms, needed to assure gas supply is readily & affordably available during extreme events
FA 3	TIER 2			Develop policies to improve gas-electric coordination that better inform & enable improved emergency response

RESOURCE PLANNING & AVAILABILITY

#	TIER	TYPE	DRIVER	RECOMMENDATION
RPA 1	TIER 1			Perform initial & ongoing assessments of minimum reliability attributes needed from SPP's resource mix
RPA 2	TIER 1			Improve or develop policies that ensure sufficient resources will be available during normal & extreme conditions. May include: • Required performance of seasonal resource adequacy assessments • Developing accreditation criteria • Incorporating minimum reliability attribute requirements • Utilizing market-based incentives

EMERGENCY RESPONSE PROCESS & PLANNING

#	TIER	TYPE	DRIVER	RECOMMENDATION
ERP 1	TIER 2			Evaluate alternative means of determining each transmission operator's allocation of load-shed obligations
ERP 2	TIER 2			Implement improvements to load-shed processes to be developed by ORWG such as: • Utilize real-time load values when determining load-shed ratio shares • Train & drill on multiple overlapping load-shed instructions • Perform a detailed review of models used to determine load-shed ratio shares • Develop & document procedures & processes to address the timing and responsibility of curtailing exports before & during a load-shed event
ERP 3	TIER 2			Develop a policy to ensure TOP emergency response & load-shed plans have been reviewed, updated & tested annually to verify their effectiveness, with attention to critical infrastructure

OPERATOR TOOLS, COMMUNICATION & PROCESSES

#	TIER	TYPE		RECOMMENDATION
OTCP 1	TIER 2		 	Develop or enhance ORWG-identified tools, communications & processes to improve SPP & stakeholder response to extreme conditions, such as: • Enhance real-time cascading analysis studies and post results • Develop tool(s) to increase operator awareness of "out of merit energy" instructions • Enhance and expand the use of R-Comm • Create a reliability dashboard to improve situational awareness for operators • Utilize member-maintained distribution lists for communications • Develop a process to update operations management during extreme conditions

SEAMS AGREEMENTS

#	TIER	TYPE	DRIVER	RECOMMENDATION
SEAMS 1	TIER 2		 	Improve seams agreement provisions with neighboring parties to facilitate adequate emergency assistance & fairly compensate emergency energy

MARKET DESIGN IMPROVEMENTS

#	TIER	TYPE	DRIVERS	RECOMMENDATION
MKT 1	TIER 2		  	Develop & improve policies to ensure price formation & incentives reflect system conditions
MKT 2	TIER 2			Develop & implement MWG-identified market design & market-related enhancements to improve operational effectiveness & ensure governing language provides needed flexibility and clarity, such as: • Improve Dispatch Target Adjustment Process • Enhance Multiday Reliability Assessment Process
MKT 3	TIER 2			Develop policies to ensure financial outcomes during emergency conditions are commensurate with benefits provided

CREDIT & SETTLEMENTS

#	TIER	TYPE	DRIVERS	RECOMMENDATION
CR 1	TIER 2			Assess need for a waiver of credit-related provisions in the tariff to avoid expected reduction of virtual activity in first quarter of 2022
CR 2	TIER 3			Evaluate effectiveness of SPP's credit policy during extreme system events — focusing on price/volume risk, determination of total potential exposure, participant/counterparty risk, etc. — and develop warranted policy changes.
CR 3	TIER 3			Clarify tariff language related to SPP's settlements & credit-related authorities and responsibilities

TRANSMISSION PLANNING IMPROVEMENTS

#	TIER	TYPE	DRIVERS	RECOMMENDATION
TXP 1	TIER 2			Develop policies that facilitate transmission expansion to improve SPP's ability to more effectively utilize transmission system during severe events
TXP 2	TIER 3			Develop transmission planning policies that improve input data, assumptions or analysis techniques needed to better account for severe events

COMMUNICATIONS RECOMMENDATIONS

#	TIER	TYPE	DRIVERS	RECOMMENDATION
COMM 1	TIER 2			Update SPP's Emergency Communications Plan annually and share as appropriate with stakeholders. The plan will include: • Processes that ensure stakeholders have a dependable way to receive timely, accurate & relevant information regarding emergencies • Plans to drill emergency communications procedures with all relevant stakeholders • Procedures for ensuring SPP's contact lists include appropriate members, regulators, customers & government entities and stay up-to-date
COMM 2	TIER 2			Evaluate & propose needed enhancements to communications tools & channels, including but not limited to enhancements to SPP's websites, development of a mobile app, automation of communications processes, etc.
COMM 3	TIER 3			Form a stakeholder group whose scope would include matters related to emergency communications
COMM 4	TIER 3			To increase public awareness of & satisfaction with SPP, develop materials to educate general audiences on foundational electric utility industry concepts & SPP's role in ensuring reliability

NEXT STEPS

Working together to responsibly and economically keep the lights on today and in the future.

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SPP'S BOARD TOOK THE FOLLOWING ACTIONS

1. Accepted SPP's report: "A Comprehensive Review of Southwest Power Pool's response to the February 2021 Winter Storm"
2. Directed work to begin on immediately on recommendations that address root causes (Tier 1)
3. Directed organizational prioritization of work needed to address remaining recommendations
4. Directed staff to provide quarterly updates on status of progress being made
5. Directed staff to submit for board approval in October a project plan of activities needed to resolve the Tier 1 recommendations
6. Directed issuance of letters to all generator operators in the SPP region requiring them to inform SPP about their plans to have and maintain fuel necessary to assure availability of all generation treated as accredited capacity for the upcoming winter season
7. Directed staff to perform additional root cause analyses to explain the failure of natural gas fuel supply during the weather event needed to better inform SPP's three fuel assurance recommendations