



SPP'S REVIEW OF WINTER STORM ELLIOTT

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STAKEHOLDER RELATIONS

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



SouthwestPowerPool



SPPorg



southwest-power-pool

PURPOSE

- Provide update on SPP's review of Winter Storm Elliott
 - Why this review?
 - Who and what was involved?
 - What did SPP review?
 - What did SPP learn?
 - What are the next steps?
 - What else should we consider?



BACKGROUND & REVIEW OBJECTIVES

WINTER STORM ELLIOTT REVIEW

ELLIOTT'S IMPACT ACROSS THE COUNTRY

From December 21 to 26, 2022, an extratropical cyclone, unofficially named Winter Storm Elliott, created extreme conditions including blizzards, high winds, snowfall or record cold temperatures across the U.S. and parts of Canada:

- Denver temperatures dropped 37 degrees in one hour.
- Alabama's Mobile Bay partially froze
- More than 5700 flights were cancelled
- 39 inches of snow fell on areas of New York
- 1.7 million East Coast customers lost power
- Tennessee Valley Authority and Duke Energy had "rolling blackouts"

SPP REGION SIGNIFICANTLY IMPACTED BY WINTER STORM ELLIOTT

- Surface temperature anomalies up to 25 degrees Celsius below average on Dec. 23
- Extreme wind chill values throughout event
- SPP in conservative operations from Dec. 23-25
- Two EEA1 alerts issued on Dec. 23





ELLIOTT: ANOTHER HISTORIC STORM FOR SPP

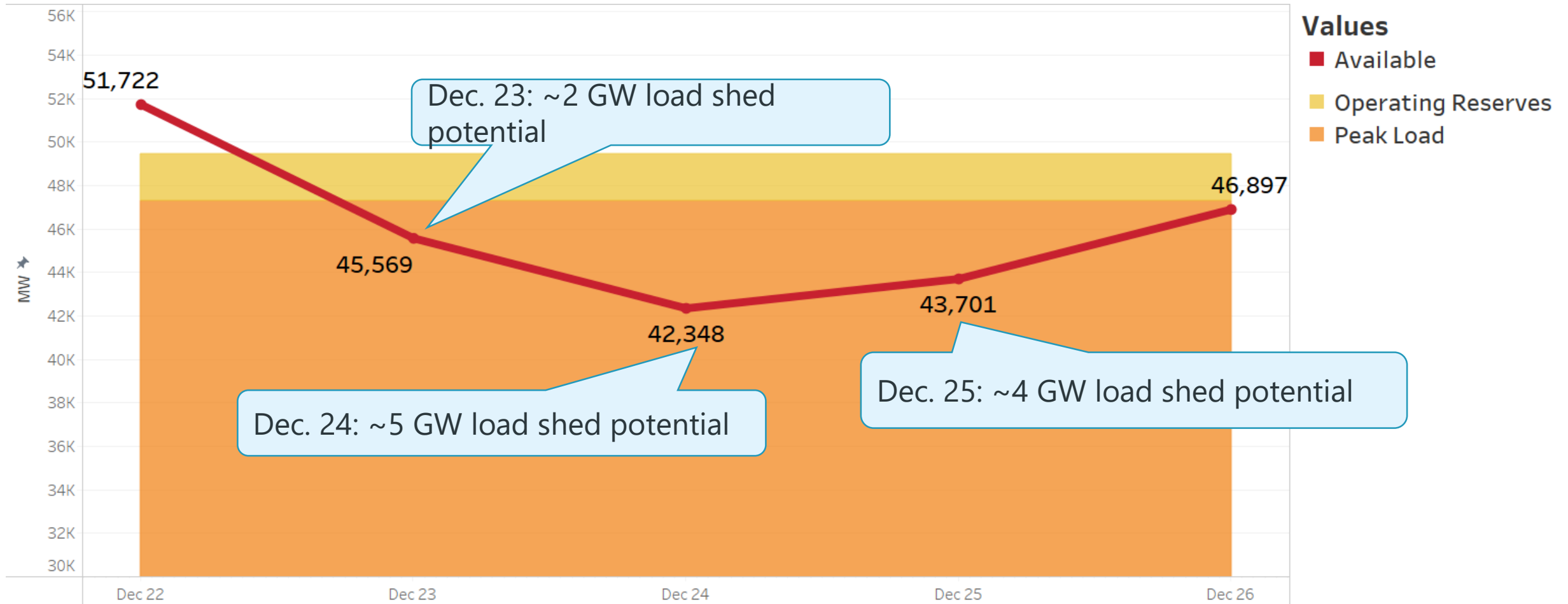
For SPP, Elliott was **not as severe** as winter storm Uri (Feb. 2021)

Fewer gas and wind outages in Elliott than Uri

Coal outages and derates were **worse** in Elliott

While there was no BA directed load shed in Elliott, there was BA load shed potential, and local load shed by an SPP TOP

PEAK OBLIGATION VS. DAILY ACCREDITED AVAILABLE CAPACITY DURING ELLIOTT

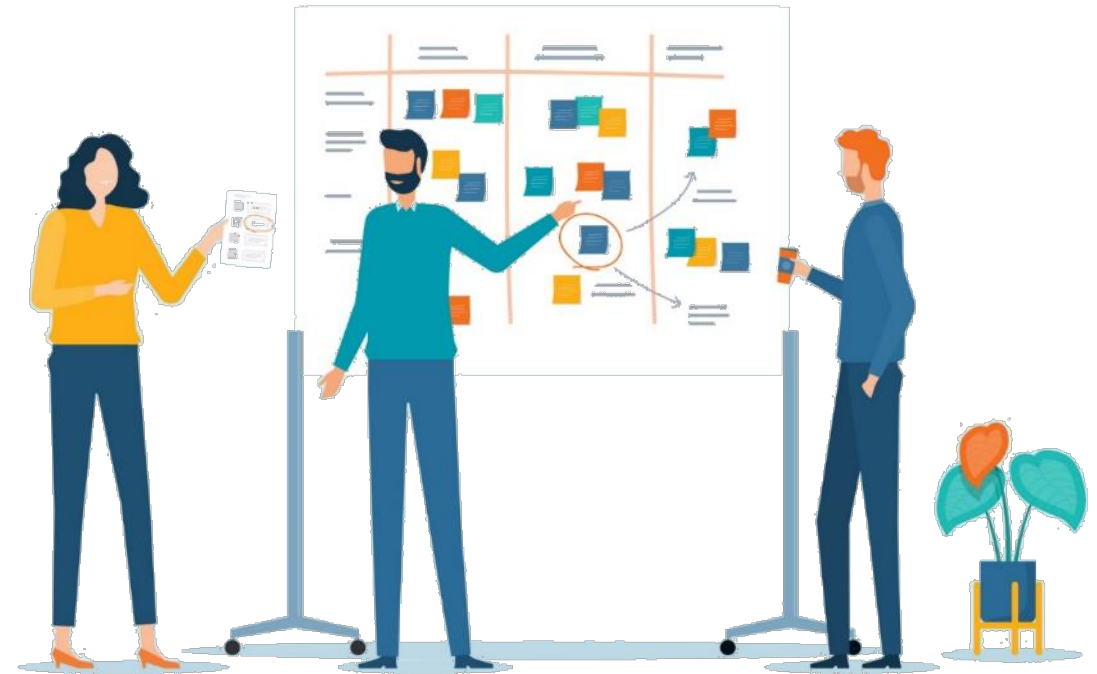


**This compares the maximum obligation during the time frame (Load + Operating Reserves) to the accredited availability on that day.

OBJECTIVES OF THE STORM REVIEW

What did we want to accomplish?

- Analyze SPP's performance during Winter Storm Elliott
- Survey stakeholders to assess performance and gather ideas
- Assess improvements since Uri
- Assess impact of transmission on key areas during Elliott
- Identify new opportunities for improvement



STORM REVIEW PROCESS

WINTER STORM ELLIOTT REVIEW

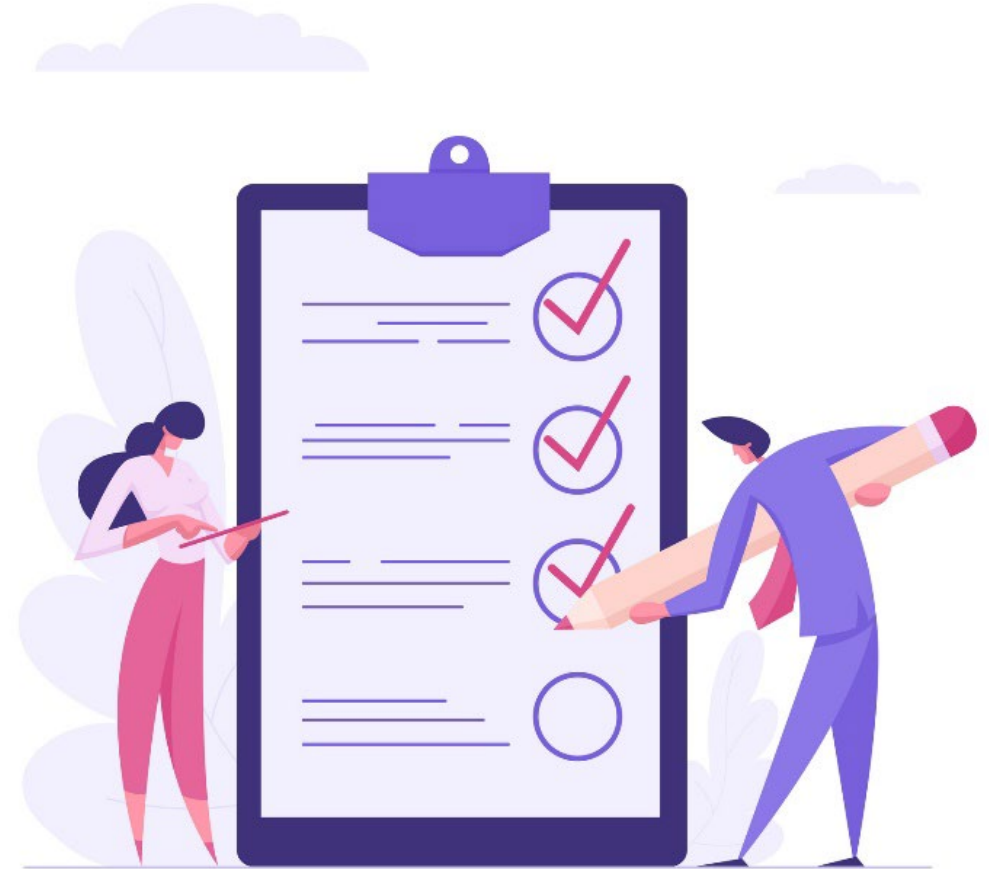
WINTER STORM ELLIOTT REVIEW RESOURCES

- 30 SPP staff members
- 4 team meetings: over 200 FTE hours
- 2 post-storm surveys with 99 stakeholder responses
- 13 analysis documents merged into draft final report
- Analysis of impact of two EHV lines on 435 buses with voltage issues during Elliott



WINTER STORM ELLIOTT: REVIEW ELEMENTS

- Timeline of events
- Operations during Elliott
- Markets during Elliott
- Challenges in real time
- Uri & Elliott comparison
- Improvements since Uri
- New opportunities for improvement



REPORT & RECOMMENDATIONS

WINTER STORM ELLIOTT REVIEW

RECOMMENDATIONS: LOOKING BACK AT URI

- Staff recommend **staying the course** on efforts to implement Uri recommendations.
- Uri recommendations were assessed to be **65% complete** with Tier 1 recs on course for completion by Q1 2024.
- Staff identified 11 new *internal* opportunities for process improvements to mitigate challenges during future extreme events.



#	TYPE	LEAD	RECOMMENDATION
1	Compliance	Members & Staff	For NERC extreme cold weather reliability standards: <ul style="list-style-type: none"> • Applicable entities must comply with the first set of NERC reliability standards effective April 1, 2023, and forthcoming additional reliability standards when approved. • SPP Reliability Coordinator will review, upon request, any revisions to TOP emergency operations plans for compliance.
2	Operations	Staff	Identify conditions for issuing transmission emergency alerts to more consistently inform entities of transmission congestion severity. Update operator guidelines where appropriate.
3	Operations	Staff	Improve situational awareness of neighboring entities' conditions during extreme winter events to maintain reliability across the combined footprint of all entities.
4	Operations	Staff	Use lessons learned from Elliott about causes of severe congestion to identify mitigation options for congestion management during extreme winter events to limit congestion severity
5	Operations	Staff	Use lessons learned from Elliott about the causes of low voltage situations to develop processes for forecasted extreme winter events that anticipate multiple contingencies to identify areas at risk for low voltage or extreme congestion.
6	Operations	Staff	Identify improvements, including automation, for forward-looking studies, to more efficiently apply uncertainty of forecasting for load, wind, outages, fuel supply, interchange and external impacts.
7	Markets	Staff & Members	Educate market participants about the importance of timely updates of offers based on gas price forecast and resource lead time during extreme cold weather.
8	Transmission Planning	Staff	Include extreme winter weather analysis in 2024 Integrated Transmission Planning (ITP) Assessment.
9	Transmission Planning	Staff	Analyze areas of SPP that experienced voltage and congestion issues to determine the impact of previously approved, but not yet in-service, transmission projects.
10	Communications	Staff	Build on Uri recommendations by launching an SPP app that incorporates push notifications.
11	Communications	Staff & Members	Educate stakeholder communications staff on emergency procedures at SPP's 2023 Communications Conference.

RECOMMENDATIONS: OPERATIONS

TYPE	LEAD	RECOMMENDATION
Operations	Staff	Identify conditions for issuing transmission emergency alerts to more consistently inform entities of transmission congestion severity. Update operator guidelines where appropriate.
Operations	Staff	Improve situational awareness of neighboring entities' conditions during extreme winter events to maintain reliability across the combined footprint of all entities.
Operations	Staff	Identify options to better mitigate and manage congestion during extreme winter events.
Operations	Staff	Improve or develop processes to identify areas at risk for low voltage or extreme congestion when extreme winter events are forecast.
Operations	Staff	Identify improvements for forward-looking studies to more efficiently apply uncertainty of forecasting for load, wind, outages, fuel supply, interchange and external impacts.

RECOMMENDATIONS: MARKETS & TRANSMISSION PLANNING

TYPE	LEAD	RECOMMENDATION
Markets	Staff & Members	Educate market participants about the importance of timely updates of offers based on gas price forecast and resource lead time during extreme cold weather.
Transmission Planning	Staff	Include extreme winter weather analysis in the Integrated Transmission Planning (ITP) Assessment.
Transmission Planning	Staff	Analyze areas of SPP that experienced voltage and congestion issues to determine the impact of previously approved, but not yet in-service, transmission projects.

RECOMMENDATIONS: COMPLIANCE AND COMMUNICATIONS

TYPE	LEAD	RECOMMENDATION
Compliance	Members & Staff	The SPP Reliability Coordinator and member Transmission Operators (TOP) should collaborate to review any revisions to TOP emergency operations plans for compliance with new NERC extreme cold weather winterization standards.
Communications	Staff	Launch an SPP app that incorporates push notifications.
Communications	Staff & Members	Educate stakeholder communications staff on emergency procedures at SPP's 2023 Communications Conference.