



FEBRUARY 2021 WINTER STORM EVENT


MIKE ROSS
SENIOR VICE PRESIDENT

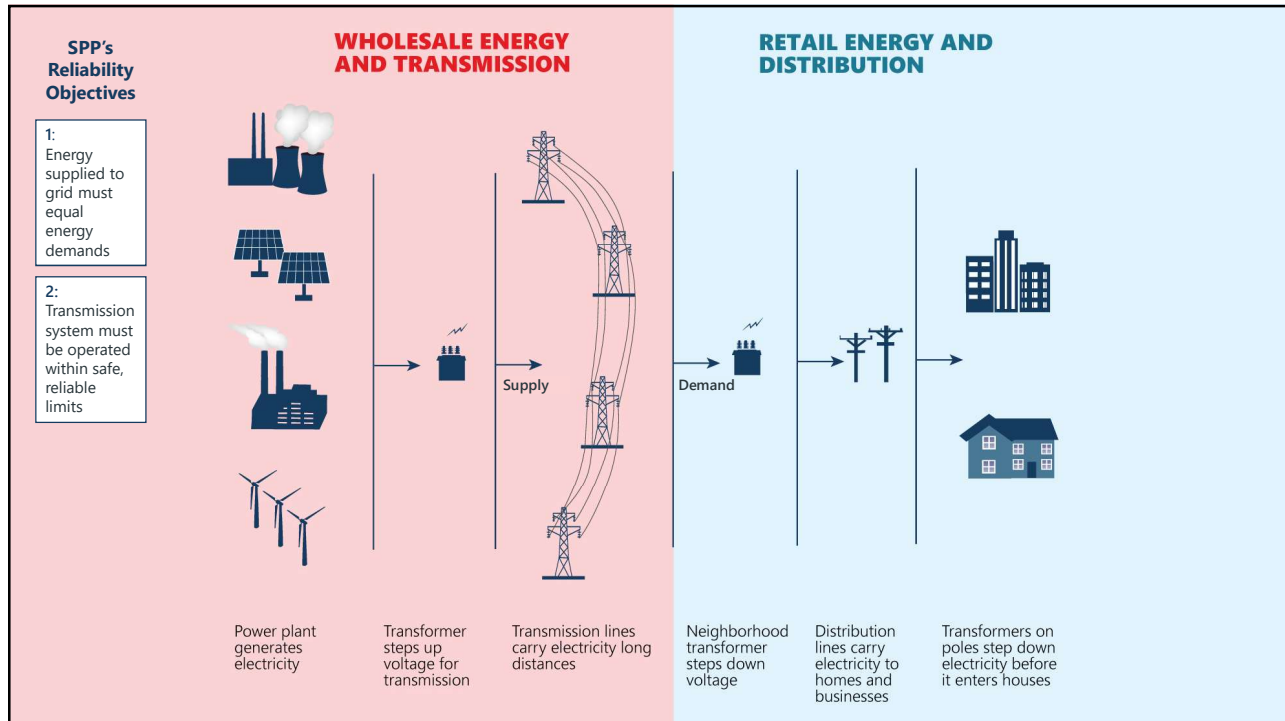
*Helping our members work together to keep
the lights on... today and in the future.*

 SouthwestPowerPool
  southwest-power-pool
  SPPorg

WHO IS SPP?

- 501(c)(6) nonprofit corporation
- One of 9 regional grid operators
- 104 member companies in 14 states
- "Air traffic control" for high-voltage grid
- Balances supply and demand across region
- Maintains reliable grid operations
- Operates wholesale energy market
- Plans future transmission needs





FERC AND NERC JURISDICTIONAL

NERC

NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION



SPP and utilities must comply with mandatory, enforceable NERC standards

Government enacted reliability standards after 2003 blackout

NERC regularly audits SPP

NERC directs how much energy SPP must keep for emergencies

FERC approves NERC standards

SPP must comply with FERC directives

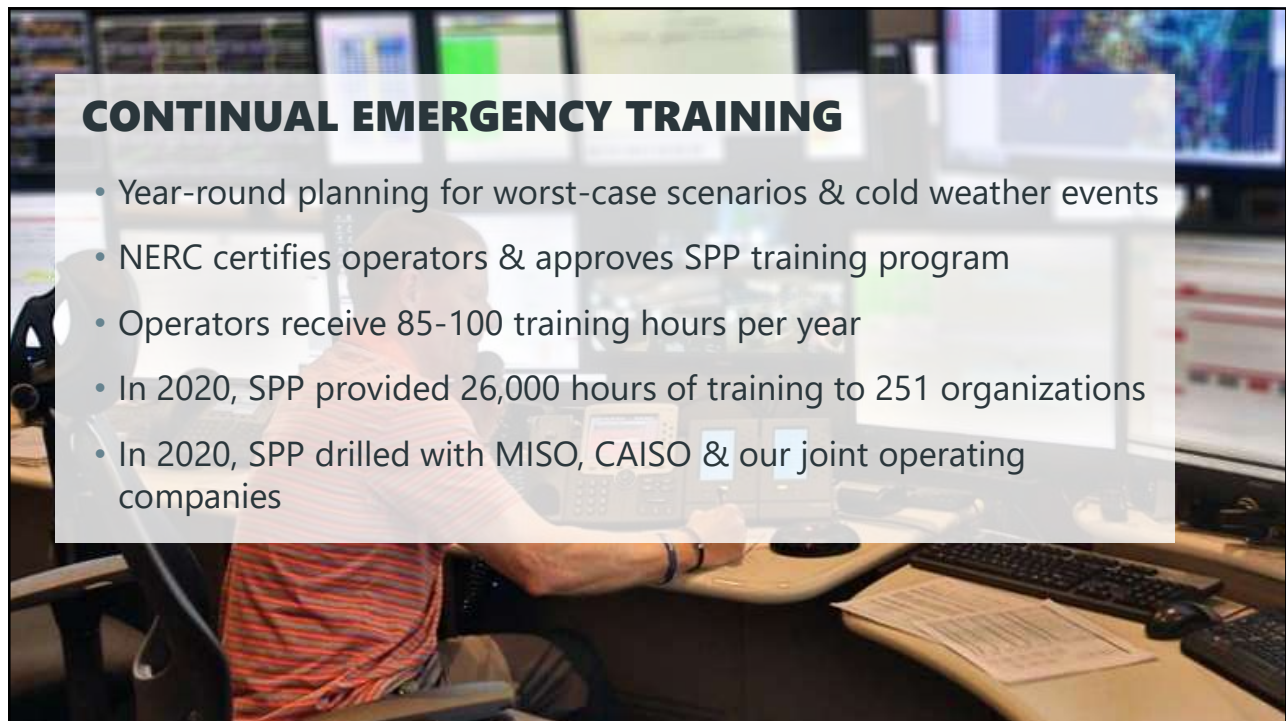


RELIABILITY COORDINATION

"AIR TRAFFIC CONTROLLERS" OF POWER GRID

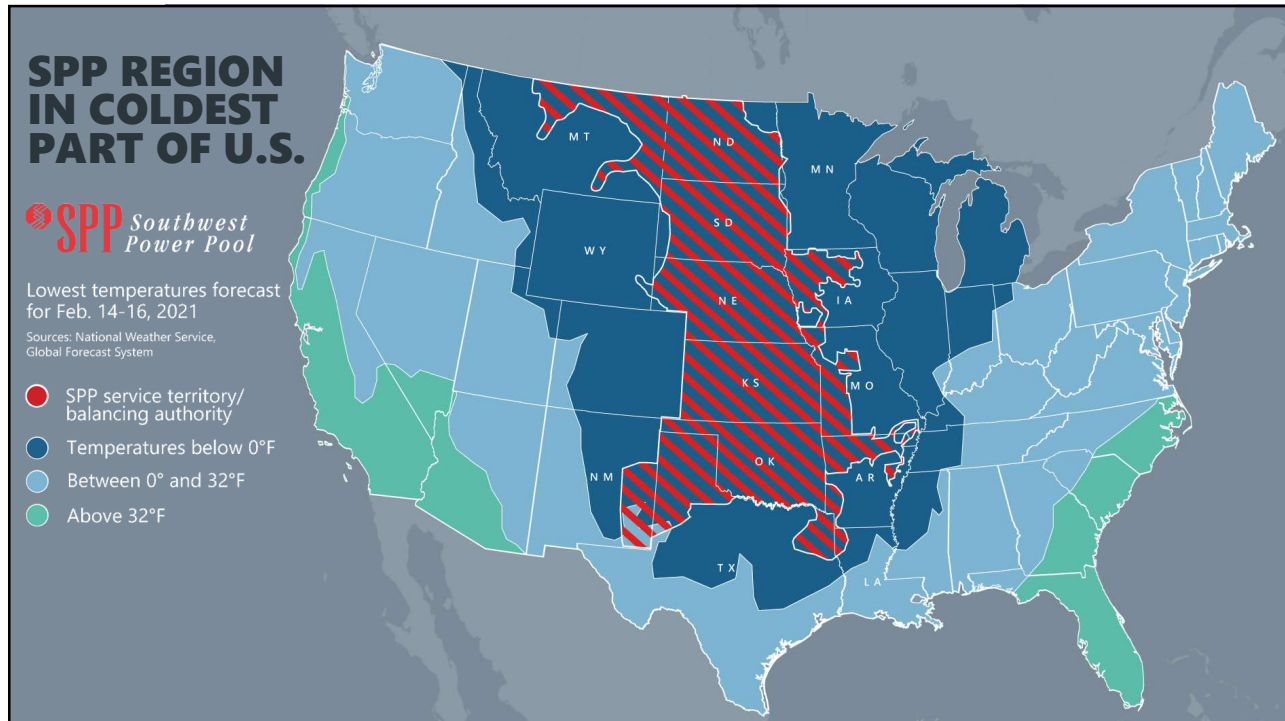
- Monitor grid 24 x 365
- Anticipate problems
- Take preemptive action
- Coordinate regional response
- Independent

Comply with more than 5,500 pages of reliability standards and criteria




CONTINUAL EMERGENCY TRAINING

- Year-round planning for worst-case scenarios & cold weather events
- NERC certifies operators & approves SPP training program
- Operators receive 85-100 training hours per year
- In 2020, SPP provided 26,000 hours of training to 251 organizations
- In 2020, SPP drilled with MISO, CAISO & our joint operating companies



THE BIG PICTURE




Early prep helped

2/4: Issued cold weather alert


2/8: Issued resource alert

2/11: Committed long-lead generation




Public appeals reduced demand

Demand dropped below forecast, helping prevent interruptions



We used every MW we could get


We ran every available generator and imported energy from neighbors



Outages protected the grid

2/15
1.5% of system load
50 min.

2/16
6.5% of system load
3 hr. 21 min.



Collaboration reduced impact

Controlled, temporary interruptions prevented uncontrolled blackouts

BALANCING AUTHORITY (BA) OPERATING LEVELS

Levels/alerts defined by SPP operating plans

Normal Operations	SPP has enough generation to meet demand, has available reserves and does not foresee extreme or abnormal reliability threats
Weather alert	SPP expects extreme weather in its reliability coordination service territory
Resource alert	SPP's BA area expects severe weather conditions, significant outages, wind-forecast uncertainty and/or load-forecast uncertainty with potential to impact total capacity.
Conservative Operations	SPP determines the need to operate system conservatively to avoid an emergency based on weather, environmental, operational, terrorist, cyber or other events
Maximum emergency generation notification	SPP foresees the need to use emergency ranges of resources for a certain hours.

Levels defined* by NERC EOP-011-1

Energy Emergency Alert (EEA) Level 1	All available generation resources in use <ul style="list-style-type: none"> All generation is committed, and there is concern about maintaining required reserves for BA Non-firm wholesale energy sales curtailed.
EEA Level 2	Load management procedures in effect <ul style="list-style-type: none"> BA is no longer able to provide its expected energy requirements and is energy deficient Operating plan implemented, including public appeals and demand response BA is still able to maintain minimum reserves Market participants and other BAs notified Transmission limitations evaluated and revised BA makes use of all available resources
EEA Level 3	Firm load interruption imminent or in progress <ul style="list-style-type: none"> BA is unable to meet minimum contingency reserve requirements System & reliability limits reevaluated and revised Immediate action taken to mitigate undue risk to the Interconnection, including load shedding.

* These are paraphrased, summarized definitions. Full definitions: <https://www.nerc.com/pa/Stand/Reliability%20Standards/EOP-011-1.pdf>



9

SPP BALANCING AUTHORITY OPERATIONS FEB. 4-20, 2021

Early Warnings	Proactive Steps	Active Emergency	Past the Peak	Return to Normal
Feb. 4 – Issued cold weather alert	Feb. 11 – Commits long-lead generation to maximize availability	Feb. 15 – All available resources in use, with multiple unplanned outages. Record 43.6 GW winter peak.	Feb. 16-17 – Imports, maximum generation, and conservation efforts ease strain on system	Feb. 18 – Operated under conservative operations or EEA 1 for entire day
Feb. 8 – Issued resource alert	Feb. 14 – Requested public appeals for conservation by member utilities	Feb. 15 – Directed interruption of 1.5% of regional demand for 50 minutes.	Feb. 17 – Made it through 38.6 GW morning peak without interruption	Feb. 19 – Exited EEA & remained in conservative operations
Feb. 9 – Declared conservative operations	Feb. 14 – Announced EEA1 to begin 05:00 Feb. 15 with all available resources committed	Feb. 16 – Directed interruption of up to 6.5% of regional demand for 3h 21m	Feb. 17 – Returned to lowest level of emergency alert for overnight operations	Feb. 20 – Ended conservative operations and returned to normal operations at 22:00



10

SPP BALANCING AUTHORITY OPERATIONS: FEB. 4-20, 2021									
<i>Time blocks are not to scale</i>									
Thurs. 2/4 to Mon. 2/8	Tues. 2/9 to Sat. 2/13	Sun. 2/14	Mon. 2/15	Tues. 2/16	Wed. 2/17	Thurs. 2/18	Fri. 2/19	Sat. 2/20	
Normal operations in effect	<p>Tues. 2/9: Declared conservative operations until further notice</p> <p>Thurs. 2/11: Committed longer-lead time generating resources for Sat. 2/13 to Tues. 2/16</p> <p>Sat. 2/13: Reminded market participants of emergency cap & offer processes</p>	Requested member companies issue public appeals for conservation	Conservative operations in effect	EEA2 in effect	EEA 2 in effect	EEA1 in effect	EEA1 in effect	Conservative operations in effect	
<p>Thurs. 2/4: Issued cold weather alert to grid operators</p>			05:00 Declared EEA1	06:15 Declared EEA3		06:46 Directed interruptions	09:30 Ended EEA and declared conservative operations through 22:00 Sat. 2/20, with appeal for public conservation		09:20 Ended EEA and declared conservative operations through 22:00 Sat. 2/20, with appeal for public conservation
			07:22 Declared EEA2	10:07 - EEA3 Restored service		11:30 Declared EEA2	13:15 Declared EEA1		
<p>Mon. 2/8: Issued resource alert to grid operators: "Implement resource preparations...ensure resource commitment start-up and run times ...report fuel shortages & transmission outages..."</p>	10:08 Declared EEA3 New record peak	12:10 Directed interruptions	13:00 - EEA3 Restored service	12:31 Declared EEA1	18:20 Declared EEA2	18:25 - Declared EEA1			
	14:00 Declared EEA2			18:28 Declared EEA2	22:59 Declared EEA1		22:00 Declared normal operations		