

Energy Infrastructure Impacts from Winter Storm Uri—Feb 2021

Causes, Cost, Response

House Energy, Utilities and Telecommunications Committee—1/11/22

Senate Utilities Committee—1/11/22

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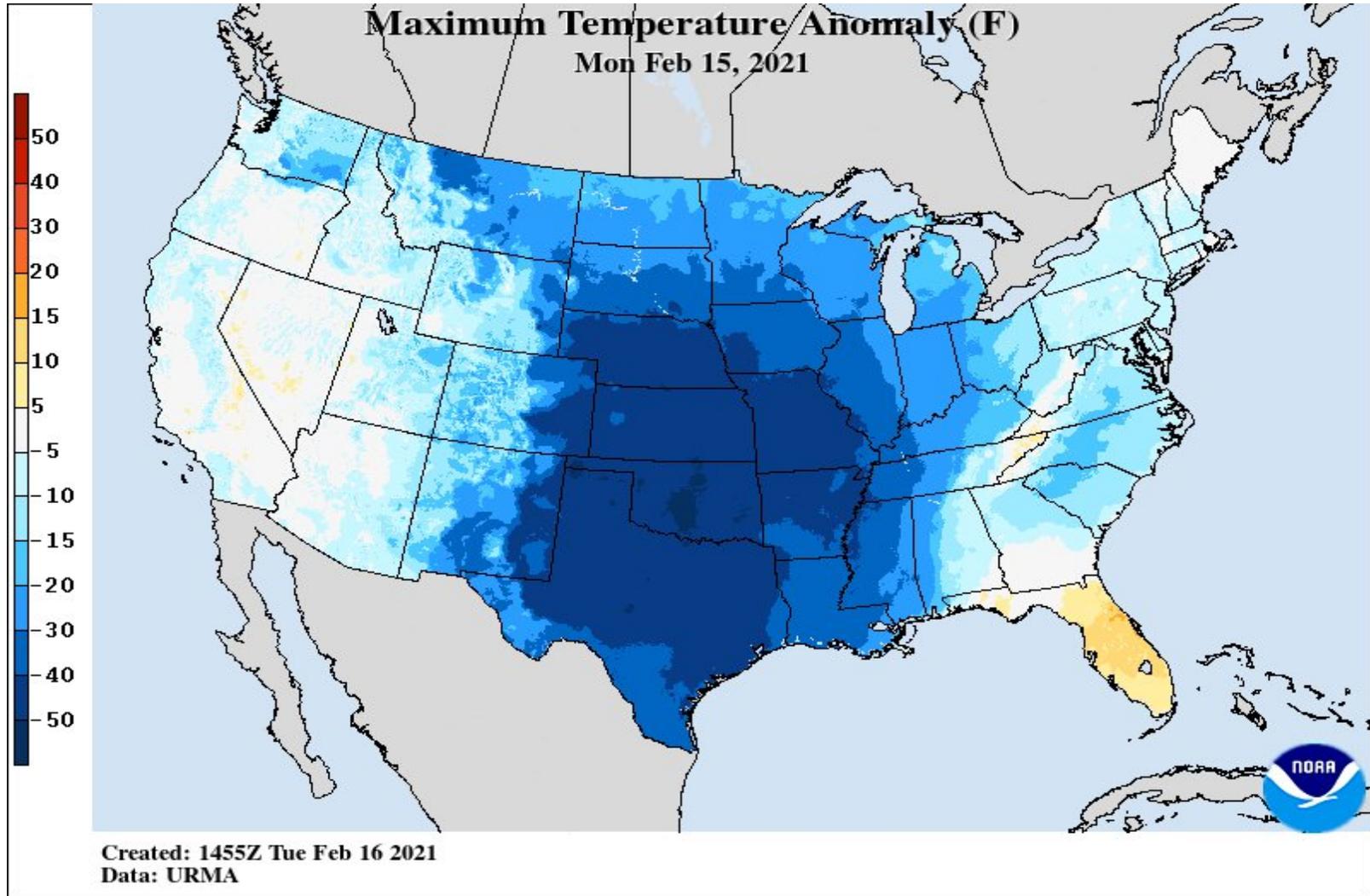
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Focus of My Presentation Today:

1. **Recap of Winter Storm Uri**—Severity and Historic Nature of the Weather Event
2. **Impacts of Winter Storm Uri**—Supply and Demand for Electricity and Natural Gas
3. **Result**—Very High Wholesale Prices for Both Electricity and Natural Gas. Then, Curtailments of Both.
4. **Review of Causes of Natural Gas and Electricity Shortages**
5. **Status of KCC Proceedings**
6. **Lessons Learned in Response to the Event**

Recap of Winter Storm Uri



Recap of Winter Storm Uri

- Historic Winter Weather Event
 - Below Freezing for 13 straight days in Kansas City. Most of this time in single digits.
 - Oklahoma City and Dallas set second coldest ever temperature records -14F OKC, -2F Dallas. Vs. -17F OKC and -8F Dallas in Feb. 1899.
 - Oklahoma City set record for longest consecutive period below 20F, 6 days, with Wichita's 10 days below 20F second only to the 11 such days in 1899.
 - “At least 3088 daily low temperature records (record low minimum or maximum) were tied or broken from February 12 to 17 at stations in the CONUS with at least 75 year long periods of record.”
 - “A total of 76 all-time cold temperature records (again low minimum or maximum) were tied or broken at stations with at least 75 year long periods of record on February 15 or 16 from Nebraska to Texas.”
 - “This cold outbreak is thought to be the most extreme for the southern Great Plains since February 12, 1899.”

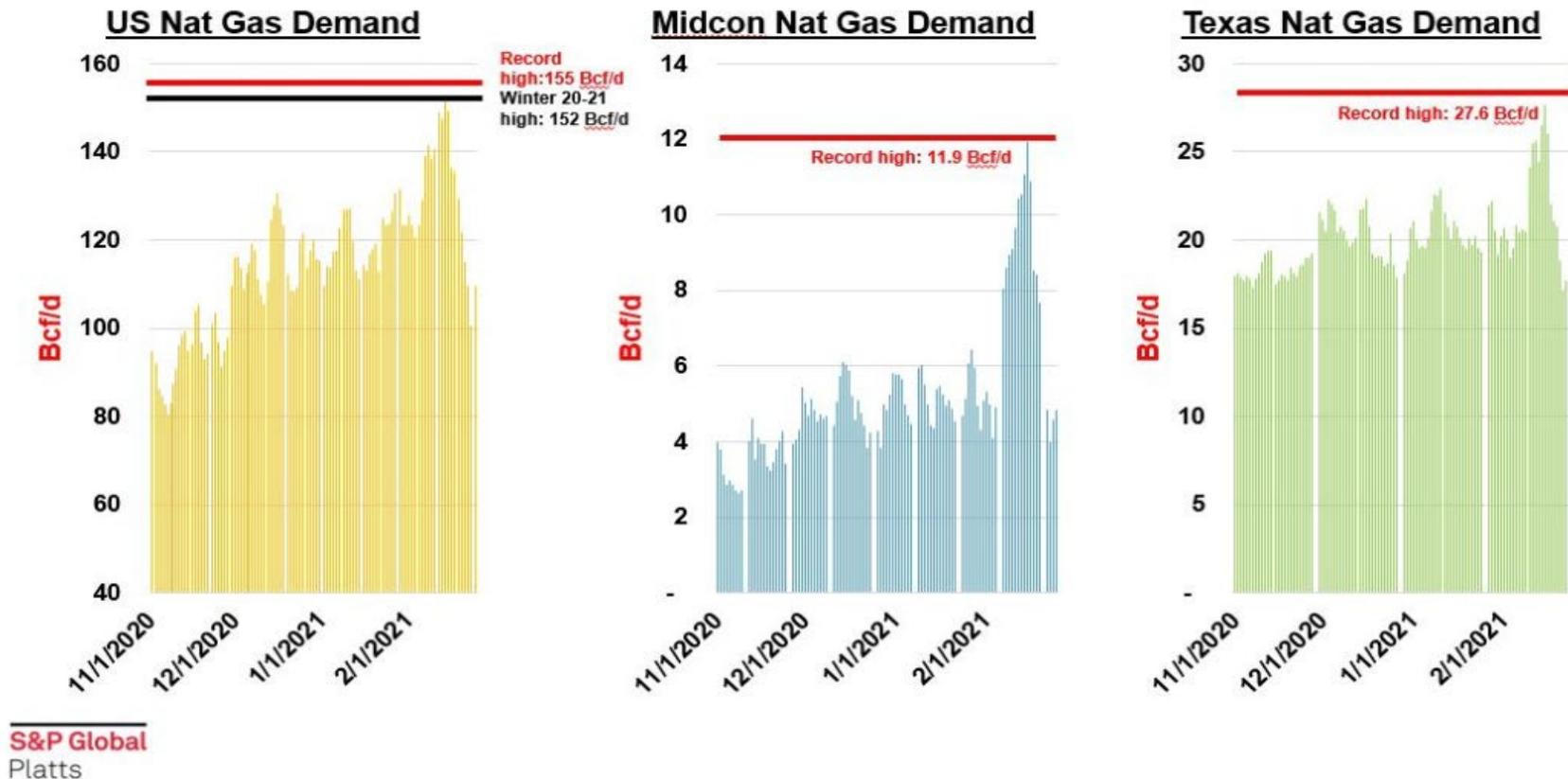
Source: NOAA—Weather Prediction Center Event Review (Feb 14-Feb 16)--
https://www.wpc.ncep.noaa.gov/storm_summaries/event_reviews.php?YYYYMMDD=20210215&product=now

Impacts of Winter Storm Uri— Supply and Demand

- Record Cold for a prolonged period caused unprecedented demand for Natural Gas and Electricity.
 - SPP set a new all-time winter peak electric demand of 43,661 MW on February 15, 2021. This is despite the public calls for conservation, which were successful. (Projected Peak was over 47,000 MW on 2/16/21). FERC/NERC Report, pg. 32.
 - ERCOT set a new all-time winter peak electric demand of 69,871 MW on February 14, 2021. Projected peak next day would have been 76,819 MW on 2/15/21—but demand couldn't be met. FERC/NERC Report, pg. 32.
 - Record High Natural Gas Demands
 - New two day record demand for natural gas total U.S. Single day demand just 1.97% below all-time record. S&P Global Platts Gas Daily
 - Midcontinent and Texas both set new all-time records for single day natural gas demand. See Id.

Record-High Natural Gas Demand

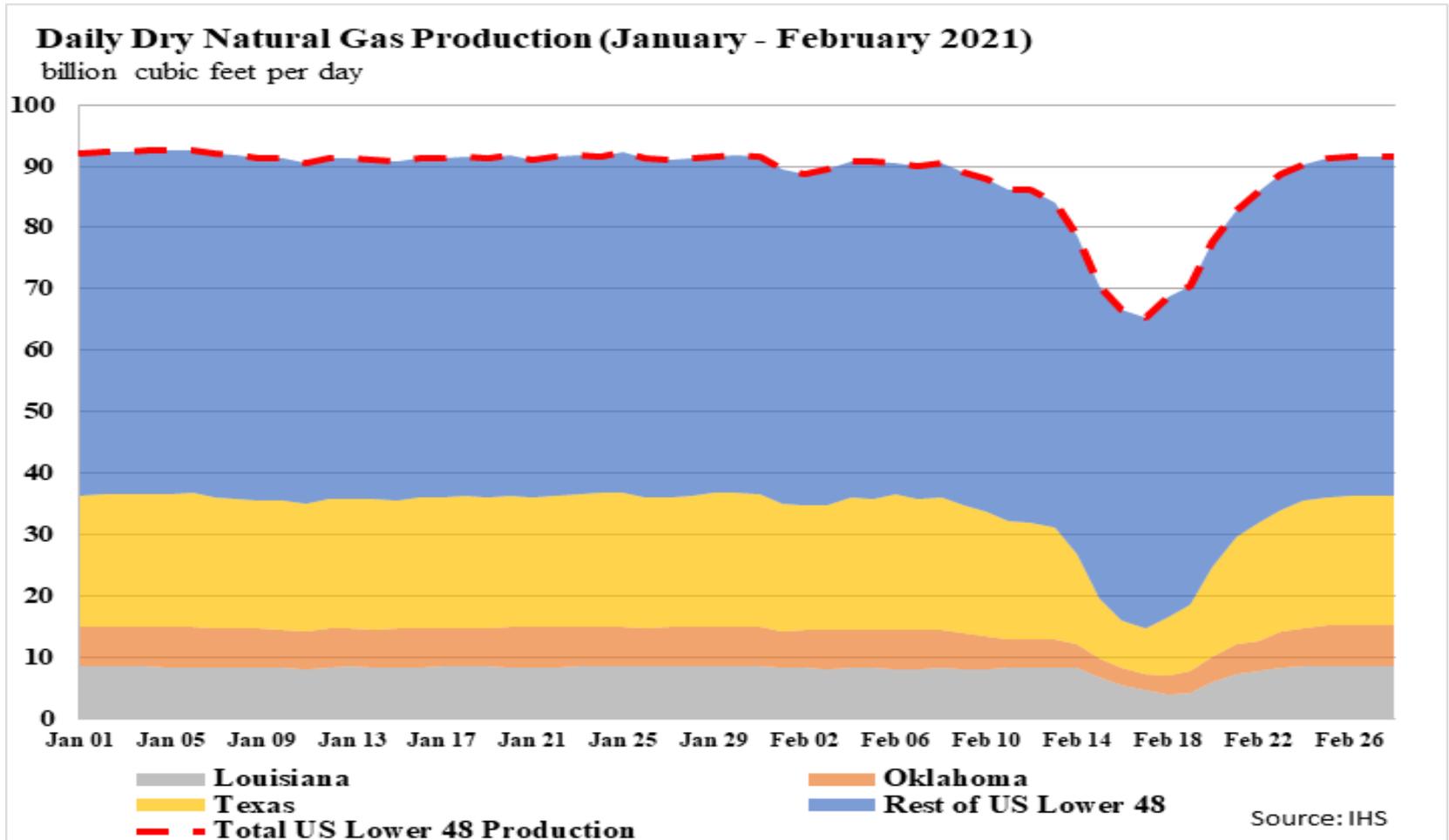
The cold weather sent demand soaring



Record-Declines in Natural Gas Supply

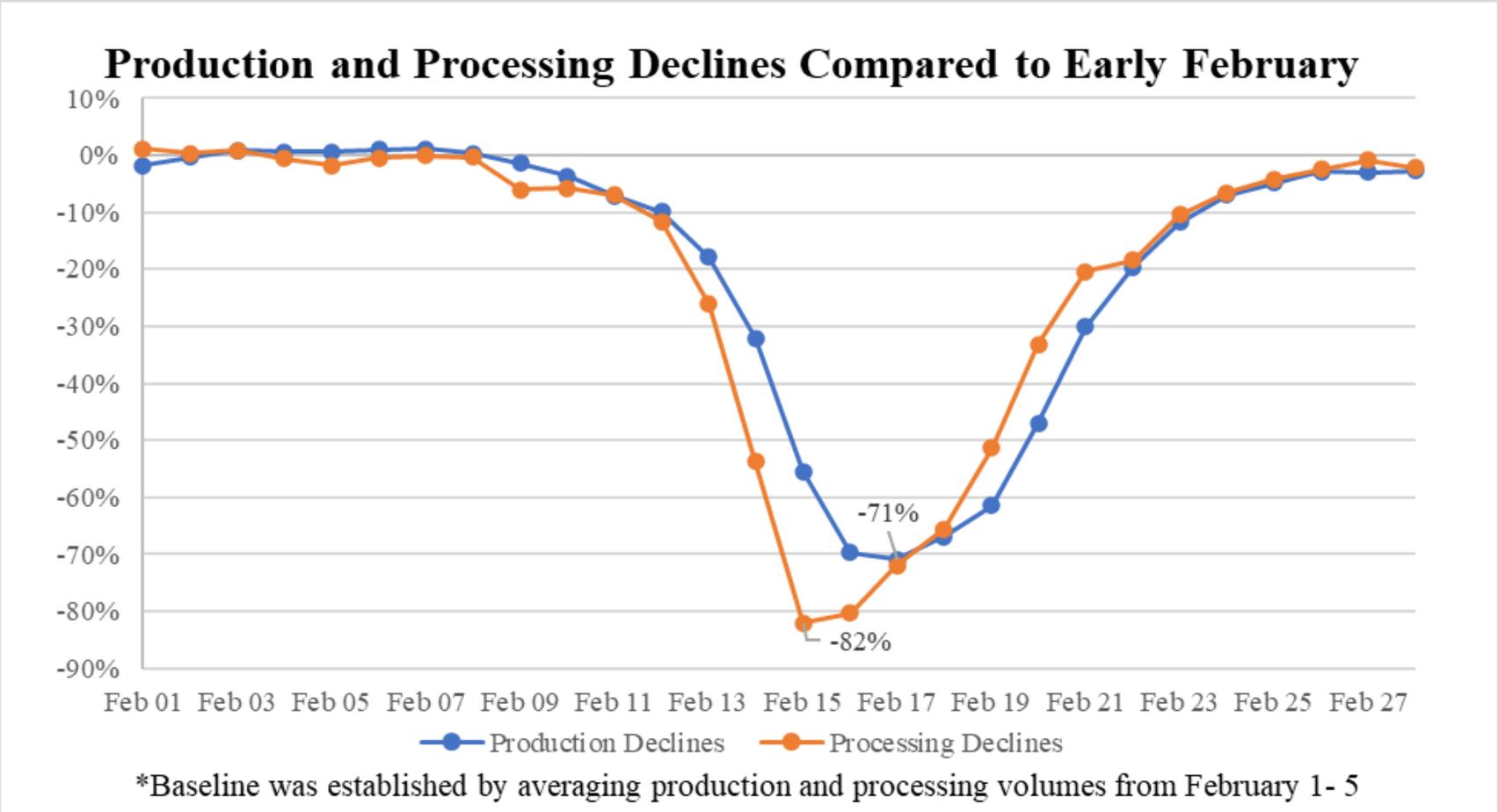
- Total U.S. Natural Gas Production suffered the largest monthly decline on record in Feb. 2021 FERC/NERC Report, pg. 13.
- Lower 48 Nat. Gas production declined by 28% from Feb. 8 through Feb. 17th FERC/NERC Report, pg. 13
- The production declines in the states of Texas (70.1% decline), Oklahoma (56.8% decline), and Louisiana (53.5% decline) represent 80% of the total decline in natural gas production during this time FERC/NERC Report, pg. 174
- Natural Gas production in Kansas declined by 21.42% during the month of February 2021 compared to January 2021 KCC-Conservation Division Production Reports
- Kansas Natural Gas Production receipts on Interstate Pipelines declined by as much as 45% during the peak of the storm KGS Testimony, Docket No. 21-KGSG-332-GIG --Bernadette Johnson, Enverus Consulting

Record Declines in Natural Gas Supply



Source: Figure 96, pg. 174 FERC/NERC Report on URI

Record Declines in Natural Gas Supply



Source: Figure 46, pg. 101 FERC/NERC Report on URI

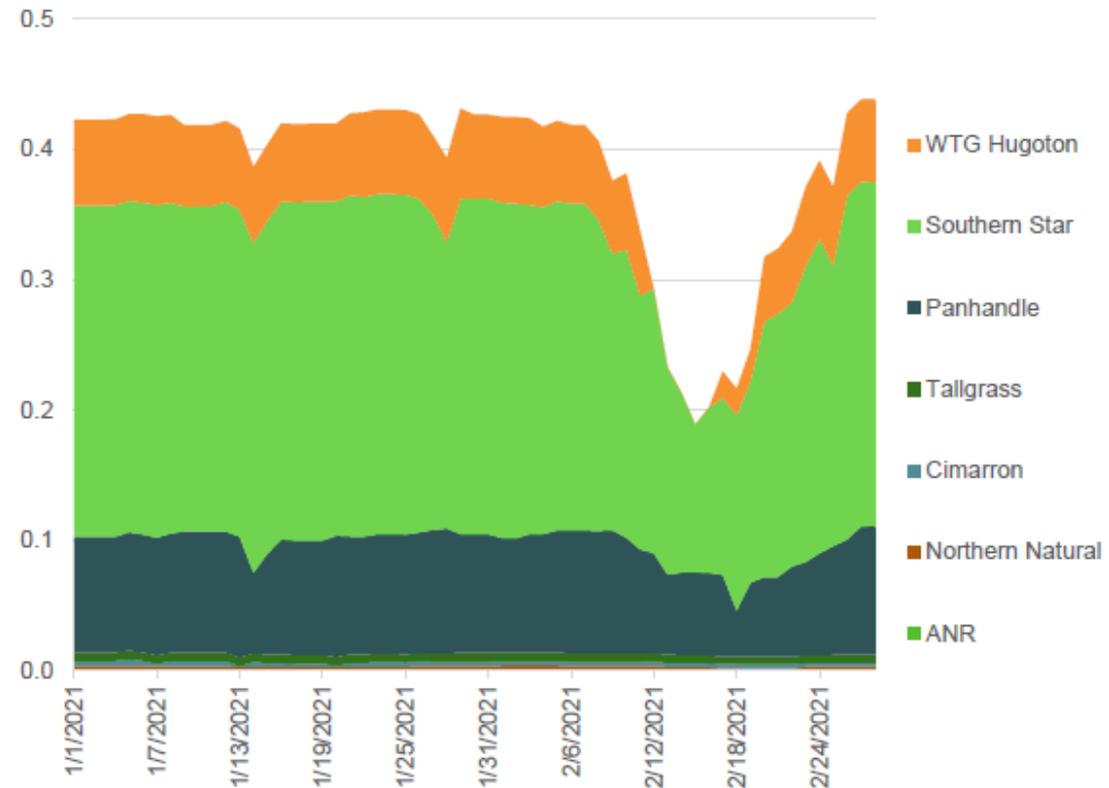
Kansas Natural Gas Production Declines

Kansas Sample Production by Pipeline

Pipeline receipts from production meters (Wellhead, Processing Plants and Gathering Systems) represent nearly 100% of the activity in the state.

The production is observed via 3 major pipelines: Southern Star Central, Panhandle and WTG Hugoton. During the winter storm of February 2021, production receipts declined by 45% when compared to Jan. levels.

Pipeline Production Receipts (in Bcf/d)



Source: KGS Testimony, Docket No. 21-KGSG-332-GIG --Bernadette Johnson, Enverus Consulting

Record High Natural Gas Prices

- Across widespread areas of the Central and Southern United States, wholesale Natural Gas prices reached previously unheard of levels
- For the four day (gas) weekend of Feb. 13-16, the following index prices were observed: All Prices in \$/MMBtu
 - ANR Oklahoma--\$213.89
 - NGPL, Midcon--\$206.11
 - Enable Gas, East-- \$375.81
 - Oneok, Oklahoma--\$368.33
 - Panhandle, Tx-Okla.-- \$224.56
 - Southern Star Central-- \$329.60
 - Chicago-NPSCO-- \$204.58
 - Northern, Demarc-- \$231.67
 - Houston Ship Channel--\$180.66
 - Cheyenne Hub (Rockies)--\$187.69
 - CIG (Rockies)--\$172.945
 - South.Cali. Gas—City Gate--\$144
 - Waha Texas--\$153.61
 - MidCon Regional Average: \$238.75
 - National Average: \$57.74

Source: S&P Global Platts—Gas Daily 2/16/21

Record High Natural Gas Prices

- Across widespread areas of the Central and Southern United States, wholesale Natural Gas prices reached previously unheard of levels
- For Gas Day Feb. 17, the following index prices were observed: All Prices in \$/MMBtu
 - ANR Oklahoma--\$100.26
 - NGPL, Midcon--\$381.48
 - Enable Gas, East-- \$300.00
 - Oneok, Oklahoma--\$944.00
 - Panhandle, Tx-Okla.-- \$129.39
 - Southern Star Central-- \$622.79
 - Katy, Texas--\$359.14
 - Northern, Ventura-- \$188.32
 - Houston Ship Channel--\$400.00
 - KERN River Opal--\$160.84
 - NW Wyoming Pool--\$136.156
 - South.Cali. Gas—City Gate--\$111.33
 - Waha Texas--\$208.79
 - MidCon Regional Average: \$328.84
 - National Average: \$79.40

Source: S&P Global Platts—Gas Daily 2/17/21

Impact of Uri on Wholesale Electricity Supply

- Out of 94,232 MW of Installed (Nameplate) Generation Capacity in SPP, 31,238 MW (33.2%) was outaged or derated during the worst of the Event. FERC/NERC Report, Figure 66a, pg. 125
- Out of 123,057 MW of Installed (Nameplate) Generation Capacity in ERCOT, 47,744 MW (38.79%) was outaged or derated during the worst of the Event. See Id.
- This reduced supply of wholesale electricity, coupled with record-high natural gas costs, and record-high electricity demand, caused record-high wholesale electricity costs.

Record High Wholesale Electricity Prices

- Day-Ahead prices in the SPP Integrated Marketplace (IM) reached an all-time peak of \$4,393/MWh at 5:00 A.M. on February 18, 2021. SPP State of the Market Winter 2021, Pg. 72
- Real-Time prices in the SPP IM reached \$4,029/MWh beginning at 6:00 A.M. on Feb. 16th. See Id.
- Wholesale energy pricing at that level translates into retail electricity rates of \$4 per kWh, or \$130 in electricity costs per day for a residential customer using 1000 kWh per month.
- For context, the average Day-Ahead price in the SPP IM was \$17.69/MWh for 2020. SPP State of the Market Winter Report, Pg. 72

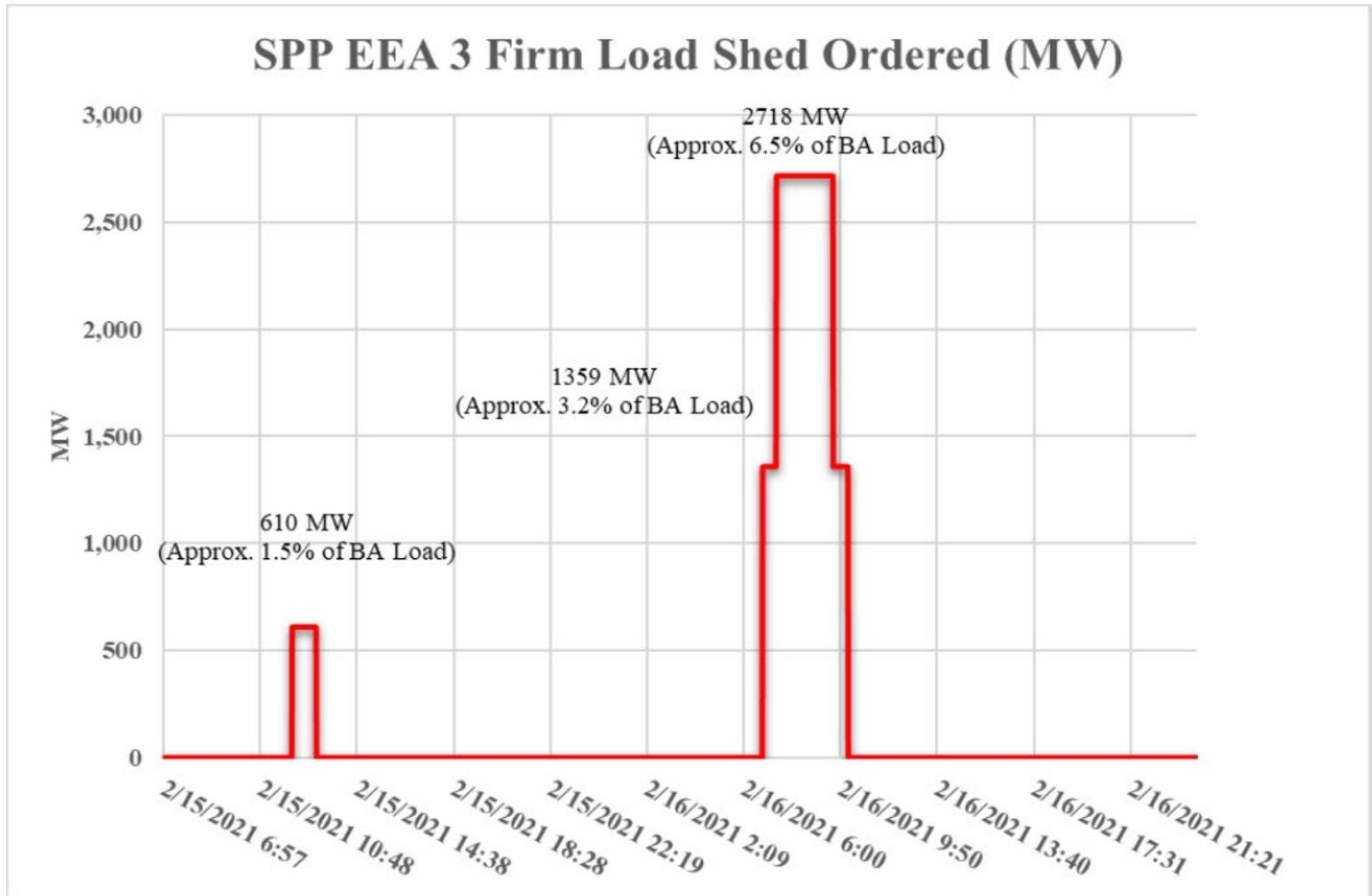
Natural Gas and Electric Shortages

- During Winter Storm Uri, natural gas and electric customers in Kansas experienced curtailments of electricity and natural gas.
- For the most part, natural gas curtailments were limited to interruptible tariff customers or non-human needs transportation customers.
- All customers were asked to conserve and non-human needs customers were asked to reduce natural gas use to plant protection levels.
- Some businesses experienced property damage, lost sales opportunities, and diminished or lost product quality.
- Overall, conservation efforts contributed to system stability, less firm load shed, and lower overall financial impact during the event.
- Staff has encountered several examples of businesses that self-generated, switched fuel sources, or curtailed to plant protection levels in support of system operations as a whole.
- 99.9% of human needs customers were able to keep natural gas service, providing life saving warmth during the most critical times of the storm.

Electric Shortages

- Customers of Kansas electric utilities that are members of SPP experienced firm load shed (controlled temporary service interruptions) for the first time in SPP's 80-year history.
- The first of these instances occurred on Monday, February 15th, at 12:04 P.M. SPP ordered Transmission Owners/Operators to shed 1.5% of load, or 610 MW in total (across all SPP). The event lasted 57 minutes. SPP Winter Event Report, pg. 28
- The second instance occurred on February 16th, beginning at 6:44 A.M. and lasting until 10:07 A.M. This was actually two load shed events back to back, totaling 6.5% of load, or 2,718 MW. SPP Winter Event Report, pg. 29
- For comparison, ERCOT's load shed lasted nearly three consecutive days, and was 20,000 MW (45% of load) at its worst point. FERC/NERC Report, pg. 152.

SPP Load Shed Events



Causes of Natural Gas Shortages

- Beginning as early as February 7th, natural gas production facilities (wells) began to freeze in or were preemptively shut in to prevent imminent freezing issues. FERC/NERC Report, pg. 83
- Natural gas wells also lost power during the event, either because of weather related outages, or later in the storm, firm load shed. FERC/NERC Report, pg. 101
- By February 14th, natural gas production had declined over 30%, while processing had declined by over 50%.
FERC/NERC Report, pg. 100
- By the 17th, natural gas production peaked at a 71% decline and gas processing peaked at a 82% decline by the 15th.
FERC/NERC Report, pg. 101

Causes of Natural Gas Production Declines

Production Event Causes on February 8th - 20th

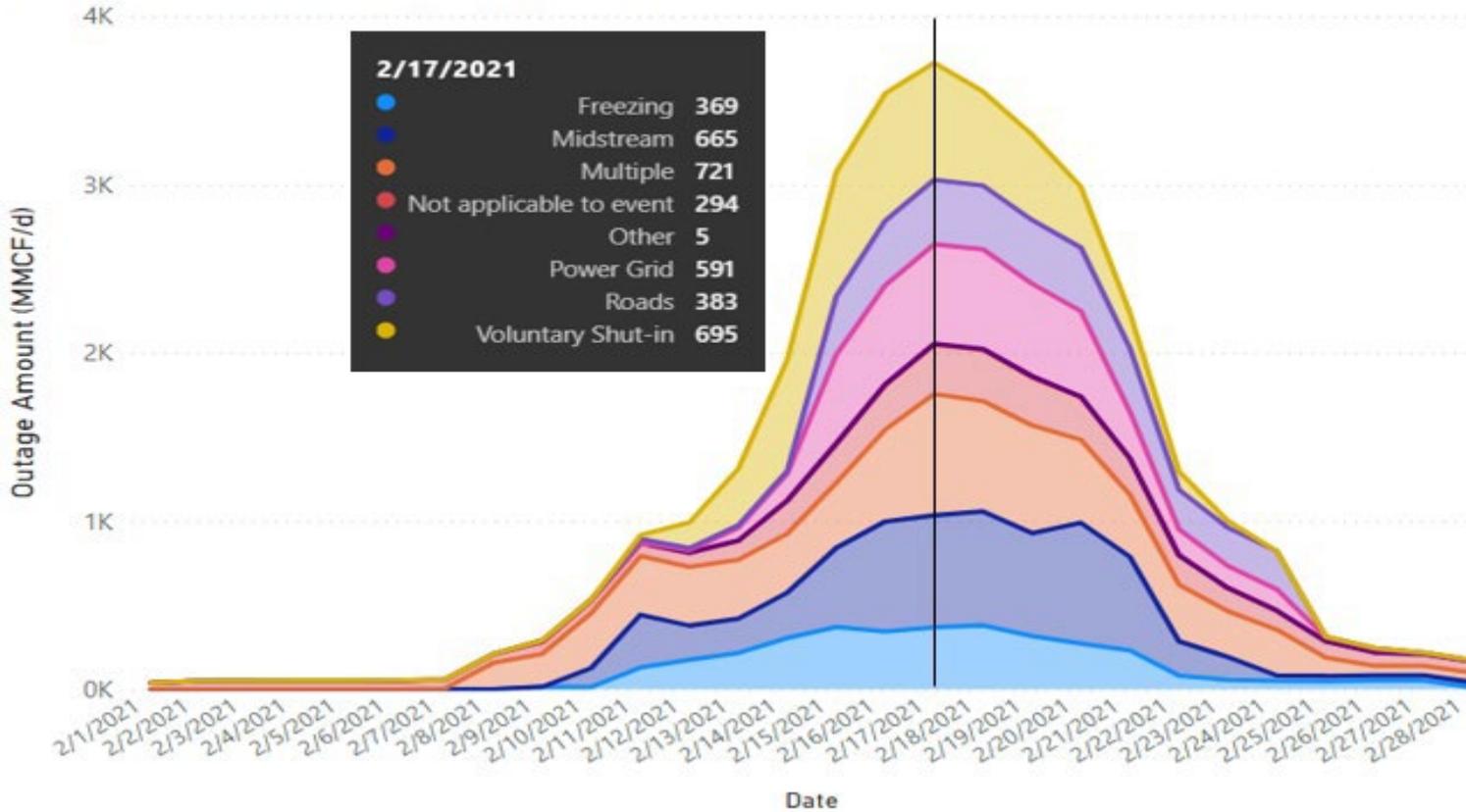
	Natural Gas Infrastructure Condition	Facility Event Causes
Freezing Temperature and Weather Conditions (43.2% of production disruptions)	Facility Shut-ins to Prevent Imminent Freezing Issues	18.0%
	Freezing Issues - Midstream	5.1%
	Freezing Issues at Well and Gathering Facilities	11.1%
	Freezing Issues on Roads/Access to Well and Gathering Facilities	9.1%
Loss of Power Supply (21.4% of production disruptions)	Midstream - Loss of Power Supply	10.4%
	Well/Gathering Facilities- Loss of Power Supply	11.1%
Multiple Issues (21.3% of production disruptions)	Multiple Issues (combination of two or more of above issues)	21.3%
Other Issues, Unrelated Issues (14% of production disruptions)	Midstream - Line Pressure	4.9%
	Midstream - Other	0.4%
	Well and Gathering Facility Issues - Not Applicable to Event	8.8%
Total		100.0%

86%

- This table categorizes the causes of the reduction in natural gas production during the entirety of the event, Feb. 8-20th.
- The individual causes of natural gas production declines vary by day, but overall freezing issues were responsible for 58% of the decline and power supply loss was responsible for 23.5% of the decline. [FERC/NERC Report, pg. 101](#)
- The FERC/NERC report could not differentiate between weather related power supply losses and firm load shed because they were coincident.

Causes of Natural Gas Production Declines by Cause 2/17/21

Outage Amounts by Date and Primary Cause



Source: Figure 50b FERC/NERC Report

Causes of Natural Gas Processing Declines

Processing Facility Event Causes on February 8 - 20			
	Natural Gas Infrastructure Condition	Result	Facility Event Causes
Freezing Temperature and Weather Conditions (74% of Plant Disruptions)	Reduced Gas Receipts from Production / Gathering Facilities	Processing Facility Disruption	61%
	Freezing Issues at Processing Facilities	Processing Facility Disruption	13%
Loss of Power (18% of Plant Disruptions)	Processing Facilities - Loss of Power Supply or curtailment	Processing Facility Disruption	18%
Other Issues	Mechanical Failures - Non-Weather Related	Processing Facility Disruption	8%
Total			100%

- The FERC/NERC Report also examined causes of natural gas processing declines. --Day by Day Differences, but overall:
- Reduced gas receipts responsible for 61%, freezing issues 13%, loss of power 18%.
- Loss of Power was responsible for 18% of processing declines on Feb. 14th (before any firm load shed) and 21% of declines on February 17th (after any SPP load shed).
- “The majority of natural gas production/supply declines in Oklahoma, northern and western Texas occurred before February 15, the first day on which firm load shed occurred, while the majority of the production declines in central, eastern, and southern Texas and Louisiana occurred on and after February 15th.”

Source: Figure 101 FERC/NERC Report, page 177-179

Production/Processing Declines by Basin

BASIN	MAXIMUM DAILY PRODUCTION OUTAGE (Bcf)	MAXIMUM DAILY PROCESSING OUTAGE (Bcf)	CAUSES
Anadarko (Feb 16th)	1.23 Bcf	0.35 Bcf	81% Reduced Gas Supply, 6% Power Outages/Curtailments, 13% Mechanical failures not related to weather
Permian (Feb 16th)	2.01 Bcf	1.04 Bcf	58% Reduced Gas Supply, 25% Power Outages/Curtailments, 17% Mechanical failures related to weather
Fort Worth (Feb 17th)	0.6 Bcf	0.02 Bcf	100% Reduced Gas Supply
Eagle Ford (Feb 17th)	0.66 Bcf	0.09 Bcf	50% Reduced Gas Supply, 50% Power Outages/Curtailments
Gulf Coast (Feb 17th)	0.02 Bcf	0.38 Bcf	100% Reduced Gas Supply
Haynesville (Feb 19th)	2.09 Bcf	0.38 MMcf	25% Reduced Gas Supply, 75% Power Outages/Curtailments

- This table from the FERC/NERC Report highlights processing declines by production basin.
- Anadarko is in SPP, Permian to a lesser degree.
- Power loss was a much larger issue for natural gas production in ERCOT than SPP, although there were instances of this in SPP.

Source: Figure 51 FERC/NERC Report, page 108

Gas Pipeline Operations

- Intrastate and Interstate gas pipelines, for the most part, provided continuous service during the Event.
- Gas pipelines were “minimally affected” by power outages.

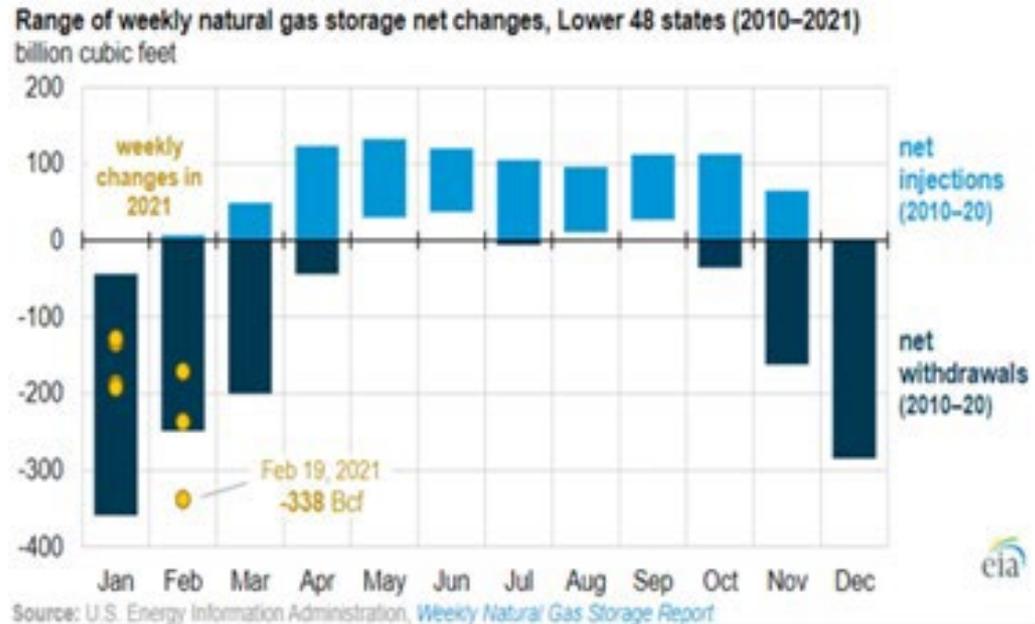
FERC/NERC Report, page 114

- Capacity was constrained, and pipelines issued Operational Flow Orders (OFOs) and some Force Majeure notices.
- Non-human needs gas service was restricted at times.
- Having firm transportation service did not guarantee gas would be shipped. 47% of generating plants that had firm service had less than 100% of their gas shipped. FERC/NERC Report, page 116

Gas Storage Operations

Storage

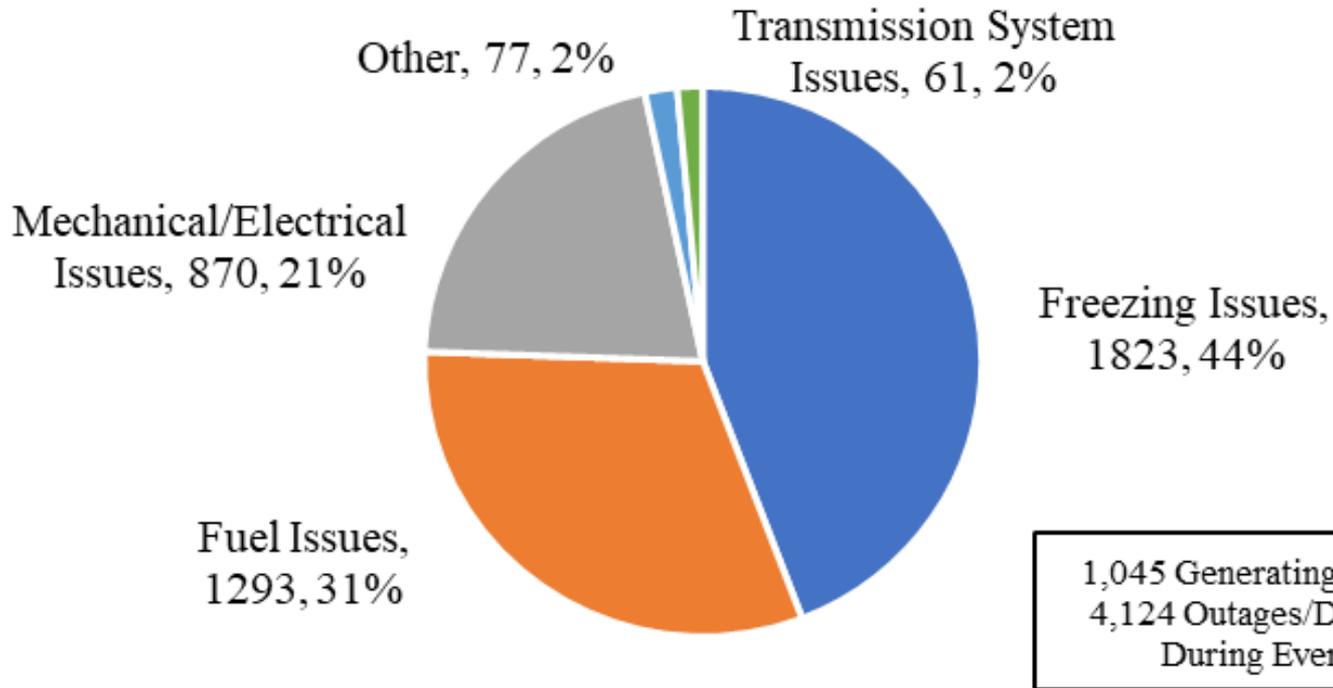
- Significant demand for natural gas in mid-February led to the second-largest reported withdrawal of natural gas from storage in the United States, according to the U.S. Energy Information Administration's (EIA)
- Storage withdrawals reached 338 billion cubic feet (Bcf) in the week ending February 19, 2021, nearly three times the average withdrawal for mid-February, according to EIA
- A record amount of natural gas, 156 Bcf, was withdrawn during the week ending February 19, 2021 in the South Central region, which includes Texas.



- Natural Gas Storage generally performed as expected and provided an invaluable source of reliable gas during the Event. FERC/NERC Report, pg. 120

Cause of Electricity Shortages (SPP+MISO+ERCOT)

Number of Incremental Unplanned Generator Outages, Derates, and Start-Up Failures by Cause, Total Event Area

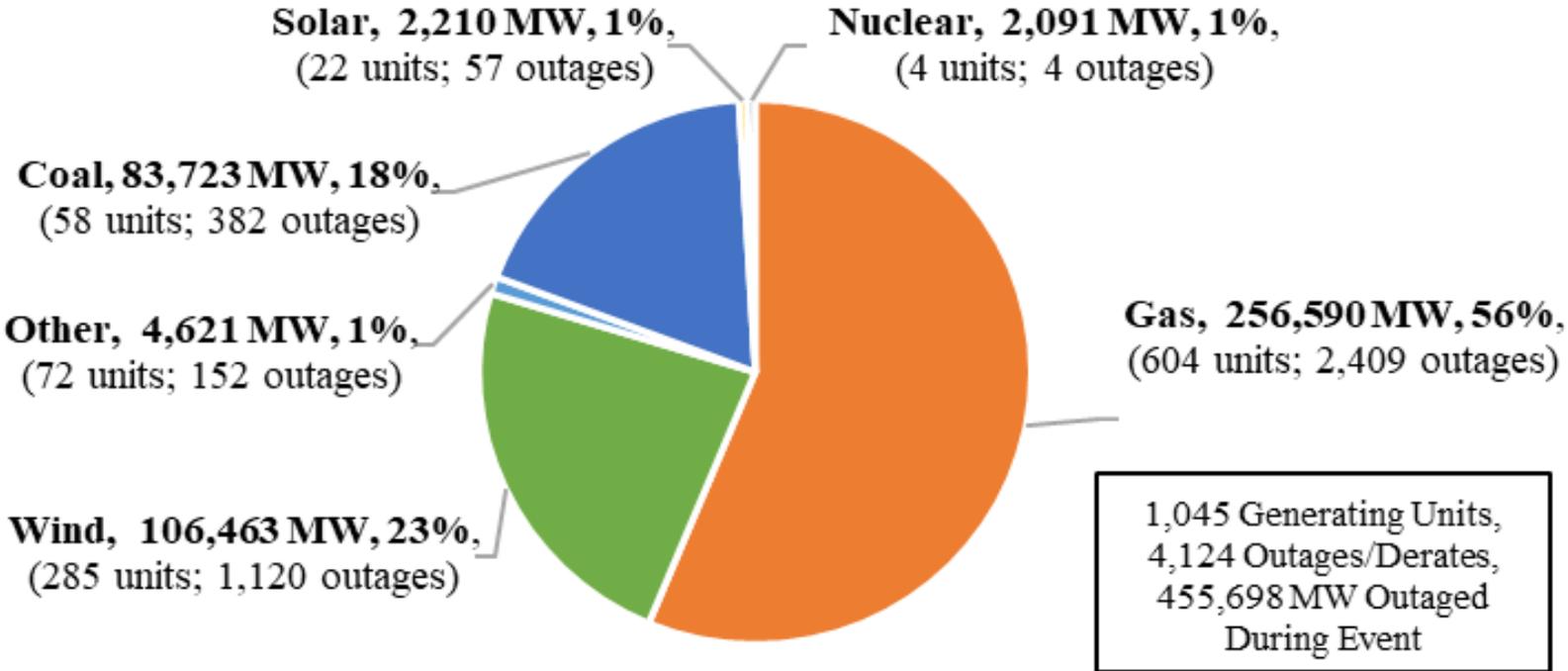


Source: Figure 3, FERC/NERC Report, page 15

Cause of Electricity Shortages

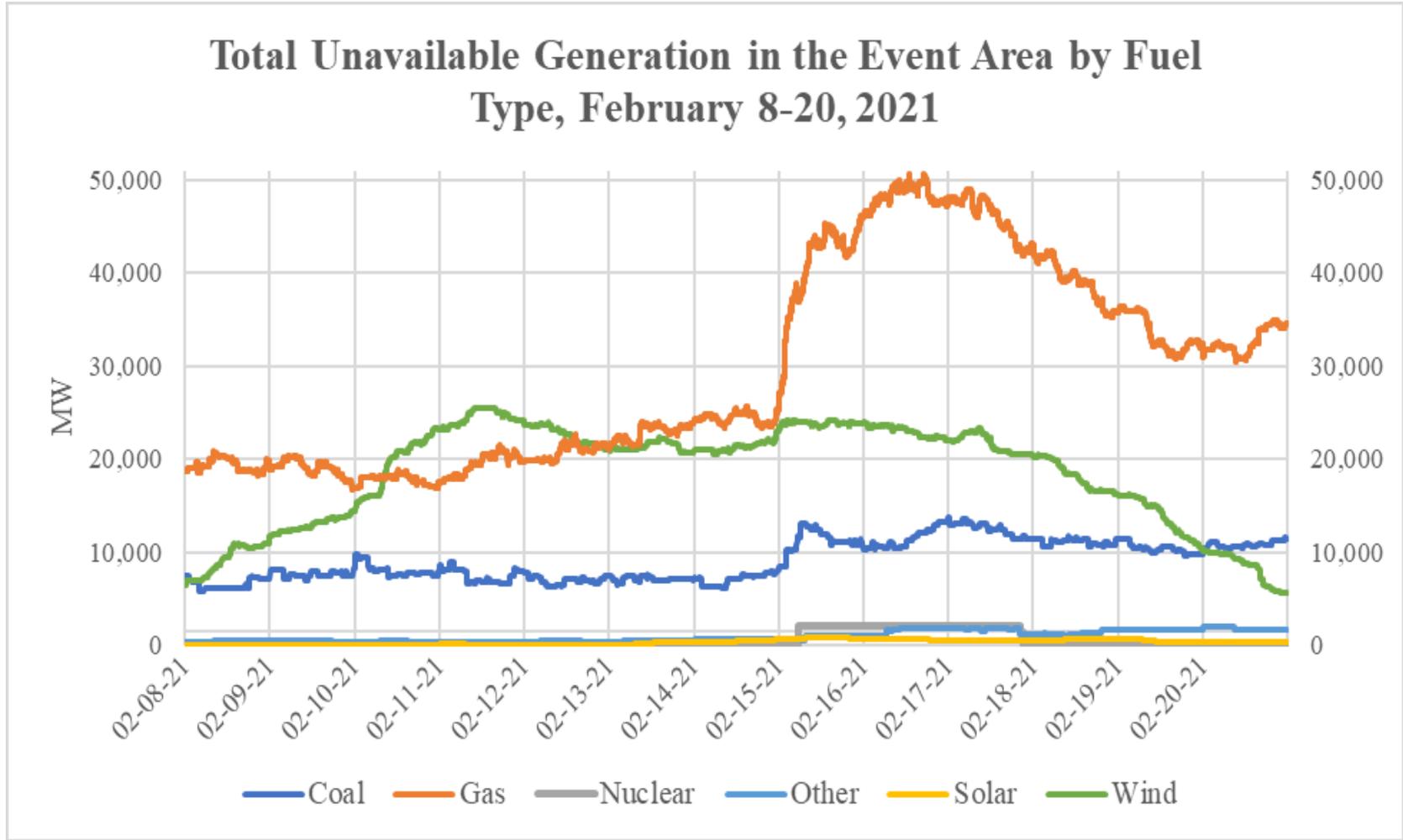
(SPP+MISO+ERCOT)

Fuel Type of Generating Units That Experienced Incremental Unplanned Outages and Derates (by Total MW Loss During Event), Total Event Area



Source: Figure 90 FERC/NERC Report, page 163
Kansas Corporation Commission

Cause of Electricity Shortages (SPP+MISO+ERCOT)

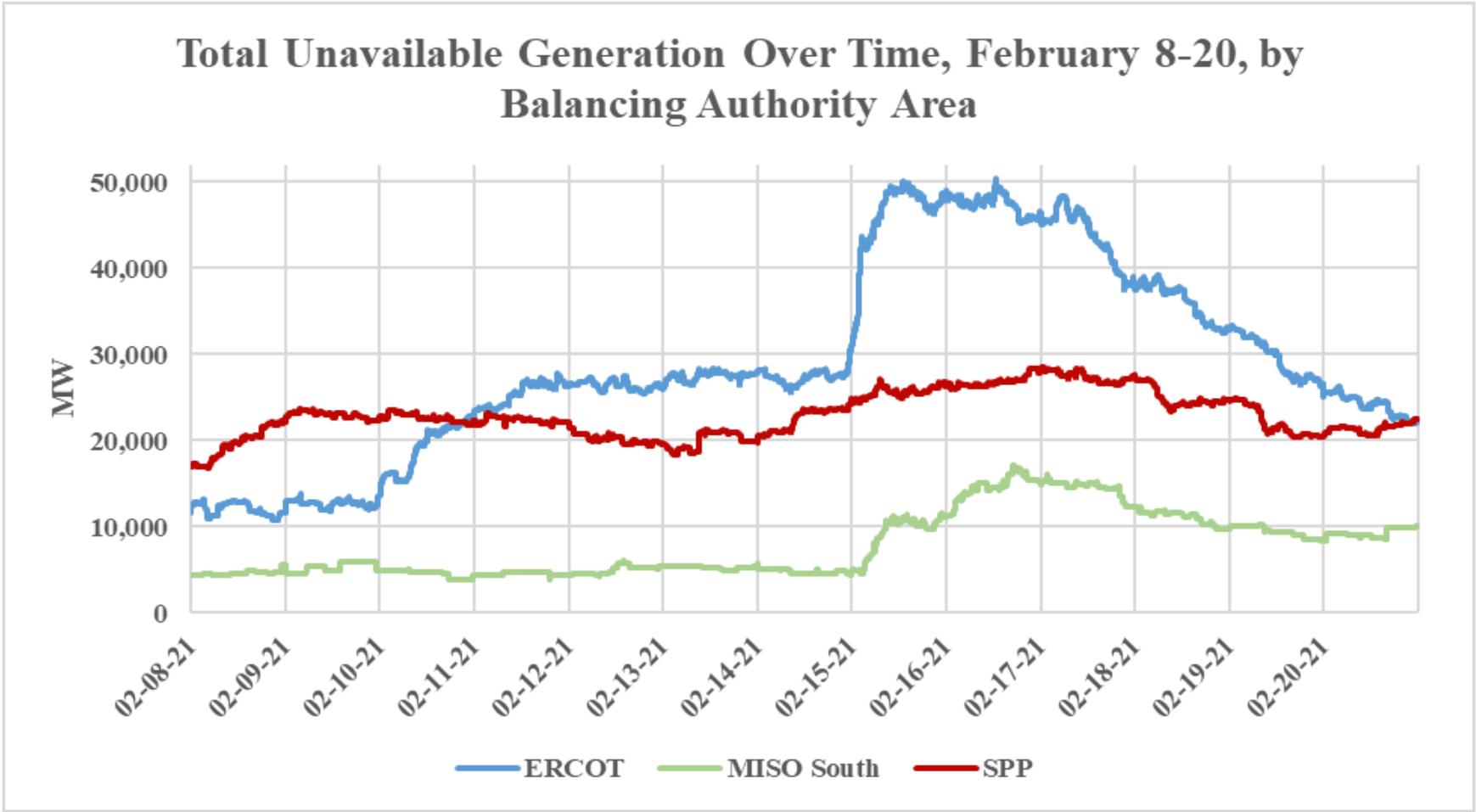


Source: Figure 88 FERC/NERC Report, page 162

Kansas Corporation Commission

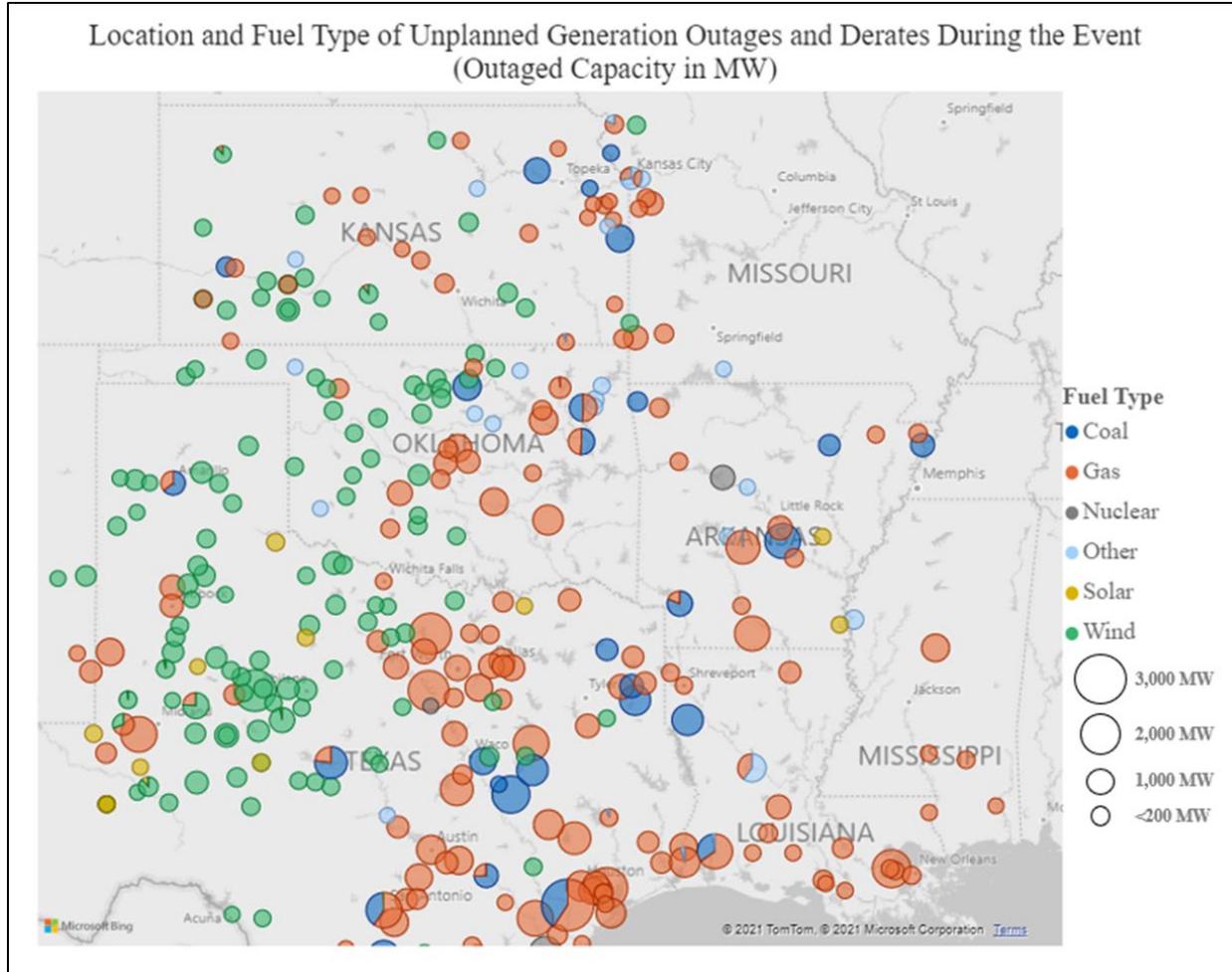
Cause of Electricity Shortages

(SPP+MISO+ERCOT)



Source: Figure 66b FERC/NERC Report, page 126

Cause of Electricity Shortages (SPP+MISO+ERCOT)



Source: Personal Communication with FERC/NERC Report Authors

January 11, 2022

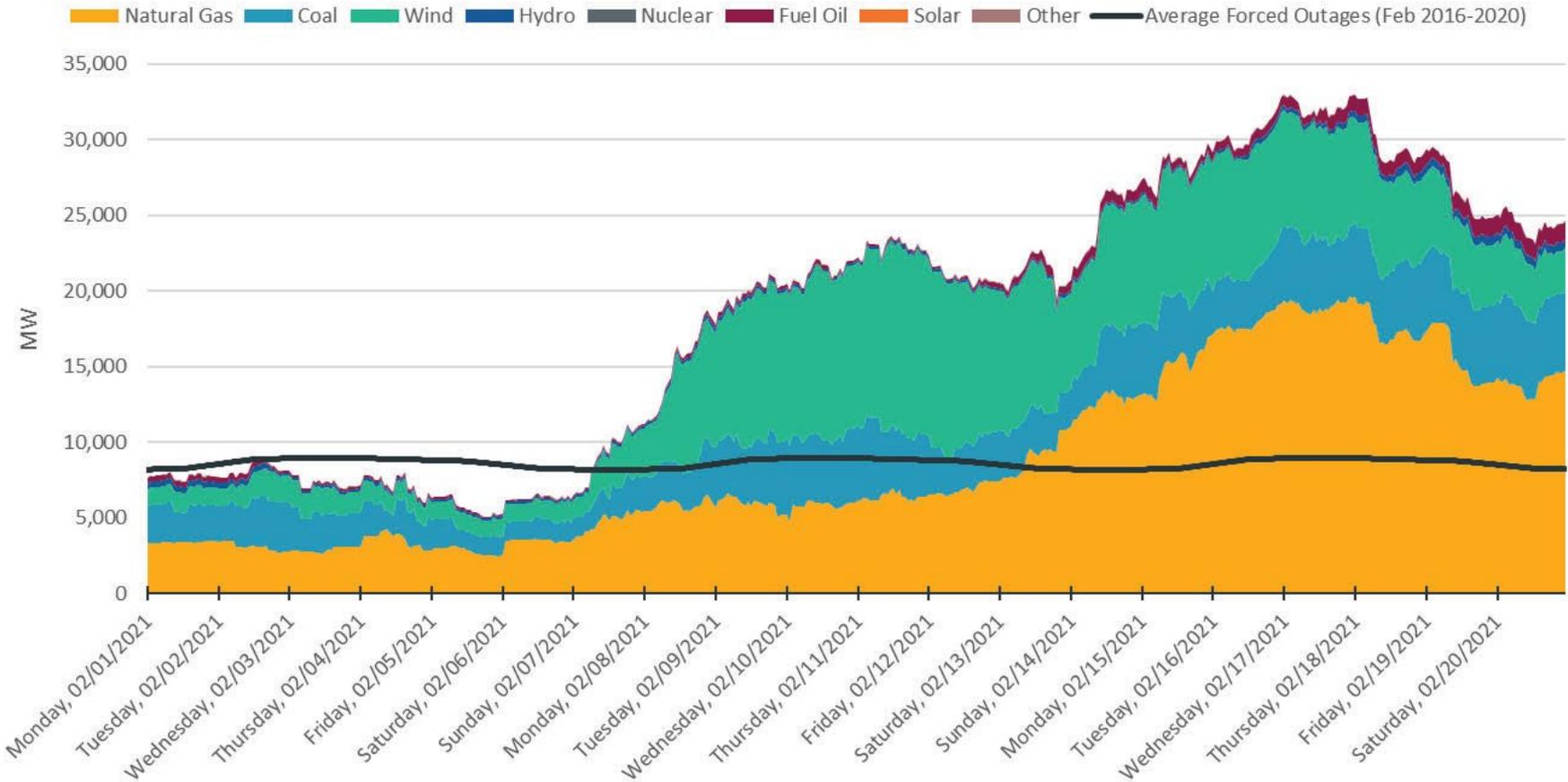
Kansas Corporation Commission

Cause of Generating Outages in SPP

- Fuel-supply issues were the largest single cause of unplanned outages in SPP. 47% of outages. (still--less than half) SPP Winter Event Report, page 8.
- Out of 30,500 MW of outaged capacity on Feb. 16th, 18,000 was natural gas-fired generation, 72% of which cited fuel-supply as the reason for the outage. SPP Winter Event Report, pages 41-43.
- Freezing was a major problem in SPP as well. At the worst of SPP's generation outages, 12,472 MW were out due to freezing. FERC/NERC Report, pg. 125.
- Many of the freezing issues were Wind turbines experiencing cold weather shutoff and blade icing. Coal and Gas experienced freezing too to a lesser degree. Most of the fuel-supply issues were with Natural Gas units. See next slides.

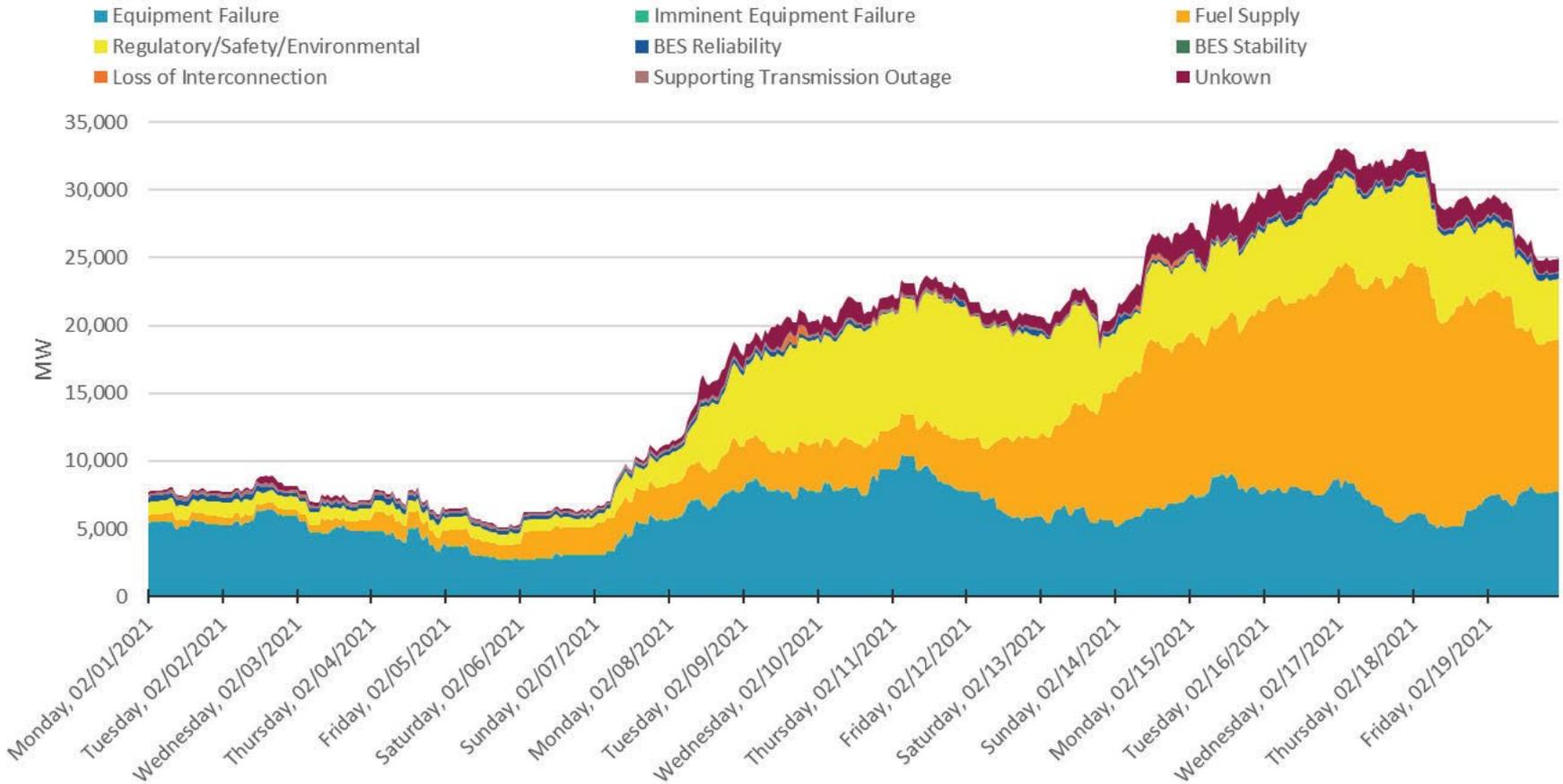
Source: Figure 90 FERC/NERC Report, page 163
Kansas Corporation Commission

SPP Generating Outages by Fuel Type



Source: SPP Winter Event Report, page. 42-Figure 16: Forced Generation Outages by Fuel-Type

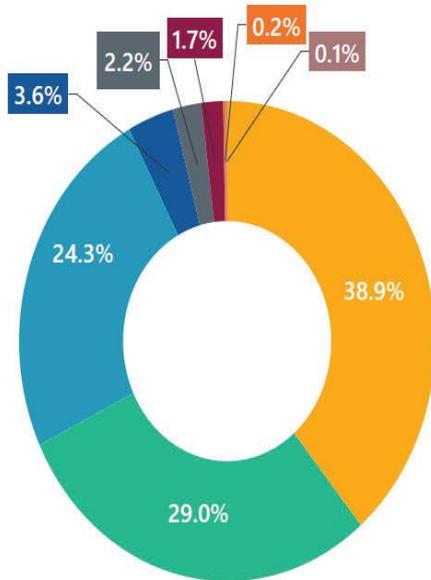
SPP Generating Outages by Cause Code



Source: SPP Winter Event Report, page. 42- Figure 17: Forced Generation Outages by Cause Code

SPP Generation Availability and Production

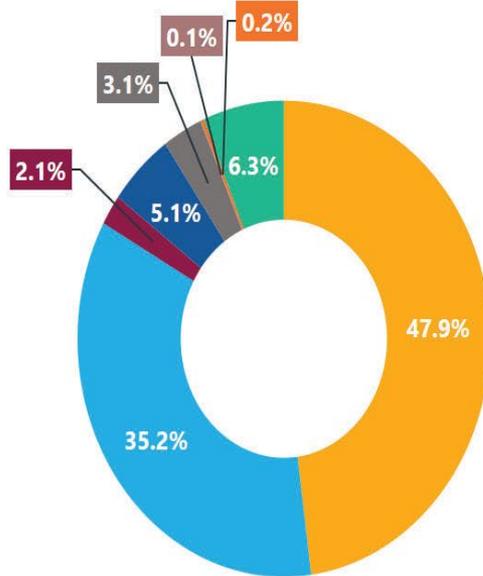
NAMEPLATE CAPACITY* 94,648 MW



- Natural Gas (36,783 MW)
- Wind (27,458 MW)
- Coal (22,992 MW)
- Hydro (3,428 MW)
- Nuclear (2,061 MW)
- Fuel Oil (1,570 MW)
- Solar (235 MW)
- Other (121 MW)

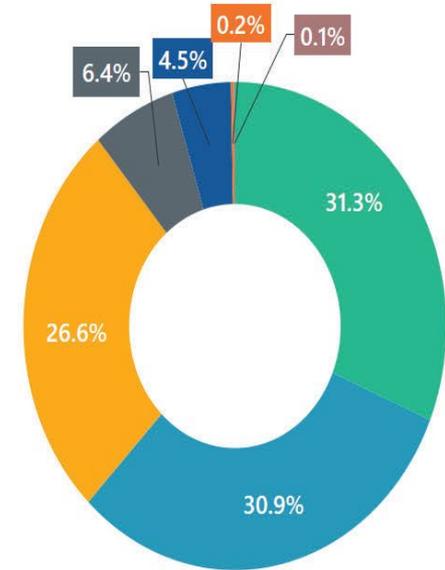
* As of 1/13/21

2020-2021 ACCREDITED WINTER CAPACITY 62,577 MW



- Natural Gas (29,965 MW)
- Coal (22,009 MW)
- Fuel Oil (1,301 MW)
- Hydro (3,206 MW)
- Nuclear (1,944 MW)
- Other (41 MW)
- Solar (151 MW)
- Wind (3,960 MW)

2020 ENERGY PRODUCTION 262.730 TWH

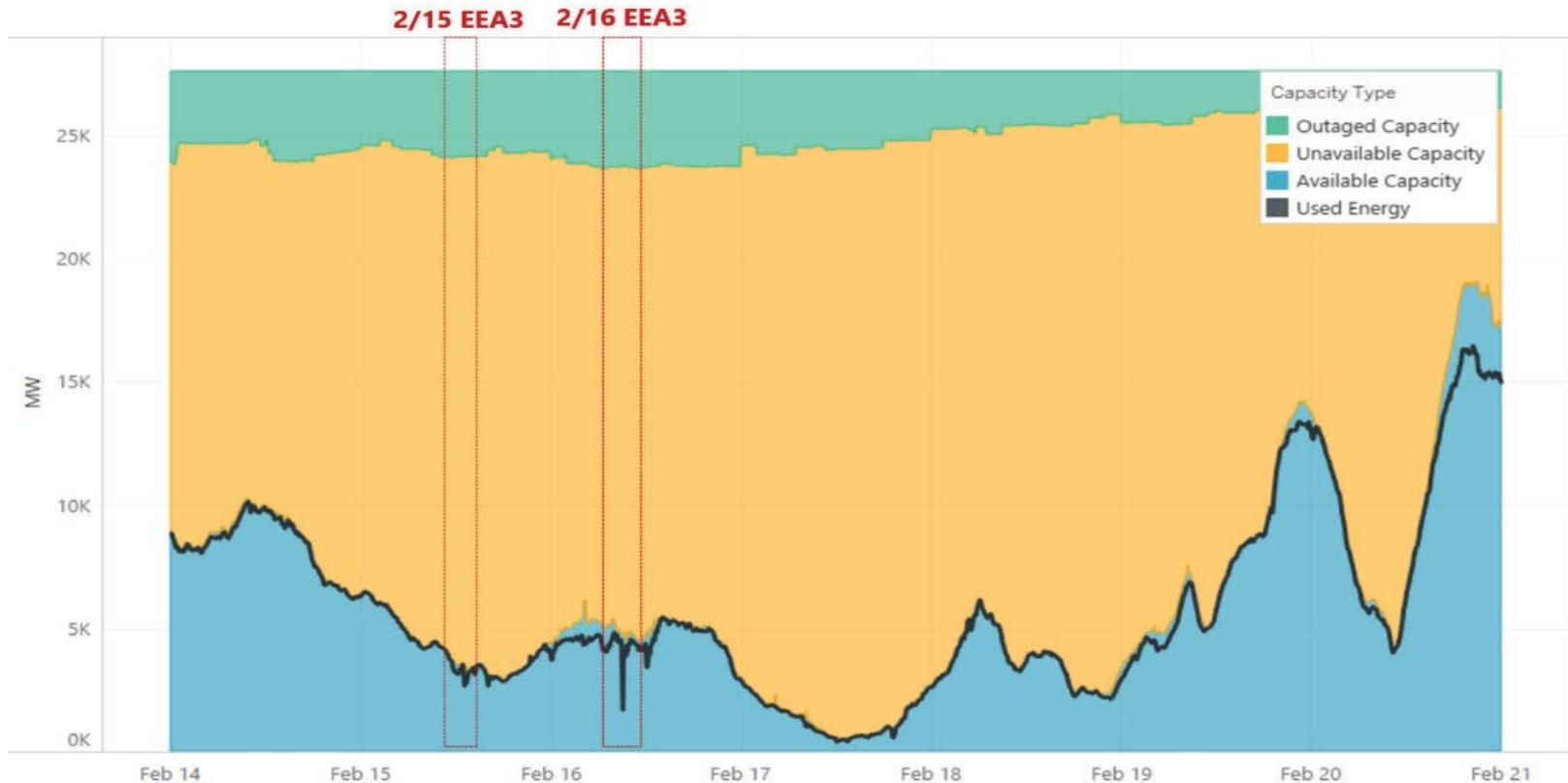


- Wind (82,280 GWh)
- Coal (81,131 GWh)
- Natural Gas (69,903 GWh)
- Nuclear (16,823 GWh)
- Hydro (11,701 GWh)
- Solar (568 GWh)
- Other (323 GWh)



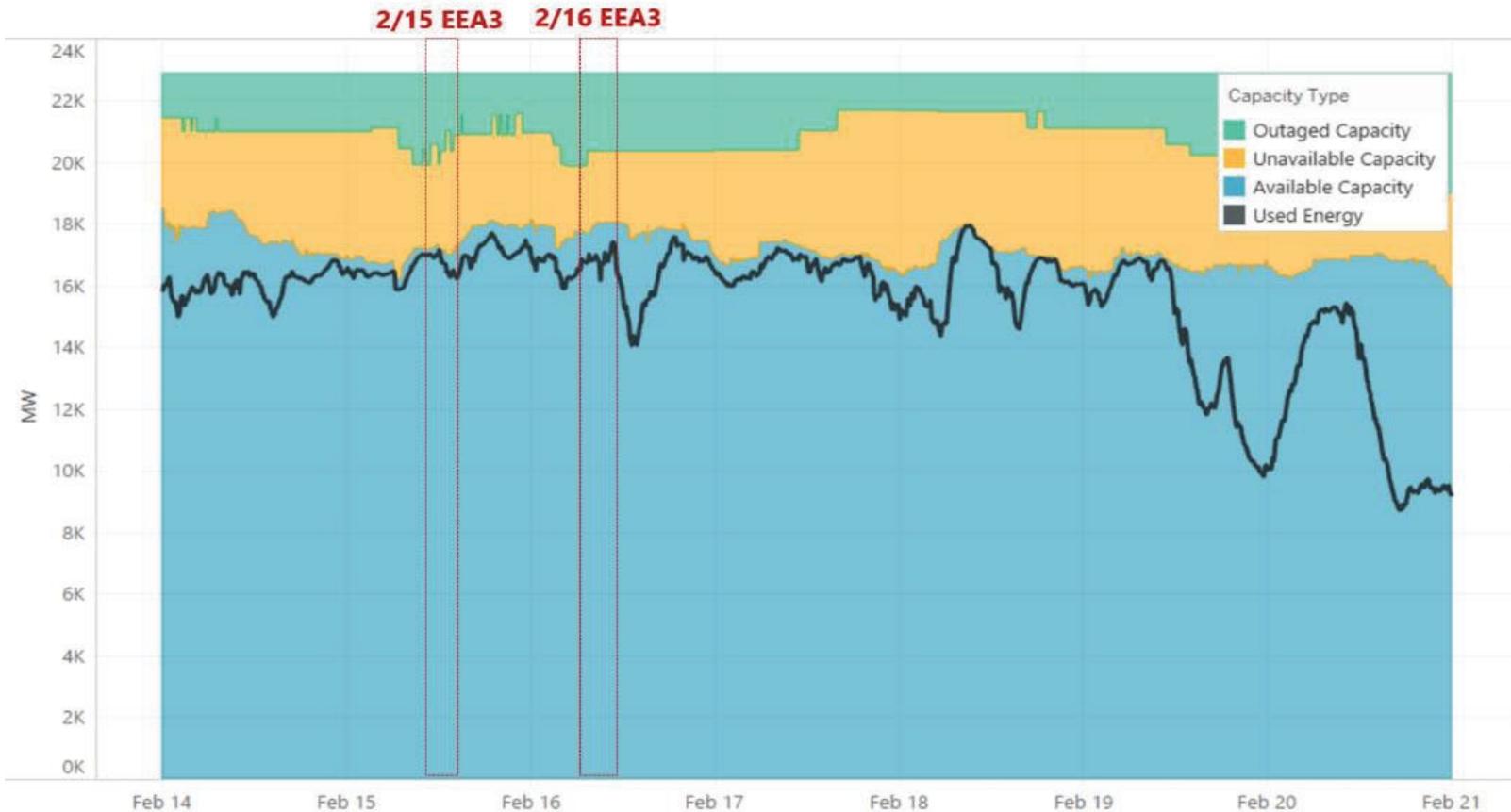
Source: SPP Winter Event Report, page. 47- Figure 21: Generation Capacity Overview

Wind in SPP—Availability and Use



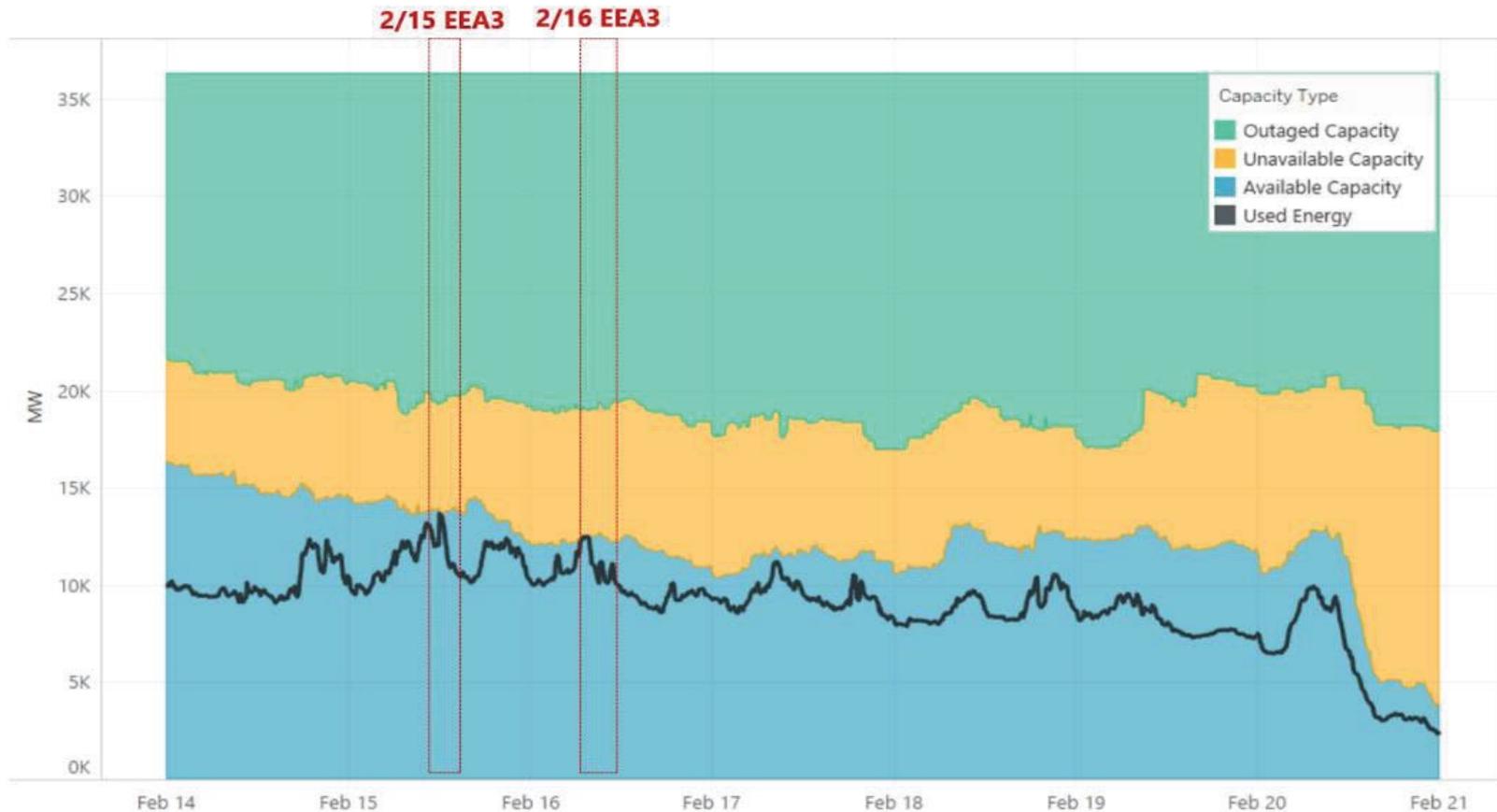
12-16% of SPP's Nameplate Wind Capacity was available during the most critical times (EEA3 events). This is between 79% and 101% of the Accredited Capacity of Wind. SPP Winter Event Report, pg. 48.

Coal in SPP—Availability and Use



77-79% of SPP's Nameplate Coal Capacity was available during the most critical times (EEA3 events). This is between 87-89% of the Accredited Capacity of Coal. SPP Winter Event Report, pg. 49.

Gas in SPP—Availability and Use

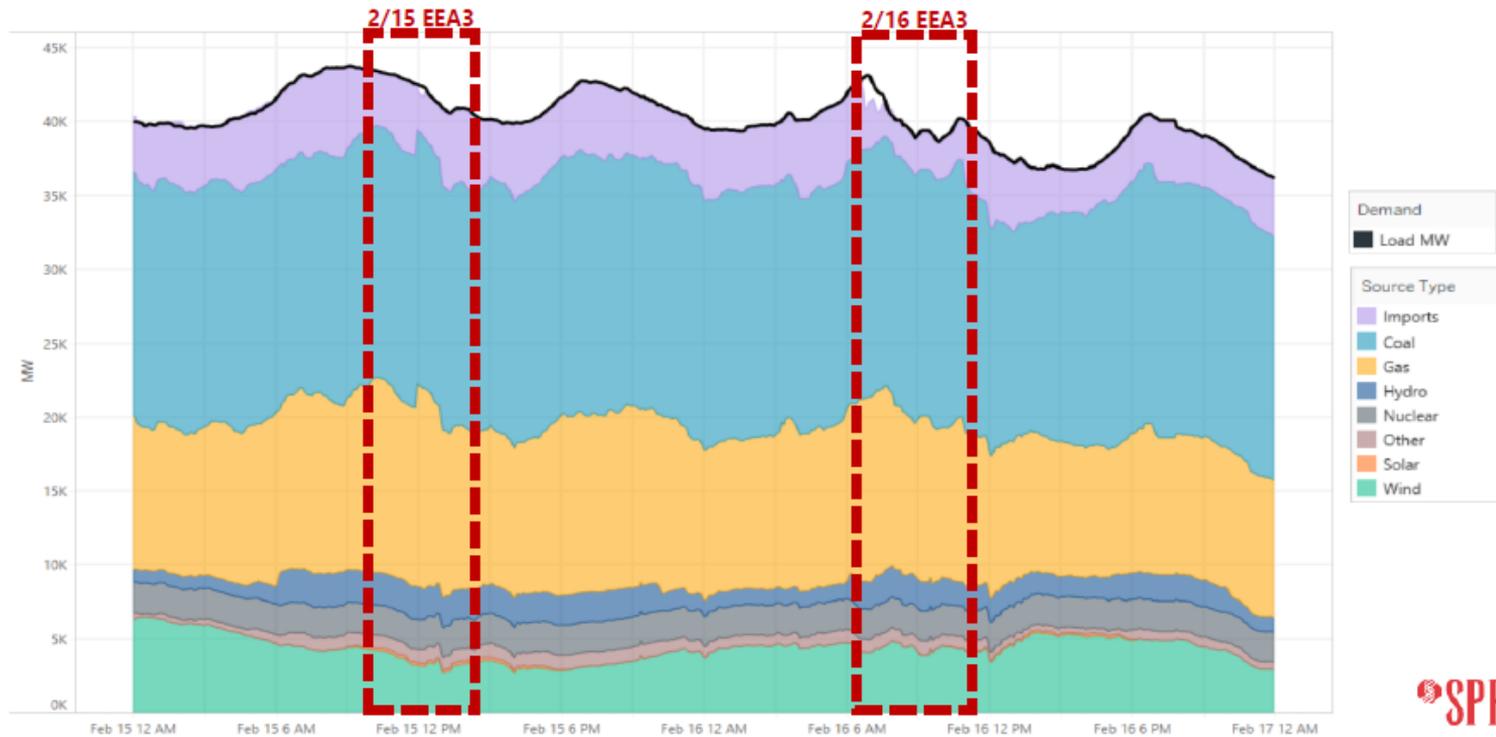


34-37% of SPP's Nameplate Gas Capacity was available during the most critical times (EEA3 events). This is between 40-45% of the Accredited Capacity of Gas. SPP Winter Event Report, pg. 49.

Big Picture—What Energy Was Used

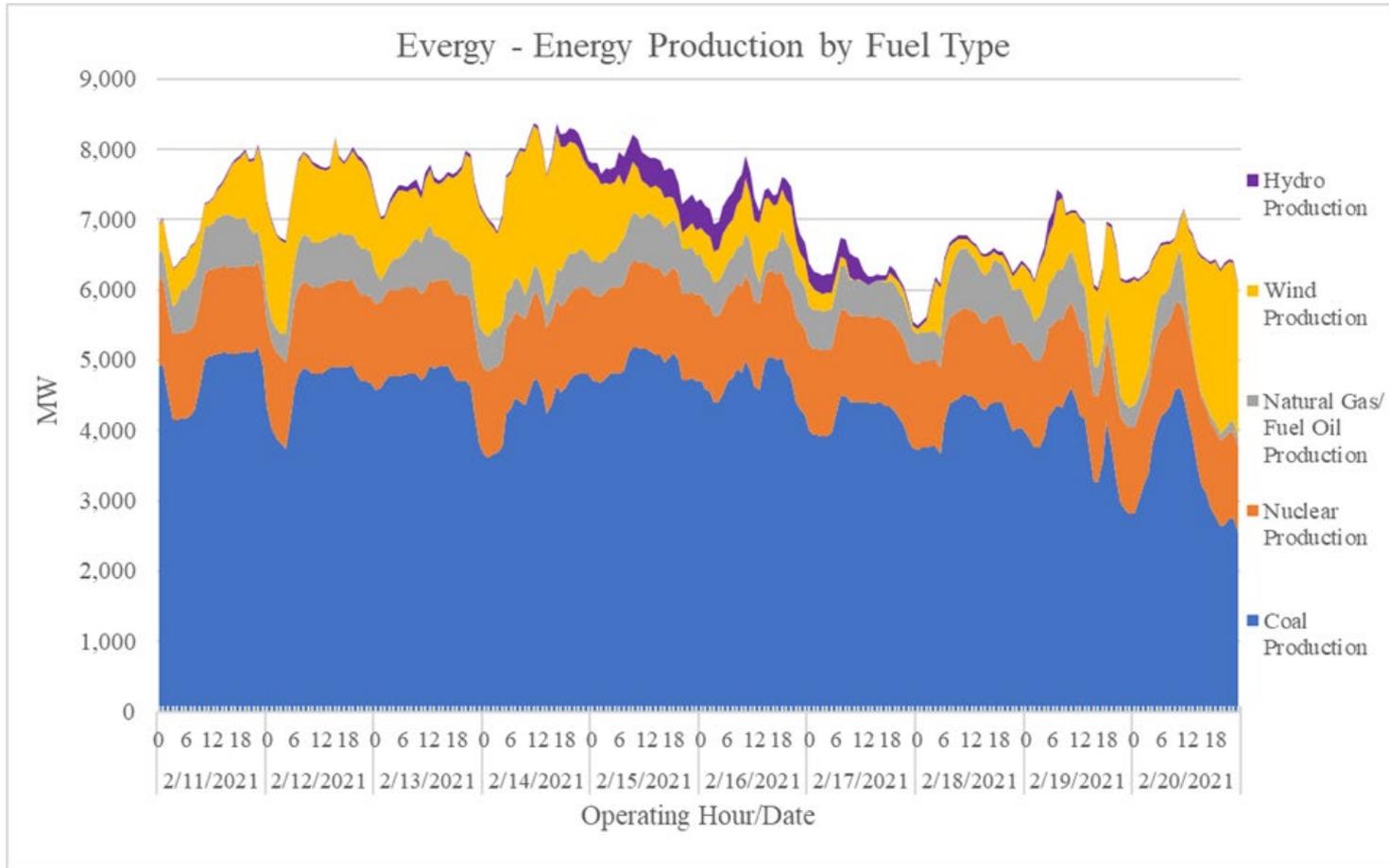
ENERGY THAT MET DEMAND IN REAL-TIME MARKET

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



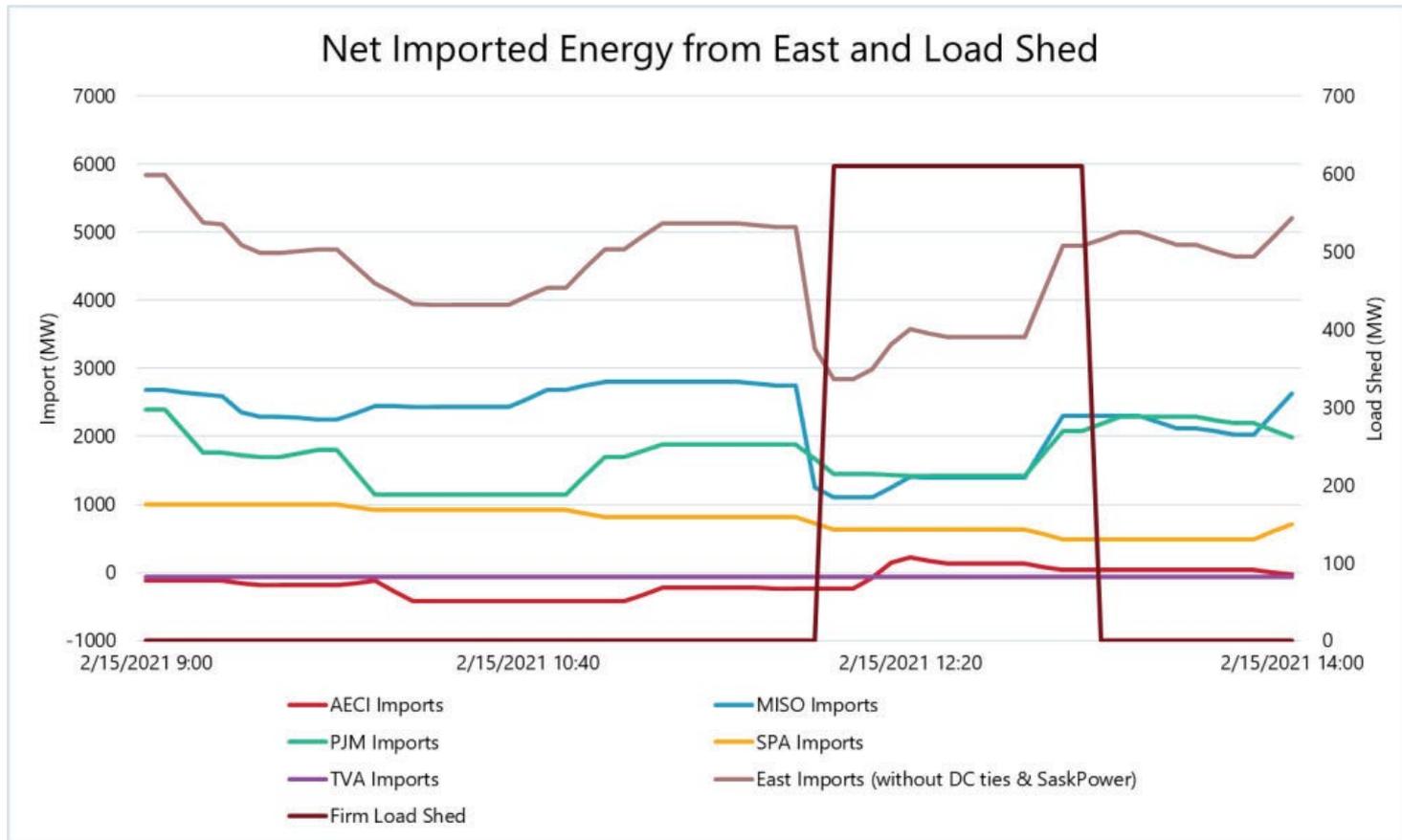
On average during the EEA periods, Coal provided 43.45%, Gas 26.09%, Imports 10.48%, Wind 8.96%, Nuclear 5.36%, All Others 5.66%

Evergy Energy Production During Uri



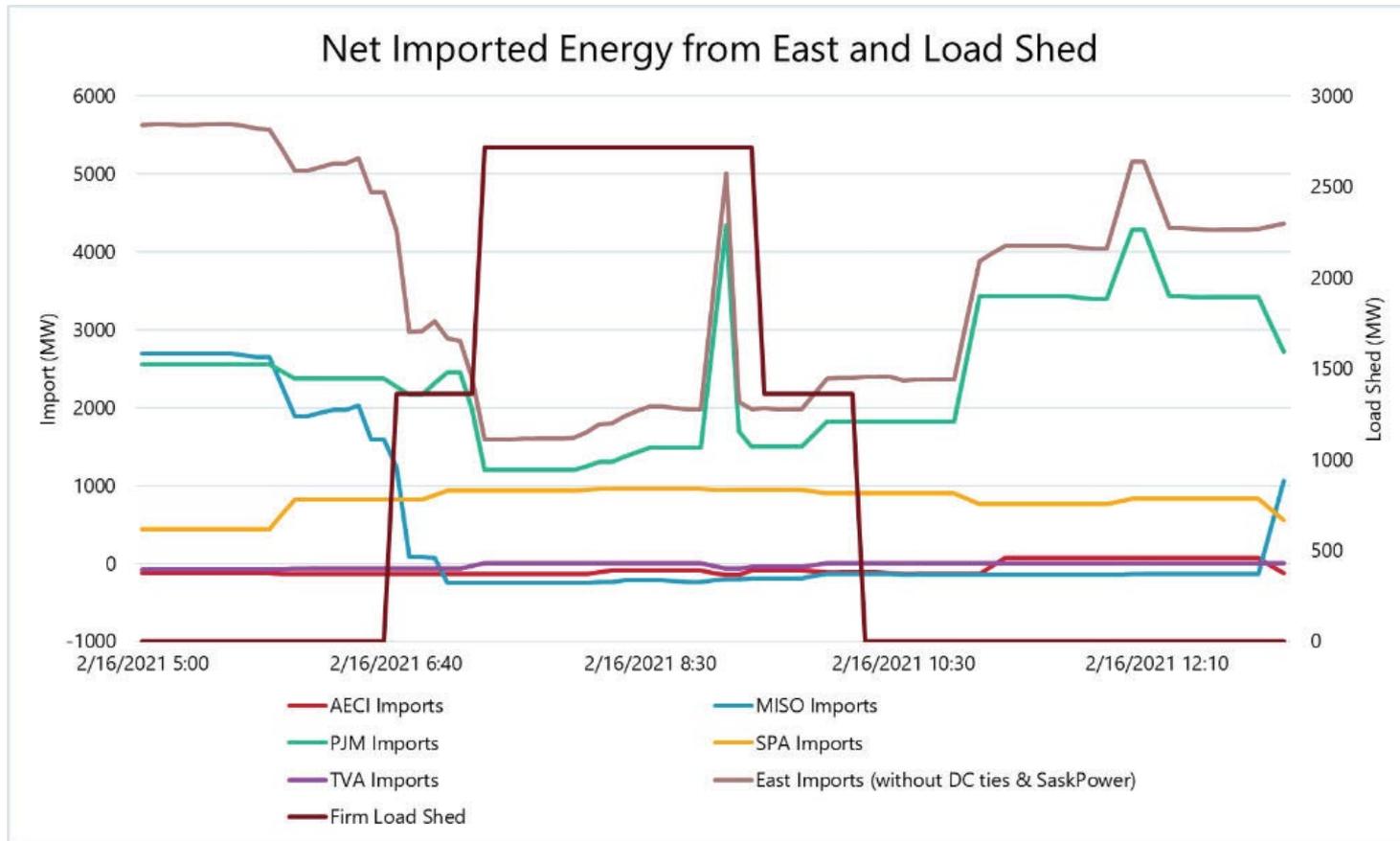
On average during the EEA3 periods, Evergy’s energy production was: Coal provided 64.14%, Nuclear 15.83%, Wind 7.20%, Gas 7.11%, Fuel-Oil 5.34%, Hydro .38%

Importance of Imports During Uri



This graph shows the load shed that occurred in SPP on Feb. 15th. Just prior to the load shed, SPP was importing more than 5000 MW of power from our neighbors. When these imports were cut by 2000 MW, SPP directed 610 MW load shed. SPP Board Report Pg. 67

Importance of Imports During Uri



This graph shows the load shed that occurred in SPP on Feb. 16th. Just prior to the load shed, SPP was importing more than 5000 MW of power from our neighbors. When these imports were cut by 3000 MW, SPP directed 2718 MW load shed. SPP Board Report Pg. 67

KCC Proceedings on Winter Storm Uri

- On February 15, 2021, the Commission issued an Emergency Order requiring:
 - Utilities to coordinate efforts and take all reasonably feasible, lawful, and appropriate actions to ensure adequate transportation of natural gas and electricity to interconnected, non-jurisdictional Kansas utilities.
 - Jurisdictional natural gas and electric utilities were ordered to do everything necessary to ensure natural gas and electricity serviced continued to be provided to their customers in Kansas.
 - Extraordinary costs were ordered to be accumulated in a deferred “regulatory asset” account, with carrying charges.
 - Once the Event ended, and after all costs have been accumulated and recorded, each jurisdictional utility was directed to file a compliance report detailing the extent of such costs incurred, and present a plan to minimize the financial impacts of this event on ratepayers over a reasonable time frame.
- On March 9, 2021, the Commission opened general investigation dockets for each affected regulated utility.
 - Dockets were opened for Evergy, Empire, Southern Pioneer, Black Hills, KGS, Atmos Energy, and American Energies.
- All Kansas utilities but Empire have submitted a compliance plan, Empire has a rate case pending and several other regulatory matters pending in Missouri and other states. Its plan is expected soon.

KCC Proceedings on Winter Storm Uri

- Staff, CURB and other intervenors are investigating each Utility in the following areas:
 - Preparation for the Event, Actions During the Event, Lessons Learned;
 - Reasonableness of costs incurred;
 - Strategies to mitigate cost exposure during the event and going forward;
 - Customer communications, areas for improvement; and
 - Operational performance during the Event, areas for improvement.
- We opted for individual company specific investigations to tailor the approach for each company, and to manage market-sensitive confidential data for each company.

KCC Proceedings on Winter Storm Uri

Cost Recovery Compliance Plans Filed:

- 21-EKME-329-GIE—Evergy:
 - Evergy Central, \$153.2 million --\$4.69/month for residential customers for 2 years
 - Evergy Metro, \$41.4 million *benefit* --\$9.70/month bill *reduction* for residential customers for 1 year.
- 21-KGSG-332-GIG—KGS: \$366.2 million
 - \$5-\$9/month residential customers depending on time for repayment (5-10 years)
- 21-BHCG-334-GIG—Black Hills: \$87 million
 - \$11.47/month on average for residential customers for five years
- 21-ATMG-333-GIG—Atmos: \$88 million
 - \$4-\$5.56/month residential customers depending on time for repayment (10-15 years)
- 21-SPEE-331-GIE—Southern Pioneer: \$16.8 million
 - \$7.89/month on average for residential customers, for three years
- 21-AEGG-335-GIE—\$252,762 for 186 customers
 - Individual balances tracked, on average \$19/month for residential customers over five years
- City of Eskridge—KMEA Supplied: \$1,124,331, for 867 customers (including Harveyville)—Approved rate is \$2.54/Mcf for 10 years.

KCC Proceedings on Winter Storm Uri

Status of Compliance Plans:

- 21-EKME-329-GIE—Evergy:
 - Staff will file R&R soon (as early as this week)
- 21-KGSG-332-GIG—KGS:
 - Settlement filed on November 19, 2021. Hearing held December 17, 2021. Order expected by February 8, 2022. Decision pending, KGS will file for securitization if approved (maximum 180 days schedule).
- 21-BHCG-334-GIG—Black Hills:
 - Settlement filed on November 9, 2021. Hearing held December 7, 2021. Decision on Settlement pending before Commission. Order expected by Jan. 27, 2022.
- 21-ATMG-333-GIG—Atmos: \$88 million
 - Discovery, Review ongoing. Hearings in March or April (depending on whether settlement is reached). Order by April or June. Securitization filing to follow.
- 21-SPEE-331-GIE—Southern Pioneer:
 - Staff R&R filed on Dec 20, 2021. CURB's response on 12/30, awaiting company reply/Commission order.
- 21-AEGG-335-GIE—Settlement filed June 18, 2021—Order approving July 8, 2021.
- City of Eskridge— Settlement filed June 29, 2021—Order approving July 13, 2021.

KCC Proceedings on Winter Storm Uri

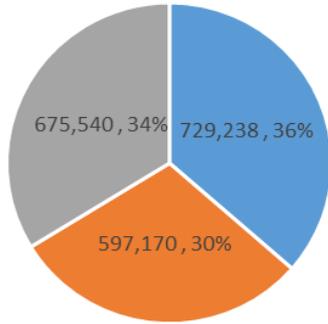
- 21-KGSG-332-GIG—In addition to KGS' financial plan, KGS filed a motion to waive penalty multipliers for transportation customers/gas marketers that failed to deliver gas in sufficient quantities during the Event.
 - Motion for Waiver filed on May 28, 2021—Request to reduce penalties for non-compliance from \$888 million to \$117 million (assumed cost of gas in the tariff).
 - On October 8, 2021, all parties but one filed a settlement agreement to further reduce penalties to \$99,695,692, to match KGS' actual gas costs incurred during the Event. The settlement also allowed for \$22.39 million in compensation for transportation customers/marketers that provided a benefit to the system by contributing more gas than they used during the event.
 - Any KGS collection of total \$77.3 million in penalties will go to offset sales customer costs during the storm. KGS doesn't keep these penalties.
 - One party that owes the most in penalties under the settlement is contesting. Hearings next week (Jan. 19-20).

Lessons Learned So Far—Gas Costs

- The financial impact of Uri on utilities in Kansas was not uniform.
 - This can be seen by comparing the total cost of gas for Feb. 2021 across utilities:
 - KGS—\$30.93/MMBtu, Black Hills—\$39.70/MMBtu, Atmos—\$39.32/MMBtu, American Energies—\$46.57/MMBtu, Eskridge \$92.59/MMBtu.
- In general, the more storage, or baseload/first of the month priced gas the utility had access to during the event, the better they fared. These options aren't free, some come with significant fixed reservation charges.
- Diversity of suppliers and pipelines made a big difference too. The more exposure to Southern Star daily prices, generally the worse financial impact.
- Not every utility has equal access to the natural gas market. Suppliers will offer some utilities a contract that others can't get. Size and financial stability matter.
- Big three (KGS, Atmos, Black Hills) all use hedging, storage, spot market in balanced fashion, which avoided worse outcomes. Hedging was successful for the gas that it covered. Very difficult/expensive to hedge or avoid exposure to daily physical gas market.
- All three have made changes to contracting strategies, purchasing strategies, storage management, etc. to minimize future exposure. Within the confines of existing hedging budgets, further exposure mitigation being considered. Will not be cheap.

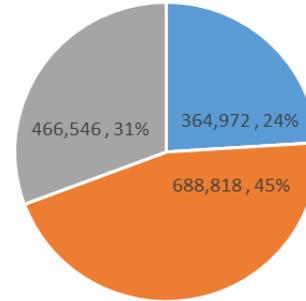
Balanced Purchasing Strategies Helped

Atmos Purchased/Storage Gas Volumes
Feb. 9-21, 2021



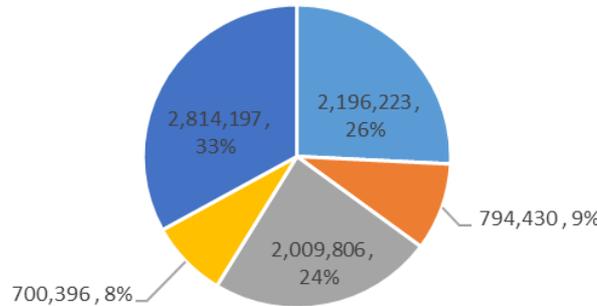
■ Baseload Purchases ■ Swing Purchases ■ Storage

Black Hills Purchased/Storage Gas Volumes
Feb. 9-22, 2021



■ Baseload Purchases ■ Swing Purchases ■ Storage

KGS Purchased /Storage Gas Volumes
Feb. 9-21, 2021



■ Baseload ■ FOTM Calls ■ GDD Calls ■ Spot Deals ■ Storage Withdrawal

Lessons Learned (SPP Review)

- SPP Formed Comprehensive Review Task Force. Which culminated in 22 recommendations in the areas of Fuel Assurance, Resource Planning and Availability, Seams Agreements (with neighboring RTOs), Transmission Planning and Others.
- TIER 1 recommendations are:
 - Fuel Assurance:
 - Develop policies that enhance fuel assurance to improve the availability and reliability of generation in the SPP region.
 - 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 and affordably available during extreme events.
 - Resource Planning and Availability:
 - Perform initial and ongoing assessments of minimum reliability attributes needed from SPP's resource mix.
 - Improve or develop policies, which may include required performance of seasonal resource adequacy assessments, development of accreditation criteria, incorporation of minimum reliability attribute requirements, and utilization of market-based incentives that ensure sufficient resources will be available during normal and extreme conditions

Lessons Learned (SPP Review)

- These recommendations are being carried out by the Improved Resource Availability Task Force (IRATF).
- Kansas is represented through our Cost Allocation Working Group member, former Commissioner Shari Feist Albrecht.
- Sunflower Electric Power Corporation and Evergy also have a member on the IRATF.
- SPP has reduced the amount of allowed planned outages for this upcoming winter.
- Also has improved forecasting methods, extreme weather assessments practices.

Lessons Learned (FERC/NERC Review)

FERC/NERC Report on Winter Weather Event

- 28 recommendations, including the following key recommendations:
- New mandatory reliability standards requiring the following:
 - Generator Owners (GOs) to identify and protect cold-weather-critical components;
 - GOs to retrofit existing generating units, and when building new generating units, to operate to specific ambient temperatures and weather based on extreme temperature and weather data, and account for effects of precipitation and cooling effect of wind;
 - GOs/ Generator Operators (GOPs) to perform annual training on winterization plans;
 - GOs that experience freeze-related outages to develop Corrective Action Plans;
 - GOs/GOPs to provide the Balancing Authority (BA) with the percentage of the total generating unit capacity that the BA can rely upon during the “local forecasted cold weather”; and
 - GOs to account for effects of precipitation and accelerated cooling effect of wind when providing temperature data to BAs.
- Congress, state legislatures and regulatory agencies with jurisdiction over natural gas infrastructure facilities should require those natural gas facilities to implement and maintain cold weather preparedness plans;
- Natural gas infrastructure facilities should undertake voluntary measures to prepare for cold weather;
- GOs/GOPs should identify the reliability risks related to their natural gas fuel contracts so that they can provide the BAs with the percentage of total generating unit capacity that the BA can rely upon during the “local forecasted cold weather”
- Critical natural gas infrastructure should be protected from manual and automatic load shedding and natural gas infrastructure should be prohibited from offering load into demand response programs.

Lessons Learned (KCC Staff Review)

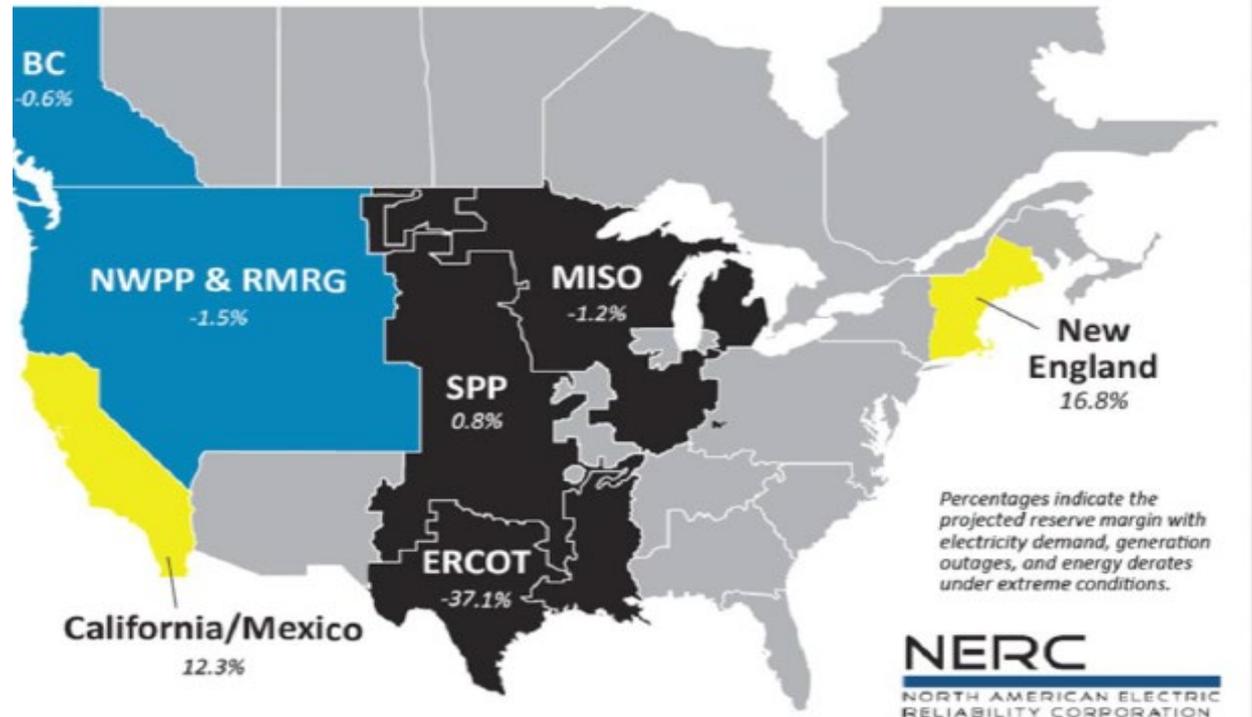
Staff Recommendations in Evergy R&R to be filed this week: Evergy should formally evaluate the feasibility/economics of the following, with the results presented in a compliance filing with the Commission:

- Avoid any scheduled outages of baseload units during winter season (Dec-Feb);
- Additional coal pile winterization techniques, including larger minimum coal piles, earlier coal conservation if piles run low due to rail traffic issues, “emergency piles” of severely sloped and treated winter coal;
- De-icing techniques or manufacturer upgrades/retrofits to wind farms to allow colder weather operations;
- Addition of LNG Storage tanks at gas-fired generators, additional onsite fuel oil for dual-fuel operations, or retrofit of gas units to add dual fuel capability;
- Identify critical natural gas infrastructure, add to critical circuit list to be exempted from load shed if possible;
- Conduct additional review and communications around interruptible customer load to consider winter interruptions;
- Revise customer communication protocols to proactively communicate Energy Emergency Alerts from SPP anytime SPP reaches EEA-2; and
- Revise customer communication protocols to include economic concerns, in addition to reliability messaging.

Winter Reliability Assessments

SPP/NERC 2021-2022

- In November of 2021, NERC released its Winter Reliability Assessment for the current winter.
- NERC made several changes to its extreme weather scenarios to evaluate the risk to reliability of a repeat of Winter Storm Uri.



- While a lot of work remains to be done in SPP, they are the only RTO out of SPP, MISO, ERCOT, that would have positive reserve margins (albeit slim) with a repeat of URI, according to this assessment.
- Under emergency conditions, we would be required to import up to 2GW from MISO, down from 4GW net during Uri.

Questions??

