A Debrief of the Texas Power Outages & The Financial & Policy Implications

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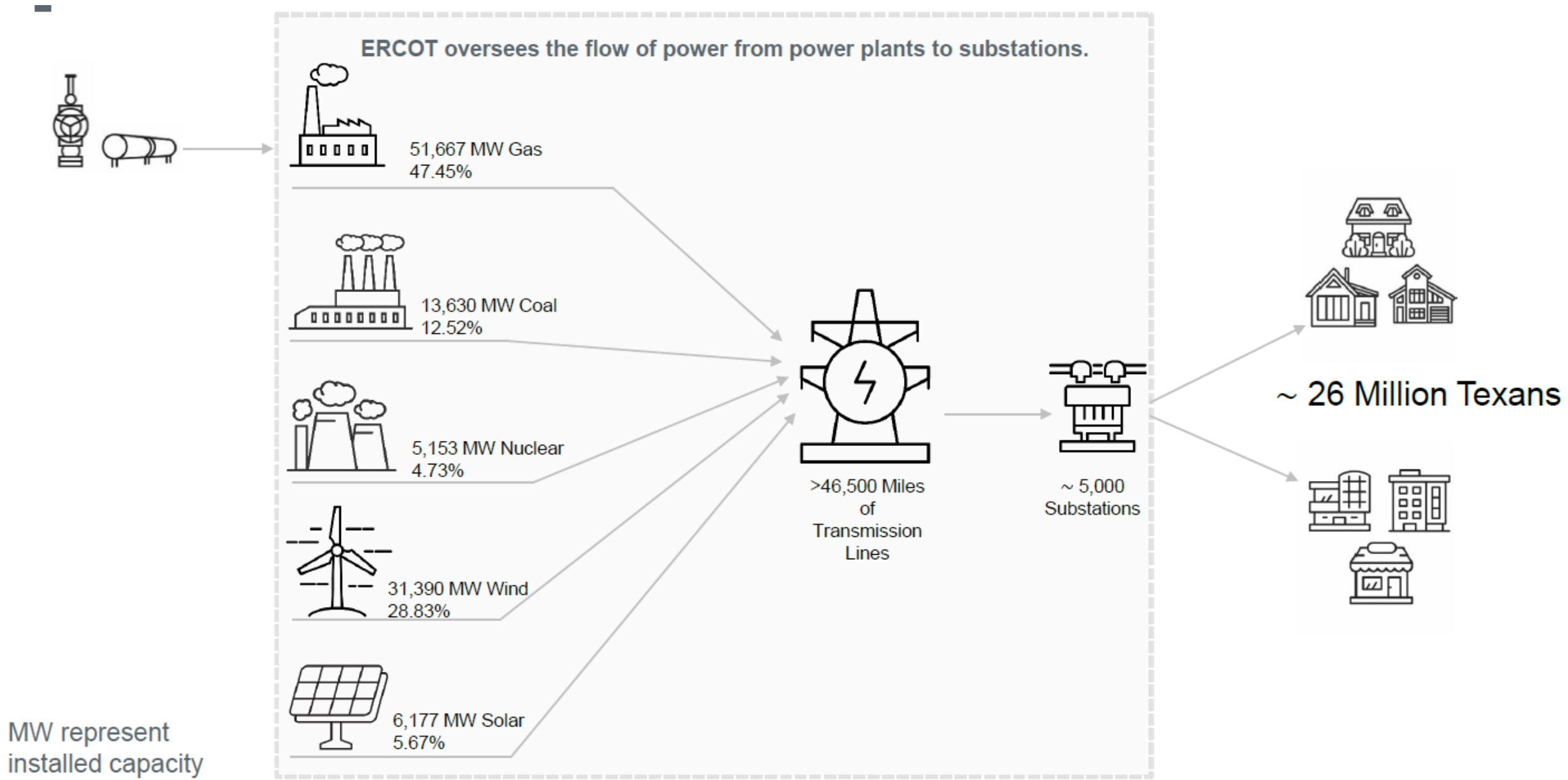
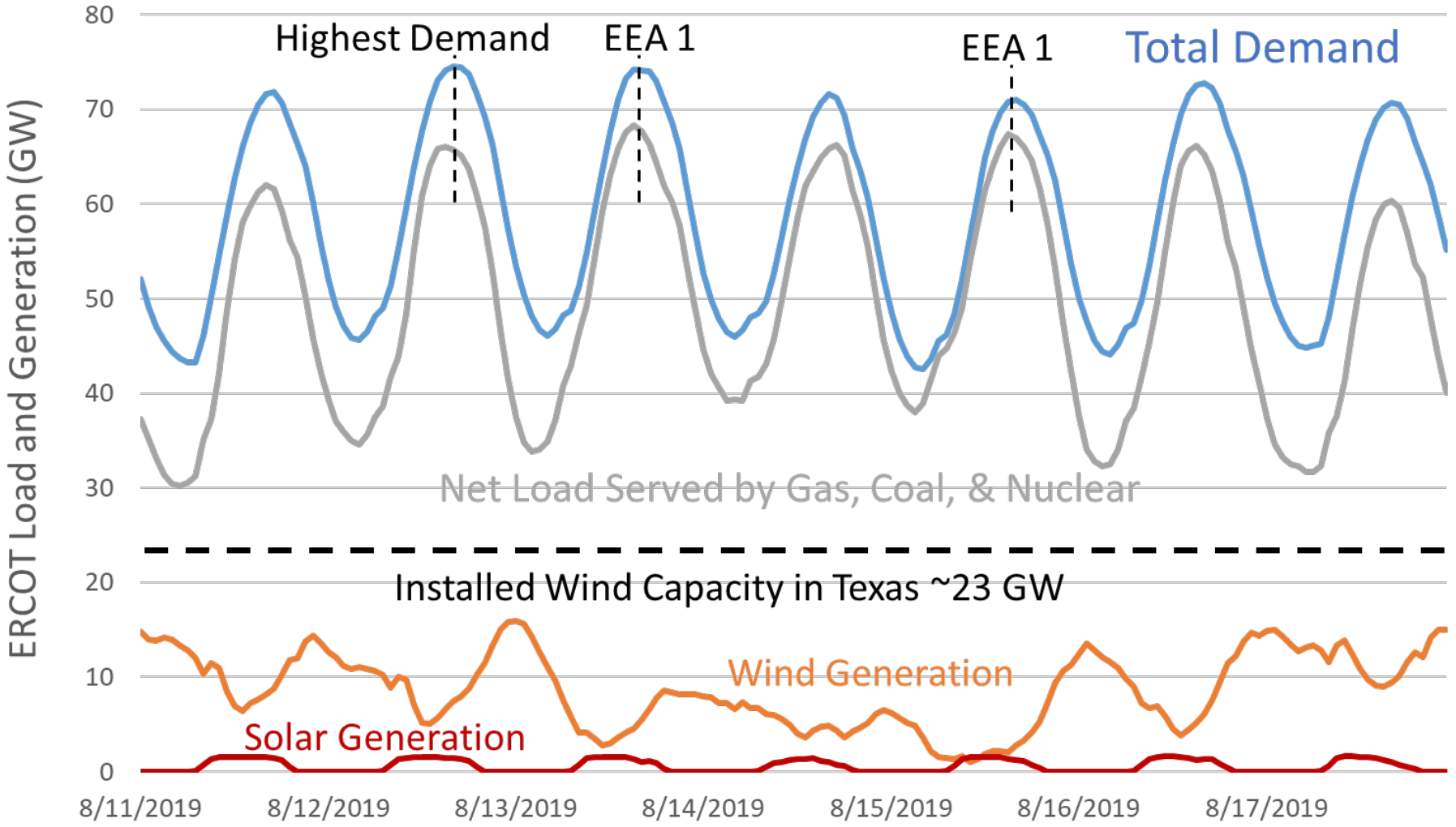

ERCOT oversees the flow of power from power plants to substations.
51,667 MW Gas
47.45%
13,630 MW Coal
12.52%
5,153 MW Nuclear
4.73%
31,390 MW Wind
28.83%
6,177 MW Solar
5.67%
>46,500 Miles of Transmission Lines
~ 5,000 Substations
~ 26 Million Texans
MW represent installed capacity

We Have Been Dodging the Bullet for Several Summers



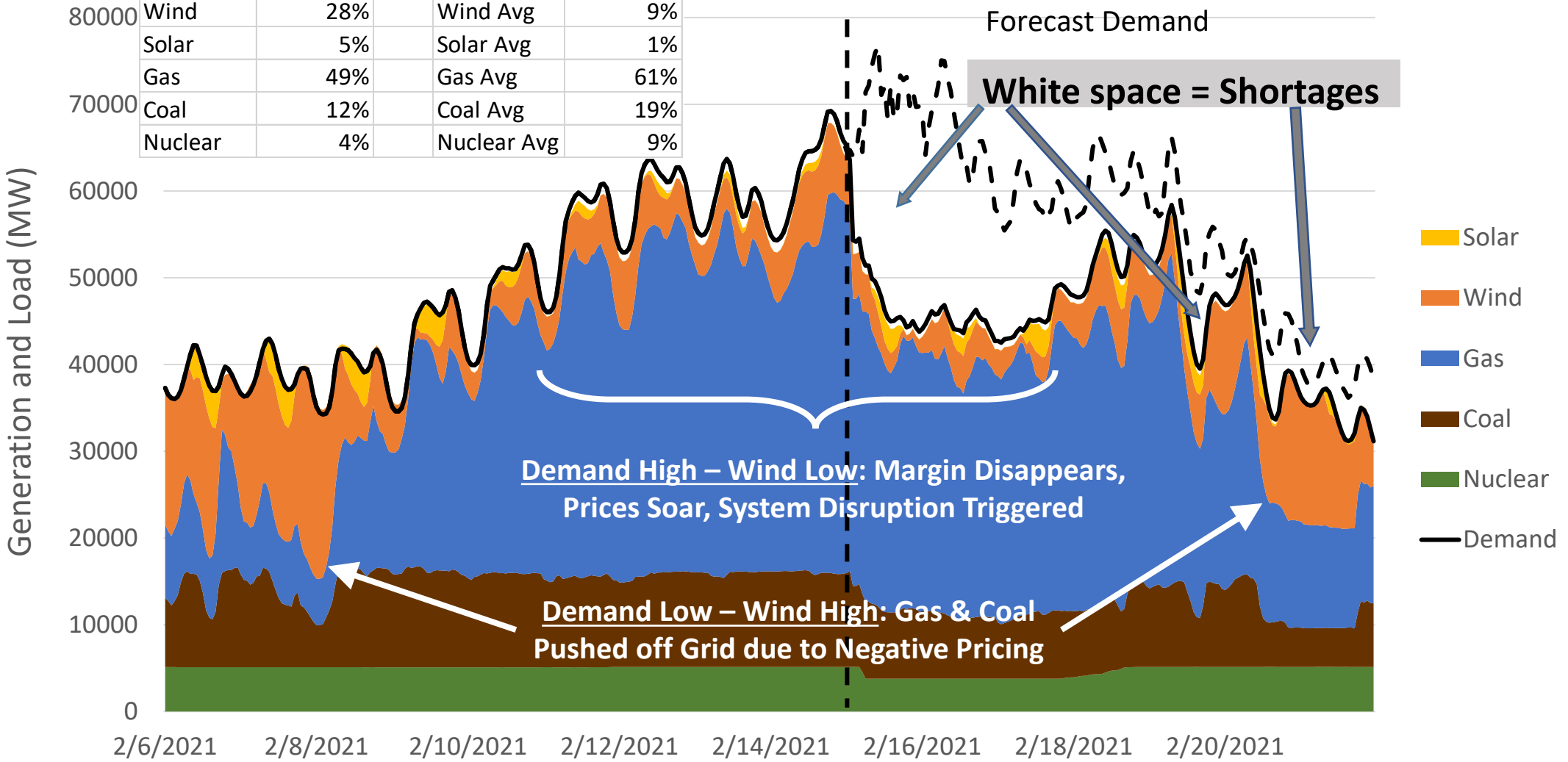
In August 2019, the EEA 1 events occurred on days following the day of highest demand.

Had the wind been low on the day of highest demand, a shortage would have occurred in both 2019 and 2020.

Source: ERCOT
For more information, visit lifepowered.org.

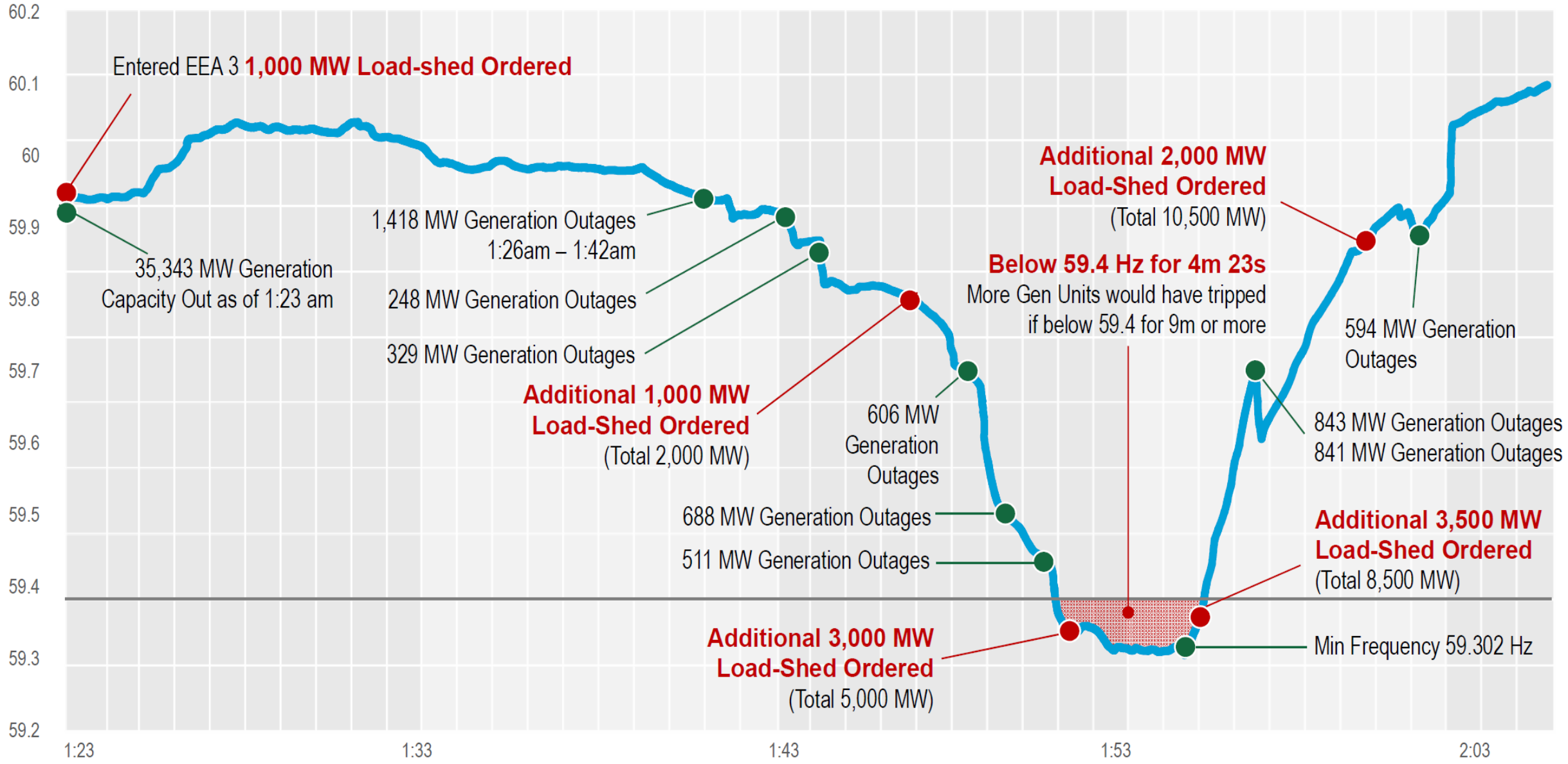
The Bullet Hit Texas This Time: February 15 – 19

Installed Capacity			February 9-19	
Wind	28%		Wind Avg	9%
Solar	5%		Solar Avg	1%
Gas	49%		Gas Avg	61%
Coal	12%		Coal Avg	19%
Nuclear	4%		Nuclear Avg	9%

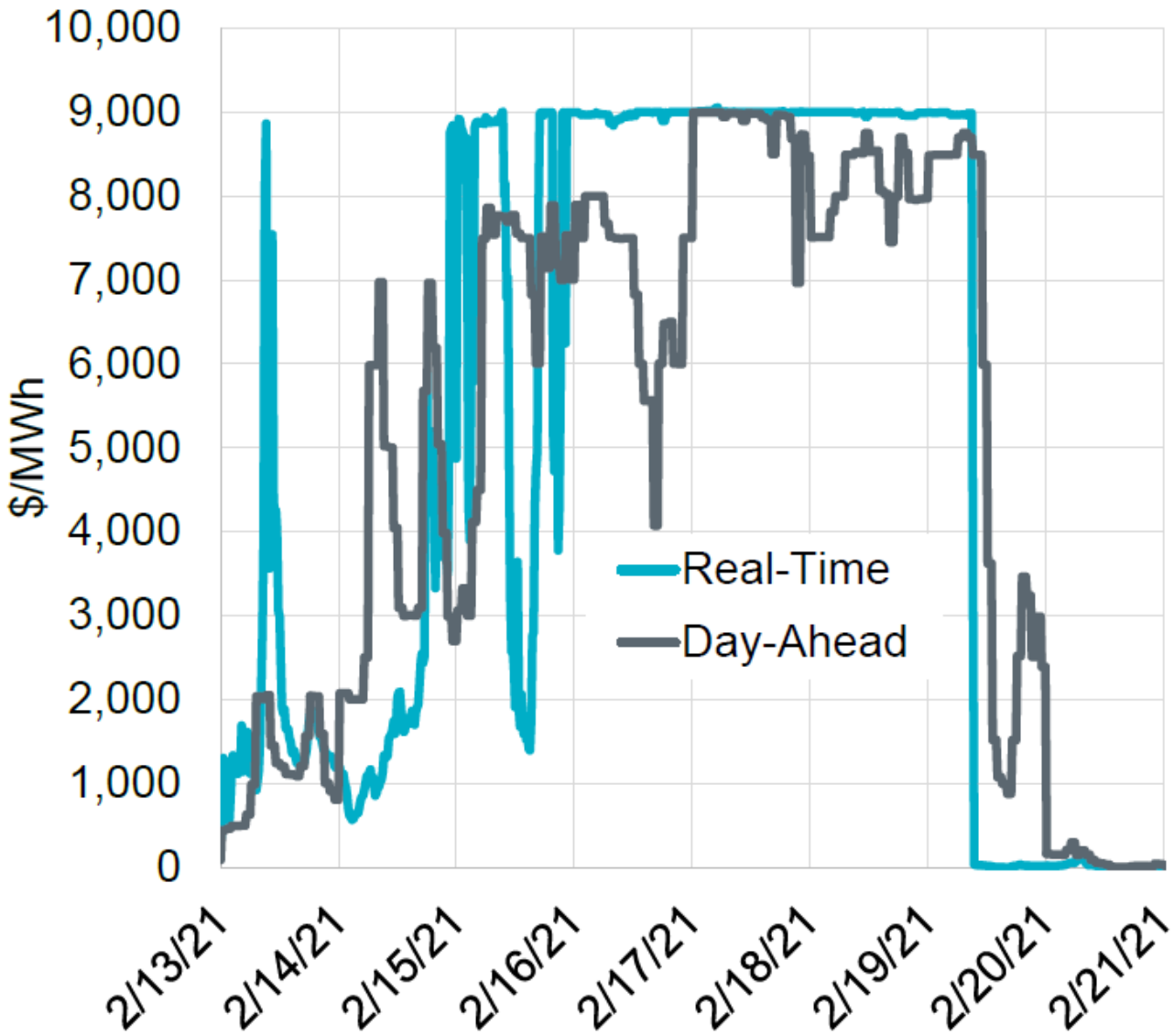


Source: Energy Information Administration Hourly Grid Monitor
For more information, visit lifepowered.org.

The Night the Grid Almost Went Down for a Month



Real-Time and Day-Ahead System-Wide Pricing

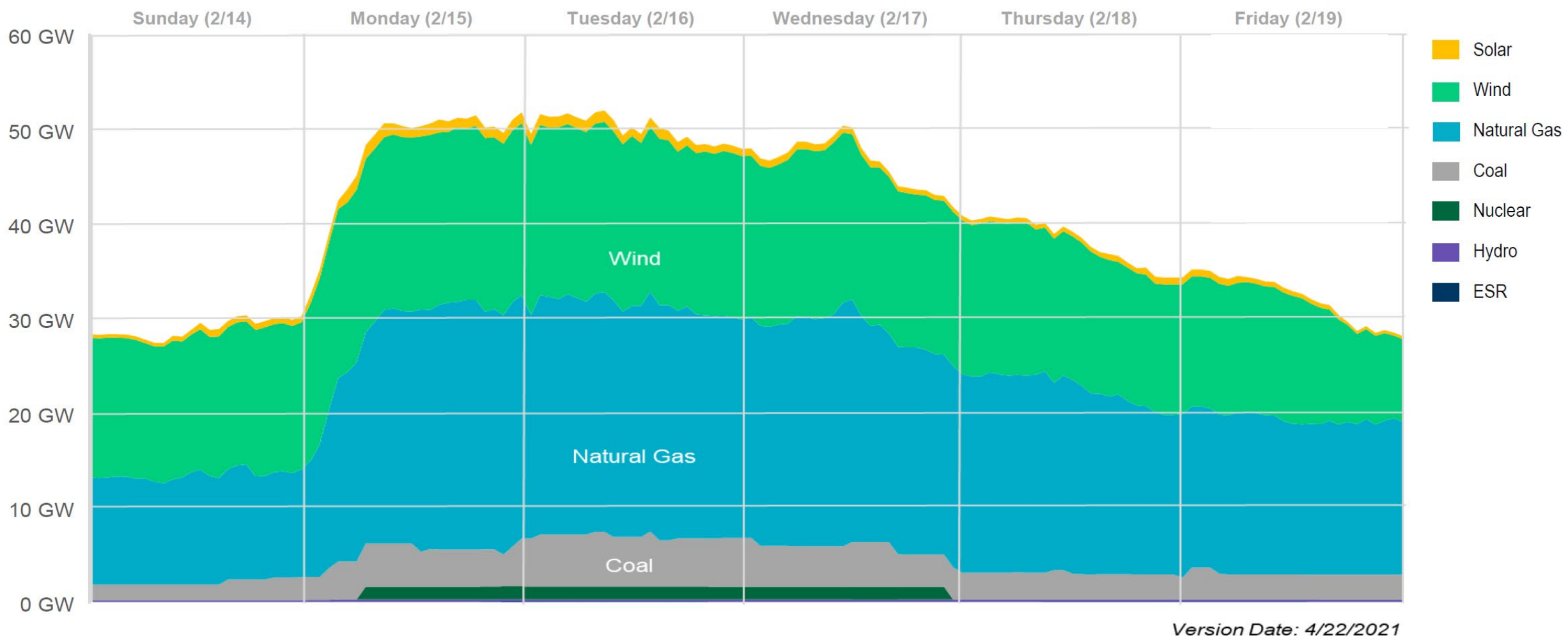


Average system-wide pricing around the event relative to other historical periods (in $/MWh)

Date Range	Real-Time	Day-Ahead
2/14/21 2/19/21	$6,579.59	$6,612.23
January '21	$20.79	$21.36
February '20	$18.27	$17.74

The ERCOT Market Exchange Value During the ONE WEEK (of Winter Storm Uri Was Larger than the PRIOR 4 YEARS COMBINED

Net Generator Outages and Derates by Fuel Type (MW)



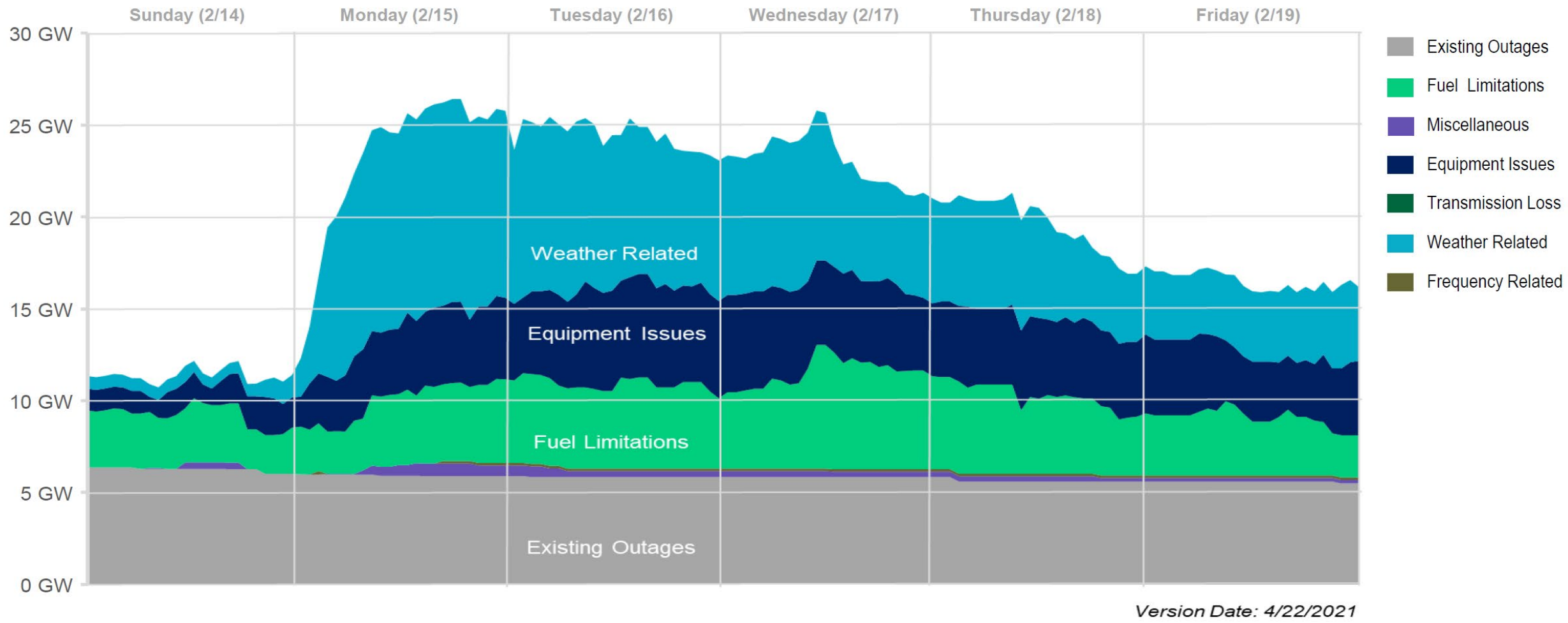
Outage and derate MW for Wind in this graph are based on capacity.

Outage and Derate Causes by Sub-causes

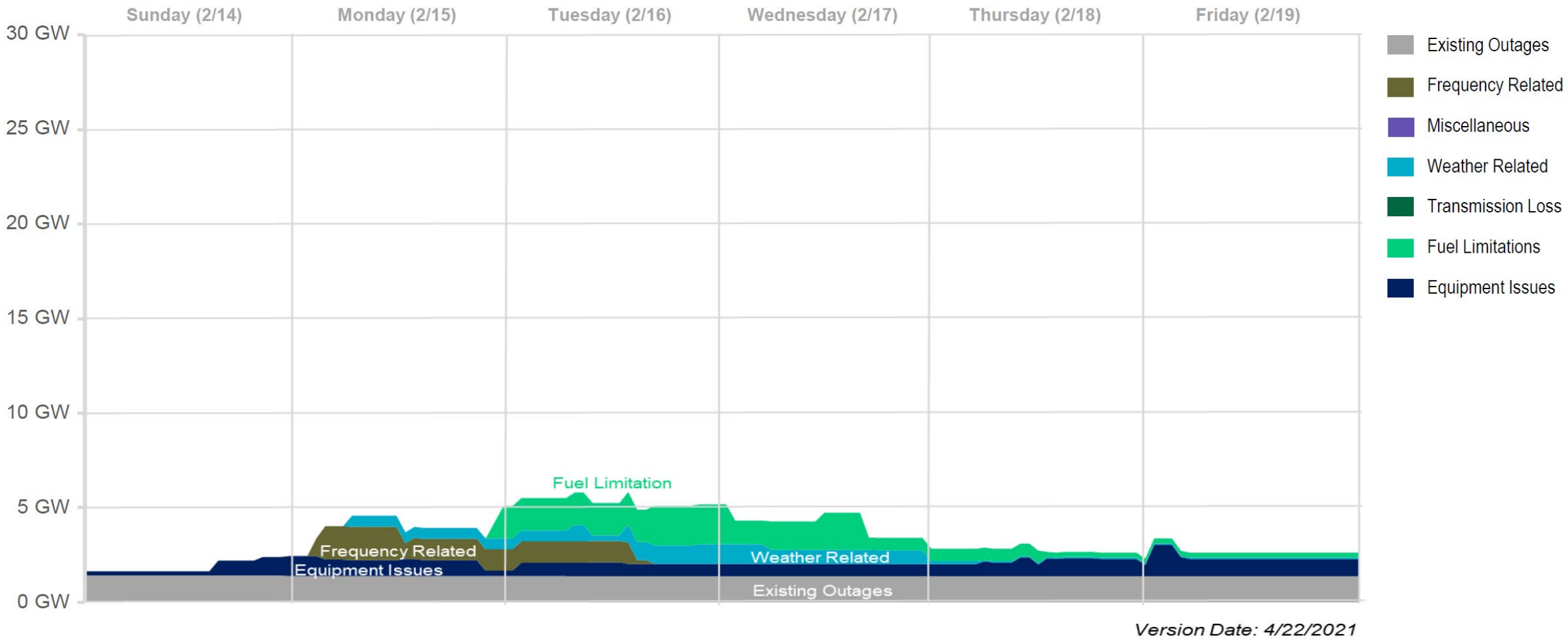
ERCOT has further divided the Weather Related and Fuel Limitations cause categories into sub-categories of causes. These subcategories are as follows:

- **Weather Related**
  - Boiler Feed Pump Issues
  - Boiler Leaks
  - Condensate System Issues
  - Control System Issues
  - Frozen Equipment (General)
  - Frozen Sensing Lines
  - Frozen Valves
  - Frozen Water Lines
  - High Exhaust Temperatures
  - Temperature Limits (non-IRR)
  - Solar Low Temperature Limits
  - Wind Low Temperature Limits
  - Solar Panel Snow/Icing
  - Wind Turbine Blade Icing
  - Other

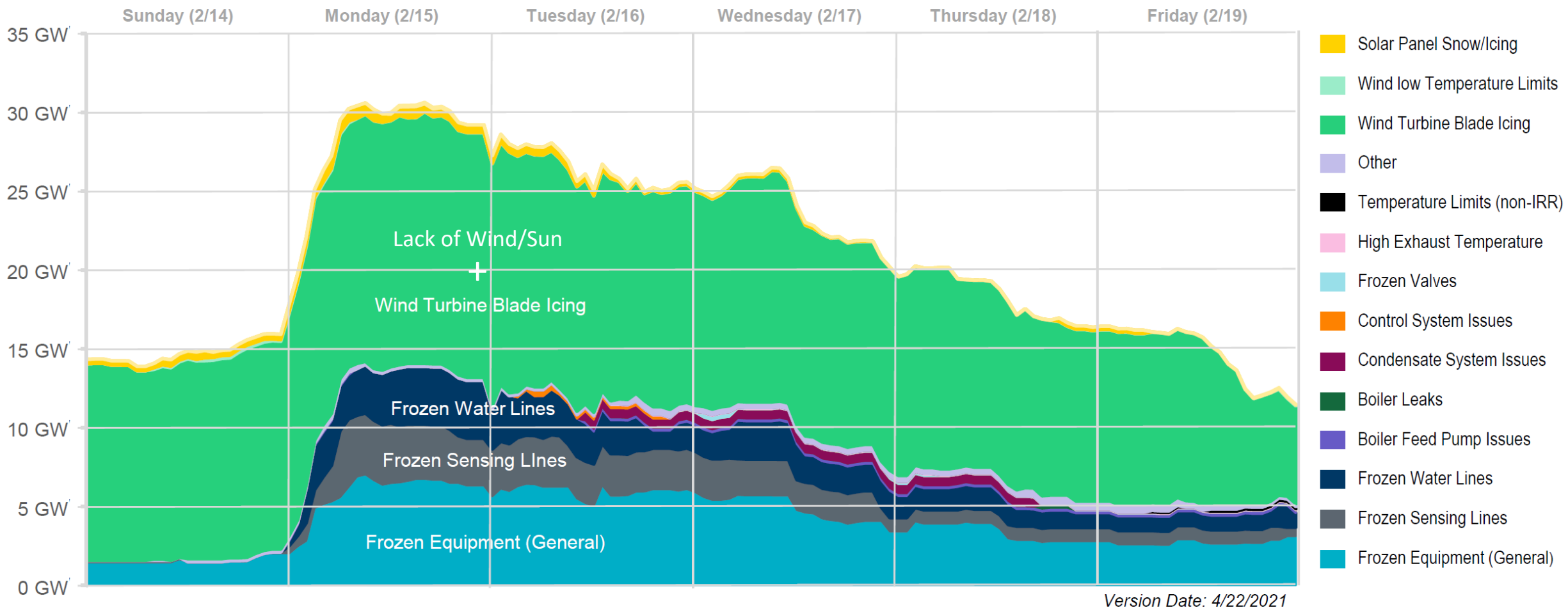
Net Generator Outages or Derates for Natural Gas Generators by Cause



Net Generator Outages or Derates for Coal Generators by Cause



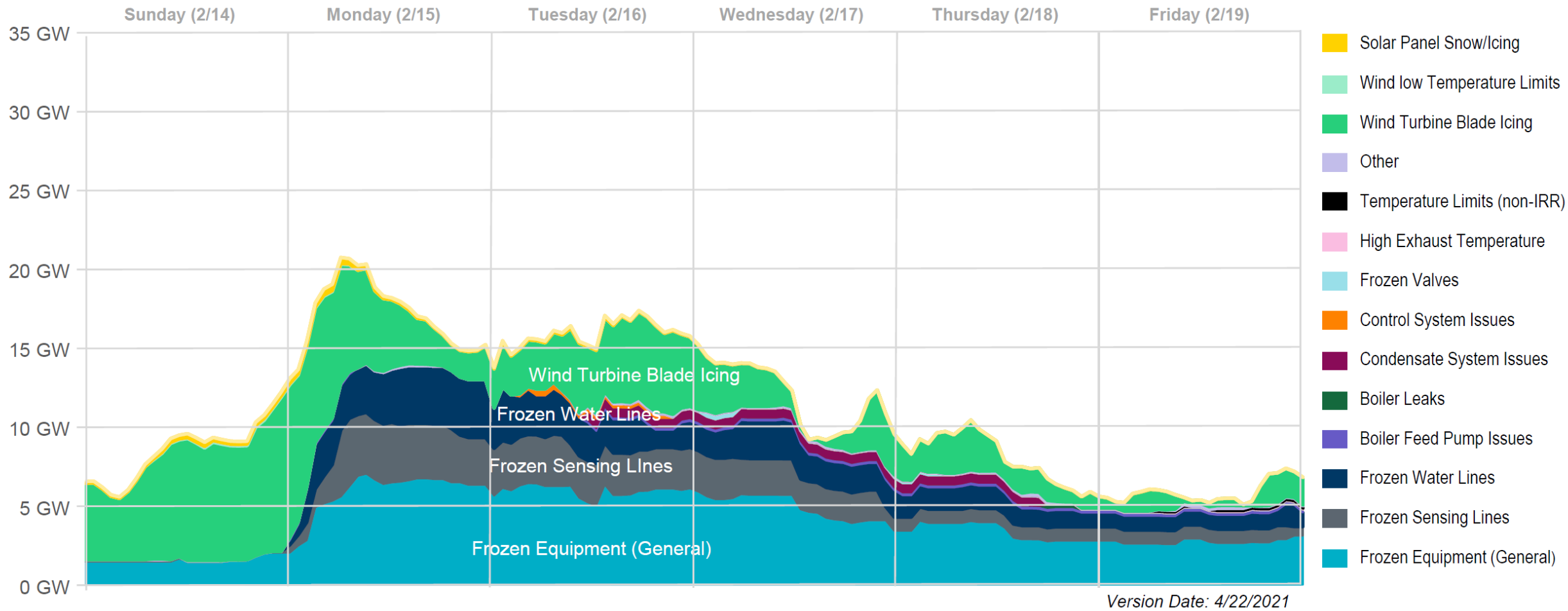
Weather Related Generator Outages and Derates by Sub Cause



Version Date: 4/22/2021

Outage and derate MW for wind and solar are based on capacity.

Weather Related Generator Outages and Derates by Sub Cause

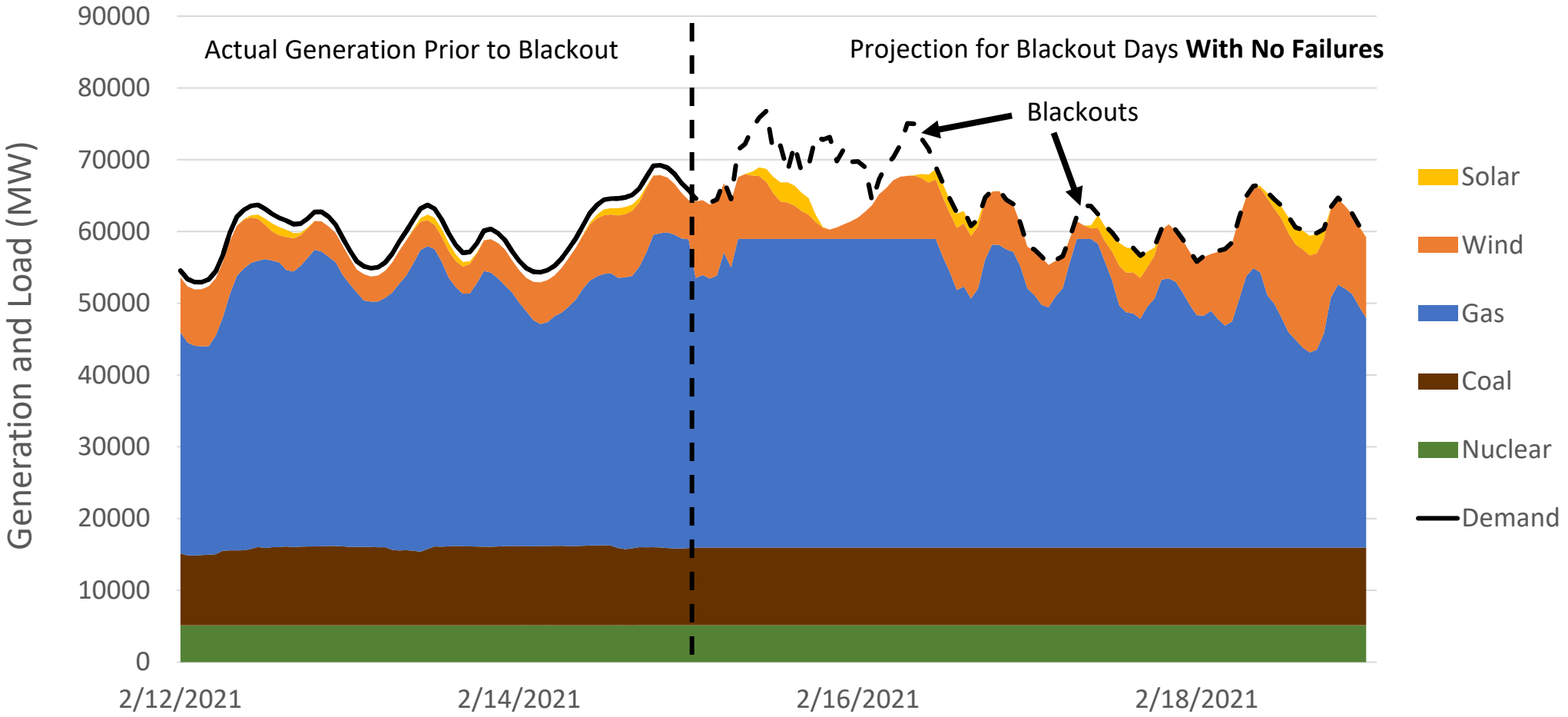


Version Date: 4/22/2021

Outage and derate MW for wind are estimated based on the proportion of total outaged wind capacity assigned to each cause for each hour.

MYTH BUSTING: This Event Was NOT Just About Winterization – It Shows that Texas Has a Dispatchable Capacity Shortage

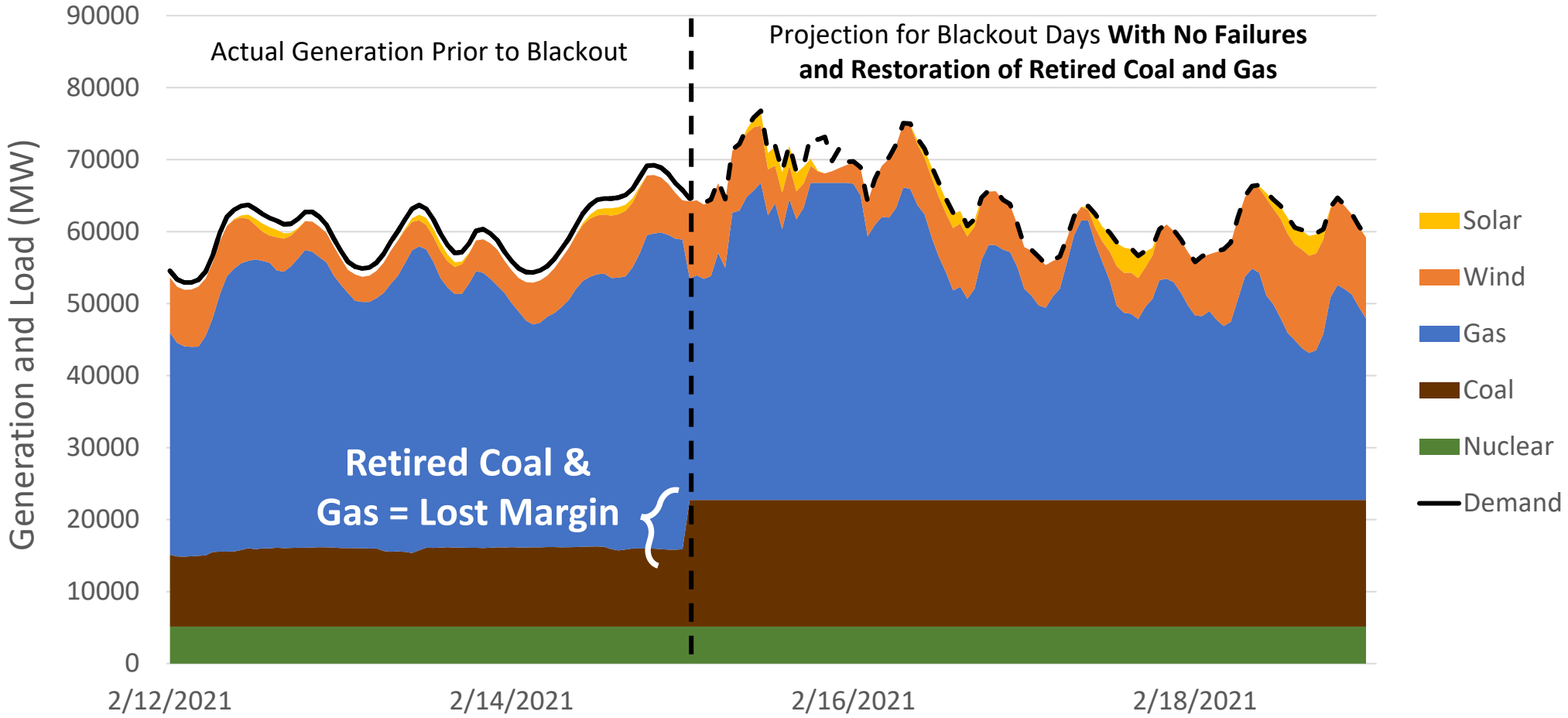
Texas would have still endured over 24 hours of outages ***even if all thermal remained online***



Source: Energy Information Administration Hourly Grid Monitor
For more information, visit lifepowered.org.

MYTH BUSTING: The Premature Retirement of Coal/Gas Over the Past Five Years WAS a Major Contributing Factor

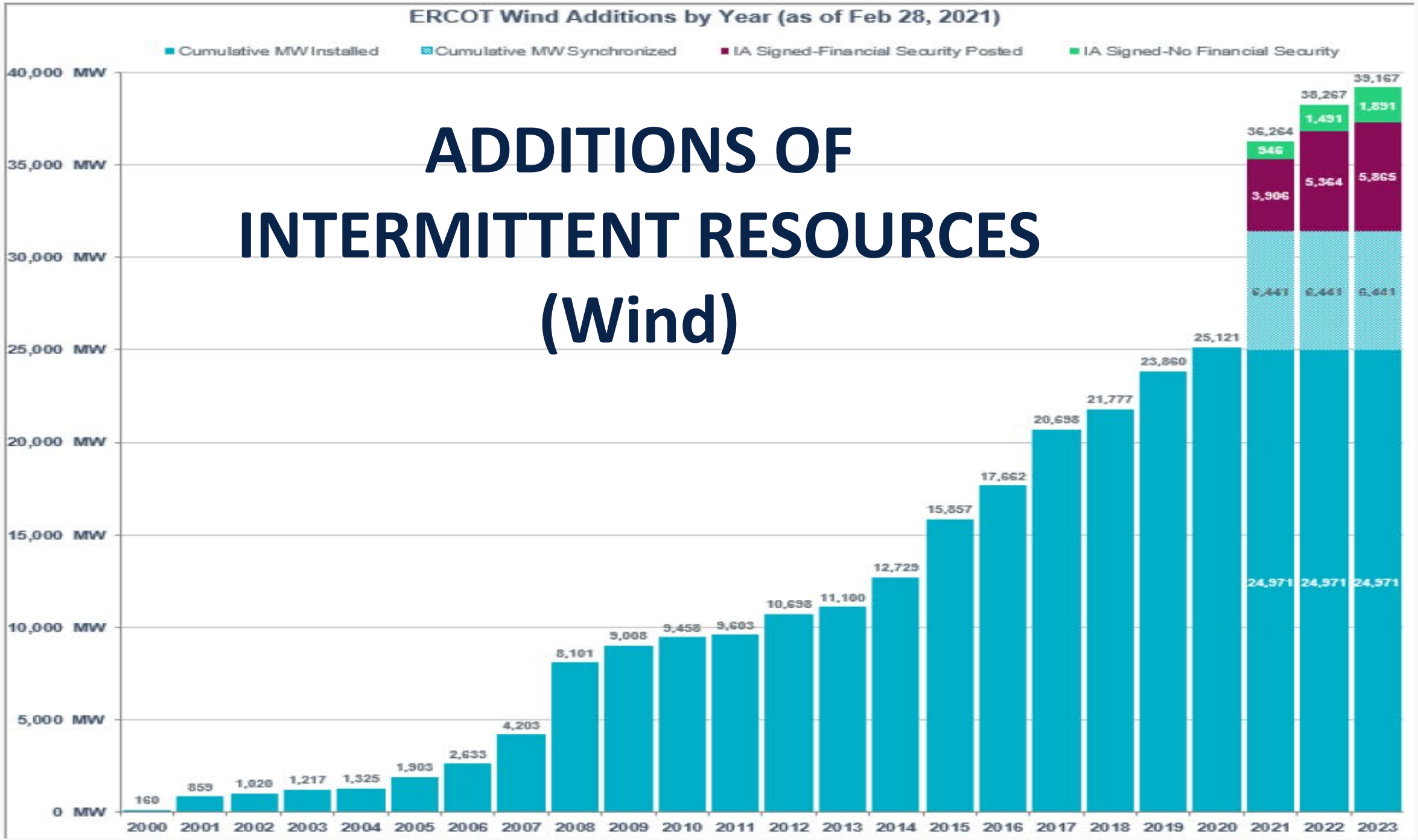
- There would have been 80% fewer hours of outages if they were still around



Source: Energy Information Administration Hourly Grid Monitor
For more information, visit lifepowered.org.

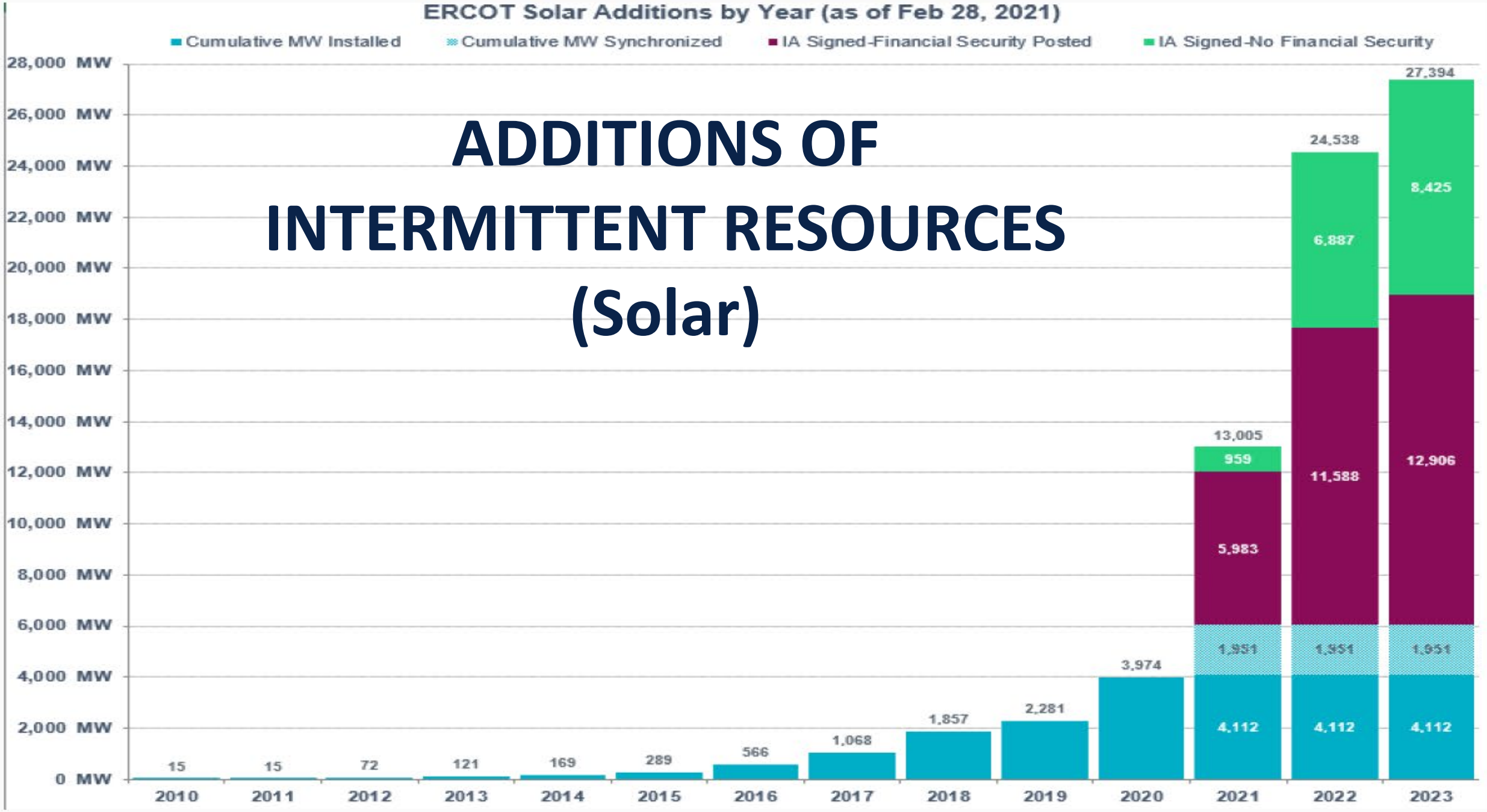
THE BUFFER WE LOST – 6200 MWs in 5 years

ID	Plant Name	Owner	State	Power Market	Capacity	Retire Date
6147-1	Monticello	Vistra	TX	ERCOT	535	Jan-18
6147-2	Monticello	Vistra	TX	ERCOT	535	Jan-18
6147-3	Monticello	Vistra	TX	ERCOT	795	Jan-18
6648-4	Sandow	Vistra	TX	ERCOT	600	Jan-18
52071-5	Sandow	Vistra	TX	ERCOT	600	Jan-18
3497-1	Big Brown	Vistra	TX	ERCOT	606	Feb-18
3497-2	Big Brown	Vistra	TX	ERCOT	602	Feb-18
6181-1	Deely	CPS San Antonio	TX	ERCOT	420	Dec-18
6181-2	Deely	CPS San Antonio	TX	ERCOT	420	Dec-18
6136-1	Gibbons Creek	TMPA	TX	ERCOT	470	Mar-19
127-1	Oklaunion	PSCo of OK	TX	ERCOT	650	Oct-20



ADDITIONS OF INTERMITTENT RESOURCES (Wind)

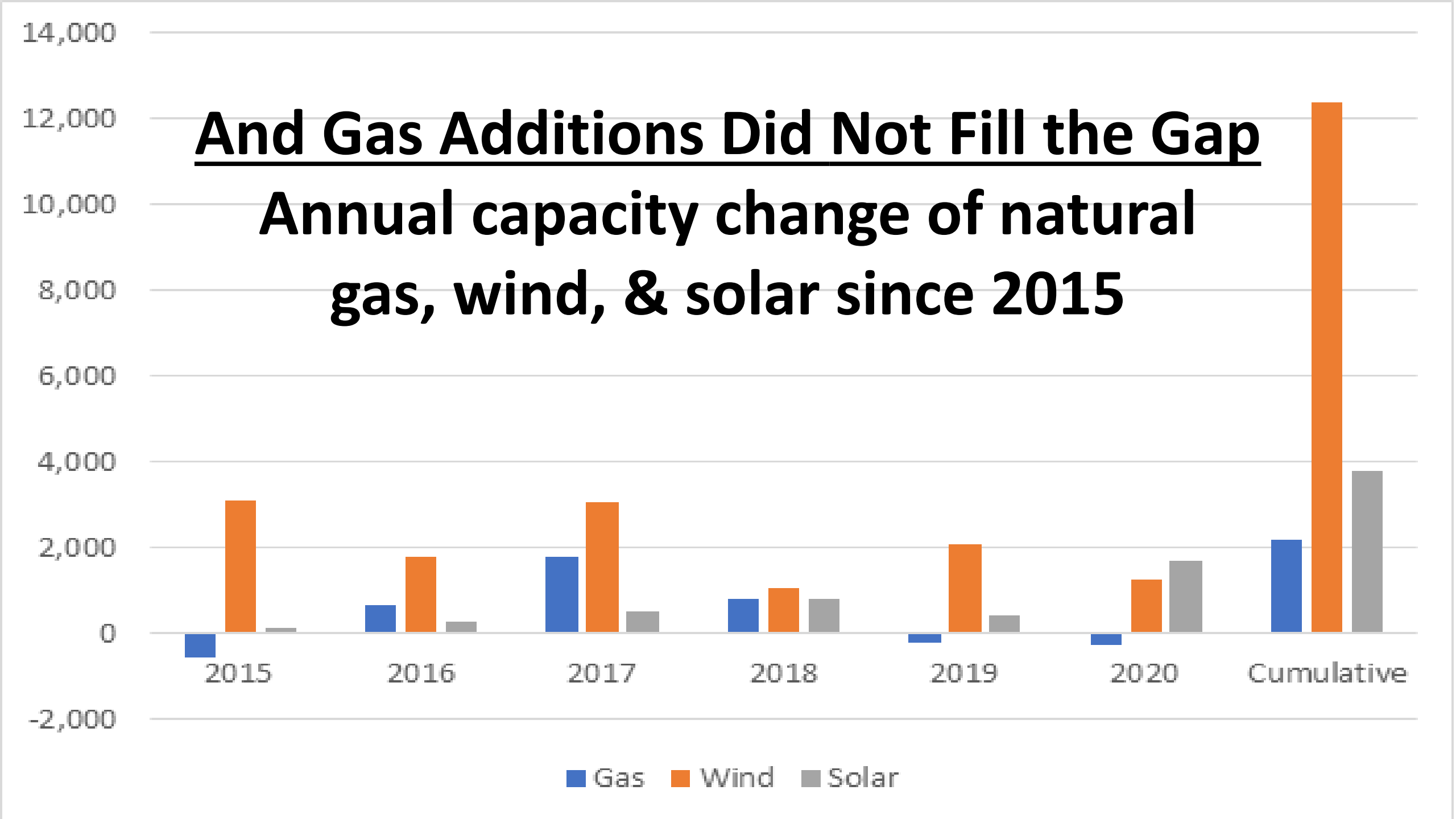
ADDITIONS OF INTERMITTENT RESOURCES (Solar)



Source: ERCOT Capacity Changes by Fuel Type Charts, February 2021

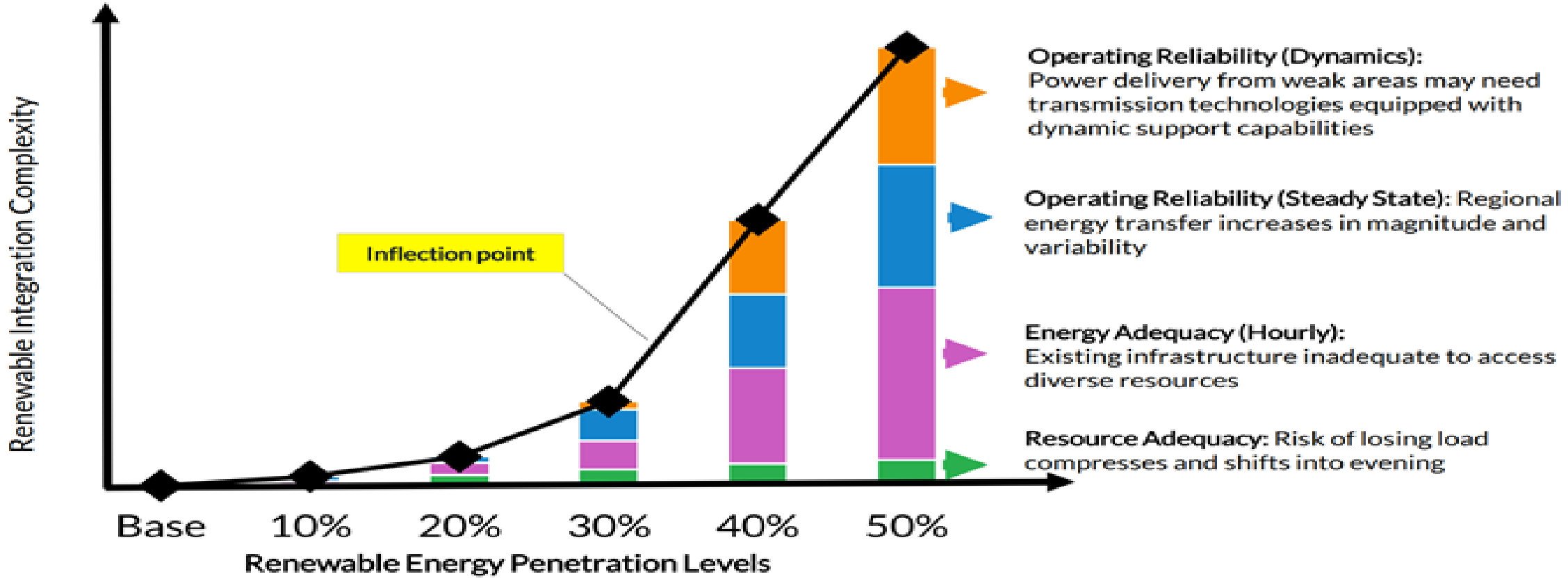
And Gas Additions Did Not Fill the Gap

Annual capacity change of natural gas, wind, & solar since 2015



MISO Concerns = ERCOT Harsh Reality -Renewable Penetration > 33% Causes Problems

These resource changes will significantly impact grid performance with complexity increasing sharply after 30% penetration levels



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WILL THINGS GET BETTER OR WORSE?

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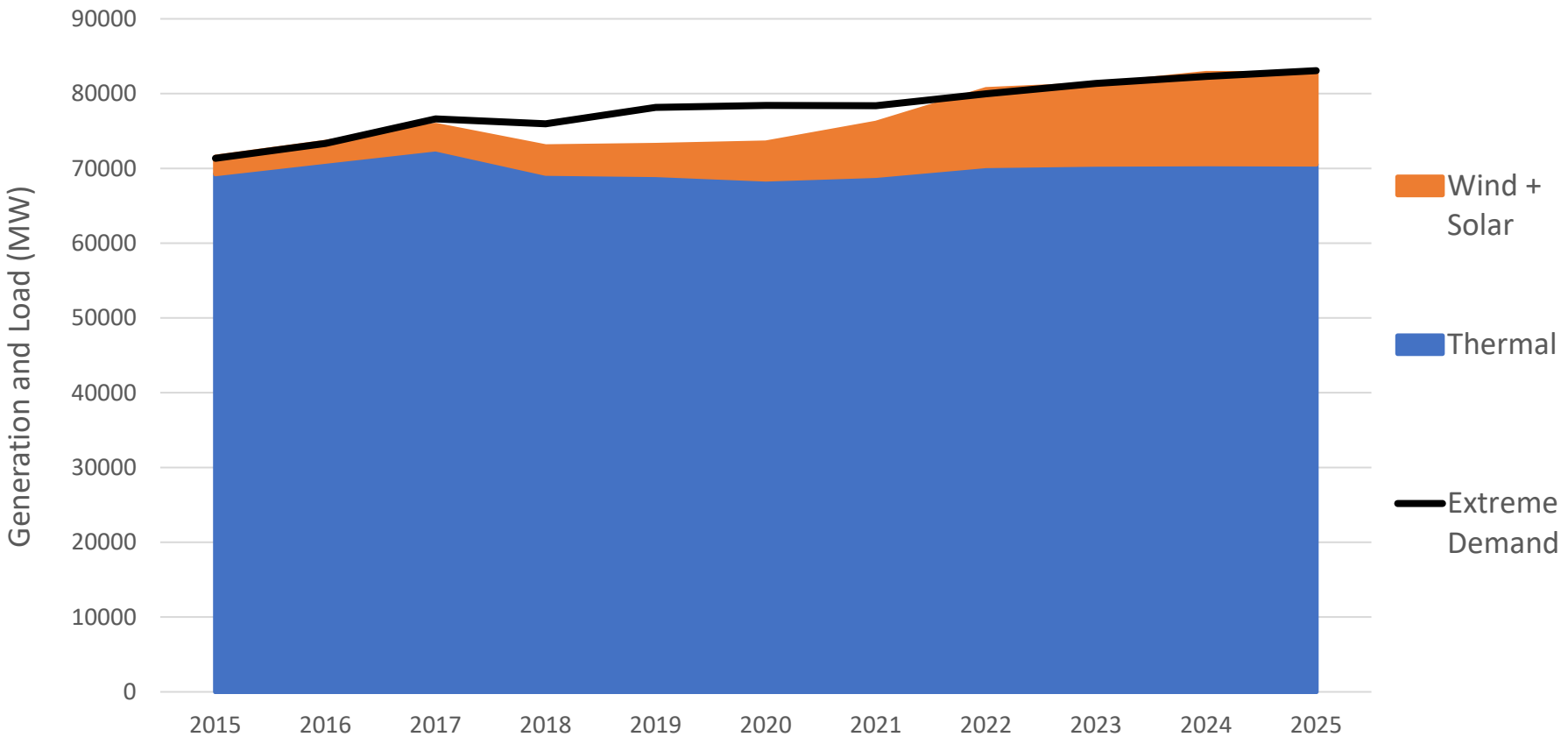
SUMMER – Will We Keep Dodging the Bullet?



July 16, 2018: Close to Level 1 emergency

August 13 and 15, 2019: Level 1 emergencies, 1 GW away from Level 3 emergency

August 14, 2020: Close to a Level 1 emergency, likely a Level 3 if not for reduced demand due to COVID-19

Estimated generation and load for a summer day with low wind and solar output, normal thermal outages and high peak demand.

Source: ERCOT
For more information, visit lifepowered.org.

This summer will be extremely tight, if not a big problem

	ERCOT Baseline Scenario	Typical Forced Outages	Typical Forced Outages + Low Wind	Typical Thermal Outages + Low Wind + Low Solar	Typical Forced Outages + Low Wind + Low Solar + Extreme Demand	Typical Forced Outages + Low Wind + Low Solar + Extreme Demand + Extreme Forced Outages
Summer Resources Available	86,908	86,908	86,908	86,908	86,908	86,908
Estimated Summer Peak Demand	**- 77,144**	**- 77,144**	**- 77,144**	**- 77,144**	**- 77,144**	**- 77,144**
Typical Forced Outages, Thermal	0	- 3,578	- 3,578	- 3,578	- 3,578	- 3,578
Low Wind Adjustment	0	0	- 6,577	- 6,577	- 6,577	- 6,577
Low Solar Adjustment	0	0	0	-3,953	-3,953	-3,953
Extreme Demand	0	0	0	0	-4,911	-4,911
Extreme Forced Outages, Thermal	0	0	0	0	0	-7,096
Total Uses of Reserve Capacity	0	**3,578**	**10,155**	**14,108**	**19,019**	**26,115**
Reserve Margin, MW	9,764	6,186	-391 ⚠	-4,344 ⚠	-9,255 ⚠	-16,351 ⚠
Reserve Margin, %	12.7%	8.0%	-0.5% ⚠	-5.6% ⚠	-9.0% ⚠	-21.2% ⚠

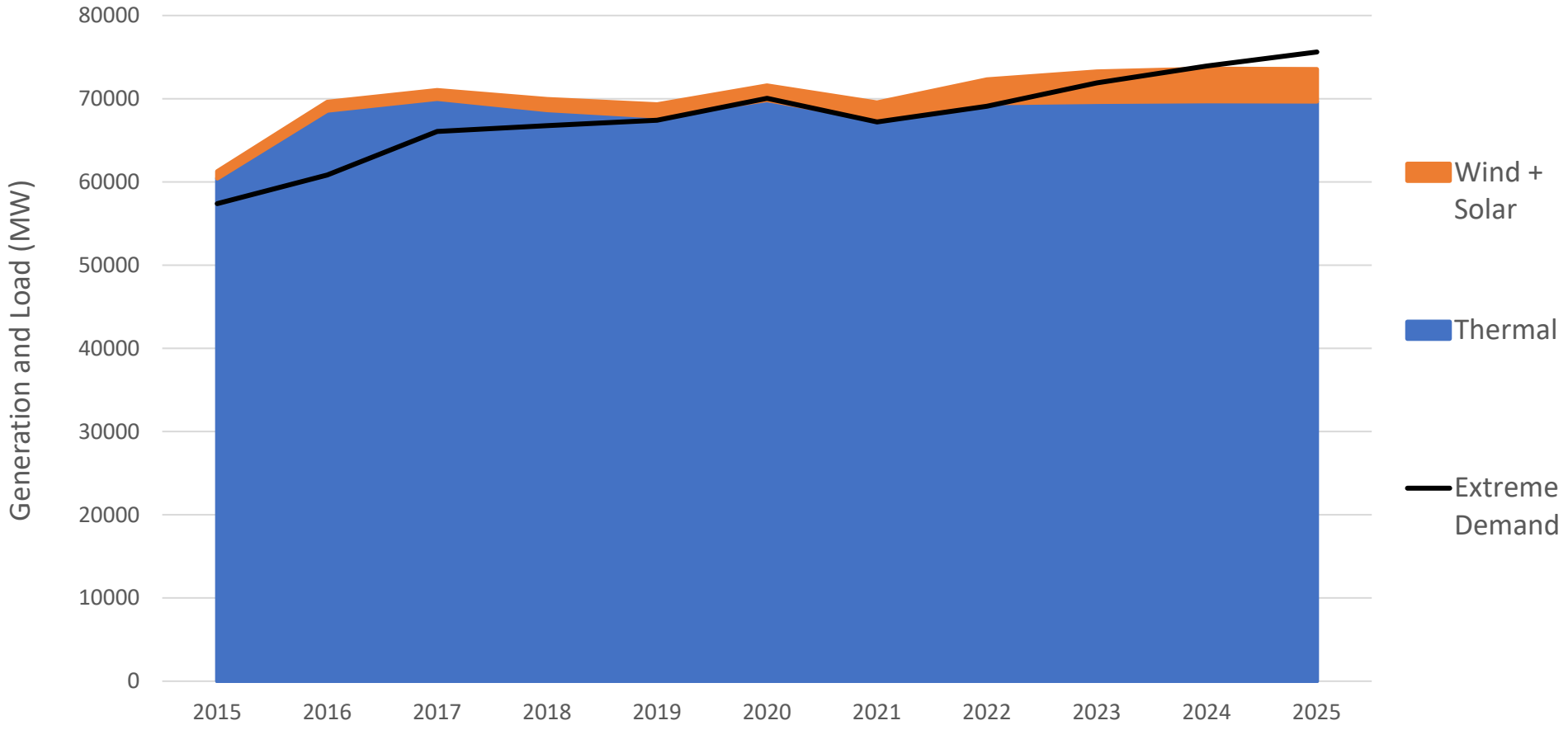
[1] Reserve margins include 1,734 MW of ancillary service reserves that are ordinarily held back until an emergency is declared.
[2] An additional 2,341 MW of emergency resources are theoretically available, according to ERCOT's Summer SARA report. Less than 1,000 MW of reserves after deployment of emergency resources indicates a need for rotating outages.

ERCOT Report: Low risk of outages, sufficient generation to meet summer demand based on expected system conditions.

Reality: Shortages are likely with any combination of low wind and solar and high demand

Source: ERCOT

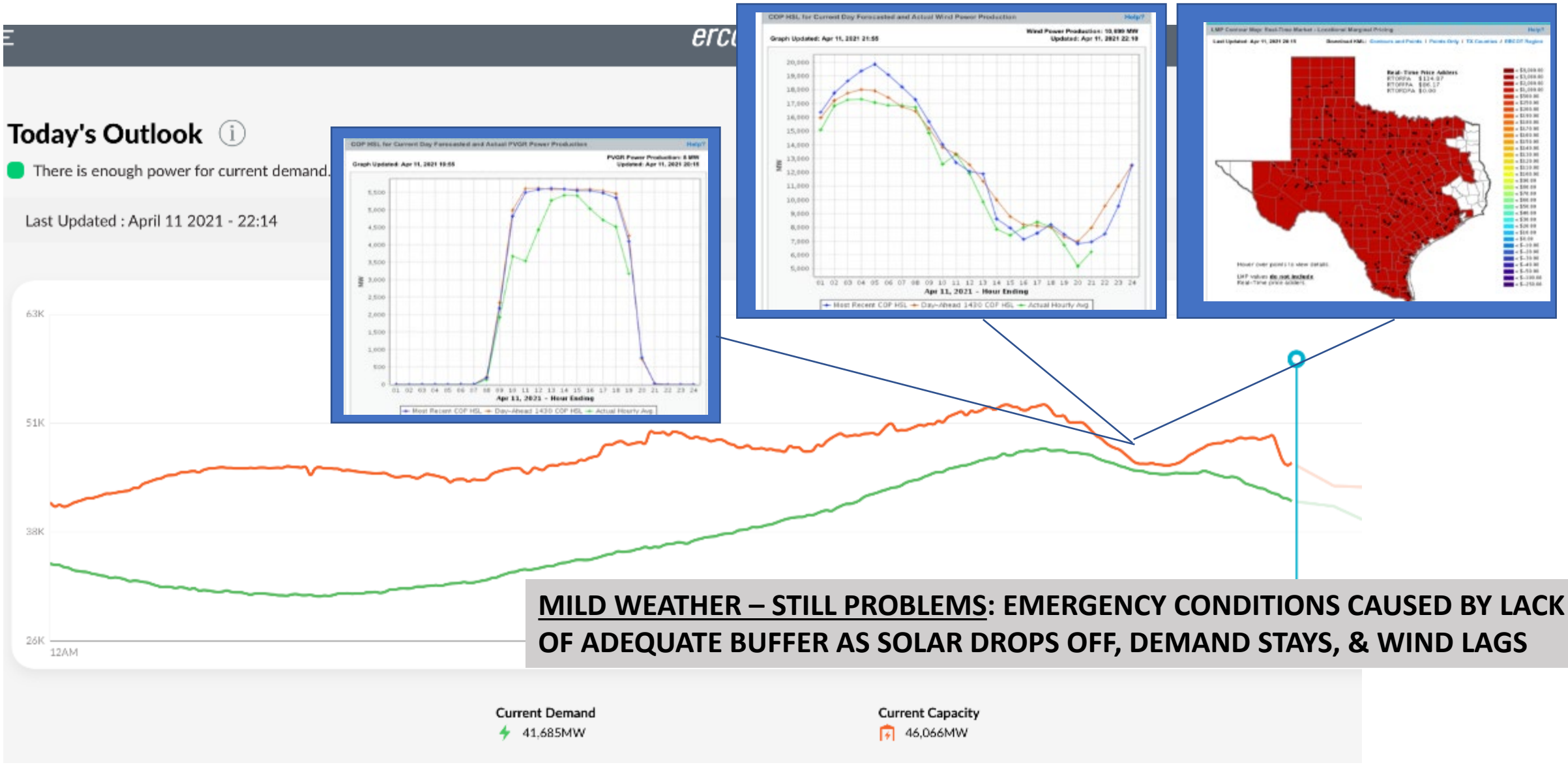
WINTER – The Bullet Looks to Hit Again



Estimated generation and load for a winter day with low wind and solar output, normal thermal outages, and high peak demand.

Source: ERCOT
For more information, visit lifepowered.org.

A PREVIEW OF SHOULDER MONTHS TO COME



<u>MILD WEATHER – STILL PROBLEMS</u>: EMERGENCY CONDITIONS CAUSED BY LACK OF ADEQUATE BUFFER AS SOLAR DROPS OFF, DEMAND STAYS, & WIND LAGS

Source: ERCOT
For more information, visit lifepowered.org.

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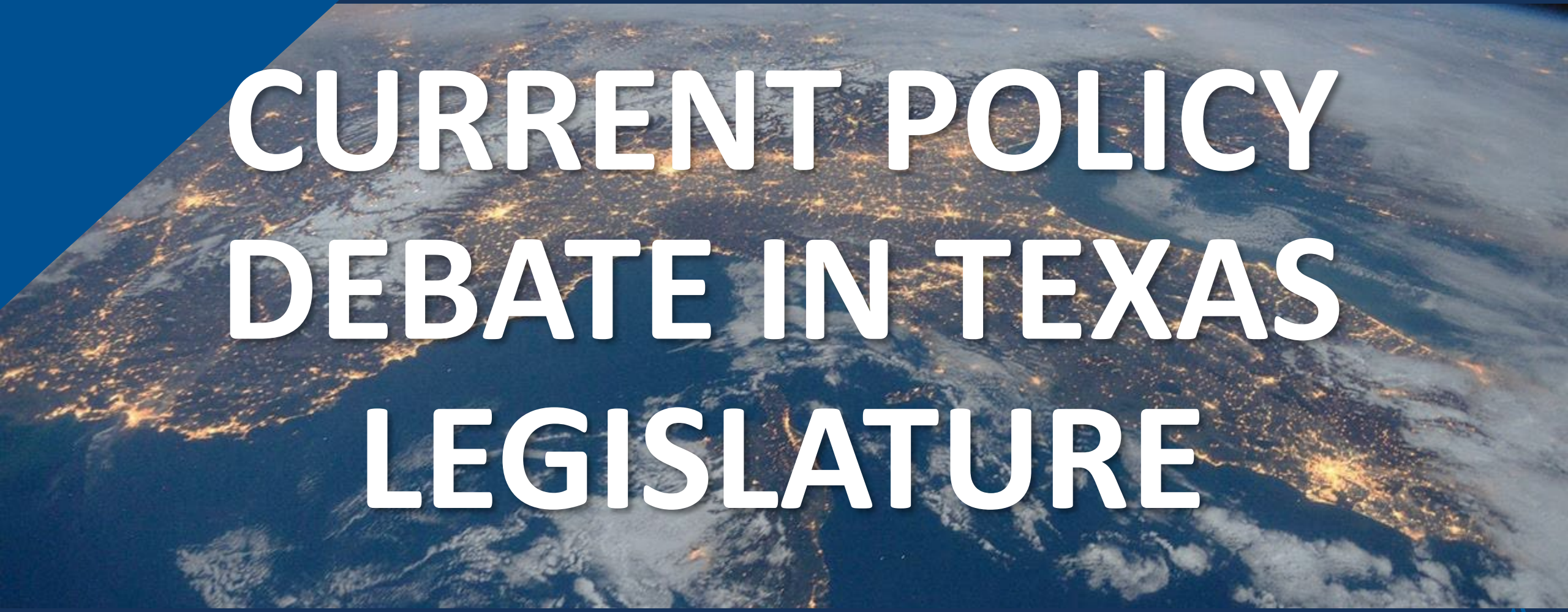

CURRENT POLICY DEBATE IN TEXAS LEGISLATURE

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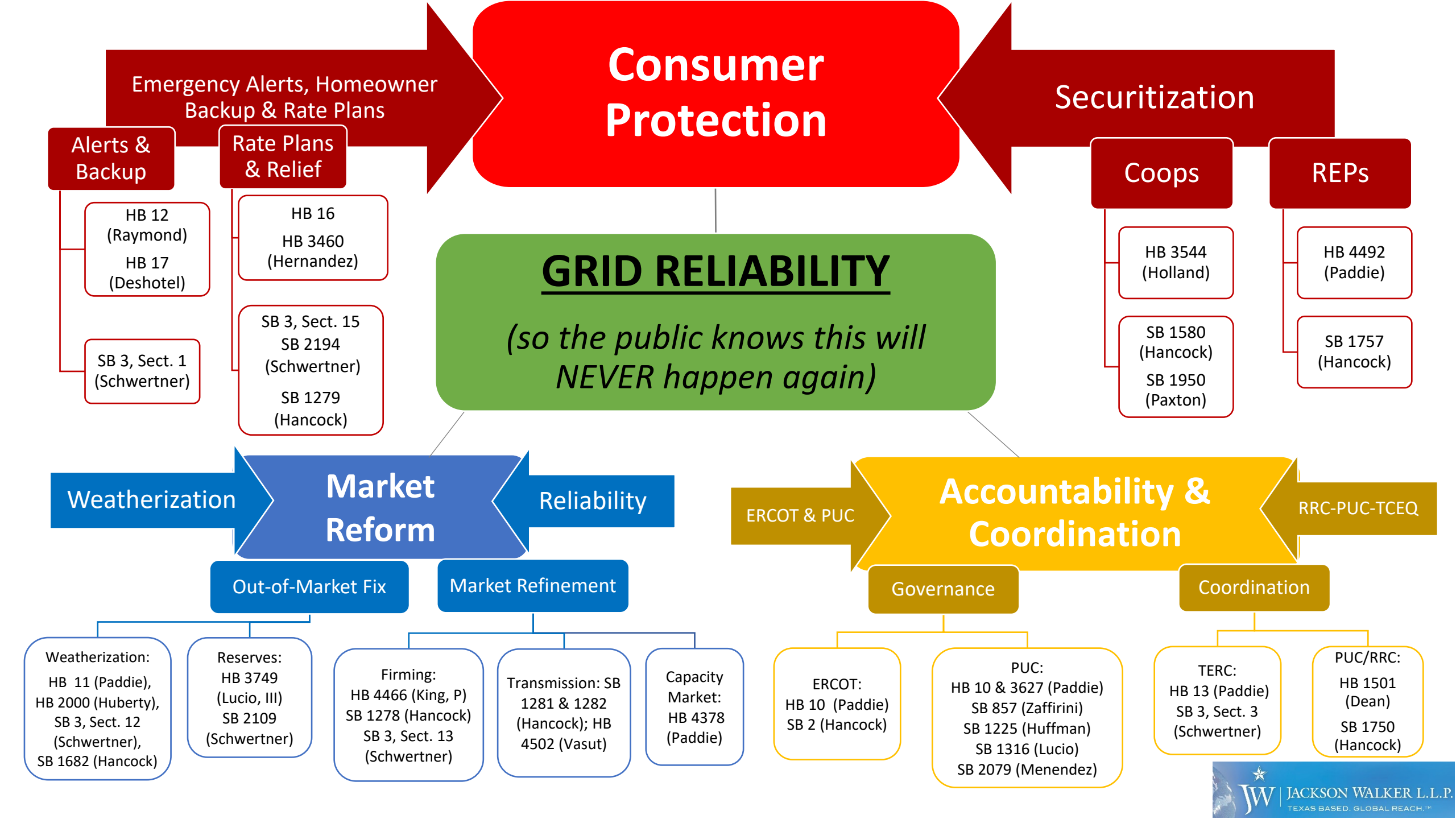

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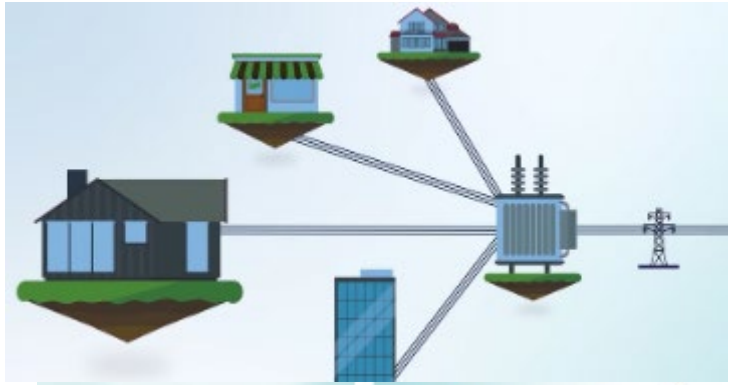
https://youtu.be/ZfrBnddgFAU

VIDEO 2 - Energy 101: The Electric Grid
https://youtu.be/WiMtU6O1SxM

VIDEO 3 - Energy 101: Where Electricity Comes From
https://youtu.be/AKuoIeupGHc



VIDEO 4 - Energy 101: Energy Density
https://youtu.be/6d-HGzZHPG4

VIDEO 5 - Energy 101: Mining and Rare Earths
https://youtu.be/yu3mkFpiGmo

VIDEO 6 - Energy 101: Environmental Technology
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QUESTIONS?

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