Twitter Thread by JesseJenkins

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Morning. The #TexasFreeze continues & grid operator ERCOT is still reporting >31,000 MW of thermal generation capacity out as of 9AM CT. Down slightly from a peak of 34,000 MW reported yesterday afternoon (https://t.co/jNMR4ibyY0) but still >40% of thermal capacity in state!

Date	HourEnding	TotalResourc	TotalIRRMW	TotalNewEquipResou
2/16/21	9	31600	21224	3302
2/16/21	10	30051	21224	3302
2/16/21	11	28256	20744	3302
2/16/21	12	28096	20744	3302
2/16/21	13	27765	18053	3230
2/16/21	14	26924	18053	3230
2/16/21	15	26149	17814	3230
2/16/21	16	26091	17739	3230
2/16/21	17	25623	16744	3230
2/16/21	18	25623	15762	3230
2/16/21	19	23665	14971	3230
2/16/21	20	23665	14673	3230
2/16/21	21	23650	14495	3230
2/16/21	22	23650	14295	3230
2/16/21	23	22795	14295	3230
2/16/21	24	16978	12627	3230
2/17/21	1	17011	12627	3230

Wind power is currently producing about 4,000 MW, or 2/3 of the ~6,000 MW that ERCOT was counting on wind to contribute during winter peaking events. Solar is coming online now and helping during daytime, exceeding the <300 MW it is counted on for in system planning.

Real-Time System Conditions

Help?

Last Updated: Feb 16, 2021 08:59:16

Frequency	
Current Frequency	60.011
Instantaneous Time Error	-48.016
Consecutive BAAL Clock-Minute Exceedances (min)	0
Real-Time Data	
Actual System Demand	45632
Total System Capacity (not including Ancillary Services)	46438
Total Wind Output	4075
Total PVGR Output	911
Current System Inertia	274532
DC Tie Flows	
DC_E (East)	1
DC_L (Laredo VFT)	0
DC_N (North)	0
DC_R (Railroad)	0
DC_S (Eagle Pass)	0

Main story continues to be the failure of thermal power plants -- natural gas, coal, and nuclear plants -- which ERCOT counts on to be there when needed. They've failed. Of about 70,000 MW of thermal plants in ERCOT, ~25-30,000 MW have been out since Sunday night. Huge problem.

ERCOT started directing electric utilities (like Oncor or Austin Electic) to start rolling blackouts or involuntary emergency load shedding at 1:25am on Monday morning, with 10,500 MW shed during that late morning. That's ~2 million homes worth of load https://t.co/6LJN7Wy75y

Throughout Monday, many thermal power plants remained offline, as freeze-offs + fuel shortages in gas pipelines forced large numbers of natural gas plants offline. Many coal plants likely struggled as well w/frozen coal piles, but breakdown of thermal outages by fuel type unclear

1 nuclear reactor at South Texas Station (STS-1) also failed yesterday, NRC data confirms. That's 1,280 MW of lost capacity also (https://t.co/AToHMBG1CR)
https://t.co/zh7kNDP2Um

Region 4

Unit	Power
Arkansas Nuclear 1	33
Arkansas Nuclear 2	88
Callaway	0
Columbia Generating Station	98
Comanche Peak 1	100
Comanche Peak 2	100
Cooper	100
Diablo Canyon 1	100
Diablo Canyon 2	0
Grand Gulf 1	100
Palo Verde 1	100
Palo Verde 2	100
Palo Verde 3	100
River Bend Station 1	96
South Texas 1	0
South Texas 2	100
Waterford 3	100
Wolf Creek 1	100

In short, ALL generation types are getting hammered.
This is an equal opportunity "clusterfuzzle" as @gmbutts put it. So put aside your technology favoratism and tech tribalism for today please!

In sheer numbers, natural gas-fired units are largest thermal capacity in Texas, accounting for ~56,000 MW or 66% of total capacity ERCOT was planning to have available during winter peaking events. The large majority of outages during this event are also at gas-fired plants.

Winter Fuel Types - ERCOT

Fuel type is based on the primary fuel. Capacity contribution of the wind resources is included at 43% for Coastal counties, 32% for Panhandle counties, and 19% for all other counties, while the solar capacity contribution is 7%. Private Use Network, and Hydro are included based on the three-year average historical capability for each Summer Season's 20 peak load hours. Non-Synchronous Tie resources import forecast is based on flows seen during Energy Emergency Alert (EEA) periods in the most recent winter of occurrence. Non-Synchronous Tie resources are categorized as Other. Mothballed resource capacity is excluded except for Available Mothball Capacity based on a Seasonal Availability Schedule or Owner's reported Return Probability. Private Use Network generator capacity is categorized as gas.

In MW

Fuel_Type	Capacity_Pct	2021/2022	2022/2023	2023/2024	2024/2025	2025/2026	2026/2027	2027/2028	2028/2029	2029/2030	2030/2031
Biomass	100%	64	64	64	64	64	64	64	64	64	64
Coal	100%	13,630	13,630	13,630	13,630	13,630	13,630	13,630	13,630	13,630	13,630
Gas	100%	56,102	56,075	56,070	56,025	55,985	55,770	55,770	55,765	55,765	55,765
Nuclear	100%	5,153	5,153	5,153	5,153	5,153	5,153	5,153	5,153	5,153	5,153
Other	69%	838	838	838	838	838	838	838	838	838	838
Hydro	78%	436	436	436	436	436	436	436	436	436	436
Wind-C	43%	2,127	2,213	2,309	2,309	2,309	2,309	2,309	2,309	2,309	2,309
Wind-P	32%	1,411	1,465	1,513	1,513	1,513	1,513	1,513	1,513	1,513	1,513
Wind-O	19%	4,794	5,297	5,468	5,468	5,468	5,468	5,468	5,468	5,468	5,468
Solar	7%	727	1,356	1,523	1,523	1,523	1,523	1,523	1,523	1,523	1,523
Storage	0%	-	-	-	-	-	-	-	-	-	-
Total		85,281	86,527	87,004	86,959	86,919	86,704	86,704	86,699	86,699	86,699

In Percentages

Fuel_Type	2021/2022	2022/2023	2023/2024	2024/2025	2025/2026	2026/2027	2027/2028	2028/2029	2029/2030	2030/2031
Biomass	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%
Coal	16.0%	15.8%	15.7%	15.7%	15.7%	15.7%	15.7%	15.7%	15.7%	15.7%
Gas	65.8%	64.8%	64.4%	64.4%	64.4%	64.3%	64.3%	64.3%	64.3%	64.3%
Nuclear	6.0%	6.0%	5.9%	5.9%	5.9%	5.9%	5.9%	5.9%	5.9%	5.9%
Other	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%
Hydro	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%
Wind-C	2.5%	2.6%	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%
Wind-P	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%
Wind-O	5.6%	6.1%	6.3%	6.3%	6.3%	6.3%	6.3%	6.3%	6.3%	6.3%
Solar	0.9%	1.6%	1.8%	1.8%	1.8%	1.8%	1.8%	1.8%	1.8%	1.8%
Storage	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

This #TexasFreeze event is FAR outside what ERCOT planned for. Their 2020/2021 Winter Resource Adequacy Assessment estimated a worst case scenario "Extreme Pead Load/Extremee Generation Outages" scenario that included 13,953 MW of total thermal outages ■■

https://t.co/U1xlYoybWl

Release Date: Novermber 5, 2020

Final
Seasonal Assessment of Resource Adequacy for the ERCOT Region (SARA)
Winter 2020/2021

SUMMARY

ERCOT anticipates there will be sufficient installed generating capacity available to serve system-wide forecasted peak demand this winter season, December 2020 – February 2021.

"In the winter, we're dealing with morning and evening peaks and sometimes extreme volatility in the weather," said Manager of Resource Adequacy Pete Warnken. "We studied a range of potential risks under both normal and extreme conditions, and believe there is sufficient generation to adequately serve our customers."

The peak demand forecast for winter 2020-21 was developed using Moody's economic data obtained in April 2020. The winter SARA includes a 57,699 MW winter peak demand forecast, which is based on normal weather conditions during peak periods, from 2004 through 2018. ERCOT's all-time winter peak demand record was set on Jan. 17, 2018, when demand reached 65,915 MW between 7 and 8 a.m.

Nearly 83,000 MW of resource capacity is expected to be available for the winter peak, including 963 MW of planned winter-rated resource capacity consisting of wind and utility-scale solar projects.

The winter SARA includes a unit outage forecast of 8,616 MW during the winter months, which is based on historical winter outage data compiled since 2017.

So in sum, total thermal generation outages of 25,000-30,000+ MW during the past 36 hours are more than DOUBLE what ERCOT considered an "Extreme Generation Outages During Extreme Peak Load" event! That is where the disaster is stemming from. (Wind underperformance is secondary).

Additionall, ERCOT predicted a seasonal peak demand of 57,699 MW with a "Extreme Peak Load" scenario adding 9,509 MW to that, for a total "extreme" scenario of 67,208 MW.

Reality: On Sunday night, ERCOT recorded a new peak winter 69,150 Megawatts between 6 and 7 p.m on 2/14!

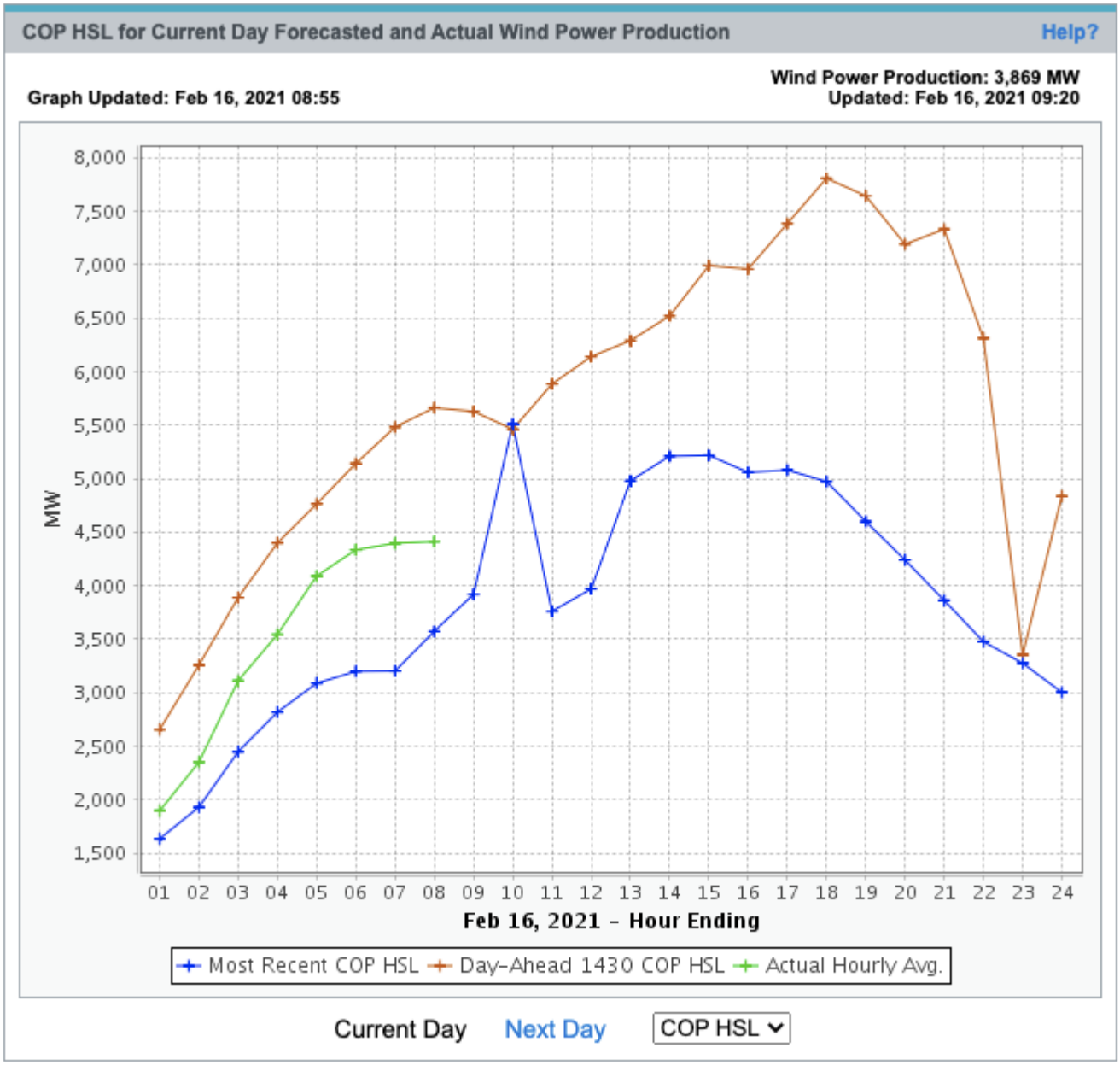
So what is leading to widespread and long-lasting electricity outages in Texas?

1. Total electricity demand was ~3,000 MW over the "Extreme Peak Load" scenario ERCOT planned for.
2. Thermal power plant outages were 10,000-16,000 MW over the "Extreme Generator Outages" scenario.

Those two factors together account for the entirety of the 10,500-16,500 MW of emergency load shedding -- aka rolling (or not so rolling) blackouts that ERCOT has reported over the past 36 hours (see https://t.co/jNMR4ibyY0 and https://t.co/6LJN7Wy75y)

Those of you who have heard that frozen wind turbines are to blame for this, think again. The extreme demand and thermal power plant outages are the principle cause.

Wind & solar have variously over & under-performed the ~6,200 MW ERCOT was planning for from these resources.



At times, wind + solar output was ~4,000-5,000 MW below what ERCOT was counting on them form, and that certainly is part of the story, but much smaller than the total thermal capacity outages, and also less prolonged. Much of the past 36 hours, wind+solar has exceeded 6,200 MW.

Finally, note that in addition to widespread blackouts from major generation failures, there are also localized power outages from transmission & distribution failures affecting numerous customers. Downed lines, overloaded transformers, etc. Networks also fail in extreme weather.

That's a basic summary of what's going on right now. Conditions are still bad in Texas. Last night was frigid and I've seen many reports of interior temps reaching the 40s in people's homes. That's terrible and can be deadly. We don't know the full toll of this emergency yet.