Texas Public Policy Foundation

FOOL ME TWICE: WHY THE TEXAS GRID IS STILL VULNERABLE TO WINTER STORMS

Part 2: Projecting Winter Outage Risks Through 2030

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INTRODUCTION

Next month will mark the five-year anniversary of Winter Storm Uri in February 2021, and we are commemorating the occasion with a three-part series of policy briefs that describe what has happened to the ERCOT grid since 2021 and forecast where it is heading over the next five years. The first piece in this series showed that even with the operational and performance improvements enacted after Uri, the risk of prolonged outages during a 1-in-10-year winter storm is still high—much higher than ERCOT's recent reports would suggest. The risk has grown because the ERCOT system has added only a few GW of firm capacity over the past five years while demand has grown more than 20%.

This second piece will shed light on whether these trends will continue or whether the ERCOT market will start catching up to this problem. We will use more conservative load growth assumptions than ERCOT, while also explaining the uncertainties in these projections, which highlights the importance of the ongoing work at the PUC and ERCOT to improve the accounting of new large loads.[1] In keeping with the normal 10-year planning horizon of grid regulators, the demand profile for the storm modeled here and other parameters (such as thermal outages and wind output) are tuned to match a 1-in-10-year storm instead of a 1-in-100-year storm like Uri. However, the results show that even a more moderate storm will cause increasingly severe consequences unless the ERCOT market begins to change soon.

PROJECTIONS FOR THE 2029-2030 WINTER SEASON

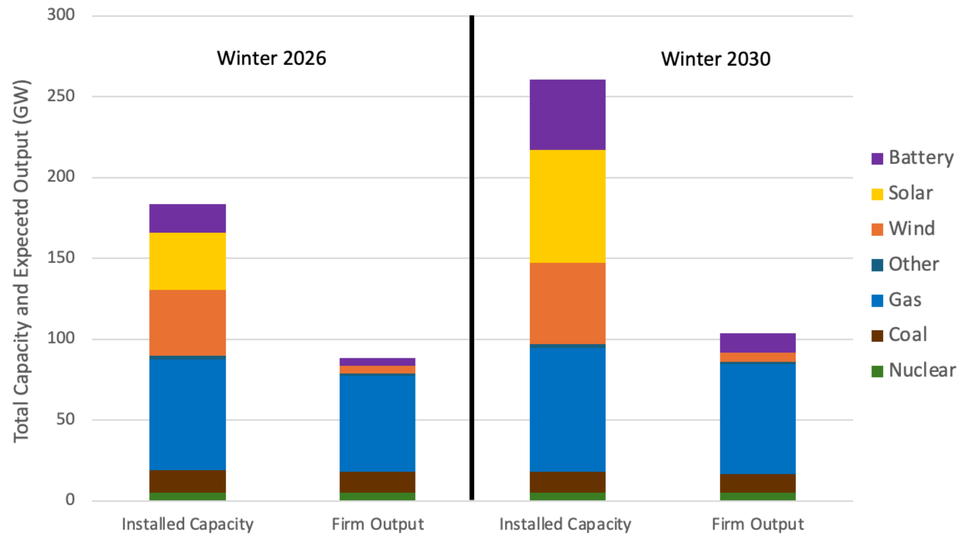
As noted in the first part of this series, the ERCOT market has seen an explosion of solar and storage since 2021—with 31 GW and 17 GW being added, respectively—while only 3 GW of gas has been

1 Public Utility Commission of Texas. (2026). *Letter from Jesse Horn to PUC commissioners* in Project No. 58480. https://interchange.puc.texas.gov/Documents/58480_53_1577452.PDF

continued

Figure 1

*Comparison of 2025 and 2030 Winter Installed Capacity and Expected Peak Output by Fuel Source**



	Winter 2026
Installed Capacity	183,727
Firm Output	88,209
Peak Demand	80,150
Reserve Margin	10.1%

	Winter 2030
Installed Capacity	260,443
Firm Output	103,802
Peak Demand	110,000
Reserve Margin	-5.6%

***Note*:** Winter 2026 data from *January 2026 Monthly Assessment of Resource Adequacy*, Electric Reliability Council of Texas, p. 4 (https://www.ercot.com/files/docs/2025/11/07/MORA_January2026.pdf). Winter 2030 data is derived from *Report on the Capacity, Demand, and Reserves (CDR) in the ERCOT Region, 2026-2030, Winter Seasonal Summary*, Electric Reliability Council of Texas, December 19, 2025 (https://www.ercot.com/files/docs/2025/12/19/CapacityDemandandReservesReport_December2025.pdf).

* Peak demand for 2026 is the actual peak demand observed on February 20, 2025. Peak demand for 2030 is the author's estimate based on an assumed 2030 summer peak demand of 115 GW. Installed capacity is derived by adding 5 GW each of wind, solar, and energy storage to ERCOT's CDR estimates for the 2029/30 winter season and by assuming that all 10 GW of Texas Energy Fund projects are completed (ERCOT only has 3.1 GW in the CDR). Firm output estimates are derived using the same assumptions as in **Figure 1** in the first piece in this series.

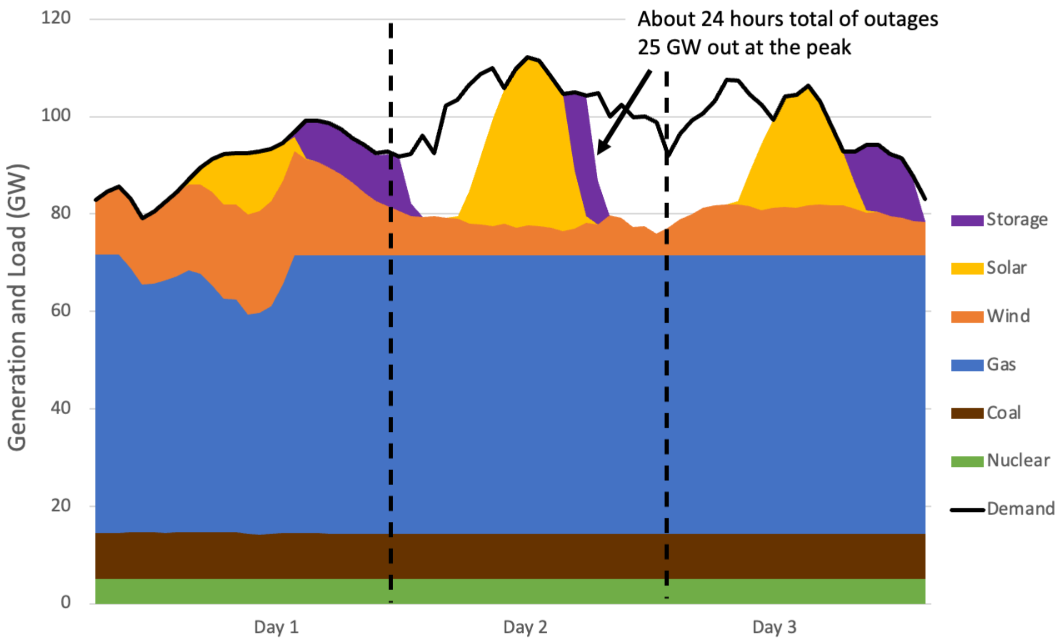
added.[2] This trend is set to continue for the next few years, as solar and storage comprise more than 80% of projects in the late stages of development.[3] With demand growth set to surge due to the influx of data centers, the ERCOT market's continued bias toward adding solar and storage will worsen the winter reliability problem. Even the improved performance of thermal power plants and other improvements made since Uri will not be able to make up the growing gap between supply and demand in winter.

As shown in **Figure 1**, peak demand growth from 80 GW today to 110 GW in 2030 will drive the winter reserve margin to -5.6%, even if the 10 GW of gas set to receive loans from the Texas Energy Fund is connected to the grid by that time. About 34 GW of solar, 26 GW of batteries, and 10 GW of wind are forecast to be added between now and 2030—60 GW of total installed capacity at a cost exceeding $60 billion if prices are similar to recent prices. This 60 GW of resources will only contribute about 9 GW of firm power during peak winter hours—firm power

2 Electric Reliability Council of Texas (ERCOT). (n.d.-a). *Capacity changes by fuel type charts December 2025* in Resource adequacy (webpage). Retrieved January 20, 2026, from https://www.ercot.com/gridinfo/resource

3 Electric Reliability Council of Texas (ERCOT). (n.d.-b). *GIS_Report_December2025* in GIS report (webpage). Retrieved January 20, 2026, from https://www.ercot.com/mp/data-products/data-product-details?id=pg7-200-er

Figure 2
Forecast Generation and Demand During a Long-Duration Winter Storm in 2030



Note: Generation forecasts are derived by scaling the generation output in **Figure 2** in Part One of this series by the changes in installed capacities from 2026 to 2030 (see **Figure 1** in this paper). Demand forecast is derived by scaling the demand profile in **Figure 2** in Part One of this series to a peak demand of 110 GW.

being the minimum amount of generation that is expected under 90% of weather conditions. If 10 GW of grid-connected gas generation is added over this time (data centers will likely add much more behind their meters), it will contribute more than 9 GW of firm power during winter peaks at a cost of only $15-20 billion.

Over the past 15 to 20 years, the ERCOT market has attracted over $150 billion of capital investment in new wind, solar, and energy storage.[4] This fact shows there is plenty of capital willing to invest in ERCOT, and the Texas Energy Fund is not solving the primary problem by simply providing loans and grants for new power plants. Revenue flows dictate what power plants get built in ERCOT, and what is needed are market design changes that redirect revenue away from wind and solar and toward resources that can work in all types of weather conditions.

Figure 2 shows that the same type of storm that resulted in about 12 hours of outages and a maximum supply/demand gap of 10 GW in 2026 would produce nearly a full day of outages and a gap of 25 GW in 2030. At that point, more than 25% of total demand goes unserved, less than the 40% of demand that was unserved during Uri but far exceeding the February 2011 storm.

Similar to our 2026 model, ERCOT market's continued reliance on limited-capacity energy storage for resource adequacy means that the -5.6% forecast reserve margin in 2030 is too optimistic when applied to a long-duration winter storm. Without energy storage, that reserve margin falls to -19.6%, and **Figure 2** shows how a gap that large would be realized. The total energy storage in the 2030 model—77 GWh—is equivalent to running a single 1 GW thermal power plant for the duration of this three-day storm.

4 American Clean Power Association (ACPA). (n.d.). *Texas state fact sheet* in Clean power state-by-state (webpage). Retrieved January 20, 2026, from https://cleanpower.org/facts/state-fact-sheets/

The ERCOT market's singular reliance on solar and storage to meet demand growth is the origin of this winter problem. Wind and solar greatly increase system variability and uncertainty during these types of weather events, which is why we say they are unreliable and insufficient for ensuring winter resource adequacy.

However, the gap between reliable capacity and demand in our 2030 model is over 25 GW at the peak of the storm, which means the batteries are completely exhausted after about 3 hours.

It is important to recognize that **Figure 2** is just one of many combinations of outcomes, and that no storm will be exactly like this one. On the negative side, extensive snow and ice may reduce wind and solar output to levels even lower than those in this model, or drive thermal outages higher,[5] as happened in 2011 and 2021. On the positive side, demand may only reach 80 GW on one morning, making it easier for batteries to cover the peak period, or the high-demand period may coincide with higher wind generation, as happened during Winter Storm Elliott in December 2022.[6] While such sensitivity tests are outside the scope of this more focused policy assessment, these varieties of scenarios must all be modeled and weighed in ERCOT's triennial reliability assessment.

Again, the ERCOT market's singular reliance on solar and storage to meet demand growth is the origin of this winter problem. Wind and solar greatly increase system variability and uncertainty during these types of weather events, which is why we say they are unreliable and insufficient for ensuring winter resource adequacy, even when they do show up sometimes. As the third part of this series will show, the outage risk for this type of situation could be mitigated almost entirely by replacing most of the 34 GW of new solar that is expected to come online between now and 2030 with about 12 GW of additional gas generation and several GW of demand response from new data centers.

DEMAND GROWTH AND THE IMPORTANCE OF FLEXIBLE DEMAND

In addition to the market design issues discussed already in this series, ERCOT faces major challenges in forecasting future demand due to the rapid and uncertain growth of data centers, which will significantly affect both transmission needs[7] and the grid's ability to withstand winter storms. While growth represents a risk—in the sense of misallocating money to the wrong kinds and quantities of transmission and generation assets—it is also an opportunity to rapidly reshape the grid and to correct for the mistakes that have been made over the past 15-plus years.

5 For thermal outages, we use ERCOT's estimate of about 12% of installed capacity, which translates to just over 10 GW for the thermal fleet in our 2030 model. ERCOT's estimate is taken from Electric Reliability Council of Texas (ERCOT). (2025, January 28). *2024 Grid Reliability and Resiliency Assessment Results*, p. 16. https://www.ercot.com/files/docs/2025/01/28/2024_Grid_Reliability_and_Resiliency_Assessment_Results_January_2025_RPG.pdf

6 As in the 2026 model, we assume that wind generation is roughly equivalent to ERCOT's lowest 10th percentile wind output from its latest winter modeling during the second and third days of our modeled storm. This profile averages only about 15% of installed wind capacity. ERCOT's estimate is taken from Electric Reliability Council of Texas (ERCOT). (2025, November 7). *Monthly Assessment of Resource Adequacy (MORA): January 2026*, p. 4. https://www.ercot.com/files/docs/2025/11/07/MORA_January2026.pdf

7 Bennett, B., & Piracci, A. (2026). *The explosion of transmission costs in ERCOT: Causes, forecasts, and policy solutions*. Texas Public Policy Foundation. https://www.texaspolicy.com/wp-content/uploads/2026/01/2026-01-LP-Transmission-Costs-BennettPiracci.pdf

Table 1
Actual and Projected Large Load Growth, Cumulative by Project Stage, 2022 to 2030, in MW

Year	Observed Energized	Approved to Energize but Not Operational	Planning Studies Approved	Under ERCOT Review	No Studies Approved	Total
2022	2,634	0	0	0	0	2,634
2023	4,406	37	0	0	0	4,406
2024	4,965	91	0	0	0	4,965
2025	5,728	1,186	0	0	0	6,914
2026	5,728	2,758	4,263	7,376	6,700	26,825
2027	5,728	2,758	8,117	34,303	30,801	81,707
2028	5,728	2,758	11,576	56,515	69,145	145,722
2029	5,728	3,058	13,221	65,161	101,636	188,804
2030	5,728	3,058	14,123	75,221	134,416	232,506

Note: Data from *Large Load Interconnection Status Update* in TAC Meeting calendar entry (Item 16: Large Load Issues), Electric Reliability Council of Texas, January 21, 2026 (https://www.ercot.com/calendar/01212026-TAC-Meeting).

The scale of this forecasting challenge is evident in ERCOT's interconnection queue: of 233 GW of large loads targeting in-service dates by 2030, only 9 GW are approved to energize, and 14 GW have approved planning studies. Another 75 GW have filed planning studies with ERCOT, while 134 GW have submitted notices to transmission service providers but have not submitted planning studies. The projects that have completed planning studies are likely to interconnect soon, but most of the remaining projects are unlikely to interconnect by the end of the decade because there will be insufficient local transmission capacity to support them.

A key parameter in the ERCOT grid's ability to accommodate this explosive growth is how flexible these data centers can be in emergency situations. The numbers in **Table 1** represent the maximum potential demand from large facilities, not their continuous electricity use. If half of the forecasted demand can be taken offline during a future winter storm, the outage risk is reduced substantially. This is why

If demand growth is accompanied by sufficient amounts of new reliable generation, that growth can benefit consumers, but if growth continues to outpace firm supply—as it has over the past decade in ERCOT—prices will increase, and winter reliability risks will worsen.

SB 6 from the 89th Texas Legislature requires ERCOT to develop the means to curtail loads over 75 MW during emergencies[8] and to develop a program to provide incentives for those loads to curtail before emergency conditions arise.

8 SB 6. Enrolled. 89th Texas Legislature. Regular. (2025). https://capitol.texas.gov/tlodocs/89R/billtext/pdf/SB00006F.pdf

CONCLUSION

Demand growth is normally a sign of a healthy market, and a larger, more efficient grid can benefit all consumers by lowering per-unit production costs (the classic economies of scale phenomenon) and by making it easier to manage reliability risks (more infrastructure and redundancies). If demand growth is accompanied by sufficient amounts of new reliable generation, that growth can benefit consumers, but if growth continues to outpace firm supply—as it has over the past decade in ERCOT—prices will increase, and winter reliability risks will worsen.

The ERCOT market must be modified to stop overpaying for variable, short-duration resources and better value reliable capacity. However, those changes will take time to implement, and only once they are implemented can the years-long process of building new power plants begin. As we approach the five-year anniversary of Winter Storm Uri, no substantial market reforms have been completed. Time is not on Texas's side when it comes to bridging this winter capacity gap that has been many years in the making.

Thankfully, a more immediate solution also exists. Market reforms to better value the reliability contributions of flexible demand can be applied to incentivize data centers and other consumers to adjust their consumption to avoid winter emergencies. This solution is not a panacea: the depth and duration of demand response available to the grid is limited by the safety and comfort that people need during cold weather and the losses incurred by businesses for powering down their operations. However, unlike new power plants which take several years to permit and build, these demand-side resources already exist in the system and can be used now. The final piece of this three-part series will explore how a combination of new reliable capacity and flexible demand can bridge the winter reliability gap. ■

ABOUT THE AUTHOR

Brent Bennett, Ph.D., is the policy director for Life:Powered, an initiative of the Texas Public Policy Foundation to raise America's energy IQ and promote human flourishing through energy freedom. Dr. Bennett is responsible for Life:Powered's research and policy development, leading efforts to roll back electricity subsidies, end electric vehicle subsidies and mandates, stop discrimination against responsible energy producers, and promote grid reliability.

Dr. Bennett has an M.S.E. and Ph.D. in materials science and engineering from the University of Texas at Austin and a B.S. in physics from the University of Tulsa. His graduate research focused on advanced chemistries for utility-scale energy storage systems. Prior to joining the Foundation, Dr. Bennett worked for a startup company selling carbon nanotubes to battery manufacturers.

Dr. Bennett spent his early years in Midland, Texas surrounded by amazing energy entrepreneurs, and he has been a passionate student of energy his entire life. He now lives in Austin with his wife, Erin, and their two children, Jack and Madeleine.

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