

#31 The next national energy crisis

A general ERCOT blackout will curtail national natural gas distribution.

The Electric Reliability Council of Texas (ERCOT) system experienced partial blackouts during February 15/16/17, 2021. While the postmortem continues, two important lessons are clear. The first is that renewables, while they did not cause the blackout, were the worst performing generation technologies during the crisis. The second lesson is that ERCOT almost escalated into a National crisis.

In a [report on the event](#), the US Energy Information Agency (EIA) correctly pointed to the disruption of the natural gas generation as the biggest absolute contributor to the capacity shortfall. This is to be expected as natural gas provides [51% of ERCOT's generating capacity](#). ERCOT operates an energy-only market which provides little incentive for generator owners to invest in weatherization for protection against rare events. The obvious solution is to require appropriate market incentives to weatherize.

An interesting question is relative performance of different generation technologies. How did they perform in comparison to ERCOT's planning expectations? ERCOT periodically publishes its planning numbers in [CDR reports](#) (Capacity, Demand and Reserves). The "plan" column presents ERCOT's installed capacity numbers for the '20/'21 winter; this is the capacity that ERCOT expects to be available. The "actual" column is the amount of power that [showed up](#). More precisely it is the minimum one-hour generation measured over the 3-day blackout period. The "performance" column in the table is the minimum actual generation as a percentage of planned capacity.

ERCOT Generator Performance (MW)			
type	plan	actual	performance
nuclear	5,153	3,865	75%
gas	48,267	26,000	54%
coal	13,630	6,200	45%
wind	6,204	681	11%
solar	269	0	0%

The most robust technology was nuclear. According to the Nuclear Regulatory Commission one of Texas' four nuclear plants shut down due to a disruption of one of its feedwater pumps. While natural gas was the largest absolute contributor to the shortfall it is still the second-best technology performer. It is still not clear what proportion of the gas generation shortfall was due to natural gas supply disruptions or power plant disruptions. Coal has a problem with frozen storage piles. With wind power it is hard to separate turbine blade icing from hours when there was little wind. Under the right conditions, ice buildup on wind turbine blades can reach a [thickness of one foot](#). And solar does not help if load peaks in the evening when there is no sun. Since wind and solar production was low for several days, a little storage would not have helped much. While renewables did not cause of the blackout, they did not perform well.

The ERCOT President & CEO reported that the system came within [4 minutes and 37 seconds](#) of a general State-wide blackout that could have lasted weeks. During the best of times, it is difficult to black-start a power grid, grid operators have little current black-start experience and the new solid-state interfaces with intermittent generators complicate the challenge in unknown ways. Since Texas delivers 24% of the nation's natural gas and the distribution system depends on electricity to power its pumps, an extended general ERCOT blackout would likely to cause a national natural gas shortage. The solution is simple. It is in the national interest to enforce [NERC reliability standards](#).

