

Texas' frozen power grid is a preview of climate change disasters to come

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UPDATED ON: FEBRUARY 18, 2021 / 8:10 PM / MONEYWATCH

The massive snowstorm that pummeled Texas over the weekend has put the state's unique energy challenges into stark relief. Four days after an unprecedented and deadly blackout plunged 4 million people into darkness, some 450,000 remain without power according to [PowerOutage.us](https://www.poweroutage.us).

The storm, which froze nuclear facilities, coal and gas power stations, and wind turbines, offers a cautionary tale of how extreme weather can paralyze critical energy facilities and throw vast swaths of country into chaos. Across the U.S., experts say, states like Texas are largely unprepared for a range of climate emergencies, from Arctic-like cold in warmer regions to widespread flooding, droughts, wildfires and other symptoms of a rapidly heating planet.

"This is a large-scale emergency," said Julie McNamara, a senior energy analyst at the Union of Concerned Scientists. "We're seeing the consequences of insufficiently considering climate impact on the grid. At the same time as grid operators underestimated potential for peak demand ... they also insufficiently estimated potential for outages."

Fossil fuel failure

While energy grids can typically handle large swings in consumer demand, the surge caused by the storm that struck Texas was outside even the most pessimistic projections of its grid operator, the Electric Reliability Council of Texas (ERCOT). At the same time, intense cold in the region caused power production to seize up.

Analysts put much of the blame for the blackouts in Texas on natural gas facilities, which provide two-thirds of the state's winter power and heat about 40% of its homes.

"By far the biggest outages have come from our natural gas plants," said Daniel Cohan, associate professor of environmental engineering at Rice University. "A portion were down for scheduled maintenance. Others weren't designed to operate reliably in extreme cold weather, and others haven't been able to get enough natural gas supply."

Climate Change

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The sub-freezing temperatures stopped production at gas fields in Texas and Oklahoma while damaging pipelines that transport natural gas over long distances. All told, 40% of Texas' natural gas capacity was offline over the weekend just as millions of residents were relying on it most to warm their homes.

That number was double the number of outages that ERCOT had planned for in a worst-case scenario, according to Jesse Jenkins, an assistant professor of mechanical and aerospace engineering at Princeton University.

Other Texas power generators also were hit by the wintry weather. Frozen instruments shut down coal plants and a nuclear reactor in South Texas, and wind turbines froze over or were turned off to protect them from the cold. Snow and ice also downed transmission lines, further snarling the system.

- Don't blame wind turbines for Texas' historic power outages

Get used to the polar vortex

The polar vortex, a weather pattern that originates in the Arctic, is increasingly descending to lower latitudes. Scientists say global warming caused by humans is partly responsible for shifts that bring glacial weather to more southern climes and keep it around longer, although this research is still debated.

And severe weather is becoming more common, whether it's severe cold in southern states or the intense heat wave in California last year that fueled deadly wildfires.

"There probably needs to be better planning, because we're starting to see more extreme weather events across the country," Sara Eftekharnjad, assistant professor of electrical engineering and computer science at Syracuse University, told The Associated Press.

But preparing Texas' grid for frigid weather would be a drastic change for an energy system designed for peak strain in sweltering August.

"There are other parts of the country where this type of weather is just a normal Tuesday, and they can deal with it," said Josh Rhodes, a research associate at the University of Texas at Austin.

"We don't insulate our houses down here as well as they do up north," said Rhodes, who spoke with [CBS MoneyWatch](#) from a friend's residence after his own home lost power. "We don't winterize our pipes as well as they do up north because we so rarely, if ever, need them to be [frost-resistant]. Now maybe we do need to."

Paying for those improvements will be a challenge in Texas' hyper-competitive energy market. Electricity producers in the state are incentivized to sell power as cheaply as possible, and cannot easily pass on the cost of improvements, such as insulation, to their customers.

"In Texas' deregulated electric market, generators are responsible for investment in their plant, just like any other facility. If a new factory needs to develop a new product for a market, that's just the cost of doing business," Dan Woodfin, ERCOT's senior director of operations, said this week.

Critics have said this price structure dissuades power producers from investing enough to keep their facilities running during extreme, if relatively rare, events like this weekend's storm.

"Texas is an island"

Another solution could be to import power from neighboring states. Currently, Texas operates its own electrical grid, separate from the bulk of the continental U.S. That means it can't import power when crisis strikes.

"Texas is an island," Rhodes said. "There are parts in the Northeast that have plenty of power right now — they just can't get it to us."

Research from the National Renewable Energy Laboratory and from the Massachusetts Institute of Technology found that connecting the primary U.S. electrical grids would make it easier for the country to handle localized outages by sharing power across regions. It would also make it much cheaper to reach decarbonization goals.

El Paso, Texas, which is on a different grid than the rest of the state, largely kept its power on despite seeing the same bone-chilling temperatures. About 3,000 electricity customers had an outage lasting less than five minutes, CBS affiliate KDBC-TV reported. And while the Great Plains and Midwest also saw rolling blackouts, they were far smaller than in Texas, in part because the grid in the Midwest was able to pull electricity from a grid in the East, according to the American Council on Renewable Energy.

"During the height of power outages this holiday weekend, over 5 million Midwestern homes saw their lights stay on due to seven gigawatts (GW) of electricity shared from a regional grid in the East," ACORE said in a statement.

"Building out more high-capacity interregional lines is an essential part of the effort to ensure grid reliability in an era of climate change."

No backup

Some analysts also blame the massive blackout on Texas' unique and competitive energy market. Because producers are only paid for power they can sell, Texas lacks so-called capacity markets, in which some power generation is kept on hand as a backup "to be there in case they are needed," Rhodes said.

This weekend's power failures are likely to bring back calls for capacity markets. Still, given how gas and coal plants have struggled during the cold snap, even having extra generating capacity on hand likely wouldn't have prevented the extensive blackouts, Rice University's Cohan told CBS MoneyWatch.

"There have been arguments that fossil fuels are necessary for resilience. I think this shows that that's an argument that needs to be interrogated," said McNamara of the Union of Concerned Scientists. She is one of many energy experts who are advocating for more distributed power generation as a way to hedge against inevitable extreme weather events.

Preparing for the future

In a future likely to feature more destructive storms potentially causing more damage to infrastructure, some power outages are inevitable, experts warn. Rather than relying on centralized large power plants, they advocate investing in

backup power in the form of battery storage run by utilities and individual homes.

In such a scenario, if a central power plant stops operating, each neighborhood or block could have a source of power and heat for emergencies.

"The power will go out, but it's the magnitude of the outage and the duration of the outage that has such an impact and consequences for people at the end of the line," McNamara said.