Why Texas's grid isn't failing during this year's extreme cold

Renewables and batteries are playing a part in keeping the power on.

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5 MINUTE READ

Three years ago, when extreme cold took out the power for millions of people in Texas for days—and more than 200 people died—Governor Greg Abbott blamed the state's windmills. But the biggest part of the problem came from the state's natural gas infrastructure, as some natural gas production and power plants stopped working and pipelines froze.

Texas now has around 25% more wind power than it did during the arctic weather in 2021, along with three times as much solar production and nearly three times as much battery storage. And when

“Gas power plants have repeatedly been shown to be vulnerable to extreme weather,” says Paul Arbaje, an energy analyst at the Union of Concerned Scientists, who recently published an issue brief examining the reliability of gas. “This can cause dangerous problems for communities if the grid is too reliant on gas plants. A diverse set of clean energy solutions can help bolster grid reliability during extreme weather events—while also mitigating the global climate change that is exacerbating these extreme events.”

Additional solar power could have helped keep the power on for more people in the freezing weather in 2021, according to one study. New solar power certainly helped during the current cold front.

“We have record output from solar—literally in the last few minutes, we crossed 14,000 megawatts of production, just about 20% of [the main grid’s] needs, on one of the coldest days of the year,” Doug Lewin, the director of Stoic Energy, a consulting firm focused on the energy transition in Texas, and the author of the Texas Energy and Power Newsletter, said when we spoke on Tuesday. Wind and battery storage also helped early Tuesday morning. (The grid was also helped by winterizing gas infrastructure—and the cold snap wasn’t as severe as the 2021 storm. But renewables played an important role in boosting power.)

In a winter storm, Lewin says, the weather can sometimes boost renewable energy production as a cold front brings more wind, and then, after the front passes and the air is stiller, it’s often sunny. Batteries can store excess renewable energy so that it’s available when wind and solar production dip. (Like fossil fuel power plants, wind farms need to be winterized to handle extreme cold, even in a place like Texas.) In the summer, solar and wind can help the state deal with extreme heat.

Texas now has around 22 gigawatts of solar capacity, enough to power more than 16 million homes. That could double over the next few years. The state has around 39 gigawatts of wind capacity, and more than 5 gigawatts of battery storage capacity. (In 2020, there were 275 megawatts of battery storage capacity in the state; now the capacity is 20 times as much.) Battery storage could double again over the next year, and potentially triple the year after that, Lewin says, noting, “It’s happening way faster than anybody could have imagined a few years ago.”

Wind energy has been growing in the state for three decades. In the mid-1990s, Texas got its electricity from coal, gas, and nuclear power plants. Only 1% was renewable. But in 1999, the state became one of the first to require utilities to get some of their energy from renewables. Wind power quickly grew, meeting the state's targets early. Sprawling new wind farms broke size records. Horse Hollow, built on 47,000 acres, was the largest in the world when it was completed in 2006. Another wind farm, completed in 2009, covers 100,000 acres, an area larger than Philadelphia. By last year, there were 239 wind projects in the state.

When solar became cheaper, around 2018, the number of solar projects also increased. Historically, there's been little opposition to building them. "We didn't have [much] NIMBYism around these projects," says Nathan Jensen, a professor of government at the University of Texas Austin. "They're pretty rural, so there aren't that many people around them. And they were put on large pieces of agricultural land, generating rents for their owners. I think there was an ethos of, 'It's your land, and if you want to release land to wind or solar, that's your choice.'" New transmission lines in the state also made it possible to deliver power from remote areas, so projects were easier to build.

Traditionally renewables have had bipartisan support. More recently, however, there's been a conservative backlash against wind and solar. Last year, multiple bills in the Texas legislature aimed to make the projects harder to build, with some lawmakers arguing that renewables were unreliable. One law that passed says that solar and wind projects are no longer eligible for the same tax breaks that other businesses can get.

Despite the political pressure, renewables are likely to continue to grow. "I don't think it's going to grind it to a halt," says Joshua Rhodes, a research scientist who studies energy at the University of Texas at Austin. He says that there's more than 100 gigawatts of new solar power in various stages of planning or development now, along with more than 100 gigawatt-hours of new battery storage. While every project won't get built, the numbers are growing rapidly.

In theory, Texas could be fully powered by renewable energy, if it's supported by storage, more transmission lines, and more energy efficiency and programs that reduce demand at peak hours. The National Renewable Energy Laboratory estimates that the state has 2,173 gigawatts of potential wind energy and more than 28,000 gigawatts of potential solar capacity; currently it uses only a tiny fraction of that. It could also use new technology to access steady geothermal power.

Administration data. As renewables increase, the grid can become more reliable and lower costs for consumers. The price of gas “is very volatile,” Lewin says. “We burned a lot of it in the last few days, and that’s going to be costly to consumers because it gets pretty pricey during these kinds of cold snaps.” Already, having more wind and solar in place has saved Texans billions of dollars.

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