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Texas seceded from the nation's power grid. Now it's paying the price.

The state's unique electrical system worked well for decades – but it wasn't ready for unexpected cold.

By Julie A. Cohn February 17, 2021

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Writing from in front of my gas fireplace, wearing multiple layers of clothing and sipping a hot beverage, I await the end of this week's apocalyptic winter storm and the return of reliable electric power. I am contemplating the grid – the term we use to describe a collection of generating plants, transmission lines, substations, and sometimes even the smaller distribution lines and electric meters that transform gas, coal, falling water, uranium, wind and sunlight into usable electricity and bring it to our homes and workplaces. When asking how the Texas grid operator happened to fail so miserably at keeping people here warm and well-lit for the past couple of days, though, we get so much wrong. There's a big picture, and a Texas picture, and both illuminate some of what is happening.

First, the big picture: The grid is shorthand for a collection of technologies owned and operated by thousands of entities – from government agencies to homeowners with rooftop solar panels. There are, in the continental United States, three major interconnected systems – one covering everything east of the Rocky Mountains, one for everything west of the Rocky Mountains, one for Texas. The Eastern Interconnection and the Western Interconnection are made up of multiple grid operators and dozens of smaller networks that serve power needs through continuous coordination, across state lines when necessary. In Texas, we have one grid operator, the Electric Reliability Council of Texas (ERCOT), one control area, hundreds of infrastructure owners and lots of coordination to make it work. So the casual use of the term "the grid" results in the common misconception that everything is under the control of, say, an electricity czar. But in the United States, even the federal government does not have that role. When something goes wrong, as happened here this week, it is a mistake to look in one direction for one culpable party.

Then there's the Texas picture. There are three things to remember: The power system that serves 95% of the state is intentionally isolated from the rest of the country; our competitive wholesale power market offers scant incentives for investment in backup power; and Texas generally does not have winter storms like this one.

Let's start 80 years ago. During World War II, America needed lots of power to build planes, tanks, bombs and other war materiel. Power companies and the federal government alike focused on expanding interconnections among power systems as the fastest and cheapest way to meet defense needs. In 1941, Texas investor-owned utilities did their part by connecting into two networks serving the northern and southern parts of the state. Congress had already given the Federal Power Commission (now the Federal Energy Regulatory Commission) authority to regulate interstate power sales. Texas didn't have any state level regulation of power companies, and the utilities liked it that way. They also didn't want federal regulation. So they were pretty careful to avoid selling or buying power across state lines. With two time zones, every type of generating resource and lots of different kinds of customers, Texas utilities were able to achieve economies of scale and power-sharing efficiencies – all within the state's borders.

In 1970, the Texas utilities formed ERCOT to comply with reliability guidelines established in the wake of the nation's first devastating power failure – the 1965 Northeast Blackout. In 1981, ERCOT took over as the grid operator. Between 1996 and 2005, the state legislature passed laws to create a competitive wholesale power market, increase renewables with hard targets and invest in new transmission infrastructure. These decisions created a very friendly environment for renewables, and as a result, Texas leads the nation in wind power and in renewables of all kinds. But the success of these initiatives hinged somewhat on the autonomy of the Texas grid: The state could set goals, foster investment and expand transmission without input from other state or federal agencies. In a sense, this is the beauty of ERCOT's isolation.

Other factors also contribute to the unique characteristics of Texas's power system. First, the state's fleet of generators has been shifting gradually but steadily from coal-fired to natural gas-fired and wind-powered plants. This winter, Texans are depending far more on wind turbines and gas-fired power plants than on coal. Second, the way the state's wholesale power market works, utilities have very few incentives for investment in backup power. The state does not say to a generator, "Please build us some extra backup power plants, and we will charge that cost to our customers." Instead, the market allows a generator to charge excessively high prices when available supply falls short – which, for an investor, could be a long shot. As a result, ERCOT's

backup power, called the spinning reserve, is lower than most other areas in the United States.

So this week, when temperatures dropped to all-time lows across the state, wind turbines that have not been winterized froze. Gas-fired plants tripped offline. And while ERCOT had anticipated rolling blackouts and warned customers to reduce power use and expect brief outages, the demand for power far exceeded the available supply, leaving millions of us stuck in the dark and the cold.

Now where shall we point our frigid fingers?

The highly centralized, isolated power grid has served Texas really well for many decades. It allowed us to accelerate renewables development and, notably, to avoid cascading blackouts – of the sort that plagued the Northeast in 1965, 1977 and 2003. But this week, it means that we are unable to import large amounts of power from the gigantic eastern and western interconnections when we need it.

We don't have a large enough backup system for when power demand shoots way up, or when our regular generators go offline, as they did this week. It is a problem that plagues ERCOT every year as the hottest part of the summer approaches. This is the fault of our wholesale market structure. Of course, additional reserve power may not have been sufficient to offset our losses over the past two days, but surely it would have helped. The cost of these extra power plants that will sit idle for most of the time wouldn't be so bad if shared by everyone connected to ERCOT. Instead, based on how the Texas wholesale market works, backup plants charged an eye-popping \$9,000/mwh rate this week (the price was \$30/mwh just six days ago, a more typical rate).

Ultimately, this outage, like many of the biggest blackouts before it, reflects the challenge of unanticipated events and consequences. In 1965, power system experts felt sure they had built in enough redundancy to prevent any cascading power failure from ever happening. But they did not envision the way dozens of different operators would respond when one relay setting caused unexpected power movement across the networks. In Texas, we know that our summers will be exceedingly hot, pushing our power system to the limit, but the last time it was this cold was in 1989, and this year's winter storms will last longer. Our wind turbines do not have the cold protection that turbines do in the cold north. Our overall system is not winterized. The conditions of this cold front and its effects on the power system were simply beyond what power experts generally planned for.

From my chilly living room, I can reflect on our state's unique approach to power systems, both the benefits and the shortfalls, and simply hope that we will learn quickly from this weather event. No doubt there will be accusations, investigations,

pontifications and extrapolations in the weeks and months to come. Surely, we can plan for our weather extremes more effectively, winterize our system more thoroughly, back up our renewables more completely, and (dare I say it?) ask customers to pay more for resiliency. I imagine there are a few million Texans ready to chip in right now. And maybe we can even reconsider links east and west to facilitate sharing more power when it gets really, really hot or really, really cold. Texans shouldn't have to start shopping for generators to prepare for the next hot summer or winter storm.