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The U.S. Needs a Supergrid

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Today 8:30AM

Right now, Texas is in the balmy mid-50s. Yet just a week ago, it was colder than Alaska, and we all know what happened next. Much of the state's energy capacity got knocked offline, leaving millions of people without power, heat, and water for days.

The extreme weather itself was an anomaly, caused by a particularly nasty blast of chilly Arctic air from the polar vortex. In many ways, there couldn't have been a worse part of the country for a cold snap like this to hit. Texas' utility system is different from the rest of the nation's in that the state has its own independent grid which is highly unregulated.

But Texas is hardly alone. Different parts of the U.S. are facing increasing damaging weather, and their infrastructure is vulnerable to different kinds of extreme weather. Each region, though, also has different strengths when it comes to generating power. There's a way to bring all those assets together to boost energy resilience across the U.S.: creating a national supergrid.

The U.S. has some of the most unreliable electric infrastructure in the developed world, and the climate crisis is already putting more strain on it from California's preemptive blackouts during fire weather to the lights going

out on the East Coast after a ho-hum Hurricane Isaias last year. According to the American Civil Society of Engineering, if the U.S. energy grid got a report card, it would receive a D+ grade.

"Texas is not a isolated incident," Johanna Bozuwa, co-manager of the Climate and Energy Program at the Democracy Collaborative, said. "This is a pervasive problem across the U.S., and our private and antiquated utility system is not up for the job."

There are three major electric grids that span the Lower 48: the Eastern Interconnection, the Western Interconnection, and the Electric Reliability Council of Texas, which serves 90% of Texas. The ASCE report card notes some parts of the grid "predate the turn of the 20th century" with many of the power lines stringing the grids together "operating well beyond their design" in terms of lifespan, transmission, and resiliency to severe weather.

A 2018 study from the National Renewable Energy Laboratory found that the separation between these three systems increases the cost of power and also makes it more difficult to share surplus energy once regional demand is met, surpluses that could be particularly important when climate disasters hit parts of the country. As last week in Texas shows, a single extreme weather event can overwhelm regional production.

The current power grids aren't just vulnerable to climate change, they also cause it by relying on outdated fossil fuel infrastructure to generate electricity. If we don't rapidly turn to zero-carbon electricity sources, unpredictable weather events will become more common. Currently, about 38% of the power the U.S. generates comes from either renewables or nuclear power, and the share urgently needs to grow.

If we knit the grids together, it could help fix many of these issues. Operators could control how power flows through direct lines that could send solar power while the sun is out in the West to be used in the East in the evening. Wind turbines harnessing the strong breezes in coastal or mountainous areas could supply power in locations where the air is more still. They could also help out areas experiencing weather disasters that limit generation. If this supergrid had been in place last week, regions of the country that were mild and using less energy could've shunted supplies to Texas to meet the explosion in demand and avert blackouts.

In fact, that's just what happened in a portion of the state last week. In El Paso, a Texas city that falls in the 10% of the state which is connected to the national western grid instead of the state's much smaller one, only 12 homes lost power for more than five minutes. The reason is simple: The region had access to power generated in parts of the country that weren't seeing gas power plants and wind turbines go offline due to the cold.

In addition to being more reliable, research shows that a single, national grid would be cheaper and faster to decarbonize than a split one.

"The further you can move intermittent wind and solar around the country, the less overall capacity you have to build," Daniel Aldana Cohen, director of the University of Pennsylvania's Socio-Spatial Climate Collaborative, wrote in an email. "Ideally, we'd have a fully North American grid, to also take advantage of solar resources in northern Mexico, and prairie wind in the middle of Canada."

Renewable power could and should look different in different regions. Sunny California, for instance, often produces even more solar power than the state can use. And according to the Department of Energy, offshore wind from U.S. shores could yield more than 2,000 gigawatts of power, which is nearly double

the country's current total electricity use. Linking up a grid to power the entire country could allow everyone to tap into these resources.

To get anything like this supergrid, we'll have to change how power is distributed in more ways than one. Right now, most American households are served by utilities that are investor-owned even though they make up a small percentage of the roughly 3,000 utilities across the country. These private entities have been among the top opponents of a clean energy transition, since that transition often threatens their business models. While there are some signs utilities could be coming around to clean energy given the multi-trillion havoc delaying the transition could cause, waiting for the market to dictate the terms based on profits isn't enough. Bozuwa said the grid must be publicly-owned to ensure the transition happens at the speed and scale needed.

"Without the same incentives for short term profits and with the ultimate accountability to its customer-owners, I think publicly owned utilities are better suited to rapidly transition off fossil fuels," she said.

If the supergrid was a federal entity, it would have the federal government's power and budget to draw from, and it won't have to worry about preserving shareholders' profits. Many aspects of boosting grid resilience—like putting transmission lines underground to shield them from precipitation and wildfires—are expensive. But they're necessary for human safety, so there's no reason they should have to be justified from a purely financial perspective.

"Public ownership is also essential for accountability," Aldana Cohen said. "If the president of the U.S. is on the hook for a stable energy system, that officeholder will have to achieve it—or be booted out of office."

We don't just need utilities to be reliable, though. We also need them to be affordable. Many Texans who didn't lose power last week are seeing bills in the thousands of dollars.

"With supply so low and demand so high, the prices on the market skyrocketed, with some withholding energy to manipulate the market and reap the benefit of the extremely high energy prices," said Bozuwa.

Though these bills were particularly egregious, they highlight a wider problem of energy unaffordability. According to federal data, nearly a third of households had trouble affording their electricity in 2018. Extreme heat and extreme cold can both increase utility costs, upping the need for more heat or air conditioning.

Better regulations on utility costs, like price caps, could help combat this. But another solution would be prioritizing moves that help homes use less energy, like providing them with more efficient appliances and better insulation so they waste less energy. Those moves could also lower the amount of energy we need overall, making it easier to produce enough renewable power to use nationwide. Again, waiting on investor-owned companies to do this could be a folly. But a nationalized grid could be updated more quickly, as it wouldn't have to worry about making more money.

"Right now, private utilities generally make more money by building more stuff," Aldana Cohen said. "They have little incentive to increase energy efficiency, especially for low-income clients,"

In the wake of the Texas blackouts, the Democratic Socialists of America's Ecosocialist Working Group has been campaigning for a public supergrid, and energy analysts have been considering the benefits of a single countrywide energy system, too. Of course, getting the government to make these

investments, let alone moving toward a federally-owned supergrid, is a big step. There are smaller ones that could also make a crucial difference in the interim, like regulating utility companies to ensure they repair and weatherize their infrastructure and upping the use of microgrids which can operate separately from the central grid amid high demand.

As the climate crisis makes severe weather and blackouts all the more common, these fixes will only become more difficult. More importantly, the worsening weather will also put more people's access to electricity—and by extension, their lives—in jeopardy.

"At the end of the day, electricity is a basic human right, and as we saw in Texas and during covid, a matter of life and death," Jean Su, energy justice program director at the Center for Biological Diversity, wrote in an email "We can't leave the delivery of basic human rights to private corporations whose incentive is to maximize profit, not protect people."