

Written Testimony of Robert Bryce
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Podcast
Before the Government Operations & Border Management
Subcommittee
United States Senate
“Strategies for Improving Critical Energy Infrastructure”
October 27, 2021

Good afternoon.

America’s electric grid is our most critical piece of energy infrastructure.

The electric grid is the Mother Network, the network upon which all of our critical systems depend. Our hospitals, nursing homes, pharmacies, police stations, fire stations, traffic lights, water, wastewater treatment, Internet, cell phones, and other essential services – all depend on the electric grid.

But the affordability, reliability, and resilience of our electric grid are being undermined. Over the past few years, the fragility of our grid – and its vulnerability to cyberattacks, physical attacks, and extreme weather events – has become ever more obvious.

Despite the grid’s growing fragility, climate change activists and policymakers are pushing for dramatic increases in the use of wind and solar energy. They are also pushing efforts to “electrify everything.” These efforts include bans on the use of natural gas for heating and electricity generation and bans on the sale of automobiles and equipment with internal combustion engines. This would force consumers to rely solely on electric vehicles and battery-powered outdoor equipment.

These policies are not just wrongheaded, they are deeply dangerous. Banning the use of liquid and gaseous fuels will reduce America’s energy security because it

will concentrate our energy risks on a single energy network, the electric grid. Furthermore, they would require an electric grid with more than two times the capacity of today's grid. That's a largely fanciful notion given that the electric grid is faltering under existing demand.

My remarks will focus on the decline in the grid's reliability, the policies that are undermining the integrity of the grid, and what policymakers should be doing to assure our energy grids are resilient and able to deliver affordable and reliable energy and power to American consumers 24/7/365.

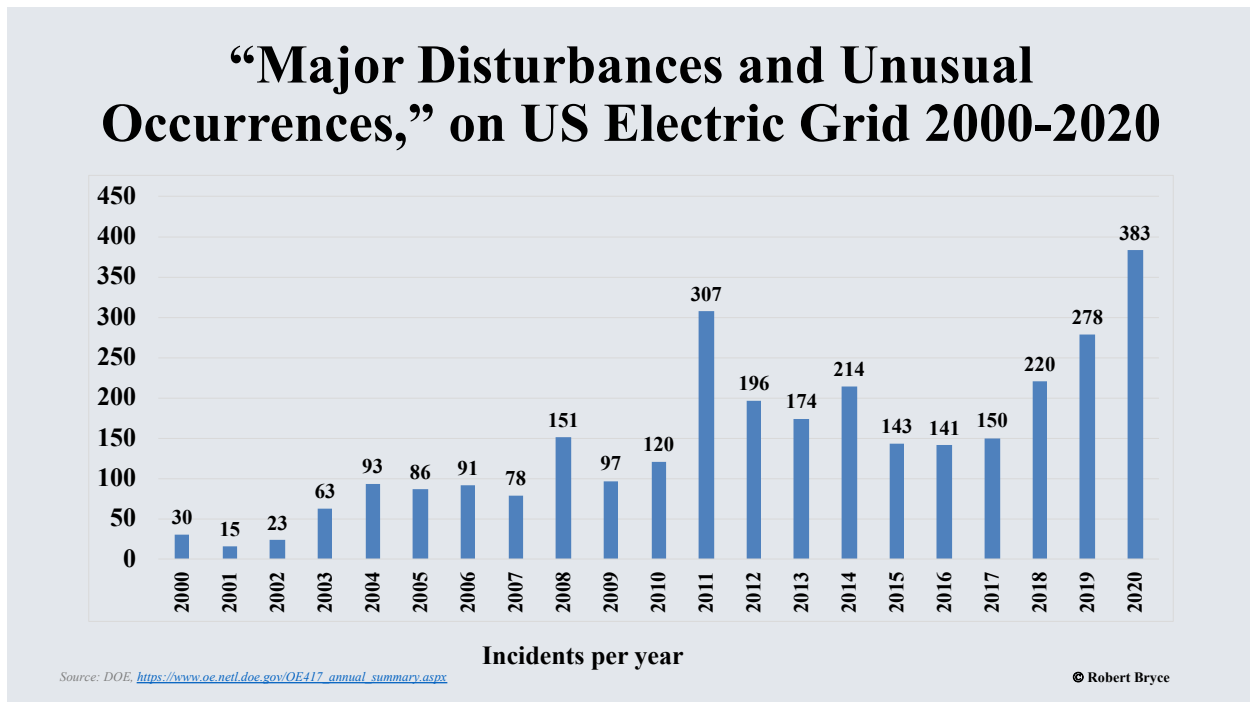
Declining grid reliability

There is no doubt that our electric grid is becoming less reliable. Earlier this week, the *Washington Post* reported that in 2020, "[the average American home endured more than eight hours without power, according to the U.S. Energy Information Administration – more than double the outage time five years ago.](#)"

In California, over the past two or three years, [blackouts have become almost daily events](#). In Texas, the country's biggest producer of oil, gas, and wind energy, the February blackouts caused by Winter Storm Uri cost some [\\$200 billion and left about 700 people dead](#).

According to data from the Department of Energy, between 2000 and 2020, the number of what the agency calls "[major electric disturbances and unusual occurrences](#)" on our electric grid jumped 13-fold. The upward trend in these occurrences can easily be seen in Figure 1.

Figure 1



Consumers and businesses have responded to the decline in electric reliability by rushing to install backup generators. [As I explained in an article I published in the Wall Street Journal on September 7](#), sales of standby generators are soaring. I wrote that Generac Power Systems, which specializes in home generators “announced in July record sales of \$920 million during the second quarter, a 68% jump over last year. But what’s good for Generac is bad for America. That’s no slam on the Wisconsin-based company, which manufactures about three-quarters of the home standby generators sold in the U.S. Instead, Generac’s soaring sales are evidence that the U.S. electric grid is becoming less reliable, which will make Americans less wealthy and less secure.” In a recent investor presentation, [Generac said that power outage severity is “increasing significantly.”](#)

Sales and installations of standby generators are particularly strong in California, a state that has seen a steady decline in the affordability and reliability of its electric grid. On October 6, M.Cubed, an economic and public policy consulting group, released a study which found that [“Over the last year, the generator population jumped by 22 percent in the South Coast Air Quality Management District, and by 34 percent in the Bay Area Air Quality Management District over the last three years.](#) In 2021, the two districts were collectively home to 23,507 backup

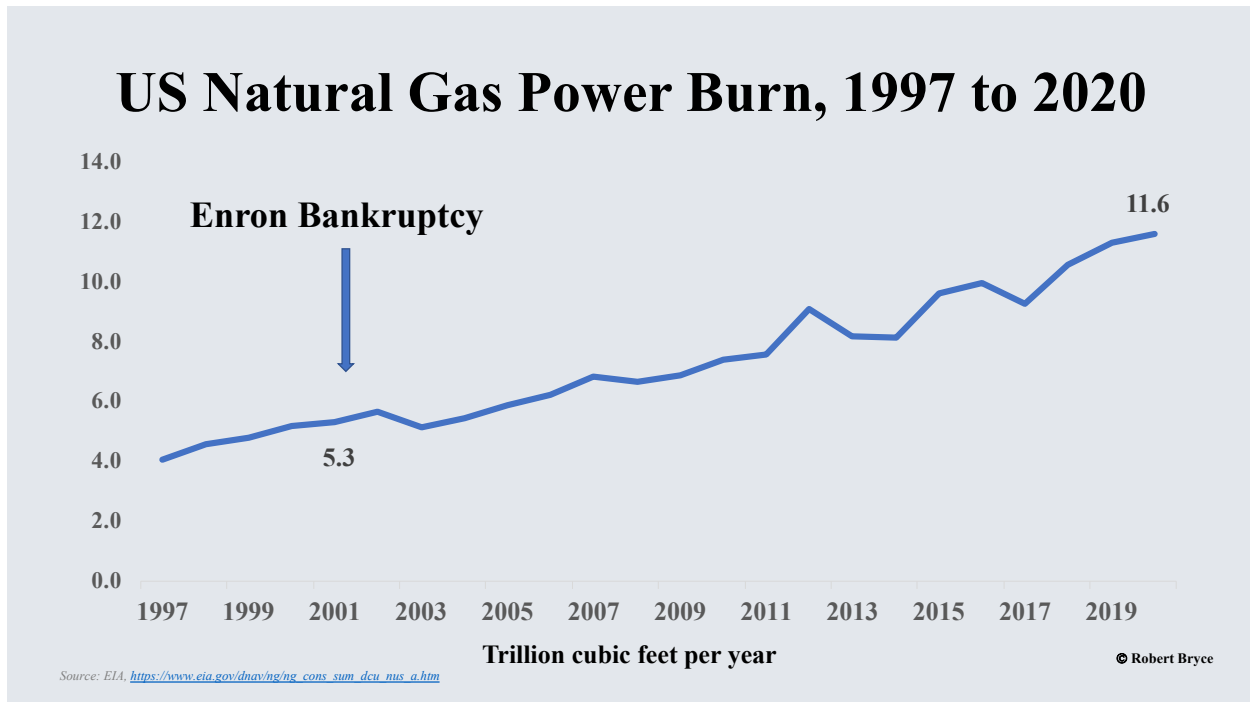
generators with a capacity of 12.2 gigawatts (GW), about 15 percent of California's entire electricity grid. Of these, 20,907 are diesel-fueled."

Factors undermining the grid

Several interrelated factors are making our grid more fragile. The first and most important factor is the shift in the energy sources being used for electricity generation. Over the past two decades, due to state-level mandates and lavish federal subsidies, the domestic electric grid has become far more reliant on weather-dependent and intermittent renewables like wind and solar. Over that same time period, dozens of coal and nuclear plants -- which provide resilient baseload power and help keep the grid stable, have been prematurely shuttered because they cannot compete with subsidized wind and solar energy.

According to the Energy Information Administration, [in 2020, coal-fired generation in the U.S. was about one-third of what it was in 2005](#). The EIA also notes that coal-fired generation now provides less energy to the grid than natural gas or nuclear. In March, the EIA reported, "U.S. coal-fired electricity generated totaled 774 million megawatt-hours (MWh) in 2020, which is less than both natural gas-fired (1.6 billion MWh) and nuclear-powered generation (790 million MWh). Indeed, as shown in Figure 2, since 2001, when Enron went bankrupt, [the amount of natural gas consumed by the U.S. electric sector has more than doubled](#).

Figure 2



While natural gas produces about half as much carbon dioxide during combustion as coal, it is a “just-in-time” fuel, meaning it is delivered by pipeline at the time it is needed. Gas-fired generation plants are less reliable than plants that have on-site fuel storage, meaning plants that rely on coal, uranium, or petroleum.

The just-in-time delivery of natural gas to power plants is not a problem when demand for electricity and heating is low. But as was made clear during the February blackouts in Texas, the overreliance on natural gas can have devastating consequences. Furthermore, despite the interrelated nature of the electric grid and the natural gas grid, regulators do not orchestrate their operation to assure that they are singing from the same hymnal. During the February blackouts, some gas infrastructure in Texas froze. Some gas processing plants and pipelines had their electricity cut off. That, in turn, reduced the amount of fuel available to produce power when electricity was needed the most.

A few months after the 2011 winter storm that caused blackouts in Texas, the Federal Energy Regulatory Commission and the North American Electric Reliability Corporation issued a report which warned about the [“interdependency of the electric and natural gas industries”](#) and urged “regulatory and industry bodies to explore solutions to the many interdependency problems which are likely

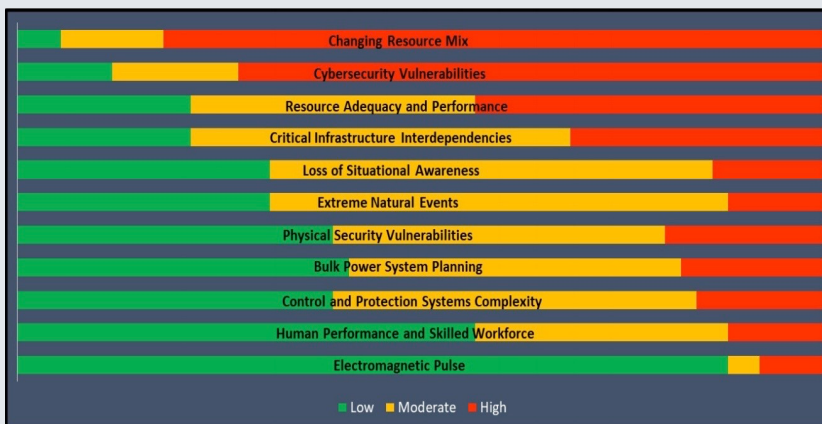
to remain of concern in the future.” But Texas and other states have not taken substantive measures to reduce the electric grid’s reliance on natural gas.

The electric grid’s overreliance on natural gas is occurring at the same time our grid is becoming more reliant on intermittent wind and solar energy. As I discussed above, the Department of Energy’s own data shows the increasing frequency of grid disturbances. This data should be a wake-up call for Congress to the very real possibility that the United States could be hit by a wide-area, long-term blackout if we do not take action to ensure the resilience of our grid.

Of course, renewable-energy promoters, as well as large environmental groups like the Rocky Mountain Institute, Sierra Club, Natural Resources Defense Council, Environmental Defense Fund, and others, don’t want to admit that wind and solar are undermining our grid and placing lives at risk. But on August 13, the North American Electric Reliability Corporation, issued a report which identified “changing resource mix” as the most urgent challenge facing the reliability of the U.S. electric grid. It also said America’s electric generation capacity “is increasingly characterized as one that is sensitive to extreme, widespread, and long duration temperatures as well as wind and solar droughts.”

Figure 3

NERC “ERO Reliability Risk Priorities Report,” August 12, 2021:



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Source: https://www.nerc.com/comm/RISC/Documents/RISC%20ERO%20Priorities%20Report_Final_RISC_Approved_July_8_2021_Board_Submitted_Copy.pdf

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The danger of such droughts can be seen by looking at the ongoing energy crisis in Europe, which was caused, in part, by extended periods of calm winds. As the *Wall Street Journal* reported on September 13, [a drop in wind in the North Sea “whipsawed through regional energy markets.](#) Gas and coal-fired electricity plants were called in to make up the shortfall from wind.” It continued, “To be sure, abundant wind power has at times led to periods of cheap electricity. This month, however, U.K. wind farms produced less than one gigawatt on certain days...Full capacity stands at 24 gigawatts.”

Prominent executives in the utility sector have also said that renewables can be bad for reliability. On March 10, in testimony in front of the Senate Environment and Public Works, at a hearing captioned “Building Back Better: Addressing Climate Change in the Electricity Sector and Fostering Economic Growth,” Xcel Energy CEO Ben Fowke said, “At higher levels of intermittent renewables, [the cost of the energy system begins to skyrocket and its reliability degrades.](#)” (Fowke [retired from Xcel in August.](#))

Generac, which profits by manufacturing standby generators, has also pointed to the increased use of renewables as a reason for the fragilization of the grid. The company’s investor presentation says key reasons for declining reliability are an “aging and under-invested electrical grid” and “increasing use of renewables leading to variability of supply and grid instability.”

Finally, it is clear that the country’s bulk power system is being mismanaged by regional transmission organizations like ERCOT in Texas and CAISO in California. Those entities manage the flow of power within their jurisdictions, but they are not providing enough incentives to assure the reliability and resilience of the electric grid. In recent years, CAISO has presided over frequent power shut-offs that affect thousands, and sometimes, millions of consumers. The mismanagement of the California grid also presents a risk to grids in adjacent states that are electrically interconnected.

Assuring resilience and reliability

Congress should take several steps to assure the resilience and reliability of the grid. First, it should do whatever it can to prevent the closure of any more coal and nuclear plants before policymakers and regulators can prove that their closure will not reduce the reliability and resilience of the grid. In particular, federal lawmakers should accelerate the development and rapid commercial deployment of reactors that are smaller, faster, cheaper, and safer than the fleet of reactors now in use.

Those reactors which are often referred to as small modular reactors, or SMRs, will be able to provide stable, dispatchable, zero-carbon power to the grid.

I have written about this many times, but I will say again that [the premature closure of New York's Indian Point Energy Center – a closure that was cheered by some of America's biggest environmental groups – was a travesty](#). That plant, by itself, provided about 25% of the electricity used by New York City. The closure of Indian Point will make the New York grid more reliant on natural gas and renewable energy, which as discussed above, will make the state's grid less reliable and less resilient. [The closure also resulted in a spike in carbon dioxide emissions in New York](#) due to the increased use of natural gas.

Second, the lavish federal tax incentives for wind and solar energy production – the production tax credit (PTC) and the investment tax credit (ITC) – should be eliminated immediately. Those subsidies distort wholesale power markets and make the grid more reliant on weather conditions, including prolonged wind and solar droughts.

In addition to reducing the reliability of the grid, wind and solar are also costing taxpayers billions of dollars per year. As I noted in a report I wrote earlier this year for the Center of the American Experiment, [between 2010 and 2029, those tax credits will cost the federal treasury about \\$140 billion](#). Designed to stimulate nascent industries, the PTC and ITC have become blatant examples of the crony corporatism that is undermining the integrity of the electric grid. The PTC and the ITC reward weather-dependent intermittent generation at the cost of dispatchable generation.

In 2015, Congress agreed on a five-year phase-out of the PTC. After that deal was struck, Sen. Charles Grassley, the Iowa Republican, and [alleged deficit hawk](#) said “[As the father of the first wind-energy tax credit in 1992](#), I can say that the tax credit was never meant to be permanent.” But the PTC keeps getting extended, including yet [another extension granted in June by the Internal Revenue Service](#). For years, Big Wind and Big Solar have claimed that they can produce the cheapest electricity. It's time for them to prove it.

Third, Congress, along with federal regulators must look for ways to incentivize electricity generators to have on-site fuel storage at their power plants. One of the key lessons that emerged from the February disaster in Texas was that the most reliable power plants were the ones that had on-site fuel, that is, the coal and nuclear plants. But those federal incentives don't have to be limited to nuclear or

coal. Fuel oil can be stored easily and relatively cheaply. It could be used in quick-start combustion turbines or in large reciprocating engines that could be deployed to help assure the resilience of the electric grid.

Conclusion

Over the past decade or so, I have testified before Congress four times. In my appearances before Congress, and in the books and articles I have published over the past decade, my message has been consistent: for energy security, and for climate concerns, we need nuclear energy and lots of it. In 2019, in testimony before the Senate Energy and Natural Resources Committee, I said, [“If the US wants to foster the innovation needed to sustain growth in nuclear-energy technology, Republicans and Democrats will have to forge significant, long-term commitments toward that goal.”](#)

Today, I am reiterating that same point. If we want a resilient and reliable grid, we cannot rely on a system whose performance and reliability depend on the weather. We need stout power systems fueled by generators that don’t depend on the vagaries of the wind or the sun.

The caption for this hearing is “Strategies for Improving Critical Energy Infrastructure.” For too long, policymakers have ignored the fragility of the electric grid. They can ignore it no longer. The data from the Department of Energy on the increasing numbers of blackouts, along with the soaring sales of standby generators, are evidence that our grid is being undermined by the senseless, headlong rush to add renewables while retiring baseload power.

Furthermore, Congress must recognize that we cannot treat electricity as though it is a commodity like crude oil, sneakers, or pork bellies. Electricity is a critical service that is delivered by a complex network that cannot be allowed to fail.

Congress must act, and act with all deliberate speed, to assure that the electricity that powers our economy stays affordable and that our grid is reliable and resilient. If a cyberattack, physical attack, solar storm, or other wide-area event causes a cascading collapse of one of the three U.S. grid interconnections, prompt recovery may not be possible if “black start” generators do not have sufficient on-site fuel supplies. A May 27 article in the *Wall Street Journal*, “The Texas Grid Came Close to an Even Bigger Disaster During February Freeze,” revealed that [nine out of the 13 primary black start generators in the state malfunctioned during the crisis](#), with at least two units being shut down for lack of fuel. According to testimony by ERCOT CEO Bill Magness, the Texas grid was less than five minutes away from

total collapse. Restoring the ERCOT grid after the collapse would have taken weeks or even months. Had that occurred, the losses in economic and human terms would have been horrendous.

In summary, the electric grid is our biggest, most complex, and most important piece of energy infrastructure. We take it for granted at our extreme peril. Essayist Emmet Penney had it right when he declared earlier this year that “[there is no such thing as a wealthy society with a weak electrical grid.](#)”

America cannot afford to have a weak electric grid.

Thank you.

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