

February 2021 Texas Power Plunge Synopsis

As the saying goes, "Don't mess with Texas," but Mother Nature ignored that warning during the Lone Star State's recent icy nose-dive into frigid depths. The February cold snap that enveloped much of the nation crept deep into the heart of Texas, leaving an estimated 4 million customers shivering without power, much like the August 2020 heat wave that left 3.3 million Californians sweltering without electricity. The result in both cases? Grid failure in states that lay claim to energy independence. The culprit? Energy independence itself. When the chips were down, Texas had few cards to play in the game of "borrowing" energy from surrounding regions. Regardless, many factors contributed to what the federal government would quickly deem a major disaster.

Texas Hold 'Em

Everything is bigger in Texas, and that certainly rings true for the state's power supply. Texas was ill-prepared when the snow started flying and ice took hold of the utility market. Temperatures fell and demand skyrocketed, causing widespread failure across Texas' utility infrastructure, which wasn't designed to operate in freezing temperatures. The Electric Reliability Council of Texas (ERCOT), which oversees approximately 90% of the state's electric load—or 26 million consumers—issued an EEA3 emergency alert on February 15, subsequently implementing rotating power outages to reduce demand and the corresponding strain on the electric grid. At its apex, 48% of ERCOT's generation—52,777 MW—went out of service, while peak demand reached a staggering, record-setting 74,820 MW. Ice-covered turbine blades and frozen gas wells in Texas and surrounding states, coupled with freezing at power plants, meant that as demand climbed, supply couldn't keep pace. Downed power lines from ice-laden snapped tree limbs added to the problem. According to ERCOT President & CEO Bill Magness, "This storm affected every generation type. It caused freezing of wind turbine blades. It caused fuel supply issues, as well as instrumentation and mechanical issues for natural gas, and it caused the mechanical-type issues for coal. We had a nuclear outage. This affected the system across the board, due to the intensity of the weather we saw and the duration of the weather we saw."

Oklahoma Governor Kevin Stitt later stated, "Renewable sources like wind and solar dropped to almost zero production. Natural gas wells froze, and compressor stations went offline. That left utility companies really scrambling to buy extra energy on the spot market at skyrocketing prices. [...] Wind is normally about 40% and it dropped to 10%. Coal in Oklahoma is normally 10% and it went to 40%. I've talked to several other governors that coal was really bailing us out in the production."

It seems that no one could add fuel to the fire, leaving Texans in chilly darkness.

Cause and Effect

In 2020, about 46% of Texas' power was generated from natural gas; the remainder was a combination of wind (23%), coal (18%), nuclear (11%), and solar (2%) generation. Texas typically expects about 67,000 megawatts of installed generating capacity from coal, nuclear, and gas, with a large portion of the remainder (approximately 29,000 megawatts), coming from wind and solar—sources that can't be revved up as demand rises. Additionally, Texas typically only counts on a fraction of wind and solar generation capacity being operational during peak winter periods, due to the intermittency of those sources. Because of the cold, natural gas supplies struggled to move from the ground through the pipes.

ERCOT estimates that 46,000 megawatts were forced off the system; thermal energy—coal, gas, and nuclear—makes up 28,000 of those megawatts, while wind and solar compose another 16,000. The drop in power generation resulted in rolling blackouts, as ERCOT struggled to balance the considerable reduction of supply vs. the significant increase in demand to try to stave off a catastrophic, comprehensive blackout. The ensuing outage lasted far longer than ERCOT anticipated.

Pay Up

Texas' power market is unregulated, which means that consumers can pick their utility providers, including some plans that allow customers to pay wholesale power prices. Soon after the storm hit, natural gas prices jumped from \$3.35 dollars per million BTU on February 9 to \$23.86 on February 17. When Texas entered the deep-freeze, wholesale electricity prices skyrocketed to \$9 per kWh—or from \$25-\$35/megawatt to 300 times the normal price. The consequence was astronomically high bills for consumers. The Texas attorney general is opening an investigation into the power outages, as well as the high prices. So far, there's been no determination as to who will ultimately be responsible for the exorbitant invoices that are being sent to consumers. Utility bankruptcies are beginning to emerge—the financial repercussions are anyone's guess.

Coal Call

While the jury might be hung on the primary cause of the Texas' poor power performance, one thing is certain—the situation would have been worse, had it not been for coal-fired generation. Despite some plant outages, coal played a substantial role in keeping the grid operational during the crisis; in 2020, ERCOT received 23% of its power from wind-generation, its primary renewable source. Solar provided an additional 2%, primarily in the summer; the remaining 75% came largely from coal, nuclear, and gas. Like nuclear energy, coal is less susceptible to fuel supply disruptions. When the elements in Texas changed course, MISO, SPP, and PJM (the eastern US grid operator) relied on fossil fuel to generate the majority of the country's power to offset the loss of wind- and solar-generated power. The undisputable fact remains—coal provides reliable baseload power generation. The nation's power grid welcomes renewable energy, but that acceptance comes at the peril of vulnerability. Extreme heat and bitter cold create a seller's market, and we're all buyers. Ohio's electric cooperative network espouses an "all of the above" fuel mix—coal, natural gas, solar, methane, and hydrogen—because reliability and affordability are paramount to our 1 million consumer-members, particularly in punishing conditions. Look no farther than Texas and California for evidence that fuel diversity must be included in the evolution of the grid. A grid in jeopardy is a country at risk.

Summary

- February 2021 cold snap left 4 million Texans without power.
- Numerous factors contributed to rotating power outages, which were implemented to reduce demand and the corresponding strain on the grid.
- Decrease in renewable energy generation resulted in reduced supply for increased demand.
- Wholesale electricity prices soared, leaving consumers holding the bag for excessive bills, as some utilities filed for bankruptcy.
- Fossil fuels are essential to an overall reliable, resilient, and diverse generation mix.