

FATAL FLAWS: IS ERCOT STILL BROKEN?

In February 2021, Winter Storm Uri caused an immense power generation outage in Texas, leaving more than 4.5 million homes without electricity. Has the Electric Reliability Council of Texas learned its lesson?

ARTICLE BY
JOHN HARPOLE

Editor's note: Thirty-two years ago, John Harpole authored his first magazine article for the Hart Energy family of publications. That article was titled "December of 89." Coincidentally, it dealt with another major storm that wreaked havoc on the Northeast U.S. during December of 1989.

Harpole described firsthand his experiences as a natural gas buyer for General Electric (GE) industrial plants. A weather-induced shortage of interstate natural gas pipeline capacity nearly sent 12,000 GE plant workers home for an early Christmas.

Harpole brings more than thirty years of market insight to this story in an effort to describe, in day-to-day terms, what happened in Texas last year.

Harpole's company, Mercator Energy, brokers the sale of natural gas for producers and manages the purchasing of natural gas for industrial plants from Louisiana to California. A thorough understanding of natural gas pipeline capacity and how natural gas flows in and on a particular pipeline is a central offering to Mercator's clients.

Freezing in energy-rich Texas is the equivalent of starving in a grocery store.

The emotional, financial and political repercussions from last year's historic electrical outage in Texas will be felt for decades, far beyond the big state's border. Recognition of the need for legislative atonement may take longer.

After a year's worth of reflection on the events surrounding Winter Storm Uri, we continue to ponder some key questions:

- Can anyone reasonably claim that the Texas deregulated electricity market is functioning properly?
- Can the February blackout ultimately be blamed on the Texas-sized gravy train of renewable tax credits/abatements, mandates and incentives?
- Has the Texas State Legislature adequately assessed the anti-competitive impact of renewable tax credits on the Electric Reliability Council of Texas (ERCOT) model?
- Are electric generation providers equally incentivized to perform, especially on a peak day of demand?
- And perhaps of greatest concern: Does the experience in Texas foreshadow larger challenges for a U.S. electric grid in transition?

The hundreds of lives lost in the largest forced outage of electricity in human history deserve a thorough exploration of those big questions. And we will get to that. But in summary, the facts in the case point to simple answers of no, no, no and no. And for that last question of greatest concern—the near certainty of future problems—the answer has to be none other than a big, frightening yes.



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Most of the discussions of the above questions would fall into what we call the “first order macro” category of the Texas power grid problem. We noticed in the last year that most of the experts involved in fixing the problem (and hopefully averting future disastrous outages) focused disproportionately on the “second order micro” category of issues. While those issues certainly command attention, the macro items should require the most attention moving forward. We need to examine the cost-benefit of federal production tax credits, subsidies for renewable energy, competitive renewable energy zones and more.

According to the most conservative measurements, over 200 people lost their lives as a result of ERCOT’s failures. On the early morning of Feb. 15, the grid came within 4 1/2 minutes of a complete system-wide failure. That type of “meltdown” would have required what the electric utility refers to as a “black start.”

“We came dangerously close to losing the entire electric system,” said Curt Morgan of Vistra Corp., in testimony to a post-Uri storm legislative hearing. Vistra Corp. owns and operates one of the largest fleets of thermal generation (natural gas and coal) units in Texas.

Let’s remember: By “close,” we are talking about minutes, and by “dangerously,” we are talking about a situation that could have resulted in the loss of thousands or tens of thousands of lives.

Some experts estimate that it could have taken at least two months to recover from such an outage. Few backup power generator systems are expected to run longer than three days. Imagine having to life flight every ICU patient to a hospital in a neighboring state due to a lack of electricity. That helicopter flight would only be possible if the typical electric-powered refueling pumps had backup diesel generators.

The cost

In a Nov. 2, 2021, press release, Texas Comptroller Glen Hegar estimated that the financial fallout from Winter Storm Uri falls in the range of \$80 billion to \$130 billion. According to a survey conducted by the University of Houston, “more than two out of three, or 69%, of Texans lost power at some point during Feb. 14 to Feb. 20, and almost half, or about 49%, had disruptions in water service.”

In yet another Uri-related jolt, the Texas Railroad Commission voted in November 2021 to give approval to the Texas Public Finance Authority to issue \$3.4 billion in state-backed bonds to compensate natural gas utilities for extraordinary expenses related to the storm. Rather than absorbing that financial shock in one monthly billing cycle, Texas ratepayers will be paying off that bond in monthly increments for decades.

Even after last February’s debacle, the degree to which Texas relies on dispatchable thermal

Fresh snow covered the state capitol in Austin, Texas, after a winter storm in February of 2021.





Q&A WITH TEXAS RAILROAD COMMISSIONER JIM WRIGHT

Elected to the Texas Railroad Commission for the first time in November 2020, Jim Wright is a fifth-generation rancher who surprisingly unseated the incumbent and gained the voters' attention with his emphasis on transparency and ethics within the energy industry and peripheral to it. We had the opportunity to discuss with him some of the more sensitive issues in connection with the Winter Storm Uri disaster.

Do you believe that the Texas Legislature assumes the Railroad Commission has a disproportionate responsibility for resolving

Electric Reliability Council of Texas' (ERCOT) failures last year?

Jim Wright: Possibly. I think legislators heard a narrative that the underlying failure of the grid was natural gas, and to some extent, they zeroed in on that in their subsequent legislation. The natural gas system could have performed better, but I think to place the bulk of the blame on the doorstep of our natural gas industry was perhaps a convenient sidestep.

Clearly a whole host of issues contributed to the events of last February. Some of those, such as weatherization of electrical power plants, stemmed from ERCOT and the power generators themselves. Many of the issues that were the result of process failures in February were addressed in Senate Bill 3, but there are some overarching issues as it relates to our Texas electrical grid that remain unresolved namely the underlying and systemic imbalances in our market structure.

Look, I understand the Legislature has a tough job after an event like Winter Storm Uri. The legislators must cobble together information to construct mandates for an agency or agencies to solve an extremely complex problem, all in a limited amount of time. Imagine trying to coordinate a single piece of legislation to direct two state agencies and one quasi state agency to work together flawlessly—it must be very difficult.

That said, I think both industry and the Railroad Commission (RRC) made it abundantly clear that natural gas played a redeeming role in Winter Storm Uri; not one of fault.

How would you rate the Railroad Commission's statutory ability to address and solve ERCOT's problems?

JW: The RRC has primary regulatory jurisdiction over the oil and natural gas industry, pipeline transporters, the natural gas and hazardous liquid pipeline industry, natural gas utilities, the LPG industry, and coal and uranium mining operations. In addition, the RRC has exclusive original jurisdiction over natural gas utility service rates in certain parts of Texas but has no jurisdiction over the commodity price of oil or natural gas, which is wholly market-determined. Most importantly for this question, however, the RRC has absolutely no jurisdiction over the regulation of the generation, transmission or distribution of electricity in Texas. In short, the RRC has no statutory authority to address or solve the problems encountered or created by ERCOT. The RRC can, however, work to ensure that certain natural gas facilities are properly designated as critical and also weatherized so that the flow of natural gas to electrical generating facilities is predictable and sufficient.

Is the larger issue in Texas a market-structure issue exacerbated by renewable energy tax incentives that have virtually eliminated competitiveness for thermal generation in the ERCOT market?

JW: Absolutely, yes. This is one of the underlying issues that I believe caused the downward spiral of blackouts during Winter Storm Uri. Wind and solar power generation is increasingly augmenting our power portfolio, which can be a good thing. In fact, the Texas Legislature effectively guarantees that wind and solar can supply up to 20% of the electrical generation without any competition. That means

or fossil fuels for electric generation is not understood by most Texans. To begin with, most people fail to consider that storage of electricity at a utility scale is currently impossible. One day of U.S. electricity demand would require 500 years of battery production from Tesla's largest 5.3 million square foot Gigafactory in Nevada. So how will our electric grid perform when the wind doesn't blow and the sun doesn't shine? Without utility-scale electricity storage, it simply can't.

In simplest terms, electricity is either being produced, transmitted or consumed.

The scale and needs of the U.S. electric grid are rarely mentioned in the "decarbonization" campaigns that routinely win politicians and hedge fund managers favor. Ironically, the winning campaign teams at capitol buildings and in hearing rooms never have to operate the electric grid after the campaign is won. For them, the work is done and the financial compensation is collected. That compensation during the first three months of the most recent Texas Legislative session amounted to \$24 million in payments from energy industry

participants to over 300 newly minted energy lobbyists. For certain advocacy groups, the energy transition from fossils to 100% renewable energy is a foregone conclusion. Renewable energy is the only solution allowed.

In economic terms, I would classify this new "era of renewables" as a classic economic clash between socialism and free-market capitalism. Some might call it crony-corporatism (socialize the cost while privatizing the profits) rather than socialism, but no reasonable economist would identify the Texas Public Utilities Commission's (PUC) deregulated market design as a truly free market. That market has been distorted in large part thanks to federal tax subsidies.

Under the current market reality in Texas, wind operators have a complete advantage over their thermal generation competitors. Thanks to the federal production tax credit, wind operators can actually bid into the ERCOT market at negative power prices and still make money. The federal production tax credit of .023 cents per kilowatt-hour is equal to \$23 per megawatt-hour (MWh) which, when converted into

when the wind is blowing and the sun is shining, thermal electrical generation sources like natural gas and coal have to come offline, making it difficult for those industries to compete. That is one part of the problem. The other is that, due to federal incentives, wind and solar operations can discount the cost of the electricity that they provide and still turn a profit.

It is this combination of state policy and federal tax incentives that best explains the absence of new gas-fired electrical generation facilities constructed in Texas in the last few years, even though the power needs in the state have increased dramatically. All power generation sources need to be on a level playing field to provide actual competition. When the sun is shining and the wind is blowing, having that renewable power generation is a benefit to Texas. However, since the renewables are at the mercy of the weather, they cannot be counted on to be there whenever needed. For that reason, nothing beats the instant-on reliable power that natural gas provides.

Does the Railroad Commission have statutory authority to mandate weatherization to/for the natural gas industry?

JW: Yes. Two specific pieces of legislation, House Bill 3648 and Senate Bill 3, collectively mandate the RRC to designate certain natural gas facilities as critical and require those facilities to weatherize. The proposed critical designation rule and corresponding forms were recently adopted at a Nov. 30, 2021, RRC conference after extensive workshops and comment periods. Much of the Senate Bill 3 requirements will be completed in 2022, including rulemaking for weatherization for critical natural gas facilities.

However, while we have the authority to mandate weatherization requirements, the RRC can't require or force production. I mentioned this at the most recent open meeting, and I continue to emphasize the need for electrical generators to secure firm gas supplies and transportation. I believe the best safeguard against extreme weather events, whether winter storms, hurricanes or summer heat, is an abundance of gas storage. Storage in salt caverns or depleted fields is advantageous in these situations, because unlike gas from the wellhead, gas from storage has already been processed and is ready for use.

So if that weatherization mandate is enforced, won't that further erode the competitiveness between renewable and thermal generators to the benefit of the renewable industry?

JW: It certainly could. I don't know if wind and solar are being

made to weatherize and, if so, what the cost of that weatherization might be. I do know that natural gas storage facilities in Texas did a fantastic job of weatherizing prior to this year, and they performed flawlessly during Winter Storm Uri. Because it can have a serious financial effect on individual wells, it simply doesn't make sense to require full weatherization on marginal assets, such as oil wells that only provide small volumes of casinghead gas or gas wells near their economic limit.

The critical designation rule addresses this issue by dividing the natural gas facilities in Texas into three separate groups: (1) "Super-critical" natural gas facilities, which supply approximately 80% of the daily gas required in Texas, are so important that they will not be allowed to opt out of the weatherization rules; (2) "Non-critical" natural gas facilities, which produce little to no natural gas and are thus automatically exempt from the weatherization requirements, provide good opportunities for initial load shed during an extreme weather event; and finally (3) "Marginally-critical" natural gas facilities, which may choose to request to opt out of the weatherization rules, will have to provide the RRC with a reasonable basis and justification for doing so.

Do you think there should be some form of capacity market for at least firm supplies on a peak demand day on ERCOT?

JW: While this question is well outside the RRC's jurisdiction as an oil and gas regulator, I do think there should be at least some sort of incentivization for power generators to contract for firm supply and transport for peak demand volumes, at least during the winter months.

I understand that PUC (Public Utilities Commission) is looking at this issue and reviewing potential solutions to address these concerns. I have already begun to put wheels in motion to enhance the market for our natural gas to ensure electricity is available for distribution onto the grid while further utilizing gas that is currently flared.

I first wrote about this in an op-ed published by the Houston Chronicle back in August. Since that time, I have been working with Congressman Michael Burgess (TX-26) on legislation (H.R. 6146) The Stranded Gas Recovery & Utilization Act to further strengthen our ability to get natural gas to market.

This isn't simply a Texas problem. Just recently, New England's power grid operator raised concerns that several issues, including natural gas pipeline constraints, could impact the area's power system.

a heating unit of natural gas, is roughly equal to more than \$6/MMBtu. Essentially, the natural gas industry can't compete against the huge advantage given to the wind energy developers and producers through a federal tax incentive. The prevailing first of the month price for electricity in February 2021 averaged \$25/MWh. Thermal generators simply could not compete. But more importantly, any incentive to compete at any time, let alone during peak demand, had been eliminated by the tax incentive for renewable energy.

What used to be a competitive ERCOT market is now characterized by a situation where dispatchable generation is apparently only required when the wind doesn't blow. It is difficult to identify or find a natural gas-fired generator that will publicly admit that they don't hold upstream firm transportation pipeline capacity to meet ERCOT's potential peak day requirements for all of their individual gas fired generation units.

It doesn't make economic sense for a gas-fired generator to hold year-round firm transportation capacity on a natural gas pipeline

when they are only competitive a handful of days per year against subsidized wind generation. There is no market incentive to do so.

It is the moral equivalent of asking the natural gas industry to run a 100-yard dash every 15 minutes, 24 hours per day, 365 days per year. Their competitor, in this case the wind energy industry, gets an 80-yard head start in every race. The only chance the natural gas industry has to win the race is when their competitor fails to show up or falls flat on their face. The real question for the natural gas industry is why even train or prepare for such a race?

In a recent Washington Examiner article, Stephen Moore, a well-known economist and former editorial board member for the Wall Street Journal, posed the question, "How much would the solar, wind and electric vehicle companies get in federal handouts and tax loopholes in President Joe Biden's 'Build Back Better' bill?" Although the bill never made it out of Congress, it would have been well over \$100 billion in taxpayer largesse. If all the tax credits had been included, that number would have reached half a trillion dollars. No other

WHEN FORCE MAJEURE BECOMES PRICE MAJEURE

The Permian Basin currently accounts for approximately 15% of total U.S. natural gas production. Ten years ago, it was about one-third of today's nearly 12 Bcf generated on a daily basis in the Permian Basin. The race to oil and natural gas production, or more accurately, associated natural gas production, in the Permian Basin has sky-rocketed.

Due to increasingly more restrictive air emission regulations implemented by the Texas Commission on Environmental Quality, oil producers had a limited amount of time to flare any natural gas associated with a new producing oil well. In order to expedite their sale of oil, Permian Basin producers almost uniformly responded by dedicating their producing acreage to a third-party natural gas gathering pipeline company. That gathering company would buy the natural gas production "at the wellhead."

In an effort to install the natural gas gathering systems as quickly as possible, midstream companies (again, almost uniformly) bypassed the historic use of natural gas-fired compression and chose electric compression. Electric compression was much easier and quicker to install given state air permit regulations related to natural gas compression emissions.

During the rolling blackouts of February 2021, significant volumes of associated natural gas production were shut in due to a lack of electricity as a result of Electric Reliability Council of Texas (ERCOT) mandated rolling blackouts. It only took an average of two hours for the natural gas to sit in that cold pipe to see the hydrates fall out in solid form and thereby freeze that route to market.

The first of the month price for electricity in February 2021 was roughly \$25/MWh. In the midstream natural gas gathering contract executed by the producer, the actual electric costs are treated as "a pass through." Stated another way, whatever the midstream company paid for electricity was passed through by the midstream company to its producer client. That February, at \$25/MWh, the electricity cost passed through to the producer on an MMBtu basis was roughly equal to 14 cents to 16 cents per MMBtu in pipeline gathering charges.

The standard midstream provider purchase agreement or contract price for the majority of Permian Basin third-party gathered gas follows an industry standard 80:20 rule. That is, 80% of the gas received a first of the month index price while the remaining 20% received a fluctuating daily price. (For February 2021, the prevailing first of the month index at Waha Hub posted at \$2.49/MMBtu.)

On the morning of Feb. 15, when the Texas Public Utility Commission unilaterally set the clearing wholesale price of electricity on ERCOT at \$9,000/MWh, that price translated to a \$50/MMBtu pass-through charge for natural gas compression electricity.

What producer would accept a price of \$2.49/MMBtu but pay a minimum of \$50 in gathering fees to receive that price?

The frozen pipes that created a force majeure event ultimately, when the expensive electricity was turned back on, forced a price majeure declaration. Some producers exercised their right to "an economic out-clause" in their midstream gas gathering contract. Should a second rolling blackout occur under similar circumstances, that price majeure declaration will most likely be made by all producers.

It is doubtful that any ERCOT market design ever anticipated or even appreciated those types of upstream natural gas supply issues.

ERCOT recently reset the maximum electric price cap from \$9,000/MWh to \$5,000/MWh. That still doesn't solve the potential price majeure problem for natural gas producers that rely on electric compression.

If a similar Winter Storm Uri is encountered in the future, a \$5,000/MWh cap would translate to a \$28/MMBtu pass through on electric compression gathering charges. That potential \$28 gathering fee far exceeds the 10-year average for Waha gas (\$2.50/MMBtu) or the highest first of the month price in the past 10 years, which occurred in November 2021 at \$5.56/MMBtu.

industry in American history has ever received that lucrative paycheck.

"The folks at the Institute for Energy Research calculated that this would have been on top of the more than \$150 billion in subsidies those industries received from Uncle Sam in the last 30 years," he said.

"The umbilical cord to taxpayer wallets never gets cut. Yet, laughably, the left says all these subsidies to 'green energy' are necessary for an 'infant industry.' Really? Does Big Wind or Big Solar ever grow up? You can call it socialism or crony-corporatism, where renewable energy developers socialize the cost and privatize the profit. But whatever you call it, it is not a free market. It is simply a bad economic policy."

Has Europe learned its lesson?

Europe deregulated its electric grid about five years ahead of Texas. At the time of this writing, many experts anticipate the same sort of Texas-forced blackouts throughout Europe in the cold months of January through March of 2022.

Last fall, energy shortages throughout Europe were made worse by a lack of wind in the North Sea, which reduced the availability of electricity for all of Northern Europe. Power prices increased dramatically. European spot natural gas prices were 10 times the cost of U.S. natural gas.

Most European fertilizer plants that utilize natural gas as a feedstock for ammonia were shuttered. Concerns over a shortage of fertilizer and the resultant shortages of crops are raising concerns about food shortages and severe inflation across Europe. During the past five years, Europe has demonstrated an overreliance on renewable energy, shirking the fundamental need for dispatchable thermal energy. However, change is in the wind.

In a recent Substack email from author Michael Shellenberger, he wrote, "Four years ago, the conventional wisdom in Europe was that the continent was transitioning to renewable energies. The cost of electricity from solar panels, wind turbines and natural gas had declined significantly, and lithium batteries could soon replace natural gas to provide energy when the sun wasn't shining and the wind wasn't blowing. And [according to consensus], nuclear energy was going away; the main question was how soon existing nuclear plants could be dismantled.

"Today, the conventional wisdom has changed radically. Energy and electricity prices are at record levels due to Europe's overreliance on renewables, inadequate supplies of nuclear energy and shortages of oil and gas due to underinvestment in oil and gas exploration and production. Carbon emissions in Germany rose 25% in the first half of 2020 due in large part to a 25% decline in wind [energy], underscoring the unreliable nature of weather-dependent renewables. In response, both France and Britain have promised a major expansion of nuclear energy."

Europe is learning an expensive lesson: dispatchable generation (coal-fired plants, natural

gas-fired plants and nuclear plants) must be available at all times for an electric grid to run efficiently and sustainably. Germany recently closed three of its remaining six nuclear plants with plans to shift energy dependency mainly to wind. We will see how that goes, but the data here seem to portend a decades-long setback in that part of Europe.

Back to Texas

Energy issues are globally connected, but the problems in Texas are big enough to absorb all our attention at this point in time. The “melt-down” of the Texas energy grid in February 2021 has generated encyclopedic volumes of documents as experts, politicians, analysts, scientists, media outlets and others debate the whys and wherefores. New information and speculations are added almost weekly, and government bodies in search of solutions keep nudging the ship in slightly different directions.

If we want to prevent a repeat of the Uri disaster, we have to start with the recognition that the myriad of contributing factors fall into the two categories that we mentioned above: macro and micro.

First order macro issues. These include market distorting tax policies (as identified by Bill Peacock with Texas Public Policy Foundation) that overlay all ERCOT/Texas Public Utility market pricing and operating functions such as:

- The Federal Production Tax credits for renewables (in Texas alone worth \$16.3 billion),
- CREZ (Competitive Renewable Energy Zones) transmission capital support (\$14 billion),
- Federal stimulus funds (\$1.6 billion),
- Renewable energy credits (\$570 million),
- Interconnection costs (\$1 billion),
- 313 property tax limitations (\$2.5 billion),
- 312 property tax abatements (?),
- ORDC costs caused by renewables (\$2.5 billion); and
- Carbon offset credits/payments (?).

These subsidies, as they run between 2006 and 2029, will amount to more than \$36 billion.

Second order micro issues. These are the day-to-day, keep-the-train-running-on-time issues, mostly pertaining to ERCOT market functions.

The boundary lines for assigning blame to the ERCOT blackouts are often gray when analyzing the duties of ERCOT, the Texas PUC, the Texas Railroad Commission and the State Legislature. The Texas Railroad Commission runs front and center in resolving both the macro and micro issues identified above.

Jason Modglin, president of Texas Alliance of Energy Producers, also agreed with Commissioner Wright about the inaccurate targeting of the natural gas industry. He went a step further in suggesting that the natural gas producers “saved lives” (along with the Railroad Commission). He noted that the Railroad Commission identified the need to keep the electric power flowing to natural gas producers, so they could in turn keep the critical natural gas

flowing to the generators. This strategy ought to be etched into future tactics.

“By identifying and prioritizing critical components of the natural gas system, operators will supply transmission utilities with the best information to make informed load-shedding decisions and keep more gas flowing to where it is needed,” he said. “There is more work to do to build the resiliency of the system by ensuring electric generators have firm pipeline and supply contracts in place and that growing urban areas have the natural gas storage needed to keep the lights and heat on.”

As it is, one of the micro issues facing ERCOT is the cyclical nature of the energy failures in an extreme environment such as Winter Storm Uri and how the failures compound one another. A lack of electricity at the natural gas production facility results in a lack of fuel for the electric generation plant at a critical time when that plant needs it the most. And round and round we go.

When power is not available, the micro issues such as “weatherization” of natural gas plants are just as important as the macro issues. But the micro issues can be addressed with a little thought and preparation and with better communication. It seems that the apologists for renewable energy want to focus on these housekeeping issues, completely neglecting more fundamental issues of market design and function. But the key question is: What market incentive can induce private companies or corporations to be available when renewable energy is not available?

In another confounding micro problem that arose during Winter Storm Uri, it turned out (thanks to Texas PUC policies) that electric generators were, in some cases, charging natural gas producers about 20 times in electric costs what the natural gas producers were able to receive to provide the natural gas. See the attached sidebar here for details about how that infuriating disincentive worked. This upside-down economic fluke was like telling the beer vendor at a football game that he had to pay \$150 for the privilege of selling a \$7.50 beer in the stadium’s executive suite.

Some of the following micro issues were just a matter of bad/unlucky timing, and some are easily solved with a proper level of commitment from legislators, regulators and others. But it is important to recognize here that these micro issues all played a role in the disaster:

- **Thermal outage due to planned maintenance.** At the same time that the storm hit, ERCOT reduced thermal capacity by 10 to 12 gigawatts (GW), representing about 15% of the minimum need for the demands of the day.
- **Frozen wells.** There is some dispute over the status of the gas wells—whether they truly froze up, and if so, exactly why it happened and how badly, and at what point it happened in the efforts to “fight” the winter storm. We believe there was some freezing which could be prevented in the future by improvements in weatherization. But the wells can’t produce if they

don't have power, which is what happened when the rolling outages began throughout the system.

- **Frozen wind turbines.** Again, we aren't certain how badly the turbines truly "froze." And if they did freeze, enhanced weatherization could solve this micro problem. But the bottom line is they weren't moving, and they weren't going to move because of our final micro issue.
- **Absence of wind.** Again, this was bad timing. Usually, the best winds at the Texas wind farms occur at about 2 a.m. or 3 a.m., and they're usually good for about 6 to 9 GW of power (topping out at about 20 GW). At 2 a.m. on the morning of Feb. 15, wind had dropped to 5.3 GW. At 8 p.m. on Feb. 15, it was at 0.8 GW. At the time Texas needed that wind power the most, the turbines were generating about 0.8 GW, or about 2% of its rated capacity. And that's exactly why dispatchable power is so crucial to the grid system to even out the intermittencies that come with renewables.

As long as we're on the topic of wind-power delivery, it is worth noting that wind power tends to arrive when it is needed the least. It ramps up late at night, when most people are sleeping and using less electricity. This problem is exacerbated, of course, by the minimal electrical storage capability mentioned above.

Texas' impact from the lack of wind power during Winter Storm Uri was greater than those states bordering to the north. The storm resulted in a high-pressure weather system sitting over the central U.S. and its associated low wind velocities that extended all the way up to Canada. This curtailed the wind turbines across the central U.S. plains and resulted in low power generation. However, the electric grids to the north of ERCOT (known as MISO and SWPP) were augmented with dispatchable power from coal-fired units, and similar crisis in power balances were not seen.

Skewed subsidies

The micro issues are numerous, and there are probably others that we could have added. But the macro issues are where we need to direct most of our energies for solutions if we want to have the greatest proportion of success in averting future tragedy over the next five, 10 or even 50 years.

Gregg Goodnight, head of a study team of retired engineers for the organization The Right Climate Stuff, said, "We conclude that there were two major contributing factors that led to the February Texas electrical grid outage: the unusual but not unprecedented weather event and the cumulative impact of long-term public policy, both at the state and federal levels."

He added the following observations:

- The long-term impact of public policy at both the state and national level during the past 20 years has increased and will continue to increase the vulnerability of the Texas grid to outages such as the one seen in February of 2021.
- The Texas grid's safety margin for handling

of severe weather events has continued to erode due to policies that reduce the reserve dispatchable (thermal) power available to offset the extreme conditions that we believe made a similar incident inevitable.

- Policies enacted in the early 1990s meant to encourage growth of wind and solar power generation (and meant to be temporary) have not been phased out as intended. They continue to significantly advantage these intermittent sources of power to the near exclusion of new thermal power additions.
- Current power pricing policies in Texas give no credit for reliability and dispatchability. Treating the pricing of "as available" power from wind and solar the same as on-demand peaking power is fundamentally flawed.

The obligation for continuously balancing the ERCOT grid's electrical supply and demand rests exclusively on thermal power sources, but the attendant costs are spread among all grid customers. Instead, these costs should be borne by all electrical producers to the extent they contribute to this intermittency.

In an interview, Bill Peacock with Energy Alliance said, "The Texas electricity market is being overrun by renewable energy generation. Since 2018, 79.3% of all new generation has been intermittent renewable energy. Only 19.1% has come from generation that can be dispatched, and all of that comes from one source—natural gas. The lack of diversity that has resulted from this overreliance on renewables has come at a great cost to Texans."

About \$66 billion has been spent building wind and solar capacity in Texas since 2006. During that fateful week in February, according to author and journalist Robert Bryce, "there was no solar production, and of the 31,000 megawatts of wind capacity installed in ERCOT, only about 5,400 megawatts, or roughly 17% of that capacity, was available when the grid operator was shedding load to prevent the state's grid from going dark."

What does the future hold? ERCOT will become increasingly dependent on weather generation powered energy. According to Bryce, "about 24,000 megawatts of solar and 11,000 megawatts of wind capacity are slated to be added to the ERCOT grid between now and 2023. Thus, over the next two years, the amount of renewable capacity in Texas will nearly double."

To Goodnight, the numbers don't add up. His studies show that under current conditions, Texas will expect to be receiving 38% of its energy from renewables by 2025, a number that is far out of whack with reality. Instead, he said, the lesson of Winter Storm Uri is that the system can handle at most 25% renewables on an average basis.

Yet we continue to see the push for subsidized renewables in Washington, D.C., and in state capitols. The federal government has renewed production tax credits more than 20 times during the decades. And in instances where the government can't benefit from

renewables directly with new laws, we see instead a “back door” advocacy through tightening regulations in which the government makes business harder and harder for the dispatchable (natural gas, coal and nuclear) power resources.

It seems that the “100% renewable crowd” is trying to fast-track the elimination of fossil fuels. Without utility-scale storage, that premise is impossible. When the world transitioned from horses to automobiles, the new automobile owners did not go out and shoot their horses.

My current overriding concern is that the mayhem we saw in Texas presages what we will see across the U.S. as statewide renewable energy mandates ratchet up over the next few decades. Unfortunately, “what happens in Texas” will not stay in Texas, as most other states join the “all-renewable bandwagon.” We distort true market competition when we mandate renewable energy generation and/or provide tax incentives for it. The mandates and incentives also eliminate any competitive incentive among generators using coal, natural gas or nuclear fuel. Texas is currently suffering through a “distorted market” phase of an energy transition to what some would hope will be an all-renewable supply of energy for the grid.

The distorted market phase resembles a socialistic economy’s command and control over

the electric grid. The uncertainty of freezing in your own home and waiting for the power to come back on must feel a lot like standing in a breadline hoping for sustenance when it’s your turn to buy bread at the counter.

The new era?

Regardless of the economic term used, socialism or crony-corporatism, the net impact on society is the same. If my assertion is correct, Texans (and more specifically ERCOT) face a much larger problem than trying to coerce the natural gas industry to weatherize.

A true functioning free market for electricity would foster, promote and nurture competition between all electric generation participants (nuclear plants, coal plants, natural gas-fired plants, wind and solar).

Competition in today’s U.S. electric grid is so skewed by renewable mandates, state utility commission must-take-resource edicts and renewable tax subsidies that most traces of a “free market” characterization have virtually disappeared.

Unfortunately for Texans, that economic reality played out in February 2021 when Winter Storm Uri penetrated Texas and wreaked havoc. Will that same problem continually repeat itself as individual states ratchet up their commitment to renewable energy? I think so. □

A WELL-TIMED HOLIDAY?

A four-day “holiday in trading” occurred just as Winter Storm Uri descended on the Midwest and Texas in February 2021. All natural gas index prices were settled at close of business on Friday, Feb. 12 and were then fixed by the natural gas trade publications and the Intercontinental Exchange for Saturday, Feb. 13 through Tuesday, Feb. 16. If not for that miraculous timing, natural gas index prices in Texas on the trading holiday of Monday, Feb. 15 (President’s Day) and Tuesday, Feb. 16 might have otherwise reached \$2,500/MMBtu.

That would have been quite a black eye for Texas natural gas producers as accusations of “profiteering” would have been leveled against them by all sides. No doubt, congressional and state legislative hearings would have ensued.

What could have caused natural gas prices to run to \$2,500/MMBtu on that frozen Monday and Tuesday?

According to Andrew Barlow, a spokesman for the Texas Public Utility Commission (TPUC), early Monday morning on Feb. 15, the TPUC had identified a “system glitch” as the reason electricity prices remained artificially low at \$1,200/MWh. The TPUC couldn’t understand why incremental generation did not materialize at the \$1,200/MWh price. It just didn’t fit their preconceived model.

Therefore, the TPUC unilaterally ordered the Electric Reliability Council of Texas (ERCOT) wholesale price to be immediately and manually fixed at \$9,000/MWh. They were attempting to send a price signal to incentivize generators that were possibly still on the sidelines.

It would arguably become known as the single most

expensive market error made by regulators in Texas and possibly U.S. history.

The TPUC “experts” fundamentally mistook a lack of available generation (caused by freezing temperatures, frozen pipes and a lack of wind generation) as a market pricing issue and not a scarcity or physical supply issue.

As one Permian Basin pumper said to me, it took them two days to realize that “frozen pipes don’t thaw out any quicker at \$9,000/MWh than they do at \$1,200/MWh.”

ERCOT made the unforgivable mistake of leaving that \$9,000 wholesale price in place for two full days longer than necessary. ERCOT forced power companies, according to their watchdog, Potomac Economics, to absorb \$16 billion in excess wholesale electricity costs.

Those costs have now been wrapped up and put in a nice box or more specifically, a bond issue, that Texas rate payers will be paying off for decades to come.

Had natural gas trades been captured by the Intercontinental Exchange or by Gas Daily publications (which were on the Monday and Tuesday tail end of that four-day holiday), natural gas pricing could have and would have chased the \$9,000/MWh TPUC-mandated wholesale price of electricity equivalent.

That \$9,000/MWh wholesale price converts to a natural gas price equivalent of \$2,640/MMBtu. As it was, record high daily spot prices for Waha hub reached \$154/MMBtu during those four days, all predicated on trades that occurred on that Friday, the last day of trading before the Presidents Day four-day weekend.

I’d call that a well-timed holiday.

—John Harpole