

**Professor Commentary: Failing to Learn from the Texas
Power Crisis,
(or, The Paradox of an Unreliable Electric *Reliability*
Council and a “Public Utility Commission” in a Largely
Unregulated Market)**

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Professors Baker and Coleman identify several reasons for the failure of the Texas electricity system during the February Freeze of 2021,¹ a failure that claimed the lives of a reported 210 people² and caused economic losses of \$130 billion in Texas and \$155 billion for the United States.³ What the Professors do not do is in any way take issue with what I and others believe is the root cause of the crisis, i.e., what they describe as an “electric power system, and its regulation, [that has long been regarded] as a model for others.”⁴ Rather, they focus on individual symptoms, such as the “weather complications,”⁵ the “fragility” of natural gas and electricity supply chains,⁶ and the exceptional difficulty of storing those sources of energy.⁷ This type of silo-ized, myopic analysis is the approach that is typically advanced in Texas and is likely to lead to more crises when the next “unprecedented”⁸ winter storm or summer heat event descends upon the state.

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¹ Collen M. Baker & James W. Coleman, *Paying for Energy Peaks: Learning from Texas' February 2021 Power Crisis*, 23 TENN. J. BUS. L. (2022).

² FED. ENERGY REGUL. COMM'N ET AL., THE FEBRUARY 2021 COLD WEATHER OUTAGES IN TEXAS AND THE SOUTH CENTRAL UNITED STATES 9, (2021), <https://www.ferc.gov/media/february-2021-cold-weather-outages-texas-and-south-central-united-states-ferc-nerc-and#>.

³ See, e.g., J.W. Busby et al., *Cascading Risks: Understanding the 2021 Winter Blackout in Texas*, 77 ENERGY RSCH. & SOC. SCI., 102106, 1 (2021).

⁴ Baker & Coleman, *supra* note 1.

⁵ *Id.*

⁶ “Winter storm Uri, however, revealed that the interconnected natural gas and electricity supply chains can be fragile because of their constant dependence on balancing supply and demand in both markets.” *Id.* (manuscript at 3).

⁷ “The challenge, however, of natural gas is that, like electricity, and unlike more traditional sources of energy such as coal and uranium, it is exceedingly difficult and expensive to store.” *Id.* (manuscript at 12).

⁸ Joe Villasana, *Gov. Abbott Warns Texans to Brace for Winter Storm 'Unprecedented in Texas History'*, KWTX (Feb. 13, 2021, 5:23 PM), <https://www.kwtx.com/2021/02/13/gov-abbott-warns-texans-to-brace-for-winter-storm-unprecedented-in-texas-history/>.

The Texas Model – “Exceptionalism” on Display in February 2021

Before I clarify the connections between the symptoms delineated by Professors Baker and Coleman that contributed to the Texas Power Crisis and the “model” system about which Texas has so broadly boasted, let me take just a minute to provide a brief description of this model system and some of the weaknesses thereof that the crisis exposed.

In 1999, the Texas legislature reorganized the electricity sector.⁹ Under the previously-existing model, a regulated utility generated, transmitted, and sold electricity to end-use consumers within a monopoly service territory.¹⁰ The new regime introduced competition within wholesale electricity generation and retail consumer markets in an area that reaches over 90 percent of its residents and that covers over seventy percent of the state’s landmass, excluding the El Paso area, part of the northern panhandle, and part of the region east of Houston.¹¹ As then-Governor Bush proclaimed: “Competition in the electric industry will benefit Texans by reducing monthly rates and offering consumers more choices about the power they use.”¹²

With oversight by the legislature, this competitive electricity market is governed by the Public Utility Commission of Texas (PUC), a Commission whose members are appointed by the Governor of Texas.¹³ The PUC, in turn, has delegated operational authority to the Energy Electric Reliability Council of Texas (ERCOT), a name so fraught after February 2021, given how unreliable many found Texas power supply performance to be, that I am surprised there has not been a general outcry for it to be renamed.¹⁴ But I digress—ERCOT has responsibility for

⁹ Public Utility Regulatory Act (PURA), TEX. UTIL. CODE ANN. §§ 39.001–.918 (West 2022).

¹⁰ *Id.*

¹¹ See Plaintiffs’ Original Petition for Declaratory Judgment and Alternatively, Jud. Rev. at 4–5, Exelon Generation Co. LLC v. Pub. Util. Comm’n of Tex., No. D-1-GN-21-001772, 2021 WL 1587964, at *4-5 (Tex. Dist. Ct. Apr. 19, 2021).

¹² *Bush Signs Texas Electric Deregulation Bill into Law*, DESERET NEWS (Jun. 19, 1999, 12:00 AM), <https://www.deseret.com/1999/6/19/19451445/bush-signs-texas-electric-deregulation-bill-into-law>; see Edward Klump, *Renewables May be a Victim in Texas Grid Revamp*, E&E NEWS: ENERGYWIRE (Nov. 30, 2021, 7:05 AM), <https://perma.cc/7K97-V5GL>. Unfortunately, some of this choice may be another victim of Winter Storm Uri. After the storm’s blackouts, the Public Utility Commission of Texas is evaluating intermittent generation as a critical issue as it tries to boost grid reliability, including wind and solar energy capacity.

¹³ PURA, TEX. UTIL. CODE ANN. §§ 12.001–.060 (West 2022).

¹⁴ PURA, §§ 39.001–.918.

ensuring: (1) open access to the transmission and distribution systems; (2) system reliability; (3) a timely and competitive retail market; and (4) an accurate and competitive wholesale market.¹⁵ One might take issue with how well it has fulfilled any of these responsibilities, including ensuring the “model’s” entire *raison d’être*, lower-cost energy for consumers via a competitive retail market. Even excluding the astronomical bills that some residential consumers received in the wake of the February freeze—some of which were reported to be as high as \$17,000¹⁶—a number of independent statistical analyses have reported that Texas residential consumers paid \$28 billion more for power between 2004 to 2019 than state residents served by traditional utilities; rates of Texas retail electricity providers averaged thirteen percent higher than the national average rate.¹⁷ Consumer savings aside, the February 2021 crisis certainly calls into question ERCOT’s ability to ensure system reliability.

One aside: the Texas Railroad Commission is tangentially relevant to the state’s electricity market. It regulates the oil and natural gas industry, pipeline transporters, the natural gas, and hazardous liquid pipeline industry, natural gas utilities, the LP-gas industry, coal and uranium surface mining operations.¹⁸ Natural gas and power generation are highly interdependent. Natural gas processing requires electricity, while natural gas-fired power plants produce nearly half the state’s electricity.¹⁹

There are just a few more relevant background details about the Texas “model” that are important to recall before I respond directly to Professors Baker and Coleman. First, as the Professors mention, unlike electricity markets in every other state in the U.S., ERCOT operates an energy-only market that relies primarily on scarcity pricing to maintain adequate reserves, allowing market participants to determine capacity.²⁰ As California can attest, this can be a risky regulatory approach,²¹ and Texas

¹⁵ PURA, § 39.151.

¹⁶ See, e.g., Paulina Firozi, Amy B. Wang & Peter Whoriskey, *Soaring Electric Bills, Outages in Hard-Hit Texas*, WASH. POST, Feb. 21, 2021, at A03.

¹⁷ Tom McGinty & Scott Patterson, *Texas Electric Bills Were \$28 Billion Higher Under Deregulation*, WALL ST. J. (Feb. 24, 2021, 5:33 AM), <https://www.wsj.com/articles/texas-electric-bills-were-28-billion-higher-under-deregulation-11614162780>.

¹⁸ See, e.g., TEX. NAT. RES. CODE ANN. §§ 101.001, 102.001–.112 (West 2022).

¹⁹ Daniel Hagan, John Forbush & Aaron Bryant, *The Texas Blackout: A Regulatory Retrospective and Future Outlook*, WHITE & CASE (Mar. 16, 2021), <https://www.whitecase.com/publications/alert/texas-blackout-regulatory-retrospective-and-future-outlook>.

²⁰ Baker & Coleman, *supra* note 1.

²¹ See generally CONG. BUDGET OFF., CAUSES AND LESSONS OF THE CALIFORNIA ELECTRICITY CRISIS (2001), <https://perma.cc/3R96-5N3G>.

is one of only a few markets to rely on this type of approach when it comes to electricity supply.²² Every other U.S. state maintains electricity supply reliability through some sort of resource adequacy requirement, such as capacity payments.²³ ERCOT does not operate a capacity market or rely on any out-of-market resource adequacy directives but relies exclusively on a competitive energy-only market to ensure resource adequacy.

Capacity or other “resource adequacy” markets operate differently from Texas’ energy-only market. Their design is intended to reduce investment risk for generators by providing revenue certainty for generation capacity offered in the future. In the Texas competitive market, however, there is little financial incentive to invest in additional generation or, for that matter, in other critical items such as weather protection and maintenance, as these investments may impact the competitiveness of a company’s product pricing and are not recoverable in regulatorily-set rates.²⁴ One academic made this analogy: “Deregulation was something akin to abolishing the speed limit on an interstate highway. ... That opens up shortcuts that cause disasters.”²⁵ That same academic also has drawn comparisons between the “disinvestment in electricity production [in Texas] to the last years of the Soviet Union, or of the oil sector today in Venezuela.”²⁶

This comparison is particularly apt vis-a-vis the February 2021 crisis. The supply failure in Texas has largely been attributed to weather-related equipment failures.²⁷ Within ERCOT’s purview, natural gas power plants could not operate due to frozen instrumentation and pipelines. Beyond ERCOT’s jurisdiction, but impacting its operations, state natural gas production also suffered weather effects, i.e., freezing gathering lines, pipelines, and well sites.²⁸ However, there apparently was no entity, including ERCOT, with authority to compel electricity generators and

²² There are others internationally, including the National Electricity Market of Australia. See Chris Johnathon, et al., *Analyzing Electricity Markets with Increasing Penetration of Large-Scale Renewable Power Generation*, 14 ENERGIES 7618, at *5 (2021).

²³ See, e.g., Joshua C. Macey & Jackson Salovaara, *Rate Regulation Redux*, 168 U. PA. L. REV. 1181, 1220 (2020).

²⁴ See, e.g., Will Englund, *The Texas Grid Got Crushed Because Its Operators Didn’t See the Need to Prepare for Cold Weather*, WASH. POST (Feb. 16, 2021), <https://www.washingtonpost.com/business/2021/02/16/ercot-texas-electric-grid-failure/>.

²⁵ See, e.g., Clifford Krauss et al., *How Texas’ Drive for Energy Independence Set It Up for Disaster*, N.Y. TIMES (May 13, 2021).

²⁶ See Englund, *supra* note 24.

²⁷ See Hagan, Forbush & Bryant, *supra* note 19.

²⁸ See *id.*

operators to perform even minimal winterization on equipment and facilities or to perform cold weather vulnerability reviews.²⁹ ERCOT was authorized to host annual weatherization workshops and to conduct generator site visits for reviews of weatherization plans,³⁰ but ERCOT officials basically were limited to records reviews; they cannot impose penalties. The arctic temperatures, combined with the regulatory disincentives for general maintenance and weatherization, created the conditions for a perfect storm, so to speak, that caused the “ERCOT grid [to collapse] in exactly the same manner as the old Soviet Union. It limped along on underinvestment and neglect until it finally broke under predictable circumstances.”³¹ Texas has since attempted to address this weatherization deficit with legislation that requires power generation companies and exempt wholesale generators that sell in the ERCOT market to prepare their generation assets for the provision of adequate electric generation service during a weather emergency, legislation that includes administrative penalties for non-compliance.³²

Another important background detail about the Texas model is that, with very few exceptions,³³ the state’s electricity grid is a “bastion of impregnable isolation,”³⁴ separated from the remainder of the United

²⁹ See, e.g., Presentation, Bill Magness, President and CEO, ERCOT, Review of February 2021 Extreme Cold Weather Event — ERCOT Presentation 17 (Feb. 25, 2021), http://www.ercot.com/content/wcm/lists/226271/Texas_Legislature_Hearings_2-25-2021.pdf.

³⁰ ERCOT reports that it averages approximately 80 site visits per year (out of more than 550 generator sites). *Id.* at 4, 17.

³¹ Michael Hiltzik, *Amid Severe Weather and Power Crisis, Texas Legislators Stop Talking About Secession*, L.A. TIMES: BUSINESS (Feb. 17, 2021), <https://www.latimes.com/business/story/2021-02-17/texas-severe-weather-power-crisis-secession>.

³² See *Texas Adopts Legislation to Better Prepare Energy Market for Extreme Weather*, KIRKLAND & ELLIS: ENERGY BLOG (June 14, 2021), <https://perma.cc/V74G-4CEY> [hereinafter KIRKLAND & ELLIS].

³³ The Texas grid has five asynchronous ties with other interconnection, three of which allow exchanges with Mexico and two of which allow exchanges with the Eastern Interconnection through the Southwest Power Pool. See FED. ENERGY REGUL. COMM’N & N. AM. ELEC. RELIABILITY CORP., REPORT ON OUTAGES AND CURTAILMENTS DURING THE SOUTHWEST COLD WEATHER EVENT OF FEBRUARY 1-5, 2011 24–25 (Aug. 2011) [hereinafter FERC-NERC 2011 REPORT], <https://perma.cc/2RHX-NPX5>.

³⁴ Richard D. Cudahy, *The Second Battle of the Alamo: The Midnight Connection*, 10 NAT. RES. & ENV’T 56, 57 (1995).

States and Mexico.³⁵ Its “independent power grid is a point of pride that has been an applause line in Texas political speeches for decades.”³⁶ “Freedom from federal regulation was a cherished goal”³⁷ in the design of the Texas grid, which dates back to Franklin D. Roosevelt’s 1935 signing of the Federal Power Act. To avoid the jurisdiction of the Federal Power Commission, Texas purposefully refrained from interstate electricity sales and from interstate electric transmission.³⁸

The Texas grid operated by ERCOT remains outside the jurisdictional scope of the Federal Energy Regulatory Commission (FERC), the federal agency that succeeded the Federal Power Commission and which now regulates interstate electric transmission.³⁹ Proponents contend that being functionally separated from the two national interstate grid systems provides a laboratory for new technologies and renewables,⁴⁰ but its isolation also limits its ability to import power when its own supply is constrained. If ERCOT had been able to import supply in an emergency situation such as occurred in February 2021, it might have mitigated some of its crisis conditions. The Texas border city of El Paso is not connected to the ERCOT grid; rather El Paso Electric is part of the Western power grid that covers 14 Western states; Northern Baja, Mexico; and two Canadian provinces. Reports indicate that, although the city’s weather conditions were the same as the rest of the state, only a few thousand people lost power for a brief time.⁴¹

The Symptoms

With that background, consider a few of the Professors’ symptoms individually:

³⁵ A Hewitt Rose, *FERC Waves Red Flag Over Federal Power Act General Jurisdiction in ERCOT*, HOLLAND & KNIGHT: ENERGY & NAT. RES. BLOG (Aug. 8, 2018), <https://www.hklaw.com/en/insights/publications/2018/08/ferc-waves-red-flag-over-federal-power-act-general>.

³⁶ See Krauss, *supra* note 25.

³⁷ Cudahy, *supra* note 34, at 57.

³⁸ See Kate Galbraith, *Texplainer: Why Does Texas Have Its Own Power Grid?*, TEX. TRIB. (Feb. 8, 2021), <https://www.texastribune.org/2011/02/08/texplainer-why-does-texas-have-its-own-power-grid/>.

³⁹ See *id.*

⁴⁰ Chris Lewis, *Cost-Competitive Renewables Poised to Grow in Deregulated Texas Market*, YALE CTR. BUS. & ENV’T: CLEAN ENERGY FIN. F. (Sept. 4, 2019), <https://perma.cc/Q6E7-Y8XN>.

⁴¹ Casey Cheek et al., *‘Self-Sufficient’ and Upgraded: How El Paso’s Electric Grid Weathered the Storm*, TEX. STANDARD: ENERGY & ENV’T (Feb. 18, 2021), <https://perma.cc/VT6G-TJKW>.

- *Weather Complications*

Professors Baker and Coleman contend that “weather complications (freezing issues⁴²) were the most significant factor.”⁴³ I wholeheartedly agree. However, as one headline noted, and its content scrupulously documented, the February 2021 “Texas cold snap was not ‘unprecedented,’ and it was inexcusable to be unprepared.”⁴⁴ Not only has Texas previously experienced similar widespread, weather-related blackouts, but relevant state and company officials and system operators were fully aware of the severe Arctic outbreak approaching in February 2021 and its potential impact on its power delivery services.⁴⁵

Indeed, in February of 2021, relevant operators and officials were warned nearly a week before it hit that the record cold winter storm on its way to Texas could cause dramatic spikes in electricity demand and threaten the state’s electricity infrastructure.⁴⁶ The National Weather Service in Texas began sending email briefings on the upcoming cold to partners in the emergency management and government communities on February 8, 2021; the Texas Division of Emergency Management began holding statewide conference calls about the upcoming storm on February 9; and, on February 11, the forecast office of the Weather Service in Houston specifically cautioned that “[p]ipes may freeze, burst with damage to infrastructure. Ice accretion, wind, and power demand could lead to power outages.”⁴⁷ ERCOT’s own meteorologist sounded the alarm in a blog post on the ERCOT website on February 12, posting that this “period will go down in Texas weather history as one of the most extreme events to ever impact the state. Temperatures early next week will set widespread daily records that are likely to be the coldest experienced since

⁴² FERC-NERC 2011 REPORT, *supra* note 33, at 11 (explaining problems caused by the failure to “winterize” the relevant infrastructure).

⁴³ Baker & Coleman, *supra* note 1.

⁴⁴ David Titley, *Texas Cold Snap Was Not ‘Unprecedented,’ And It Was Inexcusable to Be Unprepared*, WASH. POST (Feb. 22, 2021, 11:31 AM), <https://www.washingtonpost.com/weather/2021/02/22/texas-cold-snap-predictable-foreseeable/>.

⁴⁵ Andrew Freedman, *Meteorologist for Texas Grid Operator Warned of The Winter Storm’s Severity*, WASH. POST (Feb. 19, 2021), <https://www.washingtonpost.com/weather/2021/02/19/texas-cold-early-warning/>.

⁴⁶ *Id.*

⁴⁷ *Id.*

the 1980s.”⁴⁸ Even with this advance notice, it appears that no entity or official informed the public of the potential catastrophe looming on the horizon or provided advice on how best to prepare.

And this despite the fact that Texas *has* experienced similar severe cold weather incidences in the past that impacted the state’s power supply.⁴⁹ While the February cold snap included one of the state’s coldest days in more than a century, the so-called “unprecedented” power crisis was hardly unforeseeable. During a 1989 storm in the state, wind chills that reached 14 degrees below zero put severe pressure on electricity systems operations, after which regulators recommended improving winterization.⁵⁰ Texas had experienced similar system disruptions, including widespread blackouts, during a severe weather incident in February of 2011, an incident that followed a very similar pattern of problems present in the 2021 power crisis.⁵¹ After the February 2011 event, a Federal Energy Regulatory Commission (FERC) and North American Electric Reliability Corporation (NERC)⁵² investigatory report concluded that the system winterization procedures of the Texas power companies and natural gas producers were either inadequate or not adequately followed.⁵³ Seemingly little substantive was done to address these conclusions. Nor was much—if anything—done in the aftermath of another major cold-weather event that struck the Texas grid in 2014, shutting down fifty generating units and sparking more inquiries into the system’s reliability.⁵⁴ NERC’s 2014 investigation revealed problems similar

⁴⁸ Chris Coleman, *Weather*, ERCOT: ABOUT (Feb. 12, 2021), <https://web.archive.org/web/20210216030125/http://www.ercot.com/about/weather>.

⁴⁹ FERC-NERC 2011 REPORT, *supra* note 33, at 169 (noting that there also were severe frigid weather recordings in 1983, 1989, 2003, 2006, 2008 and 2010).

⁵⁰ Ari Natter & Jennifer A. Dlouhy, *Texas Was Warned a Decade Ago Its Grid Was Unready for Cold*, BLOOMBERG (Feb. 17, 2021 2:55 PM), <https://perma.cc/JHU8-TZ4S>.

⁵¹ Hagan, Forbush & Bryant, *supra* note 19.

⁵² Following an extensive blackout in the Eastern United States and Canada in the mid-1960’s, members of the electric utility industry formed a voluntary council, NERC, to develop voluntary standards and practices to promote reliability of the interconnected system. Mandatory reliability standards, however, were not adopted until Congress passed the Energy Policy Act of 2005, a law that required FERC to certify an independent Electric Reliability Organization (ERO) to create and enforce mandatory reliability standards. Pursuant to implementation procedures adopted by FERC in 2006, NERC has delegated part of its enforcement authority to Regional Entities, over which it will retain oversight. FERC-NERC 2011 REPORT, *supra* note 33, at 20–21.

⁵³ FERC-NERC 2011 REPORT, *supra* note 33, at 10.

⁵⁴ Jeremy Schwartz et al., *“Power Companies Get Exactly What They Want”*: How Texas Repeatedly Failed to Protect Its Power Grid Against Extreme Weather, TEX. TRIB. (Feb. 22, 2021),

to those reported after the 2011 storms, i.e., inadequate equipment weatherization.⁵⁵ Data indicate that equipment failures affected 241 plants during the 2011 freeze, and many of these same plants experienced shutdowns during the February 2021 “unprecedented” winter storm.⁵⁶

A report on the February 2021 system failures concluded that:

Despite multiple prior recommendations by FERC and NERC, as well as annual reminders via Regional Entity workshops, that generating units take actions to prepare for the winter (and providing detailed suggestions for winterization), [multiple] generating units in [in Texas] still did not have any winterization plans, and [eighty-one] percent of the freeze related generating unit outages occurred at temperatures above the unit’s stated ambient design temperature. Generating units that experienced freeze-related outages above the unit’s stated ambient design temperature represented about 63,000 MW of nameplate capacity.⁵⁷

Some have suggested that the use of “unprecedented” in the context of the February 2021 storm is not applicable and will not shield state officials and industry insiders from scrutiny when there are precedents. FERC and NERC launched a staff inquiry even before the February 2021 weather event had ended.⁵⁸ In the final Report into that inquiry, FERC and NERC concluded that:

[Comparisons of] the weather conditions of the [February 2021] Event with past cold weather events . . . makes clear that although the [February 2021] Event was unusually cold, severe cold and freezing precipitation are far from unprecedented

5:00 PM), <https://www.texastribune.org/2021/02/22/texas-power-grid-extreme-weather/>.

⁵⁵ *Id.*; Neena Satija & Aaron Gregg, *Ten Years Ago, 241 Texas Power Plants Couldn’t Take the Cold. Dozens of Them Failed Again This Year*, WASH. POST (Mar. 6, 2021), <https://perma.cc/TE7W-J3AS>.

⁵⁶ Satija & Gregg, *supra* note 55.

⁵⁷ FERC-NERC 2021 STAFF REPORT, *supra* note 2, at 17 (citation omitted).

⁵⁸ *See id.* at 21 (citation omitted).

for winter in the Event Area. For example, other prior cold weather events had lower average daily temperatures for some days during each event. For two of the five events, Houston and Jackson experienced at least one day for each of the week-long periods where the average daily temperature was below [ten] degrees, and Dallas and Jackson experienced at least one day for each of the week-long periods where the average daily temperature was below [five] degrees. In all five events, average daily temperatures were below freezing in Dallas, Houston, and Jackson, for at least three days out of the week-long periods. The 1983 event had seven separate recorded cold fronts, while the 1989 event is still the coldest recorded winter in the Houston and Galveston areas, with [fourteen] days below freezing over two to three weeks, and lows below those seen during the Event. The 1983, 2011 and 2018 events all had significant freezing precipitation, like the Event . . . After each of the four . . . events in the last ten years, one or more of the Commission, NERC, and/or the Regional Entities issued reports with recommendations to prevent similar events from recurring.⁵⁹

As one expert commented about the 2021 storm and its impact on Texas' electricity supply, "[t]he freeze was easy to see coming. When I read that this was a black-swan event, I have to wonder whether the folks who are saying that have been in this business long enough that they forgot everything, or just came into it."⁶⁰

Texas law now provides for winterization of its electricity supply,⁶¹ but reports question claims made by state regulators regarding the preparedness of the Texas system for another hard freeze that like

⁵⁹ *Id.* at 47 (citation omitted).

⁶⁰ Tim McLaughlin & Stephanie Kelly, *Why A Predictable Cold Snap Crippled the Texas Power Grid*, REUTERS: COMMODITIES (Feb. 20, 2021, 7:46 PM), <https://www.reuters.com/article/us-usa-weather-texas-power-insight/why-a-predictable-cold-snap-crippled-the-texas-power-grid-idUSKBN2AL00N>.

⁶¹ See KIRKLAND & ELLIS, *supra* note 32.

experienced by the state in 2021.⁶² Although regulators assured the public that they had inspected 4,000 sites as of February 1, 2022, it is unclear what these inspections confirmed since many were based upon written records rather than on-site visits and since the relevant winterization standards have not yet been promulgated.⁶³ One skeptic suggested that the regulatory inspection campaign was “more of a public relations stunt than a credible regulatory effort.”⁶⁴

● *Fragility of Natural Gas and Electricity Supply Chains*

Professors Baker & Coleman also contend that winter storm Uri, the storm that caused the February 2021 Power Crisis, “revealed that the interconnected natural gas and electricity supply chains can be fragile because of their constant dependence on balancing supply and demand in both markets.”⁶⁵ If the Professors are referring to the vulnerability of any type of infrastructure to disinvestment and planning, then, yes, all power supply chains potentially are vulnerable. Perhaps they also are referring to power supply chain vulnerabilities to cyberattacks, which also could be described as making them fragile.⁶⁶ However, in Texas, most of the causes of a power supply chain’s fragility, assuming that I understand that term correctly, seemingly are inherently baked into the state’s “model,” i.e., the model’s competitive pricing structure, the grid’s lack of connection to the national grids, and the state’s lack of appetite for regulatory oversight of system operating entities.

⁶² See Mike Lee & Mike Soraghan, *Documents Show Major Gaps in Texas Gas Inspections*, E&E NEWS: ENERGYWIRE, (FEB. 7, 2022, 7:21 AM), <https://www.eenews.net/articles/documents-show-major-gaps-in-texas-gas-inspections/>; Josiah Neeley, *Risk to Grid Isn't Sufficiently Addressed*, THE MARSHALL NEWS MESSENGER (Feb. 6, 2022), https://www.marshallnewsmessenger.com/opinion/guest-column-risk-to-grid-isn-t-sufficiently-addressed/article_6b61fe0a-86c9-11ec-ad09-8791915016f6.html (“The recent [February 2022] routine cold snap across Texas appears to have caused a short-term natural gas supply interruption, with roughly a quarter of the state’s natural gas operations going offline for a short period of time.”).

⁶³ See generally Lee & Soraghan, *supra* note 62.

⁶⁴ *Id.*

⁶⁵ Baker & Coleman, *supra* note 1.

⁶⁶ Geoffrey Morgan, *Potential for Two Major Fuel Pipeline Shutdowns This Week Shows Fragility of North America's Energy System*, FIN. POST (May 10, 2021), <https://financialpost.com/commodities/energy/two-potential-shutdowns-of-major-fuel-pipelines-this-week-show-fragility-of-north-americas-energy-system>.

- *The Exceptional Difficulty of Storing Natural Gas and Electricity*

The Professors state that “[t]he challenge . . . of natural gas is that, like electricity, and unlike more traditional sources of energy such as coal and uranium, it is exceedingly difficult and expensive to store.”⁶⁷ This statement is a bit more difficult to parse. Natural gas storage has long been used, and its capacity is also subject to the economics of regulatory design. However, lack of capacity is not synonymous with functional “difficulty.” In the United States, there are numerous ways to store natural gas, including types of three underground storage facilities: There are three major types of underground geologic formations where natural gas storage sites are found: (1) depleted oil and gas reservoirs; (2) underground salt caverns, and (3) depleted aquifers.⁶⁸ Natural gas also can be stored in above-ground Liquefied Natural Gas (LNG) facilities⁶⁹ or stored in the pipeline system using a process called line packing.⁷⁰ Accordingly, natural gas storage is neither new nor uncommon, but investors may lack incentives to invest in developing storage.⁷¹

Regarding the storage of electricity, the prevailing wisdom is that it cannot be stored large-scale or that it is exceedingly difficult to do so.⁷²

⁶⁷ Baker & Coleman, *supra* note 1.

⁶⁸ U.S. GOV'T ACCOUNTABILITY OFF., GAO-18-89, NATURAL GAS STORAGE: DEPARTMENT OF TRANSPORTATION COULD TAKE ADDITIONAL STEPS TO IMPROVE SAFETY ENFORCEMENT PLANNING (2017), <https://perma.cc/9TP5-UHYD>.

⁶⁹ See JAMES G. SPEIGHT, NATURAL GAS: A BASIC HANDBOOK, Storage: Chap. 5.4.4 (Katie Hammon ed., Gulf Prof. Pub., 2nd ed. 2018) (stating that gasholders or gasometers also have served as storage for aboveground for natural gas); see also Sarah O'Carroll, *So the Oval's Gasholder Will Survive. But Our Other Beautiful Gasometers Are Going*, THE GUARDIAN (Mar. 4, 2016, 10:53 AM), <https://perma.cc/G49H-67XV> (noting gasholders or gasometers, although more often used overseas, have also served as storage for aboveground for natural gas, with some even prized for their architectural and heritage value).

⁷⁰ See, e.g., Kody Kazda et al., *Optimal Utilization of Natural Gas Pipeline Storage Capacity under Future Supply Uncertainty*, 139 COMPUTS. & CHEM. ENG'G 106882, at *2 (2020).

⁷¹ While FERC regulatory activity, specifically Order 636, tended to discourage development in the gas storage sector, its 2006 Order 678 was designed to stimulate investment in construction and expansion of natural gas storage. Rate Regulation of Certain Natural Gas Storage Facilities, FERC Order No. 678, 18 C.F.R. pt. 284 (2006) <https://perma.cc/HCZ7-BT64>.

⁷² See generally GEORG FUCHS ET AL., TECHNOLOGY OVERVIEW ON ELECTRICITY STORAGE 55 (Dirk U. Sauer et al. eds., 2012) (noting that it is sometimes difficult to distinguish between storage and other sources that are capable of creating more flexibility in a power system with more variable output due to the increasing use of renewables,

However, it can be converted to other forms of energy capable of being stored for later reconversion to electricity on demand.⁷³ There are a variety of storage systems for electricity, including batteries and pumped hydroelectric storage, as well as the lesser-known flywheels and compressed air.⁷⁴ Newer forms of storage technologies are being developed, such as flow batteries, superconducting magnetic energy storage, and systems that hybridize two or more storage systems, including the use of battery-super capacitor combinations in wind energy systems for energy smoothing and grid integration or battery-fuel cell combinations in hybrid wind and photovoltaic renewable energy systems.⁷⁵ According to recent data, the United States has more than twenty-four gigawatts of electrical energy storage capacity;⁷⁶ much of that—ninety-four percent—is in the form of pumped hydroelectric storage.⁷⁷

Concluding Thoughts

Texas exceptionalism is certainly a large component of the official promotion of that state's electricity system and is an underlying theme in the commentary of Professors Baker and Coleman. There are not, however, as many non-Texans who find that state's system to be the "model" that Texans continue to promote, and the faith of even those who are true believers has eroded after the system's virtual collapse in February of 2021.⁷⁸

Professors Baker and Coleman appear to be among the steadfast believers, however, and their hyper-silo-ized analysis is characteristic of the rhetoric espoused by Texas officials and affected entities to avoid

with constantly fluctuating demand, and with unforeseen circumstances, such as the Texas freeze. By way of example, the authors reference hydropower reservoirs as dispatchable generation or as storage and note that hot water storage linked to heat pumps or electrical heaters, while not technically designed as such, could also be defined as storage or as a demand response solution if equipped with smart controls).

⁷³ *Id.* at i.

⁷⁴ See Ahmed Zayed AL Shaqsi et al., *Review of Energy Storage Services, Applications, Limitations, and Benefits* 6 ENERGY REP. 288, 292 (2020).

⁷⁵ See *id.* at 293–95, 299.

⁷⁶ CENTER FOR SUSTAINABLE SYSTEMS, UNIV. MICH., U.S. GRID ENERGY STORAGE FACTSHEET 1 (2021), <https://perma.cc/HDZ5-SBEY>.

⁷⁷ *Electricity Storage*, U.S. ENVTL. PROT. AGENCY, <https://www.epa.gov/energy/electricity-storage> (last updated Nov. 22, 2021).

⁷⁸ See generally Kyle Arnold, *This Year's Winter Storm Could Become the Costliest Weather Event in Texas History*, DALL. MORNING NEWS (Feb. 18, 2021, 3:33 PM), <https://perma.cc/8UJS-YX7A>.

acting upon the decades of warnings regarding system vulnerability. These warnings, if heeded, would have provided at least some preparation for the February storm, but the state's firm denials of responsibility and commitment to system so-called exceptionalism and isolation may lead to more crises when the next "unprecedented" winter storm descends upon the state.

Why is any of this a problem for those of us who were not in Texas during the crisis and who did not lose family members or friends, lose our power, or otherwise did not physically experience an impact? We care because we are concerned about the safety and health of our fellow citizens and because, while the failure of Texas' grand "model" was estimated to cost that state \$130 billion in economic losses, it also cost the rest of the U.S. \$155 billion.⁷⁹ While the February 2021 weather might not have been unprecedented, the storm might "become the costliest weather event in Texas history,"⁸⁰ with damage estimates ranging from \$195 billion to as much as \$295 billion.⁸¹

It is ironic, therefore, that, just weeks after Texas Republicans had endorsed legislation advocating a referendum on secession from the United States,⁸² Governor Greg Abbott sought an emergency federal disaster declaration from President Biden.⁸³ On February 14, 2021, President Biden declared a state of emergency in all 254 Texas counties and ordered federal assistance to supplement state and local response efforts at a seventy-five percent federal funding level.⁸⁴ Although Texas

⁷⁹ See Busby, *supra* note 3. On study commissioned in 2013 by ERCOT after the 2011 winter event concluded that the value of lost load, or the value lost to the state's economy when power is off, was approximately \$6,000 an hour for each megawatt that could have been delivered. See Will Englund, et al., *Texas, The Go-It-Alone State, is Rattled by the Failure to Keep the Lights On*, WASH. POST (Feb. 18, 2021), <https://perma.cc/WU28-MBC8>. In February 2021, the numbers would have been breathtakingly higher—the state power companies were estimated to be short by approximately 20,000 megawatts per hour, so, \$120 million an hour, or \$2.8 billion a day. *Id.*

⁸⁰ Arnold, *supra* note 78.

⁸¹ Irina Ivanova, *Texas Winter Storm Costs Could Top \$200 Billion—More Than Hurricanes Harvey and Ike*, CBS NEWS (Feb. 25, 2021, 3:59 PM), <https://perma.cc/7J5H-4XHM>.

⁸² See Kenya Evelyn, *Texas Republicans Endorse Legislation to Allow Vote on Secession from US*, THE GUARDIAN (Feb. 5, 2021, 1:17 PM), <https://perma.cc/GS32-N296>.

⁸³ Fares Sabawi, *Texas Governor asks President Joe Biden for Major Disaster Declaration for Winter Storm*, KSAT (Feb. 18, 2021, 2:47 PM), <https://perma.cc/T3CA-ASUD>.

⁸⁴ *President Joseph R. Biden, Jr. Approves Texas Emergency Declaration*, THE WHITE HOUSE: BRIEFING ROOM (Feb. 14, 2021), <https://www.whitehouse.gov/briefing-room/statements-releases/2021/02/14/president-joseph-r-biden-jr-approves-texas-emergency-declaration/>.

refuses to subject its electrical system to federal jurisdiction, it certainly is eager to receive federal funding to prop up that system's failure.

Don't expect any change of hearts in the Lone Star State, though. Former Texas Governor and Secretary of the U.S. Department of Energy Rick Perry proclaimed that "Texans would be without electricity for longer than three days to keep the federal government out of their business."⁸⁵ Apparently, independence has an "exceptional" Texas definition, and we all are going to pay according to its definition, regardless whether our understandings are the same.⁸⁶

⁸⁵ Kevin McCarthy, *What's Up in Texas?*, REPUBLICANLEADER.GOV (Feb. 17, 2021), <https://www.republicanleader.gov/whats-up-in-texas>.