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HOUSTON, WE HAVE A MARKET DESIGN PROBLEM: WHY THE LEGISLATIVE RESPONSE TO WINTER STORM URI DOES NOT YET DEVELOP A MORE EFFICIENT MARKET MECHANISM TO ENSURE RELIABILITY

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Abstract

In February 2021, Winter Storm Uri exposed the Texas grid to a spike in electricity demand and simultaneously a sharp drop in supply. The long duration of cold temperatures resulted in an electricity shortage, causing 4.5 million Texans to be without power for multiple days. Subsequently, questions circulated about how such a tragedy occurred in an energy-rich state. In the 87th session, the Texas Legislature attempted to correct the underlying issues brought to light by Winter Storm Uri. However, many of the problems that caused the tragedy will likely persist without additional legislation addressing market incentives and the uneven playing field between different types of generators. This paper examines and provides a technical breakdown of what occurred in the tragic winter storm and offers concrete statutory reform to improve the reliability and resilience of the unique Texas grid.

I. Introduction

Texas was 4 minutes and 37 seconds away from having a system-wide blackout that could have left twenty-six million Texans without power or energy for months.[1] In February 2021, 4.8 million electricity customers[2]

1. Erin Douglas, *Texas was "Seconds and Minutes" Away from Catastrophic Months Long Blackouts, Officials Say*, TEX. TRIB. (Feb. 18, 2021), https://www.texastribune.org/2021/02/18/texas-power-outages-ercot/; Robert Bryce, *Why Fixing the Texas Power Grid is so Complicated*, FORBES (Apr. 19, 2021), https://www.forbes.com/sites/robertbryce/2021/04/19/this-graphic-illustrates-the-complexity-of-trying-to-fix-the-ercot-mess/?sh=7987ecc8268a.

2. Erin Douglas & Mitchell Ferman, *Texas Lawmakers Want to Prevent Another Power Crises: But the Legislation Doesn't Go Far Enough to Do That, Critics Say*, TEX. TRIB. (Mar. 30, 2020), https://www.texastribune.org/2021/03/30/power-grid-texas-legislature-prevention/. The winter storm's impacts did not stop with the electricity and gas infrastructure. *See* Jess Donald, *Winter Storm Uri, The Economic Impact of the Storm* (Oct. 2021), https://comptroller.texas.gov/economy/fiscal-notes/2021/oct/winter-storm-impact.

lost power, causing numerous deaths and an unfortunate spiral of high electricity prices, property damages, and power and water shortages.[3] At one point, up to twelve million Texans were without water or under boil advisories due to either low water pressure or damaged treatment facilities.[4] In one week alone, electricity sales in Texas topped 46 billion dollars—more than five times what the state spent on electricity in all of 2020.[5] Questions began to circulate about "what broke" as such tragedy seemed to present an irony in an energy-rich state.[6]

Two narratives have circulated from the historic freeze.[7] First, the extreme and severe weather was the reason for the capacity shortage.[8] It is undeniable that the conditions were unprecedented as every county in Texas was under a severe weather warning; however, much of the information and data used to prevent unprecedented results were predictable and preventable.[9] Second, due to the extreme temperatures, a large number of coal and gas plants "froze."[10] This interesting paradox requires Texas to point its finger inwards because these types of power plants operate in

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php. The storm also directly and indirectly impacted other infrastructures, including water and housing. *Id.*

3. *See* Kara Norton, *Why Texas Was Not Prepared for Winter Storm Uri*, NOVA (Mar. 25, 2021), https://www.pbs.org/wgbh/nova/article/texas-winter-storm-uri/ (statement of University of Texas at Austin Professor Michael Webber) ("So we have a water problem--freezing water, become[s] a gas problem, become[s] a power problem, become[s] a bigger gas problem, become[s] a bigger power problem, become[s] a water problem and a humanitarian crisis").

4. Phil Helsel & Yuliya Talmazan, *Texas Water Shortage Adds to Power Crisis as New Winter Storm Moves in*, NBC NEWS (Feb. 17, 2021), https://www.nbcnews.com/news/us-news/texas-contending-water-nightmare-top-power-crisis-n1258208.

5. Kathryn Blunt & Russell Gold, *'A Failure of Texas Size Proportions' – State Debates How to Overhaul its Power Market*, THE WALL ST. J. (Apr. 16, 2021), https://www.wsj.com/articles/a-failure-of-texas-size-proportionsstate-struggles-to-overhaul-its-power-market-11618565415?page=1.

6. U.S. ENERGY INFO. ADMIN., https://www.eia.gov/state/?sid=TX (last visited Dec. 10, 2021) (reporting that Texas is the nation's top oil and gas producing state, leads the nation in wind-powered generation and produces almost one-third of all U.S. wind power, and "produces more electricity than any other state").

7. Brent Bennett, *Here's What Happened: Seeking Answers for Winter 2021 Texas Blackouts*, LIFE: POWERED (Feb. 17, 2021), https://lifepowered.org/heres-what-happened-seeking-answers-for-the-winter-2021-texas-blackouts/.

8. *Id.*

9. *Id.*; *see* NAT'L OCEANIC AND ATMOSPHERIC ADMIN., https://www.weather.gov/hgx/2021ValentineStorm (last visited Dec. 10, 2021).

10. *Id.*

much colder conditions worldwide.[11] Thus, the cascading failures were likely due to a more deep-rooted issue.[12]

As hearings and legislation unfolded, Texas sought to pinpoint what broke.[13] But, ultimately, the problem with the narratives that have prompted the allocation of blameworthiness is that they avoid addressing the uneven playing field that made it inevitable.[14] Legislators and Texans need to know what went wrong with the long-term policy decisions that made the event inevitable and, more importantly, why this storm's consequences are likely to be repeated if statutory reform is not implemented. The vast majority of legislation focused on weatherization, gas supply, and coordination of Texas's energy systems avoids the fundamental issue that Texas *never* had enough reliable capacity to make it through this event without blackouts.[15] Even if it had been a normal day for the Texas grid with electricity generators operating at the same level of reliability, "the combination of high demand, low wind speeds, and no sun during the cold mornings and nights meant that there were periods of time when blackouts were inevitable."[16]

To avoid repeating the cycle, the Texas Legislature must concretely address concerns that demand will continue to exceed supply in the wake of climate change and unpredictable seasons.[17] When analyzing targeted reserve margins and the lack of investment in the years prior, it is evident that supply availability has not kept up and will not keep up without interference by state leaders. As the market stands, renewable generators are in a no-lose situation. Additionally, the electric grid's immense scale challenges the storage built to maintain the variability of these generators.[18] Thus, there is only one promising option for protection in the immediate future: to build more gas power plants through pricing incentives and

11. Reese Oxner et al., *Catastrophic Texas Power Outages Prompt Finger Pointing and Blame Shifting at Legislative Hearings*, TEX. TRIB. (Feb. 25, 2021), https://www.texastribune.org/2021/02/25/texas-house-senate-ercot/.

12. Bennett, *supra* note 7.

13. Oxner et al., *supra* note 11.

14. Bennett, *supra* note 7.

15. Brent Bennet, *Forget About What Broke: The Texas Blackout was Inevitable*, LIFE: POWERED (Mar. 3, 2021), https://lifepowered.org/forget-about-what-broke-the-texas-blackout-was-inevitable/.

16. *Id.*

17. *See* Ralph A. Cantafio & Miles C. Nowak, *Solving the Interconnection Problem*, 7 A&M J. PROP. L. 526, 528 (2021).

18. *See infra* Part 0.0 (explaining that Texas' reliance on wind and solar is challenged by the duration and scale needed to keep up with the demand of the electric grid).

accountability. This comment argues that while the omnibus bills passed by the Texas Legislature in the 87th session have opened the door to significant market reforms, much more is needed to ensure reliability in this unique market. Part II provides a factual background of Winter Storm Uri and Texas's complex, unique system.[19] Part III proposes concrete statutory reform by the Texas Legislature to ensure reliability;[20] and, lastly, Part IV explores practical implications at both the federal and state level that necessitate urgency in the statutory reform.[21]

II. Energy Implications from Winter Storm Uri

A. Oversight and Objective of the Energy Market

Texas leads the nation in electricity and natural gas production and consumption.[22] For most Texas consumers, energy is provided through an intrastate grid, managed by an independent operator.[23] Because Texas is operated independently, it has limited interconnection to the other two main electrical grids serving the U.S. and relies on its own resources to be self-sufficient.[24]

Natural gas plays a huge role in providing electricity generation in Texas.[25] However, Texas is has made huge pushes in the development and generation of electricity from renewable energy sources.[26] Despite the state's natural gas and renewable generation being operated independent of the electricity industry, different state agencies have regulatory oversight over the two sectors.[27] The Public Utility Commission of Texas (PUC)

19. *See infra* Part 0 (analyzing the technical breakdown of Winter Storm Uri and the critical bounds in which the grid operates).

20. *See infra* Part 0 (discussing how the proposed statutory amendment will cure issues in the current market structure).

21. *See infra* Part 0 (concluding that the proposed amendment is even more pivotal given the pending federal legislation that affects the Texas market).

22. U.S. ENERGY INFORMATION ADMINISTRATION, *supra* note 6.

23. OFFICE OF ELEC., https://www.energy.gov/oe/information-center/educational-resources/electricity-101 (last visited Dec. 10, 2021).

24. *See* Terry Spry Jr., *Does Texas Have an Independent Power Grid, and What Does That Mean?* (Feb. 16, 2021), https://www.king5.com/article/news/verify/texas-independent-power-grid/507-6192cf48-4bf4-4a82-8586-0e5c0a549707.

25. U.S. ENERGY INFORMATION ADMINISTRATION, *supra* note 6.

26. *See, e.g., id.*

27. Peter Cramton, *Fostering Resiliency with Good Market Design: Lessons From Texas* 27 (Oct. 27, 2021), https://www.cramton.umd.edu/papers2020-2024/cramton-lessons-from-the-2021-texas-electricity-crisis.pdf.

oversees electricity services, and the Texas Railroad Commission (RRC) regulates the natural gas sector.[28] The PUC's oversight over the electricity industry includes responsibility for overseeing the operations of the electric grid operator, the Electric Reliability Council of Texas (ERCOT).[29]

ERCOT is a non-profit corporation that represents multiple parties, including generators, utilities, and consumers.[30] ERCOT's main role in the operation of the unique grid is to oversee the entire system, thus "managing the flow of electrical power to twenty-six million customers within the state of Texas," representing approximately ninety percent of Texas's electrical load.[31] ERCOT is not directly involved in owning and operating facilities, but they tell the operators of generation facilities when to start up and shut down. This determination is highly dependent on the electrical demand.[32] To perform this task, ERCOT uses the weather to understand electrical demand.[33] "Weather is also central to understanding production from renewable sources."[34] ERCOT evaluates multiple weather forecasts.[35] Some are seasonal, some are close to real-time, and some look far ahead.[36] Updated continuously, ERCOT aggregates the studies into a load-and-supply forecast and utilizes them in analyzing grid demands.[37]

Electricity is produced, transmitted, and consumed in the same instant; and if tracking that is not hard enough, the supply of electricity has to match the demand simultaneously.[38] Because demand is constantly changing throughout the day depending on various circumstances, ensuring the grid starts up and shuts down at the appropriate times can be very tedious.[39] Power demand "usually drops

28. *See, e.g.*, PUB. UTIL. COMM'N OF TEX., https://www.puc.texas.gov/agency/about/mission.aspx (last visited Dec. 10, 2021); R.R. COMM'N, https://www.rrc.texas.gov/oil-and-gas/ (last visited Dec. 10, 2021).

29. Cramton, *supra* note 27, at 26–27.

30. ERCOT, http://www.ercot.com/about (last visited Dec. 10, 2021).

31. ERCOT, http://www.ercot.com/content/wcm/lists/219736/ERCOT_Fact_Sheet_2.12.21.pdf (last visited Dec. 10, 2021).

32. *See* Cramton, *supra* note 27, at 2–3.

33. *Id.* at 4.

34. *Id.*

35. *Id.*

36. *Id.*

37. *Id.*

38. *See* U.S. ENV'T PROT. AGENCY, https://www.epa.gov/energy/about-us-electricity-system-and-its-impact-environment (last visited Dec. 10, 2021) (explaining how electricity is delivered to consumers through a complex network).

39. *See id.*

due to mild weather and at night when people are asleep"; thus, the grid needs generators to shut down.[40] If the grid did not do this, the frequency of the AC power would speed up above 60 Hertz (Hz).[41] ERCOT operates using the principle known as alternating current, and is "designed for current and voltage to oscillate at a frequency of 60 cycles per second, or 60 Hz."[42] When demand rises, the grid needs generators to (1) be available and (2) match the current.[43] Otherwise, frequency will fall below 60 Hz because the demand is bogging the generators down.[44] If grid frequency falls below 59.4 Hz, ERCOT is made aware that the load is large relative to demand.[45] The consequences are massive if the frequency deviates by too much because the whole grid is magnetically coupled.[46] When parts of the system lose synchronization, both generators and equipment connected to the grid can face adverse circumstances.[47] "Most parts of the grid, including generation facilities, have breakers that trip to isolate equipment if the frequency deviates too far to prevent tearing apart."[48] The breakers in one's house monitor electrical current.[49] The breaker will trip if you plug in too many things into one circuit.[50] The breakers on the grid work in a very similar way.[51] However, the breakers on the grid monitor frequency. Unfortunately, "unlike one's house, where restoring power is a quick fix, large power generating stations don't turn on and off with a flip of the switch."[52]

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40. PRACTICAL ENG'G, *What Really Happened During the Texas Power Grid Outage* (Mar. 23, 2021), https://practical.engineering/blog/2021/3/22/what-really-happened-during-the-texas-power-grid-outage.

41. *See* OFFICE OF ELEC., https://www.energy.gov/oe/services/electricity-policy-coordination-and-implementation/transmission-planning/recovery-act-0 (last visited Dec. 10, 2021).

42. Carey W. King et al., *The Timeline and Events of the February 2021 Texas Electric Grid Blackouts* (July 2021), https://www.puc.texas.gov/agency/resources/reports/UTAustin_(2021)_EventsFebruary2021TexasBlackout_(002)FINAL_07_12_21.pdf.

43. PRACTICAL ENGINEERING, *supra* note 40.

44. *Id.*

45. King et al., *supra* note 42, at 26 n.31.

46. PRACTICAL ENGINEERING, *supra* note 40.

47. *Id.*; *see* King et al., *supra* note 42, at 26 ("This automatic shutdown lowers the risk of exposure to harmful vibrations and heat that can damage generation equipment if operating at low frequency for too long.").

48. PRACTICAL ENGINEERING, *supra* note 40.

49. *Id.*

50. *Id.*

51. *Id.*

52. *Id.*

Therefore, one of the most critical parts of ERCOT's role in managing the power grid is matching supply and demand to maintain a stable frequency for reliability.[53]

ERCOT was under a national microscope during Winter Storm Uri.[54] However, ERCOT's approach to managing the grid is unique given the market in which it operates. Market forces are heavily relied upon to provide enough generation to run the grid effectively.[55] Thus, ERCOT must also consider adequately incentivizing generators to guarantee the supply meets the demand of the electric grid.[56] Whether ERCOT can continue to operate without additional legislative guidance is an inquiry that can be assessed by looking into the operating principles it uses.

B. Electricity and Natural Gas Financial Flows and Prices

ERCOT's day-to-day operations in Texas's energy market are an essential part of this story.[57] "ERCOT administers day-ahead and real-time markets for energy, as well as a day-ahead market for ancillary services (AS)."[58] Unlike other markets that, the wholesale electricity market in Texas is energy-only thus it does not pay generators to secure capacity in the future [59] That means only if a generator actually puts power on the grid, will it get paid for it.[60] Market participants or electricity generators are relied upon to ensure enough supply is available.[61] But the Texas grid does not just depend on the willingness of generators alone; "caps on market-price offers have been raised to relatively high

53. *Id.*

54. Ali Linan, *Several Winter Reports Find Texas Electric Grid Not Ready for Another Winter Storm* (Nov. 23, 2021), https://www.cnhinews.com/cnhi/article_51891488-4c94-11ec-8bda-d3ac5e45aa8e.html.

55. King et al., *supra* note 42, at 88.

56. *Id.*; *see also infra* Part II.0 (explaining ERCOT's tactic in raising compensation to incentivize generation of electricity).

57. PRACTICAL ENGINEERING, *supra* note 40.

58. King et al., *supra* note 42, at 88.

59. *Id.* Other "energy only" markets include electricity markets in Alberta and Australia. *Id.* n.186; Michael Goggin, *Capacity Markets: The Way of the Future or the Way of the Past?,* ENERGY SYS. INTEGRATION GRP. (Mar. 27, 2020), https://www.esig.energy/capacity-markets-the-way-of-the-future-or-the-way-of-the-past/ (explaining the differences between capacity market and energy-only markets).

60. PRACTICAL ENGINEERING, *supra* note 40; Goggin, *supra* note 59 (stating that capacity market payments cover all or some of the fixed costs of building and maintaining generating resources).

61. King et al., *supra* note 42, at 88.

levels in hopes of providing sufficient compensation to the generation sector to incentivize investment during times of peak demand."[62]

Consequently, Texas relies on generators to be adequately incentivized to perform when Texas needs it most. Generators receive no compensation or credit for having generation capacity when it is not required on the grid, making their functionality a gamble.[63] The use of scarcity pricing of wholesale electricity makes it possible for the availability of supply to appear attractive to generators.[64] When demand is high, the price increases significantly.[65] In theory, this incentivizes generators to make short-term investments to ensure their facilities are up and running during peak demands but also long-term investments in plants that can become available during these times when prices are sky high to capitalize on the energy scarcity.[66] This method of using scarcity pricing also favors intermittent sources of electricity like wind and solar which would struggle to compete in a market that values a guarantee of available supply at any given time.[67] Theoretically, if renewable sources are available in Texas, they can compete in the market and profit on the inflated pricing

The price of electricity varies typically between thirty dollars and fifty dollars per megawatt-hour on an average day. Designed to increase power generation to meet supply, the wholesale electricity price went up to a number way beyond that. In fact, the pricing was set at the cap of $9,000 per megawatt-hour during the storm.[68] While the inflated price lasted for multiple days, the result was that providers spent more money on wholesale electricity in a week than would typically be spent

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62. *Id.* at 15, 88; Goggin, *supra* note 59 (Texas relies on energy market price spikes during periods of shortage to cover the fixed costs).

63. PRACTICAL ENGINEERING, *supra* note 40.

64. King et al., *supra* note 42, at 88 (stating that the price offer cap has increased almost 10-fold over a span of 13 years).

65. PRACTICAL ENGINEERING, *supra* note 40.

66. *Id.*

67. *Id.*; U.S. ENERGY INFO. ADMIN., shttps://www.eia.gov/tools/glossary/?id=electricity (last visited Dec. 10, 2021) (defining firm capacity as the amount of energy available for production must be guaranteed to be available at a given time); Goggin, *supra* note 59 (noting that experts are debating the role of capacity markets as the generation mix evolves, incorporating more renewable resources).

68. Erin Douglas & Mitchell Ferman, *Texas Legislature Close to Approving Billions to Pay for Winter Storm Financial Fallout*, TEX. TRIB. (May 25, 2021), https://www.texastribune.org/2021/05/25/electricity-market-financing-winter-storm/.

in four years.[69] That price includes the extreme load shedding that occurred but doesn't include the inflated prices that some utilities had to pay for natural gas.[70]

Luckily, most ratepayers won't see those massive costs—and if they do, it won't be right away.[71] A majority of Texas ratepayers are shielded from the dips and swings of the wholesale price because most retail providers offer a fixed rate for electricity to their customers.[72] The providers "bear the dips and swings of the wholesale price by using various financial tools and long-term contracts to try and hedge against the extreme volatility."[73] However, the prudent planning of such providers did not prove efficient in an event like Winter Storm Uri—as evidenced by the amount of energy providers filing for bankruptcy protection after the bill came due.[74]

Other retail energy providers use a different strategy. They do so by passing the risk on to their customers with direct access to wholesale energy rates for a monthly fee.[75] As opposed to the fixed price model that enables a customer to lock in a set rate per kilowatt hour (kWh) for the generation portion of their electricity bill, the index price model is tied to market rates.[76] Thus, a consumer's monthly bill varies based on both the individual's consumption and potentially the high wholesale market rate.[77] Conversely, under a fixed price model, a consumer's monthly bill can vary based on the individual's consumption but the rate remains constant despite price spikes in the market.[78] The idea of the index price model is that some users may prefer to manage their

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69. PRACTICAL ENGINEERING, *supra* note 40.

70. *Id.*; *see* Kevin Crowley, *Gas Sellers Made $11 Billion While Millions of Texans Were Without Power in February*, FORTUNE (July 9, 2021), https://fortune.com/2021/07/09/gas-sellers-made-11-billion-texas-winter-blackout/ (stating that the cost of gas for power generation alone was about $8.1 billion).

71. PRACTICAL ENGINEERING, *supra* note 40; Ali Linan, *Texas Regulator Approves Blueprint for Energy Market Redesign* (Dec. 17, 2021), https://www.itemonline.com/news/texas-regulator-approves-blueprint-for-energy-market-redesign/article_a7e2b99a-0f9c-5dfe-87fb-a8fec808ba08.html ("Texans with fixed-rate plans likely did not see higher rates immediately but are subject to increases in the future.").

72. *Id.*

73. *Id.*

74. *See* DIRECT ENERGY PRICING, https://business.directenergy.com/understanding-energy-pricing (last visited Dec. 10, 2021).

75. *Id.*

76. *Id.*

77. *Id.*

78. *Id.*

own demand, cutting back on electricity usage when rates are high and shifting usage to times when rates are low.[79] But "many of those consumers were misled or misunderstood the incredible volatility of the wholesale energy market to which they were being exposed"—resulting in residential energy bills in the thousands of dollars.[80] In either circumstance, energy providers and ratepayers are facing unreasonably high prices due to the wholesale pricing inflation.

C. Timeline of Events Related to Winter Storm Uri

Significant facts display the unprecedented nature of Winter Storm Uri: first, it was frigid.[81] A large portion of the southern U.S. had average temperatures "more than twenty-five degrees Fahrenheit below normal."[82] All-time low-temperature records were set in many cities.[83] Second, it was not just a local event— all 254 Texas counties were on emergency weather warnings, and many suffered extended outages of electricity and water.[84] Finally, the duration of frigid temperatures was long—large portions of the state were below freezing for more than seven successive days.[85]

The whole week before the storm had already put most of Texas under stress. But as the weekend approached and things got worse, the forecasts started to make clear that the next week would not provide any relief for the ongoing disaster.[86] On February 8, there were very

79. PRACTICAL ENGINEERING, *supra* note 40.

80. *Id.*

81. Erin Douglas et al., *Texas Leaders Failed to Heed Warnings That Left the State's Power Grid Vulnerable to Winter Extremes, Experts Say*, TEX. TRIB. (Feb. 17, 2021), https://www.texastribune.org/2021/02/17/texas-power-grid-failures/.

82. Theresa Machemer, *How Winter Storm Uri Impacted the United States*, SMITHSONIAN MAG. (Feb. 19, 2021), https://www.smithsonianmag.com/smart-news/how-winter-storm-uri-has-impacted-us-180977055/.

83. *Id.*

84. CBSDFW.COM, *Entire State of Texas Under Winter Storm Warning, Federal Emergency Declaration Approved* (Feb. 14, 2021), https://dfw.cbslocal.com/2021/02/14/entire-state-of-texas-under-winter-storm-warning/.

85. Andrew Freedman et al., *Frigid, Icy Weather Plague Central and Eastern U.S. While Millions in Texas Remain in the Dark*, THE WASH. POST (Feb. 16, 2021), https://www.washingtonpost.com/weather/2021/02/16/winter-storm-live-updates/.

86. King et al., *supra* note 42, at 23 ("The forecast available to ERCOT on February 8 anticipated a low in North Central Texas of 20.5 [degrees Fahrenheit] at 4:00 a.m. on February 14, for the entire week of the winter event . . . The data for South Central Texas show a similar pattern. The February 8 forecast showed a low of 26 [degrees Fahrenheit] at 4:00 a.m. on February 14, for the entire week of the winter event.").

high expected electrical demands and notices of extreme weather.[87] "ERCOT delayed or canceled approval for a large number of scheduled outages to make sure as much electrical infrastructure as possible would be in service in anticipation of the storm."[88] ERCOT prioritized the natural gas sector by working with the Texas Railroad Commission[89] ERCOT also allowed power plants "to temporarily exceed their emission limits from the EPA during peak needs for electricity."[90]

Due to the severity of the winter storm, the Texas Governor declared a state of emergency due.[91] Just one day after the declaration, large generators began to unexpectedly go offline.[92] On Sunday, February 14, ERCOT issued a public appeal for energy conservation.[93] They also were on watch regarding power supply shortages.[94] These outages were made up of about one-half wind power and one-half natural gas generators.[95] During the late hours of February 14, electricity demand was approaching available generation.[96] "Despite known lack of capacity, as nighttime approached on Sunday, Texas hit an all-time winter peak electrical demand of nearly 70,000 MW."[97] The Texas grid surprisingly met that demand.[98] The previous demand on the Texas grid was 66,000 MW.[99] Many individuals had no choice but to run their heaters to stay warm during the unprecedented times.[100] As the evening continued, and demand continued to increase, it became clear that the hope of

87. *Id.* at 18–20.

88. *Id.* Approximately 6,630 MW of thermal generation were offline for planned maintenance. *Id.* at 24.

89. *Id.* at 50.

90. PRACTICAL ENGINEERING, *supra* note 40.

91. *See Proclamation by the Governor of the State of Texas*, https://gov.texas.gov/uploads/files/press/DISASTER_severe_weather_FINAL_02-12-2021.pdf; King et al., *supra* note 42, at 20.

92. King et al., *supra* note 42, at 25.

93. *Id.*

94. *Id.* Texas started with about 1/4th of its total electrical capacity out of service, mainly due to weather the week before. *Id.* at 8.

95. PRACTICAL ENGINEERING, *supra* note 40.

96. *Id.*

97. *Id.*

98. *Id.*

99. *Id.*

100. *Id.*

continuing to meet a rising demand was unlikely and the grid was not going to be able to keep up.[101]

1. A Call for Lost Capacity

After warnings were issued that supply was low, generation facilities started to trip offline, reducing the faith that the resources available would meet the high demand.[102] Texas has a diverse portfolio of power generators.[103] One of the largest resource Texas relies on is natural gas—making up about half of the capacity.[104] The second largest resource Texas relies on is wind turbines.[105] The remaining resources that Texas relies on consists of "coal-powered plants, nuclear plants, and solar farms."[106] Wind and natural gas made up most of the lost capacity.[107] Cold temperatures make natural gas particularly vulnerable.[108] "Not only does a gas stream contain water vapor that can freeze by itself, that water vapor can also combine with hydrocarbons to create hydrates that solidify at temperatures well above freezing."[109] Thus, it was nearly impossible for some gas suppliers to keep supply levels adequate.[110] Aside from those issues, facilities faced issues presented by the wholesale pricing rate.

The wholesale price of natural gas during the storm "skyrocketed to more than 100 times its regular price."[111] At that price, it was nearly impossible to deliver gas to customers.[112] Even if the effort being made was enough, generators couldn't afford given the extremely high cost of fuel.[113] But it was not just gas power plants that are to blame.[114] Wind

101. *Id.*
102. *Id.*
103. *See* Norton, *supra* note 3.
104. *Id.*
105. *Id.*
106. *Id.*
107. *Id.*; *see also* Erin Douglas & Ross Ramsey, *No, Frozen Wind Turbines Aren't the Main Culprit for Texas' Power Outages*, TEX. TRIB. (Feb. 16, 2021), https://www.texastribune.org/2021/02/16/texas-wind-turbines-frozen/.
108. Douglas & Ferman, *supra* note 68.
109. PRACTICAL ENGINEERING, *supra* note 40.
110. *Id.*; U.S. ENERGY INFO. ADMIN., *Cost of Transporting Coal to Power Plants Rose Almost 50% in Decade* (Nov. 19, 2012), http://www.eia.gov/todayinenergy/detail.cfm?id=8830.
111. PRACTICAL ENGINEERING, *supra* note 40.
112. *Id.*
113. *Id.*
114. *Id.*

turbines faced troubles—shutting down due to icing.[115] In addition, solar panels remained challenged as the Winter Storm left panels covered in snow.[116] "Overall, the entire system was proved ill-prepared for a storm of this magnitude."[117]

To help alleviate some of the supply issues Texas faces, Texas has a few connections to other power grids.[118] However, those grids that Texas could rely on did not have much electricity to spare because of the weather conditions effecting their own facilities.[119] With most generators going offline when Texas needed them most, Texas had nearly half of its total supply gone during the coldest event in Texas's history.[120]

2. ERCOT's Solution: Load Curtailment

The ERCOT system frequency reached "a low of 59.302 Hz at roughly 2:00 AM on February 15, 2021."[121] ERCOT had only one option left to keep supply and demand simultaneously matched: shed load.[122] "This process requires turning off parts of the power grid by disconnecting customers to reduce total demands on the system. This functions by ERCOT telling the transmission operators X-amount of megawatts need to be taken off the grid."[123] Entities that are particularly relevant to the health and safety of individuals, like hospitals, are prioritized when ERCOT proceeds with the process of shedding load.[124] Other circuits

115. *Id.*

116. *Id.*

117. *Id.*

118. Kate Galbraith, *Texplainer: Why Does Texas Have Its Own Power Grid*?, TEX. TRIB. (Feb. 15, 2021), https://www.texastribune.org/2011/02/08/texplainer-why-does-texas-have-its-own-power-grid/ (explaining the history behind the Texas power grid); Matt Simon, *Texas' Icy Disaster Makes the Case for Uniting the US Grid*, WIRED (Feb. 25, 2021), https://www.wired.com/story/texas-disaster-makes-the-case-for-uniting-thegrid/.

119. *See* 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), https://www.texastribune.org/2021/02/22/texas-power-grid-extreme-weather/.

120. U.S. ENERGY INFO. ADMIN., *Texas natural gas production fell by almost half during recent cold snap*, https://www.eia.gov/todayinenergy/detail.php?id=46896 (last visited Dec. 10, 2021).

121. King et al., *supra* note 42, at 26.

122. *See id.* at 8.

123. *Id.*

124. *Id.*

are shut off in a rolling manner.[125] That way, there is less of an inconvenience and the 15-30 minute rolling intervals of lost power.[126]

The frequency of the Texas power grid became more vulnerable as time went on.[127] "ERCOT continued ordering additional load to be shed from the system, trying to keep up with the rising demand from the cold weather and the quickly failing supply."[128] Roughly 30 gigawatts of thermal power plant—which includes gas, coal, and nuclear—were offline.[129] ERCOT's winter demand was significant, so the "scale of the loss was devastating."[130] When the frequency fell below the threshold for grid stability, the whole system was in jeopardy.[131] "Power plant controls are set to automatically disconnect if the frequency stays below 59.4 Hz for more than nine minutes."[132] To prevent such events from occurring, ERCOT ordered X amount of MW of load to be shed, relieving the exceeding demand.[133] The problem with the solution is that the amount of MW that ERCOT ordered to be shed was a significant amount. In fact, the amount MW shed was the equivalent of turning off half of Texas today.[134] The load shed orders lasted for three days straight.[135] Thus, "what should have been rolling outages couldn't roll" because there was no more to effectively turn off. [136] The result was that millions of Texans were left without power or heat for days on end.[137]

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125. *Id.*

126. *Id.*

127. *See* Richard Axelbaum & Phillip Irace, *WashU Expert: ERCOT to Blame for the Texas blackouts, Not Renewables or Fossil Fuels* (Mar. 19, 2021), https://source.wustl.edu/2021/03/washu-expert-ercot-to-blame-for-texas-blackouts-not-renewables-or-fossil-fuels/.

128. King et al., *supra* note 42, at 8.

129. *Id.* at 26

130. PRACTICAL ENGINEERING, *supra* note 40.

131. *Id.*

132. King et al., *supra* note 42, at 26. ERCOT begins various contingency plans such as calling on reserves and shedding load, and at low enough frequencies, automated load shed can occur. *Id.* ERCOT makes other non-automated (by engineering devices) decisions to trigger actions to stabilize the grid before grid frequency reaches 59.3 Hz (e.g., call on responsive reserve and non-spinning reserve capacity). *Id.*

133. PRACTICAL ENGINEERING, *supra* note 40.

134. *Id.*

135. *Id.*

136. *Id.*

137. *Id.*

Texas was minutes away from a complete grid collapse.[138] "Absent load shed, ERCOT back casted demand to peak at roughly 76,800 MW, about 19,120 MW higher than the value expected under normal winter weather (57,699 MW) and more than 9,500 MW higher than ERCOT's 'Extreme Peak Load.'"[139] With this amount of demand on the system, Texas might still be without power months later if the urgent action to continue shedding load from the system was not promptly initiated.[140] If ERCOT did not continue to order additional load to be shed, shutting off more and more electricity for Texans, Texas would have faced a complete collapse of the power grid or a "black start."[141] Not only is recovering from a black start an "immense technical challenge[,]" but equipment would also likely be damaged.[142] Suppose Texas needed to recover from a black start; bringing the system back online would be a very tedious operation.[143] In that case, Texas could only begin bringing generators and customers online slowly. In doing so, the grid would have to maintain the perfect balance between supply and demand throughout the entire process of starting over.[144] If not, and frequency deviates too far, breakers will trip to protect its equipment, and Texas would be in the same place from where it began.[145]

3. Historical Reluctance

In both 1989 and 2011 similar problems were triggered. In 2011, there were calls for the Texas grid to winterize its power generation and upstream production assets (e.g., natural gas wellheads may freeze during winter events, preventing supply to natural gas fired power plants, and wind turbines may be unable to operate during freezing weather).[146] That winterization/weatherization did not occur.[147]

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138. Katherine Blunt & Russell Gold, *Texas Power Grid Was Minutes from Collapse During Freeze, Operator Says*, WALL ST. J. (Feb. 24, 2021), https://www.wsj.com/articles/texaspower-grid-was-minutes-from-collapse-during-freeze-operator-says-11614202063.

139. King et al., *supra* note 40, at 26.

140. *Id.*

141. *Id.* at 9.

142. *Black Start*, NREL, https://www.nrel.gov/grid/black-start.html (last visited Dec. 10, 2021).

143. PRACTICAL ENGINEERING, *supra* note 40.

144. King et al., *supra* note 42,. at 26–27, 31.

145. PRACTICAL ENGINEERING, *supra* note 40.

146. *See* Mose Buchele, *Texas Lawmakers Passed Changes to Prevent Blackouts. Experts Say They're Not Enough*, NPR (Jun. 2, 2021), https://www.npr.org/2021/06/02/1002277720/texas-lawmakers-passed-changes-to-prevent-moreblackouts-experts-say-its-

While all the winter events triggered power outages, many circumstances make Winter Storm Uri different.[148] Texas now relies less on coal and more upon renewable energy resources.[149] It is undeniable that the extent and duration of the outages were far more significant in 2021, and the previous events were not linked to any loss of life; however, the generation fleet has changed significantly.[150]

D. The Legislative Response

From many of the lessons learned, it was evident that "too many Texans were left without heat or power for days on end."[151] Therefore, the legislative response in the 87th session is purported to improve the reliability of the electric grid and help ensure another Winter Storm Uri does not occur.[152] Numerous bills were filed in the Legislature attempting to identify and address the causes of the market failure.[153] After taking testimony from market stakeholders and individuals impacted by the storm, three general categories comprise the causes identified by the Legislature.[154] First, neither the generation sector nor the natural gas production are designed to operate in the conditions presented by Uri.[155] Second, there was communication breakdown across the relevant sectors, and ERCOT gave conflicting signals.[156] Third, there were not sufficient dispatchable

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not-eno; *see* Kelsey Vlamis, *Texas Was Warned to Winterize Power Plants—But Many Still Froze in the Latest Storms*, YAHOO!NEWS (Feb. 19, 2021), https://news.yahoo.com/extreme-cold-events-1989-2011-051906264.html (finding that the 2011 event was not without precedent and more than two dozen of the generators that failed in 1989 failed again in 2011).

147. *Id.*; Vlamis, *supra* note 146 ("While power generators and natural gas producers implemented some winterizing procedures, 'the poor performance' of many of them 'suggests that these procedures were either inadequate or were not adequately followed.'").

148. *See* King et al., *supra* note 42, at 73.

149. *Id.*

150. *Id.*

151. Christina Aguayo, *Gov. Greg Abbott on Texas Power Grid "I can guarantee the lights will stay on"* (Nov. 28, 2021), https://www.kxan.com/news/gov-greg-abbott-on-texas-power-grid-i-can-guarantee-the-lights-will-stay-on/?ipid=promo-link-block1.

152. *See id.*

153. *See* Dane McKaughan, *The 87th Session: Public Utility Law*, 84 TEX. B. J. 735 (2021) (summarizing SB 2, which primarily addresses ERCOT board governance, and SB 3, which calls for facility weatherization upgrades).

154. *Id.*

155. *Id.*

156. *Id.*

generation sources where the generator could be turned off or on rather than relying on external environmental factors.[157]

SB 3 attempts to accumulate all the lessons learned by focusing on the identified issues from both consumer and generator aspects. SB 3 requires certain power generators to "implement measures to prepare to operate during a weather emergency."[158] Part of this preparation has been debated to include requirements for facilities to weatherize its equipment.[159] Non-compliance could "result in fines up to $1 million *per day*."[160]Additionally, SB 3 addressed the need for more reliable generation to increase supply and insulate that supply from external environmental factors.[161] However, the type of generation needed is not specified.[162] More specifically, SB 3 does not require the construction of any new gas-fired generation. Instead, the bill directs the PUC to establish requirements to meet the reliability needs of the ERCOT region and, at least annually, determine the quantity and characteristics of reliability or ancillary services necessary to meet extreme heat and extremely cold weather conditions.[163] Exactly how the PUC should go about this, SB 3 does not say.[164]

Whether it's possible for the PUC to follow this legislation without additional guidance or interference is currently debated among critics.[165] As stated previously, the PUC has been tasked with managing ERCOT.[166] Because ERCOT answers to a different regulating agency from other grid operators, its rules and regulations come from the Texas Legislature rather

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157. *Id.*

158. Deanna R. Reitman and Jeffrey Bourdon, *Winter Storm Uri: New Texas Legislation Aims to Improve Power Grid, Restructure the Grid's Overseeing Agency* (June 15, 2021), https://www.dlapiper.com/en/us/insights/publications/2021/06/winter-storm-uri-new-texas-legislation-aims-to-improve-power-grid/.

159. *Id.*

160. *Id.*

161. *Id.* Senate Bill 3 also requires winterization of power systems, which is something even critics of the legislative response say is much needed. Erin Douglas & Mitchell Ferman, *Texas Legislature approves bills to require power plants to "weatherize," among other measures to overhaul electric grid*, TEX. TRIB. (May 26, 2021), https://www.texastribune.org/2021/05/26/texas-power-grid-reform-legislature/.

162. McKaughan, *supra* note 153, at 736.

163. *Id.*

164. *Id.*

165. Catherine Morehouse, *Congress, Texas Should 'Rethink' ERCOT's 'Go It Alone Approach':FERC Chair Glick*, UTILITY DRIVE (Feb. 19, 2021), https://www.utilitydive.com/news/congress-texas-should-rethink-ercots-go-it-alone-approach-ferc-chair/595335/.

166. *Id.*

than the Federal Energy Regulatory Commission (FERC).[167] In a sense, Texas operates alone, responding only to its respective regulatory agencies.[168] The Texas Legislature enacted the Public Utility Regulatory Act and created the Public Utility Commission of Texas.[169] At present, ERCOT and electric utilities answer to the PUC, whose board is appointed by the Governor.[170] Thus, all entities that controlled the operations of Winter Storm Uri answer to the Texas Legislature, who can take as little or as much action in regulating the system through laws.[171] Despite this power, lawmakers and regulators have been reluctant to consider significant changes to address reliability issues with the grid.[172]

Governor Greg Abbott changed this historical reluctance when he issued a directive letter on July 6, 2021 after the events of Winter Storm Uri.[173] The letter discussed improving incentives to develop reliable fossil fuel and nuclear generation and requirements of specific generators to shoulder reliability costs when they cannot guarantee their availability.[174] While these proposals provide some direction for the design of the market, Texas regulators and lawmakers have known about the grid's vulnerabilities for years.[175] Still, they seemed to have prioritized a less involved approach, creating significant doubt that change can occur without concrete grid reform. The FERC has no role in deciding whether ERCOT maintains the current model or moves under FERC jurisdiction. Some believe that federal regulation could certainly enhance reliability.[176] However, additional state regulation could be just as efficient for improving reliability in Texas while maintaining an independent approach.

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167. *Id.*
168. *Id.*
169. PUB. UTIL. COMM'N OF TEX., *supra* note 28 (responsibilities include providing statewide regulation of the rates and services of electric and telecommunications utilities)
170. Darla Cameron et al., *How Texas' Power Grid Works*, TEX. TRIB. (Feb. 25, 2021), https://www.texastribune.org/2021/02/25/texas-power-grid-ercot-puc-greg-abbott/.
171. *See id.*
172. *See id.*
173. Brent Bennett, *Improving the ERCOT Grid through a reliability requirement for variable generation* 11 (Oct. 2021), https://www.texaspolicy.com/wp-content/uploads/2021/10/LP-ImprovingReliabilityofERCOTGrid-10-18-21-BrentBennett-FINAL.pdf.
174. *Id.* at 10.
175. *See generally* Cameron et al., *supra* note 170.
176. *Id.*

III. The Complex Interconnection of Production and Generation Requires Addressing Resiliency Efforts in a Concrete Manner

Winter Storm Uri revealed the cascading failures of energy production, generation, transmission, and regulation.[177] In the storm's aftermath, citizens and policymakers demanded transformation, and the Texas Legislature was tasked with pinpointing who was to blame.[178] Many pointed out that generators had failed to weatherize their facilities leading to the anticipated downfall of ill-prepared equipment.[179] Others insisted that the intentional disconnect from the other power grids in the United States is untenable in an era of climate change and increased demand for power on aging infrastructure.[180] Lastly and most persuasively, some argued that the storm was the cause of misaligned market incentives that inevitably result in such tragedies.[181]

It is plausible that the allocation of fault cannot be attributed to one sole cause, but despite an overwhelming number of fixable circumstances, it is not enough for the Texas Legislature to focus on remedies that only protect against extreme weather risks.[182] For instance, weatherization is partly to blame for Winter Storm Uri, however, it is neither prudent nor possible to manage against the risks of a future Winter Storm Uri.[183] The weatherization part of SB 3 allows the Texas Railroad Commission to set weatherization requirements for facilities to protect them from future cold spells.[184] Not only is compliance with the bill likely to take time as there are hundreds of power plants, but there are also questions of whether participants will be willing to pay for the winterization measures for a once-

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177. *See* Isabella Zou, *Texas Power Generation Companies Will Have To Better Prepare For Extreme Weather Under Bills Gov. Greg Abbott Signed Into Law*, TEX. TRIB. (June 8, 2021), https://www.texastribune.org/2021/06/08/greg-abbott-texas-power-grid-ercot.

178. *Id.*

179. *See* Buchele, supra note 146.

180. Galbraith, supra note 118.

181. Christopher Hooks, *Who's Responsible for the Texas Blackouts*?, TEX. MONTHLY (Apr. 2021), https://www.texasmonthly.com/news-politics/responsible-texas-blackouts/; *see also* 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/.

182. Bennett, *supra* note 15.

183. *Id.*

184. Scott Friedman, *Texas PUC Requires Power Plants Fix Issues Related to Winter Outages*, NBC NEWS (Oct. 21, 2021), https://www.nbcdfw.com/investigations/texas-puc-requires-power-plants-fix-issues-related-to-winter-outages/2779286/.

in-a-decade spell.[185] After a similar storm in 2011, generators were encouraged to winterize their power generation and upstream production assets (e.g., natural gas wellheads may freeze during winter events, preventing supply to natural gas-fired power plants and wind turbines may be unable to operate during freezing weather).[186] Facilities were urged to independently safeguard the ill-prepared equipment against the next big winter storm.[187] While it is reasonable to expect some blackouts and power plant failures during extreme weather, the aftermath of the 2011 storm prompted critics to demand otherwise.[188] The demand for weatherization faced strong opposition because generators received no payment to offset the costs.[189] Now, facilities possess the same resistance but are dealing with legislation mandating compliance.[190] To mitigate some of this resistance, the Texas Railroad Commission has been given the authority to enforce penalties for those facilities that refuse to comply.[191] However, even with additional measures taken to bolster the success of the Legislature's efforts, there is still significant doubt that penalties alone may not be enough to break an unwavering opposition if the fines alone cost less than the price of complying with the law.[192]

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185. Englund, *supra* note 181; Mitchell Ferman, *"People Should Probably be Worried": Texas Hasn't Done Enough to Prevent Another Winter Blackout, Experts Say*, TEX. TRIBUNE (Nov. 29, 2021), https://www.texastribune.org/2021/11/29/texas-power-grid-winter-storm/ ("Texas' grid remains vulnerable, largely because newly written regulations allowed too much wiggle room for companies to avoid weatherization improvements that can take months or years.").

186. Monika U. Ehrman, *Reimaging Energy*, 74 VAND. L. REV. 489, 494 (2021).

187. Shawn Mulcahy, *Texas' Natural Gas and Power Generators Would Have to Prepare for Extreme Temperatures under Bill Senate Committee Approved,* TEX. TRIB. (Mar. 25, 2021), https://www.texastribune.org/2021/03/25/texas-power-generators-weatherization-legislature/.

188. King et al., *supra* note 42, at 72–73 (stating that the Texas Legislature passed a law that merely required the PUC to analyze the preparedness of power plants of extreme weather events).

189. *Id.* (finding that the law 2011 law does not explicitly require annual weatherization reports and to date, only one report has been filed).

190. *See* Friedman, *supra* note 184.

191. *Id.*

192. *See* Buchele, *supra* note 146; *see also* Bob Sechler, *Texas Utility Regulators Approve Plain Aimed at Boosting Power Grid's Reliability Over Time*, AUSTIN AMERICAN STATESMAN (Dec. 16, 2021), https://www.statesman.com/story/business/2021/12/16/texas-plans-boost-electric-grid-reliability-after-winter-storm-power-outages/8928065002/ (stating that in the rollout of the Weatherization requirements of SB 3, "nearly 30% [of facilities]—asserted a "good cause for non-compliance" with some part of the winterization rules").

The event's media narrative pointed its finger at the "12 GW of power plant outages related to the weather and the 6 GW caused by gas shortages," resulting in naïve legislation remedying weather-based issues.[193] But requiring generators to shield valves and wrap electrical cables with rubber insulation will not ease policymakers' liability if the primary reason for the breakdown was not ill-prepared equipment. Oklahoma, a neighboring state that faced similar issues, points out that coal bailed it out when faced with the challenging circumstances of Winter Storm Uri.[194] Ironically, the coal fleet had minimal winterization issues not caused by frequency variation—necessitating a closer look into the blame game occurring in Texas.[195] During the storm, ERCOT was in such desperate mode that Texas had significant variation in frequency, causing plants to trip offline and disturb the system.[196]

Given the comparison between Texas and a neighboring state, it is likely that frequency deviation was to blame in Texas, just as much as it was in Oklahoma. More alarming in this realization is that the legislation did not remedy this finding, making the legislative response insufficient to protect facilities from future blackouts in winter *and* summer. It is predicted that Texas's summer demand will pose issues because the demand is not decreasing. In fact, the summer demand will reach or exceed the levels of

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193. Brent Bennett, *Responding to the Texas Blackouts: SB3 is just the First Step on a Long Road Toward Reform*, THE DAILY CANNON (May 27, 2021), https://thecannononline.com/responding-to-the-texas-blackouts-sb-3-is-just-the-first-step-on-a-long-road-toward-reform/.

194. Kevin Stitt (@Stitt4Gov), TWITTER (June 7, 2021, 1:15 PM), https://twitter.com/Stitt4Gov/status/1401965932952629252?ref_src=twsrc%5Etfw; OK ENERGY TODAY (Feb. 16, 2021), http://www.okenergytoday.com/2021/02/gov-stitt-on-blackouts-thank-goodness-for-coal/.

195. *See id.* Mostly coal and natural gas generators listed frequency issues as the reason for tripping offline during the winter event. King et al., *supra* note 42, at 26. Even though, according to ERCOT protocols, the frequency deviation shouldn't have tripped any under-frequency relays that automatically disconnect the power plant from the grid to protect itself physically. *Id.* However, rapid increases in exhaust and boiler pressures occurred at some power plants from equipment responding to grid frequency changes. *Id.* Those fluctuating power plant conditions, in turn, tripped other safety mechanisms that took generators offline. *Id.*

196. Catherine Traywick et al., *The Two Hours That Nearly Destroyed Texas's Electric Grid*, BLOOMBERG GREEN (Feb. 20, 2021), https://www.bloomberg.com/news/features/2021-02-20/texas-blackout-how-the-electrical-grid-failed; Matt Largey, *Texas' Power Grid Was 4 Minutes and 37 Seconds Away from Collapsing. Here's How It Happened*, TEX. STANDARD (Mar. 1, 2021), https://www.texasstandard.org/stories/texas-power-grid-was-4-minutes-and-37-seconds-awayfrom-collapsing-heres-how-it-happened/.

Winter Storm Uri every year from now on.[197] Therefore, the volatility in supply and demand levels causing frequency deviations will persist and will not be cured by the legislative response in SB 3. It is unfortunate that Texas did not have the resource of coal to fall back on to remedy the circumstances during the storm; however, Texas does have a neighboring state to look to when understanding the future effectiveness of the legislation.

Some critics have gone so far as to argue that looking to other states for understanding is insufficient, and dependency must come from the ability to connect to other grids when in need of power.[198] But neither the eastern nor the western half of the national grid would have let Texas borrow large amounts of power when facing Winter Storm Uri.[199] "Texas would have had to fall back on a neighbor that was far enough away so as to not also be suffering from similar extreme circumstance."[200] Many of those states were also dealing with their own high energy demand and generation issues.[201] Additionally, while the eastern and western interconnection exchange power on the local level, there are no high-voltage lines to connect the grids, which leaves the question of who will bear those extremely expensive build-out costs.[202]

Given that Texas has its own grid, it is apparent that the state must rely on its own method and resources. To combat the reluctance of generators, the inconsistent findings in the aftermath, and the impracticability of relying on other grids, state interference is necessary.[203] To accomplish this task, the Legislature should address Texas's dependency on its natural gas backbone and focus on the root problem brought to light by Winter Storm Uri—misaligned market incentives.

A. Evaluating Market Incentives to Improve Fuel Security

Texas *never* had enough reliable capacity to make it through Winter Storm Uri without blackouts.[204] Even if electricity generators had been

197. Bennett, *supra* note 193.
198. Simon, *supra* note 118. *But see* Melissa Lott, *Building a 'Green Star State'* (Dec. 10, 2010), https://cockrell.utexas.edu/news/archive/6776-greenstarstate (asserting that if other states had a chance to set up their grid where it had control over a majority of the state's electrical demand, they would choose the independence Texas has).
199. Simon, *supra* note 118.
200. *Id.*
201. *Id.*
202. *Id.*
203. *See generally* Bennett, *supra* note 193.
204. Bennet, *supra* note 15.

operating at the same level of reliability that they do during the peak days, blackouts were still inevitable.[205] It has become apparent that Texas's electricity demand is growing, but the supply of reliable thermal generation is not.[206] Thus, lawmakers must first address why supply fails to keep up with rising demand.[207] Pointing at management and technical errors rather than policy choices that favored one generation over the other avoids the root cause of Winter Storm Uri and future blackouts.[208] Poor real-time decisions most definitely heightened some of the issues; however, "these long-term policies left the grid vulnerable to any event combining high demand with low wind and solar output."[209]

In SB 3, the Legislature correctly recognized that ERCOT needs to control the generation of electricity by having additional resources to dispatch in the event of high demand and low supply levels.[210] However, SB 3 does not itself require the construction of needed generation, nor does the legislation guarantee the supply level will be adequate.[211] Instead, the bill directs the PUC to ensure that ERCOT periodically "determines the quantity and characteristics of ancillary or reliability services necessary during extreme heat and cold weather conditions and during times of low non-dispatchable power production."[212] The problem with this solution is that the legislation intends to create a different result during times of need; that is, an availability of resources despite any change in the market design. The PUC is expected, not required, to somehow ensure with some degree of certainty that market participants will show up in the market as it stands. If that logic was promising, additional firm generation would have presented itself during Winter Storm Uri.

To guarantee availability, dependable assets must be available.[213] One might find that there is a simple solution—build more generation plants.[214] However, with the current model, the unfair advantages between renewable

205. *Id.*

206. *See, e.g.*, Bennett, *supra* note 193.

207. *See id.*

208. Bennett, *supra* note 7.

209. *Id.*

210. McKaughan, *supra* note 153, at 736.

211. *Id.*; *see also infra* Part II. 0 (discussing what type of generation is needed).

212. Brooksany Barrowes et al., *Texas Adopts Legislation to Better Prepare Energy Market for Extreme Weather* (June 14, 2021), https://www.kirkland.com/publications/blog-post/2021/06/texas-extreme-weather-energy-market-legislation.

213. *See infra* Part II.0 (discussing the benefits of thermal generation over renewable generation when evaluating dependency)

214. *See* Bennett, *supra* note 193.

and non-renewable energy generators create a high likelihood of absence from the generation sought.[215] These generators are not necessarily to blame because, as the market stands, if a generator were to add an investment to the Texas electricity grid, it almost invites financial hardship. Building additional generation facilities effectively guarantees that the price stays low even though the demand continues to increase.[216] In other words, players on the bench aren't being paid unless they play, so they are bidding to play for less and less just to be able to operate.[217] Consequently, Texas generators face economic challenges that have resulted in the retirement of facilities and a lack of investment in new facilities.[218] To put the issue in perspective, over the last ten years in Texas, the revenues collected by the generators were less than the cost of providing the electricity—creating more and more bench players unable to enter the game.[219]

If there are not reliable incentives to build enough generators or pay maintenance costs, "it is not simply a problem of how the market works—it is a problem of market design, a problem of planning."[220] Market design problems have existed in other areas and for various reasons.[221] "It overwhelmed California's first electricity market during the Western Energy Crisis in the early 2000s just as much as it mars Texas electricity markets today."[222] The realistic consequence of poor planning is the unavailability of resources, which is the dilemma Texas faces today. ERCOT heavily relies on the scarcity pricing of wholesale electricity with a shortage price set by the Public Utility Commission to guarantee availability.[223] When demand is high, the price increases significantly.[224]

215. *Id.*

216. Bennett, *supra* note 173, at 11.

217. Ed Hirs, *Why the Texas Power Market Failed*, YALE INSIGHTS (Mar. 23, 2021), https://insights.som.yale.edu/insights/why-the-texas-power-market-failed.

218. Bennett, *supra* note 7. ("Only 2,186 MW of gas generation was added from 2015 to 2020, compared to 16,197 MW of wind and solar, a number which has grown . . . . Several thousand MW of coal plants were also retired over that time . . . show[ing] a net loss of about 1,000 MW in reliable capacity for peak winter demand periods").

219. Hirs, *supra* note 217.

220. Georg Rilinger, *The Texas Blackouts and the Problems of Electricity Market Design*, PROMARKET (Mar. 24, 2021), https://promarket.org/2021/03/24/texas-blackouts-problems-electricity-market-design-failure/.

221. *Id.*

222. *Id.*

223. Resmi Surendran, *Scarcity Pricing in Ercot* (June 27, 2016), https://cms.ferc.gov/sites/default/files/2020-05/20160629114652-3%2520-%2520FERC2016_Scarcity%2520Pricing_ERCOT_Resmi%2520Surendran.pdf.

224. *See* Rilinger, *supra* note 220.

The market assumes that the prediction of profit by energy providers will incentivize generators to be available when the price is inflated.[225] In theory, generators are incentivized to make "short-term investments to ensure their facilities are up and running during peak demands and long-term investments in plants that can spin up to capitalize on the energy capacity."[226]

Because the system is at peak for only a few hours during the year. Thus, there is time in which generators are idle while they wait for prices to skyrocket. Theoretically, ERCOT's reliance on the unique "crisis-based model" should have driven extremely high prices during Winter Storm Uri and, in turn, provided for movement. However, the exact opposite occurred as many generators struggled to recover costs of lost load and ended up bankrupt. So, the real inquiry is: why isn't the incentive structure Texas relies on building a market that incentivizes generators to build and maintain generation capacity at the required level of reliability?[227] Or in another light, what is preventing reliable generational capacity from seeing a return on its investments?

It is difficult not to blame Texas's own market design when prices skyrocket, assuming this is what generators have been waiting for but then nevertheless results in a shortage. This paradox can be attributed to the distortion of prices by federal subsidies, investors, and municipal utilities explicitly looking to invest in wind and solar, even at a higher cost.[228] For too long, market distorting subsidies have created a no-lose situation for renewable generators.[229] The benefits these resources receive include massive tax breaks, special financing arrangements and avoidance of fuel costs.[230] Furthermore, the production tax credit pays renewable generators

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225. *See* PRACTICAL ENGINEERING, *supra* note 40.

226. *Id.*

227. *See* Rilinger, *supra* note 220.

228. Bennett, *supra* note 173, at 4; Brent Bennett et al., *The Siren Song that Never Ends: Federal Energy Subsidies and Support from 2010 to 2019*, TEX. PUB. POLICY FOUND. (Apr. 23, 2021), https://www.texaspolicy.com/the-siren-song-that-never-ends/.

229. Jason Isaac, *Electricity Isn't on the Special Session Agenda and That's a Good Thing* (July 16, 2021), https://www.texaspolicy.com/electricity-isnt-on-the-special-session-agenda-and-thats-a-good-thing/.

230. *Id.*; Jason Isaac, *Texas Blackouts are the Result of Unreliable 'Green' Energy* (Feb. 19, 2021), https://www.texaspolicy.com/texass-blackouts-are-the-result-of-unreliable-green-energy/ ("Research by the Texas Public Policy Foundation's Life:Powered project found that more than $80 billion of our tax dollars have been spent on wind and solar subsidies in the last decade, in federal subsidies alone. Texans are also charged an average of $1.5 billion a year in state subsidies for renewable energy.").

to produce electricity whether the grid needs it or not, which most would probably say is a compelling reason to stay in the game.[231] On the other hand, these incentives and tax credits provide a reason for other generators not to enter the game.

The prediction of profit by energy providers is the foundation for ensuring investment in the Texas grid.[232] While the incentive to invest in renewable generation is present and promising, other generators are not as lucky. Prediction of profit is eliminated for firm generators in the Texas market because of the policy choices that guarantee renewable resources revenue, resulting in more and more wind and solar investment.[233] Under this structure, renewable generators do not have to consider meeting reliability standards, much less at the lowest possible cost. Moreover, renewable generation continues to grow with no penalty. This growing presence keeps prices low by decreasing the wholesale electricity prices. It causes other generators to experience more hours offline and reduces the incentive to build or maintain any plants in the market. This trend will likely intensify as renewable capacity grows and makes bolstering requirements necessary to even the playing field. Now facing policymakers: statutory reform to counteract the discriminatory practices—incentivizing firm generators to get off the bench and enter the game.

B. Proposed Amendment to SB 3—Firming Up Variable Energy Resources

Texas's lack of grid resilience and integrity was at the forefront of issues needing to be addressed; however, the substantive reforms passed in the regular session still lack concrete guidance that can address the fear of a repetitive cycle. As the market stands, the market redesign that Texas hopes for is still plagued by two issues: how much backup power is needed to step up and how to allocate the cost. [234]

The worry for Texas has been that better energy efficiency and continued renewable energy additions will combine with cheap natural gas to keep electricity prices low, creating severe implications for fuel availability.[235]

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231. Isaac, *supra* note 229.

232. *See* Rilinger, *supra* note 220.

233. Bennett, *supra* note 173, at 10; *see* Lott, *supra* note 198 ("In the past decade, Texas has installed more renewable energy in the state than it has in the past 100 years, and no one is talking about—Texas is doing it quietly.").

234. *Id.*

235. *See, e.g.*, Gavin Bade, *The Great Capacity Market Debate: Which Model can Best Handle the Energy Transition?*, UTILITY DRIVE (Apr. 18, 2017), https://www.utilitydive.com/news/the-great-capacity-market-debate-which-model-can-best-handle-the-energy-

Texas is an energy-only market which means that the market obtains a premium during times of scarcity and the construction of new dispatchable energy is left for the market to decide.[236] The system's reliance on the market to show up and produce has led to an increased cost for backup power and more frequent reliability issues.[237] To rely less on the market and ensure generators spin up during times of need, the Texas market redesign must be guided in statute with a firming requirement.

"The term 'firming requirement' refers to a requirement for variable generators to guarantee a minimum level of availability."[238] Moreover, if there is a time a renewable source cannot physically generate or is incapable of producing what is expected, it must pay to guarantee production from another source.[239] While it may appear harsh to hold renewable energy sources to a penalty motivated standard, it is necessary to avoid another event like Winter Storm Uri.

Different types of generators, such as power plants, are not restriction free.[240] Non-renewable generators are required to reduce their pollution levels to match the advantages offered by wind and solar.[241] Thus, wind and solar should have reliability standards to meet the level of system-level reliability of coal and gas. To convey these requirements, legislation should be implemented that mirrors Governor Abbott's directive letter to the Public Utility Commission which states, "allocate reliability costs to generation resources that cannot guarantee their own availability, such as wind or solar power."[242]

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tr/440657/; *see also* Jeff Deyette & Steven Frenkel, *Ripe for Retirement, Catalyst: Spring 2013, Union of Concerned Scientists*, http://www.ucsusa.org/publications/catalyst/sp13-ripe-for-retirement.html (last visited Dec. 10, 2021) (analyzing the cost to modernize existing coal generation by installing pollution controls and comparing the operating cost of the coal-fired generator to a natural gas combined-cycle generator or a wind power facility).

236. McKaughan, *supra* note 153.

237. Bennett, *supra* note 173, at 11.

238. Isaac, *supra* note 229.

239. *Id.*

240. *Id.*

241. *Id.*

242. Letter from Greg Abbott, GOVERNOR OF TEX., to Chairman Peter Lake, Commissioner Will McAdams, Commissioner Lori Cobos, PUB. UTIL. COMM'N OF TEX. (July 6, 2021) (on file with author); Isaac, *supra* note 229. SB 3 contains some provisions to give the PUC latitude to address this problem. Sections 13 and 17 require the commission to establish more clear reliability standards and adjust prices to incentivize more dispatchable generation. *See* Bennett, *supra* note 193. While these sections leave far too much to the discretion of the PUC, they do offer a clear directive for market reform, the only parts of SB 3 that do. *Id.*

As is the case with any proposed legislative change, it is necessary to balance the pros and cons. There are convincing policies associated with environmental and sustainability concerns, which serve as colorable arguments in driving the grid towards more cleaner energy sources.[243] It is undeniable that these sources provide critical environmental benefits but, in broadening the lens of perception, a far more vital consideration is how much more the Texas electric grid can rely on environmentally sound sources without rendering the system so unstable that it becomes prone to crashing. If the Texas Legislature were to incorporate a firming requirement into the text of the statute, the other generators would be re-incentivized and more inclined to enter the game. In fact, a firming service of just 12% of installed capacity would incentivize a procurement of 3,473 MW of power from other sources.[244] This major advancement does not come at the expense of renewable production though—charging renewable resources for their imposed cost may only marginally affect their present incentives and development—allowing Texas to continue supporting and encouraging renewable source production.[245] By creating this incentive, the playing field becomes more even and, in turn, allows the PUC to believe with a higher degree of certainty that other generators will show up.[246]

ERCOT estimates contributions from generators to meet peak demand.[247] "Thermal generators contribute more than 90% of their peak output during peak-demand periods."[248] Conversely, wind and solar generators often produce far less than their expected output during peak periods.[249] When this happens, the weather-dependent generation is faced with uncertainty, making load balancing extremely difficult.[250] Every year, ERCOT is required to estimate the expected demand and the capacity available to meet peak demand.[251] The more uncertain resource availability is, the higher the

243. U.S. ENV'T PROT. AGENCY, https://www.epa.gov/statelocalenergy/local-renewable-energy-benefits-and-resources (last visited Dec. 10, 2022).

244. Bennett, *supra* note 173, at 13.

245. *See id.*

246. *Id.*

247. *Id.*

248. *Id.* at 5. (Potomac Economics, 2021, p.84) — found in the text — within the footnotes.

249. *Id.* During the summer-demand hours over the previous years, renewables contributed between 16% and 46% of their aggregate installed capacity, making them up to 10 times more variable than thermal generation. *Id.*

250. *Id.*

251. *Id.*

required reserve margin.[252] However, unlike other markets ERCOT does not require utilities to meet a required reserve margin.[253] Instead, it has a target reserve margin that informs policymakers on whether reliability is adequate.[254] Thus, in times like Winter Storm Uri, when load balancing is extremely difficult, the market assumes generators will step up to provide the backup power needed. When they don't, Texas ratepayers bear the transmission and reliability costs.[255]

The unfortunate reality of the situation is that ratepayers are vulnerable to high costs in not only the winter, but the summer as well. Winter Storm Uri may have well been a once-in-a-lifetime event, but Texas will be unable to rely on the legislation to resolve future reliability issues. There is roughly 76 GW of thermal generation available, which equals a summer peak demand.[256] This demand is growing between 1% and 2% every year in Texas, relying on wind and solar generation to meet that growth.[257] Therefore, it is likely that a substantial portion of capital costs going towards variable generation will continue to present reliability issues.[258] Unless the new market design addresses all seasons where the availability of reliable supply is an apparent issue, the market will continue to bifurcate into an expensive system of subsidized back up generation.[259]

Therefore, the lesson here extends beyond preparing for another Winter Storm Uri in Texas.[260] Other states, such as California, have also faced severe blackouts, in different extreme weather events.[261] Thus, while Texas is the latest glaring cause of failure, the issue of planning for these type of extremes is critical for all grid systems in the U.S.[262] With a firming requirement implemented in statute, the legislation will remedy future issues during all peak times, not just winter.[263] Moreover, requiring

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252. *Id.*

253. *Id.*

254. *Id.*

255. *Id.* (finding that ratepayers bear the cost by either subsidizing backup generation or endure more blackouts).

256. Bennett, *supra* note 15.

257. *Id.*

258. *Id.*

259. Bennett, *supra* note 173, at 11.

260. Lili Pike, *3 Ways Texas Could Avoid Another Electricity Crisis*, VOX (Feb. 17, 2021), https://www.vox.com/22286974/texas-power-outage-winter-storm-uri-gas-grid-ercot-snow-climate-change.

261. *Id.*

262. *Id.*

263. *See* Bennett, *supra* note 173, at 11.

renewable sources to guarantee availability will bring more balance to the market during all seasons and provide an incentive for generators, thereby lowering the overall cost to ratepayers. Without it, the market will continue to be an uneven playing field, resulting in the same outcome that prompted the discussion.

C. A More Efficient Market Mechanism

Improving fuel security through a firming requirement is most successful within the proposed market blueprint. As of December 2021, the PUC has "adopted a two-phase blueprint to address Texas's wholesale energy market design."[264] In the restructure, the PUC has correctly focused on keeping Texas performance-driven.[265] Now that commissioners of the PUC have given ERCOT time to explore concepts and establish plans to achieve results in the market design, ERCOT has developed a plan to ensure additional dispatchable energy is available to meet the demands of the grid.[266] Texas will now have fashioned products that power plant operators will own and qualify for.[267] ERCOT will procure a certain percentage of those types of products, qualifying plant operators to be paid for performance.[268] However, the additional incentives are not system-wide, instead, the capacity-like payments are limited to only a few power plants. Thus, SB 3 creates what could be referred to as a Texas-style capacity market and preserves the performance-driven system.[269]

264. Linan, *supra* note 71

265. Isaac, *supra* note 229; Linan, *supra* note 71 (statement from PUC commissioner Lori Cobos) ("The balance that we're trying to strike here today with these rules, and that is continuing in our commitment to protect residential and small commercial consumers and maintain a healthy competitive retail market.");
see also Jason Deign, *Flexibility without a Capacity Market: What Texas Can Teach the UK* (June 12, 2020), https://www.greentechmedia.com/articles/read/flexibility-without-a-capacity-market-what-texas-can-teach-the-uk ("Legislators have shown strong support for the energy-only market that has fueled the diversification of the state's electricity generation fleet and yielded significant benefits for customers"); *see also* Walton, *supra* note 269.

266. Linan, *supra* note 71

267. *See also* Walton, *supra* note 269.

268. Linan, *supra* note 71 (explaining that mechanisms implemented include "load-serving obligations and dispatchable energy credits that should offer economic rewards and provide robust penalties or alternative compliance payments based on a resource's ability to meet established standards").

269. Robert Walton, *California Markets in the Lone Star State? Texas Regulators Consider 'Quasi-Capacity' Market System*, UTILITY DRIVE (Oct. 22, 2021), https://www.utilitydive.com/news/california-markets-in-the-lone-star-state-texas-regulators-consider-quasi/608695/.

System-wide capacity markets are designed to provide incentives for all generators seeking to enter the market by guaranteeing revenue upfront.[270] It does so by incentivizing the building of new plants through the opportunity to secure revenue years in advance.[271] The critical difference is that, unlike generators in Texas, generators in a capacity market don't have to wait and hope that the prices hit $9000/MWh because the generators are paid to exist.[272] By guaranteeing some profit for generators, the competitor is incentivized *per se*. Whether these incentives work in application is controversial and could lead to additional issues.[273] Under this scheme, the PUC and ERCOT would contract with generation resources to be available at all times of the year.[274] But, these resources would only be required to provide energy only a few hours a year.[275] Moreover, aside from those few hours each year, the generators would face no penalties for non-performance.[276]

If Texas were to consider this alternative approach, it would protect the individual competitors over the competition—hampering the new market design. Though protecting individual competitors seems to be an easy solution to incentivize new generation, it would set Texas back in three regards. First, a capacity market would not change the fact that ensuring incentive structures is still "an elusive and precarious byproduct of a company's search for profits."[277] Historically, the electricity industry fluctuates with "boom-and-bust cycles."[278] The closer the existing capacity is to peak demand levels, the more generators contemplate an increasingly dangerous gamble.[279] "These considerations show that the margin of error for electricity market design is very thin" and proves it is "inherently risky

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270. Gavin Bade, *The Great Capacity Market Debate: Which Model Can Best Handle the Energy Transition?*, UTILITY DRIVE (Apr. 18, 2017), https://www.utilitydive.com/news/the-great-capacity-market-debate-which-model-can-best-handle-the-energy-tr/440657/. If Texas were to consider a capacity market style model by protecting competitors instead of competition, by ensuring some guaranteed revenue, capacity costs could generate higher power costs for the ratepayer. *Id.*

271. *Id.*

272. *Id.*

273. Largey, *supra* note 196.

274. Matt Welch & Landon Stevens, *Welfare for Texas Electricity Generators is Not a Viable Solution* (Oct. 21, 2021), https://www.conservativeenergynetwork.org/welfare-for-texas-electricity-generators-is-not-a-viable-solution/.

275. *Id.*

276. *Id.*

277. Rilinger, *supra* note 220.

278. *Id.*

279. *Id.*

to tie the reliability of electrical systems to such an ideal."[280] Even assuming ideal conditions, the long-term reliability of the system would depend on the incentive structure and calculations of generators that are operating in the market.[281]

To assume that a capacity market would have a different result is wishful thinking.[282] Even if these incentives were geared to the firm capacity that is needed, the capacity market would drive excess capacity. Actors undoubtedly need to face the correct incentives.[283] However, market participants in a capacity market would still bet that the system will need their resources during peak demand and that prices will be high enough to make the investment worthwhile.[284] This calculation is often hard to predict because of the long lead-times to construct new capacity.[285] For example, a company's investment might not pay off if too many others also build up generation.[286] Thus, a capacity market design doesn't change the fact that "[e]lectricity market design is thus an ambitious project of social engineering that operates against a thin margin of error."[287]

Second, a competitive market should allow customers and generators to react to real-time conditions to save customers money.[288] Today, customers who purchase energy off the grid can determine whether to consume electricity from the grid, generate their own electricity, or reduce consumption based on all relevant factors at the time.[289] This also allows residential customers flexibility to exercise when they want to turn electricity-consuming products on and off.[290] But regulatory obligations imposed in a capacity market would require customers to pay for electricity

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280. *Id.*

281. *Id.*; *Winter Storm 2021 and the Lifting of COVID-19 Restrictions in Texas*, U. HOUS. HOBBY SCH. OF PUB. AFFAIRS, https://uh.edu/hobby/winter2021/ (last visited Dec. 10, 2021).

282. *See* Bade, *supra* note 270.

283. Rilinger, *supra* note 220.

284. *Id.*; Goggin, *supra* note 59 (explaining that capacity markets have some of the largest surpluses of generating capacity). One might argue that large reserves of generating capacity are worthwhile to improve electric reliability. *Id.* However, reports show that rapidly diminishing returns for excess capacity. *see id.*

285. Rilinger, *supra* note 220.

286. *Id.*

287. *Id.*

288. Welch, *supra* note 274.

289. *Id.*

290. *Id.*

one to three years in advance, squashing flexibility and forcing retail customers to pay costs that are otherwise avoidable.[291]

Third, it becomes increasingly difficult to justify the capacity model considering the current rapid innovation in technologies.[292] Capacity markets might clarify who owns what, but it does not address the planning and strategy required in dealing with wind and solar.[293] Both Texas, an energy-only market, and California, a capacity market, have faced negative prices for periods of time.[294] Considering Texas is one of the nation's renewable energy leaders, it cannot be hampered by a one-size-fits-all approach. Additionally, capacity markets remain vulnerable to price depression due to out-of-market subsidies.[295] For instance, Connecticut lawmakers have debated nuclear subsidies to encourage the development of that resource. Similarly, Massachusetts passed a law mandating additional GW of offshore wind and hydropower purchases.[296] From a market participant standpoint , "the problem with these mandates and long-term power purchase agreements is that they give renewables and/or nuclear an economic leg-up over the other resources that don't get access to those incentives."[297] This could suppress capacity market revenues for unsubsidized generators if the subsidized generators play in the market.[298] Therefore, capacity markets point to a much bigger issue: how to reconcile environmental goals that subsidize and encourage more renewable energy additions with the need to preserve market incentives for unsubsidized generation.[299]

The decision to reject central planning models for the Texas grid will prove more successful in providing long-term incentives for investment in more unsubsidized generation. Through the creation of such targeted backstop measures, where providers will compete to perform, the Texas

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291. *Id.*

292. Jonathan Lesser, *America's Electricity Grid: Outdated or Underrated?*, THE HERITAGE FOUND. (Oct. 23, 2014), https://www.heritage.org/environment/report/americas-electricity-grid-outdated-or-underrated.

293. *Id.*

294. Bade, *supra* note 270; MIT ENERGY INITIATIVE, *Utility of the Future*: *an MIT Energy Initiative Response to an Industry in Transition* 6 (Dec. 2016), ttps://energy.mit.edu/wp-content/uploads/2016/12/Utility-of-the-Future-Full-Report.pdf.

295. *Id.*

296. *Id.* Those concerns have sparked challenges to nuclear subsidy programs and proposals in New York, Illinois, Connecticut, New Jersey, Ohio, and Pennsylvania. *Id.*

297. *Id.*

298. *Id.*

299. *Id.*

market will protect competition rather than individual competitors.[300] As seen in the pre-Winter Storm Uri market design, protecting individual competitors can severely jeopardize the reliability of the grid. Like the functionality of the firming requirement, both measures will be dependent on Texas keeping a performance-driven focus. With the Texas-capacity market underway, the Texas market design avoids the severe price spikes that would otherwise need to occur in energy-only markets to attract investments but does not eviscerate the competitive retail market.

D. Defining Dispatchable Energy

Winter Storm Uri highlighted many issues with the electric grid; but fundamentally, it exposed a systemic shortage of reliable capacity.[301] It is worthwhile to look at the value of each ancillary source debated by the PUC to understand why Texas needs more coal and gas generation.[302] It would be ideal if more transmission from wind and solar could meet the Texas demand.[303] But renewable sources, through no fault of their own, are "unavailable" or less effective in the sense that they cannot produce more electricity during peak demand, which makes reliance on them ill-advised or risky.[304] Texas is limited to these resources “when the sun shines or the wind blows.”[305] This also makes renewable resources the precise definition of non-dispatchable—Texas is unable to call on them for assistance when needed to meet unexpected peaks.[306]

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300. *See id.*

301. Bennett, *supra* note *7*.

302. *See* Bennett, *supra* note 193.

303. Shelby Webb, *Wind and Solar Power is Rapidly Growing in Texas, but ERCOT Limits how much goes on the Grid*, HOUS. CHRON. (June 4, 2021), https://www.houstonchronicle.com/business/energy/article/Wind-solar-production-outstrips-transmission-in-16223706.php.

304. *See* Jordan Hanania et al., *Intermittent electricity*, ENERGY EDUC. (Apr. 28, 2020), https://energyeducation.ca/encyclopedia/Intermittent_electricity; Bethel Afework et al., *Non-dispatchable Source of Electricity*, ENERGY EDUC. (Oct. 15, 2021), https://energyeducation.ca/encyclopedia/Non-dispatchable_source_of_electricity. Renewable energy sources are intermittent, meaning they are not to be used as a constant source of supply. *Id.*; Josh Lederman, *Texas Officials Circulated Climate Skeptic's talking Points on Failures During Storm*, NBC NEWS (Apr. 1, 2021), https://www.nbcnews.com/politics/politics-news/texas-officials-circulated-climate-skeptic-s-talking-points-power-failures-n1262700 (stating there was a lesson to learn from the Texas crisis: that renewable generators are often useless when you need them most).

305. Lederman, *supra* note 304.

306. *Id.* (stating that because renewable sources don't generate electricity 24 hours a day, the grid must pull from other sources when the sun isn't shining, or wind isn't blowing).

ERCOT administers day-ahead and real-time markets, as well as a secondary market, also called the ancillary service market, that allows procurement of short-term reserves to meet high demand.[307] The procurement of the ancillary service must base its analysis on the amount of capacity necessary to accommodate both intermittent generation and reliable backup power.[308] Predictive models show that a 50% wind and solar share for Texas would still require, at a bare minimum, 60 GW of dispatchable generation and 10 GW of energy storage—meaning Texas must rely even more on natural gas to provide energy during shortages.[309] The value of an ancillary resource is different depending on the season it comes to fuel storage. In the summer, it is not as important to have a few days or a few weeks' worth of fuel because the peaks during the summer are very discrete and do not interrupt fuel supply. Conversely, in the winter, like the event in Winter Storm Uri and what happened in the winter storm of 2011, fuel supply can get disrupted, so there presents a need for fuel storage options (e.g., backup fuel storage at gas plants so they can burn diesel or fuel oil, or underground gas storage for coal and nuclear plants).[310]

Texas usually does not have many storage capacity options because the resource-laden state can easily pull it from the ground when needed.[311] But when production of natural gas in the state has decreased, it is difficult for power plants to get the fuel needed to operate.[312] Natural gas power plants usually do not have access to fuel storage directly onsite; most of the plants rely on the flow of natural gas from pipelines all across the state.[313] Thus, all of the existing gas plants that were patiently waiting for the price spike but, when it did, could not deliver and limit the windfall.[314] Thus, even if gas operators have taken all the necessary precautions to weatherize their

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307. King et al., *supra* note 42, at 88.

308. *See generally* Bennett, *supra* note 173.

309. Brent Bennett, *Green New Deal Will Put Texans in the Red: Effects on Texas Electricity Costs and Energy Production up to 2030*, TEX. PUB. POLICY FOUND. (Oct. 2019), https://lifepowered.org/wp-content/uploads/2019/10/2019-08-PP-LP-Bennett-Green-New-Deal.pdf.

310. *Id.*

311. Erin Douglas, *Texas Largely Relies on Natural Gas for Power. It wasn't Ready for the Extreme Cold*, TEX. TRIB. (Feb. 16, 2021), https://www.texastribune.org/2021/02/16/natural-gas-power-storm/.

312. *Id.*

313. *Id.*

314. Julian Spector, *Why is the Texas Market so Tough for Energy Storage?* (Nov. 19,2018), https://www.greentechmedia.com/articles/read/why-is-the-texas-market-so-tough-for-energy-storage.

facilities, it won't be enough to prevent another disaster.[315] That is because Texas has not fixed the critical problem that paralyzed the plants: maintaining a sufficient supply of natural gas.[316]

Instead of relying on Texas's natural gas backbone, renewables could be paired with battery technology to provide more storage and assistance in times of need.[317] However, the solution can't displace the need for firm generation because electricity is still extremely expensive to transport and store.[318] The incredible success of the renewable industry "should, in theory, create a role for energy storage."[319] However, the wind and solar advocates abandoning the need for dispatchable generation and claiming that demand response and battery storage can manage the variability of renewable resources are [320] But until there is an economic alternative for long-duration storage, the proposal is a "fantasy borne of statistical models and academic studies."[321]

While technologies are being developed for utility-scale energy storage, they are all challenged by the immense scale required by the electric grid.[322] For Texas to rely solely on renewable resources—resources such as wind and solar—Texas would need at least a day's worth of energy storage for the entire grid.[323] Winter Storm Uri would have required 2–4 days' worth of storage.[324] This challenge inevitably comes with a high cost—a day's worth of storage capacity would require "building a battery the size of a small power plant (100 MW/400 MWh) every day between now and 2035, at a [at the cost of] nearly 100 billion per year."[325] Similarly, demand response can

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315. Ferman, *supra* note 185.

316. *Id.*

317. Bob Sechler, *Texas Utility Regulators Approve Plain Aimed at Boosting Power Grid's Reliability Over Time*, AUSTIN AMERICAN STATESMAN (Dec. 16, 2021), https://www.statesman.com/story/business/2021/12/16/texas-plans-boost-electric-grid-reliability-after-winter-storm-power-outages/8928065002/ (statement of PUC Commissioner Lake) ("[Texas] must do more to ensure sufficient incentives exist to warrant investment in "reliable sources of power" as well. That could include renewable sources. . . such as wind or solar if paired with batteries, or energy from biomass or other nonintermittent sources.").

318. Erin Douglas, *Texas Largely Relies on Natural Gas for Power. It Wasn't Ready for the Extreme Cold*, TEX. TRIB. (Feb. 16, 2021), https://www.texastribune.org/2021/02/16/natural-gas-power-storm/.

319. Spector, *supra* note 314.

320. Bennett, *supra* note 193.

321. *See Id.*

322. *Id.*

323. *Id.*

324. *Id.*

325. *Id.*

be a great tool to adjust to sudden drops in electricity supply but is still limited in the practicality of reliance.[326] If Texas were to rely on demand response, residential and commercial consumers would be burdened with turning off the electricity to adjust to sudden drops in supply.[327] There has to be a limit of consumers who would be willing and required to turn off their air conditioning in the hot summer heat, dampening the interest.[328] Therefore, until there is an economically viable alternative to long-duration storage, storage and demand response can help in small ways by shifting energy but will not suffice as wholly reliable.[329]

The Texas Legislature has already clearly expressed the desire of Texans to improve the reliability of the grid.[330] This desire can be fulfilled by evaluating the costs of alternative methods of providing the same response, which could be, for example, price incentives to shift or reduce demand or dispatch of extra generation.

IV. Without Concrete Legislation Implemented into Statute, the Texas Market Design Subjects Itself to External Influence

A. Deferring to Lawmakers Will Provide Security and Protection for Ratepayers

Market design is a highly political activity, is open to stakeholder influence, and takes place in bureaucratic processes.[331] As such, it is usually not prioritized by Texas legislators as they end up in a position unable to enforce the requirements of their ideal.[332] Traditionally, Texas has always deferred to the market participants and received push back to market reform by industrial customers.[333] One of the main reasons that the Texas market has become so underequipped to value the construction of new power plants is because the industrial load is extremely politically powerful (e.g.,

326. *Id.*

327. *Id.*

328. Catherine Wolfram, *The Problem with Demand Response* (Sep. 25, 2017), https://energyathaas.wordpress.com/2017/09/25/the-problem-with-demand-response/.

329. Bennett, *supra* note 193.

330. *Id.*

331. Rilinger, *supra* note 220.

332. *Id.*

333. *Id.; see* Dan Gearino, *Texas Politicians Aim to Penalize Wind and Solar in Response to Outages. Are Renewables Now Strong Enough to Defend Themselves?*, INSIDE CLIMATE NEWS (Apr. 17, 2021), https://insideclimatenews.org/news/17042021/texas-politicians-wind-solar-natural-gas-winter-storm/ ("politicians are motivated by who gets them elected, and if you look at who gets them elected, it's oil and gas.").

downstream petrochemical, industrial steel).[334] The industrial load has extremely compelling arguments and is why this market has not been modernized and created to better price signals for thermal generation. That contributes to a culture in which companies have escaped certain responsibilities and requirements.[335] Rulemaking entities, therefore, tend to curb prices before the market can remunerate generators' investments.[336]

In the past, making the market rely on the enforcement actions by "chronically underfunded regulators" has not proven successful.[337] Regulators, like ERCOT and the PUC, are allowed too much wiggle room.[338] When statutory change and compliance are necessary, governing bodies fix the imperfections by mandating certain behavior by rules.[339] But, when rules conflict with profits, companies tend to lobby against the rule-making entities, which is precisely what happened to the recommendation following the 2011 event in Texas.[340] Similarly, in "California's electricity markets, the power marketers blocked rules that would have corrected flawed incentive structures."[341] Therefore, even if administrative rules are put in place, the market almost incentivizes market participants to elude compliance.[342] For this very reason, regulators attempt to align companies' interests with market mechanisms.[343] The designers do so by re-aligning companies' interests with reliability requirements.[344] For example:

> Texas adopted an operating reserve demand curve, which augments the energy market to reflect the cost of investments in marginal capacity. Another approach has been to separate markets for the construction of new capacity. In each case, designers translate technical reliability requirements into new

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334. Lesser, *supra* note 292; Ferman, *supra* note 185 ("The natural gas industry has been among the most politically powerful in Texas for generations and has donated generously to the campaigns of governors, lawmakers and the Railroad Commission.").

335. Ferman, *supra* note 185.

336. Rilinger, *supra* note 220.

337. *Id.*

338. Ferman, *supra* note 185.

339. Rilinger, *supra* note 220.

340. *Id.*

341. *Id.*

342. *Id.*

343. *Id.*

344. *Id.*

> markets or products. This creates custom-tailored incentives for companies to meet the requirements of the system.[345]

Unfortunately, solutions that are contemplated by legislators tend not to cure the issue that made the solutions necessary in the first place. That is, the development of new market rules is a very political activity and still subject to influence.[346] Ideal market mechanisms, like the market redesign discussed above, do not simply serve as blueprints that are automatically implemented.[347] Rather, they offer a common language for experts, market participants, and lawmakers to use in articulating their objectives and interest.[348] While the compromises may seem promising initially, the compromises among the entities rarely reflect the logic of the ideal markets that prompted the design effort. Instead, they tend to express the interests of the industrial load and powerful incumbents who have a very compelling, strong voice.[349] However, this exact storyline has troubled other markets.[350]

This repetitive cycle is a wake-up call to the Texas Legislature as the urgency behind interference by state leaders is necessary to protect Texans from another tragic storm. While market imperfections may produce new imperfections, statutory change is still necessary.[351] Thus, the Texas Legislature should not use historical hesitancy and the fear of powerful players to avoid interference that follows through with the logic of the ideals that prompted the redesign efforts.

The historical reluctance comes at high costs.[352] High costs for ratepayers.[353] Texas ratepayers will ultimately be saddled with billions of

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345. *Id.*

346. *Id.*

347. *Id.*

348. *Id.*

349. *Id.*

350. *Id.* ("Just as the market structure of the first California markets represented the powerful independent plant producers, so did the auction rules for European capacity markets that depressed incentives for investment to the benefit of prominent players).

351. One might expect that the industry would reject more regulation, but the oil and gas companies seem to agree that more regulation is necessary. Will Maddox, *How Will Texas' Weatherization Laws Impact the Energy Industry?* (July 21, 2021), https://www.dmagazine.com/business-economy/2021/07/how-will-texas-weatherization-laws-impact-the-energy-industry/.

352. *See generally* Meryl Kornfield & Paulina Firozi, *Some Texans Received Electric Bills up to $17,000 after the Storm. How does that Happen?*, https://www.washingtonpost.com/nation/2021/02/21/texas-high-electric-bills/.

353. *See, e.g.*, *id.*

dollars in excess energy costs.[354] ERCOT kept its wholesale pricing cap in place for too long during the week of the storm.[355] In keeping it at that price, the market did not bring any more electricity supply onto the grid and subsequently subjected ratepayers to the high costs.[356] Although the total cost estimate is unknown, calculating the excess cost to ratepayers for the overpriced electricity is straightforward.[357] Over that time when the prices skyrocketed, electricity demand in Texas was about 50,000 megawatts. "Thus, a bit of simple multiplication — $6,578 x 80 hours x 50,000 MW — shows that Texas consumers were overcharged by roughly $26.3 billion due to the inattention or incompetence of officials at the PUC and ERCOT."[358]

The reason that this blunder did not get more attention from the Texas Legislature is another example of reluctance.[359] One of the most plausible explanations for this reluctance is that state leader, Governor Greg Abbott appointed the PUC Chair, who signed the order to increase the wholesale electricity price.[360] The PUC Chair's job before the PUC was serving as one of Abbott's senior policy advisors.[361] Thus, any further scrutiny of the actions during the week of the freeze reflects poorly on Abbott.[362]

Moreover, it is clear the Texas ratepayers will be forced to pay the biggest costs after Winter Storm Uri. However, "[t]hose bills, those exorbitant costs should be borne by the state of Texas and not the individual consumers, who did not cause this catastrophe this week."[363] Deregulation has resulted in lower electricity prices in Texas for years.[364] But now, those savings are diminishing in the same market, necessitating a closer investigation into what is more important: political pride or the wellbeing ratepayers.

354. Robert Bryce, *Texas Ratepayers Are Being Saddled with Nearly $38 Billion in Excess Energy Costs from Winter Storm Uri*, FORBES (June 11, 2021), https://www.forbes.com/sites/robertbryce/2021/06/11/texas-ratepayers-are-being-saddled-with-nearly-38-billion-in-excess-energy-costs-from-winter-storm-uri/?sh=7b61cf516785.

355. *Id.*

356. *Id.*

357. *Id.*

358. *Id.*

359. *Id.*

360. *Id.*

361. *Id.*

362. *Id.*

363. Meryl Kornfield & Paulina Firozi, *Some Texans Received Electric Bills up to $17,000 after the Storm. How does that Happen?*, https://www.washingtonpost.com/nation/2021/02/21/texas-high-electric-bills/.

364. Bryce, *supra* note 354.

B. Federal Legislation's Role in Texas's Electricity Costs and Energy Production

Environmental policies could necessitate urgency from the Texas Legislature as outside factors will continue to influence the wholesale market.[365] Federal subsidies that encourage renewable energy development by lowering installation cost hurdles are one of the primary issues with distortion of the Texas market as it stands today.[366] When looking at South Texas, the resource availability is excellent, and it appears to be the perfect place for the development of wind farms.[367] A majority of the reason this area appears to be so promising is the compelling tax credit that is in place.[368] Unfortunately, the overproduction of one electricity provider because of an economic incentive is hampering the goal of changing the energy landscape.[369]

At present, the development of firm generation is not supported without the incentive of a firming requirement. Renewable advocates often defend the incentive structure by pointing out that fossil fuels also receive subsidies.[370] But the difference in amount is significant. [371] Renewable energy farms are not economically viable without incentives at the federal level and, thus, justify the incentive. Similarly, the generation of gas, coal, and nuclear is not economically viable without a firming requirement and, therefore, should be accepted for the same reason. Accepting the need for federal legislation in aiding the production of renewable generation can be mirrored with acceptance of the need for the Texas state Legislature to assist the production of other resources.

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365. *See* Isaac, *supra* note 230.

366. Barbara S. Jost, *Who pays for firming up variable sources?*, POWER MAG. (Sep. 1, 2011), https://www.powermag.com/who-pays-for-firming-up-variable-energy-resources/ ("These include the production tax credit, the investment tax credit, accelerated depreciation for certain renewable generation property, and federal loan guarantees for renewables developers").

367. Sarah Hutchinson & Laura Rice, *Why Texas is Uniquely Positioned to Start Collecting Windy Energy in the Gulf* (Nov. 3, 2021), https://www.kut.org/texasstandard/2021-11-03/why-texas-is-uniquely-positioned-to-start-collecting-wind-energy-in-the-gulf.

368. Isaac, *supra* note 230.

369. *Id.*

370. *Id.*

371. *Id.* ("[S]olar companies receive 75 times more money and wind 17 times more per unit of electricity generated."). While renewable sources have received more subsidies than other generators, debates about energy subsidies should not revolve around which generator receives more. Bennett et al., *supra* note 228. The focus must be on how the subsidies distort the market. *Id.*

Additionally, there are questions about how a proposed "clean-electricity standard" could impact the Texas grid at the federal level.[372] The clean-energy standard is challenging the energy sector to achieve 100 percent clean energy.[373] Some programs require utilities to increase their zero-emission output, imposing a penalty if ignored.[374] Although unlikely to pass, similar regulations on the federal level could get passed in the future, altering Texas's control of the production of certain resources. As of now, the investment market is predicated on that not happening, but given the policy drivers in place, Texas will have to be prepared to deal with such regulation. The greenwashing stemming from federal influence is an essential consideration in the urgency necessary to implement a firming requirement.[375]

Texas and other states have taken a stance on ending the cycle of energy discrimination through environmental, social, and governance (ESG) investing.[376] However, until legislation is filed to prohibit companies from

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372. Dominic Anthony Walsh, *ERCOT Announces Market Redesign Warns of More Energy Conservation Requests*, HOUS. PUB. MEDIA (July 22, 2021), https://www.houstonpublicmedia.org/articles/news/energy-environment/2021/07/22/403930/ercot-announces-electricity-market-redesign-warns-of-more-energy-conservation-requests/.

373. *See The Biden Plan to Build a Modern, Sustainable Infrastructure and an Equitable Clean Energy Future*, JOEBIDEN.COM, https://joebiden.com/clean-energy/ (last visited Dec. 10, 2021) (declaring the goal of 100% carbon-free power by 2035); *see also* Nick Sobczyk & Geof Koss, *Manchin could get top role in writing clean energy standard* (July 20, 2021), https://www.eenews.net/articles/manchin-could-get-top-role-in-writing-clean-energy-standard/.

374. Daniel Slesinski, *Why the Unites States Needs a Clean Electricity Standard*, CTR. FOR CLIMATE AND ENERGY RES. (July 8, 2021), https://www.c2es.org/2021/07/why-the-united-states-needs-a-clean-electricity-standard/ (arguing that state-level policies will not be enough to fully decarbonize the electricity sector and to meet the Biden administration's goals in the timeframe required to address climate change).

375. *See* Joanna H. Slusarewicz & Daniel S. Cohan, *Assessing Solar and Wind Complementarity in Texas*, Springer Open (Nov. 16, 2018), https://jrenewables.springeropen.com/articles/10.1186/s40807-018-0054-3; Isaac, *supra* note 230 (explaining that even with the amount of money going into renewables, wind and solar provide for only four percent of energy nationwide); *see also* Garrett Golding, *Surging Renewable Energy in Texas Prompts Electricity Generation Adequacy Questions* (Aug. 17, 2021), https://www.dallasfed.org/research/economics/2021/0817.aspx ("Renewable energy proliferation in Texas, increased natural gas use and coal plant retirements reduced electricity sector carbon emissions by 13 percent over the previous decade even as consumption increased 20 percent, according to the U.S. Energy Information Administration.").

376. Isaac, *supra* note 230.

doing business with the government that boycott or divest from fossil fuels, it is a good start to ensure energy discrimination does not occur.[377]

The federal government has a keen interest and responsibility in supporting the Texas grid resilience because Texas serves as an economic engine.[378] Even though Texas does not possess many linkages with other states, Texas's crisis played a significant role in the national gas supply, which fell by twenty percent.[379] The winter storm caused the price of natural gas to soar nationwide.[380] Therefore, the stakes are high, and not just for Texas, which happens to be the nation's top energy-producing state. Texas's "preparedness affects customers as far away as California and Minnesota and is a test of America's ability to deal with climate change, which is making weather more extreme, more unpredictable and more deadly."[381]

Fixing the regulation problem begins with recognizing that "[we] don't have a regulatory system in place that holds the industry accountable."[382] While the federal government should not necessarily bring oversight to the Texas market, it can provide support to mitigate Texas's moral hazard.[383] The federal government should take pride in ensuring states against high-impact, low-probability events. Instead of defining the capacity of its role by adding more oversight, the awareness of how renewables and prices distort the Texas market would aid the federal government's primary role of ensuring that states correctly manage risks. Moreover, Texas should be encouraged to operate and serve as the number one energy producer.[384] Because of the federal government's little regulatory power over Texas, state interference is even more necessary to prevent federal legislation from jeopardizing reliability and promote Texas as an economic engine. With additional guidance in statute, the PUC will have clearer guidance on

377. *Id.*

378. Michael E. Webber, *The Texas Power Crisis Didn't Have to Happen* (Jun. 15, 2021), https://www.asme.org/topics-resources/content/the-texas-power-crisis-didn-t-have-to-happen ("[Texas] is the world's third-largest natural gas producer.").

379. Mitchell Ferman, *Texas Natural Gas Production Dropped During Recent Cold Front, Reviving Concerns about Electric Grid*, TEX. TRIB. (Jan. 5, 2022), https://www.texastribune.org/2022/01/05/texas-power-grid-natural-gas-cold/.

380. Crowley, *supra* note 70.

381. Ferman, *supra* note 185.

382. *Id.*

383. David C. Wagman, *It's Time to Tie the U.S. Electric Grid Together, Says NREL Study* (Aug. 8, 2018), https://spectrum.ieee.org/energywise/energy/the-smarter-grid/after-almost-100-years-of-talk-time-might-be-right-to-strengthen-the-interconnect.

384. *See* Buchele, *supra* note 146.

"writing rules based on laws passed by the state lawmakers, ensuring reliability in the grid."[385]

V. Conclusion

The rapid development of renewable generation in the current market structure is beginning to create serious reliability issues for the Texas electric grid, as evidenced by Winter Storm Uri. The Texas Legislature and the PUC must address these physical realities concretely and start dealing with them to prevent future electric grid breakdowns. Adding statutory reform to SB 3 that addresses managing renewable generators will prevent future blackouts and ensure that costs do not fall on ratepayers.

The current economic structure that the Texas market operates under has not and will not be sufficient to ensure incentives needed for more firm generation and, more importantly, ensure the Texas people do not face another tragic event.[386] Prices remain too low to provide the necessary incentive to increase availability.[387] Furthermore, investment is driven toward generation that keeps the price low without reliability. If the Texas Legislature does not assist in changing the market design by leveling the playing field, the PUC will be left to merely raise scarcity pricing.[388] In that case, Texas will be faced with the same issues that caused Winter Storm Uri—continued retirement of coal, nuclear, and gas (collectively "thermal") generation.[389]

Conversely, a well-designed firming requirement that mirrors the Governor's directive letter would ensure that variable generators face accountability.[390] Under the current market structure, generators are not incentivized to provide for the Texas grid, at the lowest possible cost, which, in turn, passes on to consumers and ratepayers. This occurs because variable generators are not required to provide a minimum amount of electricity to the ERCOT grid. If they were so required, during peak demand periods like Winter Storm Uri, the volatility of prices and supply would be reduced. The consistency in the market would prevent premature

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385. Mitchell Ferman and Jon Schuppe, *Texas Hasn't Done Enough to Prevent Another Winter Blackout, Experts Say*, Texas Tribune and NBC News (Dec 1. 2021), https://www.caller.com/story/news/2021/12/01/texas-hasnt-done-enough-prevent-winter-blackout-experts-say/8809757002/.

386. Bennett, *supra* note 173, at 14.

387. *Id.*

388. *Id.*

389. *Id.*

390. *Id.*

retirement of existing generation and ensure that adequate investment secures available resources in the future. Additionally, the variable generation that is inevitably being added due to out-of-market subsidies will come with adequate backup power through reliability requirements.

An ideal market structure should be designed around the ratepayers. "The Texas model of socializing transmission and reliability costs among ratepayers provides generators with an implicit subsidy and favors generators that impose more transmission and reliability costs on the system."[391] While Texas should not ignore what is best for generators, generators can deliver these outcomes under a system that protects competition with "uniform reliability standards where companies have proper incentives to maximize the quality of electricity service for ratepayers."[392] Thus, the firming requirement aids in achieving the ultimate goal of an ideal market and prevents consumers from paying for a system of subsidized backup generation but still retains its fundamental purpose of allowing flexibility and promoting all forms of generation.

This call to action is urgent due to the high probability that federal regulation and subsidies will continue to distort the market. In the wake of unpredictable seasons and climate change, supply issues will cause future blackouts in Texas. While Texas cannot control external circumstances that affect the grid (like the weather or federal incentives and mandates), Texas can change its approach to managing the circumstances. Texas can ensure that it creates a system that values reliability with its vast energy resources and provides the lowest cost to the ratepayers.

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391. *Id.* at 4.
392. *Id.* at 14.