

What Investors and the SEC Can Learn from the Texas Power Crises

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June 2021



BROOKINGS

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Acknowledgements

The authors thank Sadie Frank, Natalie Karas, Pam Kiely, Colin Leyden, Vickie Patton, and Steven Rothstein for insights helpful to scoping and drafting this paper. We are also grateful to the following individuals for providing their expertise in comments on a review draft: Jay Apt, Jeff Ball, Madison Condon, Tyler Gellasch, Susan Tierney, and Romany Webb. A review draft of the paper was also shared with company representatives at AEP, CenterPoint, Edison, Entergy, Exelon, PNM, Sempra, Vistra, and Xcel in an effort to prevent factual errors, and we appreciate responses provided. Finally, we thank Ted Reinert for guidance on the review and production process. The authors maintain full editorial control of the content of the report, and any errors are our own.

Abstract

The February 2021 extreme winter weather event and ensuing power outages in Texas (collectively, the “February 2021 Crisis”) are a salient example of the electric sector’s vulnerability to extreme weather events that will plausibly become more frequent and more severe with climate change. The blackouts were dangerous, costly, and in some cases deadly for the Texans who suffered the effects on the ground. Such events, and the market and policy responses they trigger, are also highly material to investors in the affected companies. We use the February 2021 Crisis as a reference point to analyze what companies consider and disclose about present and future climate-related perils. We focus on the “10-K” reports filed with the Securities and Exchange Commission (“SEC”) by all seven major publicly-traded power generation and utility companies in the Texas Interconnection, the grid covering the majority of the state. The review finds that these reports say little about the physical impacts of climate change and possible policy changes in response to physical climate change impacts. Where the 10-Ks engage with climate-related risks at all, it is mainly in the domain of risks related to transition away from high carbon fuels, despite increasing evidence that material physical risks are knowable to companies (with varying degrees of uncertainty, as is common with many material risks). Investors are not readily able to gain such information absent corporate disclosure. The high degree of similarity in the insufficiencies of disclosure practices across all seven companies analyzed reflects a need for reform in disclosure standards, rather than just reform by individual companies. We outline potential disclosure reforms that address failures of “memory” (i.e., the need to learn from prior extreme weather events, such as a similar cold snap in Texas in 2011) and failures of “imagination” (i.e., the need to do better forecasting of how climate impacts might affect assets, markets, and policies). We also conclude that existing voluntary frameworks—we focus on the TCFD—are not driving sufficient change in 10-K disclosure practices, which suggests the need for the SEC to mandate climate risk disclosures rather than expect that voluntarism will be sufficient. Finally, we outline a process by which the SEC can engage its fellow agencies and market participants to advance disclosure rules and practices, in tandem with evolving science around physical climate change impacts and improving capabilities of companies to assess climate-related risks to their assets.

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Introduction

In February 2021, millions of Texans were left without power, water, and heat as major winter storms decimated the state's electric system (the "February 2021 Crisis"). The February 2021 Crisis, because it was extreme, helps to reveal how individual power companies and the power sector as a whole may be affected under adversity. Understanding such impacts is important in its own right, for the power system is constantly affected by extreme weather.¹ With climate change, some of those extremes will become more frequent and more severe.

We examine this event as a case study on how climate-related perils can affect publicly traded companies.² Texas electric power companies,³ along with their suppliers and customers, are exposed to the two major categories of climate risks. One is transition risk, which encompasses the impacts on companies of society's responses to climate change in the form of shifts in policy, liability, technology, market dynamics, and reputational issues related to the control of emissions. The other is physical risk, which encompasses the impacts of climate change-driven shifts in weather extremes, patterns, and baseline conditions on companies' assets and operations. While some firms are ostensibly reporting on both types of climate-related risk, the quality of these disclosures is often inadequate, and disclosure of physical risks is particularly weak.⁴ Physical risks have great significance for many sectors, including the electric sector.

Since the origin of the federal mandatory securities disclosure

framework, there have been important arguments in favor of enhancing disclosure requirements (such as protecting investors and correcting market failures) and against (such as the benefits of more onerous reporting obligations not necessarily justifying the costs). As society, the economy, technology, and science evolve, securities disclosure rules must also evolve to sustain the right balance of requiring information that investors and other market participants need with what companies are able to reasonably provide. In recent years, investors, regulators, and other experts have focused on climate change as an area where disclosure is not keeping pace with a large and growing set of risks. Recognizing the increasing significance of climate-related information to market participants, the Securities and Exchange Commission ("SEC") requested public input on questions relating to climate disclosure in March 2021.⁵

The February 2021 Texas Crisis is a recent, significant example of an extreme weather event that inflicted substantial impacts on the region's power industry. Although unusual, the extreme weather experienced was a foreseeable possibility. In the context of this event, we investigate the gulf between what is known or knowable about physical climate risks and what is actually disclosed under the current disclosure regime.⁶ Section II of this report describes the February 2021 storm and resulting impacts on the Texas electricity system, and examines the foreseeability of such a crisis in light of prior events and climate science. Section III analyzes the extent of climate risk information disclosed by publicly-traded Texas power generators and investor-owned utilities in their 10-Ks, and reveals consistent underreporting of climate risks, notably

¹ NAT'L ACAD. OF SCI., ENHANCING THE RESILIENCE OF THE NATION'S ELECTRICITY SYSTEM 54-66 (2017), <https://www.nap.edu/catalog/24836/enhancing-the-resilience-of-the-nations-electricity-system>.

² "Climate" as used in this paper encompasses current weather patterns (including incidence of extreme weather events) and potential shifts in these patterns that may plausibly result from increased atmospheric carbon levels.

³ All of the companies analyzed have generation or utility operations in the Texas electric system. Some of the companies analyzed also have additional locations or types of operations, including gas service and gas distribution.

⁴ PARKER BOLSTAD ET AL., BROOKINGS INST., FLYING BLIND: WHAT DO INVESTORS REALLY KNOW ABOUT CLIMATE CHANGE RISKS IN THE U.S. EQUITY AND MUNICIPAL DEBT MARKETS? 3 (2020), https://www.brookings.edu/wp-content/uploads/2020/09/WP67_Victor-et-al.pdf.

⁵ See Public Statement, Acting Chair Allison Herren Lee, Sec. & Exch. Comm'n, Public Input Welcomed on Climate Change Disclosures (Mar. 15, 2021), <https://www.sec.gov/news/public-statement/lee-climate-change-disclosures>.

⁶ For the purposes of this study, a risk is "known" if companies already have information regarding the risk. A risk is "knowable" if companies are able to seek out information about that risk at a reasonable cost.

related to physical impacts of climate change. Section IV considers the implications of these findings for potential action by the SEC to strengthen climate risk disclosure. Section V offers conclusions.

Foreseeability of the February 2021 Crisis in Texas

a. February 2021 Storm and Impacts on the Texas Electricity System

In February 2021, Texas experienced a severe winter weather event, with days of extremely cold temperatures, snow, and ice affecting large portions of the state, unofficially known as Winter Storm Uri. The event created higher electricity demand, lower natural gas production, and generation equipment outages, which together resulted in a severe electricity shortage and blackouts that affected millions of people for days.⁷ While Texas was not the only state exposed to extremely cold temperatures, snow, and ice during this event, other states “routinely expect harsh conditions in the winter,” whereas in Texas “the conditions were more extreme than anticipated.”⁸ The crisis was particularly acute within the grid operated by the Electric Reliability Council of Texas (“ERCOT”), the Texas Interconnection, which covers the majority of the state.⁹ The ERCOT footprint is especially vulnerable to severe storm

impacts because it has “isolated itself from the national grid, limiting the state’s ability to import power when its own generators are foundering,” and its deregulatory approach lacks enforcement of reserve margins and incentives for equipment weatherization.¹⁰ In the spirit of looking at extremes because they reveal more starkly factors that can be relevant in other settings as well, this analysis focuses on the ERCOT areas of Texas.

The extreme February 2021 weather conditions resulted in “record-breaking winter-time demand for electricity at the same time that various adverse conditions developed on the supply side.”¹¹ On the demand side, over 60 percent of Texans rely on electric heat and many homes are poorly insulated, and thus extreme cold caused a surge in demand for electricity by an amount equivalent to a third of winter peak load.¹² Supply suffered at the same time, as freezing in the natural gas supply system, and priorities in gas supply for home heating, meant much less gas was available for power generation.¹³ Emissions reports from multiple natural gas producers in Texas confirmed that their system failures

⁷ Keith Everhart & Gergely Molnar, *Severe power cuts in Texas highlight energy security risks related to extreme weather events*, IEA (Feb. 18, 2021), <https://www.iea.org/commentaries/severe-power-cuts-in-texas-highlight-energy-security-risks-related-to-extreme-weather-events>; see also Letter from Woody Rickerson, Vice President, Grid Planning and Operations, Elec. Reliability Council of Tex., Inc. to Arthur C. D’Andrea, Chairman, Pub. Util. Comm’n of Tex. (Apr. 6, 2021), http://www.ercot.com/content/wcm/lists/226521/51878_ERCOT_Letter_re_Preliminary_Report_on_Outage_Causes.pdf (presenting preliminary analysis of causes of February 14-19, 2021 outages in Texas).

⁸ Testimony of Dr. Susan F. Tierney, Ph.D., Before the U.S. House Committee on Science, Space and Technology, Hearing on “Lessons Learned from the Texas Blackouts: Research Needs for a Secure and Resilient Grid” (Mar. 18, 2021), at 7, <https://science.house.gov/imo/media/doc/Dr.%20Tierney%20Testimony.pdf> (citing News Release, Elec. Reliability Council of Tex., Extreme cold weather expected to result in record electric use in ERCOT region (Feb. 11, 2021), <http://www.ercot.com/news/releases/show/224996>) [hereinafter “Testimony of Susan F. Tierney”]; News Release, Pub. Util. Comm’n of Tex., PUC Anticipates Record Electricity Demand Across ERCOT Region (Feb. 11, 2021), <https://www.puc.texas.gov/agency/resources/pubs/news/2021/PUCTX-REL-ERCOT-COLD21-FIN.pdf>.

⁹ Elvia Limón & Julián Aguilar, *You might have heard that Texas has its own power grid. Did you know not all parts of the state use it?*, TEX. TRIBUNE (Feb. 18, 2021), <https://www.texastribune.org/2021/02/18/texas-power-grid-outage-ercot/> (reporting that the parts of Texas connected to other grids experienced shorter outages affecting fewer customers during the February 2021 storm than those within the ERCOT footprint).

¹⁰ Clifford Krauss et al., *How Texas’ Drive for Energy Independence Set It Up for Disaster*, N.Y. TIMES (Feb. 21, 2021), <https://www.nytimes.com/2021/02/21/us/texas-electricity-ercot-blackouts.html>.

¹¹ Testimony of Susan F. Tierney, *supra* note 8, at 7 (citing BILL MAGNESS, REVIEW OF FEBRUARY 2021 EXTREME COLD WEATHER EVENT (2021) http://www.ercot.com/content/wcm/key_documents_lists/225373/2.2_REVISED_ERCOT_Presentation.pdf (slides presented by ERCOT President & CEO at Feb. 24, 2021 urgent Board of Directors meeting) [hereinafter “ERCOT Presentation”]).

¹² Peter Cramton, *Lessons from the 2021 Texas electricity crisis*, UTIL. DIVE (Mar. 23, 2021), <https://www.utilitydive.com/news/lessons-from-the-2021-texas-electricity-crisis/596998/>.

¹³ Testimony of Susan F. Tierney, *supra* note 8, at 7-8 (citing Department of Energy, Emergency Situation Report, February 17, 2021, at https://www.energy.gov/sites/prod/files/2021/02/f82/TLP-WHITE_DOE%20Situation%20Update_Cold%20%20Winter%20Weather_%20Report%20%232%20FIN.pdf). These problems with the natural gas supply are emblematic of a larger set of concerns that have been raised on reliability of the nation’s bulk gas supply, and the understanding of and reporting on factors that affect reliability. See Gerad Freeman, Jay Apt, & Michael Dworkin, *The Natural Gas Grid Needs Better Monitoring*, 34 ISSUES IN SCIENCE & TECHNOLOGY 79-84 (2018), <https://www.jstor.org/stable/26597993>.

were due to the cold weather.¹⁴ Many power generators, even those gas plants not starved for fuel and wind generators, also tripped offline for reasons related to the cold temperatures, such as freezing of control systems.¹⁵ All told, “over 48% of the region’s total capacity [was] unavailable at the highest point in the outages.”¹⁶

As often happens in large power crises, the loss of electric service created synergistic effects that made the crisis deeper. For example, as production and generation activity declined, “power was cut to the wells, processing plants and compressor stations that move the gas into and along major pipelines serving power plants,” which “created a death spiral for electricity generation.”¹⁷ To break this cycle and “avoid a catastrophic system-wide outage as potential demand exceeded available generation, ERCOT instituted rolling blackouts (‘load shedding’),” which “extended over nearly three full days and at one point affected 20,000 MW of customer loads”—over 25 percent of estimated total customer demand had the system been fully operational.¹⁸

As the supply of electricity and gas plummeted, prices skyrocketed. Power prices were set by market regulators at the cap, \$9,000/MWh, and stayed there for most of the trading hours over a few days—a windfall for generators that were still online but a catastrophic rise in cost for customers

that still bought power at variable wholesale prices,¹⁹ as well as companies that had to procure power at these prices to meet supply obligations.²⁰ Natural gas prices also increased dramatically, exceeding \$200/MMBtu at multiple Texas hubs—approximately 100 times higher than prices at the beginning of February.²¹

The storm and outages caused massive disruption to people’s lives and to business operations of all kinds.²² Hypothermia and other cold weather-related perils, exacerbated by the outages, took the lives of at least 151 Texans.²³ Marginalized communities experienced particularly devastating impacts, both in terms of the outages and resulting price spikes.²⁴

Initial damage estimates vary depending on method, but

¹⁴ See, e.g., Tex. Comm’n on Env’t Quality, Air Emission Event Report Database Incident 350608 (Mar. 3, 2021), <https://www2.tceq.texas.gov/oce/eer/index.cfm?fuseaction=main.getDetails&target=350608> (XTO Energy report of February emission event); Tex. Comm’n on Env’t Quality, Air Emission Event Report Database Incident 351001 (Mar. 3, 2021), <https://www2.tceq.texas.gov/oce/eer/index.cfm?fuseaction=main.getDetails&target=351001> (Apache Corporation report of February emission event); Tex. Comm’n on Env’t Quality, Air Emission Event Report Database Incident 352572 (Mar. 12, 2021), <https://www2.tceq.texas.gov/oce/eer/index.cfm?fuseaction=main.getDetails&target=352572> (Chevron report of February emission event); see generally Tex. Comm’n on Env’t Quality, Air Emission Event Report Database, <https://www2.tceq.texas.gov/oce/eer/index.cfm>.

¹⁵ See, e.g., Erin Douglas, *Texas largely relies on natural gas for power. It wasn’t ready for the extreme cold*, TEX. TRIBUNE (Feb. 16, 2021), <https://www.texastribune.org/2021/02/16/natural-gas-power-storm/>; ERCOT Presentation, *supra* note 11, at 14.

¹⁶ Testimony of Susan F. Tierney, *supra* note 8, at 7 (citing ERCOT Presentation).

¹⁷ Garrett Golding, Anil Kumar & Karel Mertens, *Cost of Texas’ 2021 Deep Freeze Justifies Weatherization*, FED. RESERVE BANK OF DALLAS (Apr. 15, 2021), <https://www.dallasfed.org/research/economics/2021/0415>.

¹⁸ Testimony of Susan F. Tierney, *supra* note 8, at 6 (citing ERCOT Presentation).

¹⁹ Mark Watson, *Texas regulators keep prices near \$9,000/MWh cap during rotating outages*, S&P GLOBAL (Feb. 16, 2021), <https://www.spglobal.com/platts/en/market-insights/latest-news/natural-gas/021621-texas-regulators-keep-prices-near-9000mwh-cap-during-rotating-outages>; Erin Douglas & Mitchell Ferman, *ERCOT overcharged power companies \$16 billion for electricity during winter freeze, firm says*, TEX. TRIBUNE (Mar. 4, 2021), <https://www.texastribune.org/2021/03/04/ercot-texas-electricity-16-billion/>.

²⁰ See, e.g., Maryam Adeeb, *Visra estimates up to \$1.3B earnings hit from Texas winter storm*, S&P GLOBAL (Feb. 26, 2021), <https://www.spglobal.com/marketintelligence/en/news-insights/latest-news-headlines/visra-estimates-up-to-1-3b-earnings-hit-from-texas-winter-storm-62895293> (“[Visra] expects the extreme weather event ‘will have a material adverse impact on its financial results driven by generation output being constrained due to challenges with receiving a steady supply of fuel for some plants as well as challenges with handling fuel already on site given the freezing conditions”); Will Wade & Naureen S. Malik, *NRG Energy Sees \$750 Million Loss Following Texas Cold Snap*, BLOOMBERG (Mar. 17, 2021), <https://www.bloomberg.com/news/articles/2021-03-17/nrg-energy-sees-750-million-loss-following-texas-cold-snap> (“NRG Energy Inc. withdrew an earlier full-year profit forecast and said it expects a \$750 million loss due to the brutal cold snap that froze Texas and led to sweeping blackouts.”); Will Wade, *Exelon Sees Profit Cut By Up to \$710 Million From Texas Cold*, BLOOMBERG (Feb. 24, 2021), <https://www.bloomberg.com/news/articles/2021-02-24/exelon-sees-profit-cut-by-up-to-710-million-from-texas-cold> (“Exelon Corp. expects its first-quarter net income will be reduced by \$560 million to \$710 million because of last week’s cold blast in Texas, saying three of its power plants were forced to shut down.”).

²¹ Devika Krishna Kumar, Scott Disavino & Jessica Resnick-Ault, *Texas freeze delivers billions in profits to gas and power sellers*, REUTERS (May 6, 2021), <https://www.reuters.com/business/energy/results-tally-up-billions-profit-texas-freeze-gas-power-sellers-2021-05-06/>.

²² Peter Eavis & Neal E. Boudette, *Winter Storm Disrupts Wide Swath of American Business*, N.Y. TIMES (Feb. 16, 2021), <https://www.nytimes.com/2021/02/16/business/winter-storm-business-disruptions.html>.

²³ Tom Steele, *Number of Texas deaths linked to winter storm grows to 151, including 23 in Dallas-Fort Worth area*, DALLAS MORNING NEWS (Apr. 30, 2021), <https://www.dallasnews.com/news/weather/2021/04/30/number-of-texas-deaths-linked-to-winter-storm-grows-to-151-including-23-in-dallas-fort-worth-area/>.

²⁴ James Dobbins & Hiroko Tabuchi, *Texas Blackouts Hit Minority Neighborhoods Especially Hard*, N.Y. TIMES (Feb. 16, 2021), <https://www.nytimes.com/2021/02/16/climate/texas-blackout-storm-minorities.html>.

A preliminary projection from Texas-based economic research firm The Perryman Group, which included estimates of property damage and lost income, reported a range of \$197–295 billion in costs stemming from the February 2021 Crisis. Other estimates put the costs at \$130 billion.

uniformly conclude that costs inflicted by the event were significant. A preliminary projection from Texas-based economic research firm The Perryman Group, which included estimates of property damage and lost income, reported a range of \$197–295 billion in costs stemming from the February 2021 Crisis. Other estimates put the costs at \$130 billion,²⁵ a figure “[t]hat rivals the economic toll of Hurricane Harvey in 2017, and is nearly 2.5-times larger than the cost of the entire Atlantic basin hurricane season.”²⁶ The Federal Reserve Bank of Dallas reported an estimate of \$80–\$130 billion in direct and indirect economic loss from the February 2021 Crisis, and calculated the value of lost load (“VOLL”) to be \$4.3 billion.²⁷ VOLL is a metric representing customers’ “willingness to pay for electricity service (or avoid curtailment).”²⁸ Even based on this VOLL figure, a much lower damages figure than the other types of estimates that reflect the wider societal costs of lost power, the authors concluded that “the most reasonable solutions to prevent winter storm blackouts are within the bounds of

being economically justified.”²⁹

The catastrophe has created massive political pressure for policy changes—pressure that is still playing out, but could lead to market reforms that further affect some companies.³⁰ ERCOT is in the midst of conducting a cause analysis of the outages and anticipates completing this analysis by August 2021.³¹

b. Foreseeability of Crisis Due to Prior Extreme Weather Impacts on Energy Sector and Texas

Extreme weather events akin the February 2021 Crisis are not new. Winter weather events, including extreme cold temperatures, snow, and icy conditions, have previously affected power sector operations in severe ways on multiple occasions, including in Texas.³² These precedents have shown empirically that it is possible for these weather conditions to occur in the affected areas, and furthermore demonstrate the effects of such conditions on the electric system. Extreme weather can manifest in a series of synergistic, interlocking events—technological, political, market-related, and social—which combine to shape real-world outcomes.³³ Many studies on the power grid underscore the need for better tools for imagining

²⁵ Mark Puleo, *Damages from Feb. winter storms could be as high as \$155 billion*, ACCUWEATHER (Mar. 5, 2021), <https://www.accuweather.com/en/winter-weather/damages-from-feb-snowstorms-could-be-as-high-as-155b/909620>.

²⁶ Testimony of Dr. Jesse D. Jenkins, Before the U.S. House Committee on Science, Space and Technology, Hearing on “Lessons Learned from the Texas Blackouts: Research Needs for a Secure and Resilient Grid” (Mar. 18, 2021), at 6–7, <https://science.house.gov/imo/media/doc/Dr.%20Jenkins%20Testimony.pdf>.

²⁷ Garrett Golding, Anil Kumar & Karel Mertens, *Cost of Texas’ 2021 Deep Freeze Justifies Weatherization*, FED. RESERVE BANK OF DALLAS (Apr. 15, 2021), <https://www.dallasfed.org/research/economics/2021/0415>.

²⁸ ELEC. RELIABILITY COUNCIL OF TEX., ESTIMATING THE VALUE OF LOST LOAD 8 (2013), http://www.ercot.com/content/gridinfo/resource/2015/mktnalysis/ERCOT_ValueofLostLoad_LiteratureReviewandMacroeconomic.pdf.

²⁹ Garrett Golding, Anil Kumar & Karel Mertens, *Cost of Texas’ 2021 Deep Freeze Justifies Weatherization*, FED. RESERVE BANK OF DALLAS (Apr. 15, 2021), <https://www.dallasfed.org/research/economics/2021/0415>.

³⁰ See, e.g., Mitchell Ferman, *Texas Legislature approves bill to ban residential wholesale electricity plans – the first major winter storm bill sent to the governor*, TEX. TRIBUNE (May 13, 2021), <https://www.texastribune.org/2021/05/13/texas-power-grid-failure-legislature/>; Mose Buchele, *Texas Lawmakers Passed Changes to Prevent Blackouts. Experts Say They’re Not Enough*, NPR (June 2, 2021), <https://www.npr.org/2021/06/02/1002277720/texas-lawmakers-passed-changes-to-prevent-more-blackouts-experts-say-its-not-eno>.

³¹ Letter from Woody Rickerson, Vice President, Grid Planning and Operations, Elec. Reliability Council of Tex., Inc. to Arthur C. D’Andrea, Chairman, Pub. Util. Comm’n of Tex. (Apr. 6, 2021), http://www.ercot.com/content/wcm/lists/226521/51878_ER-COT_Letter_re_Preliminary_Report_on_Outage_Causes.pdf.

³² Testimony of Susan F. Tierney, *supra* note 8, at 5 (“[Texas] has previously experienced extreme cold weather conditions during the winter which created electric reliability problems when power plants were not able to perform, for one reason or another.”) (quoting FERC/NERC 2011 Report, *infra* note 39); see also James Doss-Gollin et al., *How unprecedented was the February 2021 Texas cold snap?*, ENV’T RSCH. LETTERS (forthcoming 2021) (accepted manuscript), <https://iopscience.iop.org/article/10.1088/1748-9326/ac0278> (discussing five previous winter storms in Texas, and finding that three were of similar or greater severity to the 2021 storm, using a temperature-based proxy for heating demand per capita).

³³ See U.S. DEPT OF ENERGY, U.S. ENERGY SECTOR VULNERABILITIES TO CLIMATE CHANGE AND EXTREME WEATHER 5–6 (2013), <https://www.energy.gov/sites/default/files/2013/07/f2/20130716-Energy%20Sector%20Vulnerabilities%20Report.pdf>.

how the grid might evolve in the future and how it (and the companies that depend on it) might be affected by crisis.³⁴ A shock like the February 2021 Crisis makes the thought experiments a bit easier, not only by adding objective information but by increasing the salience and tangibility of these scenarios.³⁵ In combination with the forward-looking hazard assessments and modeling addressed in Section II.C, these prior events put actors on notice.

Analyses of significant weather events by the Federal Energy Regulatory Commission (“FERC”),³⁶ which regulates the nation’s interstate electricity system, and the North American Electric Reliability Commission (“NERC”),³⁷ which sets grid reliability standards, are particularly pertinent. These FERC and NERC analyses of prior weather events affecting the electric and gas systems are public and readily available to companies and state regulators.³⁸ These studies make clear that cold snaps are not novel in Texas. For example, FERC and NERC conducted a study of a previous February 2011 cold weather event in the Southwest (the “FERC/NERC 2011 Report”), during which “210 individual generating units within the footprint of [ERCOT] ... experienced either an outage, a derate, or a failure to start,” triggering a “controlled load shed affecting some 3.2 million

The 2011 FERC/NERC Report found a need for increased weatherization of the energy sector in Texas, noting that non-binding recommendations by the Public Utility Commission of Texas (“PUCT”) on weatherization were apparently insufficient.

customers,” among other impacts throughout the region.³⁹ The 2011 FERC/NERC Report found a need for increased weatherization of the energy sector in Texas, noting that non-binding recommendations by the Public Utility Commission of Texas (“PUCT”) on weatherization were apparently insufficient because “[m]any of the generators that experienced outages in [a cold weather event in] 1989 failed again in 2011.”⁴⁰

However, “[f]or the most part, the electric industry and gas industry in Texas did not act on” the 2011 FERC/NERC recommendations, “nor did regulators at the PUCT (for electric industry issues) or at the Texas Railroad Commission (for gas industry issues).”⁴¹ The state did begin requiring power generators to “submit emergency plans that include details on what they will do in the event of extreme heat or cold.”⁴² However, most of these emergency plans are confidential; “many plants decline to disclose them, citing rules that allow them to withhold trade secrets from competitors.”⁴³ These plans—and how they would interact with the plans of other generators and the possible

³⁴ See NAT’L ACAD. OF SCI., *THE FUTURE OF ELECTRIC POWER IN THE UNITED STATES* 3 (2021), <https://www.nap.edu/catalog/25968/the-future-of-electric-power-in-the-united-states>. (“[T]he nation needs to build and test new tools for simulation and experimentation to understand how the grid of the future will behave and how operators and policy makers can ensure its continued reliability.”)

³⁵ Cf. David G. Victor, *Forecasting energy futures amid the coronavirus outbreak*, BROOKINGS INST. (Apr. 3, 2020), <https://www.brookings.edu/blog/order-from-chaos/2020/04/03/forecasting-energy-futures-amid-the-coronavirus-outbreak/> (“When the waters drained from today’s economy rise again, the rocks that define how the system works will be harder to see. Today’s pandemic offers an opportunity for forecasters to test what they know and can predict.”).

³⁶ FERC is the independent federal agency that regulates the sale and transmission of electricity in interstate commerce, with the mission of ensuring “economically efficient, safe, reliable, and secure energy for consumers.” Fed. Energy Regul. Comm’n, About FERC, <https://www.ferc.gov/about/what-ferc>; see also Federal Power Act, 16 U.S.C. §§ 791 et seq. (creating the agency currently called FERC).

³⁷ NERC is a nonprofit regulatory authority under the oversight of FERC that develops and enforces grid reliability standards, assesses reliability, and monitors the bulk power system. North Am. Elec. Reliability Corp., About NERC, <https://www.nerc.com/AboutNERC/Pages/default.aspx>; see also Energy Policy Act of 2005, Pub. L. No. 109-58, 119 Stat. 594 (directing FERC to certify an electric reliability organization).

³⁸ North Am. Elec. Reliability Corp., Major Event Analysis Reports, <https://www.nerc.com/pa/rrm/ea/Pages/Major-Event-Reports.aspx> (listing 16 reports on major events affecting the U.S. electric system, including cold weather, snowstorms, fires, and hurricanes).

³⁹ FED. ENERGY REGUL. COMM’N & NORTH AM. ELEC. RELIABILITY CORP., REPORT ON OUTAGES AND CURTAILMENTS DURING THE SOUTHWEST COLD WEATHER EVENT OF FEBRUARY 1-5, 2011, at 10 (2011), <https://www.ferc.gov/sites/default/files/2020-04/08-16-11-report.pdf> [hereinafter “FERC/NERC 2011 Report”].

⁴⁰ *Id.* at 10.

⁴¹ Testimony of Susan F. Tierney, *supra* note 8, at 5-6 (citing Molly Christian, Zack Hale & Ellie Potter, *Experts mull market, reliability rule changes amid Texas, regional outages*, S&P GLOBAL, (Feb. 16, 2021), <https://www.spglobal.com/marketintelligence/en/news-insights/latest-news-headlines/experts-mull-market-reliability-rule-changes-amid-texas-regional-outages-62688009>).

⁴² Lauren McGaughy & Holly K. Hacker, *Texas tells power plants to be winter ready. But how to prepare is up to them*, DALLAS MORNING NEWS (Feb. 20, 2021), <https://www.dallasnews.com/news/investigations/2021/02/20/texas-tells-power-plants-to-be-winter-ready-but-it-lets-them-decide-how-to-prepare/>.

⁴³ *Id.*

responses by regulators—are relevant to the financial performance of the generators both immediately (e.g., in times of crisis) and over the long term (e.g., if a crisis leads to policy and market reforms).⁴⁴

In combination with the current inaccessibility of information on companies' planning, the absence of standards on extreme cold operational performance makes companies in the Texas energy sector vulnerable to cascading impacts.⁴⁵

While operators have financial incentives to winterize equipment, what makes short-to-medium term financial sense for plant operations doesn't add up to system-level reliability expectations. Relatedly, there is an issue of coordination failure: a natural gas plant owner needs to know that gas will reach the plant, and an owner of a wind farm that transmission lines will not fail. The need, but not requirement, to winterize the entire system means that, individually, owners of separate assets shy away from taking action, since they expect that others may not act either. This has meant that there is insufficient overall investment in winterization of the energy system in Texas, exposing the system to massive failure events

Accordingly, history has continued to rhyme, if not exactly repeat itself. Crisis occurs; hurried reports identify the causes and synergies; little of fundamental import changes. A November 2013 winter weather event in Texas affected oil and natural gas producers by causing "extensive power outages, facilities freeze-ups, trucking curtailments and

limited access to production and drilling facilities."⁴⁶ Cold temperatures in January 2014 caused more than a dozen Texas power plant failures in 12 hours, "helping to bring the state's electric grid to the brink of collapse."⁴⁷ Despite these serious recurring issues, leading up to the February 2021 Crisis, "the power generation and gas production/delivery systems in Texas had not undergone the types of weatherization actions that could have enabled the provision of energy supply in the event of extreme winter temperature events."⁴⁸

The problems are not unique to Texas, and extensive attention to similar concerns in other parts of the country offers evidence that these kinds of risks are known or knowable. The mid-Atlantic grid operator, PJM interconnection ("PJM"), experienced a similar cycle of electric system constraints during a 2014 polar vortex event.⁴⁹ The New England grid operator, ISO-NE, likewise experienced constraints during this polar vortex event.⁵⁰ Hurricane Harvey caused outages in Texas in 2017 when torrential rainfall and high winds damaged transmission and distribution infrastructure.⁵¹ California's electric sector has been strained by increasingly severe wildfires and heatwaves, leading most recently to grid operator-forced

⁴⁴ Balancing business interests in confidentiality with investor need for disclosure is not a new exercise for the SEC. See Sec. & Exch. Comm'n, Confidential Treatment Applications Submitted Pursuant to Rules 406 and 24b-2, <https://www.sec.gov/corpfin/confidential-treatment-applications> (last visited June 7, 2021). Confidentiality should not be a barrier to top-level disclosure on firms' vulnerability and planning analyses, and such disclosure is done routinely in other areas where there is confidential information. Publicly traded companies that enjoy the benefit of raising capital through public means make the trade-off that they must provide those investors with information for decision-making.

⁴⁵ Testimony of Dr. Varun Rai, Before the U.S. House Committee on Science, Space and Technology, Hearing on "Lessons Learned from the Texas Blackouts: Research Needs for a Secure and Resilient Grid" (Mar. 18, 2021), at 2, <https://science.house.gov/imo/media/doc/Dr.%20Rai%20Testimony.pdf>.

⁴⁶ NGI Staff Reports, *Texas Freeze Slams Pioneer; Another Wintry Blast On Its Way*, NAT. GAS INTELLIGENCE (Dec. 2, 2013), <https://www.naturalgasintel.com/texas-freeze-slams-pioneer-another-wintery-blast-on-its-way/>.

⁴⁷ Jeremy Schwartz, Kiah Collier & Vianna Davila, "Power companies get exactly what they want": How Texas repeatedly failed to protect its power grid against extreme weather, TEX. TRIBUNE & PROPUBLICA (Feb. 22, 2021), <https://www.texastribune.org/2021/02/22/texas-power-grid-extreme-weather/>.

⁴⁸ Testimony of Susan F. Tierney, *supra* note 8, at 5-6 (citing Molly Christian, Zack Hale & Ellie Potter, *Experts mull market, reliability rule changes amid Texas, regional outages*, S&P GLOBAL, (Feb. 16, 2021), <https://www.spglobal.com/marketintelligence/en/news-insights/latest-news-headlines/experts-mull-market-reliability-rule-changes-amid-texas-regional-outages-62688009>).

⁴⁹ Bentham Paulos, *PJM Tightens Capacity Market Rules to Improve Reliability*, POWER MAGAZINE (Dec. 18, 2014), <https://www.powermag.com/pjm-tightens-capacity-market-rules-to-improve-reliability/>.

⁵⁰ ISO NEW ENGLAND, JANUARY 2014 FERC DATA REQUEST 11 (2014), https://www.iso-ne.com/static-assets/documents/pubs/spcl_rpts/2014/iso_ne_response_ferc_data_request_january_2014.pdf.

⁵¹ U.S. Energy Info. Admin., *Hurricane Harvey Caused Electric System Outages & Affected Wind Generation in Texas*, TODAY IN ENERGY (Sept. 13, 2017), <https://www.eia.gov/todayinenergy/detail.php?id=32892>. Analyses of Hurricane Harvey using different scientific methods found that climate change increased the amount of rainfall from that storm by between 15 to 37 percent. Michael Burger, Jessica Wentz & Radley Horton, *The Law and Science of Climate Change Attribution*, 45 COLUM. J. ENV'T L. 109-10 (2020), <https://journals.library.columbia.edu/index.php/cjel/article/view/4730/2118>.

outages due to extreme heat in August 2020.⁵² These events have resulted in operational or organizational changes for affected power companies, ranging from new regulatory requirements⁵³ to bankruptcy.⁵⁴ To be sure, the details vary across regions—wildfires are different than hurricanes, and these are different from the dynamics of this extreme cold weather in Texas—but the larger point is that envisioning the impacts of these events is getting easier as the examples multiply and the hazard assessment tools advance.

c. Foreseeability of Crisis Due to Climate Science and Modeling

Though the details of any particular extreme weather event are predictable only a short time beforehand,⁵⁵ climate change is driving more frequent and intense occurrences.⁵⁶ Climate change is shifting both baseline weather patterns and extreme events, and the electricity system is highly

Though the details of any particular extreme weather event are predictable only a short time beforehand, climate change is driving more frequent and intense occurrences.

susceptible to damage and disruption from these shifts.⁵⁷ It is not possible in a deterministic sense to foresee far in advance that a certain event will hit a certain area at a certain time, but it is possible in a probabilistic sense to foresee that frequency and severity of extreme weather events will increase; this is the sense in which the February 2021 events were foreseeable. Of specific relevance to the February 2021 storm, climate scientists have identified a potential link between the faster warming of the Arctic compared to the global average, or “Arctic amplification,” and colder winter weather in the midlatitudes—factors that can lead to more variable weather as the jet stream and frontal systems meander across wider latitudinal bands.⁵⁸ Different studies have come to different conclusions on whether and how climate change may affect the intensity and frequency of winter storms, but increased risk of this

⁵² ROMANY M. WEBB ET AL., CLIMATE RISK IN THE ELECTRICITY SECTOR: LEGAL OBLIGATIONS TO ADVANCE CLIMATE RESILIENCE PLANNING BY UTILITIES 1 (2020), https://climate.law.columbia.edu/sites/default/files/content/Full%20Report%20-%20Climate%20Risk%20in%20the%20Electricity%20Sector%20-%20Webb%20et%20al_L0.pdf (citing Kavya Balaraman, *California Regulators Plan Post-Mortem to Examine Cause of Rolling Blackouts*, UTIL. DIVE (Aug. 21, 2020), <https://www.utilitydive.com/news/california-post-mortem-rolling-blackouts/583923/>); see also Press Release, CAISO, CPUC & CEC, CAISO, CPUC, and CEC Issue Preliminary Report on Causes of August Rotating Outages (Oct. 6, 2020), <http://www.caiso.com/Documents/CAISO-CPUC-CEC-Issue-Preliminary-Report-Causes-August-Rotating-Outages.pdf> (“The climate change-induced extreme heat storm across the western U.S. resulted in the demand for electricity exceeding the existing electricity resource planning targets. The existing resource planning processes are not designed to fully address an extreme heat storm like the one experienced in mid-August.”).

⁵³ Bentham Paulos, *PJM Tightens Capacity Market Rules to Improve Reliability*, POWER MAGAZINE (Dec. 18, 2014), <https://www.powermag.com/pjm-tightens-capacity-market-rules-to-improve-reliability/>.

⁵⁴ Kavya Balaraman, *Wildfires pushed PG&E into bankruptcy. Should other utilities be worried?*, UTIL. DIVE (Nov. 19, 2020), <https://www.utilitydive.com/news/wildfires-pushed-pge-into-bankruptcy-should-other-utilities-be-worried/588435/> (“[C]limate-change-driven wildfire activity will increase costs to utility-sector stakeholders, including investor-owned utilities, state and local governments, ratepayers, and taxpayers. These increased costs will in turn place financial stress on utility companies and crowd out essential investment in renewable energy and grid upgrades.”) (quoting John MacWilliams, senior fellow at Columbia University’s Center on Global Energy Policy).

⁵⁵ See, e.g., ERCOT Presentation, *supra* note 11, at 9 (providing timeline of cold weather warnings issued prior to February 2021 storm).

⁵⁶ Testimony of Susan F. Tierney, *supra* note 8, at 9 (“Although Texas’ winter weather in February 2021 was extraordinarily cold, and colder than expected, it is now predictable that extreme weather events will occur more frequently and be more intense as a result of climate change.”).

⁵⁷ See, e.g., Romany Webb & Michael Panfil, *Without planning, climate change will bring more Texas-style blackouts*, THE HILL (Feb. 23, 2021), <https://thehill.com/opinion/energy-environment/539996-without-planning-climate-change-will-bring-more-texas-style/>; U.S. DEPT OF ENERGY, U.S. ENERGY SECTOR VULNERABILITIES TO CLIMATE CHANGE AND EXTREME WEATHER i-iv (2013), <https://www.energy.gov/sites/default/files/2013/07/f2/20130716-Energy%20Sector%20Vulnerabilities%20Report.pdf>; Sinnott Murphy, Fallaw Sowell & Jay Apt, *A time-dependent model of generator failures and recoveries captures correlated events and quantifies temperature dependence*, APPLIED ENERGY (2019), Vol. 253, Art. 113513, <https://doi.org/10.1016/j.apenergy.2019.113513> (finding that generators are more likely to fail at very hot or cold temperatures).

⁵⁸ See Judah Cohen et al., *Divergent consensus on Arctic amplification influence on midlatitude severe winter weather*, 10 NATURE CLIMATE CHANGE 20 (2020), <https://www.nature.com/articles/s41558-019-0662-y> (“Observational studies overwhelmingly support that AA [Arctic amplification] is contributing to winter continental cooling.”); see also Ethan Siegel, *This Is Why Global Warming Is Responsible For Freezing Temperatures Across The U.S.*, FORBES (Jan. 30, 2019), <https://www.forbes.com/sites/startswithabang/2019/01/30/this-is-why-global-warming-is-responsible-for-freezing-temperatures-across-the-usa/>.

specific type is plausible,⁵⁹ and increased risk of extreme weather events more broadly is highly likely.⁶⁰ Other climate change impacts that generally represent departures from historical precedent and pose significant hazards to the electric system include increasing temperature and humidity, decreasing water availability, and increasing storms, flooding, and sea level rise.⁶¹

Adverse consequences of climate change for specific locations, sectors, and companies are becoming increasingly foreseeable. Global climate models “simulate key aspects of the Earth’s climate” and “project likely outcomes based on different emissions scenarios;” downscaling techniques allow companies and regulators to make more granular projections applicable to their

operations.⁶² Many companies currently have access not only to largescale climate models but to downscaled projections for use in their assessment and actions on climate vulnerabilities.⁶³ In addition, commercial offerings are available (with many more likely in the near future) that can provide sophisticated forward looking climate assessments along with estimates of possible damages from severe climate-related events.⁶⁴ AIR Worldwide, RMS, and EQECAT are all widely used by companies for catastrophe modeling. New risk management startups like Four Twenty Seven, risQ, Jupiter, and One Concern also offer investors and companies ways to quantify the effects of climate change. These downscaled projections can facilitate knowledge of climate risks at the company level and even the asset level. Climate risks to corporate assets should be considered rigorously and, where relevant, disclosed.

Recent efforts of several utilities have demonstrated that the advanced state of climate science makes it possible for electric system entities to learn from crises, comprehensively assess the current and future climate vulnerabilities of their operations, and develop resilience

⁵⁹ See Katharine Hayhoe et al., *Our Changing Climate*, in *IMPACTS, RISKS AND ADAPTATION IN THE UNITED STATES: FOURTH NATIONAL CLIMATE ASSESSMENT*, Vol. II 94 (D.R. Reidmiller et al. eds., 2018), <https://nca2018.globalchange.gov/chapter/2/> (“Regarding the influence of arctic warming on midlatitude weather, two studies suggest that arctic warming could be linked to the frequency and intensity of severe winter storms in the United States; another study shows an influence of arctic warming on summer heat waves and large storms. Other studies show mixed results (e.g., Barnes and Polvani 2015, Perlwitz et al. 2015, Screen et al. 2015), however, and the nature and magnitude of the influence of arctic warming on U.S. weather over the coming decades remain open questions.”)

⁶⁰ See *generally id.* at 72-144.

⁶¹ U.S. DEPT OF ENERGY, *CLIMATE CHANGE AND THE ELECTRICITY SECTOR: GUIDE FOR CLIMATE CHANGE RESILIENCE PLANNING 10-11* (2016), https://www.energy.gov/sites/prod/files/2016/10/f33/Climate%20Change%20and%20the%20Electricity%20Sector%20Guide%20for%20Climate%20Change%20Resilience%20Planning%20September%202016_0.pdf; see also Michael Burger, Jessica Wentz & Radley Horton, *The Law and Science of Climate Change Attribution*, 45 COLUM. J. ENV'T L. 57, 64, 109, 121 (2020), <https://journals.library.columbia.edu/index.php/cjel/article/view/4730/2118> (cataloguing events and conditions projected to increase in frequency, intensity, and/or duration due to climate change including high temperatures, sea level rise, droughts, floods, hurricanes, and wildfires).

⁶² WEBB ET AL., *supra* note 52, at 5. Multiple publicly available downscaled climate projection tools, which model climate variables such as temperature and precipitation at resolutions as fine as 0.6 miles, have been developed by governmental, academic, and private entities. See, e.g., U.S. Climate Resilience Toolkit, Energy Data Gallery, <https://toolkit.climate.gov/topics/energy/energy-data-gallery> (last visited June 8, 2021); Nat'l Aeronautics & Space Admin., NASA Earth Exchange (NEX) Downscaled Climate Projections (NEX-DCP30), <https://www.nccs.nasa.gov/services/data-collections/land-based-products/nex-dcp30> (last visited June 8, 2021); U.S. Geological Survey, Regional Climate Change Viewer, <http://regclim.coas.oregonstate.edu/visualization/rccv/index.html> (last visited June 8, 2021); Bureau of Reclamation et al., Downscaled CMIP3 and CMIP5 Climate and Hydrology Projections, https://gdo-dcp.ucllnl.org/downscaled_cmip_projections/#Welcome (last visited June 8, 2021); Conservation Biology Inst., AdaptWest - A Climate Adaptation Conservation Planning Database for North America, <https://adaptwest.databasin.org/> (last visited June 8, 2021); Cal-Adapt, <https://cal-adapt.org/> (last visited June 8, 2021); see also Katharine Hayhoe et al., *Climate Models, Scenarios, and Projections*, in *CLIMATE SCIENCE SPECIAL REPORT: FOURTH NATIONAL CLIMATE ASSESSMENT*, Vol. I 133, 144 (D.J. Wuebbles et al. eds., 2017), https://science2017.globalchange.gov/downloads/CSSR2017_FullReport.pdf.

⁶³ Environmental Defense Fund & Sabin Center, FERC’s Request for Comments Related to the Technical Conference on Climate Change, Extreme Weather, and Electric System Reliability (Docket No. AD21-13-000), at 14-15 (Apr. 15, 2021), <https://climate.law.columbia.edu/sites/default/files/content/EDF%20Sabin%20Center%20Comments.pdf>.

⁶⁴ See, e.g., Roger Grenier et al., AIR Worldwide Corporation, *Quantifying the Impact from Climate Change on U.S. Hurricane Risk* (2020), https://www.air-worldwide.com/SysSiteAssets/Publications/White-Papers/documents/air_climatechange_us_hurricane_whitepaper.pdf.

plans to reduce these vulnerabilities.⁶⁵ For example, pursuant to a settlement with the New York Public Service Commission following Superstorm Sandy,⁶⁶ Consolidated Edison (“ConEd”) engaged in a thorough Climate Change Vulnerability Study, which concluded in 2019 and was followed in 2020 by a Climate Change Implementation Plan to address identified vulnerabilities.⁶⁷ ConEd “analyzed projected change in temperature, humidity, precipitation, sea level, and extreme weather in ConEd’s service territory over seven time periods spanning from 2020 through 2080” by engaging academic scientists and consultants “to develop downscaled climate projections for three sub-areas within its territory based [on] thirty-two [global climate models].”⁶⁸ The ConEd vulnerability study and implementation plan regarding climate risk show that it is possible for utilities to draw on downscaled climate models and other available scientific information to foresee and prepare for multiple climate risks, including ones that have not yet severely impacted that company.

As another example, following wildfires, all of the California electric utilities are under immense pressure to understand and disclose climate-related risks and there is an active proceeding under the California Public Utilities Commission (“CPUC”) on related issues.⁶⁹ Pursuant to the CPUC’s order directing utilities to prepare climate vulnerability assessments on risks from wildfire and other impacts, SCE recently released a draft Community Engagement Plan,

describing its ongoing climate vulnerability assessment and adaptation planning actions, and its efforts to engage disadvantaged and vulnerable communities in these processes.⁷⁰ SDG&E engaged in a vulnerability assessment that found that climate change posed increasing risks to its system in the form of not only wildfires, but also sea level rise and peak demand increases.⁷¹ California utilities, along with the State itself, are investing heavily in weather monitoring and analysis of patterns, and other climate resilience measures intended to help understand and manage such risks.⁷²

ERCOT did not incorporate forward-looking projections in its forecasts of expected and extreme conditions, basing supply and demand estimates solely on historical extremes.

Despite the significance of climate change for the operation of the electric system and the availability of relevant information, Texas electric regulatory authorities have not sufficiently engaged with climate considerations, which both increases and obscures climate risks to companies and investors. First, ERCOT did not incorporate forward-looking projections in its forecasts of expected and extreme conditions, basing supply and demand estimates solely on historical extremes, in turn hindering the ability to prepare

⁶⁵ WEBB ET AL., *supra* note 52, at 4-14.

⁶⁶ Order Approving Electric, Gas and Steam Rate Plans in Accord with Joint Proposal, NY PSC Case Nos. 13-E-0030 *et al.*, (Feb. 21, 2014), [https://climate.law.columbia.edu/sites/default/files/content/docs/Final-Order-2014-02-21%20\(1\).pdf](https://climate.law.columbia.edu/sites/default/files/content/docs/Final-Order-2014-02-21%20(1).pdf). A coalition of NGOs and academic institutions including the Columbia Law School Center for Climate Change Law and EDF were parties to this rate proceeding. *Id.*

⁶⁷ ConEd Climate Change Vulnerability Study (Dec. 2019), <https://www.coned.com/-/media/files/coned/documents/our-energy-future/our-energy-projects/climate-change-resiliency-plan/climate-change-vulnerability-study.pdf?la=en>; ConEd Climate Change Implementation Plan, Case Nos. 19-E-0065 and 19-G-0066 (Dec. 29, 2020), <http://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId={F59D306D-F332-4669-B023-4EFE980F65E9}>; ConEd Climate Change Resilience and Adaptation: Summary of 2020 Activities (Jan. 2021), <https://www.coned.com/-/media/files/coned/documents/our-energy-future/our-energy-projects/climate-change-resiliency-plan/climate-change-resilience-adaptation-2020.pdf>.

⁶⁸ WEBB ET AL., *supra* note 52, at 13 (citing ConEd Climate Change Vulnerability Study at 17-19).

⁶⁹ See Cal. Pub. Util. Comm’n, Climate Change Adaptation, <https://www.cpuc.ca.gov/climatechangeadaptation/> (last visited May 14, 2021).

⁷⁰ Southern California Edison Company’s (U 338-E) Community Engagement Plan, CPUC Rulemaking 18-04-019, https://www.sce.com/sites/default/files/inline-files/SCE_Draft_2021_Climate_Adaptation_Community_Engagement_Plan.pdf (last visited May 14, 2021).

⁷¹ RISK ASSESSMENT AND MITIGATION PHASE REPORT OF SAN DIEGO GAS & ELECTRIC COMPANY AND SOUTHERN CALIFORNIA GAS COMPANY, at E-1 – E-2 (Oct. 27, 2016), https://www.sdge.com/sites/default/files/documents/SDGE_SCG_Risk_Assessment_Mitigation_Phase_Submission_Report.pdf?nid=11781.

⁷² See, e.g., SDG&E’s Commitment to Sustainability, SDG&E, <https://www.sdge.com/more-information/environment/sustainability-approach> (“Since 2007, [SDG&E has] invested more than \$2 billion to strengthen the regional grid against threats posed by climate change, in particular wildfire risk.”).

ERCOT itself states that under its approach, “the only entity that can confirm that a plant is ‘weatherized’ to any particular standard is the entity that owns or operates the plant.”

for plausible outcomes.⁷³ Forward-looking analysis is crucial for electric regulators and regulated companies to understand relevant transition and physical climate risks. Second, as the examples above illustrate, state electric regulators have the ability to take measures on climate vulnerability assessment and resilience planning, which can reveal information about and reduce harm from climate-related impacts, but Texas regulators are not doing so. For example, the PUCT and ERCOT do not “enforce compliance with weatherization plans or enforce minimum weatherization standards”—regulatory actions which, if undertaken, could not only reduce climate-related risks but provide information on companies’ risks to investors and other market participants.⁷⁴ ERCOT itself states that under its approach, “the only entity that can confirm that a plant is ‘weatherized’ to any particular standard is the entity that owns or operates the plant.”⁷⁵ Furthermore, as shown in analysis below, financial regulation did not drive sufficient climate risk disclosure by Texas power companies in 10-Ks. Under current electric and financial regulatory requirements and disclosure practices, these companies’ climate vulnerabilities, planning processes, and resilience measures

remain unclear,⁷⁶ which has system-wide implications. The magnitude of companies’ exposure to physical climate risk depends not only on the climate conditions in which they operate, but the regulatory and market conditions as well, so these considerations are relevant to financial regulators and investors.

⁷³ Testimony of Beth Garza, Before the U.S. House Committee on Science, Space and Technology, Hearing on “Lessons Learned from the Texas Blackouts: Research Needs for a Secure and Resilient Grid” (Mar. 18, 2021), at 4, <https://science.house.gov/imo/media/doc/Ms.%20Garza%20Testimony.pdf> (citing Elec. Reliability Council of Texas, Seasonal Assessment of Resource Adequacy for the ERCOT Region (SARA) - Winter 2020/2021, Nov. 5, 2020, <http://www.ercot.com/content/wcm/lists/197378/SARA-FinalWinter2020-2021.xlsx>).

⁷⁴ See ERCOT Presentation, *supra* note 11, at 17.

⁷⁵ *Id.*

⁷⁶ See Lauren McGaughey & Holly K. Hacker, *Texas tells power plants to be winter ready. But how to prepare is up to them*, Dallas Morning News (Feb. 20, 2021), <https://www.dallasnews.com/news/investigations/2021/02/20/texas-tells-power-plants-to-be-winter-ready-but-it-lets-them-decide-how-to-prepare/> (noting that the PUCT requires Texas power companies to create extreme weather plans, but many companies assert confidentiality over these plans).

Analysis of Climate Risk Disclosures by Texas Entities

a. Background

Understanding System-Wide Climate Disclosure Trends

The above section highlights the foreseeability of extreme weather events like the February 2021 Crisis. It shows that, given past natural disasters and increasingly sophisticated climate science, companies should have the requisite information to understand plausible severe climate-related physical risks to owned assets and operations.⁷⁷

The financial implications of these risks should presumably necessitate their disclosure to the SEC. Under Regulation S-K and Regulation S-X of the U.S. Securities Act of 1933, public companies are required to disclose financial and non-financial information relevant to investors. These disclosures are made through 10-Ks, which detail companies' history, structure, executive compensation, and financial performance. 10-Ks undergird investment decision-making and, as investors' main source of comparable and company-supplied risk information, should include discussion of climate-related risks that are material to the financial performance of the company.⁷⁸

This section analyzes the extent to which power generators and investor-owned utilities implicated in the February 2021 Crisis incorporated climate risk information in their 10-Ks to the SEC. This analysis finds consistent underreporting of climate-related risks from power generators and investor-owned utilities in the ERCOT region of Texas. Critically, we find a systemic under-disclosure of highly relevant information—where existing SEC rules, as interpreted and

applied by publicly traded firms, have resulted in investors, suppliers, customers, and the public receiving inadequate risk disclosure.

Method

This study assesses the climate risk disclosure practices of publicly-traded power generators and investor-owned utilities with operations in the ERCOT region of Texas. It focuses specifically on the electric sector and does not include companies solely engaged in the natural gas production or distribution side of the energy sector, even though they may have incidental power generation as part of their core business operations.⁷⁹ Subsequent analyses of the February 2021 Crisis should be conducted to address climate risk disclosure from the perspective of the natural gas industry. Future research might also look at other suppliers that are exposed to power generation behavior in Texas, along with power users exposed to reliability and cost of delivered electricity.

An initial list of power generators and investor-owned utilities with operations in Texas was drawn from the Public Utility Commission of Texas's market directory for the electric industry.⁸⁰ This list was screened to include only public companies or subsidiaries of public companies (because these are the companies subject to SEC disclosure requirements). The list was then screened to include only companies within the ERCOT region of Texas, given the winter storm's acute effects on the ERCOT grid. This screen yielded a universe of seven companies—three merchant power generators and four investor-owned utilities—with varying degrees of exposure to Texas. Some

⁷⁷ As noted at the outset, "climate" as used in this paper encompasses current weather patterns (including incidence of extreme weather events) and potential shifts in these patterns that may plausibly result from increased atmospheric carbon levels.

⁷⁸ See Commission Guidance Regarding Disclosure Related to Climate Change, Securities Act Release No. 9106, Exchange Act Release No. 61,469, 75 Fed. Reg. 6290 (Feb. 8, 2010) (SEC's 2010 Guidance confirming that existing disclosure obligations may require disclosure of climate-related risks).

⁷⁹ All of the companies analyzed have generation or utility operations in the Texas electric system. Some of the companies analyzed also have additional locations or types of operations, including gas service and gas distribution.

⁸⁰ Market Directories: Electric Companies Serving Texas, Public Utility Commission of Texas, <https://www.puc.texas.gov/industry/electric/directories/Default.aspx>.

companies included in this universe operate almost entirely in Texas, while others draw less than 10% of revenue from their Texas subsidiaries.

The group also featured companies with different voluntary climate risk disclosure commitments and practices. One company releases a stand-alone climate report aligned with the Task Force on Climate-related Financial Disclosures (“TCFD”), two companies include TCFD-aligned sections in their corporate sustainability reports, three companies publish “TCFD mapping reports” that tie disclosures made in other materials to the TCFD framework, while one company does not address the TCFD across any of its reports.⁸¹ Attention to which firms are purportedly aligned with TCFD is important because TCFD alignment is often seen as a bellwether for better reporting.

The three power generators analyzed are Exelon Corporation, NRG Energy, and Vistra Corporation. The four investor-owned utilities analyzed are CenterPoint Energy, American Electric Power, Sempra Energy, and PNM Resources.

Company	Texas Financial Exposure
AEP	10% of 2020 earnings
CenterPoint	Not available
Exelon	6% of 2020 revenue
NRG	72% of 2020 revenue
PNM	25% of 2020 revenue
Sempra	15% of 2020 earnings
Vistra	81% of 2020 earnings

Figure 1: Texas Financial Exposure of Companies Sampled

This study draws on the February 2021 Crisis to determine what companies are communicating to investors about their climate-related risks. As such, we are interested in what companies reported just after the February 2021

Crisis (all filed their 2021 10-Ks after the crisis) and just before the crisis (in 10-Ks filed in 2020). Moreover, because the winter storm, though particularly extreme in 2021, is not unprecedented, we raise the same before and after questions with regard to extreme weather experienced in 2011. We thus review 10-Ks for all seven companies in four years: 2010, 2011, 2020, and 2021. This approach is employed to reveal whether companies provide the market with dynamic climate risk information that accounts for updated knowledge of climate-related physical risks. Detailed analysis of these 10-Ks can be found in the Appendix to this study.

Scope

As explained above, this study concentrates on the electric sector and excludes companies solely involved in the natural gas production or distribution side of the energy sector.

Additionally, this study focuses specifically on climate-related risk disclosure in 10-Ks. While we recognize that companies also disclose climate-related risk information in voluntary materials (e.g., TCFD reports, ESG reports, sustainability reports) and filings with energy regulators, we are interested in how climate-related information appears in financial reporting, which guides investor decision-making and capital allocation. 10-Ks are the bedrock of financial risk evaluation and fall under SEC purview. Because climate change presents clear financial risks to companies, we expect discussion of climate-related risks to appear in 10-Ks, no different from traditional financial risks. The core of our analysis thus revolves around 10-Ks.

b. Findings

Companies released their 2021 10-Ks at the end of February, one to two weeks after the February 2021 Crisis, and each company took a similar approach, both stylistically and substantively, to climate risk disclosure when compared

⁸¹ See Appendix B: Companies’ TCFD Reporting, A-3.

with pre-crisis filings.⁸² First, high-level discussions of climate change appeared in the companies' opening "Business" sections. Firms then generally included relatively more substantive considerations of climate-related risks in their "Risk Factors" sections. Most companies devoted separate sub-sections to transition and physical risk, though a handful combined the two topics under one climate risk sub-section. Commentary on the Texas winter storm appeared in the section of companies' 10-Ks entitled, "Management's Discussion and Analysis of Financial Condition and Results of Operations." Generally, companies used broad, boiler-plate language to describe climate risk. Although firms provided more detailed insights into transition risks than physical risks, they overall did not offer investors decision-useful information on climate-related financial risks.⁸³

Our evaluation of 10-Ks proceeds in five steps. First, we analyze transition risk disclosures across the full set of seven 2021 10-Ks. Second, we evaluate physical risk disclosure across the seven 2021 10-Ks. Third, we assess firms' 10-K discussion of the February 2021 Crisis and any efforts to use that crisis to reveal how extreme events—whether linked to climate or not—affect performance. Fourth, we compare companies' 2020 and 2021 physical risk disclosures. Lastly, we compare companies' 2010 and 2011 physical risk disclosures.

Transition Risks

Across these companies, the 2021 10-Ks described existing and emerging climate regulations in detail and in many instances linked company-specific decarbonization strategies to potential federal or state emissions reduction policies. Although the power industry, in various ways, is

conducting extensive analysis on the costs of potential action on climate change,⁸⁴ none of these companies quantified past or projected costs of climate emissions regulation on their businesses. While some of the general information about regulatory risks is available broadly to investors, such as through industry and academic studies and power sector regulatory filings, limited company-specific information on impacts of these risks is included in 10-K filings.

None of these companies quantified past or projected costs of climate emissions regulation on their businesses.

AEP's 2021 10-K serves as one example. It summarizes recent federal energy policy and relevant state renewable energy standards, describing in particular the regulatory and legal history of the Clean Power Plan and the Affordable Clean Energy rule. It then describes how these policies may create financial risk by delineating its emissions reduction goals in subsequent paragraphs. AEP provides its 2030 and 2050 CO₂ reduction targets and highlights its percentage emissions reduction from 2000 levels.⁸⁵ These metrics are company-specific, offering investors tailored climate insights not found in sub-sections on physical risk.

Specificity is lacking, however, in considering the possible misalignment between business operations and climate emissions regulation. The 10-K states, for instance, that "excessive costs to comply with future legislation or regulations has led to the announcement of early plant closures."⁸⁶ This is a general statement not linked to

⁸² We are mindful that companies released their 10-Ks shortly after the February 2021 Crisis. However, previous extreme weather events across the industry, as detailed in previous sections, had already shown companies the potential financial implications of climate-related risks and therefore should have given companies a foundation for analysis.

⁸³ Madison Condon et al., *Mandating Disclosure of Climate-Related Financial Risk*, 23 N.Y.U. J. LEGIS. & PUB. POL'Y (forthcoming 2021), at 11 http://blogs.edf.org/climate411/files/2021/02/Mandating_Climate_Risk_Financial_Disclosures.pdf ("Information needs to be of a kind and quality that allows users to 'integrate climate risk disclosure into their decision-making.' Relevant decisions include not just those regarding whether and how much to invest, but also ownership, engagement, and proxy-voting related decisions.").

⁸⁴ See, e.g., ELEC. POWER RSCH. INST., *POWERING DECARBONIZATION: STRATEGIES FOR NET-ZERO CO₂ EMISSIONS* (2021), <https://www.epri.com/research/products/000000003002020700>.

⁸⁵ AEP 2021 10-K, at 74.

⁸⁶ AEP 2021 10-K, at 74.

particular plants or their generating capacity or financial impacts. Nor is there an estimate of possible impacts of future regulation on other plants in the AEP fleet, even though the company surely has done that analysis itself. To be useful for investors, these disclosures would need assessments of likely impacts on specific facilities and operations and their financial materiality. The 10-K's generic reference to "excessive costs" does not contain sufficient information to guide investment decisions.

We highlight AEP's 10-K to illustrate system-wide trends, for the practices at AEP are typical based on our sample. Across the industry, disclosures generally discuss policy developments and emissions reductions strategies yet do not offer estimates that quantify potential transition costs resulting from the retirement of carbon-intensive assets, regulatory scrutiny, or litigation. PNM's 10-K, for example, considers state renewable portfolio standards in the states where it operates and federal clean energy goals. It additionally describes and quantifies its emission reduction efforts with detailed, company-specific information. When addressing transition costs more explicitly, however, the 10-K does not provide quantifiable, specific estimates. It reports that "because of PNM's dependence on fossil-fueled generation, legislation or regulation that imposes a limit or cost on GHG could impact the cost at which electricity is produced."⁸⁷ Without quantifying and identifying what elements of its business could be subject to emissions regulation, PNM, like AEP, provides investors with minimal information about how it is responding to climate-related policy exposure. Similar disclosure practices manifested across all other surveyed companies, with 10-Ks generally describing relevant regulation but not quantifying how those regulations would affect business.

Physical Risks

Transition risk disclosures are incomplete, even with information that firms likely have on hand as part of their strategic planning. But the situation for physical risks is far worse. Here, companies uniformly relied on generic, boiler-plate language to characterize physical risks caused

by climate change. Few companies provided firm-specific physical risk data, and no company quantified potential future damages resulting from extreme weather let alone extreme weather patterns that might vary due to climate change. This is particularly important because the science of climate change impacts has shown, repeatedly, that the actual impacts of climate-related events (and chronic conditions) depend on two factors—the severity of the event itself and preparedness for the event.⁸⁸ Most policy debates have focused on the former, but often the latter is much more important.

No company quantified potential future damages resulting from extreme weather let alone extreme weather patterns that might vary due to climate change.

Findings were consistent across all companies reviewed, with each using boiler-plate language to disclose their exposure to physical risks resulting from climate change. Vistra's 10-K, for example, noted that "the potential physical effects of climate change, such as increased frequency and severity of storms, floods, and other climatic events, could disrupt our operations and cause us to incur significant costs to prepare for or respond to these effects."⁸⁹ Similarly, Sempra (the parent of Oncor, a Texas utility) reported that as weather-related incidents become "more prevalent, unpredictable and severe as a result of climate change," physical risks could "have a material adverse effect on our businesses, financial condition, results of operations, cash flows and/or prospects."⁹⁰

⁸⁷ PNM 2021 10-K, at 57.

⁸⁸ See INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, CLIMATE CHANGE 2014, IMPACTS, ADAPTATION, AND VULNERABILITY 40, 42 (2014), https://www.ipcc.ch/site/assets/uploads/2018/02/WGIIAR5-PartA_FINAL.pdf; see also Section II, *supra* (discussing heightened climate vulnerabilities of companies on the ERCOT grid due to limitations of planning processes and lack of resilience requirements).

⁸⁹ Vistra 2021 10-K, at 43.

⁹⁰ Sempra 2021 10-K, at 38.

This information is generic and of essentially no value to an investor or other market participant; disclosures of this generality could apply generally to almost any company across the economy. The disclosure provides no details related to the specific risks of any assets or operations, nor does it quantify probabilities or impacts of those risks. Additionally, the disclosure does not offer useful information related to how the company may be acting to address specific risks and impacts. This lack of relevant information prevents investors and other market participants from adequately assessing the climate-related risks of the company, which is essential in determining not only the value of the company but whether and under what terms other market participants may want to engage in business with the company.

At best, firms offered qualitative insights specific to the power sector. CenterPoint stated that “if climate changes occur that result in warmer temperatures in our service territories... natural gas could be adversely affected through lower natural gas usage.”⁹¹ These comments are an improvement relative to boiler-plate disclosures more common in other industries, but still have little value to investors seeking to make company-specific asset allocation decisions.⁹² Exelon’s 10-K illustrated a similar approach, conveying that “extreme weather conditions or storms could affect the availability of generation and ... transmission, limiting [Exelon’s] ability to source or send power to where it is sold.”⁹³ This language, mirrored by the other companies included in this study, lacks the specificity and precision needed to inform investor analysis.

In sum, the firms reviewed did not provide comparable, specific, or decision-useful physical risk information. Based in boiler-plate generalities, companies’ analyses of extreme weather events suggest a system-wide deficiency in climate-related disclosures and financial reporting in particular.

Discussion of the February 2021 Crisis

In addition to the high-level climate-related physical risk disclosures described above, companies’ most recent 10-Ks included separate disclosures specific to the February 2021 Crisis. Most commonly, this information was conveyed in a portion of the physical risk sub-section or featured in a stand-alone sub-section about the storm elsewhere in the 10-K.

Companies’ comments on the February 2021 Crisis focused principally on quantifying weather-related financial impacts. NRG, for example, devoted half of its Texas storm sub-section to explaining its process for estimating financial damages, noting that the event likely altered the company’s 2021 income by approximately \$100 million.⁹⁴ Every company besides Sempra estimated the financial impacts of the winter weather, which is perhaps not surprising since only a small portion of Sempra’s total earnings are from its regulated Texas power business. Firms considered the immediate business ramifications of the storm a top priority.⁹⁵

Notably, firms generally framed the February 2021 Crisis as a point-in-time, rare event, unlikely to recur. In fact, such extreme weather events are uncommon but historically well-known, and could become more frequent and thus salient to investment decisions in light of climate change. PNM, for example, emphasized that the winter storm delivered “the coldest temperatures in 100 years for many parts of the state.”⁹⁶ Portraying the storm in this manner implies that the winter freeze was extremely improbable rather than amenable to estimation, as prior experience and analysis suggests.⁹⁷ With this framing, companies also fixated on estimated damages from the particular extreme winter weather event without connecting the incident to larger patterns: neither previous winter-related blackouts nor future, increasingly frequent and severe climate-induced disasters. Indeed, the February 2021 Crisis was

⁹¹ CenterPoint 2021 10-K, at 32.

⁹² PARKER BOLSTAD ET AL., BROOKINGS INST., FLYING BLIND: WHAT DO INVESTORS REALLY KNOW ABOUT CLIMATE CHANGE RISKS IN THE U.S. EQUITY AND MUNICIPAL DEBT MARKETS? 3 (2020), https://www.brookings.edu/wp-content/uploads/2020/09/WP67_Victor-et-al.pdf.

⁹³ Exelon 2021 10-K, at 35.

⁹⁴ NRG 2021 10-K, at 50.

⁹⁵ Many companies also filed 8-Ks on the financial repercussions of the February 2021 Crisis.

⁹⁶ PNM 2021 10-K, at 20.

⁹⁷ FERC/NERC 2011 Report, *supra* note 39.

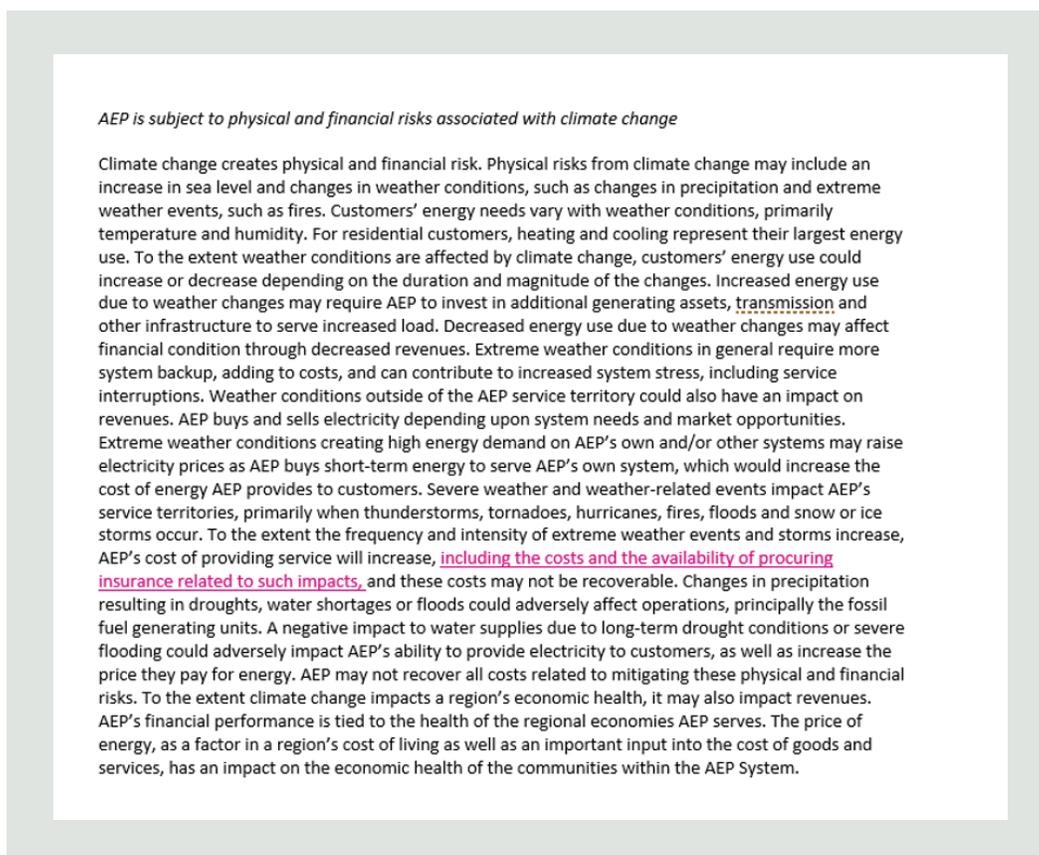


Figure 2: Comparison of AEP's 2020 and 2021 10-Ks

often defined as “unprecedented”⁹⁸ when, in fact, it was preceded.⁹⁹ This characterization obscures the knowable and material risks that this event demonstrates—that owned assets and operations may be increasingly exposed to climate-amplified extreme weather. Only one company detailed its winter season preparation process.¹⁰⁰

Companies' long-term, forward-looking analysis was generally limited. No company observed in its section on the February 2021 Crisis that events like this could become more frequent and severe due to climate change, nor did any company outline potential plans in its 10-K to

successfully manage future extreme weather events of this magnitude.¹⁰¹ The only forward-looking disclosures drawing on the February 2021 Crisis revolved around possible regulatory changes resulting from the Texas blackout. This

No company observed in its section on the February 2021 Crisis that events like this could become more frequent and severe due to climate change, nor did any company outline potential plans in its 10-K to successfully manage future extreme weather events of this magnitude.

⁹⁸ CenterPoint 2021 10-K, at 30.

⁹⁹ See, e.g., James Doss-Gollin et al., *How unprecedented was the February 2021 Texas cold snap?*, ENV'T RSCH. LETTERS (forthcoming 2021) (accepted manuscript), <https://iopscience.iop.org/article/10.1088/1748-9326/ac0278> (discussing five previous severe winter storms in Texas).

¹⁰⁰ Vistra 2021 10-K, at 52.

¹⁰¹ Some companies did, however, discuss updated risk management plans in their first quarter 2021 10-Qs, which are filed later than 10-Ks.

commentary remained narrow, offering investors little to no information on corporate climate risk management.

Firms' discussions of the February 2021 Crisis reveal the prevalence of short-term thinking undergirding corporate disclosure of climate-related risks. Companies did not consider the storm in the context of past winter freezes or acknowledge that extreme weather events like the storm could become more frequent as a result of climate change. Rather, they focused almost entirely on the singular financial impacts of the event as a discrete occurrence. This static framing—a rare oddity, improbable to be repeated—fails to present investors with a complete picture of climate-related risk or corporate risk management.

Changes in Climate Disclosure Between 2020 and 2021

If 2021 were seen as a watershed moment—a wakeup call about the kinds of events that could become more likely with climate change—then we might expect big differences between the 10-Ks filed after the crisis and those prior. Empirically, the 10-Ks show no such epiphany—with the caveat, of course, that the 2021 filings occurred just weeks after the crisis. Despite its substantial financial impacts, the February 2021 Crisis did not trigger significant changes to firms' physical risk disclosure. In fact, aside from time-sensitive regulatory updates and stand-alone subsections on the event, the climate sections of companies' 2020 and 2021 10-Ks are almost identical. These findings demonstrate the insufficiency of current disclosure requirements and practices in promoting dynamic risk reporting responsive to evolving climate science and experience.

Directly comparing companies' 2020 and 2021 10-Ks revealed that firms copied their climate disclosures almost verbatim from year to year. AEP provides a case study. Between 2020 and 2021, the company changed only 13 of 409 words in its discussion of physical risks, adding a short phrase about insurance procurement. Although the February 2021 Crisis left AEP's Texas subsidiary with over \$40 million of restoration expenditures, it did not prompt the company to offer more specific or detailed climate risk information.¹⁰²

¹⁰² AEP 2021 10-K, at 67.

This near-identical consistency between AEP's 2020 and 2021 reports prevents investors from tracking corporate progress on climate risk management. For additional comparisons of physical risk disclosure in companies' 2020 and 2021 10-Ks, see the Appendix.¹⁰³

Exelon offers another example of static climate risk reporting between 2020 and 2021. The company's disclosure of physical climate risks in both years is the same except for two sentences added to the 2021 10-K that explain the relevance of climate change to extreme weather.¹⁰⁴ While this mention of climate change is important, it does not provide enough depth to inform investor decision-making on Exelon. Comparing other companies' 2020 and 2021 10-Ks yields analogous results; companies rely on a fixed climate disclosure template and deviate from that template only slightly over time.

The similarities between companies' 2020 and 2021 reports suggest that existing climate risk disclosure standards and regulatory requirements are not creating sufficient incentive for firms to reveal more information about how they are assessing potentially material climate impacts—even though, as an industry whose financial prosperity hinges on the performance of weather-exposed assets, most if not all of these firms are assessing their exposures. Our review shows that companies behaved with relative uniformity in providing essentially no decision-useful climate information to investors in their 10-Ks. Companies seem to check the boxes on disclosure, cutting and pasting text from one year to another, without updating their reporting with new insights beneficial to investors. In turn, investors are unable to evaluate corporate progress on climate risk management and react to relevant risks corporate entities face.

Climate Risk Disclosure Over Time

Though companies largely treated the February 2021 Crisis as an isolated occurrence, Texas, as previously mentioned, had experienced a comparable freeze in 2011. This sub-section analyzes companies' 2010 and 2011 10-K

¹⁰³ See Appendix C: Comparison of Companies' 2020 and 2021 10-Ks, A-4.

¹⁰⁴ Exelon 2021 10-K, at 35.

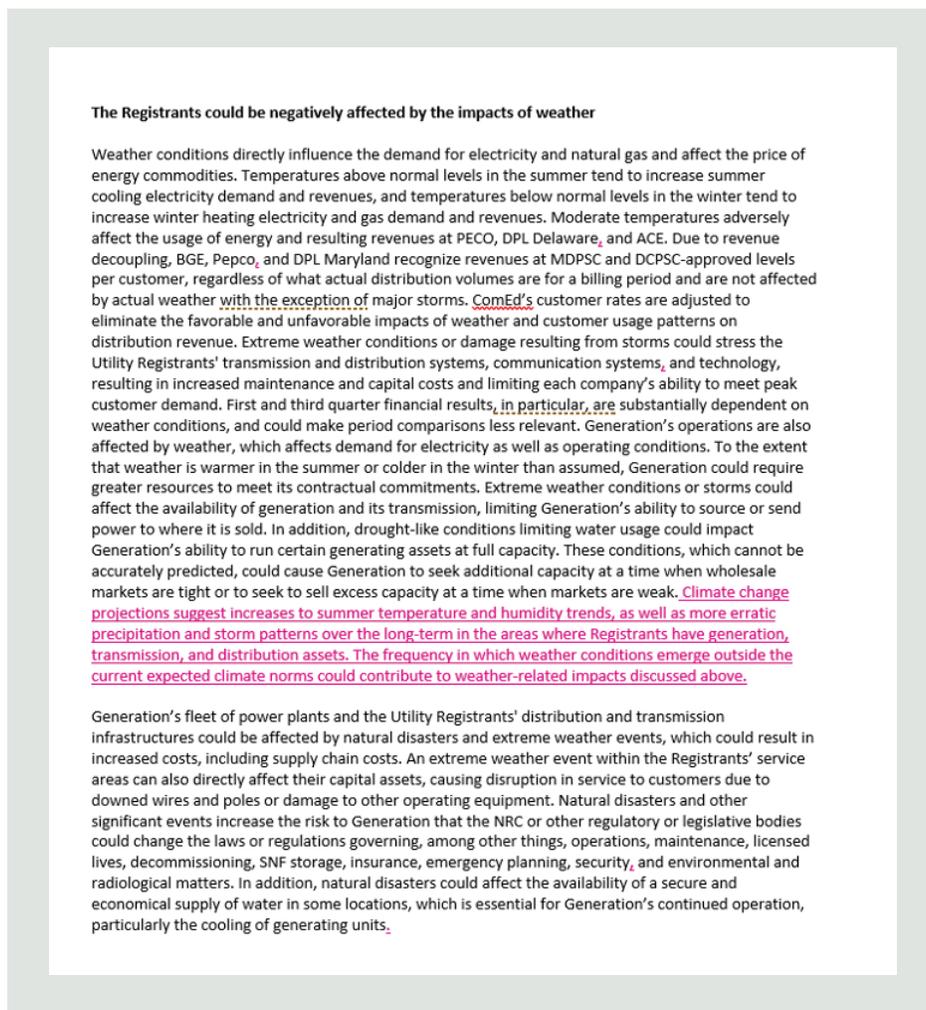


Figure 3: Comparison of Exelon's 2020 and 2021 10-Ks

submissions to ascertain how companies altered climate disclosures following the 2011 winter storm, focusing specifically on disclosures of climate-related physical risks.¹⁰⁵ Using 2011 as a case study provides additional data to determine whether existing rules compel companies to disclose extreme weather event information. Ultimately, this section determines that, even more so than in 2021, corporate disclosures in 2011 were unresponsive to severe winter weather. These findings underscore the inadequacy of risk disclosure requirements.

As described above, companies acknowledged the February 2021 Crisis in their 2021 10-Ks. However, the 2011 Texas freeze was not mentioned in 2011 reports, even though companies had more time to update their 10-Ks after the 2011 freeze than they did in 2021.¹⁰⁶ Companies discussed inclement weather in broad, high-level terms, with no mention of Texas-specific winter weather events. Overall, companies did not incorporate any direct learning from the 2011 Texas winter event into their 2011 10-Ks. From the

¹⁰⁵ Not all companies included in this study are featured in this section because not all were public or had Texas operations in 2011.

¹⁰⁶ The 2011 Texas freeze took place from February 1, 2011 to February 5, 2011, with companies filing their 10-Ks at the end of February or beginning of March. By contrast, the February 2021 Crisis took place in mid-February, with companies filing their 10-Ks one-to-two weeks later.

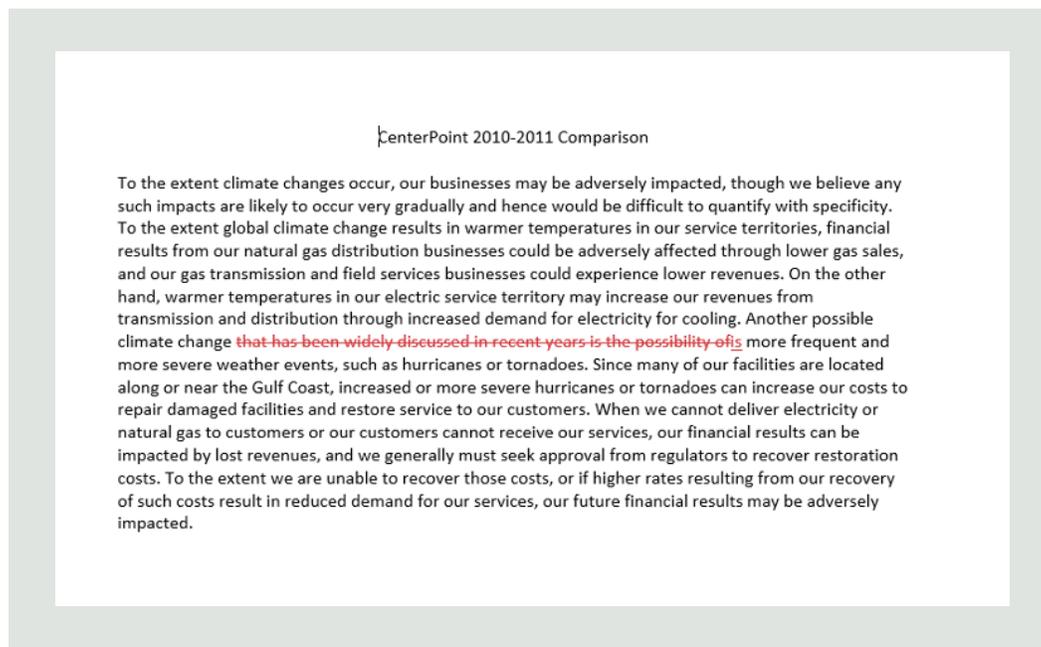


Figure 4: Comparison of CenterPoint’s 2010 and 2011 10-Ks

perspective of 10-K reporting, there was no incentive to remember the event or imagine how similar future events could unfold.

Moreover, companies did not significantly adjust their discussions of physical climate risk between 2010 and 2011 to account for updated interpretations of climate change following the 2011 extreme weather incident. Similarities in reporting over these two years are even more striking than similarities between 2020 and 2021 disclosures. CenterPoint, for example, did not alter any substantive points about extreme weather or climate-related risks across its 10-Ks for 2010 and 2011. Between 2010 and 2011, the company deleted twelve words from its 226-word paragraph on physical climate-related risks.¹⁰⁷ Most companies employed this approach, repeating information on climate-induced risks from 2010 to 2011.

In the aftermath of two similar extreme weather events in 2011 and in 2021, power generators and investor-owned utilities in Texas made no substantive changes to their climate risk disclosure practices. Put simply, the companies

treated extreme weather events as one-off incidents with few implications for subsequent physical risk disclosure.

The disclosures we reviewed suggest strongly that the companies have not interpreted their disclosure obligations in a manner that keeps pace with increasing physical and transition climate risks. System-wide lags between corporate disclosures and climate realities expose investors and other market participants to heightened risks, inhibiting them from pricing assets accurately and allocating their resources efficiently.

In the aftermath of two similar extreme weather events in 2011 and in 2021, power generators and investor-owned utilities in Texas made no substantive changes to their climate risk disclosure practices.

¹⁰⁷ CenterPoint 2011 10-K, at 35.

c. Analysis

Based on the above findings, we identify four deficiencies, each explored in greater detail below: (1) existing SEC rules do not result in the disclosure of comparable, specific, and decision-useful climate risk information, (2) alignment with the TCFD, a voluntary disclosure framework, does not drive sufficient climate risk information in company 10-Ks, (3) companies fail to remember and integrate insights from past weather events into 10-Ks, and (4) companies fail to imagine and consider the forward-looking implications of climate change in 10-Ks. These themes apply to every company included in this study, revealing potential shortcomings of the current SEC disclosure rules.

Current Disclosures Fail to Provide Comparable, Specific, and Decision-Useful Information

Current corporate climate risk disclosures fail to provide comparable, specific and decision-useful information for investors. Boiler-plate language constituted the bulk of climate risk sections in companies' 2021 10-Ks. Discussions of physical risks, in particular, lacked specificity and utility. Companies commented on extreme weather events in generic terms that could have applied to any firm across many sectors or, at the very least, any firm that owned or operated power generation, transmission or distribution assets. Additionally, companies did not estimate the financial costs of climate-induced extreme weather events. These gaps leave investors in the dark, struggling to compare companies that, on paper, have seemingly identical risk profiles and risk management practices. To prepare for incidents like the February winter storm and push companies to de-risk accordingly, investors need more detailed, firm-specific climate risk information. The current reporting regime hinders investors' ability to make informed investment decisions.

Limitations of Voluntary Disclosure Frameworks

Although companies included in the study supported the TCFD to varying degrees, all companies analyzed displayed similar climate reporting limitations. Both TCFD-aligned and non-TCFD-aligned companies relied on boiler-plate language to describe transition and physical risks in 10-Ks.

Similarly, all companies, regardless of TCFD-alignment, issued nearly identical climate risk information before and after the February 2021 Crisis. These reporting deficiencies suggest that although the TCFD provides a valuable framework to draw upon for development of mandatory climate-related financial disclosure standards, it is not sufficient as a voluntary regime to ensuring the release of specific, decision-useful climate risk information in 10-Ks. This conclusion aligns with existing studies of climate-related risk disclosure, which find that “[d]isclosure can be lacking even where corporations have committed to and are ostensibly seeking to align reporting with the TCFD framework.”¹⁰⁸

Both TCFD-aligned and non-TCFD-aligned companies relied on boiler-plate language to describe transition and physical risks in 10-Ks.

Failures of Memory

The point-in-time framing companies used to describe the February 2021 Crisis highlights what we term a “failure of memory:” the failure to address patterns that emerge from a series of similar events. Here, analysis reveals that company 10-Ks treat the February 2021 Crisis as an isolated event, without connecting the event to previous weather-induced power crises.

By failing to consider the connections between extreme weather events, disclosure filings may fail to convey lessons relevant to investors' climate risk reduction needs. Events like the February 2021 Crisis are relevant beyond static, descriptive text and have probative value to inform forward-looking risk profiles to company assets and operations. Likewise, companies could have drawn on analyses like the FERC/NERC 2011 Report for insights on winterizing

¹⁰⁸ Condon et al., *supra* note 83, at 22.

operations and improved capacity to predict how extreme weather, informed by the past, could affect future financial performance. Information on assets affected by previous winter storms could also have helped firms model extreme winter weather and prepare for the February 2021 freeze. With the right data, climate risks are increasingly knowable. Disclosure requirements should ensure that companies collect and report knowable metrics, leveraging lessons of the past to guide present climate analysis.

Failures of Imagination

Companies' point-in-time framing of the Texas event also underscores what we term a "failure of imagination" among companies included in this study—that is, the failure to use information about how the system has performed under stress, along with predictive models, to evaluate the potential future impacts of climate change. No company mentioned climate change when discussing the February 2021 Crisis. Moreover, most companies did not make substantive edits to the physical risk sections of their 10-Ks between 2020 and 2021, despite a massive disruption in 2021 that highlighted the kinds of futures that need imagining. These findings suggest that existing disclosure rules do not effectively prompt companies to report the implications of extreme weather events for their future operations. Companies experienced inclement weather and its cascading consequences but, like in 2011, did not adjust their disclosures accordingly, maintaining the same reporting practices despite new climate lessons. In short, companies are not showing investors how they will prepare for extreme events that will become increasingly frequent and severe. Updated disclosure rules should compel companies to look forward and imagine climate risks—and to explore the unknowns, as well as the knowns—providing investors with the projections they need to account for climate-related financial risks.

Implications for the Securities and Exchange Commission and Industry Disclosure Practices

The above analysis identifies 10-K disclosure trends across all companies included in this study, highlighting four key gaps: (1) SEC rules did not yield disclosure of specific and decision-useful climate risk information, (2) voluntary climate risk disclosure frameworks had little impact on the quantity and quality of climate reporting, (3) companies did not reveal through their disclosures whether they integrated insights from past extreme weather events into their business strategies, and (4) companies did not indicate whether or how they imagined forward-looking implications of the February 2021 Crisis. That every company displayed these disclosure limitations suggests regulatory failures (and failures of standard industry practice).

Current disclosure rules and practices do not seem to elicit climate-related information that investors or other market participants will need as they exercise their business judgments to value, buy, or sell a company's securities; vote in key corporate decisions; lend to the company; negotiate for employment with a company; offer tax breaks or other incentives for a company; buy from the company; sell products or services to a company, or take other actions. All of these decisions may directly impact the company's longer-term financial prospects. This system-wide issue necessitates regulatory intervention on climate-related financial disclosures and thus demands SEC attention, as it implicates the SEC's "long-standing tripartite mission—to protect investors, maintain fair, orderly, and efficient markets, and facilitate capital formation."¹⁰⁹

Based on our findings, we recommend that the SEC: (1) require the disclosure of climate-related information from exposed firms that investors and other market participants need to make informed business decisions that are the bedrock of "fair, orderly, and efficient" markets; (2) update its rules to require disclosures that make the TCFD framework mandatory and

build on it to require more detailed, specific information; and (3) continue to update and refine disclosure requirements over time to align corporate reporting with advances in climate science. While our third recommendation will take time to develop and implement, the first two recommendations demand immediate action and should not be delayed by considerations specific to the third recommendation.

Requiring the Disclosure of Climate-Related Information to Support Investors and Fair, Orderly, and Efficient Markets

The SEC should urgently move to require the disclosure of climate-related information that investors and other market participants need to make informed business decisions. Current disclosure rules, as demonstrated by the 10-Ks scrutinized in this study, do not elicit adequate information. Companies did not quantify the projected impact of emerging climate regulations on their operations. And even when companies acknowledged that certain climate policies would lead to the early retirement of assets, they did not tell investors which assets would be affected or estimate the financial loss that such retirements would entail. These types of details on transition risk influence investor decision-making and should be disclosed to enhance market efficiency.

The disclosure of physical risk information demands even more attention. The plausibility of the February 2021 Crisis was knowable given past winter weather events in Texas and available climate science. In fact, some utilities in other regions have assessed their current and future climate risks, with new technologies emerging to help companies conduct sophisticated analyses. Still, companies included in this study used vague, boiler-plate language in 10-Ks to describe their exposure to extreme weather both before and after the storm. These practices prevent investors from accurately accounting for firm-specific climate vulnerabilities. Distinct, quantifiable physical risk information supports informed business decision-making and should be disclosed.

¹⁰⁹ Sec. & Exch. Comm'n, Our Goals, <https://www.sec.gov/our-goals>.

Building on the TCFD Framework

The SEC should issue rulemaking that makes mandatory and builds on the TCFD framework, but does not treat TCFD alignment as sufficient to ensure specific, decision-useful climate reporting. Since its creation in 2017, the TCFD has become the leading voluntary climate risk disclosure framework. Investors with over \$54 trillion in assets, including the world's largest asset manager BlackRock, have called on companies to align their disclosures with the TCFD framework, setting a new industry standard for corporate climate reporting.¹¹⁰ We recognize the value in leveraging a framework well understood by investors and companies and encourage the SEC to use the TCFD as a foundation on which to build out its mandatory disclosure rules. Making this voluntary framework mandatory as a part of regulatory action will provide immediate benefit through ensuring that more relevant disclosures are made through 10-Ks.

Our analysis indicates, however, that the TCFD framework by itself does not prompt sufficient climate risk reporting, at least in its voluntary formulation. TCFD-aligned companies featured in our analysis exhibited the same disclosure limitations as their non-TCFD-aligned counterparts in 10-Ks, discussing transition and physical risks in non-specific terms that failed to meet investor needs. Given these reporting gaps consistent across TCFD-aligned firms, we suggest that SEC rulemaking builds on and goes beyond the TCFD with additional disclosure requirements.

Aligning Disclosure Requirements with Advances in Climate Science and Improved Methods for Assessing Climate Impacts on Corporate Assets and Practices

Finally, the SEC should enhance its internal capacity to update disclosure requirements over time to align corporate climate reporting with advances in asset-level climate risk measurement. The needs of investors and other market participants for climate-related information are evolving rapidly as the impacts of climate change are growing. At the same time, climate science is improving, making new information about climate change increasingly available to companies, investors, and market participants. The SEC can continue

to protect investors and promote healthy financial markets by ensuring that this evolving information is integrated into corporate disclosures. Without regulatory support, as previously demonstrated, companies lack the voluntary incentives to imagine the long-term implications of climate change. Too often, firms re-use the same disclosure templates year-to-year, failing to assimilate new climate science into existing reporting practices.

There are many ways to advance this agenda. One would be for the SEC, along with other financial regulators, to form an inter-agency working group convened in collaboration with relevant agencies like the National Oceanic and Atmospheric Administration and other organizations in the federal government that are responsible for climate impact analysis.¹¹¹ The working group, which could also assist other government institutions grappling with the need for asset-specific damages—such as the Federal Emergency Management Agency and the National Climate Assessment—would be charged with identifying robust techniques to estimate climate-related damages.¹¹² The working group would benefit from collaboration with relevant stakeholders—including catastrophe risk modeling groups—to stay abreast of the frontier and to ensure that innovative developments inform federal action. To further inform that process, the SEC might also invite volunteer companies to participate in a kind of “sandbox” exercise where diverse experiences are tested and evaluated and best practices can be identified. These measures can push corporate climate reporting to keep pace with climate science and investor needs.

We recognize that these collaborative processes would take time and consideration to orchestrate. The demands of this endeavor should not, however, delay the SEC in executing the two prior recommendations. With the effects of climate change only becoming more frequent and severe, investors need improved, decision-useful information now to manage risks effectively.

¹¹¹ See Condon et al., *supra* note 83, at 37-38.

¹¹² SADIE FRANK, ERIC GESICK & DAVID G. VICTOR, BROOKINGS INST., INVITING DANGER: HOW FEDERAL DISASTER, INSURANCE AND INFRASTRUCTURE POLICIES ARE MAGNIFYING THE HARM OF CLIMATE CHANGE, (2021), <https://www.brookings.edu/research/inviting-danger-how-federal-disaster-insurance-and-infrastructure-policies-are-magnifying-the-harm-of-climate-change/>.

¹¹⁰ Climate Action 100+, “Initiative Snapshot,” <https://www.climateaction100.org/>

Conclusion

Through shifting global weather patterns, increasingly severe and frequent extreme weather events, and cascading impacts of these shifts, climate change poses significant risks to the American financial system.¹¹³ This reality makes disclosure of climate-related risks key to efficient capital allocation, informed business decisions, and fair, orderly, and efficient markets. With enhanced climate-related information, investors, corporate lenders, workers, customers, and other market participants can better assess climate risk, allocating their resources to less risky firms and, in turn, incentivizing enhanced corporate climate planning. Insights from past weather events and advances in climate science make the effects of climate change increasingly knowable. Investors and other market participants can at least partially reduce their climate-related financial risks provided that they have comparable, specific, and decision-useful climate information from companies.

This report examines the February 2021 Crisis as a case study to spotlight how public companies are responding to current disclosure rules and practices. We find that although extreme weather events endanger human life, devastate families and communities, and upend business operations and critical services, as manifested in the February 2021 Crisis, prior to the crisis companies did not provide investors with the information needed to evaluate firms' exposure to the event and its associated risks. Companies used (and still use) vague, boiler-plate language to characterize both transition and physical risks. Moreover, firms did not connect the February 2021 Crisis to past extreme weather events or the forward-looking implications of climate change, leaving investors, lenders, workers, customers, and other market participants with information insufficient to making financial decisions. Because

these disclosure gaps applied to all companies analyzed, we conclude that strengthened regulatory oversight is best suited to remedy the current gaps in climate risk disclosure. We thus encourage the SEC to require the disclosure of climate-related information that is needed by investors and other market participants to make informed business decisions, issue rulemaking that builds on the TCFD framework, and prepare to update disclosure requirements over time to align with advances in climate science.

As extreme weather events become more common and scientific research becomes more sophisticated, our understanding of climate change will improve as will the capacity to connect that scientific assessment to the performance of specific assets and firms. To inform investors and maintain fair, orderly, and efficient markets, corporate disclosures should do the same, moving in tandem with leading risk analysis to provide investors with up-to-date climate data that promotes informed capital allocation. Investors and other market participants can take measures to prepare for events like the February 2021 Crisis and can push companies to do the same—they just need information. Updated SEC rulemaking on mandatory disclosure of climate-related risks can catalyze this process, making the financial system more resilient to the effects of climate change.

¹¹³ COMMODITY FUTURES TRADING COMM'N CLIMATE-RELATED MARKET RISK SUBCOMM. OF THE MARKET RISK ADVISORY COMMITTEE, MANAGING CLIMATE RISK IN THE U.S. FINANCIAL SYSTEM 11 (2020), <https://www.cftc.gov/sites/default/files/2020-09/9-9-20%20Report%20of%20the%20Subcommittee%20on%20Climate-Related%20Market%20Risk%20-%20Managing%20Climate%20Risk%20in%20the%20U.S.%20Financial%20System%20for%20posting.pdf>.



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