

Federal Regulation for a “Resilient” Electricity Grid

Stephanie Phillips*

A well-functioning United States electricity system, also known as “the grid,” is fundamentally important to the American way of life. Nearly everyone involved—from users, to electricity generators, to transmitters, to regulators—recognizes this and agrees broadly that the system should be “resilient” to threats such as extreme weather, attack, and infrastructure failure. This idea—of promoting grid resiliency—has been central in many recent conversations surrounding the industry. It has been the subject of scientific and government reports. It was present in a proposed rulemaking from the Department of Energy to justify compensating the coal and nuclear industries for the resiliency attributes they provide the grid. While this rule was ultimately rejected, it led to resiliency as the subject of a lengthy action by the Federal Energy Regulatory Commission, which sought information—and received hundreds of comments—from large sectors of the industry about what they are doing to promote resiliency and how those efforts can best be supported by the Commission. What representatives of the industry do not agree on, however, is how to best achieve resiliency, or even more fundamentally, exactly what resiliency really means.

This Note explores the emergence of the term resiliency within the context of federal electricity regulation. It details how it has emerged as a widely agreed-upon solution to a still undefined problem. It also explores proposed themes for how it relates to, and might be distinguishable from, the well understood federal electricity regulatory frameworks of reliability and resource adequacy. If a specific technical problem is successfully connected to the concept of resiliency, this Note then argues that it could likely easily be housed conceptually and

DOI: <https://doi.org/10.15779/Z38D21RJ82>

Copyright © 2019 Regents of the University of California

* J.D., University of California, Berkeley, School of Law, 2019. Thank you to Professor Eric Biber for his incredible mentorship during my brainstorming, researching, and writing of this Note, and to Maribeth Hunsinger, for applying her expertise in energy policy to her role as Teaching Assistant for this piece. Another big thank you to the talented and dedicated students of Ecology Law Quarterly, with whom I was privileged to work with in many capacities during my time at Berkeley Law, and who vastly improved this work along with many others’ on their paths to publication. A special thank you to Paul Balmer, Albert Lin, Denny Bai, Nina Lincoff, and Mary Rassenfoss who worked directly on this Note. Finally, I am grateful to my mother, Kathleen McFall, who has written a great deal about energy and environmental policy throughout her career, and whose knowledge and talents inspired my own interests from a young age.

achieved within such existing regulatory frameworks. On the other hand, if a specific problem is not agreed upon, and it remains a more nebulous concept loosely connected to the notion of a low-risk grid, the idea of resiliency is a term that could potentially be used strategically to justify broader administrative or legislative actions to increase coordination across the grid, expand the scope of federal authority over the electricity sector, or even promote more environmentally-focused policy proposals that incent the development of more distributed electricity infrastructure, renewable energy generation, or broader climate change prevention and mitigation policies.

Introduction.....	417
I. An Overview of the United States Electricity System	422
II. Vulnerabilities in the Electricity Grid	
and the DOE/FERC Response.....	428
A. Examples of Potential System Vulnerabilities	428
B. The DOE Proposed Rule to Compensate On Site Fuel Storage	430
C. FERC Rejected Proposed Rule but Called for Information on Resiliency.....	431
D. Responses from the Industry on Resiliency	432
III. Resiliency Undefined.....	434
A. Overlapping Definitions of Resiliency, Reliability, and Resource Adequacy	434
B. Three Themes Distinguishing Resiliency from Reliability, and How These Themes Relate to Existing Regulations.....	435
1. Resiliency is about what happens after a disruptive event occurs.....	435
2. Resiliency is about more severe, rare events.....	436
3. Resiliency is over a longer-term time horizon.....	437
4. Conclusion	437
IV. Resiliency within Reliability or Resiliency within Resource Adequacy	438
A. Resiliency Within NERC-Regulated Reliability	439
1. Background on National Reliability Regulation.....	439
2. Resiliency Within the NERC Framework	441
3. Cost Analysis	442
4. Reach of Resiliency Within this Framework.....	443
5. Regional Flexibility	443
B. Resiliency within Regional Resource Adequacy Planning.....	444
1. Background on Resource Adequacy and Reliability Managed by RTOs and ISOs	444
2. Resiliency within RTO and ISO Resource Adequacy	445
3. Cost	448
4. Reach of Resiliency within this Framework.....	448
5. Regional Flexibility	448

2019] “RESILIENT” ELECTRICITY GRID 417

V. Resiliency Definition as a Tool to Increase Coordination, or as Justification to Expand Federal Jurisdiction.....	449
Conclusion	452

INTRODUCTION

In September 2017, Secretary of Energy Rick Perry proposed a controversial rule for consideration by the Federal Energy Regulatory Commission (the Commission, or FERC),¹ the federal agency that regulates the interstate transmission and sales for resale of electricity.² This rule would have required regional electricity grid operators, who are overseen by the Commission, to issue market rules requiring a special, above-market rate to be paid just to power plants that keep ninety days of fuel on site at all times.³ The stated purpose of this additional compensation was to increase the resiliency and reliability of the electricity grid due to concerns about potential threats to the supply of natural gas, which is generally not stored on site, is transported through pipelines, and in some regions of the country is used for both electricity generation and home heating.⁴ Therefore, according to the proposal, if there is a breakdown in the supply chain of natural gas, with no alternate available power plants with stored fuel on site, there will be no power.⁵ Compensating on site fuel storage, the rule posited, would therefore help ensure a diversity of resources stay online, and help make the grid more reliable and resilient.⁶

Such potential strains on natural gas supply chains, however, are only a concern in some regions of the country.⁷ This is also only one of many possible threats to the grid.⁸ Many critics within the industry therefore viewed the proposed rule as a bailout to the coal and nuclear industries.⁹ Coal and nuclear are the primary generating industries that use fuel that can be stored on site, and

1. U.S. Dep’t of Energy, Grid Resiliency Pricing Rule, FERC Dkt. No. RM17-3-000 (proposed Sept. 28, 2017) (to be codified at 18 C.F.R. pt. 35), <https://www.energy.gov/sites/prod/files/2017/09/f37/Notice%20of%20Proposed%20Rulemaking%20.pdf> [hereinafter “Proposed Rule”].

2. JAMES H. MCGREW, FERC FEDERAL ENERGY REGULATORY COMMISSION 2 (2d ed. 2009).

3. Proposed Rule, *supra* note 1, at 11–12; Order Terminating Rulemaking Proceeding, Initiating New Proceeding, and Establishing Additional Procedures, 162 FERC ¶ 61,012, para. 2, FERC Dkt. No. AD18-7-000 (Jan. 8, 2018).

4. Proposed Rule, *supra* note 1, at 4–5.

5. *Id.*

6. *Id.* at 11–12.

7. Cal. Pub. Utils. Comm’n, Comment on Proposed Grid Reliability and Resilience Pricing Rule 4–5, FERC Dkt. No. RM18-1-000 (Oct. 23, 2017), <https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=14721798>.

8. *Id.*

9. See, e.g., Advanced Energy Economy et al., Comment on Proposed Grid Reliability and Resilience Pricing Rule 7–8, FERC Dkt. No. RM18-1-000 (Oct. 23, 2017), <https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=14721356>.

they are also industries currently in decline.¹⁰ Additionally, coal combustion, emits more carbon dioxide than other electricity sources, contributing to climate change.¹¹

Protecting the grid from threats is a valid and longstanding concern. The United States has over 6,500 power plants¹² supplying electricity across nearly 700,000¹³ miles of transmission lines to approximately 150 million customers for an annual revenue of around \$400 billion in electricity sales.¹⁴ It is the heart of the economy, powering industry processes and lighting, heating, and cooling homes and office buildings.¹⁵ It also is integral to health and safety, and access to affordable electricity is important to quality of life.¹⁶

Other than Hawaii, Alaska, and Texas, this system is also largely interconnected.¹⁷ At the same time, it is highly regionally diverse in terms of generation technology, infrastructure, type of market structure that governs wholesale and retail sales of power, and regulatory agency oversight.¹⁸ Because electricity cannot yet be stored on a significant scale, it also must be perfectly balanced at all times, with generation meeting demand in real time.¹⁹ The fact that it works is due to a highly sophisticated conglomeration of systems that operate in coordination under the management and oversight of private entities, regional and state regulatory entities, and the federal government.²⁰

10. Proposed Rule, *supra* note 1, at 3–4 (detailing the number of coal and nuclear power plants currently scheduled to retire).

11. California Public Utilities Commission, *supra* note 7, at 18; NAT'L RENEWABLE ENERGY LAB., ELECTRICITY GENERATION BASELINE REPORT 28, NREL/TP-6A20-67645 (Jan. 2017).

12. U.S. DEP'T OF ENERGY, TRANSFORMING THE NATION'S ELECTRICITY SYSTEM: THE SECOND INSTALLMENT OF THE QER A-4 (Jan. 2017).

13. *Id.* at A-7.

14. *Id.* at A-4.

15. See NAT'L ACADS. OF SCIS., ENG'G & MED., ENHANCING THE RESILIENCE OF THE NATION'S ELECTRICITY SYSTEM 8 (2017); See also U.S. Energy Info. Admin., *Link between growth in economic activity and electricity uses is changing around the world* (Nov. 20, 2017), <https://www.eia.gov/todayinenergy/detail.php?id=33812> ("Growth in economic activity (measured as gross domestic product) has tended historically to be coupled with increases in electricity use as populations grow and generate more goods and services." While this report then goes on to show that this relationship is changing in certain countries with the growth of industries requiring *less* electricity, they still require electricity.).

16. ENVIRONMENTAL & CLIMATE JUSTICE PROGRAM, NAACP, LIGHTS OUT IN THE COLD: REFORMING UTILITY SHUT-OFF POLICIES AS IF HUMAN RIGHTS MATTER 3–5 (Mar. 2017), http://www.naacp.org/wp-content/uploads/2017/04/lights_out.pdf (providing a collection of stories about the life-changing impacts of electricity shutoff policies).

17. NAT'L ACADS. OF SCIS., ENG'G & MED., *supra* note 15, at 20 (map showing a western interconnection, an eastern interconnection, and that Texas, Alaska, and Hawaii are not connected geographically, and thus operate separate systems).

18. *Id.* at 25; U.S. DEP'T OF ENERGY, *supra* note 12, at A-4 (generation), A-7 (transmission infrastructure), A-33 to A-35 (business models).

19. ASHLEY LAWSON, CENTER FOR CLIMATE & ENERGY SOLUTIONS, DECARBONIZING U.S. POWER 2 (June 2018), <https://www.c2es.org/site/assets/uploads/2018/06/innovation-power-background-brief-07-18.pdf>.

20. U.S. DEP'T OF ENERGY, *supra* note 12, at A-15, fig.A-5.

The system, however, is not immune to vulnerabilities, such as weather, security, aging infrastructure, and market manipulation. For example, the extreme cold weather in much of the country in early 2014, known as the Polar Vortex, significantly challenged the ability of the electricity system to maintain reliable operations in certain regions.²¹ Increased risks of fire, severity of storms, and flooding due to climate change also threaten transmission and generation infrastructure in other regions of the country.²² In addition, there is a growing risk that the system is vulnerable to a cyberattack from a foreign state, as many of the technologies used to operate the system are not well-secured.²³ Much of the electricity infrastructure is also aging, in need of significant upgrades.²⁴ Finally, the massive interconnected market structures themselves can be prone to manipulation that can go undetected and contribute to price spikes and the loss of reliable power for entire regions.²⁵

Simultaneously, the grid is ever-changing. The past four decades have seen a dramatic shift in the technologies and fuel used to generate electricity, the size and location of power plants, and the identity of entities who own, operate, and deliver electricity to customers.²⁶

Considering these rapid changes, the vulnerabilities that face the electric grid, and the essential nature of a well-functioning electricity system together, highlights the need for a grid—from generation to transmission to distribution—that can withstand these challenges and any others that may come its way. It is within this broad context that the Department of Energy issued its controversial proposed rule, calling upon FERC to take unprecedented regulatory action in the name of a reliable and resilient grid by subsidizing generators who keep fuel on site for ninety days—functionally, the coal and nuclear industries.²⁷

21. N. AM. ELEC. RELIABILITY CORP., POLAR VORTEX REVIEW iii (Sept. 2014), https://www.nerc.com/pa/rtm/January%202014%20Polar%20Vortex%20Review/Polar_Vortex_Review_29_Sept_2014_Final.pdf.

22. LAWRENCE BERKELEY NAT’L LABS., ESTIMATING RISK TO CALIFORNIA ENERGY INFRASTRUCTURE FROM PROJECT CLIMATE CHANGE 1–3, CEC-500-2012-057 (July 2012), <http://www.energy.ca.gov/2012publications/CEC-500-2012-057/CEC-500-2012-057.pdf>.

23. ROBERT K. KNAKE, COUNCIL ON FOREIGN RELATIONS, CONTINGENCY PLANNING MEMORANDUM NO. 31: A CYBERATTACK ON THE U.S. POWER GRID 4 (Apr. 2017), https://cfrd8-files.cfr.org/sites/default/files/pdf/2017/03/ContingencyPlanningMemo31_Knake.pdf.

24. See generally AMERICAN SOC’Y OF CIVIL ENG’RS, 2017 INFRASTRUCTURE REPORT CARD (Mar. 2017), <https://www.infrastructurereportcard.org/wp-content/uploads/2017/01/Energy-Final.pdf> (discussing the aging U.S. energy system infrastructure).

25. See, e.g., *The California Crisis: California Timeline*, PBS: FRONTLINE (last visited Dec. 10, 2018), <https://www.pbs.org/wgbh/pages/frontline/shows/blackout/california/timeline.html>.

26. NAT’L ACADS. OF SCIS., ENG’G & MED., *supra* note 15, at 20–23; DEVASHREE SAHA, COUNCIL OF STATE GOV’TS, THE RAPIDLY CHANGING LANDSCAPE OF ELECTRICITY GENERATION MIX ACROSS U.S. STATES (Sept. 8, 2017), <http://knowledgecenter.csg.org/kc/content/rapidly-changing-landscape-electricity-generation-mix-across-us-states>.

27. See generally Proposed Rule, *supra* note 1 (discussing the need for reliable electricity and the risks of premature retirement of generation resources).

In the three months that followed the issuance of the proposed rule, FERC received comments from representatives across the electric industry.²⁸ The proposed rule was widely opposed. Many commenters argued that the rule was outside the scope of FERC's authority and was bad policy for failing to recognize regional differences in grid vulnerability and benefiting some fuels over others.²⁹ It was also widely criticized for relying on the concept of resiliency while failing to define what that means.³⁰

Ultimately, FERC rejected the proposed rule as outside of its authority under the Federal Power Act.³¹ However, FERC used the opportunity to open a new docket on the issue of resiliency, as highlighted in the proposed rule, requesting input from industry participants regarding efforts to monitor and increase resiliency in various regions across the country, as well as how federal policies and market mechanisms could be improved to create a more resilient grid.³² FERC posed the following definition of resiliency: "the ability to withstand and reduce the magnitude and/or duration of disruptive events, which includes the capability to anticipate, absorb, adapt to, and/or rapidly recover from such an event."³³

While the FERC proceedings stemming from the initial proposed rule discussed *resiliency* as a regulatory concept that exists on its own and is in need of addressing, another similar concept—*reliability*—has a long history within federal, state, and regional regulation, and whose meaning and metrics for success are guided by statute and widely understood in the electricity industry.³⁴ Achieving reliability is regulated in various ways. At the federal level, the North American Electricity Reliability Corporation (NERC), overseen by FERC, issues a series of standards to ensure reliability and security³⁵ that all facilities and

28. See Docket Sheet for FERC Docket RM18-1, FERC ONLINE ELIBRARY https://elibrary.ferc.gov/idmws/docket_search.asp (search Docket Number field for "RM18-1").

29. Advanced Energy Economy et al., *supra* note 9, at 5–6; Solar Energy Indus. Ass'n., Comment on Proposed Grid Reliability and Resilience Pricing Rule 3–4, FERC Dkt. No. RM18-1-000 (Oct. 23, 2017), <https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=14721489>; Cal. Pub. Util. Comm'n, *supra* note 7, at 15–16.

30. Advanced Energy Economy et al., *supra* note 9, at 2 ("The justification for the proposed payments—resiliency—is not well defined, nor does the DOE NOPR demonstrate that resiliency is lacking in the aforementioned regions.")

31. Order Terminating Rulemaking Proceeding, Initiating New Proceeding, and Establishing Additional Procedures, 162 FERC ¶ 61,012, para. 14, FERC Dkt. No. AD18-7-000 (Jan. 8, 2018).

32. *Id.* paras. 17–18.

33. *Id.* para. 23.

34. METIN CELIBI ET AL., BRATTLE GRP., EVALUATION OF THE DOE'S PROPOSED GRID RESILIENCY PRICING RULE 5 (Oct. 23, 2017), https://www.ourenergypolicy.org/wp-content/uploads/2017/11/Evaluation_of_the_DOEs_Proposed_Grid_Resiliency_Pricing_Rule.pdf.

35. The Federal Power Act, for example, which authorizes federal jurisdiction over elements of the nation's electricity system, defines "reliable operation" as: "operating the elements of the bulk-power system within equipment and electric system thermal, voltage, and stability limits so that instability, uncontrolled separation, or cascading failures of such system will not occur as a result of a sudden disturbance, including a cybersecurity incident, or unanticipated failure of system elements." 16 U.S.C. § 824o(a)(4) (2018). See also N. Am. Elec. Reliability Corp., *About NERC* (last visited Dec. 10, 2018), <https://www.nerc.com/AboutNERC/Pages/default.aspx>; Order Certifying N. Am. Elec. Reliability Corp.

control systems must comply with to operate an interconnected electric energy network, referred to as the Bulk Power System.³⁶ Regional entities also employ numerous programs to ensure reliable operations.³⁷

In addition to following such reliability metrics, regional entities also take various actions to ensure that the regions they oversee have enough generating resources to meet future demands and future vulnerabilities.³⁸ This is known as *resource adequacy*.³⁹

Returning to the concept of *resiliency* recently highlighted by the Department of Energy (DOE) and subsequently by FERC, it is unclear exactly what resiliency means from an applied regulatory standpoint, considering the breadth of reliability and resource adequacy. While many scholars, regulators, and analysts have noted that these concepts are distinguishable,⁴⁰ there is also no clear agreement on what technical problem must be solved to achieve resiliency, nor agreement as to why any such technical problem cannot be addressed within one of these existing frameworks.⁴¹ Therefore, resiliency hints at thus far being a widely discussed solution to an undefined problem.

This Note explores this dynamic in depth. Part I provides a broad overview of the U.S. electricity system. It also details the nature of federal and state regulatory roles over the electricity system. Part II begins by overviews vulnerabilities in the current system and then turns to the recent DOE proposed rule and subsequent FERC actions on resiliency. Part III explores various proposed definitions of resiliency and compares them to those of reliability and resource adequacy. It highlights three possible distinction themes but ultimately argues that these concepts are deeply interwoven from a practical regulatory standpoint, and any technical problems associated with the need for resiliency, once actually identified, could likely be addressed within existing regulatory frameworks. Part IV explores two such possible regulatory framework options: the regulation of reliability by NERC and FERC oversight of regional entity coordination of resource adequacy. It assesses each of these options based on potential costs, impacts to regional autonomy, and ability to best respond to regional differences. Finally, Part V returns to the fact that despite the attention

as the Elec. Reliability Org. and Ordering Compliance Filing, 116 FERC ¶ 61,062, paras. 10–11, FERC Dkt. No. RR06-1-000 (July 20, 2006).

36. Order Certifying N. Am. Elec. Reliability Corp. as the Elec. Reliability Org. and Ordering Compliance Filing, 116 FERC ¶ 61,062, 10 n.12 (“Bulk-Power System means facilities and control systems necessary for operating an interconnected electric energy transmission network (or any portion thereof), and electric energy from generating facilities needed to maintain transmission system reliability. The term does not include facilities used in the local distribution of electric energy.”).

37. Cal. Indep. Sys. Operator Corp., Comment on Grid Resilience in Regional Transmission Organizations and Independent System Operators 5–6, FERC Dkt. No. AD18-7-000 (Mar. 9, 2018), <https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=14838222>.

38. CELIBI, *supra* note 34, at 6; U.S. DEP’T OF ENERGY, *supra* note 12, at A-37.

39. CELIBI, *supra* note 34, at 6; U.S. DEP’T OF ENERGY, *supra* note 12, at A-37.

40. Amy L. Stein, *Distributed Reliability*, 87 U. COLO. L. REV. 887, 891 (2016); *see also infra* Part III (discussing three common themes of distinction between resiliency and reliability).

41. *See infra* Part III (discussing distinctions between resiliency and reliability).

to resiliency, the specific problem it seeks to address has still yet to be identified. If instead of tethering it to such a problem that can easily be addressed within existing frameworks, it remains a more nebulous concept associated with a low-risk grid, the idea of resiliency is a term that could potentially be used strategically to build support for broader administrative or legislative actions increasing coordination across the grid, to expand the standard scope of federal authority over the electricity sector, or even to promote more environmentally-focused policy proposals that incent the development of more distributed electricity infrastructure, renewable energy generation, and broad anti-climate change policies.

I. AN OVERVIEW OF THE UNITED STATES ELECTRICITY SYSTEM

In the early twentieth century, electricity generation, transmission, and distribution was largely developed and controlled by a few private entities.⁴² For example, in 1932, eight holding companies controlled 75 percent of privately-owned utilities across the country.⁴³ Building power plants was (and still is) a capital intensive endeavor and one plant alone is capable of powering entire regions.⁴⁴ Further, in the name of maximizing efficiency and preventing a mess of competing wires, transmission infrastructure should ideally only be installed once in a particular area.⁴⁵ Because of these factors and others, electricity as a business was long viewed as a “natural monopoly,” meaning that it is more efficient when controlled by fewer entities exclusively, as opposed to an industry that benefits from maximum competition.⁴⁶

As regulation of the industry grew over time, regulators originally did not seek to break up monopolies that developed, but rather sanctioned them, allowing exclusive regional access for single investor-owned utilities in exchange for them supplying enough power for everyone at a price approved by a regulator.⁴⁷ This became the purview of state public utility commissions.⁴⁸

Over time, however, as electricity infrastructure became more connected across state lines, it became clear that state regulators alone did not have the necessary legal authority to keep rates reasonable for consumers when electricity

42. MCGREW, *supra* note 2, at 139.

43. DAVID P. TUTTLE ET AL., UNIV. TEX. AT AUSTIN, THE HISTORY AND EVOLUTION OF THE U.S. ELECTRICITY INDUSTRY 5 (July 2016), http://sites.utexas.edu/energyinstitute/files/2016/09/UTAustin_FCe_History_2016.pdf.

44. See, e.g., STEVE CORNELI & STEVE KIHM, LAWRENCE BERKELEY NAT'L LAB., ELECTRIC INDUSTRY STRUCTURE AND REGULATORY RESPONSES IN A HIGH DISTRIBUTED ENERGY RESOURCES FUTURE 3–4, LBNL-1003823 (Nov. 2015), <http://eta-publications.lbl.gov/sites/default/files/lbnl-1003823.pdf> (discussing the emergence of distributed energy resources).

45. See JAMES M. GRIFFIN & STEVEN L. PULLER, ELECTRICITY DEREGULATION: CHOICES AND CHALLENGES 2 (2005).

46. TUTTLE ET AL., *supra* note 43, at 5; GRIFFIN & PULLER, *supra* note 45, at 2–4; CORNELI & KIHM, *supra* note 44, at 4.

47. TUTTLE ET AL., *supra* note 43, at 3.

48. *Id.* at 6.

could be sold at wholesale prices across state lines.⁴⁹ Therefore, in 1935, Congress passed the Federal Power Act, granting the Federal Power Commission authority to regulate transmission and sales for resale of electricity in interstate commerce, and to require that such rates be “just and reasonable.”⁵⁰ Over the next few years, through implementation and a series of interpretive court decisions, a regulatory model emerged in which the federal government regulated the interstate transmission of electricity and electricity rates when sold for resale (or wholesale), regardless of whether such electricity crossed state lines.⁵¹ State public utility commissions still then regulated the retail generation, sales, and ratemaking of electricity, based on the costs of supplying that service and allowing for a reasonable return.⁵² This is often referred to as traditional cost-of-service ratemaking.⁵³

Under this system, the majority of utilities across the country were vertically integrated, generating, transmitting, and delivering power to consumers in their regions exclusively on the infrastructure they owned.⁵⁴ From a technology standpoint, this initially lent itself well to the reliance on large centralized power plants that could maximize economies of scale.⁵⁵ In some regions of the country, however, the generation and sale of power has always been conducted by large public entities, and remained so.⁵⁶ In other regions, electricity was generated and delivered by municipalities or rural electric cooperatives.⁵⁷ Such entities are generally much smaller than Investor-Owned Utilities (IOUs), and are regulated

49. MCGREW, *supra* note 2, at 139 (stating that there was little or no regulatory oversight of utilities conducting business across state lines and that rates were bloated). Further, in 1927, the Supreme Court held that there was no legal way for a state public utility commission to regulate the rates of power generated in that state if some of that power—no matter how small the amount—was sold in a neighboring state. *Public Utils. Comm’n of R.I. v. Attleboro Steam & Elec. Co.*, 273 U.S. 83, 89–90 (1927). The commission in the neighboring state could not regulate the sale, either. *Id.* This created a regulatory gap that could easily be exploited by utilities to avoid regulation. MCGREW, *supra* note 2, at 140.

50. Public Utility Act of 1935 §§ 201, 202, 206, Pub. L. 74-333, 49 Stat. 803, 847–52 (1935); MCGREW, *supra* note 2, at 140.

51. MCGREW, *supra* note 2, at 140–43; *see also* *Federal Power Comm’n v. S. Cal. Edison Co.*, 376 U.S. 205, 215–16 (1964) (holding that Congress intended to create a “bright line” when passing the Federal Power Act and sales for resale of electricity are under federal regulatory jurisdiction); *Fed. Power Comm’n v. Fla. Power & Light Co.*, 404 U.S. 453, 460–63 (1972) (holding that the federal government has jurisdiction over sales, even if not made in interstate commerce, if that energy is “comingled” with interstate commerce—for example sold to another utility who sells it across interstate commerce).

52. MCGREW, *supra* note 2, at 179.

53. *Id.* at 179–80.

54. RICHARD F. HIRSH, *POWER LOSS* 51–54 (1999).

55. *Id.* at 55–56.

56. This is often the case in regions reliant on hydropower under the jurisdiction of federal entities. *See, e.g.,* Bonneville Power Admin., *About Us* (last visited Dec. 13, 2018), <https://www.bpa.gov/news/AboutUs/Pages/default.aspx>; Tennessee Valley Auth., *Our History* (last visited Dec. 13, 2018), <https://www.tva.gov/About-TVA/Our-History>; *see also* HIRSH, *supra* note 54, at 53.

57. HIRSH, *supra* note 54, at 53; Am. Pub. Power Ass’n., *Stats and Facts* (last visited Dec. 13, 2018), <https://www.publicpower.org/public-power/stats-and-facts>.

more locally, as they are either nonprofit or government-owned entities.⁵⁸ Today, these entities supply power to 28 percent of U.S. customers.⁵⁹

This system of regulated vertically-integrated utilities, public power, and rural electric cooperatives remained largely the same across the country until the 1980s.⁶⁰ The last forty years, however, have seen a dramatic shift in some regions toward deregulation and free market electricity principles.⁶¹ This shift began in response to the energy crisis of the 1970s, along with simultaneous fears about the safety of nuclear power and concerns about the environmental impacts of the power system overall.⁶² These political forces resulted in the passage of the Public Utility Regulatory Policies Act of 1978, which required IOUs to buy all available power from certain qualified renewable and efficient power sources.⁶³ Next, in the 1980s, many began publicly advocating for the idea that competitive market forces would be better at regulating the costs of power for consumers than traditional cost-of-service ratemaking, and that such ratemaking was not able to keep up with necessary technological innovation.⁶⁴ Congress then passed the Energy Policy Act of 1992 to encourage competition in transmission. The legislation authorized FERC⁶⁵ to encourage utilities to open their transmission infrastructure, freeing it up for use by competitors, and thus allowing entities outside of the utility to transport power at the same cost the utility would assume.⁶⁶

This trend toward expanding access to transmission and creating a competitive market continued, culminating in FERC Orders 888 and 889 in 1996, which required all utilities with transmission service to offer nondiscriminatory transmission access for all wholesale sales, comparable to the access they gave their own wholesale power.⁶⁷ This step is often referred to as “functional unbundling” as it officially separated the sale of electricity from the transmission of electricity, which had previously always been bundled together.⁶⁸ Order 888 also encouraged the development of independent system operators (ISOs) as a means of facilitating the nondiscriminatory access to the

58. Am. Pub. Power Ass’n., *supra* note 57.

59. *Id.*

60. Many assert that the first major change to the industry structure was triggered by the passage of the Public Utility Regulatory Policies Act of 1978. HIRSH, *supra* note 54, at 73; *see also* MCGREW, *supra* note 2, at 144.

61. Order Terminating Rulemaking Proceeding, Initiating New Proceeding, and Establishing Additional Procedures, 162 FERC ¶ 61,012, paras. 7–10, FERC Dkt. No. AD18-7-000 (Jan. 8, 2018).

62. MCGREW, *supra* note 2, at 143–44.

63. *Id.*; *see also* Public Utility Regulatory Policies Act of 1978 § 210, Pub. L. 95-617, 92 Stat. 3117, 3144–46 (1978); 16 U.S.C. §§ 796(17)–(18) (2018).

64. MCGREW, *supra* note 2, at 145–46.

65. By this time, the Federal Power Commission had been replaced by the Federal Energy Regulatory Commission. *Id.* at 144.

66. *Id.* at 146.

67. *Id.* at 154; *see generally* Order No. 888, 75 FERC ¶ 61,080, FERC Dkt. No. RM95-8-000 (Apr. 24, 1996); Order No. 889, 75 FERC ¶ 61,078, FERC Dkt. No. RM95-9-000 (Apr. 24, 1996) (requiring nondiscriminatory transmission access for wholesale sales).

68. MCGREW, *supra* note 2, at 154; Order No. 888, 75 FERC ¶ 61,080, 57.

transmission infrastructure.⁶⁹ These entities are independent of any power generator or utility, and they coordinate the operation of transmission systems and the sale of power across these systems.⁷⁰ While at the time, FERC did not mandate any specific rules around ISOs, Order 888 provided detailed guidance on principles for setting up and managing the systems.⁷¹

In 2000, FERC issued Order 2000, creating the concept of the regional transmission organizations (RTOs), which, similar to ISOs,⁷² operate transmission and facilitate competitive electric markets across those transmission lines. RTOs, however, operate systems for entire regions, and have twelve set characteristics laid out by FERC which they must follow to qualify.⁷³ In general, FERC has encouraged utilities to join RTOs and ISOs and supports these competitive markets.⁷⁴

Today, two-thirds of the country receives electricity in competitive markets managed by RTOs and ISOs.⁷⁵ There are unique aspects to the structure of these entities by region, and to further complicate matters, some oversee states which still use vertically-integrated models, and some directly manage wholesale market sales. But their common feature is that they control access to transmission in their specific region.⁷⁶ They also often oversee markets for shorter- and longer-term regional electricity generation sales, including capacity markets, which encourage the development of new resources to meet growing needs for electricity over long periods of time.⁷⁷

In these open markets, wholesale rates are generally set by the market under the rules of the RTO and ISO. These rates and rules are overseen by FERC, who ensures that they are “just and reasonable” under the Federal Power Act.⁷⁸ FERC has generally limited intervention, allowing flexibility in establishing such rates

69. FERC, *Regional Transmission Organizations (RTO)/Independent System Operators (ISO)* (last updated Oct. 18, 2018), <https://www.ferc.gov/industries/electric/indus-act/rto.asp>.

70. *Id.*; Order No. 888, 75 FERC ¶ 61,080, 280.

71. Order No. 888, 75 FERC ¶ 61,080, 280–86.

72. For the remainder of this Note, RTOs and ISOs are referred to together, as their relationship with potential resiliency regulations is the same.

73. Order No. 2000, 89 FERC ¶ 61,285, 151–496, FERC Dkt. No. RM99-2-000 (Dec. 20, 1999) (identifying eight characteristics as “functions”); FERC, *Regional Transmission Organizations (RTO)/Independent System Operators (ISO)*, *supra* note 69.

74. See John P. Perkins, III, *Electric Capacity Markets and Resource Adequacy: Recommendations to Properly Balance Competition and Reliability in RTO and ISO Regions*, 6 J. OF ENERGY & ENVTL. L. 26, 29–30 (2014).

75. MCGREW, *supra* note 2, at 161; Mid-Atlantic ISO, ISO New England, New York ISO, PJM, Southwest Power Pool, and California ISO are within FERC’s purview under the Federal Power Act. *Id.* Texas’ ERCOT facilitates a competitive market but is not under FERC’s jurisdiction.

76. See Perkins, *supra* note 74, at 29; see also, e.g., PennState, *EME 801: Energy Markets, Policy, and Regulation, Regional Transmission Organizations* (last visited Dec. 13, 2018), <https://www.e-education.psu.edu/eme801/node/535>.

77. See, e.g., PennState, *supra* note 76.

78. MCGREW, *supra* note 2, at 193–94.

and market structures.⁷⁹ FERC has, however, at times rejected some market mechanisms as unjust and unreasonable, and has suggested changes to policies to bring them into compliance.⁸⁰ FERC also has a robust program that seeks to ensure that competitive markets are not manipulated.⁸¹

In the remaining one-third of the country, utilities are either publicly-owned, rural cooperatives, or continue to operate in a more traditional vertically-integrated fashion,⁸² with cost-of-service ratemaking overseen by state public utilities commissions and sales for resale overseen, but generally deferred to, by FERC.⁸³

Despite these many structural differences, most of the grid is physically interconnected across the country.⁸⁴ Electricity can move from a publicly-owned region to a competitive market region. On the other hand, a breakdown in the systems in one area may impact another area operating under a different market structure. In the backdrop of all of this are technological constraints requiring that the entire system be nearly perfectly balanced at all times, meaning that generation must always match demand, and there must be enough transmission infrastructure to transport power at peak periods of demand.⁸⁵

Emergencies on the grid have highlighted weaknesses in the disparate nature of the grid and the need for uniform standards that will ensure the grid continues to operate as one effective machine. A massive blackout in the Northeast in 2003, for example, led Congress to amend the Federal Power Act to require national standards to ensure a reliable electric grid.⁸⁶ The California

79. *Id.* at 204; FERC, CENTRALIZED CAPACITY MARKET DESIGN ELEMENTS, COMMISSION STAFF REPORT AD13-7-000 2 (Aug. 23, 2013) (“The Commission has provided each region with flexibility as to market design and has not required a “one-size fits all” approach. However, the primary goal of each of these markets is the same: ensure resource adequacy at just and reasonable rates through a market-based mechanism that is not unduly discriminatory or preferential as to the procurement of resources.”).

80. See, e.g., Gavin Bade, *States say FERC overstepped its bounds in PJM capacity market order*, UTILITY DIVE (July 31, 2018), <https://www.utilitydive.com/news/states-say-ferc-overstepped-its-bounds-in-pjm-capacity-market-order/528994/> (outlining states request to FERC to revisit PJM capacity market order).

81. MCGREW, *supra* note 2, at 159.

82. See FERC, *Electric Power Markets: National Overview* (last updated Apr. 10, 2019), <https://www.ferc.gov/market-oversight/mkt-electric/overview.asp>; Am. Pub. Power Ass’n., *supra* note 57.

83. MCGREW, *supra* note 2, at 204.

84. NAT’L ACADS. OF SCIS., ENG’G & MED., *supra* note 15, at 20 (map showing a western interconnection, an eastern interconnection, and that Texas, Alaska, and Hawaii are not connected geographically, and thus operate separate systems).

85. LAWSON, *supra* note 19, at 2.

86. 16 U.S.C. § 824o (2012); FERC, *Fact Sheet: Energy Policy Act of 2005* (Aug. 8, 2006), <https://www.ferc.gov/legal/fed-sta/epact-fact-sheet.pdf>; U.S.-CANADA POWER SYSTEM OUTAGE TASK FORCE, REPORT ON THE AUGUST 14, 2003 BLACKOUT RECOMMENDATION 12: THE RELATIONSHIP BETWEEN COMPETITIVE POWER MARKETS AND GRID RELIABILITY 125 (July 14, 2006). The entity designated to do this is the North American Reliability Corporation, overseen by FERC, and it issues regulations that every operator within the Bulk Power System must follow to ensure reliable grid operations, regardless of location in a traditional utility model region or an RTO/ISO region. See N. Am. Elec. Reliability Corp., *About NERC*, *supra* note 35; Order Certifying North American Electric Reliability

Energy Crisis of 2000 and 2001 also led to significant reforms, including more robust monitoring of potential market manipulation.⁸⁷

Alongside the changes in regulatory structures over the years, the technology present in the electricity industry has also changed over time, particularly that used to generate electricity.⁸⁸ In 1960, for example, the vast majority of electricity was generated by centralized coal power plants, hydroelectric power plants, and natural gas.⁸⁹ Then in the 1970s, many large nuclear power plants began coming online.⁹⁰ Recently, however, the technology trend has begun de-emphasizing large centralized plants (although they do remain prominent) and increasingly incorporating smaller distributed generation, often through renewable sources.⁹¹ There has also been a rapid growth in natural gas-fired power plants and a steady decline in the use of coal.⁹²

There are many factors that influence technological changes in the grid.⁹³ Changes in law and regulation surrounding electricity are particularly impactful. For example, the passage of the Public Utility Regulatory Policies Act (PURPA) opened up the electricity industry to brand new technologies by mandating that utilities buy power from small renewable generating facilities.⁹⁴ Today, with growing emphasis on climate change and the need to reduce fossil fuel use, many states have passed laws requiring that utilities buy from renewable sources, which has helped grow these technologies.⁹⁵ Changes in technology and market forces are also impactful. The availability of new natural gas extraction technology in the mid-2000s, for example, dramatically decreased the cost of

Corporation as the Electricity Reliability Organization and Ordering Compliance Filing, 116 FERC ¶ 61,062, paras. 10–11, FERC Dkt. No. RR06-1-000 (July 20, 2006).

87. MCGREW, *supra* note 2, at 207–16.

88. NAT’L ACADS. OF SCIS., ENG’G & MED., *supra* note 15, at 20–23; SAHA, *supra* note 26.

89. NAT’L RENEWABLE ENERGY LAB, *supra* note 11, at x, fig.ES-3.

90. *Id.*

91. *Id.* at ix.

92. *Id.* at x, fig.ES-3. For example, from 2005 to 2015, nonhydropower renewables grew from 2 percent to 7 percent of the net electricity generation in the United States, natural gas went from 19 percent to 33 percent, and coal fell from 49 percent to 33 percent. *Id.* at ix.

93. In regions with more renewable power tied to sunlight and the wind blowing, there needs to be power that can readily come online when it is dark or the wind stops blowing. California ISO, *What the duck curve tells us about managing a green grid*, 2 (2016), https://www.cao.com/Documents/FlexibleResourcesHelpRenewables_FastFacts.pdf. These regions will need more flexible resources to respond to changing conditions. *Id.* Natural gas, for example, is a more flexible resource than nuclear power plants because it can be turned off and on quickly, whereas nuclear power is best suited for continuing operation. See NAT’L RENEWABLE ENERGY LAB., *supra* note 11, at 89.

94. Public Utility Regulatory Policies Act of 1978 § 210, Pub. L. 95-617, 92 Stat. 3117, 3144–46; 16 U.S.C. §§ 796(17)–(18); see also MCGREW, *supra* note 2, at 105–113.

95. NAT’L RENEWABLE ENERGY LAB., *supra* note 11, at 5 (“The increase in renewables is in part due to a large buildout of wind turbines since 2009, which has largely been driven by State renewable portfolio standards (RPS) and the availability of the production tax credit (PTC).”).

natural gas extraction, and increased its use to generate electricity.⁹⁶ Similarly, technological innovation has caused solar panels and wind power to rapidly decrease in price.⁹⁷ Changes in public perception are also relevant. Fear of nuclear accidents and nuclear waste may have contributed to the long-term viability of nuclear power.⁹⁸ Nuclear power plant construction has dramatically decreased since 1977 and more nuclear power plants are retiring than are planned for construction.⁹⁹

In sum, the U.S. electricity grid today is a complicated web of different technologies, laws, and market structures, all changing rapidly but at different paces and in different ways across the country. Yet, at the same time, the grid must provide a constant and reasonably priced commodity necessary for the health of the population and the health of the economy. The system functions well, but it does not function perfectly, and it is highly vulnerable in many ways.

II. VULNERABILITIES IN THE ELECTRICITY GRID AND THE DOE/FERC RESPONSE

The importance of the electricity grid to the U.S. economy and lives of its citizens underscores the importance of ensuring the system is always able to deliver electricity, able to accommodate changes in technology and laws, and able to absorb any expected or unexpected events that may disrupt normal operations. There are many regulations and checks in place to keep the system operating.¹⁰⁰ However, extreme changes and events such as severe weather conditions, cyberattacks, aging infrastructure, and market manipulation, while rare, expose vulnerabilities and may pose significant threats to large sections of the system.

A. Examples of Potential System Vulnerabilities

In January 2014, a massive cold front—known commonly as the Polar Vortex—settled upon huge parts of the North American Northeast, resulting in sustained temperatures of up to thirty-five degrees Fahrenheit below average in some areas and an extremely high demand for electricity.¹⁰¹ In the regions where natural gas is used for electricity as well as for heating, this caused strain on the fuel supply.¹⁰² The cold weather also had direct impacts on generation

96. See generally PPI Energy & Chems. Team, U.S. Bureau of Labor Statistics, *The effects of shale gas production on natural gas prices*, 2 BEYOND THE NUMBERS 1, 1 (May 2013) (discussing the Producer Price Index for natural gas and the impact of shale gas).

97. NAT'L RENEWABLE ENERGY LAB., *supra* note 11, at xiv.

98. *Id.* at 109.

99. *Id.* at xiii.

100. See *infra*, Part IV (providing a more detailed discussion of reliability regulations).

101. N. AM. ELEC. RELIABILITY CORP., *supra* note 21, at iii, v–ix (detailing historically high demand for electricity—or “historic winter peak”—in certain regions from Jan 6–8, 2014).

102. *Id.* at 2, 13 (Page 2 discusses the impacts of curtailment of the supply of natural gas, and page 13 discusses demand from other sectors such as residential heating).

equipment, with frozen equipment significantly reducing the electricity generation capacity available across the country.¹⁰³ While the system did continue to deliver reliable electricity during the event, it highlighted vulnerabilities in the region such as overreliance on one fuel type—natural gas—that has to be transported, often long distances, via pipeline.¹⁰⁴

In addition, changing weather patterns as a result of climate change pose a great risk to the future of the electricity system in many regions of the country. In California, for example, the Lawrence Berkeley National Lab found that higher temperatures as a result of climate change may require 38 percent more electricity generation capacity at peak times in the future, and 31 percent more transmission infrastructure due to an increased demand for air conditioning and strains on infrastructure due to heat.¹⁰⁵ The same study also found that transmission lines were 40 percent more likely to be exposed to wildfire, and highlighted an increased vulnerability due to sea-level rise of any power plants and infrastructure that are located close to the ocean.¹⁰⁶

Susceptibility to attack on the grid is another concern. In 2017, the Council on Foreign Relations released a report noting that while it would be difficult to launch a successful attack on the U.S. system, it is possible.¹⁰⁷ The report also noted that many electricity control systems contain older technology built without security in mind.¹⁰⁸

Aging infrastructure also poses a threat to the grid. In 2017, the American Society of Civil Engineers gave U.S. energy infrastructure a rating of D+, noting that many transmission lines were built in the 1950s and 1960s with a fifty-year life expectancy, and that in some places, single lines cannot be taken offline for maintenance because it will overload other lines.¹⁰⁹

Finally, market manipulation and failures in regulation can also disrupt the system. During the California Energy Crisis of 2000 and 2001, for example, following a movement toward deregulation of its electricity industry, the state experienced huge spikes in electricity prices, rolling blackouts, and the ultimate bankruptcy of its major utility, Pacific Gas & Electric.¹¹⁰ While this was caused by many factors,¹¹¹ the failure of regulators to respond to market manipulation and price-fixing contributed significantly.¹¹²

103. *Id.* at 13–16.

104. *Id.* at 2, 17 (“Increased reliance on natural gas during the polar vortex exposed the industry to various challenges with fuel supply and delivery.”).

105. LAWRENCE BERKELEY NAT’L LABS., *supra* note 22, at iv.

106. *Id.* at iv, 3.

107. KNAKE, *supra* note 23, at 1.

108. *Id.* at 4.

109. *See generally* AM. SOC’Y OF CIVIL ENG’RS, *supra* note 24 (calling for more attention to be paid to aging electric infrastructure).

110. CHRISTOPHER WEARE, PUB. POLICY INST. OF CAL., *THE CALIFORNIA ELECTRICITY CRISIS: CAUSES AND POLICY OPTIONS 1–5* (2003).

111. *Id.* at v.

112. MCGREW, *supra* note 2, at 207–16 (discussing the California Energy Crisis and its impact on FERC regulations).

These rapid changes, the vulnerabilities that face the electric grid, and the essential nature of a well-functioning electricity system together, highlight the need for a grid that can withstand these challenges, from generation to transmission to distribution.

B. The DOE Proposed Rule to Compensate On Site Fuel Storage

As previously discussed, in September 2017, DOE Secretary Rick Perry called upon FERC to take unprecedented regulatory action to require RTOs and ISOs to implement market rules creating a separate, higher rate for certain generators—primarily coal and nuclear power plants—to compensate them for providing grid resiliency attributes.¹¹³ The premise was that the operators of such plants add additional value to the overall system by ensuring an alternative in the face of potential natural gas supply failures, and they should be compensated for this value.¹¹⁴ The proposed rule drew heavily on the example of the Polar Vortex, noting that demand was met only because “a number of fuel-secure plants that were scheduled for retirement were called upon to meet the need for electricity.”¹¹⁵

Secretary Perry’s proposed rule was a direct market intervention and a significant departure from FERC’s precedent doctrine of not interfering with market operations of RTOs and ISOs. To propose this rule, he used a rarely-invoked authority granted to the Secretary of Energy under Section 403 of the DOE Organization Act to propose rules for FERC’s final action.¹¹⁶ While FERC is housed under the Department of Energy, it operates independently, and FERC is not compelled to follow the Secretary’s proposed rule.¹¹⁷ Upon receipt of the proposed Rule, FERC initiated a docket, RM18-1, to consider the proposal and solicit comments.¹¹⁸

In the three months that followed the proposed rule, FERC received comments from representatives across the electric industry.¹¹⁹ From the many opposed, there were numerous arguments that the rule would be outside the scope of FERC’s authority, that it would be arbitrary and capricious, that it was

113. Proposed Rule, *supra* note 1, at 11–12.

114. *Id.* at 11.

115. *Id.*

116. *Id.* at 2; *see generally* Cal. Pub. Util. Comm’n, *supra* note 7, at 2 (referring to authority under 403 as “rarely invoked”).

117. *See* FERC, About FERC (last visited Aug. 27, 2018), <https://www.ferc.gov/about/about.asp>; FERC, *Commission Members* (last visited Dec. 16, 2018), <https://www.ferc.gov/about/com-mem.asp?csrt=16483974147365651321>; FERC, *An Overview of the Federal Energy Regulatory Commission and Federal Regulation of Public Utilities* (June 2018), <https://www.ferc.gov/about/ferc-does/ferc101.pdf>.

118. Order Terminating Rulemaking Proceeding, Initiating New Proceeding, and Establishing Additional Procedures, 162 FERC ¶ 61,012, paras. 2–5, FERC Dkt. No. AD18-7-000 (Jan. 8, 2018).

119. *See* Docket Sheet for Docket RM18-1, FERC ONLINE ELIBRARY https://elibrary.ferc.gov/idmws/docket_search.asp (search Docket Number field for “RM18-1”).

regionally inflexible, that it unfairly supported certain technologies and fuels over others, and that it would encroach upon state jurisdiction.¹²⁰

Commenters also noted that the proposal failed to even really define what resiliency means, despite basing the rule of the notion of promoting it alongside reliability.¹²¹

C. FERC Rejected Proposed Rule but Called for Information on Resiliency

In January 2018, FERC rejected the proposed rule in its decision “Grid Reliability and Resilience Pricing,” stating that there was no demonstration that existing tariffs were not just and reasonable, and therefore FERC lacked the authority to intervene.¹²² The majority opinion also noted that resiliency is a commonly used term that is not clearly defined, and while an important issue, much more information is needed about the concept and current efforts across the country to increase resiliency before issuing national regulations to encourage resilience.¹²³ It closed the docket on the proposed rule, but opened a new docket seeking information about the nature of resiliency in the market, and about efforts already underway regionally to address resiliency concerns.¹²⁴ It sought input specifically from RTOs and ISOs on 1) the common meaning and understanding of what resiliency is, 2) how RTOs and ISOs assess threats to resilience, and 3) how RTOs and ISOs mitigate threats to resilience.¹²⁵

120. Some highlighted specifically that it would exceed FERC’s authority under the Federal Power Act, which allows for rate intervention only in cases when existing rates are not just and reasonable. *See, e.g.,* California Public Utilities Commission, *supra* note 7, at 15–16. They also argued that the focus on ninety days of fuel on site was arbitrary given that most challenges facing the grid were regional, and could not be addressed with these technologies alone. *Id.* at 14–15. Further, others argued that the proposal illegally encroached on state integrated resource planning, a process by which states plan for future electricity demands and supply. *Id.* at 9–10. Finally, they argued that the proposal lacked substantial evidence by failing to consider that its solution would exacerbate the problem of climate change, which is making resiliency problems in some regions of the country worse. *Id.* at 18.

121. Solar Energy Industries Association, Comment on the Proposed Grid Resiliency Rules, 3, (Oct. 23, 2017).

122. The majority opinion stated: “The FPA is clear: in order to require RTOs/ISOs to implement tariff changes as contemplated by the Proposed Rule, there must be a demonstration that the specific statutory standards of section 206 of the FPA are satisfied. Thus, there must first be a showing that the existing RTO/ISO tariffs are unjust, unreasonable, unduly discriminatory or preferential. Then, any remedy proposed under FPA section 206 must be shown to be just, reasonable, and not unduly discriminatory or preferential.” Order Terminating Rulemaking Proceeding, Initiating New Proceeding, and Establishing Additional Procedures, 162 FERC ¶ 61,012, para. 14, FERC Dkt. No. AD18-7-000 (Jan. 8, 2018).

123. *Id.* para. 22.

124. *Id.* paras. 17–18.

125. *Id.* para. 18.

D. Responses from the Industry on Resiliency

In the months that followed, stakeholders across the industry, including RTOs and ISOs, submitted comments as requested.¹²⁶ The responses were varied from a policy standpoint. More details are provided throughout the remainder of this Note. Broadly, however, many RTOs and ISOs spoke directly to the need for regional flexibility in responding to resiliency concerns and either stated or implied that major reforms were unnecessary. The California ISO (CAISO) highlighted a number of comprehensive tools it uses in combination to successfully guard against possible disruptive events to the grid.¹²⁷ The Midcontinent ISO (MISO), whose territory covers many states in the middle portion of North America,¹²⁸ also noted that it had no specific resilience concerns currently and highlighted some actions FERC could take to increase coordination between regions.¹²⁹ Others emphasized the importance of, or at the very least noted the possibilities for, further federal regulatory involvement and support. The Southwest Power Pool (SPP), which is an RTO covering numerous states across the southwest and beyond,¹³⁰ stated that it believes NERC's current framework for enhancing reliability standards is sufficient to address resilience needs.¹³¹ ISO New England focused primarily on fuel security and asked the Commission to continue to allow them to do their regional outreach and stakeholder engagement work in this area.¹³² The PJM Interconnection (PJM), whose operations are across multiple states in the eastern part of the United States,¹³³ on the other hand, asked the Commission to take quick action and require each RTO and ISO to propose changes, for approval by FERC, addressing resiliency, specifically, allowing for market reforms and related

126. See Docket Sheet for FERC Docket AD18-7, FERC ONLINE ELIBRARY https://elibrary.ferc.gov/idmws/docket_search.asp (search Docket Number field for "AD18-7").

127. Cal. Indep. Sys. Operator, *supra* note 37, at 6–7.

128. FERC, *Electric Power Markets: Midcontinent (MISO)* (last updated July 13, 2017), <https://www.ferc.gov/market-oversight/mkt-electric/midwest.asp>.

129. Midcontinent Indep. Sys. Operator, Inc., Comment on Grid Resilience in Regional Transmission Organizations and Independent System Operators 2, FERC Dkt. No. AD18-7-000 (Mar. 9, 2018), <https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=14837832> ("While MISO does not have any imminent or immediate resilience concerns, there are opportunities for the Commission to play a greater role by opening an industry dialogue to identify future actions to support on grid resilience efforts in the areas of: (1) information technology tools; (2) transmission planning; and (3) inter-regional operations.").

130. Sw. Power Pool, Inc., Comment on Grid Resilience in Regional Transmission Organizations and Independent System Operators 1–2, FERC Dkt. No. AD18-7-000 (Mar. 9, 2018), <https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=14838083>.

131. *Id.* at 18 ("SPP believes the current NERC construct for continually monitoring and enhancing the NERC reliability standards is sufficient to address current and future needs with regards to enhancing resilience for the BPS.").

132. ISO New England, Inc., Comment on Grid Resilience in Regional Transmission Organizations and Independent System Operators 1–2, FERC Dkt. No. AD18-7-000 (Mar. 9, 2018), <https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=14837903>.

133. PJM, *Territory Served* (last visited Dec. 16, 2018), <https://www.pjm.com/about-pjm/who-we-are/territory-served.aspx>.

compensation mechanisms.¹³⁴ PJM also noted a potential need for nonmarket cost-based compensation in the case of emergencies.¹³⁵ Five other RTOs and ISOs, however, then submitted response comments to PJM’s comments noting that they did not support PJM’s request for new filings and want more flexibility by region.¹³⁶

Despite the different assessments of how resilient various regions are and what next steps should be, one notable common theme ran across many of the RTO and ISO comments: Many called for clarification for how resiliency is defined in relation to existing regulations and practices already governing the industry.

For example, PJM asked that the Commission clarify its authority over the concept of resiliency in relation to its jurisdiction over the establishment of just and reasonable rates under the Federal Power Act, and its definition of reliability that governs NERC reliability standards.¹³⁷ CAISO, on the other hand, noted the ambiguity in the definition of resiliency posed by the Commission, stating that FERC did not “address any potential overlap between resilience and reliability, clearly articulate the differences between the two, [or] state why a new, wholly separate concept is needed.”¹³⁸ NYISO went further to state that “[r]eliability and resilience are not necessarily separate and distinct concepts in relation to the electric system. Rather, these two concepts are highly intertwined and often indistinguishable.”¹³⁹ It then detailed areas where resiliency may go above current concepts of reliability, but noted there is not yet agreement in the industry.¹⁴⁰ ISO New England also noted that regulating reliability and regulating resiliency is essentially the same thing.¹⁴¹

134. PJM Interconnection, L.L.C., Comment on Grid Resilience in Regional Transmission Organizations and Independent System Operators 6, FERC Dkt. No. AD18-7-000 (Mar. 9, 2018), <https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=14838220>.

135. *Id.*

136. Cal. Indep. Sys. Operator Corp. et al., Comment on Grid Resilience in Regional Transmission Organizations and Independent System Operators 4–6, FERC Dkt. No. AD18-7-000 (May 8, 2018), <https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=14912362>.

137. PJM Interconnection, L.L.C., *supra* note 134, at 11–12 (“PJM asks the Commission to clarify in this proceeding that resilience is anchored in the Congressional definition of reliable operations as set forth in FPA, section 215, but also is supported by the requirement for just and reasonable rates, terms and conditions of service and the requirement that the planning and expansion of the BES meet the needs of load serving entities.”).

138. Cal. Indep. Sys. Operator Corp., *supra* note 37, at 10.

139. N.Y. Indep. Sys. Operator, Inc., Comment on Grid Resilience in Regional Transmission 3, FERC Dkt. No. AD18-7-000 (Mar. 9, 2018), <https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=14838201>.

140. *Id.* at 5 (“[D]ifferences of opinions persist with respect to the definition of resilience. Additional dialogue regarding concepts for market-based resilience services and practices may be warranted.”).

141. ISO New England, Inc., *supra* note 132, at 2 (“In assessing reliability, ISO-NE considers two key aspects of the bulk power system: (1) security (*i.e.*, the system’s ability to withstand unexpected disturbances, such as loss of system elements), and (2) adequacy (*i.e.*, the system’s ability to supply the energy to meet demand, accounting for scheduled and reasonably expected unscheduled outages of system elements). For the system to be resilient—*i.e.*, able to withstand and reduce the magnitude and/or duration of disruptive events—both of these aspects of reliability need to be addressed.”).

In total, nearly all RTOs and ISOs implied that resiliency was already situated within an existing regulatory framework. Even SPP, which unlike the others, took the approach of detailing exactly how it perceived resilience to be outside of existing regulatory concepts, also stated that “a well-thought-out discussion of resilience may often require reference to reliability-centered practices and principles.”¹⁴²

III. RESILIENCY UNDEFINED

As raised in the previous Part, *resiliency*, as presented in the DOE proposed rule and the subsequent FERC docket, is being discussed as an important concept to address within grid regulation. However, as noted by many commenters, it has yet to be defined in a way that is distinct, from a practical standpoint, from existing regulatory frameworks. Specifically, it has not been distinguished from federal efforts to ensure *reliable* operations, nor has it been separated from regional and state planning processes to ensure *resource adequacy* in the future. Part of the difficulty is resiliency also has not yet been tied to a specific technical concern in the grid.

A. Overlapping Definitions of Resiliency, Reliability, and Resource Adequacy

In its Order requesting comments on resiliency, FERC proposed to define it as: “the ability to withstand and reduce the magnitude and/or duration of disruptive events, which include the capability to anticipate, absorb, adapt to, and/or rapidly recover from such an event.”¹⁴³

This is nearly identical to a definition FERC cited in its proposal by the National Infrastructure Advisory Council, which states “[i]nfrastructure resilience is the ability to reduce the magnitude and/or duration of disruptive events. The effectiveness of a resilient infrastructure or enterprise depends upon its ability to anticipate, absorb, adapt to, and/or rapidly recover from a potentially disruptive event.”¹⁴⁴ Similarly, the National Academies of Sciences, Engineering, and Medicine (National Academies) state that “a resilient system is one that acknowledges that . . . outages can occur, prepares to deal with them, minimizes their impact when they occur, is able to restore service quickly, and draws lessons from the experience to improve performance in the future.”¹⁴⁵

Many scholars, regulators, and industry experts have emphasized that there is a clear distinction between reliability and resiliency.¹⁴⁶ The National

142. Sw. Power Pool, *supra* note 130, at 3.

143. Order Terminating Rulemaking Proceeding, Initiating New Proceeding, and Establishing Additional Procedures, 162 FERC ¶ 61,012, para. 23, FERC Dkt. No. AD18-7-000 (Jan. 8, 2018).

144. NAT'L INFRASTRUCTURE ADVISORY COUNCIL, A FRAMEWORK FOR ESTABLISHING CRITICAL INFRASTRUCTURE RESILIENCE GOALS 15 (Oct. 19, 2010).

145. See NAT'L ACADS. OF SCIS., ENG'G & MED., *supra* note 15, at 10.

146. Amy Stein notes in her article, *Distributed Reliability*, that “resiliency is often distinguished from reliability.” Stein, *supra* note 40, at 891, n.15. The Southwest Power Pool also stated that “[i]n the

Academies, for example, have specifically stated that resiliency is different than operating reliability, which is "the ability of the bulk power system to withstand sudden disturbances, such as electric short circuits or the unanticipated loss of system elements from credible contingencies, while avoiding uncontrolled cascading blackouts or damage to equipment."¹⁴⁷ They have also explained that resiliency is different than resource adequacy, which is "the ability of the electricity system to supply the aggregate electrical demand and energy requirements of the end-use customers at all times, taking into account scheduled and reasonably expected unscheduled outages of system elements."¹⁴⁸

Despite these claims that there is a clear distinction, the difference is harder to pin down from a practical standpoint, and resiliency appears to mean slightly different things to different parties.

B. Three Themes Distinguishing Resiliency from Reliability, and How These Themes Relate to Existing Regulations

The review of comments to FERC's resiliency docket, and related literature, suggests the following three possible policy themes of distinction between resiliency, reliability, and resource adequacy: 1) resiliency is about what happens *after* a disruptive event occurs, whereas reliability and resource adequacy planning are about avoiding such events, 2) resiliency is a concept tied to less likely and more extreme events, whereas reliability and resource adequacy focus on more predictable and routine disruptions, and 3) resiliency is a conversation about the electricity grid and how it will change over a longer time frame than reliability and resource adequacy are able to take into account.

1. Resiliency is about what happens after a disruptive event occurs.

First, looking only at specific language used in various definitions, the distinction initially appears to lie in the theme of what happens after a disruptive event occurs. Therefore, resiliency is about how the grid responds and how long the event lasts, whereas reliability is about preventing disruptive events from impacting the grid in the first place. This is intuitively connected to the dictionary definitions of the two words. Reliability, or the state of being "reliable," is defined as "dependable" and "giving the same results on successive trials."¹⁴⁹ Something that is resilient, on the other hand, is "capable of withstanding shock"

context of operating the BPS, reliability and resilience are distinct, yet complementary, concepts." Sw. Power Pool, Inc., *supra* note 130, at 3.

147. See NAT'L ACADS. OF SCIS., ENG'G & MED., *supra* note 15, at 9. Slightly different, the Federal Power Act defines reliability as: "operating the elements of the bulk-power system within equipment and electric system thermal, voltage, and stability limits so that instability, uncontrolled separation, or cascading failures of such system will not occur as a result of a sudden disturbance, including a cybersecurity incident, or unanticipated failure of system elements." 16 U.S.C. § 824o(a)(4).

148. See NAT'L ACADS. OF SCIS., ENG'G & MED., *supra* note 15, at 9.

149. *Reliable*, MERRIAM-WEBSTER.COM (last visited Apr. 18, 2019), <https://www.merriam-webster.com/dictionary/reliable>.

and “tending to recover from or adjust easily to misfortune or change.”¹⁵⁰ Looking only at the words, there is a difference. Yet, a “dependable” system cannot arguably just be about performance when conditions are perfect because conditions change. Weather shifts, infrastructure needs to be repaired, and there are predictable disruptive events. Therefore, regulating for reliability—or regulating to ensure “dependability”—requires that a regulator also think about sudden disturbances and how the system will respond to ensure a reliable supply of electricity. By these definitions, a reliable grid would also be a resilient grid. Texas’ reliability corporation (ERCOT) and primary utility also noted this practical similarity. It wrote,

The Commission’s proposed definition of resilience . . . reflects a conventional understanding of the term—namely, the ability to withstand or recover from some disturbance. Because any disturbance to the bulk-power system that impairs the continuous provision of electric service has, to that same extent, impaired reliability, ERCOT and the [Public Utilities Commission of Texas] view resilience as an important subset of their existing reliability responsibilities.¹⁵¹

Similarly, regions already take on substantial planning efforts to ensure long-term and short-term resource adequacy in a way that accounts for reasonably unscheduled outages.¹⁵² As defined by the National Academies, such adequacy should account for reasonably expected unscheduled outages.¹⁵³ If disruptive events are part of reasonably unscheduled outages, then such proper planning would directly impact the ability of the grid to respond, and therefore impact resiliency.

2. *Resiliency is about more severe, rare events.*

Turning to the second possible distinction theme, perhaps resiliency is not about the response to a disruption, but rather it is tied to the nature and severity of a disruptive event. Perhaps resiliency is meant to fill a gap in the failure to recognize or plan appropriately for the extremely rare, but extremely damaging events. For example, in her article, *Distributed Reliability*, Amy Stein writes “notably, reliability assessments often exclude extreme weather events from their calculations.”¹⁵⁴

The Federal Power Act definition of reliability specifically calls out cybersecurity attacks, which are arguably extreme and rare,¹⁵⁵ and there is no

150. *Resilient*, MERRIAM-WEBSTER.COM (last visited Apr. 18, 2019), <https://www.merriam-webster.com/dictionary/resilient>.

151. Elec. Reliability Council of Tex., Inc. & Pub. Util. Comm’n of Tex., Comment on Grid Resilience in Regional Transmission Organizations and Independent System Operators 2, Dkt. No. AD18-7-000 (Mar. 9, 2018), <https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=14837907>.

152. See Perkins, *supra* note 74, at 27.

153. See NAT’L ACADS. OF SCIS., ENG’G & MED., *supra* note 15, at 9.

154. Stein, *supra* note 40, at 891 n.15.

155. KNAKE, *supra* note 23, at 1 (noting unlikely but damaging effects of a potential attack).

indication that excluding a severe weather event from planning assessments is a required factor for assessing responses to unanticipated failures.¹⁵⁶ NERC already examines the system’s responses to extreme weather events in terms of reliability.¹⁵⁷ At the same time, extreme weather is becoming more and more common as a result of climate change,¹⁵⁸ lending to the notion that such severe and rare events may be entirely reasonable from a definitional standpoint of adequacy.

3. Resiliency is over a longer-term time horizon.

Finally, some propose a distinction theme that lies in the timeframe and horizon for planning for disruptive events: that resiliency is about looking much further into the future at longer-term threats and the changing nature of threats. SPP, for example, wrote that reliability is about maintaining power availability now, whereas resilience is a longer-term and more holistic concept.¹⁵⁹ Similarly, MISO stated that resilience is about more than just responding to events, but also planning for the changing nature of the events themselves.¹⁶⁰ However, in the name of both reliability and resource adequacy, many RTOs and ISOs already study changes in the industry and threats over time and incorporate that into planning processes.¹⁶¹

4. Conclusion

Within one, two, or all three of these distinction themes, there may be a valid policy concern. Existing regulations may not be accounting in some way for what happens after an event, or an extremely severe event, or planning over the long-term effectively. This Note is not seeking to analyze the merits of such a claim. It is also not seeking to identify technical proposals that can help increase resiliency of the electric grid, whatever it may ultimately mean.

Rather, despite claims that resiliency is a clear and distinct concept, and despite the vast number of resources now being devoted to defining it, describing it, and attempting to help regulate it, it remains unclear, even to those directly involved in managing the industry, exactly what new problem resiliency uniquely addresses that is not already covered—or could not easily be covered—by existing regulatory frameworks. Resources are therefore being devoted to

156. 16 U.S.C. § 824o(a)(4) (2018).

157. See, e.g., N. AM. ELEC. RELIABILITY CORP., *supra* note 21.

158. UNION OF CONCERNED SCIENTISTS, THE SCIENCE CONNECTING EXTREME WEATHER TO CLIMATE CHANGE (June 2018), <https://www.ucsusa.org/sites/default/files/attach/2018/06/The-Science-Connecting-Extreme-Weather-to-Climate-Change.pdf>.

159. Sw. Power Pool, *supra* note 130, at 3.

160. Midcontinent Indep. Sys. Operator, *supra* note 129, at 3 (“MISO views resilience beyond just the ability to respond to events, but also the ability to assess and respond to changes in the nature of ‘events’ that are the result of the transformative industry changes in fuel economics, environmental regulations, technology, customer preferences and State policies.”).

161. See *infra*, Part IV (discussing regional resource adequacy planning).

defining an already widely-used term in the industry that, given the vastly differing views on what it actually means, if anything, is being used prematurely.

However, for better or worse, the effort to define resiliency as a concept is already well underway. Assuming that within one of these distinction themes is a tangible gap in regulation tethered to an unaddressed problem on the grid, two existing regulatory frameworks could likely support filling such a gap.

IV. RESILIENCY WITHIN RELIABILITY OR RESILIENCY WITHIN RESOURCE ADEQUACY

The following Part will analyze how the concepts of resiliency proposed in Part III—what happens after an event occurs, responding to very severe events, or planning over longer time horizons—might exist within two currently operating regulatory frameworks: NERC reliability standards and regional RTO and ISO resource adequacy planning and energy market structures. If FERC defines resiliency as a subset of one of these frameworks, with specific problems to address, it is likely that policies within these frameworks could be modified accordingly to address those problems. For each framework, this Part provides a brief overview, discusses how the framework already incorporates resiliency-related concepts, and provides examples of how it might further incorporate modifications.

This Part then examines the following three issues: 1) how any modifications within each framework might impact affordability for electricity consumers, 2) how widespread impacts from any policy changes within each framework could be on a national level, and 3) how policy changes within each framework could maintain regional flexibility. These three metrics—cost, breadth of impact, and regional flexibility—are standard lenses through which electricity regulation of any sort is typically analyzed for the following reasons. Because electricity is such an important aspect of daily life and industry, the value of keeping costs low is contemplated at every step in the regulatory process.¹⁶² Because of the interconnectedness of the grid, the ability to have a widespread impact when proposing solutions to any policy problem is an important factor. This was one of the reasons why the Federal Power Act of 2005 mandated national reliability standards, to ensure that the entire interconnected entity was able to achieve an overall adequate level of reliability.¹⁶³ Finally, as pointed out by many RTOs and ISOs, regional entities highly value flexibility to respond to threats facing the electric grid.¹⁶⁴ Threats are different in different places. Some regions face flooding and fire threats.¹⁶⁵ Others face tornadoes and

162. 16 U.S.C. §§ 824e–824i (2018); MCGREW, *supra* note 2, at 179–80 (traditional cost of service ratemaking overview), 193–94 (discussion of “just and reasonable”).

163. Order Certifying North American Electric Reliability Corporation as the Electricity Reliability Organization and Ordering Compliance Filing, 116 FERC ¶ 61,062, paras. 15–17, FERC Dkt. No. RR06-1-000 (July 20, 2006) (discussion of overall adequate levels of reliability).

164. See Cal. Indep. Sys. Operator Corp. et al., *supra* note 136, at 4–5.

165. See *id.* at 7.

hurricanes.¹⁶⁶ Resource and fuel mixes are different across the country and policy ideas that work for a natural gas region, for example, may not make sense for a hydropower region.¹⁶⁷ Further, many regions already have programs operating to address threats to the grid in many ways over various time horizons, and regional flexibility may allow a greater ability to integrate with these existing programs.¹⁶⁸ Lastly, as it relates to regional flexibility, many regions are responding to environmental threats and climate change differently, with some state governments requiring certain amounts of power to come from renewable resources, incenting rooftop solar generation or efficiency measures, and others currently requiring no response.¹⁶⁹ Regional flexibility allows areas to balance various policy goals together.

A. Resiliency Within NERC-Regulated Reliability

Whether resiliency is ultimately identified as a policy gap, the existing framework for national reliability standards is fairly flexible to fill that gap. Action within this framework, however, could potentially be expensive and limit regional flexibility. It would have high national implementation reach.

1. Background on National Reliability Regulation

Prior to 2005, there was little mention of reliability in terms of federal regulation.¹⁷⁰ In response to a widespread 1965 blackout in the Northeast, the electricity industry established the National Electric Reliability Council to develop voluntary standards for the energy grid.¹⁷¹ This later became NERC.¹⁷² In 2005, as discussed earlier in this Note, Congress then added a new section to the Federal Power Act—section 215—which called for the creation of mandatory

166. *Id.*

167. *Id.* at 5–7.

168. *Id.* at 7–8.

169. Amy L. Stein, *Regulating Reliability*, 54 HOUS. L. REV. 1191, 1211 (2017); *see also* NAT’L RENEWABLE ENERGY LAB., *supra* note 11, at 5.

170. *Id.* at 1215.

171. *Id.*

172. *Id.* at 1216.

national standards for electricity system reliability.¹⁷³ A year later, FERC certified NERC as the entity to oversee the creation of reliability standards.¹⁷⁴

In its order certifying NERC as the national entity responsible for reliability standards, in addition to developing specific standards, FERC also directed NERC to develop two broader concepts: 1) define what an overall “adequate level of reliability” would mean, and 2) propose methods for ensuring any standards developed lead to this adequate level of reliability.¹⁷⁵

In carrying out this mandate, NERC then defined this adequate level broadly around seven objectives¹⁷⁶ to plan for and respond to “disturbances” to the system.¹⁷⁷ Further, one of the overall reliability performance standards is specifically centered on managing the response to “low probability disturbances.”¹⁷⁸ Another is ensuring that restoration after major disturbances occurs in a controlled and coordinated matter.¹⁷⁹ The objectives are also assessed over four set time frames: 1) the period before a disturbance, 2) the period immediately after a disturbance when automatic response actions occur, 3) the period quickly following a disturbance when operator action is necessary, and 4) the potentially longer-term recovery and system restoration period.¹⁸⁰ NERC has also noted that all of its activities are viewed within and coordinated around achieving such broadly defined adequate levels of reliability.¹⁸¹

173. Energy Policy Act of 2005, Pub. L. No. 109-58, 119 Stat. 594 (2005); 16 U.S.C. § 824o(a)(4). Note that FERC retained language respecting the jurisdiction of the FPA over only interstate service reliability, noting that reliability regulations under Section 215 would not encroach upon local reliability regulations. Stein, *supra* note 169, at 1211. This has resulted in significant regulatory overlap. Many individual states and regional RTOs maintain their own reliability-based programs which both adhere to NERC’s standards and expand upon them or operate in parallel with them. Despite the overlapping terminology, such local reliability programs are not the subject of this section, which is focused on the NERC-established reliability framework. Incorporating resiliency into regional reliability frameworks is discussed in the next section.

174. Order Certifying North American Electric Reliability Corporation as the Electricity Reliability Organization and Ordering Compliance Filing, 116 FERC ¶ 61,062, paras. 10–11, FERC Dkt. No. RR06-1-000 (July 20, 2006).

175. *Id.* at para. 240.

176. N. Am. Elec. Reliability Corp., Comment on Grid Resilience in Regional Transmission Organizations and Indep. System Operators 4–5, nn.13–14, FERC Dkt. No. AD18-7-000 (May 9, 2018), <https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=14913032>.

177. *Id.*

178. *Id.* at 5 n.13 (Performance Objective 4).

179. *Id.* (Performance Objective 5).

180. *Id.* at 5–6.

181. *Id.* at 7 (“ALR is an outcome of a multi-dimensional effort to identify Reliability Performance and Assessment Objectives and then achieve outcomes that will support reliable operations. This multi-dimensional effort is reflected in NERC’s current and evolving body of reliability standards, which work together to establish a portfolio of performance outcomes, risk reduction, and capability-based reliability standards that are designed to achieve a defense in depth against an inadequate level of reliability. Other NERC programs, such as industry alerts, reliability assessments, event analysis, education, and the compliance with and enforcement of reliability standards, are designed to work in concert with reliability standards to support reliable operation. Each of these activities should be driven by the goal of consistently achieving an adequate level of reliability.”).

In its FERC resiliency docket comments, NERC also highlighted the existence of eight specific NERC standards that relate to “the [Bulk Power System’s] capability to withstand disturbances in anticipation of potential events, manage the system after an event, and/or prepare to restore or rebound after an event.”¹⁸² This includes Reliability Standard TPL-001-4, for example, which is referenced in numerous RTO and ISO comments as related to resiliency,¹⁸³ and requires that transmission operators provide planning performance requirements in anticipation of potential disruptive events.¹⁸⁴ NERC also has standards tailored to responding to emergency events, including cybersecurity incidents.¹⁸⁵

Taken together, NERC reliability is about more than ensuring day-to-day operations. It incorporates consideration of what happens after routine and nonroutine threats to the system, it specifically considers low probability disturbance, and it plans over short- and longer-term planning horizons. These concepts and objectives are arguably sufficiently broad to have room—in the form of modifying existing standards, or creating new standards—to incorporate new policy objectives identified in the name of *resiliency*.

2. Resiliency Within the NERC Framework

If resiliency becomes ultimately about filling a gap in planning for the response after an event, perhaps one of the existing response-based standards could be expanded to address such a gap. Or if that is not sufficient, NERC’s objectives related to a “controlled response” could likely be invoked as a justification for new standards to address whatever gaps exist.

If resiliency is about a gap in regulation relating to extreme events, perhaps TPL-001-4, which already includes assessment of a “wide range of probable” events,¹⁸⁶ could be expanded to fill that gap. Or a new standard could be adopted under the objective of responding appropriately to “low probability disturbances.”

Finally, if resiliency is about a different type of planning horizon, there does not appear to be any language in NERC’s objectives nor in Congress’s authority over reliability limiting the time horizon for reliability regulation to the short term.

Many stakeholders have already suggested that the NERC framework is the right place to house a continuing conversation about resiliency. SPP, for

182. *Id.* at 8–9.

183. *See, e.g.*, Sw. Power Pool, Inc., *supra* note 130, at 5; Midcontinent Indep. Sys. Operator, Inc., *supra* note 129, at 25.

184. N. Am. Elec. Reliability Corp., *supra* note 176, at 8.

185. *Id.*; *see also* N. Am. Elec. Reliability Corp., Standard CIP-004-6: Cyber Security – Personnel & Training (July 2016), <http://www.nerc.com/pa/Stand/Reliability%20Standards/CIP-004-6.pdf>; N. Am. Elec. Reliability Corp., Standard CIP-007-6: Cyber Security – System Security Management (July 2016), <http://www.nerc.com/pa/Stand/Reliability%20Standards/CIP-007-6.pdf>.

186. N. Am. Elec. Reliability Corp., Standard TPL-001-4: Transmission System Planning Performance Requirements (Jan. 2015), <https://www.nerc.com/files/TPL-001-4.pdf>.

example, stated that the NERC construct for continually monitoring and enhancing standards is sufficient to address current and future needs with regards to enhancing resiliency.¹⁸⁷ By using this model, it states that specific policy goals and gaps could be identified and then woven into existing or new standards.¹⁸⁸ NERC itself has also already taken action to signify that it is thinking about resiliency within the jurisdiction of reliability, as part of its existing mission.¹⁸⁹ As noted in NERC's comments, it has already adopted a "framework" for discussing resiliency and will continue to assess what activities, including any proposed reliability standards, may be appropriate to address areas where the industry can improve resilience of the Bulk Power System.¹⁹⁰

3. Cost Analysis

It is difficult to analyze costs for policies that do not yet address a specified unique problem and for whose scope of solution is unknown. Further, NERC does not currently detail specific analysis of the costs of implementing its standards when forming them.¹⁹¹ In general, high costs of implementation and a lack of a cost-effectiveness analysis during the standards development process have been cause for concern in the industry.¹⁹² NERC, however, has been developing a Cost of Risk Reduction Analysis,¹⁹³ which will help assess a risk to the electricity system, the consequences of not addressing the risk, any potential egregious costs, and the relative effectiveness and cost of alternative approaches to meet the standard's objective.¹⁹⁴ NERC also noted, however, that certain reliability mandates under NERC's purview come directly from FERC and "[i]rrespective of industry opinion regarding risk or cost, NERC is required to address the reliability issue that FERC identified in its directives."¹⁹⁵ This dynamic places some basic limitations on NERC to mitigate against the high costs of implementation.

187. Sw. Power Pool, *supra* note 130, at 18–19.

188. *Id.*

189. N. Am. Elec. Reliability Corp., *supra* note 176, at 8–9.

190. *Id.* NERC, does, however, upon subsuming resiliency within reliability, go on to encourage FERC to explore additional action supporting reliability attributes provided by all resources. *Id.* NERC doesn't have authority over this, but reliability concepts already influence work outside of NERC, and such a "resiliency as reliability" framework would simply be an expansion of how reliability is already discussed and managed by FERC and NERC together.

191. See N. AM. ELEC. RELIABILITY CORP., COST OF RISK REDUCTION ANALYSIS, PHASE 1: NERC PROJECT 2015-10 SINGLE POINTS OF FAILURE (TPL-001-4) PILOT iv (Aug. 5, 2016), https://www.nerc.com/pa/Stand/CostEffectivenessPilotProgram/Consideration_of_Comments_080516.pdf.

192. *Id.*

193. See *generally id.* (discussing the development of the Cost of Risk Reduction Analysis program).

194. *Id.* at iv.

195. *Id.*

4. Reach of Resiliency Within this Framework

NERC standards have a broad regulatory reach. They touch every owner, operator, or user of a facility or control system necessary for operating the interconnected energy supply and transmission network.¹⁹⁶ This generally includes transmission owners and operators and utilities that transport energy across transmission lines.¹⁹⁷ It also includes owners and operators of power plants. This is broader than FERC’s regulatory reach over wholesale rates as it includes entities in Texas,¹⁹⁸ and public entities otherwise largely outside of FERC’s jurisdictional reach.¹⁹⁹

It is still, however, not a universal reach. NERC jurisdiction does not include Alaska, Hawaii, Guam, or Washington, DC.²⁰⁰ It also does not reach infrastructure from the local distribution facility to more distributed resources, such as solar projects on roofs, or the management of technology installed in a building to help control how and when that building uses energy in relation to price and availability of electricity resources.²⁰¹ Many states have taken measures to encourage the growth of such resources and technologies as part of larger goals to encourage efficiency and increase the use of renewable resources,²⁰² and as programs grow in accordance with these goals, NERC’s existing reach may continue to diminish.

5. Regional Flexibility

There is a longstanding tension in environmental regulation and policy scholarship between advocating for nationwide standards to prevent the effects of largescale problems, such as pollution, and the promotion of local action to lead to local, creative solutions, which can showcase various ways of achieving success based on region-specific needs.²⁰³

196. Order Certifying North American Electric Reliability Corporation as the Electric Reliability Organization and Ordering Compliance Filing, 116 FERC ¶ 61,062, para. 10 n.12, FERC Dkt. No. RR06-1-000 (July 20, 2006) (“Bulk-Power System means facilities and control systems necessary for operating an interconnected electric energy transmission network (or any portion thereof), and electric energy from generating facilities needed to maintain transmission system reliability. The term does not include facilities used in the local distribution of electric energy.”).

197. *But see* Stein, *supra* note 169, at 1211, 1215–16 (discussing some of the exceptions and limitations on reach over certain transmission and all local distribution facilities).

198. Elect. Reliability Council of Tex., Inc. & Pub. Util. Comm’n of Tex., *supra* note 151, at 2 (explaining that NERC standards would govern Texas entities).

199. *See* Bonneville Power Admin., Comment on Grid Resilience in Regional Transmission Organizations and Independent System Operators 2, FERC Dkt. No. AD18-7-000 (May 9, 2018), <https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=14913702> (noting that Bonneville is registered with NERC).

200. Stein, *supra* note 169, at 1216. It can’t, however, be used to issue penalties against the federal government. *See* Sw. Power Admin. v. FERC, 763 F.3d 27, 29 (D.C. Cir. 2014).

201. Stein, *supra* note 169, at 1216.

202. NAT’L RENEWABLE ENERGY LAB., *supra* note 11, at 5.

203. *Compare* George C. Coggins, *Regulating Federal Natural Resources: A Summary Case against Devolved Collaboration*, 25 ECOLOGY L. Q. 602, 604–06 (1999), with Andrea K. Gerlak, *Federalism and*

Here, there may be a similar tension. While NERC purports to employ standards focused on results rather than the methods of accomplishing those results,²⁰⁴ the application of top-down standards across the entire country is likely less responsive to regionally-specific needs and priorities than regionally-developed policies. NERC currently, for example, has very detailed training and physical security requirements for entities to follow to protect critical infrastructure, particularly in the case of cyberattack.²⁰⁵ In this vein, some members of the industry have indicated that similar NERC standards for resilient infrastructure may not be the most flexible way of addressing resiliency-related problems. Specifically, in its comments on the resiliency docket, MISO asked the commission to directly ensure that any NERC standards do not create limitations on the implementation of superior tools and best practices developed regionally to support grid security and resilience.²⁰⁶

B. Resiliency within Regional Resource Adequacy Planning

In addition to following NERC reliability standards, regional entities including RTOs and ISOs engage in robust resource planning processes to ensure they have generation and transmission resources to meet future demand.²⁰⁷ Such RTO and ISO programs, as overseen by FERC, may be able to house resiliency concerns. This option would likely vary in terms of cost and have a more limited reach, but it would allow for significant regional flexibility.

1. Background on Resource Adequacy and Reliability Managed by RTOs and ISOs

As discussed earlier in this Note, RTOs and ISOs manage transmission and competitive electricity market transactions for approximately two-thirds of the country's consumers.²⁰⁸ In addition to managing transmission, they also take actions to ensure adequate electricity resources exist to meet current and future demand for electricity in their regions.²⁰⁹ To achieve this resource adequacy, they facilitate numerous planning programs, often with public utility commissions, to ensure every utility acquires what it will need.²¹⁰ Some regions

U.S. Water Policy: Lessons for the Twenty-First Century, 36 *PUBLIUS: J. OF FEDERALISM* 231, 232–33 (2006).

204. N. Am. Elec. Reliability Corp., *Results Based Standards* (last visited Dec. 16, 2018), <https://www.nerc.com/pa/Stand/Pages/ResultsBasedStandards.aspx>.

205. N. Am. Elec. Reliability Corp., Standard CIP-007-6: Cyber Security – System Security Management (July 2016), <http://www.nerc.com/pa/Stand/Reliability%20Standards/CIP-007-6.pdf>; N. Am. Elec. Reliability Corp., Standard CIP-004-6: Cyber Security – Personnel & Training (July 2016), <http://www.nerc.com/pa/Stand/Reliability%20Standards/CIP-004-6.pdf>.

206. Midcontinent Indep. Sys. Operator, *supra* note 129, at 2.

207. See Perkins, *supra* note 74, at 27.

208. MCGREW, *supra* note 2, at 161.

209. See Perkins, *supra* note 74, at 27.

210. *Id.*

operate capacity markets, allowing wholesale electricity purchasers, often utilities reselling power to individual consumers, to bid to pay another entity to build a power plant in the future to ensure there will be enough resource capacity on the market in the future.²¹¹

The specific rules and structures of each region are determined primarily at the regional level, and for any decisions they make that impact wholesale rates, the ISO or RTO must submit filings for FERC approval, known as tariffs.²¹² While generally, ideas originate at the local level and are approved by FERC, and generally, FERC has allowed a great deal of flexibility in developing these programs,²¹³ FERC could, for example, disapprove existing or proposed policies as unjust and unreasonable and suggest alternatives.²¹⁴

Like NERC reliability, these programs are about much more than just ensuring day-to-day operations or even ensuring that there will be enough power in the future to maintain day-to-day operations. Many of the ISOs view their existing menu of programs and markets as comprehensive tools that allow them to respond to the many challenges of their region, including planning for what happens after a disruptive event occurs, taking measure to account for significantly disruptive events, and conducting long-term planning.²¹⁵

2. Resiliency within RTO and ISO Resource Adequacy

Due to the comprehensive tools available to RTOs and ISOs in the regional coordination of resource adequacy planning, any policy gap identified in the name of resiliency could very likely be housed within this framework. Because this Note focuses on actions that the federal government can take, such a practical placement would likely mean that FERC could help identify specific policy outcomes in the name of resiliency and recommend tools to achieve those

211. See *id.* at 28–31; see also, e.g., PennState, *supra* note 76.

212. Order Terminating Rulemaking Proceeding, Initiating New Proceeding, and Establishing Additional Procedures, 162 FERC P 61012, 8, para. 9, FERC Docket No. AD18-7-000 (Jan. 8, 2018).

213. Perkins, *supra* note 74, at 29–30.

214. See Order Terminating Rulemaking Proceeding, Initiating New Proceeding, and Establishing Additional Procedures, 162 FERC ¶ 61,012, para. 14, FERC Dkt. No. AD18-7-000 (Jan. 8, 2018) (noting that without a showing of unjust and unreasonable, FERC has no authority to impose a new rate).

215. CAISO, for example, stated in its resiliency docket comments that it views the many operations that it and the California Public Utilities Commission take, many outside the scope national standards and jurisdiction, as working together to protect the region. See Cal. Indep. Sys. Operator, Comments of the California Independent System Operator Corporation in Response to the Commission’s Request for Comments About System Resiliency and Threats to Resilience 7 (March 9, 2018), FERC Docket No. AD18-7-000. Similarly, NYISO has a biennial “reliability planning process” to identify any risks to resource adequacy or transmission security over a ten-year planning horizon. N.Y. Indep. Sys. Operator, Inc., *supra* note 139, at 20–21. If the NYISO identifies a reliability need, it solicits solutions relating to transmission, generation, efficiency, and more, to resolve any such need. *Id.* This reliability planning process strives to achieve market-based solutions whenever possible, but if these aren’t sufficient, the NYISO analyzes options and selects the most cost-effective or efficient regulated transmission solution to resolve the reliability need. *Id.*

outcomes, acting as a resource.²¹⁶ FERC could also use its authority under the Federal Power Act and signal that it would approve certain changes, or even request changes, to market structures in RTO and ISO tariffs if a region wanted to try new approaches to incorporate new, more flexible tools to better facilitate whatever resiliency is ultimately understood to mean.²¹⁷ Under this framework, depending on the policy gap identified in relation to resiliency, there are many possible actions that regions can use and weave together—and FERC could encourage—to fill the gap. The following paragraphs examine two possibilities.

First, a consistent aspect of regional resource adequacy planning is that the projection of future demand does not just include a projection of exactly how many hours of the day people will have the lights on, or factories will run, but also incorporates expected and unexpected events that may change demand, such as predictable weather and outages, and also more unlikely threats such as extreme weather and attack.²¹⁸ This is often referred to as a “reserve margin,” which represents an extra amount of resource built into the projected needs.²¹⁹ In NYISO’s capacity market, for example, enough power must be purchased to incorporate a reserve margin that is intended to address potential contingencies and “other unanticipated events.”²²⁰ SPP does not operate a capacity market but requires that each entity supplying power maintain a reserve margin of 12 percent more power resources available than they project they will actually need.²²¹ California’s regulators also engage in a resource adequacy planning process which incorporates a baseline 15 percent reserve margin to account for unanticipated events, and to provide flexibility for changing resource mixes and the growing threat of climate change.²²² Depending on what resiliency is ultimately seeking to address, new policy goals could be folded into these models to increase the amount of future available resources that can compensate for losses after an event occurs, or anticipate more extreme events.

Second, FERC could routinely approve and even encourage market mechanisms surrounding energy and future capacity markets that allow them to react to contingency events in a more flexible manner.²²³ Such mechanisms will likely require tariff adjustments that allow for higher rates in certain circumstances.²²⁴

216. See, e.g., PJM Interconnection, L.L.C., *supra* note 134, at 6 (in requesting that FERC ask RTOs and ISOs to propose tariff amendments to include market changes relating to price formation and nonmarket operations during emergencies, PJM demonstrates that they are looking to FERC for approval and potentially guidance in this area).

217. *Id.*

218. See, e.g., Sw. Power Pool, *supra* note 130, at 15 (SPP’s reserve margin); Cal. Indep. Sys. Operator Corp., *supra* note 37, at 154 (California’s reserve margin).

219. Cal. Indep. Sys. Operator Corp., *supra* note 37, at 154.

220. N.Y. Indep. Sys. Operator, *supra* note 139, at 8.

221. Sw. Power Pool, *supra* note 130, at 15.

222. Cal. Indep. Sys. Operator Corp., *supra* note 37, at 154.

223. See, e.g., PJM Interconnection, *supra* note 134, at 6.

224. *See id.*

Texas, which does not need FERC approval over its market structures, is already doing this.²²⁵ Texas’s electricity markets include scarcity pricing, which authorizes them to pay wholesale electricity rates as high as \$9,000 per megawatt-hour based under scarcity conditions.²²⁶ This is much higher than approved rates in other regions of the country.²²⁷ This means, for example, that in extremely cold weather conditions that causes people to increase their use of heating or threatens electricity infrastructure, Texas would be able to pay higher prices, potentially making it economically feasible for reserve power generators to stay in operation.

FERC has already approved emergency payments outside of market rules when requested in extreme situations.²²⁸ Flexible solutions outside of capacity or energy market payments in the name of resiliency would therefore likely not be out of reach within already existing FERC-regulated market and regulatory frameworks. This idea is particularly relevant if resiliency is ultimately about what happens after an event, or if it is about more severe events.

In this vein, as previously discussed, PJM has already called upon FERC to request tariff proposals from all of the RTOs and ISOs that would permit nonmarket operations during emergencies, including provisions that allow utilities to pay generators for their costs when the markets are not operational.²²⁹ PJM also requested that FERC request necessary tariff proposals on a number of other comprehensive measures to address resiliency, including changes to its operating reserve market rules and energy price formation to allow it to value energy resources based upon their reliability and resiliency attributes.²³⁰

Of note, PJM’s desire for FERC to request these formal tariff changes is not shared by other RTOs and ISOs.²³¹ PJM also supported the DOE rule of compensating power plants for keeping fuel on site, and such market mechanisms they are proposing likely incorporate this possibility.²³² Unlike the initial DOE proposal, however, which would have required this tool everywhere to promote resiliency,²³³ using this framework would make it just one possible

225. Elec. Reliability Council of Tex., *supra* note 151, at 2.

226. *Id.* at 4–5.

227. *Id.*

228. Order on Technical Conferences, 149 FERC ¶ 61,145, 6, FERC Dkt. No. AD13-7-000 (Nov. 20, 2014) (“[D]uring the severe cold weather events of last winter, the Commission granted several requests submitted by RTOs/ISOs to temporarily waive bid caps that could prevent generators from reflecting their full fuel costs in their offers, providing generators with greater certainty that they would be permitted to recover higher fuel costs caused by the extreme cold weather. Finally, the Commission has accepted two Winter Reliability Programs filed by ISO-NE to encourage generators to maintain onsite fuel inventories, addressing concerns about generator reliance on pipeline deliveries of fuel during periods of high natural gas demand and stresses on pipeline systems.”).

229. PJM Interconnection, *supra* note 134, at 6.

230. *Id.*

231. Cal. Indep. Sys. Operator Corp., *supra* note 136, at 4–5.

232. PJM Interconnection, *supra* note 134, at 6.

233. Proposed Rule, *supra* note 1, at 11–12.

tool to address whatever resiliency ultimately means within the context of RTO and ISO adequacy planning and market operations. It helps to illustrate, however, that there is room within existing market mechanisms to incorporate any new resiliency concepts on a regional basis.

3. *Cost*

It is not possible to directly analyze the costs of actions taken at the regional level to promote a still emerging concept of resiliency. Some actions, such as mandating additional power plants be built to accommodate potential events, may be very expensive and result in wasted resources if events never occur. On the other hand, Texas's utility claims that use of such market tools helps keep their grid running more efficiently and reliably and helps the state to avoid more expensive regulations overall.²³⁴ Encouraging regions to develop their own tools—and in doing so, engaging with local stakeholders and agencies such as public utilities commissions, who are charged with keeping rates low—may help ensure that cost is more closely considered in weighing various actions in the name of resiliency. For example, NYISO's stakeholder process involves always striving to select the most cost-effective tool to achieve a certain reliability outcome.²³⁵

4. *Reach of Resiliency within this Framework*

As detailed previously in this Note, FERC-regulated RTOs and ISOs only represent two-thirds of the country, and any actions geared toward them, therefore, leave out a third of the nation.²³⁶ Further, if FERC were to encourage and incent actions by RTOs and ISOs, rather than request changes, it would be uncertain which entities would proceed with changes.

5. *Regional Flexibility*

Practically defining resiliency within the confines of existing RTO and ISO programs, on the other hand, directly promotes regional flexibility. Even the most heavy-handed option, which PJM has called for—FERC requesting tariff changes to incorporate new resiliency-based market mechanisms—in theory, could allow regions to incorporate regional concerns into their proposals.²³⁷ However, many RTOs and ISOs consider this to be too far-reaching and seek a

234. Elec. Reliability Council of Tex., *supra* note 151, at 4–5.

235. N.Y. Indep. Sys. Operator, *supra* note 139, at 20–21.

236. MCGREW, *supra* note 2, at 161; FERC, *Electric Power Markets: National Overview*, *supra* note 82.

237. PJM Interconnection, *supra* note 134, at 6 (the requests for tariff changes that are still broad enough to incorporate different interpretations if for example, they were based on performance metrics rather than specific policies).

less intrusive model which allows each region to act first and then seek approval.²³⁸

V. RESILIENCY DEFINITION AS A TOOL TO INCREASE COORDINATION, OR AS JUSTIFICATION TO EXPAND FEDERAL JURISDICTION

The ideas presented in Part IV are premised on the notion that resiliency is addressing a problem or problems that have yet to be effectively defined, but problems that nevertheless do exist and will ultimately be defined, likely within the realm of three identified themes. Part IV also attempts to demonstrate that thus far, concerns raised surrounding resiliency could likely be addressed within existing regulatory frameworks.

However, this may be a faulty premise. On one hand, DOE based an entire proposal on compensating coal and nuclear power resiliency attributes, without defining what resiliency was in that proposal.²³⁹ While FERC did not move forward with this specific proposal, by opening a rulemaking to define and seek information from RTOs and ISOs on what they are doing to promote resiliency, it sent a message that this is a conversation that is both within its purview and essential to the future of the electricity grid.

On the other hand, however, some critics do not think resiliency is essential, and that this exercise is not just inefficient policy making, but is rather a solution in search of a problem.²⁴⁰ While FERC has defined resiliency, the current definition thus far has limited applied value because it is not tethered to a problem, and the concepts it touches on are already present in existing regulatory frameworks.²⁴¹

If those critics are right, and there is not actually any specific technical problem that urgently needs to be defined, agreed to, and addressed in the name of resiliency, then the concept has the potential to remain a widely used regulatory word without a specific applied definition. Reliability means something, and it is clear who is in charge of it. Resource adequacy also means something, and it is clear who is in charge of that. Resiliency, however, is less clear. It has also just been largely associated with the response to threats and security concerns, and with the idea that the grid is unable to respond to extreme impending events. Resiliency therefore comes with a sense of urgency that could be directed toward numerous goals.

The rapid evolution of the term and the shift toward focusing on it demonstrates this urgency and this potential. Ideas of resiliency did not originate

238. See Cal. Indep. Sys. Operator Corp. et al., *supra* note 136.

239. See *generally* Proposed Rule, *supra* note 1 (lacking a definition of “resilience” or “resiliency” despite regular use).

240. See Kenneth W. Irvin & Christopher Polito, *Grid Reliability and Resilience Pricing: FERC’s Rulemaking and How Our Energy Markets Are Responding*, POWER (June 27, 2018), <https://www.powermag.com/blog/grid-reliability-and-resilience-pricing-fercs-rulemaking-and-how-our-energy-markets-are-responding/?printmode=1>.

241. See *supra*, Parts II–III.

with the DOE proposed rule. The National Academies, for example, published a report earlier in 2017 on the need to enhance the resiliency of the electric system nationwide.²⁴² It noted, however, that there remained a lack of widespread agreement on the metrics that should be used to define resiliency and that more research was needed,²⁴³ and then discussed various policies across every level of the electricity sector not currently being addressed, that could enhance resiliency.²⁴⁴

The DOE policy proposal then increased the attention and focus on the concept of resiliency, creating an additional sense of urgency, without actually defining it.²⁴⁵ This urgency was then channeled into the idea that without supporting coal and nuclear plants, we were risking such future resiliency. For example, the initial DOE proposed rule uses language such as “the nation’s electric grid is *threatened* by premature retirements . . .” and “fuel-secure resources are . . . indispensable for *our economic and national security*.”²⁴⁶

FERC’s response then, arguably, may have been an attempt to insert policy into rhetoric and take the now widely used term “resiliency” and help develop an applied meaning and appropriate next steps. It also may have been an attempt to soften the potential political impacts of otherwise rejecting a proposed rule. While FERC is an independent agency, its directors are appointed by the President.²⁴⁷ In rejecting a proposal from the President’s Secretary of Energy, FERC arguably took on some political risk. Continuing the conversation about resiliency, and using it as an opportunity to showcase and reiterate that this is a concept fundamentally important to the future of the electricity system may help reduce that risk while simultaneously gathering valuable information from the industry for future use in the process. Even if this was not the intention, it may have had that effect. Secretary Perry, following FERC’s rejection of the proposed rule, explained that he primarily wanted to start a conversation: “[a]s intended, my proposal initiated a national debate on the resiliency of our electric system.”²⁴⁸

Regardless of any politics that were or were not at play during the initial DOE proposal or FERC’s response, considering that hundreds of comments from across the industry about actions to protect the electricity grid from threats were

242. See NAT’L ACADS. OF SCIS., ENG’G & MED., *supra* note 15.

243. *Id.* at 32–33.

244. *Id.* at 33–34.

245. See Proposed Rule, *supra* note 1.

246. *Id.* at 2–3 (emphasis added).

247. FERC, *Commission Members* (last updated Apr. 11, 2019), <https://www.ferc.gov/about/com-mem.asp?csrt=16483974147365651321>.

248. Press Release, U.S. Dep’t of Energy, Department of Energy Responds to FERC Decision on Proposed Rule (Jan. 8, 2018), <https://www.energy.gov/articles/department-energy-responds-ferc-decision-proposed-rule>. On the other hand, however, President Trump then nominated Bernard McNamee as FERC Commissioner in October 2018, who was a chief proponent of the initial DOE proposal. Jeff St. John, *Key Backer of Trump’s Coal and Nuclear Bailout Effort Is Nominated to FERC*, GREENTECH MEDIA (Oct. 3, 2018), <https://www.greentechmedia.com/articles/read/key-backer-of-trumps-coal-and-nuclear-bailout-effort-is-nominated-to-ferc#gs.kmy5u6Y>.

submitted in response to the docket, and significant amounts of resources are being expended across the industry on understanding and promoting resiliency, the concept of resiliency carries weight. Still, without an applied definition, this, then, also presents an opportunity. There is now a concept available, connected to protecting the electricity grid, which comes with an idea of importance and a need for action, not yet completely tethered to a particularly specific applied problem or metric.

One possible use of this concept going forward is to link it to a specific concern and house it within NERC or RTO and ISO resource adequacy programs, as described above in this Note, using it to support policy gaps identified by FERC’s analysis of the response comments. This would be the least disruptive and would largely maintain the status quo.

Another possibility would be to view it primarily as a coordinating concept—one that covers the threats to the grid that may exist simply because there are so many entities regulating it. The electricity grid is highly interconnected from an infrastructure standpoint, and yet simultaneously disparate from a regulatory standpoint.²⁴⁹ The concept of resiliency could be used as a necessary catalyst for the federal government to take action to ensure that all aspects of the electricity industry are talking to each other. A resilient grid would therefore be a coordinated grid. This idea is fundamental to the 2017 National Academies report, which discussed resilience as a broad concept, and issued recommendations to entities across the industry, from the federal government to local operators, to coordinate resiliency efforts.²⁵⁰ This idea of coordination is also already present in FERC’s resiliency order, where FERC noted that “a proper evaluation of grid resilience should . . . encompass a broader consideration . . . including wholesale electric market rules, planning and coordination, and NERC standards.”²⁵¹

Even another possibility would be to use the idea of resiliency to highlight the importance of supporting more politically challenging policies. One option would be its future deployment as a communications tool to the public and across the industry to support broad Congressional changes mandating major reforms in the electricity industry. For example, advocating for a resilient electricity grid could be used to support greater federal reach into reliability regulations, requiring all entities operate by certain standards, even at the distribution and distributed level.²⁵² Some have suggested that it could even be used to

249. See *supra*, Part II.

250. See NAT’L ACADS. OF SCIS., ENG’G & MED., *supra* note 15; see also *id.* at 3–7.

251. Order Terminating Rulemaking Proceeding, Initiating New Proceeding, and Establishing Additional Procedures, 162 FERC ¶ 61,012, para. 19, FERC Dkt. No. AD18-7-000 (Jan. 8, 2018).

252. In her law review article *Regulating Reliability*, Amy Stein argues that the current limits of federal authority over the grid may not actually reach far enough to ensure reliability, with the inherent limits that stop at wholesale. She writes “the need for a reliable grid is non-negotiable, but the boundaries of authority over it may prove capable of some adjustment.” *Stein, supra* note 169, at 1262. Perhaps resiliency as a concept could ultimately be used as the justification for an expansion of federal authority

completely restructure organized markets, returning to a more directly regulated approach.²⁵³

Further, and paradoxically given its original use to support coal and nuclear power in Secretary Perry's proposed rule, the concept of resiliency could instead be used to promote renewable energy, efficiency, or distributed generation and distributed demand response. More distributed generation, as in power being generated at the very local level, is less susceptible to attack and extreme events because of its more dispersed nature. If a handful of rooftop solar operations go down, or even one small scale community distribution facility fails, the impact to the grid is likely much more manageable than if one nuclear power plant facility suffered an attack or was susceptible to an extreme event.²⁵⁴ Therefore, a more "resilient" grid could be a more distributed grid.

Alternately, as detailed in Part II, climate change itself—with increased fire and flooding risks—poses a significant threat to the electricity grid.²⁵⁵ Policy makers and advocacy groups could then promote anti-climate change policies, such as incentives for renewable energy, and mitigation policies centered on slowing impacts of climate change, like forest fire prevention work, all in the name of a "resilient" grid.

Given the lack of agreement on a concrete, technical definition of resiliency, paired with its current widespread use and associated rhetorical power, resiliency promises to be a very powerful tool for whatever policy proposals can effectively use it.

CONCLUSION

This Note has provided an overview of the current status of resiliency within federal regulation and associated energy markets. It has argued that this concept, while now being discussed in great detail across the industry, lacks an applied definition in that it is untethered to a technical policy problem, and it lacks widespread agreement about what it means or how it is different from the already widely understood regulatory frameworks surrounding reliability and resource adequacy. On the one hand, the ongoing discussion demonstrates that there are routes for resiliency, once defined, to be addressed within these existing regulatory frameworks. On the other hand, it notes that the lack of a specific definition associated with a concept widely understood to be important may present an opportunity to push for greater changes to the electric power system.

over the bulk power system, either immediately within FERC, or perhaps eventually pushing toward Congressional action to create mandates on more actors in emergency situations.

253. Irvin & Polito, *supra* note 240.

254. See Tatsujiro Suzuki, *6 Years after Fukushima, Japan's Energy Plans Remain Murky*, SCI. AM. (Mar. 15, 2017), <https://www.scientificamerican.com/article/6-years-after-fukushima-japans-energy-plans-remain-murky1/> (providing an overview of the longstanding impact of one extraordinary incident involving nuclear power over Japan's power markets).

255. See *supra* Part II.

2019]

“RESILIENT” ELECTRICITY GRID

453

Because resiliency as a concept has a wide reach, but still no agreed-upon technical definition, it can (and likely will) be used strategically to support policy proposals that are more political, and not as deeply rooted in energy data metrics as existing reliability and capacity regulations. Secretary Perry already attempted to use the resiliency concept to support a subsidy for the coal and nuclear industries through the DOE proposed rule. However, that resiliency-linked fossil fuel subsidy was not successful, and widespread interest in resiliency remains. Perhaps it does not have to be tied to such traditional forms of energy, each with its own host of environmental and safety concerns. Instead, resiliency could be defined broadly in a way that can be used to support policies that encourage a more distributed electricity grid, support the growth of emerging clean technologies, or slow and mitigate against climate change.

We welcome responses to this Note. If you are interested in submitting a response for our online journal, Ecology Law Currents, please contact cse.elq@law.berkeley.edu. Responses to articles may be viewed at our website, <http://www.ecologylawquarterly.org>.

