NODAL GOVERNANCE OF THE U.S.
ELECTRICITY GRID

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The U.S. electricity grid faces more challenges on a wider scale than ever before—climate change, energy poverty, crumbling grid infrastructure, the pending onboarding of millions of new grid devices, etc. Preparing the grid for these challenges is not an engineering problem, but rather a governance one: we need a new model for how to govern our grid.

Grid experts often advocate for one of two centralized governance models: the command-and-control system associated with the early development of the electricity grid, or the neoliberal system associated with more recent market reforms.

This article argues that both of these models are wrong. Neither model accurately describes how the grid has functioned in the past or how it ought to function today. Instead, a close examination of the grid and its history reveals a highly decentralized network in which private firms, industry associations, public utilities, local organizations, and state and federal regulators all influence grid governance. This landscape is more aptly labeled a “nodal governance system,” wherein power is wielded by a variety of state, sub-state, and non-state actors.

The nodal governance model is not only descriptively accurate, but also useful. First, using a nodal governance framework, we can develop a true topography of all the players and “power” flows on the U.S. electricity grid. Second, a nodal governance system carries certain benefits we often associate with decentralized governing systems and may even provide a path forward for current policy issues, such as the

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regionalization of California’s electricity grid or the Green New Deal. And third, the nodal governance model reveals the threat that a grid jurisprudence premised on centralized models—recently embraced by the Supreme Court—could pose to our grid. This article argues that we ought to preserve the grid’s nodal nature and leverage it to prepare the grid for the future.

INTRODUCTION

Electricity is a necessity in the modern world. But as the recent example of Puerto Rico shows us, the system that delivers that electricity—the electricity grid—is vulnerable to failure.

As the U.S. moves into a future where electricity becomes even more central to our lives—powering our phones, computers, cars, homes, and essentially every private and public institution in the country—our electricity grid faces more threats than it ever has before. Climate change,1 energy poverty,2 cybersecurity attacks,3 crumbling

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1. In order to reduce greenhouse gas emissions to the levels agreed to by the international community in the Paris Climate Agreement, carbon dioxide equivalent emissions from the U.S. electricity grid must drop around 70% below today’s levels by 2050. RACHEL CLEETUS, ALISON BAILIE, & STEVE CLEMMER, UNION OF CONCERNED SCIENTISTS, THE U.S. POWER SECTOR IN A NET ZERO WORLD: ANALYZING PATHWAYS FOR DEEP CARBON REDUCTIONS 1 (2016). Practically, this means that by 2030, coal-fired power plants must be almost entirely phased-out; natural gas plants must comprise less than a third of electricity generation; and non-hydroelectric renewable energy must provide almost 50% of our electricity needs. Id. at 7 fig.4.

2. In 2016, approximately 2.9 million people in eighteen states had their electricity cut off because they were unable to pay their bills. Jim Polson, More Americans Are Getting Their Electricity Cut Off, BLOOMBERG NEWS (Oct. 13, 2017), https://www.bloomberg.com/news/articles/2017-10-13/in-great-american-blackout-millions-go-dark-due-to-unpaid-bills. The U.S. Department of Health and Human Services reports that more than six million households receive financial aid on their home heating bills through the Low Income Home Energy Assistance program (LIHEA), a federal program designed to provide financing to low-income families struggling to pay their electricity bills. U.S. DEP’T OF HEALTH & HUMAN SERVS., LOW INCOME HOME ENERGY ASSISTANCE PROGRAM: REPORT TO CONGRESS FOR FISCAL YEAR 2014 vi (2014). And LIHEA funding has only been able to reach around 19% of eligible households. Id.

3. According to a 2016 report prepared for the U.S. Department of Energy, there have been an increasing number of cybersecurity events on the U.S. electricity grid over the last few years, primarily in the form of malware attacks intended to hack into grid computer systems. ICF INT’L, ELECTRIC GRID SECURITY AND RESILIENCE: ESTABLISHING A BASELINE FOR ADVERSARIAL THREATS 17 (2016). The Director of National Intelligence, Dan Coats, has even warned that ongoing and ever-more-advanced cyberattacks to critical U.S. infrastructure, including the electricity grid, threaten a “Cyber 9/11.” Dan Coats, Director of National Intelligence, Remarks Delivered to the Billington Cybersecurity Summit (Sept. 13, 2017), https://www.dni.gov/index.php/newsroom/speeches-interviews/speeches-interviews-2017/item/
grid infrastructure, and the massive grid modernization project required to support millions of new devices all present challenges to the grid on an unprecedented scale. If not properly addressed, these challenges could lead to dire consequences. Contrary to conventional wisdom, these challenges are not ones of technology or engineering, but rather ones of governance. We have, for the most part, the mechanical systems we need to bring our electricity grid into the future. What we are missing, according to legal scholars, economists,

4. The American Society of Civil Engineers estimated that we will have a grid infrastructure investment gap of approximately $107 billion by the end of the decade if investment continues apace, AM. SOC’Y OF CIVIL ENG’RS, FAILURE TO ACT: THE ECONOMIC IMPACT OF CURRENT INVESTMENT TRENDS IN ELECTRICITY INFRASTRUCTURE 5 (2011). The electric industry projects than an additional $298 billion of new transmission system investment will be needed between 2010 and 2030 to maintain current levels of grid reliability. MARC W. CHUPKA ET AL., TRANSFORMING AMERICA’S POWER INDUSTRY: THE INVESTMENT CHALLENGE 2010-2030, at 38 (2008). Climate change is expected to accelerate physical threats to the grid: many power generation facilities are at risk due to decreasing water availability in a warming climate; energy infrastructure located along the coastlines is threatened by sea level rise and more frequent and intense storms; oil and gas supply chains are likely to be disrupted during extreme weather events; transmission lines operate less efficiently at higher temperatures; and increasing temperatures can put greater stress on peak demand periods. U.S. DEP’T OF ENERGY, U.S. ENERGY SECTOR VULNERABILITIES TO CLIMATE CHANGE AND EXTREME WEATHER 7 (2013).

5. In order to incorporate new “smart grid” technologies that allow for a more sustainable, efficient, automated, iterative, and self-healing grid, we will need to spend somewhere between $300–$500 billion. ELEC. POWER RESEARCH INST., ESTIMATING THE COSTS AND BENEFITS OF THE SMART GRID: A PRELIMINARY ESTIMATE OF THE INVESTMENT REQUIREMENTS AND THE RESULTANT BENEFITS OF A FULLY FUNCTIONING SMART GRID 1–4 (2011).


7. See, e.g., Severin Borenstein, Effective and Equitable Adoption of Opt-In Residential Dynamic Electricity Pricing, 42 REV. INDUS. ORG. 127 (2013) (advocating for adoption of new governance mechanisms that incorporate time-varying retail pricing for electricity in order to improve the efficiency of electricity markets).
engineers,\textsuperscript{8} and industry associations,\textsuperscript{9} is a grid governance model that can make these changes happen.

The current proposals on the table often revolve around two stylized versions of grid governance and grid history. The first form of governance, associated with the formation and spread of the electricity grid beginning in the early twentieth century and extending through the 1980s, is known as the public utility or regulatory compact model.\textsuperscript{10} In this version, the electricity grid is understood as a severely hierarchical, heavily regulated industry. Electricity is generated, transmitted, and delivered to end-use customers on a grid governed by the same monopoly owner and functioning in a single, top-down direction.

The second form of electricity governance is a neoliberal version of the grid. This model emerged during the 1980s and 1990s, when regulators embraced a market-based approach to electricity management.\textsuperscript{11} During this time, the federal government broke electric utilities’ monopoly grip on the wholesale side of electricity sales, forced utilities across the country to allow non-utility generators access to utilities’ transmission lines, and established regulated wholesale markets to allow parties to buy and sell electricity at competitive prices.

Most academics and policy makers have bought into these two binary versions of grid history, debating whether modern grid problems should be addressed through a more robust or revised

\textsuperscript{8} See, e.g., IGNACIO PÉREZ-ARRIAGA ET AL., MASS. INST. OF TECH., UTILITY OF THE FUTURE: AN MIT ENERGY INITIATIVE RESPONSE TO AN INDUSTRY IN TRANSITION ix (2016) (“[T]he need for proactive reform is clear. Customers now face unprecedented choice regarding how they get their power and how they manage their electricity consumption—regardless of whether they are aware of those choices or are acting on them today.”); J.D. TAFT & A. BECKER-DIPPMAN, PAC. NW. NAT’L LAB., U.S. DEP’T OF ENERGY, GRID ARCHITECTURE 4.6 (2015) (“Due to the relationships between regulatory structure and emerging needs for new types of coordination, the nature of the interplay between regulatory structure and reliability responsibility and management are coming under scrutiny in the industry.”).  

\textsuperscript{9} See, e.g., PETER KIND, EDISON ELEC. INST., DISRUPTIVE CHALLENGES: FINANCIAL IMPLICATIONS AND STRATEGIC RESPONSES TO A CHANGING RETAIL ELECTRIC BUSINESS 3 (2013) (“While we cannot lay out an exact roadmap or timeline for the impact of potential disruptive forces, given the current shift in competitive dynamics, the utility industry and its stakeholders must be prepared to address these challenges in a way that will benefit customers, long-term economic growth, and investors.”).  

\textsuperscript{10} See infra Part I.A.  

\textsuperscript{11} See infra Part I.B.
version of the regulatory compact,12 or whether better market design and expanded competition is the answer.13 Also, within the legal literature, the discussion translates into a federalism issue: should we look to the federal government (often associated with the neoliberal market model) to provide clear governance over the grid,14 or should we promote experimentation at the state level (often associated with the regulatory compact model)?15 Some have even adopted a cooperative federalism approach that attempts to reconcile these narratives.16

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13. See, e.g., Eisen, supra note 6, at 1723–30 (advocating for an “open access” principle to be applied to the distribution system akin to the deregulation of the transmission system that occurred under FERC in the 1990s and 2000s); Ignacio Pérez-Arriaga et al., supra note 8, at x (observing that “structural reform that establishes financial independence between distribution system operation and planning functions and competitive market activities” would be the preferred economically efficient solution); Severin Borenstein, Time-Varying Retail Electricity Prices: Theory and Practice, in ELECTRICITY DEREGULATION: CHOICES AND CHALLENGES 325 (James M. Griffin & Steven L. Puller eds., 2005) (noting that a real-time pricing fix to the competitive retail marketplace would “be the ideal in terms of economic efficiency”); Lester Lave, Jay Apt, & Seth Blumsack, Deregulation/Restructuring Part I: Reregulation Will Not Fix the Problems, 20 ELECTRICITY J. 9, 10 (2007) (decriing state-level efforts to halt deregulation and promoting instead changes in market design to enable greater competition).


But these discussions are making a threshold mistake: assuming that either the command-and-control model or the neoliberal market model—both ultimately top-down, centralized governance systems—describes how the electricity grid actually works. In fact, neither of these models is correct.

This article argues that we ought to think of the U.S. electricity system as a decentralized, nodal network. Not just in the physical sense (with a grid infrastructure composed of a series of nodes where electricity is produced and consumed, interconnected by a web of transmission lines along which electricity is delivered), but also in the theoretical sense. Inspired by the nodal governance model developed in the world of international security law, this article argues that the

State and Local Voices in the Green Energy Revolution, 64 CASE W. RES. L. REV. 1619, 1624–25 (2014) (arguing for a cooperative federalism model that preserves federal and state authority in energy regulation); Felix Mormann, Clean Energy Federalism, 67 FLA. L. REV. 1621, 1657–80 (2015) (applying a dynamic federalism model to Renewable Portfolio Standards and feed-in tariffs at the state and federal levels); Osofsky & Wiseman, Hybrid Energy Governance, supra note 6, at 4–5 (proposing an “innovative model of energy governance” based on “hybrid institutions with strong regional components” to address federalism gaps and overlaps in energy law); Jim Rossi, The Brave New Path of Energy Federalism, 95 TEX. L. REV. 399, 403 (2016) (arguing that the Supreme Court has “abandon[ed] dual sovereignty” in energy law and adopted instead a “concurrent federal-state” jurisdictional framework); Hannah J. Wiseman, Moving Past Dual Federalism to Advance Electric Grid Neutrality, 100 IOWA L. REV. BULL. 97, 100 (2015) (explaining that the dual federalism framework no longer fits the electricity system); Wiseman & Osofsky, Dynamic Energy Federalism, supra note 6, at 814–40 (arguing that a dynamic federalism model with overlapping horizontal and vertical jurisdictional lines describes the energy law landscape better than a dual federalism approach and discussing the governance issues that arise from this overlap).

electricity grid is best described as a series of nonhierarchical relationships that rely on groups (or “nodes”) of actors consolidating their power and using formal and informal connections (“networks”) to manage a course of events. There is no single centralized decision-making entity on the grid.

In fact, looking more closely at the history of the electricity grid, it becomes clear that the grid has always operated as a nodal network, even during phases characterized as command-and-control or neoliberal. Informal actors that survived along the grid’s edge, not captured by the standardized governance frameworks, often dictated the flow of events. And the changes that we see in grid governance are not shifts between two top-down governing phases, but rather the constant evolution of a nodal governance model that has grown more complex and interconnected over time.

Beyond the simple fact that it is descriptively correct, the nodal governance model is helpful for three reasons.

First, it allows us to create an accurate topography of the current grid governance structure and identify the different players and decision-making processes that determine how our grid actually functions, which is often overlooked in a top-down narrative. (For those policymakers and activists looking to make changes on the grid—even to address some of the grid challenges named above—this topography is a useful starting point, as it suggests different pressure points and paths of action.)

Second, building on that topography, we can see the benefits that a nodal governance structure provides: the decentralized nature of the grid offers governance advantages akin to those that we see in other decentralized systems, such as preference maximization; competition and the minimization of externalities; policy experimentation; local governance; and minority rule and dissent, to name a few. Such a topography thus provides potential solutions to intractable policy
problems that have stalled under a top-down governance framework, including movements to regionalize California’s electricity grid or to decarbonize the electricity grid through a Green New Deal-style program.

Third, we can see that these benefits may be threatened by a grid jurisprudence premised on an incorrect, top-down understanding of the grid. In two recent cases, the Supreme Court adopted an interpretation of the Federal Power Act (the federal law governing the electricity grid) that prioritizes certain governing nodes over others. That interpretation, which has already resulted in a flurry of litigation in the federal courts, could lead to a concentration of power at the federal level and an upending of the current nodal structure of the electricity grid precisely when it is needed most.

This article proceeds in five parts. Part I presents the conventional history of the electricity grid based on the top-down, command-and-control and neoliberal models. Part II develops a revised (and more accurate) grid history based on the nodal governance model, then uses that model to map out the topography of our modern electricity grid. Part III lists the governance and policy benefits of a nodal network approach to the electricity grid. Part IV explains how nodal governance is currently under attack. Part V concludes.

The legal and policy implications of a nodal governance approach to the electricity grid discussed in this article are only the tip of the iceberg. Nodal governance could prove useful to a whole host of modern grid problems, ranging from the ongoing disputes within states over how to transform distribution utilities into platform-based ecosystems where individual homes and communities can buy and sell electricity\textsuperscript{18} to the possibility of a “smart home” future where the home itself is populated with new automated, electricity-intensive devices, such as appliances, heating and cooling systems, sensory lighting, and

security systems. This article does not aspire to tackle all of these issues, but rather to lay the groundwork for a nodal governance approach to the electricity grid. Such an adaptive and innovative framework can then be used to address the problems that arise as Americans build an electricity grid fit for the future.

I. THE CONVENTIONAL HISTORY OF THE U.S. ELECTRICITY GRID

What follows is the conventional story of governance theory, as told by nodal governance scholars—which, incidentally, maps perfectly onto the conventional story of grid governance told by most grid policymakers and experts. Both stories begin with two standard ways of conceptualizing governance: a top-down, command-and-control model (under which the state directly dictates the behavior of private actors), and a regulated marketplace or neoliberal model (under which the state harnesses economic forces to direct the choices of private actors). According to this conventional governance theory, the history of governance is the history of command-and-control states transitioning to neoliberal states. According to most legal scholars and policymakers, the history of the governance of the U.S. electricity grid follows the same pattern: the electricity grid began as a command-and-control model, then transitioned into a neoliberal model.

A. The Command-and-Control Model

We begin first with the command-and-control model, which, in the conventional story, owes its origins to the writings of Thomas Hobbes. In his seminal work, *Leviathan*, Hobbes theorized that the State, rising out of the state of nature, gains a monopoly over the legitimate exercise of power via a social contract consented to by the people. The people give up their right to autonomy and self-governance in return for the State’s promise to provide protection and security. The Hobbesian model assumes that governance is a centralized, top-down, command-and-control system in which the State is the ultimate source of power.


and decision-making. Although the State can designate other, more technically competent agents to execute its commands, the determination of the end goals remains within the State itself because, under the social contract, it is only this body that can decide the will of the people. Figure 1 presents a diagram of the command-and-control model, in which decision-making originates at the top and flows down a hierarchical pyramid.

Figure 1. Representation of a command-and-control governance framework. Power flows from the top down, and the bottom layer (signifying private actors) has little input in everyday governance choices.

The conventional history of the U.S. electricity grid likewise says that the first phase of grid governance followed this Hobbesian model. Out of a state of nature emerged a centralized governance system charged with defining and acting on behalf of the common good under the blessing of the social contract. To wit: in 1882, the modern electricity grid is born when Thomas Edison performs the first large-scale commercial test of his electric lightbulb. Shortly thereafter,

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21. WOOD & SHEARING, IMAGINING SECURITY, supra note 17, at 8.
22. Id. at 9–10.
hundreds of “electric lighting” companies popped up around the country, using Edison’s technology and the lure of the lightbulb as the means of establishing small, decentralized grids, mostly private and mostly for the wealthy.24 The wild state of numerous small-scale grids was quickly followed by consolidation at the hands of a few big players in the electricity field: Edison’s company (which later became General Electric), Westinghouse, and Houston-Thomson.25

But the real leviathan of this emerging command-and-control ecosystem was Samuel Insull, Edison’s protégé and the instigator of the public utility model.26 While running the Chicago Edison Company, Insull realized that the secret to increasing the company’s revenues was not attracting wealthy customers with luxury prices but rather broadening the customer base by lowering prices and recruiting a diverse set of consumers.27 This model made the large central turbine powering the grid—increasingly the preferred technology for electric utilities—more efficient and cost-effective.28 Furthermore, if electric utility companies could capture a large set of customers in a single area, the duplicative transmission lines strung by competing electric lighting companies in cities across the country could be eliminated. Insull concluded that a monopoly structure was the best answer to both the consumer and capital problems that his industry faced.29 Moreover, this would not be just a simple monopoly, but a regulated monopoly whereby the state oversaw rate and service standards for the electricity companies and the companies were granted an exclusive franchise territory in return.30

Thus began the electric utility version of the Hobbesian social contract—the “regulatory compact.”31 The regulatory compact envisioned a straightforward exchange: “In return for an exclusive


27. *Id.* at 67–69; Hughes, *supra* note 24, at 217.


franchise, the right of eminent domain, and an ability to sell electricity at reasonable rates, electric utilities would provide reliable, universal service and forgo some of the profits that might be attainable in the absence of regulation. Like the social contract, the regulatory compact required that the people give up their freedom to choose amongst a variety of competitive electricity companies and cede decision-making authority to the public utility commission (PUC) and the utility itself in return for a guarantee that the regulated utility would provide for the common good—i.e., providing low-cost electricity to all customers within its domain.

To implement the regulatory compact, states passed public utility laws requiring utilities to set “just and reasonable” rates. PUCs were formed and instructed to determine what constituted reasonable expenses and profits for the electricity business. In most cases, this involved cost-of-service ratemaking, or heavily factual and technically complex administrative proceedings that required utilities and regulators to determine the “actual prudent costs” necessary to allow electric utilities to operate effectively. Utilities were then allowed to set electricity rates sufficient to cover their costs and earn a fair return on investment.

The regulatory compact spread like wildfire across the electricity business. Between 1907 and 1930, every state but Delaware passed public utility laws that formed PUCs in order to regulate entities like electricity companies. Meanwhile, Insull and his fellow electric utility monopolists flourished. By the end of the 1920s, ten electric utility holding companies controlled three quarters of the electricity

32. Boyd, supra note 6, at 1643.
33. See McDermott, supra note 31, at 6 (“Under this contract both the utility and consumers give up certain rights, or in contract law terms, exchange detriments. Utilities accept the obligation to serve and charge regulated cost-based rates, and customers accept limited entry (i.e., loss of choice) for protection from monopoly pricing. This bargain represents an ongoing mutual relationship between the owners of the utility (and their agents) and the customers; in effect, a relational contract overseen by the regulator.”).
34. For a good explanation of the development of the case law regarding ratemaking, see Boyd, supra note 6, at 1644–46.
35. McDermott, supra note 31, at 6. Rate-making cases consider such variables as the total revenue for the company; the total costs incurred by the company; the rate base or value of capital; the accumulated depreciation of the capital; the average cost of capital; the company’s operating expenses; annual depreciation costs; and any taxes the utility paid. Id. at 8.
Together, the regulators and the utilities engaged in what historian Richard Hirsh describes as the “utility consensus,” or the agreement amongst electric utility executives, progressive era reformers, public utility commissioners, and economists that the electricity industry constituted a natural monopoly that required a single service provider in a franchised area, subject to direct state monitoring.

In the decades that followed, according to the traditional version of electric grid history, top-down, centralized government regulation of the electricity industry became the norm. In fact, by some metrics, regulatory oversight of the system increased: in 1934, Congress passed the Public Utility Holding Company Act, requiring holding companies that held assets crossing state lines to register with the newly-formed Securities and Exchange Commission and abide by its financial regulations. The next year, Congress also passed the Federal Power Act, giving the federal government regulatory authority over wholesale sales and transmission of electricity that occurred interstate. Around the same time, Congress created the Tennessee Valley Authority (TVA), a power project that involved the federal government playing a direct role in the production and sale of electricity.

For the next sixty years, so the story goes, very little changed in electricity governance. Command-and-control regulation of the electricity monopoly ostensibly produced a steady stream of profits, consistent declines in the price of electricity, and capital investment large enough to build giant, centralized power plants and an intricate

37. BAKKE, supra note 24, at 69–70.
38. See generally RICHARD F. HIRSH, POWER LOSS: THE ORIGINS OF DEREGULATION AND RESTRUCTURING IN THE AMERICAN ELECTRIC UTILITY INDUSTRY (1999); see also BAKKE, supra note 24, at 70.
42. From the inception of the industry until the 1970s, electricity consumption doubled every decade. CASAZZA & DELEA, supra note 23, at 4.
web of transmission lines stretching across the entire country.\textsuperscript{44} Then, as a series of external shocks rocked the electricity system—the 1970s oil crisis, a drop in demand for electricity accompanied by an efficiency plateau for large turbines, and the beginnings of the environmental movement\textsuperscript{45}—the command-and-control system faltered, and the stage was set for the transition to the next stage of governance: the neoliberal marketplace.

\textbf{B. The Neoliberal Model}

According to the conventional governance story, while the Hobbesian model is a useful starting point for describing how centralized bodies wield power, it is incomplete. In particular, the command-and-control model fails to account for the effects of economic forces (namely, the free market ideas developed by classical liberals like Adam Smith and John Locke). The neoliberal model of governance is an attempt to respond to this deficiency. It combines the political characteristics of the State developed in the command-and-control model with the free market of classical liberalism to produce a regulated marketplace governance model.\textsuperscript{46}

Importantly, the neoliberal model does not eschew the centralized, top-down existence of the State. Under neoliberalism, the State continues to decide the goals of governance, but markets are used to execute those goals.\textsuperscript{47} Some neoliberal scholars use the analogy of “steering” and “rowing”:\textsuperscript{48} the State steers the ship, while markets are responsible for rowing it in the chosen direction.\textsuperscript{49} The State guides the “rowing” by setting the rules of the market, policing the market for bad actors, or even dictating the economic terms of the market by contracting for market goods itself.\textsuperscript{50} Thus, both the Hobbesian model

\textsuperscript{44} Lorin Philipson & H. Lee Willis, Understanding Electric Utilities and De-Regulation 94 (2d ed. 2006).
\textsuperscript{45} Bakke, supra note 24, at 86–90.
\textsuperscript{46} Wood & Shearing, Imagining Security, supra note 17, at 10.
\textsuperscript{47} Id. at 10–11.
\textsuperscript{49} Shearing, Reflections on the Refusal to Acknowledge Private Governments, in Democracy, Society, and the Governance of Security, supra note 17, at 22; Wood & Shearing, Security and Nodal Governance, supra note 17, at 2.
\textsuperscript{50} Wood & Shearing, Security and Nodal Governance, supra note 17, at 2–4.
and the neoliberal model embrace top-down, hierarchical systems of government, even if the neoliberal model also disaggregates power from one form (political) into two (political and economic). Figure 2 presents a diagram of the neoliberal model; the blue arrows represent political forces, while the red arrows represent economic forces.

**Figure 2.** Representation of a neoliberal governance framework. Political power still flows from the top down (signified by the blue arrows), but private actors can also interact with each other via economic exchanges in regulated marketplaces (signified by the red arrows). In this example, two separate marketplaces are shown.

Similarly, the conventional story of U.S. electricity grid governance says that the second phase of grid governance began with the development of the neoliberal model. That story proceeds as follows: beginning in the late 1980s and early 1990s, after the electricity industry had experienced external shocks to its system, policymakers seized on the notion that the problem with the electricity system was a failure to allow the free market to “row” the ship of low-cost electricity. To remedy this, regulators set about dismantling the regulatory compact in favor of a market-based approach.

The breakup of the utility monopoly began at the federal level. In 1992, Congress passed the Energy Policy Act, which directed the Federal Energy Regulatory Commission (FERC) to order utilities to open up their interstate transmission lines so that any generator—as

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part of a regulated utility company or not—could sell their electricity at the wholesale level.\textsuperscript{52} Shortly thereafter, FERC adopted Orders 888\textsuperscript{53} and 889,\textsuperscript{54} which mandated that all public utilities that owned or operated interstate transmission facilities file “open access tariffs” with FERC certifying that their transmission services would be run in a “non-discriminatory” manner.\textsuperscript{55} By removing the exclusive franchise at the generation level and putting in place incentives for independent generators to enter into the market, Congress and FERC hoped to turn electricity into a commodity—tradable on a competitive marketplace just like any other good.\textsuperscript{56}

Then, in 1999, FERC adopted Order 2000. This rule created voluntary, independent transmission organizations in the form of Regional Transmission Organizations (RTOs) to manage the transmission lines, develop long-term transmission planning, run wholesale markets where electricity could be bought and sold in competitive auctions, and ensure that access was enforced in a nondiscriminatory manner.\textsuperscript{57} Two years later, FERC issued a Notice of Proposed Rulemaking on Standard Market Design that would have made participation in RTOs mandatory for all interstate buyers and sellers of electricity.\textsuperscript{58}


\textsuperscript{54} Open Access Same-Time Information System (formerly Real-Time Information Networks) and Standards of Conduct, Order No. 889, FERC Stats. & Regs. ¶ 31,037 (1996), 61 Fed. Reg. 21,737 (1996) [hereinafter Order 889].

\textsuperscript{55} See Order 888, supra note 53.

\textsuperscript{56} BAKKE, supra note 24, at 138.


Meanwhile, the states were embarking on competitive retail market efforts of their own. By 1991, thirty-six states had required their regulated utilities to engage in a competitive bidding process to secure additional generation capacity.\textsuperscript{59} In 1998, Massachusetts, Rhode Island, and California set in place programs to break apart the utilities’ retail monopolies and offer greater choice to customers.\textsuperscript{60} By 1999, according to FERC, “twenty-one states had enacted electric restructuring legislation, three had issued comprehensive regulatory orders, and twenty-six states plus the District of Columbia had legislation or orders pending or investigations underway.”\textsuperscript{61}

California in particular approached the neoliberalization of the retail market with fervor. In 1992, California’s PUC began exploring options to open up the state’s private utilities to market competition.\textsuperscript{62} In 1996, California’s legislature passed Assembly Bill 1890, putting in place several principles for electricity restructuring that would go into effect in 1998: (1) direct access, allowing all customers to purchase electricity from any provider, regardless of whether they fell within its franchise territory; (2) the transfer of transmission operations to the California Independent System Operator (CAISO), akin to FERC’s RTO model; (3) the creation of the California Power Exchange (PX), a “spot” market for wholesale electricity purchases open to both investor-owned utilities and independent power generators; and (4) a freeze on retail electricity rates set at 1996 levels in order to allow cost recovery for utilities forced into a competitive market model.\textsuperscript{63} Under California’s restructuring approach, the utilities were required to divest at least 50% of their generation assets and were strongly encouraged to divest the remainder.\textsuperscript{64} They were also banned from

\textsuperscript{59} Watkiss & Smith, supra note 52, at 454 n.28. The states had also already engaged in some competitive wholesale expansion by adopting utility contracting requirements for non-utility power wholesalers that were either cogeneration facilities or renewable energy generators. Id. at 452. This movement sprang from several seemingly innocuous lines in the 1978 federal Public Utilities Regulatory Policies Act (“PURPA”), intended to encourage greater energy efficiency in the wake of the oil crisis. Id.

\textsuperscript{60} Joskow, The Difficult Transition to Competitive Electricity Markets in the United States, in ELECTRICITY DEREGULATION, supra note 43, at 32.

\textsuperscript{61} Order 2000, supra note 57.

\textsuperscript{62} JAMES L. SWEENEY, THE CALIFORNIA ELECTRICITY CRISIS 26 (2002). At the time, investor-owned utilities served 78% of California customers. Id. at 7.


\textsuperscript{64} SWEENY, supra note 62, at 61.
securing generation via long-term, bilateral contracts; instead, they had to conduct all of their wholesale electricity purchases on the spot market or the CAISO wholesale market.\textsuperscript{65}

The results were not encouraging. Wholesale market prices for electricity in June and July of 2000 increased 270% from the same period in 1999.\textsuperscript{66} The state experienced frequent rolling blackouts, with almost 100 declared power emergencies in 2000 and more than 150 in 2001.\textsuperscript{67} One of California’s three largest investor-owned utilities, Pacific Gas & Electric, declared bankruptcy in April 2001.\textsuperscript{68} To staunch the bleeding, both California and FERC issued price caps; the California PX was closed and utilities were permitted to once again contract outside of the market for generation; and the California PUC suspended direct access (or retail choice) in the state.\textsuperscript{69}

In the wake of the California electricity crisis, whereas before around half of the states had been exploring options to transition towards retail competition or were in the early stages of doing so, only fifteen soldiered on.\textsuperscript{70} FERC, having received backlash on its proposal to convert all states to the regional wholesale market model, rescinded its rulemaking. Although FERC continued to issue improvements in RTO design and implementation, the concerted and enthusiastic effort to move the electricity industry to a neoliberal framework stalled. Today, the U.S. electricity grid sits in an ad hoc limbo, with some states containing “restructured” retail markets, some governed by RTOs, and some engaging in traditional ratemaking cases.\textsuperscript{71}

This is where the conventional story of U.S. electricity grid governance ends. With no alternative to the command-and-control model or the neoliberal model, and with no ability to see the history of grid governance as anything but the evolution between those two

\textsuperscript{65.} Id. at 61–64; see also Frank A. Wolak, Lessons from the California Electricity Crisis, in \textsc{Griffin & Puller, Electricity Deregulation} 145, 145–78 (2005).


\textsuperscript{67.} Id.

\textsuperscript{68.} Id.

\textsuperscript{69.} Id.; see also Wolak, supra note 65, at 158–65; see generally Sweeney, supra note 62.

\textsuperscript{70.} Boyd, supra note 6, at 1668.

\textsuperscript{71.} See Boyd & Carlson, supra note 12, at 818–38 (summarizing existing state of hybrid electricity markets).
models, legal scholars and policymakers are left debating the merits and demerits of the two hierarchical governance systems. But as critics tear apart the flaws of both governance systems as applied to the electricity grid, and as neither system seems particularly well-suited to govern the grid of today, no consensus for grid governance has emerged. Meanwhile, problems facing the grid proliferate, and the grid is left with no governing blueprint ready to bring it into the future.

II. NODAL GOVERNANCE AND THE U.S. ELECTRICITY GRID

While the conventional story of the electricity grid told in Part I grasps some of the superficial elements of grid governance, it misses the nuance and driving forces underneath. As a result, the narrative provides little guidance for how policymakers and scholars should approach grid governance moving forward. A new model of governance is needed to understand how the grid actually functioned in the past, and how it ought to function today. That is where nodal governance comes into play. Nodal governance is a theory of governance arising from the realm of international security law that describes a decentralized model of decision-making. It recognizes that a variety of actors, not just the State or the private sector responding to economic incentives, have the ability to influence events in the world. This decentralized model gives a more accurate historical account of the grid and reveals power dynamics that are ignored in the conventional story. As a result, it is more useful for describing the electricity grid today, unearthing the kaleidoscope of players and decision-making processes that actually dictate grid outcomes.

A. The Nodal Governance Model

Nodal governance is a governance model that developed in international security law in order to account for the bevy of non-state actors that wield force alongside the traditional conception of the State. Many scholars have recognized that non-hierarchical, decentralized, pluralistic governance models better describe the landscape of power in the real world than stylized, top-down systems. But often these models are discussed in the context of more traditional American institutional frameworks—for instance, constitutional law, see Metzger, supra note 17, at 1373 (proposing “a new constitutional analysis of privatization”), or administrative law, see Freeman, supra note 17, at 546 (observing that “[t]he time has come” for “the discipline of administrative law to grapple with private power”). That is
firms, think tanks, non-state actors, media organizations, political parties, non-governmental organizations, and civil society entities that populate the modern world, it was unrealistic to think that governing power comes from just one source.75 Governance itself also must be disaggregated. As one such scholar has explained:

What one has in practice is not a single model of governance, but a complex of hybrid arrangements and practices in which different mentalities of governance as well as very different sets of institutional arrangements coexist. We have not simply witnessed a shift away from direct command and control governance to forms of indirect state governance that operate through market mechanisms or through the gentle touch of persuasion associated with third-sector mobilization. Rather, we have a complex set of relationships in which ‘steerers’ and ‘rowers’ constitute relationships and align their interests.76

When you tear apart the hierarchical conception of governance entirely, you end up with a “nodal” view of governance.77 Under this view, no one entity monopolizes governance decisions.78 Instead, a variety of actors—legislatures, government agencies, neighborhood associations, non-governmental organizations, firms, and media conglomerates—use their expertise, resources, and technologies to set governance goals. They then use economic, political, social, informational, propagandistic, and other forms of power to “cajole,” “coerce,” or otherwise direct those they wish to control to fall into compliance with their aims.79 Moreover, under this view of governance,
the “time” of governance must be disrupted as much as its “space”: the “nodes” and “networks” of people and power are “constantly reconstituting themselves” as new organizations form and new connections of influence are established in response to changing environments and shifting alliances.80

The end result is a decentralized theory of governance that is best represented as a collection of dots connected by a multitude of lines rather than a hierarchical pyramid that assumes a single, dominant point. A diagram of nodal governance is shown in Figure 3, in which the multi-colored lines signify different forms of power that actors can use to influence events in the world.

**Figure 3.** Representation of a decentralized nodal governance framework. Power flows from a variety of different “nodes” (the blue circles) or players across the network, some more powerful or interconnected than others. The multi-colored arrows represent different forms of power or influence—economic, top-down regulatory, direct self-governance, informational, or social—that the nodes can use to control events on the network.

**B. A Revised Grid History**

Revisiting the history of the U.S. electricity grid with the nodal governance model in mind, it becomes clear that this model best

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80. Id. at 40; Shearing & Wood, *Nodal Governance, Democracy, and the New ‘Denizens,’* supra note 17, at 404.
describes how governance and power were actually deployed on the grid. In fact, a closer examination of grid history reveals the informal nodes and networks that hummed outside of the formal legal systems all along, and how these out-of-system actors kept the grid intact and steered its course. Take the example of voluntary power pools and small-scale independent generation sources. Both had tremendous influence over events on the grid, yet neither are captured by the standard governance narrative. Nonetheless, both fit seamlessly into the framework of a nodal governance approach. These examples demonstrate that the history of grid governance is best understood as the constant evolution of a nodal governance model that has grown more complex and interconnected over time, rather than a stepwise transition from a command-and-control to a neoliberal model.

1. Voluntary Power Pools

One of the most prominent critiques of the conventional grid story comes in the form of the voluntary power pools of the twentieth century. As the conventional story would have it, the U.S. electricity grid existed in a “highly balkanized” state during the command-and-control phase, during which each utility stayed within its own monopoly jurisdiction. But in reality, very early on in the formation of the grid, the electric utilities *sua sponte* created an interconnected grid that saw utilities swapping electricity across jurisdictional lines and defying the monopoly model. These interconnections, known as “voluntary power pools,” were formed by utility operators seeking to share engineering expertise and maintain grid stability. Eventually, the pools morphed into informal wholesale markets and, later, into regional markets overseen by FERC in the reforms of the 1990s. The pools also represent a classic nodal governance relationship: private firms acting independently to control events on the grid through means other than top-down governance or market competition.

From almost the very beginning of the grid, the electric utilities realized that some level of inter-coordination was necessary to keep

the grid functioning. Reliability demands and the high costs of creating and building new technologies convinced electricity companies—without any pressure from centralized governance systems—that they should design grid infrastructure that was interoperable. That is, the technologies of each utility were compatible: utilities’ transmission lines, interties, voltage converters, frequency levels, and other systems could all be used by rival utilities. The utilities’ organizational structures were compatible as well: the companies developed communication channels between their engineers and operators so that rival utilities could share generation and transmission resources. As the historian Julie Cohn describes it, in the early days of grid development, “thousands of engineers, system operators, manufacturers, and academics” joined together to create “information exchange networks” that “provided opportunities for collaboration, critique, and the development of voluntary standards, especially for power control and reliability,” all without the guidance of “designated governing authorities.”

Over time, these experts developed what they called “power pools,” or cross-jurisdictional arrangements between utilities in which the utilities aggregated their generation assets and determined the least-cost configuration for dispatch at any given time—in essence, voluntary wholesale markets. The power pools operated differently depending on the region: in the Pennsylvania-New Jersey pool, the utilities organized an “operating agreement” under which “each member utility designated one person to serve on an operating committee, which then established the policies for operations,

82. See JULIE A. COHN, THE GRID: BIOGRAPHY OF AN AMERICAN TECHNOLOGY 21 (2017) (describing the example of the Southern California Power Company and the Redlands Electric Light and Power Company in California, two separate companies in the early formation of the grid who had their “own financial obligations to investors and [their] own customer base” but nonetheless engaged in “[p]ower sharing” arrangements to aid in each other’s electricity production and distribution).

83. Id. at 26.

84. CASAZZA & DELEA, supra note 23, at 5–6.

85. COHN, supra note 82, at 8; see also CASAZZA & DELEA, supra note 23, at 24.

86. COHN, supra note 82, at 27.


88. See Boyd & Carlson, supra note 12, at 831; Boyd, supra note 6, at 1674; Michael H. Dworkin & Rachel Aslin Goldwasser, Ensuring Consideration of the Public Interest in the Governance and Accountability of Regional Transmission Organization, 28 ENERGY L.J. 554 (2007).
exchanges of energy, and forecasts of loads." The operating agreement even had member utilities share planning activities. Other power pools were less formal. Some “used loose arrangements, effected by a handshake”; some were regional; some operated only within one state.

These voluntary nodes were not just technically resourceful, however; they were also politically nimble. For instance, during the 1940s, the Roosevelt Administration expressed interest in taking over all of the regionally interconnected grids in order to further the war effort. In response, the utilities formed more interties and tightened their governance structures to prove that they could run the interconnected grid without government oversight. The federal government, acquiescing, waived its interstate jurisdiction and allowed companies to continue to join regional pools without subjecting themselves to federal control.

Twenty years later, federal regulators again attempted to seize oversight of the grid interconnections. They released a National Power Survey in 1964 proposing that a national grid system and accompanying governance and planning body be adopted. Anticipating the report, the utilities united in 1963 to form the North American Power Systems Interconnection Committee (“NAPSIC”), which—by interconnecting seven existing power pools—created the largest synchronized grid in the world. As Julie Cohn describes it:

With the creation of NAPSIC, the power industry had finally established an entity that had eluded large utilities, politicians, and engineers for decades. The independent interconnected systems

89. Cohn, supra note 82, at 64.
90. Id.
91. Id. at 104; see also Philipson & Willis, supra note 44 at 50 (“[U]tilities in both Texas and California were pretty much linked together in pools which covered each state but did not stray too far over state boundaries. Sometimes the pools covered multiple states, as for example the power pool that interconnected utilities in New York and New England, or the Southwest Power Pool, which was formed by utilities in Oklahoma, Arkansas, Louisiana, and parts of surrounding states.”).
92. Cohn, supra note 82, at 106, 108, 110. Hardware companies even developed to cater to the special technological needs of grids that could be operated jointly or separately. Id. at 97–99.
93. Id. at 109–17.
created NAPSIC without fanfare, publicity, political endorsement, or regulatory demand. NAPSIC served as a clearinghouse for stability issues for all the power companies, both public and private, that operated interconnected across the continent. In addition, at the outset, NAPSIC provided a forum for a level of national grid operation and some discussion of autonomous system plans unprecedented in the industry’s history. Yet through its very organizational structure, NAPSIC preserved the independence of government agencies, privately owned utilities, municipal companies, and rural cooperatives and respected the wide variety of systems developing across the continent. NAPSIC was the embodiment of shared responsibility and divided authority.\textsuperscript{96}

NAPSIC and the power pools continued operating relatively uninterrupted by government oversight for the next thirty years.\textsuperscript{97} It was not until the 1990s (coinciding with the so-called neoliberal phase) that the voluntary power pools were converted into formal structures overseen by the federal government. As FERC began to push for greater competition on the grid, regulators and industry participants alike recognized that some form of a regional organizing body was needed to manage load, dispatch, and capacity requirements without discrimination. Instead of subsuming that responsibility under FERC or creating new entities to manage transmission, FERC and the states turned to the preexisting power pools.\textsuperscript{98} These pools formed the first wholesale market operators that FERC eventually adopted and converted into RTOs.\textsuperscript{99}

There are two important observations to draw from this history of the voluntary power pools. First, there was no clean two-phase period in grid governance history marked by a “command-and-control” model and a “neoliberal” model. The wholesale markets that FERC implemented in the 1990s were not the brainchild of neoliberal reforms; they were engrafted solutions that utilities and engineering experts had been using to ensure grid stability and efficiency for almost one hundred years (although they had expanded and transformed as their roles developed under FERC orders). Second, the U.S. electricity grid was populated by unconventional, decentralized nodes that wielded power—through informational ties, political lobbying, and

\textsuperscript{96} COHN, supra note 82, at 146.

\textsuperscript{97} In 1980, NAPSIC was folded into the National Electric Reliability Council (“NERC”), another voluntary regional organization that came about through the utilities’ own initiative. Id. at 145, 167–70, 201. The formation of NERC is itself another excellent example of the network governance operation of the grid.

\textsuperscript{98} Boyd & Carlson, supra note 12, at 831.

industry affiliations and collaborations—to influence events on the electricity grid. Neglecting these nodes and networks of power leaves out valuable information about the on-the-ground reality of grid operation.

2. Independent Generation Sources

A similar story could be told with regard to independent generation sources. The traditional narrative of grid governance says that market competition increased under—and as a direct result of—the neoliberal transition. Moreover, this narrative presumes that no market competition existed during the command-and-control phase. But in reality, a barely noticed, offhand section in a piece of 1970s federal legislation that was intended to address energy efficiency opened up the industry to competition decades before the deregulatory efforts began within FERC. It was this statutory text that convinced experts that wholesale competition could be beneficial and helped spur the reforms of the 1990s. The independent generation sources supported by the statute are again examples of unconventional nodes unaccounted for in the standard governance models, despite their enormous influence.

In 1978, Congress passed the Public Utilities Regulatory Policy Act (PURPA) in response to the oil crisis of 1973. PURPA was designed to encourage more efficient energy usage by promoting cogeneration facilities and favoring electricity produced by non-fossil fuel generators (e.g., biomass, waste, geothermal, solar, and wind).

In particular, Section 210 of the Act—inserted by New Hampshire Senator John Durkin, who had a cogeneration facility in his district that needed a government boost—said that utilities had to purchase electricity from cogenerators or small-scale, non-fossil fuel power producers if they cost the same as the “purchasing utility’s ‘incremental cost . . . of alternative electric energy,’ i.e., the purchaser’s avoided cost.

100. BAKKE, supra note 24, at 86–88.
101. Cogeneration involves the “simultaneous production of electric energy plus steam, heat, or some other useful form of energy.” Watkiss & Smith, supra note 52, at 452 n.20.
102. Id. at 452 n.21.
103. BAKKE, supra note 24, at 96.
to generate or purchase the same amount of electricity.104 The statutory language was merely intended to promote energy conservation and reduce dependence on foreign oil; it was not meant to impact grid governance.105 But—to the surprise of the utilities as well as many policymakers—PURPA had an enormous effect on the wholesale market for electricity. By requiring utilities to purchase generation from small, independent sellers, PURPA broke the hold that vertically integrated utilities exercised over the generation market.106 As historian Phillip Schewe recounts: “[h]ere was something new in the electricity business. A small company, an unregulated company, could build modest generators and find a niche market. . . . Here was an opportunity for an energy entrepreneur to fit into the cracks between existing monopoly grid giants.”107 In fact, in the years after PURPA passed, small-scale independent generators accounted for more than half of new generation capacity built in the U.S.108

In retrospect, PURPA was one of the key factors responsible for paving the way towards the reforms of the 1990s.109 First, the rapid uptake of these generators proved that non-utility generation could compete economically with utility generation, calling into question the usefulness of a monopoly model.110 Second, PURPA’s mandate that small-scale generators be used and compensated at the “avoided cost” of an additional utility installation motivated many state regulators to set costs via a competitive bidding process, foreshadowing today’s wholesale market auctions.111 Third, PURPA forced regulators away from the traditional cost-of-service ratemaking methodology and encouraged the adoption of a more competitive pay-for-performance standard.112 And finally, by focusing on avoided costs, PURPA encouraged state regulators to consider a wider variety of tools—including demand-side management—in reaching customer needs.
thus expanding the range of potential participants in the business beyond utility generators.113

Altogether, the PURPA example yet again demonstrates the points made by the voluntary power pools: first, that history of grid governance is best understood as the evolution, expansion, and improvement upon preexisting models rather than the abrupt transition between a “command-and-control” and “neoliberal” phase; and second, that nodes unaccounted for in the standard governance models nonetheless harnessed their own forms of power to influence outcomes on the electricity grid. In the case of small-scale independent generators, that form of influence was all the more unique, as the generators were brought to life by a top-down mandate but survived under free-market economic principles (before any such market ostensibly existed).

The same story of the influence of decentralized nodes on the U.S. electricity grid could be told about many grid entities.114 The takeaway of each of these stories, though, is that power was not just wielded in a top-down approach on the electricity grid, and that it was not just the State (or the State and regulated markets) that dictated grid events. Rather it was the actions of many decentralized actors, all of them asserting control according to their own methods, all of them motivated by their own governing aims, which “steered” and “rowed” the ship of the electricity grid. It is this decentralized, nodal history of grid governance that can provide the blueprint for how to understand the governance of the electricity grid today.

C. The Topography of the Modern U.S. Electricity Grid

This revised grid history suggests that a better understanding of grid governance requires a comprehensive analysis of all of the potential nodes and pathways that influence events on the grid. Such an analysis produces a decentralized network topography that describes and directs grid governance. This mapping reveals that

113. Id. at 67, 69.
114. For instance: the regional coordinating councils and the formation of the National Electric Reliability Council (“NERC”), see COHN, supra note 82, at 145, 167–70, 201; the long-term bilateral contracts that were prohibited during California’s restructuring period and helped plunge the state into rolling blackouts, see SWEENEY, supra note 62, at 64–66, 74; and the TVA and its “grassroots” approach to electrifying the rural South, see SCHEWE, supra note 25, at 94; see supra note 41 and accompanying citations.
electricity governance should not be conceived of as a command-or-control model, or a neoliberal one, but rather as a densely populated, constantly evolving network of decentralized actors—one that has grown more complex (with more nodes and networks introduced) over time. This network is illustrated in Figure 4.
Figure 4. A map of the key players and paths of influence in modern electricity grid governance. The map reveals a decentralized, nodal network model. The blue circles ("nodes") represent the variety of actors that exercise control over the electricity grid. The multi-colored arrows ("networks") symbolize the different methods of influence that the nodes use to wield their power.
Figure 4 is the visual representation of modern grid governance under the decentralized model. All of the main players and paths of power are included. Some are familiar from the history of the grid recounted above; others are new entrants that have cropped up in the last decade. Similar network relationships and means of influence have been highlighted with colored arrows. This Part discusses these relationships. For those interested in influencing grid events—for instance, environmentalists looking to decarbonize the grid—each relationship represents an opportunity to assert influence, some with more likelihood of success than others.

1. Economic Competition

The red arrows represent a standard market-based or competitive economic relationship. This relationship most often describes the dynamic between buyers and sellers on the electricity grid.

Take sellers of electricity. Historically, this category was dominated by the private investor-owned utility, which controlled three-quarters of wholesale electricity sales in the country. Today, after the reforms of the 1990s, private investor-owned utilities are responsible for only one-tenth of total wholesale sales. The vast majority of wholesale electricity sales (around 40%) have shifted to merchant generators—owners and operators of natural gas plants, nuclear power stations, hydropower and wind turbines, solar fields, and coal plants—that operate outside of the utility structure. These entities are the “Merchant Generator” nodes that appear in Figure 4.

Merchant generators sell their electricity in the wholesale markets (labeled “Regional Wholesale Markets” in Figure 4), competing alongside each other and other generation resources to offer the lowest-cost electricity. Competitors can include leftover private utility assets (the “Private Utility” node in Figure 4), federally owned
generation assets—like the four federal power marketing administrations (PMAs) that generate electricity predominantly from hydroelectric dams (labeled “Federal PMA” in Figure 4),\(^\text{118}\) or the New Deal–era TVA\(^\text{119}\)—as well as local generation owned or operated by states, municipal utilities, public utility districts, or cooperative utilities (represented by the “Municipal Utility” node).\(^\text{120}\)

A new form of competitor has also recently been appearing in the wholesale markets: the “distributed energy resource” (labeled “Distributed Energy Resource” in Figure 4). This umbrella term represents a variety of small-scale, customer-side generation assets—often residential solar panels, cogeneration plants, or electric vehicles or other battery storage technologies—that can either be used to fuel a single household or, alternatively, aggregated together across thousands of households to form one large “power plant” that can bid into the wholesale marketplace.\(^\text{121}\) Depending on the jurisdiction, distributed energy resources can also include demand response or energy efficiency programs, which pay groups of customers to reduce their energy usage.\(^\text{122}\) Distributed energy resources are relatively new


\(^{120}. \) For instance, the U.S. Energy Information Administration (“EIA”) reports that in 2016, eighteen municipal marketing authorities—nonprofit organizations that are created by the residents of a municipality in order to create a public-private electricity partnership—accounted for around 2% of total wholesale sales. See Form EIA-861, supra note 116, “Operational Data.” More than one hundred public utility districts—which are “voted into existence by a majority of the residents of any given area for the specific purpose of providing utility service to the voters,” and which are independent of city councils or governments, see id., “861 2017 Instructions”—were responsible for almost 3.5% of total wholesale sales, see id., “Operational Data.” Eighteen state-owned utilities, including entities like the California Department of Water Resources and the New York Power Authority, provided around 2.3% of total wholesale sales of electricity. Id. And cooperative utilities (a quasi-public, quasi-private form of nonprofit entities that are member-owned and -governed, often by rural communities or other community groups who were not being adequately served by private investor-owned utilities, JIM LAZAR, THE REGULATORY ASSISTANCE PROJECT, ELECTRICITY REGULATION IN THE U.S.: A GUIDE 10 (2011)), accounted for almost 12% of total wholesale sales of electricity in 2016. See Form EIA-861, supra note 116, “Operational Data.”


\(^{122}. \) Id. at 7–8.
assets in the wholesale markets, but they have the potential to disrupt standard wholesale market operation by allowing decentralized, small-scale resources to compete against more traditional large-scale power plants.

Sellers who do not participate in the wholesale markets are nonetheless also motivated by economic considerations. Such sellers often negotiate bilateral contracts directly with electricity buyers. Bilateral contracts can be good options for buyers to hedge against price volatility and ensure a long-term electricity supply; they are also popular in those regions of the U.S. that did not transition to FERC’s regional wholesale market model.

The economic forces guiding both in- and out-of-market purchases can also have a profound effect on events occurring on the electricity grid. Over the last decade, for instance, the grid has seen a dramatic shift away from higher-priced coal and nuclear power plants towards lower-cost natural gas and renewable (i.e., wind and solar) plants. Although market dynamics are not the only factor influencing generation trends, fuel costs have been a crucial driver of this shift.

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123. The California Independent System Operator (“CAISO”), the market operator responsible for overseeing California’s wholesale markets, has allowed distributed energy resources to participate in the wholesale markets since 2016. California Independent System Operator, 155 FERC ¶ 61,229 (2016). The Federal Energy Regulatory Commission (“FERC”), the federal agency responsible for setting rules for most of the wholesale markets in the country—California is one such market, but FERC oversees six others in the United States. OFFICE OF ELECTRICITY DELIVERY AND ENERGY RELIABILITY, U.S. DEP’T OF ENERGY, UNITED STATES ELECTRICITY INDUSTRY PRIMER 26 (2015) [hereinafter U.S. ELECTRICITY INDUSTRY PRIMER]—was expected to issue its own rules requiring distributed energy resource participation in wholesale markets across the country, but has postponed that rulemaking for more factfinding. Electric Storage Participation in Markets Operated by Regional Transmission Organizations and Independent System Operators, Order No. 841, 162 FERC ¶ 61,127, at *4 (Feb. 15, 2018) [hereinafter Order 841]. However, FERC has taken a piecemeal approach to distributed energy resources, requiring wholesale market operators to accommodate specific distributed resources like energy storage resources, id. at *3, and demand response programs, Demand Response Competition in Organized Wholesale Energy Markets, Order No. 745, 76 Fed. Reg. 16,658 (Mar. 24, 2011) [hereinafter Order 745].


125. U.S. ENERGY INFO. ADMIN., ANNUAL ENERGY OUTLOOK 2018, at 83 (2018). In 2010, coal was the dominant fuel source for electricity generation in the United States; today, natural gas comes out ahead, with renewables falling close behind. Id.

126. Id. at 84 (“Fuel prices in the near term drive the share of natural gas-fired and coal-fired generation.”); see also id. at 88 (“Coal-fired generation capacity decreases by an additional 65 GW between 2017 and 2030 [under EIA projection scenarios] as a result of competitively priced natural gas and increasing renewables generation . . . . Higher natural gas prices . . . slow the pace of coal power plant retirements . . . . Conversely, lower natural gas prices . . . increase coal power plant retirements . . . .”).
2. Direct Self-Governance

The green arrows represent opportunities for direct self-governance. There are a number of autonomous entities on the grid that, unlike private utilities, are run by consumers for themselves. As a result, these entities are often governed by a wider variety of concerns than just the cost of electricity, such as environmental impact, self-sufficiency, reliability, and trendiness.

For instance, municipal utilities, public utility districts, municipal marketing authorities, and cooperative utilities are all owned or managed to some degree by the residents of the communities they serve. Because these utilities are all public entities or not-for-profits, and are often exempted from state and federal regulations, they can prioritize their electricity purchases according to their members’ non-economic preferences. For example, responding to member interest in renewable energy, public utilities and cooperatives have driven innovative energy projects like large-scale community solar plants. And cities like Georgetown, Texas and Boulder, Colorado are using their municipal utilities to achieve residents’ demands for renewable energy and energy efficiency.

Similarly, communities interested in self-run utilities but dissuaded by the legal hurdles involved in forming them can turn to Community Choice Aggregations (CCAs) (labeled as such in Figure 4). CCAs are stripped-down versions of municipal utilities that employ private utilities for the maintenance of distribution lines, transmission

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127. See generally DISTRIBUTED ENERGY RESOURCES, supra note 121.
128. See PHILIPSON & WILLIS, supra note 44, at 37.
lines, and billing systems, but still allow communities to manage their own electricity contracts, build and run their own generation assets, and develop distributed energy resource programs.\footnote{132. Welton, supra note 15, at 308.} CCAs are relatively new and are only authorized in a few states.\footnote{133. See CCA by State, LOCAL ENERGY AGGREGATION NETWORK (last updated Apr. 2018), http://www.leanenergyus.org/cca-by-state/.
} Nonetheless, they have already become an explosive force in retail electricity sales. In California, for instance, five CCAs alone served almost a million customers by the end of 2017.\footnote{134. Herman K. Trabish, Join or Die: How Utilities Are Coping with 100% Renewable Energy Goals, UTILITY DIVE (Dec. 13, 2017), https://www.utilitydive.com/news/join-or-die-how-utilities-are-coping-with-100-renewable-energy-goals/512664/.
} And, like their public utility counterparts, CCAs are often formed to serve communities’ clean energy goals.\footnote{135. See id.
}

Self-supply of electricity is also popular. In the corporate world, large industrial or commercial customers may elect to build their own generation sources, contract with independent generators, or purchase credits that support energy development elsewhere. Recently, corporations have been particularly active in the renewables markets, buying up a record number of long-term renewable energy contracts and energy credits\footnote{136. Corporations Purchased Record Amounts of Clean Power in 2017, BLOOMBERG NEF (Jan. 22, 2018), https://about.bnef.com/blog/corporations-purchased-record-amounts-of-clean-power-in-2017/.
} to reduce greenhouse gas emissions, meet sustainability goals, save money, and limit exposure to price volatility.\footnote{137. PRICEWATERHOUSECOOPERS, CORPORATE RENEWABLE ENERGY PROCUREMENT SURVEY INSIGHTS 2 (2016).
}

Finally, individual households may also engage in electricity self-governance. Depending on their own preferences—e.g., status or brand loyalty, environmental concerns, energy independence, or expense—residents can buy rooftop solar panels, energy efficient appliances, smart thermostats, electric vehicles, battery storage, and small-scale cogeneration facilities for their home.\footnote{138. In 2017, distributed generation installations amounted to an estimated 30,000 MW. FED. ENERGY REG. COMM’N, supra note 121, at 7 fig.2. The number of annual installations is expected to double by 2024. Id.
}

All told, these self-governing entities may eventually overtake private investor-owned utilities’ retail dominance. In fact, according to the California PUC, more than 85% of California customers are predicted to be served by sources other than private investor-owned
utilities in less than a decade—the inverse of the state’s retail consumption today. If that trend holds true for the rest of the country, the number of nodes connected by green arrows on the grid could multiply. Accordingly, electricity customers’ individual preferences could increasingly influence electricity purchase decisions.

3. Indirect Self-Governance

The purple arrows represent opportunities for indirect self-governance. In this relationship, while a node may not directly dictate the governing choices of another node on the grid, it can do so by proxy.

For instance, consumers and state PUCs have an indirect self-governing relationship. While individual consumers are not directly responsible for the governing choices made by PUCs, as public agencies, these commissions are ultimately accountable to voters. That means that consumers unhappy with how their electricity grid is being governed may participate in public proceedings conducted by the commission, contact their commissioners, contact their state representatives (who appoint the commissioners), or ultimately vote for new representation in the state legislature.

Similarly, aggregated distributed energy resources represent an opportunity for indirect self-governance. Individual consumers with rooftop solar, energy efficient appliances, electric vehicles, or battery storage may use those resources to govern their own electricity consumption directly. But they can also lend out those resources to a third-party aggregator, who can indirectly bid those collective resources into the wholesale markets. That aggregation allows the choices of individual consumers to have a much larger effect on grid governance.

4. Top-Down Regulation

The blue arrows represent a top-down regulatory relationship. As recounted in the grid history above, there are two general levels at which this happens: the state and federal level. The federal regulator node in Figure 4 is labeled “FERC,” while the state node is labeled “State PUC.” The electricity grid also has several quasi-public, quasi-

139. CAL. PUB. UTIL. COMM’N, supra note 18, at 3.
private regional bodies that behave similarly to regulatory agencies, including the regional wholesale markets. These bodies connect to other entities via the blue arrows as well.

To begin at the state level: state nodes generally take the form of PUCs. Because state retail competition efforts haphazardly collapsed in the early 2000s, the PUCs perform different functions depending on the state. In approximately fifteen states and the District of Columbia, the PUCs supervise a competitive retail choice model, under which customers can select their electricity provider with relative freedom (signified by the pink arrow connecting the “Residential Consumer” node to the “Private Utility” node).140 In seven states, retail choice options have been suspended or rescinded, leaving a split between regulated monopoly utilities and competitive retail options (signified by the tan double-lined arrow connecting the “Consumer” node to the “Private Utility” node).141 The remaining states function solely under a regulated monopoly model (signified by the yellow arrow connecting the “Consumer” node to the “Private Utility” node).

Through top-down regulation of private utilities, PUCs wield enormous influence over the composition of the electricity grid. For instance, PUCs often subsidize preferred forms of merchant generation by requiring utilities to purchase electricity from specific sources.142 Or, PUCs may direct utilities to achieve an energy savings target each year. PUCs can also use their power over utilities to bring new technologies onto the grid: for example, several states have implemented energy storage mandates that require utilities to procure a set quantity of battery storage,143 while others have used utility rate-

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141. Those states are California, Arizona, Nevada, New Mexico, Montana, Arkansas, and Virginia. See Morey & Kirsh, supra note 140, at 3; Pfeifenberger, supra note 140.


143. The most prominent examples of these include California’s mandate to its electric utilities to procure 1300 MW of energy storage by 2020, Energy Storage, Cal. Public Utilities Comm’n (last visited Apr. 20, 2018), http://www.cpuc.ca.gov/General.aspx?id=3462, and New York’s mandate to procure 1500 MW of energy storage by 2025, Energy Storage in New York, NYSERDA (last visited July 16, 2018), https://www.nyserda.ny.gov/All%20Programs/Programs/
setting mechanisms to encourage investments in carbon capture and sequestration technologies. These command-and-control techniques allow expensive technologies to build up economies of scale until they can compete in the wholesale markets—an example of a blue arrow transitioning to a red one.

State PUCs also influence events on the grid through various licensing, rate-setting, and incentive programs that are directed at non-utility entities. For instance, state programs like net metering—a method of rate-setting that allows owners of residential solar panels to sell their excess electricity back onto the grid—can be the deciding factor for whether distributed energy resources like rooftop solar are economically viable. Similarly, state laws regarding energy efficiency, demand response, battery storage, and other technologies often dictate whether and how these resources can be aggregated to bid into the wholesale markets. And innovative forms of retail-side electricity governance, like CCAs, often require permission under state law before they can be constituted. In fact, if the role of private utilities diminishes in the future, state governance of unconventional electricity sellers may become the key mechanism through which PUCs assert control on the grid.

Moving on to the federal level: the primary federal node on the grid, FERC, also uses top-down regulatory powers to dictate outcomes on the electricity grid. FERC is charged with regulating wholesale sales of electricity that occur across state lines, transmission, and several other interstate electricity transactions. FERC exercises this power through direct regulation of merchant generators, private utilities, and distributed energy resources, as well as indirect regulation of these entities via the regional wholesale markets.

FERC’s most important exercise of its top-down authority comes in the form of rules regarding the operation of the regional wholesale markets. As the number and type of electricity sellers and buyers has increased on the grid, this gatekeeping function has grown in

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144. See Boyd & Carlson, supra note 12, at 851–52 (describing Mississippi’s subsidies for a clean-coal plant through favorable electricity rate treatment).
145. See id. at 862–63, 863 n.220.
146. See 16 U.S.C. § 824a–w.
significance. That is, only several decades ago, the wholesale markets were populated primarily by fossil fuel and nuclear plants. Now, FERC is deciding whether and how to introduce new resources—like demand response, renewable energy, battery storage, and distributed energy resources\textsuperscript{147}—into the marketplace. For instance, in 2011, FERC issued a rule requiring market operators to allow demand response programs to bid into the wholesale markets.\textsuperscript{148} More importantly, FERC directed market operators to compensate demand response programs—which are in essence promises to reduce rather than generate electricity—at a rate equal to the clearing price for electricity.\textsuperscript{149} This rule gave electricity savings the opportunity to compete on equal footing with electricity generation in the wholesale market. Similar rules were adopted in 2018 for energy storage.\textsuperscript{150}

Moreover, FERC is not the only entity to use its regulatory authority to influence the power flows in the marketplace. In many cases, the regional market operators do not wait for FERC’s dictates; they set market rules on their own and receive FERC’s approval at the tail end of the process. In Figure 4, the “Regional Wholesale Market” nodes thus have their own blue arrows linking to the “Merchant Generator,” “Distributed Energy Resource,” “Private Utility,” “Community Choice Aggregation,” and “Municipal Utility” nodes—arrows representing their own regulatory power functionally (if not formally) distinct from that of FERC.

There are nine RTOs that oversee the grid’s transmission lines.\textsuperscript{151} These regional market operators are tasked with running transmission in a nondiscriminatory manner.\textsuperscript{152} They determine who can participate in the markets, set the clearing price for electricity, and dispatch electricity to meet demand. They also manage congestion on the

\textsuperscript{147} See supra Part II.C.1 for a definition of these resources.

\textsuperscript{148} See Order 745, supra note 123.

\textsuperscript{149} See C.F.R. § 35.28(g)(1)(v)(A).

\textsuperscript{150} Order 841, supra note 123, at *3–4.

\textsuperscript{151} Technically, these RTOs are properly broken down into “RTOs” and “ISOs.” RTOs and ISOs are functionally very similar, except that ISOs (which preceded FERC’s orders creating RTOs) either may not meet the four minimum characteristics and eight minimum functions required for RTOs, or the ISO may not have petitioned FERC for RTO status. U.S. ELECTRICITY INDUSTRY PRIMER, supra note 123, at 25–26 (2015); see also 18 C.F.R. § 35.34(j)(1)–(4). For simplicity’s sake, I refer to them all as “RTOs” here.

transmission lines, ensure adequate long-term generation resources, and provide a variety of ancillary services that support the grid.  

Coincident with their origin as voluntary power pools, the market operators have acquired an unusual structure. They are private entities that come into existence by the voluntary agreement of regional stakeholders. They are run by corporate-like boards of directors who cannot have financial interests in the transmission, generation, or distribution assets that they oversee. FERC created these operators to encourage greater competition within the electricity markets but, in the process, essentially granted the RTOs a monopoly over the dispatch and transmission of electricity.

5. Collaboration & Negotiation

The orange arrows represent opportunities for collaboration and negotiation between regulatory nodes on the grid. In most cases, this occurs where a pathway for top-down, command-and-control regulation exists, but the parties have opted for a more collaborative relationship.

Take the orange arrow connecting the “Regional Wholesale Markets” node to the “FERC” node in Figure 4. Technically, FERC has the power to dictate how the market operators run the wholesale markets. In reality, the process tends to contain much more back-and-forth: market operators develop rules for market management, submit those rules to FERC for input, and then refine their policies based on FERC’s response. In some cases, market operators may even originate a rule and test it out in their jurisdiction, with FERC later making that policy (once proven successful) mandatory across all of the wholesale markets. In fact, that is exactly what happened in the case of energy

153. FERC specified the ancillary services RTOs are responsible for providing in Order No. 888. See Order 888, supra note 53.
154. Dworkin & Goldwasser, supra note 88, at 556.
155. These boards can include representatives from state regulatory agencies, public consumer advocacy organizations, public and private utilities, independent power producers and other merchant generators, environmental groups, and transmission operators. For an overview of the stakeholder board composition of the nine RTOs/ISOs, see CAL. INDEP. SYS. OPERATOR, TABLE OF STAKEHOLDER COMMITTEES OF OTHER ISOs AND RTOs (2014), https://www.caiso.com/Documents/ISO-RTO_CommitteeStructures-Oct2014.pdf.
156. Dworkin & Goldwasser, supra note 88, at 553.
157. Id. at 555.
storage: California’s wholesale market operator developed a mechanism for incorporating energy storage into its wholesale markets, the policy was tested out in California’s market for several years, and just in 2018 FERC issued a rule requiring all wholesale market operators to include energy storage within their markets.158

State PUCs also have the opportunity to collaborate and negotiate with the regional and federal nodes on the grid, as indicated by the orange arrows connecting these nodes in Figure 4. First, states often include representatives from their PUCs on the market operators’ stakeholder governance board; in fact, in some regional markets, state representatives can even approve market rules prior to their enactment.159 Second, some state PUCs work closely with market operators to align their policy preferences. Again, California provides the best example of this: the California wholesale market operator has collaborated with the California PUC to integrate renewable energy and distributed energy resources into the grid, often by jointly planning price mechanisms, transmission infrastructure, and capacity requirements.160

6. Lobbying

The black dotted arrows represent opportunities for lobbying or political influence. The relationship is similar to that indicated by the orange arrows, but highlights the informal influence wielded by private entities instead of public ones. Most often, this includes private utilities or merchant generators lobbying state PUCs, the regional market operators, or FERC in order to give themselves a competitive advantage.

Private utilities are particularly adept at convincing state PUCs and FERC to subsidize expensive infrastructure investments with uncertain futures and to deter competition from new forms of energy resources. For instance, in South Carolina, Georgia, and Florida, lobbying by the utility companies led the states’ PUCs to allow the utilities to recover the costs of the construction of floundering nuclear and clean coal projects before the projects were even online.161

158. See Order 745, supra note 123, and accompanying citations.
159. See supra note 155 and accompanying citations.
160. See infra Part III.B.1.
In Arizona, aggressive lobbying by the utility companies had the state remove its net metering program for rooftop solar technologies, thereby also removing one of the utility’s prime competitors. At the federal level, as FERC contemplates rules for allowing distributed energy resources to compete in the wholesale markets, utilities have been jockeying to be given the final say on whether those resources can bid into the marketplace, a position that would essentially allow utilities to decide the economic future of their competition.

Merchant generators also lobby state and federal regulators. For instance, owners of nuclear power plants, which have suffered in recent years due to low natural gas and renewable energy prices, have appealed to the states to subsidize their generation. They achieved some success in New York, Illinois, Connecticut, and New Jersey (with efforts currently stalled in Ohio and Pennsylvania). Coal plant owners are similarly pushing both the states and the federal government for support.

Under the Trump Administration, coal plants have even pushed FERC and the DOE to use various “emergency” powers to provide financial support to struggling plants. Some of these efforts can

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163. Utilities assert that this power is needed in order to prevent potential threats to the operation of the distribution lines. See Gavin Bade, Utilities, DER Providers Face Off Over Market Access at FERC Meeting, UTILITY DIVE (Apr. 12, 2018), https://www.utilitydive.com/news/utilities-der-providers-face-off-over-market-access-at-ferc-meeting/521197/.


translate into reconfigurations of grid governance that threaten the existence of other nodes on the grid.

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The nodes and networks described above dictate how our electricity grid functions. They set its priorities and control its outcomes. Some nodes are more powerful than others, exercising control over larger swaths of the electricity grid. Some are wealthier than others. Some are more populous. Some have more paths for influence than others, and some maintain networks that are innately more powerful. Each of these players influences how our grid is run to some degree, and changes in the number or type or role of nodes and networks inevitably change the nature of our electricity grid.

III. THE BENEFITS OF A NODAL ELECTRICITY GRID

The nodal grid presented in Part II is not only descriptively accurate, but also useful as a guide for solving grid governance problems. First, the nodal topography of the grid reveals the potential benefits that flow from having a diversity of nodes and networks—benefits that we often associate with other forms of decentralized governance. And second, these overlooked actors can offer solutions to policy issues that, thus far, a top-down approach has been unable to solve. For instance, California’s proposal to regionalize its electricity grid has faced pushback because of concerns about who would govern the regional grid in a top-down manner. Federal action to decarbonize the electricity grid has been conspicuously absent for decades, at least in part because of fears of a top-down federal carbon tax or cap-and-trade program. A nodal governance approach suggests a way to move beyond these debates by empowering unconventional nodes on the grid and leveraging the grid’s nodal benefits to achieve certain policy outcomes. Indeed, the Green New Deal—a recent proposal to, in part, decarbonize the electricity grid—looks a lot like what one might expect under a nodal governance framework.

This is not to say that there are not downsides that come with the nodal grid. The nodal grid raises obvious concerns about inefficiency, unequal distribution of power, inertia, and a lack of systemwide thinking. It would be useful, in another paper, to think about ways to mitigate some of these concerns while still maintaining the benefits. But for now, this article focuses on sketching out some of the upsides of a nodal network approach, particularly because they are not immediately obvious.
A. The Governance Benefits of a Nodal Grid

Many of the governance benefits that come from a nodal electricity grid are akin to those found in decentralized governing systems.\textsuperscript{166} For instance, scholars often extoll the benefits decentralization offers in the form of preference maximization; competition and the minimization of externalities; policy experimentation; local governance; and minority rule and dissent.\textsuperscript{167} This section provides an overview of how some of these conventional benefits apply to the U.S. electricity grid. The overview is not meant to be exhaustive or in-depth, but it does provide a useful framework for thinking about why the complex nodal network described in Part II is preferable to a more streamlined, top-down system.

1. Maximizing Preferences

One of the most commonly cited benefits of decentralized governance is that it allows citizens to maximize their preferences. Imagine a single, centralized governing body choosing between two options based on majority rule. The option with the greatest total support wins. Then imagine if that same governing body is split up into smaller units, with each unit capable of selecting its own option. Assuming that the preferences are distributed unevenly amongst the smaller sites, with some units favoring the “majority” option and others the “minority,” overall utility is maximized in the decentralized system rather than the centralized one.\textsuperscript{168}

\textsuperscript{166} That is not to say that a nodal governance system is the exact same as any other decentralized system. Under nodal governance theory, the nodes and networks can be fluid, unstable, and multi-layered. By contrast, more conventional decentralized systems, e.g., the American federalist system, have relatively static boundaries for their governing bodies and governing mechanisms. Nonetheless, many of the same benefits that we see in decentralized systems—which we often associate with democratic governance—are equally applicable to nodal electricity governance.


\textsuperscript{168} See McConnell, \textit{supra} note 167, at 1494.
A decentralized grid similarly offers greater likelihood that individual consumers will be able to maximize their electricity preferences. Imagine a single, top-down electricity grid: one form of grid governance would predominate based on majority preference. Then picture a nodal grid (in its idealized form): consumers interested in actively managing their electricity consumption can choose to participate in municipal utilities, cooperatives, CCAs, or similar self-governed nodes. They can supply their own electricity through distributed energy resources, energy efficient appliances, smart-home devices, and (if they are large commercial or industrial consumers) direct contracts with generators. Within each of these nodes, consumers can then select the electricity generation choices that satisfy their priorities such as sustainability, cost, local job provision, etc. Alternatively, if consumers prefer to leave their electricity consumption choices to others, they can purchase electricity from a private utility and cede governing control in return for less hassle. More choices are available on the nodal grid than the centralized one.

For instance, in regional wholesale markets, the nine market operators have created very different market dynamics depending on their stakeholder preferences. The California wholesale market operator has been active in incorporating distributed energy resources into the grid, building transmission infrastructure that supports higher renewable energy resource penetration, and designing a “greenhouse gas emissions bidder” that puts a price on carbon for all resources bidding into the California wholesale market, which is essentially a carbon tax for the electricity sector. Meanwhile, the eastern states’ market operators have adopted rules that favor more traditional fossil fuel and nuclear power plants, citing concerns over reliability and the intermittent generation that comes with wind and solar resources.

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169. California’s wholesale market operator is the first (and as of right now, the only) market operator to allow distributed energy resources to participate at the wholesale level. California Independent System Operator, 155 FERC ¶ 61,229 (2016).


2. Competition and Minimization of Externalities

Decentralized governing systems also offer the opportunity for competition and the minimization of externalities. Competition operates horizontally: the existence of multiple different nodes across the same level of governance allows those nodes to compete with each other on the basis of governance outcomes, with the hope that government becomes “more responsive by putting the States in competition for a mobile citizenry.”\textsuperscript{173} Minimization of externalities operates vertically: the governing node that is best able to internalize both the costs and benefits of a given policy exercises jurisdiction over those policies, with smaller nodes responsible for local issues and larger ones tasked with overseeing national priorities.\textsuperscript{174} That way, each node oversees policies that either benefit or burden its constituency equally.

The same holds true for the nodal electricity grid. A diverse range of utility models (e.g., public, private, rural cooperative, CCA, etc.), generation and conservation nodes (which compete economically with each other in the regional wholesale markets), and state regulatory and ratemaking regimes encourages horizontal competition. Consumers or generators who are unhappy with their existing nodes can switch to different jurisdictions or different generation sources, with the hope that the “best” node outcompetes its rivals. CCAs are a perfect example of this: the demand for self-governed municipal utility nodes was high, but the legal hurdles required to form such nodes dissuaded consumers from selecting them. So, CCAs were developed, which offered many of the same benefits as municipal utilities without the same regulatory costs. Horizontal competition between different utility models thus leads to the creation of a new governing node that fits consumers’ demand.

Meanwhile, externality minimization operates through FERC and the regional wholesale markets. If the electricity grid consisted of only local governing nodes, the costs and benefits of electricity generation

\textsuperscript{173} Gregory v. Ashcroft, 501 U.S. 452, 458 (1991); see generally Thomas R. Dye, American Federalism: Competition Among Governments (1990); Friedman, supra note 167, at 387.

\textsuperscript{174} For instance, McConnell explains how the existence of externalities argues for national defense and water pollution regulation and treatment decisions to occur at the national, rather than local, level. McConnell, supra note 167, at 1495. But see Heather K. Gerken & Ari Holtzblatt, The Political Safeguards of Horizontal Federalism, 113 Mich. L. Rev. 57, 78–98 (2014) (arguing that “spillovers” between states is a feature, not a bug, and therefore may not require correction).
would be borne by small, localized groups of consumers. But that may be an inherently inefficient system if the benefits and the costs of electricity generation could be distributed over a larger consumer base. FERC and the regional wholesale markets—governing nodes that capture a larger swath of the population—reduce exactly this inefficiency. For instance, by allowing generators to compete across regional marketplaces, the wholesale markets distribute the costs of generation across a larger population. The wholesale markets also allocate the costs of transmission lines and security, resiliency, and reliability standards throughout the region. Additionally, if the wholesale market has a greenhouse gas “bid adder” (as the California market does), the environmental costs of generation can be borne by the region as well.

3. Policy Experimentation

Decentralization is also associated with policy experimentation—Justice Brandeis’s “laboratories of democracy.” According to Brandeis, “[i]t is one of the happy incidents of the federal system that a single courageous State may, if its citizens choose, serve as a laboratory; and try novel social and economic experiments without risk to the rest of the country.” 175 Decentralized governing units provide opportunities for citizens to develop tailored solutions to local problems, invest in and refine those solutions at a small scale, and then enumerate “best practices” for similar problems occurring in other jurisdictions or at a national level.176

Likewise, the nodal grid allows experimentation in grid technologies and management techniques. For example, California’s enthusiasm for solar energy led it to support solar technologies through tax benefits, net metering, solar mandates, rebate programs, and creative third-party ownership models. These policies reduced the cost of solar technologies, spurred innovation in the field, and enabled solar to spread to other states.177 A similar story could be told for wind

technologies promoted by states in the West and Midwest and (although the technology is still in its nascent economic stages) carbon capture and sequestration in the South. Without the heavy early-stage investment by local jurisdictions in certain technologies, these technologies may not have developed.

Similarly, electricity management techniques benefit from a decentralized grid. The division of governance authorities has allowed states to test out varying degrees of retail competition and rate structures; local communities to experiment with municipal utilities, cooperatives, and CCAs; and regional grid operators to try out different market mechanisms, such as greenhouse gas bid adders and wholesale-side distributed energy resources. If these techniques prove successful, they can be adopted by others or scaled up to the federal level. Again, FERC's recent rules regarding energy storage participation in the wholesale markets present the perfect example: these rules were developed, tested out, and refined by the California wholesale market operator first before being scaled up for all of the regional wholesale markets operating under FERC's jurisdiction.

4. Local Governance

Decentralization is often celebrated for its ability to promote local governance. As Richard Briffault explains it, this “localism” enables citizens to participate in the political process, develop distinct communities with their own histories and values, and respond more effectively to matters of local concern.

Similarly, people have more opportunities to engage in local governance on a nodal grid than on a centralized one. Public utilities run by cities, municipalities, and communities all involve some form of public vote for their formation. Once created, they are managed either directly by consumers or indirectly via city councils or other public

was responsible for more than 50% of the rooftop solar installations in the state).

178.  Boyd & Carlson provide a good overview of some of these, as well as other, state-based experiments. See Boyd & Carlson, supra note 12, at 841–79.

179.  See supra Part II and supra note 123 and accompanying citations.

180.  Richard Briffault, Localism and Regionalism, 48 BUFF. L. REV. 1, 15–18 (2000); see also David J. Barron, A Localist Critique of the New Federalism, 51 DUKE L.J. 377, 377–78 (2001) (describing local governance as associated with the “attractive values” of “protecting localized decisionmaking” and “promoting responsive and participatory government by bringing the government closer to the people”).
bodies. Such entities can empower local communities to engage in self-governance beyond simply electricity governance.

The best example of this comes from one of the older nodes on the U.S. electricity grid: the TVA. This New Deal–era program was a massive infrastructure project intended to electrify the rural South and lift millions of people out of poverty through a “grassroots” approach to governance.\(^{181}\) Although the TVA originated from federal legislation and was supported by federal dollars, it was implemented primarily at the local level: hundreds of newly formed, municipally-owned distribution plants and rural cooperatives built and then managed their own distribution systems in order to tap into the electricity supplied by federal power plants.\(^{182}\) Communities then paired this distribution with local employment, labor union development, and the creation of farming cooperatives and neighborhood libraries.\(^{183}\) Though the success of the TVA dwindled over the decades and never quite reached the lofty democratic goals set for it,\(^{184}\) the program nonetheless suggests more opportunities may lie for leveraging local electricity nodes to produce a wider range of governance outcomes.

Self-governing utilities also allow communities to form their own set of values with regard to electricity governance. For instance, cities like Georgetown and Boulder and the CCAs in California have used self-governance to declare and further their environmental goals.\(^{185}\)

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183. D AVID LILIENTHAL, THE JOURNALS OF DAVID E. LILIENTHAL VOLUME I: THE TVA YEARS (1939–1945), at xxix (1964) (“[B]y stimulating a far broader participation in labor unions, farm cooperatives, the management of relief, recovery, and security, conservation and development enterprises, [the TVA] enlarged the concept of democracy and the scope of its operation.”); see also SCHEWE, supra note 25, at 97–98 (describing the TVA’s goal of “bolster[ing] local cultural activities such as the construction of libraries and the development of adult education classes”). But see Melissa Walker, African Americans and TVA Reservoir Property Removal: Race in a New Deal Program, 72 AGRICULTURAL HIST. 1877 (1998) (describing how African American communities were neglected in and harmed by the program’s vision of white rural community development).

184. See generally CREESE, supra note 41, at 95–124 (describing the struggle and eventual decline of the TVA as a source of democratic governance when the program’s emphasis shifted to mass electricity production for the war effort); Ekbladh, supra note 181, at 345 (“Power production focused on industry eventually became an end in itself rather than simply an offshoot of other programs, leaving some to feel the TVA had moved away from its origins.”).

185. See supra Part II and notes 129–34 and accompanying citations.
Similarly, self-supply by corporations, college campuses, and individual households can encourage local governance entities to assert greater control over their electricity consumption, adopt solutions suitable to their particular concerns, and express values related to conservation, environmentalism, self-sufficiency, and independence.

5. Minority Rule and Dissent

Finally, decentralization offers opportunities for minority rule and what Heather Gerken terms “dissent by deciding.” Decentralized governing units allow national minorities to become local majorities, and, assuming that those governing units wield some degree of autonomy, those units can express their disagreement with the national majority by enacting policies opposed to the majority position. Those dissenting policy positions could shift the goalposts in the national conversation, prepare the national minority’s governing platform should the tides shift, or, at the very least, achieve local victories in contentious issues.

A decentralized electricity grid similarly offers the chance for people to “dissent” from the governance of the broader electricity network. If a consumer disagrees over how electricity is generated, distributed, or sold, he or she can disconnect from the grid and supply his or her own electricity. A decentralized grid also allows organized ways to express dissent. For example, consumers’ and private corporations’ purchases of solar, wind, or battery resources can be signals of discontent with the lack of environmentally-friendly generation sources on the larger grid. Movements to form municipal utilities or CCAs can be expressions of a community’s dissatisfaction with how its private utility has run its electricity grid in the past. When President Trump pulled out of the Paris Climate Agreement in 2017, more than fifteen states, 455 cities, 1700 businesses, and 300 institutions of higher learning in the U.S. affirmed their commitment to the Agreement’s goal of reducing greenhouse gas emissions by pledging to reduce their own carbon footprints—promises that are only possible if states, cities, local governments, and private entities are in charge of

187. Gerken, supra note 167, at 12 n.10.
188. Id. at 60–61; Gerken, supra note 186, at 1759–97.
their own electricity procurement. Without the variety of consumption and generation nodes available on a decentralized grid, dissenters would not be able to turn their private or public disagreement into organized action that can itself influence events on the grid.

B. The Policy Benefits of a Nodal Electricity Grid

There are also policy benefits to a nodal governance approach to the electricity grid. Nodal governance gives policymakers and other actors on the grid the ability to skirt traditional centralized institutions in favor of sub-state entities, private actors, nonprofits, and other unconventional nodes to solve governance problems when formal institutions have stalled. This section discusses two such examples: California’s movement to regionalize its electricity grid, and a Green New Deal–style program to decarbonize the electricity grid.

1. The Regionalization of California’s Electricity Grid

One of the best examples of the policy benefits of a nodal governance approach to the electricity grid is California’s current debate over whether to regionalize its electricity grid. Some California lawmakers favor regionalization because it may reduce greenhouse gas emissions and electricity rates for California consumers. Others are concerned that regionalization could disrupt California’s efforts to make its grid greener. A nodal governance approach to regionalization may help move this effort, which has been dragging for several years, in a new direction.

A quick background on California’s regionalization debate: California has been leading the effort to reduce the carbon emissions from the electricity sector, passing a Renewable Portfolio Standard, a carbon cap-and-trade bill, an energy storage mandate, and a variety of energy efficiency and distributed energy resource incentives intended to promote energy savings and solar and battery

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technologies.\footnote{So far, the state has managed to support these policies without severe disruption to its electricity grid, primarily because California has an in-state-only wholesale market operator, CAISO. Importantly, unlike any of the other FERC-overseen wholesale market operators, CAISO’s governing board is composed of appointees of the California governor and legislature.} Thus CAISO’s leadership has a strong interest in promoting California’s environmental and energy policies through its operation of the wholesale markets.

But as the state approaches more aggressive renewable energy targets, to satisfy its electricity demands, it is finding that it increasingly must look outside of the state—particularly to renewable generation sources in the Pacific Northwest, Midwest, and Southwest, as well as to out-of-state consumer markets that can take up some of California’s excess generation during peak solar periods. As a result, some state officials have been pushing the California legislature to convert CAISO to a regional grid operator—one that would run wholesale electricity markets not just for California, but for the surrounding western states as well.\footnote{According to a CAISO-sponsored study, regionalization could offer significant environmental and economic benefits.} But it would come at a price: the governance board of

\footnotetext[193]{For a summary of California’s existing policies promoting distributed energy resources and how the state plans to integrate them moving forward, see CAL. PUB. UTIL. COMM’N, CALIFORNIA’S DISTRIBUTED ENERGY RESOURCES ACTION PLAN: ALIGNING VISION AND ACTION (2016).}

\footnotetext[194]{The California ISO was created by California legislation and has a five-member oversight board, with three of those members appointed by the Governor of California, one member appointed by the Speaker of the California Assembly, and one member appointed by the Senate Committee on Rules. CAL. PUB. UTIL. CODE § 336(a)(1)–(3).}


\footnotetext[196]{Pursuant to California law, CAISO recently completed a study on the costs and benefits that a regional ISO would offer for the grid and the state’s environmental policies. CAL. INDEP. SYS. OPERATOR, SENATE BILL 350 STUDY: THE IMPACTS OF A REGIONAL ISO-OPERATED
CAISO would have to transition from a state-appointed body to one that contains representatives from all of the participating states.

That change in leadership could create complications for California’s sovereignty over its environmental policies. There is the risk that a regional grid operator (containing representatives from less environmentally focused states) may not be as willing to support California’s environmental goals as CAISO. In fact, due to this risk, conversations surrounding California grid regionalization have been stalled for three years.\(^{197}\)

But that is where a nodal governance approach to the electricity grid could be helpful. Instead of looking to the states and the wholesale market operator, we might look to private nodes on the grid as sites of governance. After all, a regional grid is beneficial primarily because it would allow California customers to purchase electricity from a wider array of out-of-state sources, and it would allow California generators to sell electricity to a wider array of out-of-state customers. Why not empower these private nodes to purchase and sell electricity to each other without relying on the states or grid operator to act first?

Such a proposal would entail CAISO designing procedures for individual out-of-state generators or end-users to bid into its existing wholesale markets, without having to bring an entire state’s electricity system into the fold. Merchant generators, public and private utilities, and even aggregated distributed energy resources could request and, assuming that they meet pertinent market rules and regulations, be granted access to CAISO’s wholesale markets. The western states could maintain a gatekeeping role for their own in-state utilities and distribution-side resources by deciding whether to permit those entities to bid into CAISO’s markets. Meanwhile, CAISO’s structure would remain the same, mitigating some regionalization opponents’ concern that FERC oversight would expand.

In fact, such a proposal has already been adopted on a small scale within CAISO. In 2014, CAISO created the Western Energy Imbalance Market (EIM), a real-time-only regional electricity market that balances last-minute electricity supply and demand needs for CAISO and seven utilities operating in eight states and parts of Canada. The Western EIM functions much as described above, except on a much more limited scale. Nonetheless, the program has managed to secure cost-savings totaling around $330 million for its participants since the initiative started; and CAISO estimates that, in the first quarter of 2018 alone, approximately 28,000 metric tons of carbon dioxide emissions were displaced as a result of the renewable generation made available through the regional market.

If CAISO expands the Western EIM model, the market could approximate many of the benefits that a regional grid operator would bring while avoiding some of the sovereignty issues that come with a regional governing board. If the benefits of such integration prove successful, they could encourage a more formalized process for interjurisdictional management sanctioned by the states and the federal government, much as the RTO model grew out of the early power pools.

2. The Green New Deal

Moreover, a nodal governance perspective may already be making inroads into grid policy debates. Federal action on climate change has been stalled for the last several decades. But in February 2019, the national conversation over electricity decarbonization took a turn with the introduction of House Resolution 109 (the “Green New Deal”). The Green New Deal—at least in its preliminary form—looks a lot like what one would expect from a nodal governance-style solution to electricity decarbonization.

For instance, H.R. 109 calls for a “10-year national mobilization” to “achieve net-zero greenhouse gas emissions” by acting with and

199. For instance, participants are not currently allowed to bid into CAISO’s day-ahead or long-term flexibility/capacity markets.
through the decentralized governing nodes of the grid.\textsuperscript{202} The Resolution proposes:

- “leveraging funding and providing investments for community-defined projects and strategies,”\textsuperscript{203}
- “building or upgrading to energy-efficient, distributed, and ‘smart’ power grids,”\textsuperscript{204}
- “providing and leveraging, in a way that ensures that the public receives appropriate ownership stakes and returns on investment, adequate capital (including through community grants, public banks, and other public financing), technical expertise, supporting policies, and other forms of assistance to communities, organizations, Federal, State, and local government agencies, and businesses working on the Green New Deal mobilization,”\textsuperscript{205}
- “directing investments to spur economic development, deepen and diversify industry and business in local and regional economies, and build wealth and community ownership,”\textsuperscript{206}
- “ensuring the use of democratic and participatory processes that are inclusive of and led by frontline and vulnerable communities and workers to plan, implement, and administer the Green New Deal mobilization at the local level.”\textsuperscript{207}

In other words, the Resolution calls for funding from the federal government, but locates decision-making within a variety of state, substate, local, private, and nonprofit actors.\textsuperscript{208} In particular, the Resolution favors local nodes run by poor and minority communities.

Those nodes appear to have significant flexibility to select the means by which they wish to achieve their goals. The Resolution sets the broad goal of “meeting 100 percent of the power demand in the U.S. through clean, renewable, and zero-emission energy sources.”\textsuperscript{209}

\begin{itemize}
\item \textsuperscript{202} Id. at 5–6.
\item \textsuperscript{203} Id. at 7.
\item \textsuperscript{204} Id. at 8.
\item \textsuperscript{205} Id. at 11.
\item \textsuperscript{206} Id. at 12.
\item \textsuperscript{207} Id. at 12.
\item \textsuperscript{208} See David Roberts, \textit{There’s Now an Official Green New Deal. Here’s What’s in It.}, VOX (Feb. 7, 2019), https://www.vox.com/energy-and-environment/2019/2/7/18211709/green-new-deal-resolution-alexandria-ocasio-cortez-markey (“[S]omething like two-thirds of the [Green New Deal] requirements, depending on how you count, direct political power and public investment down to the state, local, and worker level . . . .”).
\item \textsuperscript{209} H.R. Res. 109, at 7.
\end{itemize}
It does not mandate that this goal be achieved through solely a command-and-control or neoliberal marketplace model—as would be the case if, say, the plan called for a carbon tax or issued a nationwide ban on coal plants. Instead, the Resolution sets a loose standard that invites nodes to select their preferred methodology. By characterizing the energy sources as “clean, renewable, and zero-emission,” the Resolution leaves a whole menu of generation options open—ranging from nuclear to hydroelectric to (theoretically) zero-emission coal with carbon capture and sequestration technology. This framework suggests that the agenda for decarbonization will be set community by community, node by node.

Of course, the Resolution is still a draft, and a sparse one at that. But the plan appears to recognize that solving a problem like climate change—or, in this narrow context, decarbonization of the electricity grid—is as much a governance problem as anything else. Leveraging the benefits of our nodal grid—particularly its opportunities for policy experimentation and local governance—to achieve larger policy goals could be a step in the right direction.

IV. THREATS TO THE NODAL GRID

The benefits outlined above suggest that a nodal governance approach to the electricity grid could provide a fruitful model for the grid’s pressing problems. But such an approach has been threatened by recent developments in electricity law jurisprudence. Over the last few years, the U.S. Supreme Court and FERC have been interpreting the Federal Power Act in a manner that elevates the wholesale markets above any other governing node on the grid. This interpretation breaks from both the structure of the Federal Power Act—which itself reflects the nodal and interconnected nature of the electricity grid—and the approach that the Supreme Court has taken to FERC’s governing authority in the past, which has typically respected the importance of cooperation and balance between governing nodes. This interpretive change could lead to a concentration of power within FERC and, concomitantly, a decrease in the power of other nodes.

A. The Federal Power Act and the Nodal Grid

First, a quick overview of the Federal Power Act. The Act divides regulatory authority between the states, the federal government, and
public and private utilities—consistent with the nodal governance approach described above. In fact, the Act specifically carves out space for cooperative and voluntary relationships between a diversity of grid entities. And it repeatedly emphasizes the need for collaboration rather than unilateral, top-down decision-making.

For instance, the Act declares that it is public policy that FERC shall have regulatory authority over “the transmission of electric energy in interstate commerce and the sale of such energy at wholesale,” and that FERC’s powers extend “only to those matters which are not subject to regulation by the States.”\(^\text{210}\) Thus, FERC is given jurisdiction over transmission, wholesale sales of electricity, and facilities that engage in either.\(^\text{211}\) The states maintain jurisdiction over “any other sale of electric energy” (including, most prominently, retail sales), as well as facilities used for generation, local distribution, intrastate transmission, and self-supply.\(^\text{212}\) From the outset, then, the Act recognizes that both FERC and the states play vital governing roles on the grid (with, arguably, FERC’s powers constrained by those exercised by the states).

The Act also acknowledges the governing presence of public and private utilities. The Act excludes from its regulations all utilities owned by “the United States, a State or any political subdivision of a State, [or] an electric cooperative.”\(^\text{213}\) These entities remain free to self-regulate without FERC’s interference. And the Act reserves a role for private utilities as well. For instance, although FERC is charged with ensuring that the wholesale rates set by utilities are “just and reasonable,”\(^\text{214}\) private utilities remain free to negotiate bilateral contracts setting those rates for themselves.\(^\text{215}\) FERC also must consider reliability standards “used by, or suggested for use by, the electric utility industry.”\(^\text{216}\) The Act leaves it up to the private utilities to create the “voluntary interconnection and coordination of facilities for the generation, transmission, and sale of electric energy.”\(^\text{217}\)

The Act also repeatedly emphasizes the need for consultation and cooperation between governing nodes. For instance, before

\(^{210}\) 16 U.S.C. § 824(a).
\(^{211}\) Id. § 824(b)(1).
\(^{212}\) Id.
\(^{213}\) Id. § 824(f).
\(^{214}\) Id. § 824d(a).
\(^{215}\) Id. § 824d(c), (d).
\(^{216}\) Id. § 824a-2(a)(2)(F).
\(^{217}\) Id. § 824a(a).
segmenting the country into regional districts for grid interconnection, FERC must “give notice to the State commission of each State situated wholly or in part within such district, and shall afford each such State commission reasonable opportunity to present its views and recommendations, and shall receive and consider such views and recommendations.”218 Before directing any utility to connect its transmission lines to other utilities, FERC must give notice to the state PUC and the utility, provide opportunity for a hearing, and establish that “no undue burden will be placed” on the utility.219 FERC is prohibited from compelling utilities to open up their transmission lines if that would “impair [the utility’s] ability to render adequate services to its customers.”220 FERC may only prescribe rules encouraging the adoption of cogeneration and other small, non-fossil-fuel generators after “consultation with representatives of Federal and State regulatory agencies” and after “public notice and a reasonable opportunity for interested persons (including State and Federal agencies) to submit oral as well as written data, views, and arguments.”221 And FERC has the general power to “refer any matter arising in the administration of” the FPA to a board of relevant State representatives, who are “vested with the same power” as FERC.222 

Altogether, these provisions recognize an overlapping, multi-nodal electricity grid built on cooperation and communication.

B. The Supreme Court’s Historic Respect for Nodal Governance

The Supreme Court has historically been respectful of the Act’s nodal structure, while still allowing FERC wide discretion in how it undertakes its statutory responsibilities.

For instance, in Connecticut Power & Light v. Federal Power Commission, one of the Court’s earliest cases addressing jurisdiction under the Federal Power Act, the Court explained that “the fact that a local commission may also have regulatory power [over an electricity facility] does not preclude exercise of the Commission’s functions.”223

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218.  *Id.*
219.  *Id.*
220.  *Id.* § 824a(b).
221.  *Id.* § 824a-3(a)(2).
222.  *Id.* § 824h(a).
The Court cited approvingly to the congressional record, which explained that the Act was “designed to secure coordination on a regional scale of the Nation’s power resources” and “conceived entirely as a supplement to, and not as a substitution for State regulation.”\textsuperscript{224} And Congress intended for the Act to “reconcile the claims of federal and of local authorities and to apportion federal and state jurisdiction over the industry”\textsuperscript{225}—an intent that the Court must take into account.\textsuperscript{226}

In the years that followed, the Supreme Court upheld regulatory schemes that required the involvement of multiple different governing nodes. It held that private companies’ bilaterally negotiated wholesale rates carry a presumption of lawfulness subject to FERC’s ultimate oversight.\textsuperscript{227} It allowed state PUCs, alongside the federal Rural Electrification Administration, to regulate rural cooperatives as a matter of “legitimate local public interest[].”\textsuperscript{228} It affirmed state PUCs’ ability to set retail rates but required them to incorporate FERC-approved wholesale rates in their cost calculations in order to give full force to both parties’ rate-setting responsibilities.\textsuperscript{229} It upheld FERC’s ability to implement an “open-access” transmission policy—allowing a new bevy of nodes to gain access to the grid—while permitting the

\begin{itemize}
\item \textsuperscript{224} Id. at 525 (quoting Hearings on H.R. 5423, House Committee on Interstate and Foreign Commerce, 74th Cong., 1st Sess., 384).
\item \textsuperscript{225} Id. at 531.
\item \textsuperscript{226} According to the Court: “Congress is acutely aware of the existence and vitality of these state governments. It sometimes is moved to respect state rights and local institutions even when some degree of efficiency of a federal plan is thereby sacrificed. Congress may think it expedient to avoid clashes between state and federal officials in administering an act such as we have here. Conflicts which lead state officials to stand shoulder to shoulder with private corporations making common cause of resistance to federal authority may be thought to be prejudicial to the ends sought by an act and regulation more likely to be successful, even though more limited, if it has local support. Congress may think complete centralization of control of the electric industry likely to overtax administrative capacity of a federal commission. It may, too, think it wise to keep the hand of state regulatory bodies in this business, for the ‘insulated chambers of the states’ are still laboratories where many lessons in regulation may be learned by trial and error on a small scale without involving a whole national industry in every experiment.” Id. at 530.
\item \textsuperscript{227} This is known as the “\textit{Mobile-Sierra} doctrine” and was developed in two cases issued in the same term: United Gas Pipe Line Co. v. Mobile Gas Serv. Corp., 350 U.S. 332 (1956), and FPC v. Sierra Pac. Power Co., 350 U.S. 348 (1956). \textit{See also} Morgan Stanley Capital Grp. Inc. v. Pub. Util. Dist. No. 1, 554 U.S. 527, 530–34 (2008) (explaining and reaffirming the \textit{Mobile-Sierra} doctrine).
\end{itemize}
The Court also explained that FERC, "within the limitations imposed by pertinent constitutional and statutory commands," must "devise methods of regulation capable of equitably reconciling diverse and conflicting interests." \(^{231}\)

**C. The Court’s Recent Disruption of Nodal Governance in EPSA and Hughes**

In the last few years, however, the Supreme Court has taken a new approach to the Federal Power Act that threatens to upend the existing nodal grid. This shift stems from two cases decided in 2016: *Federal Energy Regulatory Commission v. Electric Power Supply Ass’n (EPSA)* \(^{232}\) and *Hughes v. Talen Energy Marketing, LLC (Hughes)* \(^{233}\).

In *EPSA*, the Court was faced with how to define FERC’s jurisdiction on a nodal grid that is increasingly intertwined. In *Hughes*, the Court confronted the same question with regard to the states. Instead of adopting the same approach to both cases, however, the Court took a functional and permissive attitude to FERC’s governing authority, while simultaneously cabining states’ governing power within formalistic constraints.

**1. FERC v. EPSA**

In *EPSA*, the Court addressed whether FERC had jurisdiction under the Federal Power Act to regulate demand response bids made in the wholesale marketplace. \(^{234}\) The case presented a thorny jurisdictional issue. On the one hand, wholesale demand response bids (i.e., bids submitted into the wholesale markets by consumers to reduce their electricity consumption) consist of wholesale market transactions. These transactions would typically fall under FERC’s jurisdiction. On


\(^{231}\) Permian Basin Area Rate Cases, 390 U.S. 747, 767 (1968). See also Morgan Stanley Capital Grp. Inc., 554 U.S. at 532 (“We have repeatedly emphasized that the Commission is not bound to any one ratemaking formula . . . . But FERC must choose a method that entails an appropriate ‘balancing of the investor and the consumer interests.’” (quoting *FPC v. Hope Nat. Gas Co.*, 320 U.S. 591, 603 (1944))).


\(^{234}\) *EPSA*, 136 S. Ct. at 767.
the other hand, the bids involved consumers promising to reduce their retail consumption for a price set by FERC, which would ordinarily fall to the states to regulate.

The Court chose to resolve this issue by taking a functional approach to FERC’s regulatory authority. First, according to the Court, the Act gives FERC jurisdiction over wholesale rates, including “rules or practices that ‘directly affect the [wholesale] rate.’” Demand response bids directly affect the wholesale rate because they influence the wholesale supply and demand curves. Thus, FERC has jurisdiction over demand response bids.

Second, the Court held that FERC’s regulation of demand response does not intrude on the states’ retail jurisdiction because the purpose of FERC’s demand response regulations is to “improv[e] the wholesale market.” The Court explained that “[t]he retail market figures no more in the Rule’s goals than in the mechanism through which the Rule operates.” Because the Court adopted a functional approach to the FPA, the end goal of the regulation, not the means, was what mattered. Even though FERC was setting the rate at which retail actors received compensation for their non-consumption, it was not regulating retail rates.

In fact, the Court went even further. The Court held that, not only did it not matter that FERC’s regulation operated through the retail markets, but also it was entirely irrelevant that the demand response bids had retail-side effects. According to the Court, “[w]hen FERC regulates what takes place on the wholesale market, as part of carrying out its charge to improve how that market runs, then no matter the effect on retail rates, [the FPA] imposes no bar.” FERC need not even consider the impact of its regulation on retail rates because “[t]hat is of no legal consequence.”

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235. *Id.* at 774 (emphasis in original) (quoting Cal. Indep. Sys. Operator Corp. v. FERC, 372 F.3d 395, 403 (D.C. Cir. 2004)).
236. *Id.* at 774.
237. *Id.* at 774–75.
238. *Id.* at 776.
239. *Id.* at 777.
240. *Id.* at 776 (emphasis omitted) (quoting Oneok, Inc. v. Learjet, Inc., 135 S. Ct. 1591, 1599 (2015)).
241. *Id.* at 776.
242. *Id.* (emphasis added).
243. *Id.*
2. *Hughes v. Talen Energy Marketing, LLC*

In *Hughes*, the Court addressed whether Maryland could subsidize an in-state generation facility by (1) directing in-state utilities to enter into long-term contracts with the facility, (2) requiring the facility to bid its capacity into one of FERC’s wholesale capacity markets, and (3) making the utilities pay the facility at a rate contingent upon the price that the facility received in the wholesale market. Again, *Hughes* presented a jurisdictional puzzle: under the FPA, states have jurisdiction over generation facilities. But FERC retains jurisdiction over the wholesale rates that generators receive for their electricity sales. The problem was how to draw the jurisdictional line on an electricity grid where generation facilities and wholesale markets overlap.

Given its approach in *EPSA*, one might expect that the Court would take the same functional approach to resolve *Hughes*, looking to the target and purpose of the state program to determine whether it was lawful. Not so. First, the Court acknowledged that Maryland’s “traditional authority” gave it jurisdiction over “in-state generation.” And the purpose of the Maryland program—”attempting to encourage construction of new in-state generation”—was “legitimate.” But it concluded that the “means” by which Maryland sought to accomplish that goal was unlawful. Specifically, the Court held that because Maryland required the generation facility to bid into the capacity market, then had in-state utilities pay the facility “a rate distinct from the clearing price” set by the market, Maryland “invade[d] FERC’s regulatory turf”—even though, like the demand response rules at issue in *EPSA*, the wholesale market acted as no more than the mechanism through which the Maryland program operated.

Understanding the formalistic distinctions made in *Hughes* requires some discussion of the nuances of electricity capacity markets. Capacity markets are markets for the total amount of long-term

244. Capacity indicates the total amount of electricity a generator is able to sell over the long term, rather than split-second generation.
246. *Id.* at 1299.
247. *Id.* at 1298.
248. *Id.*
249. *Id.*
available generation in a region. They work as follows: wholesale market operators calculate future demand projections, often several years in advance, for the entire region. They then divvy up that demand between all of the distribution utilities in the region. Each utility must purchase an amount of capacity proportional to its share of future customer demand. At the same time, generators in the region submit bids for their expected future supply. The utilities buy their requisite capacity from these bids. The price (rate) for capacity is set by the market.\footnote{Id. at 1293.}

Now, utilities may also satisfy their capacity requirements by purchasing electricity directly from generators through a bilateral contract. In those contracts, the parties buy long-term electricity supply and set the rates themselves. In order to account for the capacity covered by these contracts, utilities are required to bid any bilateral contracts they hold into the capacity marketplace. Usually, utilities bid those contracts in at some nominal price ($0) to ensure that they clear the market, as the utilities have already purchased the capacity. The utilities then, outside of the FERC-run market, pay the generators the rate agreed to in the bilateral contract.\footnote{Id. at 1293–94.} Notably, states will often mandate that their in-state utilities enter into bilateral contracts in order to encourage investment in certain forms of generation. (Many state renewable energy policies, for instance, operate in this manner.)

From this explanation, it should be clear that the Maryland program at issue in \textit{Hughes} functioned much the same as a bilateral contract. But FERC has “long accommodated” bilateral contracts in its markets—a practice that the \textit{Hughes} Court endorsed.\footnote{Id. at 1299.} So what made the programs different? According to the Court, Maryland’s program required the \textit{generation facility} to submit its capacity into the marketplace, whereas for bilateral contracts, it was the \textit{utility} that did so.\footnote{Id.} The Maryland program “operate[d] within the auction” in a manner that interfered with FERC’s jurisdiction.\footnote{Id. at 1299.} But both the Maryland program and the bilateral contracts had \textit{the exact same effect} on the wholesale market rate. The Court was thus primarily concerned with the precise formal entity that bid the contracts into the wholesale capacity market, rather than the effect that the contracts had on market-based capacity prices. This stands in stark contrast to the
Court’s approach in *EPSA*, where it disregarded formalistic distinctions so long as the purpose of the program was FERC-related.

We are left, then, with an *EPSA*-based approach to FERC jurisdiction under the Federal Power Act where FERC has free rein to regulate, without regard to the effect of its policies on other parts of the market, so long as it targets rules and practices that “directly affect” the wholesale markets. Meanwhile, states must take a *Hughes*-based approach and be especially wary of the precise ways in which their regulations intersect with the wholesale markets. FERC’s governing power is thus elevated above that of the states in a manner inconsistent with the structure and language of the Federal Power Act and the Court’s historical approach to electricity grid jurisprudence. By employing two different approaches with regard to FERC and the states, irrespective of which approach is “better,” the Court has created an uneven playing field.

D. The Consequences of the Court’s Uneven Approach in *EPSA* and *Hughes*

The Court’s uneven approach to different governing nodes on the grid threatens to upend its existing nodal state, consolidating power within FERC while others are diminished. For instance, state programs are currently under attack in the courts for potential *Hughes* violations, while FERC is using its *EPSA*-backed control over the wholesale markets to either diminish the power of state programs or kick them out of the markets entirely. The end result could be a less innovative grid that loses the benefits of decentralization.

Soon after *Hughes* came down, several state programs supporting in-state generation came under attack. For instance, Connecticut’s renewable energy procurement program (intended to encourage the construction of renewable generators in Connecticut) was challenged under a theory of *Hughes*-style preemption. The Second Circuit ultimately upheld the program, but only after a careful formalistic distinction between the Maryland program in *Hughes* and the Connecticut program.255 New York’s and Illinois’ subsidies for nuclear generators also faced litigation. Although in both cases the Courts of Appeals upheld the programs under a similarly formalistic approach,

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255.  *Allco Fin. Ltd. v. Klee*, 861 F.3d. 82, 97–100 (2d Cir. 2017).
petitions for certiorari for both of those decisions are pending before the Supreme Court. 256 And Minnesota’s Next Generation Energy Act was struck down by the Eighth Circuit, in part because of concerns that the program regulated capacity market prices in violation of Hughes. 257

Meanwhile, FERC has been using its control over wholesale markets to undermine state-based programs in a change from its past practice. This phenomenon can be seen most clearly in the wholesale capacity markets. In the past, FERC employed a “price floor” in the capacity markets in order to prevent market participants from manipulating capacity prices by artificially lowering them. These price floors often had the unintended effect of shutting out bilateral contracts and state-mandated procurement from the capacity markets because, as discussed above, those contracts are often bid in at $0. In order to counteract that effect, in the years prior to Hughes and EPSA, FERC accommodated out-of-market contracts by selectively exempting them from the price floor. 258

But in the past year, FERC has indicated that it is no longer willing to accommodate out-of-market contracts, particularly those mandated by state programs. In an order issued in March 2018, FERC expressed concern that out-of-market contracts “raise[] a potential conflict with the Commission’s interest in maintaining efficient and competitive wholesale electric markets.” 259 To combat this, a minority of FERC commissioners suggested that the price floor may be used to preempt such programs from the capacity markets entirely. 260 Three months later, FERC officially abandoned its policy of accommodation, declaring that “the integrity and effectiveness of the capacity market” have become “untenably threatened” by these out-of-market contracts, and that wholesale market operators must apply the price floor to all generation forms with “few to no exemptions.” 261


257. North Dakota v. Heydinger, 825 F.3d 912, 927 (8th Cir. 2016) (Murphy, J., concurring in part and concurring in the judgment).


260. Id. Commissioners LaFleur, id. at *37, Powelson, id. at *38–40, and Glick, id. at *42, indicated that they did not agree with this preemption policy, suggesting that the position received support from only two out of five Commissioners.

261. Order Rejecting Proposed Tariff Revisions, Granting in Part and Denying in Part
FERC’s new stance towards out-of-market contracts leaves states in an unenviable position. They can forego their generation programs entirely, essentially ceding control over generation facilities to FERC’s wholesale markets. Or they can require their utilities to purchase capacity in FERC’s markets and buy state-mandated capacity consistent with state renewable energy and other programs. But that would force consumers to double-pay for capacity, once for the FERC market and once for the state program. Or states could pull their utilities out of the wholesale markets entirely and opt for a form of state-owned generation and distribution—essentially, a government-run electricity industry. In other words, FERC, in its most recent orders, is telling states that they can either acquiesce to FERC’s demands or leave the wholesale markets.

Following both of these strands of electricity law phenomena—the attack on state programs in the courts and in the FERC-run capacity markets—to their logical ends leads to some troubling outcomes for the electricity grid. As discussed in Parts II and III, the decentralized electricity grid offers significant governance benefits. States can be the sites of experimentation in grid technologies and management techniques as well as local governance. States, in partnership with direct and indirect self-governance nodes, have helped spur innovation in solar, wind, energy storage, and distributed energy resources, in some cases even supporting these resources until they could be scaled up and competitive in the wholesale markets. The wholesale markets, in turn, encourage cost-competitiveness and efficiency, allowing local generation to access regional markets and larger customer bases. If states abandon some of their more innovative programs due to threats from FERC, or if the wholesale markets diminish in their reach due to state withdrawal, these benefits of multi-nodal governance would be lost.

The damage would be based upon an erroneous approach to electricity grid governance as embodied in the Federal Power Act and historical practice. As FERC Commissioner Richard Glick noted in his dissent from the Commission’s June 2018 order:

It is an inevitable consequence of the FPA’s division of jurisdiction over the electricity sector that one sovereign’s exercise of its
authority will affect matters subject to the other sovereign’s exclusive jurisdiction. . . . But the existence of such cross-jurisdictional effects is not necessarily a ‘problem’ for the purposes of the FPA. Rather, these cross-jurisdictional effects are the product of the ‘congressionally designed interplay between state and federal regulation’ . . . . 262

Mistaking the complexities and interconnections of the electricity grid for failures of grid governance, as FERC has done in its approach the capacity markets and as the Supreme Court did in Hughes, is misguided. And concentrating power within FERC, to the detriment of other governing nodes, in order to correct this so-called problem threatens to upend the nodal governance model of the grid. This could result in a grid that is less innovative, less adaptable to new technologies, less responsive to regional changes and local concerns.

V. CONCLUSION

The threat of consolidation of power within FERC at the expense of other governing nodes on the grid is poised to get worse, not better. As we saw in EPSA, the Court was very willing to give FERC jurisdiction over new grid programs that intersect with the wholesale markets. Demand response represents only the tip of the iceberg. FERC may soon assert control over residential solar panels, electric vehicles, and even residential smart thermostats. While we may want to incorporate these devices into the wholesale markets, we may also want to subject them to governance control at a state and local level as well. Courts, policymakers, and regulators must recognize that the U.S. electricity grid operates according to a nodal governance framework, not a centralized, top-down system. Giving other nodes the ability to exercise governing power alongside FERC allows the grid to innovate, experiment, and adapt to the changing needs and preferences of consumers, and better prepares the grid for the many challenges it faces now and in the years to come.

262. Id. at *50 (Glick, Commissioner, dissenting).