GRID GOVERNANCE: THE ROLE OF A NATIONAL NETWORK COORDINATOR

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Mounting concerns over the security and reliability of the grid have prompted many to question the grid's state-centered regulatory framework. Today, the federal government regulates interstate transmission, while the states exercise exclusive authority over intrastate distribution, generation, and transmission siting. In an interconnected system, however, each state's energy policies and infrastructure investments inevitably affect operations and costs throughout the entire network. The ongoing physical, financial, and technological integration of the interstate electric power network portends a growing federal role in coordinating intrastate infrastructure policy.

This Article conceptualizes the federal role in grid governance as that of a "National Network Coordinator." The Article illustrates the coordination model with respect to federal policies establishing national transmission reliability standards and siting interstate transmission lines. The coordination model rationalizes an expansion of federal authority, but also provides a principle to limit that expansion. Federal authority need not preclude state regulation that supplements or enhances the federal standards. If federal authority is used to coordinate—rather than replace—state regulation, much of the value of state autonomy is preserved.

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INTRODUCTION

On October 29, 2012, Superstorm Sandy ravaged the east coast of the United States, flooding towns and cities and causing ten million power outages across twenty-one states.[1] More than two weeks after

[1] Jeffrey B. Havlerson & Thomas Rabenhorst, *Hurricane Sandy: The Science and Impacts of a Superstorm*, WEATHERWISE, Mar.–Apr. 2013, at 14; *see also* William Fulton, *Sandy Forces Northeast to Rethink Infrastructure*, GOVERNING (Jan. 2013), http://www.governing.com/columns/eco-engines/col-sandy-forces-northeast-to-rethink-infrastructure.html.

Sandy, many customers (myself included) remained in the dark. The extended blackout was frustrating and worrisome, but not entirely surprising. Weaknesses in the electric grid have become increasingly apparent over the past decade. In 2003, cascading power failures swept across the northeastern United States and parts of Canada, raising serious concerns over the security and reliability of the nation's energy infrastructure.[2] Two years later, the American Society of Civil Engineers awarded the transmission grid an overall grade of D.[3] In 2008, a study conducted by the Department of Defense (DOD) ominously concluded that "the grid is fragile, vulnerable, near its capacity limit, and outside of DOD control."[4]

Mounting concerns over the security and reliability of the grid have prompted many to question the grid's state-centered regulatory framework.[5] The electric power network is a sprawling interstate system that is physically, financially, and technologically integrated. Each flow of electricity along each line has the capacity (at least in theory) to affect network reliability, transmission rates, and regional energy markets. As the Supreme Court recently observed, "any electricity that enters the grid immediately becomes a part of a vast pool of energy that is constantly moving in interstate commerce."[6] Isolating intrastate operations is no longer a simple task.

Empowering states to establish infrastructure policy enables state regulators to respond to local conditions and experiment with regulatory strategies. This reduces the risk of widespread regulatory failure and likely produces better policy outcomes in each individual state. In an interstate network, however, policies designed to maximize

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2 U.S.–CAN. POWER SYS. OUTAGE TASK FORCE, FINAL REPORT ON THE AUGUST 14, 2003 BLACKOUT IN THE UNITED STATES AND CANADA: CAUSES AND RECOMMENDATIONS 17–22 (2004) [hereinafter OUTAGE TASK FORCE], *available at* http://energy.gov/sites/prod/files/oeprod/DocumentsandMedia/BlackoutFinal-Web.pdf (describing causes of the cascading blackout).

3 AM. SOC'Y OF CIVIL ENG'RS, 2005 REPORT CARD FOR AMERICA'S INFRASTRUCTURE 18 (2005), *available at* http://www.asce.org/uploadedFiles/Infrastructure/Report_Card/2005_Report_Card-Full_Report.pdf.

4 DEF. SCI. BD., REPORT OF THE DEFENSE SCIENCE BOARD TASK FORCE ON DOD ENERGY STRATEGY 18 (2008), *available at* http://www.acq.osd.mil/dsb/reports/ADA477619.pdf.

5 *See, e.g.*, Ashley C. Brown & Jim Rossi, *Siting Transmission Lines in A Changed Milieu: Evolving Notions of the "Public Interest" in Balancing State and Regional Considerations*, 81 U. COLO. L. REV. 705, 708 (2010); Michael Dworkin et al., *Energy Transmission and Storage*, *in* THE LAW OF CLEAN ENERGY: EFFICIENCY AND RENEWABLES 531, 538 (Michael B. Gerrard ed., 2011); Steven J. Eagle, *Securing A Reliable Electricity Grid: A New Era in Transmission Siting Regulation?*, 73 TENN. L. REV. 1, 13 (2005); Alexandra B. Klass & Elizabeth J. Wilson, *Interstate Transmission Challenges for Renewable Energy: A Federalism Mismatch*, 65 VAND. L. REV. 1801, 1857–59 (2012); Hari M. Osofsky & Hannah J. Wiseman, *Dynamic Energy Federalism*, 72 MD. L. REV. 773, 794–95 (2013); Jim Rossi, *The Trojan Horse of Electric Power Transmission Line Siting Authority*, 39 ENVTL. L. 1015, 1019 (2009) [hereinafter Rossi, *The Trojan Horse*].

6 New York v. Fed. Energy Regulatory Comm'n, 535 U.S. 1, 7 (2002).

the welfare of an individual state have a tendency to reduce the welfare of the network as a whole. Inconsistent and frequently parochial state regulatory regimes increase the costs of compliance for the power industry, burden the interstate market for electric power, and create a formidable obstacle to system-wide coordination.[7] Thus, as with most modern regulatory regimes, effective grid governance requires a cooperative, interjurisdictional approach involving federal, state, and local regulators.[8]

This Article outlines one such approach in which the federal role is that of a "National Network Coordinator." Critically, this model rationalizes an expansion of federal authority, but also provides a principle to limit that expansion. Federal authority need not preclude state regulation that supplements or enhances the federal standards. If federal authority is used to coordinate—rather than replace—state regulation, much of the value of state autonomy is preserved.

State authority over the interstate network is problematic, first, because states lack the legal authority to regulate the *inter*state portions of the network, and second, because state regulation of the *intra*state portions of the network is likely to benefit in-state interests at the expense of the interstate network. National coordination can account for both sets of state-level collective action problems.[9] Federal law establishes uniformity, overcoming the inability of states to coordinate standards on a broad scale. Federal law also compels states to internalize the costs of their regulations, overcoming states' parochial tendencies.

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7 *See, e.g.*, Brown & Rossi, *supra* note 5, at 748–50, 761 (arguing that a growing interstate electricity market and an increased focus on renewable resources, require a broader understanding of public interest than is traditionally secured by state utilities law); Dworkin et al., *supra* note 5, at 538 (arguing that "the deregulation of some wholesale markets and the parochialism of most state statutes, which do not consider interstate effects or the possibilities for regional coordination, have made state regulation inefficient in the interstate context."); Michael G. Morris, *Electric Transmission: Building the Next Interstate System*, PUB. UTIL. FORTNIGHTLY, Jan. 2006, at 17, 18 ("Transmission remains trapped between federal and state regulatory regimes, slowing development of a truly, and much-needed, national interstate grid.").

8 Ashira Pelman Ostrow, *Process Preemption in Federal Siting Regimes*, 48 HARV. J. ON LEGIS. 289, 301–02 (2011) (describing modern "'interactive,' 'dynamic,' 'iterative,' 'diagonal,' or most generically, 'cooperative' regimes that engage multiple, overlapping levels of government to promote diversity within a federalist framework." (footnotes omitted)).

9 Robert L. Glicksman & Richard E. Levy, *A Collective Action Perspective on Ceiling Preemption by Federal Environmental Regulation: The Case of Global Climate Change*, 102 NW. U. L. REV. 579, 594–95 (2008) (describing traditional use of federal preemption to overcome collective action problems by setting uniform standards and accounting for negative externalities); Samuel Issacharoff & Catherine M. Sharkey, *Backdoor Federalization*, 53 UCLA L. REV. 1353, 1370 (2006) (describing use of federal preemption to coordinate state standards and account for interstate externalities); Jim Rossi, *Moving Public Law Out of the Deference Trap in Regulated Industries*, 40 WAKE FOREST L. REV. 617, 647 (2005) (describing use of federal authority to compel states to coordinate with regard to interstate infrastructure).

Nonetheless, in the context of energy infrastructure, concentrating authority in a federal administrative agency dramatically increases the risk of regulatory failure. Energy experts have a rather dismal record for predicting future infrastructure needs.[10] Ongoing changes in the electric power industry, including shifts in the price and type of fuel used to generate electricity, existing and anticipated environmental regulations, and the integration of smart grid technologies, demand-response programs, distributed generation, and renewable resources are certain to affect the optimal energy infrastructure policy in unforeseen ways.[11]

Meanwhile, the capital-intensive nature of infrastructure investments means that infrastructure choice, even if obviously flawed, will dictate energy policies for decades to come.[12] Having heavily invested in the construction of a facility, an owner will be compelled to operate it, at least until it recoups its initial investment. In the 1960s and 1970s, for example, utilities built excessively large power plants. Once they had been sited and installed, customers were forced to pay for them, even though it soon became clear that these new facilities were less efficient than other power plants.[13] Because the future is uncertain, it makes sense to diversify risk—to spread our eggs among many baskets—by leaving substantial regulatory authority in state hands.[14]

The Article proceeds as follows. Part I describes the evolution of the electric power network from a patchwork of isolated local energy

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10 VACLAV SMIL, ENERGY AT THE CROSSROADS: GLOBAL PERSPECTIVES AND UNCERTAINTIES 121–77 (2003) (citing numerous examples of failed energy forecasts). As energy historian Daniel Yergin notes, "[w]hen it comes to energy, the rule of the game is to expect the unexpected." Clifford Krauss, *"Expect the Unexpected"*, N.Y. TIMES, Apr. 25, 2013, at F1 (internal quotation marks omitted).

11 *See infra* Part I & Part II.A.2.

12 Eduardo M. Peñalver, *Land Virtues*, 94 CORNELL L. REV. 821, 832 (2009) (describing permanence of land uses and noting that "once in place, existing land uses will frequently limit the scope of our land-use choices for a long time to come"); Joel Achenbach, *The 21st Century Grid: Can We Fix The Infrastructure That Powers Our Lives?*, NAT'L GEOGRAPHIC, July 2010, *available at* http://ngm.nationalgeographic.com/2010/07/power-grid/achenbach-text (noting that utilities are risk averse because "they tend to make very large capital investments and eat that cooking for 30 or 40 or 50 years." (internal quotation marks omitted)).

13 Jim Rossi, *The Political Economy of Energy and Its Implications for Climate Change Legislation*, 84 TUL. L. REV. 379, 396 (2009).

14 Donald Elliott makes a similar point in explaining—though not defending—why the United States does not have a renewable energy policy. According to Elliott:

> Many Americans think that the government isn't all that smart. They are more concerned about government picking and subsidizing losers than about missing the boat because we don't have a strong centralized energy policy. Thus, our current renewable energy policy is not to have a single national policy, but to allow states and private companies to experiment with different approaches and ultimately to let the market decide what works best in the light of experience.

E. Donald Elliott, *Why the United States Does Not Have a Renewable Energy Policy*, 43 ENVTL. L. REP. 10095, 10100 (2013).

grids into a vast interstate network that is physically, financially and technologically interconnected. This Part then identifies two national policy goals that are driving the ongoing expansion and modernization of the grid—maintaining reliable electric service throughout the interconnected transmission network and incorporating renewable energy sources into the nation's energy mix.

Part II considers the balance of state and federal authority in grid governance. State autonomy enables state regulators to tailor energy policy to regional conditions and diversifies the risk of regulatory choice. State and local input is particularly important for infrastructure siting, which involves context-specific determinations as to the appropriate use of land.[15] Nonetheless, this Part argues that national coordination is necessary to establish system-wide standards for the interstate network and to balance the competing interests of individual states. Ultimately, then, this Part concludes that effective grid governance requires an interjurisdictional framework that accounts for the federal, state and local interests at stake in regulating energy infrastructure.

Part III develops one such framework, in which the federal government coordinates—rather than preempts—parallel state regulation. Section A of Part III argues that as the electric power becomes increasingly interconnected, federal authority will expand to encompass intrastate generation, distribution, and transmission policies that have the capacity to affect network operations, transmission costs, or regional energy markets. Moreover, although the Federal Energy Regulatory Commission (FERC) is not authorized to regulate intrastate infrastructure directly, this Section suggests that FERC's existing authority to establish transmission reliability standards,[16] combined with its authority to establish interoperability standards for smart grid

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15 Eric T. Freyfogle, *The Particulars of Owning*, 25 ECOLOGY L.Q. 574, 580 (1999) ("Sensible land use decisions require knowledge of the land itself, in its many variations. . . . Local people typically know the land better than outsiders."); Ashira Pelman Ostrow, *Land Law Federalism*, 61 EMORY L.J. 1397, 1442 (2012); Ostrow, *supra* note 8, at 296 ("[L]ocal primacy in this area of law stems from a practical recognition that local governments are institutionally better suited to this task than are higher levels of government.").

16 16 U.S.C. § 824*o* (2012) (authorizing the establishment of mandatory reliability standards for the bulk-power system). The North American Electric Reliability Corporation (NERC), which has been charged by FERC with establishing mandatory reliability standards for the transmission system, defines "Reliable Operations" as

> [o]perating the elements of the bulk-power system . . . within equipment and electric system thermal, voltage, and stability limits so that instability, uncontrolled separation, or cascading failures of such system will not occur as a result of a sudden disturbance, including a cybersecurity incident, or unanticipated failure of system elements.

NERC, GLOSSARY OF TERMS USED IN NERC RELIABILITY STANDARDS 66 (updated April 3, 2014), *available at* http://www.nerc.com/files/glossary_of_terms.pdf.

equipment,[17] and its long-standing authority to establish "just and reasonable" rates for the transmission of electric energy,[18] provides a significant foundation for indirect federal regulation of intrastate infrastructure.

Section B of Part III considers the federal framework for establishing mandatory transmission reliability standards. This Section argues that the reliability framework conforms to the coordination model by enabling a central federal regulatory agency—FERC—to coordinate network operations, while affording state regulators an opportunity to supplement the federal standards and tailor them to local conditions.

Section C of Part III extends the coordination model to interstate transmission siting. Specifically, this Section argues against the enactment of a preemptive federal siting regime that grants FERC siting authority for any interstate transmission lines. Instead, Section C proposes a federal "Process Preemption" siting policy to enable national coordination of multistate infrastructure projects, while preserving traditional state authority to site transmission lines within their own boundaries.[19]

I. EVOLUTION OF THE INTERSTATE ELECTRIC POWER GRID

In 1882, Thomas Edison constructed a local grid that supplied electric lights to fifty-nine customers in the Wall Street area.[20] Today, that modest grid has morphed into a sprawling, interconnected network serving "more than 143 million residential, commercial, and industrial customers through more than 6 million miles of transmission and distribution lines"[21] and supporting competitive wholesale electricity markets. This Part describes the evolution of the electric power network.

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17 42 U.S.C. § 17385 (authorizing the development of interoperability standards for smart grid systems to enable "all electric resources, including demand-side resources, to contribute to an efficient, reliable electricity network"). Interoperability is the ability for systems to work together (inter-operate). *What Is Interoperability?*, NETWORK CENTRIC OPERATIONS INDUS. CONSORTIUM, http://www.ncoic.org/technology/what_is_interoperability (last visited Mar. 18, 2014).

18 16 U.S.C. § 824e(a) ("Whenever the Commission . . . shall find that any rate, charge, or classification . . . rule, regulation, [or] practice . . . is unjust, unreasonable, unduly discriminatory or preferential, the Commission . . . shall fix the same by order.").

19 Process Preemption is a hybrid federal-local siting mechanism that empowers state and local regulators to make siting decisions, subject to federal constraints on the decisionmaking process. Ostrow, *supra* note 8, at 293.

20 MASS. INST. OF TECH., THE FUTURE OF THE ELECTRIC GRID: AN INTERDISCIPLINARY MIT STUDY app. A, at 235 (2011) [hereinafter MIT STUDY], *available at* http://mitei.mit.edu/system/files/Electric_Grid_Full_Report.pdf.

21 *Id.* at 1.

Section A describes the transformation of the grid along three critical dimensions—physical, economic, and technological. Section B identifies reliability and renewable energy as two nationally significant policy goals that are motivating the ongoing physical expansion and modernization of the interstate network.

A. *Beyond State Boundaries*

Historically, the electric power industry was vertically integrated.[22] State-authorized monopoly firms operated within a discrete geographic area, producing, transmitting, and delivering electricity to end-users.[23] Vertically integrated utility companies sold electricity to consumers for a single "bundled" price that included the cost of the electricity itself as well as its transmission and delivery.[24] Over time, three fundamental changes in the power industry have created a network that transcends state boundaries: (1) the expansion of the physical infrastructure network across state lines; (2) the transition from monopolistic to competitive interstate markets; and (3) the integration of advanced communication technologies and demand-side resources.

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22 DEPT. OF ENERGY, ENERGY INFO. ADMIN., THE CHANGING STRUCTURE OF THE ELECTRIC POWER INDUSTRY: AN UPDATE ix n.2 (1996) ("A vertically integrated utility is one which engages in generation, transmission, and distribution operations."); *see also* BIPARTISAN POLICY CTR., CAPITALIZING ON THE EVOLVING POWER SECTOR: POLICIES FOR A MODERN AND RELIABLE U.S. ELECTRIC GRID 15 (2013), *available at* http://bipartisanpolicy.org/sites/default/files/Energy_Grid_Report%5B1%5D.pdf ("Until the early 1990s, electric utilities were typically vertically integrated, which meant that an individual utility owned and operated the generation, transmission, and distribution resources in its footprint."). This structure was formalized by the Public Utility Holding Company Act of 1935 (PUHCA), which allowed utility holding companies to own electricity distribution systems in only a single state or region and required them to operate as a solitary, integrated system. Public Utility Holding Company Act of 1935, ch. 687, 49 Stat. 803 (codified at 15 U.S.C. §§ 79(a)–(z-6)) (repealed 2005); *see also* Joshua P. Fershee, *Misguided Energy: Why Recent Legislative, Regulatory, and Market Initiatives Are Insufficient to Improve the U.S. Energy Infrastructure*, 44 HARV. J. ON LEGIS. 327, 335–37 (2007) (describing the impact of PUHCA on the electricity industry).

23 STAN MARK KAPLAN, CONG. RESEARCH SERV., R40511, ELECTRIC POWER TRANSMISSION: BACKGROUND AND POLICY ISSUES 2–4 (2009), *available at* http://fpc.state.gov/documents/organization/122949.pdf. *See generally* RICHARD F. HIRSH, POWER LOSS: THE ORIGINS OF DEREGULATION AND RESTRUCTURING IN THE AMERICAN ELECTRIC UTILITY SYSTEM 9–31 (2002); Ari Peskoe, *A Challenge for Federalism: Achieving National Goals in the Electricity Industry*, 18 MO. ENVTL. L. & POL'Y REV. 209 (2011) (describing the evolution of regulation in power industry).

24 New York v. Fed. Energy Regulatory Comm'n, 535 U.S. 1, 5 (2002).

1. Interconnections and Interstate Infrastructure

The electric power network is made up of three distinct physical components: generating facilities, high-voltage transmission lines, and local distribution systems.[25] Generating facilities—i.e. power plants—produce electricity using a range of fuels including coal, natural gas, wind, solar, or nuclear material. High-voltage transmission lines carry electricity from power plants to major population centers. Local distribution systems and their associated transformers and substations bring electricity into homes and businesses via overhead lines or underground cables.[26]

Most electric power systems began as independent networks constructed by vertically integrated utility companies to serve specific local communities.[27] As the demand for electricity grew, particularly after World War II, local utility companies began to merge and physically link their transmission networks to form larger regional grids. Larger networks allowed utility companies to improve reliability and increase efficiency, and facilitated power sales and co-ownership of large and expensive power plants.[28] Multi-state, even multi-national, power companies soon emerged.[29] By 1970, the United States had twenty-one

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25 RICHARD J. CAMPBELL, CONG. RESEARCH SERV., R42923, ELECTRICAL POWER: OVERVIEW OF CONGRESSIONAL ISSUES 1 (2013), *available at* http://www.fas.org/sgp/crs/misc/R42923.pdf ("The electrical grid of the United States consists of all the power plants generating electricity, together with the transmission and distribution lines and their associated transformers and substations which bring power to end-use customers."); AM. SOC'Y OF CIVIL ENG'RS, FAILURE TO ACT: THE ECONOMIC IMPACT OF CURRENT INVESTMENT TRENDS IN ELECTRICITY INFRASTRUCTURE 4–5 (2011) [hereinafter ASCE, FAILURE TO ACT], *available at* http://www.asce.org/uploadedFiles/Infrastructure/Failure_to_Act/energy_report_FINAL2.pdf (listing generation, transmission and distribution as three elements of energy infrastructure).

26 KAPLAN, CONG. RESEARCH SERV., R40511, at 2.

27 *Id.* ("The grid is a patchwork of systems originally built by individual utilities as isolated transmission islands to meet local needs."); *see also, supra* note 23.

28 ADAM VANN & JAMES V. DEBERGH, CONG. RESEARCH SERV., R40657, THE FEDERAL GOVERNMENT'S ROLE IN ELECTRIC TRANSMISSION FACILITY SITING 2 (2011) ("Interconnections were motivated by the reliability benefits of connecting a utility to its neighbors, opportunities for power sales, and joint ownership of increasingly large and expensive power plants."); EDISON ELEC. INST., KEY FACTS ABOUT THE ELECTRIC POWER INDUSTRY 15 (2013), *available at* http://www.eei.org/resourcesandmedia/key-facts/Documents/KeyFacts.pdf ("Electric companies have interconnected their transmission systems so that they may buy and sell power from each other and from other power suppliers, and to ensure reliability of service."); *What is the Electric Power Grid, and What are Some Challenges It Faces?*, U.S. ENERGY INFO. ADMIN., http://www.eia.gov/energy_in_brief/article/power_grid.cfm (last updated Apr. 27, 2012) [hereinafter EIA, *What is the Electric Power Grid*] (describing benefits of interconnection).

29 NAT'L COUNCIL ON ELEC. POLICY, COORDINATING INTERSTATE ELECTRIC TRANSMISSION SITING: AN INTRODUCTION TO THE DEBATE 3 (2008), *available at* http://www.ncouncil.org/Documents/Transmission_Siting_FINAL_41.pdf.

interconnected networks of transmission lines, known as "power pools,"[30] that enabled coordination among neighboring utilities.[31]

Today, the patchwork of isolated local grids has evolved into three major regional networks that include connections to Mexico and Canada: the Eastern Interconnection, the Western Interconnection, and the Electric Reliability Council of Texas (which covers most of the state).[32] These three grids account for 73%, 19%, and 8%, respectively, of electricity sales in the United States,[33] and consist of approximately 160,000 miles of high-voltage transmission lines and almost six million miles of lower-voltage distribution lines.[34] Together, these grids serve approximately 125 million residential customers, 17.6 million commercial customers, and 775,000 industrial customers.[35]

2. Growth of Competitive Regional Electricity Markets

In addition to the physical infrastructure, the market for electricity has become decidedly interstate. For most of the twentieth century, the electric power industry was regulated as a natural monopoly.[36] Since the late 1970s, federal and state policies have encouraged restructuring the electric power industry by introducing competition into the generation

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30 James F. Fairman & John C. Scott, *Transmission, Power Pools, and Competition in the Electric Utility Industry*, 28 HASTINGS L.J. 1159, 1170 (1977).

31 *Id.* at 1169 (describing pooling arrangements regarding reserve generating capacity, contingencies for emergencies, and centralized coordination of generation based on cost).

32 AM. SOC'Y OF CIVIL ENG'RS, 2009 REPORT CARD FOR AMERICA'S INFRASTRUCTURE 134 (2009); *see also* MIT STUDY, *supra* note 20, at 3; EIA, *What is the Electric Power Grid*, *supra* note 28 ("The grid of electric power lines has evolved into three large interconnected systems that move electricity around the country.").

33 MIT STUDY, *supra* note 20, at 3.

34 AM. PLANNING ASS'N, REBUILDING AMERICA: APA NATIONAL INFRASTRUCTURE INVESTMENT TASK FORCE REPORT 35 (2010), *available at* http://www.planning.org/policy/infrastructure/pdf/finalreport.pdf; *Electricity Explained: How Electricity Is Delivered to Consumers*, U.S. ENERGY INFO. ADMIN., http://www.eia.gov/energyexplained/index.cfm? page=electricity_delivery (last updated July 9, 2012) ("In the United States, the network of nearly 160,000 miles of high voltage transmission lines is known as the 'grid.'").

35 MIT STUDY, *supra* note 20, at 5.

36 Joskow and Noll explain that:

> Natural monopoly was believed to have two sources. First, transmission and distribution were regarded as provided at minimum cost through a single network. Second, the physics of electricity flow in a network plus the random variation in both electricity generation and retail demand were thought to give rise to a system wide need for coordination of generation and current flow, causing the natural monopoly to extend to segments that did not exhibit significant economies of scale.

Paul L. Joskow & Roger G. Noll, *The Bell Doctrine: Applications in Telecommunications, Electricity, and Other Network Industries*, 51 STAN. L. REV. 1249, 1292 (1999).

and wholesale electricity market,[37] and mandating open access of interstate transmission facilities.[38]

In 1999, FERC issued Order 2000, which established principles for the formation of Regional Transmission Organizations (RTOs, originally called Independent System Operators (ISOs)), to manage interstate transmission and ensure equal access and reliability.[39] RTOs perform a number of regional functions, including congestion management;[40] obtaining a tariff from FERC establishing the rate for generators to use transmission lines; managing an electricity market; and planning for needed transmission expansions and upgrades.[41]

As a result of industry restructuring, merchant generators have proliferated and competitive wholesale electricity markets have emerged. In 2007, merchant generators produced 42% of U.S. electricity.[42] Electricity is widely viewed as a commodity that is traded on interstate markets.[43] Wholesale electricity markets, which are operated by RTOs, "now cover two-thirds of the U.S. population and meet about two-thirds of U.S. demand."[44] Wholesale electricity products and services have developed to facilitate the sale and transmission of

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37 The Public Utility Regulatory Policies Act introduced competition into generation of electricity by allowing independent electricity producers with "qualifying facilities" access to the power grid and electricity sales. Public Utility Regulatory Policies Act, Pub. L. No. 95-617, 92 Stat. 3117 (1978) (codified as amended at 16 U.S.C. § 824a-3 (2012)). The Energy Policy Act of 1992 (EPAct 1992), enhanced competition in the wholesale electricity market by introducing exempt wholesale generators to compete with traditional utility generators. Energy Policy Act of 1992, Pub. L. No. 102-486, 106 Stat. 2776 (1992) (codified as amended in scattered sections of U.S.C.); Public Utility Holding Company Act of 1935, ch. 687, 49 Stat. 803 (codified at 15 U.S.C. § 79z-5a) (repealed 2005); Dworkin et al., *supra* note 5, at 542.

38 Regional Transmission Organizations, 18 C.F.R. pt. 35 (2013) (encouraging RTOs); Promoting Wholesale Competition Through Open Access Non-Discriminatory Transmission Services by Public Utilities; Recovery of Stranded Costs by Public Utilities and Transmitting Utilities, 61 Fed. Reg. 21,540 (May 10, 1996) (mandating open access on a first come first served basis).

39 There are six RTOs under FERC jurisdiction: The New York ISO and the California ISO are single-state RTOs; PJM in the mid-Atlantic; the Midwest ISO in the upper Midwest; the Southwest Powerpool serving the lower Great Plains and part of the South; and the ISO New England, are regional RTOs. No RTOs serve the Northwest, the Southeast, the Mountain West, or the Southwest. *See* Dworkin et al., *supra* note 5, at 540.

40 Congestion, or capacity constraints, "results in adverse economic consequences by preventing the least-cost set of generators from supplying load." MIT STUDY, *supra* note 20, at 32–33.

41 Regional Transmission Organizations, Fed. Energy Reg. Comm'n Rep. (CCH) ¶ 13,992.01, SEC. 35.34 (2013) (to be codified at 18 C.F.R. pt. 35) ("The Regional Transmission Organization must be responsible for planning, and for directing or arranging, necessary transmission expansions, additions, and upgrades that will enable it to provide efficient, reliable and non-discriminatory transmission service and coordinate such efforts with the appropriate state authorities."); Dworkin et al., *supra* note 5, at 539 (listing functions of RTOs).

42 MIT STUDY, *supra* note 20, at 7.

43 RICHARD J. CAMPBELL, CONG. RESEARCH SERV., R42923, ELECTRICAL POWER: OVERVIEW OF CONGRESSIONAL ISSUES 4 (2013), *available at* http://www.fas.org/sgp/crs/misc/R42923.pdf.

44 MIT STUDY, *supra* note 20, at 4.

power.[45] Utility companies, states, and in some states, end-users, import and export electric power on the interstate market.[46]

3. Advanced Technology and the Smart Grid

The electric power network was designed for one-way power flows, from central power plants to consumers, with supply continuously adjusted to meet changes in consumer demand.[47] The integration of advanced communication technologies and demand side resources are transforming the grid into a dynamic system with electric power introduced and controlled at both ends of the network. Like the physical and financial integration of the grid, technological integration distorts the traditional divide between federal and state authority.[48]

Advanced communication technologies, or smart grid technologies, enable instant communication between network components located in multiple states.[49] Smart grid technologies provide customers and utilities with real-time information on grid performance. They can help operators balance supply and demand, prevent power failures from cascading through the network, and incorporate intermittent energy sources, including wind and sun.[50] Smart grid technologies are being integrated into every domain of the grid—from smart meters in homes to advanced software in transmission control centers.[51]

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45 CAMPBELL, CONG. RESEARCH SERV., R42923, at 4 ("These involve both physical transactions (i.e., electricity is generated and sent to or taken off the grid), and financial transactions (i.e., the purchase and sale of electricity).").

46 Brown & Rossi, *supra* note 5, at 711.

47 Joel B. Eisen, *Distributed Energy Resources, "Virtual Power Plants," and the Smart Grid*, 7 ENVTL. & ENERGY L. & POL'Y J. 191, 192 (2012) (describing design of the electric power network).

48 As Joel Eisen has noted, the line between state and federal authority "will seem arbitrary when the issue under consideration is whether a smart meter can communicate with a device located on another part of the grid in another state." Joel B. Eisen, *Smart Regulation and Federalism for the Smart Grid*, 37 HARV. ENVTL. L. REV. 1, 51 (2013).

49 *Smart Grid*, FED. ENERGY REG. COMMISSION, http://www.ferc.gov/industries/electric/indus-act/smart-grid.asp (last updated Feb. 27, 2012) ("Smart Grid advancements will apply digital technologies to the grid, and enable real-time coordination of information from generation supply resources, demand resources, and distributed energy resources . . . .").

50 STAN MARK KAPLAN, CONG. RESEARCH SERV., R40511, ELECTRIC POWER TRANSMISSION: BACKGROUND AND POLICY ISSUES 22–23 (2009), *available at* http://fpc.state.gov/documents/organization/122949.pdf; Osofsky & Wiseman, *supra* note 5, at 802 (noting that smart grid technologies "can enable new generation sources to connect to the grid and empower consumers to influence the type, quantity, and price of electricity they consume").

51 The U.S. Energy Information Administration has written:

> The "Smart Grid" consists of devices connected to transmission and distribution lines that allow utilities and customers to receive digital information from and communicate with the grid. These devices allow a utility to find out where an outage

Advanced technologies can also facilitate distributed generation and demand-response programs. Distributed generators, which are small-scale systems, generally connected to distribution networks, allow end users to connect to the grid both to purchase power off of the grid and to sell excess power to the utility.[52] The growing availability of natural gas and use of renewable energy creates the potential for increased deployment of distributed generation.[53] Moreover, tax incentives and subsidies at both the federal and state level promote distributed generation from low carbon sources.[54] Demand-side resources include technologies that enable consumers to reduce demand to meet available supply of electricity rather than require power generators to increase electricity supply to meet demand.[55] FERC recently adopted an inventive set of demand response policies.[56] Unlike the traditional one-way power generation model, distributed generation and other demand-side resources enable end-users to control the flow of electricity in interstate commerce.

B. *National Energy Goals*

Many efforts to expand and/or modernize the transmission network are motivated by two policy goals: (1) maintaining reliable and cost-effective electric service; and (2) integrating remote renewable resources into the network.[57] The extended blackout that followed

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> or other problem is on the line and sometimes even fix the problem by sending digital instructions. Smart devices in the home, office, or factory inform consumers of times when an appliance is using relatively high-cost energy and allow consumers to remotely adjust its settings.

EIA, *What is the Electric Power Grid*, *supra* note 28. *See also,* FED. ENERGY REGULATORY COMM'N, ASSESSMENT OF DEMAND RESPONSE & ADVANCE METERING 19 (2007), *available at* http://www.ferc.gov/legal/staff-reports/09-07-demand-response.pdf ("RTOs and ISOs, Public Power Authorities, and states increasingly incorporate elements of demand response, energy efficiency, advanced technologies, and the smart grid in their plans and policies.").

52 RICHARD J. CAMPBELL, CONG. RESEARCH SERV., R42923, ELECTRICAL POWER: OVERVIEW OF CONGRESSIONAL ISSUES 4 (2013), *available at* http://www.fas.org/sgp/crs/misc/R42923.pdf; KAPLAN, CONG. RESEARCH SERV., R40511, at 33; MIT STUDY, *supra* note 20, at 16–17.

53 CAMPBELL, CONG. RESEARCH SERV., R42923, at 54.

54 MIT STUDY, *supra* note 20, at 16; DATABASE OF STATE INCENTIVES FOR RENEWABLES & EFFICIENCY, http://www.dsireusa.org (last visited Apr. 21, 2014).

55 KAPLAN, CONG. RESEARCH SERV., R40511, at 32–33; *see also* BIPARTISAN POLICY CTR., *supra* note 22, at 49 ("Demand response is an umbrella term that encompasses a variety of arrangements under which consumers (i.e., the 'demand' side of the power market) intentionally reduce or increase (or agree to an adjustment of) their consumption of electricity in response to price signals or power grid needs.").

56 *See generally* Demand Response Compensation in Organized Wholesale Energy Markets, 76 Fed. Reg. 16,658 (Mar. 24, 2011) (codified at 18 C.F.R. pt. 35) (providing market rules for demand response in organized wholesale energy markets).

57 Alexandra B. Klass, *Takings and Transmission*, 91 N.C. L. REV. 1079, 1083 (2013) (noting

Superstorm Sandy and the looming threat of more frequent extreme weather events, some of which have been linked to climate change,[58] added urgency to both of these goals.

1. Reliability Goals

Transmission system reliability requires the transmission system to have enough capacity to continuously meet customer needs, and the resilience to withstand major failures, such as the loss of a key transmission line.[59] Because the transmission grid is uniquely interconnected, each flow of electricity along each line affects the entire interstate network.[60]

> When a generator turns on and off, it affects system conditions throughout the interconnected network. Large swings in demand at one node affects system conditions at other nodes. The failure of a major piece of equipment in one part of the network can affect the stability of the entire system.[61]

In fact, a single failure can trigger extensive rolling blackouts across state and national boundaries, as evidenced by the cascading Northeast blackout of 2003.

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that the transmission grid must be expanded to improve reliability and integrate renewable energy so as to achieve federal and state climate change goals); Diane Cardwell et al., *Upgrade or Clean Up?*, N.Y. TIMES, Dec. 29, 2012, at B1.

58 *See* James Hansen et al., *Perception of Climate Change*, 109 PROC. OF THE NAT'L ACAD. OF SCI. E2415 (2012); Justin Gillis, *Study Indicates a Greater Threat of Extreme Weather*, N.Y. TIMES, Apr. 27, 2012, at A5; Fiona Harvey, *Scientists Attribute Extreme Weather to Man-Made Climate Change*, THE GUARDIAN (July 10, 2012, 12:53 PM), http://www.theguardian.com/environment/2012/jul/10/extreme-weather-manmade-climate-change; Janet Raloff, *Extremely Bad Weather: Studies Start Linking Climate Change to Current Events*, SCIENCE NEWS (Nov. 2, 2012, 6:35 AM), http://www.sciencenews.org/article/extremely-bad-weather; *see also* INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, CLIMATE CHANGE 2007: SYNTHESIS REPORT 30, *available at* http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr.pdf (predicting more frequent and intense extreme weather).

59 KAPLAN, CONG. RESEARCH SERV., R40511, at 11. The Department of Homeland Security's 2009 National Infrastructure Protection Plan defines resilience as "the ability to resist, absorb, recover from, or successfully adapt to adversity or a change in conditions." U.S. DEP'T OF HOMELAND SEC., NATIONAL INFRASTRUCTURE PROTECTION PLAN 111 (2009), *available at* http://www.dhs.gov/xlibrary/assets/NIPP_Plan.pdf.

60 Eagle, *supra* note 5, at 12 ("Because electricity moves along all available paths once introduced into the power grid, every flow of electricity affects the entire distribution network."); Osofsky & Wiseman, supra note 5, at 775 (describing grid as uniquely interconnected). According to Joskow and Noll, the transmission network is "a complex 'coordination system' that integrates a large number of generating facilities dispersed over wide geographic areas to provide a reliable flow of electricity to dispersed demand nodes (hopefully) economically while adhering to tight physical requirements to maintain network frequency, voltage, and stability." Joskow & Noll, *supra* note 36, at 1303.

61 Joskow & Noll, *supra* note 36, at 1303; *see also* Eagle, *supra* note 5, at 12.

The damage caused by a power failure is magnified because electricity is a necessary input for virtually all other critical infrastructure systems. Power outages cripple our telecommunications systems, water pumps, sewer systems, and transportation systems.[62] Blackouts, brownouts, and other power outs cost Americans billions of dollars a year.[63] One study concluded that for many businesses the loss of power for as little as one second could create a substantial economic loss.[64] Even small disruptions in the power supply wreak havoc on the national economy, create unacceptable national security risks, and threaten public health and safety.[65] As energy infrastructure ages and

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62 MATTHEW H. BROWN, CHRISTIE REWEY & TROY GAGLIANO, NAT'L CONFERENCE OF STATE LEGISLATURES, ENERGY SECURITY 8 (2003), *available at* http://www.oe.netl.doe.gov/docs/prepare/ncslenergy%20security.pdf ("[W]ater pumps rely on electricity to operate. Electricity relies on compressed gas as a fuel, which in turn often relies on electricity to run the compressors. Telecommunications systems serve as a vital support system for the power grid and they too require electricity."); Massoud Amin & John Stringer, *The Electric Power Grid: Today and Tomorrow*, 33 MRS BULL. 399, 399 (2008) ("[E]lectricity is increasingly recognized as a key to societal progress throughout the world, driving economic prosperity and security and improving the quality of life.").

63 Achenbach, *supra* note 12, at 133 (estimating $80 billion a year). Other estimates range from $25 billion to $180 billion. KRISTINA HAMACHI LACOMMARE & JOSEPH H. ETO, UNDERSTANDING THE COST OF POWER INTERRUPTIONS TO U.S. ELECTRICITY CONSUMERS 11–14 (2004), *available at* http://certs.lbl.gov/pdf/55718.pdf.

64 Brown, Rewey, and Gagliano note:

> The losses fall into several categories that include: [d]ata losses at computer-based businesses, [a] workforce that is being paid but is unable to work because of the outage, [m]aterials loss or spillage (some restaurants or food processing centers are required to dispose of any food that has not been refrigerated for a certain length of time), [l]oss of unfinished products at electronics manufacturing facilities (even very brief outages, less than one second, can cause substantial losses), [e]quipment damage, [c]osts of running backup generation, or [c]osts of restarting equipment.

BROWN, REWEY & GAGLIANO, *supra* note 62, at 9–10 (citing DAVID LINEWEBER & SHAWN MCNULTY, PRIMEN, THE COST OF POWER DISTURBANCES TO INDUSTRIAL AND DIGITAL ECONOMY COMPANIES (2001), *available at* http://www.onpower.com/pdf/EPRICostOfPowerProblems.pdf).

65 The *National Security Strategy*, released in May 2010, recommended a number of strategies for protecting and increasing the resilience of critical infrastructure, including energy infrastructure. These suggestions included investing in improvements, maintenance of existing infrastructure, and creating redundancy in the system through the construction of additional infrastructure that can take the place of failed systems. THE WHITE HOUSE, THE NATIONAL SECURITY STRATEGY (May 2010), *available at* http://www.whitehouse.gov/sites/default/files/rss_viewer/national_security_strategy.pdf; *see also* BROWN, REWEY & GAGLIANO, *supra* note 62, at 18 (noting that, from a national security perspective, some fear that a "coordinated attack at strategic points in the transmission grid could be devastating to a large portion of the transmission system"). For discussion of national policies related to infrastructure resilience, *see* JOHN D. MOTEFF, CONG. RESEARCH SERV., CRITICAL INFRASTRUCTURE RESILIENCE: THE EVOLUTION OF POLICY AND PROGRAMS AND ISSUES FOR CONGRESS (2012), *available at* http://www.fas.org/sgp/crs/homesec/R42683.pdf.

the demand for electricity grows, additional investment will be required in order to meet reliability goals.[66]

2. Renewable Energy Goals

In addition to grid reliability, grid expansion and modernization are also propelled by policies encouraging or mandating the development of renewable energy. The United States does not have a unified "renewable energy policy."[67] Nonetheless, state and federal policies, including renewable portfolio standards,[68] tax and fiscal incentives, and proposed environmental regulations,[69] are driving the integration of renewable energy sources into the grid. According to the U.S. Energy Information Agency's (EIA's) estimates, if current federal policies are continued, renewables other than hydropower will account for 57% of the increase in generation between 2010 and 2030.[70]

Incorporating renewable energy into the grid presents two significant infrastructure challenges. First, to maintain grid reliability, grid technology and transmission operators will need to develop strategies for accommodating intermittent power generators, or "variable energy resources" (VERs), such as wind and solar resources, that cannot be stored or controlled by grid operators.[71]

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66 ASCE, FAILURE TO ACT, *supra* note 25, at 34 (noting opportunities for investment to improve "congestion management, reliability, and greater deliverability of renewables from resource-rich regions"); LETHA TAWNEY ET AL., WORLD RESOURCES INST., HIGH WIRE ACT: ELECTRICITY TRANSMISSION INFRASTRUCTURE AND ITS IMPACT ON THE RENEWABLE ENERGY MARKET 6 (2011) (noting growing consensus that grid "is reaching its technological limits and requires renewed investment to maintain reliability and meet other modern challenges"); Robert L. Reid, *The Infrastructure Crisis,* AM. SOC'Y CIV. ENGINEERS, http://www.asce.org/Content.aspx?id=25562 (last visited Apr. 21, 2014) (quoting the ASCE's deputy executive director, Lawrence H. Roth, who stated that America's infrastructure faces two enormous and simultaneous challenges: "not only do we have old and outdated infrastructure, we are also putting new demands on it"). For a more complete analysis of technologies and strategies designed to enhance grid reliability, see BIPARTISAN POLICY CTR., *supra* note 22.

67 Elliott, *supra* note 14, at 10095–96 (distinguishing energy policy from energy plan).

68 Renewable Portfolio Standards require an increasing percentage of electricity sold within each state to be generated from renewable sources, such as wind or solar. Patricia E. Salkin & Ashira Pelman Ostrow, *Cooperative Federalism and Wind: A New Framework for Achieving Sustainability*, 37 HOFSTRA L. REV. 1049, 1050–51 (2009); *see also infra* notes 93–98.

69 Regulations that are expected to accelerate the retirement of some coal-fired power plants include the Mercury and Air Toxics Standards (MATS) (to reduce emissions of mercury) and the Cross-State Air Pollution Rule (CSAPR) (to reduce sulfur dioxide and nitrogen oxides emissions in the Eastern United States). CSAPR was finalized in 2011, but it was vacated by the D.C. Circuit Court in August 2012. *See* EME Homer City Generation, L.P. v. EPA, 696 F.3d 7, 12 (D.C. Cir. 2012).

70 *Annual Energy Outlook, No-Sunset Case*, U.S. ENERGY INFO. ADMIN, http://www.eia.gov/oiaf/aeo/tablebrowser (last visited Mar. 22, 2014); s*ee also* Salkin & Ostrow, *supra* note 68, at 1080–81 (providing overview of federal policies promoting the growth of renewable energy).

71 Integration of Variable Energy Resources, 77 Fed. Reg. 41,482 (July, 13 2012) (to be

Second, unlike traditional power plants, which could be built close to demand centers or existing transmission lines, renewable energy generators must be built near renewable resources, many of which are located in remote areas.[72] Accessing these resources will require the construction of long-distance interstate transmission lines, a prospect that presents unique obstacles to siting and cost allocation.[73] Thus, FERC has called for a "[n]ational policy commitment to develop the extra-high voltage, EHV, transmission infrastructure to bring renewable energy from remote areas where it's produced most efficiently to our large metropolitan areas, where most of this Nation's power is consumed."[74]

II. THE NATIONAL NETWORK COORDINATOR

Over the course of the past century, the electric power network has evolved from a scattered patchwork of independent local utility systems to a dynamic interstate network that is physically, economically, and technologically integrated. This Part evaluates the grid's traditional state-centered regulatory framework in light of this transformation. Section A recognizes the value of state autonomy in formulating energy policy and investing in energy infrastructure. In particular, preserving state autonomy (1) diversifies the risk of regulatory choice; and (2) enables state and local regulators to tailor energy policies and infrastructure investments to local conditions and preferences. State autonomy is particularly valuable in the context of energy infrastructure siting, which combines rapid technological and market change with capital-intensive, sticky land use decisions.

Section B argues that national coordination of the interstate electric power network is required to (1) establish uniform standards for the

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codified at 18 C.F.R. pt. 35) (defining variable energy resources as renewable energy resources that cannot be stored and have variability that is beyond the control of the facility operator).

72 MIT STUDY, *supra* note 20, at 12 (noting that optimal locations for large-scale renewable power plants are located in sparsely populated, remote areas, such as the desert Southwest or the "wind belt" that "stretches north from Texas through the Dakotas to the Canadian border").

73 BIPARTISAN POLICY CTR., *supra* note 22, at 28; MIT STUDY, *supra* note 20, at 13; *see also* Klass, *supra* note 57, at 1084 ("[A]t the current time, there is no alternative technological means to transport renewable energy long distances . . . .").

74 *Transmission Infrastructure: Hearing Before the S. Comm. on Energy and Natural Res.*, 111th Cong. 8 (2009) (statement of Jon Wellinghoff, Acting Chairman, FERC), *available at* http://www.gpo.gov/fdsys/pkg/CHRG-111shrg48760/pdf/CHRG-111shrg48760.pdf; *see also* NAT'L COMM'N ON ENERGY POLICY, SITING CRITICAL ENERGY INFRASTRUCTURE: AN OVERVIEW OF NEEDS AND CHALLENGES 17 (2006), *available at* http://bipartisanpolicy.org/sites/default/files/Siting%20Critical%20Energy%20Infrastructure_448851db5fa7d.pdf (stating that "additional transmission lines are needed to connect new generating capacity to the grid and to ensure that power from these facilities can flow to areas where it is needed").

interconnected system; and (2) account for interstate spillovers that are generated when individual states face incentives to engage in harmful behaviors by externalizing costs onto other states. Ultimately, then, this Part demonstrates that an interjurisdictional or cooperative framework that simultaneously coordinates and preserves state authority is best able to maximize the relative institutional capabilities of each level of government.[75]

A. *State Standards and National Networks*

Though influenced by federal law, the physical shape and character of the interstate electric power network is determined primarily by the states.[76] In 1935, when the Federal Power Act (FPA) was enacted, and for many years thereafter, power was produced and delivered by state-regulated vertically integrated monopolies.[77] At that time, interstate markets were largely isolated and "most transmission issues were handled through bilateral contracts between neighboring utilities."[78]

Thus, the FPA sought merely to fill the regulatory gap that existed when energy was transmitted across state borders.[79] The FPA granted the Federal Power Commission (now FERC) authority over the "transmission of electric energy in interstate commerce and . . . the sale of electric energy at wholesale in interstate commerce."[80] The Act expressly declared that federal regulation should "extend only to those

75 Ostrow, *supra* note 15, at 1438–42.

76 STAN MARK KAPLAN, CONG. RESEARCH SERV., R40511, ELECTRIC POWER TRANSMISSION: BACKGROUND AND POLICY ISSUES 6 (2009), *available at* http://fpc.state.gov/documents/organization/122949.pdf (noting that state public utility commissions (PUCs) establish retail rates, oversee utility operations, and grant siting permits for new transmission lines); Dworkin et al., *supra* note 5, at 538 (noting that each state has its own generation, distribution, and infrastructure permitting and siting policies); Osofsky & Wiseman, *supra* note 5, at 815–16 (noting state authority over "most important aspects of generation, transmission, and distribution").

77 *See supra* notes 22–24.

78 Jim Rossi & Thomas Hutton, *Federal Preemption and Clean Energy Floors*, 91 N.C. L. REV. 1283, 1317 (2013); *see also* RICHARD J. CAMPBELL & ADAM VANN, CONG. RESEARCH SERV., R41193, ELECTRICITY TRANSMISSION COST ALLOCATION 4 (2012), *available at* http://www.hsdl.org/?view&did=728978 (noting that until recently, the pattern of transmission development "did not emphasize the construction of very long-distance inter-regional lines involving multiple owners and jurisdictions"); MIT STUDY, *supra* note 20, at 101 ("The problem of siting interstate electric transmission facilities was not important in 1935 when the Federal Power Act was passed, and it was not addressed in that legislation.").

79 Pub. Utils. Comm'n of R.I. v. Attleboro Steam & Elec. Co., 273 U.S. 83, 84–86 (1927); *see* Rossi & Hutton, *supra* note 78, at 1343 (noting that the FPA "was designed primarily to help address the Attleboro Gap—the void of regulation left behind by the sweeping disqualification of states from regulating interstate transactions").

80 Federal Power Act, Pub. L. No. 74-333, 49 Stat. 847 (1935) (codified as amended at 16 U.S.C. § 824 (2012)).

matters which are not subject to regulation by the States."[81] As a result, state commissions retained primary authority over most other aspects of energy policy, administering the "regulatory compact" between utilities, customers, and investors, setting rates for all intrastate sales and approving the siting of new facilities.[82]

This Section first provides a brief, through important, overview of the diverse state energy policies that have evolved in response to local economic and geographic conditions, social preferences, and natural resource endowment. This Section then argues that state autonomy enables state regulators to adopt policies that meet regional conditions and to experiment with regulatory strategies and infrastructure investments. In contrast, particularly with regard to costly energy infrastructure, concentrating authority in a federal agency increases the risk of locking in suboptimal regulations or investments that will make it difficult to adapt to changing technologies, markets, and environmental conditions.

1. Variation in State Regulation

State energy policies and infrastructure needs vary widely across the country, reflecting differences in market structure, fuel used for electricity generation, geography, climate conditions, and environmental preferences.[83] Some states have restructured their electric

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81 *Id.* The House Committee on Interstate and Foreign Commerce summarized the Act's purpose as follows:

> The new parts are designed to meet the situation which has been created by the recent rapid growth of electric utilities along interstate lines. The percentage of electric energy generated in the United States that was transmitted across State lines increased from 10.7 in 1928 to 17.8 in 1933. . . . Under the decision of the Supreme Court of the United States in [*Attleboro*], the rates charged in interstate wholesale transactions may not be regulated by the States. Part II gives the Federal Power Commission jurisdiction to regulate these rates.

H.R. REP. NO. 74-1318, at 7–8 (1935).

82 States regulated electric utility companies to insure that they provided adequate, non-discriminatory service and that they earned a reasonable rate of return. HIRSH, *supra* note 23, at 11 (describing regulatory compact between utility companies and state regulators). William Malone has stated:

> The deals for universal service struck between state legislatures and private companies were quintessential "regulatory compacts." . . . The state's role is that of negotiating and administering a contract that governs the continuing relationship with the utility on behalf of its body of customers and of adjusting that contract to changing situations.

William Malone, *Municipalities' Right to Full Compensation for Telecommunications Providers' Uses of the Public Rights-of-Way*, 107 DICK. L. REV. 623, 625–26 (2003).

83 Wholesale Competition in Regions with Organized Electric Markets, 73 Fed. Reg. 12576 (Mar. 7, 2008) (to be codified at 18 C.F.R. pt. 35) (observing regional variations); MIT STUDY,

power markets by authorizing or requiring divestiture of generation assets from utilities and by introducing competition into retail sales of electricity.[84] Other states have retained the traditional vertically integrated utility model.[85] As a result, the amount of power that is generated by traditional utilities as compared to independent power producers varies significantly between states. In 2010, for example, utilities generated less than 2% of electricity in Massachusetts,[86] and over 86% in Indiana.[87]

In addition to market structure, the generation mix in individual states varies greatly. As of 2010, Rhode Island generates 100% of its electricity from natural gas; Vermont generates 75% from nuclear and 25% from hydro and other renewable sources; and Indiana generates over 90% of its electricity from coal.[88] States that produce coal or neighbor major coal producing states tend to have low electricity rates and emit high levels of greenhouse gasses.[89] These states generally have not restructured their electricity markets. In contrast, states with more expensive electricity rates have restructured their electricity industries.[90]

All states provide tax credits or other incentives to stimulate investment in renewable energy and to promote distributed generation from low carbon sources.[91] Forty-six states and the District of Columbia have "net-metering" programs, which compensate end-users for generating their own energy at the retail electricity rate.[92]

Twenty-nine states and the District of Columbia have renewable or alternative energy portfolio standards, which require utilities to obtain a specified percentage of energy from renewable sources.[93] The targets

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supra note 20, at 4 (describing regional variation in market structure).

84 THE ELEC. ENERGY MKT. COMPETITION TASK FORCE, REPORT TO CONGRESS ON COMPETITION IN WHOLESALE AND RETAIL MARKETS FOR ELECTRIC ENERGY (2007), *available at* http://www.ferc.gov/legal/fed-sta/ene-pol-act/epact-final-rpt.pdf (describing state restructuring efforts); *Status of Electricity Restructuring by State*, U.S. ENERGY INFO. ADMIN. (Sept. 2010), http://www.eia.gov/electricity/policies/restructuring/restructure_elect.html (providing detailed summary of restructuring status by state).

85 *See e.g.*, MIT STUDY, *supra* note 20, at 4 (noting that the vertically integrated model is dominant in the Southwest).

86 U.S. ENERGY INFO. ADMIN., STATE ELECTRICITY PROFILES 2010, at 127 tbl.1 (2012), *available at* http://www.eia.gov/electricity/state/pdf/sep2010.pdf.

87 *Id.* at 85 tbl.1.

88 AM. PLANNING ASS'N , *supra* note 34, at 35.

89 Peskoe, *supra* note 23, at 241–47.

90 *Id.* at 244–45.

91 MIT STUDY, *supra* note 20, at 11–12; *see also* DATABASE OF STATE INCENTIVES FOR RENEWABLES & EFFICIENCY, *supra* note 54).

92 MIT STUDY, *supra* note 20, at 182 (citing DATABASE OF STATE INCENTIVES FOR RENEWABLES & EFFICIENCY, *supra* note 54).

93 BIPARTISAN POLICY CTR., *supra* note 22, at 18 (citing DATABASE OF STATE INCENTIVES FOR RENEWABLES & EFFICIENCY, RENEWABLE PORTFOLIO STANDARD POLICIES (Mar. 2013), *available at* http://www.dsireusa.org/documents/summarymaps/RPS_map.pdf); MIT STUDY, *supra* note 20, at 77; Richard Schmalensee, *Renewable Electricity Generation in the United*

established by these policies vary widely. California, for example, requires 33% of its electricity supply to come from renewables by 2020.[94] Arizona requires a more modest 15% by 2025.[95] Many states have "escape clauses" that preclude enforcement of the RPS if the added cost of renewable generation exceeds a given threshold.[96] Four states—Michigan, Ohio, Pennsylvania, and West Virginia—allow some of the renewable requirement to be met with advanced coal technologies, such as carbon capture and sequestration.[97] Eight states, including North Dakota and Utah, have voluntary standards.[98] Approximately twenty states have no standards at all.

In addition to renewable portfolio standards, roughly half of the states have "Energy Efficiency Portfolio Standards" that seek to decrease the demand for electricity by encouraging or mandating more efficient generation, transmission, and distribution of electricity.[99] As with state RPS requirements, the goals and policies associated with energy efficiency standards vary widely. Maine, for example, requires a 30% reduction in electricity sales by 2020, while Indiana requires only a 2% reduction by 2019.[100] And again, roughly half of the states have no energy efficiency requirements.

Thirty-four states currently require some sort of integrated resource plan for electricity.[101] An integrated resource plan (IRP) is a long-range utility plan for meeting the forecasted demand for energy by

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States, *in* HARNESSING RENEWABLE ENERGY IN ELECTRIC POWER SYSTEMS 209 (Boaz Moselle et al. eds., 2010).

94 *California Renewable Energy Statistics & Data*, CAL. ENERGY COMM'N, http://www.energyalmanac.ca.gov/renewables/index.html (last updated Apr. 20, 2011).

95 ARIZ. ADMIN CODE. § R14-2-1801 to -1816 (2014); *see also RPS and AEPS Policy Details*, CENTER FOR CLIMATE & ENERGY SOLUTIONS, http://www.c2es.org/us-states-regions/key-legislation/renewable-energy-portfolios (last visited Apr. 21, 2014).

96 *Most States Have Renewable Portfolio Standards*, U.S. ENERGY INFO. ADMIN. (Feb. 3, 2012), http://www.eia.gov/todayinenergy/detail.cfm?id=4850.

97 Peskoe, *supra* note 23, at 245 n.198 (citing *Renewable and Alternative Portfolio Standards*, CENTER FOR CLIMATE & ENERGY SOLUTIONS, http://www.c2es.org/us-states-regions/policy-maps/renewable-energy-standards (last visited Apr. 21, 2014)).

98 DATABASE OF STATE INCENTIVES FOR RENEWABLES & EFFICIENCY, RENEWABLE PORTFOLIO STANDARD POLICIES (Mar. 2013), *available at* http://www.dsireusa.org/documents/summarymaps/RPS_map.pdf (listing eight states with voluntary renewable goals).

99 DATABASE OF STATE INCENTIVES FOR RENEWABLES & EFFICIENCY, ENERGY EFFICIENCY RESOURCE STANDARDS (Feb. 2013), *available at* http://www.dsireusa.org/documents/summarymaps/EERS_map.pdf (listing twenty states that have energy efficiency resource standards and seven states that have efficiency goals).

100 *Id.*

101 STATE & LOCAL ENERGY EFFICIENCY ACTION NETWORK, USING INTEGRATED RESOURCE PLANNING TO ENCOURAGE INVESTMENT IN COST-EFFECTIVE ENERGY EFFICIENCY MEASURES 2 (Sept. 2011), *available at* http://www1.eere.energy.gov/seeaction/pdfs/ratepayer_efficiency_irpportfoliomanagement.pdf. The Energy Policy Act of 1992 required all states to consider adopting IRP. Energy Policy Act of 1992, Pub. L. No. 102-486, 106 Stat. 2776 (codified as amended at 16 U.S.C. § 2621 (2012)).

identifying "the mix of resources that will minimize future energy system costs while ensuring safe and reliable operation of the system."[102]

In developing an IRP, planners consider a variety of alternative strategies for meeting projected electricity demand, from adding energy infrastructure—including generating capacity, transmission, or distribution lines—to implementing demand response programs, or investing in energy efficiency programs to reduce future demand.[103] In states that have retained the traditional vertically integrated structure, IRP is usually conducted by the utility itself, subject to the oversight of the state public utility commission. Some restructured states have initiated state-wide energy planning. Other areas, including the Pacific Northwest, have adopted region-wide approaches that incorporate a multistate energy planning process.[104]

2. The Value of State Autonomy

Energy infrastructure needs are notoriously unpredictable. Only ten years ago, the nation's supply of natural gas was thought to be nearing depletion. Energy entrepreneurs prepared for the inevitable scarcity by investing in enormously expensive terminals to import liquefied natural gas (LNG) from West Africa, the Middle East, and even Australia and Russia.[105] The Energy Policy Act (EPAct), passed in 2005, facilitated that trade by including a direct override of state siting authority for liquid natural gas terminals, vesting exclusive authority in FERC.[106] The federal siting policy was justified by the fear that, left to their own devices, each state and local government might refuse to site these facilities, thereby denying the entire nation the benefits of imported natural gas.[107]

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102 STATE & LOCAL ENERGY EFFICIENCY ACTION NETWORK, *supra* note 101, at vi; *see also* BIPARTISAN POLICY CTR., *supra* note 22, at 41 (describing use of IRP).

103 STATE & LOCAL ENERGY EFFICIENCY ACTION NETWORK, *supra* note 101, at vi–vii; RACHEL WILSON & PAUL PETERSON, SYNAPSE ENERGY ECONOMICS, INC., A BRIEF SURVEY OF STATE INTEGRATED RESOURCE PLANNING RULES AND REQUIREMENTS 3–4 (2011), *available at* http://www.cleanskies.org/wp-content/uploads/2011/05/ACSF_IRP-Survey_Final_2011-04-28.pdf.

104 BIPARTISAN POLICY CTR., *supra* note 22, at 41.

105 KENNETH B. MEDLOCK III, U.S. NATURAL GAS POLICY: RECOMMENDATIONS FOR THE PRESIDENT 1 (2013), *available at* http://bakerinstitute.org/files/444; Krauss, *supra* note 10; Daniel Yergin, Op-Ed., *America's New Energy Reality*, N.Y. TIMES, June 10, 2012, at SR9.

106 Energy Policy Act of 2005, Pub. L. No. 109-58, 119 Stat. 594 (codified as amended at 15 U.S.C. § 717b(e)(1)).

107 William W. Buzbee, *Asymmetrical Regulation: Risk, Preemption, and the Floor/Ceiling Distinction*, 82 N.Y.U. L. REV. 1547, 1614 (2007).

In just a few years, however, the market has dramatically transformed.[108] New drilling techniques have made vast quantities of natural gas accessible.[109] The glut has caused the price of natural gas to fall and the use of coal—long the dominant fuel for electricity production—to decline.[110] In fact, "[i]n April 2012, for the first time in history, the amount of electricity generation from natural gas equaled that of coal . . . with each representing about 32% of the market."[111] Today the United States is considering prospects for exporting, rather than importing, natural gas. In fact, three facilities now have permission to do so and nearly two dozen applications await export decision.[112] Thus, had it been effective, FERC's exclusive authority to site LNG terminals would still have led to poor outcomes.[113]

The electric power industry and electric power network are constantly evolving. Shifts in the supply and price of fuel, advances in technology, environmental regulations, and market conditions are certain to create unforeseen infrastructure needs. The unpredictability of infrastructure needs, combined with the permanence of infrastructure improvements, means that regulators will make the wrong choice, at least in some cases, and that the impact of those choices will constrain energy policy for decades to come. Eliminating the states and centralizing authority in a federal agency magnifies that risk fifty times over. [114]

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108 Krauss, *supra* note 10. Daniel Yergin further notes: "So much effort is going into research, development and innovation all across the energy spectrum, 10 years from now we may well see the next game changer." *Id.* (internal quotation marks omitted).

109 Benjamin Alter & Edward Fishman, Op-Ed., *The Dark Side of Energy Independence*, N.Y. TIMES, Apr. 28, 2013, at SR5 ("By some estimates, the United States is on track to overtake Saudi Arabia as the world's largest oil producer as early as 2017, start exporting more oil and gas than it imports by 2025, and achieve full energy self-sufficiency by 2030.").

110 RICHARD J. CAMPBELL, CONG. RESEARCH SERV., R42923, ELECTRICAL POWER: OVERVIEW OF CONGRESSIONAL ISSUES 5 (2013), *available at* http://www.fas.org/sgp/crs/misc/R42923.pdf (noting that the percentage of total electricity generation from coal declined from 49% in 2007 to 42% in 2011).

111 *Id.*

112 Ayesha Rascoe, *U.S. Approves Natural Gas Exports from Third Terminal*, REUTERS (Aug. 7, 2013, 6:13 PM), http://www.reuters.com/article/2013/08/07/usa-lng-exports-idUSL1N0G811120130807.

113 *See* Joan M. Darby et al., *The Role of FERC and the States in Approving and Siting Interstate Natural Gas Facilities and LNG Terminals After the Energy Policy Act of 2005—Consultation, Preemption and Cooperative Federalism*, 6 TEX. J. OIL, GAS & ENERGY L. 335, 339, 384 (2010–11) (concluding that the changes enacted pursuant to EPAct have not made the LNG approval process quicker or more organized); Sheila Slocum Hollis, *Liquefied Natural Gas: "The Big Picture" for Future Development in North America*, 2 ENVTL. & ENERGY L. & POL'Y J. 5, 18, 22 (2007) (explaining that local opposition to LNG terminal construction is common); James C. Erdle, Jr., Note, *Controlling LNG:* AES Sparrows Point LNG, LLC v. Smith, *527 F.3d 120 (4th Cir. 2008)*, 29 ENERGY L.J. 695, 702 (2008) (concluding that deference to states' coastal-zone-management plans enables states to block construction of LNG terminals).

114 As Professor William Buzbee has argued, unitary federal preemption is often to be

Moreover, federal regulation may, at times, be insufficiently sensitive to local concerns and conditions.[115] Particularly with regard to infrastructure siting, state and local regulators, who are a part of and politically accountable to the local community, are more likely to be familiar with local conditions and responsive to local preferences than are federal administrators.[116] As the president of NARUC stated: "Siting and planning transmission is one of the most difficult yet essential jobs of a State regulator, and no federal agency will have the resources or local knowledge on its own to balance all the considerations that must be taken into account."[117] Bill Buzbee makes an analogous point in the context of chemical facilities siting, arguing against eliminating state and local regulators because "effectively regulating risks from such facilities will invariably involve context-rich judgments that no regulation can effectively capture."[118]

To illustrate, consider the federal experience siting railroad facilities. The Interstate Commerce Commission Termination Act (ICCTA) grants the Surface Transportation Board (STB) exclusive jurisdiction over railroad facilities.[119] Local permitting requirements are preempted even when the STB lacks the authority to require an environmental impact assessment.[120] As a result, some ancillary projects

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avoided because "[a]gency and legislative inertia, information uncertainties and asymmetries, outdated information and actions, regulatory capture, and a host of other common regulatory risks create a substantial chance of poor or outdated regulatory choice." Buzbee, *supra* note 107, at 1548.

115 *Id.* at 1606–07 ("[I]f a regulatory choice implicates localized economic tradeoffs, then a national rule risks matching poorly with optimal local choice . . . ."); Roderick M. Hills, Jr., *Dissecting the State: The Use of Federal Law to Free State and Local Officials from State Legislatures' Control*, 97 MICH. L. REV. 1201, 1206 (1999) ("Congress is simply not as well-suited as the states for creating institutions that deliver local public goods to the residents of a state in a politically accountable and cost-effective way."); Rossi & Hutton, *supra* note 78, at 1338–39 ("Subnational entities such as cities, states and regional institutions are much better suited than federal regulators to adapt investments to specific regional opportunities and challenges, and are more likely to place the costs of these programs with those groups of customers most likely to benefit.").

116 Ostrow, *supra* note 15, at 1425, 1436–42.

117 STAN MARK KAPLAN, CONG. RESEARCH SERV., R40511, ELECTRIC POWER TRANSMISSION: BACKGROUND AND POLICY ISSUES 16 (2009), *available at* http://fpc.state.gov/documents/organization/122949.pdf (quoting statement of NARUC president) (internal quotation marks omitted).

118 Buzbee, *supra* note 107, at 1617. Professor Buzbee explains that "[p]hysical layouts will differ, and surrounding populations and land usage will ineluctably make each facility's risks and appropriate safety measures subject to necessary individual tailoring." *Id.*

119 49 U.S.C. § 10501(b)(2) (2012) (granting the STB exclusive authority over "the construction, acquisition, operation, abandonment, or discontinuance of spur, industrial, team, switching, or side tracks, or facilities, even if the tracks are located, or intended to be located, entirely in one State"); Florida E. Coast Ry. Co. v. City of West Palm Beach, 110 F. Supp. 2d 1367, 1373 (S.D. Fla. 2000) (finding that Congress clearly intended for the Interstate Commerce Commission Termination Act to preempt state law, including local zoning ordinances).

120 Shata L. Stucky, Note, *Protecting Communities from Unwarranted Environmental Risks:*

are entirely free from regulation—federal, state, or local. Several potentially harmful facilities have fallen within this regulatory gap.[121] Local communities have been prohibited from regulating track upgrades and refurbishments, the extensions or additions of railroad lines and diesel refueling depots.[122] Exclusive federal siting authority has created regulatory gaps that pose significant threats to local communities.

B. *Coordinating the Interstate Network*

Despite the value of state autonomy, inconsistent and sometimes parochial state regulatory policies interfere with network reliability and impose costs on the network as a whole. Where an infrastructure network crosses state boundaries, only the national government has the jurisdictional authority and regulatory capacity (1) to maintain network interoperability by establishing system-wide standards for network operations, and (2) to compel states to internalize the costs of their regulations. As the Fourth Circuit has noted: "Only FERC, as a central regulatory body, can make the comprehensive public interest determination contemplated by the FPA and achieve [a] coordinated approach to regulation . . . . No single state commission has the jurisdiction, and neither can it be expected to have the competence or inclination, to make this broad determination."[123]

1. Establishing Standards for the Interstate Network

System-wide coordination of network operations and physical infrastructure is critical to the reliability and efficiency of the interstate network.[124] The strongest case for national uniformity arises in the context of products that are distributed nationally.[125] Varying design

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A NEPA Solution for ICCTA Preemption, 91 MINN. L. REV. 836, 837 (2007).

121 *Id.* at 842–44; *see also* Maureen E. Eldredge, *Who's Driving the Train? Railroad Regulation and Local Control*, 75 U. COLO. L. REV 549, 550 (2004); Christina Hawkins, *How States and Municipalities Can Retain the Power to Regulate Rail Carrier-Owned Solid Waste Transfer Facilities in the Context of the* Metro Enviro Transfer, LLC v. Village of Croton-on-Hudson *and* Buffalo Southern Railroad, Inc. v. Village of Croton-on-Hudson *Decisions*, 26 PACE ENVTL. L. REV 289, 293 n.24 (2009).

122 Stucky, *supra* note 120, at 844.

123 Appalachian Power Co. v. Pub. Serv. Comm'n of W. Va., 812 F.2d 898, 905 (4th Cir. 1987) (citing Pub. Utils. Comm'n of R.I. v. Attleboro Steam & Elec. Co., 273 U.S. 83, 84–86 (1927)).

124 Dworkin et al., *supra* note 5, at 538 ("In a world where reliability and grid coordination are so important, there is a real need for interstate coordination.").

125 *See* J.R. DeShazo & Jody Freeman, *Timing and Form of Federal Regulation: The Case of Climate Change*, 155 U. PA. L. REV. 1499, 1507–09 (2007) (noting "that the economic case for

standards create an unworkable fifty-state patchwork that breaks up the national market and increases the costs of production.[126] The value of national uniformity is compounded in the case of an interstate network that, by definition, requires interoperability between its component parts.[127]

States lack the legal authority to establish uniform standards for operations and facilities located in other states. This limitation creates a classic coordination problem in which there is no individual strategy by which a single state can achieve socially optimal results.[128] Although it is theoretically possible for states to develop uniform standards by adopting similar laws, it is highly unlikely that uniformity would be fully achieved.[129]

Indeed, despite accounts depicting the grid as a "decrepit victim of underinvestment,"[130] the physical condition of transmission lines is not the only, or even the primary, source of the grid's vulnerability.[131] The

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[federal] preemption is strongest" when state regulation is likely to interfere with national distribution of uniform products); Issacharoff & Sharkey, *supra* note 9, at 1385–86 (describing need for national uniformity for products that are mass produced); Alexandra B. Klass, *State Standards for Nationwide Products Revisited: Federalism, Green Building Codes, and Appliance Efficiency Standards*, 34 HARV. ENVTL. L. REV. 335, 338 (2010) (noting the "oft-stated position that when it comes to 'nationwide products' (whether they are automobiles, appliances, drugs, or medical devices) there is a significant economic benefit to uniformity that outweighs the benefits of state innovation, which may result in an unworkable fifty-state 'patchwork' of regulation").

126 Richard L. Revesz, *The Race to the Bottom and Federal Environmental Regulation: A Response to Critics*, 82 MINN. L. REV. 535, 544 (1997).

127 *See* Nicholas Economides, *The Economics of Networks*, 14 INT'L J. INDUS. ORG. 673, 673–74 (1996) (arguing that interoperability is a critical defining characteristic of networks). According to the NIST, "Interoperability—the ability of diverse systems and their components to work together—is vitally important to the performance of the smart grid at every level. It enables integration, effective cooperation, and two-way communication among the many interconnected elements of the electric power grid." *NIST and the Smart Grid*, NAT'L INST. OF STANDARDS & TECH., http://www.nist.gov/smartgrid/nistandsmartgrid.cfm (last updated May 8, 2013).

128 Issacharoff & Sharkey, *supra* note 9, at 1369. Air pollution provides a classic example of the coordination problem: "[A]ir pollution does not confine itself to State boundaries. Therefore, if one State wants cleaner air and its neighboring State wants to permit more pollution which would prevent the first State from achieving its objectives, some Federal policy is necessary to resolve interstate disputes." Glicksman & Levy, *supra* note 9, at 594–95 (alteration in original) (internal quotation marks omitted).

129 Glicksman & Levy, *supra* note 9, at 599.

130 STAN MARK KAPLAN, CONG. RESEARCH SERV., R40511, ELECTRIC POWER TRANSMISSION: BACKGROUND AND POLICY ISSUES 30 (2009), *available at* http://fpc.state.gov/documents/organization/122949.pdf; *see also* MIT STUDY, *supra* note 20, at 7 (noting that "[t]he U.S. grid is often referred to as 'antiquated' or 'broken'").

131 KAPLAN, CONG. RESEARCH SERV., R40511, at 30–31 (noting that there is no clear evidence that the grid is physically deteriorating, but that it must be modernized to maintain reliability); MIT STUDY, *supra* note 20, at 79 ("The transmission system is not broken, and there has been and continues to be substantial investment in system upgrades and new interconnections."). Moreover, the grid performs relatively well. Customers in the United States experience, on average, up to two power interruptions per year totaling two to eight hours.

grid is compromised by a lack of coordination between its component parts.[132] In fact, analysts have determined that the 2003 blackout was not caused by congestion or deteriorated infrastructure,[133] but rather by "confusion—communication breakdowns both technical and human."[134]

Given its evolutionary history, it should not be surprising that the grid does not always function as a unified network. The interstate grid is cobbled together from thousands of local systems in which "different circuits, production systems and transmission lines all link together without uniformity."[135] System-wide coordination is crucial because technical problems can arise from variations in infrastructure used in different areas. As one energy consultant notes:

> One of the problems with the system is that you can literally have a one horse town . . . that will have its own little power generation plant . . . [that] could have been set up by the town 70 years ago—possibly using 70-year-old technology—and this energy is sort of passed around the town on its own little circuit which then links up to the national grid in one of many ways.[136]

System-wide coordination is also vital to maintaining a steady supply of electricity. The demand for electricity is constantly in flux, varying widely throughout the day and from day to day. Because electricity cannot be stored, generation and consumption over the whole grid must be balanced continuously.[137] Generators within each

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These statistics are comparable to most European countries. *Id.* at 9.

132 *See* AM. SOC'Y OF CIVIL ENG'RS, 2013 REPORT CARD FOR AMERICA'S INFRASTRUCTURE 61 (2013), *available at* http://www.infrastructurereportcard.org/a/browser-options/downloads/2013-Report-Card.pdf (noting that "[m]any transmission and distribution system outages have been attributed to system operations failures"); BIPARTISAN POLICY CTR., *supra* note 22, at 40 (noting that "[s]uboptimal coordination . . . can exacerbate loop flows and result in disparate pricing and inefficient dispatch, cost shifting or inequities, and reliability concerns." (footnote committed)); *Reliability Risk Management*, N. AM. ELEC. RELIABILITY CORP., http://www.nerc.com/pa/rrm/Pages/default.aspx (last visited Apr. 21, 2014) (attributing 2011 power outages to weather related events and insufficient operating coordination).

133 KAPLAN, CONG. RESEARCH SERV., R40511, at 30. *See generally* OUTAGE TASK FORCE, *supra* note 2.

134 Ralph G. Loretta & James E. Anderson, *The Near-Term Fix*, PUB. UTIL. FORTNIGHTLY, Nov. 2003, at 34; *see also* KAPLAN, CONG. RESEARCH SERV., R40511, at 31 (explaining that the blackout was caused by "such factors as malfunctioning if not obsolete computer and monitoring systems, human errors that compounded the equipment failures, mis-calibrated automatic protection systems on power plants, and FirstEnergy's failure to adequately trim trees"); NAT'L COMM'N ON ENERGY POLICY, *supra* note 74, at 4 ("Although it was not convincingly linked to any lack of transmission or generation capacity, the blackout revealed weaknesses in the hardware, telecommunications, and protocols that govern the operation of all regional electric transmission grids.").

135 Jared Wade, *Are You Afraid of the Dark?*, RISK MGMT., May 2004, *reprinted in* U.S. INFRASTRUCTURE 145 (Paul McCaffrey ed., 2011).

136 *Id.* at 144–45 (internal quotation marks omitted).

137 U.S. GOV'T ACCOUNTABILITY OFFICE, GAO-11-117, ELECTRICITY GRID

interconnection must be precisely synchronized to avoid equipment damage and power outages.[138] "Efficient and effective remedial responses to equipment failures can involve coordinated reactions of multiple generators located remotely from the site of the failure."[139]

Grid coordination is complicated by the fact that parts of the system operate on surprisingly antiquated technology.[140] Indeed:

> The parts of the grid you come into contact with are symptomatic. How does the power company measure your electricity usage? With a meter reader—a human being who goes to your home or business and reads the dials on a meter. How does the power company learn that you've lost power? When you call on the phone.[141]

Coordination along the network is primarily based upon an operating system developed in the 1960s that relies upon telephone calls between systems operators at utility control centers, "*especially during emergencies*."[142]

A number of ongoing developments in the power industry will require an even greater degree of coordination among network components than ever before. The integration of intermittent power generators, such as wind and solar generators, as well as distributed generation, and demand response programs, decrease the predictability

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MODERNIZATION: PROGRESS BEING MADE ON CYBERSECURITY GUIDELINES, BUT KEY CHALLENGES REMAIN TO BE ADDRESSED 3 (2011) ("Because electric energy is generated and consumed almost instantaneously, the operation of an electric power system requires that a system operator constantly balance the generation and consumption of power."); Joskow & Noll, *supra* note 36, at 1302–03 (noting that "supply and demand must be balanced continuously to maintain the frequency, voltage, and stability of the electric power network").

138 KAPLAN, CONG. RESEARCH SERV., R40511, at 3 ("[S]ynchronization failure can cause damage to utility and consumer equipment, and cause blackouts . . . ."). Achenbach explains that:

> At each instant there has to be a precise balance between generation and demand over the whole grid. In control rooms around the grid, engineers constantly monitor the flow of electricity, trying to keep voltage and frequency steady and to avoid surges that could damage both their customers' equipment and their own.

Achenbach, *supra* note 12, 133.

139 Joskow & Noll, *supra* note 36, at 1303.

140 PRESIDENT'S COUNCIL ON JOBS AND COMPETITIVENESS, TAKING ACTION, BUILDING CONFIDENCE, JOBS COUNCIL 14, *available at* http://files.jobs-council.com/jobscouncil/files/2011/10/JobsCouncil_InterimReport_Oct11.pdf. ("[T]he majority of today's electricity transmission infrastructure is more than 25 years old and has failed to keep up with rapid industry changes.").

141 Achenbach, *supra* note 12, at 133.

142 Amin & Stringer, *supra* note 62, at 403. Amin and Stringer note that although "computation is now heavily used in all levels of the power network (e.g., for planning and optimization, fast local control of equipment, and processing of field data), coordination across the network happens on a slower time scale." *Id.*; *see also* Achenbach, *supra* note 12, at 133 (quoting physicist Phillip F. Schewe, author of *The Grid*, as saying, "The electrical grid is still basically 1960s technology . . . [t]he Internet has passed it by." (internal quotation marks omitted)).

of demand and challenge the capacity of transmission operators to maintain a steady, reliable supply of electricity.[143]

2. Siting Interstate Transmission Lines

State authority over a common resource, such as an interstate network, creates a strong incentive for states to regulate in a manner that benefits in-state residents by shifting costs to the interstate market (generating negative externalities) or to free-ride on infrastructure investments made by other states (generating positive externalities).[144] In *McCulloch v. Maryland*,[145] the Supreme Court prohibited state taxation of a national bank, reasoning that states could not be trusted to tax a federal entity.[146] The taxing state would gain all of the benefit of the tax while the burden would be spread among all of the states.[147] If each state acted in its own best interest—charging the maximum tax—the aggregate tax would far exceed the socially optimal level.

By the same token, when states are authorized to tax and set the rates for the intrastate portions of an interstate network, they will invariably seek to extract high taxes from the industry and maintain low rates that benefit state residents at the expense of the network as a whole.[148] Indeed, this parochial tendency is so strong that states have long been prohibited from setting interstate rates for interstate infrastructure networks, including railroads,[149] natural gas pipelines,[150] and electricity transmission.[151]

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143 BIPARTISAN POLICY CTR., *supra* note 22, at 35–37; MIT STUDY, *supra* note 20, at 16–17.

144 DAVID L. SHAPIRO, FEDERALISM: A DIALOGUE 44 n.109 (1995) (explaining that a negative externality "arises when action in one state causes disproportionate harm in other states" while a positive externality "arises when significant benefits from costly action in one state accrue in other states.").

145 McCulloch v. Maryland, 17 U.S. (4 Wheat.) 316 (1819).

146 *Id.* at 435.

147 *Id.* at 435–36; *see also*, Issacharoff & Sharkey, *supra* note 9, at 1369 (noting that this tendency is "a market application of the pollution problem in which individual actors face incentives to engage in harmful behavior because the benefits are localized to them (as with economic gains from coal-burning power plants) while the burdens are externalized to downstream communities.").

148 James W. Ely, Jr., *"The Railroad System Has Burst Through State Limits": Railroads and Interstate Commerce, 1830–1920*, 55 ARK. L. REV. 933, 939–42 (2003) (describing parochial nature of state tax and rate regulation in the context of interstate railroads); Glicksman & Levy, *supra* note 9, at 591–602 (analyzing state incentive to regulate taxes and rates to benefit in-state interests); Herbert Hovenkamp, *Regulatory Conflict in the Gilded Age: Federalism and the Railroad Problem*, 97 YALE L.J. 1017, 1067–70 (1988) (describing rate discrimination in railroad industry); Richard J. Pierce, Jr., *The Evolution of Natural Gas Regulatory Policy*, 10 NAT. RES. & ENV'T 53, 53 (1995) (noting in the context of interstate gas pipelines, the enactment of "regulatory policies that were designed to help the residents of one state at the expense of residents of other states").

149 Transportation Act of 1920, ch. 91, § 416, 41 Stat. 456, 484 (1920) (amending § 13 of the

On the flip side, investments in infrastructure are generally thought to produce positive externalities that benefit the economy as a whole.[152] Physical infrastructure produces social value directly, through its consumption, and indirectly, by facilitating other socially valuable activities, including the production of public goods.[153] Because infrastructure resources generate downstream social benefits that cannot be recaptured by an individual state, each state will be tempted to free-ride on the investments made in other states.[154]

The externalities problem is well-documented in the context of physical infrastructure, where local opposition, often labeled "NIMBY", an acronym for Not In My Backyard,[155] frequently prevents facilities that provide broad regional benefits from being sited.[156] Public opposition to infrastructure siting is driven primarily by local concerns, including: potential environmental harms, declining property values, negative aesthetic impacts, health and safety risks, insufficient

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Interstate Commerce Act); Wabash, St. L. & P. Ry. Co. v. Illinois, 118 U.S. 557, 572–73 (1886) (striking down state rate regulation as a violation of the dormant commerce clause); Hovenkamp, *supra* note 148, at 1018 (describing state rate discrimination).

150 Natural Gas Act, 15 U.S.C. § 717 (2012); Pub. Utils. Comm'n of R.I. v. Attleboro Steam & Elec. Co., 273 U.S. 83 (1927) (striking down state rate regulation under the dormant commerce clause); Missouri v. Kan. Natural Gas Co., 265 U.S. 298 (1924); Pennsylvania v. West Virginia, 262 U.S. 553 (1923); Pierce, *supra* note 148, at 53.

151 Federal Power Act, 16 U.S.C. § 824; *Pub. Utils. Comm'n of R.I.*, 273 U.S. 83.

152 BARRY BOSWORTH & SVETA MILUSHEVA, BROOKINGS INST., INNOVATIONS IN U.S. INFRASTRUCTURE FINANCING: AN EVALUATION 5 (2011) ("There is widespread agreement that investments in the public infrastructure offer substantial benefits to the economy as a whole."); Brett M. Frischmann, *An Economic Theory of Infrastructure and Commons Management*, 89 MINN. L. REV. 917, 923–29 (2005) ("Most economists agree that traditional infrastructure resources generate significant positive externalities that result in 'large social gains.'" (footnote omitted)).

153 Frischmann, *supra* note 152, at 932 ("Critically, many infrastructure resources act as inputs into a wide variance of socially valuable activities, including the production of public goods and nonmarket goods.").

154 Allan Erbsen, *Horizontal Federalism*, 93 MINN. L. REV. 493, 524 (2008) ("The inverse of state action creating negative externalities is free-riding by states on the positive externalities of investments in infrastructure and human capital by other states.").

155 *See generally* WILLIAM A. FISCHEL, THE HOMEVOTER HYPOTHESIS: HOW HOME VALUES INFLUENCE LOCAL GOVERNMENT TAXATION, SCHOOL FINANCE, AND LAND-USE POLICIES 9–11, 262 (2001); Michael Dear, *Understanding and Overcoming the NIMBY Syndrome*, 58 J. AM. PLAN. ASS'N 288 (1992); Michael B. Gerrard, *The Victims of NIMBY*, 21 FORDHAM URB. L.J. 495 (1994).

156 Ostrow, *supra* note 15, at 1444 & n.161. Professor Eagle explains that:

> NIMBYism can prevent the approval of any new transmission line project, no matter how dramatic its benefits. Even when the new infrastructure improves reliability and lowers prices, is necessary for national security, and replaces older, more heavily polluting facilities, siting attempts may fail. These failures can occur in any jurisdiction and to any developer, regardless of the developer's competence and its efforts to satisfy local residents.

Eagle, *supra* note 5, at 25 (footnotes omitted).

compensation for easements, equity and fairness issues, and doubts that the proposed facility is needed.[157]

As one scholar notes, "Americans continue to respond negatively to the essential infrastructure required to power the American economy and our lives—power plants and transmission lines—when elements of that infrastructure are proposed in our communities and neighborhoods."[158] All states, even those with centralized siting procedures, permit local property owners or land use officials to participate in the siting process.[159] Even where localities are not formally authorized to veto proposed projects, local opposition frequently functions as de facto veto authority.[160]

Siting interstate transmission lines through state siting regimes—which typically focus on intrastate costs and benefits—gives rise to a particularly complex set of interstate externalities. First, to issue a certificate of need for a proposed transmission line, state law generally requires the public utility commission to determine whether a proposed project is in the public interest.[161] Some states consider overall system reliability as a public benefit; other states focus exclusively on *intrastate* benefits.[162]

North Dakota, for example, has traditionally allowed out-of-state power needs to justify the siting of a new line in the state.[163] In contrast,

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157 NAT'L COMM'N ON ENERGY POLICY, *supra* note 74, at 9.

158 Elise N. Zoli, *Power Plant Siting in A Restructured World: Is There Light at the End of the Tunnel?*, 16 NAT. RESOURCES & ENV'T 252, 253 (2002).

159 Uma Outka, *The Renewable Energy Footprint*, 30 STAN. ENVTL. L.J. 241, 258 (2011) ("Virtually all of the statutes provide a mechanism for local involvement in the siting process and strive for consistency with local regulation . . . .").

160 Eagle, *supra* note 5, at 25; Ostrow, *supra* note 8, at 320; *see also* NAT'L COMM'N ON ENERGY POLICY, *supra* note 74, at 9 (describing siting as involving "multiple stages of public meetings, environmental reviews, project redesigns, permit applications, and likely legal proceedings"); Rossi, *The Trojan Horse*, *supra* note 5, at 1021 ("In many recent siting proceedings, the environmental and land owner opposition to a proposed line has been formidable, resulting in frequent delays to a project and sometimes to the project never being built.").

161 The state PUC will typically consider how the proposed line fits in with the state's resource planning, whether there is a need for the line based upon demand, a full consideration of the environmental impacts of the line and the availability of alternatives. Klass & Wilson, *supra* note 5, at 1807; Dworkin et al., *supra* note 5, 538 (reviewing state regulations on transmission siting); Rossi, *The Trojan Horse*, *supra* note 5, at 1019–22 (discussing state siting statutes, certificates of need, and eminent domain authority for transmission lines).

162 Dworkin et al., *supra* note 5, at 538–39 (noting that some states "treat a healthy regional system as beneficial to their own state" while others "consider intrastate issues without regard for the total regional picture"); Rossi, *The Trojan Horse*, *supra* note 5, at 1024 ("[M]any states limit the consideration of 'need' to in-state benefits, rather than more broadly consider the benefits of locating and building a transmission line.").

163 Klass, *supra* note 57, at 1109 (summarizing North Dakota law holding improvement to system-wide reliability provides direct benefit to in-state customers); *see also* Rossi, *The Trojan Horse*, *supra* note 5, at 1022–26.

states such as Massachusetts, Mississippi, and Arizona reject certificates of need and eminent domain authority for out-of-state power.[164] In 2011, for example, the Arkansas Public Service Commission rejected a proposed interstate transmission line that was intended to transmit wind power from Oklahoma to out-of-state customers served by the Tennessee Valley Authority because state law precluded it from granting eminent domain authority to a project that would not serve Arkansas customers.[165]

State ratemaking principles create another set of interstate externalities. State regulators typically include the construction costs of new lines into the rates of the customers who will be served by the new line. In the case of a multi-state line, however, a host state lacks the authority to build the construction costs into out-of-state rates.[166] Regardless of a project's national or regional benefits, most states will object to financing an interstate transmission line that benefits out-of-state customers.[167]

Even where the construction costs are to be borne by the benefiting state, the proposed host state may still object to siting the undesirable land use. Arizona, for example, rejected a proposed high-voltage transmission line between California and Arizona, with the construction costs to be borne by California ratepayers. Arizona called the line a "230-mile extension cord," and objected to using its natural resources to benefit residents of California.[168]

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164 Rossi, *The Trojan Horse*, *supra* note 5, at 1022–26.

165 BIPARTISAN POLICY CTR., *supra* note 22, at 29 (citing Plains & Eastern Clean Line, LLC, Docket No. 10-041-U, at 10 (Ark. P.S.C. Jan. 11, 2011)).

166 SARI FINK ET AL., NAT'L RENEWABLE ENERGY LAB., A SURVEY OF TRANSMISSION COST ALLOCATION METHODOLOGIES FOR REGIONAL TRANSMISSION ORGANIZATIONS 2 (2011), *available at* http://www.nrel.gov/docs/fy11osti/49880.pdf; Brown & Rossi, *supra* note 5, at 762–63 ("Because the primary beneficiaries are not located entirely in the state in which many transmission facilities will be built, the state ratemaking process alone will prove insufficient as a mechanism for facilitating such cost sharing.").

167 BRACKEN HENDRICKS, CTR. FOR AM. PROGRESS, WIRED FOR PROGRESS: BUILDING A NATIONAL CLEAN-ENERGY SMART GRID 24 (2009), *available at* http://www.americanprogress.org/wp-content/uploads/issues/2009/02/pdf/electricity_grid.pdf (noting that the cost allocation policy "creates a strong disincentive for utilities and their state regulators to invest in transmission that will have broader social benefits that extend beyond their jurisdictional boundaries."); Brown & Rossi, *supra* note 5, at 710 ("It is highly improbable that a state will approve a line being built by a jurisdictional utility (operating in that state) if the costs, or even the residual revenue risks, are to be borne by local consumers while the benefits are largely extra-jurisdictional.").

168 Rossi, *The Trojan Horse*, *supra* note 5, at 1022 ("Among the concerns stated were environmental impacts on 'everything from native plants and wildlife to viewshed and archeological sites.'" (citing Press Release, Ariz. Corp. Comm'n, Regulators Reject "Extension Cord for California" (May 30, 2007), available at http://www.azcc.gov/divisions/administration/news/Devers_II_Vote.pdf)). As one Arizona regulator bluntly put it, "I don't want Arizona to become an energy farm for California. This project, if we approved it, would use our land, our air and our water to provide electricity to California." *Id.* (internal quotation marks omitted).

In an interconnected network, many proposed energy projects provide regional, rather than local, benefits. Transmission lines in one state might need to be expanded in order to enhance reliability, relieve congestion, or access renewable resources in another state. State infrastructure policies and siting regimes frequently fail to account for out-of-state benefits, giving rise to substantial interstate externalities and creating the need for a national network coordinator.[169]

III. INTRASTATE IMPLICATIONS: GENERATION, DISTRIBUTION, AND TRANSMISSION SITING

Today, the federal government regulates interstate transmission, while the states exercise primary authority over intrastate distribution, generation, and transmission siting. In an interconnected system, however, each state's energy policies and infrastructure investments inevitably affect operations and costs throughout the entire network. The ongoing physical, financial, and technological integration of the interstate electric power network portends a growing federal role in coordinating intrastate infrastructure policy.

This Part conceptualizes the federal role in grid governance as that of a "National Network Coordinator." As its name suggests, the "National Network Coordinator" model emphasizes the national role in coordinating—rather than replacing—parallel state regulatory authority. This Part, thus, develops a framework for grid governance to facilitate national coordination of network operations and the interstate market for electric power, while preserving a substantial state role in formulating and implementing energy infrastructure policies.

Section A argues that as the power network continues to evolve, becoming evermore physically and economically integrated, federal authority will expand to encompass intrastate generation, distribution, and transmission policies that have the capacity to affect network reliability, transmission costs, or regional energy markets. In addition, this Section argues that FERC's express authority to regulate transmission rates, combined with its authority to establish mandatory reliability standards for the transmission network and interoperability standards for the smart grid, provides a substantial base for indirect regulation of intrastate infrastructure.[170]

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169 Glicksman & Levy, *supra* note 9, at 591–602 (justifying federal preemption in the context of interstate externalities); Ostrow, *supra* note 8, at 306 ("In cases of substantial interstate spillovers, only the federal government is able to compel states to absorb the costs of their activities.").

170 *See supra* notes 22–24; *see also* Catherine R. Connors et al., *Transmission Preemption*, 148 PUB. UTIL. FORTNIGHTLY 47, 51 (2010).

Section B argues that the federal transmission reliability policy, which grants FERC the authority to establish mandatory reliability standards for the transmission network, embodies the coordination model. The reliability policy enables FERC to coordinate state policies with regard to network operations, while allowing states to supplement the federal standards and tailor them to local conditions.

Section C extends the coordination model to interstate transmission siting. Specifically, this Section argues in favor of a federal Process Preemption siting policy for interstate transmission lines to coordinate state siting regimes without displacing state and local regulators. Process Preemption, and the coordination model more generally, balances federal and state interests, enabling national coordination of the interstate network, without unduly sacrificing the well-known values of federalism.[171]

A. *Federal Regulation of Intrastate Infrastructure*

Though FERC lacks the authority to establish standards for intrastate infrastructure resources, the ongoing integration of the electric power grid has made it increasingly difficult to isolate a realm of exclusive state authority. Already, the Supreme Court has recognized that the interconnected nature of the interstate grid can obscure the distinction between interstate and intrastate transmission.[172] In *Federal Energy Regulatory Commission v. Mississippi*,[173] the Court upheld the Public Utility Regulatory Policies Act under the Commerce Clause, even with respect to regulation of *intrastate* activities, noting "federal regulation of intrastate power transmission may be proper because of the interstate nature of the generation and supply of electric power."[174] The Court further noted, "it is difficult to conceive of a more basic element of interstate commerce than electric energy, a product used in virtually every home and every commercial or manufacturing facility. No State relies solely on its own resources in this respect."[175]

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171 The oft-noted "values of federalism" include "avoiding the undue concentration of regulatory authority in one level of government; fostering democratic accountability and responsiveness; and leaving ample room for local variation, innovation, and competition." Ostrow, *supra* note 15, at 1442.

172 New York v. Fed. Energy Regulatory Comm'n, 535 U.S. 1, 17 (2002); *see also* Fla. Power Comm'n v. Fla. Power & Light Co., 404 U.S. 453 (1972) (describing the scientific electron flow test for federal jurisdiction).

173 Fed. Energy Regulatory Comm'n v. Mississippi, 456 U.S. 742 (1982).

174 *Id.* at 755.

175 *Id.* at 757.

More recently, the Court reached a similar conclusion with respect to electricity transmission.[176] In *New York v. Federal Energy Regulatory Commission*, the Court reviewed FERC Order No. 888, which imposed an open access requirement on retail electricity transactions.[177] FERC maintained that it was "irrelevant to the Commission's jurisdiction whether the customer receiving the unbundled transmission service in interstate commerce is a wholesale or retail customer."[178] The Supreme Court agreed, finding that "[t]he unbundled retail transmissions targeted by FERC are indeed transactions of 'electric energy in interstate commerce,' because of the nature of the national grid."[179]

In addition, though FERC is not authorized to establish reliability standards for local distribution systems or resource adequacy or to order the construction or enlargement of power generators or transmission facilities,[180] the interconnected 'nature of the national grid' may enable it to do so indirectly. In approving ISO New England's installed capacity requirement, for example, FERC maintained that it was authorized to consider in-state resource adequacy in setting transmission rates because in-state resources directly impact the performance and reliability of the interconnected grid. According to FERC:

> [W]here an interconnected transmission system is operated on [a] regional basis as part of an organized market for electricity . . . all users of the system are interdependent, particularly with respect to reliability, i.e., one participant's reliability decisions can impact the reliability of service available to other participants and the related costs the other participants must bear . . . .[181]

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176 *New York*, 535 U.S. at 1.

177 Promoting Wholesale Competition Through Open Access Non-Discriminatory Transmission Services by Public Utilities; Recovery of Stranded Costs by Public Utilities and Transmitting Utilities, 61 Fed. Reg. 21,540, (May 10, 1996) (to be codified at 18 C.F.R. pts. 35, 385).

178 *Id.* at 21,571.

179 *New York*, 535 U.S. at 17.

180 16 U.S.C. § 824*o* (2012) (expressly denying FERC authority to establish reliability standards for distribution systems or to establish intrastate resource adequacy requirements or order the construction of energy infrastructure); 16 U.S.C. § 824(b)(1) (providing that FERC "shall not have jurisdiction . . . over facilities used for the generation of electric energy"); *see also* STAN MARK KAPLAN, CONG. RESEARCH SERV., R40511, ELECTRIC POWER TRANSMISSION: BACKGROUND AND POLICY ISSUES 33 (2009), *available at* http://fpc.state.gov/documents/organization/122949.pdf (noting that "generation connected to the distribution system (in contrast to the transmission system) is not covered by NERC reliability standards"); BIPARTISAN POLICY CTR., *supra* note 22, at 25 (noting that FERC is expressly prohibited from establishing resource adequacy requirements or requiring the construction generation or transmission facilities); N. AM. ELEC. RELIABILITY CORP., 2012 LONG-TERM RELIABILITY ASSESSMENT ii (2012).

181 Connors, *supra* note 170, at 47 (alterations in original) (citing ISO New England, Inc., 119 FERC ¶ 61,161, 62,005 (2007) (internal quotation marks omitted)).

The D.C. Circuit upheld the installed capacity requirements on the ground that they only indirectly regulated generation facilities—states would have to construct new in-state generation facilities in order to meet the installed capacity requirements, but the requirements did not directly mandate that new in-state facilities be built.[182]

By the same logic, FERC's authority to regulate transmission rates and transmission reliability likely supports indirect regulation of distribution systems. Though analysis of the energy grid has often focused on the transmission network, distribution system infrastructure plays a critical role in maintaining network reliability and supporting the wholesale energy market.[183] The majority of power outages and line losses occur on distribution lines, not transmission lines.[184] Distribution systems tend to be the most antiquated and least automated segment of the electric grid.[185] Security risks at the distribution level have the potential to compromise large sections of the interstate grid.

As with intrastate generating capacity, creeping regulation of intrastate distribution policies is already underway. In 2009, FERC issued Order 719, which required RTOs to accept demand-response offers from aggregators of retail energy customers, unless the relevant state regulator prohibits their participation.[186] In supporting its Order, FERC rejected claims that it was intruding on state regulatory jurisdiction over retail sales. FERC emphasized its broad authority under the Federal Power Act to identify practices that "affect" public utility wholesale rates and determined that intrastate demand response resources affect competitive electric markets.[187] As FERC Chairman Jon Wellinghoff has noted, demand response can have a major impact on wholesale market prices because "even modest amounts of demand response can lead to significant reductions in wholesale prices at times of capacity constraints."[188] Order 719 also leaves open the possibility for

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182 Ct. Dep't. of Pub. Util. Control v. Fed. Energy Regulatory Comm'n, 569 F.3d 477, 482 (D.C. Cir. 2009). The court emphasized that state regulators could choose to meet the ICR requirement in a variety of ways, noting that "[a load serving entity] could fulfill its capacity obligation to ISO-NE by constructing new electrical generating capacity but it could also add 50 MW of demand response and 50 MW of capacity contracts (from inside or outside the state), or any mix of the above." *Id.* (internal quotation marks omitted).

183 BIPARTISAN POLICY CTR., *supra* note 22, at 28.

184 *Id.* at 25 ("[M]ost outages (and therefore the largest share of costs) occur on distribution systems rather than on the bulk power system, particularly during the course of weather-related events.").

185 *Id.* at 45 ("Although the majority of line losses and customer interruptions occur at the distribution level, these networks tend to be the least instrumented and automated portion of the electric grid.").

186 Wholesale Competition in Regions with Organized Electric Markets, 73 Fed. Reg. 64,100, 64,101 (Oct. 28, 2008) (codified as amended at 18 C.F.R. § 35.28).

187 *Id.*

188 Jon Wellinghoff & David L. Morenoff, *Recognizing the Importance of Demand Response:*

FERC to establish requirements for energy efficiency resources, which can have a similarly large impact on wholesale market prices.[189]

In addition to its indirect authority over generating capacity and distribution policies, FERC has express authority to establish interoperability standards for smart grid devices, to "enable all electric resources, including demand-side resources, to contribute to an efficient, reliable electricity network."[190] The Energy Independence and Security Act of 2007 (EISA) charged the National Institute of Standards and Technology (NIST), a unit of the Department of Commerce, with developing the standards for smart grid equipment.[191] Once NIST's work is sufficiently advanced, FERC is to adopt, through a rulemaking, the standards and protocols "as may be necessary to insure smart-grid functionality and interoperability in interstate transmission of electric power, and regional and wholesale electricity markets."[192]

FERC's authority over interoperability for the smart grid is potentially broad because smart grid technology involves all network components, from generation, to transmission, to distribution.[193] In particular, the integration of demand-side resources will require substantial investments at the distribution level.[194] Integrating renewable resources—through distributed generation and through large-scale solar and wind power plants—will also require the development of new operating standards at both ends of the network.[195] In fact, FERC has already established standards for interconnecting large wind resources.[196] Like interoperability standards for the smart grid more generally, a national standard for integrating renewable resources into the grid would help to maintain interoperability between components of the grid.[197]

The Second Half of the Wholesale Electric Market Equation, 28 ENERGY L.J. 389, 395 (2007) (internal quotation marks omitted).

189 Wholesale Competition in Regions with Organized Electric Markets, Order No. 719, 128 FERC ¶ 61,059, ¶ 14 (2009) (declining to regulate energy efficiency resources because it had not been proposed in this proceeding therefore FERC "did not have an adequate record to address this issue").

190 42 U.S.C. § 17385(a) (2012).

191 *Id.* In addition, the 2009 stimulus bill allocated $4.5 billion to smart grid projects. Michael Grabell & Christopher Weaver, *The Stimulus Plan: A Detailed List of Spending*, PROPUBLICA (Feb. 13, 2009), http://www.propublica.org/special/the-stimulus-plan-a-detailed-list-of-spending#stim_transportation.

192 42 U.S.C. § 17385(d).

193 *See supra* notes 49–56.

194 BIPARTISAN POLICY CTR., *supra* note 22, at 35–37; MIT STUDY, *supra* note 20, at 16.

195 MIT STUDY, *supra* note 20, at 17.

196 Interconnection for Wind Energy, 70 Fed. Reg. 75,005 (Dec. 19, 2005).

197 BIPARTISAN POLICY CTR., *supra* note 22, at 19.

At this point, it is not clear how the NIST's authority will be implemented.[198] FERC has suggested that it is authorized to mandate standards for all domains of the grid.[199] States, for the most part, oppose mandatory standards, even for the bulk power system, fearing—quite rightly—that such standards will trickle down to the distribution level.[200] Still, a meaningful role for the states could be preserved if the NIST standards were voluntary or—like the federal transmission reliability standards, considered in more detail in the next Section—established minimum criteria that states were free to tailor or to exceed.[201]

B. *National Coordination of Network Reliability*

The 2003 Northeast blackout—which affected fifty million people and cost six billion dollars—dramatically illustrated the interconnectedness and vulnerability of the interstate transmission network.[202] The blackout prompted Congress to do what the states could not—coordinate network operations by authorizing the establishment of mandatory transmission reliability standards. Critically, however, the federal policy establishes a regulatory floor, leaving states with substantial authority to experiment with and tailor infrastructure policies to local conditions. In this way, the federal policy coordinates state infrastructure policy to safeguard network operations, but does not replace state regulators with federal administrators.

1. National Transmission Reliability Standards

The EPAct of 2005 ordered FERC to designate an official Electric Reliability Organization (ERO) to design and enforce new mandatory reliability standards, subject to FERC's review and approval.[203] In 2006,

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198 U.S. GOV'T ACCOUNTABILITY OFFICE, GAO-11-117, ELECTRICITY GRID MODERNIZATION: PROGRESS BEING MADE ON CYBERSECURITY GUIDELINES, BUT KEY CHALLENGES REMAIN TO BE ADDRESSED 21–22 (2011) (noting that the FERC lacks an approach to monitor and enforce industry compliance with any standards it adopts in this process).

199 Eisen, *supra* note 48, at 50–52 & n.323.

200 *Id.* at 51 (describing state opposition to FERC mandates).

201 *Id.* at 52 (noting with regard to potential ossification of regulatory standards that "if the NIST Catalog is a 'toolkit,' and not a 'rulebook,' this objection is less relevant. A state that believes the Catalog standards are not state-of-the-art is free to depart from them.").

202 Achenbach, *supra* note 12; JR Minkel, *The 2003 Northeast Blackout--Five Years Later*, SCI. AM. (Aug. 13, 2008), http://www.sciam.com/article.cfm?id=2003-blackout-five-years-later.

203 16 U.S.C. § 824p (2012); *see also* ADAM VANN & JAMES V. DEBERGH, CONG. RESEARCH SERV., R40657, THE FEDERAL GOVERNMENT'S ROLE IN ELECTRIC TRANSMISSION FACILITY SITING 6 (2011).

FERC designated the North American Electric Reliability Corporation (NERC)—previously a voluntary organization established by the electric utility industry[204]—as the ERO.[205]

NERC's reliability standards are developed through an industry consensus process.[206] Once approved by FERC, the reliability standards apply to a wide range of organizations engaged in the bulk power system, including RTOs/ISOs as well as owners, operators, and users of transmission and generation facilities.[207] As the ERO, NERC has issued, and FERC has approved, over 120 reliability standards, which collectively impose over 1400 discrete compliance requirements on owners, operators, and users of the bulk electric system.[208]

The Reliability Standards are grouped into fourteen categories reflecting key bulk electric system functions.[209] For example, the Transmission Operations standards "set forth responsibilities and decision-making authority for reliable operations, requirements for operations planning, planned outage coordination, and related operational and reporting requirements."[210] The Resource and Demand Balancing standards "address balancing resources and demand to maintain interconnection frequency within prescribed limits."[211] The Communications standards "require that adequate telecommunications facilities be staffed and available to address real-time emergencies."[212]

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204 VANN & DEBERGH, CONG. RESEARCH SERV., R40657, at 8; Jonathan D. Schneider, *NERC on a Wire*, 151 PUB. UTIL. FORTNIGHTLY 32, 34 (2013).

205 Order Certifying North American Electric Reliability Corporation as the Electric Reliability Organization and Ordering Compliance Filing, 116 FERC ¶ 61,062 (2006); *Electric Power Industry Overview 2007*, U.S. ENERGY INFO. ADMIN., http://www.eia.gov/electricity/archive/primer (last visited Apr. 22, 2014).

206 Schneider, *supra* note 204, at 32–35 (describing standard setting process).

207 Entities subject to compliance with NERC reliability standards include: Balancing Authorities, Distribution Providers, Generation Owners, Generation Operators, Interchange Authorities, Load-Serving Entities, Planning Authorities, Purchasing and Selling Entities, Reliability Coordinators, Reserve Sharing Groups, Resource Planners, Transmission Owners, Transmission Operators, Transmission Planners, and Transmission Service Providers. *See* BIPARTISAN POLICY CTR., *supra* note 22, at 25; N. AM. ELEC. RELIABILITY CORP., STATEMENT OF COMPLIANCE REGISTRY CRITERIA (REVISION 5.0) 4–6 (2008), *available at* http://www.nerc.com/files/FinalFiled-compFiling-LSE-07312008.pdf.

208 Paul D. Ackerman, *The Challenge and Cost of Keeping the Lights On: Mandatory and Enforceable Electric System Reliability Standards*, 43-OCT MD. B.J. 36, 38–39 (2010) (citing N. AM. ELEC. RELIABILITY CORP., RELIABILITY STANDARDS FOR THE BULK ELECTRIC SYSTEMS OF NORTH AMERICA (2008), *available at* http://www.nerc.com/files/Reliability_Standards_Complete_Set.pdf).

209 For a summary of NERC's reliability standards, see *id.*, at 38–39; *see also* Mandatory Reliability Standards for the Bulk-Power System, 72 Fed. Reg. 40,717, 40,725 (July 25, 2007) (order approving and summarizing the initial Reliability Standards).

210 Ackerman, *supra* note 208, at 39.

211 *Id.*

212 *Id.*

Both NERC and FERC are authorized to enforce these requirements by imposing penalties for violations,[213] though FERC has, for the most part, left enforcement matters to NERC.[214] NERC, together with its eight Regional Reliability Organizations (RROs),[215] "enforce compliance with Reliability Standards through a rigorous program of monitoring, self-certification requirements, audits, and investigations."[216]

2. Preserving State Authority

The EPAct's regulatory framework for network reliability enables national entities—FERC and NERC—to coordinate state regulation without displacing state regulators. Under the EPAct, FERC and NERC are authorized to create baseline operating standards for the interconnected network. States, however, retain substantial discretion to determine whether to meet the federal standards through the construction of new transmission or through the employment of non-transmission alternatives. In complying with the federal standards, for example, states can choose to add generation capacity; promote distributed generation and combined heat and power facilities;[217] develop utility-scale energy storage;[218] improve congestion management; reduce line losses in the transmission and distribution system; expand the geographic footprint of balancing authorities;[219]

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213 *See* 16 U.S.C. § 824*o*(e)(3) (2012); N. AM. ELEC. RELIABILITY CORP., RULES OF PROCEDURE § 402(5) (2013) [hereinafter NERC, RULES OF PROCEDURE], *available at* http://www.nerc.com/FilingsOrders/us/RuleOfProcedureDL/NERC_ROP_Effective_20131004.pdf.

214 Schneider, *supra* note 204, at 33.

215 The eight regional reliability councils are: Florida Reliability Coordinating Council (FRCC); Midwest Reliability Organization (MRO); Northeast Power Coordinating Council (NPCC); Reliability First Corporation (RFC); SERC Reliability Corporation (SERC); Southeast Power Pool, Inc. (SPP); Texas Regional Entity (TRE); and Western Electricity Coordinating Council (WECC). *Regional Entities*, N. AM. ELEC. RELIABILITY CORP., http://www.nerc.com/AboutNERC/keyplayers/Pages/Regional-Entities.aspx (last visited Apr. 22, 2012).

216 Ackerman, *supra* note 208, at 39–40 (citing NERC, RULES OF PROCEDURE, *supra* note 213, §§ 400–407). "NERC and the RROs conduct planned and 'spot check' audits to verify compliance. . . . Violations discovered during audits, disclosed by self reports, or otherwise identified are subject to a compliance enforcement process that starts at the regional level, but includes both NERC and FERC review." *Id.* at 40. Settlements of compliance violations must be approved by FERC. *See* 16 U.S.C. § 824*o*(e)(2); NERC, RULES OF PROCEDURE, *supra* note 213, app. 4B.

217 Combined heat and power systems provide heat for buildings or industrial processes by using the "waste" energy from electricity generation. MIT STUDY, *supra* note 20, at 109.

218 Although advanced storage technologies, including grid-scale batteries, are not yet cost-effective enough to be adopted widely, some companies have successfully demonstrated utility-scale storage projects. BIPARTISAN POLICY CTR., *supra* note 22, at 53.

219 Balancing authorities are responsible for continuously balancing electricity supply and

integrate demand response programs; or implement energy efficiency programs to reduce future demand.[220] In some cases, alternative methods of enhancing reliability might reduce the need for new generation or transmission facilities, thereby avoiding the enormous capital investment and siting controversy attendant to the construction of new energy facilities.[221]

Moreover, NERC's reliability standards do not prevent the states from imposing additional, consistent reliability standards for electric service within the state. The statute contains an express savings clause, which states: "Nothing in this section shall be construed to preempt any authority of any State to take action to ensure the safety, adequacy, and reliability of electric service within that State, as long as such action is not inconsistent with any reliability standard . . . ."[222] As a result, NERC's reliability standards coordinate state policies with regard to network operations, but leave ample room for state regulators to supplement the reliability standards or tailor them to local conditions.

The federal transmission reliability policy is consistent with the cooperative federalism approach taken in many environmental programs, where states are required to meet federal standards but are given substantial discretion in designing implementation plans tailored to state resources and preferences. Under the Clean Air Act, for example, states must design state implementation plans (SIPs) to meet national air-quality and emissions standards.[223] The Act affords state and local regulators much leeway in allocating criteria pollutants, thus empowering state and local officials to tailor patterns of development, building codes, public transportation, farming practices, and wetland drainage to meet federal standards.[224] Similarly, the Coastal Zone Management Act of 1972 (CZMA) encourages coastal states to develop coastal management plans that comply with federal standards.[225] The federal standards are broadly drawn, leaving states with substantial discretion to tailor the mix of coastal-protection measures they adopt.[226]

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demand over a defined geographic area. NERC has noted that larger, more diversified balancing areas (or coordination agreements between balancing areas) offer reliability benefits while also enabling variable energy resources (VER) integration and increasing system flexibility. *Id.* at 17.

220 STATE & LOCAL ENERGY EFFICIENCY ACTION NETWORK, *supra* note 101, at vi–vii; WILSON & PETERSON, *supra* note 103, at 3–4.

221 BIPARTISAN POLICY CTR., *supra* note 22, at 7; *see also infra* notes 264–65.

222 16 U.S.C. § 824*o*(i)(3) (2012).

223 42 U.S.C. §7410(a). EPA's procedure for SIP approval is contained in 40 C.F.R. § 51.101–.105 (2013).

224 42 U.S.C § 7410(c).

225 Pub. L. No. 92-583, 86 Stat. 1280 (codified as amended at 16 U.S.C. §§ 1451–1466).

226 *See generally* NAT'L OCEAN SERV., U.S. DEP'T OF COMMERCE, CZMA SECTION 312 EVALUATION SUMMARY REPORT—2006 (2007), *available at* http://coastalmanagement.noaa.gov/success/media/312summaryreport2006.pdf (identifying

So too, compliance with NERC's reliability policy enables each state to enact a suite of policies tailored specifically to its own physical infrastructure, market structure, environmental preferences, and resource mix.

C. *Coordinating Interstate Transmission Siting Through Federal Process Preemption*

Although many intrastate infrastructure policies have an impact on the interstate grid, interstate transmission lines present a unique set of jurisdictional challenges. Discrete generating and distribution facilities are located entirely within one state. Each state has the authority site facilities located within its own borders. In contrast, *no* state has the authority to site an interstate line. Siting interstate transmission lines demands coordinated action by multiple states, each of which has an incentive to shift the costs of siting energy infrastructure onto other states.

Interstate coordination is critical to interstate transmission siting: "[M]ost states are dependent on other states for energy imports or exports and cannot construct transmission lines for such interstate imports and exports without working with other states."[227] One state's refusal to site an interstate transmission line can prevent new energy generators, particularly renewables, from coming online and inhibit the growth of wholesale energy markets.[228] California's plan to import energy from New Mexico cannot move forward without approval from New Mexico and Arizona.[229] Connecticut utilities cannot export power to communities on Long Island without the consent of both New York and Connecticut.[230]

The demand for interstate coordination is only expected to grow. As wholesale energy markets expand and new energy generators (particularly renewable energy generators) are connected to the grid, an increasing percentage of new transmission lines will cross state boundaries.[231] According to the Edison Electric Institute, 52% of planned or ongoing transmission projects span two or more states.[232]

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challenges for state coastal-management programs and encouraging information exchange).

227 Klass & Wilson, *supra* note 5, at 1831.

228 Interstate transmission projects connect remote renewable resources to population centers, *see supra* notes 72–74, and allow wholesale electricity markets to expand geographically. MIT STUDY, *supra* note 20, at 80.

229 *See supra* note 168.

230 Patrick Healy, *Connecticut Seeks to Shut Off Cross-Sound Cable (Again)*, N.Y. TIMES, April 1, 2004, at B6.

231 BIPARTISAN POLICY CTR., *supra* note 22, at 23 (quoting MIT STUDY, *supra* note 20, at 78) (noting that if renewable energy resources are to be developed in an efficient manner, "an

State siting regimes are widely thought to hinder the development of critical interstate transmission lines.[233] Thus, many proposals favor granting FERC siting authority for some or all interstate transmission lines.[234] This Section rejects that approach in favor of a federal siting policy that incorporates Process Preemption. Process Preemption is a hybrid federal-local siting mechanism that empowers state and local regulators to make siting decisions, subject to federal constraints on the decision-making process.[235] Process Preemption balances state and federal siting concerns and is far more likely to further federal land use policies than is a siting regime that grants FERC direct siting authority.[236] This Section then suggests that FERC's Order 1000, which mandates regional and interregional transmission planning and cost allocation,[237] while expressly preserving exclusive state siting authority,[238] could provide a framework for Process Preemption.

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increasing fraction of transmission lines will cross state borders, independent system operator (ISO) regions, and land managed by federal agencies such as the U.S. Forest Service").

232 EDISON ELEC. INST., *supra* note 28, at viii.

233 As Jim Rossi explains:

> While state transmission line siting laws may have worked adequately in the era of the monopoly franchise and vertically integrated utility, . . . they [generally] do not provide [states with] sufficient legal authority . . . to expand transmission infrastructure to accommodate either wholesale powers markets or to expand infrastructure to accommodate renewable energy resources.

Rossi, *The Trojan Horse*, *supra* note 5, at 1023; *see also* BLUE RIBBON PANEL ON COST ALLOCATION, HARVARD UNIVER., A NATIONAL PERSPECTIVE ON ALLOCATING THE COSTS OF NEW TRANSMISSION INVESTMENT: PRACTICE AND PRINCIPLES 35–36 (2007), *available at* http://www.hks.harvard.edu/hepg/Papers/Rapp_5-07_v4.pdf (noting that state siting laws are "out of sync" with the modern industry structure); Eagle, *supra* note 5, at 12 (noting that many experts believe the state transmission siting procedure slows their construction); Outka, *supra* note 159, at 259–61 (noting that "state frameworks are often blamed for inhibiting grid expansion across state lines").

234 Rossi, *The Trojan Horse*, *supra* note 5, at 1040 (noting that "[t]he predominant political solution has been to call for an expansion of federal power to preempt state and local regulators").

235 Ostrow, *supra* note 8, at 293.

236 *Id.* at 290.

237 Transmission Planning and Cost Allocation by Transmission Owning and Operating Public Utilities, 76 Fed. Reg. 49,842 (Aug. 11, 2011) (to be codified at 18 C.F.R. pt. 35) [hereinafter FERC Order 1000]. Order 1000 expands upon FERC's earlier planning requirements. Under FERC's Order 890, issued in 2007, utility transmission plans were required to be consistent with the following principles: (1) coordination; (2) openness; (3) transparency; (4) information exchange; (5) comparability; (6) dispute resolution; and (7) economic planning studies, and include an explanation of how the utility will coordinate with other utilities in the region on transmission. Preventing Undue Discrimination and Preference in Transmission Service, 72 Fed. Reg. 12,266, 12,279, 12,318 (Mar. 15, 2007) (to be codified at 18 C.F.R. pts. 35, 37).

238 FERC Order 1000, *supra* note 237, at 49,885 n.231.

1. Considering (and Rejecting) Federal Siting Authority

The EPAct of 2005, enacted in the aftermath of the 2003 Northeast blackout, granted FERC backstop siting authority for transmission lines in designated National Interest Electricity Transmission Corridors (NIETC).[239] The federal siting policy was intended to further two national policy goals: improving network reliability and enabling renewable resources to access the grid.[240] Not surprisingly, the unitary siting regime has failed to further federal land use goals.[241] State opposition and narrow interpretations of FERC's authority by both the Fourth and Ninth Circuits have effectively nullified FERC's role.[242]

Some have suggested doubling-down on the failed siting policy by vesting exclusive siting authority over all transmission lines in FERC,[243] using FERC's long-standing jurisdiction over natural gas pipelines as a model.[244] Others have suggested granting FERC siting authority over a more limited category of interstate lines.[245]

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239 16 U.S.C. § 824p (2012); *see also* ADAM VANN & JAMES V. DEBERGH, CONG. RESEARCH SERV., R40657, THE FEDERAL GOVERNMENT'S ROLE IN ELECTRIC TRANSMISSION FACILITY SITING 2 (2011) ("Difficulty in constructing new transmission led Congress to include federal transmission siting authority as part of the [EPAct].").

240 FERC's backstop siting authority was initially intended to increase grid capacity so as to improve reliability and later expanded to enable renewable resources to access the grid. 16 U.S.C. § 824p (authorizing the expansion or construction of transmission lines in corridors adversely affected by "electric energy transmission capacity constraints or congestion"); The American Recovery and Reinvestment Act of 2009, Pub. L. No. 111-5, § 409, 123 Stat. 115, 146 (directing the Department of Energy to include areas where renewable energy may be hampered by lack of access to the grid); *see also* VANN & DEBERGH, CONG. RESEARCH SERV., R40657, at 6 (noting that FERC's siting authority was intended to further reliability and renewable goals).

241 Ostrow, *supra* note 8, at 323–24.

242 Cal. Wilderness Coal. v. U.S. Dep't of Energy, 631 F.3d 1072, 1089–90 (9th Cir. 2011) (vacating the Department of Energy's DOE's congestion study and NIETC designations, which are a prerequisite for FERC's back-stop siting authority); Piedmont Envtl. Council v. Fed. Energy Regulatory Comm'n, 558 F.3d 304, 309–10 (4th Cir. 2009) (rejecting FERC's interpretation of the EPAct language, which would have allowed FERC to preempt a state's decision to reject a transmission project).

243 In testimony before Congress, FERC's Chairman, Jon Wellinghoff, for example, noted that FERC "has developed comprehensive, efficient processes that provide for public notice and extensive public participation, including participation by affected states" and suggested that Congress give FERC a similar role in siting electric transmission facilities. *Transmission Infrastructure: Hearing Before the Comm. on Energy and Natural Res.*, 111th Cong. 11 (2009) (statement of Jon Wellinghoff, Acting Chairman, FERC), *available at* http://www.gpo.gov/fdsys/pkg/CHRG-111shrg48760/pdf/CHRG-111shrg48760.pdf. The authors of a recent MIT study similarly advocate plenary federal siting authority modeled on FERCs authority over gas pipelines. MIT STUDY, *supra* note 20, at 102.

244 Under the natural gas model, developers of interstate natural gas pipelines apply to FERC for a Certificate of Public Convenience and Necessity. FERC has the authority to impose conditions on the certificate and to determine the service area to be covered. Once a project is approved, FERC grants the pipeline owner eminent domain authority to construct the pipeline. 15 U.S.C. § 717f(c)–(h); *see also* Klass & Wilson, *supra* note 5, at 1859 (considering use of

This Article rejects this approach for several reasons. First, transferring exclusive siting authority to FERC, even for a limited category of interstate transmission lines, would face significant political opposition.[246] Second, as Part II argued, from a policy perspective, concentrating authority in a single federal administrative agency increases the risk of regulatory failure. Unitary federal preemption is strong medicine that sacrifices some of the most valuable elements of federalism including (1) the ability to diversify regulatory risk, and (2) the ability to tailor broad federal standards to local conditions. This is particularly true for infrastructure siting, which implicates land use and local officials.

Third, and most importantly, as a practical matter, FERC does not have the regulatory capacity to implement its infrastructure plans absent state and local support. As FERC's experience with its existing backstop siting authority reveals, federal authority does not guarantee results, particularly in the traditionally local area of land use. Long gone are the days when project developers could construct large-scale infrastructure projects without public, and particularly local, approval.[247] Studies of siting conflicts throughout the country and internationally confirm that unilateral preemption of the siting process rarely succeeds and often increases opposition to future siting efforts.[248]

Thus, notwithstanding the federal government's formal legal authority to preempt state and local permitting requirements, the federal government cannot simply preempt local political authority and force an unwanted facility on a resistant community or a parochial

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natural gas model); Robert R. Nordhaus & Emily Pitlick, *Carbon Dioxide Pipeline Regulation*, 30 ENERGY L.J. 85, 88–89 (2009) (describing natural gas pipeline permitting process and noting that courts have repeatedly held that the Natural Gas Act provides exclusive and preemptive federal siting authority to FERC).

245 STAN MARK KAPLAN, CONG. RESEARCH SERV., R40511, ELECTRIC POWER TRANSMISSION: BACKGROUND AND POLICY ISSUES 16 (2009), *available at* http://fpc.state.gov/documents/organization/122949.pdf (describing a proposal that would grant FERC siting authority for "National High Priority Transmission Projects" identified through a federally-sanctioned interconnection-wide planning process); BIPARTISAN POLICY CTR., *supra* note 22, at 31 (proposing limiting FERC's backstop siting authority to high-voltage multi-state lines that have been approved by at least one of the states in which it will be located).

246 NARUC has long opposed any federal authority over intrastate infrastructure. *See, e.g.*, NAT'L ASSN. OF REGULATORY UTIL. COMM'RS, RESOLUTION REGARDING STATE AUTHORITY OVER PUBLIC UTILITY RESOURCE PLANNING (2013), *available at* http://www.naruc.org/Resolutions/Resolution%20Regarding%20State%20Authority%20over%20Public%20Utility%20Resource%20Planning.pdf (criticizing FERC for "inappropriately infring[ing] on State authority reserved by Congress over integrated resource plans, generation and transmission decisions, assurance of resource adequacy and reliability, and authorization and construction of new facilities"); *see also* Klass & Wilson, *supra* note 5, at 1860 (noting that Congress is unlikely to expand FERC's siting authority).

247 NAT'L COMM'N ON ENERGY POLICY, *supra* note 74, at 9.

248 Ostrow, *supra* note 8, at 323–24.

state.[249] Instead, modern siting strategies emphasize the need for addressing public opposition through early and robust public participation.[250]

That public acceptance, including state and local government approval, is a necessary precondition to successful siting is confirmed by FERC's experience siting natural gas pipelines. Despite FERC's formal legal authority to site pipelines, pipeline projects face many of the same obstacles as transmission projects.[251] A recent study by the Interstate Natural Gas Association of America catalogued numerous intergovernmental conflicts between federal, state, and local permitting agencies that invariably increased the costs of the project and often delayed and/or affected the eventual success of the project.[252] Moreover, as in other siting contexts, permitting conflicts not only affected the proposed projects, but also had a negative impact on future pipeline projects.[253]

Thus, FERC's once exclusive authority over interstate pipelines has devolved to include an increasingly important role for state and local agencies.[254] So too, regardless of the formal allocation of regulatory authority, state and local agencies are likely to retain a de facto role in transmission siting and policy. An effective national siting policy must account for that role.

2. The Process Preemption Alternative

Rather than preempt state siting authority, this Section proposes a federal Process Preemption mechanism to coordinate interstate siting through state siting regimes. In most states, the authority to permit and site a power plant or transmission line rests with the state public utility commission.[255] Developers must apply to the commission for a

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249 *Id.* at 323.

250 NAT'L COMM'N ON ENERGY POLICY, *supra* note 74, at 9 ("Researchers, planners, regulators, and utility professionals have developed a variety of methods and guides, such as *The Facilities Siting Credo*, for overcoming siting difficulties—specifically public opposition—by facilitating public participation, implementing new auction and compensation strategies, and testing detailed decision analysis frameworks, among other solutions.").

251 INGAA FOUND., AVOIDING AND RESOLVING INTERGOVERNMENTAL CONFLICTS WITH INTERSTATE NATURAL GAS FACILITY SITING, CONSTRUCTION, AND MAINTENANCE 2 (2005), *available at* http://www.ingaa.org/File.aspx?id=56 (providing that FERC authorization is frequently conditioned on applicants obtaining approval from numerous other federal, state, tribal and/or local agencies).

252 *Id.* at i.

253 *Id.* at ii.

254 *Id.* at 2.

255 Dworkin et al., *supra* note 5, at 538; Klass & Wilson, *supra* note 5, at 1807; Rossi, *The Trojan Horse*, *supra* note 5, at 1019–22.

certificate of need and a site or route permit to build a new generation facility or a transmission line. Once a project has been approved, state statutes generally authorize the project developer to exercise eminent domain authority to construct the line if the developer is unable to purchase voluntary easements from landowners.[256]

State need determinations—which focus on in-state costs and benefits—are often too narrow to account for the regional and system-wide interests at stake in planning and siting interstate lines.[257] Process Preemption would constrain the state level permitting process by (1) authorizing FERC to determine whether a particular interstate project is needed, or alternatively, by establishing standards for states to use in determining need, while (2) preserving states' authority over siting and routing the project within their own borders. A federal, or federally-constrained, need determination could account for interstate externalities, enabling regulators to consider whether the project as a whole provides benefits that outweigh its costs. At the same time, preserving state siting authority allows state and local regulators to engage directly with stakeholders in the traditional public utility commission forum.[258]

Interestingly, FERC's Order 1000 seemingly reflects a Process Preemption approach: It empowers state and local regulators to site transmission lines subject to federal constraints on the decision-making process. Order 1000 envisions a broad planning process designed to identify regionally beneficial projects that would not otherwise survive a state-by-state needs determination.[259] In developing regional plans, Order 1000 directs transmission providers to consider "public policy requirements" established by state or federal laws or regulations, including state renewable portfolio standard requirements.[260] Order 1000, thus, recognizes that ongoing investment in the transmission network will be shaped not only by traditional reliability and economic considerations, but also by the drive to integrate renewable resources into the grid.

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[256] Klass & Wilson, *supra* note 5, at 1807.

[257] See *supra* Part II.A.2.

[258] Trevor Stiles, *A Goldilocks Approach: Hybrid Federal/State Transmission Siting*, ENERGY BIZ (Nov. 15, 2013), http://www.energybiz.com/article/13/11/goldilocks-approach-hybrid-federalstate-transmission-siting; *see also* Klass & Wilson, *supra* note 5, at 1859 (adapting process preemption framework to transmission siting).

[259] FERC Order 1000, *supra* note 237, at 49,842 (expanding the definition of public benefits and ordering states to consider regional benefits in planning and cost allocation).

[260] *Id.* at 49,876. Order 1000 defines "public policy requirements" as requirements established "[b]y 'state or federal laws or regulations,'" which means "enacted statutes (i.e., passed by the legislature and signed by the executive) and regulations promulgated by a relevant jurisdiction, whether within a state or at the federal level." *Id.* at 49,845.

Order 1000 also recognizes that constructing long-distance transmission lines is not the only, or necessarily most efficient, way to meet projected electricity demand. In some cases, non-transmission alternatives, including energy efficiency requirements or demand response resources, may be more cost effective and less intrusive than the construction of new transmission lines.[261] Moreover, by reducing the overall demand for electricity, these alternatives further other important goals related to environmental quality, conservation, and energy security.[262] Order 1000 thus requires that non-transmission alternatives be given equal consideration to new transmission projects in regional transmission plans.[263]

In addition to transmission planning, Order 1000 also requires the development of regional financing schemes to facilitate construction of regional transmission lines that enhance overall grid reliability and increase capacity for renewable energy.[264] Though not all FERC approved formulas have survived judicial review,[265] the regional approach will help overcome cost allocation barriers to the construction of interstate transmission lines.[266]

FERC's regional planning process is designed to coordinate concurrent state authority to account for a variety of interstate externalities relating to infrastructure investment, siting, and cost

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261 RICHARD J. CAMPBELL & ADAM VANN, CONG. RESEARCH SERV., R41193, ELECTRICITY TRANSMISSION COST ALLOCATION 1 (2012), *available at* http://www.hsdl.org/?view&did=728978 (Opponents argue that "there are less costly and intrusive means of maintaining reliability and meeting . . . [electricity] needs than a large transmission build-out."); BIPARTISAN POLICY CTR., *supra* note 22, at 23; Paul Hines, Jay Apt & Sarosh Talukdar, *Large Blackouts in North America: Historical Trends and Policy Implications*, 37 ENERGY POL'Y 5249 (2009) ("[T]ransmission construction alone is a costly, and potentially ineffective, solution to reliability problems."). This point was emphasized in the National Governors' Association "infrastructure vision" report, which dismissed big transmission projects in favor of decentralized and technological solutions to power system issues. STAN MARK KAPLAN, CONG. RESEARCH SERV., R40511, ELECTRIC POWER TRANSMISSION: BACKGROUND AND POLICY ISSUES 12 (2009), *available at* http://fpc.state.gov/documents/organization/122949.pdf (citing DARREN SPRINGER & GREG DIERKERS, AN INFRASTRUCTURE VISION FOR THE 21ST CENTURY 11–13 (2009)).

262 Outka, *supra* note 159, at 244 (focusing on the land impacts of energy infrastructure, particularly renewable energy infrastructure); Rossi & Hutton, *supra* note 78, at 1336–37 (noting that demand response programs "can advance values associated with conservation and environmental protection").

263 FERC Order 1000, *supra* note 237, at 49,856–58.

264 Klass & Wilson, *supra* note 5, at 1825 (noting that "Order 1000 is an effort by FERC to create additional authority to spread transmission costs regionally, which will facilitate regional transmission lines to expand the reliability of the transmission grid generally and increase capacity for renewable energy specifically"); *Order No. 1000—Transmission Planning and Cost Allocation*, FERC, http://www.ferc.gov/industries/electric/indus-act/trans-plan.asp (last updated Mar. 20, 2014).

265 Ill. Commerce Comm'n v. Fed. Energy Reg. Comm'n, 576 F.3d 470, 476 (7th Cir. 2009).

266 Klass & Wilson, *supra* note 5, at 1870–71.

allocation. Critically, however, Order 1000 expressly reserves state authority over transmission siting, noting, "[n]othing in this Final Rule is intended to limit, preempt, or otherwise affect state or local laws or regulations with respect to construction of transmission facilities, including but not limited to authority over siting or permitting of transmission facilities."[267] The preservation of state siting authority permits state and local regulators to tailor the implementation of the policy to local geographical, social, and economic conditions.

Of course, a complete analysis of Order 1000 is beyond the scope of this Article. Moreover, the extent of FERC's authority to enforce compliance with Order 1000 so as to facilitate the construction of projects identified in regional plans is still subject to debate.[268] In fact, nearly every aspect of Order 1000 has been challenged and the legal issues surrounding its enforceability will work their way through the judicial system for years to come.[269] Nonetheless, Order 1000's hybrid federal-planning-state-siting-framework embodies a promising Process Preemption approach to interstate transmission siting: It coordinates state regulation, inserting a national perspective into the *permitting* process without displacing the state level *siting* process.[270] Thus, Process Preemption, and the coordination model more generally, seeks to preserve and to coordinate the states' role in formulating and implementing energy infrastructure policies.

CONCLUSION

The modern electric power network is a sprawling interstate system that is physically, financially, and technologically integrated. The Federal Power Act established a dual governance system, granting FERC authority over interstate transmission and the interstate sale of energy, while reserving for the states authority over intrastate transactions, operations, and facilities. The traditional division of authority, though

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[267] FERC Order 1000, *supra* note 237, at 49,885 n.231.

[268] RICHARD J. CAMPBELL & ADAM VANN, CONG. RESEARCH SERV., R41193, ELECTRICITY TRANSMISSION COST ALLOCATION 18 (2012), *available at* http://www.hsdl.org/?view&did=728978 (noting that the order does not specify how FERC will enforce the Final Rule); *Analysis of FERC Order No. 1000*, STEPTOE & JOHNSON LLP (Aug. 3, 2011), http://www.steptoe.com/publications-7723.html (considering FERC's authority to enforce Order 1000 pursuant to its authority to establish "just and reasonable" transmission rates).

[269] *See* South Carolina Public Service Authority v. Fed. Energy Regulatory Comm'n, No. 12-1232 (D.C. Cir. filed May 25, 2012). This case was argued before the United States Court of Appeals for the D.C. Circuit on March 20, 2014. For a recording of the three-hour oral argument see Oral Argument, *South Carolina Public Service Authority v. Fed. Energy Regulatory Comm'n*, (No. 12-1232), *available at* http://www.cadc.uscourts.gov/recordings/recordings2014.nsf/4B0C3D6D6828FB9385257CA1005CF022/$file/12-1232.mp3.

[270] Ostrow, *supra* note 8, at 291.

entirely reasonable in a world of vertically integrated local monopolies, does not meet the governance requirements of the modern electric power grid.

As the grid becomes more fully automated—and interconnected—infrastructure choice at the state level will inevitably affect network operations, transmission rates, and regional energy markets. As these effects become more pronounced, federal regulation will expand to encompass intrastate generation, transmission, and distribution as necessary to protect the interstate network as a whole. In the context of the interstate network, federal regulation is critical to (1) establish system-wide operating standards for the interconnected network; and (2) account for the regional impact of each state's energy infrastructure policies, particularly with regard to siting interstate transmission lines.

At the same time, however, concentrating regulatory authority in a federal agency prevents state and local regulators from experimenting with regulatory alternatives and responding to regional conditions. This, in turn, dramatically increases the risk of locking in suboptimal infrastructure investments that will make it difficult to adapt to changing technologies, markets and environmental conditions. Thus, this Article articulates a "National Network Coordinator" model for grid governance that enables a national entity to coordinate state policies while preserving state authority.