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The Electric Grid at a Crossroads: A Regional Approach to Siting Transmission Lines

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The current regulatory framework for approving long-distance, interstate electric transmission lines does not match the physical aspects of the interstate electric grid, regional electricity markets, or the growing but dispersed renewable energy sources increasingly used to power the grid. Despite the interstate nature of the electric grid and electricity markets, the states have virtually complete authority over the siting and permitting of interstate transmission lines. Continuing state authority over the development of the interstate transmission grid is puzzling when compared to the nation's network of interstate natural gas pipelines, for which regulatory authority was transferred to the federal government in the 1940s.

The question for this Article is whether the history surrounding the transfer of regulatory authority over interstate natural gas pipelines can be instructive in planning for the future of the electric grid. This Article shows that that there was a moment in time in the 1940s when natural gas, which for a century had been limited in its commercial use because of lack of transportation from well sites to cities, became a critical energy resource for the entire nation. At that time, Congress responded by creating a federal regulatory process to build the interstate pipeline network necessary to transport this resource after state regulatory authorities had blocked such pipelines.

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This Article then suggests that the electric grid is nearing a crossroads that justifies a similar shift in regulatory authority over the grid, although not necessarily using the same framework Congress created for siting interstate natural gas pipelines. Instead, this Article proposes a regional model for siting interstate transmission lines rather than the purely federal approach used for interstate natural gas pipelines. It sets forth various options for regional siting approaches, including interstate compacts under the Energy Policy Act of 2005 to create separate, regional siting authorities; granting Regional Transmission Organizations ("RTOs") siting authority over interstate transmission lines within their footprints; and federal mandates on state public utility commissions and courts to consider regional benefits and needs in making siting and eminent domain determinations.

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INTRODUCTION

The current regulatory framework for approving long-distance, interstate electric transmission lines does not match the physical aspects of the interstate electric grid, regional electricity markets, or the growing but dispersed renewable energy resources increasingly used to power the grid.[1] Despite the interstate nature of the electric grid and electricity markets, the states have virtually complete authority over the siting and permitting of interstate transmission lines.[2] Continuing state authority over the development of the interstate transmission grid is puzzling when compared to the nation's network of interstate natural gas pipelines, for which regulatory authority was transferred to the federal government in the 1940s.[3] The question for this Article is whether the history surrounding the

[1] *See, e.g.*, BIPARTISAN POLICY CTR., CAPITALIZING ON THE EVOLVING POWER SECTOR: POLICIES FOR A MODERN AND RELIABLE U.S. ELECTRIC GRID 28-33 (2013) (discussing flaws in the existing regulatory regime for siting interstate electric transmission lines); MASS. INST. OF TECH., THE FUTURE OF THE ELECTRIC GRID 77 (2011) (concluding that existing electric transmission line siting procedures are a "significant hurdle" to necessary transmission system expansion and proposing new processes for planning interregional transmission line expansion and cost allocation); Alexandra B. Klass, *Takings and Transmission*, 91 N.C. L. REV. 1079 (2013) (suggesting that states ensure their eminent domain laws governing electric transmission lines reflect their policy goals for expansion of renewable energy use); Alexandra B. Klass & Elizabeth J. Wilson, *Interstate Transmission Challenges for Renewable Energy: A Federalism Mismatch*, 65 VAND. L. REV. 1801 (2012) (suggesting modifications to state-centered electric transmission line siting regimes to recognize the regional and national scope of the electric grid); Ashira Pelman Ostrow, *Grid Governance: The Role of a National Network Coordinator*, 35 CARDOZO L. REV. 1993 (2014) [hereinafter *Grid Governance*] (proposing the creation of a federal "network coordinator" to address electric grid expansion needs rather than a complete transfer of siting authority from the states to the federal government); Jim Rossi, *The Trojan Horse of Electric Power Transmission Line Siting Authority*, 39 ENVTL. L. 1015, 1018-19 (2009) (contending that the problem of cost allocation in transmission line expansion is a bigger problem than restrictive state siting laws); Joel F. Zipp, *Amending the Federal Power Act: A Key Step Toward an "Energy Security and Supply Act of 2009" for the New Administration*, 21 ELECTRICITY J. 6 (2008) (proposing federal legislation that would transfer siting and eminent domain authority over interstate electric transmission lines from the states to the Federal Energy Regulatory Commission).

[2] BIPARTISAN POLICY CTR., *supra* note 1, at 28-33.

[3] *See* Minisink Residents for Envtl. Pres. & Safety v. FERC, 762 F.3d 97, 101-02 (D.C. Cir. 2014) (describing federal process for siting and approving interstate natural gas pipelines under the Natural Gas Act); Klass & Wilson, *supra* note 1, at 1859-61 (discussing Natural Gas Act and natural gas pipeline siting); Robert R. Nordhaus & Emily Pitlick, *Carbon Dioxide Pipeline Regulation*, 30 ENERGY L.J. 85, 88-89 (2009) (providing additional background on the regulatory scheme underlying the Natural Gas Act).

transfer of regulatory authority over interstate natural gas pipelines from the states to the federal government can be instructive regarding how to plan for the future of the electric grid. This Article first concludes that the history of interstate natural gas pipeline siting authority provides a pathway away from state regulation. However, this Article also concludes that in the case of interstate electric transmission lines, a regional approach rather than a purely federal approach is a better match for the physical and market characteristics of the grid as well as modern policy preferences regarding future electricity resources.

This Article shows that there was a moment in time in the 1940s when natural gas, which for a century had been limited in its commercial use because of lack of transportation from well sites to cities, became a critical energy resource for the entire nation. At that time, Congress responded by creating a federal regulatory process to build the interstate pipeline network necessary to transport this resource after state regulatory authorities had blocked such pipelines.[4]

This Article then suggests that the electric grid is nearing a similar crossroads that justifies a similar shift in regulatory authority over the grid, although not necessarily using the same framework Congress created for siting interstate natural gas pipelines. The circumstances that justify such a change in regulatory authority include: (1) the physical nature of the grid which long ago grew from local and state-based origins to a regional, multi-state network that facilitates interstate, wholesale electricity market transactions; (2) the growth of renewable energy, particularly wind energy which is often located far from population centers and can only be transported by interstate transmission lines,[5] in contrast to fossil fuels which can be transported by train, pipeline, truck, or ship throughout the country; (3) the growth of Regional Transmission Organizations ("RTOs") — federally-approved nonprofit entities that manage the transmission of electricity within multi-state regions in many parts of the country, operate wholesale market transactions for electricity, and oversee the planning of transmission grid expansions within their footprints; and

[4] Klass & Wilson, *supra* note 1, at 1859-65. *See generally* Alexandra B. Klass & Danielle Meinhardt, *Transporting Oil and Gas: U.S. Infrastructure Challenges*, 100 IOWA L. REV. 947 (2015) (discussing states' refusal to approve interstate natural gas pipelines and Congress's response).

[5] While some forms of renewable energy, such as rooftop solar and small-scale wind energy can be transported over local distribution lines or a small-scale "micro-grid," such distributed renewable energy resources currently make up only a small portion of total renewable energy use.

(4) developing state and federal clean energy policies such as state renewable portfolio standards and the U.S. Environmental Protection Agency's ("EPA's") 2014 proposed greenhouse gas ("GHG") rule for existing power plants,[6] which has the potential to fundamentally shift the dominant electric energy sources throughout the country in future years toward increased renewable energy.

The purpose of this Article is to show that the physical and market factors that created the current regulatory regime have changed in a manner that is quite similar to the transition that occurred in the natural gas industry many decades ago.[7] This review also suggests that policymakers should consider a regional approach to transmission line siting in addition to a federal approach or the status quo.

Notably, we often pay little attention to the central role the electric grid plays in our lives until it breaks down, at which point modern life as we know it comes to a screeching halt. As described in a 2013 U.S. House of Representatives Report, the nation's electric grid is both a critical asset and highly vulnerable:

> The U.S. bulk-power system serves more than 300 million people and is made up of more than 200,000 miles of transmission lines, and more than 1 million megawatts of generating capacity, and is valued at over $1 trillion. . . . The components of the grid are highly interdependent and, as history has shown, a line outage or system failure in one area can lead to cascading outages in other areas. For example, on August 14, 2003, four sagging high-voltage power lines in northern Ohio brushed into trees and shut off. Compounded by a computer system error, this shut-down caused a cascade

[6] *See Clean Power Plan Proposed Rule*, U.S. ENVTL. PROT. AGENCY, http://www2.epa.gov/carbon-pollution-standards/clean-power-plan-proposed-rule (last visited Feb. 26, 2015).

[7] Issues surrounding the potential means of addressing the inevitable state opposition to reducing state regulatory authority over the siting of interstate transmission lines, and whether principles of federalism support such a change are matters scholars and other experts have explored in earlier work. For a discussion of these issues, see, for example, Klass, *supra* note 1 (arguing that increased federal authority over interstate transmission line siting is desirable but is strongly opposed by many state regulatory authorities); Klass & Wilson, *supra* note 1 (discussing federalism issues in electric grid development); Ostrow, *Grid Governance*, *supra* note 1 (discussing federalism issues in electric grid development); Rossi, *supra* note 1, at 1019 (discussing the historically state-centered approach to regulating electric energy transmission); and Zipp, *supra* note 1, at 6 (proposing legislation that would create a federal regulatory scheme to govern electric transmission projects). These issues will not be addressed in detail here.

> of failures that eventually left 50 million people without power for two days across the United States and Canada. This event, the largest blackout in North American history, cost an estimated $6 billion and contributed to at least 11 deaths.[8]

The Congressional Research Service has expressed similar concerns about the impact of significant weather events, such as Hurricane Sandy in 2012, on the nation's aging electric grid.[9]

Despite the interstate nature of the electric grid and its importance to interstate commerce and national security, states exercise virtually exclusive control over the siting and approval of interstate electric transmission lines. By contrast, the federal government, through the Federal Energy Regulatory Commission ("FERC") controls the siting and approval of interstate natural gas pipelines. The reasons for this are not obvious. Both the electric grid and the interstate natural gas pipeline network are massive, interlinked, interstate energy transportation networks designed to bring energy resources from generation and distribution sites to suppliers and users. But each regulatory system arose during different political and economic times and in response to different constellations of actors, assumptions regarding the scarcity or availability of the energy resource in question, the role of federal and state governments in regulating energy transportation, and varying concerns over monopoly power. Many of these factors with regard to the actors, technologies, resource availability, and economic forces that underlie these regulatory regimes have changed dramatically in the decades that followed their creation.

This Article illustrates how the nation's sources of electricity, the nature of the electric grid itself, and federal and state policies for powering the grid have changed so significantly in recent years that a new regulatory framework for siting interstate transmission lines is needed to address these shifts. Today there are federal and state policies in place to develop wind, solar, and other renewable electricity

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[8] U.S. HOUSE OF REPRESENTATIVES, ELECTRIC GRID VULNERABILITY: INDUSTRY RESPONSES REVEAL SECURITY GAPS 4 (2013).

[9] *See* RICHARD J. CAMPBELL, CONG. RESEARCH SERV., R42923, ELECTRICAL POWER: OVERVIEW OF CONGRESSIONAL ISSUES 8 (2013) ("The recent damage sustained to the electrical grid by Hurricane Sandy in New York and New Jersey and difficulty in restoring electricity service underscore the age and fragility of the power system, and how electricity service might benefit from hardening and modernization of various power systems."). *See generally The Switch: America's Electrical Grid*, BURN: AN ENERGY JOURNAL (June 17, 2013), http://burnanenergyjournal.com/the-switch-americas-electrical-grid/ (documenting a series of stories on the electricity grid, how it works, the players, and what happens when it breaks down).

resources that are located far from population centers in places like Wyoming, North Dakota, South Dakota, rural Texas, and the Mojave Desert. Unlike fossil fuel resources that can be transported to load centers by train, truck, pipeline, or ship, large-scale wind and solar energy can, for now, only be transported through transmission lines. With today's national and regional electric grid, it no longer makes sense for states to be wholly responsible for reviewing and approving long-distance, interstate transmission lines. This Article then concludes that while a centralized, federal framework could address this issue, a regional approach for siting interstate electric transmission lines may be a better match for today's regional electricity grids, markets, and resources. A regional approach for siting interstate transmission lines is possible if states entered into interstate compacts under existing federal law, if Congress granted RTOs siting authority for interstate transmission lines within their footprints, or if Congress required state public utility commissions ("PUCs") and courts to consider regional benefits in siting and eminent domain decisions.

Part I explores the interstate natural gas market and its transportation network. Unlike interstate electric transmission lines, siting and eminent domain authority for interstate natural gas pipelines were transferred from the states to the federal government in the 1940s. Thus, this Part examines the factors that led to this major displacement of state authority in favor of federal authority in order consider its potential application to interstate electric transmission lines.

Part II turns to the creation of the U.S. electric grid and interstate electric transmission markets. It explains how the grid developed from a local, central station model to the regional grids that transport electricity today. It also summarizes briefly the development of state and federal regulation of electricity markets, electric transmission networks, and the siting of interstate electric transmission lines.

Part III details the contours of the modern, regional grid, along with the regional electricity markets that federal law, state law, and market actors have created. It also highlights the significant changes in recent years to the sources of energy used to generate electricity and the impact of those changes on the future of the electric grid. Finally, it describes current interstate transmission projects designed to transport renewable energy, particularly wind energy, in multiple regions of the country, as well as the roadblocks many of these projects are facing in connection with the state siting process.

Part IV then proposes that with regard to transmitting electric energy, the United States is approaching a crossroads similar to the one that existed for natural gas in the 1940s. At that time, cities across the country began to transition away from manufactured gas, which could be created within city limits from a variety of energy sources such as coal and oil, to relying more heavily on natural gas, which required interstate pipelines to transport the gas from distant well sites to population centers. A similar transition is now occurring with regard to renewable electric energy resources, but the fact of this transition has been somewhat masked because we still have ample non-renewable energy resources to rely upon for electricity. Using coal, natural gas, or uranium to generate electricity has historically allowed for multiple means of transporting the energy resources themselves: coal and uranium can be transported by truck and train to power plants near population centers and natural gas can be transported by pipeline to the same destinations. Renewable energy, by contrast, can only be transported through transmission lines and, like natural gas, renewable energy, particularly wind energy, is a locally-constrained resource that is often most abundant far from population centers.

This Part then suggests that a regional approach to siting interstate electric transmission lines may be preferable to the purely federal approach used for interstate national gas pipelines. This is because a regional approach to siting interstate transmission lines better matches the physical dimensions of the electric grid, existing electricity markets, and current electric transmission needs. There are at least three models for siting interstate transmission lines on a regional level. First, states could enter into interstate compacts under the Energy Policy Act of 2005 to create regional siting agencies with permitting authority over interstate transmission lines within those states.[10] Second, Congress could transfer siting authority to RTOs in areas where RTOs exist. Although RTOs are non-governmental organizations and are thus not traditional siting authorities, there is precedent both within and outside of the electricity realm for granting siting authority with federal oversight to such entities where appropriate. Third, Congress could leave siting authority with the states but require state PUCs and state courts to expressly consider regional transmission needs and regional energy needs in making siting and eminent domain decisions.

In suggesting a regional approach to interstate transmission line siting, this Article recognizes that state interests in protecting their own regulatory authority, as well as the politics of today's Congress, make it difficult to envision implementing such an approach in the

[10] Energy Policy Act of 2005, 16 U.S.C. § 824p(i) (2012); *see infra* Part IV.A.

near future. Nevertheless, a major regional or national disruption, like the natural gas shortages on the East Coast in the 1940s, or the 2003 blackouts, which led to the creation of new regulatory bodies to govern the grid, can change political sentiment very quickly.[11] When that day arrives, it will be important to consider a regional approach to interstate transmission line siting that matches today's regional grid and regional electricity resources in additional to a federal approach or the status quo. Indeed, what may seem like a radical approach today may appear inevitable in the future.

I. THE NATURAL GAS TRANSPORTATION NETWORK: HISTORY AND REGULATION

This Part provides a history of the natural gas transportation network with a focus on how the industry's development influenced the regulation of the network of interstate pipelines that transports natural gas across the country.[12] It explains how and why Congress transferred siting and eminent domain authority for interstate natural gas pipelines to the federal government in the early part of the twentieth century. In doing so, this Part provides an example of Congress shifting jurisdiction over siting and eminent domain authority for a major U.S. energy transportation network away from the states in order to meet national energy transportation goals. This example is instructive in considering the potential for similar shifts in siting electric transmission lines discussed in Parts II–IV.

Natural gas seeps have been observed since ancient times.[13] In the early 1800s people knew natural gas springs could produce heat and light, but transportation technology at the time did not permit capturing or transporting the gas long distances for use elsewhere.[14] As a result, throughout the 1800s and into the mid-1900s, cities relied on manufactured gas, or "town gas" for lighting, cooking, and heating.[15] Manufactured gas is similar in chemical composition to

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11 *See infra* notes 40–44 and accompanying text (discussing events leading up to enactment of the Natural Gas Act); *infra* notes 126–28 and accompanying text (discussing the legislative response to the 2003 Northeast blackouts).

12 For a more detailed discussion of the history and regulation of the interstate natural gas pipeline network, see Klass & Meinhardt, *supra* note 4, at 989-1009.

13 *See History*, NATURALGAS.ORG (Sept. 20, 2013), http://naturalgas.org/overview/history/.

14 *See* CHRISTOPHER J. CASTANEDA, INVISIBLE FUEL: MANUFACTURED AND NATURAL GAS IN AMERICA, 1800–2000, at 38 (1999); ARLON R. TUSSING & CONNIE C. BARLOW, THE NATURAL GAS INDUSTRY: EVOLUTION, STRUCTURE, AND ECONOMICS 9-10 (1984).

15 *See* CASTANEDA, *supra* note 14, at 4.

natural gas but has the benefit of being able to be made at any location from coal, oil, wood, or other cheap organic material.[16]

Major natural gas wells were discovered in Ohio in the 1840s but lack of transportation options limited commercial development.[17] By the 1850s only industries and towns located very close to wells could make use of natural gas.[18] Although associated natural gas was discovered with oil in the first U.S. oil boom in Titusville, Pennsylvania in the late 1850s, the gas was simply a nuisance to oil drillers as it caused well blowouts and fires and could not be captured and put to economic use.[19] As a result, when drillers found natural gas deposits without accompanying oil they were usually abandoned.[20]

It was not until 1872 that the first miles of iron pipe were constructed to create the first natural gas transportation in the Pennsylvania Oil Region for the "waste gas" found with the oil.[21] Pittsburgh was the first major city in the United States to use natural gas for industrial purposes on a large scale, made possible by discovery of gas wells in close proximity to the city in the early 1870s.[22] In the 1880s, natural gas companies began forming and developing more gas fields in Pennsylvania, transporting gas to households in nearby municipalities and to local glass and steel plants.[23] Pittsburgh had historically used tremendous amounts of coal to fuel its iron industry and the city's air quality was poor.[24] In the 1880s, the *New York Times* reported that Pittsburgh's adoption of natural gas would improve its air quality.[25] Overall, natural gas offered many benefits over manufactured gas throughout the country, namely, twice as much energy ("Btu") per unit of volume, no poisonous carbon monoxide,

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[16] *See id.*; Richard J. Pierce, Jr., *Reconstituting the Natural Gas Industry from Wellhead to Burnertip*, 25 ENERGY L.J. 57, 60 (2004) (originally published in 9 ENERGY L.J. 1 (1988)).

[17] The same challenge exists today in North Dakota, which is producing massive amounts of natural gas from oil wells, but instead of capturing and making commercial use of the gas, oil well operators are flaring quantities of natural gas worth $100 million per month into the atmosphere because of the lack of sufficient natural gas pipeline infrastructure. *See* Klass & Meinhardt, *supra* note 4, at 1009-15 (discussing natural gas flaring practices by North Dakota oil well drillers).

[18] *See* CASTANEDA, *supra* note 14, at 42.

[19] *See id.*; TUSSING & BARLOW, *supra* note 14, at 9.

[20] *See* CASTANEDA, *supra* note 14, at 42-43.

[21] *See id.* at 43-44; TUSSING & BARLOW, *supra* note 14, at 9.

[22] *See* CASTANEDA, *supra* note 14, at 44-45.

[23] *See id.* at 45.

[24] *See id.* at 44.

[25] *See id.*

and elimination of the soot and sulphur compounds that were emitted from manufactured gas works.[26]

Local availability of lower cost natural gas, with its higher Btu content, encouraged industry to begin using natural gas to manufacture iron, steel, chemical products, and glass on a more widespread basis.[27] By 1885, 150 companies were chartered to sell gas in Pennsylvania and further gas discoveries in Ohio and West Virginia enabled cities in that region to begin using natural gas from nearby wells.[28] Indiana gas fields were discovered in the late 1800s, which increased both demand for and production of natural gas resources.[29] While these eastern gas fields were soon depleted, drillers discovered new gas fields in Oklahoma and Kansas which followed the same boom and bust pattern. From 1880 to 1910, the use and transportation of natural gas expanded nationwide, leading to new natural gas pipeline networks and markets.

In the late 1890s Standard Oil formed the East Ohio Gas Company to produce and deliver gas to customers in Ohio, and Hope Natural Gas Company acquired gas wells in West Virginia.[30] The public was becoming increasingly dependent on natural gas during this period and so states created their own regulatory commissions to regulate intrastate gas pipelines and their rates.[31] In 1918, drillers discovered the huge Panhandle Field in northern Texas, and in 1922, new sources of gas were found in the Mid-Continent Field near the borders of Kansas, Oklahoma, and Texas.[32] Between 1927 and 1931, about twelve major gas transportation systems developed, all over 200 miles long.[33]

By the late 1920s, four public utility holding companies dominated the gas industry, operating as a powerful cartel often referred to as the "Power Trust."[34] During the Depression, shortages and high gas prices, monopoly power, and a reliance on manufactured gas characterized the eastern United States while in Texas, Kansas, Oklahoma, and Louisiana, an oversupply of natural gas remained unconnected to

[26] *See* TUSSING & BARLOW, *supra* note 14, at 28.

[27] *See* CASTANEDA, *supra* note 14, at 49.

[28] *See id.* at 50.

[29] *See id.* at 51.

[30] *See id.* at 71.

[31] *See The History of Regulation*, NATURALGAS.ORG (Sept. 20, 2013), http://naturalgas.org/regulation/history/.

[32] *See* CASTANEDA, *supra* note 14, at 84.

[33] *See* TUSSING & BARLOW, *supra* note 14, at 33.

[34] CASTANEDA, *supra* note 14, at 89-90.

markets.[35] Pressure for greater gas industry regulation grew. Congress directed the Federal Trade Commission ("FTC") to study and report on allegations of discrimination and exercise of monopoly power in the natural gas industry. The FTC report showed that the four holding companies controlled more than 60% of all natural gas produced in 1934 as well as 58% of U.S. pipelines.[36] The FTC found that 40% of gas used in the United States was shipped in interstate commerce and seven million end users consumed it for various purposes in thirty-four states.[37]

The FTC's report resulted in several pieces of legislation, including the Natural Gas Act of 1938, which gave the Federal Power Commission ("FPC") authority to regulate sales of natural gas for resale in interstate commerce, transportation of natural in interstate commerce, and facilities used for such sales and transportation.[38] The Natural Gas Act created a process where a proposed interstate natural gas pipeline could obtain a Certificate of Public Convenience and Necessity from the FPC — now FERC — after a review of the economic and environmental impacts of the pipeline.[39]

After World War II, major northeast cities shifted quickly from manufactured gas to natural gas when southwestern natural gas arrived via long-distance pipelines.[40] But the existing pipelines could not meet the growing demand and state governments, the coal industry (a source of manufactured gas), and railroad interests blocked efforts to construct new pipelines in Pennsylvania.[41] Landowners in other states also blocked pipeline efforts. Natural gas shortages during the winter of 1946–1947 resulted in nearly 50,000 workers being laid off from jobs, and raised alarms in Congress.[42]

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[35] *See id.* at 103-04 (noting that many pipelines carried less than 50% of their capacity because of low demand or lack of reliable supplies while in Texas trillions of cubic feet of natural gas were vented as drillers were only interested in the oil from the wells and not the associated gas); M. ELIZABETH SANDERS, THE REGULATION OF NATURAL GAS: POLICY AND POLITICS, 1938–1978, at 24 (1981).

[36] CASTANEDA, *supra* note 14, at 107.

[37] *Id.*

[38] *See, e.g.*, 15 U.S.C. § 717c (2012) (stating pipeline rates must be just, reasonable, and not unduly discriminatory and subject to federal agency oversight).

[39] *See* 15 U.S.C. § 717f(c)–(h) (2012); Minisink Residents for Env't Pres. & Safety v. FERC, 762 F.3d 97, 101-02 (D.C. Cir. 2014) (describing federal process for siting and approving interstate natural gas pipelines under the Natural Gas Act); Klass & Wilson, *supra* note 1, at 1859-60.

[40] *See* CASTANEDA, *supra* note 14, at 132.

[41] *Id.*

[42] *Amendments to the Natural Gas Act: Hearings on H.R. 2185, H.R. 2235, H.R. 2292, H.R. 2569, and H.R. 2956 Before the H. Comm. on Interstate & Foreign Commerce*, 80th

During subsequent debates, House members heard testimony regarding the workers laid off during gas shortages, the rapid depletion of gas storage fields during the winter, and the industries that could not meet production commitments.[43] In 1947, Congress enacted new legislation granting federal eminent domain authority to any interstate natural gas pipeline holding a certificate of public convenience and necessity under the Natural Gas Act.[44]

In 1948, Philadelphia became the first major eastern city to convert from manufactured gas to natural gas and receive gas by long-distance pipelines from the southwest.[45] Between 1950 and 1956, five pipelines of 1,000 miles or more were built from the Gulf Coast to northern and eastern markets.[46] As the Panhandle and Mid-Continent Fields continued producing natural gas, pipeline companies tripled and quadrupled their capacity by the 1980s.[47] While Congress and FERC have experimented over the years with more and less regulation of the natural gas industry, federal permitting and eminent domain authority over interstate natural gas pipelines has remained constant.

Until recently, natural gas was used primarily for heating rather than electricity because of its high price as compared to coal and other baseload electricity resources.[48] The shale gas revolution that begin in approximately 2007, however, has caused gas prices to fall significantly in the United States, allowing natural gas to replace coal as a source of baseload electricity in many parts of the country.[49] There are significant air emission benefits associated with burning natural gas for electricity as opposed to coal in the form of significant

Cong. 46 (1947) (statement of Simeon Willis, Governor of Kentucky) [hereinafter *Amendments to the Natural Gas Act Hearings*]. Committee members heard testimony regarding the approximately 49,000 workers laid off during gas shortages, *id.* at 620 (statement of James W. Haley, Attorney, National Coal Association), the rapid depletion of gas storage fields during winter, *id.* at 186 (statement of John Siggins, Jr., Chairman, Pennsylvania PUC), and the industries that could not produce or purchase necessary materials, including a pipeline company that could not expand its capacity because it had reduced its gas deliveries to the company that manufactured the needed pipe, *id.* at 183-84.

43 *See id.* at 183-84, 186 (Statement of John Siggins, Jr., Chairman, Pennsylvania PUC); *id.* at 188 (statement of William A. Daugherty, Attorney); *id.* at 620 (statement of James W. Haley, Attorney, National Coal Association).

44 CASTANEDA, *supra* note 14, at 139; *see* Natural Gas Act Amendments, Pub. L. No. 80-245, 61 Stat. 459 (1947).

45 *See* CASTANEDA, *supra* note 14, at 139-40.

46 *See* TUSSING & BARLOW, *supra* note 14, at 46.

47 *See id.*

48 LINCOLN DAVIES ET AL., ENERGY LAW AND POLICY 125-27 (West Acad. Publ'g 2015).

49 *See infra* Part III.B (discussing energy sources used for electricity).

reduced emissions of pollutants such as mercury, SO_2 and CO_2.[50] Nevertheless, many energy policy experts remain concerned about the nation becoming too dependent on natural gas for electricity generation because of GHG emissions associated with the hydraulic fracturing process itself and adverse impacts of natural gas use on continued renewable energy development.[51]

There are currently about 2.6 million miles of interstate and intrastate natural gas pipelines in the United States.[52] These include almost 200,000 miles of gathering pipelines in the country; these lines collect gas from production areas and transport it to processing facilities where it is then sent to transmission pipelines after the refining process.[53] As of 2007, interstate pipelines carried 81% of the natural gas in the United States to local distribution companies for retail sale to customers.[54] A majority of the country's gas thus flows in pipelines subject to FERC's regulation regarding construction, rates, and terms of service.

Between 2000 and 2011, pipeline companies applied for and received FERC approval for more than 16,000 miles of interstate gas pipelines, 14,600 miles of which had been constructed and put in service by 2011.[55] In order to expedite the permitting process, the Energy Policy Act of 2005 ("EPAct 2005") created an optional pre-filing procedure and made FERC the lead agency responsible for coordinating federal agency authorizations and compliance with the National Environmental Policy Act ("NEPA") during pipeline certificate application reviews.[56] An Executive Order was also issued in

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[50] *See, e.g.*, DAVIES ET AL., *supra* note 48, at 126-27 (describing environmental benefits and costs of electricity produced by natural gas); Press Release, Nat'l Oceanic & Atmospheric Admin., New Study: U.S. Power Plant Emissions Down (Jan. 9, 2014), *available at* http://www.esrl.noaa.gov/csd/news/2014/148_0109.html (reporting on new study showing shift from coal-fired power to natural gas-fired power for electricity has resulted in a reduction of pollution associated with power plants).

[51] *See, e.g.*, Matthew L. Wald, *The Potential Downside of Natural Gas*, N.Y. TIMES, June 3, 2014, at B3 (presenting problems associated with increased use of natural gas for generating electricity).

[52] *See* U.S. GOV'T ACCOUNTABILITY OFFICE, GAO-13-221, PIPELINE PERMITTING: INTERSTATE AND INTRASTATE NATURAL GAS PERMITTING PROCESSES INCLUDE MULTIPLE STEPS, AND TIME FRAMES VARY 4 (2013).

[53] *See id.*

[54] *See* CTR. FOR CLIMATE & ENERGY SOLUTIONS, U.S. NATURAL GAS INFRASTRUCTURE 3 (2012).

[55] INTERSTATE NATURAL GAS ASS'N OF AM. FOUND., NORTH AMERICAN NATURAL GAS MIDSTREAM INFRASTRUCTURE THROUGH 2035: A SECURE ENERGY FUTURE 8-9 (2011).

[56] *See* Energy Policy Act of 2005, 15 U.S.C. § 717n (2012); PAUL W. PARFOMAK, CONG. RESEARCH SERV., R43138, INTERSTATE NATURAL GAS PIPELINES: PROCESS AND

2012 to "institutionalize best practices and reduce the amount of time required to make permitting and review decisions for infrastructure projects, including pipelines."[57] A 2013 Congressional Research Service report noted that federal and state agencies have attempted to be responsive to the shale gas boom, and that twice as much transmission capacity was added to the U.S. pipeline network in 2008 as in 2007.[58] The same report cited statistics showing that most interstate natural gas pipelines can move from the pre-filing stage to certificate within twelve months.[59]

II. THE ELECTRICITY TRANSPORTATION NETWORK: HISTORY, REGULATION, AND CURRENT CHALLENGES

This Part turns from the natural gas transportation network to the electricity transportation network. It begins with Thomas Edison and the construction of the first transmission lines. It then describes the development of the early electric grids and electric utilities, state and federal electricity regulation, and the regulatory regime governing the siting and approval of interstate transmission lines. Thus, this Part sets the stage for Part III, which explores the new demands placed on the grid by policies encouraging the use of renewable energy as well as the new regional grid actors, such as RTOs, that have fundamentally transformed grid planning, management, and operation in many parts of the country.

A. The First Electric Grids and the Rise of Electric Utilities

In the United States, Thomas Edison started working on the incandescent bulb in 1877, joining a group of inventors already developing a power supply that would be economical and steady.[60] Edison ultimately succeeded in creating a lighting system that would operate in a central station, sending electricity through wires and switches to incandescent bulbs.[61] After a period of testing and

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TIMING OF FERC PERMIT APPLICATION REVIEW 2 (2015).

[57] U.S. GOV'T ACCOUNTABILITY OFFICE, *supra* note 52, at 30 (citing Exec. Order No. 13604, 77 C.F.R. 18887 (2012)).

[58] *See* PARFOMAK, *supra* note 56, at 8 & fig.2.

[59] *See* PARFOMAK, *supra* note 56, at 7-9. For a discussion of some of the safety issues associated with the build-out of oil and gas pipelines as a result of the shale oil and gas "revolution," see Klass & Meinhardt, *supra* note 4.

[60] *See* ERNEST FREEBERG, THE AGE OF EDISON: ELECTRIC LIGHT AND THE INVENTION OF MODERN AMERICA 29 (2013).

[61] *See id.* at 43.

formulation, Edison identified 1,500 potential future customers who were burning coal-gas in about 20,000 lamps, mapped out routes for ditches and switches,[62] and carefully studied the existing gas infrastructure, as he planned to use abandoned gas pipelines to carry electrical wires to homes and replace gaslights with electric fixtures.[63] In 1879, San Francisco became the first city in the world to install a centralized electric generating station to distribute electricity to power arc lamps at different points in the city,[64] and in 1880, New York lit almost a mile of Broadway with twenty-three lights.[65] Electric companies usually installed a town's entire street lighting system at their own expense in order to enter into potentially lucrative municipal contracts.[66]

The introduction of single-phase alternating current ("AC") and transformers in the late 1880s would change the movement of electricity and the extent of electric utility service.[67] George Westinghouse, the famous industrialist who drilled for natural gas in his Pittsburgh backyard, collaborated with other inventors and built on earlier developments to create the modern transformer.[68] The transformer allowed voltage to be increased ("stepped up") as it left the generator, and to be decreased ("stepped down") to low voltage at the end of a long transmission line.[69] Westinghouse recognized that with AC, he might ship electricity over long distances to factories and homes. In this way, power could be used for many purposes beyond than incandescent lighting[70] and generating stations with their accompanying smoke and noise could be located closer to fuel sources[71] and further from customers.[72]

Direct current ("DC") had been Edison's preferred method of transmitting electricity, but DC had significant limitations.[73] After his

62 JILL JONNES, EMPIRES OF LIGHT: EDISON, TESLA, WESTINGHOUSE, AND THE RACE TO ELECTRIFY THE WORLD 77 (2003).

63 *See* CASTANEDA, *supra* note 14, at 60.

64 DAVID J. MUCHOW & WILLIAM A. MOGEL, ENERGY LAW AND TRANSACTIONS § 81.01[1] (2014).

65 *See* FREEBERG, *supra* note 60, at 48.

66 *See id.* at 61.

67 *See* CHARLES DAVID JACOBSON, TIES THAT BIND: ECONOMIC AND POLITICAL DILEMMAS OF URBAN UTILITY NETWORKS, 1800–1990, at 79 (2000).

68 JONNES, *supra* note 62, at 132.

69 *Id.*

70 *Id.* at 132-33.

71 *Id.* at 135-36.

72 JACOBSON, *supra* note 67, at 79.

73 JONNES, *supra* note 62, at 133-36. At that time, DC over 1,000 volts was taken

initial success with AC, Westinghouse strung three miles of wire between Pittsburgh and East Liberty to test the system.[74] The company's first customer was a Buffalo, New York department store.[75] Twenty-seven new customers in various locations placed orders for service soon after that,[76] and after one year in business, Westinghouse Electric Company had sixty-eight AC central stations under contract or completed.[77] Developments such as the commercial introduction of competitive AC motors made it increasingly apparent that AC was more than a temporary threat to DC, and Edison Electric Company ultimately merged with a successful AC firm to become the General Electric Company in 1892.[78] The period between 1893 and 1903 witnessed increasing use of AC, which allowed transmission distances to jump from two miles to over 100 miles.[79] In 1896 Westinghouse transmitted 11,000 volts from the new hydroelectric generating plant at Niagara Falls to Buffalo, New York across a line spanning twenty-two miles.[80] Long-distance hydroelectric power transmission began in California in the 1890s.[81]

The introduction of AC and long-distance transmission encouraged the consolidation of electric utilities.[82] In Philadelphia in 1895, there were more than twenty electric companies operating technologically incompatible systems that used varying voltage and AC at different frequencies.[83] By 1902, the Philadelphia Electric Company had consolidated all of the city's neighborhood companies into one utility.[84] Companies that consolidated prospered from "increased reliability, economies of scale, fuel cost differentials and [ability to

from generators and transmitted over longer distances (which was possible because of the higher voltage) and then transferred into a series of batteries. After the batteries charged, they were disconnected and reconnected in parallel, which created a low voltage that the distribution network could handle. THOMAS P. HUGHES, NETWORKS OF POWER: ELECTRIFICATION IN WESTERN SOCIETY, 1880–1930, at 85 (1983). AC transmission would eventually replace the use of storage battery substations. *Id.*

74 JONNES, *supra* note 62, at 136.

75 *Id.* at 137.

76 *Id.*

77 *Id.* at 144.

78 RICHARD F. HIRSH, POWER LOSS: THE ORIGINS OF DEREGULATION AND RESTRUCTURING IN THE AMERICAN ELECTRIC UTILITY SYSTEM 13 (1999).

79 MUCHOW & MOGEL, *supra* note 64, § 81.01[1].

80 HIRSH, *supra* note 78, at 13; MUCHOW & MOGEL, *supra* note 64, § 81.01[1].

81 HUGHES, *supra* note 73, at 265.

82 MUCHOW & MOGEL, *supra* note 64, § 81.01[1].

83 *Id.*

84 *Id.*

manage] peak loads."[85] In 1905, California Gas & Electric incorporated as Pacific Gas & Electric, and by 1906 had grown through a series of mergers and acquisitions to include ten hydroelectric plants, interconnecting transmission lines, two long-distance transmission lines to the San Francisco Bay area, and gas and electric utilities that distributed power to customers in cities including San Jose, Oakland, Berkeley, and San Francisco.[86] Between 1882 and 1905, Chicago had granted electric companies twenty-nine charters for nonexclusive franchises, and outlying towns granted eighteen charters during the same years, hoping to spur competition and lower service costs.[87] Samuel Insull — the man credited with "founding the business of centralized electric supply" — saw the potential in combining AC and steam turbines to produce massive quantities of power,[88] but he would need a large and varied customer base to make it profitable. Insull instructed General Electric to build a 5,000-kilowatt turbine — a huge generating capacity for the time — and installed it in 1903 at the Chicago Edison Company where Insull was president.[89] He bought out competitors, merged their equipment with his own, and promoted electricity consumption at different times of the day to produce cheaper electricity (which further attracted customers), enlarging to become Commonwealth Edison.[90] As other electric companies followed Insull's approach in the early decades of the 1900s, cities like New York and Detroit were eventually served by monopolies rather than competitive power markets.[91]

By the 1890s, towns were building their own waterworks, and many thought they should be the entity to provide electricity to their citizens as well.[92] Public officials began comparing lighting bills and were angry to find that customers were paying dramatically different prices.[93] City governments sometimes engaged in "municipalization," where they purchased the assets of utility companies and operated

85 *Id.* § 81.01[2].

86 HUGHES, *supra* note 73, at 276.

87 HIRSH, *supra* note 78, at 14.

88 *Id.* at 13. Invented in 1884 in England, steam turbines work by high-pressure steam pushing against blades that are attached to and turn a shaft, creating a rotating motion that powers a generator. *Id.* In 1911 12,000 kW units replaced Insull's smaller turbine, allowing Commonwealth Edison to see electricity throughout Chicago and the surrounding area. *Id.*

89 *Id.*

90 *Id.* at 13-14.

91 *Id.* at 14.

92 FREEBERG, *supra* note 60, at 196.

93 *Id.* at 197.

them, or built their own utility service and forced private utilities to sell.[94] In some places it worked: the mayoral candidate of Detroit ran on the issue in 1889, won, and established municipal ownership of the power plant and streetlight network in 1895.[95] The annual cost to run each streetlight went from $132 to $87 in 1898.[96] Municipal ownership became a popular idea,[97] gaining strength so that by the 1912 presidential election, public ownership of electric utilities was an issue of importance to voters.[98] Between 1910 and 1920, some Midwestern cities' voters opted to make their electric utility companies municipally owned and operated.[99] But even at the apex of this movement, municipalities did not run the majority of electric utilities.[100] The threat that a local government might take over electric service did cause private utilities to become more amenable to regulation, as a better alternative to losing the market altogether.[101]

B. State and Federal Regulation of Public Utilities and Grid Expansion

During the 1920s, vertically integrated public utilities constructed intrastate and interstate transmission lines to serve customers in their in-state territories. As a consequence of the growing efficiencies in the electric industry from 1900 to the 1930s, small public and private

[94] HIRSH, *supra* note 78, at 14. In 2013, Boulder, Colorado began the process of municipalizing its electricity system and taking over transmission lines and other facilities from Xcel Energy in order to rely more heavily on renewable energy instead of fossil fuels. *See* Herman K. Trabish, *A Utility in the Making: The Municipalization of Boulder, Colorado*, UTILITY DIVE, Aug. 27, 2014). Xcel Energy filed a lawsuit against the city to block the municipalization process in 2014. *See* Brian Holton Henderson, *The Future of Public Power*, HUFFINGTON POST, http://www.huffingtonpost.com/brian-holton-henderson/the-future-of-public-powe_b_5501074.html (last updated Aug. 17, 2014, 5:59 AM EDT).

[95] HIRSH, *supra* note 78, at 14.

[96] *Id.*

[97] FREEBERG, *supra* note 60, at 196.

[98] BILL BECK, INTERCONNECTIONS: THE HISTORY OF THE MID-CONTINENT AREA POWER POOL 3 (1988).

[99] *Id.*

[100] FREEBERG, *supra* note 60, at 199. In 1902 there were 815 municipal power companies and more than 1,000 by 1907, comprising 30% of electricity providers in the United States. HIRSH, *supra* note 78, at 14-15. As of 2014, the percentage of total electricity sold by the various types of power providers was as follows: investor-owned utilities (68.5%), publically owned utilities (14.4%), electric cooperatives (12.8%), federal power agencies (less than 1%), and power marketers (4.3%). AM. PUB. POWER ASS'N, 2014–15 ANNUAL DIRECTORY & STATISTICAL REPORT 26, *available at* http://www.publicpower.org/files/PDFs/USElectricUtilityIndustryStatistics.pdf.

[101] FREEBERG, *supra* note 60, at 199.

power companies merged with, purchased power from, or were acquired by larger private utility companies.[102] By the late 1920s, the sixteen largest electric power private holding companies, which often owned a number of electric utilities in various jurisdictions, controlled more than 75% of all U.S. generation.[103] States' PUCs began to regulate utility rates in exchange for grants to utilities of exclusive service territories. In this way, states, generally with the support of the utilities they regulated, created the rate-regulated, natural monopoly framework in electricity that continues to exist in most states today.[104]

Also in the 1920s, utilities continued to seek economies of scale and worked together to integrate their systems by constructing interstate transmission lines and creating the start of the regional grids that exist today. When states attempted to regulate those interstate electricity sales, the Supreme Court held that such regulation violated the dormant Commerce Clause, creating a regulatory gap known as the "*Attleboro* gap" after the primary Supreme Court decision restricting state regulation.[105] In 1935, Congress filled that gap by enacting the Federal Power Act ("FPA") granting FERC's predecessor, the Federal Power Commission ("FPC"), exclusive authority to regulate the transmission of electricity in interstate commerce and the wholesale sale of electricity in interstate commerce.[106] The law left the regulation of retail electricity transactions to the states as well as the siting of interstate and intrastate transmission lines.[107]

102 HUGHES, *supra* note 73, at 391-92; MUCHOW & MOGEL, *supra* note 64, § 81.01[1]–[2].

103 HUGHES, *supra* note 73, at 391-92; JOSEPH P. TOMAIN & RICHARD D. CUDAHY, ENERGY LAW IN A NUTSHELL 372 (West 2d ed. 2011) (describing industry consolidation).

104 DAVIES ET AL., *supra* note 48, at 308-12, 317-18. Beginning in the 1990s, many states "restructured" their regulated utilities by splitting the formerly vertically integrated utility functions of generation, transmission, and distribution, and attempted to create markets and competition for generation and distribution within the state. Today, about half the states have some market competition for electricity services. *See id.* at 428-29.

105 *See* New York v. FERC, 535 U.S. 1, 5-8 (2002) (describing *Attleboro* gap and Congress's subsequent enactment of the Federal Power Act to fill that gap by authorizing federal regulation of interstate wholesale sales of electricity and transmission of electricity in interstate commerce); Pub. Utils. Comm'n v. Attleboro Steam & Elec. Co., 273 U.S. 83, 89 (1927).

106 *See* Federal Power Act, 16 U.S.C. § 824 (2012); *New York v. FERC*, 535 U.S. at 5-8.

107 *See* Federal Power Act, 16 U.S.C. § 824; *New York v. FERC*, 535 U.S. at 5-8; *see also* Brief of Amici Curiae the Honorable Joseph T. Kelliher et al. in Support of Petition for Writ of Certiorari at 14, Edison Elec. Inst. v. Piedmont Envtl. Council, 558 U.S. 1147 (2010) (No. 09-343), 2009 WL 3420493 [hereinafter Kelliher Amici Brief] ("In 1935, electricity delivery was essentially local in nature, and it is thus not

The FPC and FERC used their Congressional authority over wholesale electricity sales and transmission of electricity in interstate commerce to issue a series of orders to ensure reasonable rates and non-discrimination in wholesale electricity markets and transmission access.[108] Congress provided additional authority to FERC to pursue these goals in the Public Utility Regulatory Policies Act of 1978 ("PURPA"), which allowed independent electricity producers with "qualifying" facilities access to the power grid and to make electricity sales.[109] Then, in the Energy Policy Act of 1992, Congress authorized FERC to require utilities to provide access to transmission services on an open and non-discriminatory basis and to encourage transmission planning by RTOs, states, and utilities.[110]

Today, RTOs and Independent System Operators ("ISOs") manage the grid and regional markets for wholesale power in many, but not all, states.[111] In the regions where RTOs and ISOs have formed, those entities engage in regional grid planning, working with public utilities, states, and other grid participants. Despite the move to regional grid planning in parts of the country where RTOs exist, Congress has left the actual permitting, siting, and eminent domain authority for interstate transmission lines with the states, subject to a few exceptions detailed below. In many ways, this is not surprising. Electricity began as a localized resource and, unlike natural gas, which has always required interstate pipelines to transport the energy resource to customers, traditional electricity resources such as coal, natural gas, and uranium did

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surprising that the Federal Power Act did not provide for federal transmission siting by the Federal Power Commission, the predecessor agency to the FERC. Instead, Congress reserved siting of transmission facilities to the states.").

108 *See* Midwest ISO Transmission Owners v. FERC, 373 F.3d 1361, 1363-65 (D.C. Cir. 2004) (describing FERC orders and amendments to the FPA). FERC jurisdiction over wholesale electricity sales and the transmission of electricity in interstate commerce extends to non-retail electricity sales and transmission throughout the country except for the states of Texas, Alaska, and Hawaii, which are not connected to the interstate grid and thus do not transmit electricity in interstate commerce. *See* Klass, *supra* note 1, at 1098-99 (discussing FERC regulation of transmission of electricity in interstate commerce); Klass & Wilson, *supra* note 1, at 1843-44 (discussing Texas's lack of connection to rest of U.S. grid and lack of FERC jurisdiction over Texas electricity sales and transmission); *New York v. FERC*, 535 U.S. at 6-8 (discussing single-state grids in Hawaii, Alaska, and Texas).

109 *See* DAVIES ET AL., *supra* note 48, at 481-83 (discussing PURPA).

110 *See New York v. FERC*, 535 U.S. at 9; DAVIES ET AL., *supra* note 48 at 173-74, 393 & n.1, 394-96; Klass & Wilson, *supra* note 1, at 1814-25 (summarizing key statutes and FERC orders).

111 *See infra* Part III.

not need transmission lines for long-distance transportation.[112] Instead, utilities could transport these energy resources by train, truck, or pipeline to local or regional power plants, which could then convert these energy resources into electricity, and deliver that electricity to customers on local transmission lines. But as states and utilities attempt to increase the percentages of renewable energy in their electricity mix, the grid begins to resemble the interstate natural gas pipeline network prior to the 1940s, with all its state-based limitations, before Congress transferred siting and eminent domain authority to the federal government.

C. State Siting and Eminent Domain Authority for Transmission Lines

As noted above, although FERC has jurisdiction over wholesale power sales in interstate commerce and transmission of electricity in interstate commerce, states retain jurisdiction over retail electricity sales and the siting, approval, and grant of eminent domain authority for virtually all transmission lines, including interstate transmission lines.[113] This stands in contrast to the regulatory structure for interstate natural gas pipelines.[114] As a result, a utility or other transmission operator that wishes to build an interstate transmission line must obtain siting permission and eminent domain authority from all of the states in the line's path, usually through the state PUCs, and follow each state's permitting process and standards.[115] In some states, transmission operators must also obtain approval from counties and other local governmental entities before constructing a line.[116] The transmission siting laws in each state vary, but generally require the transmission operator (whether a public utility or a private transmission company) to establish the "need" for the line, the effect of the line on reliability, alternatives to the proposed line, and the potential environmental impacts of the line.[117] If successful, the transmission operator receives a "Certificate of Need" or a "Certificate of Public Convenience and Necessity."[118]

In virtually all states, once a transmission operator receives its certificate, it can exercise the power of eminent domain if it fails to

[112] *See* Klass & Wilson, *supra* note 1, at 1805-08, 1811-12 (discussing growth of the transmission grid and challenges associated with transmitting renewable energy).

[113] Klass, *supra* note 1, at 1101-02.

[114] *See supra* Part I; *see also* Klass & Meinhardt, *supra* note 4, at 953-89.

[115] Klass, *supra* note 1, at 1101-02.

[116] *Id.* at 1101 & n.134.

[117] *Id.* at 1102.

[118] *Id.*

reach voluntary agreements with all landowners for the required easements.[119] Generally, states define transmission lines as a "public use," which allows the use of eminent domain under both the Fifth Amendment to the U.S. Constitution as well as state constitution with similar provisions that allow the taking of private property for a public use upon payment of just compensation.[120] In a few states, public utility and/or private transmission operators can exercise eminent domain authority without first obtaining a certificate.[121] Some states allow public utilities, but not private transmission operators, to exercise eminent domain authority under the theory that such privately built lines are not a "public use."[122]

The problem with individual states determining whether there is a "need" for an interstate transmission line or whether the line is a public use is that a single state legislature, PUC, or court will necessarily focus on the need of the citizens of its own state.[123] In most states, interstate transmission lines provide regional or national benefits that may overshadow any in-state benefits. This is particularly true for long-distance transmission lines designed to bring wind energy from one state to population centers several states away without any on-ramps or off-ramps in between. What is the benefit or public use to the states in between who will not see lower electricity rates, increased clean energy use in the state, or new markets for their own generation resources? While such states may see improved grid reliability because the new line will benefit the grid as a whole, that

119 *Id.* at 1123, app. A.

120 *Id.* at 1089, 1102-03.

121 *Id.* app. A.

122 *Id.* at 1123-26, app. A.

123 *See, e.g.*, BIPARTISAN POLICY CTR., *supra* note 1, at 28-33 (noting that some states may reject projects that do not directly benefit them); MASS. INST. OF TECH., *supra* note 1, at 77 (finding that "current siting procedures are biased against approving interstate transmission projects and are a significant hurdle to efficient transmission expansion."); Klass, *supra* note 1, at 1135-36 ("[T]he problem with a single state determining whether an interstate transmission line is a public use . . . is that a single state legislature or state court must focus primarily on the citizens of its own state."); Klass & Wilson, *supra* note 1, at 1827-31 ("Leaving siting authority for interstate transmission lines exclusively within state (and sometimes even local) authority causes significant problems because, for the most part, states consider only in-state benefits in their siting determinations . . . ."); Ostrow, *Grid Governance*, *supra* note 1, at 2023 (some states "focus exclusively on intrastate benefits" to "determine whether a proposed project is in the public interest"); Rossi, *supra* note 1, at 1019 (explaining how states' self-interests affect need determinations); Zipp, *supra* note 1 (stressing the need for comprehensive regional plans that can stretch across state lines and borders).

may be little consolation when weighed against the physical impacts to private lands, views, and natural resources caused by the line.

Although state law governs the vast majority of interstate transmission line approvals, there are some circumstances where federal law rather than state law controls the siting and approval of transmission lines. However, such authority is quite limited geographically and does little to address the poor "fit" between state regulatory siting authority for transmission lines and the regional scale of the transmission grid and electricity markets.

First, the federal government has plenary authority over siting transmission lines on federal lands, which make up a significant percentage of land in many western states, although only a very small percentage of land in the rest of the country.[124] The FPA also provides limited authority to construct transmissions lines to connect federally permitted hydropower facilities to the existing grid.[125]

Beyond such projects on federal land or for federal hydropower projects, Congress created limited federal siting authority to address transmission congestion in section 1221 of the Energy Policy Act of 2005 ("EPAct 2005") in response to the 2003 Northeast blackouts.[126] In section 1221 of EPAct 2005, Congress directed the U.S. Department of Energy ("DOE") to conduct transmission congestion studies every three years to identify areas of the country experiencing transmission constraints or congestion.[127] The DOE may formally designate those areas as National Interest Electric Transmission Corridors ("NIETCs") and, once an area receives a NIETC designation, FERC may exercise "backstop" siting authority if a state declines to approve a line within a NIETC.[128] However, decisions by the federal courts of appeal have significantly limited DOE and FERC's authority in this area, and the statutory provisions have not resulted in a single federal approval of a transmission line.[129]

[124] Klass & Wilson, *supra* note 1, at 1825-27. For a map showing the significant variation in percentage of federal lands in the fifty states, see CHRISTINE A. KLEIN, FEDERICO CHEEVER & BRET C. BIRDSONG, NATURAL RESOURCES LAW 36 (3d ed. 2013).

[125] 16 U.S.C. § 797(e) (2012) (FERC's hydropower licensing authority includes siting authority over related transmission lines); James J. Hoecker & Douglas W. Smith, *Regulatory Federalism and Development of Electric Transmission: A Brewing Storm?*, 35 ENERGY L.J. 71, 82 (2014).

[126] *See* DAVIES ET AL., *supra* note 48, at 461-64.

[127] Klass & Wilson, *supra* note 1, at 1816-17.

[128] *Id.* at 1816-19 (discussing EPAct 2005).

[129] *See* Cal. Wilderness Coal. v. U.S. Dep't of Energy, 631 F.3d 1072, 1107 (9th Cir. 2011) (invalidating DOE's NIETCs in the Southwest and Mid-Atlantic regions for failure to adequately consult with affected states in making NIETC designations);

In one significant decision, *Piedmont Environmental Council v. FERC*,[130] the U.S. Court of Appeals for the Fourth Circuit held that language in EPAct 2005 granting FERC transmission line permitting jurisdiction when a state commission has "withheld approval [of a permit application] for more than 1 year" did not include situations where a state commission had denied a transmission line application.[131] Instead, the court held that FERC's authority was limited to circumstances where the state commission did not have authority to act or acts inappropriately by including "project-killing" conditions on the permit.[132]

This major limitation on FERC's ability to site transmission lines in areas experiencing congestion prompted a dissent from Judge Traxler, who cited the circumstances leading up to EPAct 2005 and some of the legislative history that supported a broader reach of FERC siting authority.[133] He focused first on the shift since the enactment of the FPA in the 1930s from electricity being produced, transmitted, and consumed in the same general geographic area to today's long-distance, interstate transmission grid.[134] He then cited a 2002 DOE report warning that construction of new transmission lines has been unable to keep up with electricity demand, which has created bottlenecks that have increased consumer costs and the chances of blackouts.[135] That report went on to recommend that FERC should be authorized to act "if state and regional bodies are unsuccessful in siting and permitting national interest transmission lines."[136] Judge Traxler also cited to statements by Senate Energy and Natural Resource Committee Chairman Domenici that reflected the same concerns contained in the 2002 Department of Energy report.[137] But

Piedmont Envtl. Council v. FERC, 558 F.3d 304, 313 (4th Cir. 2009), *cert. denied*, 558 U.S. 1147 (2010).

130 *Piedmont Envtl. Council*, 558 F.3d 304.

131 *Id.* at 310, 313-14 (quoting Federal Power Act § 216(b)(1)(C)(i), 16 U.S.C. § 824p (2006)) (internal quotation marks omitted).

132 *Id.* at 313-14.

133 *Id.* at 320, 325-26 (Traxler, J., concurring in part, dissenting in part).

134 *Id.* at 320-21.

135 *Id.* at 321.

136 *Id.* (quoting U.S. DEP'T OF ENERGY, NATIONAL TRANSMISSION GRID STUDY 58-59 (2002), *available at* http://www.ferc.gov/industries/electric/indus-act/transmission-grid.pdf); *see also* Kelliher Amici Brief, *supra* note 107, at 21-26 (citing legislative history supporting argument that Congress intended to grant FERC authority to override state agency denials of transmission line permits to address the changing needs of the interstate transmission grid such as grid reliability and to promote development of renewable energy resources).

137 *See Piedmont Envtl. Council*, 558 F.3d at 321.

the majority did not agree with this analysis and thus, despite the fact that Congress and federal agencies completed studies similar to those done in 1940s for interstate natural gas pipelines, EPAct 2005 has not resulted in any real shift of transmission siting authority away from the states.

Finally, under a separate provision of EPAct 2005, Congress has granted two of the four federal power marketing administrations — the Western Area Power Administration ("WAPA") and the Southwestern Power Administration ("SWPA")[138] — authority to design, develop, construct, or operate a new electric power transmission project within any state in which WAPA or SWPA operates if the Secretary of Energy determines that such project will reduce congestion of electricity transmission, is necessary to accommodate increased demand for electric transmission capacity, and meets other requirements.[139] This statutory authority also allows WAPA and SWPA to participate with other entities in designing, constructing, or operating such projects, therefore facilitating public-private collaboration on transmission lines.[140] Notably, existing case law has held that electric transmission lines proposed by federal power administrations need not comply with state siting requirements or obtain state siting permits and may take private property using federal eminent domain authority.[141] Thus, there is the potential for private parties seeking to construct transmission lines in states where WAPA and SWPA operate to work with those power marketing

[138] "Four federal Power Marketing Administrations (PMAs) operate electric systems and sell the electrical output of federally owned and operated hydroelectric dams in 33 states." *Federal Power Marketing Administrations Operate Across Much of the United States*, U.S. ENERGY INFO. ADMIN. (June 12, 2013), http://www.eia.gov/todayinenergy/detail.cfm?id=11651. They are the Bonneville Power Administration ("BPA"), the Western Area Power Administration ("WAPA"), the Southeastern Power Administration ("SEPA"), and the Southwestern Power Administration ("SWPA"). *Id.* "Of the four PMAs, BPA and WAPA are much larger in terms of the volume of electricity marketed than SWPA and SEPA." *Id.* There is no PMA coverage in the northeastern states and for much of the Midwest. *Id.* Federal power agencies supply less than 1% of U.S. electricity needs. *See supra* note 100.

[139] *See* Energy Policy Act of 2005, 42 U.S.C. § 16421(a) (2012).

[140] *Id.* § 16421(b).

[141] *See, e.g.*, United States v. 14.02 Acres of Land More or Less in Fresno Cnty., 547 F.3d 943, 953-54 (9th Cir. 2008) (holding WAPA was not required to comply with California law); Citizens & Landowners Against the Miles City/New Underwood Powerline v. Sec'y, U.S. Dep't of Energy, 683 F.2d 1171 (8th Cir. 1982) (holding WAPA was not required to comply with South Dakota laws governing the siting and permitting of transmission lines or obtain a state siting permit prior to planning and constructing a new transmission line in the state).

administrations on projects and avoid the state transmission siting process. To date, neither WAPA nor SWPA have used their siting and eminent domain authority under EPAct 2005.

III. THE MODERN ELECTRICITY GRID: ENERGY SOURCES, TRANSMISSION LINES, AND REGIONAL PLANNING

This Part describes in more detail the modern electric grid and highlights major interstate transmission projects, as well as the difficulty of obtaining approval in all necessary states for such projects. It then turns to the changing nature of the energy sources powering the grid with a focus on the growing use of renewable energy, particularly wind, to generate electricity in many parts of the country. This Part ends with a discussion of the growing focus on RTOs as major players in managing the grid in many regions of country as well as wholesale markets for electricity within those regions.

A. Existing Transmission Infrastructure, Future Needs, and Proposed Interstate Transmission Projects

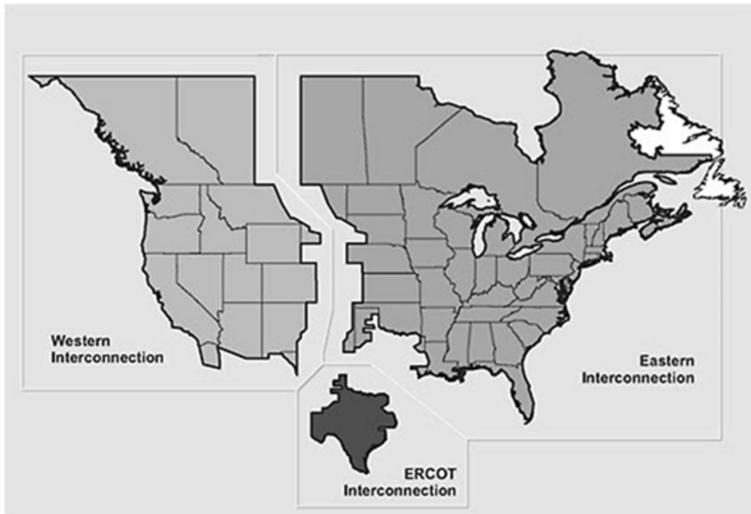
Today, electricity from nearly 7,000 power plants travels over 450,000 miles of high-voltage transmission lines in the United States, connecting with nearly 6 million miles of lower voltage distribution cables, to provide power to homes, businesses, and industrial facilities.[142] The U.S. electric grid constitutes an $876 billion asset managed by over 3,000 utilities serving nearly 300 million customers.[143] Unlike the interstate natural gas pipeline network, which has no state or regional boundaries, there are three separate and distinct electricity grids within the continental United States — the

[142] *See* ECON. DEV. RESEARCH GRP., INC., AM. SOC'Y OF CIVIL ENG'RS, FAILURE TO ACT: THE ECONOMIC IMPACT OF CURRENT INVESTMENT TRENDS IN ELECTRICITY INFRASTRUCTURE 4-5 (2011), *available at* http://www.asce.org/uploadedFiles/Issues_and_Advocacy/Our_Initiatives/Infrastructure/Content_Pieces/failure-to-act-electricity-report.pdf (stating that there are over 450,000 miles of high-voltage transmission lines in the United States); MASS. INST. OF TECH., *supra* note 1, at 4 (stating that there are 6 million miles of low-voltage distribution lines); Ken Wells et al., *Crumbling U.S. Grid Gets Jolt Driving Smart Houston Power*, BLOOMBERG (June 25, 2014, 3:00 AM PDT), http://www.bloomberg.com/news/articles/2014-06-25/crumbling-u-s-grid-gets-jolt-driving-smart-houston-power (stating that 7,000 power plants supply electricity through 450,000 miles of high-voltage transmission lines).

[143] *See* HARRIS WILLIAMS & CO., TRANSMISSION & DISTRIBUTION INFRASTRUCTURE 2 (2014), *available* at http://www.harriswilliams.com/sites/default/files/industry_reports/ep_td_white_paper_06_10_14_final.pdf?cm_mid=3575875 (stating that the grid services 300 million customers); Wells et al., *supra* note 142 (stating that the grid is a $876 billion asset and is serviced by over 3,000 utilities).

Eastern Interconnection, the Western Interconnection, and the Electric Reliability Council of Texas ("ERCOT"). There is essentially no transfer of electricity between the three interconnections.[144]

Figure 1: U.S. Interconnections[145]



These grids make up 73%, 19%, and 8%, respectively, of electricity sales in the United States.[146]

Many experts warn that the U.S. transmission grid must be modernized and expanded to maintain reliability, to address increasingly severe weather events brought about by climate change, to address cyber security concerns, and to integrate more domestic renewable energy into the grid to achieve federal and state climate change goals.[147] According to experts, power outages are becoming

[144] *See generally* U.S. Dep't of Energy, *Learn More About Interconnections*, ENERGY.GOV, http://energy.gov/oe/services/electricity-policy-coordination-and-implementation/transmission-planning/recovery-act-0 (last visited Feb. 7, 2015) (explaining the function of the three main "interconnections" in the United States). The North American Electric Reliability Corporation ("NERC"), a non-governmental organization, works with eight regional entities to ensure bulk power reliability throughout the United States. *About NERC*, N. AM. ELEC. RELIABILITY CORP., http://www.nerc.com/ABOUTNERC/pages/default.aspx (last visited Apr. 18, 2015).

[145] *See* NAT'L ACAD. OF SCIS. ET AL., AMERICA'S ENERGY FUTURE: TECHNOLOGY AND TRANSFORMATION 568 fig.9.4 (2009).

[146] MASS. INST. OF TECH., *supra* note 1, at 3.

[147] *See, e.g.*, CAMPBELL, *supra* note 9, at 7 (discussing the aging nature of the transmission grid); BIPARTISAN POLICY CTR., *supra* note 1, at 28-33 (arguing that the

more frequent in the United States, and in order to maintain even current levels of grid reliability, the electric industry must make total investments on the scale of $1.5 to $2 trillion dollars and investments in transmission and distribution alone of nearly $900 billion.[148]

Likewise, a 2013 White House report noted that "[s]evere weather is the number one cause of power outages in the United States and costs the economy billions of dollars a year in lost output and wages, spoiled inventory, delayed production, inconvenience and damage to grid infrastructure."[149] More important, the report points out that the "aging nature of the grid," most of which was constructed over a

grid's infrastructure will need to be updated in order to meet renewable energy targets); ECON. DEV. RESEARCH GRP., *supra* note 142, at 4-9 (arguing that without increased investment in grid infrastructure, we will not be able to meet the growing demands for energy); MASS. INST. OF TECH., *supra* note 1, at 77 (arguing that one factor requiring an increased investment in transmission capacity is the need for more renewable energy sources); Klass, *supra* note 1, at 1116 (arguing that more transmission needs to be built in order to maintain reliability and meet new renewable energy targets); Klass & Wilson, *supra* note 1, at 1802 (arguing that the transmission infrastructure must be improved in order to incorporate domestic renewable energy); Ostrow, *Grid Governance*, *supra* note 1, at 1995-96 (arguing that the state-centered regulatory system is ineffective for regulating such a sprawling, interconnected system, such as the grid); Rossi, *supra* note 1, at 1018-33 (arguing that existing state regulation of the grid is inadequate to address competitive wholesale markets and climate change goals). *See generally* EDISON ELEC. INST., TRANSMISSION PROJECTS: AT A GLANCE, at iii (2014) (showing increases in transmission investment from 2011–2013 but then a projecting a slight decline in investment from 2013–2016); *Investment in Electricity Transmission Infrastructure Shows Steady Increase*, U.S. ENERGY INFO. ADMIN. (Aug. 26, 2014), http://www.eia.gov/todayinenergy/detail.cfm?id=17711 (reporting that after a thirty-year decline in transmission investment, more recent trends from 1997–2012 show increased investment in transmission infrastructure by public utilities and other power providers to improve reliability and to connect load centers to renewable energy resources).

148 *See, e.g.*, MARC W. CHUPKA ET AL., EDISON FOUND., TRANSFORMING AMERICA'S POWER INDUSTRY: THE INVESTMENT CHALLENGE 2010–2030, at iv-xi (2008), *available at* http://assets.fiercemarkets.com/public/sites/energy/reports/transformingamericaspower.pdf (summarizing costs of grid investment); Massoud Amin, *Toward a More Secure, Strong and Smart Electric Power Grid*, IEEE SMART GRID (IEEE, Piscataway, N.J.), Jan. 2011, *available at* http://smartgrid.ieee.org/january-2011/67-toward-a-more-secure-strong-and-smart-electric-power-grid ("In the electricity sector, outages and power quality disturbances cost the economy, on average, more than $80 billion annually and sometimes as much as $188 billion in a single year."); Wells et al., *supra* note 142 ("Power outages are up 285 percent since 1984 and the U.S. ranks last among the top nine western industrialized nations in the average time that it takes to get the light back on after power failures. Outages cost businesses as much as $150 billion a year in lost continuity . . . .").

149 EXEC. OFFICE OF THE PRESIDENT, ECONOMIC BENEFITS OF INCREASING ELECTRIC GRID RESILIENCE TO WEATHER OUTAGES 4 (2013), *available at* http://energy.gov/sites/prod/files/2013/08/f2/Grid%20Resiliency%20Report_FINAL.pdf.

period of more than one hundred years, makes the country more susceptible to severe weather-related power outages.[150] The report also warns that the number of outages "is expected to rise as climate change increases the frequency and intensity of hurricanes, blizzards, floods and other extreme weather events."[151] "In 2012, the United States suffered eleven billion-dollar weather disasters — the second-most for any year on record, behind only 2011."[152]

As for augmenting the nation's supply of renewable electricity, new long-distance interstate electric transmission lines are a critical aspect of achieving that goal. Unlike competing sources of electricity such as coal, uranium, and natural gas, which can be transported to consumers via pipelines, rail, truck, or ship, large-scale renewable energy such as wind or solar energy can only be transported through transmission lines.[153] As a result, expanding the electric transmission system is critical to increasing the nation's supply of renewable electricity because these sources of energy are generated in states like Kansas, North Dakota, South Dakota, Montana, and rural parts of Texas, Illinois, Oregon, and Iowa, which are generally far from load centers.[154]

The regulatory framework for transmission lines that gives states virtually exclusive siting and eminent domain authority for both interstate and intrastate transmission lines has significant implications for the future of the grid. A 2011 interdisciplinary study by MIT entitled *The Future of the Electric Grid* devotes an entire chapter to regulatory policy affecting transmission expansion, with particular focus on the issue of integrating large-scale renewable generation.[155] It concludes that current siting procedures are often biased against approving interstate transmission projects and are a significant barrier to adequate and efficient transmission expansion.[156] The report recommends better planning of regional transmission projects, better compilation of data on the U.S. bulk power system, the use of regional and interconnection cost allocation procedures to better share the cost

150 *Id.*

151 *Id.*

152 *Id.*

153 As noted earlier, although rooftop solar and other distributed renewable energy resources do not rely on transmission lines, such energy resources so far make up only a small percentage of total renewable electricity resources although that percentage is likely to increase substantially in the future. *See supra* note 5.

154 *See United States — Average Annual Wind Speed at 80 m*, NAT'L RENEWABLE ENERGY LAB., http://www.nrel.gov/gis/images/80m_wind/USwind300dpe4-11.jpg (last visited Apr. 4, 2015) (map showing high potential wind areas in purple).

155 MASS. INST. OF TECH., *supra* note 1, at 77-108.

156 *Id.* at 100.

of long-distance transmission, and enhanced federal siting authority for interstate transmission lines.[157]

A 2013 report by the Bipartisan Policy Center entitled *Capitalizing on the Evolving Power Sector, Policies for a Modern and Reliable U.S. Electric Grid* also highlights the limitations of the state siting process for interstate transmission lines, particularly those high-voltage, long-distance lines necessary to transport renewable energy to load centers.[158] According to the report:

> Siting new transmission lines is often a prolonged, expensive, and contentious undertaking. . . . In recent decades . . . the evolution of interstate and regional electricity markets has increasingly necessitated long-line, interstate transmission projects. Further, the extent of [variable energy resource] integration that will be required by existing state renewable portfolio requirements, and the reality that many renewable resources are located at a distance from load, will likely create a greater need for new long-line transmission in some regions.
>
> . . . Under the current siting regime, the developer of a multistate transmission line must obtain requisite approvals from state and local authorities along the full length of the line . . . . For their part, individual state authorities may be bound by state statutes to accept or reject the project on the basis of their in-state transmission needs, or the in-state benefits that the project offers. In these cases, states may not be empowered to consider the regional benefits of a proposed project. Thus, a project that transmits power generated in one state, passes through a second state, and serves load in a third state could have difficulty winning approval from regulators in the second state. In some states, regulators might even be required by law to reject a project that does not serve load within the state's boundaries, even in cases where the project delivers broader benefits to the region at large that the state would share in over time.[159]

Despite these regulatory hurdles, both public utilities and private or "merchant" transmission companies[160] are attempting to build long-

157 *Id.* at 102-04.

158 BIPARTISAN POLICY CTR., *supra* note 1, at 5.

159 *Id.* at 28-29; *accord* Hoecker & Smith, *supra* note 125, at 86-88 (discussing state siting barriers to interstate transmission projects).

160 "[M]erchant transmission companies . . . generate revenue solely from contracts

distance, interstate transmission lines to improve grid reliability and transport new sources of renewable energy to load centers. Recent efforts include:

- The Montana Alberta Tie Line, a 214-mile, 230-kV merchant line running between Lethbridge, Alberta and Great Falls, Montana to transport Montana wind energy.[161]
- The Zephyr Transmission Project, owned by Duke-ATC, a proposed 950-mile 500-kV line from southeastern Wyoming to Las Vegas, Nevada designed to connect wind-rich areas of Wyoming to load centers in California and the southwestern United States and expected to be in service by 2020.[162]
- The $6.8 billion Texas Competitive Renewable Energy Zone ("CREZ") project consisting of eight years of planning and new construction of 3,600 miles of high-voltage transmission lines across portions of central and West Texas to integrate 16,000 MW of wind energy into the Texas grid.[163]
- The SunZia Southwest Transmission Project, two proposed bi-directional 500-kV lines in Arizona and

they sign with electricity generators to transmit electricity . . . for delivery to [utilities and other electricity providers to sell to] the retail market." Klass, *supra* note 1, at 1081 n.7 (citing Heidi Werntz, *Let's Make a Deal: Negotiated Rates for Merchant Transmission*, 28 PACE ENVTL. L. REV. 421, 424 n.13 (2011)). By contrast, public utilities and independent transmission companies receive a cost-based rate of return from electricity users through the state public utility commission ratemaking process. *Id.* at 1121.

161 *Montana-Alberta Tie-Line*, ENBRIDGE, http://www.enbridge.com/DeliveringEnergy/Power-Transmission/Montana-Alberta-Tie-Line.aspx (last visited Feb. 13, 2015).

162 EDISON ELEC. INST., *supra* note 147, at 35.

163 *See* Daniel Cusick, *New Power Lines Will Make Texas the World's 5th-Largest Wind Power Producer*, CLIMATEWIRE (Feb. 25, 2014), http://www.eenews.net/climatewire/stories/1059995041. It is important to note that Texas is unique in its ability to plan and site large-scale transmission lines for renewable energy development because it has its own grid (ERCOT) and the state includes both major population centers and significant wind energy resources. *See* Klass & Wilson, *supra* note 1, at 1843-47 (discussing CREZ projects and uniqueness of Texas); Matthew L. Wald, *Wired for Wind*, N.Y. TIMES, July 23, 2014, at B1 [hereinafter *Wired for Wind*], *available at* http://www.nytimes.com/2014/07/24/business/energy-environment/texas-is-wired-for-wind-power-and-more-farms-plug-in.html (reporting on completion of Texas CREZ projects).

New Mexico designed to spur development of renewable energy in those states and anticipated to be in service by 2020.[164]

- Five separate DC high-voltage transmission projects by Clean Line Energy Partners, a merchant transmission company, each travelling between 200 and 900 miles designed to bring wind energy to population centers.[165]

- The Multi-Value Projects ("MVPs") in the Midcontinent Independent System Operator ("MISO") region designed to enhance grid reliability and help the MISO states meet renewable portfolio standards by allowing more transmission of wind energy throughout the region, and imposing cost sharing among utilities within MISO.[166]

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164 *See Welcome to the SunZia Transmission Project*, SUNZIA, http://www.sunzia.net/ (last visited Feb. 13, 2015).

165 *See Projects*, CLEAN LINE ENERGY PARTNERS, http://www.cleanlineenergy.com (last visited Feb. 19, 2015). The five Clean Line Energy Partners projects are the Rock Island Clean Line (bringing wind energy from northern Iowa to Illinois and states east of Illinois), the Grain Belt Express Clean Line (bringing wind energy from western Kansas to Missouri, Illinois and states east of Illinois), the Plains & Eastern Clean Line (bringing wind energy from the Oklahoma Panhandle region to southeastern states), the Centennial West Clean Line (line from Northeast New Mexico to California designed to develop wind and solar energy in the region), and the Western Spirit Clean Line (bringing renewable power from New Mexico to Western markets working together with the Centennial West Clean Line). *See id.* The Centennial West Clean Line had entered into a partnership with WAPA and thus may be able to take advantage of the federal siting authority discussed in Part II.C, under section 1222 of EPAct 2005. *See generally* Press Release, W. Area Power Admin. & Clean Line Energy Partners, Centennial West Clean Line, Western Sign Agreement for Transmission Project Development (June 18, 2012), *available at* http://www.centennialwestcleanline.com/sites/centennial_west/media/docs/FINAL_Centennial_West_Press_Release_061812.pdf (announcing the partnership between WAPA and Clean Line Energy Partners). The Plains & Eastern Clean Line has sought to enter into a similar relationship with SWPA under section 1222 of EPAct 2005. *See* Letter from Tom Kiernan, CEO, Am. Wind Energy Ass'n, to Ernest Moniz, Sec'y, U.S. Dep't of Energy (May 15, 2014), *available at* http://www.plainsandeasterncleanline.com/sites/plains_eastern/media/docs/AWEA_Letter_of_Support.pdf (urging Department of Energy "to move forward as expeditiously as possible to a final decision under your Section 1222 authority on the Plains & Eastern Clean Line and other projects that will facilitate the deployment of wind energy").

166 *See* Ill. Commerce Comm'n v. FERC, 721 F.3d 764, 771-75 (7th Cir. 2013) (describing MISO's MVP projects as lines designed to facilitate increase in renewable energy generation and integration within MISO region); Glen Boshart, *MISO: MVP Project Benefits Larger than Previously Thought*, SNL (Oct. 1, 2014, 6:16 PM ET),

- The Great Northern Transmission Line, a 500-kV line designed to run between Winnipeg, Manitoba and northeastern Minnesota to transport both hydropower and wind energy and proposed to be in service by 2020.[167]
- The Northern Pass Transmission Line, a 187-mile power line to connect significant hydropower resources in Quebec to population centers in New England.[168]

Both public utilities and private merchant lines are investing in new, large-scale transmission projects, many of which are DC rather than AC. Although the U.S. electric grid runs predominantly on AC, many of the proposed long-distance transmission lines for wind are DC because DC is more efficient and results in less line losses, even though it limits the number of "on ramps" and "off ramps" along the path of the line.[169] Notably, the time, cost, and multi-state regulatory hurdles associated with such lines are significant and most of the projects listed above are still in the state permitting process. Moreover, there are far fewer large-scale renewable energy projects proposed for the eastern United States, highlighting the difficulty of constructing new transmission lines east of the Mississippi River.[170]

Projects of this magnitude can take more than a decade to plan, propose, and obtain regulatory approval from multiple states prior to

https://www.snl.com/InteractiveX/Article.aspx?cdid=A-29379703-12582 (reporting on a 2014 MISO study showing that the MVPs will offer "between $13.1 billion and $49 billion in net benefits over the next 20 to 40 years, an increase of approximately 50% from the 2011 estimates" and that the MVP projects will help states meet their renewable energy requirements because the increased transmission will reduce wind curtailments due to insufficient transmission); *see, e.g.*, EDISON ELEC. INST., *supra* note 147, at 68 (describing Mid-American Energy Expansion as "an integral part" of the portfolio of MISO MVP projects).

167 EDISON ELEC. INST., *supra* note 147, at 78-79.

168 *See* Sam Evans-Brown, *Understanding Northern Pass*, N.H. MAG. (Jan. 2014), http://www.nhmagazine.com/January-2014/Understanding-Northern-Pass/.

169 *See* Klass, *supra* note 1, at 1111 & n.196 (providing descriptions of AC and DC and benefits and drawbacks of each type of current).

170 *See, e.g.*, Rossi, *supra* note 1, at 1021-22 (discussing state opposition to interstate transmission lines in Arizona and Connecticut); Evans-Brown, *supra* note 168 (discussing controversy over Northern Pass project); *see also* BIPARTISAN POLICY CTR., *supra* note 1, at 28-29 (stating that regulatory approval for interstate transmission projects is difficult to obtain and discussing a project denial by regulatory authorities in Arkansas).

the actual construction process.[171] Then there are often more years of delay due to legal challenges to the lines on grounds ranging from whether one or more states properly issued the certificate of need, to whether an RTO is justified in imposing the cost of such transmission lines on all utilities in the region, to whether the line constitutes a "public use" justifying eminent domain under various state laws.[172] This stands in contrast to interstate natural gas pipelines, which can often be built on a twelve-month to two-year timeline with one-stop shopping at FERC.[173]

For instance, in the summer of 2014, the Wisconsin Public Service Commission ("PSC") held hearings to determine the need for and environmental impacts associated with the Badger-Coulee Line. MISO had designated this 345-kV line as a high-priority line that would offset the need for about $160 million to $180 million in lower voltage transmission system upgrades in western Wisconsin, provide local utilities with increased access to wholesale energy markets, and establish another pathway for renewable energy into Wisconsin and to load centers in other states.[174] During the Wisconsin PSC hearings, landowners and citizen groups questioned "why Wisconsinites should have to give up their land and views so generators in the Dakotas can ship surplus energy to the East Coast."[175]

Similar concerns have been raised as public hearings in Missouri for the Grain Belt Express, one of the Clean Line Energy Partner DC

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[171] *See* Alison Silverstein, Presentation at the NCEP Transmission Technology Workshop: Transmission 101, at 51 (Apr. 20–21, 2011), http://www.naruc.org/grants/Documents/Silverstein%20NCEP%20T-101%200420111.pdf. *See generally* NAT'L ELEC. MFRS. ASS'N, SITING TRANSMISSION CORRIDORS — A REAL GAME OF CHUTES AND LADDERS (2011), *available at* http://www.nema.org/Communications/Documents/tC_gameboard_vertical.pdf (providing the gameboard for a game that explains how the siting process works).

[172] *See, e.g.*, Richard J. Pierce, Jr., *Completing the Process of Restructuring the Electricity Market*, 40 WAKE FOREST L. REV. 451, 483-85 (2005) ("The causes of the growing shortage of transmission capacity are well known and well documented. FERC has not yet devised and implemented a method of encouraging adequate investment in transmission capacity, and NIMBY-based opposition to proposed transmission expansion projects dooms most projects at the state and local agencies that now have authority to authorize or veto such projects.").

[173] *See supra* notes 44, 58–59 and accompanying text.

[174] News Release, Am. Transmission Co., PSC Deems Badger Coulee Transmission Line Project Application Complete (Apr. 30, 2014), *available* at http://www.atcllc.com/whats-current/psc-deems-badger-coulee-transmission-line-project-application-complete/.

[175] Danielle Endvick, *Farmers, Rural Landowners Opposing Transmission Project Say It Puts Their Lifestyle . . . On the Line*, COUNTRY TODAY (June 16, 2014, 8:22 AM), http://www.thecountrytoday.com/front_page/article_5963e286-f559-11e3-9dc9-0019bb2963f4.html.

transmission lines in the Midwest designed to transport wind energy to population centers in the east.[176] The Grain Belt Express would travel through four states, including Missouri.[177] At the hearing, critics of the line argued the costs to Missouri landowners exceeded the project's benefits. One landowner stated, "Grain Belt says they're going to bring power to Missouri. They mean through Missouri . . . . If the East Coast wants wind power, let them produce it locally."[178] However, one county commissioner representing a Missouri county receiving property tax benefits from a new oil pipeline through the state argued that if landowners are paid a fair price for their land, they should accept projects that will benefit "the greater good."[179] He questioned, "Where would we be if we had stopped all of these projects many years ago?"[180]

Further east, some environmental groups in Vermont have provided cautious support for new transmission lines to bring hydropower and wind energy from Quebec and New York through Vermont to southern New England states. But many interested parties question whether such lines will only serve out-of-state generators or whether they will provide any in-state benefits by transporting Vermont energy resources or bringing new renewable energy resources to Vermont customers.[181]

The fact that major, interstate transmission lines are subject to frequent opposition from local residents or state regulators does not in and of itself mean the process for siting transmission lines is broken. History is replete with examples of large-scale infrastructure projects

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176 *See* Jeffrey Tomich, *Clean Line Transmission Project Gets Chilly Reception in Mo.*, ENERGYWIRE (Aug. 13, 2014), http://www.eenews.net/energywire/2014/08/13/stories/1060004417.

177 *Id.*

178 *Id.* (quoting Phillip Brown of Moberly, Mo.) (internal quotation marks omitted).

179 *Id.*

180 *Id.* (quoting Glenn Eagan, Cnty. Comm'r, Shelbyville, Missouri) (internal quotation marks omitted).

181 John Herrick, *Renewable Energy Group Backs Vermont as Transmission Corridor*, VTDIGGER.ORG (Apr. 22, 2014, 7:28 PM), http://vtdigger.org/2014/04/22/renewable-energy-group-backs-vermont-transmission-corridor/ ("'Is this just a super highway, or is this going to be [a] highway with off ramps that could bring renewable energy into Vermont communities or needed transmission so we can bring more Vermont renewable energy into our grid? That's what I don't know' . . . ." (quoting Johanna Miller, Energy Program Dir., Vt. Natural Res. Council)). For a discussion of other interstate transmission line projects where state PUCs denied approval because the line would not provide power to state residents, see Hoecker & Smith, *supra* note 125, at 86-88.

that never should have been built and for which roadblocks in the form of local siting requirements, organized opposition, or enhanced environmental laws may have led to better outcomes.[182] Nevertheless, with regard to multi-state projects designed to meet regional transmission and energy needs, there is a misalignment between the scope of such projects and the state agencies and courts with authority to review and approve those projects.

B. Fuel Sources for the Grid and Integrating Renewable Energy

Just as the 1930s and 1940s brought major changes in the sources of energy used to heat the nation's residences and industries, the first two decades of the 21st century have brought significant shifts in the sources of electricity used to power the grid. For instance, in 2013, the percentage of net U.S. power generation from coal declined to just 39%, down from a high of 55% in 1990.[183] At the same time, electricity generated from natural gas increased to 27% in 2013, up from only

[182] Major highways built through city neighborhoods and parks, which led to urban decay and destruction of parkland, and massive hydroelectric dams in the West with little energy benefits but significant environmental harm are just two examples. *See, e.g.*, San Antonio Conservation Soc'y v. Texas Highway Dep't, 400 U.S. 968, 968-69 (1970) (Black, J., dissenting) (expressing dismay at refusal of the Supreme Court to review the U.S. Department of Highway's decision to approve a highway that would destroy a city park); St. Paul Branch of NAACP v. U.S. Dep't of Transp., 764 F. Supp. 2d 1092, 1097 n.3 (D. Minn. 2011) (discussing the Rondo neighborhood of St. Paul which was "devastated when it was divided to build Interstate Highway 94 ('I-94') between Minneapolis and St. Paul" in the 1960s in reviewing a proposed light rail project through relocated Rondo neighborhood); MARC REISNER, CADILLAC DESERT: THE AMERICAN WEST AND ITS DISAPPEARING WATER (1986) (discussing adverse environmental impacts and questionable benefits associated with the construction of major federal dams and hydropower projects in the West). Indeed, the National Environmental Policy Act ("NEPA") and other federal and state environmental laws enacted in the 1970s were intentionally designed to slow down the permitting process so that the potential adverse environmental impacts of major projects could be analyzed in a manner that could potentially limit those impacts or prevent projects entirely. *See generally* WILLIAM W. BUZBEE, FIGHTING WESTWAY: ENVIRONMENTAL LAW, CITIZEN ACTIVISM, AND THE REGULATORY WAR THAT TRANSFORMED NEW YORK CITY (2014) (discussing the background of NEPA and explaining the federal involvement in the permitting process).

[183] *See Electricity Emissions in the United States*, CTR. FOR CLIMATE & ENERGY SOLUTIONS, http://www.c2es.org/technology/overview/electricity (last visited Feb. 13, 2015) [hereinafter *Electricity Emissions*]; Jeffrey Logan, *U.S. Power Sector Undergoes Dramatic Shift in Generation Mix*, NAT'L RENEWABLE ENERGY LAB.: RENEWABLE ENERGY PROJECT FIN. (Feb. 26, 2013, 10:00 AM), https://financere.nrel.gov/finance/content/us-power-sector-undergoes-dramatic-shift-generation-mix.

12% in 1990.[184] Non-hydropower renewables increased from essentially zero in the late 1980s to nearly 7% by 2013.[185] Moreover, in the first quarter of 2014, for the first time, non-hydropower renewable energy generation exceeded hydropower renewable energy generation, which constituted just over 6% of total generation during that same period.[186] Renewable energy as a whole made up 13% of total net electricity generation in 2013.[187]

To put these numbers in historical perspective, in 1950, coal provided almost 50% of U.S. net power generation, hydropower was at 30%, natural gas was at just under 15%, petroleum was at 10%, and non-hydropower renewables and nuclear energy were at zero.[188] During the 1970s and 1980s, coal fluctuated between 45% and 55% of total U.S. net generation, hydropower had declined to between 10% and 20%, and natural gas remained at 15% after a brief increase to 25% in the 1960s, while nuclear energy climbed to 20% and petroleum declined to less than 5% of total net generation and then to less than 1% by 2013. Table 1 provides a summary of these trends.

[184] *See Electricity Emissions*, *supra* note 183; Logan, *supra* note 183.

[185] *See Electricity Emissions*, *supra* note 183; Logan, *supra* note 183.

[186] *See* Kenneth Bossong, *Non-Hydro Renewables Outproduce Hydro for First Time Ever*, RENEWABLEENERGYWORLD.COM (May 23, 2014), http://www.renewableenergyworld.com/rea/news/article/2014/05/non-hydro-renewables-outproduce-hydro-for-first-time-ever (citing U.S. ENERGY INFO. ADMIN., ELECTRIC POWER MONTHLY WITH DATA FOR MARCH 2014 (May 2014), *available at* http://www.eia.gov/electricity/monthly/current_year/may2014.pdf) (noting data through March 31, 2014); *see also* Logan, *supra* note 183 (showing changes in energy mix for electricity).

[187] *Energy in Brief: How Much U.S. Electricity Is Generated from Renewable Energy?*, U.S. ENERGY INFO. ADMIN., http://www.eia.gov/energy_in_brief/article/renewable_electricity.cfm (last updated Apr. 14, 2014). Although solar remains less than 1% of total net U.S. electricity generation, its growth has been significant over the past two years and, according to EIA, the published solar numbers understate growth in that sector because "[u]nlike other energy sources, significant levels of solar capacity exist in smaller, non-utility-scale applications — e.g., rooftop solar photovoltaics." Bossong, *supra* note 186.

[188] *See* Logan, *supra* note 183.

Table 1. U.S. Net Electricity Generation by Source[189]

	1950	1970	1990	2013
Coal	47%	44%	55%	39%
Natural Gas	13%	22%	12%	28%
Nuclear	0%	2%	20%	20%
Hydropower	31%	18%	10%	7%
Non-Hydropower Renewables	0%	0%	2%	6%
Petroleum	10%	18%	3%	0.7%

Notably, there are huge variations among the states in the sources of energy they use for electricity. For instance, EIA data from 2012 indicate that West Virginia (95%), Kentucky (93%), Missouri (83%), and North Dakota (79%) rely predominantly on coal for electricity generation.[190] By contrast, New York (4%), California (1%), and Maine (.05%) rely very little on coal to generate electricity.[191] Mississippi (60%), California (59%), and Texas (47%) all rely on natural gas to generate a significant percentage of electricity in the state.[192] And Idaho (58%), Washington (69%), and Oregon (56%) rely mostly on hydropower for their electricity needs.[193]

This same variation exists to an even greater degree with regard to non-hydropower renewable energy. For many years now, wind energy has been the main driver in increasing the percentage of non-hydropower renewable energy on the grid. In 2013, wind power in the United States, which produced over 61,000 MW of electric generating capacity, exceeded 4% of the U.S. power grid for the first time.[194]

[189] *See Electricity Emissions*, *supra* note 183; Logan, *supra* note 183. Percentages in Table 1 are approximate.

[190] *Facts & Figures — According to EIA Data*, AM. COAL. FOR CLEAN COAL ELEC.: AM.'S POWER (July 2013), http://www.americaspower.org/according-to-eia-data (summarizing 2013 EIA data).

[191] *Id.*

[192] *Id.*

[193] *Id.*

[194] *See* Press Release, Am. Wind Energy Ass'n, American Wind Power Reaches Major Power Generation Milestones in 2013 (Mar. 5, 2013), *available at* http://www.awea.org/MediaCenter/pressrelease.aspx?ItemNumber=6184 [hereinafter AWEA Press Release];

According to the National Renewable Energy Laboratory, there exists over 10 million MW of onshore wind resources in the United States, enough to power 10 times the nation's total electricity needs.[195] At the start of 2014, there were 12,000 MW of additional wind project capacity under construction. That growth may slow in future years, however, based on the potential expiration of the production tax credit for wind, low natural gas prices, and low growth in demand for new electricity.[196] But there is significant variation in the use of wind power for generating capacity among the states. For instance, wind power now exceeds 25% of total electricity production in both Iowa and South Dakota and provides more than 12% of electricity production in nine states and over 5% in twelve states.[197] As a result of these increases, wind is now the fifth largest electricity source in the United States, behind coal, natural gas, nuclear, and hydropower.[198] All renewable energy sources together, such as wind, solar, and hydropower, provide nearly 13% of the U.S. electricity supply.[199] But in many states, particularly in the southeast, wind generates virtually no electricity at all.[200] And Texas has installed over 12,000 MW of wind energy on its own, more than double the amount produced by the next highest ranked states.[201] These regional variations highlight the need for a regional or national approach to transmission siting to meet current concerns associated with integrating non-fossil fuel energy resources into the grid on a more widespread basis.

Both state renewable portfolio standards ("RPSs") that exist in more than twenty-five states and EPA's 2014 Clean Power Plan proposed rule will lead to increased renewable energy generation throughout the country and increased trading of renewable energy credits ("RECs"). RPSs require utilities to generate a certain percentage — generally

Installed Wind Capacity, U.S. DEP'T OF ENERGY: WINDEXCHANGE, http://apps2.eere.energy.gov/wind/windexchange/wind_installed_capacity.asp (last visited Feb. 13, 2015); *Wind Energy Facts at a Glance*, AM. WIND ENERGY ASS'N, http://www.awea.org/Resources/Content.aspx?ItemNumber=5059&navItemNumber=742 (last visited Feb. 13, 2015).

195 AWEA Press Release, *supra* note 194.

196 *Id.*; Logan, *supra* note 183; *see Annual Energy Outlook 2015: Market Trends: Electricity Demand*, U.S. ENERGY INFO. ADMIN. (Apr. 14, 2015), http://www.eia.gov/forecasts/aeo/MT_electric.cfm.

197 AWEA Press Release, *supra* note 194.

198 *Id. See generally* Logan, *supra* note 183 (displaying a graph showing significant decrease in coal for electricity and significant increases in natural gas and non-hydropower renewables).

199 AWEA Press Release, *supra* note 194.

200 *See Installed Wind Capacity*, *supra* note 194.

201 *Id.*

between 15% and 30% — of the electricity they sell from renewable energy resources by 2020, 2025, 2030, or a similar date, or purchase RECs from other in-state or out-of-state power providers, thus creating interstate markets for renewable energy.[202]

Under EPA's Clean Power Plan Proposed Rule, released in June 2014, the electric power sector would be required to reduce carbon emissions by 30% from 2005 levels by 2030.[203] Under the rule, states would be required to implement plans to achieve this goal. While the means of obtaining compliance would vary from state to state, EPA projects that by 2030, coal-fired electricity would drop to about 30% of the nation's total electricity supply, with significant increases in the use of natural gas and renewable energy sources in addition to energy efficiency improvements.[204] EPA's rule also allows the purchase of RECs to meet the rule's requirements, which will spur additional generation of renewable energy and sales of credits in those states with ample renewable energy resources.[205] Thus, the shift away from coal and towards both natural gas and renewable energy will increase in future years. Even though in 2012 coal provided only 39% of U.S. net electricity generation, it was responsible for approximately 75% of U.S. electricity-related GHG emissions, thus explaining EPA's focus on reducing the use of coal-fired power in order to meet climate change goals.[206]

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202 *See* Alexandra B. Klass & Elizabeth Henley, *Energy Policy, Extraterritoriality, and the Dormant Commerce Clause*, 5 SAN DIEGO J. CLIMATE & ENERGY L. 127, 155 (2014); U.S. Dep't of Energy, *Renewable Portfolio Standard Policies*, DATABASE OF STATE INCENTIVES FOR RENEWABLES & EFFICIENCY (Sept. 2014), http://ncsolarcen-prod.s3.amazonaws.com/wp-content/uploads/2015/01/RPS_map.pdf.

203 *See* U.S. ENVTL. PROT. AGENCY, NATIONAL FRAMEWORK FOR STATES: SETTING STATE GOALS TO CUT CARBON POLLUTION 1 (2014), *available at* http://www2.epa.gov/sites/production/files/2014-05/documents/20140602fs-setting-goals.pdf; Nathanael Massey, *Proposed EPA Power Plant Rule Launches a New Experiment in Federalism*, CLIMATEWIRE (June 3, 2014), http://www.eenews.net/climatewire/2014/06/03/stories/1060000595.

204 *See* U.S. ENVTL. PROT. AGENCY , *supra* note 203; Coral Davenport, *Key Details of E.P.A. Carbon Emissions Proposal*, N.Y. TIMES (June 2, 2014), http://www.nytimes.com/2014/06/03/us/politics/key-details-of-epa-carbon-emissions-proposal.html ("The E.P.A. expects that under the regulation, 30 percent of electricity in the United States will still come from coal by 2030, down from about 40 percent today."); Edward Felker, *EPA Sets 30 Percent Power Plant Carbon Cut by 2030*, ENERGY GUARDIAN (June 2, 2014), http://www.energyguardian.net/epa-sets-30-percent-power-plant-carbon-cut-2030 ("EPA projected that coal-fired electricity will drop under the plan to about 30 percent of the nation's electricity supply by [2030], down from about 37 percent in 2012.").

205 *See* Nick Juliano, *EPA Proposal Puts States with Abundant Green Power in Catbird Seat*, GREENWIRE (June 3, 2014), http://www.eenews.net/greenwire/2014/06/03/stories/1060000624.

206 *See Sources of Greenhouse Gas Emissions, Electricity Sector Emissions*, U.S. ENVTL. PROT. AGENCY http://www.epa.gov/climatechange/ghgemissions/sources/electricity.html

C. Regional Grid Governance and RTOs

Unlike the national network of federally-sited interstate pipelines used to transport natural gas throughout the nation, the U.S. transmission grid is cleanly divided into the three, distinct interconnections.[207] Within these three transmission grids, ISOs and RTOs are FERC-approved nongovernmental agencies that manage portions of the transmission grid and regional markets for wholesale power for much of the country. From electricity's early days, bordering utilities long had coordinated with each other. Eventually, groups of neighboring utilities, especially in geographically smaller states, formed "power pools," or "tight power pools," that operated in sync with each other.[208] Beginning in 1999 with Order 2000, FERC encouraged power pools to cede operation of their transmission systems to RTOs or ISOs that would also run power markets in the region.[209]

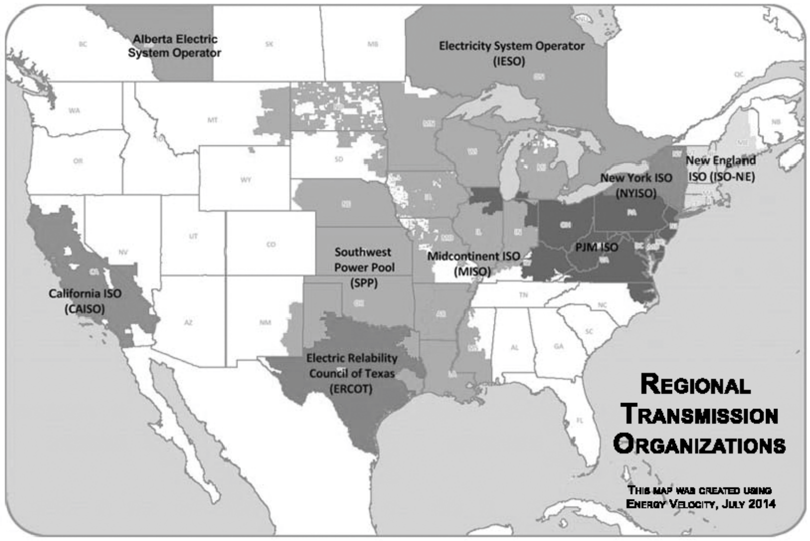
(last updated July 2, 2014).

[207] *See supra* note 144 and accompanying text.

[208] *See* DAVIES ET AL., *supra* note 48, at 435-39 (discussing RTOs); NAVIGANT CONSULTING, INC., TRANSMISSION PLANNING WHITE PAPER 6-10 (Jan. 2014), http://www.naruc.org/grants/Documents/Transmission%20Planning%20Whitepaper.pdf (detailing history of development of power pools and RTOs).

[209] *See generally id.* (explaining history and functions of RTOs); Hari M. Osofsky & Hannah J. Wiseman, *Hybrid Energy Governance*, 2014 U. ILL. L. REV. 1, 44-55 (discussing RTOs).

Figure 2: Regional Transmission Organizations[210]



RTOs and ISOs tend to have three key functions. The first is that these groups — which are typically non-profit organizations formed by member utilities, independent power producers, municipalities, cooperatives, and other players in the electricity market — physically run, operate, and help plan the transmission grid. Utilities that built the grid maintain their ownership in the physical lines, but the RTO or ISO handles day-to-day operation of the system. Second, RTOs and ISOs typically operate and set prices for the wholesale electricity markets within their jurisdictions. Finally, RTOs and ISOs play a major role in planning the expansion of electricity grids within their footprints.[211]

Membership in RTOs is voluntary and utilities may join RTOs or leave them at will.[212] For instance, in 2013, Entergy, a major utility with a significant presence in Mississippi and Louisiana, joined MISO, significantly expanding that RTO's footprint and prompting MISO to change its name from the Midwest Independent System Operator to the Midcontinent Independent System Operator to reflect its new

210 *Regional Transmission Organizations (RTO)/Independent System Operators (ISO)*, FED. ENERGY REGULATORY COMM'N (last updated June 15, 2015), http://www.ferc.gov/industries/electric/indus-act/rto/elec-ovr-rto-map.pdf.

211 DAVIES ET AL., *supra* note 48, at 436-39.

212 *Id.*

geographic scope.[213] Although FERC initially considered making membership in an RTO mandatory, it eventually instead required that public utilities either join a FERC-approved RTO or report on their progress toward joining one. Political opposition and industry resistance from utilities in the Southeast and West have so far prevented more complete coverage of the U.S. electric grid by RTOs but that may change in future years.[214] As shown in Figure 2, RTOs cover approximately two-thirds of the U.S. population and meet approximately the same amount of U.S. electricity demand.[215]

In parts of the United States where RTOs do govern many aspects of electricity transmission, both FERC and the courts have in recent years enhanced the importance of these organizations. For instance, FERC Order 1000 directs electricity providers to formally cooperate to consider the benefits of interstate transmission.[216] Each public utility transmission provider must participate in a regional transmission planning process through an RTO or otherwise; establish transmission needs based on "public policy" requirements, which include state RPSs and other federal laws and regulations; and coordinate with transmission providers in neighboring regions to determine the most cost-effective solutions to mutual transmission needs.[217] Order 1000

[213] *See* Press Release, Midcontinent Indep. Sys. Operator, Inc., MISO Completes Largest-Ever Power Grid Integration (Dec. 19, 2013), *available at* https://www.misoenergy.org/AboutUs/MediaCenter/PressReleases/Pages/MISOCOMPLETESLARGEST-EVERPOWERGRIDINTEGRATION.aspx; *About Us: Media Center*, MIDCONTINENT INDEP. SYS. OPERATOR, INC., https://www.misoenergy.org/AboutUs/MediaCenter/pages/MediaCenter.aspx (last visited Feb. 4, 2015). *See generally* MIDCONTINENT INDEP. SYS. OPERATOR, INC., CORPORATE INFORMATION (2014), *available at* https://www.misoenergy.org/Library/Repository/Communication%20Material/Corporate/Corporate%20Fact%20Sheet.pdf (calling itself "[t]he Midcontinent Independent System Operator, Inc."); *About Us: History*, MIDCONTINENT INDEP. SYS. OPERATOR, INC., https://www.misoenergy.org/AboutUs/History/Pages/History.aspx (last visited Feb. 4, 2015) (describing the history of MISO).

[214] DAVIES ET AL., *supra* note 48, at 436-37.

[215] *See supra* Figure 2; *see also* MASS. INST. OF TECH., *supra* note 1, at 4.

[216] *See* Transmission Planning and Cost Allocation by Transmission Owning and Operating Public Utilities, Docket No. RM10-23-000, Order No. 1000, 136 FERC ¶ 61,051, at 1-2 (2011), *available at* www.ferc.gov/whats-new/comm-meet/2011/072111/E-6.pdf; *see also* DAVIES ET AL., *supra* note 48, at 465-66 (discussing FERC Order No. 1000).

[217] *Id.*; Christopher James & Ken Colburn, *Opportunity Knocks for Air Regulators: FERC Order 1000*, EM, Sept. 2013, at 28, 30-31, *available at* http://www.raponline.org/document/download/id/6724. See generally Jim Hoecker, FERC's Order No. 1000: What You Need to Know, INTELLIGENT UTIL., May–June 2013, at 37, available at http://www.huschblackwell.com/~/media/Files/BusinessInsights/BusinessInsights/2013/05/FERCs%20Order%20No%201000%20What%20You%20Need%20to%20Know%20Part%201__/Files/FERCs%20Order%20No%201000/FileAttachment/Article2_

also eliminates certain incumbent utilities' "right of first refusal" to build transmission lines within their territories in order to allow market forces to spur the development of new transmission lines. One of the purposes of Order 1000 is to prioritize lines to serve renewable energy goals and make those lines more affordable.[218] Thus, Order 1000 mandates a regional transmission planning process for the first time with RTOs playing a central role in the process in the areas where they exist, and places regional planning process requirements on all public utility transmission providers regardless of whether they are part of an RTO. In 2014, the U.S. Court of Appeals for the D.C. Circuit upheld FERC's authority under the FPA to impose the requirements of Order 1000 on utilities in the face of multiple legal challenges.[219]

Another development that highlights the growing importance of RTOs is the 2013 decision by the U.S. Court of Appeals for the Seventh Circuit in *Illinois Commerce Commission v. FERC*.[220] In that case, Judge Richard Posner, writing for the court, reviewed FERC's approval of a request by MISO to impose a tariff on its 130 members to fund construction of new high-voltage power lines known as "multi-value projects" or MVPs.[221] The tariff is designed to finance the construction of transmission lines to bring wind energy generated in the western portion of MISO (i.e., Iowa, North Dakota, Minnesota) to urban centers further east within MISO. MISO allocated the cost of the MVPs among the utilities drawing power from the MISO grid in proportion to each utility's share of the region's total wholesale consumption of electricity rather than focusing on the extent to which each utility's customers would actually use the lines. In other words, MISO allocated the costs across the entire region based on electricity use, which meant utilities serving urban centers would pay more even though the lines to be built were often quite distant from those urban centers. The FPA requires that all fees imposed (or approved) by FERC be "just and reasonable" which the courts have interpreted as being "at least roughly proportionate to the anticipated benefits to a

IntelligentUtility_Hoecker_May2013.pdf (questioning the likely effectiveness of Order No. 1000).

218 *See* Claire Kreycik, *Transmission for Renewables: Opportunity in FERC Order 1000*, NAT'L RENEWABLE ENERGY LAB.: RENEWABLE ENERGY PROJECT FIN. (Jan. 16, 2012, 4:54 PM), https://financere.nrel.gov/finance/content/transmission-renewables-opportunity-ferc-order-1000.

219 *See, e.g.*, S.C. Pub. Serv. Auth. v. FERC, 762 F.3d 41, 63 (D.C. Cir. 2014) (upholding the FERC's authority).

220 Ill. Commerce Comm'n v. FERC, 721 F.3d 764, 770 (7th Cir. 2013).

221 *Id.* at 771.

utility of being able to use the grid."[222] Notably, in an earlier decision written by Judge Posner in 2009, also entitled *Illinois Commerce Commission v. FERC*, the court had struck down a transmission cost allocation tariff the PJM RTO had attempted to impose on its members to finance interstate transmission lines on grounds that PJM and FERC had failed to sufficiently estimate the costs and benefits for FPA compliance.[223]

In its 2013 decision, however, the court affirmed the broad cost allocation for the MVP lines and in doing so focused on the importance of renewable energy, grid reliability, and transmission expansion on a regional basis.[224] The court discussed the difficulty of meeting state RPSs without interstate transmission lines to move large amounts of wind power from the windy, lightly populated plains in the middle of the country to the coasts where more people live; the environmental and energy security benefits associated with developing domestic renewable energy; and the importance of taking those benefits into account when considering the costs of connecting remote wind farms to the grid and who should pay.[225] This decision, by deferring to MISO's allocation of costs and benefits, allows RTOs much greater leeway in planning for regional transmission upgrades and imposing those costs on a regional rather than a local basis. In order words, it reaffirms and to some extent expands the importance of RTOs and regional entities in general in managing the grid and making important decisions for the grid on a regional basis. This authority for regional governance of the transmission grid stands in contrast to the natural gas pipeline network. While Congress shifted authority over pipelines directly from the states to the federal government, in regards to the transmission grid, there is already a significant role for regional entities, even if their authority does not yet include siting or eminent domain power.

222 *Id.* at 770.

223 Ill. Commerce Comm'n v. FERC, 576 F.3d 470, 476-77 (7th Cir. 2009).

224 *Ill. Commerce Comm'n*, 721 F.3d at 774-75.

225 *Id.* at 771, 775, 778. *But see* Ill. Commerce Comm'n v. FERC, 756 F.3d 556, 564-65 (7th Cir. 2014) (rejecting FERC approval of PJM cost-allocation for high-voltage transmission lines within the PJM region for failure to sufficiently calculate costs and benefits of the lines).

IV. NEXT STEPS: THE ELECTRIC GRID AT A CROSSROADS AND THE POTENTIAL FOR A REGIONAL SOLUTION

The regulatory structure for interstate electric transmission lines no longer matches current policy preferences regarding the use of renewable energy resources and for many decades has not matched either the contours of the physical grid or electricity markets. Until recently, however, it was difficult to argue for a change in the status quo. Of course, interstate transmission lines have always been difficult to site and build in light of landowner, environmental group, and sometimes state agency opposition, as well as the patchwork of state laws governing siting and eminent domain. But until now, state siting laws have not created any real crisis in electricity access as existed with regard to natural gas access in the 1940s.

As described in Part I, the history of the development of U.S. energy transportation infrastructure illustrates that there have been critical points in time where the federal government has stepped in to address a national need for energy infrastructure development and created a federal siting process that displaces state law. With regard to natural gas pipelines, by the 1940s the nation's businesses, industries, and homes had become dependent on natural gas. At that same time, states were refusing to allow interstate pipelines to be constructed because those pipelines did not provide a direct, public use for state residents. When natural gas shortages on the East Coast resulted in significant industry layoffs in the winter of 1946–1947 as a result of regional natural gas shortages, Congress responded by amending the Natural Gas Act to provide nationwide siting, permitting, and eminent domain authority for interstate natural gas pipelines.[226] This federal process has resulted in more certainty of investment for natural gas pipelines, allowing them to be permitted and built often within a year or two of when first proposed. Notably, the lack of alternative means of transporting natural gas apart from pipelines may well have led to the push for federal siting and eminent domain for interstate lines. With pipelines the only means of economically transporting natural gas, state interference with siting those pipelines was an insurmountable obstacle to transporting the energy resource itself.

The electric grid now appears to be faced with a similar dilemma approximately seventy years later. Because coal, natural gas, and uranium can be transported by truck, train, and pipeline, utilities have historically been able to use those methods of transportation to bring traditional energy resources to power plants built close to load centers,

[226] *See supra* notes 38–44 and accompanying text.

and then build shorter transmission lines to connect power plants to customers. Likewise, to the extent utilities in different states wished to join RTOs or ISOs to share resources and create regional grids, they could plan and build lines under state law and, if the economics favored a new interstate line, resources could be pooled to undertake the often decade-long path to build such lines and those costs could be passed on to ratepayers under state law. But with efforts to integrate more wind and other renewable energy resources into the electric grid, state siting laws have increasingly posed a real barrier to transporting the energy resource itself.

Do changes in the electricity realm justify creating a new regulatory framework to enhance the interstate transmission network to take advantage of abundant wind and solar energy resources? Do the environmental, reliability, and energy security benefits of renewable energy outweigh the costs as well as the likely opposition of state regulators and state residents? Certainly, the history of natural gas pipeline regulation shows that Congress is able to move beyond state authority in the energy law context when there is a drive to turn what has historically been a locally constrained energy resource into a national one. Today, natural gas provides a reliable form of energy for heating and cooking for U.S. residents and industries throughout the country. And now, with new domestic natural gas resources made available by hydraulic fracturing technologies, that same interstate natural gas pipeline network has served to transport gas to power plants across the country for electricity generation purposes, displacing coal and the adverse environmental impacts associated with coal. But none of that development likely could have happened, or happened as rapidly, without the creation at a national level of an interstate transportation network able to transform natural gas into a national energy resource.

The United States is facing a similar decision with regard to a growing number of policies and priorities designed to promote much more widespread use of renewable energy, which requires major expansions in the electric grid. The existing electric grid can support renewable energy as a local resource, transporting it from one part of Texas to another or from North Dakota to Minnesota. Moreover, the existence of RECs allows local development of renewable energy to "count" for reductions in states that do not have such ample resources available.[227] But REC markets alone will not be enough to integrate the

[227] *See* Klass & Wilson, *supra* note 1, at 1810-11 (discussing RECs and the impact of various state RPSs on renewable energy development in nearby states).

scale of renewable energy necessary to move that electricity resource into a more dominant position nationwide. Thus, the difficulties faced by utilities, merchant transmission companies, and others attempting to build long distance transmission lines to serve today's regional grids and meet state and federal renewable energy targets and carbon reduction mandates highlight the limitations of the existing state-based siting framework. These renewable electricity resources, particularly wind, will remain trapped where they are least needed unless there is a new regulatory structure to consider the benefits and costs of those lines.

One option is for Congress to adopt the model that currently exists for interstate natural gas pipelines. Under the Natural Gas Act, a natural gas pipeline operator obtains a Certificate of Public Convenience and Necessity from FERC, which in turn allows the operator to exercise nationwide eminent domain authority along the path of the pipeline if it is not able to enter into voluntary easements with all the landowners.[228] This would eliminate many of the roadblocks to the interstate transmission lines needed to bring wind and solar energy from resource-rich parts of the countries to population centers. Indeed, as early as 1994, Professor Richard Pierce noted that without federal siting authority, the interstate electric transmission grid could never obtain the level of cost control and reliability enjoyed by the interstate natural gas pipeline system.[229] This has become even more true twenty years later, in 2015, as the United States attempts to integrate increasing amounts of renewable energy into the grid that can be generated cheaply in the Midwest (wind) and Southwest (solar) but must be transported to population centers where both demand and electricity prices are high to be cost-effective.

Adopting a federal siting and eminent domain framework would eliminate the need to obtain multiple state approvals for interstate transmission lines and allow FERC to consider national and regional benefits of grid expansion. Similar to regulation under the Natural Gas Act, states and other interested parties could have significant involvement in the permitting process but ultimately it would be FERC that would have decision-making authority. This would allow the entire nation to have regulatory authority, renewable resources, and population centers all within a single jurisdiction — a situation that exists today only in the state of Texas and cannot be replicated

228 *Id.* at 1859-60 (discussing federal siting and eminent domain process for interstate natural gas pipelines).

229 *See* Richard J. Pierce, Jr., *The State of the Transition to Competitive Markets in Natural Gas and Electricity*, 15 ENERGY L.J. 323, 333-34 (1994).

elsewhere under the current legal framework for interstate transmission lines.[230]

But while there is historical precedent in the natural gas industry for completely replacing state siting authority with federal siting authority, there are also good arguments that a fully centralized approach may not be the best model for modernizing today's electric grid. First, the Natural Gas Act came on the heels of significant New Deal legislation, including the National Labor Relations Act of 1935, the Social Security Act of 1935 and the establishment of the Securities and Exchange Commission in 1934.[231] At that time, the political climate favored significant new federal regulation of markets and monopolies by Congress and by new federal agencies Congress created.[232] The Natural Gas Act was an effort to apply these principles to natural gas markets and transportation as states struggled to regulate interstate pipeline companies and the rates they charged.[233] The Natural Gas Act filled that gap by providing federal regulation of interstate pipeline companies, rates, and the infrastructure needed to create a federal natural gas pipeline transportation system. Clearly, the political climate is quite different today.

Even putting aside the difference in the political climate between 1938 and 2015, there are other reasons that the "fix" for expanding interstate natural gas pipelines in 1938 may not be ideal for expanding interstate electric transmission lines in 2015. In 1938, there were no regional entities with any authority or expertise associated with natural gas rates, markets, or interstate pipelines. Thus, the only potential replacement for state regulation, which was seen as inadequate, was the federal government. In 2015, the situation is quite different with regard to electricity markets, rates, and interstate transmission lines. RTOs and ISOs provide significant authority and expertise in connection with setting wholesale electricity rates, planning for new transmission lines, and acting as a forum where

[230] *See* Klass & Wilson, *supra* note 1, at 1843-47 (discussing unique ability of Texas to engage in cost-effective integration of renewable energy because it has its own transmission grid, ample renewable resources, and major population centers within a single jurisdiction with regulatory authority).

[231] *Id.* at 1862.

[232] *See* Hiram Caton, *Progressivism and Conservatism During the New Deal: A Reinterpretation of American Political Traditions*, *in* THE NEW DEAL AND ITS LEGACY: CRITIQUE AND REAPPRAISAL 177, 183-84 (Robert Eden ed., 1989); Ellis W. Hawley, *The New Deal and the Problem of Monopoly*, *in* THE NEW DEAL: ANALYSIS AND INTERPRETATION 73, 78 (Alonzo L. Hamby ed., 1969).

[233] *See* John T. Miller, Jr., *Competition in Regulated Industries: Interstate Natural Gas Pipelines*, 47 GEO. L.J. 224, 230 (1958).

multiple stakeholders, including regulated entities, consumer interests, and states can collaborate on these issues. Even where RTOs and ISOs do not exist, regional transmission line planning among utilities is well-developed, and entities like the WAPA and the Western Electricity Coordinating Council ("WECC") serve as umbrella organizations for many sub-regional planning efforts within the Western Interconnection.[234] These regional planning efforts will become even more robust in future years as a result of FERC Order 1000, issued in 2011, which mandates that all utilities engage in regional planning efforts regardless of whether they are part of a RTO or ISO.[235] Thus, there is an existing level of expertise and regulatory authority at the regional level with regards to the electric industry that simply did not exist in 1938 in the natural gas industry.

Finally, a completely federal approach to interstate transmission line siting may not sufficiently take into account local conditions and concerns.[236] As Professor Ashira Ostrow has aptly summarized:

> 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.
>
> Moreover, federal regulation may, at times, be insufficiently sensitive to local concerns and conditions. 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

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[234] *See* Klass & Wilson, *supra* note 1, at 1855-57 (discussing WAPA and WECC).

[235] *See* Transmission Planning and Cost Allocation by Transmission Owning and Operating Public Utilities, Docket No. RM10-23-000, Order No. 1000, 136 FERC ¶ 61,051, at 1-2 (2011), *available at* www.ferc.gov/whats-new/comm-meet/2011/072111/E-6.pdf. In 2014, the U.S. Court of Appeals for the D.C. Circuit upheld FERC's authority to impose the requirements of Order 1000 on utilities in the face of numerous challenges. *See* S.C. Pub. Serv. Auth. v. FERC, 762 F.3d 41, 63 (D.C. Cir. 2014).

[236] *See* Ostrow, *Grid Governance*, *supra* note 1, at 2015-16 (arguing that centralizing authority for energy infrastructure magnifies their inherent risks "fifty times over").

conditions and responsive to local preferences than are federal administrators.[237]

As a result of these concerns, policymakers should seriously consider a regional approach to transmission line siting. This idea is not completely new. Justice Felix Frankfurter and Professor James Landis suggested a regional approach to electricity regulation as far back as 1925 in a Yale Law Journal article.[238] Even at that early date, they recognized "[t]he regional characteristic of electric power, as a social and engineering fact, must find a counterpart in the effort of law to deal with it."[239] Since that time, the regional growth of the electric grid has resulted in the rise of RTOs, regional approaches to transmission planning, and the creation of regional electricity markets. But so far these regional structures have had no impact on regulatory authority over transmission siting. Nevertheless, in the area of transmission siting, policymakers should consider regional options in addition to either the status quo or a complete transfer of siting authority to FERC under the interstate natural gas pipeline model. The Subparts below discuss the various regional options.

A. Interstate Compacts Under EPAct 2005 to Create Regional Siting Authorities

There is the potential under existing federal law to create new, regional entities to site interstate transmission lines. As discussed earlier, EPAct 2005 has not succeeded to date in granting DOE and FERC sufficient backstop authority to site interstate transmission lines in NIETCs.[240] But a separate provision of the legislation allows three or more contiguous states to enter into interstate compacts to establish regional siting authorities to determine the need for future transmission facilities within those states and carry out the transmission siting responsibilities of those states.[241] Under the

[237] *Id.* at 2015-16.

[238] Felix Frankfurter & James M. Landis, *The Compact Clause of the Constitution — A Study in Interstate Adjustments*, 34 YALE L.J. 685, 717 (1925).

[239] *Id.*

[240] *See supra* notes 126–29 and accompanying text (discussing EPAct 2005, NIETCs, and backstop siting authority).

[241] Energy Policy Act of 2005 § 216(i), 16 U.S.C. § 824p(i) (2012). The Compact Clause of the U.S. Constitution provides that "[n]o State shall, without the Consent of Congress . . . enter into any Agreement or Compact with another State . . . ." U.S. CONST. art. 1, § 10, cl. 3. For a discussion of the Compact Clause in the context of electricity regulation, see Frankfurter & Landis, *supra* note 238, at 717. *See generally* Jill Elaine Hasday, *Interstate Compacts in a Democratic Society: The Problem of*

statute, the siting authority would have power to "review, certify, and permit siting of transmission facilities," including facilities in NIETCs.[242] To date, no states have entered into such compacts and there is currently no real incentive for them to do so. But what if Congress gave states the option of entering into such compacts and, if they refused to do so within a set time period, siting authority would transfer to FERC? This would give states a choice to cede authority to a regional entity that would be more focused on local concerns or give up siting authority altogether. Congress could also use as an alternative incentive additional funds for transmission grid-related projects for those states that enter into compacts and create regional siting authorities. Thus, through new legislation, Congress could encourage rather than force states to move to a regional siting model.

Notably, the Council of State Governments through its National Center for Interstate Compacts ("NCIC") has created online resources for states, including model transmission line compact language, in an effort to encourage states to create interstate compacts.[243] In the model compact, the NCIC states one of the "purposes" of the compact is to recognize that "states have a vested interest in retaining their sovereignty and that EPACT 2005 authorizes interstate compacts that can forestall federal preemptive acts if states cooperatively develop a transmission siting process."[244] The model compact would create: (1) "A state project review panel within each member state, consisting of three or more members, to coordinate the views of different agencies and interests within the state;" (2) "[a] combined multi-state siting authority, consisting of the states affected by a particular project proposal, authorized to make siting decisions for that project;" and (3) "[a]n Interstate Compact Commission, which provides administrative support and rulemaking capability."[245]

It is clear that at the time the NCIC created its model compact, there were hopes that state concerns regarding exercise of federal backstop siting authority under EPAct 2005 would incentivize states to enter

Permanency, 49 FLA. L. REV. 1 (1997) (discussing the benefits and democratic concerns of interstate compacts).

[242] Energy Policy Act § 216(i).

[243] *See Transmission Line Siting Compact*, NAT'L CTR. FOR INTERSTATE COMPACTS, http://www.csg.org/NCIC/TransmissionLineSitingCompact.aspx (last visited Feb. 19, 2015).

[244] NAT'L CTR. FOR INTERSTATE COMPACTS, ELECTRIC TRANSMISSION LINE SITING COMPACT 1, *available at* http://www.csg.org/NCIC/documents/Electric%20Transmission%20Line%20Siting%20Compact%20-%20November%20Final%20Draft.pdf (last visited Feb. 19, 2015).

[245] *Id.* at 5.

into compacts to avoid an override of state authority.[246] But since the courts have not supported DOE and FERC's efforts in that area,[247] there is currently no real incentive for states to cede any power to a multi-state siting authority. Moreover, there is a dearth of successful regional governance regimes in the United States in light of the historic dominance of federal-state-local approaches to regulation in most areas of the law.[248] Nevertheless, that could change if: (1) Congress strengthened federal siting authority beyond what currently exists in EPAct 2005; or (2) a group of states determined that their renewable energy resources were sufficiently valuable for export as a result of new state or federal clean energy policies or financial incentives that it would justify entering into a compact to streamline siting authority for the necessary transmission lines to export those energy resources. In this way, either fear of federal preemption or market factors could create the necessary incentives for interstate transmission line siting compacts and allow use of the existing interstate compact authority in EPAct 2005.[249]

B. RTO Siting Authority

A second option is for Congress to grant transmission line siting authority to RTOs within their footprints. Since the start of the twenty-first century, RTOs and ISOs have played a central role in regional transmission planning and electricity markets in many parts of the country.[250] FERC and the federal courts have supported those efforts, with FERC Order 1000 and the 2013 *Illinois Commerce*

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[246] *See id.* at 1.

[247] *See supra* notes 130–32 and accompanying text (discussing judicial interpretations of EPAct 2005 backstop siting provisions).

[248] *See, e.g.*, Frank P. Darr, *Electric Holding Company Regulation by Multistate Compact*, 14 ENERGY L.J. 357 (1993) (discussing the problems with regional regulation).

[249] *See, e.g.*, *id.* at 374 (citing literature concluding that interstate compacts are only successful when they are "perceived as a last resort — other forms of regulation are not perceived as options"); Hasday, *supra* note 241, at 11 ("[S]tates should resort to compacts only when their advantages are most compelling: when the problem at hand requires a regional response; when any interstate agreement must be a compact because it may infringe on federal authority; when Congress is unable or unwilling to act; and when the compact agreement itself is drafted to mitigate democratic concerns.").

[250] *See, e.g.*, Regional Transmission Organizations, Docket No. RM99-2-000, Order No. 2000, 89 FERC ¶ 61,285 (1999) (setting forth requirements for utilities to join RTOs or report on progress towards doing so as well as RTO characteristics and functions); DAVIES ET AL., *supra* note 48, at 436-39 (discussing RTOs and ISOs).

Commission decision serving as just two examples of that support. Notably, RTOs and ISOs, where they exist, have a history of creating a forum for a diverse number of stakeholders, including state PUCs, utilities, consumer advocates, non-utility electricity providers, and local governments.[251] Thus, RTO-led transmission line siting has the potential for creating an open and inclusive forum for resolving multi-state and multi-party siting issues.

With the exception of Texas, which has major population centers, ample renewable energy resources, and its own electric grid within the boundaries of one state, RTOs are the only existing legal entity other than the federal government with jurisdiction over a transmission grid, major population centers, and ample renewable energy resources. No single state other than Texas can bring all of these elements together under one umbrella, which suggests a regional approach for the remainder of the country.[252] To accomplish this goal, Congress would need to expressly grant authority to RTOs to site transmission lines or states would need to cede some of their authority to the RTO through an interstate compact or some other legal means.[253]

One potential obstacle to this approach is that RTOs are non-governmental organizations, and thus do not easily "fit" within the types of entities that generally engage in the rulemaking and adjudicative functions normally exercised by a governmental body. Indeed, the U.S. Supreme Court addressed a similar issue in 2015 in a case involving whether Congress unconstitutionally delegated regulatory authority to a private corporation when it authorized Amtrak and the Federal Railroad Authority to jointly develop standards that would govern Amtrak as well as other rail carriers in the Passenger Railroad Investment and Improvement Act of 2008. The U.S. Court of Appeals for the D.C. Circuit held that the delegation was unconstitutional because Amtrak was a private corporation, but the U.S. Supreme Court reversed, holding that Amtrak was in fact a governmental entity.[254] In many ways, however, granting siting

[251] *See* Osofsky & Wiseman, *supra* note 209, at 52.

[252] *See* Wald, *Wired for Wind*, *supra* note 163, at B1 (explaining that Texas is in a much better position to build long distance transmission lines for wind energy than the rest of the country because "Texas is one of only three states with borders roughly contiguous with a grid operator, putting its electric system under the control of a single legislature and a single public utilities commission, and it is by far the largest in that category").

[253] *See* Klass & Wilson, *supra* note 1, at 1867-69 (discussing EPAct 2005 provisions allowing states to enter into interstate compacts to create regional siting agencies).

[254] *See* Dep't of Transp. v. Ass'n of Am. R.Rs., 135 S. Ct. 1225, 1226 (2015).

authority to RTOs differs from the issue in the Amtrak case because RTOs do not own or operate transmission lines and thus would not be making decisions that impact their own interests directly, even if an RTO may indirectly benefit from a new line because it would ease congestion on a grid that it manages.

Even apart from these distinctions, there is precedent for allowing a hybrid organization like an RTO to exercise such authority in the context of the electric grid. NERC, the North American Electric Reliability Corporation, is a not-for-profit entity composed of utility and other members. It long has served as an umbrella organization providing standards to help maintain the reliability of the bulk transmission system in the United States.[255] In EPAct 2005, after the 2003 Northeast blackouts, Congress authorized FERC to designate an electric reliability organization ("ERO") to ensure grid reliability and also granted FERC oversight authority over the ERO. In 2006, FERC designated NERC to be the ERO.[256] Today, NERC, working with eight regional entities, proposes reliability standards and cyber security standards to FERC and has authority — with FERC oversight — to impose fines up to $1 million daily and to engage in other enforcement actions against utilities and other grid participants for failure to comply with those standards. Thus, there is precedent even within the electricity realm for a private, nonprofit entity to exercise quasi-governmental authority with regards to electric grid development and management with federal oversight.[257]

Moreover, it is certainly possible to give RTOs siting and eminent domain authority for interstate transmission lines without completely transferring regulatory authority over transmission lines from the states to RTOs. Railroads and public utilities, for instance, have eminent domain authority and in some cases siting authority for building necessary infrastructure, but regulatory authority and oversight of those industries continues to remain with state and federal governmental entities.[258] Thus, Congress could create very

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[255] *See supra* note 144 (discussing NERC); *see also* DAVIES ET AL., *supra* note 48, at 463 (describing NERC and reliability standards).

[256] *See* Osofsky & Wiseman, *supra* note 209, at 37; *see also* DAVIES ET AL., *supra* note 48, at 463.

[257] *See* Osofsky & Wiseman, *supra* note 209, at 36-37.

[258] *See* Uma Outka, *The Renewable Energy Footprint*, 30 STAN. ENVTL. L.J. 241, 256-59 (2011) (discussing state siting of power plants); Amy L. Stein, *The Tipping Point of Federalism*, 45 CONN. L. REV. 217, 233-37, 247 (2012) (discussing federal regulation and siting regimes for railroads and energy generation facilities); Hannah Wiseman et al., *Formulating a Law of Sustainable Energy: The Renewables Component*, 29 PACE ENVTL. L. REV. 827, 849-50 (2011) (discussing state eminent domain authority for

limited authority within RTOs to site transmission lines without ceding additional authority to regulate those lines, thus avoiding some of the unconstitutional delegation problems raised in the Amtrak case.

C. New Mandates on the States to Consider Regional Need

A final and more modest option is to leave siting and eminent domain authority with the states but require states to affirmatively consider regional benefits in making siting and eminent domain determinations. Thus, in any siting or eminent domain proceeding for an interstate transmission line, federal law would require state PUCs and state courts to consider regional "need" and regional "public use" rather than in-state need and public use under existing state laws. If Congress followed this path, it could use as a model the Telecommunications Act of 1996 ("TCA").[259] Congress enacted the TCA to increase competition in the telecommunications industry and expand wireless service nationwide.[260] At the time, local zoning boards and city councils across the country were denying and delaying approval of cell phone towers in response to local citizen concerns. In response, instead of transferring siting authority away from local governments to a federal authority, Congress used the siting provisions of the TCA to: (1) prevent local governments from banning facilities outright; (2) ban unreasonable discrimination among providers; (3) require local authorities to respond to siting requests within a reasonable time period and to make decisions in writing, supported by substantial evidence; and (4) grant parties denied a siting permit the right to sue the local government in federal court with the claim decided on an expedited basis.[261] States and local governments retain the right to make decision on where, how, and when to site facilities within these federal mandates. According to Professor Ashira Ostrow, the law has resulted in the siting of

power plants).

[259] Telecommunications Act of 1996 (TCA), 47 U.S.C. § 332 (2012).

[260] Klass & Wilson, *supra* note 1, at 1865 (discussing the TCA); Camille Rorer, *Can You See Me Now? The Struggle Between Cellular Towers and NIMBY*, 19 J. NAT. RESOURCES & ENVTL. L. 213, 214-15 (2005).

[261] *See* T-Mobile S., LLC v. City of Roswell, 135 S. Ct. 808, 814 (2015) (describing provisions of the TCA and holding that the Act requires localities to provide reasons in writing when they deny cell phone tower siting applications and those reasons must be issued contemporaneously with the denial); Klass & Wilson, *supra* note 1, at 1866 (describing provisions of the TCA); Patricia E. Salkin & Ashira Pelman Ostrow, *Cooperative Federalism and Wind: A New Framework for Achieving Sustainability*, 37 HOFSTRA L. REV. 1049, 1091-97 (2009) (same).

thousands of new cell phone towers and significantly expanded the development of a "national telecommunications network."[262] She describes this siting policy as a "hybrid federal-local framework" that balances national and local land use priorities and has encouraged local regulators to cooperate with land use developers.[263]

If Congress were to take a similar approach with regard to interstate transmission lines, it could leave siting authority with the state but require state PUCs and courts to expressly consider regional need and regional public use in making certificate of need and eminent domain decisions for interstate transmission lines. State actors would be required to document this consideration in their decisions, and transmission line operators could seek relief in federal court for violation of these requirements. This hybrid approach would impose new, regional considerations on state actors, thus requiring them to take into account the regional value of transmission lines for renewable energy integration and grid reliability.[264]

All of the options above recognize the regional nature of the modern transmission grid as well as the shortcomings of leaving siting and eminent domain authority completely with the states under existing state laws. In suggesting a regional approach to interstate transmission

[262] Ashira Pelman Ostrow, *Process Preemption in Federal Siting Regimes*, 48 HARV. J. ON LEGIS. 289, 293 (2011).

[263] *Id.* at 292-93.

[264] One might argue that a federal requirement that state PUCs consider regional need in making transmission line siting decisions raises constitutional concerns associated with the "anti-commandeering" principles in the Tenth Amendment to the U.S. Constitution. *See, e.g.*, New York v. United States, 505 U.S. 144, 162 (1992) ("The Federal Government may not compel the States to enact or administer a federal regulatory program."); Printz v. United States, 521 U.S. 898, 932-33 (1997) (same). One judge on the U.S. Court of Appeals for the Fourth Circuit in 2000 found that the "substantial evidence" standard and other requirements imposed on local governments in the cell phone tower siting provisions of the TCA were unconstitutional based on this reasoning. *See* Petersburg Cellular P'ship v. Bd. of Supervisors, 205 F.3d 688, 692 (4th Cir. 2000) (Niemeyer, J., concurring). However, this view did not garner a majority opinion on the Fourth Circuit, and no other circuit has adopted its reasoning. *See, e.g.*, *id.* at 691-92. Moreover, the U.S. Supreme Court has held that Congress may constitutionally require state PUCs to "consider" federal standards in state electricity ratemaking proceedings to encourage certain cogeneration and small power facilities and to require states to enact rules to carry out such federal policies. *See* FERC v. Mississippi, 456 U.S. 742, 759-71 (1982) (upholding provisions of PURPA that direct state PUCs to "consider" the adoption and implementation of specific rate design regulatory standards and that require states to implement such rules). Thus, Supreme Court precedent would appear to support Congressional action requiring states to consider regional need among other factors in making electric transmission line siting decisions.

line siting, this Article recognizes that state interests in protecting their own regulatory authority, as well as the politics of today's Congress, make it difficult to envision implementing such an approach in the near future. Nevertheless, a major regional or national disruption, like the natural gas shortages on the East Coast in the 1940s, or the 2003 blackouts, which led to the creation of NERC, can change political sentiment very quickly. When that day arrives, it will be important to consider a regional approach to interstate transmission line siting that matches today's regional grid and regional electricity resources in additional to a federal approach or the status quo. Indeed, what may seem like a radical approach today may appear inevitable in the future.

Finally, this Article's support for a shift in siting authority to facilitate the development of new interstate transmission lines comes with a major caveat — it assumes that the nation will remain dependent at least to some extent on today's existing technology for transporting renewable energy for many decades. It may be that there will be significant developments in battery storage technology or some other means of storing electric energy that will allow the transport of wind, solar, and other renewable energy without the need for long-distance transmission lines.[265] There may also be breakthroughs in distributed solar technologies or geothermal energy that will make all of our current assumptions about how to best transport power obsolete. This is important not only for the massive costs associated with expanding the electric grid but also because of the adverse environmental and aesthetic concerns often associated with large-scale transmission lines.[266] Nevertheless, this Article assumes that for now,

265 *See, e.g.*, Brian Huskinson, et al., *A Metal-Free Organic-Inorganic Aqueous Flow Battery*, 505 NATURE 195 (2014) (reporting on the study of new battery technology to store renewable energy); *Organic Mega Flow Battery Promises Breakthrough for Renewable Energy*, HARVARD SCH. OF ENG'G & APPLIED SCIS. (Jan. 8, 2014), http://www.seas.harvard.edu/news/2014/01/organic-mega-flow-battery-promises-breakthrough-for-renewable-energy (describing a new battery technology that could store electricity generated from renewable, intermittent energy sources).

266 *See, e.g.*, Klass & Wilson, *supra* note 1, at 1803 (discussing historic opposition of environmental groups to many electric transmission lines across the country); Evans-Brown, *supra* note 168 (discussing landowner and environmental group opposition to Northern Pass transmission line designed to bring hydropower from Quebec to population centers in New England and discussing disputes over prior transmission lines in the region); Dustin Thaler, *Strange Bedfellows: Environmental Groups, Transmission Developers Working Together on Renewable Energy Projects*, AMS. FOR A CLEAN ENERGY GRID (Apr. 16, 2014), http://cleanenergytransmission.org/cross-post-strange-bedfellows-environmental-groups-transmission-developers-working-together-on-renewable-energy-projects/ (discussing historic environmental group

long-distance transmission will remain a central component of the U.S. electricity delivery system. As a result, because the grid is so central to our lives, and the benefits that come with modernizing the grid and integrating renewable energy are so significant, this Article concludes that it is critical to address regulatory barriers to a better transmission grid using current technological assumptions.

CONCLUSION

This Article first compares the history of the development of the electric grid with the development of the natural gas pipeline network as well as the regulatory history of each form of energy transportation. This history helps explain why Congress transferred regulatory authority over siting interstate natural gas pipelines from the states to the federal government. With regard to natural gas, there was a moment in time in the 1940s when the entire country was dependent on a locally constrained energy resource and states were blocking the creation of the interstate infrastructure necessary to transport that resource to population centers around the country. With regard to electricity, we have not yet experienced that "moment in time" because renewable energy still makes up a small percentage of our total electricity generation. But it is growing in many parts of the country, and current policies such as state RPSs, the EPA's Clean Power Plan Proposed Rule, and other EPA environmental regulations that have already begun to limit the nation's use of coal-fired electricity will put pressure on utilities to transport greater amounts of renewable energy to their customers.

This Article then concludes that in order to create a modern electric grid that can support such a shift, Congress can certainly turn to FERC as it did for interstate natural gas pipelines. But a regional siting approach better matches the physical aspects of the grid, as well as existing electricity markets and energy resources, all of which are or are becoming regional in scope, and leaves siting authority closer to the communities that the transmission lines will impact. Because of the grid's regional development as well as the rise of unique, regional actors like RTOs, Congress through legislation or the states through interstate compacts should seriously consider creating a regional approach to siting interstate transmission lines.

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opposition to transmission lines as compared to recent environmental group support in some instances for lines designed to transport renewable energy). Another problem with any major build-out of the transmission grid is that it may facilitate transmission of new fossil fuel energy resources in addition to or instead of renewable energy sources. *See* Rossi, *supra* note 1, at 1042-43.