MARKETS, STATES AND THE FEDERAL GOVERNMENT IN THE TRANSITION TO WIND ENERGY: MANY STEPS FORWARD, AND RECENT STEPS BACKWARDS

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INTRODUCTION

Key aspects of wind energy continue to improve, making it a more economically competitive resource for electricity. These aspects include the declining cost of wind generation, the reasonable costs of integrating moderate amounts of wind into the grid, the continued grid reliability with moderate amounts of wind integrated, and even increased grid resilience to a number of extreme weather events.

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Nevertheless, wind energy continues to face major challenges in other "public goods" aspects, particularly in the construction of interstate transmission lines. The construction of these transmission lines would ultimately yield benefits. However, there are upfront costs to this construction: states would need to agree how to allocate costs among states when the distribution of benefits and costs are uneven across states. For example, pass-through states—states that host these transmissions lines but do not receive the electricity transmitted—perceive costs without compensating benefits.[1] States' initiatives and cooperation, in collaboration with regional transmission organizations (RTOs), have, in some cases, paved the way for the construction of interstate transmission, though cost allocation among states remains a thorny issue.[2] States' political support for wind, stemming from the benefits of wind on the aggregate to rural communities and consumers, cements the impetus for cross-state collaborations.

Wholesale electricity markets have evolved over time to become more competitive, with new market rules enabling demand response and storage facilities to participate and to be compensated in these markets, thus providing incentives for cost-competitive services essential for grid reliability to expand. Under several administrations, the federal government—through the Federal Energy Regulation Commission (FERC), which regulates interstate electricity markets—has facilitated these innovations by issuing supportive rules. The federal government under the Obama Administration attempted to address market failures in the wholesale electricity market, specifically, by enacting regulations to reduce greenhouse gas (GHG) emissions. The Clean Power Plan sets targets for states to reduce their GHG emissions from the power sector, giving states the flexibility on how to achieve these reductions.

The Trump Administration has reversed course on these efforts of encouraging market competition and addressing market failures. The Department of Energy's proposal on subsidizing coal and nuclear energy undermines market signals that led to the retirement of less cost-effective coal and nuclear energy, in favor of more cost-effective natural gas and renewables. Additionally, the

1. *See* Jay Reidy, *How Crude?: Determining Transmission "Beneficiaries" and Related Steps Toward Workable Renewables Transmission Cost Allocation*, 41 ECOLOGY L. Q. 491 (2016).

2. *See generally id;* Alexandra B. Klass & Elizabeth J. Wilson, *Interstate Transmission Challenges for Renewable Energy: A Federalism Mismatch,* 65 VAND. L. REV. 1801 (2012).

federal government's failure to price carbon or to take the alternative strategy of supporting the Clean Power Plan squanders the opportunity to create a more level playing field by internalizing costs of pollution, and thus, to incentivize more rapid adoption of renewable energy.

Part I of this Essay reviews wind generation trends across states and regional electricity markets in the United States. Part II summarizes key aspects of wind energy that have shown continued improvements, and have enhanced wind's cost competitiveness, such as the declining cost of wind generation, the reasonable costs of integrating moderate amounts of wind into the grid, continued grid reliability with moderate amounts of wind integrated, and even increased grid resilience to a number of extreme weather events. Part III turns to the Achilles heel of wind—the barriers to constructing interstate transmission lines that are essential for integrating more wind into the grid while ensuring its reliability, and states' initiatives to enhance collaborative solutions. Part IV then describes the Trump Administration's efforts to subsidize coal and nuclear, which contradicts the trend of increasing market competition in wholesale electricity markets that incentivize cost-effective resources. Part V outlines how state governments in red, blue, and purple states support wind generation as, on the aggregate, wind has benefitted rural communities and consumers. Finally, this Essay concludes by noting that wind's continued improvements toward economic competitiveness and states' political support for wind bodes well for its continued growth. Nevertheless, the Trump Administration's anti-market actions in attempting to subsidize coal and nuclear under false pretexts and in contradiction to facts risk eroding investor confidence in cost-effective solutions winning the day.

I. WIND GENERATION IN THE UNITED STATES

In 2016, wind contributed 6% of the U.S. utility-scale electricity generation—far behind natural gas (34%), coal (30%), and nuclear (20%), but comparable to hydroelectric (7%) and ahead of biomass (2%) and solar (1%).[3] In recent years, wind made up a significant share of the additional utility-scale capacity addition. In 2016,

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3. *Electricity in the United States*, U.S. ENERGY INFO. ADMIN., https://www.eia.gov/energyexplained/index.cfm?page=electricity_in_the_united_states (last updated May 10, 2017).

wind made up 32% of this additional capacity, while natural gas contributed 33% and solar 28%.[4]

In 2015, wind exceeded almost a quarter of electricity generation in Iowa (31.3%), South Dakota (25.5%), and Kansas (23.9%), with shares at or exceeding 10% in a total of eleven states.[5] Texas produces the most amount of wind power in the United States, followed by California and Iowa.[6] In 2016, Texas contributed 24% of total wind generation in the United States, and wind made up 9.9% of electricity generation in Texas.[7]

At the level of regional transmission networks, wind generation provided 11.7% of the energy used in the Electric Reliability Council of Texas (ERCOT) region in 2015.[8] In the same year, wind provided 9% of total generation in the Midcontinent Independent System Operator (MISO) system, which serves the Midwest and parts of the South,[9] though within some regions the share was about 20%.[10] However, wind accounted for a much limited share in other networks. For example, in the PJM system that serves the mid-Atlantic region and some parts of the Midwest, while renewable energy accounted for 6% of the share of total generation, wind accounted for less than 1% of the share of total generation.[11]

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4. *U.S. Generating Capacity Increase in 2016 Was Largest Net Change Since 2011*, U.S. ENERGY INFO. ADMIN. (Feb. 27, 2017), https://www.eia.gov/todayinenergy/detail.php?id=30112.

5. *Wind Generation Share Exceeded 10% in 11 States in 2015*, U.S. ENERGY INFO. ADMIN. (Oct. 26, 2016), https://www.eia.gov/todayinenergy/detail.php?id=28512. The other states with wind generation at or exceeding 10% are Oklahoma (18%), North Dakota (18%), Minnesota (17%), Idaho (16%), Vermont (15%), Colorado (14%), Oregon (11%), and Maine (10%).

6. *Id.*

7. *Id.*

8. *Energy Use in ERCOT Region Grows 2.2 Percent in 2015*, ERCOT (Jan. 15, 2016), http://www.ercot.com/news/releases/show/86617.

9. Wayne Barber, *MISO Energy Mix 51% Coal in 2015; Expected to Decline to 36% in 2030*, GENERATIONHUB, (Aug. 23, 2016), http://generationhub.com/2016/08/23/miso-energy-mix-51-coal-in-2015-expected-to-declin.

10. Eric Gimon et al., *Renewables Curtailment: What We Can Learn From Grid Operations in California and the Midwest*, GREENTECH MEDIA (Mar. 23, 2015), https://www.greentechmedia.com/articles/read/renewables-curtailment-in-california-and-the-midwest-what-can-we-learn-from#gs.0k4SxAI.

11. PJM INTERCONNECTION, PJM'S EVOLVING RESOURCE MIX AND SYSTEM RELIABILITY 9 (2017), http://www.pjm.com/~/media/library/reports-notices/special-reports/20170330-pjms-evolving-resource-mix-and-system-reliability.ashx.

II. WIND ENERGY'S ECONOMIC COMPETITIVENESS

A. Declining Project Costs

A number of studies, despite their imperfect metrics, indicate that wind's economic competitiveness has improved over time. Lazard, a financial advisory and asset management firm, has produced an annual report on energy production cost since 2008. It reports that unsubsidized levelized costs of wind energy are declining over time.[12] In 2016, this cost ranged between $32/MWh and $62/MWh, about one-third of the costs in 2009, which ranged from $101/MWh to $169/MWh.[13]

Power purchase agreements for wind energy likewise show declines.[14] In the interior region of the United States, which has the best wind resources, the power purchase agreements stood at $20/MWh in 2016, roughly a third of the 2009 price of $55/MWh.[15] While acknowledging that comparisons are imperfect, a Department of Energy's (DOE) study notes that the future stream of wind prices from these power purchase agreements signed in 2014–2017 "compares very favorably" with the projected fuel costs for gas-fired generation through 2050 calculated by the U.S. Energy Information Administration.[16] As a result of this favorable comparison, wind power is attractive as a hedge against the

12. The levelized costs captures the lifetime costs of a project (e.g. operations and maintenance, fuel, capital and debt-financing) divided by the amount of energy generated. While these figures capture how wind is becoming more competitive, resulting, for example, from technological improvements, the levelized costs figures are not meant to capture the total benefits and the total costs from wind generation. The levelized costs exclude social benefits from wind, such as environmental benefits. It also excludes costs that enable wind to reach consumers while maintaining grid stability, such as integration costs and transmission costs. *See Levelized Cost of Energy 2017*, LAZARD (Nov. 2, 2017), https://www.lazard.com/perspective/levelized-cost-of-energy-2017/. The levelized costs are not meant to capture the heterogeneity in value of wind farms. Wind farms are most valuable when they produce wind during times of high energy demand and in locations where they require less ramping from other generators (e.g. during low wind speeds). *See* Julian V. Lamy, et. al, *Should We Build Wind Farms Close to Load or Invest in Transmission to Access Better Wind Resources in Remote Areas? A Case Study in the MISO Region*, 96 ENERGY POL'Y 341 (2016).

13. LAZARD, LAZARD'S LEVELIZED COST OF ENERGY ANALYSIS—VERSION 10.0, at 10 (2016), https://www.lazard.com/media/438038/levelized-cost-of-energy-v100.pdf.

14. *See Renewable Electricity Production Tax Credit (PTC)*, U.S. DEPT. OF ENERGY, https://energy.gov/savings/renewable-electricity-production-tax-credit-ptc. Purchasing power agreements capture only part of the cost of wind generation as generators may be receiving federal, state or local subsidies. Nevertheless, comparison of prices from purchase power agreement over time provide some indication that wind is becoming more cost-competitive over time. The production tax credit for wind projects constructed in 2016 is $0.023/kWh, and is declining by 20% in 2017, 40% in 2018 and 60% in 2019. *Id.*

15. RYAN WISER ET AL., U.S. DEP'T OF ENERGY, 2016 WIND TECHNOLOGIES MARKET REPORT, at viii (2017).

16. *Id.*

uncertain prices of natural gas.[17] Indeed, CEOs of utility companies, such as Xcel, have noted that the competitive prices of power purchase agreements for wind relative to prices of natural gas and the importance of hedging against the uncertain price of natural gas, even when natural gas prices are at historical lows, have led them to choose wind.[18]

B. The Reliability and Resilience of the Grid with Wind Energy

A more reliable grid is one in which a customer is less likely to face a loss of electricity resulting from sudden loss of generation, transmission, or other disturbances in the system.[19] A more resilient grid is one in which outages in the event of disruptions—for example, from weather events—last for shorter periods and affect a narrower geographical expanse.[20]

As documented in a number of studies, moderate shares of wind have been integrated into the grid at reasonable costs while maintaining the reliability and the resilience of the grid; in fact, wind power has enhanced resiliency in a number of documented cases. The North American Electric Reliability Corporation (NERC), the nonprofit corporation that oversees and reports on the reliability of the U.S. bulk power system (BPS), reported that "the BPS provided an adequate level of reliability (ALR) during 2016,"[21] echoing findings from previous years from 2013 through 2015.

Regional transmission organizations similarly report reliability with moderate shares of winds. For example, PJM Interconnection, which coordinates the movement of wholesale electricity in the mid-Atlantic region and parts of the Midwest, reports that its system—which has shifted to greater shares of natural gas and wind—is reliable.[22] In 2005, the PJM system relied on coal and nuclear for 91% of its electricity.[23] In 2016, resources shifted to

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17. *Id.* at 62.

18. Alex Nussbaum & Chris Martin, *Wind Power Now Cheaper Than Natural Gas for Xcel, CEO Says*, BLOOMBERG (Oct. 23, 2015, 4:49 PM), https://www.bloomberg.com/news/articles/2015-10-23/wind-energy-cheaper-than-natural-gas-for-xcel-ceo-fowke-says.

19. *Part II: Powering America: Defining Reliability in a Transforming Electricity Industry: Hearing Before the Subcomm. on Energy of the H. Comm. on Energy & Commerce*, 115th Cong. (2017) [hereinafter *Hearing*] (statement of John Moore, Director, Sustainable FERC Project, Energy & Transportation Program, Natural Resources Defense Council), http://docs.house.gov/meetings/IF/IF03/20171003/106457/HHRG-115-IF03-Wstate-MooreJ-20171003-U3.pdf.

20. *Id.*

21. N. AM. ELECTRIC RELIABILITY CORP., STATE OF RELIABILITY 2017, at vi (2017).

22. PJM INTERCONNECTION, *supra* note 11, at 3.

23. *Id.* at 9.

33% coal, 33% natural gas, 18% nuclear, and 6% renewables, with improved demand response capabilities.[24] PJM reports that its blend of resource mix, which consists of both its current mix and its projected mix as far out as 2021, has given it reliability. PJM reports that it can maintain high levels of reliability, even if renewable energy were to make up close to 20% of its unforced capacity.[25] Present renewable energy shares in the PJM system, at 6%, are still far below this 20% threshold.[26] With its blend of resource mix, PJM has been able to mitigate risks common to similar resource types, address volatility in fuel prices and disruptions in fuel supply, and mitigate risks from weather and other unanticipated events.[27]

Utility companies have similarly reported their ability to maintain reliability with greater shares of wind in their portfolio. Xcel Energy, a utility company, relies on coal for 37% of its energy generation, and wind for 17% of that generation, with a goal to achieve 35% of wind in its mix by 2021.[28] Xcel Energy's CEO, Ben Fowke, stated: "I don't think 5 or 10 years ago I'd be comfortable telling you we could not sacrifice reliability when we're going to have 35% of our energy come from wind . . . . I'm telling you, I'm very comfortable with that today."[29]

Wind has contributed to the resilience of the grid, during episodes of extreme cold or hot-weather events. Wind in the Midwest produced power during the 2014 Polar Vortex.[30] Wind in Texas generated power during the morning peak of the February 2011 cold snap.[31] During that time, frozen equipment caused coal and gas fired power plants to shut down in the Southwest region.[32]

Wind also made a critical contribution in meeting 10% of electricity needs in Texas in the summer of 2011, when it was hit by prolonged high temperatures and drought.[33] A heatwave that

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24. *Id.*

25. *Id.* at 5.

26. *See supra* note 11, and accompanying text.

27. *Id.* at 3.

28. Amy Harder, *Wind Energy's Watershed Moment*, AXIOS (May 25, 2017), https://www.axios.com/a-utility-ready-to-rely-on-wind-2420915196.html.

29. *Id.*

30. JUDY W. CHANG ET AL., ADVANCING PAST "BASELOAD" TO A FLEXIBLE GRID: HOW GRID PLANNERS AND POWER MARKETS ARE BETTER DEFINING SYSTEM NEEDS TO ACHIEVE A COST-EFFECTIVE AND RELIABLE SUPPLY MIX 17 (2017).

31. *Id.*

32. *Id.* at 16.

33. Paul Faeth, *In Drought-Prone Texas, A Threat to the Energy Supply*, DALLAS NEWS (Dec. 2013), https://www.dallasnews.com/opinion/commentary/2013/12/20/in-drought-prone-texas-a-threat-to-the-energy-supply; David Hochschild & David Olsen, *Renewable Energy No Threat to Electric Grid, As Trump Aides Claim,* S.F. CHRONICLE, June 16, 2017,

hit Texas caused shortages in water that was needed to cool down nuclear, coal, and gas fired power plants. At the same time, high temperatures caused an increase in electricity demand.[34]

David Hochschild, a commissioner with the California Energy Commission, and David Olsen, a member of the California Independent System Operator Board of Governors, argued that renewable energy contributed to California's grid reliability and resilience. They concluded:

> [T]he three biggest threats to our grid over the last 20 years came from market manipulation (Enron et al, during the 2001 energy crisis), a nuclear plant failure (San Onofre, 2012) and the largest natural gas leak in history (Aliso Canyon gas storage facility, 2015). Rather than create these emergencies, renewable energy was part of the solution and continued to operate reliably and prevented these events from becoming worse.[35]

The preceding examples underscore that moderate share of wind has been incorporated into the grid without sacrificing grid reliability and resilience. Indeed, the availability of wind energy has lessened the negative impacts from a number of adverse events.

C. Reasonable Costs of Integrating Moderate Shares of Wind in the Grid

The National Renewable Energy Laboratory (NREL) review of wind integration studies concluded that "integrating significant levels of wind energy generation, on the order of 30%, is not only technically possible, but economically feasible."[36] The key to integrating more wind is the flexibility of the system.[37] A flexible system can better maintain the balance between generating supply and meeting demand under uncertainty.[38] Flexibility of the system

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http://www.sfchronicle.com/opinion/article/Renewable-energy-no-threat-to-electric-grid-as-11226625.php.

34. Faeth, *supra* note 33.

35. Hochschild & Olsen, *supra* note 33.

36. M. MILLIGAN ET AL., NAT'L RENEWABLE ENERGY LAB., REVIEW AND STATUS OF WIND INTEGRATION AND TRANSMISSION IN THE UNITED STATES: KEY ISSUES AND LESSONS LEARNED 19 (2015).

37. *Id.*

38. Eric Hsieh & Robert Anderson, *Grid Flexibility: The Quiet Revolution*, 30 ELECTRICITY J. 1, 1 (2017).

is enhanced among others, by demand response and generation that can quickly ramp up and down to balance the system.

The wind integration studies conclude that despite the increase in reserves[39] to cope with the variability and uncertainty of wind power, electricity generation from additional sources costs about 10% of the value of wind power.[40] The studies further note that "[w]ind penetrations up to 10% or 20% of the load served can often be accommodated with little or no changes to system operational practices," though greater coordination among balancing areas authorities (BAA) would improve integration.[41] "[A]t wind penetration levels in excess of 20%, it is likely that changes will be required to the standard practices of system balancing (e.g., increased frequency of scheduling and BAA coordination)."[42]

In the case of ERCOT, incremental costs from additional reserves were modest for integrating 10,000 MW of wind into the system (i.e., 11% of the electricity in the system).[43] The additional reserves increased the cost of wind by $0.50/MWh.[44] From the perspective of Texas household, the additional need for reserves increased their electricity bill by $0.06 per month relative to a typical Texas household's $140 monthly electric bill.[45] In the case of MISO, it reports integrating 10,000 MW of wind generation, requiring little to no increase in its reserve needs.[46]

For the WestConnect group of utilities in Arizona, Colorado, Nevada, New Mexico, and Wyoming, 30% wind and 5% solar is operationally feasible, with 20% of wind achievable with greater cooperation among balancing authorities and without additional interstate transmission.[47] Wind and solar generate savings of $28/MWh to $29/MWh by reducing the need for fossil fuels. At the same time, adding wind and solar to the grid would impose only $0.47/MWh to $1.28/MWh to the costs of fossil fuel generators.[48] These additional costs result from the wear and tear experienced

39. U.S. ENERGY INFO. ADMIN., ASSUMPTIONS TO THE ANNUAL ENERGY OUTLOOK 2017, at 111 (2017). Reserve margins—i.e. backup electricity generating capacity—are planned not only for renewable energy, but also for gas, coal or nuclear plants in case of unexpected power plant shutdowns or other supply disruption.

40. MILLIGAN ET AL., *supra* note 36, at 19.

41. *Id.*

42. *Id.*

43. *Id.* at 25.

44. *Id.*

45. *Id.*

46. *Id.*

47. *Id.* at 10.

48. *Id.* at 11.

at conventional plants as they ramp up and down to balance the intermittency of solar and wind.[49]

DOE's review of integration studies similarly concluded that costs are reasonable to integrate moderate shares of wind into the grid, while maintaining its reliability. According to that review, "[Wind energy] integration costs are [almost always] below $12/MWh—and often below $5/MWh—for wind power capacity penetrations of up to [or] even exceeding 40% of the peak load of the system in which the power is delivered."[50] These studies include the costs of additional reserves and additional balancing strategies.[51] However, these studies exclude the costs of additional transmission.[52] The challenge of increasing transmission is discussed in Part III.

A variety of strategies are being improved to enhance cost-effective wind integration at current and future wind penetration levels.[53] These strategies include improving forecasting, enhancing demand response (i.e., rewarding customers who voluntarily use less electricity at times when power supplies are tight), introducing real-time pricing of electricity (i.e., charging consumers higher prices during times of peak demand relative to supply, and vice versa), and improving energy storage.[54] Stafford and Wilson discuss the combination of innovations in policy rules and technologies to integrate wind.[55] MISO, through complex negotiations with stakeholders, successfully redesigned electricity markets and policy rules, so that wind energy under the Dispatchable Intermittent Resource program can bid directly into wholesale electricity markets.[56]

III. OVERCOMING CHALLENGES IN WIND INTEGRATION: MULTISTATE COOPERATION FOR INTERSTATE TRANSMISSION LINES

As identified in numerous studies, one of the key barriers, under present wind technologies, to high shares of wind in the grid

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49. *Id.*
50. WISER ET AL., *supra* note 15, at 69.
51. *Id.*
52. *Id.*
53. ANDREW MILLS & RYAN WISER, STRATEGIES FOR MITIGATING THE REDUCTION IN ECONOMIC VALUE OF VARIABLE GENERATION WITH INCREASING PENETRATION LEVELS 3–5 (2014).
54. *Id.*
55. Benjamin A. Stafford & Elizabeth J. Wilson, *Winds of Change in Energy Systems: Policy Implementation, Technology Deployment, and Regional Transmission Organizations*, 21 ENERGY RES. & SOC. SCI. 222 (2016).
56. *Id.* at 222.

is the construction of transmission lines.[57] Transmission lines are needed to bring wind power from points of generation—typically rural areas with the best wind resources—to points of use, which are located in urban areas.[58] Transmission by connecting areas across a larger geographical expanse can improve the balancing of electricity demand and supply, and reduce curtailment of wind that occurs when supply exceeds demand within the interconnected area.[59] Indeed ERCOT, despite its increased wind penetration, reduced wind curtailment from 17% in 2009 to 1.6% in 2016, thanks to Texas's build up and upgrade of its transmission lines and its more efficient electricity market designs.[60] ERCOT spread the cost of transmission to all the electricity customers in the state.[61]

Interstate transmission has become more important, as more states have set even higher targets for Renewable Portfolio Standards (RPS), which require utilities to sell a minimum threshold of electricity generated from renewable energy to consumers, and a number of states permit utilities to meet these targets from out-of-state resources. Interstate transmission, however, faces a critical challenge from an administrative, legal, and financial mismatch. Decision-making on whether to permit interstate transmission grids is governed primarily by state laws, with a very limited role for federal law; but operations of electricity markets and the planning for grid reliability and transmission lines is governed at the regional level.[62] Pass-through states, whose approval is required for the construction of transmission lines, may receive benefits that fall short of the costs they bear.[63] Interstate transmission lines, while improving grid stability in pass-through states, may not purchase from or sell electricity to the pass-through states.[64]

57. JENNY JORGENSON ET AL., NAT'L RENEWABLE ENERGY LAB., REDUCING WIND CURTAILMENT THROUGH TRANSMISSION EXPANSION IN A WIND VISION FUTURE, at v (2017).

58. *See* David C. Hoppock & Dalia Patiño-Echeverri, *Cost of Wind Energy, Comparing Distant Wind Resources to Local Resources in the Midwestern United States*, 44 ENVTL. SCI. TECH. 8758 (2010). The challenges of building transmission lines have led scholars to compare the benefits and costs of projects in wind rich areas that are further from population centers versus projects in areas with less ideal resources, but that are closer to population centers. *See id.* at 8758.

59. JORGENSEN ET AL., *supra* note 57, at v.

60. WISER ET AL., *supra* note 15, at 37.

61. JENNIE C. STEPHENS ET AL., SMART GRID (R)EVOLUTION: ELECTRIC POWER STRUGGLES 121–23 (2015).

62. *See* Alexandra B. Klass, *The Electric Grid at a Crossroads: A Regional Approach to Siting Transmission Lines*, 48 U.C. DAVIS L. REV. 1895 (2015).

63. *Id.* at 1917.

64. *Id.* at 1917–18.

This uneven distribution of benefits and costs from interstate transmission lines raises the challenging question of the extent to which pass-through states and local landowners therein should be compensated for siting these transmission lines on their lands, and to what extent electricity consumers in pass-through states should be forced to share in the financial costs from transmission lines.[65] At the same time, fair compensation and cost allocation to pass-through states and local communities needs to be balanced with the financial viability of constructing transmission lines.

Scholars point to cooperation across states in the Midwest that has led to successful construction of interstate transmission lines, although coming to an agreement on the cost allocation question proved to be a major challenge as benefits and costs are unevenly distributed among states. Professors Stephens, Wilson and Peterson provide a detailed analysis of how Midwestern states—Iowa, Minnesota, North Dakota, South Dakota, and Wisconsin—formed the Upper Midwest Transmission Development Initiative (UMTDI) in 2008 to create a plan for the multistate development of transmission lines to support renewable energy development in the Midwest (including Illinois), and to design a cost allocation strategy for sharing the cost of the transmission line among states.[66]

The UMTDI executive committee included representatives from each state's governor's office and public utility commission; staff from MISO also provided support.[67] The UMTDI studied various scenarios for the development of wind, the transmission routes, and the benefits and costs of these various scenarios, in doing so it consulted with a wide variety of stakeholders, including state regulators, transmission companies, electric utilities, and independent power producers. In 2011, the National Governors Association and MISO mapped, planned, and eventually approved the seventeen Multi-Value Project (MVP) lines across the system with costs to be shared across the entire region in proportion to each utility's share of the region's total wholesale consumption of electricity.[68]

As described in Stephens, Wilson and Peterson's report, cost allocation among states and utilities proved to be a thorny issue.[69]

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65. Ashley C. Brown & Jim Rossi, *Siting Transmission Lines in a Changed Milieu: Evolving Notions of the "Public Interest" in Balancing State and Regional Considerations*, 81 U. COLO. LAW REV. 705, 726–28 (2010).

66. STEPHENS ET AL., *supra* note 61, at 127–33.

67. *Id.* at 129–30.

68. *Id.* 130–31.

69. *Id.*

After FERC approved the cost allocation submitted by MISO, Illinois sued FERC arguing that its rural electric cooperatives did not benefit from these lines as they were exempt from meeting the state's RPS.[70] Michigan sued FERC, arguing that it derived little benefit from the lines, as it used only small amounts of electricity from MISO, and Michigan utilities could not use out-of-state renewable energy to meet its RPS.[71] In June 2013, the Seventh Circuit Court of Appeals ruled in favor of FERC, pointing out that Illinois benefited from the enhanced reliability of the grid and the availability of wind in the MISO system would yield annual savings to MISO customers of about $297 million to $423 million.[72] The court also ruled against Michigan, noting that Michigan discriminated against out-of-state renewable energy in contravention to the dormant commerce clause.[73]

As wind penetration increases and brings generation and transmission lines into collision with more communities, achieving buy-in from local landowners and non-landowners through revenue-sharing is becoming more important.[74] Professor Klass describes revenue sharing strategies, such as annual lease payments to landowners and community benefit agreements, that can encourage buy-in, but at the price of raising the costs of the transmission lines.[75]

IV. FEDERAL LEVEL: EVOLUTION OF MARKET RULES TO REWARD BENEFITS AND REGULATIONS TO PENALIZE POLLUTION

In wholesale electricity markets, generators of electricity sell power to utility companies and other electricity providers for resale, ultimately, to final users. Market rules in wholesale electricity markets[76] have been evolving and, in some states, these

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70. *Id.* at 131.

71. *Id.*

72. Ill. Commerce Comm'n v. FERC, 721 F.3d 764, 774 (7th Cir. 2013); *see also* Richard Allan, *Seventh Circuit Ruling Upholds Transmission Cost Sharing, Raises Questions of Renewable Portfolio Standards*, MARTEN LAW (Aug. 4, 2013), http://www.martenlaw.com/newsletter/20130804-transmission-cost-sharing-upheld.

73. Allan*, supra* note 72.

74. E. Lantz & L. Flowers, *Scoping and Framing Social Opposition to U.S. Wind Projects*, NAT'L RENEWABLE ENERGY LAB. (2010), https://www.nrel.gov/docs/fy10osti/47969.pdf.

75. Alexandra B. Klass, *Expanding the U.S. Electric Transmission and Distribution Grid to Meet Deep Decarbonization Goals*, 47 ENVTL. L. REP. 10749, 10765 (2017).

76. Wholesale electricity markets are a hybrid of markets, regulations and antimarket features (i.e., market players can externalize social costs or they receive subsidies without generating social benefits). *See* Severin Borenstein & James Bushnell, *The U.S. Electricity Industry After 20 Years of Restructuring* (Nat'l Bureau of Econ. Res. Working Paper No. 21113, 2015), http://www.nber.org/papers/w21113.pdf.

rules provide compensation for a variety of services that improve grid reliability, thus encouraging their growth. In the PJM system, industrial and commercial customers that agree to demand response—that is, to reduce their demand during peak hours—are linked by aggregators, which bid in this total demand response into the wholesale market.[77] The PJM and MISO systems allow energy storage technologies to participate in wholesale electricity markets.[78] FERC, which regulates the interstate electricity market, and thus has jurisdiction over RTOs and independent system operators (ISOs), has responded positively to these innovations. In 2011, FERC issued orders so that companies that offer to reduce electricity use during peak periods receive compensation rates that would have been otherwise paid to the generators to meet that peak demand.[79] In 2016, FERC issued a notice of proposed rulemaking so that storage resources can participate in wholesale electricity markets,[80] and FERC subsequently issued a final order (Order 841) in 2018.[81]

In the realm of pollution, however, electricity markets fail to reward low-carbon generation sources or penalize carbon-intensive generation. Attempts to adopt market-based solutions that would correct the price signal to generators, such as a carbon tax or cap and trade, have so far faltered.[82] In August 2015, the Environmental Protection Agency (EPA) under the Obama Administration, citing its statutory responsibility under the Clean Air Act, finalized a rule that would curb carbon dioxide emissions.[83] This rule, knows as the Clean Power Plan (CPP), set targets for states to reduce their carbon dioxide emissions in their power sector, giving states the flexibility on how they would

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77. Klass, *supra* note 75 at 10759.

78. *Id.* at 10760.

79. Demand Response Compensation in Organized Wholesale Energy Markets, 134 FERC ¶ 61,187 (Mar. 15, 2011) (codified at 18 C.F.R. pt. 35).

80. Electrical Storage Participation in Markets Operated by Regional Transmission Organizations and Independent System Operators, 81 Fed. Reg. 86,522 (proposed Nov. 30, 2016) (to be codified at 18 CFR pt. 35).

81. Electric Storage Participation in Markets Operated by Regional Transmission Organizations and Independent System Operators, 162 FERC ¶ 61,127 (Feb. 15, 2018) (codified at 18 C.F.R. pt. 35).

82. *See* MOLLY F. SHERLOCK & JEFFERY M. STUPAK, CONG. RESEARCH SERV., R43206, ENERGY TAX POLICY: ISSUES IN THE 114TH CONGRESS 5, 24 (2016).

83. *See* JONATHAN L. RAMSEUR & JAMES E. MCCARTHY, CONG. RESEARCH SERV., R44145, EPA'S CLEAN POWER PLAN: HIGHLIGHTS OF THE FINAL RULE 1 (2016).

achieve these reductions.[84] However, on February 9, 2016, the Supreme Court stayed the rule during a litigation mounted by a number of states.[85]

A. Contradicting Markets: The Trump Administration's Proposal to Subsidize Coal and Nuclear

The Trump Administration has chosen to contradict this effective strategy of rewarding cost-effective services that enhance grid stability. Instead, the Administration has chosen to push for subsidies for coal and nuclear, under the false pretext of addressing the threat to grid reliability. On September 29, 2017, the Department of Energy issued a Notice of Proposed Rulemaking (NOPR) to FERC, requesting that FERC adopt a rule mandating ISOs and RTOs to pay plants that have 90 days' worth of fuel on site for "its fully allocated costs and a fair return on equity."[86] Coal and nuclear power plants are facilities that could qualify under this fuel-on-site requirement. In his testimony to Congress, Secretary of Energy, Rick Perry, asserted that "traditional baseload generation with on-site fuel storage that can withstand fuel supply disruptions caused by natural and man-made disasters. But the resiliency of the electric grid is threatened by the retirements of these fuel-secure traditional baseload resources, including coal and nuclear."[87]

A myriad of groups have opposed this proposal, including natural gas, renewable energy, storage and environmental groups and a bipartisan group of former FERC commissioners, while nuclear and coal generation groups have voiced support for the proposal.[88] Critics condemned this proposal for its departure from competitive wholesale electricity markets and from FERC's technology-neutral position.[89] In wholesale electricity markets, generators are not guaranteed any payments. Whether and how

84. *Id.*

85. LINDA TSANG & ALEXANDRA M. WYATT, CONG. RESEARCH SERV., R44480, CLEAN POWER PLAN: LEGAL BACKGROUND AND PENDING LITIGATION IN WEST VIRGINIA V. EPA 14–15 (2017).

86. Grid Resiliency Pricing Rule, 82 Fed Reg. 46,940 (proposed Oct. 10, 2017).

87. *Department of Energy Missions and Management Priorities: Hearing Before the Subcomm. on Energy of the H. Comm. on Energy & Commerce*, 115th Cong. (2017) (statement of Secretary Rick Perry, U.S. Dep't of Energy), http://docs.house.gov/meetings/IF/IF03/20171012/106506/HHRG-115-IF03-Wstate-PerryR-20171012.pdf.

88. Gavin Bade, *Updated: DOE Cost Recovery Rule Divides Power Sector in House Hearing*, UTIL. DIVE (Oct. 4, 2017), https://www.utilitydive.com/news/updated-doe-cost-recovery-rule-divides-power-sector-in-house-hearing/506452/.

89. Emma Hand & Adam Brown, *DOE Proposal Offers Blatant Subsidies for Coal Industry*, LAW360 (Nov. 1, 2017, 3:31 PM), https://www.law360.com/articles/980466/doe-proposal-offers-blatant-subsidies-for-coal-industry.

much payment they receive depends on their competitiveness relative to other generators. Generators bid into these markets. Grid operators purchase the lowest cost generation followed by higher cost generation. And the market clearing price is the price paid to the last unit of generation needed to meet demand.[90] Wholesale electricity markets work in complement with capacity markets. Generators that can remain profitable enough by staying operational for the sake of providing power just in the event there are power shortages sell into the capacity markets.

The Department of Energy's proposal runs counter to market practices by guaranteeing compensation to nuclear and coal plants, regardless of whether these plants truly provide services to the grid. The proposal would implement subsidies to prop up coal and nuclear plants that cannot compete in either wholesale or capacity markets and that would otherwise exit the market. The vague wording of the proposal could mean that these plants would be guaranteed revenue, not only to cover their operating and fixed costs, but also to assure generous profit margins. These subsidies, which would accrue mainly to ten companies,[91] divert resources from investments in strategies that can truly increase grid reliability and resiliency.[92]

Alison Silverstein led the DOE Staff Report on Electricity Markets and Reliability, a study ordered by Secretary Perry, ostensibly to inform his proposal to FERC. Silverstein explained how competitive market pressures—which by virtue shift competitive plants to survival and non-competitive plants to demise—led to the retirement of coal[93] and nuclear plants.[94] Falling natural gas prices made natural gas more competitive than coal and nuclear; natural gas plants' flexibility and fuel efficiency added to its competitiveness; and falling electricity demand

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90. Susan Kelly & Elise Caplan, *Time for a Day 1.5 Market: A Proposal to Reform RTO-Run Centralized Wholesale Electricity Markets*, 29 ENERGY L.J. 491, 496 (2008).

91. ROBBIE ORVIS ET AL., THE DEPARTMENT OF ENERGY'S GRID RESILIENCE PRICING PROPOSAL: A COST ANALYSIS 1, 5–6 (2017) (stating that about 90% of the subsidies to nuclear plants would accrue to five or fewer companies, and about 80% of the subsidies to nuclear plants would accrue to five companies).

92. *See supra* Sections II.A and II.B.

93. STAFF OF DEP'T OF ENERGY, REPORT ON ELECTRICITY MARKETS AND RELIABILITY 22 (2017) ("Between 2002 and 2016, 531 coal generating units representing approximately 59,000 MW of generation capacity retired from the U.S. generation fleet."). The average plant was built in the mid to late 1970s. Service life for coal plants are about 35 to 50 years. The majority of plants retired between 2010 and 2016 had a capacity factor of less than 50% in the year prior to retirement. *Id.*

94. *Id.* at 30 ("Between 2002 and 2016, 4,666 MW of nuclear generating capacity was announced for retirement, or approximately 4.7 percent of the U.S. nuclear capacity."). In 2016 another eight reactors representing 7,167 MW of nuclear capacity or 7.2% of U.S. nuclear capacity announced retirement plans. *Id.*

removed the cushion once enjoyed by high cost plants.[95] Silverstein wrote, "As a root cause of retirements, wholesale competition *worked as intended*, driving inefficient, high-cost generation out of the market. . . . As another root cause, most of the plants that have retired were old, smaller, inefficient, and high-cost."[96]

A bipartisan group of former FERC commissioners argued that DOE's proposal, rather than addressing reliability, would undermine grid reliability:

> The published proposal in this Docket would be a significant step backward from the Commission's long and bipartisan evolution to transparent, open, competitive wholesale markets. . . . Subsidizing resources so they do not retire would fundamentally distort markets. The subsidized resources would inevitably drive out the unsubsidized resources, and the subsidies would inevitably raise prices to customers. Investor confidence would evaporate and markets would tend to collapse. This loss of faith in markets would thereby undermine reliability.[97]

The estimated cost of the proposed subsidy to coal and nuclear plants ranges from $311 million per year to $11.8 billion per year.[98] PJM, the regional transmission organization with largest share of coal power, would face costs up to $7.3 billion per year, a 17% increase in total costs.[99] If the costs are passed to the 65 million consumers in the PJM system, each person would face a cost of $112 per year.[100] These subsidies are likely to be borne by consumers for the long-term as plants receiving subsidies have

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95. Alison Silverstein, *Silverstein: If I'd Written the DOE Grid Study Recommendations*, UTIL. DIVE (Oct. 2, 2017), https://www.utilitydive.com/news/silverstein-if-id-written-the-doe-grid-study-recommendations/506274/.

96. *Id.* (emphasis added); *see also* STAFF OF DEP'T OF ENERGY, *supra* note 93, at 24 (arguing retirements of old coal plants yield air quality improvements). "Most of the power plants being closed today were built in the 1940s to 1960s . . . [and] many have minimal air pollution controls . . . ." *Id.*

97. Elizabeth Ann Moler et al., Comments of the Bipartisan Former FERC Commissioners on Proposed Rule Grid Resiliency Pricing Rule (Oct. 19, 2017), *available at* https://s3.amazonaws.com/dive_static/paychek/Comments_of_BFFC_Docket_RM18-1_1.pdf.

98. ORVIS ET AL., *supra* note 91, at 7 (estimating from four different scenarios from the most to the least conservation assumptions on cost recovery, as the proposal is vague on that critical point).

99. *Id.* at 4–5.

100. *Id.*

little incentive to retire.[101] Another study conducted by research firm ICF estimated the costs at $3.8 billion per year.[102]

Critics also condemned this proposal because of its false assertions. First, the proposal asserts that, at present, the stability of the grid is threatened.[103] This claim contradicts the findings of the DOE Staff Report, as well as additional studies by the North American Electric Reliability Corporation, RTOs and ISOs, utility companies, and U.S. national laboratories.[104]

Second, the proposal asserts that fuel on site enhances grid reliability.[105] This assertion is false. Fuel shortage was not the main cause of major electricity disruptions faced by consumers, causing only 0.00007% of this disruption.[106] Instead, 96.2% of these disruptions in 2012-2016 were the result of severe weather, including Hurricane Sandy that knocked down power lines.[107] Fuel on site does not enhance grid reliability. Instead, frequency of outages due to loss of electric supply in 2013-2016 increased slightly when market shares of coal and nuclear grew from 20% to 80%.[108]

Moreover, coal and nuclear plants with fuel on site have failed during weather extremes. Frozen and wet coal forced the shutdown on a number of coal plants during the 2014 Polar Vortex and Hurricane Harvey.[109] Three nuclear reactors shut down during Hurricane Sandy,[110] and two plants shut down during Hurricane Irma.[111] In contrast, wind performed well during these episodes. Wind and demand response enabled PJM to maintain grid

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101. *Id.* at 7.

102. Jeff St. John, *Experts Debate the Energy Department's Coal and Nuclear Market Intervention*, GREENTECH MEDIA (Oct. 31, 2017), https://www.greentechmedia.com/articles/read/alternatives-to-doe-coal-and-nuclear-market-intervention#gs.1ojpAJI.

103. Grid Resiliency Pricing Rule, 82 Fed Reg. 46,940, 46,941 (proposed Oct. 10, 2017).

104. *See supra* Section II.B.

105. Grid Resiliency Pricing Rule, 82 Fed Reg. at 46,943.

106. John Larsen, et al., *Electric System Reliability: No Clear Link to Coal and Nuclear*, RHODIUM GROUP, at fig.2 (Oct. 23, 2017), http://rhg.com/notes/doe-nopr-ferc-comments.

107. *Id.*

108. *Id.* at fig.3. According to the source, "the analysis was commissioned by the Natural Resources Defense Council and Environmental Defense Fund, but was conducted independently by Rhodium Group, LLC." *Id.*

109. *Hearing*, *supra* note 19 (statement of John Moore, Director, Sustainable FERC Project, Energy & Transportation Program, Natural Resources Defense Council).

110. Steven Mufson, *Three Nuclear Power Reactors Shut Down During Hurricane Sandy*, WASH. POST, Oct. 30, 2012, https://www.washingtonpost.com/business/economy/3-nuclear-power-reactors-shut-down-during-sandy/2012/10/30/7ddd3a94-22b6-11e2-8448-81b1ce7d6978_story.html?utm_term=.69814126b01b.

111. Timothy Gardner, *Florida Nuclear Plants to Shut Ahead of Hurricane Irma*, REUTERS (Sept. 7, 2017, 1:44 PM), https://www.reuters.com/article/us-storm-irma-nuclearpower/florida-nuclear-plants-to-shut-ahead-of-hurricane-irma-idUSKCN1BI2IA.

reliability during the Polar Vortex.[112] Wind power plants near the Texas coast were able to survive Hurricane Harvey, which brought 110-mile-per-hour winds.[113]

In January 2018, FERC commissioners unanimously rejected the proposed rule on Grid Reliability and Resilience Pricing submitted by Secretary Perry.[114] The commissioners opined that the proposed rule and the record in the proceeding did not demonstrate that the RTO/ISO tariffs are unjust and unreasonable, and that the proposed remedy is just and reasonable.[115] The commissioners noted that the proposed payments to resources that could meet the on-site 90-day fuel supply requirement would compensate resources that provide resilience to the grid.[116] Nevertheless, the commission did initiate a new proceeding (Docket No. AD18-7-000) to consider the issue of grid resilience[117]

B. Externalizing Pollution Costs: The Trump Administration's Repeal of the Clean Power Plan

In October 2017, Scott Pruitt, the EPA Administrator, issued a Notice of Proposed Rulemaking, proposing to repeal the Clean Power Plan.[118] According to the U.S. Energy Information Administration projections, in the absence of the Clean Power Plan, renewable energy adoption will continue, but the rate of adoption will be slower.[119] Under the Reference case, with implementation of the Clean Power Plan, renewable energy

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112. PJM INTERCONNECTION, ANALYSIS OF OPERATIONAL EVENTS AND MARKET IMPACTS DURING THE JANUARY 2014 COLD WEATHER EVENTS 21 (2014), http://www.pjm.com/~/media/library/reports-notices/weather-related/20140509-analysis-of-operational-events-and-market-impacts-during-the-jan-2014-cold-weather-events.ashx.

113. *Hearing*, *supra* note 19 (statement of John Moore, Director, Sustainable FERC Project, Energy & Transportation Program, Natural Resources Defense Council).

114. Order Terminating Rulemaking Proceeding, Initiating New Proceeding, and Establishing Additional Procedures, 162 FERC ¶ 61,012, Docket No. RM18-1-000 and AD18-7-000 (Issued Jan. 8, 2018).

115. *Id.* ¶¶14–16.

116. *Id.* ¶16.

117. *Id.* ¶18. *See also infra* Part IV.

118 *See EPA's Endangerment Finding: The Legal and Scientific Foundation for Climate Action*, NAT. RES. DEF. COUNCIL (NRDC) (May 2017), https://www.nrdc.org/sites/default/files/epa-endangerment-finding-fs.pdf. At that event, Pruitt made no statement on the EPA's 2009 Endangerment Finding. "In 2009, the U.S. Environmental Protection Agency (EPA) issued its science-based finding that the buildup of heat-trapping greenhouse gases in the atmosphere endangers public health and welfare." *Id.* at 1.

119. *Projected Electricity Generation Mix Is Sensitive to Policies, Natural Gas Prices,* U.S. ENERGY INFO. ADMIN. (Feb. 14, 2017), https://www.eia.gov/todayinenergy/detail.php?id=29952 [hereinafter *Projected Electricity Generation*].

overtakes coal in the share of power generation by 2028.[120] Importantly, studies indicate operators would be able to maintain grid reliability even with increased renewable energy projected under the Clean Power Plan.[121] However, without the implementation of the Clean Power Plan, the share of wind in power generation increases more slowly and remains below that of coal even after 2040.[122]

The longer-term rate of retirement of coal plants (and thus the demand for substitute generation) is highly sensitive to the projected prices of natural gas.[123] These prices are notoriously difficult to predict.[124] With the market for natural gas shifting from mainly serving the domestic U.S. market to also serving international markets, long-term natural gas prices may well increase.[125] In the case of high natural gas prices, without the price corrections offered by a carbon price or without the Clean Power Plan, rates of retirement of coal plants would decline.

V. POLITICAL SUPPORT FOR WIND GENERATION

Despite the Trump Administration's actions towards creating an uneven playing field for wind, wind generation is buttressed by its continuing improvements in its economic competitiveness[126] and, importantly, its political support among many state and local governments in red, blue, and purple states (though support is not uniform).[127]

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120. *Id.*

121. *See* SUSAN TIERNEY ET AL., ELECTRIC SYSTEM RELIABILITY AND EPA'S CLEAN POWER PLAN: THE CASE OF MISO 38–39 (2015), https://www.eenews.net/assets/2015/06/10/document_daily_01.pdf; SUSAN TIERNEY ET AL., ELECTRIC SYSTEM RELIABILITY AND EPA'S CLEAN POWER PLAN: THE CASE OF PJM 32 (2015), http://www.analysisgroup.com/uploadedfiles/content/insights/publishing/electric_system_reliability_and_epas_clean_power_plan_case_of_pjm.pdf.

122. *Projected Electricity Generation*, *supra* note 119.

123. *Id.*

124. *Id.*

125. *See* U.S. ENERGY INFO. ADMIN., EFFECT OF INCREASED NATURAL GAS EXPORTS ON DOMESTIC ENERGY MARKETS 6 (2012), https://www.eia.gov/analysis/requests/fe/pdf/fe_lng.pdf.

126. *See supra* Part II.

127. *See, e.g.*, Benjamin Storrow & Daniel Cusick, *As Wind Grows, So Does Its Opposition*, E&E NEWS (Mar. 2, 2017), https://www.eenews.net/stories/1060050773 (describing attempts by some state legislators in states with influential oil and gas industry to block wind).

A. Benefits to Local Communities, Though Distribution of Benefits and Costs Can Be Unequal

State governments support wind generation because of aggregate benefits to rural communities, even when utility-scale wind is not owned by local residents. A bipartisan group of governors wrote a letter to the Trump Administration advocating federal actions to support renewable energy.[128] The letter noted:

> The nation's wind and solar energy resources are transforming low-income rural areas in ways not seen since the passage of the *Homestead Act* over 150 years ago. For example, U.S. wind facilities pay rural landowners $222 million a year, with more than $156 million going to landowners in areas with below-average incomes. In addition, $100 billion has been invested by companies in low-income counties, where some 70 percent of the nation's wind farms are located.
>
> Last year, the country's solar industry employed over 200,000 and added 31,000 new jobs. Most of the [solar] installations are in rural areas and have provided landowners another income option.[129]

In their study of Texas, Slattery, Lantz, and Johnson report that landowners receive lease payments of about $3000–$7000 per MW while local governments receive property tax revenue of about $4000–$12,000 per MW.[130] In another study of Texas, De Silva et al., report that local communities benefit from the decline in

128. Letter from Gina M. Raimondo & Sam Brownback, Governors' Wind & Solar Energy Coal., to President Donald J. Trump (Feb. 13, 2017), http://governorswindenergy-coalition.org/wp-content/uploads/2017/02/GWSC-Letter-to-President-Trump-2-13-17.pdf. The actions advocated include grid modernization and transmission development, research and development for electricity distribution, storage, controls and end-use technologies, and collaboration to facilitate permitting of wind and solar energy. *Id.*

129. *Id.* at 1; *see also See* Edward P. Louie & Joshua M. Pearce, *Retraining Investment for U.S. Transition from Coal to Solar Photovoltaic Employment*, 57 ENERGY ECON. 295 (2016). The jobs figures are cited to indicate a structural shift in the economy towards growth in the wind and solar sector relative to other sectors in the economy. For the local economy, job opportunities in wind and solar provide employment opportunities for workers facing a shrinking coal or manufacturing sector. My discussion about jobs in the renewable sector is not meant to imply that energy policies are the appropriate policy tool to increase employment levels. Instead, energy policies aim to meet energy needs in an affordable and reliable manner while ensuring environmental costs are internalized. *See* Severin Borenstein, *The Private and Public Economics of Renewable Electricity Generation,* 26 J. ECON. PERSP. 67 (2012).

130. Michael C. Slattery et al., *State and Local Economic Impacts from Wind Energy Projects: Texas Case Study*, 39, ENERGY POL'Y 7930, 7932 (2011).

county tax rates, while potentially benefiting from services funded with the increased total county tax revenue.[131]

Nevertheless, De Silva et al. note that local communities bear uneven benefits and costs.[132] "[L]ocalized benefits are mostly concentrated in the form of lease and royalty income to landowners. Conversely, localized environmental impacts, such as degradation of the landscape and effects on wildlife, will be borne more generally by the county residents."[133] The perception of net costs by neighbors who live next to turbines but do not benefit from lease payments can lead to local opposition to wind development.[134]

B. Cheaper Electricity Bills for Consumers

State governments have also supported wind generation, because it has reduced consumer electricity bills. For example, "[i]n 2009, . . . additions of renewable energy, primarily wind, to the [New York Independent Systems Operator] grid . . . lowered electricity prices by more than $1.60 per MWh."[135] Other studies project declines in electricity prices with greater wind generation. In 2009, a PJM study reported:

> [T]he addition of 15,000 MWs of wind to the PJM grid would decrease wholesale electricity prices . . . by between $5 to $5.50 per MWh and the wholesale cost of power in the aggregate by between $4 to $4.5 billion. As a result, electricity customers' monthly bills would decrease by $3.50 to $4 per month or by $42 to $48 annually.[136]

In 2010, the New England Wind Integration Study found that 20% regional wind penetration would reduce wholesale electricity prices from $5 per MWh to $11 per MWh.[137]

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131. Dakshina G. De Silva et al., *What Blows in with the Wind?*, 82 S. ECON. J. 826, 856 (2016).

132. *Id.* at 857.

133. *Id.*

134. *See* Lantz & Flowers, *supra* note 74.

135. Bruce Burcat, Executive Director, Mid-Atl. Renewable Energy Coal., Direct Testimony Before the Public Utilities Commission of Ohio, Case No. 11-5201-EL-RDR, at Exhibit 2 (Jan. 31, 2013), http://www.dnrec.delaware.gov/energy/information/otherinfo/Documents/RPS%20Cost%20Cap%20Regulation%20Public%20Record/RPS%20Cost%20Cap%20Exhibits/8%20Bruce%20Burcat%20Testimony%20-%20Ohio%20PUC.pdf.

136. *Id.*

137. *Id.*

CONCLUSION

Wind energy continues its trend of improving cost competitiveness. Integrating moderate shares of wind has been achieved in a cost-effective manner while maintaining grid reliability and resilience, though there are clear challenges ahead to increasing wind penetration to high levels. Under current technologies, constructing interstate transmission lines is critical to integrating greater shares of wind and ensuring grid reliability. This endeavor will necessitate greater cooperation across states in achieving cost allocation that is acceptable across states. Wind energy, which yields benefits to rural communities and to consumers, has clinched the political support of state governments, and this recognition may spur states' greater willingness to cooperate and to compromise on interstate transmission lines. As wind penetration increases and brings generation and transmission lines into collision with more communities, revenue-sharing initiatives have become more important to secure buy-in from local landowners and non-landowners.

Competitive electricity markets have provided valuable market signals that promote cost-effective solutions to grid reliability, though market rules have not caught up with compensating all essential grid services.[138] The Trump Administration has taken counterproductive actions to change the rules of the game in wholesale electricity markets from their gradual evolution towards more competition to rules of the game in which the Administration, for its political expediency, pushes anti-market policies to favor selected sectors under the pretext of improving the electricity systems. Even though there are checks and balances that would force FERC to issue rules that pass legal muster, the Department of Energy's actions under false pretexts, in contradiction to facts, and in pursuit of politically favored sectors rattle market participants. The three FERC commissioners have sought to placate the market by emphasizing that they do not intend to "blow the market up."[139] As noted by the former FERC commissioners, transparent, open, competitive wholesale markets are essential for protecting investor confidence.[140]

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138. Silverstein, *supra* note 95.

139. Gavin Bade, *Chatterjee: FERC May Boost Coal, Won't "Blow up the Market*," UTIL. DIVE (Oct. 13, 2017), https://www.utilitydive.com/news/chatterjee-ferc-may-boost-coal-wont-blow-up-the-market/507266/; *see also* Gavin Bade, *Powelson: FERC "Will Not Destroy the Marketplace" in DOE Cost Recovery Rulemaking,* UTIL. DIVE (Oct. 5, 2017), https://www.utilitydive.com/news/powelson-ferc-will-not-destroy-the-marketplace-in-doe-cost-recovery-rule/506577/.

140. *See* Elizabeth Ann Moler et al., *supra* note 97.

Addressing reliability and resilience of the grid requires Perry's DOE to walk a more productive path, as noted by Alison Silverstein's aptly titled piece *If I'd Written the DOE Grid Study Recommendations*:

> NERC has given us a starting set of essential reliability services, but many of those services are not yet compensated adequately. We don't yet have a comparable understanding of the key elements of resilience (including fuel security), nor how to measure, productize and compensate them. We do know that a wide variety of supply- and demand-side resources can provide many of these services—and the better we define and productize these services and specify their need and value, the more resources can step up to deliver them.
>
> We must figure out what all these essential services are and how to compensate providers appropriately for each . . . .[141]

Initiated in January 2018, FERC's new proceeding (Docket No. AD18-7-000) to explore resilience issues in the RTOs/ISOs can be a positive step forward.[142] The proceeding aims to explore what resilience means and requires; how each RTOs/ISOs addresses resilience; and what actions, if any, the commission needs to undertake to enhance grid resilience. [143]

141. Silverstein, *supra* note 95.

142. Order Terminating Rulemaking Proceeding, Initiating New Proceeding, and Establishing Additional Procedures, 162 FERC ¶ 61,012, at 10 (Issued Jan. 8, 2018).

143. *Id.*