Against the Wind—Sustainability, Migration, Presidential Discretion

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Against the wind. I'm still runnin' against the wind
I'm older now but still running against the wind.

"Against the Wind"
- Bob Seger & the Silver Bullet Band

I. AGAINST THE WIND

Wind is very expensive. I mean, wind, without subsidy, wind doesn't work. You need massive subsidies for wind. There are places maybe for wind. But if you go to various places in California, wind is killing all of the eagles. You know if you shoot an eagle, kill an eagle, they want to put you in jail for five years. Yet the windmills are killing hundreds and hundreds of eagles. One of the most beautiful, one of the most treasured birds—and they're killing them by the hundreds and nothing happens.[1]

- Donald J. Trump

The weekend before Christmas 2018, the United States government began its longest shutdown in history, which extended well into the new year. The crisis was the result of the ongoing legal controversies surrounding migratory rights and U.S. immigration policy, and following the shutdown, President Trump declared a national emergency at the southern border.[2] The

1. Phillip Bump, *There's a Lot to Unpack in just One of Donald Trump's Answers About Energy Policy*, WASH. POST (May 26, 2016), https://www.washingtonpost.com/news/the-fix/wp/2016/05/26/theres-a-lot-to-unpack-in-donald-trumps-answers-about-energy-policy/?noredirect=on&utm_term=.919dacbd2c8f [https://perma.cc/6GVS-T67T].

2. Chantal Da Silva, *As Trump Declares Border 'Crisis,' Homeland Security Says Crossing Attempts Up by 200 Percent. Here's Why*, NEWSWEEK (Apr. 5, 2018, 9:17 AM), http://www.newsweek.com/trump-declares-border-crisis-homeland-security-says-crossings-200-percent-873029 [https://perma.cc/FP3X-MXR5]; *see also* Claire Foran, *Current Shutdown Ties Record for Longest Government Shutdown in US History*, CNN: POL. (Jan. 11, 2019, 6:01 AM), https://www.cnn.com/2019/01/11/politics/government-shutdown-ties-record-longest/index.html [https://perma.cc/9T6J-ZCLH].

executive branch has a constitutional responsibility to enforce all U.S. laws.[3] However, while the Trump administration has focused pointedly on executive branch enforcement of immigration and migratory laws at the southern border, it has made no effort to enforce an international treaty and three long-standing U.S. statutes protecting migratory birds.

More than one thousand species of birds are legally protected by U.S. law, making it a criminal felony, punishable by up to two years jail time and fines of up to one-quarter million dollars, for killing even a single migratory bird.[4] Despite these harsh penalties, hundreds of thousands of these statutorily protected birds are killed by wind power turbines in the U.S. each year.[5]

Wind power, however, is an indispensable tool to address global climate change for a multitude of reasons. For instance, wind power is an essential technology to reduce U.S. greenhouse gas emissions and to meet the goals the U.S. previously pledged as part of the international Paris Agreement of 2016.[6] Wind power does not emit either carbon-dioxide ("CO_2") or methane into the atmosphere, nor does it contribute to climate change.[7] Further, wind power has been the leading source among all new electric power technologies installed in the U.S. for the past decade,[8] and wind power is now cost-competitive with most other means of power generation.[9] The U.S. Department of Homeland Security has also identified sixteen critical infrastructure sectors in the

3. U.S. CONST. art. II, § 3.

4. 18 U.S.C. § 3571(b) (2018). The MBTA includes a felony charge for a "knowing violation" and imposes a penalty of up to two years imprisonment and a $250,000 fine. Corporations may be fined up to $500,000. *Id.* § 3571(c).

5. With a maximum fine of $250,000 for a knowing violation and 350,000 annual wind turbine bird deaths, this is $87,500,000,000 in total potential liability risk. *See infra* note 47.

6. *See List of Parties that Signed the Paris Agreement on 22 April*, U.N. SUSTAINABLE DEV. GOALS (Apr. 20, 2016), http://www.un.org/sustainabledevelopment/blog/2016/04/parisagreementsingatures [https://perma.cc/LGL5-DR5R]. The U.S. is in the process of withdrawing from the Paris Agreement. Valerie Volcovici, *U.S. Submits Formal Notice of Withdrawal from Paris Climate Pact*, REUTERS, Aug. 4, 2017, https://www.reuters.com/article/us-un-climate-usa-paris/u-s-submits-formal-notice-of-withdrawal-from-paris-climate-pact-idUSKBN1AK2FM [https://perma.cc/DSR6-D2DJ].

7. Coal-fired power plants emit significantly more sulfur dioxide ("SO_2"), nitrogen oxides ("NO_x"), and particulate matter ("PM"), three of the six Clean Air Act-regulated criteria pollutants, per megawatt hour ("MWh") of electric power generated compared to natural gas-fired and oil-fired plants. STEVEN FERREY, LAW OF INDEPENDENT POWER § 6:22 (47th ed. 2019). Wind power emits none of these pollutants.

8. *See infra* note 26.

9. *See infra* note 47.

United States,[10] each of which depends fundamentally on a stable power supply, a requirement that can be bolstered, if not achieved, by wind.[11]

Creating legal and economic implications for the power sector, the Trump administration announced its unilateral executive policy not to enforce the Migratory Bird Treaty Act ("MBTA"), a century-old statute that implements an eponymous treaty protecting migratory birds.[12] The cessation of legal enforcement of the MBTA will decrease the costs of wind facilities, as the MBTA makes the killing of a single bird on any day a felony crime.[13]

There is now a yin and yang for wind power. Civil law is populated with important state and federal economic and legal incentives for wind power generation and infrastructure transition. Yet, federal investment tax incentives are currently being phased out and the newest tax regime is not nearly as supportive. In a parallel legal realm, criminal law creates an elevated risk for the decidedly modest number of wind turbines that kill an estimated one-quarter million protected birds annually in the U.S.[14] There is a temporal mismatch between these federal criminal statutes, a transitory policy which does not enforce those laws, and civil law incentives for the industry.

However, this criminal risk for wind facilities is not static; it changes with different occupants of the executive branch which enforces federal criminal law. There is an added dimension when the technology involved is not a mere substitute commodity, but is critical to mitigate global climate change. This confluence of competing factors requires reconciliation by legislative change, regulatory clarification, or judicial determination.

This Article navigates several layers of this emerging technology-species conflict and its counterposed statutory objectives to chart a new direction in U.S. law. Part I begins with a discussion of how law and technology evolve symbiotically,[15] with state and federal law

10. *Critical Infrastructure Sectors*, U.S. DEP'T OF HOMELAND SECURITY, https://www.dhs.gov/critical-infrastructure-sectors [https://perma.cc/Z2M2-TUH2] (last visited May 10, 2019).

11. *Id.*

12. *See infra* notes 276–77.

13. *Id.*

14. *See infra* note 233.

15. This has been an issue with electronic application technology, now confronted with the sale of consumer information by Facebook and the manipulation of that data by Cambridge Analytica and others. *See* Kevin Roose, *How Facebook's Data Sharing Went from*

enabling new technology. It proceeds to examine how when federal law recedes, state law fills that vacuum. Beyond federal and state legal policy, this Article examines the technical challenges to connecting wind power to the grid, the resultant grid reliability challenges, and solutions to those challenges.

Wind power is vigorously supported by significant federal and state financial incentives. Part II examines these key incentives at the federal level, which have provided significant advantages for wind power, but are now being eliminated or reduced. First, Part II.A analyzes the phase-out of the wind production tax credit and the investment tax credit, along with accelerated depreciation and bonus depreciation. It thereafter analyzes the tax reform act of 2018, and how, counter-intuitively, it changes and imperils wind power financing. It goes on to look at the impact of the Trump administration's 10% tariff on aluminum and 25% tariff imposed on steel imports on the wind power sector.[16]

Part II.B examines the changing legal landscape as wind power's foundation shifts from federal government policy to state policy. These policies include state net-metering laws and renewable portfolio standard credits for wind. Along with this policy shift, wind power development costs declined dramatically during the Obama and Trump administrations, but certain legal aspects of these state subsidy programs continue to face constitutional challenges.

Part II.C analyzes two additional legal challenges arising from the interface of wind power technology with the utility grid. First is the issue of legal allocation of the often very high cost to connect wind power to the grid. Second are the legal wrinkles arising from the deregulated sale of wind power in several of the most populous U.S. states. Part II.C then examines the technical reliability challenges of wind power generation posed by intermittency and low capacity, the high cost of ramping up power to accommodate such intermittency, and the resultant economic repercussions for

Feature to Bug, N.Y. TIMES (Mar. 19, 2018), https://www.nytimes.com/2018/03/19/technology/facebook-data-sharing.html [https://perma.cc/C5ZB-GLA2]; Sam Meredith, *Facebook-Cambridge Analytica: A Timeline of the Data Hijacking Scandal*, CNBC (Apr. 10, 2018, 9:51 AM), https://www.cnbc.com/2018/04/10/facebook-cambridge-analytica-a-timeline-of-the-data-hijacking-scandal.html [https://perma.cc/95KW-QYLB].

16. Chris Martin, *China Flooded U.S. with Solar Panels Before Trump's Tariffs*, BLOOMBERG (Feb. 16, 2018), https://www.bloomberg.com/news/articles/2018-02-16/china-flooded-u-s-with-solar-panels-before-trump-s-tariffs [https://perma.cc/5B9D-F3MT].

the electric grid and the U.S. economy. This Part also examines power storage alternatives and charts the legal direction in which state regulation is heading.

While Part II examines the contours of civil law incentives for wind at the federal and state levels, Part III explores the looming potential of criminal law liabilities that confront wind power projects in the U.S. Criminal penalties transcend financial incentives embodied in civil law, including felony jail time that must be served by individuals regardless of whether there is a corporate "shell" protecting the company under U.S. law. Part III examines legal obligations of the executive branch under three primary U.S. statutes that protect birds, including a multilateral treaty that prohibits any human-caused intentional or unintentional killing of any single bird of more than 1,025 bird species.[17] Part III then analyzes and contrasts the fundamentally different interpretations of these criminal statutes by the Obama and Trump administrations. Finally, this Part analyzes the current enforcement mechanisms interpreting these obligations and construes them against the rapid development of wind power as the dominant new power generation technology in the United States.

Part IV showcases the Trump administration's executive branch non-enforcement of U.S. law under the three critical bird protection statutes within the context of changing government support at the state and federal levels. It examines newly-defined Supreme Court limitations on the executive branch in "tailoring" how it enforces U.S. law, along with alternative legal support for power technology across the federal-state legal divide.

This Article concludes by advocating for clarification in U.S. law, as enforcement of these statutory regimes should not be left to the whim of the incumbent presidential administration. Such reform can be achieved by legislative and regulatory change and/or judicial determinations.

17. *See infra* note 224.

II. INTO THE WIND: PARSING LEGAL INCENTIVES AND CHALLENGES AS POWER TECHNOLOGY EVOLVES

A. Disadvantageous Recent Tax Law Reform

It's the economy, stupid!
- James Carville

There has been quite prodigious development in wind power in recent years. As will be examined in Part II.A.1, wind power has become the dominant new power generation technology in the U.S. Over the last five successive years, wind power has constituted the majority of newly installed power generation.[18] Notwithstanding the environmental benefits that wind might offer as a larger player in electric power generation,[19] developers have deployed wind because of bottom-line economics, abetted substantially by tax incentives and state renewable energy incentives that have lowered the cost of wind development and made it competitive with more conventional power generation alternatives.[20]

However, these advantages for wind power have been significantly diminished at the federal level. Part II.A.2 examines how, during the Obama administration, wind production tax incentives were first reduced and then phased out.[21] It then considers what federal tax incentives and alternatives are left for wind power, examining the investment tax credit, accelerated depreciation, and bonus depreciation.[22]

Part II.A.3 examines the Trump tax cuts which, on the surface, would seem to be good for all companies. However, for wind development, these cuts are not so benign; this Part examines this double-edged sword. First, due to the need for huge capital investment in wind turbine technology before a given project generates any revenue, wind projects generally don't incur tax liability in their early years.[23] Therefore, the tax cut has no near-term advantage. Second, tax equity investment, which was a major

18. *See infra* Part II.A.1.
19. *See id.*
20. *See id.*
21. *See infra* Part II.B.
22. *See id.*
23. *See infra* Part II.C.

part of U.S. wind party financing,[24] was less enticing once the marginal corporate tax rate was slashed in 2018 from 35% to 21%.[25] This Part examines each of these aspects, as well as other provisions of the new tax law that, counter-intuitively, could hamper wind project financing and development.

1. The Significant Foothold of Wind Power Generation

Along with natural gas, wind has dominated new sources of electric energy deployed in the U.S. over the past ten years.[26] In 2012, wind energy led among all newly installed U.S. electricity generation, constituting 43% of all new added electric generation capacity.[27] In 2015, approximately half of new generating capacity added was wind energy.[28] For the 2019 summer months, the U.S. Department of Energy ("DOE") Energy Information Administration ("EIA") forecasts that 9% of total power supply will be from non-hydro renewables including wind, biomass, geothermal, and utility-scale solar, and 7% from hydroelectric renewables.[29] On an annual basis, wind now supplies 6.6% of total generation, and solar photovoltaics supply 1.5% of total power generation.[30] Wind is expected to increase to 14,000 megawatts ("MW") of newly installed wind generation capacity by 2020, raising the cumulative wind total to more than 1% of total installed U.S. power generation capacity.[31] According to one analysis, renewable energy sources will overtake natural gas as the dominant source of

24. *See* FERREY, LAW OF INDEPENDENT POWER, *supra* note 7, § 3:59.115.

25. *See infra* Part III.C.

26. *Energy Dept. Reports: U.S. Wind Energy Production and Manufacturing Reaches Record Highs*, U.S. DEP'T OF ENERGY (Aug. 6, 2013), http://energy.gov/articles/energy-dept-reports-us-wind-energy-production-and-manufacturing-reaches-record-highs [https://perma.cc/3AG7-RS2U].

27. *Id.*

28. *Scheduled 2015 Capacity Additions Mostly Wind and Natural Gas; Retirements Mostly Coal*, U.S. ENERGY INFO. ADMIN.: TODAY IN ENERGY (Mar. 10, 2015), http://www.eia.gov/todayinenergy/detail.cfm?id=20292 [https://perma.cc/3Y6H-AD42].

29. *EIA Expects Less Electricity to Come from Coal This Summer as Natural Gas, Renewables Rise*, U.S. ENERGY INFO. ADMIN.: TODAY IN ENERGY (May 9, 2019), https://www.eia.gov/todayinenergy/detail.php?id=39412 [https://perma.cc/96FT-PMKU].

30. *What Is U.S. Electricity Generation by Energy Source?*, U.S. ENERGY INFO. ADMIN.: TODAY IN ENERGY (Mar. 1, 2019), https://www.eia.gov/tools/faqs/faq.php?id=427&t=3 [https://perma.cc/9VJ5-W5D3].

31. *Integrating Wind Energy into Power Planning: Lessons from the Pacific Northwest*, MARTEN LAW (July 21, 2011), http://www.martenlaw.com/newsletter/20110721-wind-energy-power-planning [https://perma.cc/7569-X7AD].

electricity generation in the U.S. in 2031, even without continuation of current subsidies, due to the plunging costs of wind and solar generation.[32]

There are many salutary benefits of greater wind development. First, its electricity production has no accompanying greenhouse gas emissions, no criteria pollutant emissions, and no hazardous air pollutants. Second, wind power diversifies the U.S. electric power system which as of 2018, the most recent full year of data, is almost two-thirds powered by fossil fuel combustion (63.5%), plus an additional 19.3% from nuclear power.[33] In 2018, coal provided 27.4% of our nation's electricity, while natural gas supplied 35.1%.[34] Diversity of fuel sources, prime movers, and types of generation make the system less reliant on any one modality, and therefore less susceptible to catastrophic failure when shortages or other unexpected problems or crises arise.

Third, electric power generation from wind is certain to be a major component of U.S. pledges to meet international goals to reduce climate-warming greenhouse gas ("GHG") emissions.[35] Energy-related emissions of carbon are forecast to increase 57% in the quarter century from 2005 to 2030.[36] For the last 800,000 years, atmospheric GHG levels stayed between 175–250 parts per million ("ppm"), but in the last 250 years, GHGs have increased dramatically to more than 400 ppm.[37]

32. Naureen S. Malik, *Renewables Will Top Gas in 2031 as Largest Energy Source*, BLOOMBERG (June 13, 2016), https://www.bloomberg.com/news/articles/2016-06-13/renewables-will-top-gas-as-biggest-u-s-power-producer-in-2031 [https://perma.cc/8YN8-BDZM].

33. *What Is U.S. Electricity Generation by Energy Source?*, U.S. ENERGY INFO. ADMIN., *supra* note 30.

34. *Id.*; *Industry Data*, EDISON ELECTRIC INST., http://www.eei.org/resourcesandmedia/industrydataanalysis/ industrydata/Pages/default.aspx [https://perma.cc/YS5X-NLBD] (last visited Apr. 1, 2019).

35. *Annual Energy Outlook 2019*, U.S. ENERGY INFO. ADMIN., https://www.eia.gov/outlooks/aeo/data/browser/#/?id=1-AEO2019&region=0-0&cases=ref2019&start=2017&end=2050&f=Q&linechart=ref2019-d111618a.3-1-AEO2019~ref2019-d111618a.10-1-AEO2019&ctype=linechart&sourcekey=0 [https://perma.cc/5SQC-UU4K] (last visited May 19, 2019). Wind and other non-hydro renewable power generation technologies are projected to increase at an average growth rate of 2.7% per year from now until 2050, twice as rapidly as its closest competitor, natural gas-fired electricity generation. *Id.*

36. U.S. GOV'T ACCOUNTABILITY OFFICE, GAO-09-151, INTERNATIONAL CLIMATE CHANGE PROGRAMS: LESSONS LEARNED FROM THE EUROPEAN UNION'S EMISSIONS TRADING SCHEME AND THE KYOTO PROTOCOL'S CLEAN DEVELOPMENT MECHANISM 48 (2008).

37. Jessica Blunden, *2013 State of the Climate: Carbon Dioxide Tops 400 ppm*, CLIMATE.GOV (July 13, 2014), http://www.climate.gov/news-features/understanding-climate/2013-state-climate-carbon-dioxide-tops-400-ppm [https://perma.cc/Y4V7-3LGU]; *see also* AM.

The parties to the Paris Agreement agreed to hold "the increase in the global average temperature to well below 2°C above pre-industrial levels" and to "pursue efforts to limit the temperature increase to 1.5°C above pre-industrial levels, recognizing that this would significantly reduce the risks and impacts of climate change."[38] The Paris Agreement was agreed upon by the requisite number of countries, including the United States, in October 2016, and the Agreement entered into force on November 4, 2016.[39]

The Obama administration joined the Paris Agreement[40] and began plans to restrict CO_2 power plant emissions through the Clean Power Plan ("CPP"), which focused on coal-fired power plants.[41] The enactment of the CPP was one of the first major initiatives in the U.S. to curb domestic greenhouse gas emissions. However, the CPP was enjoined preliminarily by the Supreme Court during the Obama administration in *West Virginia v. EPA*.[42] In December 2017, the Trump administration EPA issued an advance notice of proposed rulemaking to replace the CPP.[43]

Under the CPP, each state would have been required to develop standards of performance to limit CO_2 emissions from existing fossil fuel-fired generating facilities.[44] However, the final CPP rule eliminated energy efficiency as one of the four originally-specified compliance building blocks to reduce CO_2 emissions, retaining the building blocks of improvement of coal-fired power facility heat rates; substitution of natural gas for coal-fired electric generation

METEOROLOGICAL SOC'Y, STATE OF THE CLIMATE IN 2017 xvi (Jessica Blunden et al. eds., 2015).

38. Paris Agreement to the United Nations Framework Convention on Climate Change, art. 2(1)(a), Apr. 12, 2016, T.I.A.S. No. 16-1104 (entered into force Nov. 4, 2016).

39. As of May 2019, 197 UNFCCC member states have signed the treaty, and it has been ratified by 185 of those member states. *Paris Agreement–Status of Ratification*, U.N. CLIMATE CHANGE, https://unfccc.int/process/the-paris-agreement/status-of-ratification [https://perma.cc/6MVJ-EHQ3] (last visited May 23, 2019).

40. *See List of Parties that Signed the Paris Agreement on 22 April*, U.N. SUSTAINABLE DEV. GOALS, http://www.un.org/sustainabledevelopment/blog/2016/04/parisagreement singatures/ [https://perma.cc/D2V5-4ZWM] (last visited May 23, 2019).

41. *See* Endangerment and Cause or Contribute Findings for Greenhouse Gases Under the Section 202(a) of the Clean Air Act, 74 Fed. Reg. 66,496 (Dec. 15, 2009).

42. *West Virginia v. EPA*, 136 S. Ct. 1000 (2016).

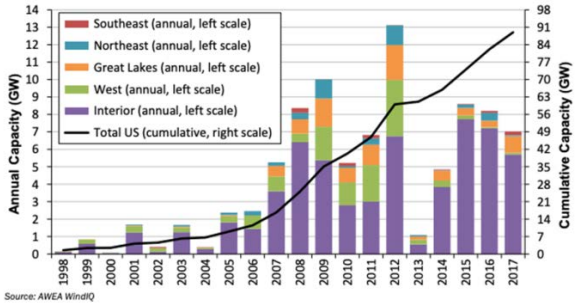
43. State Guidelines for Greenhouse Gas Emissions from Existing Electric Utility Generating Units, 82 Fed. Reg. 61,507 (Dec. 28, 2017).

44. *See* U.S. ENVTL. PROT. AGENCY, EPA-452/R-13-003, REGULATORY IMPACT ANALYSIS FOR THE PROPOSED STANDARDS OF PERFORMANCE FOR GREENHOUSE GAS EMISSIONS FOR NEW STATIONARY SOURCES: ELECTRIC UTILITY GENERATING UNITS (2013).

facilities; and construction of more renewable energy to comply with CO_2 reduction requirements.[45]

During the Obama administration, there was a deliberate and express effort to displace certain high carbon-emitting fuels, such as coal. The regulations for the CPP expressly targeted coal-fired power generation facilities and favored substitution with renewable energy.[46] While natural gas has been credited with displacing more carbon-intensive methods of power generation in recent years, renewable energy was the primary source of the 4.2% decrease in power sector carbon emissions in 2017.[47] The cost of wind power has dropped to be competitive with the price of more traditional fossil fuel resources for electricity generation.[48] Indeed, wind, along with natural gas, has dominated new sources of electric energy capacity deployed in the most recent decade.[49]

Figure 1. Annual U.S. Wind Power Capacity Growth Through 2017[50]



45. *See* Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electricity Utility Generating Units, 80 Fed. Reg. 64,661, 64,667 (Oct. 23, 2015); U.S. ENVTL. PROT. AGENCY, THE CLEAN POWER PLAN: KEY CHANGES AND IMPROVEMENTS 3 (2015).

46. Final Opening Brief for Petitioner Murray Energy Corp. at 41–42, Murray Energy Corp. v. EPA, No. 14-1112 (D.C. Cir. March 9, 2015); JONATHAN L. RAMSEUR, CONG. RESEARCH SERV., R43652, STATE CO_2 EMISSION RATE GOALS IN EPA'S PROPOSED RULE FOR EXISTING POWER PLANTS 6–14 (2014).

47. BLOOMBERG NEW ENERGY FIN., SUSTAINABLE ENERGY IN AMERICA: 2018 FACTBOOK EXECUTIVE SUMMARY 3–4 (2018), http://www.bcse.org/wp-content/uploads/2018-Sustainable-Energy-in-America-Factbook_Executive-Summary.pdf [https://perma.cc/RV2N-9JUR].

48. Tara Patel, *Fossil Fuels Losing Cost Advantage Over Solar, Wind, IEA Says*, BLOOMBERG (Aug. 31, 2015), http://www.bloomberg.com/news/articles/2015-08-31/solar-wind-power-costs-drop-as-fossil-fuels-increase-iea-says [https://perma.cc/L6A7-NNXF].

49. *Energy Dept. Reports: U.S. Wind Energy Production and Manufacturing Reaches Record Highs*, U.S. DEP'T OF ENERGY, *supra* note 26.

50. RYAN WISER ET AL., U.S. DEP'T OF ENERGY, 2017 WIND TECHNOLOGIES MARKET REPORT 3 fig.2 (2018), https://www.energy.gov/sites/prod/files/2018/08/f54/2017_wind_technologies_market_report_8.15.18.v2.pdf [https://perma.cc/Y78B-3GWR].

The International Energy Agency estimates that approximately 1,000 gigawatts ("GW") of additional renewable power, including wind power, will be installed worldwide over the next five years.[51] This amount of additional power is equivalent to the amount that coal power generation achieved in the first 80 years of coal power utilization (although the base of installed power generation was much lower when coal power usage began more than 100 years ago).[52] This total electric generation capacity also exceeds what is currently consumed in China, India, and Germany combined.[53]

Total clean energy investments were $329 billion in 2015, and by 2040, investment in wind, solar, and other clean technologies is projected to reach about $7 trillion.[54] Wind power's significant and growing foothold is a condition of current economic factors, and developers will change what they build depending on the economics of different power generation technologies. This is especially true in the 60% of states that paraticipate in an Independent System Operator ("ISO") to dispatch and use the least expensive wholesale power available each hour in a region.[55] The Federal Energy Regulatory Commission ("FERC") approves all Regional Transmission Organization ("RTO") and ISO terms of service and financial tariffs.[56] In 2014, nearly 40% of U.S.

51. Anna Hirtenstein, *Dawn of Solar Age Declared as Sun Power Beats All Others*, BLOOMBERG: ENV'T (Oct. 4, 2017, 8:49 AM), https://news.bloombergenvironment.com/environment-and-energy/dawn-of-solar-age-declared-as-sun-power-beats-all-others [https://perma.cc/CG46-8FMU].

52. *Id.*

53. *Id.*

54. Nina Chestney, *Global Clean Energy Investment Hits Record $329 Billion in 2015*, REUTERS, Jan. 15, 2016, https://www.reuters.com/article/uk-global-renewables-investment-idUKKCN0UT0Z6 [https://perma.cc/S3X2-AGXE]; Kelvin Ross, *Renewables to Grab $7 Trillion of Global Power Investment, Says BNEF*, RENEWABLE ENERGY WORLD (June 15, 2017), https://www.renewableenergyworld.com/articles/2017/06/renewables-to-grab-7-trillion-of-global-power-investment-says-bnef.html [https://perma.cc/3K74-HWTB].

55. *Regional Transmission Organizations (RTO)/Independent System Operators (ISO)*, FED. ENERGY REG. COMMISSION (Oct. 18, 2018), https://www.ferc.gov/industries/electric/indus-act/rto.asp [https://perma.cc/MCR8-UHBY]. RTOs, or regional transmission organizations, are independent of all generation and power marketing entities and manage a larger interstate transmission market for in-state utilities, subject to FERC authority. ISOs, or independent system operators, manage the regional operation of a wholesale power sale market and the interstate transmission system on behalf of all power market participants, subject to FERC oversight. ISOs were created by FERC Order Nos. 888, 889, and 2000, as a way for existing power pools to provide non-discriminatory access to transmission for all stakeholders.

56. STEVEN FERREY, THE NEW RULES: A GUIDE TO ELECTRIC MARKET REGULATION 49–50 (2007).

electricity was generated by what the U.S. EIA terms "independent power producers,"[57] which was an increase of almost 400% from 10% approximately two decades earlier.[58] The geographic locations of ISOs are shown in Figure 2.

Figure 2. U.S. Independent System Operators[59]

As we enter the third decade of the new millenium, wind is positioned technologically to serve as the critical carbon-free power generation source while the world confronts climate change and mitigates its effects. However, under U.S. law, the recent pro-business federal tax law reforms may not advantage new wind power production. This, and the elimination of key federal tax credits, is addressed next.

2. Tax Incentive Credits for Wind at the Federal Level

The success of the wind industry is boosted by federal and state tax credits, falling installation prices,[60] and the proliferation of net

57. U.S. ENERGY INFO. ADMIN., ELECTRIC POWER MONTHLY: AUGUST 2015 tbls.1.2, 1.3, 1.4., 1.5 (2015), http://www.eia.gov/electricity/monthly/ [https://perma.cc/9BRQ-E6QT].

58. Promoting Wholesale Competition Through Open Access Non-Discriminatory Transmission Services by Public Utilities; Recovery of Stranded Costs by Public Utilities and Transmitting Utilities, 61 Fed. Reg. 21,540, 21,549 (1996).

59. *See Regional Transmission Organizations (RTO)/Independent System Operators (ISO)*, FED. ENERGY REG. COMMISSION, *supra* note 55.

60. *See Solar Industry Growing at a Record Pace*, SOLAR ENERGY INDUSTRIES ASS'N, http://www.seia.org/research-resources/solar-industry-data [https://perma.cc/6EY8-GLGT] (last visited May 25, 2019).

metering programs.[61] The U.S. Department of Energy ("DOE") forecasts that wind power will be cheaper than electricity produced from natural gas by 2025, even without a continuing federal production tax credit incentive.[62] Nonetheless, federal tax credits have been a chief incentive for wind development.

Established by the Energy Policy Act of 1992,[63] the federal renewable electricity production tax credit ("PTC") was created as a means to subsidize wind generation through the tax code. The PTC provided a tax credit for the first ten years of operation of a wind turbine, and the amount of the tax credit was linked to the quantity of energy generated.[64] The credit was initially $0.015 per kilowatt-hour ("kWh") generated, but as provided for in the statute, this amount inflated over time to $0.024/kWh generated for a wind turbine for its first 10 years of operation.[65] Under this scheme, the owner of the facility acquires the credit, and the wind power is then sold to an unrelated person.[66]

While the PTC is the mechanism typically used for wind power projects, wind projects may alternatively utilize the federal investment tax credit ("ITC"), which is more typically used by solar power projects.[67] There are two reasons for this distinction. First, the ITC provides a 30% of capital investment tax credit upon completion of the renewable energy investment.[68] Because, per kilowatt ("kW") of generating capacity, the capital cost of solar

61. *See State Net Metering Policies*, NAT'L CONF. OF ST. LEGISLATURES (Nov. 20, 2017), http://www.ncsl.org/research/energy/net-metering-policy-overview-and-state-legislative-updates.aspx [https://perma.cc/F47S-LLYD]; Sean Paul, *The Solar Industry in a Period of Transition*, GEO. PUB. POL'Y REV. (Nov. 15, 2016), http://gppreview.com/2016/11/15/solar-industry-period-transition/ [https://perma.cc/4YZM-6BSD].

62. *See* Christopher Martin & Justin Doom, *Wind Power Without U.S. Subsidy to Become Cheaper Than Gas*, BLOOMBERG (Mar. 12, 2015), https://www.bloomberg.com/news/articles/2015-03-12/wind-energy-without-subsidy-will-be-cheaper-than-gas-in-a-decade [https://perma.cc/4S9F-KCHX].

63. *See* FERREY, LAW OF INDEPENDENT POWER, *supra* note 7, at 3-227.

64. *See* American Recovery and Reinvestment Act of 2009, Pub. L. No. 111-5, 123 Stat. 115; *American Taxpayer Relief Act of 2012*, Pub. L. No. 112-240, 126 Stat. 2313; *Tax Increase Prevention Act of 2014*, Pub. L. No. 113-295, 128 Stat. 4010, Consolidated Appropriations Act of 2016, Pub. L. No. 114-113, 129 Stat. 2242; Bipartisan Budget Act of 2018, Pub. L. No. 115-123, 132 Stat. 64.

65. FERREY, LAW OF INDEPENDENT POWER, *supra* note 7, at 3-226; 26 U.S.C. § 45 (2018); CONG. RESEARCH SERV., R43453, THE RENEWABLE ELECTRICITY PRODUCTION TAX CREDIT: IN BRIEF 1 (2018).

66. 26 U.S.C. § 45 (2018).

67. *Id.*

68. *Id.* § 48 .

power generation is greater than the capital cost of wind power generation, a flat 30% of investment is a larger tax credit per kW of installed solar capacity than wind capacity. Therefore, the ITC yields the most value for a renewable project developer when applied to technologies which are the most expensive capital investments per unit of generating capacity, and/or do not yield as much power output per dollar invested.

Second, wind power operates at a significantly larger capacity factor (the percentage of hours in the year when a power generator is actually able to operate) than does solar power in the U.S. Of note, both technologies have a low capacity factor compared to fossil fuel-fired generation, which is not eligible for the PTC.[69] Wind and solar power are intermittent in supply, and thus distinct from traditional forms of power deployed in the United States.

Both solar and wind power demonstrate a relatively low availability factor in the 10% to 40% range of hours during a week or month in which they are able to operate.[70] The capacity factor of a generation technology documents what percentage of the maximum power generation of the equipment is realized in operation. The highest recorded U.S. annual wind capacity factor was 33.9% in 2014, and the U.S. EIA recorded the median wind capacity factor over the past decade as 31%.[71] In the United Kingdom, the wind capacity factor ranged from a low of 21.5% in 2010 to a high of 27.9% in 2013.[72]

In the United States, fixed non-tracking solar panels have a capacity factor even less than that for wind power. For example, in New England, the solar capacity factor for fixed non-tracking solar panels is less than 15%.[73] Therefore, depending on siting in the U.S., wind projects may enjoy a capacity factor—which indicates the amount of power generated as a percentage of design capacity—more than double that for fixed non-tracking solar panel generation.

69. *See* FERREY, LAW OF INDEPENDENT POWER *supra* note 7, §§ 2:12.10, 2:12.20.

70. *Id.* § 2:11 (noting the inability of intermittent sources to serve as base-load energy generators).

71. Planning Engineer & Rud Istvan, *True Costs of Wind Electricity*, CLIMATE ETC. (May 12, 2015), http://judithcurry.com/2015/05/12/true-costs-of-wind-electricity/ [https://perma.cc/6DRV-9FC9].

72. *Id.*

73. From author's experience with solar projects in New England qualifying for forward capacity payments with ISO-New England's forward capacity auction.

The PTC pays its subsidy per unit of power output, contrary to the ITC which rebates a portion of the initial investment in the project regardless of whether or not the project ever operates. Wind power, with a greater number of hours of operation and production compared to fixed non-tracking solar panels, produces power at a higher capacity factor of at least twice as many hours during a month. Thus, wind projects that take the PTC as opposed to the ITC have the advantage of a two or three times higher capacity factor than solar projects,[74] and wind is now more cost-efficient and earns more PTC tax credits for the project owner.[75] When the production tax credit incentive is calibrated based on amount of kWh of production, even at the same incentive per kWh generated, the PTC is worth more than twice as much annually for a wind project which produces for more than twice as many hours of the month compared to a fixed non-tracking panel solar project. Accordingly, wind projects tend to use the output-determinative PTC, while solar projects use the investment-determinative ITC. The PTC involved an expenditure on renewable energy incentives resulting in a tax collection loss to the federal government of $1.4 billion in both 2010 and 2011, and $1.6 billion in 2012,[76] with a total projected cost to the U.S. government of $24 billion from 2018 to 2022.[77]

In 2015, Congress passed a multi-year extension—albeit with a significant phase-down—of the renewable PTC. This was not the first extension, as the PTC was previously scheduled to expire several times. A history of extensions of the PTC is shown in Table 1. Before Congress extended these programs, the PTC had already expired at the end tax of 2014 and the ITC was set to drop from 30% to a credit for 10% of project costs at the end of 2016.[78] However, at the end of 2015, the PTC was extended through 2019 with a phase out in 2020, if project construction had not begun prior to January 1, 2020. Now, the ITC 30% tax credit is scheduled

74. *See* FERREY, LAW OF INDEPENDENT POWER, *supra* note 7, at 3-259.

75. *Id.*

76. CONG. RESEARCH SERV., R44852, THE VALUE OF ENERGY TAX INCENTIVES FOR DIFFERENT TYPES OF ENERGY RESOURCES: IN BRIEF (2019).

77. CONG. RESEARCH SERV., R43453, *supra* note 65, at 5, 7 tbl.3.

78. John Larsen & Whitney Herndon, *Renewable Tax Extenders: The Bridge to the Clean Power Plan*, RHODIUM GROUP (Jan. 27, 2016), http://rhg.com/notes/renewable-tax-extenders-the-bridge-to-the-clean-power-plan [https://perma.cc/Z8YQ-HXUZ].

to decline to 10% in 2021 and will continue at that reduced rate.[79] Placing an order for turbines can constitute the "beginning of construction," as long as completion of construction and commercial operation is achieved from 2021 to 2023, depending on the start date.[80]

From 2017 until 2020, the PTC will decline by 20% each year until a 60% reduction is achieved in 2019, and thereafter, the PTC will phase out for projects that begin construction during or after 2020.[81] After the PTC either phases out or is not renewed, developers will have the alternative option of taking the ITC.[82] Indeed, the federal PTC incentives for wind, unless subsequently reauthorized, will vanish soon after the publication of this Article. In the federal regulatory landscape, this leaves only the ITC, which will decline from 30% to a credit of 10% in 2021, although as the law currently stands, it is scheduled to continue at that percentage past 2021.[83] By any measure, the federal tax incentive available for future wind development will be diminished.

Once installed, power facilities can operate for up to 30 to 40 years.[84] International policy and law must properly value and accurately motivate sustainable energy choices so that these multi-decade energy infrastructure investments will reflect both policy and real-time best choices.

79. FERREY, LAW OF INDEPENDENT POWER, *supra* note 7, §§ 3:59.10, 3:59.40.

80. For detailed treatment of what constitutes beginning construction, see *id.* at 3-260–61.

81. *Id.* at 3-226; 26 U.S.C. § 45 (2018).

82. FERREY, LAW OF INDEPENDENT POWER, *supra* note 7, § 3:59.40; 26 U.S.C. § 48 (2018).

83. FERREY, LAW OF INDEPENDENT POWER, *supra* note 7, §§ 3:59.10, 3:59.40.

84. ALEX OLCZAK ET AL., WIND EUROPE, EXTENDING THE LIFE OF WIND FARM PROJECTS TO 40+ YEARS (2016), http://www.ewea.org/events/workshops/wp-content/uploads/Tech16a-PO-044.pdf [https://perma.cc/4TXG-M7KD].

Table 1. History of Federal Production Tax Credit Extensions[85]

Legislation	Date Enacted	Start of PTC Window	End of PTC Window	Effective PTC Planning Window (considering lapses and early extensions)
Energy Policy Act of 1992	10/24/1992	1/1/1994	6/30/1999	80 months
>5-month lapse before expired PTC was extended				
Ticket to Work and Work Incentives Improvement Act of 1999	12/19/1999	7/1/1999	12/31/2001	24 months
>2-month lapse before expired PTC was extended				
Job Creation and Worker Assistance Act	3/9/2002	1/1/2002	12/31/2003	22 months
>9-month lapse before expired PTC was extended				
The Working Families Tax Relief Act	10/4/2004	1/1/2004	12/31/2005	15 months
Energy Policy Act of 2005	8/8/2005	1/1/2006	12/31/2007	29 months
Tax Relief and Healthcare Act of 2006	12/20/2006	1/1/2008	12/31/2008	24 months
Emergency Economic Stabilization Act of 2008	10/3/2008	1/1/2009	12/31/2009	15 months
The American Recovery and Reinvestment Act of 2009	2/17/2009	1/1/2010	12/31/2012	46 months
2-day lapse before expired PTC was extended				
American Taxpayer Relief Act of 2012	1/2/2013	1/1/2013	Start construction by 12/31/2013	12 months (in which to start construction)
>11-month lapse before expired PTC was extended				
Tax Increase Prevention Act of 2014	12/19/2014	1/1/2014	Start construction by 12/31/2014	2 weeks (in which to start construction)
>11-month lapse before expired PTC was extended				
Consolidated Appropriations Act of 2016	12/18/2015	1/1/2015	Start construction by 12/31/2016	12 months to start construction and receive 100% PTC value
			Start construction by 12/31/2017	24 months to start construction and receive 80% PTC value
			Start construction by 12/31/2018	36 months to start construction and receive 60% PTC value
			Start construction by 12/31/2019	48 months to start construction and receive 40% PTC value

The PTC grants a credit based on actual power generation achieved after construction, while the depreciation deduction of the wind project capital cost is earned on the invested capital expenditure itself, regardless of whether operation occurs. There are particular advantages and disadvantages of taking the PTC for wind projects, in lieu of the ITC. First, the PTC spreads its realization equally over the first 10 years of project operation, not requiring as much early-year offsetting tax liability and minimizing

85. WISER ET AL., *supra* note 50, at 67 tbl.4.

the need for third-party tax-equity financing for the project.[86] Second, these PTC benefits, stretched out over 10 years, extend longer than the accelerated 5-year full depreciation period for wind power.[87]

These tax credit changes do not occur in a vacuum. Wind technology competes at the margin against other alternative forms of power generation in the U.S. Available tax credits fundamentally reshape the economics of the power industry and what will be installed in the next decade.[88] Tax credits determine whether coal is replaced by natural gas combined cycle ("NGCC") units as the least-cost option for new power generation, or whether it is replaced by solar and wind power.[89]

This dominance of new renewable energy in lieu of natural gas and coal, reduces U.S. carbon emissions.[90] However, the CPP is currently enjoined by the Supreme Court and in the process of repeal by the Trump administration.[91] Without the CPP in place, either due to judicial or executive branch action, the PTC—the major federal tax credit incentive for wind power development—will fade substantially for projects beginning construction after December 31, 2019.[92] While this will have a major negative impact on new wind projects, a countervailing factor is that wind technology is continuing to decline in cost,[93] thereby becoming

86. For a more detailed treatment of tax equity financing, see FERREY, LAW OF INDEPENDENT POWER, *supra* note 7, § 3:59.115.

87. *Id.* § 3:57.

88. Larsen & Herndon, *supra* note 78.

89. *Id.*

90. JAMES E. MCCARTHY & CLAUDIA COPELAND, CONG. RESEARCH SERV., R41914, EPA'S REGULATION OF COAL-FIRED POWER: IS A "TRAIN WRECK" COMING? (2011), https://www.fas.org/sgp/crs/misc/R41914.pdf [https://perma.cc/H8VH-N8MT] ("Coal is an inherently 'dirty' fuel. Burning it produces sulfur dioxide (SO_2), nitrogen oxides (NO_x), particulates, mercury, acid gases, and other pollutants, in greater abundance than other fossil fuels.").

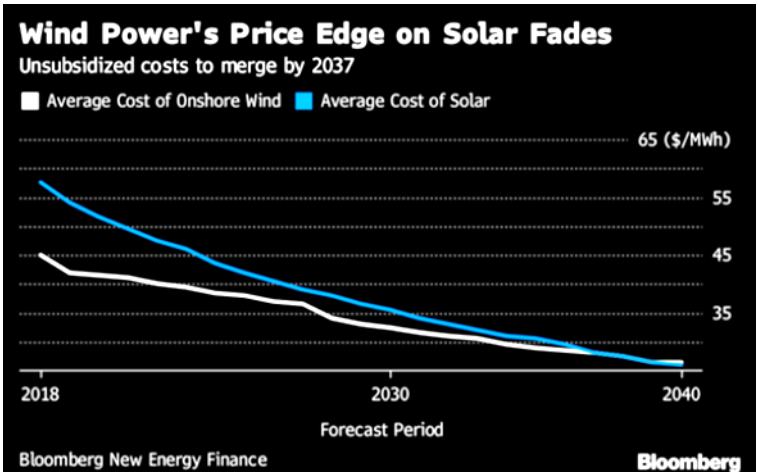
91. *West Virginia v. EPA*, 136 S. Ct. 1000 (2016); State Guidelines for Greenhouse Gas Emissions from Existing Electric Utility Generating Units, 82 Fed. Reg. 61,507 (Dec. 28, 2017).

92. 26 U.S.C. § 45(b)(5) (2018).

93. *Wind Generators' Cost Declines Reflect Technology Improvements and Siting Decisions*, U.S. ENERGY INFO. ADMIN.: TODAY IN ENERGY (July 12, 2018), https://www.eia.gov/todayinenergy/detail.php?id=36615 [https://perma.cc/NJ3F-MFMM]; *see also Database of State Incentives for Renewables & Efficiency®*, N.C. CLEAN ENERGY TECH. CTR., http://www.dsireusa.org/ [https://perma.cc/CY8L-NWAG] (last visited May 23, 2019).

competitive with other power generation options.[94] Wind projects in the U.S. cost, on average, $45/megawatt hour ("MWh") for capacity and energy without other subsidies; the cost is $58/MWh for solar.[95] By 2040, as solar panels become more efficient and manufacturing costs continue to decline, solar could operate at an identical cost to wind, as shown in Figure 3.

Figure 3. Unsubsidized Costs of Wind and Solar Through 2040[96]



While dramatic declines in the capital costs of wind turbines have positioned wind power in a critical role as the core new technology to mitigate climate change worldwide, the imminent elimination of prior federal tax credits in the U.S. affects its prospects domestically. Moreover, the 2018 federal tax law changes are intended to help business, but may help wind power businesses much less. These issues are examined next.

94. *Wind Generators' Cost Declines Reflect Technology Improvements and Siting Decisions*, U.S. ENERGY INFO. ADMIN., *supra* note 93.

95. Jim Efstathiou Jr. & Brian K. Sullivan, *Smarter Wind Turbines Try to Squeeze More Power on Each Rotation*, BLOOMBERG: ENV'T (May 9, 2018), https://www.bloomberg.com/news/articles/2018-05-09/smarter-wind-turbines-try-to-squeeze-more-power-on-each-rotation [https://perma.cc/ZQT2-ZDZE].

96. *See New Energy Outlook 2018*, BLOOMBERG NEW ENERGY FIN., https://bnef.turtl.co/story/neo2018?teaser=true [https://perma.cc/L56Q-3Z63] (last visited May 19, 2019).

3. 2018 Tax Law Changes: Reduced Rates Are Not Always Positive

The Republican Tax Cuts and Jobs Act[97] ("the Act"), enacted in late 2017 and effective in 2018,[98] did not change or eliminate existing PTC and ITC energy tax credits,[99] nor did it change the "continuously constructed" eligibility standard for beginning construction or the tax "safe harbor" for projects to "look back" to 2016 and continue construction by the existing deadlines.[100] However, these credits are not the only federal tax incentives embedded in the Tax Code that significantly benefit wind power. Wind energy projects enjoy an accelerated 5-year depreciation period under Section 168 of the Code,[101] as well as bonus depreciation.[102] Bonus depreciation earned by the power industry is estimated to be $10 billion.[103]

The new Act affects investment in the energy sector, particularly capital-intensive renewable energy.[104] The Act dramatically lowers the corporate tax rate on a permanent basis, unlike its graduated rate reductions for individual taxpayers, which are temporary.[105] The corporate tax rate was changed to a flat 21% tax from its prior maximum rate of 35%.[106] This reduction of more than 40% in the prior maximum rate has the effect of creating a lesser marginal value of tax savings to attract tax equity financing for renewable energy projects.[107] Tax-equity financing often will constitute one-third of energy investment capital for renewable energy projects which cannot use the non-refundable energy credits or losses in

97. Tax Cuts and Jobs Act, Pub. L. No. 115-97, 131 Stat. 2054 (2017).

98. *Id.*

99. *Id.*

100. MARK BOLINGER & RYAN WISER, LAWRENCE BERKELEY NAT'L LAB., BALANCING COST AND RISK: THE TREATMENT OF RENEWABLE ENERGY IN WESTERN UTILITY RESOURCE PLANS 48 (2005), https://eta-publications.lbl.gov/sites/default/files/report-lbnl-58450.pdf [https://perma.cc/D7J9-AZY4].

101. 26 U.S.C. § 168 (2018); *See* FERREY, LAW OF INDEPENDENT POWER, *supra* note 7, §§ 3:56–57.

102. *Id.*

103. Paul Carlsen, *'Bonus Depreciation' Boosting Industry Cash Flow About $10 Billion, but More IRS Guidance Awaited*, ELECTRIC UTIL. WK. (Mar. 14, 2011).

104. For more information, see Michael H. Levin, *Will the Tax Cuts Act Cut Back AD?*, BIOCYCLE, Feb. 2018, at 25.

105. Tax Cuts and Jobs Act, § 11001(a)(j)(1).

106. *Id.*

107. FERREY, LAW OF INDEPENDENT POWER, *supra* note 7, § 3:59.115 (providing a detailed treatment of tax-equity financing for renewable power projects).

their early years of operation.[108] At the reduced corporate tax rate of 21%, reduced from a prior top rate of 35%, the value of these tax credits is reduced by more than 40%, as is the cash value saving realized from depreciation and bonus depreciation. This reduced cash value affects the ability to monetize both tax credits and depreciation deductions as part of independent renewable energy project financing.

The Act allows small businesses, including wind power projects, to expense up to $1 million in qualified expenditures immediately, a 33% increase from past amounts.[109] It also allows all businesses to claim 100% "bonus depreciation" in the first year on equipment purchased after September 27, 2017 and placed into service after January 1, 2018 (subject to a phase down of 20% for equipment placed into service during each year after 2022). The 100% figure represents a nominal doubling of the previous bonus depreciation deduction.

Futher, the Act caps business interest deductions to 30% of an entity's earnings before interest, taxes, depreciation, and amortization ("EBITDA").[110] More severe caps are implemented after 2021.[111] Previously, interest deductions were not capped, and all interest was deductible.

The Act also restricts the value and directional fungible nature of project operating losses.[112] Under past and current tax law, tax losses are not refundable in a given tax year. Therefore, they need to be applied to either past or future tax years' tax liability to offset net operating income over time. Prior to the 2018 changes, project net operating losses ("NOLs") were allowed to be carried back two previous tax years or carried forward to the next twenty future tax years at full 100% value to offset past or future net taxable income.[113] The 2018 Act eliminates reverse direction "carryback"

108. From author's extensive experience working on energy project financing.

109. *Id.*

110. *Id.*

111. *Id.*

112. *Id.*

113. For more information about carry forward and carry back of these prior credits, see Levin, *supra* note 104. If applied to one of the prior two years with net income, they would generate immediate refundable tax rebates with an amendment of a prior year tax return. If carried forward, the taxpayer would need to wait for future years to monetize these deductions against future taxable income. *Id.*

of losses; thus, only "carrying forward" to future years remains.[114] The Act also restricts NOL deductibility to 80% of taxable income instead of the prior full 100% deductibility. This makes tax-equity financing potentially more valuable to realize gains immediately (and as close as possible to full value) at the same time that the reduction in the tax rate those credits and deductions offset is much lower, thereby making its monetized tax-saving value much less a part of project finance.

The new tax reform affects energy projects structures which use a "pass-through" entity structure, such as a limited liability company ("LLC").[115] The Act provides a permanent 20% tax deduction for these entities' qualifying business income for income tax calculation.[116] As these tax aspects are passed through to individual energy project owners, if their income is less than $157,500 for a single taxpayer or $315,000 for a joint taxpayer, this tax reduction can be realized.[117]

In sum, while the Tax Cuts and Jobs Act helps businesses generally, it may not significantly help developers of new wind projects—at the precise time that they are being called on to substitute fossil fuel-fired older power generation technologies. State wind power incentives may fill this vacuum, as examined next.

B. The State Economic Lifeline for Wind

Part II.B focuses on what legal structures can now aid wind power in maintaining its strong foothold. Eighty percent of the states are partially filling the gap from the loss of tax credits and benefits in the changing federal tax treatment for wind power.[118] Part II.B.1 highlights how wind development costs decreased dramatically during the Obama and Trump administrations.[119] However, there have been recent changes: the Trump administration has placed 30% tariffs on the importation of Chinese solar panels[120] (upheld

114. I.R.S. News Release IR-2018-254 (Dec. 18, 2018), https://www.irs.gov/newsroom/irs-issues-guidance-on-changes-to-excess-business-and-net-operating-losses. [https://perma.cc/J8JP-8BET].

115. *Id.*

116. *Id.*

117. *Id.*

118. *See infra* Part II.B.1

119. *See id.*

120. Chris Martin, *China Flooded U.S. With Solar Panels Before Trump's Tariffs*, BLOOMBERG: QUINT (Feb. 20, 2018, 4:41 AM), https://www.bloombergquint.com/technology/china-

as to new imports),[121] a 10% tariff placed against aluminum, and a 25% tariff imposed against steel imports, thereby affecting the costs of turbine and mast components for wind projects.[122] These tariffs increase the cost of wind turbines and solar panels.

Part II.B.1 progresses to look at how the loss of federal tax credits and diminution under federal tax law of tax-equity finance for wind can be augmented by state incentives when driven by bottom-line economics for power generation. Part II.B.2 goes on to examine net metering programs for wind projects in 38 states that now offer them, which can quadruple the value paid and earned for generation of wind power.[123] Part II.B.3 analyzes the added significant incentive in the 29 states that have renewable portfolio standard credits that incentivize wind power, which can approximately double the revenue realized and earned by renewable wind power project generation.[124] This Part also looks at recent legal aspects of these and similar state programs supporting selected types of power generation. First, is an examination of changing costs.

1. Changing Costs

The capital costs of wind power projects have decreased to be competitive with the costs of some more traditional fossil fuel resources for electricity generation.[125] Internationally, wind turbine prices have decreased by approximately half over the most recent eight years, yielding to wholesale electric power from onshore wind projects at an international price equivalent to $0.06/kWh in 2017.[126] Wind power is now the cheapest electricity

flooded-u-s-with-solar-panels-before-trump-s-tariffs [https://perma.cc/FYE3-7CK6]. Many Chinese panel makers stockpiled their panels in the fourth quarter of 2017, increasing their imports to the U.S. by 1200% just before the tariff was imposed. *Id.*

121. Sunpreme Inc. v. United States, No. 17-1338 (Fed. Cir. June 14, 2018); Brian Flood, *Solar Importer Faces Dark Day at Appeals Court*, BLOOMBERG: ENV'T (June 14, 2018, 11:49 AM), https://news.bloombergenvironment.com/environment-and-energy/solar-importer-faces-dark-day-at-appeals-court [https://perma.cc/SV5E-G9SP].

122. Ana Swanson, *Trump to Impose Sweeping Steel and Aluminum Tariffs*, N.Y. TIMES (Mar. 1, 2018), https://www.nytimes.com/2018/03/01/business/trump-tariffs.html [https://perma.cc/8LYD-VRQ9].

123. *See infra* Part II.B.2.

124. *See infra* Part II.B.3.

125. Patel, *supra* note 48.

126. INT'L RENEWABLE ENERGY AGENCY, RENEWABLE POWER GENERATION COSTS IN 2017 14 (2018), https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2018/Jan/IRENA_2017_Power_Costs_2018.pdf [https://perma.cc/2WC6-JNUQ].

source in Germany and the U.K., even without government subsidies, and wind is expected to be cheaper than coal and gas worldwide before 2025.[127]

The U.S. Department of Energy forecasts that wind power will be cheaper than electricity produced from natural gas by 2025, even without a continuing federal production tax credit incentive.[128] Between 2008 and 2015, the average cost of building capacity for land-based wind in the U.S. decreased by 41%, for distributed PV by 54%, and for utility-scale PV by 64%.[129]

Some of this decrease in cost is attributed to the increasing size of wind turbine height and the increased diameter of the rotor over the last decade, as shown in Figure 4. The swept area of the turbine blade is the square of the length of the blade.[130] Therefore, a relatively modest or small increase in the length of the blade translates to much more power produced.[131] Taller turbine masts allow greater height, which allows a longer blade, which creates more swept area by the larger blades. Rather than adding linerally, this squares the amount of power produced from a single turbine.

127. Tom Randall, *Solar and Wind Just Passed Another Big Turning Point*, BLOOMBERG: BUS. (Oct. 6, 2015, 6:00 AM), https://www.bloomberg.com/news/articles/2015-10-06/solar-wind-reach-a-big-renewables-turning-point-bnef [https://perma.cc/5PRW-YX7X].

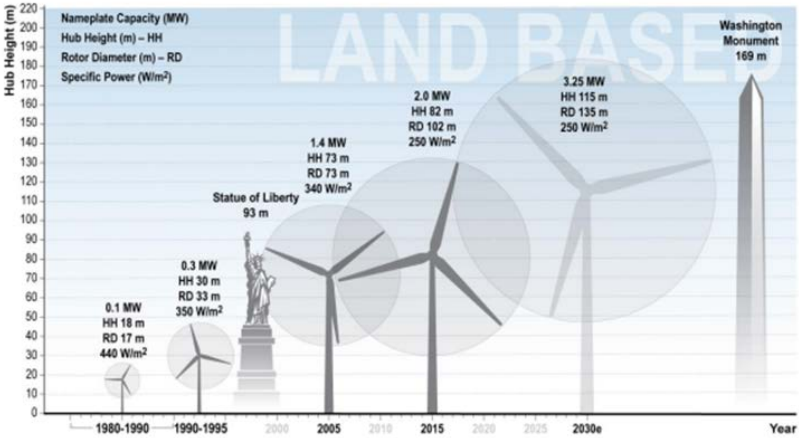
128. Martin & Doom, *supra* note 62.

129. U.S. DEP'T OF ENERGY, REVOLUTION NOW: THE FUTURE ARRIVES FOR FIVE CLEAN ENERGY TECHNOLOGIES—2016 UPDATE 1, 4, 6 (2016); *see also* INT'L ENERGY AGENCY & CLEAN ENERGY MINISTERIAL, NEXT GENERATION WIND AND SOLAR POWER: FROM COST TO VALUE 6 (2016), https://www.res4africa.org/wp-content/uploads/2016/12/Next_Generation_Windand_Solar_PowerFrom_Cost_to_ValueFull_Report.pdf [https://perma.cc/JT7A-VAGZ]; MARK BOLINGER, JOACHIM SEEL & KRISTINA HAMACHI LACOMMARE, LAWRENCE BERKELEY NAT'L LAB., UTILITY-SCALE SOLAR 2016: AN EMPIRICAL ANALYSIS OF PROJECT COST, PERFORMANCE, AND PRICING TRENDS IN THE UNITED STATES (2017), https://emp.lbl.gov/sites/default/files/utility-scale_solar_2016_report.pdf [https://perma.cc/9U75-3SGW].

130. FERREY, LAW OF INDEPENDENT POWER, *supra* note 7, § 2:12.20

131. *Id.*

Figure 4. Expected Growth in Land-Based Turbine Size in North America[132]



Therefore, if one starts with a blade length of 100%, when it is squared, it becomes 10,000%. Correspondingly, the amount of power produced is a function of the cube of the wind speed.[133] With greater wind speed at a greater height, that cube's original power output of 100% becomes 1,000,000%. The longer blade length allows for the squaring of power output, and the stronger wind speed simultaneously cubes this already greater power output, realizing a 10,000-fold increase in total power output. Both taller turbines and larger blades are an example of Moore's law[134] applied to renewable energy—that is, the squaring and cubing of the efficiency of the machine.

However, the front wall of propellers creates a wake that reduces the efficiency of the wind turbines behind.[135] Making each unit more integrated with the rest of the facility could boost output as

132. RYAN WISER ET AL., LAWRENCE BERKELEY NAT'L LAB REDUCING WIND ENERGY COSTS THROUGH INCREASED TURBINE SIZE: IS THE SKY THE LIMIT? 2 fig.1 (2016), https://emp.lbl.gov/sites/all/files/scaling_turbines.pdf [https://perma.cc/B8B5-WGMU].

133. *Id.*

134. "Moore's Law [is a] prediction made by American engineer Gordon Moore in 1965 that the number of transistors per silicon chip doubles every year." *Moore's Law*, ENCYLOPAEDIA BRITANNICA (Mar. 29, 2019), https://www.britannica.com/technology/Moores-law [https://perma.cc/UPC8-W7UA].

135. Efstathiou, Jr. & Sullivan, *supra* note 95.

much as 15%, according one estimate.[136] For birds, these factors become a moving obstacle in the airspace, as the blades always face directly into the wind, rotated to change their angle for optimal performance in different wind speeds.[137] This quick pivoting poses an obstacle in the path of birds, and bird fatalities are thus correlated with turbine height.[138]

2. State Net Metering Policy in Three-Quarters of U.S. States

With the phase-down of the ITC value by 67% and the elimination of the PTC, notwithstanding the value of depreciation and bonus depreciation, much of the federal incentives for wind power phase out soon.[139] There also are significant state financial incentives for wind power in a majority of states. These occur primarily in the form of state net metering and state renewable portfolio standard energy credits for wind power projects. The most used state subsidy for renewable power and for combatting climate change is net metering,[140] which at its peak was used in 44 states. However, several states recently have withdrawn net metering, which now remains is in 38 states.[141]

Net metering is a policy that allows retail electricity customers to receive credits on their utility bills for on-site renewable energy generation exported to the state's regulated electric grid in excess of the individual customer's electric load.[142] Each state has different state law and requirements for net metering—no two

136. *Id.* This is an estimate by WindWISDEM, a wind-industry software startup funded by venture capital firm Ystrategies Corp. WindWISDEM has been renamed Vayu Corp. *Vayu (Formerly Known as WindWISDEM) Launches Wind Energy Optimization Cloud Software*, BUS. WIRE (Nov. 20, 2018), https://www.businesswire.com/news/home/20181120005141/en/Vayu-WindWISDEM-Launches-Wind-Energy-Optimization-Cloud [https://perma.cc/S4H9-RAVM].

137. *See Energy Dept. Reports: U.S. Wind Energy Production and Manufacturing Reaches Record Highs*, U.S. DEP'T OF ENERGY, *supra* note 26.

138. *See* Robert M.R. Barclay, E.F. Baerwald & J.C. Gruver, *Variation in Bat and Bird Fatalities at Wind Facilities: Assessing the Effects of Rotor Size and Tower Height*, 85 CAN. J. ZOOL. 381 (2007).

139. *See supra* Part II.B.

140. *See Database of State Incentives for Renewables & Efficiency®*, N.C. CLEAN ENERGY TECH. CTR., *supra* note 93.

141. STEVEN WEISSMAN & NATHANIEL JOHNSON, U.C. BERKELEY CTR. FOR L., ENERGY, & THE ENV'T, THE STATEWIDE BENEFITS OF NET-METERING IN CALIFORNIA AND THE CONSEQUENCES OF CHANGES TO THE PROGRAM 2 (2012), https://www.law.berkeley.edu/wp-content/uploads/2015/06/The_Statewide_Benefits_of_Net-Metering_in_CA_Weissman_and_Johnson3.pdf. [https://perma.cc/CV4Z-A2XQ].

142. FERREY, LAW OF INDEPENDENT POWER, *supra* note 7, § 4:28.

programs are identical in terms of eligible technologies, types and value of net metering credits, or vintage of credits. For each of the 44 states that previously had net metering, and the 38 that retain it today, wind power is eligible to be net metered. Forty-four states and the District of Columbia had some form of net metering policy, while six states—Alabama, Idaho, Mississippi, South Dakota, Tennessee, and Texas—never had had net metering.[143]

During times when energy is not being used by the customer but the customer's renewable energy system is producing electricity, the net meter spins in the reverse direction, registering exported electricity to the utility as a reduction of the amount of power sold by the utility to the customer.[144] Customers are given credit by the utility for every kWh of electricity not used by the customer but exported to the utility.[145] By turning the meter backwards, and because only a single rate applies to a single meter, net metering effectively compensates the generator at or near the full retail rate. This includes approximately half of the retail bill attributable to transmission, distribution, and taxes, for transferring just the wholesale energy commodity—the power itself.[146] The value received for that net metered power is an amount above the utility's avoided cost[147] or the wholesale rate set by FERC or ISOs, which manage the utility grids for more than half of consumers.[148]

The net-metered customer enjoys a free energy "banking" service and does not compensate the utility for using the grid to effectuate this energy banking, or for the distribution services used. The retail credit received in some states can be in the vicinity of

143. *See State Net Metering Policies*, NAT'L CONF. OF ST. LEGISLATURES, *supra* note 61. Alabama, Idaho, Mississippi, South Dakota, Tennessee, and Texas are the only states without a state net metering program. *Id.*

144. *See id.*

145. *See id.*

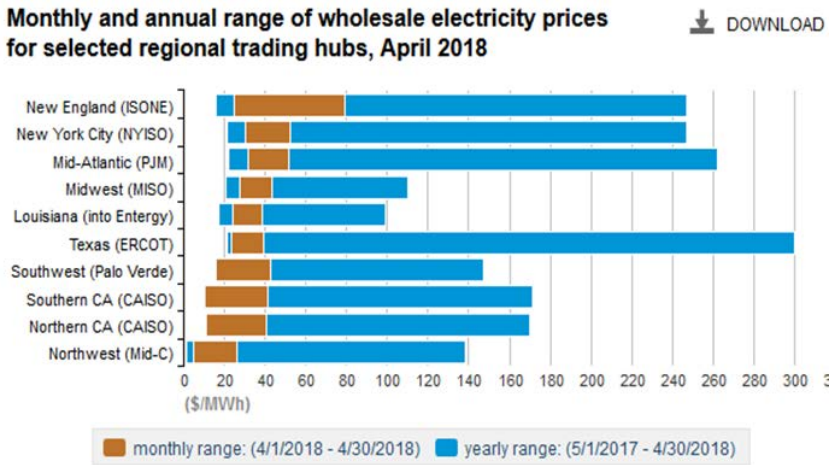
146. *See Glossary*, N.C. CLEAN ENERGY TECH. CTR., http://www.dsireusa.org/support/glossary [https://perma.cc/7GXH-DYBG] (last visited May 23, 2019) ("In effect, the customer uses excess generation to offset electricity that the customer otherwise would have to purchase at the utility's full retail rate."). As to whether electricity is a "good" or a "service" and how it should be treated under the law, see STEVEN FERREY, THE NEW RULES: A GUIDE TO ELECTRIC MARKET REGULATION 211–31 (2000).

147. 16 U.S.C. § 824a-2 (2012).

148. *See Regional Transmission Organizations (RTO)/Independent System Operators (ISO)*, FED. ENERGY REG. COMMISSION, *supra* note 55.

$0.20/kWh.[149] For example, the author's current retail rate in Boston is an average cost of $0.26/kWh, and a net-metered customer would be credited at or near this retail rate. Wholesale power in New England, and in most other areas of the country, has been selling for approximately $0.045/kWh or less for the past 5 years.[150] Figure 5A displays wholesale power prices across the U.S. in in April 2018 ranging from $0.00–0.08/kWh, and Figure 5B shows prices from March 2016 ranging from $0.00–0.35/kWh at a given hour of the year, averaging $0.00-0.04/kWh in different parts of the country.

Figure 5A. Monthly and Annual Range of Wholesale Electricity Prices, April 2018[151]

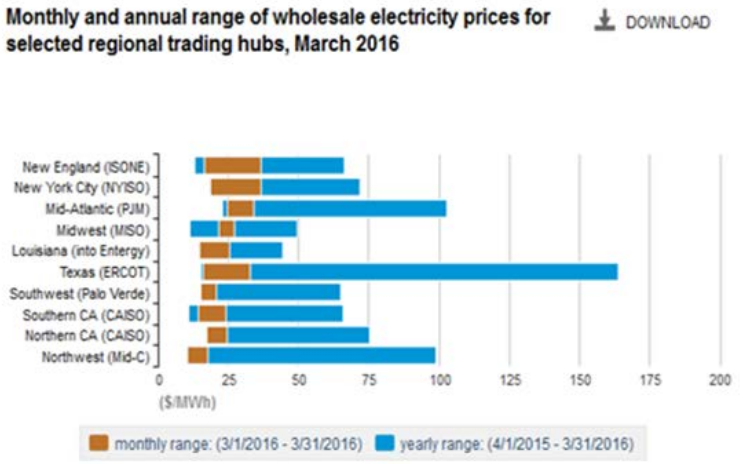


149. *See How Does National Grid's Net Metering Work?*, ENERGYSAGE, https://www.energysage.com/net-metering/national-grid/ [https://perma.cc/47RG-7VKC] (last visited May 23, 2019).

150. *See* Press Release, New England ISO, New England's Wholesale Electricity Prices Up in 2018 (Mar. 12, 2019), https://www.iso-ne.com/static-assets/documents/2019/03/20190312_pr_2018-price-release.pdf [https://perma.cc/TCC6-JDU8].

151. *Electricity Monthly Update with Data for April 2018*, U.S. ENERGY INFO. ADMIN. (June 26, 2018), https://www.eia.gov/electricity/monthly/update/archive/june2018/ [https://perma.cc/V6FT-TZ3S] (select "print this issue").

Figure 5B. Monthly and Annual Range of Wholesale Electricity Prices, March 2016[152]



In 2016, 28 of the then 43 net metering states had some measures proposed (but most were not implemented) to curtail net metering, which followed similar levels of proposed state pull-back activity in 2015 and 2014.[153] While there has been a recent 15% decline in the number of net metering states, it still remains the most used state renewable energy incentive in the U.S., and is still offered in 38 states. The second most used state support for wind power is state renewable portfolio standards ("RPSs").

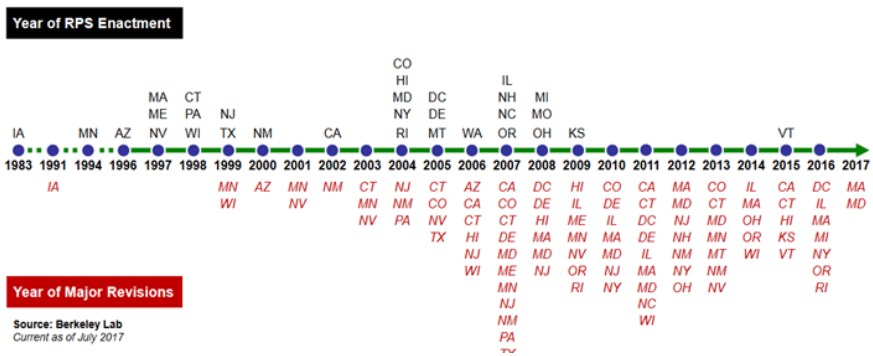
152. *Electricity Monthly Update with Data for March 2016*, U.S. ENERGY INFO. ADMIN. (May 25, 2016), https://www.eia.gov/electricity/monthly/update/archive/may2016/ [https://perma.cc/JMZ9-78DF] (select "print this issue").

153. N.C. CLEAN ENERGY TECH. CTR., 50 STATES OF SOLAR: Q4 2016 & ANNUAL REVIEW EXECUTIVE SUMMARY 5 tbl.1 (2017), http://ncsolarcen-prod.s3.amazonaws.com/wp-content/uploads/2017/02/Q42016_ExecSummary.pdf [https://perma.cc/P55P-5HH6]; N.C. CLEAN ENERGY TECH. CTR., THE 50 STATES OF SOLAR: A QUARTERLY LOOK AT AMERICA'S FAST-EVOLVING DISTRIBUTED SOLAR POLICY CONVERSATION (2015), https://nccleantech.ncsu.edu/wp-content/uploads/2017/05/50-States-of-Solar-Q1-2015.pdf [https://perma.cc/GFF3-EX2K].

3. State Renewable Portfolio Standards for Wind Power

Twenty-nine states and the District of Columbia have enacted state RPSs.[154] Unlike net metering programs, which have flowed and now have ebbed in some states, RPS states have remained relatively constant over time in 29 states. All were enacted independently at different times between 1983 and 2015, and revised periodically, as shown in Figure 6.[155] For example, Massachusetts was an early state to adopt a RPS in 1997, with revisions made in 2008, 2010, 2011, 2012, 2014, 2016, and 2017.[156] More than half the states have raised the level of RPS percentages that must be achieved, and 18 have added carve-out categories for specific (often solar) technologies.[157]

Figure 6. Timeline of RPSs Enactments[158]



A RPS requires certain retail electricity sellers to maintain evidence of a predetermined percentage of designated clean

154. *See* N.C. CLEAN ENERGY TECH. CTR. & U.S DEP'T OF ENERGY, RENEWABLE PORTFOLIO STANDARD POLICIES (2018), http://ncsolarcen-prod.s3.amazonaws.com/wp-content/uploads/2018/10/Renewable-Portfolio-Standards-2018.pdf [https://perma.cc/74JM-RM9U].

155. *See* GALEN BARBOSE, LAWRENCE BERKELEY NAT'L LAB., U.S. RENEWABLE PORTFOLIO STANDARDS: 2017 ANNUAL STATUS REPORT 8 (2017), http://eta-publications.lbl.gov/sites/default/files/2017-annual-rps-summary-report.pdf [https://perma.cc/MUS2-WP78].

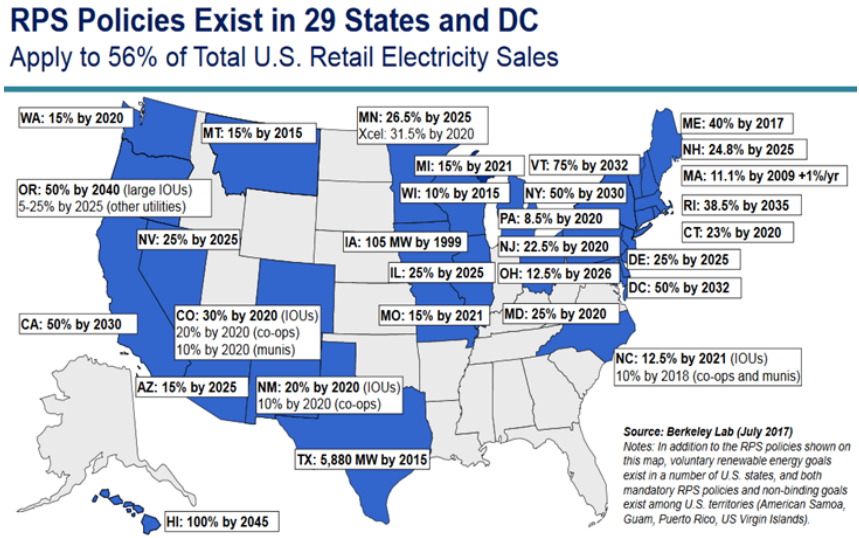
156. *Id.*

157. *Id.*

158. *Id.*

resources in their wholesale electric supply mixes.[159] RPS programs were denominated as one form of "backdoor" renewable energy subsidies.[160] There is myriad variation with state RPS models, but all 29 RPS states allow wind power as an eligible RPS technology.[161] These mandatory RPS programs cover 46% of nationwide retail electricity sales.[162] The 29 states with RPS programs and their requirements over time are displayed in Figure 7.

Figure 7. RPS Policies and Requirements[163]



159. Resources such as renewables, demand-side management ("DSM"), or high efficiency fossil fuel combustion, as defined by a particular state, would be included in the company's overall resource portfolio. Portfolio requirements can be applied to electricity sellers, such as generation companies and vertically integrated utilities as a condition of continued market access. The requirements could also be applied to wholesale electricity buyers, such as distribution companies and electricity brokers, but the states do not exercise authority over wholesale markets.

160. *See* Robert Glennon & Andrew M. Reeves, *Solar Energy's Cloudy Future*, 1 ARIZ. J. ENVTL. L. & POL'Y 91, 106 (2010).

161. *See* THE LAW OF CLEAN ENERGY EFFICIENCY AND RENEWABLES 77 (Michael B. Gerrard ed., 2011).

162. RYAN WISER & GALEN BARBOSE, LAWRENCE BERKELEY NAT'L LAB., RENEWABLE PORTFOLIO STANDARDS IN THE UNITED STATES 5 (2008), http://eta-publications.lbl.gov/sites/default/files/report-lbnl-154e-revised.pdf [https://perma.cc/3QYX-FRK9].

163. *See* WISER ET AL., *supra* note 50, at 68 fig.55.

The required state percentage of annual retail sales of energy delivered from renewables can be deceiving depending on whether preexisting renewable resources are counted.[164] To comply with RPS requirements, electric utilities may purchase renewable energy credits ("RECs") from eligible renewable generation projects, which exist as separate commodities to be traded and transferred.[165] Moreover, many states strengthen their requirements periodically.[166] For example, California has continually raised requirements for utilities to purchase renewable energy credits under its RPS—California had a requirement to reach 20% renewable energy by 2010, and then in 2009, increased its requirement to achieve 33% renewable energy by 2020. California raised the standard again in 2015 to achieve 50% renewable energy by 2030.[167] In June 2015, Hawaii enacted a law requiring all electric power to come from renewables by 2045.[168]

Seven of the 29 states have credit multipliers for in-state renewable energy, as shown in Figure 10. The 7th Circuit declared such in-state credit multipliers unconstitutional under the dormant Commerce Clause, particularly focusing on the Michigan program.[169] As shown in Figure 10, Michigan, the subject of Judge Posner's and the Seventh Circuit's declaration on this illegality, has continued its discriminatory program. Other geographically discriminatory aspects are grafted on to other state RPS RECs programs but go beyond the scope of this article.[170]

164. *See generally* WISER ET AL., *supra* note 50,

165. *See Renewable Energy Certificates, (RECs)*, U.S. ENVTL. PROTECTION AGENCY (June 5, 2018), https://www.epa.gov/greenpower/renewable-energy-certificates-recs [https://perma.cc/PQS4-LX5J].

166. *See supra* fig.6; BARBOSE, *supra* note 155, at 10.

167. *Renewables Portfolio Standard (RPS)*, CAL. ENERGY COMMISSION, http://www.energy.ca.gov/portfolio [https://perma.cc/J955-E38R] (last visited May 24, 2019).

168. H.B. 623, 28th Leg., Reg. Sess. (Haw. 2015).

169. Ill. Commerce Comm'n v. F.E.R.C., 721 F.3d 764 (7th Cir. 2013).

170. *See* Steven Ferrey, *Threading the Constitutional Needle with Care: The Commerce Clause Threat to the New Infrastructure of Renewable Power*, 7 TEX. J. OIL, GAS, & ENERGY L. 59 (2012).

Table 2. Eligible RPS Renewable Energy Technologies and Requirements by State[171]

State	Eligible Renewable	Standard
AZ	Solar Water Heat, Solar Space Heat, Solar Thermal Electric, Solar Thermal Process Heat, PV, Landfill Gas, Wind, Biomass, Hydroelectric, Geothermal Electric, Geothermal Heat Pumps, CHP/Cogeneration, Solar Pool Heating (commercial only), Daylighting (non-residential only), Solar Space Cooling, Solar HVAC, CHP (only counts when the source fuel is an eligible renewable energy resource), Anaerobic Digestion, Fuel Cells using Renewable Fuels, Geothermal Direct-Use, Additional technologies upon approval	15% of retail electric load by 2025. Utilities must procure 20% of their RPS eligible power from distributed renewable (DR) sources in 2010, 25% from DR in 2011, and 30% from DR in 2012 and thereafter
CA	Solar Thermal Electric, PV, Landfill Gas, Wind, Biomass, Geothermal Electric, Municipal Solid Waste, Energy Storage, Anaerobic Digestion, Small Hydroelectric, Tidal Energy, Wave Energy, Ocean Thermal, Biodiesel, Fuel Cells using Renewable Fuels	20% by Dec 31, 2013; 25% Dec 31, 2016; 33% by 2020; 50% by 2030
CO	Solar Thermal Electric, PV, Landfill Gas, Wind, Biomass, Hydroelectric, Geothermal Electric, Recycled Energy, Anaerobic Digestion, Fuel Cells	30% by 2020

171. *State Renewable Portfolio Standards and Goals*, NAT'L CONF. OF ST. LEGISLATURES (Feb. 1, 2019), http://www.ncsl.org/research/energy/renewable-portfolio-standards.aspx [https://perma.cc/DP6Z-67HD].

	using Renewable Fuels & Distributed generation.	
CT	Solar Thermal Electric, PV, Landfill Gas, Wind, Biomass, Hydroelectric, Fuel Cells, Municipal Solid Waste, CHP/Cogeneration, Low E Renewables, Anaerobic Digestion, Tidal Energy, Wave Energy, Ocean Thermal, Fuel Cells using Renewable Fuels	Class I 20% by 2020; Class I or Class II 3% by 2010; Class III 4% by 2010
DE	Solar electric, PV, wind, ocean, tidal, ocean thermal, fuel cells powered by renewable fuels, small hydro, biomass, anaerobic digestion, and landfill gas	5% for compliance year 2010–2011; 25% for 2025–2026
HI	Solar Water Heat, Solar Space Heat, Solar Thermal Electric, Solar Thermal Process Heat, PV, Landfill Gas, Wind, Biomass, Hydroelectric, Geothermal Electric, Geothermal Heat Pumps, Municipal Solid Waste, CHP/Cogeneration, Hydrogen, Seawater AC, Solar AC, Anaerobic Digestion, Tidal Energy, Wave Energy, Ocean Thermal, Ethanol, Methanol, Biodiesel, Fuel Cells using Renewable Fuels	10% of electricity from renewable sources by 2010; 40% by 2030
IL	Solar Thermal Electric, PV, Landfill Gas, Wind, Biomass, Hydroelectric, Anaerobic Digestion, Biodiesel	IOUs must supply 25% of their customers' electricity from renewables by 2025
IA	Solar Thermal Electric, PV, Landfill Gas, Wind, Biomass, Hydroelectric, Municipal Solid	At least 105 MW generating capacity; 1000 MW wind capacity by

	Waste, Anaerobic Digestion	2010
KS	Solar Space Heat, Solar Thermal Electric, Solar Thermal Process Heat, PV, Landfill Gas, Wind, Biomass, Hydroelectric, Small Hydroelectric, Fuel Cells using Renewable Fuels	Less than 15,000 customers, must generate or purchase 20% renewable by 2010
ME	Solar Thermal Electric, PV, Landfill Gas, Wind, Biomass, Hydroelectric, Geothermal Electric, Fuel Cells, Municipal Solid Waste, CHP/Cogeneration, Tidal Energy, Fuel Cells using Renewable Fuels, Other Distributed Generation Technologies	IOUs and retail suppliers shall meet 40% of intrastate energy needs by 2017. 30% from Class II, 10% from Class I
MD	Solar Water Heat, Solar Thermal Electric, PV, Landfill Gas, Wind, Biomass, Hydroelectric, Geothermal Electric, Municipal Solid Waste, Anaerobic Digestion, Tidal Energy, Wave Energy, Ocean Thermal, Fuel Cells using Renewable Fuels	Tier I 20% by 2022, 2.5% from Tier II; at least 0.5% solar, increasing to 2% by 2022
MA	Solar Thermal Electric, PV, Landfill Gas, Wind, Biomass, Hydroelectric, Geothermal Electric, Municipal Solid Waste, Anaerobic Digestion, Small Hydroelectric, Tidal Energy, Wave Energy, Ocean Thermal, Renewable Fuels, Fuel Cells using Renewable Fuels	Class I 5% by 2010, 15% by 2020; Class II 3.6% retail sales

MI	Solar Thermal Electric, PV, Landfill Gas, Wind, Biomass, Hydroelectric, Geothermal Electric, Municipal Solid Waste, CHP/Cogeneration, Coal-Fired with CCS, Gasification, Anaerobic Digestion, Tidal Energy, Wave Energy	IOUs, alternative retail suppliers, electric cooperatives, and municipal electric utilities 10% retail by 2015
MN	Solar Thermal Electric, PV, Landfill Gas, Wind, Biomass, Hydroelectric, Municipal Solid Waste, Hydrogen, Co-Firing, Anaerobic Digestion	Xcel Energy 30% retail sales by 2020, of which, 25% by wind or solar, with solar no more than 1%; Other utilities 25% by 2025
NV	Solar Water Heat, Solar Space Heat, Solar Thermal Electric, Solar Thermal Process Heat, PV, Landfill Gas, Wind, Biomass, Hydroelectric, Geothermal Electric, Municipal Solid Waste, Waste Tires (using microwave reduction), Energy Recovery Processes, Solar Pool Heating, Anaerobic Digestion, Biodiesel, Geothermal Direct-Use	Utilities 12% retail sales by 2009, 25% by 2025. Solar must be 5% annually through 2015, 6% by 2016.
NH	Solar Water Heat, Solar Space Heat, Solar Thermal Electric, Solar Thermal Process Heat, PV, Landfill Gas, Wind, Biomass, Hydroelectric, Fuel Cells, Geothermal Heat Pumps, CHP/Cogeneration, Hydrogen, Anaerobic Digestion, Small Hydroelectric, Tidal Energy, Wave Energy, Ocean Thermal, Renewable Fuels, Biodiesel, Fuel Cells using Renewable Fuels, Microturbines	Class I 16% by 2025; Class II 0.3%; Class III 6.5%; Class IV 1%

NJ	Solar Thermal Electric, PV, Landfill Gas, Wind, Biomass, Hydroelectric, Geothermal Electric, Municipal Solid Waste, Anaerobic Digestion, Tidal Energy, Wave Energy, Fuel Cells using Renewable Fuels	IOU and retail suppliers must reach 22.5% by 2021. Must buy 2,518 gigawatt hours ("GWh") from in-state solar electric generators by 2021 and 5,316 GWh by 2026
NM	Solar Thermal Electric, PV, Landfill Gas, Wind, Biomass, Hydroelectric, Geothermal Electric, Zero emission technology with substantial long-term production potential, Anaerobic Digestion, Fuel Cells using Renewable Fuels	IOUs 20% by 2020; rural co-ops 10% total retail; IOUs 20% solar, 20% wind, 10% geothermal, biomass, new hydro or other renewables, 3% distributed
NY	Solar Water Heat, PV, Landfill Gas, Wind, Biomass, Hydroelectric, Fuel Cells, CHP/Cogeneration, Anaerobic Digestion, Tidal Energy, Wave Energy, Ocean Thermal, Ethanol, Methanol, Biodiesel, Fuel Cells using Renewable Fuels	IOUs 30% by 2015, 20.7% from existing facilities, 1% voluntary green power sales. Remainder: 93% main tier and 7% customer sited tier
NC	Solar Water Heat, Solar Space Heat, Solar Thermal Electric, Solar Thermal Process Heat, PV, Landfill Gas, Wind, Biomass, Geothermal Electric, CHP/Cogeneration, Hydrogen, Anaerobic Digestion, Small Hydroelectric, Tidal Energy, Wave Energy	IOUs 12.5% of retail by 2021; Municipal utilities and electric co-ops 10% by 2018
OH	Solar Thermal Electric, PV, Landfill Gas, Wind, Biomass, Hydroelectric, Geothermal Electric, Fuel Cells, Municipal Solid Waste, CHP/Cogeneration, Waste Heat, Energy Storage, Clean	25% retail by 2025; 12.5% by 2024; 0.5% solar by 2024

	Coal, Coal Mine Methane, Advanced Nuclear, Anaerobic Digestion, Fuel Cells using Renewable Fuels, Microturbines	
OR	Wind, Solar, Hydro, Ocean Thermal, Wave, Tidal, Geothermal, Certain Types of Hydrogen Power, Biomass, Biogas, Municipal Solid Waste	5% by 2011; 25% by 2025. Less for smaller utilities
PA	Solar thermal, solar PV, wind, low impact hydro, geothermal, biomass, certain methane gas and fuel cells, waste coal, DG systems, demand side management increasing energy efficiency, large hydro, municipal solid, wood pulping, and integrated gasification combined cycle coal	18% by 2020; Of that 18%, 8% from Tier I, 10% from Tier II. 5% of Tier I requirement solar.
RI	Solar Thermal Electric, PV, Landfill Gas, Wind, Biomass, Hydroelectric, Geothermal Electric, Anaerobic Digestion, Tidal Energy, Wave Energy, Ocean Thermal, Biodiesel, Fuel Cells using Renewable Fuels	IOUs 16% retail sales by 2019
TX	Solar Water Heat, Solar Thermal Electric, PV, Landfill Gas, Wind, Biomass, Hydroelectric, Geothermal Electric, Geothermal Heat Pumps, Tidal Energy, Wave Energy, Ocean Thermal	5,880 MW by 2015, 500 MW from other than wind. 10,000 MW by 2025.
WA	Solar Thermal Electric, PV, Landfill Gas, Wind, Biomass, Hydroelectric, Geothermal Electric, Anaerobic Digestion,	Utilities procure 3% by 2012; 15% by 2020

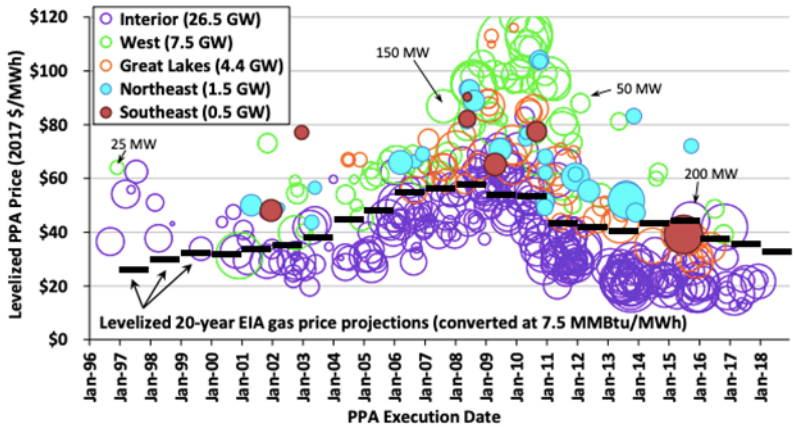
	Tidal Energy, Wave Energy, Ocean Thermal, Biodiesel	
WI	Solar Water Heat, Solar Thermal Electric, Solar Thermal Process Heat, PV, Landfill Gas, Wind, Biomass, Hydroelectric, Geothermal Electric, Geothermal Heat Pumps, Municipal Solid Waste, CHP/Cogeneration, Solar Light Pipes; Biomass Thermal; Densified Fuel Pellets; Pyrolysis; Synthetic Gas; Biogas, Anaerobic Digestion, Small Hydroelectric, Tidal Energy, Wave Energy, Biodiesel, Fuel Cells using Renewable Fuels	10% statewide needs by 2015, mandatory targets each year
DC	Solar Water Heat, Solar Space Heat, Solar Thermal Electric, Solar Thermal Process Heat, PV, Landfill Gas, Wind, Biomass, Hydroelectric, Geothermal Electric, Municipal Solid Waste, Solar Space Cooling, Tidal Energy, Wave Energy, Ocean Thermal, Fuel Cells using Renewable Fuels	20% by 2020; Solar 2.5% by 2023

It is estimated that 45% of the 4,300 MW of wind power installed in the U.S. between 2001 and 2004 was motivated by these 29 state RPS programs, while an additional 15% of these installations were motivated by state renewable energy subsidies.[172] Current RPSs are projected to add 76,750 MW of additional renewable generation by

172. BOLINGER & WISER, *supra* note 100, at 1. For more on system benefit charge systems operative in fewer than 20 states, see FERREY, LAW OF INDEPENDENT POWER, *supra* note 7, § 10:114.

2025.[173] Receiving up to $0.02/kWh or even $0.065/kWh—above and apart from the value of the power itself which has been hovering in these regions in the general vicinity of $0.04/kWh over the prior 8 years[174]—is a significant financial incentive for renewable power.

Figure 8. Levelized Wind PPA Prices by PPA Execution Date and Region[175]



The cost to ratepayers and taxpayers for subsidies for wind power over a 20 year period disaggregated by region of the country, is shown in Figure 8. This includes costs for RPS RECs in 29 states (ranging in amount from $0.01/kWh to $0.05/kWh, (notwithstanding that solar RECs in Massachusetts which traded for as high as $0.50/kWh and averaged $0.27/kWh),[176] accelerated the modified accelerated cost recovery system ("MACRS") depreciation, and the PTC at $0.023/Kwh. Figure 8 shows the amount of subsidy for wind on the two coasts ranging between $0.04/kWh to $0.12/kWh produced. This is a significant subsidy

173. Brad Plummer, *The Biggest Fight over Renewable Energy Is Now in the States*, WASH. POST (March 25, 2013), https://www.washingtonpost.com/news/wonk/wp/2013/03/25/the-biggest-fights-over-renewable-energy-are-now-happening-in-the-states/?utm_term=.7081c78b153a [https://perma.cc/K2J5-53RV].

174. *See* WISER ET AL., *supra* note 50, at 57–61.

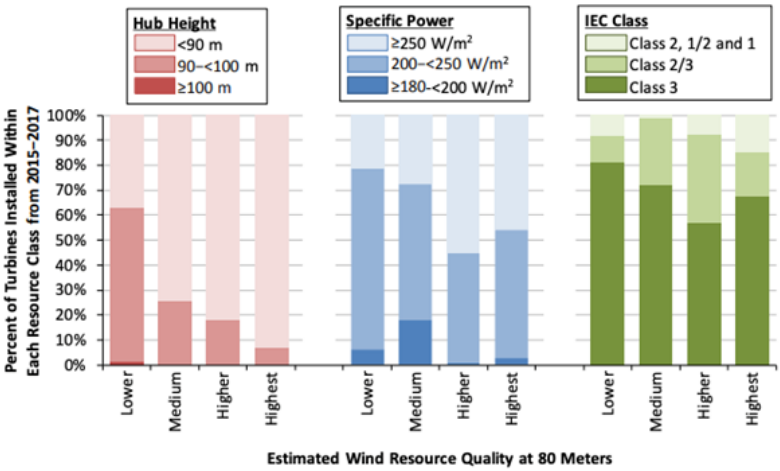
175. *Id.* at 58 fig.50.

176. From author's experience handling REC transactions in Massachusetts.

from federal and state sources, given that the value of the power itself has averaged approximately $0.04/kWh for the last decade.[177]

Translating this per unit of renewable energy generated subsidy in Figure 8 into the total cost to utility rate payers of RPS programs, the cost in 2015 was $3 billion per year and climbed in each successive year due to the greater availability of renewable energy, as shown in Figure 9.[178]

Figure 9. Estimated Wind Resource Quality at 80 Meters[179]



C. Operational Costs and Challenges Facing the Wind

Notwithstanding these significant surviving state benefits for wind power, there are two additional costs of note associated with the siting and operation of wind power. To capture the strongest wind, turbines are often sited away from consumers and at a distance from the existing transmission grid. The contiguous 48 states have

177. *See, e.g.*, PJM, THE VALUE OF MARKETS 2 (2018), https://www.pjm.com/-/media/about-pjm/newsroom/fact-sheets/the-value-of-pjm-markets.ashx [https://perma.cc/62X8-UPQE]. JOHN HOWLEY, D.C. PUB. SERV. COMM'N, ELECTRICITY PRICE OUTLOOK FOR MARCH 2019 2 fig.1 (2019), https://dcpsc.org/getmedia/71a99f7e-842f-4a6f-9d50-ff487517bbd6/elecpriceoutlook.aspx [https://perma.cc/VJR4-M74Z].

178. BARBOSE, *supra* note 155, at 3, 34.

179. WISER ET AL., *supra* note 50, at 34 fig.29.

enough potential wind energy to generate far more electricity than the country currently consumes,[180] but the most potential wind power is located in the Great Plains states, at a great distance from consumers.[181]

Part II.C.1 examines the law and policy associated with wind power turbine interconnection. What alters the analysis is that approximately 25% of U.S. states, including some of the most populous U.S. states, have deregulated, in whole or in part, the sale of retail power in their states during the last two decades. In these deregulated states, independent merchant power generators are often the ones constructing wind projects.[182] If the wind project interconnection line has to come to the existing grid, it can be prohibitively expensive and time consuming to obtain necessary rights-of-way. However, as examined next, there are recent decisions where the grid comes to the wind project with the high cost billed to all retail ratepayers, rather than to the wind developer. The evolution and development of this legal concept will be critical to the economics and build-out of wind in the U.S.

Part II.C.2 evaluates the legal parameters of adding more "ramping" back-up power to accommodate wind's unpredictable intermittency, and considers how these costs are allocated within the system.

1. "Whose Line Is It Anyway?"[183]

The distribution of electricity from source to consumers requires a vast, physically interconnected grid.[184] In the United States, there are five separate grids which transmit electricity on a regional scale:

180. NAT'L RENEWABLE ENERGY LAB., NREL TRIPLES PREVIOUS ESTIMATES OF U.S. WIND POWER POTENTIAL 1–2 (2011), http://www.nrel.gov/docs/fy11osti/51555.pdf [https://perma.cc/W34B-VMRP].

181. WISER ET AL., *supra* note 50, at 2.

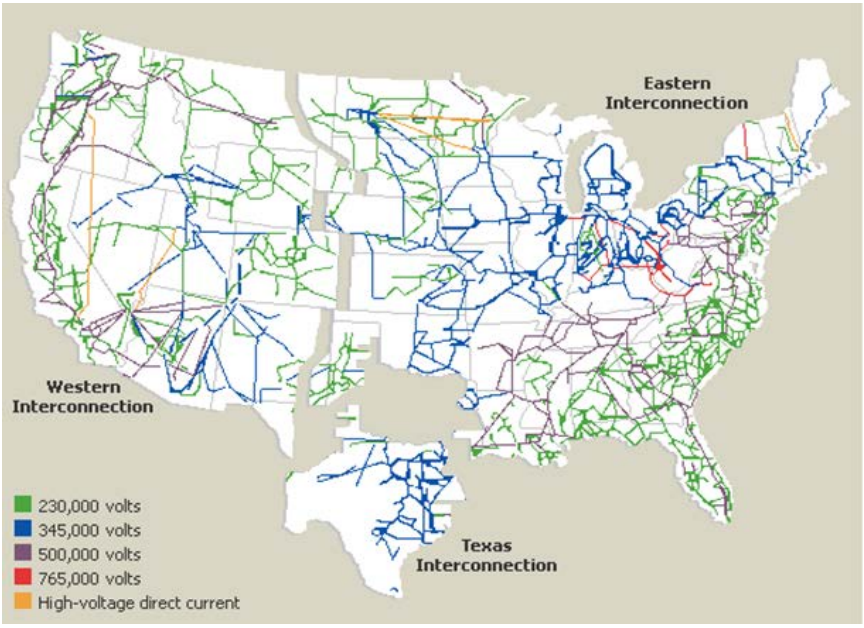
182. *Id.* at viii ("Independent power producers own the vast majority of wind assets built in 2017. IPPs own 91% of the new wind capacity installed in the United States in 2017, with the remaining assets owned by investor-owned utilities (9%) and other entities (<1%.").

183. This is the title of an American improvisational comedy show, which was originally hosted by Drew Carey on the ABC network from 1998 to 2007. *Whose Line Is It Anyway? (TV Series 1998–2007)*, https://www.imdb.com/title/tt0163507/ [https://perma.cc/C6EC-QGEA] (last visited Mar. 30, 2019).

184. U.S. DEP'T OF ENERGY, QUADRENNIAL ENERGY REVIEW—TRANSFORMING THE NATION'S ELECTRICITY SYSTEM: THE SECOND INSTALLMENT OF THE QER S-16 (2017), https://www.energy.gov/sites/prod/files/2017/02/f34/Quadrennial%20Energy%20Review—Second%20Installment%20%28Full%20Report%29.pdf [https://perma.cc/6UPN-2N7H].

one for the Eastern United States, one for the Western United States, one for most of Texas, one for Hawaii, and one for Alaska.[185] Power transactions transmitted between these five major regional grids are logistically either nonexistent or limited by lack of interconnection. This U.S. transmission grid system operates at fifteen different voltage levels.[186]

Figure 10: United States Transmission Grids[187]



A significant number of proposed new wind power projects are waiting to be interconnected so that they can move their generated

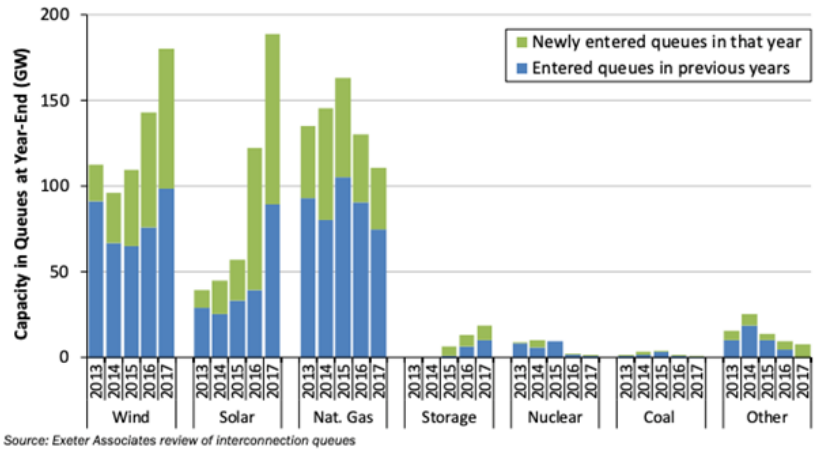
185. *Id.* at S-3 fig.S-2 (providing a visual display of critical infrastructure interconnections). Note that the term "interconnection" is used here to refer to alternating current power grids. *See Learn More About Interconnections*, U.S. DEP'T OF ENERGY, https://energy.gov/oe/services/electricity-policy-coordination-and-implementation/transmission-planning/recovery-act-0 [https://perma.cc/XGB2-92ZL] (last visited May 24, 2019).

186. Craig Cano, *Efficiency Should Be Viewed as Key Part of Entire Delivery System, Wellinghoff Says*, ELECTRIC UTIL. WK., Dec. 13, 2010, at 18, 19.

187. *United States Transmission Grid*, GLOBAL ENERGY NETWORK INST., https://www.geni.org/globalenergy/library/national_energy_grid/united-states-of-america/americannationalelectricitygrid.shtml [https://perma.cc/V89K-J23Z] (last visited Mar. 30, 2019).

power to consumers. Figure 11 shows that in 2017, there were 220 GW of new power waiting to be interconnected to the grid. This alone was about 20% of the then-existing 1,183 GW of power generation capacity in the U.S. in 2017. Of this 220 GW of power waiting to be interconnected, almost half of it was wind power.[188] It is the responsibility of regulated utilities to perform this interconnection.

Figure 11. Generation Capacity in 35 Selected Interconnection Queues[189]



The U.S. Federal Power Act of 1935 delegates to FERC exclusive jurisdiction over interstate and wholesale power sales, excluding "any other sale of electric energy."[190] Section 201(a) of the Federal Power Act provides that federal regulation under the statute shall "extend only to those matters which are not subject to regulation by the States."[191] Sections 205 and 206 of the Act[192] provide FERC exclusive authority to regulate interstate and wholesale sales of power, as well as the transmission of electricity in the United

188. *Visualizing the U.S. Electric Grid*, NPR (Apr. 24, 2009, 12:00 AM), http://www.npr.org/2009/04/24/110997398/visualizing-the-u-s-electric-grid [https://perma.cc/Z82K-JKFW]; *Industry Data*, EDISON ELECTRIC INST., *supra* note 34.

189. WISER ET AL., *supra* note 50, at 9 fig.7.

190. 16 U.S.C. § 824(b)(1) (2018).

191. *Id.* § 824(a).

192. *Id.* § 824(d)–(e).

States.[193] The Supreme Court commented on the operation of deregulated markets in one-quarter of the states: "Over the past few decades, many States, including Maryland, have deregulated their energy markets" and utilities "purchase that electricity . . . from independent power generators."[194] The Ninth Circuit Court of Appeals, in a case that would proceed to the Supreme Court, had previously found:

> Local utilities now obtain power largely through wholesale contracts subject to FERC's exclusive regulation, rather than through self-generated and self-transmitted power. . . . Although state regulators formerly took an extremely active role so as to ensure the just and reasonable retail power rates, FERC has exclusive jurisdiction over the wholesale rates that now drive the electric power market and, as a practical matter, largely determine the rates ultimately charged to the public.[195]

FERC does not regulate the construction of transmission facilities; it does regulate economic tariffs for transactions moving on power lines.[196] Distribution of power, as opposed to the transmission of power,[197] is regulated by the states exclusively.[198] Local government exercises police power over electric facility siting and land-use authority.[199] Approximately half the states also

193. Pub. Util. Dist. No. 1 of Snohomish Cty., Wash. v. F.E.R.C., 471 F.3d 1053, 1058 (9th Cir. 2006), *aff'd in part, rev'd in part sub nom.* Morgan Stanley Capital Grp., Inc. v. Pub. Util. Dist. No. 1 of Snohomish Cty., Wash., 554 U.S. 527 (2008), *and vacated*, 547 F.3d 1081 (9th Cir. 2008).

194. Hughes v. Talen Energy Mktg., LLC, 136 S. Ct. 1288, 1292 (2016); *see* FERREY, LAW OF INDEPENDENT POWER, *supra* note 7, § 10:13.

195. *Pub. Util. Dist. No. 1 of Snohomish Cty., Wash.*, 471 F.3d at 1067.

196. *See* Transmission Planning and Cost Allocation by Transmission Owning and Operating Public Utilities (Order 1000), 76 Fed. Reg. 49,842 (Aug. 11, 2011) (requiring nondiscriminatory access by all parties to transmission infrastructure).

197. FERREY, LAW OF INDEPENDENT POWER, *supra* note 7, § 5:10; STEVEN FERREY, ENVIRONMENTAL LAW: EXAMPLES & EXPLANATIONS 627 (8th ed. 2019); FERREY, THE NEW RULES, *supra* note 56, at 23–24, 46–47.

198. *Pub. Util. Dist. No. 1 of Snohomish Cty., Wash.*, 471 F.3d at 1058; 16 U.S.C. § 824(a) (2018).

199. *What FERC Does*, FED. ENERGY REG. COMMISSION (Aug. 14, 2018), http://www.ferc.gov/about/ferc-does.asp. [https://perma.cc/MM68-92JW] (discussing the limits of jurisdictional authority).

regulate power facility siting, and can preempt the siting authority of local municipalities.[200]

Over the past two decades, approximately one quarter of the states deregulated retail sale of power and many increased incentives for renewable energy. Beginning in 1997, Massachusetts, Rhode Island, and 13 states thereafter, implemented competition in retail power sales and partial deregulation. Several of these states have made their regulated utilities divest their power generation assets and purchase power wholesale.[201] In a significant number of these 13 deregulated states, this resulted in the regulated monopoly utilities selling their power generation units to independent power companies.[202]

The majority of new generation facilities are now constructed each year by "merchant" (unregulated) companies, rather than by the conventional regulated utilities which still own the transmission and distribution grid.[203] In 2017, U.S. investor-owned electric companies accounted for 37.8% (1,516,629 GWh) of total U.S. electricity generation, and non-utility-owned plants accounted for 42.2 % (694,239 GWh) of total electricity generation in the U.S.[204]

Figure 12 shows that the vast majority of new U.S. wind turbines are independent non-utility power generation projects which make wholesale power sales regulated exclusively by FERC.[205] In 2015, independent wholesale power companies built 7,290 MW of wind turbines which is 85% of the 8,598 MW of new wind power capacity

200. *See* NAT'L ASS'N OF REG. UTIL. COMM'RS, WIND ENERGY & WIND PARK SITING AND ZONING BEST PRACTICES AND GUIDANCE FOR STATES 13 (2012), https://pubs.naruc.org/pub.cfm?id=539BA6EE-2354-D714-5157-359DDD67CE7F [https://perma.cc/B7YY-EB49].

201. FERREY, THE NEW RULES, *supra* note 56, at 238–39.

202. U.S. ENERGY INFO. ADMIN., DOE/EIA-0562(00), THE CHANGING STRUCTURE OF THE ELECTRIC POWER INDUSTRY 2000: AN UPDATE 106 (2000).

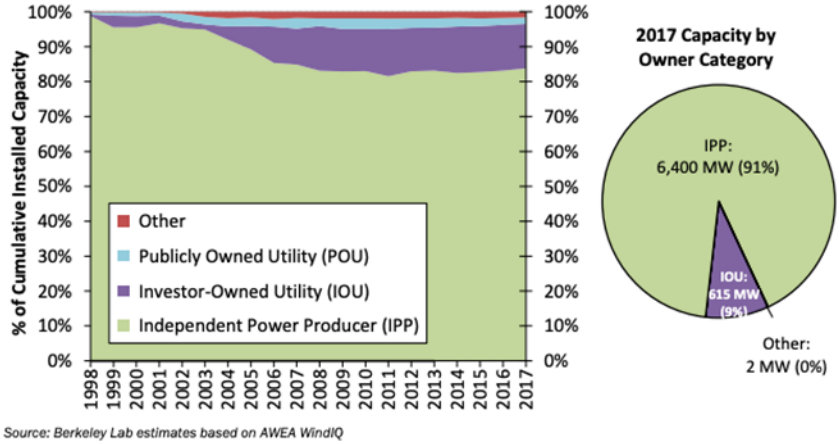
203. "In the 1970s, vertically integrated utility companies (investor-owned, municipal, or cooperative utilities) controlled over 95 percent of the electric generation in the United States. . . . [B]y 2004 electric utilities owned less than 60 percent of electric generating capacity. Increasingly, decisions affecting retail customers and electricity rates are split among federal, state, and new private, regional entities." ELEC. ENERGY MKT. COMPETITION TASK FORCE, REPORT TO CONGRESS ON WHOLESALE AND RETAIL COMPETITION MARKETS FOR ELECTRIC ENERGY 10 (2007); Steven Ferrey, *Sale of Electricity*, *in* THE LAW OF CLEAN ENERGY: EFFICIENCY AND RENEWABLES 217, 217–18 (Michael B. Gerrard ed., 2011). *See Scheduled 2015 Capacity Additions Mostly Wind and Natural Gas; Retirements Mostly Coal*, U.S. ENERGY INFO. ADMIN., *supra* note 28.

204. *Industry Data*, EDISON ELECTRIC INST., *supra* note 34.

205. WISER ET AL., *supra* note 50, at 22 fig.18.

completed that year in the U.S.[206] Of all cumulative wind power capacity in place in the U.S. by the conclusion of 2017, independent wholesale developers owned 91% of total wind capacity, with utilities owning only 9%.[207]

Figure 12. Cumulative U.S. Wind Power Capacity by Owner[208]



With an increase of independent power projects ("IPPs") and renewable energy facilities now dominating new power facilities, there is a potential legal challenge for wind power IPPs to secure transmission rights to move their power from remote sites to population centers: the conventional regulated retail utilities have access to state siting powers not necessarily available similarly to IPPs.[209]

States and localities vary in their exercise of siting authority for both generation facilities and lines to move power. In 12 of the 28 states that exercise separate state-level power facility siting authority, only public utilities are required to obtain a siting license or certificate before beginning construction on a wind generation

206. RYAN WISER & MARK BOLINGER, U.S. DEP'T OF ENERGY, 2015 WIND TECHNOLOGIES MARKET REPORT 26 (2016), https://www.energy.gov/sites/prod/files/2016/08/f33/2015-Wind-Technologies-Market-Report-08162016.pdf [https://perma.cc/8F83-PPDM].

207. WISER ET AL., *supra* note 50, at viii.

208. *Id.* at at 22 fig.18.

209. *See* Alexandra B. Klass, *Takings and Transmission*, 92 N.C. L. REV. 1079, 1124–27 (2013).

facility.[210] Independent or "merchant" wind power generation facilities in these 12 states, as well as in the 22 other states that do not separately regulate power plant siting by any developer, need not obtain state siting authority prior to wind project construction. Thus, in 34 states, merchant IPP power generation facilities are not legally required to obtain advance state certifications before constructing a facility. They still must satisfy local land-use requirements for their wind turbine locations and the lines to carry power away from the facility. Notwithstanding any state authority, local communities traditionally exercise their police power to regulate siting of any land uses, including wind power facilities.[211]

The use of more remote wind power affects not only the length of transmission, but also the handling-capacity for that transmission. A recent study demonstrated that intermittent wind and solar power serving 90% of the load at a given hour required a doubling of transmission capacity and intermittent power, coupled with battery storage of 180% of the load. To serve 99.9% of the load requires almost 290% of the electrical energy capacity.[212]

Therefore, cost-effective interconnection to the utility grid to export the wholesale power produced by wind turbines is a technical limitation facing wind, which rests apart from the generation technology itself. The allocation of such costs poses a substantial legal issue pursuant to interpretation of the Federal Power Act. The next section addresses an additional technical challenge that confronts the power grid—accommodating and working around the intermittency and unreliability of wind generation as it assumes a larger share of power generation responsibility.

210. *Compare e.g.*, IND. CODE ANN. § 8-1-8.5-7 (West 2019) (exempting construction of "facilit[ies] primarily for that person's own use") *with* MO. ANN. STAT. § 386.020(15) (West 2019) (noting exemptions including electricity generated for railroads, and for private use of private land).

211. FERREY, ENVIRONMENTAL LAW: EXAMPLES & EXPLANATIONS, *supra* note 197, at 502.

212. Cory Budischak et al., *Cost-Minimized Combinations of Wind Power, Solar Power and Electrochemical Storage, Powering the Grid up to 99.9 Percent of the Time*, 225 J. POWER SOURCES 60, 69 (2013).

2. The Key Gap: Intermittency and Storage

There's no battery technology that's even close to allowing us to take all of our energy from renewables[.] . . . [It is] necessary to deal not only with the 24-hour cycle but also with long periods of time where it's cloudy and you don't have sun or you don't have wind.

- Microsoft Chairman Bill Gates[213]

Unlike other forms of energy, electric power cannot be efficiently stored as electricity.[214] Wind and solar power demonstrate a relatively low availability factor in the 10% to 40% range of hours and operating capacity during a week or month in which they are able to operate.[215] The hours when wind and solar power are supplied are dependent on weather and cannot be adjusted to the times when the system most needs power to meet consumer demand.

Intermittent renewable wind power operation affects grid reliability. From February through April 2014, the California Integrated System Operator ("CAISO") was forced to curtail wind generation four times for six hours to restore the supply-demand balance on the California electric grid system.[216] These curtailments affected 485 MW of wind during one period, thereby raising system costs.[217] Such curtailments can be expected to become a larger issue as intermittent power sources increase in use and their percentage of power supply on the U.S. grid increases each year.

As wind and solar power increase as a percentage of total generation and their intermittency becomes a larger variable in the grid, that intermittency must be offset by a supplemental reserve.[218]

213. Lewis Page, *Gates: Renewable Energy Can't Do the Job. Gov Should Switch Green Subsidies into R&D*, THE REGISTER (June 26, 2015, 3:03 PM), https://www.theregister.co.uk/2015/06/26/gates_renewable_energy_cant_do_the_job_gov_should_switch_green_subsidies_into_rd/ [https://perma.cc/8CBG-3GPA].

214. *Id.*

215. *See* FERREY, LAW OF INDEPENDENT POWER, *supra* note 7, § 2:11 (noting the inability of intermittent sources to serve as base-load energy generators).

216. David Howarth & Bill Monsen, *Renewables Face Daytime Curtailments in California* PROJ. FIN.: NEWSWIRE, Nov. 2014, at 12, 13.

217. *Id.*

218. W. Edward Platt & Richard B. Jones, *The Impact of Carbon Trading on Performance: What Europe's Experience Can Teach North American Generators*, POWER (Jan. 1, 2010),

Due largely to its commitment to developing wind and solar, Germany constructed an additional 10.7 GW of coal-fired power plants to balance its grid between 2011 and 2015, at a time when the U.S. was closing just as many coal-fired plants.[219] Likewise, when Germany increased its intermittent renewable generation between 2011 and 2013 from 20.2% to 24%, coal-fired power generation increased from 42.8% to 44.8%, with almost half of Germany's electricity generation coming from lignite and other hard coal resources.[220]

In the U.S., spinning reserve is typically supplied by fossil fuel-fired and other base-load power generation units, which "spin" at partial output to be quickly available in seconds to "ramp" up to fill wind and solar dips instantaneously. There are both financial and environmental costs and damages to spinning backup fossil power resources.[221] This additional spinning and ramping up of fossil fuels is proportional to the increase in intermittent power generation resources, including wind power, which require regular back-up when not operating.

III. FEDERAL CRIMINAL LAW PROTECTS BIRDS

The federal and state incentives for wind power emanate from the exercise of civil regulatory law: It is money gained or lost. However, clouding the operational continuity of wind power in the U.S. are three long-standing federal statutes—one of which implements a multilateral treaty—that impose significant felony penalties for killing a single protected bird. It is estimated that the modest existing number of wind turbines kill approximately one-quarter million protected species every year.[222]

https://www.powermag.com/the-impact-of-carbon-trading-on-performance-what-europes-experience-can-teach-north-american-generators/ [https://perma.cc/V4EU-8K9S].

219. Robert Wilson, *Why Germany's Nuclear Phase Out is Leading to More Coal Burning*, ENERGY CENT. (Jan. 20, 2014), http://theenergycollective.com/robertwilson190/328841/why-germanys-nuclear-phase-out-leading-more-coal-burning [https://perma.cc/QP6S-SCGW].

220. *Germany's Renewable Electricity Generation Grows in 2015, but Coal Still Dominant*, U.S. ENERGY INFO. ADMIN.: TODAY IN ENERGY (May 24, 2016), https://www.eia.gov/todayinenergy/detail.php?id=26372 [https://perma.cc/FH99-MNW5].

221. Steven Ferrey, *The Poles of Power: Magnetic Bi-Directional Turn of the Meter*, 8 GEO. WASH. J. ENERGY & ENVTL. L. 39, 44–45 (2017).

222. *See infra* note 233.

A. The Statutory Framework

Three existing statutes make it a criminal offense, with jail time and large fines imposed, to kill a significant number of migrating birds. Each statute varies, covering different birds. The Gold and Bald Eagle Protection Act ("GBEPA") protects only two species of eagles,[223] while the MBTA makes it a felony to kill any of the more than 1,025 migratory bird species.[224] The third statute, the Endangered Species Act of 1973 ("ESA"), prohibits the taking of federally threatened or endangered species and protects these species' habitats.[225]

The MBTA[226] mirrors an international treaty and formalizes treaties and conventions between the U.S. and Great Britain (on behalf of Canada),[227] Mexico,[228] Japan,[229] and the former Soviet Union.[230] Under the MBTA, killing any of the protected birds can result in a $15,000 fine and up to six months in jail.[231] The MBTA also establishes a felony charge, which requires a "knowing violation" and imposes a penalty of up to two years imprisonment and a $250,000 fine.[232] At different times, the MBTA's absolute prohibition on killing birds has been interpreted as forbidding

223. 16 U.S.C. §§ 668–668d (2018). The Act prohibits anyone "without a permit issued by the Secretary of the Interior, from 'taking' bald eagles, including their parts, nests, or eggs." *The Bald and Golden Eagle Protection Act*, U.S. FISH & WILDLIFE SERV., https://www.fws.gov/midwest/eagle/permits/bagepa.html [https://perma.cc/9KY9-JFV3] (last visited May 24, 2019).

224. 16 U.S.C. §§ 703–712 (2018).

225. *Id.* §§ 1531–1544.

226. The MBTA makes it illegal for anyone to "take, possess, import, export, transport, sell, purchase, barter, or offer for sale, purchase, or barter, any migratory bird, or the parts, nests, or eggs of such a bird except under the terms of a valid permit issued pursuant to Federal regulations." *Migratory Bird Treaty Act*, U.S. FISH & WILDLIFE SERV., https://www.fws.gov/birds/policies-and-regulations/laws-legislations/migratory-bird-treaty-act.php [https://perma.cc/KDX4-N5XT] (last visited May 24, 2019).

227. The Convention Between the United States and Great Britain for the Protection of Migratory Birds in the United States and Canada, U.S.-U.K., Aug. 16, 1916, 39 Stat. 1702.

228. The Convention Between the United States and Mexico for the Protection of Migratory Birds and Game Mammals, U.S.-Mex, Feb. 7, 1936, 50 Stat. 1311.

229. The Convention Between the Government of the United States of America and the Government of Japan for the Protection of Migratory Birds in Danger of Extinction, and their Environment, U.S.-Japan, Mar. 4, 1972, 25 U.S.T. 3329.

230. The Convention Between the United States of America and the Union of Soviet Socialist Republics Concerning the Conservation of Migratory Birds and their Environment, U.S.-U.S.S.R., May 23, 1972, 29 U.S.T. 4647.

231. 16 U.S.C. § 707(a) (2018).

232. *Id.*; 18 U.S.C. § 3571(b) (2018).

"incidental takes" of any protected bird by any means.[233] The phrase "incidental takes," referring to certain indirect killings and harming of birds, does not appear in this MBTA treaty; however, it does appear in the more modern Endangered Species Act where certain incidental takes are authorized.[234]

There are now documented cases of wind turbines killing what is estimated cumulatively to be hundreds of thousands of statutorily protected migratory birds annually. Data compiled by *U.S. News & World Report* estimate that wind power killed about 25% the number of birds than did oil- and gas-fired electricity production, and about 5% the number of bird deaths attributed to coal-fired power plants in the U.S.[235] However, this data requires normalization for the relative amount of power produced by each major power generation technology that was associated with bird fatalities. In 2011, roughly corresponding to the time the aforementioned data were gathered, natural gas-fired generation produced about 1,000% more electric power than did wind turbines in the U.S., and coal-fired power produced closer to 2,000% more electric power than did wind.[236] Normalized per unit of power produced, the number of bird fatalities linked to each kWh of wind power produced is at least as or more significant than the fatalities per kWh of power produced by fossil fuel electric generation. Moreover, most of that fossil fuel-generation is pre-existing and in place, while wind power is growing dramatically and requires new siting permission.

According to the U.S. Fish and Wildlife Service ("FWS"), the bird mortality rate due to wind turbine collisions ranges from a minimum of 140,438, to a maximum of 327,586, with a median

233. Jennifer A. Dlouhy, *Trump Administration Reverses Obama-Era Policy on Accidental Bird Deaths*, BLOOMBERG (Dec. 22, 2017, 5:01 PM), https://www.bloomberg.com/news/articles/2017-12-22/trump-is-said-to-reverse-strict-obama-era-policy-on-bird-deaths-jbi84akp [https://perma.cc/3QR4-A7S7]; *see generally* Memorandum from Hilary C. Tompkins, Solicitor, U.S. Dep't of the Interior, to Dir., Fish & Wildlife Service (Jan. 10, 2017), https://www.eenews.net/assets/2017/02/21/document_ew_01.pdf [https://perma.cc/FMH3-E7GS] (discussing incidental takes prohibited under the Migratory Bird Treaty Act).

234. Tompkins, *supra* note 233.

235. Emily Atkin, *CHART: How Many Birds Are Killed by Wind, Solar, Oil, and Coal?*, THINKPROGRESS (Aug. 25, 2014), https://thinkprogress.org/chart-how-many-birds-are-killed-by-wind-solar-oil-and-coal-230d2a939bbb/ [https://perma.cc/NZE7-PJKV].

236. U.S. ENERGY INFO. ADMIN., DOE/EIA-0384(2011), ANNUAL ENERGY REVIEW 2011 7 tbl.1.2 (2012), https://www.eia.gov/totalenergy/data/annual/pdf/aer.pdf [https://perma.cc/CB7T-8FQK].

estimate of 234,012 birds killed annually.[237] The American Wind Energy Association, a developer trade organization, provides lower estimates of bird fatalities that are less than the median value estimated by the FWS:

> Wind power is far less harmful to birds than communication towers, tall buildings, airplanes, vehicles, cats, and numerous other human-caused threats including the conventional energy sources that wind power displaces. Wind turbines are estimated to cause fewer than three out of every 100,000 human-related bird deaths in the U.S., and will never cause more than a very small fraction of bird deaths no matter how extensively wind power is used in the future.[238]

Mammals can also be affected by wind turbine operation. A study in 2018 identified wind turbines as a predominant reason for mass mortalities of bats.[239] It concluded that since the start of 2000, wind turbines are responsible for slightly more than one-third of "multiple mortality events" affecting bats.[240] Prior to 2000, wind turbines accounted for only about 2% of bat mortality events.[241] If certain species of bats were to be listed as endangered, that would preclude the killing of bats without an incidental take permit under the ESA as part of wind project operation.[242] The FWS has considered listing some bats as endangered under the ESA.[243]

Although bird deaths provide criminal penalties for violations, the Department of Interior and the FWS, as a matter of executive discretion—without congressional change to any of the statutes—have created certain permits that allow for the taking or harming of species and avoid prosecution. It is official FWS policy that these "permits are voluntary but strongly suggested if project

237. *Threats to Birds: Migratory Bird Mortality—Questions and Answers*, U.S. FISH & WILDLIFE SERV. (Sept. 14, 2018), https://www.fws.gov/birds/bird-enthusiasts/threats-to-birds.php [https://perma.cc/6SGQ-5TQY].

238. Press Release, Am. Wind Energy Ass'n, Statement on Interior's Proposed Wildlife Guidance for Wind Turbines (Feb. 15, 2011), https://www.awea.org/resources/news/2011/statement-on-interior-s-proposed-wildlife-guidance [https://perma.cc/4TFK-RSJP].

239. Alan Kovski, *Study Finds Rising Bat Mortality from Wind Farms*, BLOOMBERG L. (Jan. 19, 2017).

240. *Id.* This is a similar percentage of bat mortality caused by white nose syndrome, a devastating fungal disease that affects bats. *Id.*

241. *Id.*

242. Nick Juliano, *Bat-disease Discovery May Add Burden to Developers of Wind Power Projects*, ELECTRIC UTIL. WK., July 4, 2011, at 2.

243. *Id.*

construction and/or operation may result in disturbance, injury, or harm to endangered or threatened species, or to bald or golden eagles. It is illegal to 'take' endangered or threatened species, and bald eagles or golden eagles, as defined under these authorities."[244]

In 2009, the FWS began to issue permits for the taking of a limited amount of protected eagles under the BGEPA, when that taking is associated with, but not the primary purpose of, an otherwise lawful activity and cannot be avoided.[245] In the original statute, once the eagle "take" permit is issued, it lasts up to five years. In 2012, the FWS proposed a rule to extend such permits from the original five years to thirty years, six times the length,[246] when given for renewable energy projects. In December 2016, as the Obama administration was winding down, the FWS announced its final new rule for an Eagle Incidental Take Permit, which includes the once-rejected 30-year extension of permit length.[247]

Compliance with FWS voluntary guidelines is necessary for a wind project to be permitted to "take" legally protected birds.[248] The guidelines are established for assessing potential adverse impacts to species of concern and their habitats in a tiered approach, split into pre- and post-construction phases.[249] The pre-construction tiers have the developers work to identify, avoid, and minimize the risks to species of concern through site evaluation and field studies which document different wildlife and habitats and the impacts the project could produce.[250] The post-construction tiers assess whether the actions taken in earlier tiers to avoid and minimize impacts are successfully achieving the goals and, when necessary,

244. *Permits, Policies and Authorities*, U.S. FISH & WILDLIFE SERV. (May 2, 2018), https://www.fws.gov/ecological-services/energy-development/laws-policies.html [https://perma.cc/Z786-WKDH].

245. 50 C.F.R. § 22.26 (2017).

246. Eagle Permits; Changes in the Regulations Governing Eagle Permitting, 77 Fed. Reg. 22,267 (Apr. 13, 2012).

247. Eagle Permits; Revisions to Regulations for Eagle Incidental Take and Take of Eagle Nests, 81 Fed. Reg. 91,494 (Dec.16, 2016); Betsy Lillian, *Feds Release Long-Anticipated Final Rule for Eagle Take Permits*, N. AM. WIND POWER (Dec. 15, 2016), http://nawindpower.com/feds-release-long-anticipated-final-rule-for-eagle-take-permits [https://perma.cc/6HD8-V39M].

248. U.S. FISH & WILDLIFE SERV., LAND-BASED WIND ENERGY GUIDELINES 6 (2012), https://www.fws.gov/ecological-services/es-library/pdfs/weg_final.pdf [https://perma.cc/DLY3-ZY9T].

249. *Id.* at 6–7.

250. *Id.* at 7.

take additional steps.[251] One observer expressed concern that, notwithstanding the official guidelines:

> [S]uch [FWS] assurances do not provide complete certainty, as agency policies and administrations change over time . . . . [I]t does not completely absolve companies from liability [and] it remains unclear what exactly constitutes adherence to the guidelines. Ultimately, nothing prevents FWS from taking action against a company for incidental takings, even if the company attempts to follow the guidelines . . . . The existing mechanisms have proven ineffective at preventing bird deaths and provide very little legal certainty for industries. Currently, there is no clear mechanism for industry to ensure compliance with the MBTA.[252]

Regarding the much longer 30-year duration eagle take permit revision in 2016, the Audubon Society's Vice President Sarah Greenberger stated:

> It is disappointing to see the U.S. Fish and Wildlife Service extend kill permits to thirty years given how much we are still learning about the impact wind farms have on species such as Bald and Golden Eagles . . . . We all agree climate change is the number one threat to birds and people and that properly-sited and operated wind farms are a key part of addressing the foremost challenge of our time.[253]

Senator David Vitter (R-La.), ranking member of the Senate Environment and Public Works Committee, also criticized the 30-year extension of permit exceptions to kill birds:

> . . . 30 years is a long time for some of these projects to accrue a high death rate . . . . The administration has repeatedly prosecuted oil, gas and other businesses for taking birds, but looks the other way when wind farms or other renewable energy companies do the exact same thing. There needs to be a balanced approach in protecting

251. *Id.* at 7–8.

252. Christopher Brooks, *Will a New Approach Fly? The FWS Considers Implementing an Incidental Take Program Under the Migratory Bird Treaty Act*, AM. BAR ASS'N (Aug. 29, 2016), https://www.americanbar.org/groups/environment_energy_resources/publications/trends/2015-2016/november-december-2015/will_a_new_approach_fly_the_fws_considers_implementing_an_incidental_take_program_under_the_migratory_bird_treaty_act.html [https://perma.cc/L9LW-LWKQ].

253. *Audubon Disappointed in Decision to Extend Eagle Kill Permits to Thirty Years*, AUDUBON (Dec. 16, 2016), http://www.audubon.org/news/audubon-disappointed-decision-extend-eagle-kill-permits-thirty-years [https://perma.cc/2ELC-WE6K].

> migratory birds, while also supporting domestic energy, and with this newest decision, the administration has failed to achieve that.[254]

This comment referred to the recent enforcement decisions of the Obama administration.

B. Obama Administration Enforcement

To date, there have only been two wind energy companies charged for bird deaths that their turbines allegedly caused. Both cases, *U.S. v. Duke Energy Renewables, Inc.*[255] and *U.S. v. PacifiCorp Energy*,[256] resulted in plea agreements and settlements.[257] In 2013, under the MBTA, Duke Energy Renewables' wind project was prosecuted by the Obama administration for the death of 14 golden eagles and 149 other MBTA-protected birds in Wyoming.[258] Regarding the ultimate impact of this enforcement:

> Duke now faces mandatory compliance with a FWS mitigation plan as part of its plea agreement. The Duke case illustrates the problem with the FWS's voluntary compliance program. FWS alerted the company that its project would likely result in a MBTA take, yet FWS had no ability to force Duke to re-site its turbines. Duke built its wind farm and paid its fine, and the turbines continue to spin. Wind energy development needs certainty. . . . [E]ven compliance with the Wind Energy Guidelines does not guarantee freedom from

254. Press Release, U.S. Senate Comm. on Env't & Pub. Works, Interior Department Releases Rule to Allow Wind Farms to Kill Eagles for 30 Years (Dec. 6, 2013), https://www.epw.senate.gov/public/index.cfm/press-releases-republican?ID=C8C9C547-947D-91A2-1D77-BC90A901114D [https://perma.cc/EQ2J-4UC2.]

255. Plea Agreement, United States v. Duke Energy Renewables, Inc., No. 13-CR-268 (D. Wyo. Nov. 7, 2013), ECF No. 2; U.S. DEP'T OF JUSTICE, ENVIRONMENTAL CRIMES SECTION: MONTHLY BULLETIN DECEMBER 2013 12–13 (2013), https://www.justice.gov/sites/default/files/enrd/legacy/2015/04/13/ENV_CRIMES-401748-v1-public_bulletin_December_2013_FINAL_508_review_June_5_-_sent_same_day_to_upload.pdf [https://perma.cc/Y5MU-TDV3].

256. Plea Agreement, United States v. PacifiCorp Energy, Case No. 14-CR-301 (D. Wyo. Dec. 19, 2014), ECF No. 2; U.S. DEP'T OF JUSTICE, ENVIRONMENTAL CRIMES SECTION: MONTHLY BULLETIN FEBRUARY 2015 14 (2015), https://www.justice.gov/sites/default/files/enrd/legacy/2015/04/13/FINAL_public_bulletin_February_2015R.pdf [https://perma.cc/R4N9-2PHP].

257. See *Golden Eagle Mortality at Wind Energy Projects—Implications of Duke and PacifiCorp Plea Agreements*, MARTEN LAW (Jan. 21, 2015), https://www.martenlaw.com/newsletter/20150121-golden-eagle-mortality-wind-energy-projects [https://perma.cc/447F-CLHW].

258. United States v. Duke Energy Renewables, Inc., No. 2:13-CR-00268 (D. Wyo. Nov. 22, 2013).

> prosecution. In this "compliance" scenario, investors are understandably hesitant to fund wind energy development.[259]

A year later in 2014, PacifiCorp Energy was prosecuted for the deaths of 38 golden eagles and 336 MBTA-protected migratory birds at their facilities in Wyoming. Neither of these two prosecutions involved criminal charges with jail-time; both companies entered a plea agreement and pled guilty, paid substantial fines, and agreed to develop and implement at their costs bird protection compliance plans. Of note, Duke had not engaged in or followed FWS voluntary guidance in siting and operating its wind facilities.[260] With these two exceptions, there has been no other federal prosecution of wind projects.

Tennessee Senator Lamar Alexander and Louisiana Senator David Vitter sent a letter of concern to DOJ asking for clarification regarding how it prosecutes alleged violations of the MBTA, and voicing their concerns about DOJ pursuing only oil and gas companies while overlooking wind energy companies for similar bird deaths.[261] Ten months later, in November 2013,[262] DOJ responded, immediately after the resulting plea agreement in the *Duke Energy* matter discussed above.[263] Regarding the timing of the response, Senator Vitter remarked that:

> I can't help but notice that DOJ waited to respond to Senator Alexander's and my request until the same day it reached a plea agreement with Duke Energy. . . . It looks like DOJ is making an example out of this particular case to shift the focus away from the Administration's bias of using the Migratory Bird Treaty Act to go after oil, gas and other businesses. We definitely don't want to see any sort of energy providers killing federally-protected birds

259. Robyn Rose, Student Article, *A Special Purpose: The Migratory Bird Treaty Act and Wind Energy*, 55 NAT. RESOURCES J. 205, 222, 228 (2014).

260. Cassie Tigue, Note, *Wind Energy Development and Protection of Wildlife: Creating a Balance Between Two Competing Interests*, 45 TEX. ENVTL. L.J. 223, 226–27 (2015).

261. Letter from Sen. David Vitter, Ranking Member of Sen. Energy & Pub. Works Comm. & Sen. Lamar Alexander, to Atty. Gen. Eric Holder (Jan. 30, 2012); Press Release, U.S. Senate Comm. on Env't & Pub. Works, Vitter, Alexander Demand a Clear Migratory Bird Policy from Justice Department (Jan. 30, 2013), https://www.epw.senate.gov/public/index.cfm/press-releases-republican?ID=8C84134D-A36C-2155-A554-DC81EADED88A [https://perma.cc/VB4P-TMFP].

262. *Commerce, Justice, Science, and Related Agencies Appropriations for Fiscal Year 2014*: *Hearing Before the S. Subcomm. of the Comm. on Appropriations*, 113th Cong. 1 (2013) (statement of Eric J. Holder, Att'y Gen. of the United States).

263. *Duke Energy Renewables, Inc.*, No. 2:13-CR-00268.

> indiscriminately, but we also don't want to see politically motivated actions by DOJ. The instances of wind energy's favoritism have been so egregious under this Administration, and DOJ's settlement and response still don't explain the Administration's obvious bias. We'll have a lot more questions on their process.[264]

DOJ responded that "the Department neither targets energy businesses for enforcement nor excuses them from enforcement because of the type of energy they produce. . . . The Department does not handle cases alleging violations by oil and gas producers differently from cases alleging violations by members of any other industry."[265]

In February 2012, former Speak of the House of Representatives Newt Gingrich wrote a letter regarding the decision in *U.S. v. Brigham Oil and Gas*, to the Chairman of the House Committee on the Judiciary, about DOJ's legal action against oil and gas companies.[266] Gingrich noted that DOJ decided to prosecute "a tiny number of bird deaths near oil pits by ignoring the thousands of bird deaths caused by wind turbines," illustrating to him that there was deliberate abuse of authority and purposeful harassment of wind companies.[267] DOJ did not reply to this letter.

According to some members of the Senate, there was discriminatory enforcement based on what companies and technologies were or were not being promoted by the executive branch. There is no requirement for the executive branch at any level of government to enforce laws or regulations equitably: it has never been a defense to an enforcement action or a fine that other people were committing the same or even more profound offenses for an individual event. However, this is not individual enforcement, but the implementation of broad policy. Not profiling or discriminating against certain groups of alleged or

264. Press Release, U.S. Senate Comm. on Env't & Pub. Works, Wind Farms Kill 14 Eagles, DOJ Waits to Respond to Sen. Vitter Until Settlement Is Finalized (Nov. 25, 2013), https://www.epw.senate.gov/public/index.cfm/2013/11/post-91197f3f-cc11-e9a7-9a48-dfcf5704a3c4 [https://perma.cc/CWZ5-5HQZ].

265. *Hearing Before the S. Subcomm. of the Comm. on Appropriations*, *supra* note 262

266. Letter from Newt Gingrich, Former Speaker of the House of Representatives, to Congressman Lamar Smith, Chairman, House Comm. on the Judiciary (Feb. 22, 2012), https://votesmart.org/public-statement/671566/letter-to-honorable-lamar-smith-chairman-house-committee-on-the-judiciary-united-states-house-of-representatives#.VzCrqT_iaEM [https://perma.cc/ZL65-ZH5N].

267. *Id.*

possible offenders has become a hot button issue during the 21st century, especially regarding equitable enforcement of U.S. criminal law.

C. Trump Administration Alterations

On January 10, 2017, 10 days before the next administration was sworn in, the Obama administration's Department of the Interior issued a memorandum concluding that "the MBTA's prohibitions on taking and killing migratory birds apply broadly to any activity, subject to the limits of proximate causation, and are not limited to certain factual contexts. Therefore, those prohibitions can and do apply to direct incidental take[s]."[268] Once in office, the Trump administration announced, by unilateral executive action, that it would not enforce the MBTA's prohibition of wind turbines killing birds.[269]

The Trump administration issued an initial temporary reversal of the Obama memorandum order on February 6, 2017.[270] On December 22, 2017, the Department of the Interior issued a replacement to the suspended order,[271] which interprets "incidental" takings of protected species by otherwise lawful activities as not constituting a violation of the MBTA.[272] This is in stark contrast to the Obama administration's prior formal legal

268. Tompkins, *supra* note 233.

269. *See infra* notes 271–74.

270. Memorandum from K. Jack Haugrud, Acting Sec'y, U.S. Dep't of the Interior, to Acting Solicitor, U.S. Dep't of the Interior (Feb. 6, 2017), https://www.doi.gov/sites/doi.gov/files/uploads/temp_suspension_20170206.pdf [https://perma.cc/BRQ5-JE4R] (on the subject of the "Temporary Suspension of Certain Solicitor M-Opinions Pending Review"). The reversal order states that the previous opinion "was written in part to support regulations, decisions, or nationwide guidance or policies that are currently under review by the new Administration. The temporary withdrawal should remain in place until the Secretary, Deputy Secretary, or Solicitor has completed their review, and determined whether the opinion should be reinstated, modified, or revoked." *Id.* at 1.

271. Memorandum from Principal Deputy Solicitor, U.S. Dep't of the Interior, to Sec'y, U.S. Dep't of the Interior (Dec. 22, 2017), https://www.doi.gov/sites/doi.gov/files/uploads/m-37050.pdf [https://perma.cc/7DP3-AU9G] (on the subject of "The Migratory Bird Treaty Act Does Not Prohibit Incidental Take").

272. *Id.* The Memorandum explains that "[i]nterpreting the MBTA to apply to incidental or accidental actions hangs the sword of Damocles over a host of otherwise lawful and productive actions . . . . [Therefore,] this Memorandum finds that, consistent with the text, history, and purpose of the MBTA, the statute's prohibitions on pursuing, hunting, taking, capturing, killing, or attempting to do the same apply only to affirmative actions that have as their purpose the taking or killing of migratory birds, their nests, or their eggs." *Id.* at 1–2.

opinion, which concluded that "the law covers incidental as well as intentional takings of migratory birds."[273]

Kathleen Sgamma, president of the Western Energy Alliance, an oil and gas industry association, remarked that the new "solicitor's opinion returns the rule of law and will help prevent the disparate treatment of industries."[274] Conservationists, on the other hand, "blasted the move, saying it would discourage companies from taking precautions to safeguard birds, such as slowing wind turbines when they are nearby or covering waste pits."[275]

In January 2018, "[i]n a remarkable show of support for keeping the MBTA strong, 17 high-ranking officials from previous Republican and Democratic administrations sent a letter to Secretary of the Interior Ryan Zinke opposing the change."[276] In early 2018, more than 500 organizations from all 50 states urged congress to protect the MBTA,[277] calling on Congress to "oppose any effort that would gut the MBTA and turn back the clock decades on bird conservation."[278]

The American Bird Conservancy ("ABC") is fiercely opposed to these changes by the Trump administration, arguing that "[t]hese policy changes would effectively let industry off the hook for any harm that may be caused, including from major oil spills."[279] The specific target of ABC's opposition is the DOJ policy of not prosecuting incidental takes of birds.[280] The National Audubon Society also objects to executive and legislative policies that "would

273. Dlouhy, supra note 233.

274. *Id.*

275. *Id.*

276. *Id.* The letter explains, "The Migratory Bird Treaty Act can and has been successfully used to reduce gross negligence by companies that simply do not recognize the value of birds to society or the practical means to minimize harm. Your new interpretation needlessly undermines a history of great progress, undermines the effectiveness of the migratory bird treaties, and diminishes U.S. leadership." *Id.*

277. *More than 500 Organizations in All 50 States Urge Congress to Defend Bird Protection Law*, NAT'L AUDUBON SOC'Y (Feb. 8, 2018), http://www.audubon.org/news/more-500-organizations-all-50-states-urge-congress-defend-bird-protection-law [https://perma.cc/2K38-HHGA].

278. Letter from National Audubon Society on Behalf of Environmental Groups, to the United States Congress (Feb. 8, 2018), https://www.audubon.org/sites/default/files/migratory_bird_treaty_act_letter_to_congress_from_500_groups_1.pdf [https://perma.cc/9YZM-SKB2].

279. *A Free Pass to Kill Birds? Migratory Bird Treaty Act Under Threat*, AM. BIRD CONSERVANCY (Jan. 25, 2018), https://abcbirds.org/migratory_bird_treaty_act_under_threat [https://perma.cc/W6ZU-PDU3].

280. *See A Free Pass to Kill Birds?*, AM. BIRD CONSERVANCY, *supra* note 279.

prevent enforcement of 'incidental' bird deaths, removing incentives for companies to adopt practices that protect birds from threats such as oil waste pits, and eliminating penalties for companies that kill substantial numbers of birds, including from large oil spills."[281]

The National Audubon Society has a dual agenda in this area. It both "protects birds and the places they need, today and tomorrow, throughout the Americas using science, advocacy, education, and on-the-ground conservation,"[282] and strongly supports wind power because, as a renewable energy source, it helps reduce the threat climate change poses to birds and people.[283] Audubon notes that it supports *properly* sited wind facilities and advocates that "wind power facilities should be planned, sited, and operated in ways that minimize harm to birds and other wildlife, and we advocate that wildlife agencies should ensure strong enforcement of the laws that protect birds and other wildlife."[284] The National Audubon Society argues that "[t]he MBTA has long had a target on its back by a range of interests that find it too strict and cumbersome. Indeed, a review of federal disclosure forms found 12 companies, representing wind, solar, oil, natural gas, electric power, and manufacturing industries, that specifically listed the MBTA as a lobbying target during 2017."[285]

An article published by the Nature Conservancy views the loss and fragmentation of bird habitats as the main problem caused by wind energy projects.[286] The organization perceives the habitat disturbance as more threatening to bird populations than actual

281. *The Migratory Bird Treaty Act, Explained*, NAT'L AUDUBON SOC'Y (Jan. 26, 2018), https://www.audubon.org/news/the-migratory-bird-treaty-act-explained [https://perma.cc/4M2X-EES7].

282. *About Us*, NAT'L AUDUBON SOC'Y, http://www.audubon.org/about [https://perma.cc/J8QB-SCCQ] (last visited Mar. 26, 2019).

283. *Audubon's Position on Wind Power*, NAT'L AUDUBON SOC'Y, http://www.audubon.org/content/audubons-position-wind-power [https://perma.cc/RSH9-A9SC] (last visited Mar. 26, 2019).

284. *Id.*

285. Hanna Waters, *17 Former Federal Officials to Zinke: Don't Change the Migratory Bird Treaty Act*, NAT'L AUDUBON SOC'Y (Jan. 11, 2018), http://www.audubon.org/news/17-former-federal-officials-zinke-dont-change-migratory-bird-treaty-act-0 [https://perma.cc/9DPN-J77D].

286. Dave Mehlman, *Wind Turbines and Birds: What's the Real Story?*, NATURE: COOL GREEN SCI. (May 28, 2014), https://blog.nature.org/science/2014/05/28/wind-turbines-bird-mortality-bats-science-impacts/ [https://perma.cc/SGJ9-4GHR].

deaths in the moving blades of turbines.[287] The Nature Conservancy also expressed that the implications of wind power development "should raise serious legal concerns that do not appear to be fully addressed in many circumstances,"[288] adding that they are actively working with the industry and regulators to address habitat displacement.[289]

While a corporation can pay fines, it cannot serve jail time; however, human officers and employees, on behalf of their corporation, authorize all of its actions. Those same individuals can be held responsible, under environmental laws, for those actions and, if it is a criminal action, serve jail time.[290] President Clinton's Executive Order No. 13,186 formalized that a criminal offense regarding birds applies to both unintentional takes as well as intentional killing of protected birds.[291] At different times,[292] the law's absolute prohibition on harming any bird, has been interpreted as forbidding "incidental takes" of any bird by any means.[293] "Incidental" take permits of protected species are only formally provided under Section 10 of the ESA, and not for violations of either of the other two bird statutes.[294]

The quick "pivot" that enforcement of environmental protection and species protection laws can take when statutes remain unchanged yet there is a change in presidential administrations,

287. *Id.*

288. *Id.*

289. *Id.*

290. FERREY, ENVIRONMENTAL LAW: EXAMPLES & EXPLANATIONS, *supra* note 197, at 257 (Clean Air Act); 430–31, 450, 505–06 (Comprehensive Environmental Response, Compensation, and Liability Act); 403–07 (Resource Conservation and Recovery Act); 669–70 (Endangered Species Act); 682 (Toxic Substances Control Act and Federal Insecticide, Fungicide, and Rodenticide Act).

291. Exec. Order No. 13,186, 66 Fed. Reg. 3853 (Jan. 17, 2001) (affirming that federal agencies must protect migratory birds).

292. Michael Greshko et al., *A Running List of How President Trump Is Changing Environmental Policy*, NAT'L GEOGRAPHIC (Mar. 15, 2019), https://news.nationalgeographic.com/2017/03/how-trump-is-changing-science-environment/ [https://perma.cc/D2AA-SBYL]. At the conclusion of the Obama administration, in January 2017, the Department of the Interior issued a memorandum finding that all forms of incidental "takes" were prohibited under the MBTA, citing the similar consistent interpretation of the U.S. Fish and Wildlife Service. *Id.* Canada, as an MBTA co-signatory nation, also interprets the treaty as prohibiting all incidental takes.

293. *Id.*

294. 16 U.S.C. § 1539(a)(2) (2018) (the applicant must submit a habitat conservation plan to be awarded an incidental "take" permit under Section 10 of the ESA, which can take years to complete due to all required consultations and studies).

underscores the vulnerability of every wind turbine to an indeterminate operation risk in the climate warming future. While any change in tax incentives affects predominately the front end of wind project economics, and state wind project incentives of RPS and net metering impact predominately operational economics over wind projects' useful lives, criminal felony sanctions hang a different threat over the heads of wind project owners. Individuals in a corporation, not the corporation itself, must serve felony jail sentences. The "corporate shield" against personal liability can protect personal assets, but it cannot protect persons from serving criminal sentences. U.S. policy seems imbalanced, as it subsidizes something that is potentially criminal under three existing statutes.

IV. MAINTAINING BALANCE IN THE WIND

Incidental takes of protected species are only expressly allowed and provided for under Section 10 of the ESA.[295] The phrase "incidental takes" does not appear in the MBTA treaty, but it does appear in the more modern ESA, under which 'takes' of birds have been permitted.[296] At different times, the MBTA's absolute prohibition on harming any bird has been interpreted as forbidding by any means "incidental takes" of any of the more than one-thousand birds that the MBTA protects. Over the century that this treaty has been in force, every presidential administration has maintained some enforcement of the law, although with different degrees of vigor.

The Trump administration elected to no longer enforce the century-old MBTA's prohibition on the "taking" or killing of its more than one thousand different species of protected birds. Ceasing the enforcement of laws protecting birds lowers the cost of siting a wind facility; however, it is not consistent with the language of the MBTA. Because this change was not accomplished through regulations or guidelines, but rather by executive order, the policy can be reversed by the next presidential administration by another unilateral declaration, without the need for any Congressional approval or legislative change.

There is a temporal mismatch between statutes which make it a crime to kill any protected bird at any time, and a transitory

295. *Id.*
296. *Id.*

enforcement policy which does not enforce those laws. Currently, there is no immediate risk to not comply with the MBTA or with the FWS's voluntary Wind Guidelines, neither of which are being enforced by the Trump administration against wind projects.[297] However, an administration can change policy, or the next administration can immediately revoke policy, either formally or informally. Indeed, the only two wind projects prosecuted during the Obama administration—those owned by Duke Energy and PacifiCorp—were based on noncompliance with the voluntary FWS guidelines.[298] Wind power will continue to be developed, but any costs saved by a project now from not needing to comply with FWS Guidelines are offset by the diminution and elimination of federal PTC for wind power projects that began construction between 2017 and 2019 (and that achieve commercial operations between 2021 to 2023).[299]

For perspective, more birds are killed by collisions with buildings and communication towers, cat attacks, and pesticides than from impacts with wind turbine blades.[300] If one looks at the extraction-to-consumption lifecycle impact of fossil-fuel generated power, per GWh of power produced, wind facilities are estimated to have less impact on avian fatalities than fossil-fuel power generation facilities, or even nuclear facilities.[301] Per year, it is estimated that between 214,000 and 368,000 birds are killed by wind turbines, which is less than the estimated 6.8 million bird deaths per year resulting from collisions with cell and radio towers, or cats, which kill an estimated 1.4 to 3.7 billion birds annually.[302]

Wind, as a function of its decreasing costs, greater efficiency, and carbon-free energy production, will inevitably play a dominant role in U.S. energy policy. While the federal PTC tax credit is phasing down and out,[303] the Trump administration's tax cuts—instead of

297. *See supra* notes 271–73.

298. *See supra* notes 256–57.

299. *See supra* note 259.

300. Benjamin K. Sovacool, *The Avian and Wildlife Costs of Fossil Fuels and Nuclear Power*, 9 J. INTEGRATIVE ENVTL. SCI. 255, 263 (2012).

301. *Id.* at 255 (stating that wind has 0.27 avian fatalities/GWh, nuclear has 0.6 fatalities/GWh, and fossil fuel-fired power stations have 9.4 fatalities/GWh).

302. Michael Graham Richard, *Wind Turbines Kill Around 300,000 Birds Annually, House Cats Around 3,000,000,000*, Treehugger (Sept. 16, 2014), https://www.treehugger.com/renewable-energy/north-america-wind-turbines-kill-around-300000-birds-annually-house-cats-around-3000000000.html [https://perma.cc/83HK-9NJS].

303. *See supra* Part II.

being a boon—may actually work as a disincentive for wind.[304] However, the U.S. has a federalist government system, dividing law-making power between federal and state levels of government, as do other significant countries.[305] With decreasing turbine costs and significant state incentives in place in 80% of U.S. states,[306] there are still incentives to support wind power installation.

The PTC, MACRS depreciation, and RECs provide financial support for wind power, but only two of these three will remain in place going forward. While the PTC could later be reauthorized by a future Congress, it would not be retroactive. The PTC operates to supply subsidies only during the first decade after construction of a wind power generation project.[307] However, somewhat counter-intuitively, the large reduction in the corporate tax rate effective in 2018 actually reduced the monetized value of the depreciation and credits for wind projects.[308] The current administration's non-enforcement of the MBTA saves short-term costs and risks, but it can provide no guarantee of continuation of non-enforcement regarding wind or other energy projects.

This diminishment of federal tax support for wind is bridged by RPS RECs earned by wind power in 29 states,[309] as well as state net metering credits earned in 38 states.[310] State incentives vary greatly, but they are now essential support for future wind power construction filling the void as the federal PTC phases out. To maintain power grid reliability while intermittent solar and wind power increases as a percentage of total generation, it is necessary to maintain the operation of quick-start spinning reserves to fill gaps in supply and provide load-following generation, at least until

304. *See id.*

305. *See The World Factbook*, CENT. INTELL. AGENCY, https://www.cia.gov/library/publications/the-world-factbook [https://perma.cc/47JU-ZQC3] (last visited Mar. 10, 2018) (select "Please select a country to view"). Federalist governments include: the United States (fifty states, two commonwealths, and twelve territories primarily in the Pacific Ocean), Canada (ten provinces and three territories), Mexico (thirty-one states), Brazil (twenty-six states), Germany (sixteen states), Switzerland (twenty-six cantons), Argentina (twenty-three provinces), Australia (six states and two territories), and India (twenty-nine states and seven territories). *Id.* *See also Federalism*, CORNELL L. SCH., https://www.law.cornell.edu/wex/federalism [https://perma.cc/SN3C-HYHB] (last visited May 25, 2019).

306. *See supra* Part II.B–C.

307. 26 U.S.C. § 48 (2018).

308. *See supra* Part II.

309. *See supra* Part II.C.

310. *See supra* Part II.B.

cost-effective power storage is implemented.[311] There are both financial and environmental costs to spinning backup fossil power resources.[312] In terms of the best location to capture wind power most effectively, there remain issues regarding the efficient interconnection of remote wind power to the existing grid.

These incentives all occupy the civil side of the law, and from the perspective of regulatory law, provide the important economic and legal framework for the rapid power transition to wind power in the U.S. However, in a parallel legal universe, often not appreciated fully, criminal law constitutes a disincentive and an elevated risk for wind power projects. If this were in the form of additional civil penalties, a wind power developer could "hedge" these risks with various contractual provisions and insurance products. However, while insurance products can pay for unanticipated liabilities or costs, they cannot provide a "designated server" as a substitute for time in jail on a felony conviction.

This criminal risk is not static; it changes with different occupants of the executive branch which enforces federal criminal law. There remain unresolved legal issues regarding executive branch non-enforcement of statutes.[313] To date, the Trump administration's non-enforcement seems to have had little effect on the development of wind projects. One example of this is the six-turbine Icebreaker Wind project planned for Lake Erie. The group guiding the project stated that, "Our risk assessment shows that our six-turbine project poses minimal risk to birds and bats. . . . Regardless, we still plan to conduct rigorous pre- and post-construction monitoring, and adopt mitigation and adaptive management measures, to proactively protect fish and wildlife."[314] According to Michael Hutchins of the American Bird Conservancy, "the Icebreaker pilot project posed potential dangers to migratory birds before the Department of the Interior['s ruling]."[315]

311. Platt & Jones, *supra* note 218.

312. *See generally* Ferrey, *supra* note 221.

313. *See Solar Industry Growing at a Record Pace*, SOLAR ENERGY INDUSTRIES ASS'N, *supra* note 60.

314. James F. McCarty, *Weakening of Bird Protections Has No "Significant Impact" on Lake Erie Wind Project, Developers Say*, CLEVELAND: METRO (Jan. 14, 2018), http://www.cleveland.com/metro/index.ssf/2018/01/weakening_of_migratory_bird_pr.html [https://perma.cc/E5JW-YMV9]

315. *Id.*

There needs to be balance in the wind. It appears anomalous to have both the federal tax law and separate laws in 80% of states subsidizing something that is documented to commit hundreds of repeated felonies every year. This incongruity takes on an added dimension when the technology involved is not only a substitute commodity for other technologies, but can also lead to a cost-effective solution to a pressing global issue affecting the environment, human rights, and world stability. The importance of wind begs for some resolution in U.S. law, and it should not be subject to the quiddities of the enforcement mood of the incumbent presidential administration. This conflict requires reconciliation by legislative change, regulatory clarification, and/or judicial determination. To date, however, there has been little effort to address, let alone implement, these needed reforms.