RURAL WIND WINDFALLS

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I. INTRODUCTION

Wind power can provide rural communities with unexpected gains or "windfalls."[1] As one North Dakota farmer put it, "Who could have guessed that the air above our land might be worth money someday?"[2] Despite these benefits, storm clouds are gathering on the horizon to threaten the outlook for the future of rural wind development.

U.S. wind energy development has been progressing "at breakneck speed."[3] According to the National Renewable Energy Laboratory (NREL), the amount of installed wind electricity capacity in the United States increased by a factor of 25 between 2000 and 2012.[4] The American Wind Energy Association (AWEA) puts the total U.S. installed capacity at 60,078 megawatts (MW)[5] as of the third quarter of 2013,[6] up from 2,578 MW in 2000.[7] The

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1. BLACK'S LAW DICTIONARY 1738 (9th ed. 2009) (noting the definition of windfall, "An unanticipated benefit, usu. in the form of a profit and not caused by the recipient.").

2. Larry Widdel, *Wind Energy for Rural Economic Development*, DEP'T OF ENERGY: ENERGY EFFICIENCY AND RENEWABLE ENERGY 2 (Aug. 2004) [hereinafter EERE2004].

3. K.K. DUVIVIER, THE RENEWABLE ENERGY READER 73 (Carolina Academic Press 2011) [hereinafter THE RENEWABLE ENERGY READER].

4. NAT'L RENEWABLE ENERGY LAB. (NREL), 2012 RENEWABLE ENERGY DATA BOOK, *available at* http://www.nrel.gov/docs/fy14osti/60197.pdf [hereinafter NREL, 2012 DATA BOOK].

5. A megawatt is equivalent to 1,000,000 watts. Megawatts and kilowatts (1,000 watts) are units commonly used for measuring utility-scale generation of electricity. When "per hour" or other time measurement is added to these units, they convert from potential capacity to become measurements of actual energy used. THE RENEWABLE ENERGY READER at 4. For example, the average U.S. residential utility customer used 10,837 kilowatt hours (kWh) or 10.837 megawatt hours (MWh) of electricity in 2012. U.S ENERGY INFO. ADMIN., *Independent Statistics & Analysis*, *Frequently Asked Questions*, http://www.eia.gov/tools/faqs/faq.cfm?id=97&t=3.

6. AM. WIND ENERGY ASSOCIATION, AWEA U.S. WIND INDUSTRY: THIRD QUARTER 2013 MARKET REPORT 3 (Oct. 31, 2013) (this is the most recent market report that has been released as of Feb. 8, 2014), http://www.awea.org/Resources/Content.aspx?ItemNumber=5752.

7. NREL, 2012 DATA BOOK, *supra* note 4, at 54. For a great graphic showing the chronology of state-to-state wind development go to *Installed Wind Capacity*, ENERGY

United States is second, behind only China,[8] for the most wind electricity capacity in the world.[9]

In 2012, Kansas more than doubled its installed wind capacity by adding 1,441 MW to the 1,272 MW installed before that date.[10] Now at a total of 2,713, Kansas ranks ninth in the United States for installed wind capacity.[11]

According to NREL even more potential exists for Kansas, as the state ranks in second place[12] with one of the United States' best terrestrial wind resources, and according to AWEA, Kansas has the potential to generate ninety times the state's current electricity needs.[13] Kansas also has a significant advantage in comparison to the majority of top wind resource states because it is located in one of the more energy-hungry of the North American Electric Reliability Corporation (NERC)[14] interconnections,[15] the Eastern

EFFICIENCY & RENEWABLE ENERGY, http://www.windpoweringamerica.gov/wind_installed_capacity.asp (last visited Feb. 8, 2014).

8. China had a cumulative installed capacity of 75,372 MW in 2012 in comparison to a U.S. cumulative capacity of 60,005 MW. ENERGY EFFICIENCY & RENEWABLE ENERGY, 2012 WIND TECHNOLOGIES MARKET REPORT 6-7 (Aug. 2013), *available at* http://www1.eere.energy.gov/wind/pdfs/2012_wind_technologies_market_report.pdf [hereinafter 2012 MARKET REPORT].

9. The United States surpassed Germany, the previous world leader, in 2008. We did not hold the crown for long, however, as China overtook the United States in 2009. THE RENEWABLE ENERGY READER, *supra* note 3, at 73-74. The United States briefly regained its leading status for installations in 2012 (with 13,131 MW installed in comparison to China's 12,960 MW) because of record new capacity installed that year in anticipation of scheduled cuts in U.S. federal incentives. 2012 MARKET REPORT, *supra note* 8, at 6.

10. *State Wind Energy Statistics: Kansas*, AMERICAN WIND ENERGY ASSOCIATION (June 9, 2013), http://www.awea.org/Resources/state.aspx?ItemNumber=5223.

11. *Id.*

12. Nat'l Renewable Energy Lab., *Estimates of Windy Land Area and Wind Energy Potential, by State, for areas >= 30% Capacity Factor at 80m*, ENERGY EFFICIENCY & RENEWABLE ENERGY (Feb. 4, 2010), *available at* http://www.windpoweringamerica.gov/windmaps/resource_potential.asp; *Potential for US wind energy is 10.5 GW*, RENEWABLE ENERGYFOCUS.COM (Feb. 19, 2010), http://www.renewableenergyfocus.com/view/7446/potential-for-us-wind-energy-is-10-5-gw/. *See also Wind Resource Potential*, WIND POWERING AMERICA, http://www.windpoweringamerica.gov/wind_maps.asp (last visited Feb. 8, 2014). The top state for wind energy potential is Texas, which could potentially install 1,901,530 MW of wind turbines and generate 6,527,850 GWh a year of renewable power. Kansas is second as it could potentially install 952,371 MW of wind turbines, producing 3,646,590 GWh per year of wind power. Nat'l Renewable Energy Lab., *Estimates of Windy Land Area and Wind Energy Potential, by State, for areas >= 30% Capacity Factor at 80m*, ENERGY EFFICIENCY & RENEWABLE ENERGY (Feb. 4, 2010), *available at* http://www.windpoweringamerica.gov/windmaps/resource_potential.asp; *see also Potential for US wind energy is 10.5 GW*, RENEWABLEENERGYFOCUS.COM (Feb. 19, 2010), http://www.renewableenergyfocus.com/view/7446/potential-for-us-wind-energy-is-10-5-gw/. California's installed potential is only 34,110.2 MW and its annual generation potential is a mere 105,646 GWh. Nat'l Renewable Energy Lab., *Estimates of Windy Land Area and Wind Energy Potential, by State, for areas >= 30% Capacity Factor at 80m*, ENERGY EFFICIENCY & RENEWABLE ENERGY (Feb. 4, 2010), *available at* http://www.windpoweringamerica.gov/windmaps/resource_potential.asp.

13. *Wind Data*, NAT'L RENEWABLE ENERGY LAB., http://www.nrel.gov/gis/data_wind.html (last visited Feb. 9, 2014) (original data must be purchased from AWEA).

14. NORTH AM. ELECTRIC RELIABILITY CORP., http://www.nerc.com (last visited Feb. 8, 2014).

Interconnection,[16] which might aid Kansas in becoming a net exporter of electricity.[17]

Part I of this article provides a summary of the economic benefits of rural wind development. Part II then covers environmental benefits from wind power. Finally, Part III addresses two major concerns that may provide some of the greatest hurdles to successful wind development in rural Kansas and similar regions.

II. ECONOMIC BENEFITS

Wind power infuses cash into rural communities in a number of ways. These include benefits directly related to the wind farm itself, indirect benefits such as those to lenders and secondary suppliers, and induced benefits to neighboring businesses.[18] In addition, some local communities have further increased the advantages of developing wind in their neighborhoods by financing community wind projects.[19] The community wind model allows participants to enjoy investment returns as well.

A. Direct Benefits

Direct benefits from wind power development include jobs, lease payments, and increased tax revenues to local entities.[20] According to the

> The North American Electric Reliability Corporation is a not-for-profit entity whose mission is to ensure the reliability of the bulk power system in North America . . . . NERC is the electric reliability organization for North America, subject to oversight by the Federal Energy Regulatory Commission and governmental authorities in Canada. Entities under NERC's jurisdiction are the users, owners and operators of the bulk power system, which serves more than 334 million people.

Id.

15. Interconnections are sets of different electric utilities that are electrically tied together with transmission lines or transformers to permit controlled flow at synchronized frequencies. The lower 48 electric grid in the United States has evolved into three separate interconnections that are essentially isolated from one another. *See Learn More about Interconnections*, ENERGY.GOV, http://energy.gov/oe/information-center/recovery-act/recovery-act-interconnection-transmission-planning/learn-more (last visited Feb. 8, 2014) [hereinafter *Interconnections*]. *See also Grid Interconnection*, NAT'L RENEWABLE ENERGY LAB., http://www.nrel.gov/learning/eds_grid_interconnection.html (last visited Feb. 9, 2014).

16. The Eastern Interconnection runs from Florida to Canada and cuts across the center of the United States eastward. *Interconnections*, *supra* note 15.

17. In addition to Texas and Kansas, the next states in the top ten include Montana, Nebraska, South Dakota, North Dakota, Iowa, Wyoming, Oklahoma, and New Mexico. *Potential for US wind energy is 10.5 GW*, RENEWABLEENERGYFOCUS.COM (Feb. 19, 2010), http://www.renewableenergyfocus.com/view/7446/potential-for-us-wind-energy-is-10-5-gw/.

18. *See infra* II.A-D.

19. *See infra* II.D.

20. U.S. DEP'T OF ENERGY, ECONOMIC BENEFITS, CARBON DIOXIDE (CO2) EMISSIONS REDUCTIONS, AND WATER CONSERVATION BENEFITS FROM 1,000 MEGAWATTS (MW) OF NEW WIND POWER IN KANSAS, Jan. 2008, *available at* http://www.windpoweringamerica.gov/pdfs/economic_development/2008/ks_wind_benefits_factsheet.pdf [hereinafter WPAK]. A more complete list of direct benefits includes construction workers, management, administrative

USDA, over 90% of modern farm income is generated from off-farm sources.[21] Wind energy provides an "alternative income stream" for these farmers.[22] Wind energy results in 60 to 80 new construction jobs per 100 MW of wind.[23] In addition, 6 to 9 long-term operations and maintenance jobs result for every 100 MW of wind development.[24]

Land lease payments for wind energy average 3% to 6% of gross revenue and can be higher in some regions of the country.[25] Lease payment revenues alone can result in more than $14,000 per year for a 250 acre farm based on 2004 turbine spacing.[26] In comparison, that same 250 acres might yield only $90 worth of corn, $40 worth of wheat, or $5 worth of beef. [27] As an added benefit, none of those other activities—corn, wheat, or beef production—need to be abandoned with the introduction of the additional wind revenue.

Aside from added revenue for individual farmers, wind power development benefits entire communities in which the wind farm is located by increasing the local tax base. Property taxes on wind farms can average $2,900 per MW per year.[28] Given another example, if the property tax is 1% of the assessed value, then adding a wind project would increase the tax revenue by approximately $10,000 per MW.[29]

Furthermore, from a property tax perspective, it is advantageous to construct a wind power plant in one's community instead of a conventional power plant. Because wind projects are more capital intensive, the property taxes attributed to them are two to three times higher per unit of energy than conventional plants.[30]

B. Indirect Benefits

While "direct benefit" are those related to the wind farm itself, "indirect benefits" are one step removed. Examples include increased activity for banks financing wind projects, suppliers of component parts, or manufacturers of

support, cement truck drivers, road crews, maintenance workers, and legal and siting. Larry Flowers, Economic Development Impacts of Colorado's 2300MW of Wind Energy at AWEA State Wind Energy Forum—Colorado (10/8/2013) [hereinafter Flowers].

21. EERE2004, *supra* note 2, at 3 (referencing the USDA as stating that 94% of farm income came from off-farm sources in 2003).

22. *Id.* at 2 (quoting Dan McGuire). In addition to jobs, wind turbines provide steady streams of revenue for farmers--$4 to $5 per acre to lease and $10,000 per turbine per year. Cathy Proctor, *An Agricultural Windfall*, DENVER BUS. J. (Dec. 24-30, 2010) (referencing statements made by Chris Tallman, President of the Colorado Association of Wheat Farmers).

23. Flowers, *supra* note 20.

24. *Id.*

25. *Id.*

26. EERE2004, *supra* note 2, at 4 (using a $2,500 per MW per year). WPAK used an average of $2,667/MW/year for standard Kansas landowner lease payments. WPAK, *supra* note 20, at 2.

27. EERE2004, *supra* note 2, at 4.

28. WPAK, *supra* note 20, at 11.

29. EERE2004, *supra* note 2, at 4.

30. *Id.*

equipment used to install and maintain the wind facility.[31] Thus, wind energy generation stimulates local industries (concrete, roads, legal, etc.) and manufacturing.[32] The United States Department of Energy (DOE) has estimated that wind power development nationally could create 80,000 new jobs and result in $1.2 billion in new income to farmers and rural landowners.[33] How do wind jobs relate to jobs created from conventional fossil fuel projects? According to one study, wind energy produces 27% more jobs per kilowatt-hour than coal plants and 66% more jobs than natural gas plants.[34]

C. Induced Benefits

Induced benefits are those more peripheral than either the direct or indirect benefits. These include increased business to local restaurants, retail establishments, and support services (such as health or child care) for those who work on wind farm construction and operations.[35]

NREL has developed tools for communities to calculate jobs and economic impacts of wind energy development including the "ripple effect" from direct through indirect to induced benefits.[36] In 2008, the DOE estimated that Kansas would reap $1.08 billion in economic benefits from developing 1,000 MW of new wind power in the state,[37] including an additional $2.7 million per year in payments to landowners, $188.5 million to local economies during the construction phase, and $21.2 million per year to local economies

31. WPAK, *supra* note 20, at 1. A more specific list includes blades, towers, gear boxes, boom truck, gas, gas station workers, supporting businesses such as bankers, financing and construction, contractor, manufacturers and equipment suppliers, utilities, hardware store purchases and workers, spare parts and their suppliers. Flowers, *supra* note 20.

32. Flowers, *supra* note 20.

33. EERE2004, *supra* note 2, at 3.

34. *Id.* (citing Ajay K. Sanghi, *Economic Impacts of Electricity Supply Options*, SOCIAL COSTS OF ENERGY 194 (1994). The New York State Energy Research and Development Authority now has a program called "Green Jobs Green New York" that emphasizes giving jobs in green energy to more people in the state, but it does not compare its employment rate to those of other industries in its annual reports. *GJGNY Advisory Council Reports*, NYSERDA, http://www.nyserda.ny.gov/Publications/Program-Planning-Status-and-Evaluation-Reports/GJG NY-Reports-and-Operating-Plans.aspx (last visited Feb. 9, 2014). The AWEA report does not contain percentages of jobs per kilowatt-hour or comparisons with other industries. At the end of 2008, 85,000 people nationally were employed in the wind industry—up 35,000 from the year before. AMERICAN WIND ENERGY ASSOC., ANNUAL WIND INDUSTRY REPORT 17, fig. 19 (2009). However, by the end of 2011, this number had dropped to 75,000. U.S. DEP'T OF ENERGY, 2011 WIND TECHNOLOGIES MARKET REPORT iv (2012).

35. WPAK, *supra* note 20, at 1. This category is also described as "jobs and earnings that result from the spending supported by the project, including benefits to grocery store clerks, retail salespeople, and child care providers." Flowers, *supra* note 20, at 3.

36. The Jobs & Economic Development Impacts (JEDI) Model estimates jobs and other economic impacts from new wind development. NAT'L RENEWABLE ENERGY LAB., ENERGY ANALYSIS: JEDI: JOBS AND ECONOMIC DEVELOPMENT IMPACT MODELS, *available at* www.nrel.gov/analysis/jedi (last updated Sept. 5, 2012).

37. WPAK, *supra* note 20, at 1.

during the operational phase.[38]

There has been some debate about the economic impacts associated with wind energy, specifically with respect to arguments about the "gross" as opposed to the "net" effects.[39] However a comprehensive "ex post" analysis of existing wind farms concluded that county-level employment increased ".5 jobs per megawatt" and that wind power resulted in "an average aggregate increase in annual personal income of approximately $11,000 per megawatt of wind power capacity installed . . . ."[40]

Yet another community benefit may be lower electricity prices. A recent study over the last five years showed a 0.37% decrease in electricity prices for the eleven U.S. states that generate more than 7% of their electricity from wind. During the same time period, all other states saw the price of electricity increase an average of 7.79%.[41]

D. Local Investment Opportunities

Some communities are reaping additional benefits by owning the wind farms built within their borders. Communities can enhance local revenue streams using limited liability companies (LLCs) as a vehicle for pursuing the development of wind farms directly owned by local farmers.[42] Through an LLC, the benefits of wind development can extend beyond those to landowners who receive lease payments and wind-production royalties. The returns on investment for the entire operation can also stay within the local community and benefit those landowners without ideal development sites or local individuals who do not own land.[43] These shared benefits help promote community buy-in and can reduce opposition from NIMBY contingencies.[44]

However, community wind is a rarity in the United States. In comparison to 50% of wind projects in Germany[45] and 80% in Denmark,[46] only 4% of U.S.

38. *Id.*

39. Jason P. Brown et al., *Ex post analysis of economic impacts form wind power development in U.S. counties*, 34 ENERGY ECONOMICS 1743 (2012).

40. *Id.* at 1753 (These figures translate to a median increase in total county personal income and employment of .22% and .4%, respectively for the counties.).

41. *More Wind Energy Means Lower Electricity Prices*, SUSTAINABLEBUSINESS.COM (Mar. 13, 2014, 3:38 PM), http://www.sustainablebusiness.com/index.cfm/go/news.display/id/25517.

42. Eric Lantz & Suzanne Tegen, *Economic Development Impacts of Community Wind Projects: A Review and Empirical Evaluation*, NAT'L RENEWABLE ENERGY LAB iii (2009), http://www.nrel.gov/docs/fy09osti/45555.pdf (not directly stating that LLCs do this, but advocating that local ownership increases community economic development impacts); *see also* Karlynn Cory et al., *Feed-in Tariff Policy: Design, Implementation, and RPS Policy Interactions*, NAT'L RENEWABLE ENERGY LAB (2009), *available at* http://www.nrel.gov/docs/fy09osti/45549.pdf.

43. EERE2004, *supra* note 2, at 5 (citing WINDUSTRY, www.windustry.org (last visited Feb. 4, 2014)).

44. JACOB GLICKEL, SITING WIND TURBINES: COLLABORATIVE PROCESSES AND JOINT FACT FINDING TO RESOLVE NIMBY DISPUTES 6 (2003) ("NIMBY" standing for "not-in-my-backyard" or local opposition), http://web.mit.edu/dusp/OldFiles/epp/music/pdf/glickel.pdf.

45. PAUL GIPE, WIND ENERGY BASICS: A GUIDE TO HOME AND COMMUNITY SCALE WIND

projects are community owned.[47] Instituting a feed-in tariff [48] for these resources could stimulate community ownership because it would assist in overcoming the greatest hurdle to community wind—finding a long-term purchaser for the power produced.[49]

III. ENVIRONMENTAL BENEFITS

Wind energy development has several advantages over conventional electricity generation or the development of fossil fuels in terms of the environment. Environmental benefits include low water demands, no air emissions, and a reduced potential for toxic spills or contamination.[50] Furthermore, recent research shows that wind power generation may have the unexpected advantage of enhancing crop production.[51]

A. Low Water Demand

Wind is one of the only sources of power, aside from solar photovoltaics,[52] that does not involve heating water or some other fluid to the boiling point and then forcing that steam into a turbine to create electricity.[53] Most all other electricity sources—coal, nuclear, natural gas—employ thermal energy through the Rankine steam turbine cycle.[54] The steam cycle is a very

ENERGY SYSTEMS 107, tbl. 7-1 (2009).

46. Mark Bolinger, *Community Wind Power Ownership Schemes in Europe and their Relevance to the United States*, ERNEST ORLANDO BERKELEY NATIONAL LAB. 9 (2001), *available at* http://emp.lbl.gov/sites/all/files/REPORT%2048357.pdf (noting that in 2001, "over 175,000 households own 80% of all wind turbines in Denmark, either on an individual basis or through 'cooperatives'").

47. The 2009 AWEA Annual Wind Market Report states that in 2009, roughly 5.6 percent of the wind capacity installed for the year was community wind (original data is in members-only report). *Community Wind*, OWNENERGY.COM, http://www.ownenergy.net/community-wind/ defined (last visited Feb. 10, 2014).

48. Also called "fixed price policies," a feed-in tariff or FIT is a renewable energy policy guaranteeing payments, access to the grid, and long-term contracts. Karlynn Cory, *Renewable Energy Feed-in Tariffs: Lessons Learned from the U.S. and Abroad*, NAT'L RENEWABLE ENERGY LAB. 3 (2009), *available at* http://www1.eere.energy.gov/wip/solutioncenter/pdfs/tap_webinar_ 20091028.pdf.

49. Brian Jansen, *Community Wind Power: Making More Americans Energy Producers Through Feed-In Tariffs*, 20 KAN. J.L. & PUB. POL'Y 329, 329 (2011). *See also*, Karlynn Cory et al., *Feed-in Tariff Policy: Design, Implementation, and RPS Policy Interactions*, NAT'L RENEWABLE ENERGY LAB (2009), *available at* http://www.nrel.gov/docs/fy09osti/45549.pdf.

50. *See infra* III.A-C.

51. *See infra* III.D.

52. "Photovoltaics" are electronic devices with semiconductors that are "capable of converting incident light directly into electricity . . . ." U.S. ENERGY INFORMATION ADMINISTRATION, http://www.eia.gov/tools/glossary/index.cfm (last visited May 8, 2014).

53. *See, e.g., How do Wind Turbines Work?*, ENERGY.GOV, http://energy.gov/eere/wind/ how-do-wind-turbines-work (last visited Apr. 3, 2014) (explaining how wind energy is created).

54. *See* Steve Voss & Greg Gould, *The Rankine Cycle: Workhorse of the Coal-fired Utility Industry*, http://www.massengineers.com/Documents/article-therankinecycle-013.pdf (last visited Apr. 3, 2014).

consumptive use of water, not only as the fluid that runs the turbines, but also for cooling the steam before the resulting water can be recirculated or released back into the environment.[55] Coal and nuclear-generated electricity consume billions of gallons of water every year.[56]

Instead of using thermal energy, the kinetic energy of the turning blades directly generates electricity in a wind turbine.[57] As a result, wind power is advantageous in parts of the country without extra water supplies. According to at least one study, wind energy saves 1,816 million gallons per 1,000 MW of power produced in comparison to conventional power plants.[58]

No significant quantities of water are required for the operational phase of power generation from a wind farm, and likewise, water is not needed in the wind farm development phase either.[59] In contrast, water consumption is often an issue in oil or gas hydraulic fracturing or fracking operations. In coalbed methane, water requirements for fracking range from 50,000 to 350,000 gallons of water per well,[60] and the average shale gas well may consume between 2 and 4 million gallons of water. [61]

Consequently, wind power means farmers do not need to make the choice of giving up irrigation of their crops. Instead, farmers can continue with their current operations. In addition, wind power will result in more fresh water supplies.[62]

55. Robin Newmark, Jordan Macknick & Maggie Mann, *Future Projections of Water Demands for Energy*, NREL (Sept. 28, 2010), http://www.gwpc.org/sites/default/files/event-sessions/9Newmark_Robin.pdf.

56. Ronald H. Rosenberg, *Diversifying America's Energy Future: The Future of Renewable Wind Power*, 26 VA. ENVTL. L.J. 505, 524 (2008).

57. *See, e.g.*, *How do Wind Turbines Work?*, ENERGY.GOV, http://energy.gov/eere/wind/how-do-wind-turbines-work (last visited Apr. 3, 2014) (explaining how wind energy is created).

58. WPAK, *supra* note 20, at 1.

59. Small amounts may be required for concrete setting or dust suppression. *Non-Hydroelectric Renewable Energy: Electricity from Non-Hydroelectric Renewable Energy Sources*, U.S. ENVTL PROTECTION AGENCY, http://www.epa.gov/cleanenergy/energy-and-you/affect/non-hydro.html (last visited Apr. 3, 2014).

60. U.S. ENVTL. PROTECTION AGENCY, DRAFT PLAN TO STUDY THE POTENTIAL IMPACTS OF HYDRAULIC FRACTURING ON DRINKING WATER RESOURCES 19 (2011), *available at* http://water.epa.gov/type/groundwater/uic/class2/hydraulicfracturing/upload/HFStudyPlanDraft_SAB_020711-08.pdf.

61. *Id. See also Modern Shale Gas Development in the United States: A Primer*, DEP'T OF ENERGY ES-4 (Apr. 2009), *available at* http://www.gwpc.org/sites/default/files/Shale%20Gas%20Primer%202009.pdf.

62. In contrast to wind power, which requires no water, fresh or otherwise, fracking operations frequently use only fresh water. Sometimes the fracked wells "produce" water, *i.e.*, more water comes out of the drilled formation than was initially pumped down in drilling the well. KATIE GUERRA, KATHARINE DAHM & STEVE DUNDORF, U.S. DEP'T OF INTERIOR BUREAU OF RECLAMATION, Science & Technology Program Report No. 157, OIL AND GAS PRODUCED WATER MANAGEMENT AND BENEFICIAL USE IN THE WESTERN UNITED STATES 1, 36 (2011), *available at* http://www.usbr.gov/research/AWT/reportpdfs/report157.pdf. This produced water creates the largest volume of the waste from oil and gas production. *Id.* at 3. Some new technologies are working on treatment of the produced water so it can be used in fracking operations to reduce the reliance on freshwater. *See, e.g.*, Ellen Chang, *Chemical-free process*

B. No Air Emissions

Conventional power plants emit "thousands of tons" of toxic emissions including "sulfur dioxide, nitrogen oxides, carbon monoxide, particulate matter, hydrocarbons, mercury, and other pollutants, while wind power produces zero emissions."[63] Specifically, electricity generation from fossil fuels accounts for 67% of the United States' sulfur dioxide emissions and 23% of our nitrogen oxides.[64] These gases cause smog, acid rain, and haze.[65] More significantly, burning fossil fuels for electricity creates 40% of the United States' anthropogenic carbon dioxide, one of the primary greenhouse gas (GHG) emissions responsible for global climate change.[66]

Wind energy does not produce any significant GHG emissions during its principal life cycle.[67] The CO2 savings in using wind-generated power in contrast to conventional power plants is 3.2 million tons of CO2 for every 1,000 MW of power.[68] In other terms, the replacement of 1 MW of fossil-fuel power with 1 MW of wind power could displace 1,800 tons of carbon dioxide per year, which is equivalent to planting one square mile of trees.[69]

Wind power development also has air quality advantages over the fracking of oil and gas. Recent data from the EPA showed that natural gas systems were the largest source category of methane emissions in the United States in 2011.[70] Emissions from field production accounted for approximately 37% of this methane.[71] The EPA is conducting additional studies[72] to respond

cleans up water from fracking, THE DENVER POST, Feb. 16, 2014, at Advertising Supp. 1.

63. Rosenberg, *supra* note 56, at 523 (citing BLM Wind Development Impact Statement).

64. *Clean Energy*, U.S. ENV'T PROTECTION AGENCY (Sept. 26, 2013), http://www.epa.gov/cleanenergy/energy-and-you/affect/air-emissions.html.

65. *Id.*

66. *Id.*

67. Rosenberg, *supra* note 56, at 523. Life cycle analyses can be complex because it might be possible to argue that the manufacturing plant for the wind turbine or blades was run on coal-fired power or that the vehicles used for construction employed fossil-fuels. *See generally Wind Power Results - Life Cycle Assessment Harmonization*, NAT'L RENEWABLE ENERGY LAB., http://www.nrel.gov/analysis/sustain_lca_wind.html (last visited Feb. 8, 2014).

68. WPAK, *supra* note 20.

69. U.S. DEP'T OF ENERGY, WIND ENERGY BENEFITS (2011), *available at* http://www.windpoweringamerica.gov/pdfs/wpa/2011/wind_energy_benefits.pdf. *See also The Benefits of Wind Energy*, NRG SYSTEMS (2013), http://www.nrgsystems.com/AboutWind/BenefitsofWindEnergy.aspx; *Benefits of Wind Energy*, WINDUSTRY.ORG, http://www.windustry.org/news-and-resources/policy-and-research/benefits-wind-energy.

70. Inventory of Greenhouse Gas Emissions and Sinks: 1990-2011: Executive Summary, Table ES-8, ES-13, *available at* http://www.epa.gov/climatechange/Downloads/ghgemissions/US-GHG-Inventory-2013-ES.pdf (estimating 144.7 million metric tons of carbon dioxide worth of methane (measurement = Tg CO2 Equivalent) were emitted from this source).

71. Inventory of Greenhouse Gas Emissions and Sinks: 1990-2011: Executive Summary, ES-13, *available at* http://www.epa.gov/climatechange/Downloads/ghgemissions/US-GHG-Inventory-2013-ES.pdf.

72. U.S. ENVTL. PROT. AGENCY, EPA 601/R-12/011, STUDY OF THE POTENTIAL IMPACTS OF HYDRAULIC FRACTURING ON DRINKING WATER RESOURCES: PROGRESS REPORT (2012), *available at* http://www2.epa.gov/sites/production/files/documents/hf-report20121214.pdf (even though this report is labeled as addressing drinking water, it is the progress report for the

to debate about the accuracy of the agency's figures, some arguing they are too high,[73] and some arguing they are too low. [74] In addition to methane, oil and gas drilling operations currently release volatile organic compounds that produce ozone.[75]

C. No Potential for Toxic Spills or Contamination

Unlike electricity generated from uranium or coal, wind power results in "no solid or hazardous waste requiring disposal as a byproduct of generation."[76] Generation of electricity from uranium in nuclear power plants results in high-level and low-level wastes that will remain radioactive for up to 24,000 years.[77] Political maneuvering effectively suspended the latest effort to create a high-level nuclear waste repository in Yucca Mountain, Nevada, as the United States continues to struggle to find appropriate ways of dealing with this byproduct.[78]

The generation of electricity by coal results in millions of tons of wastes.[79] The disposal of these wastes is not uniformly regulated across the country and has resulted in ash spills. Most recently, Duke Energy acknowledged that "up to 82,000 tons of coal ash mixed with 27 million gallons of contaminated water have escaped [from its Dan River Steam Station in North Carolina] since a drainage pipe running under a 27-acre waste pond collapsed Sunday [2/2/2014], turning the river gray for miles."[80] Arsenic, lead, mercury, and other toxins were being filtered from drinking water in a Virginia city over twenty miles downstream, and experts warned that "it could take years before the full impacts of the spill work their way through the Dan River's ecosystem."[81]

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upcoming 2014 report that should address the effects of fracking in general).

73. The Associated Press reported in April 2013 that the EPA dramatically lowered its estimate of how much methane leaks during fracking since the Inventory report. Kevin Begos, *EPA Methane Report Further Divides Fracking Camps*, ASSOCIATED PRESS, Apr. 28, 2013, http://bigstory.ap.org/article/epa-methane-report-further-divides-fracking-camps.

74. In November of 2013, another study claimed that methane emissions are significantly higher than the EPA Estimates. *Methane Emissions from Fracking Operations 50% Higher than EPA Estimates, Report Finds*, INSIDE CLIMATE NEWS (Nov. 26, 2013), http://insideclimate news.org/breaking-news/20131126/methane-emissions-fracking-operations-50-higher-epa-estimates-report-finds.

75. E.g., the oil and gas industry in Colorado has been releasing 350 tons of VOCs per day according to the Regional Air Quality Council, causing violations of clean air standards. Bruce Finley, *Fuel-on effort*, THE DENVER POST, Feb. 16, 2014, at 1B.

76. Rosenberg, *supra* note 56.

77. Backgrounder on Radioactive Waste, U.S. NUCLEAR REGULATORY COMM'N, http:// www.nrc.gov/reading-rm/doc-collections/fact-sheets/radwaste.html.

78. *High-Level Waste Disposal*, U.S. NUCLEAR REGULATORY COMM'N (Sept. 30, 2011), http://www.nrc.gov/waste/hlw-disposal.html.

79. Rosenberg, *supra* note 56.

80. *Dan River Coal Ash Spill Not Yet Fully Contained in North Carolina, Duke Energy Says*, HUFFINGTON POST (Feb. 8, 2014), http://www.huffingtonpost.com/2014/02/08/dan-river-coal-ash-spill-nc_n_4751437.html.

81. Michael Biesecker & Mitch Weiss, *Duke Energy Issues Apology for NC Coal Ash Spill*,

The full solid waste and water contamination impacts of hydraulic fracturing for natural gas are also still under study. A recent investigation by the University of Missouri in Columbia found that areas around fracking operations had higher incidences of endocrine blockers.[82] These blockers can disrupt hormones in an organism's endocrine system, causing adverse development.[83] In addition, new vulnerabilities were exposed when Colorado experienced a one in a thousand year flood event in September of 2013.[84]

In Colorado's most actively drilled county, flood waters and debris damaged storage tanks, resulting in more than 22,000 gallons of oil spilled into the South Platte River Valley.[85] A total of more than 1,900 wells were shut down,[86] and the Colorado Oil and Gas Conservation Commission (COGCC) estimated that 48,250 gallons of oil and gas spilled from Colorado wells during the event.[87] Cleaning up spilled oil is no easy task and may take years.[88] Oil contains carcinogens, including polycyclic aromatic hydrocarbons or PAHs,

YAHOO! NEWS (Feb. 8, 2014), http://news.yahoo.com/duke-energy-issues-apology-nc-coal-ash-spill-191347294.html?iframe=true&width=850.

82. Christopher D. Kassotis et al., *Estrogen and Androgen Receptor Activities of Hydraulic Fracturing Chemicals and Surface and Ground Water in a Drilling-Dense Region*, ENDOCRINOLOGY (Dec. 16, 2013), *available at* http://medicine.missouri.edu/news/docs/en.2013-1697.full.pdf; *MU Researchers Find Fracking Chemicals Disrupt Hormone Functioning*, SCH. OF MEDICINE: UNIV. OF MISSOURI HEALTH SYS.: NEWS, http://medicine.missouri.edu/news/0214.php (last visited Feb. 4, 2014).

83. Kassotis, *supra* note 82; MU Researchers, *supra* note 82. E.g., the endocrine disrupter diethylstilbestrol (DES), a synthetic estrogen prescribed to pregnant mothers, caused vaginal cancer in their daughters. *What are Endocrine Disrupters?*, U.S. ENVTL. PROT. AGENCY, http://www.epa.gov/endo/pubs/edspoverview/whatare.htm (last visited Feb. 4, 2014).

84. Bryan Walsh, *The Science Behind Colorado's Thousand Year Flood*, TIME (Sept. 17, 2013), http://science.time.com/2013/09/17/the-science-behind-colorados-thousand-year-flood/.

85. *See* Sharon Dunn, *Weld County Oil, Gas Flooding Damage: Operators Work to Shut Down Field Production*, HUFFINGTON POST (Sept. 17, 2013), *available at* http://www.huffingtonpost.com/2013/09/17/weld-oil-gas-0perators-w_n_3943013.html; COLO. OIL & GAS CONSERVATION COMM'N, WEEKLY & MONTHLY OIL & GAS STATISTICS 11 (Jan. 7, 2014), *available at* http://cogcc.state.co.us/Libarary/Statistics/CoWklyMnthlyOGStats.pdf; Bruce Finley, *Colorado confirms more oil spills but flood flows complicate clean-up*, THE DENVER POST (Sept. 20, 2013), *available at* http://www.denverpost.com/environment/ci_24141077/colorado-confirms-more-oil-spills-flooded-weld-county.

86. Mark Jaffe, *Colorado Floods: 1,900 Oil and Gas Wells Shut as Crews Check Damage*, THE DENVER POST (Sept. 17, 2013), *available at* http://www.denverpost.com/breakingnews/ci_24116404/oil-field-flood-tally-1-900-wells-shut.

87. *COGCC 2013 Flood Response*, COLO. OIL & GAS CONSERVATION COMM'N 1 (last updated Nov. 26, 2013), *available at* http://cogcc.state.co.us/Announcements/Hot_Topics/Flood2013/COGCC2013FloodResponse.pdf. Additionally, 43,479 gallons of produced water spilled.

88. The process and time for cleaning up oil spills varies depending upon the oil type, location, and weather. *How do you clean up an oil spill?*, UNIVERSITY OF DELAWARE SEA GRANT PROGRAM, http://www.ceoe.udel.edu/oilspill/cleanup.html (last visited Feb. 14, 2014). Cleaning up a September 2013 oil spill in North Dakota will take at least 2 years because it requires excavation of soils down to 30 feet, baking out the oil, and replacement of removed soil. *North Dakota Oil Spill Cleanup Will Take At Least 2 More Years*, HUFFINGTON POST (Feb. 12, 2014), http://www.huffingtonpost.com/2014/02/12/north-dakota-oil-spill-cleanup-pipeline_n_4774001.html.

which "account for 4 of the top 10 most dangerous substances on the 2011 ATSDR[89] Priority List of Hazardous Substances" because they increase the risk of lung, skin, and urinary cancers.[90] Although Colorado had proposed to amend its spill reporting process before the floods,[91] the COGCC is now considering additional rule amendments to minimize potential damage from future disasters.[92]

Even though wind farms were also located in flooded counties, they continued to produce power without any contamination of the local environment.[93] They were not as impacted by the floods because wind turbines are generally sited on higher ground to catch wind currents.[94] Even if a working turbine had been flooded, environmental damage might be limited to loose debris.[95]

D. Enhancing Crop Production

Recent scientific findings seem to suggest yet another windfall to farmers in having a wind farm on their property (or just nearby) is the enhancement of crop production. Wind turbines create turbulence wakes forcing warmer air downward.[96] Although more research is required, one group of scientists has

89. Agency for Toxic Substances and Disease Registry, http://www.atsdr.cdc.gov/spl/ (last visited April 8, 2014).

90. *All About PAHs*, OREGON STATE UNIV., http://superfund.oregonstate.edu/about_PAHs (last visited Feb. 14, 2014)*; see also Gulf of Mexico Oil Spill, PAHs, and Health*, OREGON STATE UNIV., http://superfund.oregonstate.edu/oilspill (last visited Apr. 3, 2014) ("The level of PAHs in crude oil varies between 0.2 and 7%, depending on location.").

91. *COGCC Spill Reporting Rulemaking 2013*, COLO. OIL & GAS CONSERVATION COMM'N: RULES, cogcc.state.co.us (last updated Dec. 20, 2013); Colorado H.B. 13-1278 (2013). COGCC Rules 337 & 906 (Feb. 1, 2014).

92. *Officials ponder new drilling regulations*, THE DENVER POST, Feb. 7, 2014, at 16A (noting that the COGCC will hold hearings on potential new rules in response to 13 oil spills during the floods. A Weld County Commissioner observed that "the amount of oil spilled was relatively small compared with the amount of floodwater . . . sewage released from a damaged treatment plant was a greater threat."); *See also* Ryan Maye Handy, *Colorado Weighs Need for New Oil Rules in Flood's Wake*, COLORADOAN (Feb. 6, 2014), http://www.coloradoan.com/article/20140206/NEWS01/302060091/Colorado-weighs-need-new-oil-rules-flood-s-wake; Alan Gilbert talks with CPR's Mike Lamp, COLO. PUB. RADIO (Feb. 6, 2014), http://www.cpr.org/news/story/lessons-2013-floods-help-prepare-next-time.

93. *See* American Wind Energy Association, *Wind Energy Facts: Colorado*, AWEA (Oct. 2012) (for wind farm locations); Daniel Petty, *Colorado flooding 2013: Map of rainrain totals*, THE DENVER POST (Sept. 16, 2013), http://www.denverpost.com/2013coloradofloods/ci_24101329/colorado-flooding-2013-precipitation-totals.

94. E-mail from Debbie Cano, Manager, Community Partners & Investment – GT (G&P/Offshore), Green & Alternative Energy and ELTM at Enbridge (Cedar Point Wind Energy Facility) (Feb. 18, 2014) (on file with author).

95. *Wind Energy Development Environmental Concerns*, WIND ENERGY DEVELOPMENT PROGRAMMATIC EIS, http://windeis.anl.gov/guide/concern/ (last visited Feb. 9, 2013); *see also* e-mail from Debbie Cano at Enbridge (Cedar Point Wind Energy Facility) (Feb. 10, 2014) (on file with author) (stating that only the transformers might be affected, and they are housed in containment pits "to prevent accidental release of their cooling oil").

96. Daniel A. Rajewski et al., *Crop Wind Energy Experiment (CWEX): Observations of*

found evidence that turbines might be helping improve crop yields.[97] The wakes cool the plants on hot days and warm them to prevent freezing during colder nights.[98] In addition, the fanning breeze evaporates dew or other moisture, thus inhibiting the growth of damaging fungi and molds.[99]

IV. CONCERNS

Despite its benefits, wind power development has encountered hurdles including community opposition,[100] lack of transmission connections,[101] and uncertain financing.[102] It is beyond the scope of this article to delve into many

Surface-Layer, Boundary Layer, and Mesoscale Interactions with a Wind Farm, 94 BULL. AMER. METEOR. SOC. 655, 661 (2013).

97. Cathy Proctor, *An Agricultural Windfall*, DENVER BUS. J., Dec. 24, 2010, at A3.

98. Rajewski et al., *supra* note 96; *see also* Somnath Baidya Roy, Justin J. Traiteur & Stephen H. Schneider, *Impacts of wind farms on surface air temperatures*, 107 PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA 17899, 17899 (2010), *available at* http://www.jstor.org/stable/25748411.

99. Rajewski et al., *supra* note 96.

100. *See, e.g.*, Hannah J. Wiseman, *Article and Essay: Urban Energy*, 40 FORDHAM URB. L.J. 1793 (2013). Also, it is beyond the scope of this article to address all of the legal issues involved in siting a local wind farm, but here are a few recommended sources to which you may turn. THE RENEWABLE ENERGY READER, *supra* note 3; STOEL RIVES, THE LAW OF WIND: A GUIDE TO BUSINESS AND LEGAL ISSUES (6th ed. 2010), *available at* http://www.stoel.com/webfiles/LawOfWind.pdf; *Draft Model Ordinance for Siting Wind Energy Systems (WES)*, SOUTH DAKOTA PUB. UTILS COMM'N (Oct. 2010), *available at* https://puc.sd.gov/commission/twg/WindEnergyOrdinanceoverview.pdf; American Planning Association, Planning Advisory Service Info Packet, Planning and Zoning for Wind Energy, www.planning.org/pas (EIP-32 2012); Jennifer R. Andriano, Comment, *The Power of Wind: Current Legal Issues in Siting for Wind Power*, 61 PLAN. & ENVTL. L. 3 (May 2009), *available at* http://www.tandfonline.com/doi/abs/10.1080/15480750902963328?journalCode=rpel20#preview; MIKE CONSTANTI & PEGGY BELTRONE, U.S. DEP'T OF ENERGY: OFFICE OF ENERGY EFFICIENCY AND RENEWABLE ENERGY, DOE/GO-102006-2370, WIND ENERGY GUIDE FOR COUNTY COMMISSIONERS, (2006); National Conference of State Legislatures State, *Siting and Permitting of Wind Energy Facilities* (April 2006), *available at* http://www.legis.nd.gov/assembly/60-2007/docs/pdf/edt030508appendixc.pdf; KANSAS ENERGY INFORMATION NETWORK, http://kansasenergy.org/wind_resources.htm.

101. *See, e.g.*, Gina Warren, *Blurred Lines: The Mixed Messages of Sustainable Energy Development*, WAKE FOREST L.J. & POL'Y (forthcoming 2014) (citing to U.S. DEP'T OF ENERGY, DOE/PI-0013, U.S. ENERGY SECTOR VULNERABILITIES TO CLIMATE CHANGE (2013) (discussing the increased vulnerabilities of the centralize plant and transmission electricity models to increasingly violent weather due to climate change)).

102. Congress allowed the primary wind energy tax benefit, the Production Tax Credit, to expire in 2012, then renewed it for only one year in 2013. *See, e.g.*, *Wind energy tax credit set to expire at the end of 2012*, U.S. ENERGY INFO. ADMIN. (Nov. 21, 2012), http://www.eia.gov/todayinenergy/detail.cfm?id=8870; American Taxpayer Relief Act of 2012, H.R. 8, 112th Cong. (2012); Larry Bell, *Loss of Production Tax Credits Brings Big Wind Chill to Cooling Subsidy-Dependent Market*, FORBES (Feb. 9, 2014, 9:00 AM), http://www.forbes.com/sites/larrybell/2014/02/09/loss-of-production-tax-credits-brings-big-wind-chill-to-cooling-subsidy-dependent-market/. According to Bell, as of the date of this writing, it had not been renewed again. The up and down cycles of allowing this credit to expire have created havoc in wind energy development. *See* Lenny Bernstein, *Wind Power Supporters Push Congress to Revive Expired Tax Credit*, THE WASH. POST (Jan. 30, 2014), http://www.washingtonpost.com/national/health-science/wind-power-supporters-push-congress-to-revive-expired-tax-redit/2014/01/30/5c9c86da-89e6-11e3-

of these in depth. Instead, the focus here will be on the two specific concerns of wildlife disruption and competing land uses.

A. Wildlife Disruption

Perhaps one of the most strident and emotional criticisms of wind power is that it kills birds.[103] A 2005 United States Forest Service (USFS) study showed that bird fatalities incidental to wind production are an extremely small number in comparison to deaths caused by other human activities.[104] Nevertheless, perhaps in response to charges that wind farms were receiving special treatment,[105] the Department of Justice has recently begun prosecuting them[106] under the strict liability standard[107] of the Migratory Bird Treaty

a5bd-844629433ba3_story.html.

103. Samuel J. Panarella, *For the Birds: Wind Energy, Dead Eagles, and Unwelcome Surprises*, 20 HASTINGS W. NW. J. ENVTL. L. & POL'Y 3 (2014); Roger L. Freeman & Ben Kass, *Siting Wind Energy Facilities on Private Land in Colorado: Common Legal Issues*, 39 COLO. LAW. 43, 46 (May 2010); Victoria Sutton & Nichole Tomich, *Harnessing Wind is not (by Nature) Environmentally Friendly*, 22 PACE ENVTL L. REV. 91, 97 (2005).

104. Wallace P. Erickson, Gregory D. Johnson & David P. Young, Jr., *A Summary and Comparison of Bird Mortality from Anthropogenic Causes with an Emphasis on Collisions*, USDA FOREST SERV. GEN. TECH. REP. 1029, 1029, 1039 (2005), *available at* http://www.dialight.com/Assets%5CApplication_Notes%5CSignaling%5CObstruction%20Lighting%20Bird%20Strike%20Study.pdf (showing deaths by the following causes in comparison to 28,500 per year for wind turbines—buildings (550 million), power lines (130 million), domestic cats (100 million) and cars (80 million)). The American Bird Conservancy believes the impact of cats, both domestic and feral, is much higher with estimates of bird deaths by cats up to 500 million per year. Kerrie Anne T. Loyd et al., *Quantifying free-roaming domestic cat predation using animal-borne video cameras*, 160 BIOLOGICAL CONSERVATION 183, 186 (2013) (stating that the domestic cats that wore cameras captured approximately two animals every week, 13% of which were birds, in seven to ten day period); *"KittyCam" Reveals High Levels of Wildlife Being Killed by Outdoor Cats*, AM. BIRD CONSERVANCY (Aug. 6, 2012), http://www.abcbirds.org/newsandreports/releases/120806.html (extrapolating that cats are likely killing at least 500 million birds per year); Elisabeth Rosenthal, *Tweety Was Right: Cats Are a Bird's No. 1 Enemy*, N.Y. TIMES (Mar. 20, 2011), http://www.nytimes.com/2011/03/21/science/21birds.html?_r=0.

105. 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), http://www.epw.senate.gov/public/index.cfm?FuseAction=Minority.PressReleases&ContentRecord_id=8c84134d-a36c-2155-a554-dc81eaded88a; Letter from Elliot Williams, Deputy Asst. Att'y General to David Vitter, Senator & Chair of Environment and Public Works Committee and Lamar Alexander, Senator (Jan. 30, 2013), *available at* http://www.epw.senate.gov/public/index.cfm?FuseAction=Files.View&FileStore_id=b5094364-eaea-42f3-a17d-3a72cf71a6d5. *See also* Robert Bryce, *Windmills vs. Birds*, WALL ST. J., (Mar. 7, 2012), *available at* http://online.wsj.com/news/articles/SB10001424052970204781804577267114294838328; *See also* Robert Bryce, *Wind Farms Killing Wildlife Without Repercussions*, FOX BUS. (Mar. 12, 2012), *available at* http://www.youtube.com/watch?v=G3jLwnauwHU (last visited Feb. 10, 2014).

106. *See* Robert S. Anderson & Jill Birchell, *Prosecuting Industrial Takings of Protected Avian Wildlife*, 59 ENVTL. CRIMES ISSUE OF THE USA BULLETIN 66-83 (July 2011), *available at* http://www.justice.gov/usao/eousa/foia_reading_room/usab5904.pdf; Plea Agreement, United States v. Duke Energy Renewables Inc., No. 2:13-cr-00268 (D. Wyo. Nov. 22, 2013), *available at* http://op.bna.com/env.nsf/id/smiy-9dpuz3/$File/DukeWyo.pdf; *see also* Press Release, Dep't of Justice: Office of Public Affairs, Utility Company Sentenced in Wyoming for Killing Protected Birds at Wind Projects (Nov. 22, 2013), *available at* http://www.justice.gov/opa/pr/2013/

Act.[108]

Moreover, bird collisions are not the greatest threat.[109] Wind sites can cause habitat fragmentation and disruption not only during the construction stage, but also as a result of ongoing operations.[110]

Take for example the Lesser Prairie Chicken. The Prairie Chicken has not yet been listed as an endangered species[111] under the Endangered Species Act.[112] Although the U.S. Fish and Wildlife (FWS) service appeared to be on the verge of doing so in March of 2014[113] the agency instead decided to list the Prairie Chicken as a "threatened species",[114] a decision that appears to be unpopular from all perspectives.[115]

The FWS's concern for the Prairie Chicken was heightened by the

November/13-enrd-1253.html; *First Prosecution of Wind Company for Killing Birds*, AMERICAN BIRD CONSERVANCY (Nov. 22, 2013), http://www.abcbirds.org/newsandreports/releases/131122.html; *U.S. Fish and Wildlife Service Imposes First-Ever Criminal Penalties for Bird Deaths Caused by Wind Projects*, PERKINS COIE (Dec. 2, 2013), http://www.perkinscoie.com/us-fish-and-wildlife-service-imposes-first-ever-criminal-penalties-for-bird-deaths-caused-by-wind-projects-12-02-2013/ (noting that "FWS is currently investigating 18 cases of bird mortality by wind-power facilities and six of these cases have been referred to DOJ for potential prosecution").

107. Roger L. Freemen & Ben Kass, *Siting Wind Energy Facilities on Private Land in Colorado: Common Legal Issues*, 39 COLO. LAW. 43, 47-48 (May 2010). There is actually a split in the circuits as to whether the MBTA standard is truly one of strict liability.

108. 16 U.S.C. § 703 (2013).

109. Bat fatalities are an even more serious problem in some localities. *See, e.g.*, Animal Welfare Institute v. Beech Ridge Energy LLC, 675 F. Supp. 2d 540 (D. Md. Dec. 8, 2009). *See also* Michelle Nijhuis, *Alternative Energy: Selling the Wind*, AUDUBON MAG., *available at* http://archive.audubonmagazine.org/features0609/energy.html (last visited Feb. 10, 2014); Paul M. Cryan, *Wind Turbines as Landscape Impediments to the Migratory Connectivity of Bats*, 41 ENVTL L. 355 (2011). However, it is beyond the scope of this article to address the bat issue further.

110. Kalyani Robbins, *Recovery of an Endangered Provision: Untangling and Reviving Critical Habitat Under the Endangered Species Act*, 58 BUFF. L. REV. 1095 (2010); Hadassah Reimer & Sandra Snodgrass, *Tortoises, Bats, and Birds, Oh My: Protected-Species Implications for Renewable Energy Projects*, 46 IDAHO L. REV. 545, 579 (2010).

111. *Species Profile: Lesser Prairie Chicken (Tympanuchus Pallidicinctus)*, U.S. FISH AND WILDLIFE SERV. (Nov. 23, 2013), http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B0AZ [hereinafter *FWS Species Profile*].

112. Endangered Species Act (ESA) of 1973, 16 U.S.C. §§ 1531-44.

113. Endangered and Threatened Wildlife and Plants; Listing the Lesser Prairie-Chicken as a Threatened Species with a Special Rule, 78 Fed. Reg. 26,302 (May 6, 2013) (to be codified at 50 C.F.R. pt. 17); *see also* Endangered and Threatened Wildlife and Plants: 6-Month Extension of Final Determination for the Proposed Listing of the Lesser Prairie-Chicken as a Threatened Species, 78 Fed. Reg. 41,022 (July 9, 2013) (to be codified at 50 C.F.R. pt. 17).

114. Final Rule Notice, Docket No.FWS-R2-ES2012-0071 (March 21, 2014), available at http://www.fws.gov/home/feature/2014/lesser-prairie-chicken/LPC_Final_Listing_Rule.pdf?ID=04F68986-AE41-6EEE-5B07E1154C2FB2E7.

115. *See, e.g.*, *Kansas Joins Oklahoma in Lawsuit on Lesser Prairie Chicken Regulation*, NEWS ON 6 (April 2, 2014), available at http://www.newson6.com/story/25140663/kansas-joins-oklahoma-in-lawsuit-on-lesser-prairie-chicken-regulation; *Unprecedented Loopholes Undermine Endangered Species Act Protections for Lesser Prairie Chicken*, WILDEARTH GUARDIANS (March 27,2014), available at http://www.wildearthguardians.org/site/News2?page=NewsArticle&id=9523&news_iv_ctrl=1194#.Uzyg1tiPKUl.

prospect of increased wind energy development[116] because the bird's historic range encompasses five of the top fifteen prime wind generation states: Colorado, Kansas, Oklahoma, New Mexico, and Texas.[117] As a species, the Prairie Chicken is especially sensitive to perceived threats from human activities. As a result, a number of drivers—agriculture, livestock grazing, wind turbines, oil and gas production, roads, pipelines, buildings, and transmission lines—have reduced the Prairie Chicken population to only about ten percent of its historic range.[118]

While listing the Prairie Chicken as endangered may impact all of the above-listed drivers, it may especially curtail wind development. Prairie Chickens are wary of tall structures that they may sense could serve as predator perches and "shadow flicker" resulting from turbine movement that they might interpret as a predator flying overhead.[119] Consequently, to avoid disruption of mating and habitat, buffer zones within a mile radius around each turbine may need to be imposed.[120] Avoidance buffers may also be required around transmission lines.[121]

The FWS has endorsed a range-wide plan for conserving the Prairie Chicken, which is authored by the Western Association of Fish and Wildlife Agencies (WAFWA).[122] A key component of the WAFWA plan is the University of Kansas's Crucial Habitat Assessment Tool (CHAT).[123] The CHAT maps Prairie Chicken areas and connectivity zones.[124] While the WAFWA plan may provide a framework for conserving Prairie Chicken

116. Endangered and Threatened Wildlife and Plants: Listing of the Lesser Prairie-Chicken as a Threatened Species, 77 Fed. Reg. 73,828 (Dec. 11, 2012) (to be codified at 50 C.F.R. pt. 17) *available at* http://www.gpo.gov/fdsys/pkg/FR-2012-12-11/pdf/2012-29331.pdf.

117. *FWS Species Profile*, *supra* note 111. *See also* Christin L. Pruett et al., *It's Not Easy Being Green: Wind Energy and a Declining Grassland Bird*, 59 BIOSCIENCE 257, 260 (2009) [hereinafter Pruett, *Not Easy*].

118. WESTERN ASS'N OF FISH AND WILDLIFE AGENCIES, THE LESSER PRAIRIE-CHICKEN RANGE-WIDE CONSERVATION PLAN 13 (William E. Van Pelt ed. Oct. 2013) *available at* http://www.wafwa.org/documents/LPCRWPFinal.21102013.pdf [hereinafter WAFWA FINAL PLAN].

119. *See* Christin L. Pruett et al., *Avoidance Behavior by Prairie Grouse: Implications for Development by Wind Energy*, 23 CONSERVATION BIOLOGY 1253, 1256-57 (2009) [hereinafter Pruett, *Avoidance*].

120. Robert J. Robel et al., *Effect of Energy Development and Human Activity on the Use of Sand Sagebrush Habitat by Lesser Prairie Chickens in Southwestern Kansas*, *in* TRANSACTIONS OF THE SIXTY-NINTH NORTH AMERICAN WILDLIFE AND NATURAL RESOURCES CONFERENCES 251, 263 (Jennifer Rahm ed., 2004).

121. *See* James C. Pitman et al., *Location and Success of Lesser Prairie-Chicken Nests in Relation to Vegetation and Human Disturbance*, 69 J. WILDLIFE MGMT. 1259, 1262-67 (2005); Pruett, *Not Easy*, *supra* note 117, at 259-61; Pruett, *Avoidance*, *supra* note 119, at 1255-56.

122. Press Release, U.S. Fish and Wildlife Serv., U.S. Fish and Wildlife Service Endorses Western Association of Fish and Wildlife Agencies Lesser Prairie-Chicken Range-Wide Conservation Plan (Oct. 23, 2013), http://www.fws.gov/news/ShowNews.cfm?ID=E6267BFC-E38A-E402-8295AE3A5FD77DF1.

123. *Southern Great Plains Crucial Habitat Assessment Tool*, KANSAS APPLIED REMOTE SENSING: UNIVERSITY OF KANSAS, http://kars.ku.edu/geodata/maps/sgpchat/ (last updated Nov. 24, 2013).

124. *Id.*

habitat, the restrictions to development that it would impose and the high costs of alternative mitigation measures may make it infeasible to develop valuable wind resources in many areas.[125]

B. Conflicts with Other Development of Oil, Gas, or Other Wind

The final focus of this piece will be the potential conflict of wind power development with alternative land uses.

During the construction phase, a wind farm requires heavy use of roads and surrounding areas for operations and maintenance facilities and for laydown yards to place the large blades and other turbine parts while the turbine tower is being completed.[126] After this initial phase, the footprint of the wind towers is relatively small.[127] Some land uses, such as wildlife conservation or historic preservation may be less compatible with towering wind turbines,[128] but farming and ranching can continue with little interference.[129]

Although many might consider wind power as primarily a surface use, perhaps one of the areas with the greatest potential for conflict is with oil and gas, or other mineral, development below the surface. The turbines may be widely spaced on the surface, but underground they must be linked from one turbine to the next and then to the grid through "a spiderweb of underground and overhead transmission, collection, and distribution lines."[130]

Disputes between wind and other mineral interests about which has priority and which must pay compensation have caused tensions to rise.[131] Must a wind farm curtail its operations to avoid interfering with accurate seismic measurements, and if so, who is responsible for the lost wind revenues? Who must accommodate whom if a mineral developer needs to cut across or pass under a wind farm's transmission or collection lines to access its resources? As wind development has expanded and the problems have become more apparent, practitioners have encountered less of an appetite for compromise and "the positions of oil and gas developers and wind developers . . . have become 'polarized.'"[132]

One of the issues raised by commentators as wind development took off

125. WAFWA FINAL PLAN, *supra* note 118, at 91-102 (noting mitigation costs for a wind tower in mixed grass (Figure 11) as over $1 million in contrast to approximately $100,000 in mitigation costs for an oil and gas pad).

126. K.K. DuVivier & Roderick E. Wetsel, *Jousting at Wind Mills: When Wind Power Development Collides with Oil, Gas, and Mineral Development*, 55 ROCKY MTN. MIN. L. INSTITUTE 9-1, § 9.03 (2009).

127. Some wind turbine pads are 50'x50' in contrast to 200'x200' for an oil and gas drilling site and 80'x80' upon completion. *Id.* at n.44.

128. Rosenberg, *supra* note 56, at 530.

129. *Id.* at 529.

130. DuVivier & Wetsel, *supra* note 126, at § 9.03.

131. Rod W. Wetsel & Jeffrey L. Allen, Epilogue, 35:3 SECTION REPORT OF THE OIL, GAS & ENERGY RESOURCES LAW SECTION OF THE STATE BAR OF TEX. 30, 31 (2011).

132. *Id.*

after 2007 was whether the severance of wind rights from the surface estate exacerbated conflicts.[133] When landowners are set to receive royalties from both a mineral and wind developer, they can work as a mediator to incentivize "both enterprises to coexist."[134] These landowners are most impacted by wind development, but severance "remove[d] the surface owner[s] from the negotiating table."[135] In addition, as a fledgling industry, wind was especially impacted by the problematic dynamic of conflicts with other severed estates because new investors were "hesitant to work with landowners who have severed their wind rights."[136]

Based on these concerns, scholars advocated taking the lessons learned from the problems of mineral severance and banning the practice of severance in the context of wind.[137] These calls for change were heeded as three states—Kansas, Montana, and Wyoming— passed wind severance ban statutes in 2011.[138] Colorado and Nebraska joined in 2012.[139] While mineral severance arguably creates more conflict than wind severance, it was politically possible to ban the latter because the wind industry is young and the practice of severing wind had not yet become widespread.[140] Furthermore, most of the more recent statutes banning severance "grandfathered" in previously severed wind rights.[141]

133. K.K. DuVivier, *Animal, Vegetable, Mineral - Wind? The Severed Wind Power Rights Conundrum*, 49 WASHBURN L.J. 69, 77 (Fall 2009).

134. *Id.* at 77.

135. *Id.* at 86.

136. *Id.* at 86.

137. *See, e.g.*, *id.* at 89 ("The lessons learned from oil development demonstrate that [the law of ownership rights to oil] should serve as a cautionary tale rather than as a model for efficient and equitable wind production."). *See also* DuVivier & Wetsel, *supra* note 126; Kathleen D. Kapla & Craig Trummel, *Severing Wind Rights Raises Legal Issues*, N. AM. WIND POWER (Oct. 2010), *available at* http://kaplalaw.com/NAW1010_WindRightsArticle.pdf; Thomas J. Forestier & Katherine A. Willyard, *Conflicts between Oil and Gas and Wind Energy Development*, 35TH ERNEST E SMITH OIL GAS AND MINERAL LAW INST. (Houston, Tex. March 27, 2009); Nathaniel C. Giddings & Laurie Ristino, *Proposal: A Uniform Act for Wind Rights*, 8:2 ENERGY COMMITTEES NEWSLETTER (March 1, 2011) (Vermont Law School Research Paper No. 24-13), *available at* http://ssrn.com/abstract=2291118; Roderick E. Wetsel & H. Alan Carmichael, *Current Issues In Texas Wind Energy La* , STATE BAR OF TEX. AGRICULTURAL L. (2009); Lisa Chavarria, *Wind Power: Prospective Issues*, 68 TEX. B. J. 832 (2005).

138. MONT. CODE ANN. § 70-17-404(1) (2013); 2011 Mont. Laws Ch. 249 (H.B. 295); WYO. STAT. ANN. § 34-27-103(B) (2013); 2011 Wyo. Laws Ch. 3 (S.F. 22); KAN. STAT. ANN. § 58-2272(B); 2011 Kan. Laws Ch. 52 (S.B. 227).

139. COLO. REV. STAT. § 38-30.7-103 (2013). Nebraska, which had already used legislation to declare wind a property right in 2009, 2009 Neb. Laws L.B. 568, added the non-severance language in 2012. 2012 Neb. Laws L.B. 828 *codified at* NEB. REV. STAT. § 76-3004 (2013) ("No interest in any wind or solar resource located on a tract of land and associated with the production or potential production of wind or solar energy on the tract of land may be severed from the surface estate."). *Id.*

140. K.K. DuVivier, *Sins of the Father*, 1 TEX. A&M J.REAL PROP. L. 301 (2014 at www.realpropertyjournal.org) [hereinafter DuVivier, *Sins*].

141. 1996 S.D. Laws Ch. 260 (S.B. 95). The first state to ban wind severance was South Dakota in 1996. This statute did not include a "grandfathering" clause. S.D. CODIFIED LAWS § 43-13-19 (2013).

Unfortunately, the wind severance bans may be creating an impression that all traditional severed interests in oil, gas, or other minerals should have priority over unsevered interests in wind.[142] This result does not necessarily follow. The rationales for application of the dominant-servient estate doctrine actually support development of wind as a valuable common resource similar to the development of minerals. In fact, because of wind's potential role in offsetting destructive climate change, some might argue developing it should be a higher public priority than developing fossil fuels.[143]

Formalizing a hierarchy that prioritizes traditional severed interests over wind rights will only encourage mineral owners to walk away from negotiations with wind developers. In Texas, where wind severance is not banned and where severed wind rights are prevalent, there is some optimism that widespread use of a standardized accommodation agreement[144] will encourage "both sides. . .[to] agree that litigation is not only costly for both parties, it is a serious impediment to any development."[145] Instead, the best outcome from a public policy standpoint is for all parties to work together to allow co-development of all resources.

V. CONCLUSION

Wind energy provides many benefits for rural community hosts. Economic benefits to areas that develop wind include not only jobs directly and indirectly related to the wind farms themselves, but also payments to property owners who hold the leases and an increased tax base for the entire community.

Wind farms also have environmental advantages over development of fossil fuel plants. They require little to no water to generate power and thus, do not compete with agricultural water needs. Furthermore, in comparison to fossil fuel plants, wind power does not generate air emissions and does not pose a threat from toxic coal ash or oil spills. Some research even suggests

No interest in any resource located on a tract of land and associated with the production or potential production of energy from wind power on the tract of land may be severed from the surface estate . . . except that such rights may be leased for a period not to exceed fifty years. Any such lease is void if no development of the potential to produce energy from wind power has occurred on the land within five years after the lease began.

Id. When North Dakota became the second state to ban severance in 2005, its statute did address existing rights. N.D. Laws Ch. 386 (S.B. 2239); N.D. CENT. CODE § 17-04-04 (2013).

Except for a wind easement created under § 17-04-03 and as otherwise provided in this section, an interest in a resource located on a tract of land and associated with the production of energy for wind power on the tract of land may not be severed from the surface estate. However, nothing in this section may be construed to prohibit or limit the right of a seller to retain any payments associated with an existing wind energy project.

N.D. CENT CODE § 17-04-04 (2013).

142. DuVivier, *Sins, supra* note 140.

143. *Id.*

144. ERNEST E. SMITH, STEVE K. DEWOLF, RODERICK E. WETSEL & BECKY H. DIFFEN, TEXAS WIND LAW at § 3.02(2)(b) (Lexis Nexis 2013).

145. Wetsel & Allen, *supra* at 131.

that crop growth may be enhanced by the downwind effect of the wind farm wakes.

However, wind power still faces significant hurdles, including the listing of the Lesser Prairie Chicken as a threatened species and turf battles between wind and conventional fuel development. In conclusion, while wind development holds the promise of providing rural communities with many benefits, it is important to recognize that the process will not always be smooth sailing.