

# MAKING RENEWABLE ENERGY A REALITY—FINDING WAYS TO SITE WIND POWER FACILITIES

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## INTRODUCTION AND OVERVIEW

Energy is central to American life affecting nearly all aspects of contemporary society. Our domestic energy use exceeds that of any other nation in the world both in terms of total amount and in per capita consumption.<sup>1</sup> While most of our petroleum fuels our transportation,<sup>2</sup> our electricity is generated from the fossil fuels coal, natural gas and oil.<sup>3</sup> Electricity provides the energy essential for our individual daily living and various industrial, commercial and institutional activities. As a result, America's energy economy has emphasized high levels of consumption and has resulted in a heavy reliance on fossil fuels.<sup>4</sup> Estimates of future electricity use over the next two decades indicate growing consumer

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<sup>1</sup> In 2005, the top ten world consumers of energy expressed in million tons of oil equivalent (mtoe) and in percentages of total consumption were: 1) United States—2336 or 22.2%, 2) China—1554 or 14.7%, 3) Russian Federation—679 or 6.4%, 4) Japan—524 or 5%, 5) India—387 or 3.7%, 6) Germany—324 or 3.1%, 7) Canada—317 or 3.0%, 8) France—262 or 2.5%, 9) United Kingdom—227 or 2.2%, and 10) South Korea—224.6 or 2.1%. BRITISH PETROLEUM, QUANTIFYING ENERGY, BP STATISTICAL REVIEW OF WORLD ENERGY JUNE 2006, at 40 (2006) [hereinafter BP WORLD ENERGY 2006].

<sup>2</sup> BUREAU OF TRANSP. STATISTICS, U.S. DEP'T OF TRANSP., POCKET GUIDE TO TRANSPORTATION 13 (2005), available at [http://www.bts.gov/publications/pocket\\_guide\\_to\\_transportation/2005/html/figure\\_05.html](http://www.bts.gov/publications/pocket_guide_to_transportation/2005/html/figure_05.html).

<sup>3</sup> For 2006, American electrical power was generated by coal (49.0%), petroleum (1.6%), nuclear (19.4%) and natural gas (20%). Renewable sources of electricity, including hydro-electric, comprised 9.4%. ENERGY INFORMATION ADMIN., U.S. DEP'T OF ENERGY, ELECTRIC POWER ANNUAL 2006, at 2 (2007), available at <http://www.eia.doe.gov/cneaf/electricity/epa/epa.pdf> [hereinafter 2006 ELECTRIC POWER REPORT].

<sup>4</sup> See ENERGY INFORMATION ADMIN., U.S. DEP'T OF ENERGY, ANNUAL ENERGY OUTLOOK 2007, at 7 (2007), available at [http://www.eia.doe.gov/oiaf/archive/aeo07/pdf/0383\(2007\).pdf](http://www.eia.doe.gov/oiaf/archive/aeo07/pdf/0383(2007).pdf) (estimating ever-growing consumption of energy).

demand, anticipating a need for greater supply.<sup>5</sup> What will generate this electricity? Where will this supply come from?

In recent years, as a nation, we have begun to appreciate the significant political, economic and environmental ramifications of our existing patterns of energy supply and use. In particular, the costs of our heavy reliance on coal as the primary source of American electrical generation has become more clearly understood.<sup>6</sup> This increased awareness of and concern about the connection between fossil fuel combustion to the phenomena of global warming has accelerated policy development and raised popular support for renewable energy alternatives as well as increased energy conservation.<sup>7</sup> Public policy has slowly developed to support a diversification in the generation of American electricity, with several strong incentives being adopted over the last several years. Taking the lead in this energy policy transition, nearly half of the states have adopted Renewable Portfolio Standards ("RPS"s), which mandate that increasing percentages of electricity sold by utilities within each state be produced from renewable sources including wind, solar, biomass and hydroelectric.<sup>8</sup>

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<sup>5</sup> In the future, total American energy use is expected to reach 131.16 quadrillion British thermal units ("Btus") by 2030 from the 2005 total of 100.19 quadrillion Btus. *Id.* at 14. American electricity generation also leads the world at 4062 billion kWh in 2005. U.S. Central Intelligence Agency, *The World Fact Book*, <https://www.cia.gov/library/publications/the-world-factbook/rankorder/2038rank.html> (last visited Apr. 1, 2008).

<sup>6</sup> See generally U.S. DEPT' OF ENERGY, *ENERGY TECHNOLOGY CHARACTERIZATIONS HANDBOOK—ENVIRONMENTAL POLLUTION AND CONTROL FACTORS* 55-103 (3d ed. 1983) (discussing coal technologies).

<sup>7</sup> See, e.g., News Release, Governor Tim Kaine, Governor Kaine Releases Virginia Energy Plan (Sept. 12, 2007), available at <http://www.governor.virginia.gov/MediaRelations/NewsReleases/viewRelease.cfm?id=49>; U.S. Department of Energy, DOE Increases Energy Efficiency Standards for Residential Furnaces and Boilers, Nov. 19, 2007, <http://www.energy.gov/news/5743.htm>; see also Allen E. Smith, *The Road to Energy Conservation*, BOSTON GLOBE, Nov. 19, 2007, available at [http://www.boston.com/bostonglobe/editorial\\_opinion/oped/articles/2007/11/19/the\\_road\\_to\\_energy\\_conservation/](http://www.boston.com/bostonglobe/editorial_opinion/oped/articles/2007/11/19/the_road_to_energy_conservation/).

<sup>8</sup> The Renewable Portfolio Standard, or "RPS," was first adopted in Iowa and Minnesota in the 1980s. By now, approximately half of the states have followed their lead. Five additional states, including Florida, Indiana, Louisiana, Nebraska and Utah, are currently considering the adoption of some variation of an RPS. An RPS is a legislative requirement requiring electricity suppliers (utilities) within a specified service area to use renewable resources to produce a percentage of their electrical supply by a predetermined date. These programs assure renewable energy producers a guaranteed market for their product. Higher production costs are then shifted to the consumers within the jurisdiction who will pay for the electricity they consume at the resulting "blended" renewable and non-renewable cost. Some commentators have attributed up to 50% of the growth in American wind power to the RPS requirements adopted by the states. Ryan H. Wiser,

In addition, federal energy and tax policy has been adopted to encourage these forms of energy production by granting a production tax credit to subsidize these forms of electrical generation.<sup>9</sup> Viewed comprehensively, government policy has increasingly emphasized renewable energy, with wind power emerging as one of the favored alternatives capable of supplying significant amounts of carbon-free electricity.<sup>10</sup>

Over the past five years the pace of wind power development has greatly accelerated in the United States, as it has in Europe,<sup>11</sup> making wind power the fastest growing category of renewable energy.<sup>12</sup> This has

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Berkeley Lab, Presentation to the Midwestern Wind Policy Institute: State Policy Update: A Review of Effective Wind Power Incentives 5, 24 (June 15, 2007) [hereinafter Wisner, RPS Update], *available at* <http://www.ncsl.org/print/energy/SPRWiserWind07.pdf>.

<sup>9</sup> A statutory Production Tax Credit ("PTC") pays utilities 2 cents for every kilowatt hour they produce for a 10-year period. This PTC is slated to expire on December 31, 2008. Attempts were made to include an 8-year extension of the PTC and other renewable energy subsidies in the Energy Independence and Security Act that was signed by President Bush in December 17, 2007. This failed to occur and, in addition, Congress did not pass a federally-mandated RPS. Clyde Rankin, *The US Green Gauge*, LAWYER, Jan. 21, 2008, at 34, *available at* <http://www.thelawyer.com/cgi-bin/item.cgi?id=130859&d=415&h=417&f=416>. Efforts were made to include the PTC extension in the economic stimulus packages, but that too failed. See Mark Clayton, *Wind, Solar Tax Credits to Expire*, CHRISTIAN SCI. MONITOR, Jan. 22, 2008, at 3. The future of the PTC for wind power will depend upon other legislative vehicles.

<sup>10</sup> See The White House, *Increasing Our Energy Security and Confronting Climate Change*, <http://www.whitehouse.gov/infocus/energy/> (last visited Apr. 1, 2008) (stating that "[w]e must continue changing the way America generates electric power through even greater use of clean coal technology, solar and wind energy, and clean, safe nuclear power."); see also NATIONAL ENERGY POLICY, REPORT OF THE NATIONAL ENERGY POLICY DEVELOPMENT GROUP xiv (2001).

<sup>11</sup> European wind power achievements have been quite striking. The United Kingdom has taken a strong pro-renewable power position, embracing the European Union general target of 20% renewable power by 2020. Recently the European Union has ordered the United Kingdom to reach 15% renewable by 2020 as a binding target with significant fines for non-compliance. There are estimates that this could result in the construction of 7,000 new wind turbines as well as the development of wave power sources. David Charter, *EU Targets Could Force Britain to Build Thousands of Wind Turbines*, TIMES, Jan. 21, 2008, at 23. Other nations such as Turkey, possessing lands with excellent wind and solar potential, have begun to develop these renewable energy technologies to free themselves from high oil and natural gas prices. See John C.K. Daly, *Analysis: Turkey Embraces Wind Power*, UNITED PRESS INT'L., Feb. 1, 2008, *available at* [http://www.upi.com/International\\_Security/Energy/Analysis/2008/02/01/analysis\\_turkey\\_embraces\\_wind\\_power/1822/](http://www.upi.com/International_Security/Energy/Analysis/2008/02/01/analysis_turkey_embraces_wind_power/1822/).

<sup>12</sup> See American Wind Energy Association, *Wind Power: U.S. Installed Capacity (Megawatts) 1981-2007*, <http://www.awea.org/faq/instcap.html> (last visited Apr. 1, 2008) [hereinafter *Wind Power: U.S. Installed Capacity*].

occurred as individuals have installed home or farm-sized windmills.<sup>13</sup> Schools<sup>14</sup> and local governments have built community-sized plants<sup>15</sup> and utilities have constructed large, utility-scaled wind farms.<sup>16</sup> These developments have taken place in approximately half of the American states, with Texas and California leading the way in terms of installed generating capacity.<sup>17</sup> “Wind farms” have the potential to proliferate on privately-owned and public land in many other states besides Texas and California.<sup>18</sup> Also,

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<sup>13</sup> To encourage green energy, the National Football League contracted with farmers in New Mexico to supply a small amount of wind-generated electricity to “produce a ‘green’ Super Bowl event in Phoenix.” Chelle Delaney, *House Wind Farm Helps to Power Super Bowl*, CNJONLINE.COM, Feb. 4, 2008, [http://www.cnjonline.com/news/energy\\_25691\\_\\_\\_article.html/turbines\\_nfl.html](http://www.cnjonline.com/news/energy_25691___article.html/turbines_nfl.html).

<sup>14</sup> Bill Scanlon, *Colorado Turbine to Power City and Schools*, ROCKY MOUNTAIN NEWS, Feb. 1, 2008, available at <http://www.rockymountainnews.com/news/2008/feb/01/colorado-turbine-power-city-schools> (describing Wray, Colorado school district construction of a turbine on high school land and providing 20% of city needs and \$40,000 to \$100,000 in school revenue).

<sup>15</sup> E.g., Jacob Adelman, *Los Angeles Breaks Ground on Wind Farm to Power 56,000 Homes*, SAN FRANCISCO CHRON., Jan. 31, 2008, available at <http://www.sfgate.com/cgi-bin/article.cgi?f=/n/a/2008/01/31/financial/f174440S48.DTL> (describing the City of Los Angeles’ groundbreaking on the 8,000-acre Pine Tree Wind Project in the Tahachapi Mountains 100 miles north of the city for a \$425 million 120 MW wind farm). In addition, local governments around the world have recently taken leadership in the adoption of energy conservation policies. See Jim Carlton, *Nine Cities, Nine Ideas*, WALL ST. J., Feb. 11, 2008, at R1.

<sup>16</sup> See, e.g., Lee Bergquist, *On With the Wind Turbine Farms to be Biggest in Eastern U.S.*, MILWAUKEE J. SENTINEL, Nov. 26, 1998, at 1; *Utilities Plan Iowa Project to Store Wind-generated Power*, ASSOCIATED PRESS NEWSWIRES, Mar. 23, 2007.

<sup>17</sup> In fact, Dallas and Houston supply 40% and 20% respectively of their energy from renewable sources including wind power. See *Dallas in Top 10 for Green Power*, DALLAS BUS. J., Jan. 31, 2008, available at [http://www.bizjournals.com/dallas/stories/2008/01/28/daily29.html?ana=from\\_rss](http://www.bizjournals.com/dallas/stories/2008/01/28/daily29.html?ana=from_rss). The top ten states in terms of year-end installed wind power capacity in 2006 were Texas, California, Iowa, Minnesota, Washington, Oklahoma, New Mexico, Oregon, New York, and Kansas. U.S. Department of Energy, *Installed U.S. Wind Capacity*, [http://www.eere.energy.gov/windandhydro/windpoweringamerica/wind\\_installed\\_capacity.asp](http://www.eere.energy.gov/windandhydro/windpoweringamerica/wind_installed_capacity.asp) (last visited Apr. 1, 2008).

<sup>18</sup> Wind power development has begun with onshore projects in the eastern United States. The Virginia Corporation Commission issued a final order in December 2007 granting approval, with conditions, of Highland New Wind Development, LLC’s request to construct and operate a wind power generating facility in Highland County, Virginia with up to 20 wind turbines with a total of up to 40 MW of nominal generation capacity. See *Application of Highland New Wind Development, LLC*, Case No. PUE-2005-00101 (March 1, 2007), available at [www.scc.virginia.gov](http://www.scc.virginia.gov). Six proposals have been made to build wind farms on the Appalachian ridges of the state. Recently, a \$250 million, 125 MW project application for Laurel Mountain, West Virginia has been filed with the West Virginia Public Service Commission. Joe Morris, *Wind Farm Proposed Near Elkins*, CHARLESTON GAZETTE, Feb. 13, 2008, available at <http://wvgazette.com/News/200802130768>.

they may be sited on federal and Tribal lands, and at offshore locations possessing the necessary wind capacity. With improved technology, expanded transmission access and continued governmental policy and financial support, wind-generated electricity is likely to be even more prevalent in the next decade than it is today. Considering the double digit increases in installed capacity over the last several years and the notable regulatory approvals in recent cases, it appears that new wind power projects will be proposed at an increasing rate in the future.<sup>19</sup>

While the rapid expansion of wind energy has been recognized as offering numerous environmental and other benefits, this prospect has not been met with universal acceptance. Although being promoted as “clean power” or “green power,” wind-generated electricity does have its downside. In fact, a number of objections have surfaced in opposition to particular wind farm projects by individuals, local conservation groups as well as statewide and national environmental organizations.<sup>20</sup> A notable example of this phenomena has been the resistance to the Cape Wind offshore wind farm project proposed for an area off of Cape Cod, Massachusetts.<sup>21</sup>

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<sup>19</sup> See GLOBAL WIND ENERGY COUNCIL, GLOBAL WIND ENERGY OUTLOOK 2006 REPORT (2006), available at <http://www.gwec.net/index.php?id=65>.

<sup>20</sup> See *infra* Part II.B. Some national environmental organizations have tentatively taken accepting positions on wind energy and have supported the expansion of the industry under certain conditions. See Michelle Nijhuis, *Alternative Energy: Selling the Wind*, AUDUBON, Sept./Oct. 2006, available at <http://audubonmagazine.org/features0609/energy.html> (wildlife organization supporting wind power along with more research on bird/bat impacts, better project planning and more stringent oversight of project approval); see also Carl Levesque, *For the Birds: Audubon Society Stands Up in Support of Wind Energy*, RENEWABLE ENERGY WORLD.COM, Dec. 14, 2006, <http://www.renewableenergyaccess.com/rea/news/story?id=46840>.

<sup>21</sup> The Cape Wind project proposed the construction of 130 turbines having a blade diameter of 440 feet that would be placed in the Nantucket Sound five miles from the nearest coastline. The project's cost has been estimated at \$1 billion with operations to commence by 2011. If constructed, the wind project would provide 75% of the energy needs for Cape Cod and the nearby islands and offset nearly 1 million tons of carbon dioxide, the principal global warming gas. Objections to the proposal focused upon the aesthetic impact of the offshore turbines on Nantucket properties as well as avian effects. Senator Ted Kennedy and then-Governor Mitt Romney were prominently associated with the opponents who founded the Alliance to Protect Nantucket Sound. However, in January 2008, the U.S. Minerals Management Service issued its extensive draft environmental impact statement finding little lasting effects on wildlife, navigation and tourism. This left nine state and local government approvals before Cape Wind construction could begin. See U.S. Department of the Interior, Offshore Minerals Management, *Alternative Energy: Projects, Cape Wind Energy Project*, [www.mms.gov/offshore/RenewableEnergy/CapeWind.htm](http://www.mms.gov/offshore/RenewableEnergy/CapeWind.htm) (last visited Apr. 1, 2008); see also Beth Daley, *Cape Wind Proposal Clears Big Obstacle: Agency Calls Impact on Environment Minor*, BOSTON GLOBE, Jan. 15, 2008, at A1.

Opposition has also surfaced in Vermont, Maryland, Pennsylvania, West Virginia, New York, Maine, Montana, Florida, Canada, and Australia.<sup>22</sup>

While acknowledging the environmental benefits of the energy technology, wind power project opponents have raised serious questions concerning the desirability of locating these facilities at specific locations. Among other things, they cite the adverse impacts of wind farms on wildlife such as birds and bats, the scenic or aesthetic qualities of the area, safety for nearby residents, the economic value of surrounding properties, recreational land uses, cultural resource values and navigational and air defense radar capabilities to name a few.<sup>23</sup> As strongly as proponents support wind power proposals, those opposed to them hold equally deep convictions and they are convinced of the inappropriateness of the new projects proposed for their communities.<sup>24</sup> Occasionally, the objections raised by opponents have led state and local governments to reject the wind power siting proposals.<sup>25</sup> As with the adoption of many other modern

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<sup>22</sup> Other objections to wind power proposals exist. See Sara Schaefer Munoz, *An Inconvenient Turbine: Conservation vs. Preservation—Homeowners Who Go Green Face Neighbors' Objections; How Gore Got His Solar Panels*, WALL ST. J., July 12, 2007, at B5; see also Dakshana Bascaramurty, *Wind Power Ardour Cools*, ENERGY PROBE, July 30, 2007, <http://www.energyprobe.org/energyprobe/index.cfm?DSP=content&ContentID=17705>; Simone Kaiser & Michael Frohlingsdorf, *The Dangers of Wind Power*, BUS. WEEK, Aug. 24, 2007, available at [http://www.businessweek.com/globalbiz/content/aug2007/gb20070824\\_562452.htm](http://www.businessweek.com/globalbiz/content/aug2007/gb20070824_562452.htm); Ian Sample, *Green Energy Would Cause Landscape Destruction: Analysis*, CANBERRA TIMES, July 26, 2007, at 15; Alison Williams, *High-Voltage Plan Sparks Ire*, L.A. TIMES, July 20, 2007, at B4; Matthew Brown, *Wind Farm Proposed in Central Mont.; State Hopes More to Come*, AG WEEKLY, [http://www.agweekly.com/articles/2008/02/01/news/ag\\_news/news40.txt](http://www.agweekly.com/articles/2008/02/01/news/ag_news/news40.txt) (last visited Apr. 1, 2008); Rachel Simmons, *People Speak Out Against Proposed Wind Turbines*, PALM BEACH POST.COM, Feb. 2, 2008, <http://www.palmbeachpost.com/search/content/tcoast/epaper/2008/02/02/0202SLWIND.html>. Although leading the world in wind power, the Europeans have had serious disputes about the impact of the large turbines on the scenic environment, cultural history and natural resources. See Joanna Kakassis, *Debating the Merits of Energy from Air*, N.Y. TIMES, Nov. 25, 2007.

<sup>23</sup> See American Wind Energy Association, *Wind Energy and the Environment*, [http://www.awea.org/faq/wwt\\_environment.html](http://www.awea.org/faq/wwt_environment.html) (last visited Apr. 1, 2008); see also Timothy C. Barmann, *Cape Wind Project Gets Lift From Environmental Impact Report*, PROVIDENCE J., Jan. 15, 2008, at E1; Press Release, Am. Wind Ass'n, *Wind Farms Do Not Hurt Property Values, Study Finds* (May 20, 2003), available at <http://www.awea.org/news/news030520prp.html>.

<sup>24</sup> See, e.g., Amanda Griscom, *Tilting at Windmills*, GRIST, Dec. 19, 2002, <http://www.grist.org/news/powers/2002/12/19/griscom-windmill/>.

<sup>25</sup> Recently, other factors such as the overall cost of the project and the inability to obtain generating equipment have scuttled potential projects regardless of other arguments in favor of it. See, e.g., Mark Harrington, *LIPA Chief Kills Wind Farm Project*, NEWSDAY.COM, Feb. 27, 2008, <http://www.newsday.com/business/ny-bzwind0824,0,7647935.story> (explaining the abandonment of Long Island Power Authority offshore project for cost reasons).

technologies, wind power siting presents wide-ranging costs that must be considered in conjunction with offsetting benefits.<sup>26</sup> It should not be surprising that not all aspects of “clean” energy proposals are 100% “green.”

While proponents of wind power stress its associated environmental and economic benefits, they also acknowledge its land use impacts. The construction of a wind power turbine or wind farm is much more than an act of energy technology substitution; rather, it represents a significant land use conversion as well.<sup>27</sup> By using so many acres of land for these large, manufactured generating structures, multi-turbine wind farms represent a major change to existing, low-density, natural land use patterns.<sup>28</sup> Because high quality, commercially-viable wind power sites are located in rural places,<sup>29</sup> these land use conversion effects are frequently experienced at largely undeveloped sites sometimes possessing significant natural resource and aesthetic importance. Therein lies the conflict. Wind power facilities represent a new carbon-free source of electricity while at the same time they present significant changes to current land uses—sometimes imposing burdens on existing environmental and natural resource values. Should wind power projects be excluded from these areas because they have some negative aspects?

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<sup>26</sup> American Wind Energy Association, Wind Energy Fact Sheet, 10 Steps in Building a Wind Farm, [http://www.awea.org/pubs/factsheets/10stwf\\_fs.PDF](http://www.awea.org/pubs/factsheets/10stwf_fs.PDF) (last visited Apr. 1, 2008).

<sup>27</sup> Due to the large size of modern wind turbines and the spacing required between them for efficient operation, commercial-scale wind farms require large amounts of land in order to generate utility-scale electricity. Beyond this, they also need to have relatively close proximity to electrical transmission lines. See Paul Davidson, *Wind Power Growth Gushes Strongly in USA in 2007*, USA TODAY, (Jan. 17, 2008), available at [http://www.usatoday.com/money/industries/energy/environment/2008-01-17-wind\\_N.htm](http://www.usatoday.com/money/industries/energy/environment/2008-01-17-wind_N.htm) (stating that “wind developers increasingly face a lack of transmission lines to transport the electricity to population centers”); see also Duncan Carrie, *Power Surge*, AM., Jan.-Feb. 2008, <http://www.american.com/archive/2008/january-february-magazine-contents/power-surge> (stating that “[a] wind farm would need 235 square miles to produce the same amount of electricity as a 1,000-megawatt nuclear power plant”).

<sup>28</sup> Even individual or community-wide small wind projects impose more limited changes to existing land uses. However, they do not present the same issues of scale that utility-sized wind farms do. An individual 10- or 15-meter-high farmer’s wind turbine represents far less of a landscape alteration than does 30 to 100 forty-meter-high utility-sized wind turbines.

<sup>29</sup> See D.L. ELLIOT ET AL., PACIFIC NW. LAB., U.S. DEP’T OF ENERGY, WIND ENERGY RESOURCE ATLAS OF THE UNITED STATES (1986) [hereinafter ELLIOT, WIND ENERGY RESOURCE ATLAS], available at <http://rredc.nrel.gov/wind/pubs/atlas>; U.S. DEP’T OF ENERGY, WEST VIRGINIA WIND RESOURCE MAP, [http://www.eere.energy.gov/windandhydro/windpoweringamerica/maps\\_template.asp?stateab=ww](http://www.eere.energy.gov/windandhydro/windpoweringamerica/maps_template.asp?stateab=ww) (last visited Apr. 1, 2008).

This Article addresses the complicated issue of deciding how to gain the benefits of this form of renewable energy while still taking into account the wide array of interests that may be adversely affected by wind power site development. This inquiry addresses issues of both process and substance. For instance, how should competing energy, economic, environmental, and land use policy objectives be reconciled? More specifically, how should decisions to locate future wind power facilities be made? Should wind power facilities be presumed to be unacceptable or acceptable in rural, remote settings? Who should have the burden of establishing the “acceptability” of any particular siting request? Who should make the “acceptability” determination?

This inquiry presents three central questions: 1) what decision-making process should be used to analyze and decide future wind power siting requests, 2) what analytical factors should be included in the wind power location decision, and 3) who should have the final “say” on wind power siting determinations? While federal energy policy increasingly favors and supports wind power, the questions raised focus more on the development of state law and policy.

After surveying the existing patterns in state regulation of wind farm location and considering the multiple interests affected, this Article concludes that for large-scale wind farm projects, a state-level facility siting procedure should be developed which adopts a broad-based environmental impact review mechanism with predictable features within an expeditious administrative framework. The recommended process will consider a wide range of local, state and regional stakeholder concerns but ultimately it would allow for decisions to be made by a state-level official following a multi-factor statutorily mandated review test under a broad, multi-factor “public interest” standard that would be subject to limited judicial review.

I. ACCELERATING THE MOVEMENT TOWARDS CLEAN, RENEWABLE ENERGY IN AMERICA: FOCUSING ON WIND POWER

A.

*Developing Patterns of Energy Supply and Demand*

1.

Global Energy Trends

American energy policies must be viewed in terms of past patterns and future predictions of energy production and consumption. Worldwide, the total primary energy consumption has steadily risen over the last decade and in 2006 it totaled 10,878.5 million tons of oil equivalents

(“mtoe”).<sup>30</sup> World primary energy consumption increased by 2.7% in 2006 alone, below the previous year’s strong growth of 4.4% but still above the 10-year annual average of approximately 1.9%.<sup>31</sup> Not surprisingly, the strongest increase in consumption was in the Asia/Pacific region, which rose by 4.9% in 2006, while North America actually declined by 0.5%.<sup>32</sup> During this period American total energy consumption actually fell by 1%, while China accounted for nearly half of global energy consumption growth.<sup>33</sup>

Energy use is likely to increase throughout the world with population growth and changing patterns of energy consumption leading to higher totals of energy use. Current baseline projections of the International Energy Agency (“IEA”) indicate that worldwide demand will increase at the rate of 1.6% annually, reaching a total of 16,300 (mtoe) by 2030.<sup>34</sup> In this scenario, oil, natural gas and coal will account for 83% of this increase and ultimately comprise 81% of global energy demand by 2030.<sup>35</sup> If this view is correct, oil will be the single largest fuel in the global energy mix while natural gas will exceed coal as the second most common fuel source. This IEA estimate also assumes that renewable energy, other than hydroelectric and biomass, is likely to increase at the largest annual rate of any fuel source—6.2%.<sup>36</sup> As promising as this statistic may appear, this rapid percentage increase springs from renewable energy’s small initial share of global energy supply. While the dominance of fossil fuels as the

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<sup>30</sup> BP WORLD ENERGY 2006, *supra* note 1, at 40. Million tonnes of oil equivalent, or mtoe, has a heat equivalency of approximately 40 million Btus per mtoe. Department of Energy, Energy Calculator, [http://www.eia.doe.gov/kids/energyfacts/science/energy\\_calculator.html](http://www.eia.doe.gov/kids/energyfacts/science/energy_calculator.html) (last visited Apr. 1, 2008).

<sup>31</sup> BP WORLD ENERGY 2006, *supra* note 1, at 40.

<sup>32</sup> In 2006, primary energy consumption rose worldwide by 2.4% with the following distribution across the regions of the world: 1) Asia/Pacific—33.5%, 2) Europe and Eurasia— 27.8%, 3) North America—25.8%, 4) South and Central America—4.9%, 5) Middle East— 5.1%, and 6) Africa—3%. *See id.*

<sup>33</sup> *Id.*

<sup>34</sup> INT’L ENERGY AGENCY, WORLD ENERGY OUTLOOK 2005, 80 (2005), *available at* <http://www.iea.org/textbase/nppdf/free/2005/weo2005.pdf>. These estimates spring from the IEA’s Reference Scenario that takes into account governmental policies and actions that have already been adopted even if not currently in place. This “baseline vision” does not include possible, potential, or even likely future policy initiatives even though it is quite possible or desirable that new energy policies will be adopted in the next two decades. *Id.* at 59.

<sup>35</sup> *Id.* at 80. Under this appraisal, nuclear power will fall from supplying 6.4% to 4.7% of energy demand “while the share of renewable energy sources—including biomass—is projected to increase from 13% to 14%.” *Id.*

<sup>36</sup> *Id.* at 86.

world's most significant fuel source appears certain, government policy changes could alter the energy mix to some degree. It is possible that by advancing goals to increase energy conservation and reduce air pollution and greenhouse gas emissions, world governments could adopt an alternative set of policies that would reduce world energy demand.<sup>37</sup> These policy changes could stimulate the demand for renewable energy technologies even beyond the projected level of growth.

## 2. Future Global Electrical Demand

Focusing solely on the component of world energy growth represented by electrical generation, the world demand increased by 4.2% in 2006 with the Asia/Pacific and Middle East regions showing the greatest percentage increase.<sup>38</sup> During the 2004-2030 period, the Department of Energy's Energy Information Agency estimates set the rate of annual growth in installed generating capacity to average 2.4% per year. While this might sound modest, it results in an increase in electrical generation from 16,424 billion kWh in 2004 to 30,364 billion kWh in 2030.<sup>39</sup> How will this near-doubling in global generating capacity be met? It is likely that the fuels and generating technologies to be employed in meeting this sizable capacity expansion will vary from country to country depending upon available fuels, national security concerns, market competition and governmental policies. If the present fuel mix used to generate electricity is

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<sup>37</sup> Maintaining the status quo of heavy reliance on fossil fuel energy sources will result in a substantial increase in the emission of energy-related CO<sub>2</sub> over the period ending in 2030. Under the IEA's Reference Scenario, emissions of this gas will increase from 24 gigatonnes to 37 gigatonnes, an increase of 52% over the 2003 level. Electrical power generation is expected to contribute approximately half of this increase while transportation-related energy use will add another quarter. *Id.* at 92.

<sup>38</sup> In terms of electrical generation, North America and the United States actually reduced electrical demand in 2006 (over 2005) with increases being registered in all other regions of the world: North America (-.2%), South and Central America (+5.9%), Europe and Eurasia (+2.3%), Middle East (+8.9%), Africa (+6.9%), and Asia Pacific (+8.5%). See BRITISH PETROLEUM, STATISTICAL REVIEW OF WORLD ENERGY, JUNE 2007: ELECTRICAL GENERATION (2007), available at [http://www.bp.com/liveassets/bp\\_internet/globalbp/globalbp\\_uk\\_english/reports\\_and\\_publications/statistical\\_energy\\_review\\_2007/STAGING/local\\_assets/downloads/spreadsheets/statistical\\_review\\_full\\_report\\_workbook\\_2007.xls](http://www.bp.com/liveassets/bp_internet/globalbp/globalbp_uk_english/reports_and_publications/statistical_energy_review_2007/STAGING/local_assets/downloads/spreadsheets/statistical_review_full_report_workbook_2007.xls).

<sup>39</sup> ENERGY INFO. ADMIN., U.S. DEP'T OF ENERGY, INTERNATIONAL ENERGY OUTLOOK 2007, at 61 (2007), available at <http://www.eia.doe.gov/oiaf/ieo/pdf/electricity.pdf>. The bulk of this projected growth is expected to come from non-OECD countries, where population increases will combine with expanding economic growth and rising living standards to result in higher electrical demand. This demand, which currently is 26% below OECD consumption, is predicted to expand to exceed OECD levels in 2030 by 30%. *Id.*

continued, it is likely that a large percentage (70-75%) of the needed, new world electrical generating capacity will be powered by fossil fuel.<sup>40</sup> Certainly, the dramatic increase in world energy generation capacity burning fossil fuels will only worsen the loading of global warming gases and air pollutants into the environment.<sup>41</sup> This raises the question of whether other generating technologies—such as renewable energy—should be promoted to fill an increasing segment of the energy supply void.

*B. American Energy Production and Consumption Patterns*

1. Overall Energy Trends

To understand the nature of energy policy in the United States, it is necessary to comprehend the trends of American energy production and consumption. As a measure of overall consumption, in 1978 America used a total of 79.99 quadrillion Btus of energy from fossil fuels, nuclear electric power and renewable energy.<sup>42</sup> By 2006, this number had grown to 99.87 quadrillion Btus, an increase of 24.85% over 28 years for an average increase of 0.89% per year.<sup>43</sup> However by comparison, the U.S. population growth over this same period was 33.3%, suggesting that per capita energy use had been reduced perhaps through the introduction of various energy conservation methods.<sup>44</sup> This per capita energy consumption reflected total energy consumption figures in all parts of American life: individuals, firms, and institutions.<sup>45</sup>

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<sup>40</sup> *Id.* at 62.

<sup>41</sup> Estimates of future world energy use conclude that fast economic growth will drive energy consumption with coal being the fastest growing energy source over the next two decades. *Id.* (estimating coal growing to 45% of world's electricity fuel by 2030). In addition, this period also is expected to witness rising energy prices and non-OECD economic growth that is energy-intensive and carbon-intensive. Christof Ruhl, British Petroleum Deputy Chief Economist, Energy in Perspective, BP Statistical Review of World Energy 2007, Presentation in London, England (June 12, 2007), available at <http://www.bp.com/statisticalreview>.

<sup>42</sup> ENERGY INFO. ADMIN., U.S. DEP'T OF ENERGY, ANNUAL ENERGY REVIEW 2006, at 5 (2007) [hereinafter ANNUAL ENERGY REVIEW 2006], available at <http://www.eia.doe.gov/emeu/aer/pdf/aer.pdf>.

<sup>43</sup> Overall, in 2006 American energy supply was provided in the following proportions: 84.87% fossil fuels, 8.22% nuclear energy, and 6.85% renewable energy. *Id.* at 3.

<sup>44</sup> *Id.* at 377.

<sup>45</sup> Total American energy use in 2006 was distributed in the following fashion: residential (21.1%), commercial (18.0%), industrial (32.4%), and transportation (28.4%). *Id.* at 38.

## 2. Trends in Electrical Generation and Consumption

The picture changes a bit when the focus is on American electrical generation and use. American electrical supply has significantly increased over the same 28-year period going from approximately 2209 billion kWh in 1978 to over 4053 billion kWh in 2006.<sup>46</sup> This represents an 83.1% increase in electrical supply for the period, with fossil fuels continuing to hold the lion's share but with nuclear generation coming in second and renewables third.<sup>47</sup> The surprising, and little known, fact is that nuclear power has become a considerably more important contributor to American electrical generation over the last three decades due to rising efficiencies even though no new plants have been licensed by the Nuclear Regulatory Commission. Recently, there has been a revival in interest in nuclear energy with a large number of projects on the drawing board.<sup>48</sup>

American use of electricity has also changed over the last three decades, with the largest increases in electricity consumption coming from the residential and commercial sectors of the economy. Over the period from 1978 to 2006, electrical use has shifted away from industry and towards residential and commercial use.<sup>49</sup> Electricity has been used in these sectors for heating and cooling, lighting and the operation of small appliances such as computers and refrigerators.<sup>50</sup> In this period, industrial use of electricity actually declined perhaps indicating a contraction in large electricity-consuming industries such as iron, steel and aluminum manufacturing.

Looking towards the future, the Department of Energy ("DOE") estimates that American electricity generation will grow at a 1.3% annual rate until 2030.<sup>51</sup> This 1.3% annual growth rate represents a slowing of

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<sup>46</sup> *Id.* at 223.

<sup>47</sup> The proportion of electrical supply shifted over the 1978-2006 period with fossil fuels (74.5% to 71.0%) and renewables (13% to 9.5%) dropping in share of supply and nuclear power gaining (12.5% to 19.5%). *Id.* at 228.

<sup>48</sup> The Nuclear Energy Institute listed 21 new nuclear plants in the United States that had been announced, approved or under consideration as of April 2008. Nuclear Energy Institute, New Nuclear Plant Status, [http://www.nei.org/filefolder/New\\_Nuclear\\_Plant\\_Status\\_15.xls](http://www.nei.org/filefolder/New_Nuclear_Plant_Status_15.xls) (last visited Apr. 1, 2008).

<sup>49</sup> In 1978, 40% of American electricity was used for industrial purposes while 33.3% and 26.3% were used for residential and commercial activities respectively. Transportation use was >1%. By 2006, industry consumed only 27.3% of annual electricity while residential and commercial activity rose to 36.9% and 35.5% respectively. ANNUAL ENERGY REVIEW 2006, *supra* note 42, at 255.

<sup>50</sup> *See id.* at 50, 53.

<sup>51</sup> U.S. Department of Energy, Energy Information Administration, Annual Energy Outlook 2008 (Early Release) Electrical Generation, <http://www.eia.doe.gov/oiaf/aeo/index.html> (last visited Apr. 1, 2008).

the growth in U.S. electrical demand. In comparison, electricity consumption grew by annual rates of 4.2%, 2.6%, and 2.3% in the 1970s, 1980s, and 1990s, respectively.<sup>52</sup> With this projected overall growth, the government estimates also project that by 2030 the composition of American electrical generation will also change—increasing the proportion of coal-fired and renewable sources of electricity with less nuclear, natural gas and petroleum-sourced power.<sup>53</sup> Although such energy assessments represent attempts at modeling complex systems of supply and demand, they do present an “educated guess” concerning future energy trends. These estimates, if even approximately correct, predict a 34.1% increase in the electricity needed to power American life.<sup>54</sup> Policymakers, utility planners and citizens must now consider the implications of selecting appropriate technologies for meeting this increased electrical demand over the next two-and-a-half decades. Staking reliance on fossil fuel sources to meet this energy challenge will certainly pose environmental consequences by raising greenhouse gas emissions and having other significant impacts over this period. Two salient questions now face us as we contemplate these future demands: 1) how will this additional electricity be generated, and 2) what role will renewable energy sources such as wind power have in meeting this need?

C. *Increasing Renewable Energy in the Twenty-First Century—Ramping Up Wind Power*

1.

Wind Power in America’s Past

Although serving America’s energy needs since the seventeenth century,<sup>55</sup> wind power has had a tumultuous history as both a motive and

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<sup>52</sup> *Id.*

<sup>53</sup> This estimate shows coal-generated electricity rising to nearly 56% of American supply but also that renewable power would grow to approximately 12% of that total. *Id.* at Figure 4.

<sup>54</sup> *Id.*

<sup>55</sup> Historical evidence of windmills in the American colonies indicated that they have been used from the beginning of the nation. It has been reported that

[t]he first English settlers in North America were aware of windmills and their laborsaving benefits. But no one built one in the first colony, Virginia, for fourteen years. That was in 1621, when Governor George Yeardley erected a windmill on his James River plantation, Flowerdieu Hundred, where a replica stands today. The Massachusetts settlers constructed their first windmill in 1631.

Ed Crews, *The Miller and the Windmill*, COLONIAL WILLIAMSBURG, Autumn 2002, at 29.

electrical energy provider. While frequently used to pump water, grind grain and provide electrical current in nineteenth century America,<sup>56</sup> wind energy largely disappeared during the early part of the next century. In the early twentieth century, the widespread availability of inexpensive, utility-generated electricity put competitive pricing pressure on individual wind power facilities as an alternative electrical source.<sup>57</sup> For much of the twentieth century there was little interest in wind-produced electricity other than for charging batteries or pumping water in remote and inaccessible locations.<sup>58</sup> Federal policies enacted in the early twentieth century encouraged rural electrification through the subsidy of rural electrical cooperatives and the installation of electric transmission lines.<sup>59</sup> Following these policies, utility electrical lines were extended and ultimately connected to fossil-fuel-powered generating plants.<sup>60</sup> The availability of inexpensive power in rural areas largely eradicated the more than 6 million mechanical windmills that had been installed throughout the western and mid-western parts of the United States.<sup>61</sup> It would take the energy price increases of the late 1970s to revive interest in wind-generated electricity as an alternative to fossil fuel and nuclear power.

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It is also known that lawyer William Robertson owned a commercial windmill for grinding grain in the colonial town of Williamsburg by 1723. *Id.* at 30.

<sup>56</sup> See PETER ASMUS, REAPING THE WIND: HOW MECHANICAL WIZARDS, VISIONARIES, AND PROFITTEERS HELPED SHAPE OUR ENERGY 24-32 (2001) (describing how wind power has been used for water pumping for railroads, grain grinding and small electrical generation).

<sup>57</sup> *Id.* at 28.

<sup>58</sup> Richard Blackwell, *Wind Power Lobbies for Northern Exposure*, GLOBE AND MAIL, Jan. 29, 2008, at B6. The author points out that the use of wind-generated electricity in remote locations has had a modern relevance as well. Such communities often employ diesel power generators for the production of electricity. This technique is costly and results in diesel exhaust emissions in often pristine venues. The government of Canada is currently considering the adoption of a \$74 million government program for the installation of small wind power units in remote northern communities. *Id.*

<sup>59</sup> See U.S. Department of Energy, Wind & Hydropower Technologies Program, [http://www1.eere.energy.gov/windandhydro/wind\\_history.html](http://www1.eere.energy.gov/windandhydro/wind_history.html) (last visited Apr. 1, 2008). See generally Richard P. Keck, *Reevaluating the Rural Electrification Administration: A New Deal for the Taxpayer*, 16 ENVTL. L. 39, 47 (1985) (noting that rural electrification in America had the indirect effect of eliminating windmills from much of the rural landscape).

<sup>60</sup> See John M. Carmody, *Rural Electrification in the United States*, ANNALS OF THE AM. ACAD. OF POL. & SOC. SCI. 82, 82-88 (1939).

<sup>61</sup> See Richard L. Settle & Kim R. York, *Potential Legal Facilitation or Impediment of Wind Energy Conversion System Siting*, 58 WASH. L. REV. 387, 387 (1983).

## 2. Defining Wind Power and its Production

Wind power represents a conversion of solar energy. When solar radiation reaches the Earth, it heats different areas at uneven rates due to differing land surfaces and the day/night alternation. The atmosphere warms unevenly and warm air rises, causing a reduction in the atmospheric pressure at the Earth's surface, and cooler air is drawn to fill in the low pressure area. The result of this process is the creation of wind.<sup>62</sup> Air has mass and when it is moving, it holds kinetic energy which can be directly or indirectly converted into mechanical force or electricity. These forces have long been useful to human life. Using wind's mechanical force directly, ships can be propelled, water can be pumped and grain can be ground. The same mechanical force of the wind can also turn generators, thereby creating electricity. The kinetic energy of the wind is available as long as the wind blows and this fact has led some wind power advocates to announce that wind energy is both clean and inexhaustible.<sup>63</sup>

Wind power electricity requires a structure to convert the force in the wind into a rotating or circular motion. Modern wind power devices employ turbines using a horizontal axis configuration that resembles the propeller of a boat or an airplane. These machines are called wind turbines.<sup>64</sup> Most wind turbines generally have the following components: a) a rotor or blades (usually three per tower) which convert the wind's energy into a rotating shaft energy, b) a nacelle or enclosure containing a drive train usually having a gearbox and a generator, c) a tower which supports the rotor and the drive train, and d) electronic equipment such as controls, ground support equipment and grid interconnection equipment.<sup>65</sup> The modern turbine has the ability to adjust its position to turn into the wind for optimal production.

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<sup>62</sup> See American Wind Energy Association, Wind Web Tutorial: Wind Energy Basics, [http://www.awea.org/faq/wwt\\_basics.html#What%20is%20wind%20energy](http://www.awea.org/faq/wwt_basics.html#What%20is%20wind%20energy) (last visited Apr. 1, 2008) [hereinafter Wind Web Tutorial] (outlining the process for solar energy to wind energy conversion); see also Shane Thin Elk, *The Answer is Blowing in the Wind: Why North Dakota Should Do More To Promote Wind Energy Development*, 6 GREAT PLAINS NAT. RES. J. 110, 111-12 (2002).

<sup>63</sup> See *supra* note 62. See also American Wind Energy Association, Wind Energy Fact Sheet 1-2 (2003), <http://www.awea.org/pubs/factsheets/HowWindWorks2003.pdf>.

<sup>64</sup> Wind Web Tutorial, *supra* note 62.

<sup>65</sup> *Id.*

Wind turbine towers are usually made of tubular steel while the blades are fabricated from fiberglass-reinforced polyester or wood epoxy.<sup>66</sup> The most common turbine design utilizes triple blades to rotate and generate electricity.<sup>67</sup> For small farm or home applications, relatively small-sized wind turbines having a diameter of eight meters or less placed on towers of forty meters or less in height would be sufficient.<sup>68</sup> There are a surprisingly large range of these small-scale users of wind power. Furthermore, significantly larger machines are needed to generate utility-scale electricity that would be interconnected into the nation's electrical grid system.<sup>69</sup> Wind turbines are measured in terms of their physical size as well as their generating capacity.<sup>70</sup> Their installed cost can exceed \$3 million per turbine and these costs have been increasing as demand has risen.<sup>71</sup> Land-based turbines commonly have a rated capacity<sup>72</sup> of 1.0 to 3.0 MW while turbines designed for offshore application may be as high as 3.6 or even 5 MW.<sup>73</sup> Currently,

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<sup>66</sup> *Id.*

<sup>67</sup> JAMES L. TANGLER, NAT'L RENEWABLE ENERGY LAB., THE EVOLUTION OF ROTOR AND BLADE DESIGN 2, 5 (2000), available at <http://www.nrel.gov/docs/fy00osti/28410.pdf>.

<sup>68</sup> See American Wind Energy Association, Small Wind Factsheet, [http://www.awea.org/smallwind/toolbox2/factsheet\\_visual\\_impact.html](http://www.awea.org/smallwind/toolbox2/factsheet_visual_impact.html) (last visited Apr. 1, 2008).

<sup>69</sup> Hugh S. Gorman et al., Mich. Technological Univ., Wind Power in the Western Upper Peninsula: Commercial Wind Farms, <http://www.ss.mtu.edu/GORMAN/LargeWindFarms.htm> (last visited Apr. 1, 2008) [hereinafter Upper Peninsula Wind Power].

<sup>70</sup> *Id.*

<sup>71</sup> Fiona Harvey, *Turbine Makers Struggle to Meet Dynamic Demand*, FIN. TIMES, Nov. 9, 2007, at 9, available at [http://www.chinaenergyfund.com/press/FT\\_Special%20Report\\_Energy\\_9%20Nov%202007.pdf](http://www.chinaenergyfund.com/press/FT_Special%20Report_Energy_9%20Nov%202007.pdf) (explaining that with the increasing demand for wind power in America, a major problem has arisen with limited amounts turbine manufacture and supply to wind farm developers).

<sup>72</sup> Wind turbines have "rated capacities" assigned to them by their manufacturers. However, these capacities generally overstate the amount of power that will be produced. The rated generating capacity only occurs when the turbine is rotating at its design speed with sustained wind current. For example, if a turbine had a rated capacity of 1 MW/hr of power output, it would produce 1 million watts of electricity each hour that it spun at its design speed. If the wind current was consistent for an entire year, this turbine would produce: 1 MW X 24 hours X 365 days = 8760 MW/hr of energy per year. However, due to wind variability (and other factors such as maintenance), wind turbines do not consistently rotate at rated capacity. If this 1 MW turbine actually generated 1,752 MW/hr over a year, its "capacity factor" would be 1,752/8,760 or 20%. The "capacity factor" is simply the ratio of actual energy produced by a power plant to the energy that would be produced if it operated at rated capacity for an entire year. See, e.g., Upper Peninsula Wind Power, *supra* note 69; see also Wind Web Tutorial, *supra* note 62.

<sup>73</sup> Turbine generating capacity has grown over the last decade with capacities now reaching levels not conceivable just a few years ago. One commentator noted that,

wind turbines for land-based wind farms come in various sizes, with rotor diameters ranging from about 50 meters to about 90 meters, and with towers of roughly the same size. A 90-meter machine with a 90-meter tower would have a total height from the tower base to the tip of the rotor of approximately 135 meters (442 feet).<sup>74</sup>

This is longer than a football field by nearly 50% and the turbine weighs approximately half a million pounds.<sup>75</sup> Offshore turbine designs now under development would have even larger rotors than under present designs, some as large as 110 meters in diameter.<sup>76</sup> Recent advances in wind turbine technology have also improved the turbine efficiency.<sup>77</sup>

### 3. Potential Wind Power Locations in the United States

There are many parts of the United States that hold the potential for wind power and clean energy advocates have claimed that the nation has only tapped a fraction of its wind power development potential. According to DOE, 37 states have wind resources that would support utility-scale wind power projects.<sup>78</sup> One estimate prepared by the Battelle Pacific

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Wind turbine technology has also progressed, with bigger turbines and a wider choice of offshore models. Turbines capable of producing up to 5MW are now becoming available for offshore use, and 3MW turbines onshore are replacing the smaller 1.5MW turbines that were standard a few years ago. These turbines have also been made more efficient. Clipper Windpower, based in the US, said in September it was developing a 7.5MW turbine for offshore use, at a site in the north-east of England.

Harvey, *supra* note 71, at 9.

<sup>74</sup> Wind Web Tutorial, *supra* note 62. The most economical use of wind-generating electric turbines is in large groups of large turbines called “wind power plants” or “wind farms.” Wind farms can exist in size from a few megawatts to hundreds of megawatts of generating capacity. Some of these facilities combine 40 or more turbines to produce over 100 MW of electrical-rated capacity. *Id.*

<sup>75</sup> Joseph O. Wilson, *The Answer, My Friends, Is In the Wind Rights Contract Act: Proposed Legislation Governing Wind Rights Contracts*, 89 IOWA L. REV. 1775, 1790 n.90 (2004).

<sup>76</sup> See Wind Web Tutorial, *supra* note 62.

<sup>77</sup> Matthew L. Wald, *Utility Will Use Batteries to Store Wind Power*, N.Y. TIMES, Sept. 11, 2007, at C2 (noting that there have also been technological advances in battery storage technology that would allow for electrical charging of the large batteries at night when generation costs are low and the introduction of the stored electricity into the transmission lines at a later time when generation costs are high. With this “time shifting” of this wind-generated electricity, the power could be used when it would have the highest value.).

<sup>78</sup> U.S. GOV'T. ACCOUNTABILITY OFFICE, GAO-04-756, RENEWABLE ENERGY: WIND POWER'S

Northwest Laboratory in 1991 suggested that wind power could supply 10.8 billion kWh annually or 20% of American electricity.<sup>79</sup> DOE has studied the wind power potential and concluded that, in theory, “the Midwest including the Great Plains . . . has more than enough potential wind energy to fulfill the entire nation’s electricity needs.”<sup>80</sup> However, the U.S. Government plans have established an optimistic, yet more modest, goal of 5% of the American electrical supply by 2020.<sup>81</sup> DOE estimates that “[g]ood wind areas, which cover 6% of the contiguous U.S. land area,” are widely distributed across the nation and “have the potential to supply more than one and a half times the current electricity consumption of the United States.”<sup>82</sup>

With wind power, turbine location is of paramount importance.<sup>83</sup> Generating electricity from the wind depends on wind speed since large-scale, commercial wind farms require consistent, high-velocity winds.<sup>84</sup> America’s land area has been mapped and classified by DOE in terms its Wind Power Resource Potential.<sup>85</sup> DOE has published a U.S. Wind Atlas to provide a visual summary of the results.<sup>86</sup> Small wind systems,<sup>87</sup> known

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CONTRIBUTION TO ELECTRIC POWER GENERATION AND IMPACT ON FARMS AND RURAL COMMUNITIES 5, 7 n.19 (2004) [hereinafter GAO REPORT].

<sup>79</sup> D.L. ELLIOTT ET AL., PACIFIC NW. LAB., AN ASSESSMENT OF THE AVAILABLE WINDY LAND AREA AND WIND ENERGY POTENTIAL IN THE CONTIGUOUS UNITED STATES iii, 54-57 (1991). After considering environmental and land use factors that would exclude wind class 3 or higher areas, this assessment also concluded that North Dakota, Texas, Kansas, South Dakota and Montana each have the potential for over 1000 billion kWh of electricity. *Id.* at 54-57.

<sup>80</sup> GAO REPORT, *supra* note 78, at 17.

<sup>81</sup> *Id.* at 2.

<sup>82</sup> U.S. Department of Energy, Wind Energy Resource Potential, [http://www1.eere.energy.gov/windandhydro/wind\\_potential.html](http://www1.eere.energy.gov/windandhydro/wind_potential.html) (last visited Apr. 1, 2008).

<sup>83</sup> See Upper Peninsula Wind Power, *supra* note 69.

<sup>84</sup> See Wind Web Tutorial, *supra* note 62. Energy that can be taken from the wind follows a common formula: wind energy is proportional to the cube of the wind speed at the site. As a result, small variations in wind speed translate into significant differences in electricity generation. For example, the difference between the power produced at a site with an average wind speed of 16 miles per hour and one with 14 miles per hour is nearly 50%. *Id.*; see also BRIAN SMITH, NAT’L RENEWABLE ENERGY LAB., U.S. DEP’T OF ENERGY, DOE WIND PROGRAM: TECHNOLOGY TRENDS AND STRATEGIC PLANS (2003). DOE has an established research goal for its Low Wind Speed Technology program: “By 2012, reduce [the cost of electricity] from large [wind] systems in Class 4 winds to 3 cents/kWh for onshore systems or 5 cents/kWh [for] offshore [systems].” The need to make these less-prime sites usable for wind power generation has become a research priority. SMITH, *supra*, at 7.

<sup>85</sup> See generally ELLIOT, WIND ENERGY RESOURCE ATLAS, *supra* note 29.

<sup>86</sup> *Id.*

<sup>87</sup> See Jennifer Alsever, *What’s Next: The Top 10 Products, Ideas, and Trends; Wind Power, The Home Edition*, BUS. 2.0, Feb. 19, 2007 (describing Southwest Windpower’s \$13,000

as distributed wind systems, may be sited in a wider variety of locations with one estimate concluding that as much as 60% of America would be suitable for small turbine use.<sup>88</sup> Native American tribal land encompass 96 million acres and possesses excellent wind resources as do federally-owned lands under the control of the Bureau of Land Management ("BLM").<sup>89</sup> Large potential wind power regions also exist in off-shore locations. The National Renewable Energy Laboratory determined that the off-shore resource between 5 and 50 nautical miles away from the Atlantic and Pacific coasts could provide 1000 GW of wind energy, an amount equal to the current installed U.S. electrical capacity.<sup>90</sup> The higher offshore construction costs may be offset by higher and more consistent wind speeds which can produce more electricity at a significantly lower cost.<sup>91</sup> Although there are approximately 600 MW of existing offshore wind farms, only a small amount of worldwide offshore potential has been currently tapped.<sup>92</sup> With the likely construction of the Cape Wind project near

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Skystream 3.7 home turbines that can provide up to 80% of home electricity). Recently companies have begun to offer small wind power turbines to homeowners. *See, e.g.*, Bergey Wind Power, <http://www.bergey.com> (last visited Apr. 1, 2008). Some states encourage homeowners in windy areas to install small wind power units. *See, e.g.*, New York State Energy Research and Development Authority, <http://www.PowerNaturally.org> (last visited Apr. 1, 2008).

<sup>88</sup> State Energy Conservation Office, Small Wind Systems, [http://www.seco.cpa.state.tx.us/re\\_wind\\_smallwind.htm](http://www.seco.cpa.state.tx.us/re_wind_smallwind.htm) (last visited Apr. 1, 2008).

<sup>89</sup> *See* U.S. Department of the Interior, Bureau of Land Mgmt., Wind Energy, [http://www.blm.gov/wo/st/en/prog/energy/wind\\_energy.html](http://www.blm.gov/wo/st/en/prog/energy/wind_energy.html) (last visited Apr. 1, 2008).

<sup>90</sup> U.S. DEP'T OF ENERGY, NATIONAL RENEWABLE ENERGY LABORATORY, WIND RESOURCE MAPPING FOR UNITED STATES OFFSHORE AREAS 1 (2006), *available at* <http://www.nrel.gov/wind/pdfs/40045.pdf>.

<sup>91</sup> *See* Wind Web Tutorial, *supra* note 62. Offshore wind power development has higher capital costs that are usually offset by higher productivity. One recent assessment has provided the following description:

Capital costs for building offshore wind farms are estimated to be 30 to 50% higher than building turbines onshore. Turbines that are installed offshore require permitting, foundation installation and constant monitoring using remote and visual inspections. Added to that are the costs associated with transporting and installing rather large structures and blades at sea. These costs are partially offset by higher energy yields in the 30% range. The wind resource is unabated offshore. Experts say that costs are expected to drop as technology improves and experience is gained and they are investigating the economics of moving installations further offshore into deeper waters.

Maggie Linsky Merrill, *The Prospects for the Subsea Market in Offshore Wind Power*, MARINE TECH. REP., June 2007, at 24.

<sup>92</sup> At present, a total of 10 offshore wind power facilities are operating and all are located in the United Kingdom, Denmark, Ireland, Sweden and Holland. Recently, a dozen new

Cape Cod, Massachusetts,<sup>93</sup> offshore wind development in the United States should accelerate in the future helping to maintain wind power's high growth rate.

*D. The Growth of Installed Wind Power Generating Capacity*

Wind power is increasingly considered to be part of the mix of renewable energy sources. It has staged a recent comeback on three levels: 1) small wind, individual home or business supply of >100kW; 2) community wind which is locally-owned, commercial-scale production for local supply; and 3) wind farms which are utility-sized turbine generators linking to the general utility transmission lines.<sup>94</sup> While all three of these components form modern wind power, the largest amount of electricity is supplied by the wind farm projects. In recent years, the

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projects have been proposed for construction in coming years in Denmark, Holland, Sweden, Ireland, Spain, Belgium and the United States. Merrill, *supra* note 91, at 26-27. Denmark currently supplies 20% of its electricity with offshore wind power and has proposed to reach 50% of its demand by 2025. See Flemming Hansen & Connie Hedegaard, *Denmark to Increase Wind Power to 50% by 2025, Mostly Offshore*, RENEWABLE ENERGY WORLD.COM, Dec. 6, 2006, <http://www.renewableenergyaccess.com/rea/news/infocus/story?id=46749>.

<sup>93</sup> In January 2008 the U.S. Minerals Management Service ("MMS") of the U.S. Department of the Interior issued its 718 page draft environmental impact statement ("DEIS") on the 130 turbine, 468 MW Cape Wind project. MINERALS MGMT. SERV., U.S. DEPT OF THE INTERIOR, CAPE WIND ENERGY PROJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT JANUARY 2008, at E-1 (2008). The 2005 Energy Policy Act gave the MMS responsibility over all alternative energy development in the Outer Continental Shelf federal waters. In the DEIS the MMS found that there would generally be "moderate" impacts on wildlife and fisheries and "moderate, long-term impact on scenic quality," although noting that such an effect would be "highly subjective." See Patrick Cassidy, *Offshore Wind Farm Wins Federal Nod*, CAPE COD TIMES, Jan. 15, 2008, at 1.

<sup>94</sup> Interest in small-scale wind power turbines has also increased leading thousands of homeowners to install turbines at their homes. See Kristina Shevory, *Homespun Electricity, From the Wind*, N.Y. TIMES, Dec. 13, 2007, available at [http://www.nytimes.com/2007/12/13/garden/13wind.html?\\_r=1&scp=15%sq=wind+power&st=nyt&oref=login](http://www.nytimes.com/2007/12/13/garden/13wind.html?_r=1&scp=15%sq=wind+power&st=nyt&oref=login) (describing the 7,000 home- or school-sized wind turbines installed nationally in 2007). Some states have taken a supportive position by encouraging small wind power installation at the home. John Casey, *Technology Smooths the Way for Home-Wind Power Turbines*, N.Y. TIMES, Apr. 15, 2008, available at <http://www.nytimes.com/2008/04/15/science/earth/15wind.html>; see, e.g., VT. PUB. SERV. BD., SMALL WIND—IS IT RIGHT FOR YOU? (2006), available at [http://publicservice.vermont.gov/energy-efficiency/ee\\_files/wind/WindFactsheetFebruary2006.pdf](http://publicservice.vermont.gov/energy-efficiency/ee_files/wind/WindFactsheetFebruary2006.pdf).

attraction of wind-generated electricity has attracted substantial amounts of individual and corporate investment.<sup>95</sup>

Significant growth in wind power generating electricity has occurred over the last decade. Progress was slow in coming. The first 1,000 MW of wind power generating capacity was installed and operating by 1985;<sup>96</sup> however, it took another 14 years until 1999 for the total capacity to double to 2,000 MW.<sup>97</sup> Following that point, progress increased considerably with doubling occurring in only slightly more than 4 years with 5,000 MW in place by 2003, and then more than doubling to 11,600 by 2006. Recently, U.S. wind power installed capacity shot up 45% and reached 16,800 MW by the end of 2007.<sup>98</sup> This acceleration in wind power investment has been spurred on by increasing fossil fuel prices and declining wind generation costs supplemented with crucial federal tax subsidies.<sup>99</sup> The result has

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<sup>95</sup> John Donnelly, *Two Oil Giants Plunge into the Wind Business: Shell, BP to Play Major Role*, BOSTON GLOBE, Mar. 2, 2007, available at [http://www.boston.com/news/nation/washington/articles/2007/03/02/two\\_oil\\_giants\\_plunge\\_into\\_the\\_wind\\_business/](http://www.boston.com/news/nation/washington/articles/2007/03/02/two_oil_giants_plunge_into_the_wind_business/); Michael J. Strauss, *Wind Spins Its Way into the Energy Equation: High Fuel Costs Add to the Allure of a Non-polluting Power Technology*, INT'L HERALD TRIB., July 6, 2005, available at <http://www.iht.com/articles/2005/07/05/nes/rsenwind.php>; Steve Hargreaves, *Green Energy's Hottest Stocks for 2008*, CNN MONEY.COM, Jan. 9, 2008, [http://money.cnn.com/2008/01/08/news/companies/where\\_renewable\\_moneyis/](http://money.cnn.com/2008/01/08/news/companies/where_renewable_moneyis/).

<sup>96</sup> American Wind Energy Association, 10,000 MW of Wind Power, <http://www.awea.org/10gw.html> (last visited Apr. 1, 2008) [hereinafter 10,000 MW of Wind Power].

<sup>97</sup> *Id.*

<sup>98</sup> The American Wind Energy Association ("AWEA") reported that "the U.S. wind energy industry installed 5,244 megawatts (MW) in 2007, expanding the nation's total wind power generating capacity by 45% in a single calendar year" with "an investment of over \$9 billion into the [domestic] economy." Press Release, American Wind Energy Association, *Installed U.S. Wind Power Capacity Surged 45% in 2007: American Wind Energy Association Market Report* (Jan. 17, 2008) [hereinafter AWEA Press Release], available at [http://www.awea.org/newsroom/releases/AWEA\\_Market\\_Release\\_Q4\\_011708.html](http://www.awea.org/newsroom/releases/AWEA_Market_Release_Q4_011708.html). More specifically, the AWEA announced in January 2008 that "the U.S. wind power fleet now numbers 16,818 MW and spans 34 states. American wind farms will generate an estimated 48 billion kilowatt-hours (kWh) of wind energy in 2008, just over 1% of U.S. electricity supply, powering the equivalent of over 4.5 million homes." *Id.* See also AM. WIND ENERGY ASS'N, *AWEA 2007 MARKET REPORT* (2008) [hereinafter AWEA MARKET REPORT], available at [http://www.awea.org/projects/pdf/Market\\_Report\\_Jan08.pdf](http://www.awea.org/projects/pdf/Market_Report_Jan08.pdf).

<sup>99</sup> Paul Davidson, *Wind Power Growth Gusts Strongly in USA in 2007*, USA TODAY, Jan. 18, 2008, at 3B (explaining the rapid wind power growth on the Production Tax Credit lowering the developer's cost to a level "on par with coal-fired plants.") Even in China wind power producers must receive higher prices than coal producers in order to spur investment in new wind generation capacity. See Keith Bradsher, *China's Green Energy Gap*, N.Y. TIMES, Oct. 24, 2007, available at <http://www.nytimes.com/2007/10/24/business/worldbusiness/24power.html?fta=y>.

been an annual wind power growth rate over the last several years of about 30% and the amount of installed capacity more than tripling over the last four years.<sup>100</sup> Should there be a stable continuation of governmental renewable power subsidy policy, technical research and development funding, and widespread RPSs, it is possible that the federal goal of 100,000 MW of wind power by 2020 can be met.<sup>101</sup>

It is also worth noting that large and small industrial firms as well as well-funded venture capital investors have been attracted to the prospects of wind-generated electricity and are actively involved in the promotion and expansion of the new industry.<sup>102</sup> The amount of invested capital is impressive. In 2005, \$17 billion was invested in clean energy projects in the U.S. (about 25% in wind projects) and \$49 billion was invested worldwide.<sup>103</sup> This investment in wind power was repeated in 2006, but wind power received over \$9 billion in project development in 2007.<sup>104</sup> This substantial flow of capital into the American wind power industry has undoubtedly been influenced by the rise in fossil fuel prices and the availability of various federal tax incentives.<sup>105</sup> It also reflects a substantial

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<sup>100</sup> 10,000 MW of Wind Power, *supra* note 96.

<sup>101</sup> One other necessary element is an adequate supply of trained technicians to install, operate, maintain and repair wind turbines. The wind energy industry employs approximately 200,000 Americans and the number is certain to grow in the future. Since the industry has expanded so rapidly in the last few years, the number of these technicians has not kept up with the number of installed turbines. It is estimated that for every 7 to 10 turbines there must be a team of two technicians. To address the shortage in skilled labor, utility companies are teaming up with community colleges to train technicians rapidly. See David Twiddy, *Wind Farms Need Techs to Keep Running*, MSNBC.COM, Feb. 3, 2008, [http://news.yahoo.com/s/ap/20080202/ap\\_on\\_bi\\_ge/wind\\_energy\\_tech\\_shortage](http://news.yahoo.com/s/ap/20080202/ap_on_bi_ge/wind_energy_tech_shortage).

<sup>102</sup> Emily Thornton & Adam Aston, *Wall Street's New Love Affair*, BUS. WEEK, Aug. 14, 2006, available at [http://www.businessweek.com/magazine/content/06\\_33/b3997073.htm?chan=top+new\\_top+news](http://www.businessweek.com/magazine/content/06_33/b3997073.htm?chan=top+new_top+news).

<sup>103</sup> *Id.*

<sup>104</sup> AWEA Press Release, *supra* note 98; see also Wind Power: U.S. Installed Capacity, *supra* note 12 (providing total installed capacity of previous years). Major investments are also currently being made in the solar energy field. Matt Richtel & John Markoff, *A Green Energy Industry Takes Root in California*, N.Y. TIMES, Feb. 1, 2008, available at [http://www.nytimes.com/2008/02/01/technology/01solar.html?\\_r=1&hp&oref=slogin](http://www.nytimes.com/2008/02/01/technology/01solar.html?_r=1&hp&oref=slogin).

<sup>105</sup> Even with the federal production tax credit and research and development spending, renewable energy, including wind power, receives far less federal support than do conventional energy sources. Alexandra Teitz, Committee on Government Reform, U.S. House of Representatives, Presentation on Renewable Energy in EPAct: Business As Usual= Failure (Oct. 19, 2005), available at [http://www.abanet.org/environ/committees/renewable\\_energy/teleconarchives/101905/TeitzPPT.pdf](http://www.abanet.org/environ/committees/renewable_energy/teleconarchives/101905/TeitzPPT.pdf) (outlining federal R&D and tax policy favoring conventional energy sources).

commitment to a rapidly growing industry that has financial viability, at least with the current subsidy structure.

*E. Current Wind Power Development in the United States*

In the summer of 2006, two significant developments took place: 1) the total amount of installed utility-scale wind power electricity exceeded 10,000 MW for the first time, and 2) Texas surpassed California as the state having the greatest installed capacity in the United States.<sup>106</sup> These two states lead the nation, by far, in terms of current wind-generated electricity, but other states are rapidly adding to their wind power capacity. By the end of 2007, the top ten states in terms of installed electrical capacity were Texas (4356), California (2438), Minnesota (1299), Iowa (1273), Washington (1123), Colorado (1066), Oregon (885), Illinois (699), Oklahoma (689), and New Mexico (495).<sup>107</sup> The optimistic goal of the federal government's Wind Powering America initiative is to have at least 24 states with at least 1,000 MW of installed wind power capacity by 2010.<sup>108</sup> In 2007, there were 16 states that already meet that goal with an additional 6 states currently meeting the 1,000 MW goal when projects under construction were considered.<sup>109</sup> Although achieving the 10,000 MW milestone in 2006 represented a ten-fold growth in 20 years, it must be kept in mind that American wind power still accounts for approximately 1% of existing, domestic electricity generation.<sup>110</sup> This total may be small but it is still significant. Providing 48 billion kWh of electricity, which is sufficient to power 4.5 million American homes, represents a significant accomplishment for the wind power industry.<sup>111</sup> However, achieving the proclaimed national goal of reaching the 5% level by 2020 will require substantial expansion of American wind power even beyond these levels and continued government encouragement.<sup>112</sup> To reach this

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<sup>106</sup> AWEA Press Release, *supra* note 98.

<sup>107</sup> AWEA MARKET REPORT, *supra* note 98, at 8.

<sup>108</sup> OFFICE OF ENERGY EFFICIENCY & RENEWABLE ENERGY, U.S. DEP'T OF ENERGY, WIND POWERING AMERICA (2000), *available at* <http://www.nrel.gov/docs/fy00osti/28133.pdf> [hereinafter DOE WIND POWER GOALS].

<sup>109</sup> American Wind Energy Association, U.S. Wind Energy Projects, State Total Power Capacities (MW), <http://www.awea.org/projects> (last visited Apr. 1, 2008).

<sup>110</sup> 10,000 MW of Wind Power, *supra* note 96.

<sup>111</sup> AWEA Press Release, *supra* note 98; *see also* Wind Power: U.S. Installed Capacity, *supra* note 12 (providing total installed capacity of previous years).

<sup>112</sup> DOE WIND POWER GOALS, *supra* note 108, at 1. Other federal energy policies have assisted the wind power industry in expanding its capacity in order to meet its own

achievement, thousands of wind turbines must be sited across the country and in offshore locations.

## II. THE FERVOR OF BELIEF: THE PROS AND CONS OF WIND POWER

The debate between supporters and opponents of wind power in America has become a fervent competition of fundamental beliefs. These individuals and highly-organized interest groups on both sides advance a series of arguments in support of or in opposition to wind power technology. Advocates of wind power strongly argue the merits of their energy technology in broad terms, focusing on the beneficial contribution that wind can make to American electricity needs. As the discussion below indicates, there are persuasive reasons favoring the expansion of wind energy in America.<sup>113</sup> Wind power constitutes one of several renewable energy technologies that should receive both popular and policy support in the future. Opponents of wind power usually do not dispute the benefits of the technology. Rather, they frequently concentrate on specific adverse environmental or natural resource impacts of facility siting at particular locations.<sup>114</sup> To them, wind-generated power is a good thing as long as it is produced somewhere else. These opponents have been characterized as classic “not in my backyard” believers and those who would stifle this emerging carbon-free electrical generation.<sup>115</sup> The points made by both

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optimistic long-term generation goals. For example, the National Energy Policy Act of 2005 provides incentives to encourage the construction of new and expanded power transmission lines. This should make transmission capacity to be more available to new market entrants like wind electricity plants. It also directs DOE to study the problem of transmission congestion and designate “national interest electric corridors.” FED. ENERGY REGULATORY COMM’N, FACTSHEET: ENERGY POLICY ACT OF 2005 1-3 (2006), *available at* <http://www.ferc.gov/legal/fed-sta/epact-fact-sheet.pdf>. The Act also requires that new utility system rules be “non-discriminatory” and provide for fair access to new electrical technologies such as wind. *Id.*

<sup>113</sup> See *infra* Part II.A.

<sup>114</sup> The siting of high voltage transmission lines has been highly controversial and frequently opposed. See, e.g., Michael D. Shear & Amy Gardner, *Power Line to Track Existing N. Va. Route*, WASH. POST, Feb. 13, 2007, at A1 (describing re-routing of transmission line in Prince William, Fauquier and Loudoun counties to minimize citizen opposition); Ken Ward, Jr., *Case for Power Line Weak, PSC Experts Say*, CHARLESTON GAZETTE, Dec. 16, 2007, *available at* <http://www.wvgazette.com/News/Lines+of+Power/200712160423?page+2&build=cache> (describing citizen opposition to siting of 500 kilovolt power line across northern West Virginia to serve the coastal mid-Atlantic region).

<sup>115</sup> Wind power has been controversial for environmental and conservation groups. Some have supported it and some have not. In addition, some prominent pro-environmental

sides in this sometimes contentious debate have been wide-ranging and always deeply felt.

A. *Principal Policy Justifications Supporting the Expansion of Wind-Generated Electricity*

Supporters of increasing “clean energy” include wind power to be among the technologies they hope will be used to fulfill future American electrical demand. Understanding that the adoption of wind power would require the construction of new facilities in many locations and that opposition to this siting could materialize, these advocates have developed a broad-based series of rationales supporting development. Most of their policy-based arguments for wind energy are related to the idea that it provides a clean, non-polluting electrical generation source with an inexhaustible and domestically-available fuel supply. This general rhetoric is reinforced with a number of more specific claims hoping to build the case to convince the public and policymakers that wind energy should be expanded throughout America. These main supporting arguments are discussed below.

1. *Diversifying Sources of Electrical Generation and Reducing Dependence on Fossil Fuels*

Related to several other supporting arguments, advocates for wind power assert that the American electrical supply should be diversified in terms of generating sources. With nearly 75% of the existing electricity being provided by fossil fuels,<sup>116</sup> this point of view anticipates an environment where renewable power sources play a greater role in meeting the nation’s energy needs and energy conservation receives more policy emphasis. Orchestrating such a shift in power generation would also assist electric utilities in complying with state RPSs, which mandate the achievement of renewable electricity benchmarks by specified future points in time.<sup>117</sup>

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public officials have objected to particular wind power projects. Robert F. Kennedy, Jr.’s opposition to the Cape Wind project off of Cape Cod, Massachusetts has been much publicized. See Felicity Barringer, *Debate of Wind Power Creates Environmental Rift*, N.Y. TIMES, June 6, 2006, available at <http://www.nytimes.com/2006/06/us/06wind.html?scp=41&sq=wind+power&st=nyt>.

<sup>116</sup> 2006 ELECTRIC POWER REPORT, *supra* note 3, at 2.

<sup>117</sup> See *supra* note 8.

2.

### ~~Zero Fuel Cost as a Prerequisite for Electric Generation and Stable,~~ Zero Fuel Cost as a Prerequisite for Electric Generation and Stable,

Wind power is a renewable and local form of non-fossil fuel electricity possessing a unique characteristic: it does not use fuel. Once a wind turbine is installed, there is zero fuel cost for the generation of power and as a result no fuel cost volatility over time.<sup>118</sup> This is an inexhaustible supply without raw material or fuel costs, thereby making the inflationary characteristics of coal, natural gas and oil irrelevant to the economic viability of the facility. The wind resource follows predictable patterns, with its kinetic energy available without charge, solely due to the siting location of the turbine in a windy area.<sup>119</sup> Finally, since the fuel is naturally occurring wind, there are no adverse impacts resulting from fuel extraction that might adversely affect workers, the environment or localities. By comparison, coal mining—the nation's largest electricity fuel source—inflicts many serious social and environmental costs including worker illness, injuries and deaths, mine drainage water pollution, landscape and terrain damage, wildlife harms and the hazards of coal transportation and storage.<sup>120</sup>

3. Total Elimination of Air Pollutants and Greenhouse Gas Emissions

Probably the strongest advantage of wind power is the absence of air pollution and greenhouse gas emissions. Thermoelectric fossil-fuel-fired plants generate the largest percentage of American electricity.<sup>121</sup> They are also the largest single CO<sub>2</sub> contributor, even exceeding contributions from all forms of transportation.<sup>122</sup> Wind power, by definition, does

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<sup>118</sup> American Wind Energy Association, Cost FAQ, <http://www.awea.org/faq/cost.html> (last visited Apr. 1, 2008).

<sup>119</sup> *Id.*

<sup>120</sup> See U.S. DEP'T OF ENERGY, ENERGY TECHNOLOGY CHARACTERIZATIONS HANDBOOK, *supra* note 6 (Coal technologies); see also PAMELA L. SPATH ET AL., NAT'L RENEWABLE ENERGY LAB., LIFE CYCLE ASSESSMENT OF COAL-FIRED POWER PRODUCTION, i-iv (1999), available at <http://www.nrel.gov/docs/fy99osti/25119.pdf>; Union of Concerned Scientists, Environmental Impacts of Coal Power: Wastes Generated, [http://www.ucsusa.org/clean\\_energy/coalvswind/c02d.html](http://www.ucsusa.org/clean_energy/coalvswind/c02d.html) (last visited Apr. 1, 2008).

<sup>121</sup> 2006 ELECTRIC POWER REPORT, *supra* note 3, at 2.

<sup>122</sup> U.S. DEPT. OF ENERGY, CARBON DIOXIDE EMISSIONS FROM THE GENERATION OF ELECTRIC POWER IN THE UNITED STATES 1-2 (2000), available at <http://tonto.eia.doe.gov/ftproot/environment/co2emiss00.pdf>.

not burn any fuel so it does not emit any air pollutants or greenhouse gases. This lack of air emissions is a permanent feature of a wind power facility. Conventional fossil fuel combustion also results in sulfur dioxide, nitrogen oxides, carbon monoxide, particulate matter, hydrocarbons, mercury and other emissions which are considered to be air pollutants of concern to the public's health and safety and regulated under clean air laws.<sup>123</sup> Additionally, the absence of carbon dioxide resulting from wind power contributes to the reduction of global warming gases. With the increased emphasis on the elimination of greenhouse gases,<sup>124</sup> the substitution of fossil-fuel-generated electricity with non-combustion-produced electricity will reduce the rate of growth of greenhouse gas emissions from America's electrical energy sector. As American climate change policy begins to embrace more rigorous greenhouse gas reduction goals, wind power could be viewed as a viable energy alternative to electricity generated from coal and natural gas.

#### 4. Conservation of Water That Would Be Used with the Fossil Fuel Thermoelectric Fuel Cycle

Wind power generation uses minimal amounts of water. This operational feature stands in stark contrast to the water use of conventional thermoelectric fossil fuel plants. The fossil fuel cycle and the nuclear fuel generating cycles both heat water in order to create steam needed to turn turbine blades for the generation of electricity. As a result, thermoelectric power plants use nearly as much freshwater in the United States as does agricultural irrigation.<sup>125</sup> Both fuel cycle and consumptive (evaporative) water use for both coal- and nuclear-generated electricity stands in the billions of gallons per year.<sup>126</sup> This intensive water use with

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<sup>123</sup> *Id.*

<sup>124</sup> As necessary as clean coal technology might be, efforts to develop effective and affordable carbon reduction techniques for coal-burning power plants ran into roadblocks and limited federal funding due to cost overruns for a government/industry pilot project. See Rebecca Smith & Stephen Power, *After Washington Pulls Plug on FutureGen, Clean Coal Hopes Flicker*, WALL ST. J., Feb. 2-3, 2008, at A7 (describing the failure of the DOE-funded FutureGen project to reduce greenhouse gas emissions).

<sup>125</sup> NAT'L ENERGY TECH. LAB., U.S. DEPT. OF ENERGY, INNOVATIVE APPROACHES AND TECHNOLOGIES FOR IMPROVED POWER PLANT WATER MANAGEMENT (2004), available at <http://www.netl.doe.gov/publications/factsheets/program/Prog055.pdf>.

<sup>126</sup> *Id.*

thermoelectric facilities is often the most serious limiting factor in the permitting of these plants, especially in arid areas where water is scarce.<sup>127</sup> As competition for fresh water becomes more intense, non-water-using energy technologies such as wind power will have an additional advantage in their lack of water use.

5. No Mining Waste, Hazardous Waste Disposal, or Mining Accidents Caused in Fuel Acquisition

After construction, wind energy facilities produce no solid or hazardous waste needing disposal during the electricity generation cycle. Coal-fired power plants, by contrast, have serious waste disposal effects. DOE has determined that the preparation (crushing and washing) of coal prior to power plant combustion generates solid wastes estimated at 10% of the coal mined.<sup>128</sup> This fuel processing results in millions of tons of coal wastes in need of disposal as part of the process of electricity generation. Coal storage prior to combustion can also result in site runoff with water polluting consequences.<sup>129</sup> Furthermore, after the coal is burned, large amounts of additional solid waste remains to be disposed of as boiler slag, fly ash and scrubber sludge produced by SO<sub>2</sub> and particulate removal equipment.<sup>130</sup> Recent estimates of the wastes produced by one 500 MW coal-fired power plant outline the scope of the environmental impact of fossil fuel technology.<sup>131</sup> By comparison, because there are no emissions from wind power, there is no solid waste disposal issue either. This is identified as another significant environmental advantage of wind-generated electricity.

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<sup>127</sup> NAT'L ENERGY TECH. LAB., U.S. DEPT. OF ENERGY, ESTIMATING FRESHWATER NEEDS TO MEET FUTURE THERMOELECTRIC GENERATING REQUIREMENTS 1-4 (2007), *available at* [http://www.netl.doe.gov/technologies/coalpower/ewr/pubs/2007WaterNeedsAnalysis-UPDATE-Final\\_10-10-07b.pdf](http://www.netl.doe.gov/technologies/coalpower/ewr/pubs/2007WaterNeedsAnalysis-UPDATE-Final_10-10-07b.pdf).

<sup>128</sup> "In 2002, about 25 percent of the raw coal processed through preparation plants was discharged to waste ponds as 'refuse' mixtures." RICHARD BONSKOWSKI ET. AL, DEP'T OF ENERGY, COAL PRODUCTION IN THE UNITED STATES—AN HISTORICAL OVERVIEW 14 (2006). However, only 21% of surface coal and 63% of sub-surface coal needs to be processed in this manner. *Id.*

<sup>129</sup> Union of Concerned Scientists, Environmental Impacts of Coal Power: Fuel Supply, [http://www.ucsusa.org/clean\\_energy/coalvswind/c02a.html](http://www.ucsusa.org/clean_energy/coalvswind/c02a.html) (last visited Apr. 1, 2008).

<sup>130</sup> Union of Concerned Scientists, Environmental Impacts of Coal Power: Air Pollution, [http://www.ucsusa.org/clean\\_energy/coalvswind/c02c.html](http://www.ucsusa.org/clean_energy/coalvswind/c02c.html) (last visited Apr. 1, 2008).

<sup>131</sup> Union of Concerned Scientists, Coal Generates 54% of Our Electricity, and Is the Single Biggest Air Polluter in the U.S., [http://www.ucsusa.org/clean\\_energy/coalvswind/c01.html](http://www.ucsusa.org/clean_energy/coalvswind/c01.html) (last visited Apr. 1, 2008).

6.

#### Economic Benefits for Rural Landowners in Rural Areas

Wind farms use leased land or land upon which royalties or land fees must be paid to the landowner. In these rural areas, there are often few leasing alternatives and none that pay the high level of lease or royalty payments of \$3,000-\$4,000 per turbine per year.<sup>132</sup> Depending on the amount of land leased and the number of turbines, the lease payments could constitute much-needed income for rural land owners who have few economic alternatives. New wind power lease payments supplement rural incomes, potentially allowing farmers and ranchers to remain on the land and continue their longstanding and traditional activities.<sup>133</sup> This would maintain the rural life and culture that is rapidly disappearing in many areas. In addition, wind energy development generally would be compatible with other existing land uses including livestock grazing, recreational use, wildlife habitat, and oil, gas and geothermal production.<sup>134</sup> This co-existence would allow for a smooth transition in the economies of rural areas. As a result, rural land owners could enjoy a new revenue stream that could supplement their existing farm and ranch incomes, having an additional effect of stabilizing rural populations in areas currently losing population.

7. Economic Benefits to Local Communities Through Increased Employment and Increased Tax Revenue Collection

The development of wind farms often occurs in rural communities experiencing depressed or reduced economic conditions. Wind power projects would have a beneficial economic impact on the economic conditions in the surrounding areas. From the governmental perspective, state governments would collect sales and income taxes from the new construction and local governments would benefit from increases in their real estate tax bases due to the presence of the new wind farm equipment.<sup>135</sup>

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<sup>132</sup> AM. WIND ENERGY ASS'N., WIND ENERGY FOR YOUR FARM OR RURAL LAND, at 1, available at <http://www.awea.org/pubs/factsheets/WindyLandownersFS.pdf>.

<sup>133</sup> U.S. DEP'T OF ENERGY, WIND ENERGY FOR RURAL ECONOMIC DEVELOPMENT 3 (2004), available at <http://www.nrel.gov/docs/fy04osti/33590.pdf>.

<sup>134</sup> *Id.* at 4.

<sup>135</sup> See Rob Gebhart, *New Wind Farm Now Online*, DAILY AM. (Somerset, Pa.), Feb. 2, 2008, available at <http://www.dailyamerican.com/articles/2008/02/02/news/news142.txt> (describing local real estate taxes paid by Pennsylvania wind projects to school districts, counties and townships); Jeanne Sager, *Wind Power Promises New Source of Funds for Towns*, SULLIVAN COUNTY DEMOCRAT (N. Y.), Mar. 16, 2007, available at <http://www.sc-democrat.com/news/03March/16/wind.htm>; see also Joe Morris, *Wind Farm Proposed*

Furthermore, employment in wind plant construction would receive a boost as well.<sup>136</sup> Assembling the pre-fabricated wind turbines and towers employs construction workers at an estimated rate of 4.8 job-years (direct and indirect employment) per 1 MW of wind power construction.<sup>137</sup> Using this ratio, a 50 MW wind farm would produce 240 job-years of employment for those workers who constructed the facility. A 2005 estimate of employment impact suggested that by 2015 wind energy projects in California alone would produce 2,690 construction jobs and 450 permanent operational jobs just for facilities built on U.S. Bureau of Land Management lands.<sup>138</sup>

After the construction phase of the wind farm project, a smaller number of permanent jobs would be added to local economies usually experiencing little job growth. It has been estimated that between 9 to 10 full-time service personnel would be needed to maintain a 100 MW wind farm.<sup>139</sup> Although this continuing employment benefit would not be extremely large, it would occur in rural areas with small populations and few incoming job opportunities, and it would be distributed over a large rural area.<sup>140</sup> New wind power lease payments supplement rural incomes,

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*Near Elkins*, CHARLESTON GAZETTE, Feb. 13, 2008, available at <http://www.wvgazette.com/News/200802130768> (describing how a proposed wind farm is to pay \$450,000 per year in real estate taxes to local county governments, becoming the largest property taxpayer in the counties).

<sup>136</sup> The economic benefits from the wind farm developments in Texas have spread to the leasing of port space and dock labor in Galveston, Texas by Mitsubishi Power Systems. See Laura Elder, *Wind Drives Mitsubishi Power Port Deal*, DAILY NEWS (Galveston, TX) Dec. 19, 2007, available at <http://galvestondailynews.com/story.lasso?ewcd=3724e8efcf85c46d&>.

<sup>137</sup> Estimates for job-years of employment have been as high as seventeen job-years for every megawatt of electricity. Michael Renner, *Going to Work for Wind Power*, WORLD WATCH, Jan.-Feb. 2001, at 26, available at <http://www.wind-power.net/wind.pdf>.

<sup>138</sup> BUREAU OF LAND MGMT., U.S. DEP'T OF THE INTERIOR, FES 05-11, FINAL PROGRAMMATIC ENVIRONMENTAL IMPACT STATEMENT ON WIND ENERGY DEVELOPMENT ON BLM-ADMINISTERED LANDS IN THE WESTERN UNITED STATES, 5-105 to 5-109 (2005).

<sup>139</sup> N.C. COASTAL WIND WORKING GROUP, BENEFITTING NORTH CAROLINA COMMUNITIES WITH OFFSHORE WIND FARMS 3, available at [http://www.repp.org/articles/static/1/binaries/NC\\_Economic\\_Development.pdf](http://www.repp.org/articles/static/1/binaries/NC_Economic_Development.pdf) (stating that "every 100 MW of wind power installed provides 310 full-time equivalent (FTE) manufacturing jobs, 67 contracting and installation jobs, and 9.5 annual jobs"); see also Martin J. Pasqualetti, *Wind Power: Obstacles and Opportunities*, 46 ENV'T 23, 29 (2004) (analysis stating that a single 250 MW wind farm in Iowa annually provides \$2 million in local government property taxes and \$640,000 in farmer rental payments).

<sup>140</sup> See Minnesota Department of Employment and Economic Development, *Wind Power in Minnesota*, <http://www.deed.state.mn.us/lmi/publications/trends/0102/wind.htm> (last visited Apr. 1, 2008).

potentially allowing farmers and ranchers to remain on the land to continue traditional agricultural or ranching activities. As mentioned above, wind energy development generally would be compatible with other existing land uses, including livestock grazing, recreation, wildlife habitat, and oil, gas and geothermal production.<sup>141</sup>

*B. Principal Policy and Environmental Objections Against an Expansion of the Wind Power Energy Technology*

Although there are many advantages to wind power, disadvantages exist as well. Every energy-producing technology contains pros and cons which must be evaluated by government policymakers, the public and private investors. With regard to wind energy, some of the associated adverse effects or disadvantages are inherent in the nature of wind power itself while others relate to the use of this technology at particular sites. In the end, judgments must be made balancing and comparing the positive features with the negative ones.

1. Disadvantageous Wind Characteristics

A major issue relates to the nature of the wind resource itself. Wind blows intermittently and occurs according to atmospheric conditions rather than human energy needs. As a result, wind does not always blow when energy is required and, in general, it cannot be stored for use later.<sup>142</sup> Wind speed and availability can vary from day to day and, as a result, the amount of electricity produced can vary. Some critics have argued that utilities relying on wind power will have to develop or purchase costly reserve capacity to fill in if wind power is not available when it is expected.<sup>143</sup> This question of intermittent supply has been much debated and, as yet, has no definitive answer. DOE and other international agencies have reported that additional operating costs of integrating

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<sup>141</sup> See *supra* notes 133-35.

<sup>142</sup> See Protect Illinois' Environment, Wind Power—"Variable or Intermittent?"—A Problem Whatever the Word, <http://www.protectillinoisenvironment.com/intermittentenergy.htm> (last visited Apr. 1, 2008) (discussing the requirement for conventional energy backup systems to provide energy to the grid when turbines are not turning).

<sup>143</sup> See *id.* But see David Hopkins, *Storing Power Could Blow Away Intermittent Inefficiency Allegations*, EDIE.NET, Nov. 18, 2005, [http://www.edie.net/news/news\\_story.asp?id=10797&channel=0](http://www.edie.net/news/news_story.asp?id=10797&channel=0) (discussing a Canadian company's attempt to create a "proprietary [wind] energy storage system").

wind power into utility systems would be small.<sup>144</sup> Further research will undoubtedly address this important question.

Good wind sites having a high wind power classification are often located in remote places far from the high-density metropolitan areas that have high energy demands. The U.S. Wind Atlas reveals that many of the highest potential Class 6 and 7 wind areas are located in the Upper Midwest which are great distances from the closest population source.<sup>145</sup> These remote places are frequently not close to high-capacity utility transmission lines so that power connections must be constructed linking the wind electrical generators with the utility power grid. The high costs of this new connective infrastructure can create serious obstacles for wind power projects.<sup>146</sup> Even if they are able to connect, remotely located wind power sources may be charged high access fees to use the transmission lines. Furthermore, these lines may have limited transmission capacity which may have been allocated on a first-in-time principle having a discriminatory effect on new power generators like wind farms.<sup>147</sup>

## 2. Cost Competitiveness of Wind-Generated Electricity

The cost of producing wind power must be taken into account in the development of the energy technology. The economics of wind-generated electricity have changed enormously over the last quarter century, with costs being drastically reduced.<sup>148</sup> Improvements in turbine design and electronic controls have led to significant reductions in costs. For instance, the taller the tower and the larger the area swept by the rotor's blades, the more energy that can be produced by the wind turbine. Over the last two decades design improvements have significantly expanded the size of the rotors and their aerodynamic features, leading to huge increases in electricity generated and greatly lowered kWh costs.<sup>149</sup>

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<sup>144</sup> See American Wind Energy Agency, Wind Power & Transmission, Getting the Rules of the Road Right, [http://www.awea.org/windletter/wl\\_03june.html](http://www.awea.org/windletter/wl_03june.html) (last visited Apr. 1, 2008).

<sup>145</sup> ELLIOTT, WIND ENERGY RESOURCE ATLAS, *supra* note 29.

<sup>146</sup> ARJUN MAKHIJANI ET. AL, INST. FOR ENERGY AND ENVTL. RESEARCH, CASH CROP ON THE WIND FARM: A NEW MEXICO CASE STUDY OF THE COST, PRICE, AND VALUE OF WIND-GENERATED ELECTRICITY 15-17 (2004).

<sup>147</sup> *Id.*

<sup>148</sup> AM. WIND ENERGY ASSOC., THE ECONOMICS OF WIND ENERGY 1 (2005) [hereinafter ECONOMICS OF WIND ENERGY], available at <http://www.awea.org/pubs/factsheets/EconomicsOfWind-Feb2005.pdf>.

<sup>149</sup> *Id.* at 2.

However, even with these improvements the cost of wind energy varies greatly depending upon the wind speed at the site.<sup>150</sup> Most of the existing wind projects have attempted to harness the winds at the best sites (Class 6 & 7) with the lowest generation costs. Experts estimate that wind power electricity costs between 3 and 6 cents per kWh making wind power cost competitive to fossil fuel plants.<sup>151</sup> This would be especially true if fuel costs continue to rise. However, sites with lower wind speeds have higher generating costs making them less economically competitive. It is believed that subsidies are needed to make the Class 4 & 5 site electricity competitive.<sup>152</sup> Federal research is being funded to advance technological improvements in order to bring down the costs at these more common sites with lower wind speeds.<sup>153</sup> Also, larger wind farms can produce electricity more economically than smaller facilities due to economies of scale with operation and maintenance costs. Financing costs also play a role in making wind power more expensive per kWh. All of these factors makes it necessary, at present, for wind projects to receive federal tax credits to make their costs competitive with conventional utility-generated electricity.<sup>154</sup>

### 3. Potential Adverse Land Use Impacts of Wind Power Projects

The construction and operation of utility-sized projects presents a number of potential conflicts with neighboring land uses and residents.

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<sup>150</sup> *Id.* at 1.

<sup>151</sup> This estimate of between 3 and 6 cents per kWh accounts for the Production Tax Credit of 1.9 cents per kWh. ENVTL. & ENERGY STUDY INST., ENVIRONMENTAL ENERGY FACT SHEET 1 (2006), available at [http://www.eesi.org/publications/Fact%20Sheets/EC\\_Fact\\_Sheets/Wind\\_Energy.pdf](http://www.eesi.org/publications/Fact%20Sheets/EC_Fact_Sheets/Wind_Energy.pdf); see also ECONOMICS OF WIND ENERGY, *supra* note 148, at 1 (listing the price of wind energy between \$.026 to \$.048 per kWh at wind speeds between 9.32 mps and 7.15 mps respectively). DOE estimates the cost of wind power in Class 4 areas, which are the most common wide spread areas, is currently at \$.04-\$.09 per kWh. DOE's goal is to reduce this cost down to \$.036 per kWh by 2012. Department of Energy, Large Wind Technology: Goal, [http://www1.eere.energy.gov/windandhydro/wind\\_low\\_speed.html](http://www1.eere.energy.gov/windandhydro/wind_low_speed.html) (last visited Apr. 1, 2008).

<sup>152</sup> See ECONOMICS OF WIND ENERGY, *supra* note 148 at 4 (discussing the requirement for federal tax code incentives to help level the playing field for wind energy projects, and acknowledging the potential on-again, off-again nature of this incentive).

<sup>153</sup> See STAN CALVERT ET AL., LOW WIND SPEED TECHNOLOGY DEVELOPMENT IN THE U.S. DEPARTMENT OF ENERGY WIND ENERGY RESEARCH PROGRAM (2002).

<sup>154</sup> See ECONOMICS OF WIND ENERGY, *supra* note 148, at 1-5.

As with any large-scale energy generation project, existing land use patterns are proposed to be changed or affected by the new energy development. During the construction phase of a wind power facility there could be direct impacts to the following interests: the underlying geology, soil erosion, site runoff and water quality, airborne dust, noise, wildlife habitat, fish and wildlife species, visual resources, increased traffic and occupational construction hazards, and the loss of cultural resources.<sup>155</sup> Once the project is operating, the most prominent concerns include: the aesthetic or visual impact of a large number of wind turbines,<sup>156</sup> interference with communications,<sup>157</sup> shadow flicker,<sup>158</sup> the noise produced by rotating blades,<sup>159</sup> effect on hunting and other forms of recreation,<sup>160</sup> health effects of low-frequency sound,<sup>161</sup> impact on aircraft communications, radar navigation and surveillance systems,<sup>162</sup> safety issues<sup>163</sup> and ice throws from

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<sup>155</sup> See WASH. DEP'T OF FISH & WILDLIFE, WINDPOWER GUIDELINES 1-2 (2003), available at [http://wdfw.wa.gov/hab/engineer/windpower/wind\\_power\\_guidelines.pdf](http://wdfw.wa.gov/hab/engineer/windpower/wind_power_guidelines.pdf); see also THE REG'L MUN. OF NIAGARA, WIND POWER GENERATION 2-3 (2005), available at [http://www.regional.niagara.on.ca/government/initiatives/wwpd/pdf/display%20Panels\\_4\\_5\\_6.pdf](http://www.regional.niagara.on.ca/government/initiatives/wwpd/pdf/display%20Panels_4_5_6.pdf).

<sup>156</sup> See Rod Thompson, *Wind Turbine Lights Have Opponents Seeing Sparks*, STAR BULL. (Honolulu, HI), May 20, 2006, available at <http://starbulletin.com/2006/05/20/news/story06.html>; American Wind Energy Association, Wind Energy and the Environment, [http://www.awea.org/faq/wwt\\_environment.html#Visual%20impacts](http://www.awea.org/faq/wwt_environment.html#Visual%20impacts) (last visited Apr. 1, 2008) [hereinafter Wind Energy and the Environment].

<sup>157</sup> See Memorandum from Kristen Burke, MTC-Renewable Energy Trust to Whitney Wilson, Black & Veatch, Interference of Wind Turbines with Wide Area Communications (June 25, 2006), available at [http://www.mtpc.org/Project%20Deliverables/Comm\\_Wind/Eastham/Eastham\\_Cell\\_Tower\\_Analysis.pdf](http://www.mtpc.org/Project%20Deliverables/Comm_Wind/Eastham/Eastham_Cell_Tower_Analysis.pdf).

<sup>158</sup> See Danish Wind Industry Association, Shadow Casting from Wind Turbines, <http://www.windpower.org/en/tour/env/shadow/index.htm> (last visited Apr. 1, 2008).

<sup>159</sup> See AM. WIND ENERGY ASSOC., FACTS ABOUT WIND ENERGY AND NOISE 1-4 (2007), available at [http://www.awea.org/pubs/factsheets/WE\\_Noise.pdf](http://www.awea.org/pubs/factsheets/WE_Noise.pdf).

<sup>160</sup> See VT. AGENCY OF NATURAL RES., LAND USE AND RECREATIONAL IMPACTS OF WIND ENERGY 15-16 (2004), available at [http://www.vermontwindpolicy.org/workingpapers/recreational\\_impact.pdf](http://www.vermontwindpolicy.org/workingpapers/recreational_impact.pdf).

<sup>161</sup> See BRITISH WIND ENERGY ASSOC., LOW FREQUENCY NOISE AND WIND TURBINES 1-2 (2005), available at [http://www.bwea.com/pdf/briefings/lfn\\_summary.pdf](http://www.bwea.com/pdf/briefings/lfn_summary.pdf); Unpublished Letter from Nina Pierpont, M.D., Ph.D., on Health Effects of Wind Turbine Noise (Mar. 2, 2006), available at [http://www.ninapierpont.com/pdf/Health\\_effects\\_of\\_wind\\_turbine\\_noise\\_3-2-06.pdf](http://www.ninapierpont.com/pdf/Health_effects_of_wind_turbine_noise_3-2-06.pdf).

<sup>162</sup> See Massachusetts Technology Collaborative, Renewable Energy Trust, Airspace Issues in Wind Turbine Siting, [http://www.mtpc.org/rebates/Community\\_Wind/faaa airspace.html](http://www.mtpc.org/rebates/Community_Wind/faaa airspace.html) (last visited Apr. 1, 2008).

<sup>163</sup> See Paul Gipe, *Contemporary Mortality (Death) Rates in Wind Energy* (2001), <http://www.wind-works.org/articles/BreathLife.html>.

the blades of turbines.<sup>164</sup> In addition, some have criticized wind power for potential adverse effects on adjacent property values, although recent analysis has not borne this out.<sup>165</sup> As research and experience with wind power technology become increasingly available, it is possible to separate verifiable claims of harm from those without basis in fact.

#### 4. Adverse Environmental Effects of Wind Energy Development

Although wind power plants have a relatively small environmental “footprint” in comparison with conventional fossil fuel generating facilities, there are some negative effects that impact the environment. Some significant questions have been raised by opponents of wind power projects identifying potential environmental, natural resource and land use issues that may arise if these renewable energy projects are constructed and operated in particular locations. Some of these issues are similar to those noted as land use impacts and include questions about the noise produced by rotating blades,<sup>166</sup> the aesthetic or visual impact of a large number of wind turbines,<sup>167</sup> and the effect on resident or migrating birds and bat populations<sup>168</sup> and other flora and fauna.<sup>169</sup> Bird and bat deaths from collisions with wind energy projects have received significant study and analysis.<sup>170</sup> These two factors have been emphasized by opponents of the wind projects.

These environmental and land use concerns reflect the inevitable fact that wind energy projects, though possessing environmentally “green” characteristics, potentially can harm other environmental, health and safety values. This should be no surprise because all new technologies impose costs and benefits upon the society adopting them. The crucial

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<sup>164</sup> IfNotWind.org, Wind Energy Facts & Myths, <http://www.ifnotwind.org/myths/myth-notsafe.shtml> (last visited Apr. 1, 2008).

<sup>165</sup> See Letter from Michael L.S. Bergey, President, Bergey Wind Power Co. addressing “Does a Small Wind Turbine Installation Diminish Property Values?” (Apr. 23, 1997), available at <http://www.awea.org/faq/propvalue.html>.

<sup>166</sup> See *supra* notes 159, 161.

<sup>167</sup> See *supra* note 156.

<sup>168</sup> See Wind Energy and the Environment, *supra* note 156.

<sup>169</sup> See W. DIXIE DEAN, WIND TURBINE MECHANICAL VIBRATIONS: POTENTIAL ENVIRONMENTAL THREAT 1-3 (2007), available at [http://www.sosmoray.org.uk/Dixie\\_dean.pdf](http://www.sosmoray.org.uk/Dixie_dean.pdf).

<sup>170</sup> But see Carl Levesque, *For the Birds: Audubon Society Stands Up in Support of Wind Power*, RENEWABLE ENERGY WORLD, Dec. 14, 2007, available at <http://www.renewableenergyworld.com/rea/news/story?id=46840> (arguing that avian impacts have been overstated and newer turbine technologies affect fewer birds).

judgment to be made when evaluating them is a determination that contrasts the advantages and disadvantages of adopting and installing the technology. Unfortunately, in permitting proceedings, supporters and opponents assert speculative claims of siting impact often without solid supporting evidence. This should not be surprising, given that acquisition of this data is often costly and obtainable only from expert studies. As a result, allegations of benefit and harm are frequently made in the context of an emotionally-charged siting proceeding with a developer's application sometimes being met with little more than opponents' beliefs about the harmful effects. In the end, the siting decisionmaker must sort through the competing claims and exercise its permitting discretion to approve or deny the proposal. The one-sidedness or weakness of information is but one problem associated with controversial siting decisions.<sup>171</sup> Equally important is the need to design a decisionmaking process that will reach a reasoned decision in a socially and politically acceptable way. The next portion of this Article discusses that issue.

### III. MULTIPLE THEORIES FOR THE REGULATION OF WIND POWER SITING

#### A.

##### *Why Not Federal Supremacy with Wind Power Siting?*

While wind power has been used to generate electrical power on a utility scale for over twenty-five years, siting decisions have been the province of state government. As a result, each state has developed its own approach to licensing, making siting rules variable from state to state.<sup>172</sup> This should not be surprising because Congress has not passed legislation imposing overall federal preemption of energy facility siting in America. Could wind power siting be made the exclusive province of the federal government with an agency "federalizing" the wind farm siting process under specific legislative authority? Would this exercise in federal supremacy be desirable to expand wind power in America?

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<sup>171</sup> Occasionally, the governing body's consideration of impact data is not crucial to the viability of a wind power project. In these cases, the overall economics of the project, not opponents' arguments, will scuttle the project regardless of other arguments. See Mark Harrington, *Green vs. Green: Environmental Activists Differed on LIPA's Offshore Wind Farm Proposal*, NEWSDAY, Aug. 29, 2007, at A43. (discussing abandonment of a Long Island Power Authority offshore project for cost reasons). In this instance, the project is terminated by its sponsor, not a permitting authority.

<sup>172</sup> See *infra* Part III.B.

Assuming such a federal authority could be justified under the Interstate Commerce Clause of the U.S. Constitution,<sup>173</sup> it is possible that wind power siting decisions could be made by a federal agency under federal law. Analogies where federal law have preempted state law in matters of facility siting do exist. For instance, §704 of the 1996 Telecommunications Act dealt with the local government regulation of the location of cellular telephone towers.<sup>174</sup> There, to neutralize local NIMBY (Not in My Backyard) sentiment that would block the establishment of a national communications network, Congress recognized limited substantive grounds for the denial of local siting permission. In addition, it created federal court jurisdiction to consider rejected or delayed siting requests and to order approval.<sup>175</sup> A second example exists in a relatively obscure area of federal energy policy. The 2005 Energy Policy Act provided similar preemptive policy for the siting of Liquefied Natural Gas (“LNG”) storage facilities<sup>176</sup> and for the establishment of National Interest Electric Transmission Corridors.<sup>177</sup> The impact of these two energy laws just has begun to be felt as LNG and electrical transmission proposals are considered under their mandates.<sup>178</sup> Taken together, these three statutes reflect contemporary congressional action expressing strong federal preferences and demonstrating an attitude that state and local decisionmaking processes should not interfere with important, national energy and communication needs.

With that being said, federal preemption for wind power siting is not presently part of the federal law and is not likely to be in the future. The practice of state and local government supremacy over direct land utilization has strong support in American concepts of federalism and enacting federal preemption would interfere with traditional land use control authority and would likely be very politically unpopular in many

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<sup>173</sup> U.S. CONST. art. I, § 8, cl. 3.

<sup>174</sup> Telecommunications Act of 1996, Pub. L. No. 104-104, § 704, 110 Stat. 56, 151 (amending 47 U.S.C. § 332 (2000)).

<sup>175</sup> *Id.*

<sup>176</sup> 15 U.S.C. § 717b(e)(1) (Supp. V 2005).

<sup>177</sup> Federal Power Act § 216(a), 16 U.S.C. § 824p(a) (Supp. V 2005).

<sup>178</sup> See Steven J. Eagle, *Securing a Reliable Electricity Grid: A New Era in Transmission Siting Regulation?*, 73 TENN. L. REV. 1, 38 (2005) (noting the uncertainty of how liberally the government will apply the statute in designating transmission corridors); Joshua P. Fershee, *Misguided Energy: Why Recent Legislative, Regulatory, and Market Initiatives are Insufficient to Improve the U.S. Energy Infrastructure*, 44 HARV. J. ON LEGIS. 327, 357 (2007) (exploring the scope of “exclusive” federal jurisdiction over LNG siting). See generally James B. Lebeck, *Liquefied Natural Gas Terminals, Community Decisionmaking, and the 2005 Energy Policy Act*, 85 TEX. L. REV. 243 (2006) (discussing the LNG siting legislation and its impact on local communities).

parts of the United States.<sup>179</sup> In political terms, such a step to federalize wind power siting could be viewed as a federal power grab impinging on local democratic decisionmaking.<sup>180</sup> In the current environment, the political costs of such an approach would appear to exceed any possible benefit. Such an expansion of federal control over energy facility siting could only be conceivable in the most extreme circumstances of national energy or environmental emergency.

Our tradition has left the states largely on their own in establishing both their utility rates and their facility siting rules. Although the federal government has become increasingly interested in energy matters, its involvement has mainly concerned national, large-scale policies—not individual project location. It has supported renewable energy (including wind power) through a range of economic incentives, research support and federal land policies.<sup>181</sup> However, the states and their localities have exercised primary control over wind farm siting on non-federal land using their traditional, police-power-based land use controls. Within this state-dominated system, a single governmental entity usually has the primary permitting authority even if several agencies are involved.

*B. Fashioning a State or Local Government Approach to Wind Power Siting*

With increasing policy support for wind power at both the state and federal levels, there is an increasing demand for the siting of wind power projects.<sup>182</sup> If a federally preemptive approach is not likely, how should wind energy siting be regulated so as to encourage project development at the optimal or “best” sites? In order to make this appraisal, it is necessary to review the current patterns in wind power siting law and

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<sup>179</sup> Similar attempts to vest the EPA with facility-siting powers for shopping malls, stadiums and other large automobile-attracting structures under the Clean Air Act met strong political resistance over twenty years ago. See Robert E. Yuhnke, *The Amendments to Reform Transportation Planning in the Clean Air Act Amendments of 1990*, 5 TUL. ENVTL. L.J. 239, 243 (1991).

<sup>180</sup> The wind power industry has been characterized as destructive and exploitative by some of its critics. See, e.g., Stanley Fish, Op-Ed., “Blowin’ in the Wind,” N.Y. TIMES, Aug. 26, 2007, available at [http://fish.blogs.nytimes.com/2007/08/26/blowin ?in ?the ?wind/](http://fish.blogs.nytimes.com/2007/08/26/blowin%20in%20the%20wind/).

<sup>181</sup> See NAT’L GOVERNORS’ ASS’N, NATURAL RESOURCES COMM., NR-18 COMPREHENSIVE NATIONAL ENERGY AND ELECTRICITY POLICY (2007), available at <http://www.nga.org/portal/site/nga/menuitem.8358ec82f5b198d18a278110501010a0/?vgnnextoid=2a2b9e2f1b091010VgnVCM1000001a01010aRCRD> (calling for continued federal support and incentives for renewable energy).

<sup>182</sup> See *supra* Part I.

policy to determine if a desirable model approach already exists or if one could be developed to serve as a national model. Because the federal government has not exercised control over the siting process, the variations employed by the states must be examined.

1. State Variation #1—Local Government Control Through Conventional Land Use Controls and Procedures. Examples: Oregon,<sup>183</sup> Illinois,<sup>184</sup> Kansas (with Kansas Energy Council voluntary guidelines),<sup>185</sup> Texas,<sup>186</sup> Idaho,<sup>187</sup> North Carolina,<sup>188</sup> New Hampshire,<sup>189</sup> Iowa,<sup>190</sup> Utah,<sup>191</sup> Nevada,<sup>192</sup> and Colorado.<sup>193</sup>

The first approach applies traditional police power regulation to project siting through conventional zoning and land use control law.<sup>194</sup> It is the most “local” regulatory approach being implemented by local planning commissions, zoning boards, city councils and county boards. This city or county consideration of a wind power development proposal would, in theory, be a reflection of local preferences and interests.<sup>195</sup> General

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<sup>183</sup> Oregon Wind Working Group, <http://www.oregon.gov/ENERGY/RENEW/Wind/OWWG/OWWG.shtml> (last visited Apr. 1, 2008).

<sup>184</sup> WINDUSTRY, W. ILL. UNIV., *HARVEST THE WIND: A WIND ENERGY HANDBOOK FOR ILLINOIS* (2004).

<sup>185</sup> KAN. ENERGY COUNCIL, *WIND ENERGY SITING HANDBOOK* (2005).

<sup>186</sup> TEX. UTIL. CODE ANN. §§ 25.101-25.113 (Vernon 2007) (describing certification, licensing, and registration of power facilities).

<sup>187</sup> See IOWA CODE ANN. §§ 476A, 478 (West 2007) (giving the Iowa Public Utilities Board jurisdiction to certify electrical generators and transmission lines).

<sup>188</sup> See North Carolina Utilities Commission, *Electric Light and Power*, <http://www.ncuc.commerce.state.nc.us/ncrules/Chapter08.pdf> (detailing the regulations for establishing a power facility).

<sup>189</sup> N.H. REV. STAT. ANN. §§ 362-A:1-a, 362-A:9 (2007).

<sup>190</sup> Iowa Energy Center, *Renewable Energy*, <http://www.energy.iastate.edu/Renewable/wind/wem-index.htm> (last visited Apr. 1, 2008) (detailing the decisionmaking process of building wind power in Iowa).

<sup>191</sup> See Utah Wind Working Group, <http://geology.utah.gov/sep/wind/uwwg/index.htm> (last visited Apr. 1, 2008) (detailing the decisionmaking process of building wind power in Utah); see also Spanish Fork, Utah Supplementary Zoning Regulation 15.3.24.090.I, available at <http://www.spanishfork.org/dept/econdev/zoning/pdf/TITLE15.pdf>.

<sup>192</sup> See NEV. REV. STAT. ANN. § 704B (West 2007) (regulating new providers of electricity).

<sup>193</sup> 4 COLO. CODE REGS. § 723-3 (2007) (Public Utilities Commission regulations).

<sup>194</sup> JULIAN C. JUERGENSMEYER & THOMAS E. ROBERTS, *LAND USE PLANNING AND DEVELOPMENT REGULATION LAW* 604-06 (2d ed. 2007) (discussing agricultural land use control).

<sup>195</sup> Often, local opinion is strongest in residents living nearby the newly proposed facility who feel that the wind project will irreparably harm the local scenic environment. See,

zoning procedures and techniques would be applied to evaluate the wind farm proposals often occupying large areas with many turbines. Rural communities have general land use controls designed to cope with rural densities and agricultural or ranching economies. These are often general in nature and do not have specific provisions to cope with the location issues presented by wind power.

The regulation of wind power proposals with local zoning and land use control techniques does hold some advantage. Local decisionmaking employing this method has one principal virtue: the speed of the process in a jurisdiction that welcomes the wind farm project. Recent experience suggests that project approvals can be received in less than twelve months in communities welcoming the wind farms.<sup>196</sup> Though this outcome may be fast, it may not be best for the local community in the long run if project impacts are not properly assessed or if permitting conditions are not attached that protect the community's long-term interests. Furthermore, an expeditious or hurried approval might not consider significant regional or statewide interests in the calculus. Local zoning decisions can be little more than project "popularity contests" driven by the prevalent popular sentiment. These decisions are often discretionary in nature and they are frequently made by public bodies without explanation or reason. A project rejection grounded on such a discretionary determination—rendered in a non-transparent and non-policy-based fashion—would be difficult to comprehend. It would also be difficult to challenge in court.

Because most wind power proposals involve rural land in small communities,<sup>197</sup> the consideration of wind farm permitting would be the responsibility of rural local governments that often have limited resources. These communities would not have extensive planning resources or personnel with which to evaluate wind power siting proposals. Wind power applicants, on the other hand, will be well funded and represented by specialized attorneys and consultants who will present their projects in the

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*e.g.*, Danielle Ulman, *Emotions Run High in Windfarm Debate: 40-story Turbines in Western Maryland?*, MD. DAILY REC., Feb. 1, 2008, available at <http://www.mddailyrecord.com/article.cfm?id=4224&type=UTTM> (discussing how a wind project on state forest land is viewed as breaking "a sacred trust").

<sup>196</sup> See, *e.g.*, Bill Draper, *Task Force Grapples with Wind Farm Development as Deadline Nears*, DODGE CITY DAILY GLOBE (Kan.), Apr. 17, 2004, available at [http://www.dodgeglobe.com/stories/041704/ag\\_0417040074.shtml](http://www.dodgeglobe.com/stories/041704/ag_0417040074.shtml) (detailing the local decisionmaking and opposition to wind farms); *Tribe Looks at Wind Farm Development*, BISMARCK TRIB., Aug. 21, 2006, available at <http://www.bismarcktribune.com/articles/2006/08/21/news/local/119486.txt>.

<sup>197</sup> U.S. DEP'T OF ENERGY, WIND ENERGY FOR RURAL ECONOMIC DEVELOPMENT 3 (2004).

most positive light possible.<sup>198</sup> With this expert project design and advocacy, wind power applications could engender one of two reactions. The local land use planning officials could be overwhelmed by sophisticated applicants and their consultants, leading to quick project approval with limited analysis and few protective conditions. Alternatively, the local community could turn against the wind power project, persuaded that it would harm their community more than it would benefit it. If it took this approach, the community could use its highly discretionary zoning authority as a “blocking” power to deny a proposal also without a careful, fact-based appraisal. Under most states’ land use law, local governments are accorded wide-ranging latitude that is often difficult to challenge in court due to its discretionary nature.

2. State Variation #2—State/Local Government Hybrid Approach. Examples: Montana,<sup>199</sup> Washington (Washington Energy Facility Site Evaluation Council for any renewable energy facility that chooses to participate in its review process/ otherwise local governments permit),<sup>200</sup> New Mexico,<sup>201</sup> California,<sup>202</sup> and Wisconsin (Wisconsin Public Service Commission model wind ordinance for wind facilities >100 kW).<sup>203</sup>

This second approach to wind power siting approval represents an attitude of “shared responsibility” that provides local governments, planners and citizens with expert state-level guidance to assist them in making a more careful assessment of wind facility applications. This approach is superior to that of State Variation #1 in that it assists rural localities by providing a structured means of assessing the wind power developer’s siting request.

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<sup>198</sup> See, e.g., Claudia H. Deutsch, *Corporate Sponsorship for a Wind Farm*, N.Y. TIMES, Mar. 18, 2008, available at <http://www.nytimes.com/2008/03/18/business/18steel.html> (detailing the rush of corporate money into developing wind farms).

<sup>199</sup> MONT. CODE ANN. §§ 38.5.8001-38.5.8002 (2007).

<sup>200</sup> WASH. REV. CODE ANN. §§ 80.50.010-80.50.904 (West 2007).

<sup>201</sup> N.M. STAT. ANN. §§ 62-16-1 et seq. (West 2007) (New Mexico Renewable Energy Act to approve renewable projects).

<sup>202</sup> California Public Utilities Commission, General Order Number 167, Enforcement of Maintenance and Operation Standards for Electric Generating Facilities, [http://docs.cpuc.ca.gov/published/GENERAL\\_ORDER/56871.htm](http://docs.cpuc.ca.gov/published/GENERAL_ORDER/56871.htm) (last visited Apr. 1, 2008).

<sup>203</sup> WIS. DEPT OF ADMIN., DRAFT MODEL WIND ORDINANCE FOR WISCONSIN (2007), available at <http://www.doa.state.wi.us/docview.asp?docid=2869&locid=5>.

This approach consists of a number of alternatives. First, state agencies can produce voluntary guidelines, checklists and technical resources for local governments to aid them in their evaluation of siting wind projects. Second, some states have provided model ordinances for local governments to apply to wind power project approval requests.<sup>204</sup> Third, some local governments have adopted wind power siting rules either following state models or individually with the assistance of state agency personnel.<sup>205</sup> In addition, they have conducted their analysis of wind power siting requests with technical assistance from state agency personnel who have assisted local land use planning officials.<sup>206</sup>

3. State Variation #3—State Agency Siting Process: Mandatory State Agency Control. Examples: Connecticut (Connecticut Siting Council for renewable sources >1 MW),<sup>207</sup> Massachusetts (Massachusetts Energy Facilities Siting Board for electrical generating plants >100 MW),<sup>208</sup> Oregon (Oregon Energy Facility Siting Council for wind energy facilities >105 MW),<sup>209</sup> Vermont (Vermont Public Service Board for all new electrical generation),<sup>210</sup> Maine,<sup>211</sup> Virginia (Virginia Corporations Commission),<sup>212</sup> and Minnesota (Minnesota Public Utilities Commission for facilities >5 MW).<sup>213</sup>

In this variation, the authority to consider wind power siting requests is lodged at the state level of government and not with local governments. The permitting responsibility is vested in either a specialized

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<sup>204</sup> See, e.g., WIS. MODEL WIND ORDINANCE FOR TOWNS/COUNTIES (2007), available at [http://www.doa.state.wi.us/docs\\_view2.asp?docid=2869](http://www.doa.state.wi.us/docs_view2.asp?docid=2869).

<sup>205</sup> See, e.g., Anne Marie Ames, *Rock County Towns Trying to Tackle the Wind*, JANESVILLE GAZETTE (Wis.), Oct. 13, 2007, available at [http://www.gazetteextra.com/windfarms\\_rockco101307.asp](http://www.gazetteextra.com/windfarms_rockco101307.asp).

<sup>206</sup> See, e.g., *id.*

<sup>207</sup> CONN. GEN. STAT. ANN. §§ 16-50(g)-(ee) (West 2007) (statutes establishing the Connecticut Siting Council that regulates all electric generators over 1 MW).

<sup>208</sup> MASS. GEN. LAWS ANN. ch. 30A (West 2007); see also MASS. ENERGY FACILITIES SITING BD., THE ENERGY FACILITIES SITING HANDBOOK (2007).

<sup>209</sup> OR. REV. STAT. ANN. §§ 469.300-469.560 (West 2007).

<sup>210</sup> VT. STAT. ANN. tit. 30 § 248 (2007) (requirements for all electrical generation and transmission facilities).

<sup>211</sup> ME. REV. STAT. ANN. tit. 35-A, § 3402-4 (2007).

<sup>212</sup> Virginia Corporations Committee, Division of Energy Regulations, <http://www.scc.virginia.gov/pue/guide.aspx> (last visited Apr. 1, 2008).

<sup>213</sup> MINN. STAT. ANN. § 116C.691-116C.697 (West 2007).

energy facility siting agency or a general agency of state government. The state government authority has the final word on whether the project will or will not be built. The agency would also impose construction and operating conditions and perhaps maintain permit enforcement responsibility. The agency involved would be state level and would have general expertise in assessing siting questions from a broader, statewide perspective. Elevating decisionmaking to a state-level entity removes the siting issue from the vagaries of local land use practices.

State agencies can formulate a more structured process for consideration of siting approval following a model of decisionmaking having an information-based assessment, a hearing and a final decision. With this clear administrative structure, interested parties would have a better idea of the basis for the decision to approve or disapprove of the siting proposal. In addition, the state agency would be more likely to have the institutional competence to assess the project's impacts. Its personnel would be more likely to have the education and training in general environmental impact analysis as well as in the analysis of socioeconomic, cultural resource and utility engineering considerations. In theory, such a state agency would be more "objective" in its review and would base its final decision on an administrative record. The state-level permitting process could implement an information-gathering and decisional process that would allow for participation by the affected local government, citizens, organizations and the applicant.

State administrative law would provide various levels of administrative appeal and judicial review to the applicant, local government, interest groups and individual citizens following the state agency decision. This part of the process would be governed by general state administrative law or by specific state wind siting legislation and could provide for broad or narrow opportunity for judicial oversight of the siting decision.

#### IV. DESIGNING THE OPTIMAL WIND POWER SITING PROCESS: PRE-CONSTRUCTION REVIEW OF WIND POWER PROJECT PROPOSALS

##### A.

##### *Dealing with a High Volume of Future Siting Requests*

The prior section shows that multiple approaches have been adopted around the nation for the assessment and permitting of wind power facilities and that no national model exists.<sup>214</sup> Recent data on American wind

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<sup>214</sup> A few sources of permitting information do exist but often they are dated and do not suggest an adequate means for dealing with the large, multi-turbine wind facilities being

turbine installations indicate that siting has rapidly accelerated, with a 45% increase in the nation's wind power generating capacity in 2007 alone.<sup>215</sup> While proponents of renewable power may trumpet this fact as an indication of success for clean, non-polluting energy, project opponents believe just the opposite, feeling that the adoption of wind power is a short-sighted, "feel-good" action reflecting poor decisionmaking with adverse consequences.<sup>216</sup> These project opponents often criticize individual project proposals as inappropriate land use decisions.

Viewing wind power siting as a complex example of land use allocation, public policy must be developed to decide fairly and efficiently where wind power facilities may be built. Land use power has traditionally been the province of the local community acting through its governmental zoning system. In general, zoning has been used to separate incompatible land use activities and to guide the physical development of the locality. This important local power has been jealously guarded and defended against criticisms that these controls work in an unfair, exclusionary fashion, keeping out much-needed land uses.<sup>217</sup> With zoning being employed to advance narrowly defined local preferences, conventional land use practices have been accused of ignoring regional or statewide concerns.

As a result, it is necessary to design a model wind power siting process useful for the location of projects that will be proposed in the future. The main objectives of such a process should be: 1) to provide the best substantive decision based upon the most concrete and verifiable data, and 2) to reach the decision while taking into account the concerns of governments, interested groups and individuals.

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proposed currently by developers. See NAT'L WIND COORDINATING COMM., PERMITTING OF WIND ENERGY FACILITIES: A HANDBOOK 1-4 (2002).

<sup>215</sup> AWEA Press Release, *supra* note 98.

<sup>216</sup> For a representative statement of objections to expanding wind power, see Henry S.F. Cooper Jr., Op-Ed., *Idiot Wind*, N.Y. TIMES, June 3, 2007, available at <http://www.nytimes.com/2007/06/03/opinion/nyregionopinions/03WEcooper.html?scp=33&sq=wind+power&st=nyt> (commenting on New York wind power developments). Wind power project sponsors whose applications are rejected may also believe that the decisionmaking process is flawed.

<sup>217</sup> See, e.g., Robert L. Liberty, *Abolishing Exclusionary Zoning: A Natural Policy Alliance for Environmentalists and Affordable Housing Advocates*, 30 B.C. ENVTL. AFF. L. REV. 581, 581-82 (2002). Exclusionary zoning prohibits locally undesirable land uses, such as low-income housing, industrial facilities, landfills and communications towers. These land uses are clearly necessary and consistent with state and regional needs but are excluded through the operation of local zoning and other land use controls. *Id.*

## B. Preliminary Considerations

### 1.

#### Dividing Regulatory Authority

Initially it would be necessary to determine which wind power facilities would be subject to the model siting procedure. As the discussion in Part II mentions, wind turbines come in different sizes and shapes. It would be possible to maintain zoning control over the location of home- or ranch-sized wind turbines, and perhaps even community-scaled generating turbines. These structures could be sited using conventional land use control authorities and procedures by local government zoning bodies. Individual home-sized turbines could be regulated under a special or conditional use zoning format with site-specific impact analysis. Should problems develop with community acceptance of these limited wind power proposals, state zoning enabling law could be modified to create a more receptive legal climate for these renewable power devices.<sup>218</sup>

### 2. Selecting a Decisionmaking Body

A “lead” agency of state government should be designated as the wind power or energy facility siting agency. Elevating the decision to the state level would lessen local influence over the ultimate siting choice and would identify wind farm siting decisions as ones bearing on state or regional interests.<sup>219</sup> Although the local community’s role is relegated to a subordinate position in this new system, it still can be accommodated in the process described below. This agency should have the personnel and the institutional capacity to conduct a high-stakes and highly visible permitting proceeding. It should also be perceived as an “honest broker” without a clear-cut mandate or desire to fulfill developmental or preservationist

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<sup>218</sup> See, e.g., Matthew Bruun, *Neighbors Voice Wariness Over Plan for Wind Power*, WORCESTER TELEGRAPH (Ma.), Sep. 12, 2007, available at <http://www.telegram.com/article/20070912/NEWS/709120518/1007/RSS01&source=rss>; Sarah Schweitzer, *Turbines Create Fiery Wind*, BOSTON GLOBE, Sep. 9, 2007, at 1, available at [http://www.boston.com/news/local/articles/2007/09/09/turbines\\_create\\_fiery\\_wind](http://www.boston.com/news/local/articles/2007/09/09/turbines_create_fiery_wind).

<sup>219</sup> Vesting local government with primary siting responsibility could result in truly “provincial” decisions that ignore statewide concerns by either approving or denying siting approval. A “too favorable” locality could approve a large wind farm siting request that would fill local government tax coffers and increase farm rental income while at the same time damage significant state scenic or natural resource interests. On the other hand, a “too unfavorable” locality could reject similar proposals for vague, uncomfortable reasons while not considering statewide interests such as RPSs or other policies.

goals. Specifically, the agency must have the capacity to collect and assess project design and impact information in a coherent and defensible manner. Its decisions should be written in a clear and persuasive fashion. Establishing a well-conceived and effectively-working siting process is important so that proposals can be considered in a timely fashion without using delay as a means of stopping an otherwise desirable project. Because there is no common legislative model, the following elements outline the characteristics of a desirable state-level approach.

### 3. Identifying Macro Site Selection Features

A useful function of this siting agency could be the preparation of a landscape classification system that could be used in project planning to identify potentially developable or undevelopable wind power sites within the state. Such a classification scheme would be prepared in advance and could provide wind power developers, localities, citizens and government agencies an idea, in advance, of where wind turbines could best be sited. Some localities have already begun this process by pre-selecting sites and advertising them as potential wind power locations.<sup>220</sup> If the state agency were to assemble such a statewide database, it could start by mapping the location of commercially-usable wind resources within the state. This would be all lands in the state that are designated Class 3 or greater in DOE's Wind Energy Resource Atlas.<sup>221</sup> This information would be available from the wind resources mapping that has been undertaken by DOE and by state agencies.<sup>222</sup>

Next, certain sensitive land uses with significant environmental and natural resource values could be added to the database and mapped for visual display. These lands could include national parks, national wilderness, scenic, roadless and research natural areas, national wildlife refuges and similar state and local government lands. Other environmental or natural features could also be added to the database. The mapped information could provide both useful data for project developers and for

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<sup>220</sup> Some state agencies have already developed analytical methods for use in assessing wind energy projects and their impact on birds and bats. See N.Y. DEP'T OF ENVTL. CONSERVATION, GUIDELINES FOR CONDUCTING BIRD AND BAT STUDIES AT COMMERCIAL WIND ENERGY PROJECTS (2007), available at [http://www.dec.ny.gov/docs/fish\\_marine\\_pdf/drwindguide1207.pdf](http://www.dec.ny.gov/docs/fish_marine_pdf/drwindguide1207.pdf).

<sup>221</sup> See ELLIOT, WIND ENERGY RESOURCE ATLAS, *supra* note 29, at Table 1-1.

<sup>222</sup> See, e.g., MICHAEL BROWER, COMMONWEALTH OF VA. DEP'T OF MINES, MINERALS, AND ENERGY & U.S. DEP'T OF ENERGY, WIND RESOURCE MAPS OF VIRGINIA (2002), available at <http://vwec.cisat.jmu.edu/documents/Virginia%20Wind%20Mapping%20Report.pdf>.

state siting agency analysis. Such a display would highlight actual and potential conflicts between wind power projects and listed sensitive lands. Hopefully projects could be planned to avoid these areas and if they were proposed for sites in the vicinity of such areas, potential adverse impacts could be mitigated through careful project planning.

C. *Wind Power Siting Model*

1.

Process Structure: Pre-Submission Consultation

This phase would occur prior to the formal submission of a project application and represents an early opportunity for mutual information sharing between the regulatory decisionmaker and the wind power applicant. At this point, the state agency would explain the decisionmaking process to the applicant and specify the types of information that will be necessary to support the application. Information about state preferences, such as the database mentioned above, may also be available. This could be done in a three part classification system highlighting 1) protected areas that are not available, 2) areas with important environmental and natural resource values that must be carefully considered, or 3) those places designated as desirable facility locations presumptively available for wind power development.

The applicant could take this opportunity to make early contact with the local community and other stakeholders in order to explain project details and to build support for the proposal. Potential objections could be discussed and evaluated at this early point, thereby eliminating or reducing the likelihood of later objection. Local concerns could be factored into the actual project application before it is formally considered by the permitting agency.

2. Process Structure: Reviewing the Project Application

The agency would specify the composition of the wind power project application. The application should be detailed enough so that the agency can assess its impact on the region. This should be comprised of descriptive information, supporting studies and other data that are considered necessary for decisionmaking. The format of the information requested should be specified by the agency in advance so that the applicant can plan for, obtain and submit the necessary application support data.

Occasionally, state law would impose a decisional time limit on the agency's consideration of applications. These require that a decision

be rendered by the agency within a set time period such as six, nine, or twelve months after submission of a “complete” application. The actual application review process could also take various procedural forms which either emphasize or limit participation of the petitioner and outside parties. These could include public meetings, public evidentiary hearings and the submission of written opinion in a notice and comment administrative format.

### 3. Process Structure: Permit Decisionmaking

The permitting agency would have to make a complex series of choices when judging the wind power application. It would decide whether the wind project may proceed and, if so, what conditions must be observed during construction, operation and de-commissioning of the facility. As a result, the agency’s decision would be the issuance of a detailed permit—not a “yes/no” determination. The decisional process could follow the environmental impact statement or review model developed at the federal and state levels of government.<sup>223</sup> An important issue would be whether the wind power proposal would be subject to existing state environmental review mechanisms or whether it would be assessed solely by the wind power siting agency with a consultative relationship with other specialized agencies.<sup>224</sup> The usual Environmental Impact Statement (“EIS”) model would propose a general action and then consider the impacts of a number of particular siting variations, including a “no action” option. With the applicant submitting a siting proposal, the agency could require information on several alternatives. In its decision, the agency would review the submitted data (asking for supplementary information when needed), other agency, local government and citizen comments and then reach a judgment on the underlying request.

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<sup>223</sup> See generally JACOB I. BREGMAN, ENVIRONMENTAL IMPACT STATEMENTS (1999) (describing the different processes in producing a Federal Environmental Impact Statement under NEPA and various state models).

<sup>224</sup> This choice could be important in terms of the potential delay built into the siting review system. Requiring an EIS to be developed by the state’s environmental agency could subject the decision to a slower administrative process, to numerous procedural requirements, and to opportunities for judicial review that could delay even an approvable project. In the United Kingdom, governmental planning approval for wind farms imposed serious delays, and in response the government proposed planning legislation that would create a new Independent Planning Commission with jurisdiction over large wind farm approval. See Rebecca Bream & Fiona Harvey, *Planning Bill “Too Late, Too Weak,”* FIN. TIMES U.K., Feb. 5, 2008, at 4.

The EIS would be the principal means for evaluating the environmental and natural resource effects of the proposal. However, the state legislation authorizing this siting procedure would contain a list of factors, in addition to environmental effects, that would be relevant to the final agency permitting decision. These other statutory factors could be expressed in specific or general terms but they would establish a statutory basis for the permitting agency's consideration of the siting proposal. Public participation would also be integrated into this decisionmaking process in ways that could take different forms. The agency could accept written comments, critiques and questions from the public as well as conduct public meetings or hearings to hear opinions from the people living in the vicinity of the proposed facility.<sup>225</sup> In its final conclusion, the agency would consider the application in light of these factors and ultimately determine whether the decision was or was not "in the public interest."

#### 4. Process Structure: Appeal of the Permitting Decision

As with most state permits, this permitting process would be subject to the usual judicial review of the permitting decision provided under state law. As such, it would be governed by the state's administrative law principles and jurisdictional requisites and this would vary from state to state. The state legislation establishing the wind power siting process should include guidance on the availability of judicial review as a general matter, as well as specific issues such as standing, venue, standard of review and finality. It should keep in mind that if the permit challenge raises issues of federal law involving claims arising under the National Environmental Policy Act, the Endangered Species Act, the Migratory Bird Act or the National Historic Preservation Act, independent review of these federal issues could occur in federal court unconstrained by state legislation.

#### 5. Process Structure: Ensuring Compliance with Permit Conditions

The permitting process should consider the project's "life cycle" from construction and operation through the closure and de-commissioning or

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<sup>225</sup> The agency must strike a balance between the usefulness of community involvement and the adverse effects created by such participation. Unlimited public participation in the decisionmaking process may delay the procedure without providing any additional benefits. See Jim Rossi, *Participation Run Amok: The Costs of Mass Participation for Deliberative Agency Decisionmaking*, 92 NW. U. L. REV. 173, 214 (1997).

re-powering of the facility. As with any permitting process, the issued permit must consider different phases of the project's life and must have specified performance conditions contained in that permit. A unit of government must be assigned the responsibility of enforcing the permit and overseeing compliance throughout the project's life cycle. Just as with any environmental or industrial operational permit, this state agency must determine compliance with the permit conditions and bring enforcement actions to rectify any episodes of wind farm non-compliance.

Of particular importance in the permitting process is the closure or de-commissioning phase of the project's life cycle. At the conclusion of their useful life, wind power facilities must be disassembled and the site restored to its pre-construction conditions or other conditions specified in the permit. Wind project applicants must provide financial assurance to the state that these steps are properly funded with performance bonds, letters of credit or other corporate guarantees. Having this financial assurance will prevent the unfortunate situation of localities having abandoned facilities in their midst without available resources to carry out proper de-commissioning.

#### CONCLUSION

America faces important energy policy questions. Will energy supply be diversified? Where will new electrical generation facilities be located? The answers to these questions will depend upon a number of factors: the distribution of electrical demand or load centers, the availability of transmission capacity, fuel supply, effects of fuel use, site characteristics and the political acceptability of new energy technology. Wind power represents one of the promising energy technologies that can assist in both the expansion of future electrical supply and also the shift away from carbon-emitted energy sources. To do this, many utility-scale wind farms must be sited both on land and offshore of the United States. As the prior discussion indicates, a shift to greater reliance on wind power will not be without its adverse aspects. However, no complex, technological change is cost-free. Rather, a shift to a new form of energy will require socially-agreed-upon trade-offs. This Article attempts to establish a process for making those trade-offs. Only the future will tell whether our society finds acceptable ways to make these complicated balances.