University of Dayton Law Review

Volume 32 | Number 3 Article 4

4-1-2007

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Cover Page Footnote

The author wishes to thank his wife for her love and support (another inexhaustible resource); his father for introducing him to this topic; Susan Elliott for her encouragement; and the Editors, especially Kimberly Bakota, for their instrumental work on this comment.

WIND POWER AND THE RENEWABLE PORTFOLIO STANDARD: AN OHIO ANALYSIS

Christopher E. Cotter[*]

I. INTRODUCTION

Wind power is the fastest-growing energy resource in the world.[1] Created by capturing wind as it moves naturally across the earth, wind power is a clean and renewable fuel source.[2] Since the United States has an abundance of wind resources, wind power is also a domestic fuel source, not dependent on overseas imports.[3] This emerging alternative energy source promises to create new jobs, increase national security, stabilize fuel prices, help struggling rural economies, and ensure a cleaner environment.[4]

Some have questioned whether wind power can fulfill these promises and, if so, whether those benefits justify the installation of wind turbines in our communities, along scenic mountain ridges, and off our coasts. Wind power is controversial, "touch[ing] on a number of social and economic issues."[5] These issues relate to property values, environmental preservation, animal rights, economics, and foreign policy.

Wind power currently supplies less than 1% of electricity consumption in the United States.[6] However, wind power could potentially supply about 20% of the nation's electricity.[7] Both state and federal lawmakers have enacted legislation aimed at increasing the development of wind power.[8] These incentives include tax breaks, grants, and a policy known as the Renewable Portfolio Standard ("RPS" or "RPS policy").[9] An RPS policy requires electricity retailers to purchase a minimum level of

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[1] Robert Y. Redlinger et al., *Wind Energy in the 21st Century* 215 (Palgrave 2002).

[2] *See generally* Neil Schlager & Jayne Weisblatt, *Alternative Energy* vol. 3, 317-23, 330 (Thompson Gale 2006).

[3] *Id.* at 330.

[4] *Id.*

[5] Interstate Energy Renewable Council, *OHIO—Wind Turbine Project Takes Flight at High School*, http://www.irecusa.org/articles/static/1/1159215915_1051597266.html (Sept. 25, 2006).

[6] Am. Wind Energy Assn., *Wind Power Today* 2, http://awea.org/pubs/factsheets/WindPowerToday_2007.pdf (2007) [hereinafter AWEA, *Wind Power Today*].

[7] *Id.*; Schlager & Weisblatt, *supra* n. 2, at 329.

[8] *See* Redlinger et al., *supra* n. 1, at 182-93.

[9] *Id.*

renewable energy, such as wind power.[10] Twenty-two states and the District of Columbia have enacted RPS policies.[11] Although the U.S. Senate has passed two energy bills containing an RPS policy, the bills' final forms did not include an RPS.[12] In 2003, members of the Ohio General Assembly proposed an RPS bill that would have required 20% of electricity sales in Ohio to come from renewable energy.[13] Ohio does not currently have an RPS policy in place.[14]

Since RPS policies could allow wind power to emerge as a "viable mainstream electricity source," and since the obstacles surrounding wind power are both "substantial and complex," this comment analyzes whether Ohio should encourage the development of wind power within its borders, particularly with respect to an RPS policy.[15] To analyze this issue, it is important to understand both wind power and the RPS. Thus, in section II, this article explains how wind power works, the forms of wind power, its historical development, and where it is located today. It also explores some of the most significant and heated controversies surrounding the development of wind power. Finally, the section defines and explains the RPS.

In section III, this comment examines whether Ohio lawmakers should encourage the development of wind power. It then explores ways Ohio lawmakers could encourage wind power, particularly with respect to an RPS policy. Finally, this comment explores how an Ohio RPS policy could be drafted in light of the state's particular goals and circumstances. This comment concludes that the Ohio legislature should enact an RPS policy to find out whether wind power can make good on its promises, but cautions that an RPS policy must be carefully crafted to match Ohio's particular goals and circumstances.

II. BACKGROUND

One of the "significant developments of the late 20th century,"[16] wind power has made steady progress over the past 30 years even while

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[10] Schlager & Weisblatt, *supra* n. 2, at 335.

[11] Paul Chernick et al., *Integrated Portfolio Management in a Restructured Supply Market* 62, http://pickocc.org/reports/ipm/irp_report.pdf (Jun. 30, 2006).

[12] Am. Wind Energy Assn., *U.S. Senate Makes History, Again, by Passing National Renewables Portfolio Standard*, http://www.awea.org/news/news030801nrps.html (Aug. 1, 2003) [hereinafter AWEA, *Senate Makes History*]; Ben Geman, *Udall to Gun for 20 Percent Renewable Power Target by 2020*, Env. & Energy Daily (Feb. 8, 2007). Both times, the RPS was removed from the bill before House approval. *See* Union of Concerned Scientists, *The 2005 Energy Bill*, http://www.ucsusa.org/clean_energy/clean_energy_policies/energy-bill-2005.html (last updated Nov. 17, 2005).

[13] Ohio Sen. 93, 125th Gen. Assembly, 2003-2004 Reg. Sess. (May 20, 2003).

[14] Tom Henry, *New Sources of Power: Proposals Seek to Tap Ohio's Renewable Energy Potential*, Toledo Blade B1 (Nov. 14, 2004) [hereinafter Henry, *New Sources*].

[15] Redlinger et al., *supra* n. 1, at xiii.

[16] J. F. Manwell et al., *Wind Energy Explained* 1 (John Wiley & Sons Ltd. 2002).

other renewable technologies have lost interest and support.[17] As of June 2006, there were over 100,000 wind turbines in operation worldwide.[18] In 2006, wind power experienced record levels of development in the United States and analysts expect a 26% increase in 2007.[19] Of all the efforts to reduce and conserve the use of fossil fuels, few are "more visible—and more inspiring—than the rapid evolution of the modern wind energy industry."[20]

A. Wind Turbines and the Transmission of Wind Energy

The technology that transforms the free flow of wind into electricity is known as a wind turbine.[21] The most common type of wind turbine has a rotor with three blades attached to a central tower and typically faces upwind.[22] The force of the wind causes the turbine's blades to spin; the gearbox behind the rotor speeds up the rotational force so that the generator can convert the kinetic energy into electricity.[23] The electricity is normally fed into electricity transmission lines, combined with electricity from other power sources, and delivered to residential or business customers.[24] Since wind does not blow constantly, electricity produced by a turbine is "inherently fluctuating" and electricity systems connected to a turbine must account for this.[25]

Generally, the height of a wind turbine's tower, its rotor blade length, and its potential to generate electricity all have increased as new turbines enter the market.[26] The tower of a commercial "utility-scale" wind turbine stands anywhere from 150-300 feet tall with a rotor blade diameter of about the same length.[27] Wind turbines for use on farms or ranches are generally much smaller than utility-scale wind turbines,[28] with a tower

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[17] Redlinger et al., *supra* n. 1, at 1.

[18] Andrew Swift, *Wind Energy 101: Meteorology, Technology, and Economics* 1, http://www.utcle.org/eLibrary/preview.php?asset_file_id=5934 (Jun. 1-2, 2006).

[19] Am. Wind Energy Assn., *AWEA Report: Wind Power Capacity Grew 27% in 2006*, 26 Wind Energy Wkly. 1225 (newsletter of the Am. Wind Energy Assn.) 2 (Jan. 26, 2007) (available at http://vwec.cisat.jmu.edu/documents/AWEA_Publications/Wind%20Energy%20Weekly%20(No%201225).pdf).

[20] Redlinger et al., *supra* n. 1, at xi. Note that the terms "wind energy" and "wind power" are used interchangeably throughout this article and within this article's cited resources.

[21] Manwell et al., *supra* n. 16, at 1.

[22] *See id.* at 3-5; Felix A. Farret & M. Godoy Simoes, *Integration of Alternative Sources of Energy* 98 (IEEE Press 2006). This type of wind turbine is known as a horizontal axis wind turbine. *Id.*

[23] Schlager & Weisblatt, *supra* n. 2, at 324-27.

[24] *Id.*

[25] Manwell et al., *supra* n. 16, at 2-3.

[26] Schlager & Weisblatt, *supra* n. 2, at 327.

[27] Am. Wind Energy Assn., *Wind Energy 101: Basics*, http://www.ifnotwind.org/we101/wind-energy-basics.shtml (accessed Apr. 11, 2007) [hereinafter AWEA, *Wind Energy 101*]. Thus, a 300-foot tower with a 300-foot rotor blade diameter would reach approximately 450 feet when one blade is pointing directly upward. *Id.* For comparison, the Statue of Liberty is 305 feet tall from its base to the tip of the torch. National Park Service, *Statue of Liberty: Frequently Asked Questions*, http://www.nps.gov/stli/faqs.htm (accessed Apr. 11, 2007).

[28] *See* G. N. Tiwari & M. K. Ghousal, *Renewable Energy Resources* 339 (Alpha Sci. Intl. Ltd. 2005).

height typically between 80-120 feet.[29] Wind turbines located offshore tend to be the largest in size, including the submerged height.[30]

There are two ways to measure wind power.[31] The greatest amount a wind turbine could potentially generate is known as "generation capacity" and is measured in kilowatts (kW) or megawatts (MW).[32] The second measure is the amount of electricity the wind turbine actually generates, which is measured in kilowatt-hours (kWh).[33] Due to the inconsistent nature of wind, a wind turbine cannot actually produce electricity at full generation capacity.[34] In fact, a newly-developed wind turbine located in a good wind location typically generates only 20-40% of its total generation capacity.[35] While generation capacity is a convenient shorthand for describing the amount of wind power installed in a particular area, the actual amount of electricity generated should be "the bottom line in any discussion of wind energy."[36]

The size of a wind turbine's generation capacity varies, depending on its function. Wind turbines for use on farms or ranches typically have a generation capacity of 50-300 kW.[37] Most large-scale wind turbines have a much larger generation capacity, ranging from 750 kW to 2 MW.[38] Research and development teams are currently developing wind turbines with 3-5 MW capacity.[39]

Wind power is currently the most cost-competitive renewable energy technology—cheaper than solar, biomass, and hydroelectric power.[40]

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[29] Bergey Windpower Co., *Small Turbines for Home & Business*, http://www.bergey.com/School/FAQ.Residential.html (accessed Apr.11, 2007).

[30] Manwell et al., *supra* n. 16, at 404.

[31] Paul Gipe, *Wind Energy Comes of Age* 9 (John Wiley & Sons, Inc. 1995).

[32] *Id.* A kilowatt is equal to 1,000 watts and a megawatt is equal to 1,000,000 watts or 1,000 kilowatts. U.S. Dept. of Energy, *Solar Glossary of Terms*, http://www1.eere.energy.gov/solar/solar_glossary.html (last updated Jan. 5, 2006) [hereinafter U.S. Dept. of Energy, *Glossary of Terms*]. Generally, one megawatt of electricity generates enough electricity for approximately 225-300 households. AEWA, *Wind Energy 101*, *supra* n. 27. Note that references in this article to the number of households supplied by wind power is merely a convenient way to translate the amount of wind power into a quantity that is more familiar. *Id.* Since wind does not blow all the time, it cannot be the only source of power for a household, absent an energy storage system. *Id.*

[33] Gipe, *supra* n. 31, at 9. A kilowatt-hour is equal to 1 kilowatt of electricity produced or consumed during one hour. U. S. Dept. of Energy, *Glossary of Terms*, *supra* n. 32.

[34] Jim Motavalli, *Catching the Wind*, 16 E/The Environmental Magazine 1 (Jan./Feb. 2005) (available at http://www.emagazine.com/view/?2176).

[35] Am. Wind Energy Assn., *Wind Energy Basics*, http://www.awea.org/faq/wwt_basics.html (accessed Apr. 11, 2007). For comparison, nuclear power plants typically operate at 90% of capacity and coal plants at 70% of capacity. Nuclear Energy Inst., *Nuclear Facts*, http://www.nei.org/doc.asp?catnum=2&catid=106 (accessed Apr. 11, 2007).

[36] Gipe, *supra* n. 31, at 9. Unfortunately, most resources on wind power provide measurements based on generation capacity since it is a more definitive measurement.

[37] Tiwari & Ghousal, *supra* n. 28, at 339.

[38] Hugo Chandler et al., *Wind: Status of Wind Energy Technology*, in *Renewable Energy in Europe: Building Markets and Capacity* 160, 161 (James & James Ltd. 2004).

[39] *Id.* at 164.

[40] N.E. Sustainable Energy Assn., *Wind Power*, http://www.nesea.org/energy/info/wind.html (accessed Apr. 11, 2007).

The cost of electricity generated by wind power has significantly declined over the past 20 years, mostly due to technological innovations.[41] Between the late 1980s and the late 1990s, its cost dropped 45% to 4-5 cents/kWh and even 3-4 cents/kWh in some places.[42] A federal tax credit reduces that cost by 1.9 cents/kWh, making wind energy cost-competitive with natural gas and coal.[43] Continued technological improvements could decrease the cost of wind power by another 30-50%.[44]

One of the greatest obstacles to the development of wind power is transmitting it to the public.[45] Many of the best wind resources are located far from population centers, where most electricity is consumed.[46] Since areas with good wind resources are also not typically near conventional electricity generation sites, new transmission lines must accompany the installation of wind turbines in those areas.[47]

The current rules of electricity transmission present another obstacle to the transmission of wind power.[48] Most electricity transmission rules were not drafted with "the unique characteristics of wind power technology" in mind.[49] For instance, many transmission policies penalize power generators for interruptions in the flow of electricity.[50] These policies assume that power generators can control their generation levels.[51] However, wind generators are penalized under these existing policies[52] even though they have no control over decreases in generation levels, since they cannot control when the wind will blow.[53]

These transmission obstacles place substantially greater costs on wind power generators compared with its competitors.[54] The Federal Energy Regulatory Commission (FERC) has proposed policies that would level the playing field by allocating transmission costs to end-use customers,

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[41] *See* Redlinger et al., *supra* n. 1, at 217.
[42] *Id.*
[43] Mark Clayton, *A New Gust of Wind Projects Across the US*, Christian Science Monitor 2 (Jan. 19, 2006).
[44] U.S. Dept. of Energy, *Technologies: Wind Power*, http://www.eere.energy.gov/de/wind_power.html (last updated May 17, 2006).
[45] Darrell Blakeway & Carol Brotman White, *Tapping the Power of Wind*, 26 Energy L. J. 393 (2005).
[46] Global Energy Network Inst., *The GENI Model* n. 6, https://www.geni.org/globalenergy/library/geni/simulation/the-GENI-model.shtml#6 (last updated May 19, 2006).
[47] *See* Am. Wind Energy Assn., *Wind Power & Transmission: Getting the Rules of the Road Right*, http://www.awea.org/windletter/wl_03june.html (Jun. 2003) [hereinafter AWEA, *Wind Power & Transmission*].
[48] *Id.*
[49] *Id.*
[50] Am. Wind Energy Assn., *Fair Transmission Access for Wind* 3, http://www.awea.org/policy/documents/transmission.pdf (2000).
[51] *Id.*
[52] *Id.* Studies have shown that the costs to a transmission facilitator for carrying wind power can be moderated even at relatively high levels. *Id.*
[53] *Id.*
[54] *Id.* at 4.

rather than generators.[55] The American Wind Energy Association (AWEA) notes that "[u]ntil there is a national system for transmission, some form of 'affirmative action' for wind power may be required."[56]

B. Forms of Wind Power

The most efficient way to generate wind power is to install many wind turbines in one location.[57] These clusters of wind turbines are known as "wind farms."[58] While there are hundreds of wind farms throughout the world, the size of wind farms varies greatly.[59] For instance, the Green Mountain Energy Company Wind Farm in northwest Ohio consists of four wind turbines with a total generation capacity of approximately 7.2 MW.[60] The Horse Hollow Wind Energy Center in Texas, on the other hand, has more than 400 wind turbines on over 47,000 acres with a total generation capacity of 735 MW.[61]

Since wind farms are usually located in rural areas,[62] harvesting wind can serve as an "alternative crop" for farmers and ranchers.[63] The income from wind power tends to be "relatively stable" compared with income from crop and livestock production.[64] And since a wind farm typically uses only 5% of the farmland, normal farming may continue.[65]

Many wind farms also exist in bodies of water rather than on land.[66] These offshore wind farms "are beginning to play an increasingly important role" in the development of wind power.[67] With limited space on land, Europe, in particular, has taken advantage of its offshore areas where winds

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[55] *Id.* The article notes that end-user customers will pay for 100% of the transmission costs under any policy, either directly or indirectly, since generators pass on transmission costs to their end-user customers. *Id.*

[56] AWEA, *Wind Power & Transmission*, *supra* n. 47.

[57] Manwell et al., *supra* n. 16, at 381.

[58] *Id.*

[59] *Id.* at 381-82.

[60] Green Energy Ohio, *Ohio Utility-Scale Wind*, http://www.greenenergyohio.org/page.cfm?pageID=103 (accessed Apr. 11, 2007).

[61] Renewable Energy Access, *Horse Hollow Wind Energy Center Completes 662 MW*, http://www.renewableenergyaccess.com/rea/news/story?id=45971 (Sept. 14, 2006).

[62] Manwell et al., *supra* n. 16, at 503.

[63] Schlager & Weisblatt, *supra* n. 2, at 330. A rural property owner typically receives between $2,000 and $5,000 in royalty payments each year from private wind power development companies. Union of Concerned Scientists, *Farming the Wind: Wind Power and Agriculture*, http://www.ucsusa.org/clean_energy/renewable_energy_basics/farming-the-wind-wind-power-and-agriculture.html (last updated Sept. 19, 2005) [hereinafter UCS, *Farming the Wind*]. These royalty payments, in turn, add to the county's tax base. Schlager & Weisblatt, *supra* n. 2, at 330. For instance, in Lamar, Colorado, the presence of wind power added $32 million to the county tax base. *Id.*

[64] U.S. Govt. Accountability Off., *Wind Power Can Benefit Farmers and Rural Communities*, in *Alternative Energy Sources* 111, 113 (Darrin Gunkel ed., Greenhaven Press 2006).

[65] Am. Wind Energy Assn., *The Most Frequently Asked Questions About Wind Energy* 13, http://www.awea.org/pubs/factsheets/FAQ1999.pdf (1999).

[66] Redlinger et al., *supra* n. 1, at 82.

[67] *Id.*

are stronger and more consistent.[68] The United States currently has no offshore wind farms; however, several projects are currently in the permitting process.[69] If all are approved and developed, the United States would have 600 MW of offshore wind energy capacity.[70]

The first proposed offshore wind project in the United States recently became "one of the most contentious political and public issues in the nation."[71] In 2002, Cape Wind Associates proposed a wind farm off the coast of Nantucket Sound in Massachusetts,[72] just five miles from "some of the most exclusive real estate in America."[73] The wind farm would contain 130 wind turbines with a projected energy production of 420 MW,[74] matching Cape Cod's total energy needs.[75] The project spurred two federal lawsuits and a great deal of national attention.[76]

While wind farms take advantage of strong and consistent winds in prime wind sites, a solitary wind turbine in a lower wind speed region can meet the needs of a particular home, farm, or ranch.[77] Where traditional windmills helped farmers and ranchers pump water, electric wind turbines perform the same task more efficiently and reliably.[78] Known as "distributed wind" and "small wind," as much as 60% of the United States has wind resources suitable for these types of development.[79]

Many states have enacted "net metering" laws that allow owners of residential wind turbines to replace the conventional electricity used in their homes with wind power.[80] Since owners cannot rely solely on the intermittent wind resource for all of their electricity needs, power from the local electricity retailer is still needed.[81] However, when strong winds generate more electricity than needed, a net metering system allows the excess electricity to feed into the local electricity retailer's transmission grid

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[68] Manwell et al., *supra* n. 16, at 404. As of May 2006, there were 18 offshore wind farms installed in Europe with over 800 MW of installed wind power capacity. U.S. Dept. of Energy, *Wind Power Today* 10, http://www.nrel.gov/docs/fy06osti/39479.pdf (May 2006) [hereinafter U.S. Dept. of Energy, *Wind Power Today*].

[69] U.S. Dept. of Energy, *DOE to Develop Multi-Million Offshore Wind Turbine with General Electric*, http://www.energy.gov/3309.htm (Mar. 9, 2006).

[70] U.S. Dept. of Energy, *Wind Power Today*, *supra* n. 68, at 10.

[71] Beth Daley, *On the Horizon?* Boston Globe B1 (Oct. 15, 2006).

[72] Timothy A. Hayden, *Reception on Nantucket Sound?* 13 Penn St. Envtl. L. Rev. 217, 217-18 (2005).

[73] Jim Motavalli, *Wind Power Should Be Pursued*, in *Energy Alternatives* 131, 132 (Barbara Passero ed., Greenhaven Press 2006).

[74] *Id.*

[75] Hayden, *supra* n. 72, at 217-18.

[76] For an extensive overview of the Cape Wind project, see Carolyn S. Kaplan, *Congress, the Courts, and the Army Corps: Sitting the First Offshore Wind Farm in the United States*, 31 B.C. Envtl. Aff. L. Rev. 177 (2004).

[77] U.S. Dept. of Energy, *Wind Power Today*, *supra* n. 68, at 4.

[78] UCS, *Farming the Wind*, *supra* n. 63.

[79] U.S. Dept. of Energy, *Wind Power Today*, *supra* n. 68, at 8.

[80] Am. Wind Energy Assn., *Wind Energy FAQ*, http://www.awea.org/faq/netbdef.html (accessed Apr. 11, 2007).

[81] *Id.*

for use by other consumers.[82] The turbine owner then receives utility credits based on the amount of electricity placed into the grid, which can later be used to pay for the conventional electricity the owner uses when the wind is not blowing.[83]

Promoters of wind power view the development of residential wind turbines as a key part of the overall development of renewable energy.[84] Some of the largest markets for wind power "are in rural parts of the world, including in Ohio."[85] It is estimated that 24% of the United States' population lives in rural areas where zoning and construction codes permit the installation of small wind turbines.[86] Also, small wind systems utilized in conjunction with utility-scale wind farms can take fuller advantage of an area's wind resources.[87] While barriers to small wind include cost, zoning regulations, permitting requirements, and grid connection issues,[88] support for small wind appears to be strong.[89] In 2001, approximately 13,400 wind turbines were sold in the United States for residential use, an estimated value of about $20 million.[90]

C. The Historical Development of Wind Power

Traditional, non-electric windmills have pumped water and ground grain in all parts of the world for thousands of years.[91] However, in 1888, Charles F. Brush of Cleveland, Ohio designed and built the first electricity-generating windmill.[92] Just three years later, Dutch meteorologist Paul la Cour developed an electric wind turbine.[93] By 1918, Denmark had approximately 120 wind turbines in operation, producing 3% of Danish electricity consumption.[94]

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[82] *Id.*
[83] *Id.*
[84] *See generally* Am. Wind Energy Assn., *Roadmap: A 20-year Industry Plan for Small Wind Turbine Technology*, http://www.awea.org/smallwind/documents/31958.pdf (June 2002).
[85] Paul E. Kostyu, *Renewable Energy Can Fuel Economy, Taft Says*, Canton Repository (Canton, Ohio) (Nov. 21, 2006) (quoting Benson Lee, President and C.E.O. of Technology Management in Cleveland).
[86] U.S. Dept. of Energy, *Wind Power Today, supra* n. 68, at 8.
[87] *See* Kostyu, *supra* n. 85.
[88] U.S. Dept. of Energy, *Wind Power Today, supra* n. 68, at 8.
[89] U.S. Dept. of Energy, *Distributed Wind Energy Technology*, http://www1.eere.energy.gov/windandhydro/wind_dist_tech.html (last updated Aug. 30, 2005).
[90] *Id.*
[91] Schlager & Weisblatt, *supra* n. 2, at 306.
[92] *Id.* at 313. The wind turbine had 144 rotor blades, a rotor diameter of 56 feet, and a generation capacity of merely 12 kW. *Id.*
[93] Tiwari & Ghousal, *supra* n. 28, at 340. The wind turbine had only four blades and probably had a generation capacity of 20-35 kW. *Id.*
[94] Danish Wind Indus. Assn., *History of Wind Energy*, http://www.windpower.org/en/pictures/lacour.htm (last updated May 12, 2003). The generation capacity of the 120 wind turbines totaled approximately 3 MW. *Id.*

Since 1918, the development of wind power worldwide has generally fluctuated with the cost of fossil fuels.[95] Between the 1930s and early 1970s, fossil fuels were not expensive in the United States and the development of wind power progressed slowly.[96] Interest in wind energy in the United States and Europe rekindled after the oil embargo of 1973, when the price of fossil fuels skyrocketed.[97] Although more than 50 countries installed wind turbines since this time,[98] nearly 80% of all installed wind capacity today exists in only five countries: Germany, Spain, the United States, India, and Denmark.[99] By the end of 2006, global wind power capacity had reached 74,200 MW.[100]

D. Wind Power in the United States and Ohio

The United States has an abundance of wind resources scattered throughout the country.[101] While domestic wind could supply up to 20% of the nation's electricity consumption,[102] currently less than 1% of consumed electricity is wind produced.[103] By the end of 2006, the United States had 11,603 MW of installed wind capacity, which was less than only two other countries: Germany (20,621 MW) and Spain (11,615 MW).[104] By 2020, wind power capacity could reach 100,000 MW in the United States, providing at least 6% of total domestic electricity generation, which is about the same amount as hydroelectric power today.[105]

Wind power does not have a strong presence in Ohio.[106] Less than 0.5% of Ohio's electricity is generated by renewable energy sources, not including hydroelectric power.[107] Thirty-four states consume a higher percentage of renewable energy than Ohio, prompting critics to claim that

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[95] U.S. Dept. of Energy, *History of Wind Energy*, http://www1.eere.energy.gov/windandhydro/wind_history.html (last updated Sept. 12, 2005).

[96] Schlager & Weisblatt, *supra* n. 2, at 313.

[97] *Id.* at 316. In California alone, over 17,000 wind machines were installed between 1981 and 1990. Tiwari & Ghousal, *supra* n. 28, at 340.

[98] Redlinger et al., *supra* n. 1, at 7.

[99] Am. Wind Energy Assn., *Global Wind Energy Market Report* 2, http://www.awea.org/pubs/documents/globalmarket2005.pdf (May 2005).

[100] Am. Wind Energy Assn., *World Wind Capacity Approaches 75,000 MW*, 26 Wind Energy Wkly. 1227 (newsletter of the Am. Wind Energy Assn.) 5 (Feb. 9, 2007) (available at http://www.awea.org/windenergyweekly/WEW1227.pdf) [hereinafter AWEA, *World Wind Capacity*]. Wind power grew 32% in 2006 alone. *Id.*

[101] *See* Peter Harper, *Why I Hate Wind Farms and Think There Should Be More of Them*, in *Energy Alternatives* 106, 107 (Helen Cothran ed., Greenhaven Press 2002) [hereinafter Harper, *Why I Hate Wind Farms*].

[102] Schlager & Weisblatt, *supra* n. 2, at 329.

[103] AWEA, *Wind Power Today*, *supra* n. 6.

[104] AWEA, *World Wind Capacity*, *supra* n. 100.

[105] Am. Wind Energy Assn., *Wind Energy Facts & Myths*, http://www.ifnotwind.org/myths/myth-expensive.shtml (accessed Apr. 11, 2007).

[106] *See* Lisa Cornwell, *Renewable Energy Not Ohio's Forte*, Cincinnati Post A1 (Feb. 26, 2007).

[107] Ohio Clean Energy Bus. Assn., *Creating Jobs & Clean Energy for Ohio* 17, http://www.greenenergyohio.org/page.cfm?pageId=478 (Nov. 2003).

Ohio has "no commitment to future renewable energy development, whatsoever."[108] Ohio is also home to some of the most polluting power plants in the country, "producing more acid rain and smog emissions than any other state."[109] Some estimate that Ohio could get about 10% of its current energy needs from wind power.[110]

Ohio's first and only wind farm began operation in 2003.[111] The wind farm, located on the Wood County landfill near Bowling Green, Ohio,[112] consists of four, 1.8 MW wind turbines that are nearly 400 feet tall including the blade.[113] At the time of installation, they were the most powerful turbines east of the Mississippi river, generating enough electricity for about 780 homes.[114]

Ohio's best wind resources lie along Lake Erie.[115] The Toledo-Lucas County Port Authority Board of Directors recently passed a resolution to survey the practical and ecological consequences of erecting an offshore wind farm on the Maumee Bay shore (near Toledo, Ohio).[116] One of the shallowest parts of the Great Lakes, this area "is especially ripe for offshore wind development."[117] In the Cleveland area, Cuyahoga County commissioners appointed an energy task force[118] that has recommended a demonstration project of four to ten turbines positioned at least three miles out on Lake Erie.[119] The wind farms would be "an unprecedented venture" since there are currently no "freshwater wind turbines" anywhere in the world.[120]

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[108] *Id.* at 16-17.

[109] Bentham Paulos et al., *Powerful Solutions for Ohio* 1, http://www.ucsusa.org/assets/documents/clean_energy/ps-oh.pdf (Apr. 1999).

[110] *Let's Catch Some Air*, Plain Dealer (Cleveland, Ohio) B8 (Jan. 18, 2007). Five percent of its current energy needs from wind power for 6 cents/kWh or less. Paulos, *supra* n. 109, at 4.

[111] Green Mt. Energy, *Ohio's First Utility Scale Wind Farm Dedicated*, http://www.greenmountain.com/about/press_events/2003_11_07.jsp (Nov. 7, 2003).

[112] *Id.*

[113] Mike Lafferty, *Huge Electric Turbines Sprout in Ohio*, Columbus Dispatch 1D (Oct. 22, 2003).

[114] *Id.*

[115] EcoCity Cleveland, *Wind Powering up Ohio*, http://www.ecocitycleveland.org/ecologicaldesign/energy/wind_power_ohio.htm (accessed Apr. 11, 2007).

[116] Natl. Wind Watch, *Port Board OKs Study of Wind Turbine Possibilities*, http://www.wind-watch.org/news/2006/10/27/port-board-oks-study-of-wind-turbine-possibilities/ (Oct. 27, 2006). The survey will be completed by March 2009. *Id.*

[117] Tom Henry, *East Toledo in Running for Wind Power Lab*, Toledo Blade (Nov. 20, 2006) [hereinafter Henry, *East Toledo*].

[118] Tom Breckenridge, *Task Force Set up to Study Likelihood of Wind Power*, Plain Dealer (Cleveland, Ohio) B4 (Aug. 12, 2006) [hereinafter Breckenridge, *Task Force*].

[119] Tom Breckenridge, *Wind Power Along Lake Erie Just May Fly*, Plain Dealer (Cleveland, Ohio) A1 (Jan. 12, 2007) [hereinafter Breckenridge, *Wind Power*]. The turbines would extend 240 feet above the water and would have a 2 MW generation capacity. *Id.*

[120] *Id.* Canada also has plans for wind farms on Lake Erie, and on Lake Ontario as well. Breckenridge, *Task Force*, *supra* n. 118.

Many believe that wind power will benefit Ohio in several ways, such as increasing energy independence, creating new jobs for Ohio citizens, helping struggling rural economies, and creating cleaner air within the state.[121] A report commissioned by the U.S. Department of Energy shows Ohio second only to California in terms of new job potential in the wind power industry.[122] Another report indicates that renewable energy could produce as many as 26,000 net new jobs in Ohio by 2010 and 39,000 net new jobs by 2020.[123]

This incredible job growth potential exists because of Ohio's manufacturing strength.[124] Some view Ohio as a "sleeping giant already in the supply chain"[125] with the potential to become the Silicon Valley of wind power.[126] Since "all the working parts that one needs to launch a new industry" are already in Ohio, the state could become a national leader in alternative energy production.[127]

Ohio's rural economies may especially benefit from the development of wind farms. Leasing agreements with wind farm developers would create an additional income for Ohio farmers.[128] The property tax revenues from the wind farms would also contribute to these local economies.[129]

E. The Debate over Wind Power

Although wind power promises to provide a cheap, clean, and domestic energy source to spur local economies, curb global warming, and decrease dependence on foreign oil, some have questioned those promises and have cautioned the wind industry and the public regarding the potentially negative consequences of wind power. Many anti-wind activists view wind turbines as "gigantic wind machines . . . glut[ting] the landscape—killing wildlife, destroying culturally significant viewsheds, devaluing property, and creating major disturbances for those who live

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[121] Amy Gomberg, *Realizing Ohio's Wind Energy Future—Executive Summary* 5, http://www.ohiowind.org/ohiowind/page.cfm?pageID=2202 (Nov. 13, 2006).

[122] Henry, *supra* n. 14; H.R. Subcomm. on Energy & Air Policy of the Comm. on Energy and Commerce, *Energy Policy Act of 2005—Hearings of H.R. 6*, 109th Cong. (Feb. 16, 2005) (statement of Alan Nogee, Union of Concerned Scientists) (available at http://republicans.energycommerce.house.gov/108/Hearings/02162005hearing1437/Nogee.pdf). A "national investment in wind energy" could create up to 13,000 new manufacturing jobs in Ohio. Gomberg, *supra* n. 121, at 5.

[123] Ohio Clean Energy Bus. Assn., *supra* n. 107, at 7.

[124] Gomberg, *supra* n. 121, at 5; Breckenridge, *Wind Power*, *supra* n. 119, at A1.

[125] Mike Boyer, *Renewable Energy in Play with Democratic Victories*, Cincinnati Enquirer 15A (Nov. 15, 2006).

[126] *Let's Catch Some Air*, *supra* n. 110, at B8.

[127] Julie Carr Smyth, *Ohio Could Be Alternative-Energy Leader*, Columbus Dispatch 5D (Nov. 21, 2006).

[128] Gomberg, *supra* n. 121, at 5.

[129] *Id.*

nearby."[130] Since approximately 10,000 wind turbines are needed to replace the generation capacity of one modern conventional power station, and since they need to be placed in windy areas such as on mountain ridges, "you can't hide them."[131] Wind power opponents also assert that this emerging technology does not "meaningfully reduce our reliance on fossil fuels."[132]

As wind energy technologies continue to develop, many environmentalists are "locking horns" with the wind industry over the development of this emerging technology.[133] To decide whether the Ohio legislature should encourage the development of wind power, it is important to consider the arguments from both sides of the debate and to be aware of the individuals and groups making these arguments.

Those who support the development of wind power in the United States consist of a diverse array of national, regional, and local groups.[134] Some of these groups support wind energy from a purely environmental perspective, while others draw upon agricultural, economic, or faith-based perspectives.[135] For instance, the AWEA is a national trade organization of wind farm developers, wind turbine manufacturers, electricity retailers, insurers, researchers, and others.[136] Its mission is to promote wind power "as a clean source of electricity for consumers around the world."[137] The Union of Concerned Scientists (UCS) is a nonprofit partnership of scientists and citizens who seek "to achieve practical environmental solutions."[138] Particularly, UCS seeks the enactment of federal and state policies that support "renewable technologies[] and encourage all energy purchasers to use renewables."[139]

On the other side of the debate is a coalition of concerned citizens and grassroots organizations, usually formed to protest the development of a particular wind farm. Several national groups have also developed, including National Wind Watch, "a nonprofit organization that promotes awareness of the negative impacts of industrial wind energy development on our environment, economy, and quality of life."[140] Jon Boone is an

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[130] stopillwind.org, *Simulation of Proposed Windplants Atop Backbone Mountain in Western Maryland*, http://www.stopillwind.org/lowerlevel.php?content=Simulation (accessed Apr. 11, 2007).
[131] Harper, *Why I Hate Wind Farms*, *supra* n. 101, at 107.
[132] Jon Boone, Speech, *The Wayward Wind* 2 (Silver Lake, N.Y., Jun. 19, 2006) (available at http://www.stopillwind.org/downloads/TheWaywardWind.pdf) [hereinafter Boone, *Wayward Wind*].
[133] David Suzuki, *They're Welcome in My Backyard*, 2495 New Scientist 20 (Apr. 16, 2005).
[134] Am. Wind Energy Assn., *About Us*, http://www.windenergyworks.org/AboutUs/tabid/53/Default.aspx (accessed Apr. 11, 2007).
[135] *Id.*
[136] Am. Wind Energy Assn., *About AWEA*, http://awea.org/about/ (accessed Apr. 11, 2007).
[137] *Id.*
[138] Union of Concerned Scientists, *About UCS*, http://www.ucsusa.org/ucs/about/mission.html (last updated Dec. 19, 2006).
[139] Union of Concerned Scientists, *Clean Energy*, http://www.ucsusa.org/clean_energy/ (last updated Jan. 18, 2007).
[140] Natl. Wind Watch, *Welcome to National Wind Watch!* http://www.wind-watch.org/about.php (accessed Apr. 11, 2007).

outspoken anti-wind activist and environmentalist who strongly opposes the development of wind farms in the eastern United States, particularly in the Appalachian Mountains.[141] He claims that he owns no property in areas of proposed wind power developments and makes no money from his work against wind energy, but speaks out solely from a "desire for enlightened public policy."[142] Since Boone believes the claims of the wind power industry cannot be substantiated, he is opposed to the development of wind turbines in areas known for natural beauty.

1. Visual Impact and Aesthetics

The primary impression of wind power is its visual and aesthetic effect.[143] Local government planning boards across the country have held meetings to discuss the proposed installation of wind turbines in their area. At a planning board meeting in Kirkland, New York, a local resident presented a photograph of his property's mountainous view and explained that he designed his house to take full advantage of that view.[144] Other local residents indicated they would think twice before buying property if wind turbines obstructed the view.[145]

Some of the best wind farm locations are often ideal places to enjoy the surrounding scenery.[146] This includes places like the Green Mountains in Vermont, the Adirondacks in New York, Chesapeake Bay in Maryland and Virginia, and Cape Cod in Massachusetts—where wind farms are currently being planned.[147] Wind turbines are usually placed along the ridges of mountainous areas, where the best wind resources are located, making them "irredeemably visible."[148] To some, the eerily and slowly spinning blades of a wind turbine dominate what was formerly a serene mountain-side view. Jon Boone asserts that "industrial" wind farms make the hills "seem to disappear, transforming nature into a mechanized energy amusement park."[149]

Others describe wind turbines as "lovely: [g]raceful, [and] delicate."[150] Most proponents of wind power view wind turbines as representing a "forward-looking concern for the environment" and—perhaps for that reason—consider them "sleek and attractive."[151] Because aesthetic

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[141] Tom Pelton, *Wind Energy Push Loses Power*, Baltimore Sun 1A (Jul. 31, 2006).
[142] Boone, *Wayward Wind*, *supra* n. 132, at 1.
[143] Harper, *Why I Hate Wind* Farms, *supra* n. 101, at 111.
[144] *Id.*
[145] *Id.*
[146] Jefferson W. Tester et al., *Sustainable Energy* 636 (MIT Press 2005).
[147] Felicity Barringer, *Debate Over Wind Power Creates Environmental Rift*, 155 N.Y. Times A18 (Jun. 6, 2006).
[148] Harper, *Why I Hate Wind Farms*, *supra* n. 101, at 111.
[149] Jon Boone, *The Aesthetic Dissonance of Industrial Wind Machines* 2, http://www.contempaesthetics.org/newvolume/pages/article.php?articleID=319#FN15 (Sept. 28, 2005).
[150] Anne Applebaum, *Tilting At Windmills*, Wash. Post A17 (Apr. 19, 2006).
[151] Schlager & Weisblatt, *supra* n. 2, at 332.

views are based on a person's individual perception, the debate in this area is largely subjective and the least quantifiable.[152]

A more quantifiable aspect of the visual and aesthetic debate is the effect of a wind farm on local property values. A nationwide study conducted in 2003 concluded that the evidence "does not support a contention that property values within the viewshed of wind developments suffer or perform poorer than in comparable region[s]."[153] However, some studies do show a decrease in property values. Appraiser Kevin Zarem, who testified before the Wisconsin Public Services Commission in June 2005, concluded that the value of residential property near a wind farm would probably decrease 17-20%.[154] The National Association of Neighbors of Wind Turbines in Denmark claims that most real estate agents estimate a 25-30% fall in property values when turbines are erected nearby.[155] Jon Boone asked his audience in Wyoming County, New York this question—Could anyone believe that "spinning sky-scraper sized structures creating a cascade of noise are *not* going to negatively affect property values for those in the neighborhood?"[156]

The AWEA responds by noting that communities already accept the presence of water towers, billboards, utility lines, silos, and communication towers as part of the landscape.[157] Also, increased knowledge of the technology and careful design of wind farms could improve public perceptions over time.[158] Regarding careful design, the degree of visual impact is typically determined by "the type of landscape, the number and design of turbines, the pattern of their arrangement, their color, and the number of blades."[159] For instance, developers usually paint wind turbines a non-intrusive color such as white or light gray, do not place corporate logos or marketing on them, and install the minimal amount of lighting necessary to warn airplanes and helicopters at night.[160]

In his article, *Why I Hate Wind Farms and Think There Should be More of Them*, Peter Harper argues in favor of installing wind power throughout the United States in spite of—in fact, because of—his dislike for them aesthetically.[161] Harper argues that when faced with a choice between

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[152] Manwell et al., *supra* n. 16, at 476.

[153] George Sterzinger et al., *The Effect of Wind Development on Local Property Values* 4, http://www.repp.org/articles/static/1/binaries/wind_online_final.pdf (May 2003). The study surveyed the effect of wind energy development on the price of real estate between 1996 and 2002 in 10 different sites. *Id.* at 12.

[154] Boone, *Wayward Wind*, *supra* n. 132, at 3.

[155] Country Guardian, *The Case Against Wind 'Farms'* § K, http://www.countryguardian.net/case.htm#ktourismetc (May 2000).

[156] Boone, *Wayward Wind*, *supra* n. 132, at 3 (emphasis in original).

[157] Mike Sagrillo, *Aesthetic Issues and Residential Wind Turbines*, http://www.awea.org/faq/sagrillo/ms_aesthetics_0405.html (May 2004) [hereinafter Sagrillo, *Aesthetic Issues*].

[158] Manwell et al., *supra* n. 16, at 476.

[159] *Id.*

[160] *See* Sagrillo, *Aesthetic Issues*, *supra* n. 157.

[161] Harper, *Why I Hate Wind Farms*, *supra* n. 101, at 109-12.

preserving the environment, protecting human health, or living in an aesthetic environment, "the presumption must be against aesthetics" since it carries less weight than health risks, climate change, and the irreversible loss of habitat and species.[162] He also argues that those who live with the negative aesthetic impact of wind power pay for its environmental costs directly, rather than "shuffl[ing] them off onto other people, other species, or other generations" (as with fossil fuels).[163] In sum, Harper considers the aesthetic impact of wind turbines "the least of many evils."[164]

2. Noise Impact

Another hotly contested issue related to a wind turbine's presence in the neighborhood is how much sound a wind turbine produces. One person living near a wind farm in New York complained of "a grinding noise or at times the shrieking sound of a wild animal" caused by the wind turbines.[165] The sound has also been described "like a train that never arrives" and "as if someone was mixing cement in the sky."[166]

The sound produced by a wind turbine comes from two sources: the wind hitting the blades (aerodynamic) and the gearbox and generator converting the kinetic energy into electricity (mechanical).[167] Proponents of wind power admit that turbines manufactured in the late 1970s and 1980s were somewhat noisy.[168] However, as wind turbine technology has improved, the mechanical noise has consistently decreased.[169] Wind turbines manufactured today generally only produce the aerodynamic sound of the wind hitting the blades.[170] The AWEA claims that a modern wind farm at a distance of 750-1000 feet is "no noisier than a kitchen refrigerator or a moderately quiet room."[171] Others consider the sound of a wind turbine "something like waves beating on a shore."[172] Proponents also add that "subjective responses of individuals, which often depend more on personal attitude than actual noise level," contribute to the manageable issue of wind turbine noise.[173]

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[162] *Id.* at 111.
[163] *Id.*
[164] *Id.* at 113.
[165] Pam Foringer, *Our Wind Farm Story*, http://kirbymtn.blogspot.com/2005/02/our-wind-farm-story.html (Feb. 9, 2005).
[166] Eric Rosenbloom, *A Problem with Wind Power* 4, http://www.aweo.org/ProblemWithWind.pdf (Sept. 5, 2006).
[167] Gipe, *supra* n. 31, at 383.
[168] Mike Sagrillo, *Residential Wind Turbines and Noise*, 23 Windletter 3 (newsletter of the Am. Wind Energy Assn.) 1 (Apr. 2004) (available at http://www.renewwisconsin.org/wind/Toolbox-Fact%20Sheets/Sound.pdf) [hereinafter Sagrillo, *Noise*].
[169] Manwell et al., *supra* n. 16, at 481.
[170] *See* Am. Wind Energy Assn., *Wind Energy Myths & Facts*, http://www.ifnotwind.org/myths/myth-nuisance.shtml (accessed Apr. 11, 2007).
[171] *Id.*
[172] Jill K. Clibum, *Public Power*, http://www.appanet.org/utility/index.cfm?itemnumber=16486 (Mar.-Apr. 2006) (quoting Paulie Shaffer).
[173] Sagrillo, *Noise*, *supra* n. 168, at 4.

Many states and local governments have enacted noise ordinances.[174] Zoning boards which grant permits to wind farm developers can set a maximum decibel level for the turbines. For instance, the maximum decibel level in Nantucket, Massachusetts cannot exceed 55.4 decibels from the closest property line to the wind turbine (where the ambient level is 45 decibels).[175] The noise from a wind turbine is not expected to cause "significant overall impediments" to the development of wind energy.[176]

3. Migratory Bird Deaths

Some have nicknamed wind turbines the "cuisinarts of the sky" for their propensity to kill migratory birds.[177] Studies have shown that more than 1,000 birds are killed each year in the Altamont Pass Wind Resource Area ("Altamont Pass") in California,[178] a wind farm home to more than 6,500 wind turbines.[179] Bird fatalities have been known to occur at many wind farms because "the same currents that power wind turbines help keep condors, eagles, and other soaring species aloft."[180] Two of North America's largest migratory bird flyways exist over Lake Erie, where developers are looking to develop offshore wind farms.[181]

The AWEA attempts to put those fatality numbers into perspective. It first points out that two factors make Altamont Pass a unique situation: 1) the selection of the wind farm location, and 2) the wind turbine technology available at the time it was built.[182] The Altamont Pass is a poor location for a wind farm since it supports an abundant number of raptors such as eagles, hawks, and owls.[183] Since the Altamont Pass wind farm was installed in the 1970s, wind turbines have been designed to reduce the likelihood of bird fatalities.

The AWEA lists five ways turbine manufacturers have designed wind turbines to reduce their effect on avian mortalities: 1) reducing the number of perches; 2) reducing the amount of noise; 3) configuring the placement of turbines in a wind farm to reduce the possibility of birds getting caught (for instance, spacing them farther apart in more densely-

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[174] Manwell et al., *supra* n. 16, at 492.
[175] Town of Nantucket, MA § 139-21(F)(1)-(2) (2007) (available at http://www.generalcode.com/Samples/05Spr_1.html#samp3).
[176] Redlinger et al., *supra* n. 1, at 220.
[177] Mike Sagrillo, *Wind Generators and Birds: Power Politics?* 46 Home Power 30, 30 (Apr./May 1995) [hereinafter Sagrillo, *Wind Generators*].
[178] PIER Energy-Related Envtl. Research, *Developing Methods to Reduce Bird Fatalities in the Altamont Pass Wind Resource Area* 1, http://www.energy.ca.gov/pier/environmental/project_summaries/PS_500-01-019_THELANDER.pdf (Nov. 2005).
[179] Sagrillo, *Wind Generators*, *supra* n. 177, at 32.
[180] Helen Cothran, *Chapter Preface*, in *Energy Alternatives*, *supra* n. 101, at 104.
[181] Henry, *East Toledo*, *supra* n. 117.
[182] Sagrillo, *Wind Generators*, *supra* n. 177, at 32.
[183] *Id.* at 30.

populated bird areas); 4) changing the blade painting pattern so that it contrasts with the general background; and 5) broadcasting a certain radio frequency to discourage birds from entering wind farm areas.[184]

Proponents such as the AWEA, also remind the public that other energy sources involve avian deaths.[185] The Exxon Valdez oil spill in Alaska resulted in the deaths of more than 500,000 migratory birds.[186] A single Florida coal-fired power plant with four smokestacks caused 3,000 avian deaths in a single evening during a fall migration.[187] A study of bird deaths in California revealed: birds flying into buildings and windows caused 55% of bird deaths, automobile collisions caused 7% of bird deaths, and wind turbines caused less than 0.01% of bird deaths.[188] As with issues surrounding the noise impact, wind power observers do not expect avian deaths to have any major impact on its continued development.[189]

4. Reducing Dependence on Fossil Fuels

In his address to Congress in May 2005, Republican Senator Lamar Alexander stated, "at a time when America needs large amounts of low-cost reliable power, wind produces puny amounts of high-cost unreliable power."[190] While the ultimate costs of wind power are still uncertain, the debate over wind power often centralizes around whether the technology can actually decrease reliance on other energy sources and, if so, whether the social and environmental costs of installing domestic wind power are worth bearing. Anti-wind activist Jon Boone asserts that even if wind turbines are placed in all of the good wind sites in the mid-Atlantic region, "saturating [this area] with 35,000 windscrapers . . . would still not reduce the mining or burning of coal."[191]

Studies of European wind farms indicate that an increase in the capacity of wind power to the electricity grid does not reduce the same amount of capacity of other CO_2-emitting energy sources.[192] For instance, the United Kingdom maintains 59,000 MW of conventional energy capacity along with 500 MW of wind power capacity.[193] However, if 7,000 MW of wind energy capacity is added to the grid, 55,000 MW of conventional

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[184] Am. Wind Energy Assn., *Facts About Wind Energy and Birds* 3, http://www.awea.org/pubs/factsheets/avianfs.pdf (accessed Apr. 11, 2007). Radio frequency devices are still under research by the Electric Power Research Institute. *Id.*

[185] *Id.*

[186] *Id.*

[187] *Id.*

[188] Schlager & Weisblatt, *supra* n. 2, at 332-33.

[189] *See* Redlinger et al., *supra* n. 1, at 220.

[190] 151 Cong. Rec. S 5191-94 (daily ed. May 13, 2005) (statement of Sen. Lamar Alexander).

[191] stopillwind.org, *Better Energy Ideas*, http://www.stopillwind.org/lowerlevel.php?content=BetterEnergyIdeas (accessed Apr. 11, 2007).

[192] Eric Rosenbloom, *The Drawbacks of Wind Power Far Outweigh the Benefits*, in *Energy Alternatives*, *supra* n. 73, at 143 [hereinafter Rosenbloom, *Drawbacks*].

[193] *Id.*

capacity is still needed.[194] Thus, the assertion that "every kilowatt-hour generated by wind is a kilowatt-hour not generated by a dirty fuel" is "overly simplistic" for large wind turbines designed to supply energy to the electricity grid.[195]

Although a full explanation of electricity generation and the electricity grid is beyond the scope of this article, a brief description of this problem is provided here.[196] When wind power is added to the grid, conventional energy resources must remain in operation.[197] While wind energy is in generation (providing electricity to the grid because the wind is blowing), conventional energy sources must remain on spinning standby to be ready to switch back to generation when the wind suddenly stops blowing.[198] While in spinning standby, conventional energy sources continue to emit CO_2.[199] Thus, even though wind energy itself is CO_2-free, conventional energy sources do not stop emitting CO_2 while wind power is in operation.[200] Therefore, the actual fossil fuel savings from wind energy are not proportional to the amount of wind energy being produced.[201]

While a system that requires conventional energy sources to remain in spinning standby represents today's electricity grid operation, new technologies could increase wind power's ability to reduce fossil fuel consumption.[202] Such technologies include energy storage devices, systems that can be brought on-line much quicker than conventional energy sources, and control schemes that take advantage of extra energy generation equipment while not being used for generation.[203] For example, gas turbines can be used to respond to large fluctuations without the need for spinning standby.[204] Also, improved wind forecasts are already being used to set generation schedules, thus providing more stability and predictability.[205]

5. The Paradox of the Wind Power Debate

The arguments made by Peter Harper[206] highlight one of the "paradoxes" of the wind power debate.[207] Although the aesthetic impacts appear to be significantly less than the potential threat to global climate change and dependence on foreign sources of energy, "the highly visible

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[194] *Id.*
[195] *Id.* at 141.
[196] For a thorough explanation of electricity grids and wind turbine connection to the grids, see Manwell et al., *supra* n. 16, at 394-403.
[197] Rosenbloom, *Drawbacks*, *supra* n. 192, at 148-49.
[198] *Id.*
[199] *Id.* at 141.
[200] *Id.*
[201] *Id.* at 147.
[202] Manwell et al., *supra* n. 16, at 403.
[203] *Id.*
[204] *Id.*
[205] *Id.*
[206] *See supra* § II.E(1).
[207] Redlinger et al., *supra* n. 1, at 163-64.

local intrusion of a wind farm may raise significantly greater passions" than concerns for long-term impacts.[208] The result is that wind power faces great difficulty in getting local and national support and permission for the development of wind power.[209]

F. Wind Energy Policies and Incentives

To encourage the development of wind power and other renewable technologies, both federal and state lawmakers have enacted many policies and incentives.[210] The federal production tax credit ("PTC") is the "most notable and effective" federal incentive for renewable energy.[211] The PTC gives wind power developers 18 cents/kWh for their wind farms' entire electricity generation during its first 10 years of operation.[212] The tax credit has gone through several cycles of expiration and renewal.[213] However, since wind power development has peaked in years when the PTC was scheduled to expire—as developers rush to finish projects in time to receive the tax benefit—the PTC clearly has had an influence on the development of wind power.[214]

A relatively new policy mechanism known as the Renewable Portfolio Standard has become an "effective and popular tool" for the development of renewable energy.[215] An RPS policy requires electricity retailers to purchase a minimum level of renewable energy, such as wind energy.[216] Electricity retailers can meet the RPS obligation by generating renewable electricity themselves or by purchasing the energy from existing generators.[217] Under some RPS policies, the electricity retailer has a third option: purchasing Tradable Renewable Certificates from generators or secondary markets.[218]

The primary goal of an RPS is to "advance renewable energy resources in the most efficient way possible by maximizing reliance on the

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[208] *Id.* at 163.
[209] *See id.*
[210] *Id.* at 169-212.
[211] Bird et al., *Policies and Market Factors Driving Wind Power Development in the United States* 1, http://eetd.lbl.gov/ea/emp/reports/53554.pdf (2003).
[212] Stoel Rives, LLP, *The Production Tax Credit and Wind Power Investments*, http://www.stoel.com/showarticle.aspx?show=843 (Sept. 1, 2004).
[213] Great Plains Windustry Project, *Wind Energy Policy: Federal Incentives and Policies*, http://www.windustry.org/resources/legislation.htm (last updated Feb. 1, 2007).
[214] Bird et al., *supra* n. 211, at 4-5. Other federal incentives include the Renewable Energy Production Incentive (REPI) and the Public Utility Regulatory Policies Act (PURPA). *Id.*
[215] Union of Concerned Scientists, *Experts Agree: Renewable Energy Standards are a Key Driver of New Renewable Energy Development*, http://www.ucsusa.org/clean_energy/clean_energy_policies/experts-agree-renewable-electricity-standards-are-a-key-driver-of-new-renewable-energy.html (last updated Jan. 12, 2006).
[216] Schlager & Weisblatt, *supra* n. 2, at 335.
[217] Nancy Rader & Scott Hempling, *The Renewables Portfolio Standard: A Practical Guide* ix, http://www.oe.energy.gov/DocumentsandMedia/narucrps.pdf (Feb. 2001); Schlager & Weisblatt, *supra* n. 2, at 335.
[218] Rader & Hempling, *supra* n. 217, at xvii.

market."[219] Broader goals include improving the environment, stabilizing energy prices, increasing reliability of the electrical system, and advancing renewable energy technologies to reduce their cost and increase their efficiency.[220] An RPS policy relies on market forces by allowing electricity retailers to choose which renewable technologies to purchase.[221] Retailers decide which technologies to purchase based on cost, location, timeliness of development, and reliability, creating a competitive environment where renewable technologies compete with one another for contracts with electricity retailers.[222] In theory, such competition increases the efficiency of renewable technologies and drives down their cost.[223] Some consider an RPS "the ideal way to encourage renewable energy development in competitive markets."[224]

RPS policies also maintain and increase the quantity of renewable resources in the system over a long period of time.[225] Two features of the policy help to accomplish this. First, RPS policies steadily increase the minimum requirement over a period of time.[226] For example, an RPS that requires 20% renewable energy by the year 2020 will probably require 10% by 2010 and 15% by 2015.[227] Since electricity retailers must continually increase purchases of renewable energy, such interim targets promote industry development, technology advancement, and cost reduction.[228] Second, the duration of an RPS policy can help to keep renewable energy in the system over a long period of time.[229] Where an RPS allows long-term contracts and lower-cost financing, the duration of the policy can also help reduce renewable energy costs.[230]

Since RPS policies rely on market forces, rather than direct government action, an RPS must provide penalties to motivate the electricity retailers to comply with the policy.[231] If penalties for noncompliance are less than the cost of full compliance, electricity retailers will probably not comply with an RPS. Strict and clear enforcement of an RPS is also crucial

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[219] *Id.* at 2.
[220] *Id.* at 3-4.
[221] *Id.*
[222] *Id.*
[223] *See* Union of Concerned Scientists, *Renewable Electricity Standard FAQ*, http://www.ucsusa.org/clean_energy/clean_energy_policies/the-renewable-electricity-standard.html#6 (last updated Oct. 13, 2005).
[224] Ole Langniss & Ryan Wiser, *The Design and Impacts of the Texas Renewable Portfolio Standard*, in *Switching to Renewable Power: A Framework for the 21st Century* 187, 187 (Volkmar Lauber ed., Earthscan 2005).
[225] Rader & Hempling, *supra* n. 217, at 12.
[226] *Id.*
[227] *Id.* Many RPS policies include interim targets for each year before the final date. *Id.*
[228] *Id.*
[229] *Id.*
[230] *Id.* at 13.
[231] *Id.* at 72.

because it "provide[s] potential investors in renewable energy facilities with confidence that a market will exist for the product of their investment."[232]

Since most RPS policies are relatively new, debate has emerged regarding their cost and impact. So far, "little consensus" has been achieved, especially relating to consumer costs.[233] Some studies have found that RPS policies raise electricity prices and other economic costs.[234] Critics assert that if electricity retailers pay higher costs for renewable energy under an RPS, those costs are then passed onto the consumer in the form of higher electricity bills.[235] Other studies have found that RPS policies lower electricity prices, since the lowered demand on nonrenewable energy decreases natural gas prices.[236] A recent study conducted by Resources for the Future analyzed these contradictory studies and concluded that "better empirical evidence is needed to understand how renewable energy and natural gas markets will respond" to RPS policies for both the long-term and short-term.[237] Renewable energy costs are difficult to predict primarily because an RPS allows market forces to determine the price of renewable energy.[238]

As of May 2006, 22 states and the District of Columbia have enacted an RPS policy.[239] Although Ohio does not currently have an RPS policy,[240] the Ohio General Assembly ("General Assembly") has twice had the opportunity to enact one.[241] In 2003, the General Assembly considered an RPS that would have required electricity retailers to purchase 20% of their electricity from renewable energy by 2020, starting with 3% in 2006.[242] Eligible renewable resources under the RPS proposal included wind, solar, biomass, geothermal, and hydroelectric power.[243] The electricity retailers would meet the RPS quota by doing one or more of the following: 1) acquiring renewable energy; 2) subsidizing the acquisition or installation of solar power technology at a customer's residence; 3) connecting to an in-state net metering system that has renewable energy as its primary energy

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[232] *Id.*

[233] Carolyn Fischer, *How Can Renewable Portfolio Standards Lower Electricity Prices?* 1 (Resources for the Future, Discussion Paper, May 2006) (available at http://www.rff.org/Documents/RFF-DP-06-20-REV.pdf).

[234] *Id.* at 2.

[235] Glenn Schleede, *"Big Money" Discovers the Huge Tax Breaks and Subsidies for Wind Energy While Taxpayers and Electric Customers Pick Up the Tab*, http://www.aweo.org/Schleede.html (Apr. 14, 2005).

[236] Rader & Hempling, *supra* n. 217, at 1.

[237] Fischer, *supra* n. 233, at 9.

[238] Chongwon Char & Scott Abramson, *Renewable Portfolio Standards in Energy Policy* 3, http://policyresearch.dartmouth.edu/assets/pdf/RPS_NH.pdf (March 13, 2006).

[239] Chernick et al., *supra* n. 11, at 64. Many of these policies have been enacted relatively recently; for instance, in 2001 only eight states had adopted an RPS. Rader & Hempling, *supra* n. 217, at ix.

[240] *See* Chernick et al., *supra* n. 11, at 64.

[241] *See* Ohio Sen. 93, 125th Gen. Assembly, 2003-2004 Reg. Sess.; Ohio H. 247, 126th Gen. Assembly, 2005-2006 Reg. Sess. (May 5, 2005).

[242] Ohio Sen. 93, 125th Gen. Assembly, 2003-2004 Reg. Sess.

[243] *Id.* Only hydropower facilities that produced less than 20 MW were eligible. *Id.*

source; or 4) purchasing green tags.[244] Those who opposed the Ohio RPS in 2003 considered it too aggressive and feared it would raise energy costs, "mak[ing] it less likely that industries will locate in Ohio."[245]

While the failed RPS apparently lacked policy support,[246] newly-elected governor Ted Strickland is "confident" that new legislation will "make Ohio a major player in alternative and renewable fuels" such as wind power.[247] In fact, sometime this year, each house of the General Assembly will consider a bill that includes an RPS policy.[248] Both bills have the same requirements as the one proposed in 2005: 3% by 2007 climbing to 20% by 2021.[249] If Ohio adopts an RPS policy, it is likely that wind power will play a prominent role.[250]

The UCS predicts that state-level RPS policies "will provide support for more than 25,550 megawatts (MW) of new renewable power by 2017."[251] This represents a 192% increase in total United States levels since 1997 (not including hydroelectricity), an amount equal to the electricity needs of 17.2 million typical homes.[252] It will also reduce carbon emissions in an amount equivalent to taking 9.7 million cars off the road or planting more than 15.6 million acres of trees.[253] Between 2001 and 2005, RPS policies provided the impetus behind 47% of new wind development in the United States.[254]

While there is currently no national RPS policy, the United States Senate has twice passed an energy bill that included such a policy.[255] Both RPS policies required 10% of the nation's electricity to come from renewable energy by 2020 ("RPS 10").[256] In addition to the benefits of state-level RPS policies, a federal RPS would establish uniform rules and allow economies of scale for the most cost-effective resources.[257]

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[244] *Id.*

[245] Henry, *New Sources*, *supra* n. 14 (quoting Rep. Lynn Olman). The General Assembly also considered an RPS bill in 2005. Ohio H. 247, 126th Gen. Assembly, 2005-2006 Reg. Sess. The failed RPS was almost identical to the 2003 RPS, merely adjusting the compliance schedule to 3% by 2007 and leveling off by 2021. *Id.*

[246] Henry, *New Sources*, *supra* n. 14.

[247] Jim Provance, *Strickland Plans to Take a Cautious Path In State*, Toledo Blade A1 (Jan. 1, 2007).

[248] Cornwell, *supra* n. 106.

[249] *See* Chernick et al., *supra* n. 11. The RPS policy is part of Ohio Sen. 69, 126th Gen. Assembly, 2005-2006 Reg. Sess. (Feb. 17, 2005).

[250] *See* Cornwell, *supra* n. 106. FirstEnergy, a large electricity retailer located in Akron, Ohio, already has agreements in place to purchase wind-generated power from sources in surrounding states. *Id.*

[251] *Energy Policy Act of 2005*, *supra* n. 122.

[252] *Id.*

[253] *Id.* 15.6 million acres is approximately the size of West Virginia. *Id.*

[254] Ryan Wiser, *Meeting Expectations: A Review of State Experience with RPS Policies* 11, http://eetd.lbl.gov/ea/
EMP/reports/awea-rps.pdf (Mar. 2006).

[255] AWEA, *Senate Makes History*, *supra* n. 12; Geman, *supra* n. 12.

[256] Geman, *supra* n. 12.

[257] *Energy Policy Act of 2005*, *supra* n. 122. Such state-level benefits include the reduction of consumer energy costs, creation of new jobs, environmental benefits, and national security interests. *See id.*

Most proponents of a federal RPS promote a 20% quota by 2020 ("RPS 20") and claim that all benefits of an RPS 10 would be increased with an RPS 20.[258] Studies have shown that an RPS 10 "would have virtually no effect on consumer electricity prices."[259] However, an RPS 20 would actually save consumers $27 billion by 2025.[260] Analysis by the Lawrence Berkeley National Laboratory indicates that more renewable energy in the marketplace reduces use of natural gas and places downward pressure on natural gas prices.[261] The analysis also found that an RPS 20 could reduce the projected growth in power plant carbon dioxide emissions by more than 50% by 2025.[262] Thus, increasing renewable energy at a national level can reduce the risks of climate change, whether such a risk is great or small.[263]

A federal RPS could also benefit the national economy.[264] Analysis by UCS found that an RPS 20 would create an increase of approximately 157,500 new jobs by 2020, $72.6 billion in new capital investment, $5 billion in new property tax revenues for local communities, and $1.2 billion in wind power land-lease payments to farmers, ranchers, and other rural landowners.[265] While a federal RPS would particularly benefit states with manufacturing or rural economies, renewable resources are available in every state and are much more broadly dispersed than fossil fuel resources.[266]

Regarding national security, imports of natural gas are projected to increase 16 fold over the next 20 years, causing the United States to become more dependent on foreign sources of natural gas.[267] Since increasing renewable energy reduces the demand for natural gas, a federal RPS would reduce the pressure to increase such imports.[268] Since renewable energy facilities do not use volatile fuel or produce dangerous wastes, unlike nuclear power plants, they "do not present inviting targets for sabotage or attack."[269]

Opponents of a federal RPS argue that state-level RPS policies serve an important role as "'laboratories' for policy experimentation."[270]

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[258] *See id.*
[259] Rusty Haynes, *Systematic Support for Renewable Energy in the United States and Beyond: A Selection of Policy Options and Recommendations* 3, http://www.dsireusa.org/documents/PolicyPublications/Haynes_KIER_Keynote.pdf (2004). While the cost of renewable electricity would cause consumer costs to rise, this would be offset by a corresponding reduction in the cost of natural gas. *Id.*
[260] *Id.*
[261] *Energy Policy Act of 2005*, *supra* n. 122.
[262] *Id.*
[263] *Id.*
[264] *Id.*
[265] *Id.*
[266] *Id.*
[267] *Id.*
[268] *Id.*
[269] *Id.*
[270] Langniss & Wiser, *supra* n. 224, at 189.

Since most state-level RPS policies have only been recently enacted, a national "one-size-fits-all" policy would disrupt the process of figuring out what works and what does not work in crafting an RPS.[271] While the "states as laboratory experiments" argument has been used in other contexts since Justice Brandeis first articulated the idea in 1932,[272] the argument is especially relevant here since "no two states have designed their [RPS] policies in the same way."[273]

Public support appears to be in favor of a federal RPS.[274] A 2002 study conducted by the Mellman Associates found that 70% of survey participants support a federal RPS when presented with arguments for and against an RPS 20.[275] Other surveys have shown that customers are willing to pay more for renewable energy.[276] However, convincing consumers to switch from conventional energy to renewable energy involves many obstacles, including consumer inertia and remembering that "[g]reen marketing is not a substitute for sound public policy."[277]

III. ANALYSIS

The controversies surrounding wind power present a "complex interplay of factors" that lawmakers must consider in determining whether to encourage the development of wind power.[278] The particular circumstances and goals of the state or country play a crucial role in this determination. Ohio lawmakers should encourage the development of wind power in Ohio by enacting an RPS. Ohio lawmakers must carefully craft a policy by identifying both its specific goals and its particular circumstances. An Ohio RPS policy will benefit Ohio economically, environmentally, and perhaps in other ways as well.

A. Should Ohio Lawmakers Encourage the Development of Wind Power in Ohio?

To determine whether wind power should play a more prominent role within Ohio, the benefits and drawbacks of wind power must be carefully considered. The most imminent plans for Ohio wind power are offshore wind farms in Lake Erie.[279] Critics of a Lake Erie wind farm stress

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[271] Jim Snyder, *Renewables Pushed as Partial Solution to Global Warming*, The Hill (D.C.) 9 (Jan. 16, 2007).
[272] *New St. Ice Co. v. Liebman*, 285 U.S. 262, 311 (1932) (Brandeis, J., dissenting); Erwin Chemerinsky, *Constitutional Law* 111 (2nd ed., Aspen Publishers 2005).
[273] Langniss & Wiser, *supra* n. 224, at 189.
[274] *Energy Policy Act of 2005*, *supra* n. 122.
[275] Sen. Comm. on Energy & Natural Resources, *Power Generation Resource Initiatives & Diversity Standards*, 109th Cong. (Mar. 8, 2005) (statement of Alan Nogee, Union of Concerned Scientists) (available at http://energy.senate.gov/public/index.cfm?FuseAction=Hearings.Testimony&Hearing_ID=1403&Witness_ID=403).
[276] *Energy Policy Act of 2005*, *supra* n. 122.
[277] *Id.*
[278] Redlinger et al., *supra* n. 1, at xiii.
[279] *See Let's Catch Some Air*, *supra* n. 110, at B8.

the negative visual impact of wind turbines and the likely effect on migratory bird patterns in the proposed areas.[280] More importantly, critics question whether the technology is a viable energy source worthy of altering the lake-side landscape.[281]

The concerns over aesthetics and avian deaths must be weighed against the ability to mitigate these negative impacts, the overall benefits of wind power, and the negative impacts of conventional energy sources.[282] The fact that some Ohio residents consider a Lake Erie wind farm "an attractive visual accent to an already beautiful lake" reaffirms the subjective nature of the debate over wind power's aesthetic impact.[283] Also, Lake Erie wind farms will probably utilize the newest wind turbine technologies, which are designed to detract birds from perching or coming too close to the turbine's blades. While these concerns are appropriate and should be seriously considered, the potential risks to human health, climate change, and international relations associated with fossil fuel energy sources must also be considered.[284] If wind power actually contributes to reducing dependence on fossil fuels, this benefit outweighs concerns over aesthetics and bird fatalities.[285]

The ultimate issue is whether wind power can truly provide a cleaner environment, ease dependence on foreign energy sources, and reduce and stabilize fuel costs. Although wind power has been developed extensively in Europe and is rapidly developing in the United States, the answers to these questions are still uncertain.[286] Thus, the continued development of wind power is needed to find out whether wind power can achieve these goals. While some advocate for a free market approach, wind power and other renewable energy sources will likely be unable to compete against nonrenewable sources such as oil, coal, and natural gas without some government intervention.[287] Therefore, government policies are needed to discover whether wind power can become a viable energy source.

B. How Should Ohio Lawmakers Encourage the Development of Wind Power in Ohio?

To encourage wind power's development in Ohio, state lawmakers should enact an RPS. While federal and state tax incentives prompted the modern wind industry in the United States, such policies are limited in several respects.[288] Since the incentives expire after a few years, there is uncertainty regarding whether the future legislature will extend the policy or

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[280] Breckenridge, *Wind Power*, *supra* n. 119.
[281] *See generally* Rosenbloom, *Drawbacks*, *supra* n. 192.
[282] *See* Harper, *Why I Hate Wind Farms*, *supra* n. 101, at 111.
[283] Chris Hagan, *Harness Lake Erie's Wind Power*, Plain Dealer (Cleveland, Ohio) 9B (Feb. 28, 2000).
[284] *See* Harper, *Why I Hate Wind Farms*, *supra* n. 101, at 111.
[285] *Id.*
[286] *See* Langniss & Wiser, *supra* n. 224, at 187.
[287] Redlinger et al., *supra* n. 1, at 170.
[288] *Id.* at 221.

repeal it.[289] This, in turn, creates a high level of risk for developers and investors, discouraging long-term planning and development.[290]

While tax incentives and net metering laws "are laudable and deserving of support," they will be unable to "get the job done" without operating in conjunction with an RPS policy.[291] RPS policies "provide a stronger stimulus" for the development of renewable resources.[292] Since RPS policies can be adapted to meet the goals of a particular state, they provide a "flexibility" that other incentives cannot.[293] "[B]y maximizing reliance on the market," they provide an environment for wind power technology to improve "in the most efficient way possible."[294] RPS policies with sufficient noncompliance penalties and active enforcement ensure a stronger likelihood of compliance compared with other policies and incentives.[295]

In Ohio, any policy decision that could affect the state's economy is "all about jobs."[296] Although proposals for wind farms in Lake Erie are moving forward, "[n]urturing the state's existing manufacturing base" appears to be more important to Ohio lawmakers than installing utility-scale wind turbines within the state.[297] As mentioned above,[298] Ohio could apply its manufacturing prowess to building wind turbine components.[299] The state could also apply its academic resources towards research and development of wind technology.[300] States that currently attract projects related to wind development are states with RPS policies.[301] Since the resources necessary to enter the wind industry are already in place, an Ohio RPS policy would create thousands of new jobs within the state in a relatively short period of time.[302]

The enactment of an Ohio RPS will also benefit the state's struggling rural economy. Ohio's rural areas are ripe for the development of wind farms and small wind systems.[303] The installation of wind farms in Ohio's rural areas would require multiple businesses, many skilled and

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[289] *See id.*
[290] *Id.*
[291] *Energy Policy Act of 2005*, *supra* n. 122.
[292] David Clement et al., *International Tax Incentives for Renewable Energy: Lessons for Public Policy* 20, http://www.resource-solutions.org/lib/librarypdfs/IntPolicy-Renewable_Tax_Incentives.pdf (Jun. 17, 2005).
[293] *Id.*
[294] Rader & Hempling, *supra* n. 217, at xi.
[295] *See id.*
[296] John Funk, *Extra Green in a Green Ohio? Strickland, Taft Bet New Energy Means New Jobs*, Plain Dealer (Cleveland, Ohio) G1 (Feb. 18, 2007).
[297] *Id.*
[298] *See supra* § II(D).
[299] *Let's Catch Some Air, supra* n. 110, at B8.
[300] Funk, *supra* n. 296, at G1.
[301] *Id.*
[302] *Supra* § II(D).
[303] *See* Kostyu, *supra* n. 85.

unskilled laborers, equipment, and materials (towers, cement, asphalt, cables, etc.) which would most likely be purchased within the state.[304] The presence of these individuals and businesses in Ohio's rural areas would, in turn, benefit the local economy since the visitors would spend part of their income in the area.[305] Although some argue that this should not be considered a meaningful factor because these jobs are only temporary, their temporary presence would nevertheless benefit these local markets.[306] Plus, the turbines' continued presence would add to the local tax base each year.[307]

By enacting net metering laws, Ohio lawmakers also appear to support the development of small wind systems in these rural areas.[308] Ohio farmers spend approximately 20% or more of their operational costs on fuel and other energy.[309] An Ohio RPS should operate in conjunction with Ohio's net metering laws to allow small wind systems to provide energy to these areas.[310] If the wind generates more electricity than the household consumes, Ohio farmers would receive another source of income. Small wind systems throughout Ohio would also help to reduce dependence on fossil fuels and provide cleaner air for Ohio. Therefore, the Ohio General Assembly should adopt an RPS policy to further its energy goals.

C. Should Ohio Lawmakers Postpone the Enactment of an RPS?

In light of recent momentum within the federal government, Ohio lawmakers could postpone state-wide efforts to wait and see if the federal government enacts a federal RPS. There is some indication that President Bush will adopt a federal RPS by mid-summer 2007.[311] In his 2007 State of the Union Address, President Bush devoted several minutes to America's energy situation and said "we must increase the supply of alternative fuels" such as "wind energy."[312] Although the Bush administration has generally not favored policies that encourage environmentally-friendly initiatives, the President enacted the Texas RPS while Governor of that state, which has been one of the most successful RPS policies in the United States.[313]

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[304] U.S. Govt. Accountability Off., *supra* n. 64, at 114.
[305] *Id.* at 115.
[306] *See* James M. Taylor, *Wind Power Is Not Economical*, in *Alternative Energy Sources*, *supra* n. 64, at 128, 131.
[307] Manwell et al., *supra* n. 16, at 503.
[308] *See* Database of State Incentives for Renewables & Efficiency, *Ohio Incentives for Renewable Energy and Efficiency*, http://www.dsireusa.org/library/includes/incentive2.cfm?Incentive_Code=OH02R&state=OH&CurrentPageID=1&RE=1&EE=1 (last DSIRE review Feb. 2, 2006).
[309] Tom Borgerding, *Weekly Update* (newsletter of Ohio Wind Working Group) 3-4 (Sept. 26, 2005) (available at http://www.ohiowind.org/ohiowind/page.cfm?pageID=2118).
[310] *See infra*, § III(D).
[311] Amy Radishofski, *Ethanol, Healthcare Reform Expected to Play Role in State of the Union Address*, http://manufacturing.net/article/CA6409171.html (Jan. 22, 2007).
[312] President George W. Bush, Speech, *State of Union Address* (U.S. Capitol, D.C., Jan. 23, 2007) (transcript online at http://www.whitehouse.gov/news/releases/2007/01/20070123-2.html).
[313] Bird et al., *supra* n. 211, at 4-5.

There also appears to be strong Democratic support for a federal RPS.[314] Democratic Senator and new Chairman of the Energy and Natural Resources Committee, Jeff Bingaman, has already created an investigation team to determine how a national RPS should be crafted.[315] Since Democratic leadership "is likely to support an RPS," there is at least some possibility that a federal RPS 10 or RPS 20 will be enacted soon.[316]

Depending upon its design, a federal RPS could override an Ohio RPS or create serious complications.[317] For instance, although states cannot restrict electricity generators under the Commerce Clause, the federal government has no such limitation.[318] If a federal RPS restricts generators, it is conceivable that these generators could purchase all of the renewable energy credits to satisfy the federal RPS, leaving electricity retailers unable to meet state-level RPS requirements.[319]

However, this "wait-and-see" approach will only further delay Ohio's goals regarding alternative energy. A federal RPS may not be enacted anytime soon, and given the state's goals, Ohio should not wait to encourage the development of wind power. Even if a federal RPS is enacted, it may not disrupt state-level RPS policies. For instance, if the federal RPS places the obligation on electricity retailers, the problem explained in the above paragraph would not arise.[320] Also, the federal RPS could provide a "savings clause," which would allow states to set minimum requirements higher than the federal RPS policy's minimum requirement.[321] Thus, any state-level RPS that is more aggressive than the federal RPS would still be in effect. Under this scenario, if the proposed Ohio RPS (20% by 2020) is enacted and a federal RPS 10 is later enacted, the Ohio RPS would still be effective after passage of the federal RPS. If a federal RPS does disrupt an Ohio RPS, Ohio lawmakers have the ability to make any needed adjustments to its policy.

D. How Should Ohio Lawmakers Craft the Renewable Portfolio Standard?

An RPS policy must be carefully crafted and tailor-made to fit Ohio's particular circumstances and goals.[322] As the experience of other states has shown, a carefully drafted RPS policy is "nearly always essential for effective renewable energy deployment."[323] RPS policies contain many components and lawmakers must make important decisions regarding each

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[314] Snyder, *supra* n. 271.
[315] Radishofski, *supra* n. 311.
[316] Snyder, *supra* n. 271.
[317] Rader & Hempling, *supra* n. 217, at app. C-1.
[318] *Id.* at app. C-6-C-7.
[319] *Id.*
[320] *Id.*
[321] *Id.* at app. C-4.
[322] *See* Langniss & Wiser, *supra* n. 224, at 199.
[323] *Id.*

aspect of the policy.[324] RPS components include the amount of required capacity, the placement of interim targets, the technologies that qualify, the location of the renewable energy generation, and the decision whether to include a Tradable Renewable Certificates program.[325] The state's particular goals should guide RPS drafters in each of these areas.[326] While Ohio's economic situation and goals are not completely certain, this section considers how the components of an Ohio RPS could be crafted in light of Ohio's probable circumstances and goals.

1. The Amount of Required Capacity and Interim Targets

The Ohio RPS must specify the amount of renewable energy that electricity retailers must purchase and how soon they have to purchase it. These features vary widely among current RPS policies, and some are more aggressive than others. For instance, the California RPS requires electricity retailers to purchase 20% of its electricity from renewable sources before the expiration of 15 years after its enactment.[327] The Wisconsin RPS, on the other hand, requires electricity retailers to purchase only 2.2% of its electricity from renewable sources before the expiration of 11 years after its enactment.[328] Maine has the highest RPS goal, requiring 30% of electricity from renewable sources effective the day of its enactment.[329] Drafters should avoid setting overly aggressive requirements, which may not be achievable or politically sustainable.[330] However, the requirement should be set high enough to trigger market growth.[331]

The size of the RPS requirement should depend upon Ohio's particular goals.[332] For example, if Ohio's main goal is to achieve technical advancements in renewable technologies, requiring a small quantity of renewables may be enough.[333] On the other hand, if the state's goal is to

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[324] *See* Rader & Hempling, *supra* n. 217, at 1.
[325] *Id.* at xi-xix.
[326] *Id.* at xi.
[327] Database of State Incentives for Renewables & Efficiency, *California Incentives for Renewable Energy*, http://www.dsireusa.org/library/includes/incentive2.cfm?Incentive_Code=CA25R&state=CA&CurrentPageID=1 (last DSIRE review Jan. 26, 2006).
[328] Database of State Incentives for Renewables & Efficiency, *Wisconsin Incentives for Renewable Energy*, http://www.dsireusa.org/library/includes/incentive2.cfm?Incentive_Code=WI05R&state=WI&CurrentPageID=1 (last DSIRE review Mar. 29, 2006).
[329] Database of State Incentives for Renewables & Efficiency, *Maine Incentives for Renewable Energy*, http://www.dsireusa.org/library/includes/map2.cfm?CurrentPageID=1&State=ME&RE=1&EE=0 (last DSIRE review Aug. 3, 2006).
[330] *See generally* Ryan H. Wiser, *State RPS Policies: Experiences and Lessons Learned*, www.oregon.gov/ENERGY/RENEW/docs/Wiser_Oregon_RPS_May_2006.ppt (May 31, 2006).
[331] Union of Concerned Scientists, *Renewable Energy Standards at Work in the States*, http://www.ucsusa.org/clean_energy/clean_energy_policies/res-at-work-in-the-states.html (last updated Dec. 20, 2006).
[332] *See* Rader & Hempling, *supra* n. 217, at 7.
[333] *Id.*

achieve substantial environmental benefits, a larger quantity requirement would be more appropriate.[334]

Because RPS policies create a competitive environment, the timing requirements of an RPS must be set so that all eligible renewable technologies can fairly compete.[335] For instance, geothermal and biomass projects take much longer to develop than solar and wind power projects.[336] If geothermal, biomass, solar, and wind energy are all eligible under the RPS, setting the first interim target at a distance of a few years from the enactment date would allow the geothermal and biomass technologies to develop and then compete with solar and wind technologies.[337]

The UCS encourages lawmakers to set RPS interim dates "on a predictable, fixed schedule," cautioning that interim targets placed either too close together or too far apart would yield a negative result.[338] A steep increase in the RPS requirement would cause the installation of many wind turbines all at once, requiring the transportation of scarce installation equipment over greater distances and at a far greater cost than otherwise.[339] On the other hand, interim targets spaced out too far may cause expert personnel to leave the industry during periods of low activity, resulting in a loss of valuable expertise and institutional memory.[340] Thus, Ohio's RPS policy should carefully place interim targets to ensure steadily increasing growth.

The Ohio RPS that is now before the General Assembly ("Senate Bill 69") sets a higher requirement each year from 2007 to 2021.[341] The requirement begins with 3% in 2007 and increases two percentage points each year until 2012.[342] Between 2012 and 2021, the requirement increases one percentage point each year, to 20% in 2021.[343] This schedule appears to follow the UCS's recommendations, requiring steadied growth over a period of 13 years. However, Ohio lawmakers have criticized past RPS policies based on an almost identical schedule as "too ambitious."[344] Such rapid growth may not allow renewable technologies enough time to improve and reduce their cost. Thus, an RPS that requires electricity retailers to purchase more renewable energy each year during this period could drive up energy costs.

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[334] *Id.*
[335] *Id.* at 10.
[336] *See id.*
[337] *Id.*
[338] *Id.* at 11.
[339] *Id.*
[340] *Id.*
[341] Chernick et al., *supra* n. 11, at 62; Ohio Sen. 69, 126th Gen. Assembly, 2005-2006 Reg. Sess.
[342] Ohio Sen. 69, 126th Gen. Assembly, 2005-2006 Reg. Sess..
[343] *Id.*
[344] Henry, *New Sources*, *supra* n. 14.

2. Which Renewable Technologies Qualify

Drafters of an Ohio RPS must also determine which renewable resources qualify under the policy. Current RPS policies vary widely in this area, in part because "[r]enewable resources come in a wide variety of forms and use a wide array of technologies."[345] As with other RPS components, Ohio's particular goals should determine which resources to include.[346] Where the goal is to provide a diverse array of resources, improve the environment, or let the market decide which technologies will win, the RPS should be broadly defined and allow many technologies to qualify.[347] If the goal is to respond to public support for a particular resource, promote one or a few renewable technologies, or receive certain economic benefits, a more limited RPS would better achieve these goals.[348] Given Ohio's eagerness to improve its economy, particularly in the manufacturing sector, wind and solar power should definitely be included in the policy.

A special consideration for Ohio is whether to include hydropower. Ohio currently has 15 hydroelectric plants,[349] constituting 1% of electricity consumption in Ohio, while other renewable energy sources constitute less than 0.5% combined.[350] However, hydroelectric sites are still available within Ohio, such as along the Cuyahoga River in Cuyahoga Falls, where a new hydroelectric plant is currently being considered.[351]

Although hydropower is a renewable energy resource, it is not included in most RPS policies.[352] Hydropower is considered "a mature resource and technology."[353] Since hydropower is already more widely developed than other renewable technologies, such as wind, solar, and biomass, an RPS that allows electricity retailers to purchase already-developed hydropower to satisfy the quota would stifle the development of other, less-developed renewable technologies.[354] Hydropower could also gain an unfair competitive advantage since many facilities already receive benefits from the government based on other subsidies.[355] Finally,

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[345] Rader & Hempling, *supra* n. 217, at 15.
[346] *Id.*
[347] *Id.*
[348] *Id.*
[349] Ohio Consumers' Council, *Power From Renewable Resources—Hydroelectricity* 1 http://www.pickocc.org/
publications/renewable_energy/Hydro_Power.pdf (Aug. 2006).
[350] Ohio Clean Energy Bus. Assn., *supra* n. 107.
[351] *Id.*
[352] H.R. Comm. on Resources, *Alternative and Renewable Energy on Federal Lands*, 107th Cong. (Oct. 3, 2001) (test. of Mary J. Hutzler, Acting Administr., Energy Info. Admin., Dept. of Energy) (available at http://www.eia.doe.gov/oiaf/speeches/1003eia.html) ("Some RPS proposals have included hydroelectricity as a qualifying source, but most have considered non-hydroelectric technologies only."). Note that the terms "hydroelectric power" and "hydropower" are used interchangeably throughout this article.
[353] *Energy Policy Act of 2005*, *supra* n. 122.
[354] Rader & Hempling, *supra* n. 217, at 40.
[355] *Id.*

hydropower is considered by many as environmentally questionable since it can cause significant damage to watersheds and river ecosystems.[356]

The Maine RPS illustrates the problem Ohio could face by including hydropower in its RPS policy. Although the Maine RPS required electricity retailers to purchase 30% of their energy from renewable resources beginning in 2000, nearly 40% of electricity produced in the state was already RPS eligible.[357] Thus, the RPS failed to spur the development of new renewable technologies.[358] If Ohio allows electricity retailers to purchase hydropower to meet the RPS requirement, the policy may fail to spur the development of other renewable technologies such as wind and solar power.

One way to continue encouraging the development of hydropower within the state while encouraging other renewable technologies is to place "handicapping" devices in the RPS to offset hydropower's advantages over other types of renewable technologies. For instance, the RPS could allow the electricity retailer's purchase of 2 MW of hydropower to qualify for only 1 MW under policy. Senate Bill 69 only allows electricity from hydropower facilities under two conditions: (1) the facility produces less than 20 MW of electricity, and (2) the facility is certified as a "low-impact hydropower facility."[359] This appears to limit hydropower to only small facilities that do not have the negative environmental effects of large facilities. Such a limitation will also prevent hydropower from crowding out the other qualifying resources, such as wind and solar.

3. Tradable Renewable Certificates

Many current RPS policies include an innovative feature known as Tradable Renewable Certificates (TRCs) or "Green Tags."[360] In states with green tag programs, generators who place electricity from renewable energy into the grid receive green tags based on the amount of such electricity.[361] Each unique green tag can then be sold on the open market.[362] Many RPS policies allow an electricity retailer to purchase green tags to fulfill its quota under an RPS.[363] For instance, if an RPS requires an electricity retailer to purchase 400 MW of renewable energy in a given year, it may purchase the

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[356] *Id.*

[357] Robert Olson & David J. Shulock, *Maine and Connecticut: Renewable Portfolio Standard Update*, http://www.retailenergy.com/statelin/0512olsn.htm (Jan. 14, 2006).

[358] *Id.*

[359] Chernick et al., *supra* n. 11, at 62 (quoting Ohio Sen. 69, 126th Gen. Assembly, 2005-2006 Reg. Sess).

[360] *See* Clean Power Markets, Inc., *What Are Green Certificates (RECs)?* http://www.cleanpowermarkets.com/greencertificates.html (accessed Apr. 11, 2007). Tradable Renewable Certificates are also sometimes known as Renewable Energy Credits (RECs). *Id.*

[361] Rader & Hempling, *supra* n. 217, at 55. For example, many green tag systems give one green tag for every 1,000 kWh placed into the grid. Redlinger et al., *supra* n. 1, at 192.

[362] *See* Rader & Hempling, *supra* n. 217, at 55.

[363] *Id.* at 56.

equivalent of 400 MW in green tags instead of generating 400 MW of renewable energy itself or purchasing 400 MW directly from a renewable energy generator.[364] Electricity retailers can purchase green tags directly from the renewable energy generator or from the secondary market that has developed.[365]

RPS policies that include the green tag feature have several advantages over RPS policies based primarily on ownership and contracting arrangements.[366] First, a green tag market breaks down geographic barriers, intensifying competition between renewable resources.[367] A green tag market also provides more stability since it facilitates forward markets, which allow price hedging and project financing.[368] Second, the risks and costs associated with RPS compliance are lower with a green tag market because electricity retailers who purchase too much renewable energy to comply with the RPS can more easily sell the excess energy in the green tag market.[369]

A third advantage of a green tag program is that it allows owners of small renewable energy systems, particularly owners of small wind developments, to more easily participate in the RPS.[370] The sale of green tags in the open market involves lower transactional costs than ownership and contracting arrangements with electricity retailers.[371] Fourth, a green tag program allows members of the public to show support for the production of renewable energy by purchasing green tags themselves.[372]

Nineteen states incorporate some type of green tag program into its RPS, although they vary somewhat from state to state.[373] Some states place a cap on the amount of green tags an electricity retailer may purchase each year, which encourages formation of at least some long-term contracts.[374] Some green tag systems allow the electricity retailer to "bank" their green

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[364] *See id.*
[365] *Id.*
[366] *Id.*
[367] Siobhan M. Doherty, *The Mechanics of the RECs Market* 11, http://www.sdenergy.org/uploads/S_%20Doherty-REC.pdf (Sept. 27, 2006).
[368] Rader & Hempling, *supra* n. 217, at 56.
[369] *Id.* at 57. The same principle applies where the electricity retailer has not purchased enough renewable energy to meet its RPS quota. *Id.*
[370] *Id.*
[371] *Id.*
[372] *Id.*
[373] *See* Database of State Incentives for Renewables & Efficiency, *Renewables Portfolio Standards*, http://www.dsireusa.org/library/includes/seeallincentivetype.cfm?type=RPS&currentpageid=2&search=Type&EE=1&RE=1 (last updated Nov. 17, 2006).
[374] Union of Concerned Scientists, *Table C-1: State Minimum Renewable Electricity Requirements (as of October 2005)*, http://www.abanet.org/environ/committees/renewableenergy/teleconarchives/111605/summary.pdf (Apr. 2006) [hereinafter UCS, *Table C-1*]. For example, New Mexico allows electricity retailers to only purchase 1 green tag for wind and hydropower, 3 green tags for solar energy, and 2 green tags for all other renewables. *Id.* Rhode Island places a 30% cap on the amount of green tags that may count towards the RPS quota. *Id.*

tag purchases for up to 2 or 3 years, giving electricity retailers more flexibility.[375]

To foster energy independence, the Ohio RPS should include a green tag program. Since such programs intensify competition between renewable technologies, facilitate forward markets, and reduce the risks and costs associated with RPS compliance, green tags will help spur quicker and better development of renewable technologies. Better technologies, in turn, reduce dependence on foreign sources of fuel.

A green tag program will also benefit Ohio's rural economy. Farmers and other rural land owners who install one or two wind turbines on their property and connect them to the electricity grid will receive green tags for the electricity they place into the grid. These green tags can then be sold to electricity retailers doing business in Ohio, constituting an additional income for these rural land owners and, at the same time, strengthening Ohio's economy.

4. The Location of the Renewable Energy Generation

Although electricity retailers must meet a state's RPS requirement to do business in that state, some RPS policies allow the electricity retailer to purchase renewable energy from an out-of-state generator.[376] For instance, in 2003, electricity retailers doing business in Wisconsin satisfied the Wisconsin RPS by purchasing approximately 50 MW of Iowa's installed wind capacity.[377] In Texas, electricity retailers can only purchase renewable energy from in-state generators, with the exception of generators who have a dedicated transmission line into the state.[378]

Which generators qualify under the Ohio RPS should depend on the state's particular goals.[379] If Ohio's goal is to promote the development of renewable technologies in general, allowing out-of-state renewable generators to qualify would better accomplish that goal.[380] However, Ohio's primary goals appear to be promoting economic development and providing cleaner air. Thus, the RPS should allow only in-state renewable energy generators to qualify.[381] This will encourage the manufacturing and development of renewable technologies to occur within the state. Indeed, Senate Bill 69 includes this limitation.[382]

An RPS that limits compliance to in-state generators, however, somewhat restricts a green tag program because only green tags from in-

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[375] *Id.*
[376] Rader & Hempling, *supra* n. 216, at 32-33.
[377] Bird et al., *supra* n. 211, at 14.
[378] UCS, *Table C-1*, *supra* n. 374, at 10.
[379] Rader & Hempling, *supra* n. 217, at 17.
[380] *See id.*
[381] *Id.*
[382] Ohio Sen. 69, 126th Gen. Assembly, 2005-2006 Reg. Sess. (2003).

state generators may be purchased. An alternative option (i.e., a compromise between the two options) is to allow electricity retailers to purchase green tags from a specified region.[383] The larger region allows a larger green tag market, creating more competition and stability. Since developers of wind and solar power in this region are more likely to rely on Ohio companies to manufacture these technologies (more likely than, e.g., Arizona or California companies), an RPS that encourages the development of renewable energy for Ohio's neighbors could foster economic and job growth within Ohio.

IV. CONCLUSION

While not comprehensive, these are some of the decisions that Ohio lawmakers face when crafting an RPS policy. Ohio lawmakers must identify the state's particular circumstances and policy goals and then carefully draft the statute to achieve the goals based on the circumstances. The only way to find out whether wind power can deliver on its promises is to give it a chance to compete with both its renewable and non-renewable energy counterparts. A cautiously and carefully drafted RPS will provide such competition, and will reveal whether wind power truly can reduce dependence on fossil fuels, create new jobs, increase national security, stabilize fuel prices, help struggling rural economies, and ensure a cleaner environment.

[383] For instance, a region that encompasses Ohio, Michigan, Indiana, Pennsylvania, Kentucky, and West Virginia.