Table of Contents

Authors ................................................................................................................................... 3
Acknowledgements ................................................................................................................ 3
Illinois Wind Working Group (IWWG) ................................................................................ 4
Center for Renewable Energy ............................................................................................... 5
Executive Summary .................................................................................................................. 6

I. Introduction .............................................................................................................................. 8

II. Wind Energy Growth Factors ............................................................................................. 9
Federal and State Policies .......................................................................................................... 9
Energy Security and Energy Costs .......................................................................................... 10
Environmental Benefits .......................................................................................................... 11
Economic Development Opportunities .................................................................................. 11
Illinois Unique Attributes ...................................................................................................... 12
Wind Resource, Transmission and Demand ........................................................................... 12
Overview of Illinois’ Current Policies .................................................................................... 13
Renewable Portfolio Standard .................................................................................................. 13
Enterprise Zones ..................................................................................................................... 13
Property Tax Legislation .......................................................................................................... 14

III. Economic Impacts of Wind Farm Development .................................................................. 15
Wind Energy Creates Skilled, High Paying Green Jobs ......................................................... 15
Building Trades, Construction and Installation ......................................................................... 15
Operation and Maintenance ..................................................................................................... 15
Landowner Benefits ................................................................................................................ 15
Increased Tax Revenues .......................................................................................................... 16
School District Benefits ........................................................................................................... 16
Road Improvements ................................................................................................................. 16

IV. Analytical Method .................................................................................................................. 17
The JEDI Model .......................................................................................................................... 17
Direct Impacts .......................................................................................................................... 18
Turbine and Supply Chain (Indirect) Impacts ........................................................................... 18
Induced Impacts ....................................................................................................................... 20
Research Data .......................................................................................................................... 21

V. Analysis and Results .............................................................................................................. 23
Employment Impacts ................................................................................................................ 23
Property Tax Revenue Impacts ............................................................................................... 23
Landowner Revenue Impacts ................................................................................................... 24
Economic Activities Impacts .................................................................................................... 24

VI. Illinois’ Future ....................................................................................................................... 26
Manufacturing Impact .............................................................................................................. 26
Workforce Development and Technical Training ....................................................................... 26
Wind Energy Businesses .......................................................................................................... 27

VII. Conclusion .......................................................................................................................... 28

References ................................................................................................................................. 29

Figures:
1.—Economic Impacts from 1,847.76 MW of Wind Energy Development .......................... 7
2.—Impact of PTC Expiration on Annual Installation of Wind Capacity ............................... 9
3.—Evolution of U.S. Commercial Wind Technology ............................................................... 12
4.—Wind Resource of Illinois .................................................................................................. 13
5.—Illinois Wind Farms ............................................................................................................ 22
6.—Direct, Indirect and Induced Impacts from 1,847.76 MW of Wind Energy ......................... 24

Tables:
1.—Illinois Wind Farm Projects ............................................................................................... 7
2.—Illinois Wind Farm Projects with Project Details ............................................................... 21
3.—Economic Impacts from 1,847.76 MW of Wind Energy Development ........................... 25

This report is also available as a PDF on www.RenewableEnergy.ilstu.edu.
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Authors

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Jennifer L. Hinman completed this report while working as a Graduate Assistant to Dr. Loomis in the Economics Department at Illinois State University (ISU). In May of 2010, Jennifer earned her Master of Science degree in Applied Economics with a specialization in the Electricity, Natural Gas, and Telecommunications Economics Regulatory sequence at ISU in Normal, Illinois. Jennifer analyzed whether proximity to an operating wind farm influences the values of surrounding residential properties (and whether any impact changes over the different stages of wind farm development) as part of her Master’s Capstone Project at ISU. Some other research areas pursued during her graduate studies include short-term electricity load forecasting and the short- and long-run relationships among real electricity prices, interest rates, natural gas prices, and coal prices. In 2008, Jennifer earned her Bachelor of Arts degree in Economics with a Financial Certificate and graduated Summa Cum Laude from the University Honors Program at Armstrong Atlantic State University in Savannah, Georgia. As an undergraduate, Jennifer presented a study she completed regarding the impact of oil price shocks on the U.S. inflation rate at the 35th Annual Meeting of the Academy of Economics and Finance in Nashville, Tennessee, and she has an article published in the Academy of Economics and Finance Papers and Proceedings, Volume 32, 2008. Jennifer has recently accepted a position as an Economist in the Policy Department of the Energy Division under the Bureau of Public Utilities at the Illinois Commerce Commission in Springfield, Illinois.
The Illinois Wind Working Group (IWWG) is affiliated with the Department of Energy’s Wind Powering America’s State Wind Working Groups. The group is administered by the Center for Renewable Energy at Illinois State University, including David Kennell (Technology), Dr. David Loomis (Economics) and Dr. J. Randy Winter (Agriculture).

Wind Powering America (WPA) is a regionally-based collaborative initiative to increase the nation’s domestic energy supply by promoting the use of Wind Energy Technology, such as low wind speed technology, to increase rural economic development, protect the environment, and enhance the nation’s energy security. WPA provides technical support and educational and outreach materials about utility-scale development and small wind electric systems to utilities, rural cooperatives, federal property managers, rural landowners, Native Americans, and the general public.

IWWG is an organization whose purposes are to communicate wind opportunities honestly and objectively, to interact with various stakeholders at the local, state, regional and national levels, and to promote economic development of wind energy in the state of Illinois. The organization is hosted by Illinois State University through a grant from the U.S. Department of Energy. The Illinois Wind Working Group is comprised of 175 key wind energy stakeholders from the state of Illinois.

IWWG is part of Illinois State University’s Center for Renewable Energy and hosts an annual Advancing Wind Power in Illinois Conference that covers many aspects of wind energy; an annual Siting, Zoning and Taxing Wind Farms in Illinois Conference; and Landowner Forums throughout the state.

www.RenewableEnergy.ilstu.edu/wind/
Illinois State University established the Center for Renewable Energy, and it received Illinois Board of Higher Education approval in 2008. The Center was initially funded by a $990,000 grant from the U.S. Department of Energy (US DOE) to research renewable energy, to establish a major in renewable energy at Illinois State and to administer the Illinois Wind Working Group (IWWG). The Center also received a grant from the Illinois Clean Energy Community Foundation to help complete its state-of-the-art renewable energy laboratory.

The Center has three major functional areas:

- Supporting the renewable energy major at Illinois State University
- Serving the Illinois renewable energy community by providing information to the public
- Encouraging applied research on renewable energy at Illinois State University and through collaborations with other universities.

**Founding Members:**

Founding members include Horizon Wind Energy LLC, State Farm Insurance, Suzlon Wind Energy Corp., and Iberdrola Renewables.

**Support of the Renewable Energy Major:**

Many new workers will be needed in the renewable energy industry. To meet the growing demand for trained and educated workers, we have developed an interdisciplinary renewable energy major at Illinois State University. Graduates of the renewable energy program are well-positioned to compete for new and existing jobs.

The Center supports the renewable energy major through:

- Creation of an advisory board of outside experts,
- Establishing a renewable energy internship program,
- Bringing renewable energy experts to campus for seminars for faculty and students,
- Funding scholarships to ensure high quality students in the major,
- Providing ongoing financial support for the major.

For more information about the Renewable Energy Undergraduate Major, please visit www.RenewableEnergy.ilstu.edu/major/.
A number of factors have contributed to the rapid growth of wind power capacity in Illinois from 50 MW in 2003 to 1,847.76 MW in 2010, including federal and state policies, energy security, energy costs, environmental benefits, and economic development opportunities. One key policy driver in Illinois was the passage of the Illinois Power Agency Act in 2007 which included a Renewable Portfolio Standard of 25% by 2025, of which 75% of the renewable energy resources must come from wind.

As of April, 2010, Illinois ranked 6th in the United States in existing wind-powered generating capacity and ranked 16th in the United States in potential capacity (AWEA, 2010b). Illinois was responsible for over half of the 539 megawatts of new generating capacity installed by the U.S. wind industry in the first quarter of 2010 (AWEA, 2010b). Illinois currently has 21 wind projects online, which account for 1,847.76 MW of wind generating capacity (see Table 1). Although project specific data were used in this report, proprietary information about the wind farms will not be released. It is very important that stakeholders and decision makers are educated about the economic development impact wind energy has brought to the state and local communities so that informed decisions regarding future adoption of wind energy projects can be made. By analyzing the impacts of Illinois’ wind energy, this report supplies interested parties with information concerning the economic development benefits of wind energy.

According to this economic analysis (see Figure 1), 1,847.76 MW of wind generating capacity in the state of Illinois:

- Created approximately 9,968 full-time equivalent jobs1 during construction periods with a total payroll of over $509 million
- Supports approximately 494 permanent jobs in rural Illinois areas with a total annual payroll of over $25 million
- Supports local economies by generating $18 million in annual property taxes2
- Generates $8.3 million annually in extra income for Illinois landowners who lease their land to the wind farm developer
- Will generate a total economic benefit of $3.2 billion over the life of the projects3.

1 Job calculations are based on a full time equivalent (FTE) basis for a year. In other words, 1 job = 1 FTE = 2,080 hours worked in a year. A part time or temporary job would constitute only a fraction of a job according to the JEDI model. For example, the JEDI model results show 1,473 new jobs during construction; though the construction of the wind farms may have actually involved hiring closer to 3,000 workers. Thus, due to the short-term nature of construction projects, the JEDI model significantly understates the number of people actually hired to work on the project. It is important to keep this fact in mind when looking at the numbers or when reporting the numbers.

2 Property tax revenue is listed for the first year (where there are property tax abatements during the first few years of the wind farm project or Payments in Lieu of Taxes (PILOT), an average figure over the first ten years is utilized). This figure will change over time due to several factors: (1) whether the county increases/decreases the local property tax rate; (2) depreciation over the life of the project; and (3) if the state law regarding wind farm valuation changes in the future.

3 The project life of the wind farm is assumed to be approximately 25 years in this calculation, although many landowner contracts may extend as long as 30 years.
Notes: All dollar values have been converted to 2008 dollars. JEDI versions 1.09.03b and 1.09.03e were utilized.

* Property tax revenue is listed for the first year. Property tax revenues will change over time due to several factors: (1) whether the county increases/decreases the local property tax rate; (2) depreciation over the life of the project; and (3) if the state law regarding wind farm assessed valuation changes in the future.

‡ Job calculations are based on a full time equivalent (FTE) basis for a year. In other words, 1 job = 1 FTE = 2,080 hours worked in a year. A part time or temporary job would constitute only a fraction of a job according to the JEDI model. For example, the JEDI model results show 1,473 new jobs during construction; though the construction of the wind farms may have actually involved hiring closer to 3,000 workers. It is important to keep this fact in mind when looking at the numbers or when reporting the numbers.

Figure 1.—Economic Impacts from 1,847.76 MW of Wind Energy Development in Illinois

Table 1.—Illinois Wind Farm Projects

<table>
<thead>
<tr>
<th>Wind Farm</th>
<th>Location (County)</th>
<th>Capacity (MW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Streator Cayuga Ridge South Wind Farm</td>
<td>Livingston</td>
<td>300.00</td>
</tr>
<tr>
<td>Lee-DeKalb Wind Energy Center</td>
<td>DeKalb and Lee</td>
<td>217.50</td>
</tr>
<tr>
<td>Twin Groves Wind Farm Phase I</td>
<td>McLean</td>
<td>198.00</td>
</tr>
<tr>
<td>Twin Groves Wind Farm Phase II</td>
<td>McLean</td>
<td>198.00</td>
</tr>
<tr>
<td>Camp Grove Wind Farm</td>
<td>Marshall and Stark</td>
<td>150.00</td>
</tr>
<tr>
<td>Grand Ridge Energy Center Phases II, III, and IV</td>
<td>LaSalle</td>
<td>111.00</td>
</tr>
<tr>
<td>EcoGrove Wind Farm</td>
<td>Stephenson</td>
<td>100.50</td>
</tr>
<tr>
<td>Rail Splitter Wind Farm</td>
<td>Logan and Tazewell</td>
<td>100.50</td>
</tr>
<tr>
<td>Top Crop Wind Farm Phase I</td>
<td>LaSalle</td>
<td>100.50</td>
</tr>
<tr>
<td>Grand Ridge Energy Center Phase I</td>
<td>LaSalle</td>
<td>99.00</td>
</tr>
<tr>
<td>GSG Wind Farm</td>
<td>Lee and LaSalle</td>
<td>80.00</td>
</tr>
<tr>
<td>Providence Heights Wind Farm</td>
<td>Bureau</td>
<td>72.00</td>
</tr>
<tr>
<td>Crescent Ridge Wind Farm</td>
<td>Bureau</td>
<td>54.45</td>
</tr>
<tr>
<td>Mendota Hills Wind Farm</td>
<td>Lee</td>
<td>50.40</td>
</tr>
<tr>
<td>AgriWind</td>
<td>Bureau</td>
<td>8.40</td>
</tr>
<tr>
<td>Turbine Adam</td>
<td>Lee</td>
<td>2.50</td>
</tr>
<tr>
<td>Illinois Rural Electric Cooperative</td>
<td>Pike</td>
<td>1.65</td>
</tr>
<tr>
<td>Eric CUSD #1 Wind Turbine</td>
<td>Whiteside</td>
<td>1.20</td>
</tr>
<tr>
<td>Gob Nob Wind Turbine</td>
<td>Montgomery</td>
<td>0.90</td>
</tr>
<tr>
<td>Bureau Valley School District Wind Turbine</td>
<td>Bureau</td>
<td>0.66</td>
</tr>
<tr>
<td>Sherrard High School Wind Turbine</td>
<td>Rock Island</td>
<td>0.60</td>
</tr>
</tbody>
</table>

Table 1.—Illinois Wind Farm Projects

Indirect (Turbine and Supply Chain) and Induced Impacts

- Direct Impacts
  - Construction Phase:
    - 1,473 new jobs
    - $137 million to local economies
  - Operational Phase:
    - 110 new long-term jobs
    - $10 million/year to local economies

- Payments to Landowners:
  - $8.3 million/year

**Local Property Tax Revenue:**

- $18 million/year

**Construction Phase:**

- 8,495 new jobs
- $1.2 billion to local economies

**Operational Phase:**

- 384 local jobs
- $69.4 million/year to local economies

<table>
<thead>
<tr>
<th>Totals (construction + 25 yrs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Economic Benefit</td>
</tr>
<tr>
<td>$3.2 billion</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>New Local Jobs‡ During Construction</th>
</tr>
</thead>
<tbody>
<tr>
<td>9,968</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>New Local Long-Term Jobs:</th>
</tr>
</thead>
<tbody>
<tr>
<td>494</td>
</tr>
</tbody>
</table>
I. Introduction

According to the American Wind Energy Association (AWEA), the wind energy industry had its strongest year yet in 2009 in which it brought close to 10,000 MW of new generating capacity online. These additions in installed capacity in 2009 brought the total installed capacity in the United States to over 35,000 MW and “America’s wind power fleet will avoid an estimated 62 million tons of carbon dioxide annually, equivalent to 10.5 million cars off the road, and will conserve approximately 20 billion gallons of water annually, which would otherwise be withdrawn for steam or cooling in conventional power plants” (AWEA, 2010a, 2). This tremendous growth in 2009 is in addition to a great year in 2008 when wind generating capacity grew by 50% and the United States wind energy industry surpassed all previous records by installing 8,545 megawatts (MW) of new generating capacity, which can power over two million households. In total, at the beginning of 2009, the United States wind energy generating capacity was 25,170 MW (AWEA, 2009a).

Regarding job creation in the United States, AWEA claimed that there has been tremendous growth in manufacturing and that the share of domestically manufactured wind turbine components has grown from less than 30% in 2005 to about 50% in 2008. Over 55 new facilities that manufacture wind turbine components were announced, added, or expanded in 2008 and these new facilities created 13,000 new jobs (AWEA, 2009b). Unfortunately, “the continuing lack of a long-term policy and market signal allowed total investment in the manufacturing sector to drop compared to 2008, with one-third fewer online, announced and expanded wind power manufacturing facilities in 2009. The result was net job losses in the manufacturing sector, which were compounded by low orders due to high inventory” (AWEA, 2010a, 2). Thirty-eight manufacturing facilities were brought online, announced or expanded in 2009 (AWEA, 2010a).

As of April, 2010, Illinois ranked 6th in the United States in existing wind-powered generating capacity and ranked 16th in the United States in potential capacity (AWEA, 2010b). Illinois currently has 21 wind projects online, which account for 1,847.76 MW of wind generating rated capacity. It is very important that stakeholders and decision makers are educated about the economic development impact wind energy has brought to the state and local communities so that informed decisions regarding future adoption of wind energy projects can be made. By analyzing the impacts of Illinois’ first 1,847.76 MW of wind energy, this report supplies interested parties with information concerning the economic development benefits of wind energy. It can also be used as a resource by communities to identify the economic development opportunities a wind project may create.

This report focuses on the benefits of wind energy to Illinois’ economy. Section II provides an overview of some of the factors driving wind energy growth. Section III provides a brief literature review of the impacts of wind farm development. Section IV discusses the analytical method used in this analysis. Section V presents the results and economic impacts in Illinois. Section VI discusses Illinois’ future in the wind power industry. Section VII provides some concluding remarks.
A number of factors have caused the rapid growth of wind power capacity in the United States in recent years including federal and state policies, concerns regarding energy security and energy costs, environmental benefits, and economic development opportunities. Federal and state policies are huge drivers of wind power development (Bird et al., 2005). For example, the American Recovery and Reinvestment Act of 2009 (ARRA, 2009) provides more than $40 billion for clean energy initiatives, and new and modified tax incentives for clean energy are estimated to contribute an additional $20 billion. In particular, federal renewable energy production tax credits (PTC) along with state renewable electricity standards (RES) have been the biggest drivers.

The federal renewable energy production tax credit is an inflation-adjusted per-kWh credit that is applied to the output of a qualifying facility during the first ten years of operation (Bird et al., 2005). As Figure 2 illustrates, wind energy installations have peaked in years that the PTC was set to expire as wind farm developers rushed to complete construction of the wind farm projects in time to take advantage of the tax credit (Bird et al., 2005). The credit expired at the end of 1999, 2001, and 2003, and the results were huge reductions in new wind power installations in 2000, 2002, and 2004 (AWEA, 2009b). ARRA extends the PTC for wind energy through 2012 (ARRA, 2009).

Figure 2.—Impact of PTC Expiration on Annual Installation of Wind Capacity. Source: AWEA

II. Wind Energy Growth Factors

Federal and State Policies
A state renewable electricity standard (RES)\(^4\) which is often referred to as a renewable portfolio standard (RPS) mandates that a percent of the state’s overall electricity generation (percent of installed capacity (MW) or percent of energy sales (MWh)) must come from renewable energy\(^5\). The percent of energy sales or installed capacity that are required to come from renewable resources usually increases incrementally from a base year to an ultimate target. Each utility in the state is required to invest in renewable energy systems in order to meet their percentage requirements\(^6\). When a state adopts a renewable electricity standard, this increases the demand for renewable energy in the state. The certainty that arises from the RPS and the permanently increased demand induces developers of renewable energy projects into the market\(^7\). These suppliers of renewable energy (developers of renewable energy projects) are related to the natural resource endowments of each state as well as the cost competitiveness of the renewable energy generation\(^8\). In the case of a state with an abundant wind resource and in-state renewable energy preference, wind developers are incentivized to enter. As of November, 2009, 29 states and Washington D.C. have an RPS and six states have state renewable portfolio goals (IREC, 2009).

Wind is an inexhaustible energy source and it is free from fuel price volatility, which can contribute to the nation’s energy security. Because of fuel price uncertainty, electricity supply portfolios need to be diversified. Wind power can help diversify electricity supply portfolios, which can then lead to relatively more stable energy prices, which benefits ratepayers in the long run. If wind power is used on a large scale, and energy storage becomes economically and scientifically feasible, the demand for fuel used in electricity generation falls, which puts downward pressure on fuel prices\(^9\). Over the past 20 years, wind energy costs have declined significantly; however, the cost of constructing a new coal plant has continued to rise. The wind energy cost decline is primarily due to technological advances in turbine design, as larger more efficient wind turbines that generate proportionally more power have put downward pressure on wind power costs (Bird et al., 2005). In addition, unlike fossil fuel-fired power plants, wind power is not subject to the uncertainty surrounding future carbon taxes, thus increasing its cost-competitiveness.

\(^4\)Renewable portfolio standards across the country vary considerably in policy objectives and design. Carley (2009) states that the “majority of policy objectives aim to facilitate the diversification of electricity generation mixes, increase renewable energy deployment, reduce state reliance on fossil fuels, help renewable energy sources become cost competitive with conventional energy sources, reduce carbon emissions, or various combinations thereof” (3071-2). The features related to policy design vary in structure, size, application, eligibility, and administration (Carley, 2009; Wiser et al., 2007).

\(^5\)Definitions of what constitutes “renewable energy” varies from state to state. In Illinois, renewable resources include wind, solar, landfill gas, and existing hydroelectric. More specifically, “renewable energy resources” includes energy and its associated renewable energy credit or renewable energy credits from wind, solar thermal energy, photovoltaic cells and panels, biodiesel, crops and untreated and unadulterated organic waste biomass, trees and tree waste trimmings, hydropower that does not involve new construction or significant expansion of hydropower dams, and other alternative sources of environmentally preferable energy. Landfill gas produced in the State is considered a renewable energy resource. “Renewable energy resources” does not include the incineration or burning of tires, garbage, general household, institutional, and commercial waste, industrial lunchroom or office waste, landscape waste other than trees and tree waste trimmings, railroad crossties, utility poles, or construction or demolition debris, other than untreated and unadulterated waste wood (IPA Act, 2007). For more background information on the Illinois RPS, see Loomis and Ohler (2010).

\(^6\)Many states allow utilities to exchange renewable energy credits (RECs) to help utilities comply with the mandates. RECs are tradable wholesale electricity commodities representing one MWh of renewable energy generation. Thus, many utilities purchase RECs in lieu of deploying one MWh of their own renewable energy (Carley, 2009).

\(^7\)This certainty also helps the projects get financed.

\(^8\)The policy specifics regarding in-state versus out-of-state renewable resources that are able to be utilized to comply with the law are also important.

\(^9\)And some would argue that the following should also be in place: a smarter electricity grid (“smart grid”), expansion of high voltage transmission lines from states with significant wind resources to states with significant load centers; and deployment of wind speed measurement devices to improve the accuracy of wind speed forecasts.
Wind power does not contaminate water with pollutants, such as mercury and it generates electricity without emitting gases that may contribute to climate change. According to AWEA, “wind power is one of the cleanest and most environmentally benign energy sources in the world today” (2009b, 6). Based on average EPA-generated 2004 emissions rates, a 396 MW wind farm such as Twin Groves displaces roughly 3,579 tons of NOx, 6,541 tons of SO2, 1,467,615 tons of CO2, 102 pounds of mercury, 62,231 pounds of volatile organic compounds, and 185,397 pounds of particulate matter annually (Horizon, 2008). In addition, when a coal plant opens up near a neighborhood, not only do the housing values closest to the coal plant decline in value, but over time as the pollution from the plant becomes a problem for residents, housing values continue to decline along with residents’ health. As the public becomes more concerned with the potential impact that CO2 emissions have on the environment, the demand for carbon-neutral electricity generation increases, thus positively influencing the growth of wind energy. Wind energy can help reduce greenhouse gas emissions such as CO2 (of which a large percentage of CO2 emissions are polluted from automobiles) in the future to the extent that plug-in electric vehicles are widely adopted in the United States and charged at night (which is typically the time of day when the wind blows most often). As mentioned previously, if energy storage becomes economically and scientifically feasible, and if wind power is used on a large scale, the demand for coal used in electricity generation falls, and this can significantly reduce greenhouse gas emissions. Wind power is a clean energy resource, and unlike coal plants, which generate a great deal of pollution and CO2, when electricity is generated from wind turbines, there are not the negative externalities from pollutants in the air that contribute to acid rain, smog, and negative health-related impacts. “Almost half of all Americans live in counties where unhealthy levels of smog place them at risk for decreased lung function and aggravation of respiratory illness, according to the American Lung Association” (AWEA, 2009b, 6).

Finally, wind power provides economic development opportunities that can revitalize rural communities around the United States. Despite the economic downturn, 35,000 new wind power related jobs were created in 2008 (AWEA, 2009b). Wind farm installations can create jobs in rural communities where local economies are often dependent on agriculture. Local jobs include construction-related jobs, operation and maintenance of the facility after it is constructed, and jobs induced by the additional money the workers spend in the local economy. Development of related in-state businesses and trained labor are crucial to maximizing the economic benefits of wind energy development within a state. Wind projects benefit rural economies by providing local jobs during construction and boosting activity at local businesses that can provide some of the needed materials and services for construction of the wind farm. Wind turbines raise the property tax base of a county, creating a new revenue source for education, fire departments, and other local government services. To the extent that governmental bodies want to promote the economic benefits from wind farm developments, appropriate incentives are put in place that contribute to the growth of wind energy development.
A number of state specific factors have contributed to the rapid growth of wind power capacity in Illinois from 50 MW in 2003 to over 1,800 MW in 2010 including the wind resource, access to unconstrained transmission, electricity demand, and policies promoting renewable energy.

The quality of the wind resource is an important consideration in developing a wind farm (Bird et al., 2005). As a result of technological advances, turbines have become much larger, and the capacity of wind turbines has steadily risen over time (see Figure 3). New turbines have allowed states with lower wind speeds to be economically viable places to develop a wind farm. In addition, the increased heights of towers have enabled states such as Illinois to take advantage of and utilize the wind energy that blows stronger the higher up one goes. In fact, an area with twice the wind speed will produce eight times the amount of electricity all else equal. This increase in wind resources the higher up one goes is illustrated in Figure 4 by the Illinois wind maps that compare the wind resource at different heights (IIRA, 2009). These new technological developments in turbines have positioned Illinois as a state with the opportunity to take advantage of its wind resources to generate electricity to power many of Illinois’ homes and businesses. In fact, Illinois has one of the most robust wind resources in the PJM market.

While there are other states that have gustier winds, Illinois has the advantage of nearby load and relatively unconstrained transmission. Access to unconstrained transmission lines is required for wind farm development (Bird et al., 2005). Illinois has a relatively large population, and large population centers, combined with other factors such as weather, keep the demand for electricity relatively high. The fact that load centers are relatively close to rural areas creates excellent wind farm development opportunities.

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**Illinois’ Unique Attributes**

**Wind Resource, Transmission, and Demand**

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10More wind map resources are available from the Illinois Institute for Rural Affairs website at: www.illinoiswind.org.

11“PJM Interconnection is a regional transmission organization (RTO) that coordinates the movement of wholesale electricity in all or parts of 13 states and the District of Columbia” (PJM, 2010).
A large driver of wind power development is the renewable portfolio standard (RPS) (Bird et al., 2005; Brown and Busche, 2008). Illinois has an RPS of 25% by 2025 and this can be reached largely by utilizing the wind resources Illinois has. In fact, the Illinois Power Agency Act (P.A. 95-481, eff. 8-28-07) states, “To the extent that it is available, at least 75% of the renewable energy resources used to meet these standards shall come from wind generation” (20 ILCS 3855/1-75(c)(1)). Through June 1, 2011, renewable energy resources can be counted for the purpose of meeting the renewable energy standards only if they are generated from in-state facilities and provided that cost-effective renewable energy resources are available from those facilities (20 ILCS 3855/1-75(c)(3)). By June 1, 2010 at least 5% of each utility’s total supply to serve the load of eligible retail customers must be generated from cost-effective renewable energy resources (20 ILCS 3855/1-75(c)(1)). The percentage increases annually until the mandated 25% is reached by June 1, 2025. The act also protects ratepayers by requiring that the renewable energy resources cannot cause rates to increase by more than a certain percentage each year. On December 28, 2009, the Illinois Commerce Commission approved a plan to allow the state’s utilities to purchase a portion of wind and other renewable energy through long-term contracts. This move has the potential to accelerate the development of wind projects in the state and should help create a more robust REC market.

As an enterprise zone incentive in Illinois, both an investment tax credit and a jobs tax credit are available. The investment tax credit entitles a developer to a 0.5% income tax credit for investments in qualified property; for example, building, structures, and other tangible property. The jobs tax credit entitles an employer to a $500 tax credit for hiring individuals certified as economically disadvantaged. The more important benefit to wind developers from an enterprise zone in Illinois is the sales-and-use tax exemption for building materials. Nearly 40 other states, including all adjacent states, automatically exempt wind energy generation equipment from any sales-and-use tax. If Illinois had not offered enterprise zone benefits, Illinois wind projects would have been at a competitive

Figure 4.—Wind Resource of Illinois
disadvantage, which is why every major wind project in Illinois has been located in an enterprise zone. Fortunately, Senate Bill 1923 (P.A. 96-28, eff. 7-1-09) amended the Illinois Enterprise Zone Act, to provide that businesses that intend to establish a new wind power facility in Illinois may be considered “high impact businesses” allowing them to claim a full exemption from sales-and-use tax without having to apply for enterprise zone status, which has been a cumbersome tax-exemption process used until the passage. More importantly, enterprise zones are completely unavailable in some counties in Illinois that have good wind resources. This new piece of legislation puts Illinois on more equal footing with its neighboring states, which all exempt wind energy generation equipment from sales-and-use taxes as previously mentioned.

As wind energy facilities were first being proposed in different counties in Illinois, local tax assessors were faced with the challenge of how the value of these new wind energy devices should be assessed. The wind energy devices in Illinois ended up being assessed differently in each county, which meant identical turbines could have vastly different taxable values across the state. Fortunately, in 2007, legislation was passed setting a state standard for valuation of wind energy devices for at least five years (P.A. 95-644, eff. 10-12-07). The wind energy property assessment division of the Illinois Property Tax Code specified that wind energy devices larger than 500 kilowatts (kW) and producing power for commercial sale be valued at $360,000/megawatt (MW) of capacity, annually adjusted for inflation according to the U.S. Consumer Price Index (35 ILCS 200/Art. 10 Div. 18 heading). The depreciation allowance may not exceed 70% (Ryerson, 2009). Although wind developers have criticized the taxes from this legislation as too high, the certainty the law provides is a net benefit to wind development in the state of Illinois. Whether the current standard is renewed when the sunset date (end of 2011) for the legislation arrives will have a significant impact on the siting and zoning of wind farms at the county level, and thus the future wind farm development in the state. Fortunately, the Wind Property Tax Extension Bill (H.B. 4797 which amends 35 ILCS 200/10-610) passed both Houses April 27, 2010, and it was sent to the Governor May 26, 2010, where it awaits his signature. If the Governor signs the bill, it would extend the current property tax valuation law for wind turbines in Illinois until the end of 2016, providing greater certainty for developers, banks, and local officials, which will help Illinois wind projects move forward.

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12 Under the current legislation, school districts and local governments benefit significantly. Any reduction in this benefit may negatively impact county board (as well as the siting and zoning board) approval of proposed wind projects. Current law governing wind farm taxation contains a sunset provision for the end of 2011, which creates an uncertainty for lenders and makes wind project finance more difficult. The uncertainty also makes local officials hesitant to approve projects, causing additional delays.
Wind farm installations can create jobs in rural parts of Illinois where local economies are often dependent on agriculture. Local jobs include construction-related jobs, operation and maintenance of the facility after it is constructed, and jobs induced by the additional money the workers spend in the local economy. This section reviews some of the published studies of the economic benefits of wind energy.

Lantz and Tegen (2008) conducted an analysis pertaining to variables affecting economic development of wind energy. Lantz and Tegen (2008) assert that “creating policies to ensure maintenance materials are supplied by in-state business and that the local labor force is trained to perform wind turbine maintenance is also likely to have a large impact for wind power plants operating for 20 or more years” (15). Development of related in-state businesses and trained labor are crucial to maximizing the economic benefits of wind energy development in Illinois.

Wind projects benefit rural economies by providing local jobs during construction and boosting activity at local businesses that can provide some of the needed materials and services for construction of the wind farm. Lantz and Tegen (2008) point out that “wind farms rely heavily on non-turbine construction materials like sand, gravel, asphalt, and concrete for construction of roads and foundations” (10). Because these materials are prevalent in conventional construction industries, “most regions are capable of supplying a high level” of the materials to wind projects (Lantz and Tegen, 2008, 10). Many developers try to hire local construction companies. Pedden (2006) notes that “some local governments offer incentives to developers in return for the developer agreeing to hire local labor” (7).

The operation and maintenance needs of a wind farm create permanent, high-quality local jobs ranging from field technicians who service the turbines to accountants and managers. Wind farms need staff to operate and regularly service the turbines throughout their roughly 20- to 30-year lifetimes.

Landowners who lease their land to wind developers benefit from having a stable source of income. On a per acre basis, the revenue landowners receive from leasing their land is usually greater than that from ranching or farming and it does not require any work from the landowners. Landowners can be compensated in a variety of ways: option payments, construction disturbance or installation payments, land leases/easements, and/or royalties. While royalty payments represent a percentage of gross income received by the wind farm owner from the sale of power, land easements represent a specific amount paid to the landowner each year and are typically adjusted for inflation.

Pedden (2006) conducted a comparative analysis on the economic impact of wind farms in rural communities across the country and concluded that more direct benefits are found in rural communities, especially those with few industries and those primarily with farming. He explains that the supplementary income paid to farmers and the local taxes greatly contribute to the economic development impacts of these communities.
The Twin Groves Wind Farm, developed by Horizon Wind Energy in McLean County, signed option and land lease agreements with property owners. In total, 130 different landowners leased land to Horizon for the wind turbines, more than 30 different landowners granted overhead transmission easements, more than 50 different landowners granted underground distribution easements, more than 70 different landowners granted ROW (Right-of-Way) easements for road improvements, and more than 50 different landowners signed to neighbor agreements (Whitlock, 2008).

### Increased Tax Revenues

Local governments receive significant amounts of revenue from permitting fees. For example, Logan County received $245,000 for wind farm zoning fees and permits from the 29 turbines that are located in the county for the Rail Splitter Wind Farm (Niziolkiewic, 2010). In addition, the EcoGrove project has provided more than $750,000 in revenue for Stephenson County through enterprise zone fees, zoning application fees, and turbine permit fees (Morse, 2008).

Wind turbines raise the property tax base of a county, creating a new revenue source for education and other local government services. In his comparative analysis, Pedden (2006) points out that taxes collected by state and local governments can support many sectors of the economy such as schools, road improvements, hospitals, and fire and rescue. Lantz and Tegen (2008) point out that property tax payments “can increase the local tax base allowing for budget increases or a lowering of the taxing district’s general tax rate” (6).

### School District Benefits

School districts can also benefit from wind farms located in their property tax base. Typically when new economic development occurs in an area, the school district receives an increase in its property tax revenue, accompanied by an increase in population, and thus costs associated with new students relocating in their district. However, when a wind farm moves to the area, the school district benefits from a large increase in revenue, with no concomitant increase in costs. The new revenues can then be used to enhance the education provided by the school to existing students.

### Road Improvements

The construction of wind farms frequently requires public road upgrades. The developers strengthen the roads, then widen them to put in the private access roads that lead to the turbines. Following road upgrades, developers then can begin construction. A road use agreement between the county and the developer is usually passed and typically pays for upgrading roads that will be used during construction.
The economic analysis of wind power development presented here utilizes the National Renewable Energy Laboratory’s (NREL’s) latest Jobs and Economic Development Impacts (JEDI) Wind Energy Model\textsuperscript{13}. The JEDI Wind Energy Model\textsuperscript{14} is an input-output model that measures the spending patterns and location-specific economic structures that reflect expenditures supporting varying levels of employment, income, and output. Essentially, JEDI is an input-output model, which takes into account the fact that the output of one industry can be used as an input for another. For example, when a wind farm developer purchases turbines to build a wind farm, those wind turbines are made of components such as fiberglass, aluminum, steel, copper, etcetera. Therefore, purchases of wind turbines impact the demand for these components. In addition, when a wind farm developer purchases a wind turbine from a manufacturing facility, the manufacturer uses some of that money to pay employees, and then the employees spend that money to purchase goods and services within their community. In essence, JEDI reveals how purchases of wind project materials not only benefit local turbine manufacturers but also the local industries that supply the concrete, rebar, and other materials (Reategui et al., 2009). The JEDI model uses construction cost data, operating cost data, and data relating to the percentage of goods and services acquired in the state to calculate jobs, earnings, and economic activities that are associated with this information. The results are broken down into the construction period and the operation period of the wind project. Within each period, impacts are further divided into direct, turbine and supply chain (indirect), and induced impacts.

The Jobs and Economic Development Impacts (JEDI) Model was developed in 2002 to demonstrate the economic benefits associated with developing wind farms in the United States. The model was developed by Marshall Goldberg of MRG & Associates, under contract with the National Renewable Energy Laboratory. The JEDI model utilizes state-specific industry multipliers obtained from IMPLAN (IMpact Analysis for PLANning). IMPLAN software and data are managed and updated by the Minnesota IMPLAN Group, Inc., using data collected at federal, state, and local levels. The JEDI model considers 14 aggregated industries that are impacted by the construction and operation of a wind farm: agriculture, construction, electrical equipment, fabricated metals, finance/insurance/real estate, government, machinery, mining, other manufacturing, other services, professional service, retail trade, transportation/communication/public utilities, and wholesale trade (Reategui et al., 2009). This study does not analyze net jobs. It analyzes the gross jobs that the new wind farm development supports.

\textsuperscript{13}The economic development impacts from the first 1,118.76 MW of wind energy in Illinois were estimated using JEDI release number W1.09.03b. The economic development impacts from the following 729 MW of wind energy in Illinois were estimated using JEDI release number W1.09.03e. The JEDI model can be downloaded at http://www.nrel.gov/analysis/jedi/.

\textsuperscript{14}The JEDI model has been used throughout the wind energy economic development literature (see Lantz and Tegen, 2008, 2009ab; Lantz, 2009; NREL, 2008a-k, 2009; Reategui and Tegen, 2008; Reategui et al., 2009; Williams et al., 2008).
Direct Impacts during the construction period refer to the changes that occur in the onsite construction industries in which the direct final demand (i.e., spending on construction labor and services) change is made. Final demands are goods and services purchased for their ultimate use by the end user. Onsite construction-related services include engineering, design, and other professional services. Direct impacts during operating years refer to the final demand changes that occur in the onsite spending for wind farm workers.

Direct jobs consist primarily of onsite construction and project development labor such as the following:

- Utility and Power Engineers
- Geophysical/Structural Engineers
- Site/Civil Engineers
- Concrete-Pouring Companies
- Wind Energy Project Developers
- Developer's Construction Management
- Clerical and Bookkeeping Support
- Developer's Legal Team
- Road Builders/Contractors
- Site Safety Coordinator
- Environmental and Permitting Specialists
- Microelectronic/Computer Programmers
- Operations and Maintenance Personnel
- Truck Drivers
- Tower Erection Crews
- Crane Operators
- Backhoe Operators
- Interconnection Labor
- Earthmovers
- Excavation Service Labor
- Electricians
- Wind Farm Operators
- Site Administrators
- Maintenance Mechanics
- Field Technicians
- Construction Crews

The initial spending on the construction and operation of the wind farm creates a second layer of impacts, referred to as “turbine and supply chain impacts” or “indirect impacts.” Indirect impacts during construction period consist of the changes in inter-industry purchases resulting from the direct final demand changes, and include construction spending on materials and wind farm equipment and other purchases of goods and offsite services. Essentially, these impacts result from “spending related to project development and on-site labor such as equipment costs (turbines, blades, towers, transportation), manufacturing of components and supply chain inputs, materials (transformer, electrical, HV line extension, HV sub-interconnection materials), and the supply chain of inputs required to produce these materials” (JEDI Support Team, 2009, 2). Concrete that is used in turbine foundations, increases the demand for gravel, sand, and cement. As a result of an expenditure for concrete there is increased economic activity at quarries and cement factories and these changes are indirect impacts. The accountant for the construction firm and the banker who finances the contractor are both considered indirect impacts. All supply chain component impacts/manufacturing-related activities are included under indirect impacts; therefore, the late stage turbine assembly process, which includes gearbox assembly, blade production, and steel rolling are all included under the construction period indirect impacts category.
Indirect impacts during operating years refer to the changes in inter-industry purchases resulting from the direct final demand changes. Essentially, these impacts result from “expenditures related to on-site labor, materials, and services needed to operate the wind farms (e.g., vehicles, site maintenance, fees, permits, licenses, utilities, insurance, fuel, tools and supplies, replacement parts/equipment); the supply chain of inputs required to produce these goods and services; and project revenues that flow to the local economy in the form of land lease revenue, property tax revenue, and revenue to equity investors” (JEDI Support Team, 2009, 3). All land lease payments and property taxes show up in the operating-years portion of the results because these payments do not support the day-to-day operations and maintenance of the wind farm but instead are more of a latent effect that results from the wind farm being present (Eric Lantz, February 25, 2009, e-mail message to author).

Examples of jobs, services and turbine-related components in this category include:

- Steel Producers
- Gear Producers
- Gearbox Assemblers
- Manufacturing Engineers
- Material Engineers
- Manufacturing Managers
- Welders
- Turbine Manufacturers
- Blade Manufacturers
- Tower Manufacturers
- Turbine Suppliers
- Blade Suppliers
- Tower Suppliers
- Gravel Workers
- Rebar Manufacturers
- Wood Products Suppliers
- Epoxy and Resin Manufacturers
- Generator Manufacturers
- Cement Producers
- Lumber and Building Materials
- Hardware and Supplies
- Bearing Manufacturers
- Speed Changers
- Cable Manufacturers
- Local Utilities
- Banks
- Attorneys
- Industrial Control Manufacturers
- Transmission Line Manufacturers
- Glass Fiber Manufacturers
- Rolled Steel Shape Manufacturers
- Electrical Equipment Wholesalers
- Metal Fabricators
- Heavy Equipment Rental Companies
- Transportation Service Providers
- Bookkeepers
- Accountants
- Motor Vehicle Retailers
- Hardware and Tool Retailers
- Tool Manufacturers
- Maintenance Providers
- Material Suppliers
- Insurance Agents
- Gas Station Attendants
- Local Government Employees
- Turbine, Blade, and Tower Component Suppliers
- Computer-Controlled Machine Tool Operators
- Engine and Other Machine Assemblers
- Electronic Controls and Equipment Manufacturers

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Induced Impacts during construction refer to the changes that occur in household spending as household income increases or decreases as a result of the direct and indirect effects of final demand changes. Local spending by employees working directly or indirectly on the wind farm project who receive their paychecks and then spend money in the community is included. Additional local jobs and economic activity are supported by these purchases of goods and services. Thus, for example, the increased economic activity at quarries and cement factories results in increased revenues for the affected firms and raises individual incomes. Individuals employed by these companies then spend more money in the local economy, e.g., as workers receive income, they may decide to purchase more expensive clothes, or higher quality food along with other goods and services from local businesses. This increased economic activity may result from “construction workers who spend a portion of their income on lodging, groceries, clothing, medicine, a local movie” theater, restaurant, or bowling alley; or a “steel mill worker who provides the inputs for turbine production and spends his money in a similar fashion, thus supporting jobs and economic activities in different sectors of the economy” (JEDI Support Team, 2009, 2).

Induced impacts during operating years refer to the changes that occur in household spending as household income increases or decreases as a result of the direct and indirect effects from final demand changes. Some examples include a “wind farm technician who spends income from working at the wind farm on buying a car, a house, groceries, gasoline,” or movie tickets; or a “worker at a hardware store who provides spare parts and materials needed at the wind farm and who spends money in a similar fashion, thus supporting jobs and economic activities in different sectors of the economy” (JEDI Support Team, 2009, 3).

Some examples of induced jobs, services, activities, materials, and spending can be associated with the following types of businesses:

- Grocery Stores
- Child Care
- Clothing Stores
- Retail Stores
- New Cars
- Restaurants
- Medical Services
- Hotels
- Gas Stations
- Movie Theaters
Lists of Illinois’ wind power projects were obtained from the American
Wind Energy Association and the Illinois Wind Working Group databases (AWEA, 2010c; IWWG, 2010). The project lists contained information regarding wind project name, developer, owner/operator, power purchaser, location, capacity (MW), project status, year online, turbine manufacturer, number of turbines, and turbine size. Data collected for the first 21 wind projects in Illinois (see Table 2 and Figure 5), which amounts to 1,847.76 MW of wind generating capacity, were used in this analysis. Project-specific information on each wind project was entered into the JEDI model to estimate the income, economic activity, and number of job opportunities accruing to the state from the project.

The data collection process consisted of background research being conducted for each of the projects. Research consisted of collecting all published information including that obtained from the following sources: e-mails from developers; media information; presentations that developers, attorneys, county board members, and members of the communities presented at wind conferences; corporate press releases; information from the websites of school districts, project developers, county boards, and electric cooperatives; news releases from the Illinois state government; and information from the Illinois Department of Revenue website. For projects lacking published input specific information, NREL’s expertise for average Illinois values was used. Following the extensive data collection, an e-mail with the project specific input data was sent to each project developer to allow them to provide feedback confirming the accuracy of the specific input numbers and in those cases where inaccuracies were found, they were able to correct the numbers prior to the input-output analysis. JEDI model inputs consist of detailed information, which many developers consider proprietary, thus information about individual wind farms will not be released.

Table 2.—Illinois Wind Farm Projects with Project Details

<table>
<thead>
<tr>
<th>Wind Farm</th>
<th>Developer/Owner/Operator</th>
<th>Location (County)</th>
<th>Capacity (MW)</th>
<th>Turbines</th>
<th>Units</th>
<th>Year Online</th>
</tr>
</thead>
<tbody>
<tr>
<td>Streator Cayuga Ridge South</td>
<td>Iberdrola Renewables</td>
<td>Livingston</td>
<td>300.00</td>
<td>Gamesa</td>
<td>150</td>
<td>2010</td>
</tr>
<tr>
<td>EcoGrove</td>
<td>Acciona Windpower</td>
<td>Stephenson</td>
<td>100.50</td>
<td>Acciona Windpower</td>
<td>67</td>
<td>2009</td>
</tr>
<tr>
<td>Gob Nob Wind Turbine</td>
<td>Rural Electric Convenience Coop</td>
<td>Montgomery</td>
<td>0.90</td>
<td>Emergya</td>
<td>1</td>
<td>2009</td>
</tr>
<tr>
<td>Grand Ridge II, III and IV</td>
<td>Invenenergy</td>
<td>LaSalle</td>
<td>111.00</td>
<td>GE Energy</td>
<td>74</td>
<td>2009</td>
</tr>
<tr>
<td>Lee-DeKalb</td>
<td>NextEra Energy Resources</td>
<td>DeKalb, Lee</td>
<td>271.50</td>
<td>GE Energy</td>
<td>145</td>
<td>2009</td>
</tr>
<tr>
<td>Rail Splitter</td>
<td>Horizon Wind Energy</td>
<td>Logan, Tazewell</td>
<td>100.50</td>
<td>GE Energy</td>
<td>67</td>
<td>2009</td>
</tr>
<tr>
<td>Sherrard High School Turbine</td>
<td>Seward Energy Resources</td>
<td>Rock Island</td>
<td>0.60</td>
<td>Vestas</td>
<td>1</td>
<td>2009</td>
</tr>
<tr>
<td>Top Crop I</td>
<td>Horizon Wind Energy</td>
<td>LaSalle</td>
<td>100.50</td>
<td>GE Energy</td>
<td>67</td>
<td>2009</td>
</tr>
<tr>
<td>Erie CUSD #1 Wind Turbine</td>
<td>Erie CUSD #1, Johnson Controls</td>
<td>LaSalle</td>
<td>1.20</td>
<td>Vensys</td>
<td>1</td>
<td>2008</td>
</tr>
<tr>
<td>Providence Heights</td>
<td>Invenenergy</td>
<td>LaSalle</td>
<td>99.00</td>
<td>GE Energy</td>
<td>66</td>
<td>2008</td>
</tr>
<tr>
<td>Twin Groves II</td>
<td>Iberdrola Renewables</td>
<td>Bureau</td>
<td>72.00</td>
<td>Gamesa</td>
<td>36</td>
<td>2008</td>
</tr>
<tr>
<td>AgriWind</td>
<td>Horizon Wind Energy</td>
<td>McLean</td>
<td>198.00</td>
<td>Vestas</td>
<td>120</td>
<td>2008</td>
</tr>
<tr>
<td>Camp Grove</td>
<td>John Deere Wind</td>
<td>Bureau</td>
<td>8.40</td>
<td>Suzion</td>
<td>4</td>
<td>2007</td>
</tr>
<tr>
<td>GSG</td>
<td>Orion Energy Group, enXco</td>
<td>Marshall, Stark</td>
<td>150.00</td>
<td>GE Energy</td>
<td>100</td>
<td>2007</td>
</tr>
<tr>
<td>Turbine Adam</td>
<td>Infinenergy</td>
<td>Lee, LaSalle</td>
<td>80.00</td>
<td>Gamesa</td>
<td>40</td>
<td>2007</td>
</tr>
<tr>
<td>Twin Groves I</td>
<td>FPC Services/GSG Wind</td>
<td>Lee</td>
<td>2.50</td>
<td>Clipper</td>
<td>1</td>
<td>2007</td>
</tr>
<tr>
<td>Crescent Ridge</td>
<td>Horizon Wind Energy</td>
<td>McLean</td>
<td>198.00</td>
<td>Vestas</td>
<td>120</td>
<td>2007</td>
</tr>
<tr>
<td>Illinois Rural Electric Coop</td>
<td>Infinenergy</td>
<td>Bureau</td>
<td>54.45</td>
<td>Vestas</td>
<td>1</td>
<td>2005</td>
</tr>
<tr>
<td>Bureau Valley SD Turbine</td>
<td>Iberdrola Renewables</td>
<td>Bureau</td>
<td>1.65</td>
<td>Vestas</td>
<td>1</td>
<td>2005</td>
</tr>
<tr>
<td>Mendota Hills</td>
<td>Infinenergy</td>
<td>Bureau</td>
<td>0.66</td>
<td>Vestas</td>
<td>1</td>
<td>2004</td>
</tr>
</tbody>
</table>

17 http://renewableenergy.illinoisstate.edu/wind/databases/
Figure 5.—Illinois Wind Farms
The results from the JEDI model show significant economic impacts from the first 1,847.76 MW of wind energy development in the state of Illinois (see Figure 6 and Table 3). Job creation and local economic activity impacts during the construction and operational periods of the wind farm projects are presented in Figure 6 and Table 3.

Employment impacts can be broken down into several different components. Direct jobs created during the construction phase typically last anywhere from 6 months to over a year depending on the size of the project; however, the direct job numbers present in Figure 6 and Table 3 from the JEDI model are based on a full time equivalent (FTE) basis for a year. In other words, 1 job = 1 FTE = 2,080 hours worked in a year. A part time or temporary job would constitute only a fraction of a job according to the JEDI model. For example, the JEDI model results show 1,473 new jobs during construction; though the construction of the wind farms may have actually involved hiring closer to 3,000 workers. Thus, due to the short-term nature of construction projects, the JEDI model significantly understates the number of people actually hired to work on the project. It is important to keep this fact in mind when looking at the numbers or when reporting the numbers. Direct jobs created during the operational phase last the life of the wind farm, typically 20-30 years. Direct construction jobs, and operations and maintenance jobs both require highly-skilled workers in the fields of construction, management, and engineering. These well-paid professionals boost economic development in rural communities where new employment opportunities are welcome due to economic downturns (Reategui and Tegen, 2008).

Based on the model’s results, the first 1,847.76 MW of wind power development in Illinois created approximately 9,968 full-time equivalent jobs during construction periods with a total payroll of over $509 million, and is supporting approximately 494 permanent jobs in rural Illinois areas with a total annual payroll of over $25 million. These 494 jobs make a significant impact because the wind farms are located in rural areas, where populations are much smaller.

Wind power projects increase the property tax base of a county, creating a new revenue source for education and other local government services. Illinois actually has higher property tax rates than most of the surrounding states. Thus, the property tax revenue impacts are substantial. According to the model’s results, the first 1,847.76 MW of wind power development in Illinois supports local economies by generating over $18 million in annual property taxes.

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18 Property tax revenue is listed for the first year (where there are property tax abatements during the first few years of the wind farm project or Payments in Lieu of Taxes (PILOT), an average figure over the first ten years is utilized). This figure will change over time due to several factors: (1) whether the county increases/decreases the local property tax rate; (2) depreciation over the life of the project; and (3) if the state law regarding wind farm valuation changes in the future.
Landowners benefit when they lease their land to wind developers because of the stabilized income stream. According to the model’s results, the first 1,847.76 MW of wind power development in Illinois is generating more than $8.3 million annually in extra income for Illinois residents who lease their land to wind farm developers.

Output refers to economic activity or the value of production in the state or local economy. According to the model’s results, the first 1,847.76 MW of wind power development in Illinois will generate a total economic benefit of $3.2 billion over the life of the projects (construction plus 25 years of operations was assumed in this calculation).

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24 The landowner payments are adjusted for inflation throughout the contract life (thus this amount will increase over time).
Table 3.—Local Economic Impacts from 1,847.76 MW of Wind Energy Development in Illinois

<table>
<thead>
<tr>
<th></th>
<th>Total Jobs‡</th>
<th>Total Output</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Construction</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Project Development and Onsite Labor Impacts</td>
<td>1,473</td>
<td>$137 million</td>
</tr>
<tr>
<td>Turbine and Supply Chain Impacts</td>
<td>5,650</td>
<td>$853 million</td>
</tr>
<tr>
<td>Induced Impacts</td>
<td>2,845</td>
<td>$337 million</td>
</tr>
<tr>
<td>New Local Jobs during Construction</td>
<td>9,968</td>
<td></td>
</tr>
<tr>
<td><strong>Operations</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Onsite Labor Impacts</td>
<td>110</td>
<td>$10 million/year</td>
</tr>
<tr>
<td>Local Revenue and Supply Chain Impacts</td>
<td>181</td>
<td>$45 million/year</td>
</tr>
<tr>
<td>Induced Impacts</td>
<td>203</td>
<td>$24 million/year</td>
</tr>
<tr>
<td>New Local Long-Term Jobs</td>
<td>494</td>
<td></td>
</tr>
<tr>
<td>Total Economic Benefit</td>
<td></td>
<td>$3.2 billion</td>
</tr>
<tr>
<td>Payments to Landowners</td>
<td></td>
<td>$8.3 million/year</td>
</tr>
<tr>
<td>Local Property Tax Revenue*</td>
<td></td>
<td>$18 million/year</td>
</tr>
</tbody>
</table>

Notes: All dollar values have been converted to 2008 dollars. JEDI versions 1.09.03b and 1.09.03e were utilized. Visit http://www.nrel.gov/analysis/jedi/ to download the model. Project specific costs and local share inputs were obtained from the wind farm developers for use in the JEDI model to improve accuracy of the estimated economic impacts. Totals assume construction plus 25 years operations.

* Property tax revenue is listed for the first year (where there are property tax abatements during the first few years of the wind farm project or Payments in Lieu of Taxes (PILOT), an average figure over the first ten years is utilized). This figure will change over time due to several factors: (1) whether the county increases/decreases the local property tax rate; (2) depreciation over the life of the project; and (3) if the state law regarding wind farm assessed valuation changes in the future.

‡ Job calculations are based on a full time equivalent (FTE) basis for a year. In other words, 1 job = 1 FTE = 2,080 hours worked in a year. A part time or temporary job would constitute only a fraction of a job according to the JEDI model. For example, the JEDI model results show 1,473 new jobs during construction; though the construction of the wind farms may have actually involved hiring closer to 3,000 workers. Thus, due to the short-term nature of construction projects, the JEDI model significantly understates the number of people actually hired to work on the project. It is important to keep this fact in mind when looking at the numbers or when reporting the numbers.
Lantz and Tegen (2008) argue that “the single largest potential driver of economic development benefits is local manufacturing. Policymakers seeking to maximize economic development benefits from wind power are likely to gain the greatest increased benefit by attracting new wind power manufacturing to their state” (11-2). Wind energy requires highly skilled manufacturing workers who take part in designing, building, and assembling wind turbines. A report developed by the Renewable Energy Policy Project concluded that as many as 31,522 new jobs could be created by manufacturing wind power components in Illinois. This could help revitalize more than 457 manufacturing firms in Illinois (Blue Green Alliance, 2007).

Some economic benefits from the wind turbine supply chain have already been experienced in Illinois. For example, Trinity Structural Towers in Clinton manufactures towers, and Siemens Energy and Automation facility (Winergy Turbine Drives) in Elgin produces wind turbine gear drivers; both of these manufacturers have created local jobs in their respective communities. Finkl and Sons in Chicago supplies wind turbine components. Thanks to a Federal Stimulus Grant, Ingersoll Machine Tools plans to retrofit their existing Rockford facility to manufacture wind turbine components that will allow the company to retain nearly 70 existing jobs and create over 80 new jobs. There are also several small wind turbine vendors in Illinois. These facilities produce goods that help their customers meet the growing demand for sustainable energy resources. For more information about the economic impacts of the wind turbine supply chain, see the Center for Renewable Energy’s report titled, “Economic Impact of Wind Turbine Supply Chain” by Loomis, Carlson, and Payne (2010).

The skill sets of residents in the community largely determine whether the wind farm developer hires local labor for the construction and operation and maintenance stages of the wind farm development. Highland Community College in Freeport, Illinois received accreditation for Illinois’ first associate degree program for wind turbine technicians in 2008. The two-year program requires students to take courses in subjects including electronics, meteorology, math, business, speech, and physical education. EcoEnergy is involved with the main focus of the program, teaching students how to assemble, maintain, and repair wind turbines. EcoEnergy is also planning to offer scholarships for the program. As the United States continues to develop and build more wind energy facilities, the demand for well-trained turbine technicians will keep increasing, which provides more stable and reliable jobs for communities (EcoEnergy, 2008).
Illinois State University in Normal, Illinois, has a Renewable Energy interdisciplinary undergraduate major as of fall 2008. The curriculum includes courses in technology, economics, and agriculture. Students in the program may choose between a technology track or an economics/public policy track. Renewable energy experts and potential employers who comprise the program advisory committee reviewed the curriculum to ensure that its scope and depth will result in graduates that are highly trained and knowledgeable. Graduates are expected to be conversant in diverse disciplines, including technical, managerial, political, and economic issues important to renewable energy.

Illinois Valley Community College is developing a curriculum that would train students to become wind turbine mechanics. The Illinois Institute of Technology (IIT) won a major US Department of Energy grant in 2009 to lead a consortium studying pioneering wind energy technologies. Members will perform focused research on critical wind energy challenges including wind technology challenge, grid system integration, and workforce challenge21.

Besides manufacturing industries, other wind energy businesses have opened up around the state. They have either brought new employees to the state who contribute to total spending in the local economy, or they have created new jobs for people in that community. There are close to ten wind energy companies with U.S. headquarters in Chicago. There are numerous other wind energy-related industries in the state, but far too many to name.

The economic impact from Illinois’ first 1,847.76 MW of wind energy supports jobs, generates landowner revenue, increases tax revenue, increases economic activity, and has numerous environmental benefits. In order for Illinois to take advantage of all the economic benefits from wind energy, more supply-chain manufacturing should be established in the state, which can definitely help revitalize Illinois’ manufacturing industry. More wind turbine technician training facilities are needed to prepare the workforce in Illinois. An extension of the in-state renewable energy resource preference to meet the state RPS would spur development of more wind farm projects in the state. Overall, wind power development in Illinois indicates a positive future for the state in helping to preserve the environment and contributing to a more secure energy future.
References


