Community Wind:
A Guidebook for Oklahoma

Oklahoma Wind Power Initiative

3200 Marshall Avenue, Suite 150

Norman, OK 73072

**Please note: This handbook is for informational purposes only. It is intended to give the reader insight to the community wind development process and is not intended to be an all inclusive manual to the community wind development process.*

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Introduction


Photo courtesy of Stephanie Buway

Wind power is the fastest growing energy source in the world. It is not only a clean and renewable source of electricity, but it can also be cost effective. Oklahoma alone has enough wind resource potential to supply almost 10% of the nation's electricity needs (OWPI, Wind Resource Economic Analysis, 2002). Currently, approximately 3% of Oklahoma's electrical generation is from wind power. The benefits of wind power are not just available in the large-scale setting of wind farms where the generated power is sold to electrical utilities. Economically beneficial applications using commercial sized wind turbines on a smaller scale are also possible. For example, schools and businesses have the ability to lower their electricity bills through the ownership and operation of wind turbines. The purpose of this handbook is to inform Oklahomans how to use their available wind resources to generate clean and economical energy. This smaller-scale ownership and distribution of energy is termed "community wind."

The Oklahoma Wind Power Initiative (OWPI)

OWPI is a joint project between the University of Oklahoma and Oklahoma State University that promotes wind power development. OWPI is a clearinghouse of information for landowners, policymakers, and those interested in wind energy. Representatives from OWPI travel the state providing presentations and exhibiting at state and regional conferences, perform wind data analysis, produce a bi-monthly newsletter, and create informational materials to distribute. OWPI would like to assist those interested in any way we can, from wind data analysis, to speaking to local civic clubs, or to putting interested parties in contact with the right connections. You can visit OWPI's website for more information at www.ocgi.okstate.edu/owpi.

"I Want a Turbine"

At OWPI, people frequently call inquiring about owning their own wind power generation capacity in order to be environmentally conscientious and/or make money and/or lessen their utility bill. However, while feasible for some, ownership is not practical for everyone.

Presently, the large turbines making up Oklahoma's wind power farms cost in excess of $1 million apiece to purchase and install; accounting for investments of over $100 million per wind farm in Oklahoma. This is known as "utility-scale" wind development and is in the realm of large investors. Wind project developers have actively scoured western Oklahoma to determine the best sites for wind farms. In this situation, the benefit for landowners comes from being able to lease their land to wind project developers for the turbines to be installed. These landowners are chosen due to their fortunate geographies of ownership. If you, as an individual, possessed over $1 million

to invest in a single utility scale wind turbine, the payback period would be longer than the projected life of the turbine unless there is an exceptional wind resource at the site. Wind project developers are structured financially to be able to gain access to financing from a variety of sources, as well as qualify for tax incentives. These factors move back the payback period for utility-scale development by developers to the range of eight to twelve years, or approximately half the estimated life of the project.

Many people are interested in powering their homes and businesses with much smaller turbines. Such turbines, which are approximately 10 kW in size as opposed to their utility-scale counterparts which are 1 MW in size, are cheaper but less efficient than their large counterparts. Small wind turbines have a longer payback period and, at best, can provide modest amounts of energy to the power grid. They can provide solutions to those who are off the grid, have a very high wind resource, or are environmentally conscience. If you are interested in finding out more information on small wind turbines, visit the OWPI website for various materials on the subject or contact a small wind manufacturer such as Bergey Wind at www.bergey.com.

The above does not necessarily paint a gloomy picture for Oklahomans who wish to participate in wind power generation ownership. Perched between the utility wind and small wind scales is "community wind." Community wind involves local ownership of turbines bigger than those used by small applications. The purpose of this guide is to provide the reader with basic considerations for community wind development in Oklahoma.

What is Community Wind?

Commercial wind farms can power tens of thousands of homes while small wind systems power single homes and businesses. Where then, does community wind fit in? According to Windustry (2006), community wind projects are

> "Locally owned, commercial-scale wind projects that optimize local benefits. Locally owned means that one or more members of the local community has a significant direct financial stake in the project other than through land lease payments, tax revenue, or other payments in lieu of taxes. Commercial-scale, for this purpose, means all projects that are too large to qualify for net metering."

Bolinger (2004) defines community wind as "locally owned utility-scale wind development, on either the customer or utility side of the meter." This definition allows for a range of project sizes, purposes, ownership structures, and interconnection choices.

From local farmers to schools to Native American tribes to rural electric cooperatives, many different groups can benefit from community wind. Many different Oklahoma groups are interested in producing their own electricity and harnessing the economic and environmental benefits of owning their own wind farm.

Benefits

Wind power has numerous benefits. The economies of the areas where wind projects are located prosper in lease payments as well as tax benefits. In large wind farm projects, landowners lease the land occupied by turbines on the order of $3,000 - 5,000 per turbine per year. The local property tax base is also affected. In 2005, the Weatherford school district received almost $150,000 from Florida Power & Light's (FPL) Weatherford Wind Energy Center. The school has used this money to purchase security cameras for the schools as well as new playground equipment for the three elementary schools in the district. Weatherford school district's Superintendent, Mr. Bill Cedar, says that the money spent will always be to benefit students for years to come. As another example of economic benefits, Horizon Wind Energy paid Comanche County approximately $140,000 in taxes in 2005 for the Blue Canyon Wind Farm. Of this, approximately $113,000 went directly to the schools in Comanche County.

Wind power is an emission-free source of electricity. A 1.5 MW turbine displaces 2,700 pounds of carbon dioxide and is the same as planting 1.5 square miles of forest (AWEA, The Difference Wind Makes, 2005). The Oklahoma Wind Power Initiative estimates that "a reduction in emissions by the electric power industry through wind energy will result in fewer premature deaths, heart attacks, asthma attacks, lung cancer deaths, and overall hospital visits. The total health benefits are estimated at $217 million/year by 2007" (OWPI, Saving Money & Lives, 2005). In addition to the overall economic and environmental benefits that wind power possesses, community wind projects offer numerous unique advantages. André et al. (2006) suggests the following advantages:

- Community wind projects can focus the economic benefits further in the community itself.
- Local projects can be a launch pad for further wind development if shown successful.
- Community wind projects can sometimes be accepted by the public more easily than a commercial-sized wind farm.
- Smaller projects may be able to harness the wind at a given location and be economically feasible where a commercial-sized farm would not benefit.
- Already existing infrastructure, such as roads and distribution lines, can bring the cost of a project down by limiting the amount of construction that needs to be done.

The economic activity that is generated by local, community projects is greater than that of a project that is owned by an out-of-state company according to the table below. The Iowa-based study, Galluzzo (2005), was based on a power purchase agreement of 3¢/kWh and an additional 1¢/kWh tradable tax credit for 10 years for the community project. Capital and operating costs were assumed to be 10% less in a large-scale operation than in a community wind project. The results can be found below.

WHERE THE DOLLARS GO: A COMPARISON OF DIFFERENT OWNERSHIP STRUCTURES: 1 MEGAWATT CAPACITY

	Large Wind Owned by Out-of-State Companies	Small Wind Owned by Local Community Members
Stay in Community	$12,000	$65,900
Stay in State	$5,100	$100,300
Leave the State	$148,000	$21,300
From Federal Tax Incentives	$63,400	$66,200
To Wind Farm from Electricity Sales	$100,400	$100,400
From Proposed State Incentives	$0	$20,100
Total	**$328,900**	**$374,200**

Source: Galluzzo, Iowa Policy Project, 2005

COMMUNITY WIND IN EUROPE

The concept of community wind projects originated in Europe. Over 40%, of the world's total installed wind power is community wind, located in Germany, Denmark, the UK and Sweden (Bolinger, 2001). Why has Europe been so successful with community wind development? There appears to be a combination of factors that are important to the success of community projects in the above countries (Bolinger, 2001). They include the following:

- *Feed-in Tariffs*: the fixed price that a utility must pay for renewable electricity from private generators.
- *Tax Advantages*
    - *Tax-Free generation:* every member of the cooperative or joint venture is not taxed on their share of the income from the project's production given that the income does not surpass the annual expenditure.
    - *Refund of energy and/or CO_2 taxes*
    - *Favorable depreciation rules for businesses:* wind turbines can be depreciated by 30% each year and that expense can be used to counter other forms of income.
- *Standard Interconnection Agreements:* utilities in these countries must interconnect small wind projects to the transmission grid.
- *Wind Turbine Manufacturing at a Local Level:* local manufacturing companies often stimulate interest and provide guidance in developing projects.
- *Familiarity with Cooperative Ownership Structures:* citizens recognize the benefits of working together towards a common good.

Although these points contribute to the past success of community across Europe, such programs in the United States have not, until recently, been as successful. Some of these issues will be discussed later on in this guidebook.

Wind Power in the United States

Wind power across the nation has seen tremendous growth in the past few years. By the end of 2006, the amount of installed wind power will be over 10,000 MW, enough power for almost 3 million homes. This increase in wind power represents a substantial growth since the initial development in 1981 of the first 10 MW wind farm in California. A dramatic decrease in the production price of wind-generated electricity and the increasing awareness of the importance of domestic energy production that is both economical and environmentally friendly has lead this rapid development. The price of wind power has dropped 90% over the last 20 years to an average price of 2.5-3.5¢ / kWh, including the production tax credit (AWEA, Economics of Wind Energy, 2002). Thus, due to its economic and environmental benefits, wind power is being pursued as a significant source of electricity.

Oklahoma

"Oklahoma! Where the wind comes sweeping down the plain," is a verse that represents one of the state's greatest potential resources. As of October 2006, Oklahoma is ranked 5th in the nation in actual installed wind power with 475 MW. As of this writing, there are three utility scale wind farms in the state:

- *Blue Canyon Wind Farm – Lawton, OK*
  Developer: Horizon Wind Energy
  Power Purchaser(s): Western Farmer's Electric Cooperative (WFEC) & Public Service Company of Oklahoma (PSO)
  Total Capacity: 225 MW
- *FPL Energy Sooner Wind, LLC. – Woodward, OK*
  Developer: Florida Power & Light (FPL)
  Power Purchaser(s): Oklahoma Gas & Electric (OG&E) & Oklahoma Municipal Power Authority (OMPA)
  Total Capacity: 102 MW
- *Weatherford Wind Energy Center – Weatherford, OK*
  Developer: FPL
  Power Purchaser: PSO
  Total Capacity: 147 MW

Centennial Wind Farm, located in Harper County, will be the newest wind addition to the state at the end of 2006 with 120 MW total capacity. Invenergy, Inc. will develop the new project and OG&E will own and operate it.


Photo courtesy of Stephanie Buway

Oklahoma has progressed in the wind industry at an impressively fast rate, as the state has gone from having no installed wind energy at the beginning of 2003 to having approximately 600 MW by the end of 2006. Community wind projects will allow Oklahoma to increase its electricity portfolio

while continuing to be a leader in the nation for wind development.

Community Wind in Other States

Community wind has made significant progress in the American market in several key locations, including Minnesota, Iowa, Illinois, Wisconsin, and Massachusetts. These locations are successful due to government incentives, motivated local residents and advocacy groups that collaborate to make community wind energy a viable alternative to developer-initiated utility-scale projects. Below is a brief summary of the most successful community wind projects.


Photo courtesy of Sarah Johnson

Minnesota, MinWind

The flagship success story of community wind development in the United States are the MinWind projects. MinWind I & II are farmer-owned projects and operate as limited liability corporations (LLCs). Initially, two farmers contacted consultants as they drafted business plans to own and operate four 950 kW wind turbines through two LLCs. Seventy percent of the $3.6 million project was financed by a local bank, while the remaining 30% was raised by selling shares in each of the companies. In just 21 days, 66 local residents raised the necessary capital, with no more than 15% of the shares belonging to any single investor and a full 85% belonging to local landowners. The most difficult step of MinWind's development came in securing the power purchase agreement, as initial negotiations with the local electric cooperative fell through. A fifteen-year agreement was eventually reached with Alliant Energy. The efforts by local resident in creating MinWind I & II proved quite successful. So successful in fact, MinWind III-IX, which includes over 200 investors from Rock County, Minnesota, was completed by December 2004.

In 2005, the Minnesota Legislature helped to ensure that the utilities gave community wind developers a fair price for their energy with new legislation. The Community-Based Energy Development (C-BED) legislation requires that public utilities offer qualifying wind projects present value rates of 2.7¢ / kWh. In order to qualify, the developer must be a Minnesota resident, a non-profit, a LLC, local government, school system, or tribal council, and no single owner may have more than a 15% stake. While utilities must offer C-BED tariffs and give consideration to community-based projects when looking for new power generation, they are not required by law to automatically enter contracts with every applicant. The above information can be found from the Clean Energy Resource Teams case study on MinWind and Windustry's Fall 2002 newsletter.

Iowa, Spirit Lake School

As early as 1991, the Iowa Spirit Lake Community School District began exploring the possibility of offsetting its energy costs with wind power. By 1992 a $119,000 grant from the Department of Energy and a low-interest loan of $239,500 through the Energy Council of the Iowa Department of Natural Resources were secured toward the purchase of a 250 kW turbine. By 1998, the loan was paid off, over 3 years ahead of schedule. As of September 2006 the turbine had produced almost $304,000 worth of power.


Photo courtesy of Spirit Lake Community Schools District

Due to the success of the 250 kW turbine, in 2001 the Spirit Lake School District purchased a 750 kW turbine to further aid in the reduction of energy costs for the school district. This turbine was financed through a $250,000 no-interest loan from the Iowa Energy Center and a $580,000 loan from a local bank through the Iowa Department of Natural Energy. As of January 2006, the 750 kW turbine has produced $506,000 worth of electricity, and the break-even point is expected sometime in 2007. Spirit Lake Community School's website summarizes, "Beginning in the year 2007, when both turbines have been paid for, the district will have about $120,000 tax free income from the clean, renewable northwest Iowa wind to improve education for the children of the Spirit Lake Community School District." The above information was taken from the International Council for Local Environmental Initiatives (ICLEI) from a Spirit Lake School case study.

South Dakota, Rosebud Sioux Tribe Wind Project


Photo courtesy of Robert Gough

In February of 2003, the Rosebud Sioux Tribe of South Dakota erected the first Native American-owned utility-scale wind turbine. The 750kW NEG Micon turbine was the result of 8 years of planning, including an 18 month study of the wind resource on the reservation. Thanks to this extensive pre-project analysis, which determined the local wind resource to average a class 5 (17.9 mph) at 50 m above ground, the tribe was successful in winning a 50/50 grant from the Department of Energy for the construction of a commercial utility turbine. The 50/50 grant is a matching assistance grant where an organization must provide 50% of the total cost and then the Department of Energy matches that amount. With assistance from the Intertribal Council on Utility Policy and Distributed Generation, Inc., the Rosebud Tribe also

acquired the first tribal commercial wind loan from the U.S. Department of Agriculture (USDA) Rural Utilities Service.

On average, the tribe receives 80% of its casino/motel's electricity from the turbine, and for times of excess production it has negotiated a multi-year sale of "green power" to Ellsworth Air Force Base, near Rapid City. State collaboration between the local utility, Nebraska Public Power, and the Western Area Power Administration was necessary to arrange the deal. The information regarding the Rosebud Sioux tribe documented above was found in Windustry's Fall 2003 newsletter as well as from the DOE Tribal Energy Program's website.

Michigan, Mackinaw City


Photo courtesy of The Michigan Daily

Commercial-grade wind is locally present on the Straights of Mackinac between Lake Michigan and Lake Huron. In the middle of 2000, the small community of Mackinaw City started looking into the possibility of wind power. There was much opposition against this project. Some in the community did not want their scenic landscapes disturbed by mechanical structures that were perceived to be aesthetically unpleasing. It was felt that the presence of wind turbines would hinder tourism which is northern Michigan's largest industry. By the end of 2000 however, the city had settled on a power purchase agreement as well as a lease agreement with Bay WindPower. The two 900 kW turbines produce enough power for approximately 600 homes (Village of Mackinaw City, 2005). The turbines came online in 2001 and have produced over 4,000,000 kWh of electricity since the end of fall of 2003 (Village of Mackinaw City, 2005). Driving over the Mackinaw Bridge, one can see the turbines in the distance, producing clean energy; tourism has not been hindered.

The Community Wind Development Process

Now that we have defined the term community wind and identified successful projects across the country, you may be asking "How can I develop my own community wind project?" The rest of this guidebook outlines the necessary steps that are needed to begin the development process.

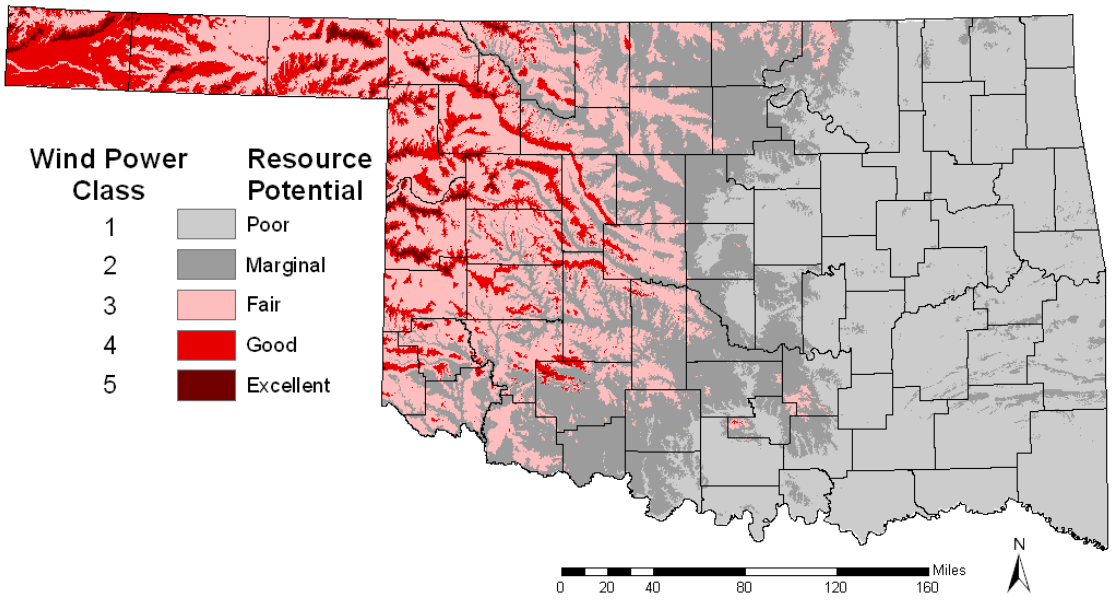
A community wind project, from beginning to end, is a time consuming process. It requires the services of many different sectors of the business, legal, and government worlds. We outline the following steps that need to be considered:

1) Wind Resource Assessment
2) Communicate with Utilities
3) Financing Options
4) Legal Counsel
5) Turbine Procurement
6) Business Structure
7) Insurance
8) Construction

1.) Wind Resource Assessment

The first step in beginning a community wind energy project is determining the wind potential. The measured wind speed at a proposed project location is critical in determining the economic feasibility of a project. The Pacific Northwest Laboratory along with the U.S. Department of Energy have established a classification system for determining the estimated power potential of a site based on the measured annual average wind speed. These classes are from Class 1, which are very light winds, to Class 7 which are exceptional wind speeds. Wind speeds categorized as Class 3 winds (6.4 - 7.0 m/s; 14.3 - 15.7 mph) or higher are typically where wind projects with commercial sized turbines become economically feasible. Based on the wind resource map created by the Oklahoma Wind Power Initiative (OWPI), approximately 49% of the state's wind resource consists of Class 3 winds and higher. Much of this potential is in western Oklahoma and in the panhandle, see figure below. However, there locally suitable sites throughout our state. Landowners interested in a more detailed description of their wind resource can visit OWPI's website for an interactive wind resource map. This map allows the user to zoom in on their parcel of land as close as township and range.

Oklahoma Wind Power Initiative's
Wind Resource Map



Source: OWPI, Wind Resource Map, 2000
www.ocgi.okstate.edu/owpi

After examining OWPI's map of estimated wind density on your land, wind measurements should be taken for at least one year, preferably at a heights of 50 m (164 ft), to provide adequate data in assessing the actual wind potential. Instrument towers, data loggers and wind measurement instruments can be purchased online or by contacting OWPI. OWPI personnel are able to lend assistance in the actual set-up of the tower and instrumentation. Once the wind speed data is collected, it will need analysis performed.

Data can be analyzed by the landowner or it can be sent to OWPI. Another option, the Oklahoma Mesonet, is also available for wind data. If your land is reasonably close to one of more than 100 Mesonet sites, the Mesonet project makes available 5-minute wind speed and direction data for purchase. However, the wind measurements are taken only at 10 m. For proper financing, the data should be processed to a height of 50 m. For more information regarding the purchasing of data from the Oklahoma Mesonet project, contact OWPI.

2.) Communication with Utilities

This is the most time consuming part of the community wind process. Communication with the local utility must begin at least a year in advance of the project. The developer must know whether or not the electricity is going to be for distribution or transmission purposes. Distribution purposes are those where the electricity produced is used on site and excess electricity is put into the distribution. The large wind farms in Oklahoma are examples of transmission purposes or wholesale electricity. The energy is created and put onto the transmission grid to go to customers across the state. Individual community wind projects may or may not be expected to add significant power onto the state's transmission system.

The developer needs to determine what Federal Energy Regulatory Commission (FERC) rules will apply to the project. Projects that are less than 2 MW in size fall under the Homeowner's Interconnection Procedures while projects between 2 and 20 MW fall under the Small Generation Interconnection Agreements. The Southwest Power Pool (SPP) is a Regional Transmission Organization responsible for the management of electric transmission in Oklahoma and neighboring states. The SPP needs to be contacted and an application needs to be submitted to the SPP if a community wind project proposed for transmission purposes. The application outlines details of the project from the size to the business structure. The SPP will also perform a transmission study. This study determines the capacity of the transmission lines and how much wind power can or cannot be added. If the study results are positive, the project can proceed. As with utilities, dealings with FERC tend to take several months.

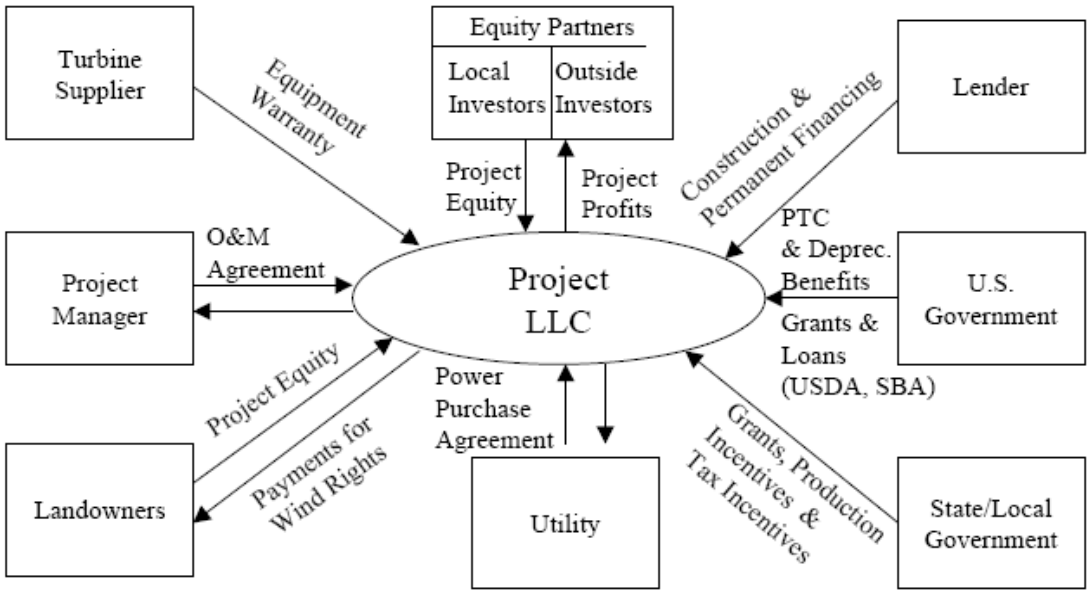
It is at this stage that a power purchase agreement (PPA) is negotiated with the utility that you wish to sell your power to. These agreements are often negotiated for 20 years or more. It is best to keep in mind that the PPA may not be with the utility that the project is interconnecting with. If the utility finds that the power will be economically feasible to purchase, then an agreement will be reached. At the time of this writing, Oklahoma does not have a "template" set by legislation or the Oklahoma Corporation Commission (OCC) rules so each project must be examined individually. If the project is on a smaller scale, rules and regulations of the net metering laws will apply. The net metering rules are explained later on in the guidebook.

3.) Financing

Identifying and obtaining the financing for the project is one of the most important parts of the community wind process and therefore should be one of the first steps. Project leaders will have to determine whether or not funds will be provided from the local

community or from grants and/or loans from the federal government, state energy offices, private companies, or local banks. Listed below are a few resources for funding of projects such as community wind. Also discussed is the Job and Economic Development Impact (JEDI) model. Those who are interested in a community wind project can use this model to quantify and estimate the expected costs and projected economic benefits. The following figure illustrates the general process and means by which community wind projects can receive financing:

COMMUNITY WIND FINANCING SCHEME



Source: Kubert, 2004

JEDI

The Job and Economic Development Impact—or JEDI—model is a user-friendly model developed by the National Renewable Energy Laboratory (NREL) for the analysis of costs and positive economic impacts associated with the construction and development of local wind projects. The model requires the input of a few details about the project (such as the year, state, and project size) and returns the associated costs and income to be expected from the project. The model includes default values for a number of factors, including equipment, construction, and personnel costs. If the user has specific data for these parameters, it will only serve to increase the accuracy of the model's assessment. The model can also be used in a limited capacity to estimate economic impact for a county or entire region. The JEDI program has a user's manual that can be consulted for assistance. The model can be found on the Wind Powering America website at www.eere.energy.gov/windandhydro/windpoweringamerica/software.asp.

USDA

Section 9006 of the Farm Security and Rural Investment Act of 2002 provides loans, grants, and guarantees to rural small businesses (as well as farmers and ranchers) for the purchase of renewable energy systems and improvements in energy efficiency. There are a few stipulations, as follows:

- Applicants may qualify for a grant, a guaranteed loan, or a combination of both.
- Renewable energy grants are available for $2,500 to $500,000.
- Energy efficiency grants are available for $1,500 to $250,000.
- Grants cannot equal more than 25% of the project cost.
- There is a simplified application process for projects whose total cost falls under $200,000.
- Loan guarantees can be for up to 50% of total eligible project costs.
- Loans are available from $5,000 to $10,000,000 per project.
- Projects can qualify for combined grant and loan guarantee, with the grant portion of assistance accounting for 25% and the loan portion making up another 25% for a maximum of 50% of eligible project costs.

Listed below in the table are other financing options available from the USDA Rural Development Program.

AVAILABLE FINANCING OPPORTUNITIES FROM USDA RURAL DEVELOPMENT

Program	Eligibility	What Program Supports	Type of Support	2006 Funding Level
Renewable Energy & Energy Efficiency	Farms, Ranches, Rural Small Businesses, Cooperatives	Capital costs of renewable energy and energy efficiency equipment	Grants/Guaranteed loans	$11.3 Million/ $176.5 Million
Value-Added Producer Grants	Farms, Ranches, Cooperatives, Producer Groups	Planning, marketing and feasibility studies; working capital	Grants	$19.2 Million
Business/Industry Guaranteed Loan Program	Rural businesses	Guarantees for business loans made by rural lending institutions	Loan guarantees up to 80%	$913 Million
Rural Economic Development Loan & Grant Program	Rural Electric and Telephone Cooperatives	Low-interest/no-interest loans	Loans to Rural Businesses, Public Agencies, others	$25.2 Million
Rural Business Opportunity Grants	Local government, non-profit, tribes, cooperatives	Technical assistance and training supporting rural economic development	Direct grants to organizations	$2.9 Million
Intermediate Relending Program	Local government, non-profit, tribes, cooperatives	Revolving Loan Fund	Subsidized loans to intermediaries	$33.8 Million
Rural Business Enterprise Grants	Local government, non-profit, tribes, cooperatives	Loan funds or direct grants	Grants to intermediaries for use as seed grants or loans	$39.6 Million

Source: Kubert, 2004

OWPI also hosts workshops several times a year regarding the 2002 Farm Bill Section 9006 Program for renewable energy and energy efficiency projects. For more information and workshop dates, visit www.ocgi.okstate.edu/owpi.

Small Business Administration

The Small Business Administration (SBA) offers two programs that are of interest to community wind developers. The first is the Certified Development Company (CDC)/504 Loan Program. The 504 Loan Program provides long term, fixed rate financing for fixed major assets. CDCs are not-for-profit companies. There are 270 CDCs across the country, and their task is to help in the economic development of the local community. 504 Program projects generally include a private loan for up to half the cost of the development, a loan from the local CDC for as much as 40% of the development, and 10% provided by the business. CDCs loans are guaranteed through the SBA, and cannot exceed $1.3 million.

Another option is the 7(a) Loan Guarantee Program. With this program private lenders, acting through the SBA, can guarantee as much as 75% of the loan value. The borrower pays a guarantee fee at time of initiation of 3.5% for loans over $700,000 and another 0.25% for amounts over $1 million.

John Deere

John Deere Credit has recently taken an interest in economically viable community wind projects over 1.25MW. Deere operates as a self-described "phase two" partner by investing in projects that have already completed many of the preliminary steps such as securing local permits and finding energy purchasers. Deere cannot finance tax-exempt entities or small-scale projects to provide energy to farms or households due to current tax and legal restrictions. Significantly more information and application forms can be found online at: http://www.deere.com, by clicking on "Credit - USA" and then selecting the wind energy image.

4.) Legal Counsel

A successful community wind venture will employ legal counsel to aid them in the project development process, as a number of legal issues will be involved. Attorneys that are trained in environmental law and land use regulation should be consulted. They can assist with the various permits needed for construction approval such as zoning restrictions, FAA approvals, and environmental permits. Note that some permit processes should be started more than a year in advance of the project due to long processing and review periods. Experts in power purchase agreements and interconnection agreements should also be consulted when speaking with the utilities. When choosing a business structure, keep in mind that a LLC with multiple investors will require an offering prospectus, a business outline, and may be subject to state and federal securities registration (ELPC, 2004). With this in mind, lawyers with securities expertise would also be a good option to have. Additionally, legal counsel with significant experience in tax law will be needed to ensure your project is properly structured to take advantage of tax and economic development incentives.

5.) Turbine Procurement

Choosing the right turbine means choosing the right size for the community wind project. A single megawatt of wind generated electricity can power approximately 300 homes. This is a useful number when roughly estimating the size and number of turbines desired.

There are numerous wind turbine manufacturers that offer utility-sized wind turbines. The table below lists a few turbine manufactures and the turbine sizes they offer:

VARIOUS WIND TURBINE MANUFACTURERS & PRODUCTS OFFERED

Manufacturer	Size(s)
Vestas	850 kW, 1.65 MW, 1.8 MW, 2.0 MW
GE	1.5 MW, 2.0 MW
Suzlon Energy	350 kW, 950 kW, 1 MW, 1.25 MW, 2.0 MW
Lorax Energy Systems	100kW, 250 kW, 600 kW
Siemens	1.3 MW, 2.3 MW
Mitsubishi	1 MW, 2.4 MW
Northern Power	100 kW
Bergey Windpower	7.5 kW, 10 kW

The choice of turbine will depend on the size needed, availability of the turbines, and most importantly, the cost. Purchasing eight 250 kW turbines instead of one 2 MW turbine may be a sensible option. If a mechanical failure were to put the one 2 MW machine out of commission, the wind farm may be without power. However, if one turbine out of the eight is down, seven turbines will still be able to provide power.

6.) Business Structures

When constructing a business plan, the local residents interested in developing a community wind farm must analyze the different structures and decide which one best suits their needs.

Minnesota Style "Flip" Structure

Started in Minnesota, this business structure gives interested parties that lack the large tax burden necessary to take advantage of the federal production tax credit (PTC), which will be explained later in the document, an opportunity to still develop their project. "Flip" ownership structures can work where a larger entity, such as a wind project developer, invests the initial capital for the project in exchange for the 10 years of the PTC and all cash flow. Initially, the developer owns 99% while the local investor owns 1% (Bolinger & Wiser, 2004). After the 10 years are over or the tax credit expires, majority project ownership (99%) "flips" back to the local investor, who now owns a revenue-producing wind project for very little up-front cost to them. After the flip, the developer can choose whether or not to keep its 1% ownership or sell it to the local investor.

Wisconsin Style "Flip" Structure

This particular style is similar to the Minnesota "Flip" structure, but entails a few differences. Instead of a single landowner providing the debt financing for a wind project, multiple local investors contribute. The Wisconsin "Flip" is described below by Bolinger & Wiser (2004):

> "A group of local investors with limited or no tax credit appetite pool enough capital into an LLC to cover 20% of the total costs of a given size of wind project. The LLC "loans" this amount to a tax-motivated

corporate investor, who in turn contributes another 30% of the total project costs in the form of equity, and borrows the remaining 50% from a commercial lender, resulting in a debt/equity ratio of 70%/30% for the project as a whole. The corporate investor owns 100% of the project for the first ten years and benefits from the federal PTC and accelerated depreciation, as well as revenue from the sales of power and renewable energy certificates (RECs). At the same time, it services the project's debt, repaying the entire 10-year commercial loan, as well as interest - but not principal - on the loan from the local LLC. At the end of the 10th year, with its minimum return hurdle met, the corporate investor simply drops out of the project, retaining the LLC's loan principal as payment for the project. At this point, the local LLC assume 100% ownership of the project, which is now free of debt, and therefore quite profitable."

Multiple Local Owners

As demonstrated in the MinWind cases in Minnesota, multiple local owner business models can be successful. Bolinger and Wiser (2004) explain this business structure as one where one or more landowners conceive of a locally-owned wind project, and then solicit sufficient equity investment to support the project from among the local community. Through the formation of limited liability corporations, or LLCs, investors can buy shares in the company. The LLC incurs debt from a local bank or in Oklahoma, from the State Energy Office through various loans programs. The project then sells power to a local utility through a negotiated long-term power purchase agreement (PPA) and investors divide the income and tax benefits proportionally, according to their level of investment in the venture (Bolinger & Wiser, 2004).

On-Site Projects

Just as the structure name suggests, on-site projects are those where the energy from the wind turbine will be used to power a local farm, school, or business instead of selling the electricity a local utility. This model is straightforward, and involves a large end-use electricity consumer (e.g., a large farm operation), financing and interconnecting a utility-scale wind turbine on its side of the meter to supply on-site power and thereby displace power purchased from the utility (Bolinger & Wiser, 2004). Although this may reduce the electric bills for some businesses, the savings that result are taxable, thereby negating the purpose of installing the wind turbine(s). Because of this, most on-site projects in the United States are those at tax exempt businesses that consume large amounts of electricity, such as the casino in the Rosebud Sioux Tribe example.

Another drawback of this model is that the federal production tax credit cannot be acquired through the on-site project model. This is because electricity is produced and consumed on-site with no third party purchase agreement. Another problem with this model is that farmers rarely will have a large enough operation to consumer all of the electricity produced from a utility-sized turbine (Bolinger & Wiser, 2004).

Cooperative Ownership

Bolinger et al. (2004) describe the cooperative ownership model as the following:

> …a business structure that "people use to provide themselves with goods and services" (Frederick 1997). While there are many different types of cooperatives, and therefore no standard definition of a cooperative, all have in common several "cooperative principles" that distinguish them from other types of businesses. These include:
>
> • **User-Owned:** A cooperative is owned by those who use its services.
> • **Democratic Control:** Each cooperative member has a direct say in the activities of the cooperative, typically through a "one member, one vote" policy.
> • **Benefits Based on Usage:** The more cooperative members use the cooperative, the more goods and services they receive. Moreover, at the end of each year, any excess revenue is distributed to cooperative members proportionally through a "patronage" dividend or refund, which is based on how much each member used the cooperative during the year.

The cooperative ownership of wind projects offers great promise for Oklahoma. This would afford individual Oklahomans the opportunity to be investor-owners. Also, the cooperative business model has been used for many years in rural Oklahoma; the state's agricultural success has been built on grain and electrical cooperatives.

Aggregate Net Metering

There are differences between aggregate net metering as opposed to traditional net metering in relation to the electricity generating equipment that bear examination. First, with aggregate net metering the generating equipment is utility-scale, as opposed to residential-scale. Additionally, the generation equipment is owned jointly by several investors as opposed to a household or single business. Finally, the meter is in a central utility-side location, opposed to the end-consumer site. At present, Oklahoma has no aggregate net metering law or Corporation Commission rule. Therefore, such projects will need to approach utility companies and the Corporation Commission and be handled on a case by case basis.

Aggregate net metering holds particular promise for wind energy, where larger and more efficient turbines sited in good areas of good wind resource promise a lower cost of energy and significantly higher returns over residential-scale projects. Each investor, then, "owns a share of generation from the turbine ... and the utility serving those investors nets that amount of generation against each investor's own electricity consumption, thereby valuing it at the full retail rate." (Bolinger et al, 2004)

7.) Insurance

Acquiring insurance for different purposes is necessary for the protection of the business. This should be done a few months prior to the construction of the project. Different types of insurance that needs to be obtained are:

- Construction insurance
- Property liability insurance
- Transit insurance
- Operation insurance

There are several companies that specialize in insurance for wind projects, e.g. WindPro Insurance. There are also general insurance companies that will work with the project as well such as AIG Insurance. As with other kinds of insurance, the buyer is advised to "shop around" to obtain the most favorable situation for a wind venture.

8.) Construction

Prior to construction of the wind project, bids for construction will need to be taken. Excavation, concrete work, crane operators, and electrical wiring are a few of the jobs that will need to be contracted out. After all appropriate permits have been obtained for the project, all proper insurance policies have been acquired, and bids have been taken for the ground work, construction can begin. The construction phase is usually short compared to other preparatory phases of the project.


Photo courtesy of Kylah McNabb

Barriers to Community Wind Development

Although community wind projects offer valuable economic benefits, benefit the environment, and promote rural development, there are several barriers that may prevent a project from being constructed. The following section discusses the barriers listed below:

1) Poor wind resource
2) Access to transmission lines
3) Power Purchase agreements and interconnection process
4) Securing financing
5) Lack of national and state incentives
6) Lack of community support
7) Competitive grants and loans
8) Land use restrictions

1.) Poor Wind Resource

The key to any successful wind project is a good wind resource. If the wind potential in the proposed area for a project is poor, it is likely that the project will not be successful. As mentioned above, a preliminary examination of the resource via analysis of wind measurements, combined with a JEDI-type economic analysis is critical to determine the potential feasibility of the proposed project. OWPI can work with project developer and help with this analysis.

2.) Access to Transmission Lines

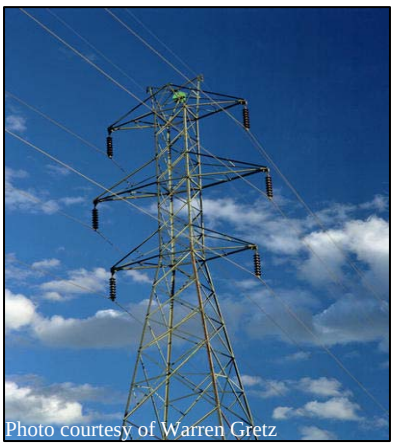


Photo courtesy of Warren Gretz

For communities to have feasible wind project, they must be within a reasonable distance from transmission lines. Building new transmission lines can cost anywhere from $100,000 per mile to $1,000,000 per mile, depending on the size and length of the lines. This can add considerable costs to the overall project. With this in mind, it is in the best interest of the community project to be as close as possible to transmission lines as well as substations. A utility scale wind farm usually requires its own substation which must be built by the project developer. For example, in western Oklahoma, transmission issues have prevented fuller development of the wind resource. The Oklahoma panhandle, where the highest wind resource potential is located, is also a region of few transmission lines and no large wind projects. The Southwest Power Pool is currently planning on improvements to transmission in the panhandle.

3.) Power Purchase Agreements & Interconnection Process

In Oklahoma, the single largest impediment for locally-owned wind projects is the lack of a power purchase agreement. The utility company will consider the benefits to their company as well as their customers. If the wind power that is going to be generated is not economically feasible within a utility's energy source portfolio, the potential buyer will not agree to the purchase. Another factor that will cease project development is a negative result from the transmission study. If the project is going to adversely affect the already existing lines, the project will need to be re-planned. Limitations are also placed on where turbines can be connected to the power grid and cost and engineering considerations frequently favor large wind projects.

4.) Securing Financing

Investors recognize that wind energy is a risk. Unless there is proof of sufficient wind resource, potential investors will pass on the opportunity. "Institutional investors, such as commercial banks and insurance companies, have large tax liabilities and experience in structured finance; however, only a few U.S. institutional investors are active in wind power projects, and these invest in larger projects initiated by commercial developers," (Kubert, p. 11, 2004). Traditionally, wind development has favored large wind farms as opposed to small projects. As the interest in renewable energy increases, banks and other financing institutions are becoming more comfortable with the risks involved and deciding to invest more in wind projects. In Oklahoma, the success of the state's first commercial wind farms provide good evidence to local financial institutions that the risk involved in financing a wind project is manageable and that it is an investment worth making.

5.) Lack of National & State Incentives

The Federal Production Tax Credit of 1.8 ¢ / kWh is available to those project owners with large tax appetites. Local landowners rarely have the ability to capture the PTC on their own. This is where the "flip" style business structure is applicable so that the PTC can be captured.

State incentives have proved important to community wind development in other states but have not been large in Oklahoma. The state has a net metering law where 100 kW or 25,000 kWh/year, whichever is less, is allowed to be 'bought' back by investor-owned utilities or municipalities (DSIRE, 2006). Oklahoma also has a state PTC of $0.0050 per kWh for projects on the ground before January 1, 2007. After January 1, 2007, it is $0.0025 per kWh. This state level credit is available to renewable energy projects that are 1 MW in size or greater. This makes it possible for community wind projects to reap tax benefits.

6.) Lack of Support from the Community

Community wind projects are a benefit to the local economies. In Massachusetts, the town of Hull has had over $510,000 in energy savings because of their community wind project (HullWind, 2005). However, support still must be gained for the venture to be successful. In many cases, the supporters of the project will also be investors in the project. Bolinger (2001) states that the U.S. is different in community wind support from Europe in that the sense of community in Europe is stronger than in the U.S. The U.S. has long been a promoter of individualism and privacy. Europe on the other hand, has held on to their sense of community and it results in cooperation and development.


Photo courtesy of Kylah McNabb

Although in general the U.S. may be less communal than Europe, rural Oklahoma towns are an exception. They are strong, involved communities that work together for a common good. Oklahoma has shown numerous opportunities where there is community support for wind projects. A successful way of acquiring the town's support is to hold a town hall meeting where members of the community can voice their concerns and/or ask questions. This can help remove any hesitations about the project. The existing wind power projects in Oklahoma have been installed with no significant opposition.

7.) Competitive Grants and Loans

The lending and granting agencies award competitive grants and loans primarily on the basis of either recouping their investment or on a project that offers promising "cutting edge" results. Accordingly, these institutions are somewhat less interested in projects that propose a marginal economic return or do not pose a successful future. Applicants for these loans are put through a thorough process of review. From business structure to

proof of financial need to environmental impact reports, the amount of information needed is extensive.

8.) Land Use Restrictions

Oklahoma's original wind power development is located in the western counties and these wide-open, rural places have proved to be well-suited to the purpose. As wind power develops over more of the Oklahoma landscape, it is anticipated that land use considerations will become more prominent. Land use is always subject to some considerations and restrictions. Some counties have active land use zoning legislation and have planning boards. The state of Oklahoma does not have statewide zoning or legislation restricting land use for wind power generation. In most instances, Oklahoma surface property rights are superseded by subsurface rights (oil and natural gas extraction), so community wind developers should check on possible conflicts long before the construction phase.

Future Prospects


Photo courtesy of Stan Whiteford

On the market level, some of the best locations for development are already in the hands of commercial developers in the form of wind easements. In Oklahoma, areas of the best wind resource, rural electric cooperatives have "all-requirements" contracts that mandate they purchase all their power through generation and transmission cooperatives. Governed by the farmers and businesses that pay the electric bills, these cooperatives often have access to cheap coal generators and are reluctant to face higher rates in exchange for green energy. For all of the above reasons, power purchase agreements tend to favor large wind plants. However, the development of turbines requiring less wind to generate cost-effective electricity makes the next decade appear promising in terms of the number of suitable wind generation sites it would allow in Oklahoma.

One possible way of promoting renewable energy in the state is to implement a Renewable Portfolio Standard (RPS). Twenty-one states and the District of Columbia have enacted a RPS. This program mandates that retail electrical suppliers reach targets of renewable energy by established dates. This sort of legislation has not been passed in Oklahoma, but in light of rising energy costs and the economic benefits of creating a large market for wind energy, the concept should not be forgotten.

Texas' RPS goal of 2,000 MW by 2009 has already been met, with 2,400 MW of installed wind capacity as of September 1, 2006. A new target, passed by Governor Rick Perry into law in 2005, is 5,880 MW by 2015. For comparison, Oklahoma Gas &

Electric (OG&E), Oklahoma's largest utility, has just over 6,000 MW of generation capacity from all energy sources.

A second avenue of promoting renewable energy in Oklahoma is to establish a mandate for renewable purchases by the state government. As one of the largest energy consumers, the state can self-impose a percentage of energy to come from renewable energy by either legislative action or executive order. Once in place, a government renewables standard establishes long-term security for investment in technologies such as wind power. With lessened risk, developers can secure loans for the large up-front cost of wind projects at better interest rates. The U.S. Environmental Protection Agency in late August 2006 took a leadership role in this regard by becoming the first federal agency to be 100% green powered. This sets an important example on a national level for other government entities.

Community wind power is not about to displace traditional utilities in the future of Oklahoma. Likewise, fossil fuels are likely to supply the bulk of Oklahoma's energy needs for the foreseeable future. What is clear is that there are opportunities for Oklahomans to own significant amounts of wind generation.

A Recipe for Success in Community Wind

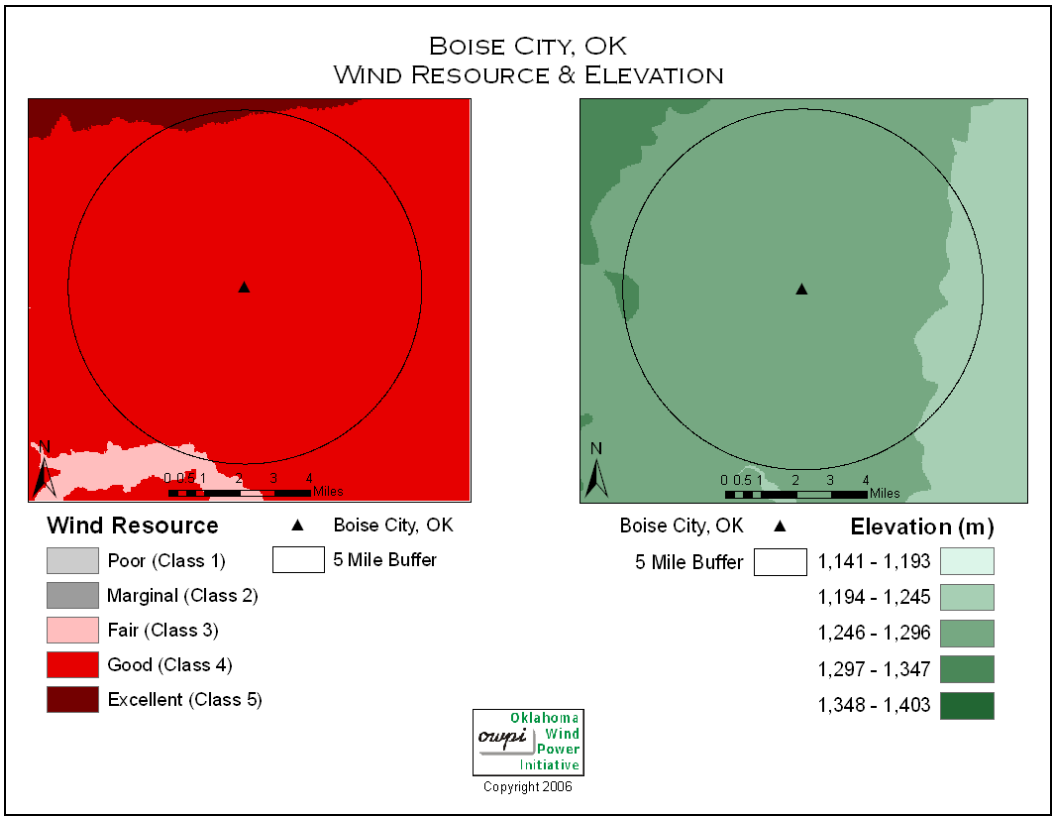
Community wind viability in Oklahoma depends on a combination of factors. First, the target area's wind resource must justify investment. Interested parties must obtain data, preferably over extended periods of time, validating the wind potential of the site. Second, consultants and attorneys should be asked to help set up a proper ownership structure. Other catalysts for community wind development could include state PTCs for small wind and mandated fixed-rate tariffs such as in the CBED initiative in Minnesota that simplify the interconnection process. With the right wind resource, some diligent effort on the part of local interest, and a little help from OWPI, community wind can be a success in Oklahoma.

APPENDIX A

CASE STUDY: BOISE CITY, OK

We will look at the potential for a community wind project in Boise City, OK. This type of analysis is done at the Oklahoma Wind Power Initiative. Boise City is located in the Oklahoma panhandle which is also the region with the best wind resource. This is a Class 5 area with average wind speeds of 16.8 mph - 17.9 mph. The town suffers from the problem of population decline. The younger population is migrating to the larger cities where better opportunities await them. Community wind projects could be a positive influence on the local area and provide jobs. This might help keep the population in places like Boise City. The wind resource in Boise City is very good as can be seen by Figure 3.

ANALYSIS OF BOISE CITY'S WIND RESOURCE & ELEVATION



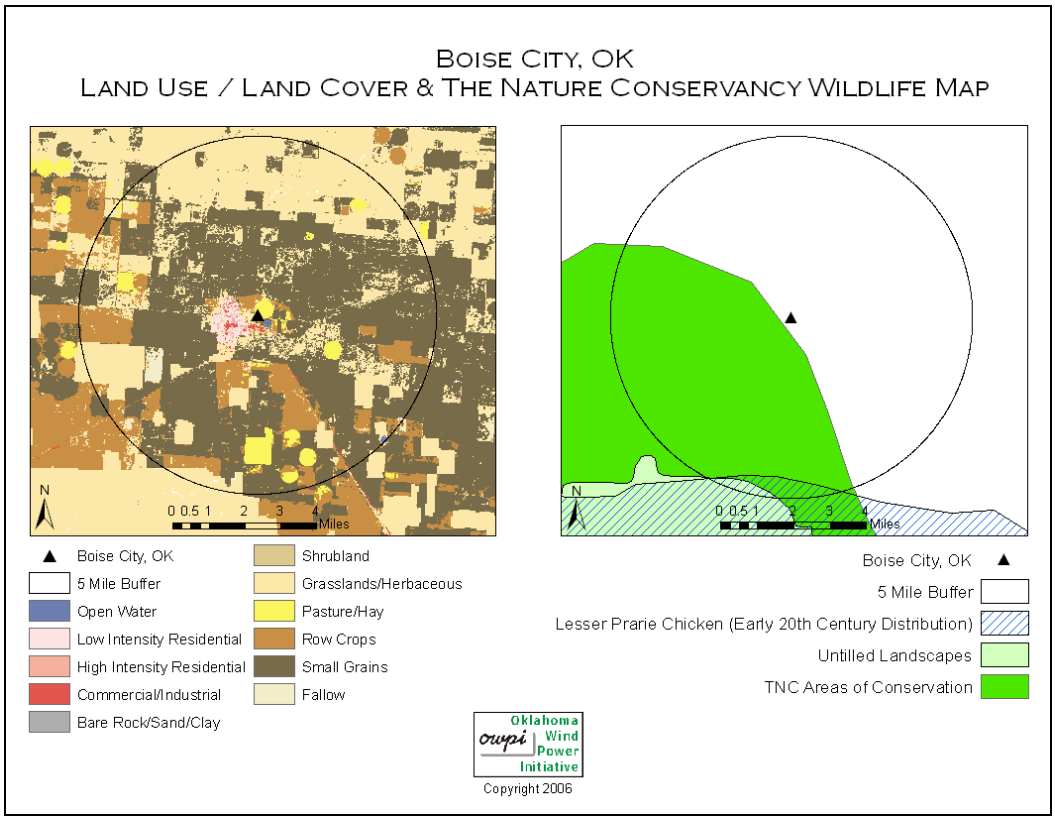
Source: Oklahoma Wind Power Initiative, 2006

In Figure 4, the land use and land cover of the city is illustrated. Much of the city's outlying areas are croplands and grasslands. The city also has areas of conservation significance as designated by the Nature Conservancy that can be seen in Figure 4 as well. An area of conservation significance is defined as

> "Areas identified for high biodiversity significance by The Nature Conservancy and partner organizations. Sites in some ecoregions are preliminary and subject to change. These areas are generally considered

important for conserving the native species, communities, and ecological systems of the state. The areas were delineated in ecoregional conservation assessments and site conservation plans by The Nature Conservancy and partners, and account for conservation "targets" across multiple scales (i.e. individual species as well as entire ecological systems)," (Hise, 2006).

ANALYSIS OF BOISE CITY'S LAND USE / LAND COVER & WILDLIFE AREAS



Source: Oklahoma Wind Power Initiative, 2006

The Boise City area contains another land use consideration. When it was included in the Oklahoma panhandle, a considerable amount of land was designated as school lands (lands set aside for generating school revenue). Until now, this revenue has been from grazing, cropping, and fossil fuels. These school lands have good to excellent wind potential.

Resources

Wind Information

American Wind Energy Association (AWEA)
www.awea.org
Find information regarding small wind systems all the way to commercial wind projects. AWEA is the 'voice of the wind energy industry!'

Environmental Law & Policy Center
www.elpc.org/energy
Here you can find the Community Wind Financing Handbook with information on how to structure and finance your community wind project.

Oklahoma Mesonet
www.mesonet.org
The Mesonet is a wonderful resource for wind data across the state of Oklahoma. Wind data can be obtained for locations near the proposed wind project.

Oklahoma Wind Power Initiative
www.ocgi.okstate.edu/owpi
We are Oklahoma's #1 resource for wind energy information. Find links to interactive wind resource & wildlife maps as well as other links to the wind industry.

Wind Powering America Program
www.eere.energy.gov/windandhydro/windpoweringamerica
Find information such as wind maps, small wind guides, wind fact sheets, Native American wind energy information and much more on this website.

Windustry
www.windustry.org
Windustry is the community wind information clearinghouse. Information such as examples of community wind projects, studies, reports and resources are available to everyone on this website.

Regulatory

Federal Energy Regulatory Commission
www.ferc.gov
The Federal Energy Regulatory Commission regulates and oversees energy industries in the economic, environmental, and safety interests of the American public.

Southwest Power Pool (SPP)
www.spp.org
Visit the SPP website for more information about application forms for wind projects and much more.

Financing

Job & Economic Development Impact Model (JEDI)
www.eere.energy.gov/windandhydro/windpoweringamerica/filter_detail.asp?itemid=707
Use this model for the analysis of costs and positive economic impacts associated with the construction and development of local wind projects.

John Deere
www.deere.com
Find information regarding wind financing through this well established company.

Oklahoma Department of Commerce: State Energy Office
www.okcommerce.gov
Look for energy related funding and other state policies and incentives.

Oklahoma Small Business Development Center
www.osbdc.org
The OSBDC can assist in finding financial assistance and they combine public and private resources to help Americans start, manage and grow their own businesses.

Small Business Administration
www.sba.gov/financing
SBA's mission statement is to "maintain and strengthen the nation's economy by aiding, counseling, assisting and protecting the interests of small businesses and by helping families and businesses recover from national disasters."

USDA Farm Bill Section 9006
www.rurdev.usda.gov/rbs/farmbill
This website provides all the information that is needed for applying for the Section 9006 grants and loans.

Incentives

Database of State Incentives for Renewable Energy (DSIRE)
www.DSIREusa.org
Visit the DSIRE website for information on Oklahoma's state incentive for renewable energy and energy efficiency.

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