Policy Brief

Small Packages, Big Benefits:
Economic Advantages of Local Wind Projects

Teresa Welsh Galluzzo

April 2005
(updated July 2005)

The Iowa Policy Project
318 2nd Avenue North, Mount Vernon, Iowa 52314
319-338-0773 (phone) – 319-354-4130 (fax)
www.iowapolicyproject.org

The Iowa Policy Project Policy Brief

April 2005
(updated July 2005)

Small Packages, Big Benefits:
Economic Advantages of Local Wind Projects

By Teresa Welsh Galluzzo

The sun heats the earth's surface unevenly creating areas of high and low pressure. Air molecules flow away from areas of high pressure towards areas of low pressure. We know this phenomenon by sight, sound and touch as wind. The speed and duration of wind are unpredictable, but what is predictable is that in many places the wind will eventually blow with enough force to be a significant power source.

This fact has been relied on and wind's kinetic energy has been harnessed for centuries to do things such as pump water and grind grain. Windmills that helped Americans from settlement times until the 1930s are still visible on much of the nation's rural landscape – including Iowa's – yet they are now found in various states of disrepair. Today the relic sentinels of the countryside are being joined in their towering positions by sleek new wind turbines. These modern machines and the clean power they generate are a sign of the prosperity they can bring to their landowners and communities.

Although wind power only accounted for one-tenth of 1 percent of the nation's total electric power generation capacity in 2003, this is four times the capacity that was in place in 1990. From 1999 to 2003, wind power capacity had an average annual growth rate of 28 percent, a much higher rate than other types of power generation. Additionally, the U.S. Department of Energy estimates that wind power capacity will continue to grow and believes that the Midwest has enough wind power potential to supply a significant portion of U.S. energy needs. (GAO 2004)

Iowa has an important role to play in the development of wind power. The Hawkeye State has the 10th-highest wind potential in the nation and it currently has the third-largest installed wind capacity. Iowa has 745 wind turbines with a total installed capacity of 634.8 MW. (IDNR 2005) In fact, wind is now Iowa's fastest growing renewable energy resource and Iowa has the wind potential to produce 4.8 times more energy than it consumes. (IDNR n.d.)

This report briefly reviews the benefits of wind power, introduces small-scale, locally owned wind generation, highlights three analyses that compare the economic development benefits of small-scale, locally owned generation to other larger capacity ownership structures and closes by discussing the barriers and changes necessary to aid the development of small-scale, locally owned wind generation, specifically in Iowa.

Teresa Welsh Galluzzo is a research associate for the Iowa Policy Project.

Benefits of Wind Power

The environmental and economic development benefits of wind power are well-established and have been proven on the ground. Currently, most of our nation's energy is produced from coal (51 percent), natural gas (18 percent), and nuclear (20 percent). (DOE Information Administration 2002) Coal, which provides half of our electricity, has been linked to illness, acid rain and mercury pollution, and releases greenhouse gases. Although natural gas is less polluting than coal, it also releases greenhouse gases that affect our world's climate. (Mazza n.d.) The use of wind energy on the other hand does not pollute our air or water and, unlike nuclear power, requires no hazardous waste storage.

In addition to the environmental benefits of using wind power rather than fossil fuels, wind energy is increasingly cost competitive with nonrenewable energy sources. As the prices of fossil fuels are predicted to continue their volatile increase, the price of wind energy will become a cost comparable option. (GAO 2004) Additionally, there are many proven economic development benefits of installing and operating wind turbines that do not exist for nonrenewable supplies.

An obvious economic benefit of wind energy is that more dollars remain in a community and less are spent importing energy from across the globe. Wind energy also increases the diversity of local economies. The construction and operation of wind turbines creates many jobs within communities. The construction of a 75 MW wind plant requires approximately 200 laborers employed for six to eight months. (Mazza n.d.) Additionally, operation of wind turbines provides more jobs than traditional energy plants. A study by the New York State Energy Research Development Authority found that wind energy produces 27 percent more jobs per kilowatt hour than coal plants and 66 percent more jobs than natural gas plants. (DOE 2004)

Wind turbines also increase the tax revenues of local jurisdictions, many of which are in dire need of a boost. It is estimated that each kilowatt of wind power installed should increase tax revenues by a $1,000. (Mazza n.d.) Another direct source of income is the payment made to landowners who lease their land to companies for installing and operating wind turbines. Such landowners receive $2,000 to $5,000 per turbine annually. (Ritsema, Edelman and Otto 2003) Landowners who own their turbines receive income directly from the sale of electricity.

The combination of these benefits multiplies within communities as the wages earned by employees of wind projects may be spent at local businesses, the supplies for the construction and maintenance wind turbines may be purchased locally, local banks may invest in such projects, tourism dollars may increase as people come to see the sight of turbines spinning and creating energy and healthcare costs may decline with a less polluted environment. Some of the same economic development benefits from wind energy operations accrue to landowner and community whether the project is a single turbine owned by a local landowner or a large wind farm owned by an out-of-state corporation. However, as three analyses have shown, economic development benefits are greater for communities in the case of small-scale, locally owned generation.

Small Scale, Locally Owned Generation

It is important to understand what is meant by small-scale generation. The definition of small-scale wind generation varies by agency. The federal government's definition is a production

capacity of 20 MW or less. The Iowa Utilities Board describes small-scale generation as 500 kW or less. Iowa Senate File 390, as passed in 2005 and signed by the governor, establishes a renewable energy tax credit of 1.5 cents per kWh. The bill defines small wind as a system with 2.5 MW or less of nameplate generating capacity, and requires in-state ownership of at least 51 percent of the project. Regardless of the amount of capacity, small-scale wind turbines are usually owned by a landowner, particularly farmers, small businesses or schools. That is, small-scale generation provides energy for residential or other similar levels of use.

Another distinction of small-scale, locally owned systems is that the generation may be dispersed and wind turbines may dot the countryside just as windmills did in the past. This is because with the right conditions any landowner can take advantage of the wind's power. Such conditions include having 16 mph or higher average annual wind speeds, about an acre of property per turbine and the financial ability to purchase and install a turbine. A general rule for estimating the cost of a turbine is that every kilowatt of installed capacity costs $1,000 to $3,000. (DOE n.d.)

Small wind systems comprise only a small share of nationwide capacity. The 2002 installed capacity of small wind (defined as 100kW) was 15-18 MW, but the market for small wind grew at an estimated annual rate of 40 percent. (Edwards et al. 2004) Additionally, farmer-owned wind turbines account for less than 1 percent of the utility-scaled wind power capacity installed nationwide. (GAO 2004) In Iowa, the largest share of production capacity from small wind systems is held by public schools. Currently, eight schools are home to 10 wind turbines ranging in size from 50 kW to 750 kW. (Bolinger 2004) In this case, money saved on electrical bills at the local level means more money for education.

Economic Development Benefits of Small Scale, Local Wind

As discussed above, wind power generation creates economic development. However, three analyses have found that small-scale, locally owned wind generation creates greater benefits. One reason for this is that although leasing land for the siting of a turbine to an energy company provides landowners with a guaranteed income, ownership of the wind turbine by the landowner can provide a much greater return. Bolinger and Wiser (2004, 1) point out that, "While hosting wind turbines can provide a much-needed boost in income to farmers struggling to maintain their livelihood, the lease payments made to farmers by commercial wind project developers typically pale in comparison to the amount of income the farmer could earn if he instead owned the turbine himself, or in conjunction with other members of his local community." While a landowner may receive lease payments of $2,000 to $5,000 per turbine annually, owning the wind turbine can double or triple this income. (GAO 2004) Not only does local ownership of the turbine provide more income for the owners, when the owners are local citizens, they may try to purchase more materials and labor for construction locally and are more likely than a large company to spend their money in the community.

National Renewable Energy Laboratory

An analysis of ownership structures was completed by the U.S. Department of Energy/National Renewable Energy Laboratory (NREL), which created a model called Jobs and Economic Development Impact (JEDI), to demonstrate the economic benefits, including the local impacts, of developing wind power. With basic information about a wind project including the location (state, county or region), year of construction and size of the facility, the model computes the cost (specific expenditures) of the project, the number of jobs created, the income, and the

economic activity that will accrue to the designated location. Input-output analysis, a method of evaluating the effects generated by an expenditure, is used to evaluate the impacts. To understand the effects of developing and operating a wind power plant, three impacts are examined for each expenditure. As described by Goldberg, Sinclair and Milligan (2004) these include direct effect, indirect effect and induced effect.

Direct effect: Direct effects are the on-site or immediate effects created by an expenditure. In constructing a wind plant, it refers to the on-site jobs of the contractors and crews hired to construct the plant. It also includes the jobs at the turbine manufacturing plants and the jobs at the tower and blade factories.

Indirect effect: Indirect effects refer to the increase in economic activity that occurs when a contractor, vendor or manufacturer receives payment for goods or services and in turn is able to pay others who support their business. For instance, this impact includes the banker who finances the contractor; the accountant who keeps the contractor's books; and the steel mills and electrical manufacturers and other suppliers that provide the necessary materials.

Induced effect: Induced effects refer to the change in wealth and income that is induced by the spending of those persons directly and indirectly employed by the project. This would include spending on food, clothing, or day care by those directly or indirectly employed by the project, retail services, public transit, utilities, cars, oil, property & income taxes, medical services, and insurance, for example. (3)

The U.S. General Accounting Office asked the NREL to apply its model to several counties, including Buena Vista, Cherokee and Dickinson counties in Iowa. NREL projected the economic impact of three different scenarios: one 150 MW plant owned by an out-of-area investor, one 40 MW plant owned by an out-of-area investor and twenty 2 MW plants owned by local citizens. The model assumed that the 150 MW and 40 MW plants were financed by out-of-area lenders and included land lease payments to local landowners. In addition to the qualification that the twenty 2 MW plants were developed by local landowners, the model assumed that the equity payments were made to local residents, that all financing was done by local lending institutions and that no land lease payments were made. The results are listed in Table 1 below.

Table 1. JEDI Analyses of Different Ownership Structures in Iowa.

County	Project Size	Number of Turbines	Local Construction Cost Spending (millions)	Local Annual O&M Spending (millions)	Total Jobs (direct, indirect, induced) Impacts (during construction)	Total Jobs (direct, indirect, induced) Impacts (during operating years)
Buena Vista	1 - 150 MW plant	200 - 750 kW	$1.9	$4.9	47	86
Buena Vista	1 - 40 MW plant	54 - 750 kW	$0.5	$1.3	13	23
Buena Vista	20 - 2 MW plants		$0.5	$7.2	13	48
Cherokee	1 - 150 MW plant	100 - 1500 kW	$1.3	$4.9	33	93
Cherokee	1 - 40 MW plant	27 - 1500 kW	$0.3	$1.3	9	25
Cherokee	20 - 2 MW plants		$0.3	$7.2	9	52
Dickinson	1 - 150 MW plant	200 - 750 kW	$1.9	$4.9	40	81
Dickinson	1 - 40 MW plant	54 - 750 kW	$0.5	$1.3	11	22
Dickinson	20 - 2 MW plants		$0.5	$7.2	11	48

A comparison of the 40 MW plant owned by an out-of-area energy company to the twenty 2 MW plants, which together have a total capacity of 40 MW, shows that small-scale, local ownership can generate significantly higher economic impacts for a county. In other words, "local ownership and local financing result in more dollars remaining in the local economy (i.e., more local spending and fewer monetary leakages) when compared with a project of similar size not locally owned or financed." (4)

Southwest Regional Development Commission

Another comparison of small-scale, locally owned wind generation was conducted by Minnesota's Southwest Regional Development Commission. The Commission undertook this analysis in 1996 after the Minnesota Legislature passed a law requiring power companies to purchase a portion of their energy from renewable sources by 2002. In light of this mandate the Commission wanted to understand which ownership structure would have the greatest economic benefit for the area. The Commission looked at two development strategies: concentrated facility ownership and ownership dispersed among local landowners.

That analysis found that if landowners are able to access the required capital, "locally owned disbursed generation can produce 25 to 150 more jobs and $700,000 to $4.3 million [more] in total value added than the [concentrated facility ownership] scenario and can have a much larger impact on the local economy in the form of retained revenues from the local ownership of the turbines." (6) Most of this savings comes from energy sales profit that might otherwise leave the area with a private developer. Another way in which locally owned projects retain dollars in the local economy occurs when individual landowners participate in the construction and installation of the project.

The report also states that disbursed generation is technically compatible with the electrical infrastructure. And in fact, "by being on-line and producing peak output when annual demand charges are measured by the generation utilities, the small power producer could help shave that demand peak for their distribution utility, thus earn a share of the demand savings and keep those dollars in their community." (36)

Wind Utility Consulting

A third comparison of small-scale, locally owned wind to large-scale out-of-state corporately owned wind was undertaken by Tom Wind, owner of Wind Utility Consulting in Jefferson, Iowa. His comparison allowed for a power purchase agreement of 3 cents per kWh in both scenarios. For the small-scale, locally owned system he included the payment of 1 cent per kWh tradable tax credit for 10 years. The capital and operating costs of the large wind farm were assumed to be 10 percent less than that for the small wind farm. Nearly all of the differences in economic impact between the two wind farms are caused by the source of financing (which was assumed to come from within Iowa for the small, locally owned projects) and the retention of profits and federal tax benefits.

The results show that locally-owned wind generation creates about 10 times more economic activity in the local community and state than does wind generation owned by out-of-state companies. (Results of this analysis are in Table 2.) This activity includes: "utilization of federal income tax benefits for wind generation by local residents and Iowa companies that can partner with the local owners; retention of profits by local residents; financing by local and regional banks; jobs for operation, maintenance, administrative and management of the wind generation."

Table 2. Where the Dollars Go: A Comparison of Different Ownership Structures

	Large Wind Owned by Out-of-State Companies	Small Wind Owned by Local Community Members
$ Stay in Community	12,200	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

Note: Analysis reflects figures per 1 MW annual generating capacity.

Barriers and Needed Changes

Despite the evidence that small wind systems produce greater economic benefits for communities, those who would like to install a small system still face challenges. In a large part the ability of landowners to install a small wind system depends on the particular incentives offered by their state. Bolinger et al. (2004, ii) reported, “In general, specific state policies that differentially support community wind have been necessary to drive this form of wind development.”

One reason that such policies are necessary at the state level is that many landowners are unable to use the federal renewable energy production tax credit. Many believe this credit, established in 1992, provides a critical incentive for landowners to develop wind systems. The credit offers a payment to producers of renewable energy at a rate of 1.5 cents per kWh for a period of 10 years. However, many landowners are not able to claim the credit due to insufficient tax liability. That is, the value of the tax credit is greater than the income tax on revenue earned by the project as well as revenue from other business. This effectively limits wind ownership to corporate owners with the large income necessary to receive the full tax credit. (Bolinger 2004)

Minnesota is the only state that has created a renewable energy cash incentive designed specifically to help those who want to develop small wind projects. Minnesota matches the federal production tax credit by offering 1.5 cents per kWh of electricity produced for 10 years. This incentive targets wind projects of 2 MW or less. As a cash incentive it may be used by anyone regardless of income and tax liability. (GAO 2004) Minnesota has the ninth-highest wind potential and currently ranks just below Iowa in installed capacity. (American Wind Energy Association 2005)

Until passage of the new renewable energy credit, Iowa has not offered such a program for the development of small-scale, locally owned wind projects. The state does have a net metering law that requires utilities to purchase excess power produced by landowners. The state also operates a loan program that enables customers served by investor-owned utilities to borrow the full cost of a wind project at a low interest rate. This program removes the barrier that requires customers to produce a large amount of cash up front. (Bolinger 2004) Another Iowa law helps to promote the development of wind power by exempting from state sales tax the total cost of wind energy equipment and all materials used to manufacture, install or construct wind energy systems. A requirement for energy companies to buy some of their power from renewable sources creates an additional impetus for wind production.

Conclusion

In many ways, Iowa is ahead of the game on promoting wind power. While the state should continue to do more, the important step of providing the new incentive specially designed for small-scale, locally owned wind may prove to encourage the state, our communities and landowners to reap the greatest benefits from this abundant, free and clean energy source.

References

American Wind Energy Association 2005. Minnesota Wind Energy Development. Available online 15 March 2005 at http://www.awea.org/projects/minnesota.html

Bolinger, Mark. 2004. A survey of statewide support for community wind power development. March. Available online 1 March 2005 at http://eetd.lbl.gov/ea/ems/cases/community_wind.pdf

Bolinger, Mark, and Ryan Wiser. 2004. A comparative analysis for business structures suitable for farmer-owned wind power projects in the United States. November. Available online 1 March 2005 at http://eetd.lbl.gov/ea/ems/reports/56703.pdf

Bolinger, Mark, Ryan Wiser, Tom Wind, Dan Juhl and Robert Grace. 2004. A comparative analysis of community wind power development options in Oregon. July. Available 1 March 2005 at http://www.energytrust.org/RR/wind/OR_Community_Wind_Report.pdf

Department of Energy (DOE). 2004. Wind energy for rural economic development. June. Available on line 1 March 2005 at http://www.nrel.gov/docs/fy04osti/33590.pdf

Department of Energy (DOE). n.d. Small wind electric systems: An Iowa consumer's guide. Available online 1 March 2005 at http://www.state.ia.us/dnr/energy/MAIN/PROGRAMS/WIND/documents/small%20wind%20guide%20for%20iowa.pdf

Department of Energy (DOE) Information Administration. 2002. From Windustry's Introduction to Wind Power. Available online 15 March 2005 at http://www.windustry.com/basics/01-introduction.htm

Edwards, Jennifer, Ryan Wiser, Mark Bolinger and Trudy Forsyth. 2004. Evaluating state markets for residential wind systems: Results from an economic and policy analysis tool. December. Available online 1 March 2005 at http://eetd.lbl.gov/ea/ems/reports/56344.pdf

General Accounting Office (GAO). 2004. Renewable energy: Wind power's contribution to electrical power generation and impact on farms and rural communities. September. Available online 1 March 2005 at http://www.gao.gov/new.items/d04756.pdf

Goldberg, M., K. Sinclair and M. Milligan. 2004. Job and economic development impact (JEDI) model: A user-friendly tool to calculate economic impacts from wind projects. March. Available online 1 March 2005 at http://www.nrel.gov/docs/fy04osti/35953.pdf

Iowa Department of Natural Resources. 2005. Personal communication with Jennifer Moehlmann on 29 March.

Iowa Department of Natural Resources. n.d. Wind energy. Available online 1 March 2005 at http://www.state.ia.us/dnr/energy/MAIN/PROGRAMS/WIND/index.html

Mazza, Patrick. n.d. Harvesting clean energy for rural development: Part one. Climate Solutions Special Report. Available online 1 March 2005 at http://www.harvestcleanenergy.org/pdfs/WindReport.pdf

Ritsema, Matthew, Mark Edelman and Daniel Otto. 2003. Renewable Power and Energy Efficiency: Policies in Iowa and Other States. A report for the Iowa Policy Project. April. Available online 1 March 2005 at http://www.iowapolicyproject.org/2002-2004_reports_press_releases/030501-energy%20full.pdf

Southwest Regional Development Commission. 1996. Economic impact analysis of windpower development in Southwest Minnesota. September. Available by contacting Southwest Regional Development Commission, 2524 Broadway Avenue, Slayton, MN 56172. Tel (507) 836-8547