Encouraging Development of Kansas Wind Energy Resources

A White Paper Prepared for the Kansas Energy Council

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Executive Summary

Kansas has very substantial wind energy resources. Sound development policies can, in time, make wind one of our best economic assets.

Wind energy development is expanding rapidly in the U.S. and around the world. Kansas will have nearly 400 MW of utility scale wind by the end of 2006. The U.S. had nearly 10,000 MW at the end of 2005, the world nearly 60,000 MW.

Development is being driven by incentives, economy of scale, rising natural gas prices and concerns about global warming. Wind offers the greatest energy profit ratio, as much as 70+ in areas with class 5 winds, and the lowest emissions of CO_2 of any method of generating electricity.

The steady long-term decline in the cost of wind energy has been interrupted recently. Inflation, foreign exchange rates, industry consolidation, improved durability and commodity prices have all been cited. Demand, driven by worldwide growth in the market for wind turbines and the currently scheduled termination of the federal production tax credit (PTC) in 2007, is likely the biggest factor. Increased production of wind turbines and resolution of the tax credit issue may lead to a return of declining prices.

Wind energy development in Kansas, while substantial, is constrained by low fossil fuel prices for conventional generation, transmission system capacity, and concerns about placing wind turbines is certain landscapes.

The many benefits of wind energy to local economies and the environment have caused individuals, businesses and units of government to developed strategies to encourage its development. Some states have enacted renewable portfolio standards requiring their utilities to acquire 3 – 25% of their energy from renewables within 5 – 20 years. Most will rely heavily on wind. Buyers without access to renewable energy resources are buying green tags or carbon credits from projects located elsewhere.

The operation of Kansas government consumes approximately 500,000 MW-hours of electricity annually, equal to the output of 140 – 170 MW of wind turbines, about the size of the Elk River Wind Farm in Butler County.

Conventional wind farm development provides significant economy of scale and real emissions reductions but their construction and operation provides limited benefits to the communities near which they are being located. Local investors are not involved and payments are limited to easements for landowners, payments in lie of taxes to local governments, and some jobs. Owners and most of the economic benefits end up far away, often abroad.

The concept of community wind implement in several Great Plains states has succeeded in enhancing rural benefits of wind energy development and has attracted wide interest in Kansas.

The Kansas Energy Council defined Community Wind in November 2005:

> *" Community Wind is locally owned commercial wind energy projects (smaller than or equal to 20 MW rated capacity) with production distributed for local use or sold under a power purchase agreement (PPA). The majority of owners/investors are members of a local community and they have a financial stake in the project coupled with a commitment to see direct positive local social and economic impacts."*

Kansas electric utilities not already purchasing wind energy recognize the widespread interest in community wind. They are willing to consider purchasing energy from community wind projects at a price that does not increase their cost, essentially the cost of displaced fossil energy.

Combining the goals of encouraging community wind development and making Kansas a leader in wind development by directly participating in wind energy development equal to the electricity consumption of state government was endorsed by the Kansas Energy Council on XX 2006.

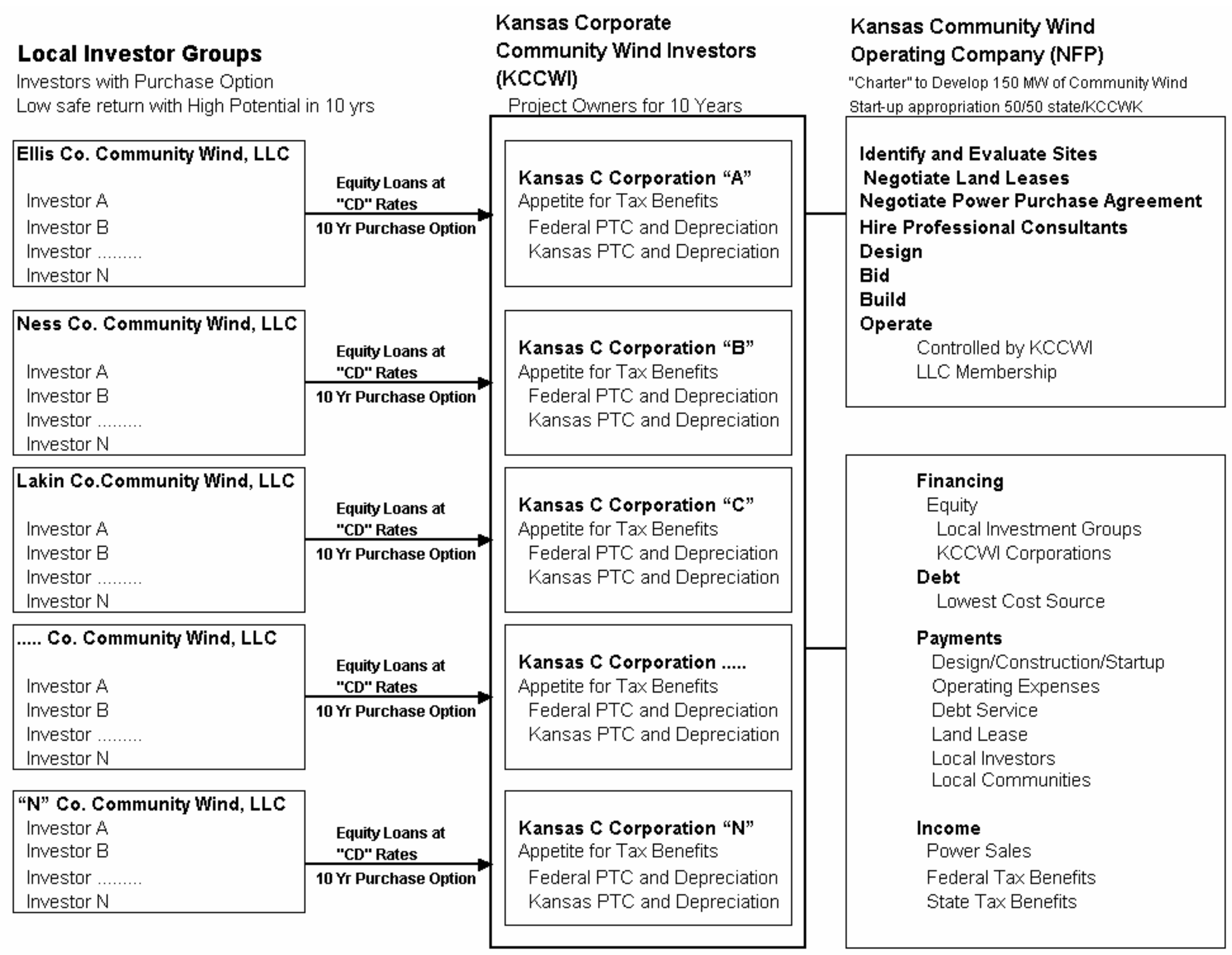
Community wind projects are expected to have somewhat higher costs, perhaps 10 - 15 percent because of their dispersed nature and reduced economy of scale. Locating on less than premium wind sites will likely reduce annual output 10-15% compared with large wind farms. Taken together these factors make financial incentives essential for community wind development in Kansas, just as in other states.

How large an incentive per kWh will be required to make community wind projects financially feasible in Kansas is not an easy question to answer. Fossil energy cost for power generation in Kansas ranges form **$10.00 – $15.00/MWh for coal to $18.00 – 20.00** /MWh for gas. Coal accounts for about 71 % of statewide generation, gas and oil only about 4%. Wind energy from Elk River, completed last year, is sold under contract for $25. per MWh and provides a savings to The Empire District Electric Utility which has a high proportion of gas fueled generation. Depending on the buyer, the evolution of the wind turbine market, and specific project development strategies, new community wind projects may require revenues of $35 – 40/MWhr and a tax incentive of $0.015 – 0.020 per kWh.

A Kansas Wind Energy Production Tax Credit targeted specifically and solely at community wind offers the most direct strategy. A production tax also insures only renewable energy actually produced is rewarded. Kansas's tax rate, 6.45 percent on income above $60,000 for couples filing jointly, $30,000 for individuals, and 7.35 percent for corporations with taxable income over $50,000 would require some method of aggregating sufficient eligible tax liability to take full advantage of such a credit. The credit would need to be in place for 10 – 15 years with sufficient certainty that it would help support project financing. Cary forward provisions would have little benefit since they would tend to pile up in subsequent years. The Kansas Department of Revenue opposes allowing such credits to be transferable since they quickly become very difficult to track. Participation of corporations with adequate federal and Kansas tax liability to take full advantage of both PTCs may offer the best solution. Using the ownership flip model developed in other states, local investors would provide equity investment gaining limited return during the first 10 years with an option to purchase the entire project for an agreed price at a future date, typically 10 years when the federal PTC expires.

Development of small wind projects will be a challenge. To regain some aspects of economy of scale developers of small projects would benefit from an alliance that would address many of their common needs. A Community Wind Operating Cooperative (CWOC), established as a nonprofit entity could serve that purpose. Seed funding could be provided by the state, local investors, and Kansas corporations whose participation would be motivated by access to state and federal tax incentives.

The development participants and their key roles are shown in the diagram below.



Local investors would be limited to Kansas residents and their investments would be transferable only to Kansas residents or immediate family.

The Kansas Development Finance Authority would be authorized to provide financing.

Green tags and carbon credits from projects using the Kansas PTC would become the property of the state and could be marketed to offset lost revenue.

Encouraging Development of Kansas Wind Energy Resources

Kansas Wind Resources
Wind is Kansas's premium renewable energy resource. Its magnitude has been extensively assessed but it remains difficult to fully appreciate. The National Renewable Energy Laboratory ranks us third among the 50 states with resources capable of generating 1,070 billion kWh per year.

Data generated from development of the Kansas Wind Map indicates Kansas has large areas with high wind energy development potential. The table below shows Kansas land area by wind class and an estimate of how much electricity could be generated as a percent of Kansas and U.S. annual gross electricity consumption in 2004. Areas with class 3 resources show no generation although they would be considered developable in other areas of the world.

Wind Class	Wind Speed M/s, 50 M	Square Miles	MW of Turbines per Square Mile	Annual Capacity Factor	Percent of Kansas kWh/Yr	Percent of U.S. kWh/Yr
1	<5.60	166	- na -	- na -		
2	5.60 – 6.40	12,608	- na -	- na -		
3	6.40 – 7.00	21,238	- na -	- na -		
4	7.00 – 7.50	31,654	9	.35	22%	1867%
5	7.50 – 8.00	16,210	12	.40	17%	1457%
6	>8.00	27	15	.45	<0%	3%
				Total	**39%**	**3328%**

Wind development of less than 1.5% of Kansas would be required to produce the equivalent of all our electricity consumption. Development at such a scale is not foreseen but it illustrates the extent of the resource.

Rationale for Wind Development

Developing wind, or any renewable energy resource for that matter, is typically advocated for reasons including:

1) Avoided fossil energy cost,
2) Reduced emissions, including greenhouse gases, air pollution, and mercury,
3) Reduced power plant demand (resource and region specific),
4) Conservation of finite fossil energy resources,
5) Reduced environmental impact of fossil fuel production.

Avoiding Fossil Energy Cost
Also referred to as locking in the future cost of energy. The investment cost of installing a wind turbine is a fixed cost, generally financed at a fixed interest rate for a specific term. Operation and maintenance costs are relatively low and well understood. The wind is free. Site use is under

contract. For the life of the system, typically 20 years, longer with major retrofit, the cost is stable. Future fossil energy costs for power generation are uncertain.

Reducing Emissions

Avoiding the emissions associated with fossil fuel combustion for generating electricity has long been part of the rationale for exploiting renewable energy resources. Increased concern about global warming has begun to make concern a major factor. Our electric utility system evolved with a different set of criteria. It is dominated by very large central generating plants with little potential for cogeneration of heat and is primarily fueled with the lowest cost fossil fuels. Fuels with higher emissions. Our utility system converts fossil fuel to electricity with an average efficiency of 30%. Energy for generation in Kansas is 74% coal, 22% nuclear, 2% natural gas (including dual fuel), 2% oil, and about 1% renewable. The CO_2 global warming emissions are summarized in the following table.

Generating Fuel	**Average Efficiency**	**1,000 Metric Tons $C0_2$**
Coal	30%	35,876
Natural Gas	27%	816
Nuclear		0
Oil		816
Nuclear		0
Wind		0

Just How Renewable Is It?

Renewable energy technology is hardware and capital intensive. By investing more solar energy is captured at no additional cost. Renewable energy hardware and its installation and operation requires significant energy inputs. Most of this input energy comes from fossil energy sources. Measuring the Energy Profit Ratio, total energy produced over the life of the system divided by the energy required to manufacture and install the system is a key factor in determining a particular technologies real merit. Wind energy has the highest energy profit ratio of any renewable energy development strategy as shown in the table below.

Renewable Energy Technology	**Energy Profit Ratio (EPR)**
Wind	
Small Systems	25[1]
Large Systems	35 - 70[2]
Photovoltaics	30[3]
Biomass	
Direct Heat	10 - 15[4]
Biodiesel	3.2[5]
Ethanol (grain based)	1.4[6]
Ethanol (cellulose)	?[7]

1 Wind has significant economy of scale and small systems are significantly more costly and have lower EPRs than large systems.

2 Wind system EPR is strongly dependent on the wind resource. A class 6 site with an annual capacity factor of .5 (spectacular) would produce twice the energy and generally have twice the energy profit ratio of a class 3 or 4 site, although the gap might be narrowed by the maintenance demands of a class 6 site.

3 The EPR ratio of PV has steadily improved.

4 Direct combustion of biomass for low grade heat currently has the best biomass EPR. See http://rael.berkeley.edu/EBAMM/

5 See http://www.soygrowers.com/newsroom/releases/2004%20releases/r031704.htm

6 The EPR of ethanol from grain is highly controversial. See XX for a detailed summary of multiple studies.

7 Expectations for ethanol from cellulose are very high but it is far to early to fully understand its EPR.

Reducing Power Plant Demand and the Issue of Intermittency and Grid Integration

Wind energy's capacity value or ability to meet peak load is often cited as one of its greatest limits. In some wind regimes, such as California coastal mountain passes, there is surprisingly good correlation between wind and utility demand. Winds on the Great Plains tend to be strongest in the winter and spring and during the night or early morning hours. Utility peak loads occur in the summer in the afternoon and early evening when wind speeds, at least near the ground are lowest. Air-conditioning loads do tend to be higher with higher wind speeds and wind generation dispersed across many miles may take advantage of spatial diversity. This issue needs additional evaluation but at present the Southwest Power Pool, which includes Kansas, assumes wind has a capacity value equal to **7**% of rated capacity. Wind energy is valued in the Great Plains today primarily as an energy resource.

Intermittency and system support requirements are related issues. Wind varies not only seasonally and diurnally, but also by the second and the minute. A graph of an anemometer's output looks a lot like an earthquake. The inertia of a large turbine, the interaction of multiple turbines, and sophisticated control systems tend to dampen all this noise. Studies on intermittency and the requirements related system support have generally concluded this issues are manageable and the costs are typically around one half cent per kWh as shown in the table below.

The issue of grid integration has been studied extensively. DOE's National Renewable Energy Laboratory (NREL) released a report in March 2004 titled Wind Power Impacts on Electric Power System Operating Costs: Summary and Perspective on Work to Date. The report concludes:

> *"Based on the results to date, several insights can be gained and generalizations can be made. First and most important, it can be seen that the incremental cost of ancillary services attributable to wind power is low at low wind penetration levels; as the wind penetration level increases, so does the cost of ancillary services. Second, the cost of ancillary services is driven by the uncertainty and variability in the wind plant output, with the greatest uncertainty in the unit commitment time frame, or day-ahead market. Improving the accuracy of the wind forecast will result in lower cost of ancillary services. Third, at high penetration levels the cost of required reserves is significantly less when the combined variations in load and wind plant output are considered, as opposed to considering the variations in wind plant output alone.*
>
> *The results to date also lay to rest one of the major concerns often expressed about wind power: that a wind plant would need to be backed up with an equal amount of dispatchable generation. It is now clear that, even at moderate wind penetrations, the need for additional generation to compensate for wind variations is substantially less than one-for-one and is generally small relative to the size of the wind plant."*

http://www.nrel.gov/docs/fy04osti/35946.pdf#search=%22wind%20energy%20integration%20cost%22

Conservation of Fossil Energy Resources
Only about 4 percent of Kansas electricity generation is now fueled by oil and gas, the two high cost premium fuels, which we are increasingly importing. The bulk is fueled by coal and nuclear. Coal supplies remain abundant but the consequences of burning it are of increasing concern.

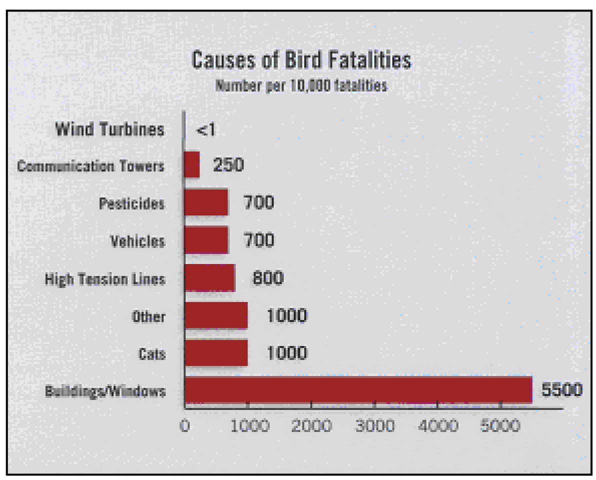
Reduced Environmental Impact
How much do we say?

Criticisms of Wind Energy

Wind energy has critics. Issues regarding cost and intermittency were summarized above as well as concerns about the extent of the resource. Other issues include:

1) Limits imposed by electrical system integration,
2) Avian and environmental impacts,
3) Impacts on the landscape.

Limits of the Electrical System
Considering peak demand issues, intermittency and grid support, impacts on power quality and grid reliability, just how much wind energy our electricity can actually use at an acceptable cost is controversial. Denmark, a country of only XX million people now gets around 30% of its electricity from wind and reportedly aspires to get 50%. Other Northern European countries are pushing wind energy very aggressively, some to the to limits of acceptable land use. In the U.S. many states have established renewable portfolio standards (RPS) requirements ranging from rather small to 20% with the expectation that much of this will come from wind. The Elk River Wind Farm in Butler County represents 14% of the available capacity for The Empire District Electric Company based in Joplin, Missouri and they are evaluating if they could manage more. Wind penetration is resource, utility, and power pool specific and effective strategies for maximizing its exploitation will continue to evolve.

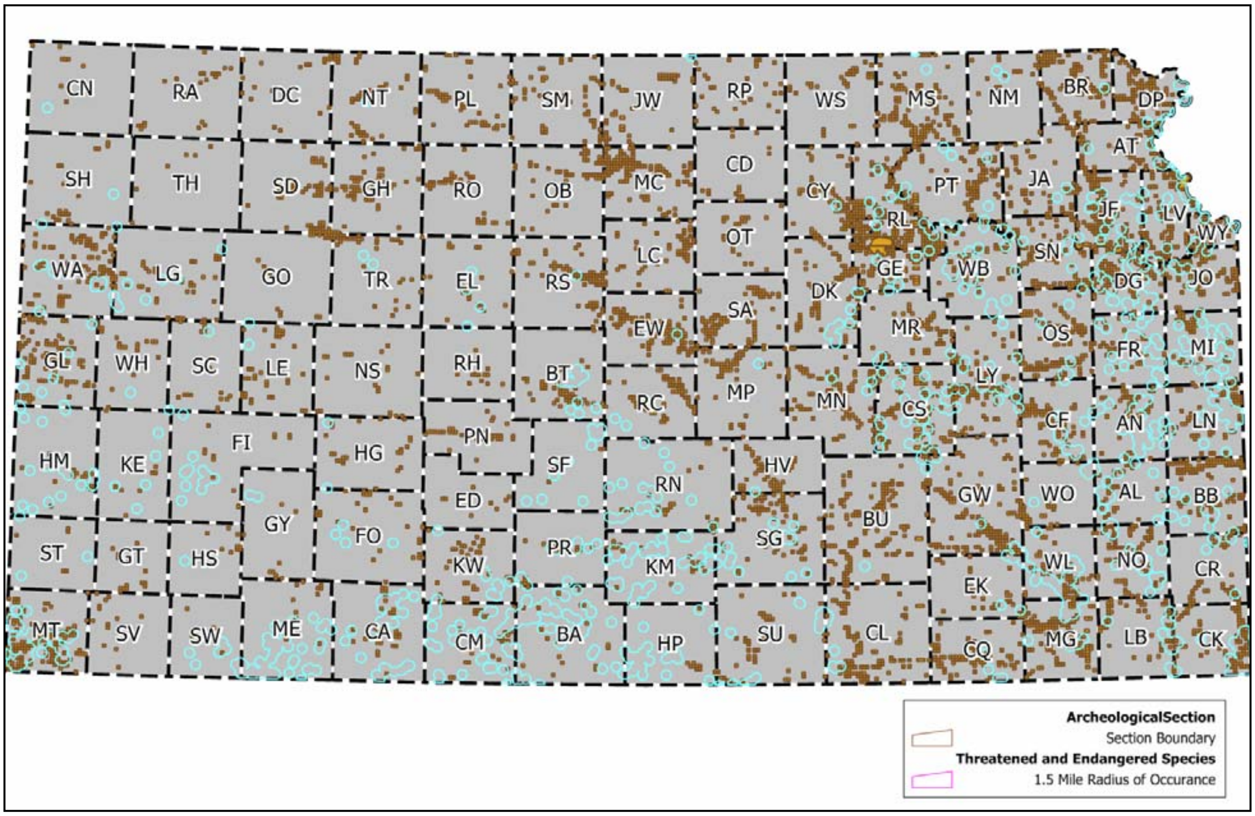


Erickson, et.al, 2002. Summary of Anthropogenic Causes of Bird Mortality
AWEA

Avian and Environmental Impacts
When raptors were found to be colliding with wind turbines at Altamont Pass in California in the 1990s concern about the impact of wind turbines on birds became widespread. The bird kills in California were carefully researched and found to result from a unique combination of birds, site, and tower configuration. Subsequent

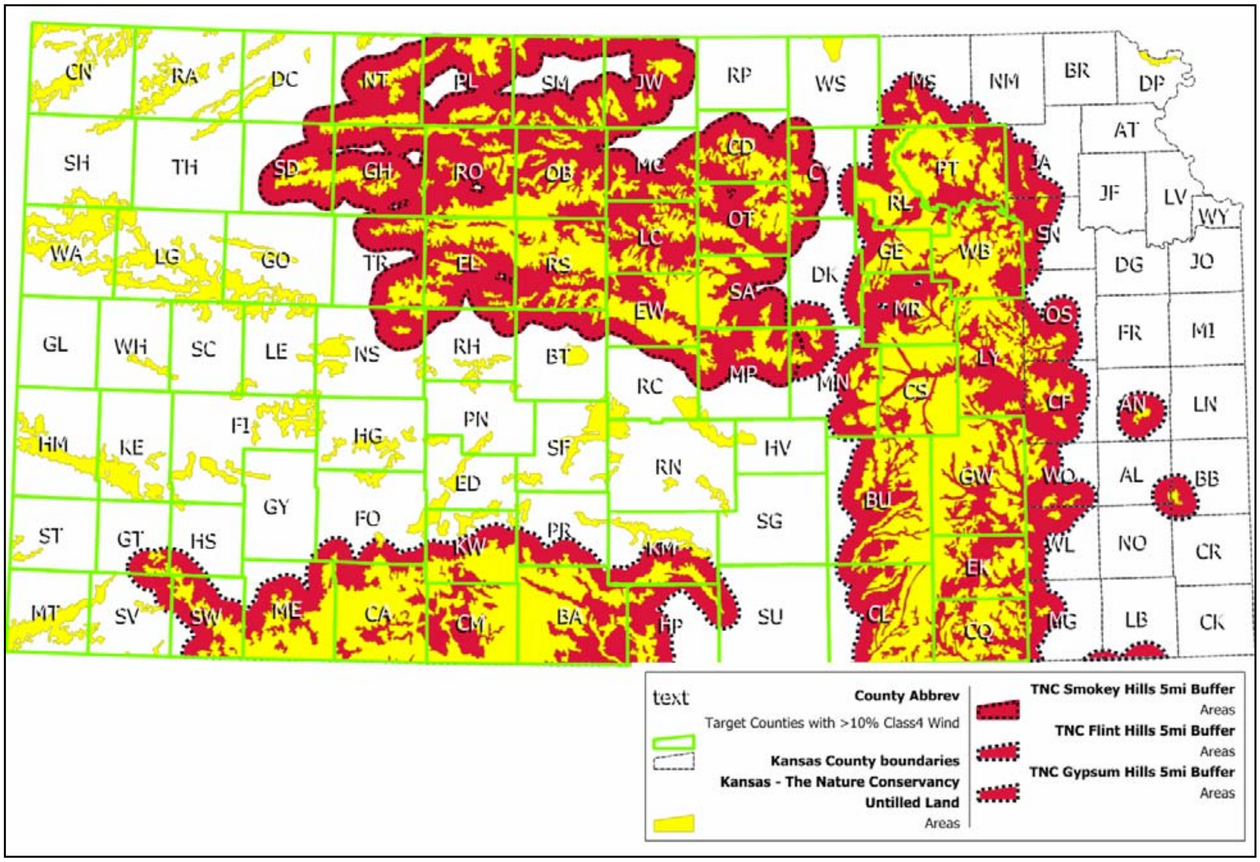
studies indicate that in most circumstances wind turbines have a minor impact on bird mortality although this may increase with more extensive development.

A broader concern is the potential impact of wind development on habitat, particularly of threatened and endangered species. Archeological sites are also a concern. The map below indicates documents occurrences of both. Developers of wind projects in these areas should take appropriate precautions.

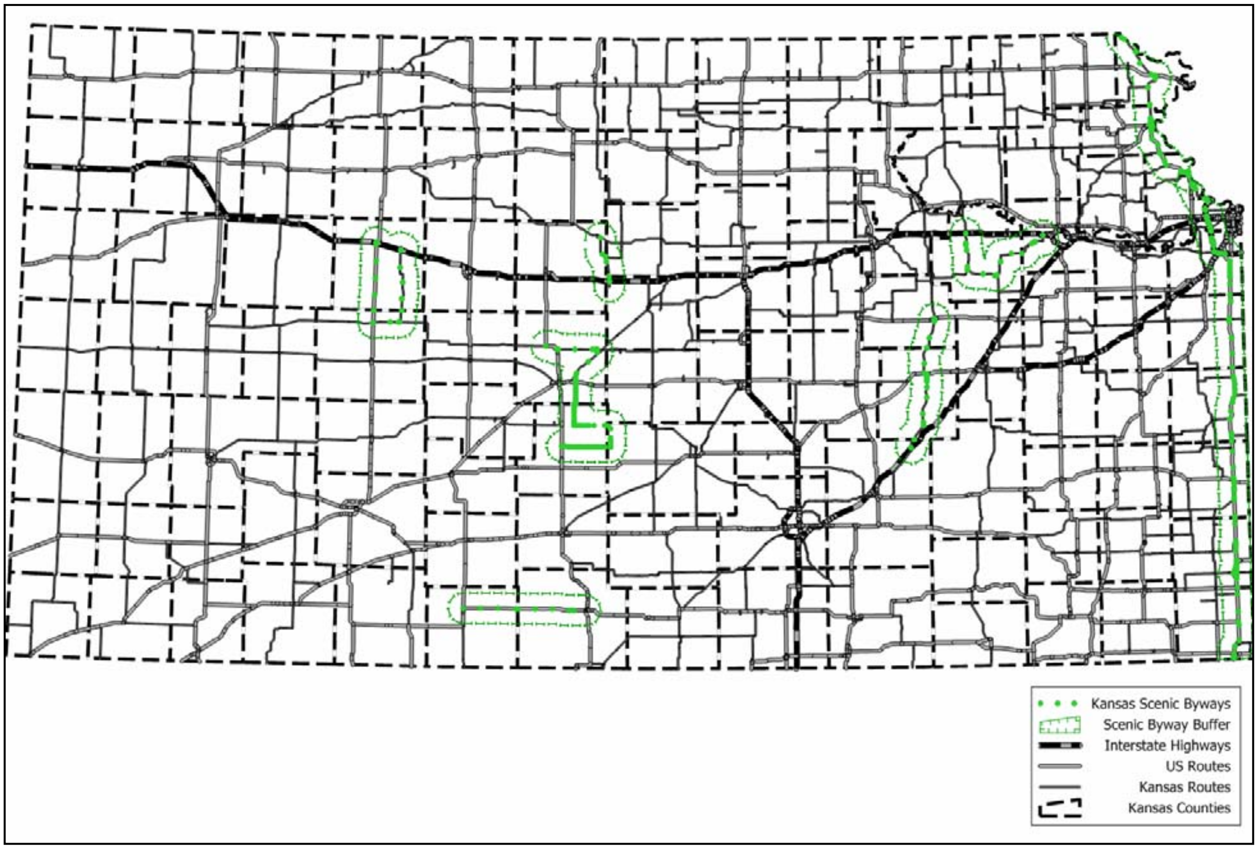


Impacts on the Landscape

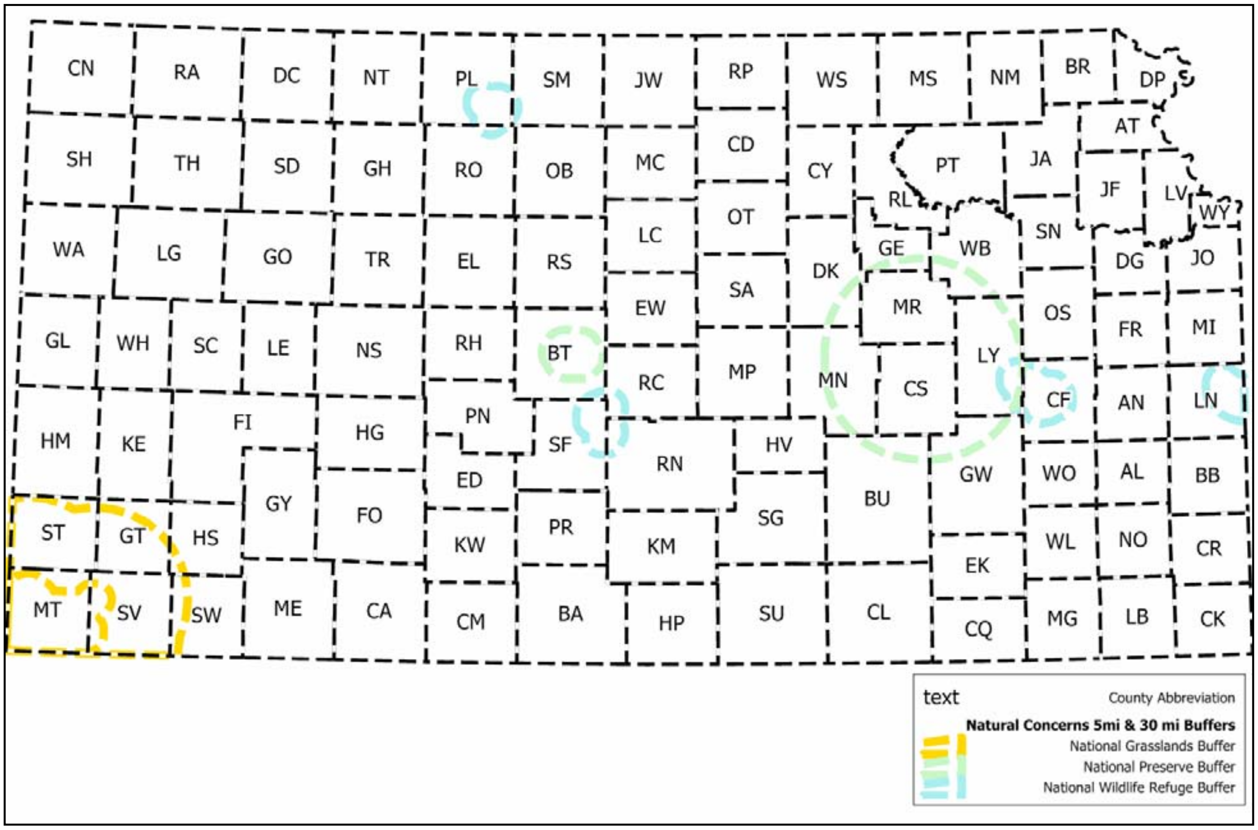
Utility scale wind turbines have evolved into enormous machines in pursuit of economy of scale and wind resources at higher elevations. A single turbine has an impact on the landscape and its visual character. A large array affects the landscape for many miles. Some find this impressive, others are not pleased. The latter strongly advocate prohibiting large wind turbines from what they consider regions of unique landscape value. Regions nominated for such protection include the Flint Hills, the Smokey Hills, and the Red or Gypsum Hills. Some if these areas, like the Flint Hills, are largely contiguous areas while other are somewhat fragmented into parcels of varying size. Considering the scale of turbines and their visibility on the horizon from many miles, setbacks ranging from five miles to any visibility have been advocated. The map below shows the regions affected by a five-mile buffer around the three regions noted above.



Kansas scenic byways have also been suggested as areas where visibility of wind turbines might conflict with the landscape. Their location and the extent of a five-mile buffer are shown in the map below.



Finally, the national preserves in Kansas have been suggested as areas from which turbines should not be visible, including the Cimarron National Grasslands and the Tallgrass National Prairie Preserve. Thirty-mile buffers from these and five-mile buffers from significant wetlands are shown in the following map.



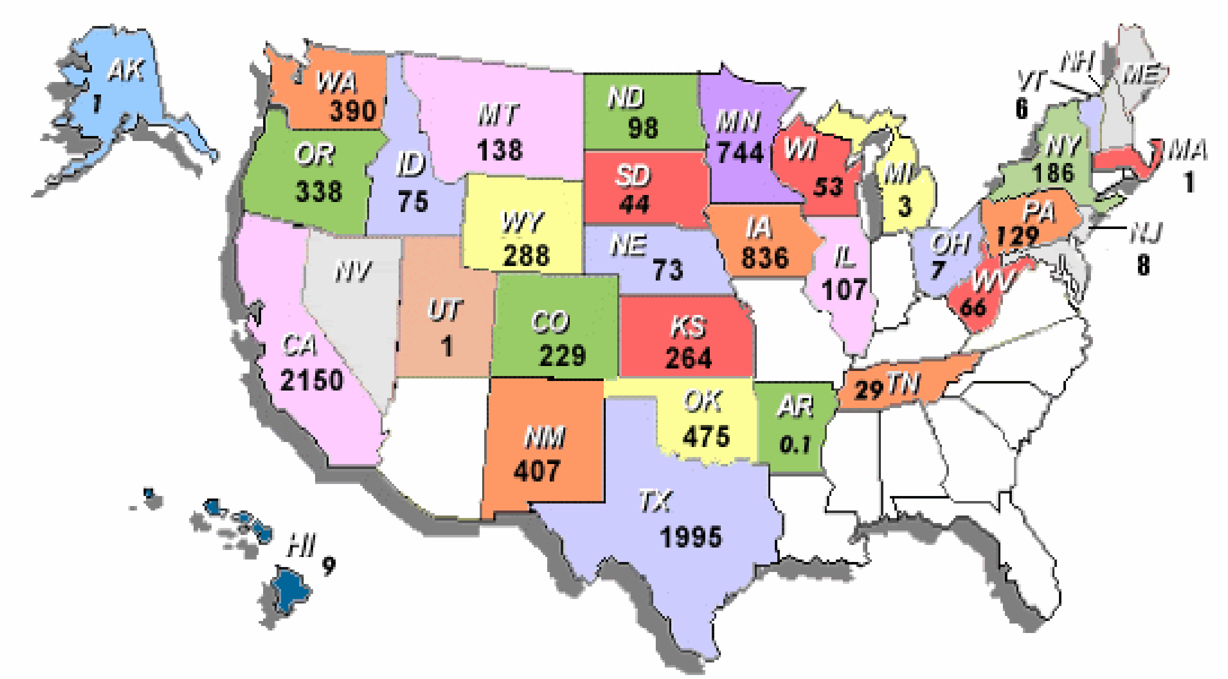
In Kansas zoning is a local function and the state imposes no specific restrictions on wind turbine location. All wind project developers must address such concerns at the local level.

Developing Wind Energy
Generating electricity for wholesale sale to electric utilities is by far the dominant strategy for wind development. While wind remains a small portion of total generation it has become the fastest growing renewable energy technology and source of electrical generation in much of the world.

Wind Farms
"A wind farm is a collection of wind turbines in the same location used for the generation of wind power electricity." Typically developed by non-utility independent power producers, wind farms generate electricity for wholesale sale to a utility buyer under a power purchase agreement (PPA). Although widely applied to wind projects regardless of size, 50 MW is often sited as the point at which a wind project is really a wind farm. Wind farms became common in California around 1980 and have become the widely replicated throughout the world.

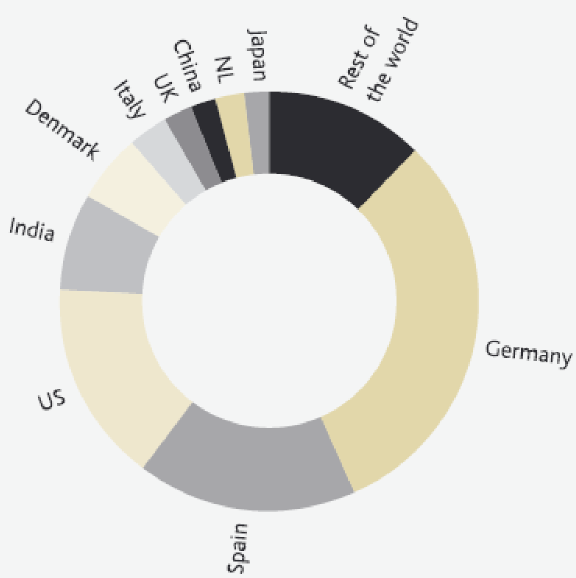
Worldwide installed wind energy capacity reached 59,084 at the end of 2005 as a result of 43.3% growth worth $14 billion.

The countries with the highest total installed capacity are Germany (18,428 MW), Spain (10,027 MW), the U.S.A. (9,149 MW), India (4,430 MW) and Denmark (3,122). Europe leads with more than 40,500 MW of installed capacity at the end of 2005, representing 69% of the global total. In 2005, the European wind capacity grew by 18%, providing nearly 3% of the EU's electricity consumption in an average wind year. The Chinese government has set a target of 30 GW of wind energy by the year 2020. See the Global Wind Energy Council at www.gwec.net for additional information.



U.S. Wind Capacity 2005 (AWEA)

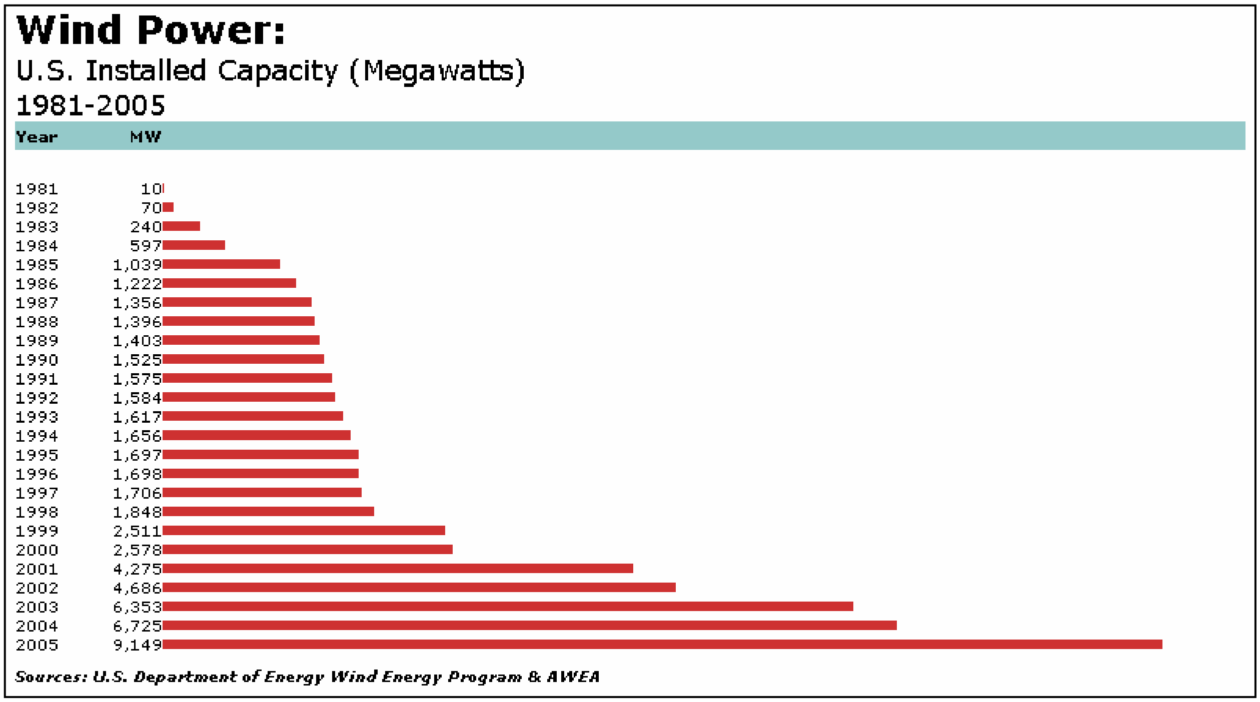
TOP 10 CUMULATIVE INSTALLED CAPACITY (DEC. 2005)



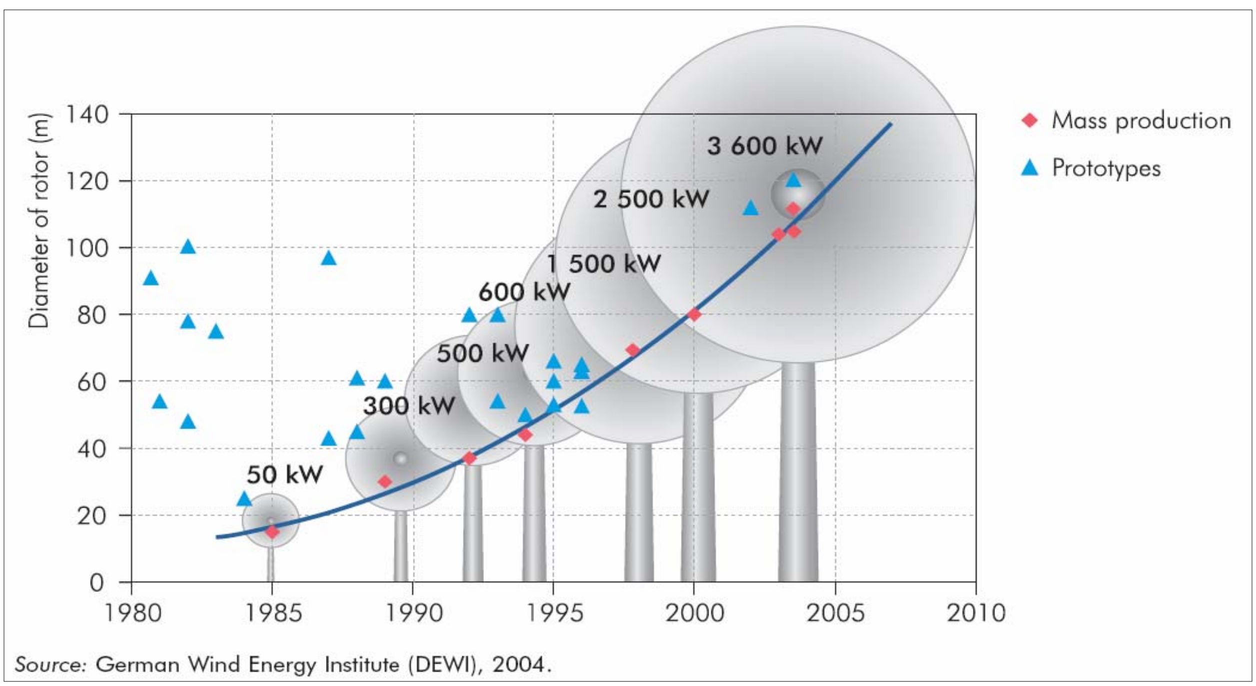
Total capacity	MW	%
Germany	18,428	31.2
Spain	10,027	17.0
US	9,149	15.5
India	4,430	7.5
Denmark	3,122	5.3
Italy	1,717	2.9
UK	1,353	2.3
China	1,260	2.1
NL	1,219	2.1
Japan	1,078	1.8
Top 10 – Total	**51,783**	**87.6**
Rest of the world	**7,301**	**12.4**
World total	**59,084**	**100**

Source: GWEC

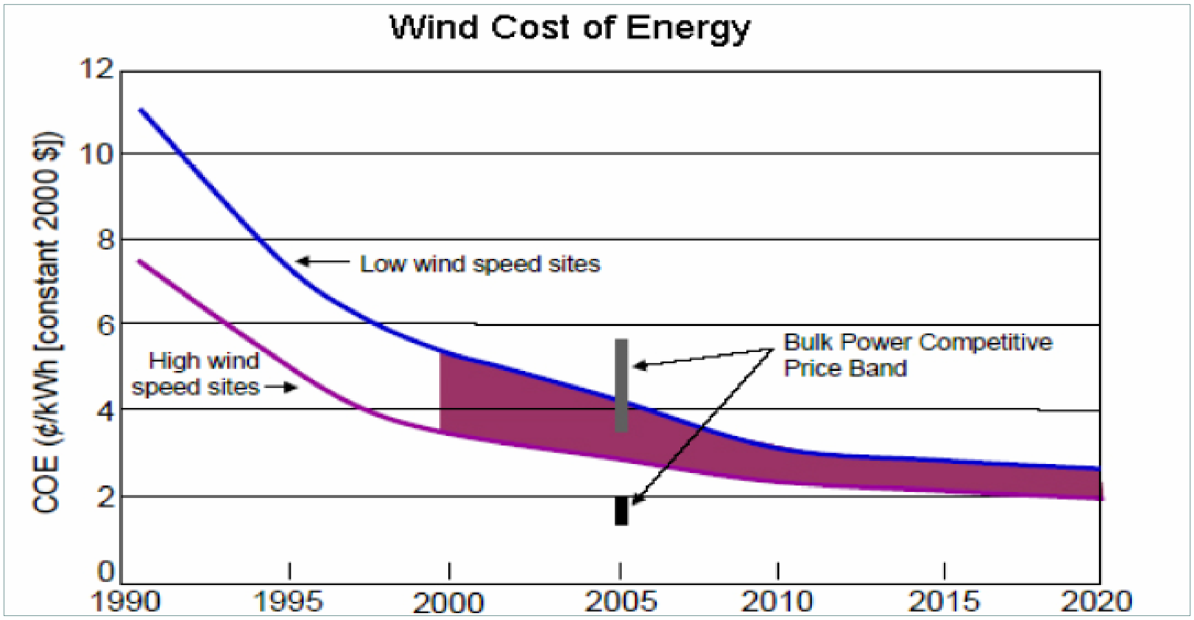
Global Wind Energy Capacity 2005



Growth of U.S. Wind Capacity 1981 - 2005



Evolution of Turbine Scale 1980 - 2005



Cost of Wind Energy

The Cost of Wind Energy
The chart of Wind Cost of Energy above is proving somewhat optimistic. In 2005 and 2006 wind project costs have increased substantially. Montezuma (200X) in Grey County reportedly cost $1,000/kW. Elk River (2005) in Butler County reportedly cost $1,300/kW and Spearville currently under construction in Ford County will reportedly cost $1,600/kW. Concerns about new project costs of $2,000 are being voiced. Clear documentation of why this is occurring is not available but reasons for it may include:

1) Inflation. Wind energy is capital intensive.
2) Dollar value. Many wind turbine components, even for U.S. based companies, are manufactured abroad. Since 200X the dollar has declined XX% in value against the euro and while global corporations manage currency fluctuations this may have forced turbine prices up.
3) Component commodity costs. Wind turbines consume a great deal of copper and steel, two commodities that have risen dramatically the past few years in response to global demand. Turbine prices must reflect this.
4) Larger turbines. The turbines are bigger, more robust, and more efficient. They capture more energy and this is reflected in the initial first cost.
5) Real costs. Wind turbine manufacturing has consolidated and the major players are addressing acquisition costs, the real cost of manufacturing quality products, and the real costs of honoring warranty requirements.
6) Demand. Global demand for wind turbines, driven in part by countries seeking to comply with Kyoto carbon emissions reduction requirements, combined with the termination of the U.S. PTC scheduled for the end 0f 2007, have increased made it a sellers market for now. Only large wind farm developers who locked in prices with firm purchase commitments can do projects with good cost control.

All of these factors may play a role but demand is likely the largest. A growing long term market and diversification of supply should bring supply in line with the market within a few years. Strategies to develop wind should anticipate this.

Wind Energy Market Development

Incentives

Wind Farm development in Kansas, the U.S. and around the world has occurred in most cases as a result of financial incentives. An extensive state-by-state database of renewable energy incentives is no the web at http://www.dsireusa.org/summarytables/financial.cfm?&CurrentPageID=7&EE=1&RE=1.

The Federal Production Tax Credit

The federal renewable energy production tax credit (PTC) has been the most significant factor in U.S. wind energy development since it was adopted in the Energy Policy Act of 1992. Originally set at a value of $0.15/kWh, it automatically adjusts for inflation and now amounts to $0.015/kWh. Typically extended by congress in increments of just a few years it drives the boom and bust of the market. Making use of the tax credit requires significant eligible tax liability making wind attractive to, and to some extent restricted to, large corporate developers. See IRS Form 8835, available at:

www.irs.gov/pub/irs-pdf/f8835.pdf#search=%22section%2045%20(d)%20tax%20credit%20irs%20rules%22 and www.irs.gov/irb/2004-17_IRB/ar09.html

Accelerated Cost Recovery

Most wind farm costs are eligible for accelerated cost recovery (depreciation) for federal tax purposes. See: www.irs.gov/publications/p946/ch04.html.

Kansas's depreciation mirrors federal.

Kansas Property Tax Exemption

Chapter 79, Article 2. 79-201. Property exempt from taxation: 11. For all taxable years commencing after December 31, 1998, all property actually and regularly used predominantly to produce and generate electricity utilizing renewable energy resources or technologies. For purposes of this section, "renewable energy resources or technologies" shall include wind, solar, thermal, photovoltaic, biomass, hydropower, geothermal and landfill gas resources or technologies.

Kansas Sales Tax Exemption

K.S.A. 79-3606(cc) provides sales tax exemptions on certain sales of tangible personal property or services. An exemption certificate must be acquired from the state.

Kansas Job Creation Tax Credit

K.S.A. 79-32,160a provides an income tax credits under specific circumstances for projects that create at least five new jobs. Relatively minor compared to other incentives it may be useful to some projects.

Incentives in Other States and Countries
Minnesota's state incentive program offered between 1 and 1.5 cents/kWh for 10 years for qualified wind energy projects of less than 2 MW. Approximately 225 MW are or will be subscribed in the program, which was closed to new applicants as of January 1, 2005.

Market Development
Renewable Portfolio Standards
At least 27 states have some form of Renewable Portfolio Standard intended to achieve significant development of renewable energy.

Renewable Energy Purchase Requirements

Federal

Federal agencies have supported renewable energy development through a variety of purchasing programs for some time. The Energy Policy Act (EPACT) of 2005 directs the federal government to increase its renewable energy use. Section 203 (a) Requirement- The President, acting through the Secretary, shall seek to ensure that, to the extent economically feasible and technically practicable, of the total amount of electric energy the Federal Government consumes during any fiscal year, the following amounts shall be renewable energy:

(1) Not less than 3% in FY07-09

(2) Not less than 5% in FY10-FY12

(3) Not less than 7.5% in FY13 & each fiscal year thereafter.

http://www.eere.energy.gov/femp/technologies/renewable_fedrequire.cfm

This will quickly make federal agencies large purchasers of renewable energy. Much of the demand will likely be met through Green Tags and Renewable Energy Certificates.

State
Other states purchasing green.

Green Tags, Renewable Energy Credits, Carbon Credits
Absent legislative or regulatory mandates, most power purchase agreements are based solely on the first, the avoided cost of fossil fuel for conventional generation. Green marketing evolved as a method of finding value for reduced emissions in the open market apart from the power purchase agreement and the regulatory environment most power purchasers operate within. Green pricing where a utility charges its customers who want to support renewable energy the additional cost was the first strategy and is still used by a number of utilities. Some customers who wanted to support renewable energy but were customers of utilities that could not, or would not, provide them led to the development of green tags.

The terms Green Tags and Renewable Energy Certificates are somewhat interchangeable although the first is often associated with small retail sales and the latter with larger wholesale sales. While Green Tags can be derived from other forms of renewable energy it has most consistently been associated with electricity from wind, solar, and landfill gas.

The concept is based on selling the energy value, kilowatt-hours, and the environmental benefits separately. The energy is sold, typically to a utility purchaser, through the power purchase agreement. The environmental benefits, reduced emissions, are sold to whoever will buy them at whatever price marketing can produce.

Who Buys

People who believe they are being environmentally conscious. Companies that want to project a green marketing image. Government agencies, federal, state, or local, responding to a mandate. In 2004 there were 324,000 residential customers and 8,000 nonresidential.

Who Sells and at What Price

Energy supplying green credits in 2004 was 61% wind, 25% biomass and 14% small hydro with solar about 0.1%. Green tags are marketing at many levels by over one hundred vendors. Some large utilities that generate with renewable resources market their own. Many use dedicated marketing firms and reportedly a few market tags that don't really have any generation behind them. Green-e, www.green-e.org, and other organizations evaluate and certify green tags and their Green-e logo is used as a marketing tool by businesses purchasing green tags.

The price ranges from a high of as much as $0.17/kWh to as little as $0.003 per kWh at the wholesale level. The average retail price advertised is around $0.02/kWh. Wholesale prices may approach the value of carbon credits described later.

How Big Is the Green Tag/REC Market

Total sales in 2004 were about 1,800 MWh. Growth was about 43%.

The Problem With Green Tags

Green tags and RECs are typically sold by subscription, contract, or single purchase, almost always after the project is complete. Their sale is not firm enough to be considered part of project cash flow and is therefore not part of project financing. For a regulated utility green tag income may serve to reduce customer cost. If the income helps sustain the economic viability of an entity essential to the renewable energy development process they may contribute indirectly to future projects. Only in unique cases do green tags actually help a project happen. They represent the "feel good" aspect of renewable energy development. Finding ways to more directly link the value of reduced environmental emissions resulting from wind energy development with actual project financing and development is a challenge.

An extensive analysis of green tag programs is provided in *Green Power Marketing in the United States: A Status Report* dtd 2005 from NREL.
http://www.eere.energy.gov/greenpower/resources/pdfs/38994.pdf#search=%22nrel%20green%20tag%20report%202005%22

The Carbon Credit Market

The U.S. is not participating in the implementation of the Kyoto Protocols. Efforts to mitigate global warming in the U.S. have resulted in voluntary federal initiatives, action by several states, the on-going formation of regional efforts, and the emergence of the Chicago Climate Exchange (CCX) www.chicagoclimatex.org.

The CCX serves as a greenhouse gas (GHG) emission registry and trading system for all six greenhouse gases (GHGs). Similar emission cap and trade systems have been used extensively for years as part of EPAs program that has successfully reduced SOX and NOX emissions and many feel it will be the method of the future for reducing GHG emissions. CCX is a self-regulatory designed and governed by its members who make a voluntary but binding commitment to reduce GHG emissions. August 2006 trade price on the CCX for a metric ton of CO_2 is in the $4.00 - 4.50 range. This is about one fourth the price of carbon trades on the European Climate Exchange where many countries are attempting to meet Kyoto emissions reduction requirements. Without a detailed audit exchange criteria assign a value of 0.40 metric tons of CO_2 per MWh of electricity. This is equivalent to the emissions from a natural gas combined cycle generating plant, the lowest emitter available among conventional generating systems. Each MW of wind would be worth $1.60 – 1.80 if traded on the exchange ($.0016 - .0018) per KWh. Trades at higher prices can be negotiated privately and registered with the exchange. Trades for future emissions are currently being registered through 2010.

Should Kansas Government Be Using Kansas Wind Energy?

If development of Kansas wind energy is important for our economy and our environment Kansas government should set a strong example by its own conduct. The operation of Kansas government consumes about 500,000 MWh annually at a cost of $**XXX**.

Generating 500,000 MWh with wind energy would require wind turbines totally an estimated 140 – 170 MW depending on the wind resource of the regions they were located in.

Community Wind

Community Wind is widely suggested as an alternative strategy for wind energy development. Just the phrase sounds appealing too many. Wind is a dispersed energy resource. Developing it locally seems consistent with its nature and beneficial to rural communities in windy regions.

Community Wind In Other States

The Community Wind concept started in Minnesota

Incentive Strategies in Other States

Ownership Models

Community Wind in Kansas

Community Wind means different things to different interests and regions. The Kansas Energy Council adopted the following definition in November of 2005:

> *" Community Wind is locally owned commercial wind energy projects (smaller than or equal to 20 MW rated capacity) with production distributed for local use or sold under a power purchase agreement (PPA). The majority of owners/investors are members of a local community and they have a financial stake in the project coupled with a commitment to see direct positive local social and economic impacts."*

More specific criteria may include:

1) Total one site project size limited to not more than 20 MW
2) Project ownership not less than 51% by Kansas residents or trusts with sale or transfer only to other Kansas residents or family members
3) Ownership structured as Limited Liability Corporation (LLC)

Other criteria for defining community wind that have been suggested for consideration:

1) A maximum turbine size of 2MW (or some other size),
2) Maximum grid interconnection voltage of 34.5 KVA (or some other voltage)

3) A minimum land easement payment of 2% of gross production value (or some other percent)
4) Payment in lieu of taxes to local jurisdictions of not less than $2,500 per MW (or some other amount)

Strategies for Encouraging Community Wind Development in Kansas

Kansas electric utilities not already purchasing wind energy recognize the widespread interest in community wind. They have are willing to consider purchasing energy from community wind projects at a price that does not increase their cost, essentially the cost of displaced fossil energy. To the great benefit of Kansas consumers these are among the lowest in the country, but that makes it more difficult for wind to compete.

Community wind projects are also expected to have somewhat higher costs, perhaps 10 - 15 percent because of their dispersed nature and reduced economy of scale. Locating closer to community loads will likely mean turbine placement on somewhat less than premium wind sites and reduction in annual output of 10-15%. Taken together these factors make financial incentives essential for community wind development in Kansas, just as in other states.

Incentives

Kansas Production Tax Credit for Community Wind
How large an incentive per kWh will be required to make community wind projects financially feasible in Kansas is not an easy question to answer. Fossil energy for power generation in Kansas ranges form $11.50 – $15.00/MWh for coal to $18.00 – 20.00 /MWh for gas. Coal

accounts for about 71%of statewide generation, gas oil less than 5%. Wind energy from Elk River, completed last year, is sold under contract for $25. per MWh and provides a savings to The Empire District Electric Utility which has a high proportion of gas fueled generation. Depending on the buyer, the evolution of the wind turbine market, and specific project development strategies, new community wind projects may require revenues of $35 – 45/Whr.

A Kansas Wind Energy Production Tax Credit targeted specifically and solely at community wind offers the most direct strategy. Kansas's tax rate, 6.45 percent on income above XX for individuals and 4 percent for corporations would require a method some method of aggregating sufficient eligible tax liability to take full advantage of such a credit. The credit would need to be in place for 10 – 15 years with sufficiently that it would help support project financing. Cary forward provisions would have little benefit since they would tend to pile up in subsequent years. The Kansas Department of Revenue opposes allowing such credits to be transferable since they quickly become very difficult to track. Participation of corporations with adequate federal and Kansas tax liability to take full advantage of both PTCs may offer the best solution. Using the ownership flip model, local investors would provide equity investment gaining limited return during the first 10 years with an option to purchase the entire project for an agreed price.

New Mexico has a corporate tax credit for renewable energy.

> "Enacted in 2002, and amended in 2003 by HB 146, the New Mexico Renewable Energy Production Tax Credit provides a tax credit against the corporate income tax of one cent per kilowatt-hour for companies that generate electricity from wind, solar, or biomass. The credit is applicable only to the first 400,000 megawatt-hours of electricity in each of 10 consecutive years. To qualify, an energy generator must use a low- or zero-emissions generation technology and have capacity of at least 10 megawatts. Energy generation from all participants combined must not exceed two million megawatt-hours of production annually. If the amount of the tax credit claimed exceeds the taxpayer's corporate income tax liability, the excess may be carried forward for up to five consecutive taxable years."

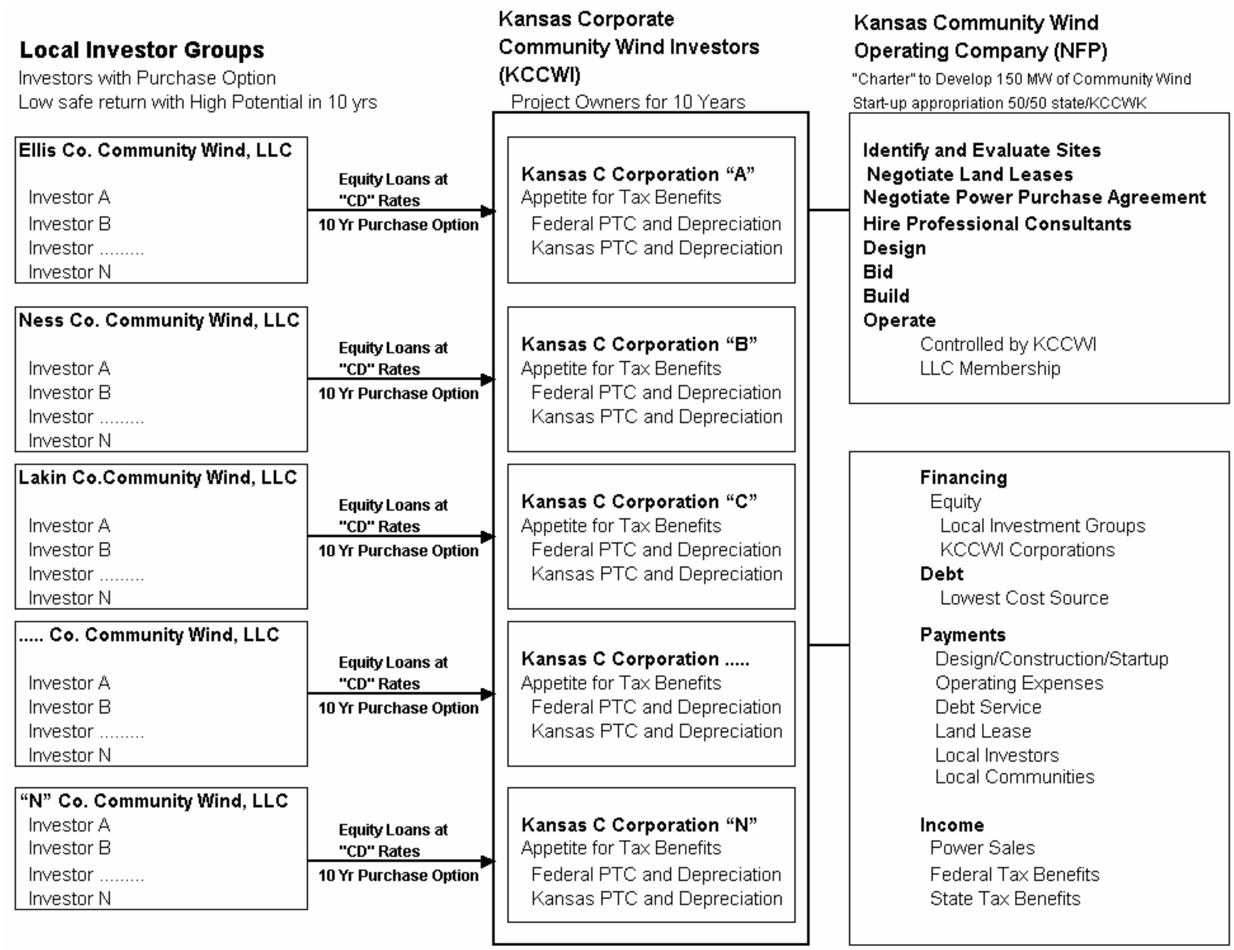
http://www.dsireusa.org/library/includes/incentive2.cfm?Incentive_Code=NM02F&state=NM&CurrentPageID=1

A Strategy for Communities to Work Together

Small projects of a few megawatts face substantial barriers. Communities often find themselves negotiating with outside developers, loosing the advantage of competitive procurement and many of the local advantages of local participation and control. If communities and local investors are to participate in and benefit from dispersed local wind energy development they need an organization dedicated solely to helping them work together to achieve their goals. To regain some aspects of economy of scale developers of small projects would benefit from an alliance that would address many of their common needs.

A Community Wind Operating Cooperative (CWOC), established as a nonprofit entity could serve that purpose. Seed funding could be provided by the state, local investors, and Kansas corporations whose participation would be motivated by access to state and federal tax incentives.

The development participants and their key roles are shown in the diagram below.



Local investors would be limited to Kansas residents and their investments would be transferable only to Kansas residents or immediate family.

The Kansas Development Finance Authority would be authorized to provide financing.

Renewable Energy Generating Cooperatives authorized under K.S.A. 17-4651 would be an eligible method of development.

Eligible renewable resources would be as defined in K.S.A. 17-4652 (d).