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WISCONSIN STATE LEGISLATURE ...
PUBLIC HEARING - COMMITTEE RECORDS

2009-10

(session year)

Senate

(Assembly, Senate or Joint)

Committee on ... Commerce, Utilities, Energy, & Rail (SC-CUER)

COMMITTEE NOTICES ...

- Committee Reports ... **CR**
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INFORMATION COLLECTED BY COMMITTEE FOR AND AGAINST PROPOSAL

- Appointments ... **Appt** (w/Record of Comm. Proceedings)
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- Hearing Records ... bills and resolutions (w/Record of Comm. Proceedings)
  (**ab** = Assembly Bill) (**ar** = Assembly Resolution) (**ajr** = Assembly Joint Resolution)
  (**sb** = Senate Bill) (**sr** = Senate Resolution) (**sjr** = Senate Joint Resolution)
- Miscellaneous ... **Misc**

* Contents organized for archiving by: Gigi Godwin (LRB) (July/2011)

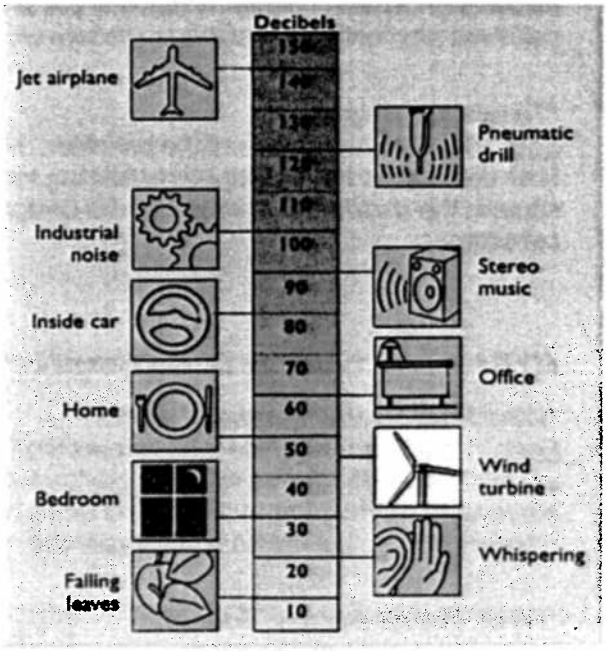
Wind Power Myths vs. Facts

As wind power generates more electricity in the U.S. and moves into new areas of the country, more people are being introduced to wind turbines in their communities. Wind power is still a relatively new technology, and a number of myths - some based on old technologies, some based on misunderstandings - are endlessly repeated by opponents of wind power. This document dispels some of the most common myths about wind power with real facts.

MYTH — Wind Turbines Are a Nuisance

"Turbines Are Noisy"

Fact: Wind turbines are quiet. An operating modern wind farm at a distance of 750 to 1000 feet is no noisier than a kitchen refrigerator or a moderately quiet room. The sound turbines produce is similar to a light whooshing or swishing sound, and much more quiet than other types of modern-day equipment. Even in rural or low-density areas, where there is little additional sound to mask that of the wind turbines, the sound of the blowing wind is often louder.



Exceptions to quiet operating turbines can occur in two instances - with older turbines from the 1980s and with contemporary turbines in some types of hilly terrain. Modern wind turbines have been designed to drastically reduce the noise of mechanical components so the most audible noise is the sound of the wind interacting with the rotor blade. However, in some hilly terrain where residences are located in sheltered dips or hollows downwind from turbines, turbine sounds may carry further and be more audible. This effect can generally be anticipated and avoided in the development process through adequate setbacks from homes.

"Turbine Lighting Is Excessive"

Fact: Lights at wind farms are non-intrusive, and improvements in design will make them even less so as the technology expands. The Federal Aviation Administration (FAA) recommends lighting for most structures more than 200 feet in height to ensure aviation safety.

The wind industry is working with the FAA to test safe and non-intrusive lighting plans for wind farms.

"Nearby Residences Will Be Affected by Shadow Flicker"
Fact: Shadow flicker is the term used to describe what happens when rotating turbine blades come between the viewer and the sun, causing a moving shadow. Shadow flicker is almost never a problem for residences near new wind farms, and in the few cases where it could be, it is easily avoided. For some who have homes close to wind turbines, shadow flicker can occur under certain circumstances and can be annoying when trying to read or watch television. However, the effect can be precisely calculated to determine whether a flickering shadow will fall on a given location near a wind farm, and how many hours in a year it will do so. Potential problems can be easily identified using these methods, and solutions range from providing an appropriate setback from the turbines to planting trees to disrupt the effect. Normally, shadow flicker should not be a problem in the U.S. because at U.S. latitudes (except Alaska) the sun's angle is not very low in the sky. If any effect is experienced, it is generally short-lived, as in a few hours over a year's time.

"Turbines Interfere with Television and Other Communications Signals"
Fact: Interference is rare and easily avoided. Large wind turbines installed at wind farms can interfere with radio or television signals if a turbine is in the "line of sight." Improving a receiver's antenna or installing relays to transmit the signal around the wind farm solves this problem; both solutions are common practice in modern wind energy development.

"Turbines Are Ugly"
Fact: Beauty is in the eye of the beholder. Many people feel wind turbines are majestic. Wind farm developers have computer-modeling tools that accurately depict virtual views from given spots in the surrounding area. Careful design of a wind project can alleviate many visual concerns.

MYTH — Wind Turbines Do Not Benefit Local Communities

"Wind Projects Harm Property Values"
Fact: There is *no evidence* that the presence of a commercial windfarm within sight of a property systematically decreases that property's value. In fact, a nationwide study conducted in 2003 surveyed property near multiple wind farms and found that not only do wind farms not harm property values, but that in some cases the values increased.

"Wind Projects Depress Tourism"
Fact: There is no evidence to indicate that wind turbines drive tourists away. In some areas, wind turbines even draw tourists. Local governments frequently work with developers to install information stands and signs near wind farms, as well as pull-off areas, similar to "scenic overlooks", from nearby roads. Surveys of tourists have

> "There is so much demand to view the wind turbines that the county is creating a pull-off area and working with the project owner to create an informational kiosk. The wind project has become a destination spot for tourists visiting nearby ski resorts and parks."
>
> *Robert Burns, Executive Director*
> *Tucker County Development Authority, West Virginia*

found that the presence of wind turbines would not affect the decision of most visitors to return. The thousands of turbines in Palm Springs, California, have had no negative impact on the tourism business; on the contrary, the local tourism center organizes bus tours to the wind farms.

"Wind Projects Don't Contribute to the Local Tax Base"

Fact: Installing millions of dollars of equipment in most areas greatly increases the local taxes assessed, and wind farms are no exception. Wind farms support the local tax base, helping to pay for schools and roads far more than their impact to local facilities. One large (108-turbine) project in rural Prowers County, Colorado, increased the county's tax base by 29%.

What 1,000 Megawatts of Wind Brought to Texas	
Taxable value of wind power plants:	*$777 million*
Property tax payments to local school districts:	*$11.6 million in 2002*
Landowner royalty income:	*$2.5 million in 2002*
Wind-related jobs:	*2,500*

Economic development associated with a new wind farm extends far beyond taxes to increased employment, directly from the wind farm operation and construction, and to money pumped in the local economy through services needed to support a large construction project, including increased hotel stays and restaurant revenues.

MYTH — Wind Turbines Aren't Safe

"Blades Cause Dangerous Ice Throws"

Fact: Ice throw, while it can occur under certain conditions, is of little danger. Setbacks typically used to minimize noise are sufficient to protect against danger to the public. In addition, ice buildup slows a turbine's rotation and will be sensed by a turbine's control system, causing the turbine to shut down.

"Turbines May Throw Blades or Collapse"

Fact: Modern wind turbines are so safe they successfully operate near schools, in urban settings and densely populated areas, and in rural communities. Blade throws were common in the industry's early years, but are unheard-of today because of better turbine design and engineering. Utility-scale wind turbines are certified to international engineering standards, such as those developed by Germanischer Lloyd or Det Norske Veritas, and these include ratings for withstanding different levels of hurricane-strength winds and for other criteria. There are thousands of turbines installed in Europe and thousands in the U.S. - wind turbine standards ensure a high level of operational reliability and safety in the U.S. and worldwide.

MYTH — Wind Turbines Harm Wildlife

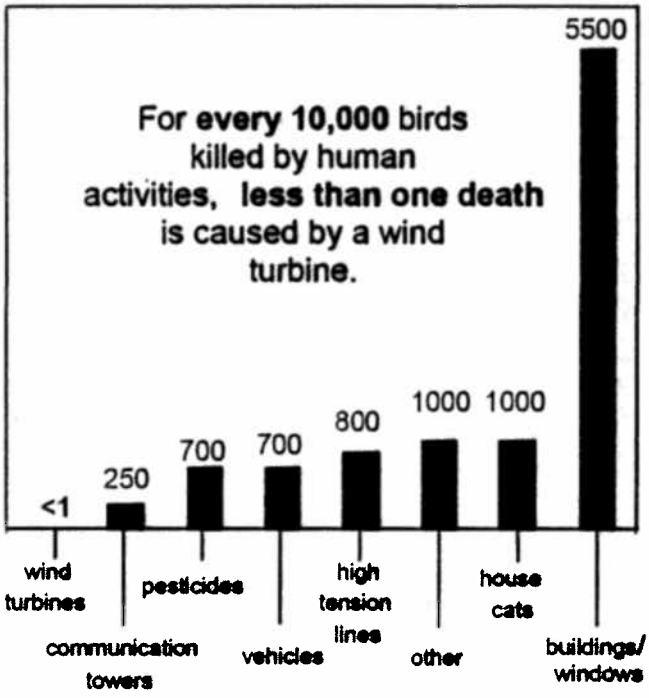
"Turbines Kill Many Birds and Bats"

Fact: Wind energy development's overall impact on birds is extremely low compared with other human-related activities. No matter how extensively wind is developed in the future, bird deaths

from wind energy are unlikely to be ever more than a small fraction of bird deaths caused by other human-related sources, such as cats and buildings.

Raptor kills (of eagles, hawks, and owls) are a problem at one large older wind farm in California, in Altamont Pass, built in the 1980s. Wind farm operators there have worked with wildlife officials and experts to reduce the impacts on raptors, and those efforts continue today.

Prior to 2003, bat kills at wind farms studied were low. However, the frequency of bat deaths at a newly constructed wind farm in West Virginia in 2003 has caused concern. In response, AWEA and several of its member companies entered into a three-year cooperative effort with Bat Conservation International, the National Renewable Energy Laboratory, and the U.S. Fish and Wildlife Service to research wind/bat interaction and test ways to reduce bat mortality. That research is ongoing, and information about the results is being published as they become available.



Data source: Erickson et al., 2002, Summary of Anthropogenic Causes of Bird Mortality.

Despite the minimal impact wind development has on bird and bat populations in most areas, the industry takes potential impacts seriously. In addition to special initiatives such as those described above, avian studies are routinely conducted at wind sites before projects are proposed. Pre-construction wildlife surveys are now common practice throughout the industry.

"Wind Projects Fragment Wildlife Habitat"

Fact: Wind farms are most often built in areas close to transmission lines where habitat has already been modified and fragmented, typically by farming and ranching. And, wind energy has a light footprint, with only the turbine itself, along with some roads and power lines, impacting the land, while pre-existing land use continues around the turbines as before. Windy land can also often be found in undeveloped areas, however, so habitat fragmentation can be a concern, especially in unbroken stretches of prairie grasslands or forests. The industry supports more research to better understand the extent of possible habitat or wildlife impacts in these areas, but those impacts must be balanced against the effects of not developing renewable energy sources and thereby aggravating global warming and pollution pressures on wildlife and their habitats--not just in prairie or forest areas, but around the world.

MYTH — Wind Turbines are Expensive and Unreliable

"Back-up Generation Is Needed for All Wind Turbines"
Fact: Because of the grid's inherent design, there is no need to back up every megawatt of wind energy with a megawatt of fossil fuel or dispatchable power. The electric grid is designed to have more generation sources than are needed at any one time because no power plant is 100% reliable. It is a complicated system designed to absorb many impacts, from electric generation sources going out of service unexpectedly to industrial customers starting up energy-intensive equipment. The grid operator matches electricity generation to electricity use, and wind energy's variability is just one more variable in the mix.

Findings of the Utility Wind Interest Group (an organization of some 55 utilities that have wind power on their systems) in November 2003:

"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 often closer to zero."

One of the most authoritative studies, conducted in 2004 for the Minnesota Department of Commerce found that adding 1,500 megawatts (MW) (enough wind to meet the needs of more than 400,000 homes) to the system of a major utility, Xcel Energy in Minnesota, would require only an additional 8 MW of conventional generation to deal with added variability.

Many sources of electricity considered highly reliable suffer from unexpected outages: for instance nuclear reactors and coal plants that shut down, often at short notice, for safety repairs or maintenance. Yet no one proposes to back up a coal or nuclear power plant with a similar amount of dedicated generation from another plant. The reality is that wind energy is naturally variable, but not unreliable. Wind farms are built in windy areas, and seasonal and daily wind generation patterns can be anticipated. Denmark and utility systems in regional areas elsewhere in Europe operate with 10-15% or more of their power coming from wind, without increased reliability problems or need for additional back-up power plants. And in contrast to conventional power plants, wind farms need not shut down altogether for maintenance and repairs–a turbine fault, when it occurs, can be repaired while the other turbines continue to operate.

"Wind Turbines Operate Only a Small Fraction of the Time"
Fact: Wind turbines generate electricity most (65-80%) of the time, although the output amount is variable. No power plant generates at 100% "nameplate capacity" 100% of the time. Nameplate capacity refers to the maximum generation potential of a power plant. A conventional power plant is occasionally closed for maintenance or repairs, or runs below full capacity to best match demand. Wind farms are built in areas where the wind blows most of the time, but because of variations in speed, a wind farm will generate power at full rated capacity about 10% of the time, and on average throughout the year the plant will generate 30% to 35% of its rated capacity. A utility in the Northwest, PacifiCorp, added 20% of its wind projects' nameplate capacity into its baseload calculation in the utility's 2004 Integrated Resource Plan. This indicates that utilities with experience with wind energy on their system consider it able to provide some consistent power on a regular basis. The full plan can be accessed at http://www.pacificorp.com/File/File47422.pdf.

"Wind Energy Will Never Provide More Than a Little Electricity"

Fact: The U.S. Department of Energy estimates America's wind energy potential to be much larger than total U.S. electricity consumption today. Tapping only a fraction of that potential would provide a significant part of America's electricity supply. In the United States, wind energy currently produces approximately 17 billion kilowatt-hours of electricity, equivalent to powering about 1.6 million average American homes year-round. A typical one-megawatt turbine generates enough electricity for 300 homes. With policies to remove barriers to wind energy development, by 2020, 100,000 MW of wind energy could be installed, providing at least 6% of electricity generated in the U.S., or about the same amount as hydropower today. Wind energy is poised to be a significant part of America's diverse energy portfolio.

American Homes Served by Wind Energy
(in millions)

TODAY - 1.6 million

BY 2020 - 25 million

"Wind Turbines Are Inefficient"

Fact: Wind turbines are efficient, and that is part of their beauty. One of the simplest ways to measure overall efficiency is to look at the "energy payback" of an energy technology, i.e., the amount of energy it takes to produce a given amount of energy.

The energy payback time for wind is in fact similar to or better than that of conventional power plants. A recent study by the University of Wisconsin-Madison calculated the average energy payback of Midwestern wind farms to be between 17 and 39 times as much energy as they consume (depending on the average wind speeds at the site), while nuclear power plants generate only about 16 times and coal plants 11 times as much energy as they consume.

Wind turbines are also highly efficient in a larger sense: they generate electricity from a natural, renewable resource, without any hidden social or environmental costs–there is no need to mine for fuel or transport it, no global warming pollutants created, and no need to store, treat, or dispose of wastes.

"Wind Energy Is Expensive"

Fact: Wind energy is now in a range that is competitive with power from new conventional power plants. The up-front, capital cost of wind energy is more expensive than that of some traditional power technologies such as natural gas. However, there are no fuel costs, and in good locations the "levelized" cost (which includes the cost of capital, the

"The new wind farm that Xcel Energy is building near Lamar will save consumers $4.6 million in their power bills."

- From Xcel Energy testimony to the Federal Energy Regulatory Commission, June 16, 2003

cost of fuel, and the cost of operations and maintenance over the lifetime of the plant) of wind energy can now be very competitive with that of other energy sources.

"Wind Energy Is Heavily Subsidized"

Fact: Every energy technology is subsidized. Wind energy is no exception. Wind receives a tax credit that provides an inflation-adjusted 1.5 cents for each kilowatt-hour generated, over the first ten years of the project. This credit reduces the tax liability of a wind farm, but is not a subsidy of public money flowing to the wind farm owner.

Other energy sources receive subsidies in many forms, including tax deductions, loan guarantees, liability insurance and leasing of public lands at below market prices. Some, like the depletion allowance for oil and gas, are permanent in the tax code. Additional indirect subsidies include federal money for research and development programs and policy provisions in federal legislation. The largest subsidy, however, may be an invisible one–the fact that the environmental impacts from fossil fuel use are not reflected through higher costs of those energy sources. Instead, all of society must pay the price for dirty air, polluted water, health costs, global warming, fuel spills, and cleanup and disposal of fuel byproducts attributed to traditional energy sources. Clean, renewable, domestic wind energy produces no emissions, requires no fuel and the cost is fixed and predictable over time.

AWEA AMERICAN WIND ENERGY ASSOCIATION

Wind Power and Reliability: The Myth of a Need for Baseload Power

Federal Energy Regulatory Commission (FERC) Chairman Jon Wellinghoff has stated that "baseload capacity is going to become an anachronism" and that no new nuclear or coal plants may ever be needed in the United States.[1] This fact sheet explains why baseload power is an obsolete concept in a world where a variety of other resources can provide the three commodities needed by the power system – energy, capacity, and flexibility – at competitive prices. A combination of a large amount of renewable energy, combined with flexible natural gas plants and demand-response and efficiency, can ensure that our electric system has sufficient energy, capacity, and flexibility, and operates cost-effectively and reliably. The marketplace is already pointing in the direction described by Chairman Wellinghoff: since 2005, natural gas and wind power have accounted for nearly 90% of all new U.S. generating capacity.[2]

There Is No Inherent Need for "Baseload" Power

Reliable and cost-effective operation of the electric grid requires a mixture of three types of resources: energy (electricity), capacity (ability to generate electricity at a certain point in time), and flexibility (ability to "turn up" or "turn down" electricity generation as needed). Each of the various types of power plants that generate electricity – nuclear, coal, gas, hydroelectric, wind and others – may specialize in providing one or two of these attributes, but no power plant excels at providing all three.

"Baseload" plants, a term typically applied to nuclear or coal-fired power plants, provide energy and some capacity. Interestingly, other types of power plants can provide these resources, often at costs competitive with baseload plants. Wind plants can produce energy just as well or better than nuclear or coal plants, while natural gas plants can provide capacity at lower cost than nuclear or coal plants. Thus, despite claims to the contrary, there is no inherent need for baseload power.

Moreover, baseload power plants provide almost zero flexibility, even though flexibility is a power system need that is just as essential as energy or capacity. In contrast, wind energy makes very valuable contributions towards ensuring that the grid has the right mixture of energy, capacity, and flexibility.

Energy, Capacity, and Flexibility

First, let us explore further what is meant by "energy," "capacity," and "flexibility." Energy on the grid is a measure of power provided over time, and can be calculated by multiplying the amount of power used or generated by the time that it was used or generated. Thus, energy is measured in watt-hours, or more commonly kilowatt-hours (the unit used on household electricity bills) and megawatt-hours (1 megawatt-hour, MWh, is equal to 1,000 kilowatt-hours, kWh). For grid operators and planners, having enough energy largely means having enough fuel that can be converted to electricity, and having a diversity of fuels that will be available at a reasonable cost.

Capacity is a measure of power provided or used in a single instant, and thus is measured in watts, kilowatts, and megawatts. Operators of the electric grid must ensure that they have enough generating resources to provide the power capacity that will be needed at any point in time. Typically, grid operators think about capacity on years-ahead basis when they are deciding what power plants to build, on a day-ahead basis when they are deciding what power plants they should have ready to operate the next day, and on a real-time basis when they decide what power plants to operate.

Flexibility is the ability of power output, or capacity, to change over a given period of time. One can speak about the flexibility of a single power plant or the combined flexibility of all power plants on the grid. Flexibility is critical for accommodating changes in electricity supply and demand that occur, often unexpectedly, as power plants go offline or as consumers turn appliances on and off. Demand for electricity can vary by a factor of three or more depending on the weather and the time of day and year, which means that hundreds of gigawatts (GW)[3] of

flexibility must be built into the power system. Flexibility can be measured over different time periods: e.g., a power system might have the flexibility to increase generation by 1 GW over 1 hour and 3 GW over 5 hours, with each capability being important for reliable system operation.

Specialization and the Division of Labor Among Power Plants

A power plant may specialize in providing one or two of these power system needs, but no power plant excels at providing all three. As a result, it is important to have a diversity of generation resources on the grid. Table 1 lists the ability of different types of power plants to provide the attributes of energy, capacity, and flexibility.

Table 1: Energy, Capacity, and Flexibility Provided by Different Types of Power Plants

	Energy	Capacity	Flexibility
Wind	X+	Some	Great for turning output down
Nuclear	X	X	None
Coal	X	X	Very little
Natural gas turbine	Typically too costly	X+	X+
Natural gas comb. cycle	Often too costly	X+	X
Hydroelectric	Some	X	X

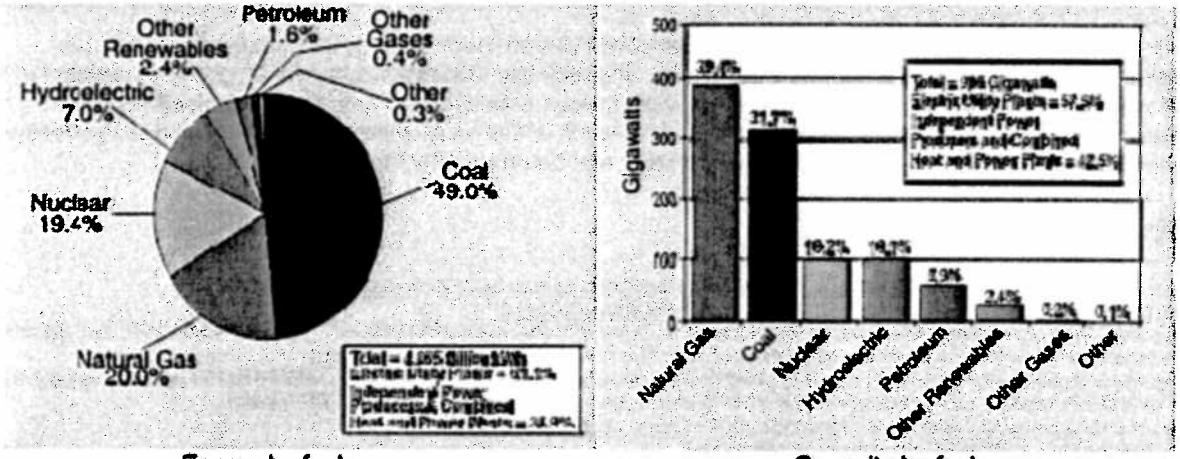
As the table illustrates, wind excels at providing energy, as its fuel source is free. Wind also provides some capacity, typically in a ratio of about one unit of capacity for every two units of average energy output.[4] A wind plant's exact amount of capacity varies depending on a number of site-specific factors, as well as the time horizon being considered.[5] Wind plants can also rapidly and precisely reduce their output on command, giving them excellent flexibility for reducing supply. Flexibility to increase power supply is much more difficult for wind plants, as doing so requires holding the plant below its potential output, sacrificing a significant amount of energy that could have been produced for free.

Nuclear and coal plants, conventionally thought of as "baseload" plants, are remarkably similar to wind plants in that they are predominantly energy resources. Like wind, their fuel costs and operating costs are very low. Nuclear and coal plants are capable of providing capacity at a level close to their maximum output. Even so, no power plant can be counted on to reliably provide capacity at its maximum output, as all plants experience mechanical, electrical, or other failures from time to time and must go offline with little notice. For example, nuclear power plants in the southeastern U.S. have been forced to shut down, some for periods of several weeks, because summertime heat waves raised the temperature of the water in the rivers they rely on for cooling their steam generators. Wind energy, by contrast, uses no water.

Coal and nuclear plants have very little flexibility -- it is difficult for them to increase or decrease their output in response to commands from the grid operator. Changing the output of a nuclear or coal plant requires changing the amount of heat traveling through the plant's steam system. The resulting temperature fluctuations can cause thermal stress to plant equipment, significantly increasing maintenance expenses and causing safety concerns.

Natural gas power plants are generally the opposite of nuclear and coal plants, providing significant amounts of flexibility and capacity but very little energy. This is not because natural gas plants are incapable of generating large amounts of energy, but rather due to the fact that gas power plants typically have very high operating costs because, as a fuel, natural gas is generally more expensive than coal.

However, gas plants, particularly combustion turbine (CT) plants, do excel at providing capacity and at changing their output rapidly. Combined-cycle (CC) natural gas plants are more efficient and thus have lower operating costs than combustion turbine plants, but the tradeoff is that they are generally less flexible. Gas plants are also stellar for providing capacity whenever it is needed, with a plant's capacity value typically many times higher than its average capacity factor. The comparisons in Figure 1 below of what resources provide the U.S. grid's mix of energy and capacity illustrate how coal and nuclear plants are used predominantly to provide energy, while natural gas plants specialize in providing capacity and flexibility.



Energy by fuel Capacity by fuel

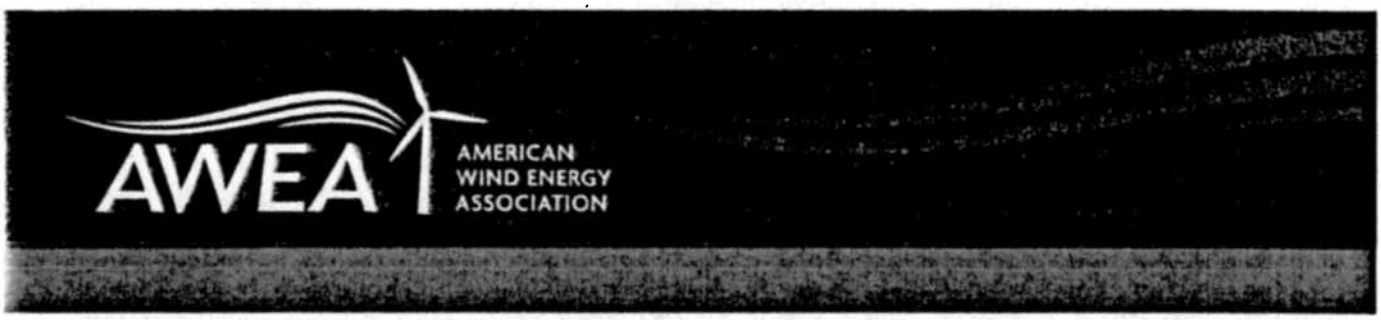
Figure 1: U.S. Generation Fleet, 2006[6]

Hydroelectric plants are capable of being used for energy, capacity, or flexibility, but there are tradeoffs between these that limit any one dam from providing significant amounts of all three. For example, an increase in the dam's energy and capacity output causes a decrease in its flexibility, and vice versa. In addition, there are also tradeoffs between energy and capacity, because using up the water stored behind the dam to provide energy limits the ability to provide capacity at a later time.

What Does our Power System Need?

Through the generation mix illustrated in Figure 1, our current power system successfully balances the need for energy, capacity, and flexibility. However, recent increases in the price of fossil fuels and growing impetus to reduce carbon dioxide emissions are creating tremendous pressure to reduce the use of coal and natural gas as sources of energy. These are not capacity or flexibility challenges, but rather energy challenges. Wind energy, being predominantly an energy resource, is ideally suited to solve these challenges.

Of course, the grid will continue to need capacity and flexibility. As explained above, wind energy can provide these resources to some extent, although not as well as other types of power plants. Fortunately, natural gas power plants can provide capacity and flexibility at very low cost. Building more natural gas plants does not harm efforts to reduce natural gas use, as power plants that are being used to provide capacity and flexibility only run during the small number of hours per year when those services are needed. Demand response, in which electricity consumers reduce or delay non-essential electricity use in response to price signals, can also be used to provide capacity and flexibility at very low cost. Plug-in hybrid electric vehicles also have significant potential to serve as sources of capacity and flexibility.



Increasing the amount of wind energy and other variable renewable resources on the grid is likely to decrease the need for baseload power. Why? As explained above, wind and baseload plants are both primarily energy resources. In addition, neither is an ideal source of capacity or flexibility. Inflexible baseload plants can actually be a significant impediment to the growth of wind energy, as the inability to turn baseload plants off during periods of low electric demand can cause the supply of electricity to exceed demand. This causes an extremely inefficient outcome in which wind plants must employ their superior flexibility and reduce their output, wasting free, zero-emissions energy. This is already occurring in some regions of the country with large amounts of both wind energy and baseload plants.[7]

The argument that baseload power is an essential power system need fails to hold up under scrutiny, as "baseload" power means nothing more than energy and capacity. Baseload power is an obsolete concept in a world where a variety of other resources can provide energy, capacity, and flexibility at competitive prices. Ultimately, the most important implication of this conclusion is that wind energy can reliably and cost-effectively displace baseload generation as the dominant energy source on our electric grid.

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1. http://www.nytimes.com/gwire/2009/04/22/22greenwire-no-need-to-build-new-us-coal-or-nuclear-plants-10630.html
2. http://www.awea.org/publications/reports/AWEA-Annual-Wind-Report-2009.pdf
3. A gigawatt (GW) is a measure of electric generating capacity equal to 1,000 megawatts (MW) or 1 million kilowatts (kW). One gigawatt of generating capacity is enough power the equivalent of about 800,000 average American households.
4. A typical wind plant's average energy output is 30-40% of the nameplate rating (capacity factor), while a typical capacity value (how much of the wind plant's capacity can be counted on for meeting electric demand) is 15-20% of the nameplate rating.
5. http://www.nrel.gov/wind/systemsintegration/pdfs/2008/milligan_wind_capacity_value.pdf
6. http://www.eia.doe.gov/bookshelf/brochures/epa/epa.html
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Wind Power – Clean AND Reliable

Can We Rely on Wind Power ?

Yes. Wind power is currently supplying 48 billion kilowatt-hours (kWh) of electricity annually in the U.S., powering the equivalent of over 4.5 million homes. Wind power is an important part of electric utility generation portfolios.

Yet some question whether wind power, being a variable resource (meaning it generates electricity when the wind is blowing) can be relied upon as part of a system that provides reliable electricity to consumers without interruption. Based on a growing body of analytical and operational experience, the answer is a resounding "yes".

According to many utilities and reliability authorities, wind power can readily be accommodated into electric system operations reliably and economically.

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Other resources

www.awea.org/utility

Utility Wind Integration Group, www.uwig.org

National Renewable Energy Laboratory, www.nrel.gov/wind/

High Wind Penetration and Reliable Operation

In Europe, Denmark receives over 20% of its electricity from wind energy, and in 2007 Germany received around 7% of its electricity from the wind. Both Spain and Portugal had periods in 2007 when wind energy provided over 20% of their electricity. In the U.S., Minnesota and Iowa both get close to 5% of their electricity from wind energy. These examples show that high penetrations of wind power can be a valuable part of a utility generation mix that supplies reliable electrical service to consumers without interruption.

Accommodating the Variable Nature of Wind Power

When wind energy output decreases, reliable electrical service is maintained by turning up the output of other generators on the electric power system. Electric utility companies serve as "system operators" which can be thought of as air traffic controllers of the power system. System operators can control, or dispatch, generators on their system such as natural gas-fired and hydroelectric generators. They have always actively dispatched their systems in response to electrical demand, or load, which varies randomly over the course of an hour or day. Wind energy output behaves similar to load in that it is "variable," meaning its output rises and falls within hourly and daily time periods; and it is "non-dispatchable," meaning its output can be controlled only to a limited extent. Reliable electrical service can be maintained by system operators dispatching generators up and down in response to variation in load and wind generation. System operators also keep generation in reserve, called "operating reserves," which can be called on in case of a shortfall.

According to Paul Bonavia, Chief Operating Officer of Xcel Energy, one of the nation's largest electric utility companies:

> "Wind energy is an integral piece of our power supply portfolio. It provides a hedge against fuel price volatility associated with other forms of electric generation. Our studies and experiences show that wind energy integrates effectively and reliably into our power systems with regional market operations to mitigate the impact of wind variability. In these cases even with 25 percent of the electricity on our system from wind we forecast cost for operating system reserves of approximately $5 per megawatt-hour, or roughly ten percent of the cost of the wind energy. As we gain experience with wind we keep seeking ways to achieve low integration costs."

Wind Energy and Reliability

Is Energy Storage Needed?

No, while it is natural to think that batteries or other storage systems might be needed to supply steady power, they are not needed to integrate wind energy into electric power systems. The power system essentially already has storage in the form of hydroelectric reservoirs, gas pipelines, gas storage facilities, and coal piles that can provide energy when needed. Storing electricity is currently significantly more expensive than using dispatchable generation. In the future, through advances in technologies such as batteries and compressed air, energy storage may become cost-effective. The prospect of plug-in hybrid electric vehicles holds great promise because the expense of their batteries would be covered by their fuel cost savings and they could provide many megawatts of storage for the overall electrical power system. This would also allow wind power and other renewable energy resources to displace consumption of foreign oil. Still, energy storage will best be used as a resource for the overall power system. It would not be cost effective or efficient to couple energy storage resources exclusively to individual wind plants.

Is wind less "reliable" than conventional generation?

No. Conventional resources occasionally shut down with no notice, and these "forced outages" require operating reserves. For example, a power system that has a 1000 Megawatt nuclear or coal plant will typically keep 1000 Megawatts of other generation available, to be ready to quickly supply electricity if a plant unexpectedly shuts down. The power system can still be operated perfectly reliably in this fashion. Thus, "reliability" is not specific to any single generation facility, rather it is measured on a system-wide basis. Because significant generation reserves are already required to accommodate unexpected changes in electricity supply and demand, in many regions large amounts of wind power can be added to the grid without increasing the total amount of reserves that are needed.

As noted by Jon Brekke, Vice President of Member Services for Great River Energy, a utility that operates in Minnesota and Wisconsin: "Wind energy is a valuable part of our diverse and growing energy portfolio. When partnered with other traditional generation resources, wind energy is an effective way to provide reliable, clean and affordable power to our member cooperatives. Geographic diversity of wind energy helps even out the variability of wind energy in the regional market. In addition, wind farms are typically made up of many individual turbines which reduce the impact of outages. For instance, there are 67 1.5 -MW turbines at our Trimont Wind Farm, so if one is down for maintenance only 1.5% of the total wind farm's generating capacity is lost."

Changes in wind energy output are not instantaneous, as are conventional generator failures. Because of the geographic diversity inherent with large numbers of wind turbine installations, it typically takes over an hour for even a rapid change in wind speeds to shut down a large amount of wind generation. This is a significant benefit when compared with the instantaneous forced outages of conventional units. In addition, wind forecasting tools that warn system operators of upcoming wind output variations are becoming widely used and better integrated into system operations.

What is the cost of wind integration?

When large amounts of wind energy are added to the grid, modest amounts of additional generation may be required to accommodate wind energy's variability. The exact costs of these incremental reserves depend on the mix of generation on a given system and various other factors, but they are generally quite small. In a document prepared by the Utility Wind Integration Group in coordination with the trade associations of all three utility sectors (investor-owned, public, and cooperative), the studies and experiences with utility wind integration are summarized as follows:

- ✓ "Wind resources have impacts that can be managed through proper plant interconnection, integration, transmission planning and system and market operations.
- ✓ System operating cost increases arising from wind variability and uncertainty amounted to only about 10% or less of the wholesale value of the wind energy.
- ✓ A variety of means – such as commercially available wind forecasting – can be employed to reduce these costs.
- ✓ In many cases, customer payments for electricity can be decreased when wind is added to the system, because the operating-cost increases are offset by savings from displacing fossil fuel generation."

See http://www.uwig.org/UWIGIntSummary.pdf for more information.


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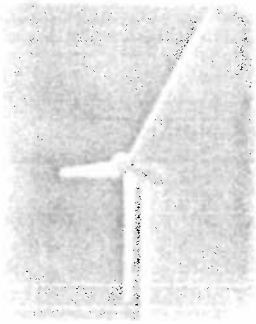
Planet Turbine

Turning Blue Sky into Green Power



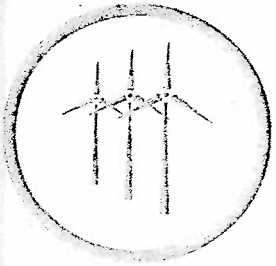
Windy Pro:
Our Windy Pro line of Turbines are great for Medium sized Commercial applications, with models from 5 kW to 20 kW.

Blue Sky Turbine:
For medium to large business and commercial applications, our beautiful line of Blue Sky Turbines available in sizes; 20kW, 30kW, 50kW & 100kW.

All Turbine:
All Turbine is a great model for Residential and Home use, ranging from 2 KW to 5 kW.

Farm Turbine:
This line of Turbines is great for multiple Farm applications from remote areas to large farm operations. This line includes 2kW to 20kW turbines.

Wind Easy:
This line of Wind Turbines works great for RVs, Yachts, and all light battery charging applications; in sizes of 400 to 1000 watts.



Wind Easy Stratosphere Towers

Advantages of Wind Power

- Save 30% on the purchase of your turbine right now! A new energy Tax Credit that went into effect on January 1, 2009 gives you 30% back on your turbine.
- Our Wind Turbines take up very little space and will not take much land to install.
- Efficiently capture Free Wind with our modern technology.
- Your Turbine will instantly reduce our dependence on foreign oil.
- Your Turbine once installed, will immediately begin to produce energy for you.
- Planet Turbine wind products are sleek and elegant. You'll find our turbines to be an attractive addition to your landscape.
- Your utility will be delighted to buy energy produced by your turbine. All utilities are mandated to find renewable resource producers like you.
- Wind power is one of the few guaranteed investments that pays for itself.
- Wind Turbines are simply fascinating. Your neighbors and friends will be delighted, interested, and envious of your Planet Turbine product.
- Remote areas that are not connected to the electrical power grid can easily use wind turbines to product electricity.
- Wind Energy does not produce green house gases or man made contaminants.
- Our Wind Turbines are available in sizes to fit your budget and needs. Municipalities, manufacturing plants, and home owners, can all find a PlanetTurbine product to fit their energy needs.

PlanetTurbine, LLC.
E7556 Highway 33 East
P.O. Box 398
Reedsburg, WI 53959-0398
U. S. A. Toll Free: 1.800.274.7001
Local & International: 1.608.524.2834
Fax: 1.608.524.8238

PlanetTurbine.com
The Wind is Free, the Electricity is Free, the Equipment is Economical!

Calculator- Here is a good rule of thumb in determining the size of wind turbine that is right for you.

Your electric bill is recorded in kilowatt hours, (KWH). You will need to convert this number to kilowatts (kW) as shown below.

1. Look up your electrical usage, if possible, for the last year. Read the bill where it says your usage of KWH this month, or year.
2. Now the math: Take your monthly usage and divide by 30 (representing 30 days), then divide again by 24 (representing 24 hours). This equals the kilowatt sized turbine you would need if it ran at 100% capacity.
3. Most turbines will run at about 25-60% of capacity (because of varying winds, wind speeds, and location of turbine on property), so multiply your kW number by 3 or 4, to get the turbine that will be potentially most suited for you.
4. Your turbine will pay for itself, no matter what size it is, and does not need to be big enough to cover all your electric usage. The examples shown here are to establish system installations that pay for *all* your electric utility bill, and create income back from the utility as well.

Example:

1. Your monthly KWH is 1,000. 1,000 / 30 / 24 = 1.39 Kilowatts used on average every hour. The Wind Turbine size you'll need to break even on your electrical usage is (1.39 x 4) = 5.6. You'll need (this is only an estimation) a 5kW turbine to break even.
2. Understand that you may get better results with your turbine than demonstrated here. We believe in giving conservative estimates for your rate of return, only to find out that they worked much better than estimated.
3. We offer customized spreadsheets with graphs to show you your specific rate of return, based on inflation, interest rates, and tax rebates. Call 1.800.274.7001 for your free printout today!

What are the tax incentives for on-site wind systems?

On October 3, 2008, the Emergency Economic Stabilization Act of 2008, H.R. 1424, was enacted into law and includes a new federal-level investment tax credit to help consumers purchase small wind turbines for home, farm, or business use. Owners of small wind systems with 100 kilowatts (kW) of capacity and less can receive a credit for 30% of the total installed cost of the system. **The credit is available for wind turbine equipment installed starting January 1, 2009,** through to December 31, 2016. The incentive is further expanded through the American Recovery and Reinvestment Tax Act of 2009, which removed the financial cap that was present in the 2008 legislation, which only allowed $4,000. **Now the tax credit is unlimited on turbines up to 100kW.**

Who is eligible for the tax incentives?
All home-owners, farmers, and businesses, that install wind turbines up to 100 kilowatts in size, are eligible for the incentive.

What do I have to do to qualify for these incentives?
Taxpayers installing on-site wind systems at their residence should tell their tax accountants to use the IRS Residential Energy Efficient Property Form 5695 when filing their federal tax returns.

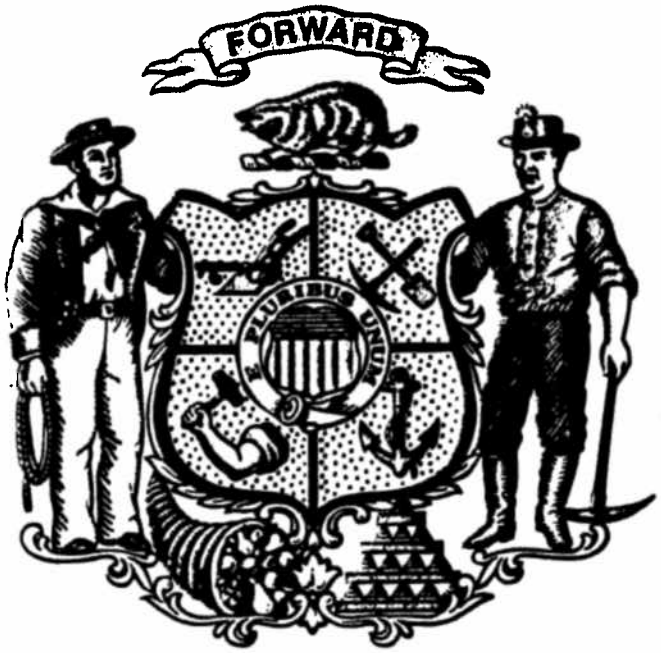
How it works:-You purchase a 10kW Wind Turbine system (for example) for $60,000. You receive a 30% tax credit amounting to $20,000. That credit is applied against your taxes due for the current year.

Example A: Your taxes due for 2009 income is $35,000, however, you will only pay $15,000 after applying your $20,000 tax credit.

Example B: Your taxes due are for the year is $15,000. You pay no taxes in that same year, and $5,000 of the remaining $20,000 tax credit is applied to your future years taxes due.

Example C: Your taxes due for your corporation are $315,000. You purchase a 100kW turbine for $500,000. Your corporate tax credit is $150,000. Your company pays only $165,000 in that year, saving $150,000 in income tax, and installing a money saving, money making, renewable energy device at the same time.

Effect: You SAVE 30% ON ANY PURCHASE of a wind turbine from Planet Turbine.com, on turbines of ***any size*** up to 100 kilowatt in size. This means you will pay off your turbine in two-thirds (2/3rd's) of the time it would normally take. WOW! There has not been a better time to buy a wind turbine than now!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Health Effects of Wind Turbine Noise

Nina Pierpont, MD, PhD

(www.ninapierpont.com)

March 2, 2006

Industrial wind turbines produce significant amounts of audible and low-frequency noise. Dr. Oguz A. Soysal, Professor and Chairman of the Dept. of Physics and Engineering at Frostburg State University in Maryland, measured sound levels over half a mile away from the Meyersdale, PA, 20-turbine wind farm. Typical audible (A-weighted) dB (decibel) levels were in the 50-60 range, and audible plus low-frequency (C-weighted) dB were in the 65-70 range.[1] 65-70 dB is the loudness of a washing machine, vacuum cleaner, or hair dryer.[2] A difference of 10 dB between A and C weighting represents a significant amount of low-frequency sound by World Health Organization standards.[3]

The noise produced by wind turbines has a thumping, pulsing character, especially at night, when it is more audible. The noise is louder at night because of the contrast between the still, cool air at ground level and the steady stream of wind at the level of the turbine hubs.[4] This nighttime noise travels a long distance. It has been documented to be disturbing to residents 1.2 miles away from wind turbines in regular rolling terrain,[5] and 1.5 miles away in Appalachian valleys.[6]

At night, the WHO recommends, the level of continuous noise at the outside a dwelling should be 45 dB or less, and inside, 30 dB or less. These thresholds should be even lower if there is a significant low-frequency component to the sound, they add – as there is for wind turbines. Higher levels of noise disturb sleep and produce a host of effects on health, well-being, and productivity.[7]

The decibel is logarithmic. Increasing the dB level by 10 multiplies the sound pressure level by 10. Increasing the dB level by 20 multiplies the sound pressure level by 100 (and 30 dB multiplies by 1000, etc.). Thus the 65 dB measured day and night half a mile from the Meyersdale wind farm has a measured intensity 100 times greater than the loudest continuous outdoor nighttime noise (45 dB) recommended by the WHO.

Typical ordinances proposed or passed for NY State communities considering industrial wind turbines allow A-weighted noise levels of 50 dB and construction of turbines only 1000 ft. from dwellings. These ordinances meet neither WHO nor NYS DEC standards, especially compared to the very low ambient noise levels (with dB levels typically in the 20's) in rural NY.[8]

The health effects of excessive community noise are carefully documented in the WHO report with reference to scientific and medical literature. Effects relevant to wind turbines, in terms of dB levels and noise type, are paraphrased and summarized from this report:

- For people to understand each other easily when talking, environmental noise levels should be 35 dB or less. For vulnerable groups (hearing impaired, elderly, children in the process of reading and language acquisition, and foreign language speakers) even lower background levels are needed. When noise interferes with speech comprehension, problems with concentration, fatigue, uncertainty and lack of

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[1] Soysal, OA. 2005. Acoustic Noise Generated by Wind Turbines. Presented to the Lycoming County, PA Zoning Board 12/14/05. osoysal@frostburg.edu

[2] www.lhh.org/noise/decibel.htm

[3] World Health Organization, 1999. *Guidelines for Community Noise*. Ed. by Berglund B et al. Available at www.who.int/docstore/peh/noise/guidelines2.html

[4] van den Berg, FGP, 2005. "The beat is getting stronger: The effect of atmospheric stability on low frequency modulated sound of wind turbines." *Journal of Low Frequency Noise, Vibration, and Active Control*, 24(1):1-24.

[5] van den Berg, FGP, 2003. "Effects of the wind profile at night on wind turbine sound." *Journal of Sound and Vibration* 277:955-970.

[6] Linda Cooper, Citizens for Responsible Windpower, "Activist Shares Wind Power Concerns," *The Pendleton Times*, March 3, 2005, p. 4.

[7] WHO, 1999. *Guidelines for Community Noise.*

[8] NYS DEC, 2001. *Assessing and Mitigating Noise Impacts.*

self-confidence, irritation, misunderstandings, decreased work capacity, problems in human relations, and a number of stress reactions arise.[9]

- Wind turbine noise, as described above and experienced by many turbine neighbors, is easily within the decibel levels to disturb sleep. Effects of noise-induced sleep disturbance include fatigue, depressed mood or well-being, decreased performance, and increased use of sedatives or sleeping pills. Measured physiologic effects of noise during sleep are increased blood pressure and heart rate, changes in breathing pattern, and cardiac arrhythmias.[10] Certain types of nighttime noise are especially bothersome, the authors note, including those which combine noise with vibration, those with low-frequency components, and sources in environments with low background noise.[11] All three of these special considerations apply to industrial wind turbines in rural NY State. Children, the elderly, and people with preexisting illnesses, especially depression, are especially vulnerable to sleep disturbance.

- Noise has an adverse effect on performance over and above its effects on speech comprehension. The most strongly affected cognitive areas are reading, attention, problem solving, and memory. Children in school are adversely affected by noise, and it is the uncontrollability of noise, rather than its intensity, which is most critical. The effort to tune out the noise comes at the price of increased levels of stress hormones and elevation of resting blood pressure. The adverse effects are larger in children with lower school achievement.[12]

- What is commonly referred to as noise "annoyance" is in fact a range of negative emotions, documented in people exposed to community noise, including anger, disappointment, dissatisfaction, withdrawal, helplessness, depression, anxiety, distraction, agitation, and exhaustion.[13] Numerous reports from neighbors of new industrial wind turbine installations document these symptoms. The percentage of highly annoyed people in a population starts to increase at 42 dB, and the percentage of moderately annoyed at 37 dB.[14]

Low-frequency sound is also sensed as pressure in the ears. It modulates the loudness of regular audible frequencies, and is sensed as a feeling or vibration in the chest and throat.[15] Neighbors of industrial wind turbines describe the distressing sensation of having to breathe in sync with the rhythmic thumps of the turbine blades, especially at night when trying to sleep.

The participants in noise studies are selected from the general population and are usually adults. Vulnerable groups of people are underrepresented. Vulnerable groups include people with decreased personal abilities (old, ill, or depressed people), people with particular diseases or medical problems, people (children) dealing with complex cognitive tasks such as reading acquisition, people who are blind or hearing impaired, fetuses, babies and young children, and the elderly. These people may be less able to cope with the impacts of noise exposure and at greater risk for harmful effects than is documented in studies. Attention needs to be paid to them when developing regulations and setback requirements for industrial wind turbines and other sources of annoying and debilitating noise.

Wind turbines also create moving visual disturbances, especially early and late in the day when the long shadows of moving blades sweep rhythmically over the landscape. That portion of the population which is susceptible to vertigo, unsteadiness, or motion sickness (including many children and a large proportion of the elderly) will be vulnerable to unsteadiness and nausea when subjected to this visual disturbance. People with seizure disorders are susceptible to triggering of seizures by the strobe effect of seeing the sun through the moving blades.

To protect the public health, it is critical that industrial wind turbines not be placed within a minimum of 1.5 miles of human dwellings (homes, hospitals, residential schools, nursing homes, prisons, etc.) or schools. In mountainous terrain the setback should be greater, especially in topography with long parallel ridges and valleys as in the Appalachians.

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[9] WHO, 1999. *Guidelines for Community Noise*, pp. 42-44.
[10] Ibid, p. 44.
[11] Ibid. p. 46
[12] Ibid. pp. 49-50
[13] Ibid. p. 50
[14] Ibid. p. 51
[15] Moller, H. and CS Pedersen. 2004. Hearing at low and infrasonic frequencies. *Noise & Health* 6 (23):37-57.


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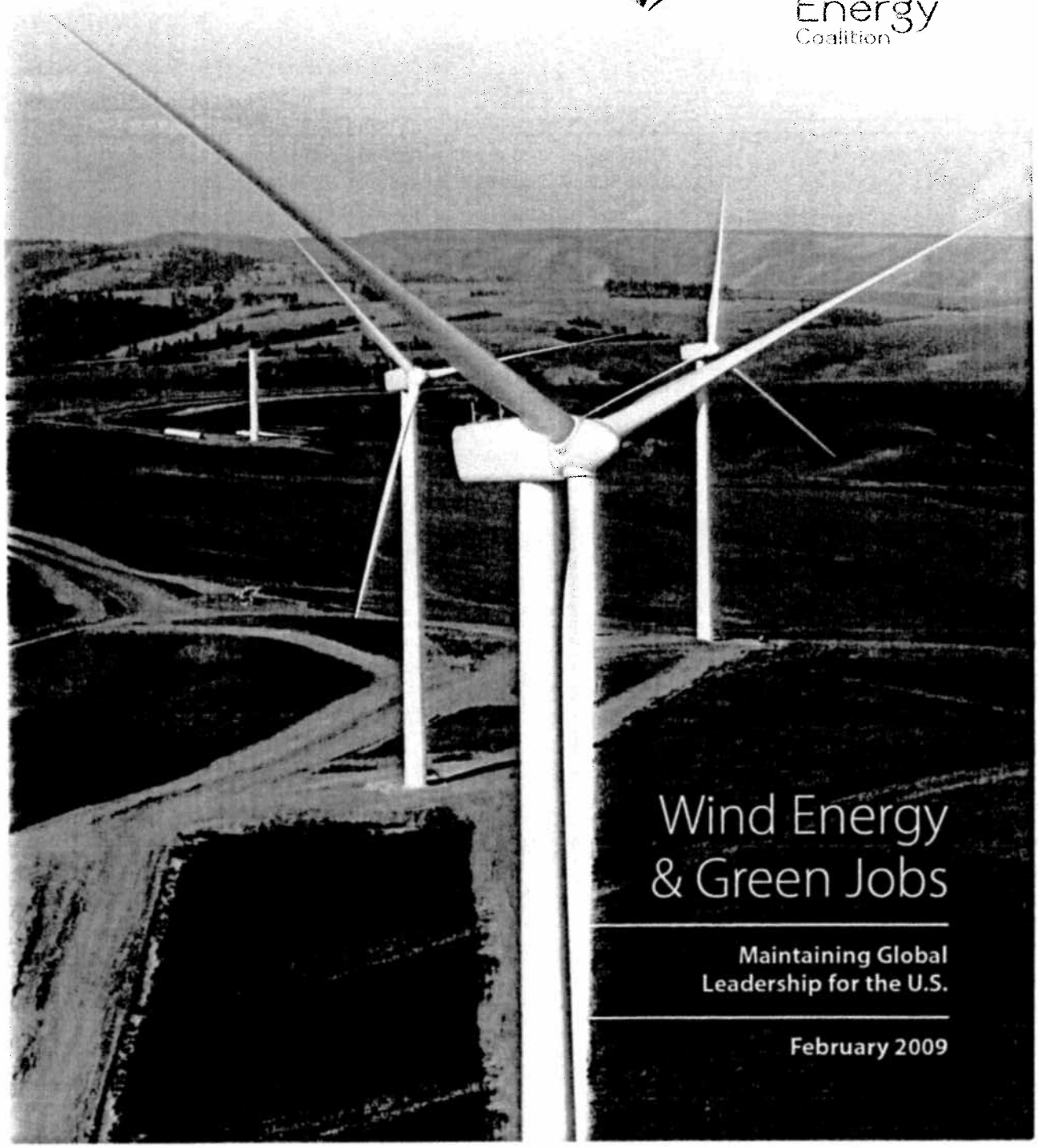
Governors' Wind Energy Coalition



Wind Energy & Green Jobs

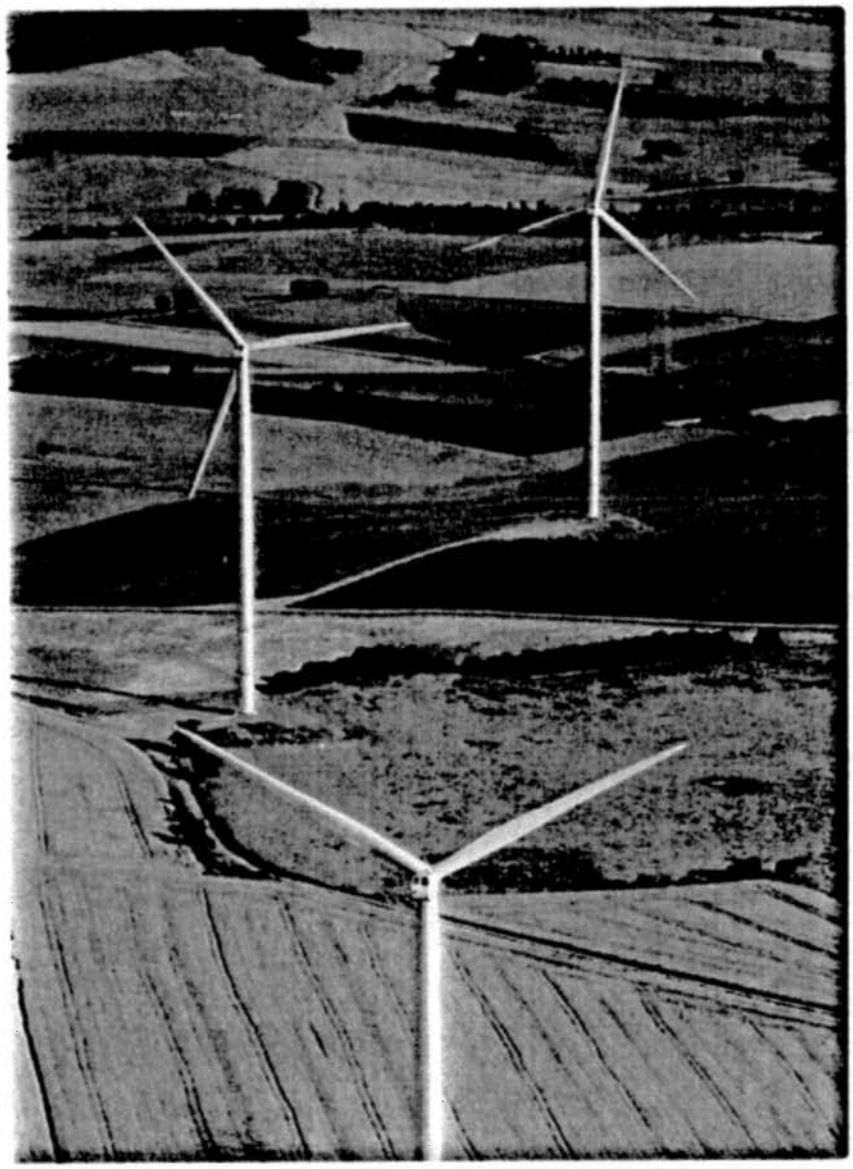
Maintaining Global Leadership for the U.S.

February 2009

Executive Summary

The Governors' Wind Energy Coalition is a bipartisan group of 24 of the nation's governors dedicated to expanding development of wind resources to meet America's domestic energy demands in an environmentally responsible manner—while reducing the nation's dependence on imported fuel sources. The Governors' Wind Energy Coalition (GWC) members recognize that wind energy is now a bright spot in the struggling U.S. economy, supporting thousands of jobs while bolstering regional economic development across the country.

Co-chaired by Iowa Governor Chet Culver and Minnesota Governor Tim Pawlenty, the GWC is a collaboration designed to maximize the economic and environmental benefits of wind power. Through coordinated multi-state efforts, GWC undertakes initiatives designed to encourage sound federal and state policies to manufacture and install wind turbines, and transmit and distribute wind generated electricity.



The good news is that the United States surpassed Germany in 2008 to become the global leader in wind power installations, generating enough carbon-free electricity from domestic wind farms to power close to 7 million American homes.

Wind power's recent growth spurt in the U.S. has accelerated job creation in the manufacturing sector, where the share of domestically manufactured wind turbine components has grown to almost 50 percent in 2008. Wind turbine and turbine component manufacturers announced, added or expanded 70 new facilities in the past two years, including over 55 in 2008 alone. The American Wind Energy Association (AWEA) estimates that approximately 85,000 people currently are employed by the domestic wind industry.

The bad news is that wind power still provides less than 2 percent of total U.S. electricity consumption. Without new federal policies and investments in research and development and construction of new transmission lines, this "green jobs" success story may have a more familiar unhappy ending.

GWC's efforts are strengthened by a report released in May 2008 by the U.S. Department of Energy (DOE), entitled ***20% Wind Energy by 2030***. The principal finding of this comprehensive report is that the U.S. possesses ample wind resources to provide 20 percent of the country's total electricity consumption by 2030 at an affordable price for rate payers.

If the U.S. can meet the goal of 20 percent wind power, more than 500,000 direct, indirect and induced jobs could be supported across the country.

More than 150,000 workers would be directly employed by the wind industry on an annual basis. Over 100,000 indirect jobs would be supported in associated industries (e.g., accountants, lawyers, steel workers and electrical manufacturing) and over 200,000 more jobs would be generated through increased local spending on products and services.

Among the other economic benefits this level of wind power development would create throughout the country are the following:

- Consumers could save $128 billion through lower natural gas prices.
- Annual property tax revenues for local governments would surge by more than $1.5 billion.
- Rural landowners—typically ranches and farms—would enjoy "wind royalties," annual payments that could exceed $600 million.

All told, the total net present value of economic activity generated by the 20 percent national wind energy goal could exceed $440 billion through the year 2030, according to the 2008 DOE report.

This report profiles the economic development benefits of five states that are members of GWC: California, Colorado, Iowa, Minnesota and Oregon. But DOE projects that under the ***20% Wind Energy by 2030*** scenario, all states would enjoy substantial economic development benefits. Furthermore, all U.S. consumers would enjoy lower natural gas costs, cleaner air and increased availability of fresh water supplies.

in order to meet the full economic development potential from wind energy, GWC endorses the following policies:

- **Adopt a National Renewable Electricity Standard of 20 percent Renewable Energy**
- **Support construction of New Interstate Electric Transmission "Smart" Grid**
- **Expand U.S. Department of Energy's Work with States and the Wind Industry to Accelerate Innovation**
- **Adopt a Long-Term Production Tax Credit for Wind Energy**

Governors' Wind Energy Coalition

www.GovernorsWindEnergyCoalition.org

Wind Energy: A Key to Job Growth & Economic Strength

The United States surpassed Germany in 2008 to become the global leader in wind power installations, generating enough carbon-free electricity from domestic wind farms to power close to 7 million American homes.[1]

These wind farms not only generate clean electricity, they generate significant numbers of well-paying jobs. The American Wind Energy Association (AWEA) estimates that approximately 85,000 people currently are employed by the domestic wind industry. If one includes direct, indirect and induced jobs, that employment number could reach a total of 500,000 by 2030, if the right mix of policies and programs are put into place today.[2]

Wind power still provides less than 2 percent of the nation's electricity. Without new federal policies and investments in research and development and construction of new transmission lines, this "green jobs" success story may have a more familiar unhappy ending. Wind power has been hampered by inconsistent federal policies: a short-sighted approach to tax incentives; a patchwork of state policies; and a lack of adequate planning for and construction of new transmission lines. Long term federal policy, such as a national Renewable Electricity Standard (RES) and a 10-year extension of the Production Tax Credit (PTC), is necessary to bring the wind power into the mainstream.

At a time when bad economic news seems to be the status quo, the wind power industry stands out as an inspiring "green jobs" success story. Wind power can lead the way on the green jobs front, helping to achieve the nation's goal of reviving the U.S. economy with clean energy technologies.

State of Colorado – Vestas

Vestas is the world's leading manufacturer of wind turbines. Based in Denmark, a country that obtains more than 20 percent of its total electricity from wind power, Vestas has been developing, selling, installing and providing service and maintenance to wind turbines for almost 30 years.

In a clear sign of the times, Vestas is now locating four different factories in the state of Colorado. Just three years ago, there was not a single wind-related manufacturing business in the state. The Danish turbine company is making Colorado the center of its manufacturing operations due to high expectations about demand for its wind turbines in the US market. All together, Vestas plans to sink over $680 million into Colorado's economy, which is expected to generate a total of over 2,500 jobs by the end of 2010.

Here is a summary of key features of these factories:

Windsor: This 400,000 square foot facility will employ 650 workers and will make 1,800 blades annually. Vestas was offered about $4 million in government grants, tax rebates and job-training funds.

Pueblo: This $50 million factory will be the world's largest tower factory and is expected to be fully operational by mid-2010. It will employ around 500 workers and have an annual processing capacity of 200,000 metric tons of steel, corresponding to 900 wind turbine towers annually.

Brighton: Vestas will build two factories in Brighton, an investment of $350 million. A blade manufacturing facility will employ 650 people and produce 1,800 blades annually. The nacelle assembly plant will employ 700 workers and produce 1,400 nacelles annually.

Why the Governors' Wind Energy Coalition?

The Governors' Wind Energy Coalition (GWC) is a bipartisan group of 24 of the nation's governors dedicated to expanding development of wind resources to meet America's domestic energy demands in an environmentally responsible manner—while reducing the nation's dependence on imported fuel sources. GWC members recognize that wind energy is now a bright spot in the struggling U.S. economy, supporting thousands of jobs while bolstering regional economic development across the country.

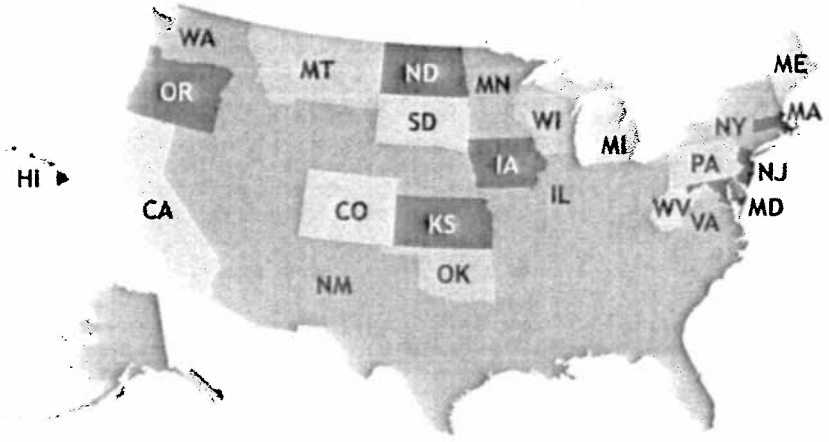
The Governors' Biofuels Coalition proved that if state leaders focus their attention on a particular goal, they can have an immense impact. For example, Iowa added $8 billion to the state's economy through investments in biofuels, creating 50,000 jobs in the process. Today, Iowa actually produces more biofuels than the state's consumption of gasoline, positioning the state as a net exporter of cleaner burning biofuels.

Co-chaired by Iowa Governor Chet Culver and Minnesota Governor Tim Pawlenty, the GWC is a collaboration designed to maximize the economic and environmental benefits of wind power. Through coordinated multi-state efforts, GWC undertakes initiatives designed to encourage sound federal and state policies to manufacture and install wind turbines, and transmit and distribute wind generated electricity. GWC will demonstrate the value and communicate the benefits of wind energy to consumers, energy companies, financial markets and other policy makers. The goal of the coalition is to support the entire value chain of companies and organizations responsibly bringing wind energy resources to market and to catalyze infrastructure investments to expand wind power capacity across the entire U. S.

GWC gives its members a unified national voice to help make wind power a cornerstone of the nation's future national energy strategy. Wind power offers a case study of how the U.S. can strategically rebuild our economy with the green technologies needed to combat global climate change and to fuel sustainable economic growth.

Membership

The Coalition's co-chairs are Iowa Governor Chet Culver and Minnesota Governor Tim Pawlenty. The Coalition currently has 24 member governors, including:



Iowa ▮ Gov. Chet Culver – Co-Chair
Minnesota ▮ Gov. Tim Pawlenty – Co-Chair

California ▮ Gov. Arnold Schwarzenegger
Colorado ▮ Gov. Bill Ritter
Hawaii ▮ Gov. Linda Lingle
Illinois ▮ Gov. Pat Quinn
Kansas ▮ Gov. Kathleen Sebelius
Maine ▮ Gov. John Baldacci
Maryland ▮ Gov. Martin O'Malley
Massachusetts ▮ Gov. Deval Patrick
Michigan ▮ Gov. Jennifer Granholm
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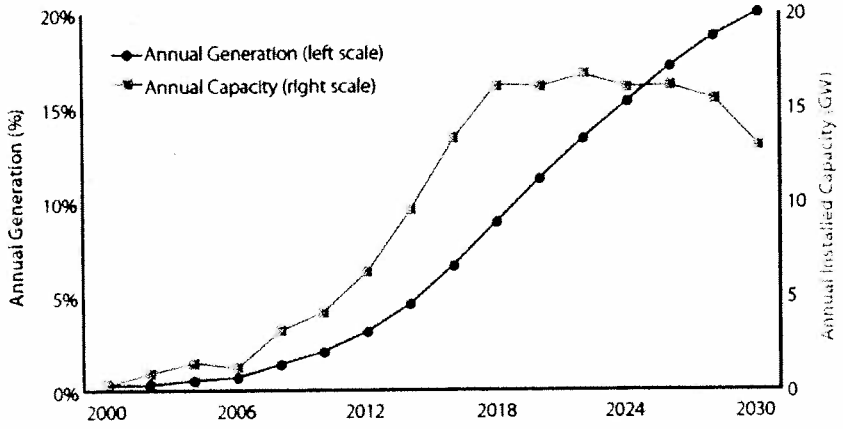
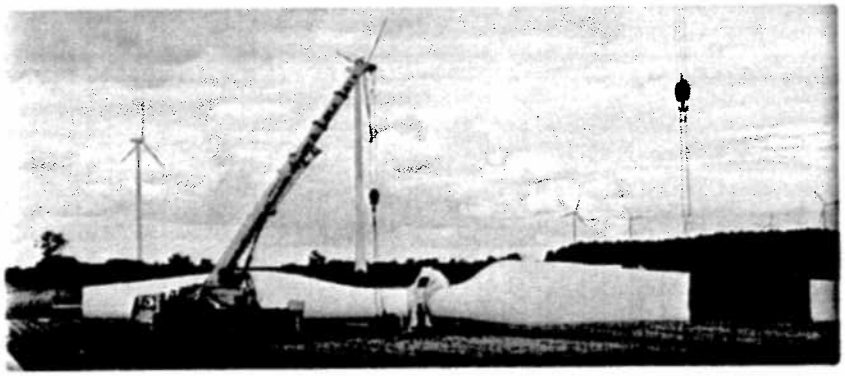
New Jersey ▮ Gov. Jon Corzine
New Mexico ▮ Gov. Bill Richardson
New York ▮ Gov. David Paterson
North Dakota ▮ Gov. John Hoeven
Oklahoma ▮ Gov. Brad Henry
Oregon ▮ Gov. Ted Kulongoski
Pennsylvania ▮ Gov. Edward Rendell
South Dakota ▮ Gov. Mike Rounds
Virginia ▮ Gov. Timothy Kaine
Washington ▮ Gov. Christine Gregoire
West Virginia ▮ Gov. Joe Manchin, III
Wisconsin ▮ Gov. Jim Doyle

20% Wind Energy is the Goal

GWC's efforts are strengthened by a report released in May 2008 by the U.S. Department of Energy (DOE), entitled ***20% Wind Energy by 2030.*** The principal finding of this comprehensive report is that the U.S. possesses ample wind resources to provide 20 percent of the country's total electricity consumption by 2030 at an affordable price for rate payers and with immense economic and environmental benefits for the whole country. The cost for each U.S. household to reach this goal is just 50 cents per month before accounting for offsetting benefits such as avoiding carbon emissions or reducing natural gas demand. No major technological breakthroughs in wind turbine technology are necessary to meet this target. Raw materials such as copper and fiberglass are also of ample supply to support this level of wind farm development over the next two decades.



Prescribed annual wind technology generation as a percentage of national electricity demand from Laxson, Hand, and Blair (2006) and corresponding annual wind capacity installation for 20% Wind Scenario from WindDS model.

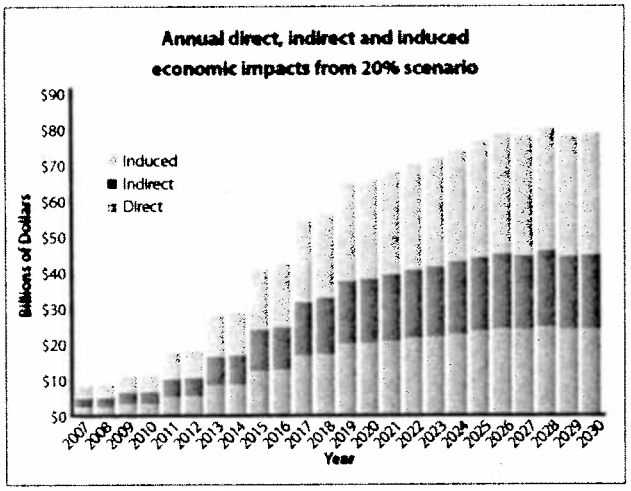


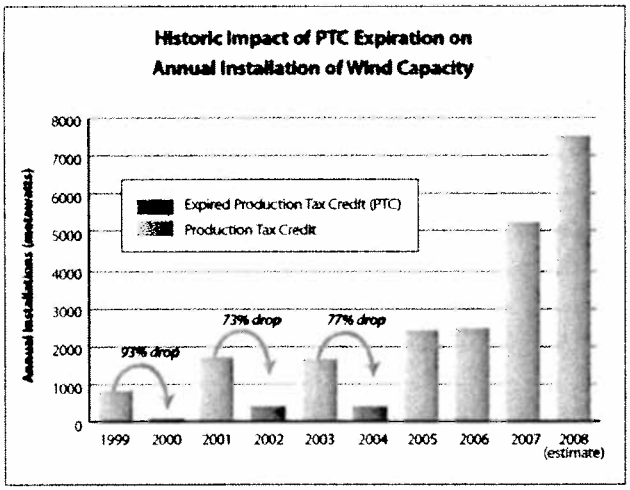
Wind Can Save Eastern U.S. Consumers $12 Billion Annually

Released in February 2008, the Joint Coordinated System Plan (JCSP) of grid operators in the Eastern U.S. examined the cost of reaching the 20 percent wind energy supply goal for the Eastern U.S. and discovered that consumers would save $12 billion annually.[3] The capital costs for these grid upgrades would be recovered within seven years. The resulting "smart" grid would not only help the environment, but reduce the risks of rolling blackouts, the study concluded.

If the U.S. can meet the goal of 20 percent wind power, more than 500,000 direct, indirect and induced jobs could be supported across the country.

More than 150,000 workers would be directly employed by the wind industry on an annual basis. Over 100,000 indirect jobs would be created in associated industries (e.g., accountants, lawyers, steel workers and electrical manufacturing) and over 200,000 more jobs would be generated through increased local spending on products and services. Consumers could save $128 billion through lower natural gas prices. Annual property tax revenues for local governments would surge by more than $1.5 billion. And rural landowners—typically ranches and farms—would enjoy "wind royalties," annual payments that could exceed $600 million. All told, the total net present value of economic activity generated by the 20 percent national wind energy goal could exceed $440 billion through the year 2030, according to the 2008 DOE report.





This on-again, off-again pattern has discouraged companies from making long-term, sizeable investments in wind power manufacturing and development.

The amount of clean non-polluting electricity generated by this fleet of wind turbines would reach 300,000 MW and would cut electricity sector greenhouse gas emissions contributing to global climate change by 25 percent.

The impact would be the equivalent of taking 140 million automobiles off the nation's highways and roads. Natural gas consumption would be reduced by 11 percent while 4 trillion gallons of water consumed by fossil fuel power plants for cooling could be diverted to other higher uses.

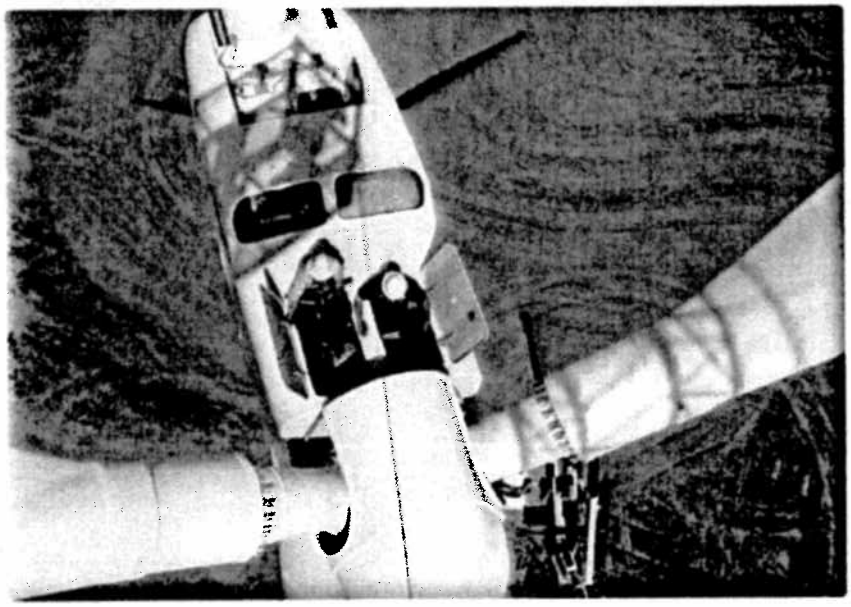
At present, 28 states have already enacted an RES, which has been a prime driver behind the U.S. ascension to the world's wind power top spot. What is remarkable is that the U.S. achieved its global leadership status despite inconsistent federal support. For example, while Congress extended federal tax credits for the solar energy industry for 8 years in 2008, the wind industry only received a one year extension of a federal PTC. Given consistent long-term support, the wind industry could become an even larger source of "green jobs" and a critical component of the nation's economic recovery.

The economic stimulus legislation signed into law in February 2009 did include an extension of federal PTC for wind power of 2.1 cents per kilowatt-hour for three more years, but that is not enough. Other policies supported by GWC still need to be put in place before the U.S. can maximize the employment and environmental benefits linked to achieving the 20 percent wind energy goal. The purpose of this report is to illustrate the broad range of economic development impacts that accrue to states from an aggressive build-out of some of the best wind resources in the world. This report also lays out GWC's policy agenda in the conclusion.

2008: A Banner Year for the U.S. Wind Power Industry

The massive growth in 2008 swelled the nation's total wind power generating capacity by 50 percent and channeled an investment of some $17 billion into the economy.[4]

The U.S. wind energy industry shattered all previous records in 2008 by installing 8,358 megawatts (MW) of new generating capacity. For the last two years in a row, wind power was the number one source of new electric generating capacity in the U.S., beating out natural gas, coal and all other competing power sources.



The U.S. was the global leader in wind power in the 1980s, largely due to the pioneering efforts of California. In 1986, California alone featured over 90 percent of the world's total wind power capacity. But over the next two decades, the rest of the world caught up and surpassed California and, until recently, the rest of the U.S.

Whether the U.S. can maintain its newly acquired global leadership mantle is still an open question. China doubled its previous installed capacity in 2008 by adding about 6,300 MW, bumping its national total to 12,200 MW of wind power capacity.[5] The Chinese government has chosen wind energy as one of its lead responses to the global economic downturn, and has established a formal program to encourage domestic turbine manufacturing. At current growth rates, China is well on its way to overtake Germany and Spain to reach second place in total wind power capacity in 2010 and to be a major supplier of turbines and components to the global market, setting itself up for a showdown with the U.S. in the years to come.

Worldwide wind capacity installations totaled more than 27,000 MW in 2008, a 36 percent increase over 2007 capacity additions. The U.S. total installed wind power capacity now stands at 25,170 MW. Here are the respective wind power capacity totals for the top five U.S. states:

Texas (7,116 MW)
Iowa (2,790 MW)
California (2,517 MW)
Minnesota (1,752 MW)
Washington (1,375 MW)

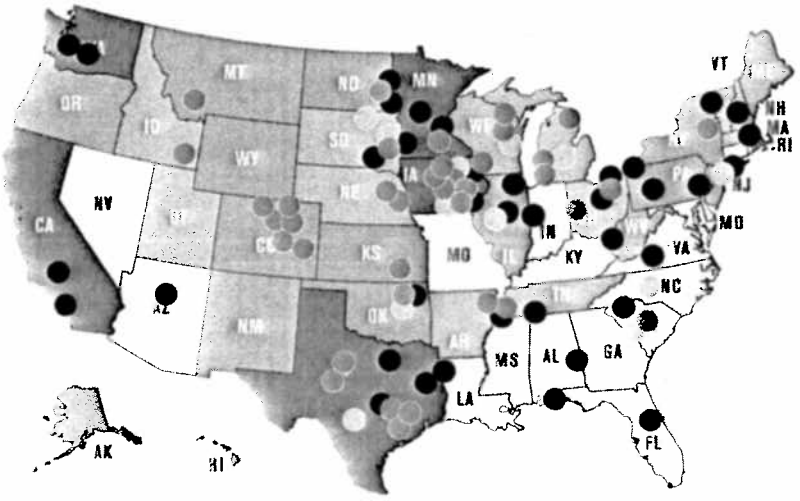
Oregon moved into the "Gigawatt Club" of states with more than 1,000 MW of installed wind capacity—a club that now also includes Colorado—and Iowa surpassed California to nab the No. 2 slot behind Texas, the national leader on wind power. About 85,000 people are directly employed in the wind industry today, up from 50,000 just one year ago. These green collar jobs come in a variety of occupations: turbine component manufacturing; construction and installation of wind farms; wind farm operations and maintenance (popularly known as "wind smiths"); legal and marketing services and more.

Up until recently, the vast majority of wind industry manufacturing jobs were concentrated in Europe. Germany, Denmark and Spain, for example, export more than half of their wind-related manufacturing output. Prior to 2005, the U.S. imported more than 70 percent of major wind turbine components for domestic wind projects. That prevalent trend of the U.S. outsourcing manufacturing jobs to other countries is now reversing itself in the case of the wind industry.

Wind power's recent growth spurt in the U.S. has accelerated job creation in the manufacturing sector, where the share of domestically manufactured wind turbine components has grown to almost 50 percent in 2008. Wind turbine and turbine component manufacturers announced, added or expanded 70 new facilities in the past two years, including over 55 in 2008 alone. Those new manufacturing facilities will create 13,000 new direct jobs. Clearly, the huge opportunity of the U.S. market has attracted new manufacturers from overseas, outweighing the risk of unstable federal policies toward wind power. A stable federal policy framework that can reduce risk for new wind component manufacturers would lead to an explosion of domestic manufacturing and the corresponding thousands of new green jobs.

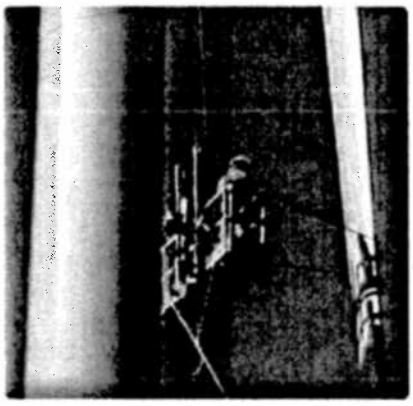
Other than U.S.-based General Electric, none of the seven largest global wind turbine manufacturers had plants in the U.S. prior to 2005. Today, six of the seven top global turbine producers now have at least one manufacturing facility located in the U.S.

Wind Power Jobs: Revitalizing Our Domestic Manufacturing Base



Wind generation capacity installed (megawatts, MW*)	**Manufacturing facilities** (existing or announced)
> 1000 MW	Online Prior to 2007
> 100 MW	Online, Expanded or Announced in 2007
< 100 MW	Online, Expanded or Announced in 2008

* One MW generated enough electricity to power the equivalent of 250-300 average homes.



Faribault – Minnesota Moventas

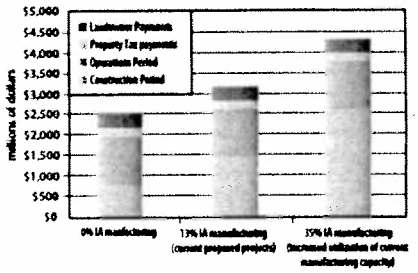
Finland-based gearbox manufacturer Moventas is building a 75,000-square-foot North American assembly and distribution facility in Faribault, Minnesota as part of a $145 million worldwide expansion program. Set to open in October 2009, the initial 90 workers will have average annual salaries of $44,000. Over the next decade, factory employment could grow to 200 or 300 jobs. Incentives offered to Moventas to locate in Faribault include $600,000 in municipal infrastructure upgrades, $3.2 million in county incentives and a $500,000 state grant.

Muncie – Indiana Brevini USA

Brevini USA, the U.S. subsidiary of an Italian wind turbine manufacturer, located a new facility to make gearboxes in Munice, Indiana. Brevini USA is investing more than $60 million to retrofit an existing 60,000-square-foot building and will add 150,000 square-feet of manufacturing space at the site in 2010. The facility will create about 450 permanent local jobs with annual salaries averaging more than $46,000.

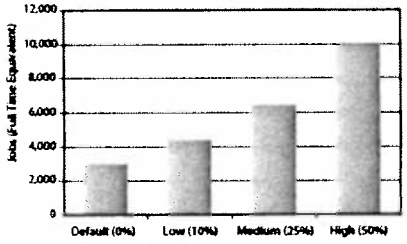
Another study by NREL came upon this startling discovery. If a state can increase local manufacturing of wind turbines and components by just 10 percent, it can boost statewide economic benefits during construction by 68 percent.[6] The parts comprising the wind turbines themselves constitute as much as 85 percent of the total costs of a wind farm. If 50 percent of the components of a wind farm can be manufactured locally, construction period economic impacts could increase by 341 percent due to increased local manufacturing activity within the state.

Total economic development impacts in IOWA (2,400 MW of development)



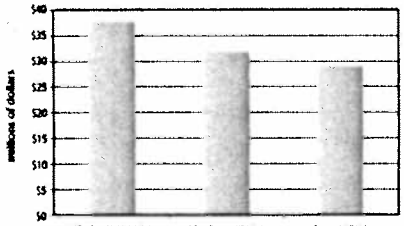
Economic development benefits for Iowa with different levels of local manufacturing

Jobs sensitivity to increased manufacturing in MICHIGAN



Construction Period Jobs Impacts in Michigan from increased reliance on local manufacturing (1000 MW of wind power)

Annual economic impacts in KANSAS

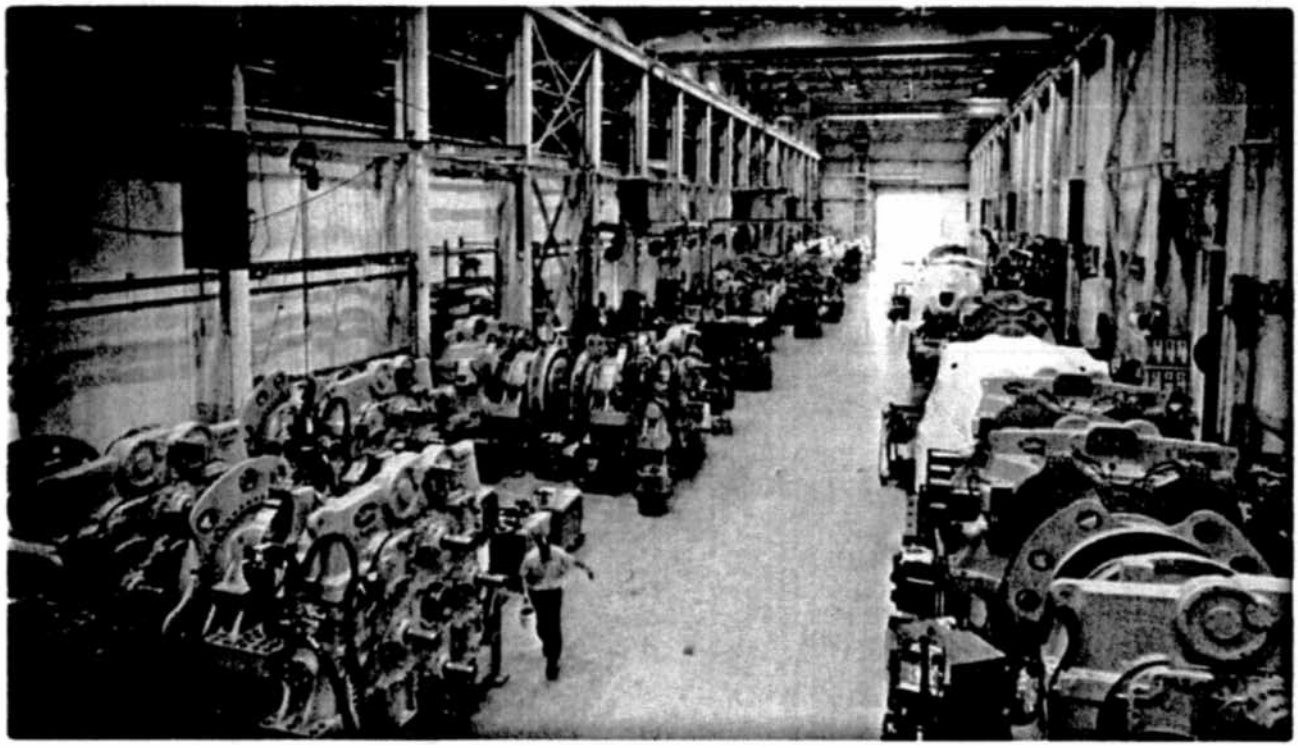


Implications of declining reliance on local labor for wind plant O&M on 1,000 MW of wind power

Despite the good news that the U.S. is now the world's top producer of wind power, some dark clouds have appeared on the horizon. At the end of 2008, financing for new projects and orders for turbine components slowed to a trickle. Layoffs also began to hit the wind turbine manufacturing sector. "The U.S. wind energy industry's performance in 2008 confirms that wind is an economic and job creation dynamo, ready to deliver on the President's call to double renewable energy production in three years," said AWEA CEO Denise Bode. "At the same time, it is clear that the economic and financial downturn has begun to take a serious toll on new wind development. We are already seeing layoffs in the area where wind's promise is greatest for our economy: the wind power manufacturing sector."

This downturn is due, in part, to our current declining economy and a subsequent dampening in demand for electricity. But the downturn can also be attributed, in part, to a flaw in U.S. federal policy support for renewable energy resources such as wind power. The federal PTC and state RES programs have been the winning combination for encouraging wind power in the U.S. The PTC is designed to be a tax credit charged against investment income. As a result, large investors who pay a lot of taxes on investment income (commonly referred to as having a large "tax appetite") have been the primary users of the PTC. About fifteen big investment houses, insurance companies and banks have been the traditional "tax partners" for new wind farms. Many of these firms—AIG, Lehman Brothers and Wachovia—have had serious financial problems and have temporarily lost their tax appetite. With no investment partners, financing for new wind projects in the U.S. has ground to a halt.

The new economic stimulus program sets up a short term fix: a new DOE program will offer grants in lieu of tax credits for two years. But in the long run, we need better policy design. Financial incentives also need to be more user-friendly and more democratic, attracting small and large investors alike to the new clean energy economy. By diversifying the base of investors, the U.S. can foster greater market stability and financial innovation in the wind power sector.



Case Study: Clipper Wind in Cedar Rapids, Iowa

Over the past three years activity levels noticeably changed on Bowling Street Southwest in Cedar Rapids, Iowa. A huge manufacturing facility that sat dormant for several years after the Rockwell Goss manufacturing plant closed in the late 1990s is now back in production, delivering commercial-scale wind turbines to power U.S. homes and businesses.

Founded in 2002 in California, Santa Barbara-based Clipper Windpower opened its expansive 330,000 square foot Iowa plant in 2005 to assemble its 2.5 MW Liberty wind turbine, which stands as tall as a 30-story building and sweeps the area of a football field. Just one of these wind turbines can power about 700 average American homes.

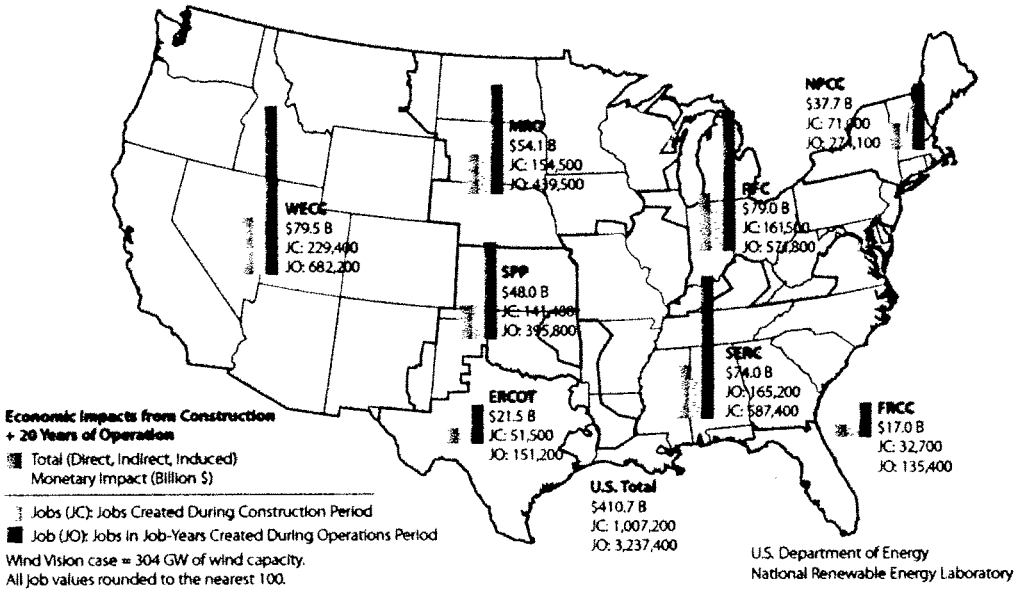
Originally built in the 1960's, the Cedar Rapids plant has been used for a variety of heavy-industry activities, including the manufacture of huge printing presses more than 30 feet tall. Bob Loyd, Clipper's Cedar Rapids plant manager, has over 30 years of industrial experience in the region, having managed the facility for 15 years during its printing press era. Similar to wind turbines, these printing presses were comprised of a large number of different interrelated components and a complex multi-shaft, high-precision geared power transmission. Gear grinding, in fact, was one of the in-house activities at the time.

Workers here assemble the wind turbine's main gear, drive train and electronic components, all housed by a nacelle. Parts and assemblies are shipped to the Cedar Rapids facility from nearby Illinois and Wisconsin, as well as Poland and Brazil. All told, 80,000 individual parts come together to make one Clipper turbine. Once transported to the construction site, the nacelle is lifted to the top of the tower where three rotor blades are then bolted to the drive train inside.

Iowa was chosen as the site for Clipper's manufacturing operation due to its 'heartland' location, which offers convenient rail facilities to service US customers, an abundance of skilled factory workers and encouragement from Iowa's economic development initiatives.

The workforce has grown from 30 to nearly 400 skilled workers at the end of 2008. But in early 2009, production has slowed and Clipper Wind was forced to reduce its global workforce by about 90 employees. "Notwithstanding this difficult economic time, the future outlook for wind energy and other renewables remains strong—particularly in the U.S." says Doug Pertz, Clipper Wind CEO.

20% Wind Electricity – Economic Impacts by NERC Region



Wind Energy and Green Jobs Stimulate the Economy

The U.S. DOE estimated the amount of green jobs that could be created from attaining a fifth of the nation's total electricity from wind power. Additional analysis by the National Renewable Energy Lab employing their Jobs and Economic Development Impacts (JEDI) model (see Appendix for a description of the methodology) is included in this report describing the economic benefits attached to wind power in greater detail for five representative states. The five states selected are all members of GWC and are among the leaders in wind power development: California, Colorado, Iowa, Minnesota and Oregon. Long term modeling by DOE suggests that these states will host a substantial share of new wind power development, but will not be the only beneficiaries.

The JEDI model estimates employment opportunities all along the supply chain, from manufacturing, shipping and construction, to operations and maintenance, with additional estimates of indirect and induced jobs. The map above sums up the employment and economic impacts projected by the JEDI model for the "20 percent" goal.

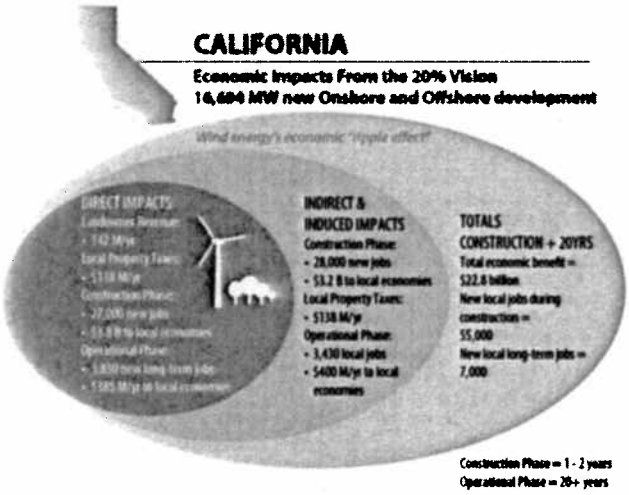
From a national perspective, the JEDI model estimates the following accumulative economic gains from a national commitment to wind resources of the U.S.:

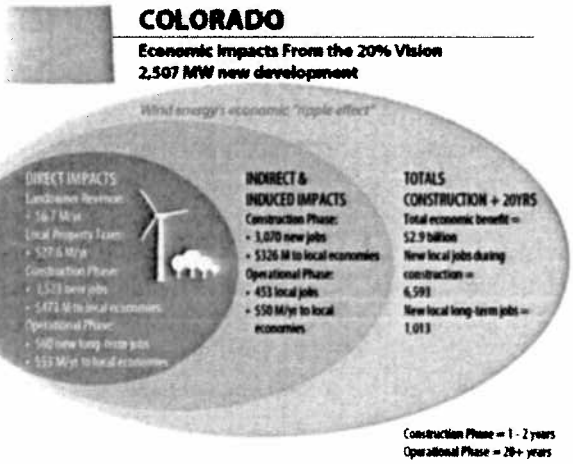
- Forty-six states will experience major wind energy development and the associated jobs and economic benefits by 2030.
- Cumulative economic activity from construction alone for all three categories (direct, indirect and induced) would exceed $944 billion by 2030.
- The construction sector would experience the largest employment gains, followed by the operations sector and then the manufacturing sector.
- An average of 250,000 workers would be employed by the wind industry annually from 2007 until 2030. These employment figures include 70,000 full-time annual construction-related sector positions and 22,000 full-time *direct* manufacturing jobs.[7]
- Manufacturing employment would peak in 2026, with 32,000 employees directly serving both land-based and offshore wind projects.
- By 2030, employment in the operations and maintenance sectors (direct, indirect and induced) would reach 215,000 workers. Of this aggregate total, an estimated 28,000 workers would be directly employed in wind farm operations and maintenance, while 48,000 workers would be subcontractors and other providers of utility services.

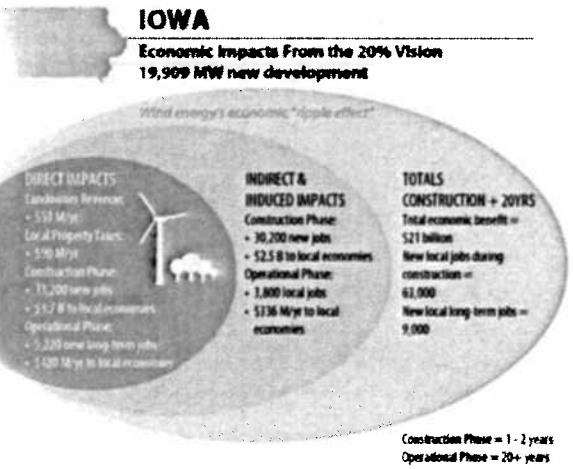
continued page 12

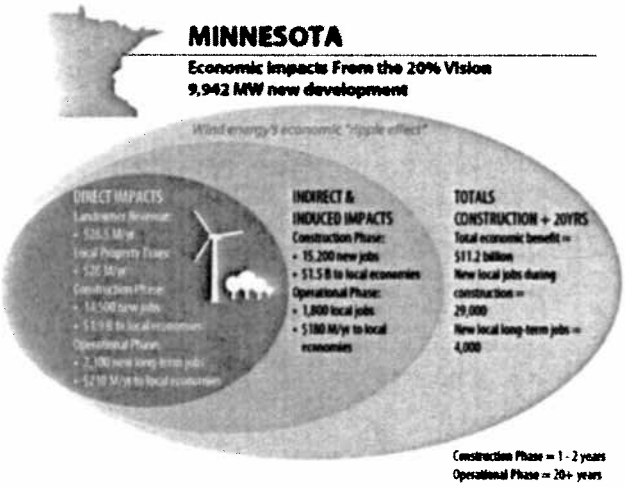
Economic Impact of Wind Power

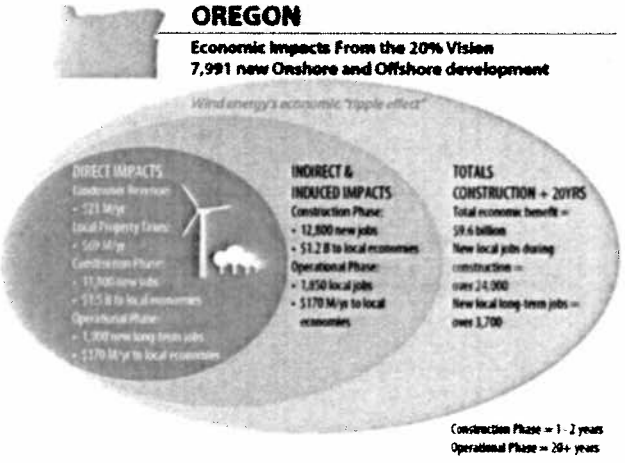
Drilling deeper into the data, here is a summary of the "ripple effect" of economic activity associated with increased reliance upon wind power for five different GWC states:





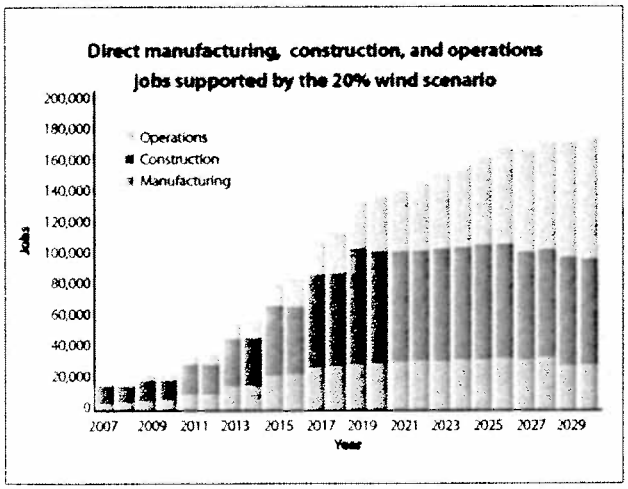


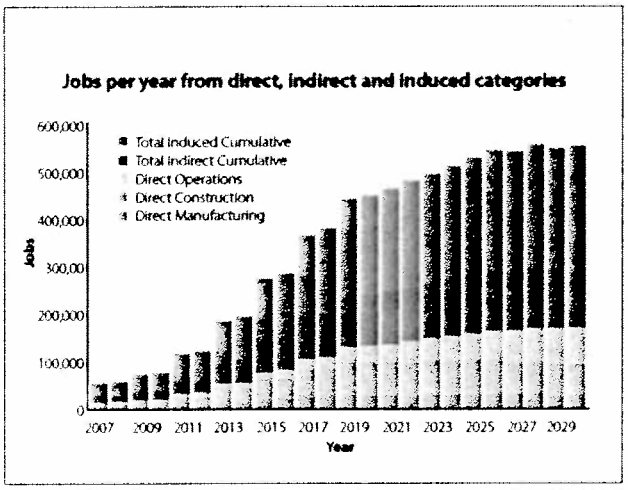




It is important to note that states with few wind resources will also benefit from a major expansion of wind power capacity in two other important ways. First, much of the employment potential of wind power lies in the manufacturing stage. From a manufacturing perspective, wind turbines are similar to trucks and tractors and other heavy equipment. They support a supply chain of conventional component suppliers, such as makers of ball bearings, wires, computer controls and software. Many of these suppliers are existing industries that will benefit from a diversified and growing market for their products.

A further benefit to states will be in the ancillary benefits that wind power can generate. Analysis by the Energy Information Administration (EIA) has shown that increasing production from renewable resources such as wind power in response to a federal RES will reduce demand for, and the corresponding cost of, natural gas, which then delivers economic benefits to the U.S. as a whole.





Fairless Hill, Pennsylvania – Gamesa Corporation

As many as 7,000 workers once populated a 2,500-acre U.S. Steel manufacturing facility in Fairless Hill, Pennsylvania. Employment started declining in 1982 and after steady downsizing, only 100 employees were left in 2001. Then along came the Spanish company Gamesa Corp., which built a new $34 million factory on 20 acres of the old U.S. Steel site in 2006. The factory employs over 500 workers to manufacture towers, blades and assembles nacelle components.

Newton, Iowa – TPI Composites

For decades, Newton, Iowa, current population 16,000, was home of Maytag, the familiar manufacturer of household appliances. But in 2007, the Maytag factory shut down, leaving 1,800 long-time employees without a job. Desperate to lure new industries, city officials attended a conference hosted by the American Wind Energy Association and convinced TPI Composites, a manufacturer of wind turbine blades for General Electric, to consider locating a new factory in Newton. Less than a year later, TPI Composites opened the doors to its $56 million, 316,000 square foot facility. The initial workforce numbers 500, with a strong likelihood of further expansion in the near future.

Grand Forks, North Dakota – LM Glasfiber

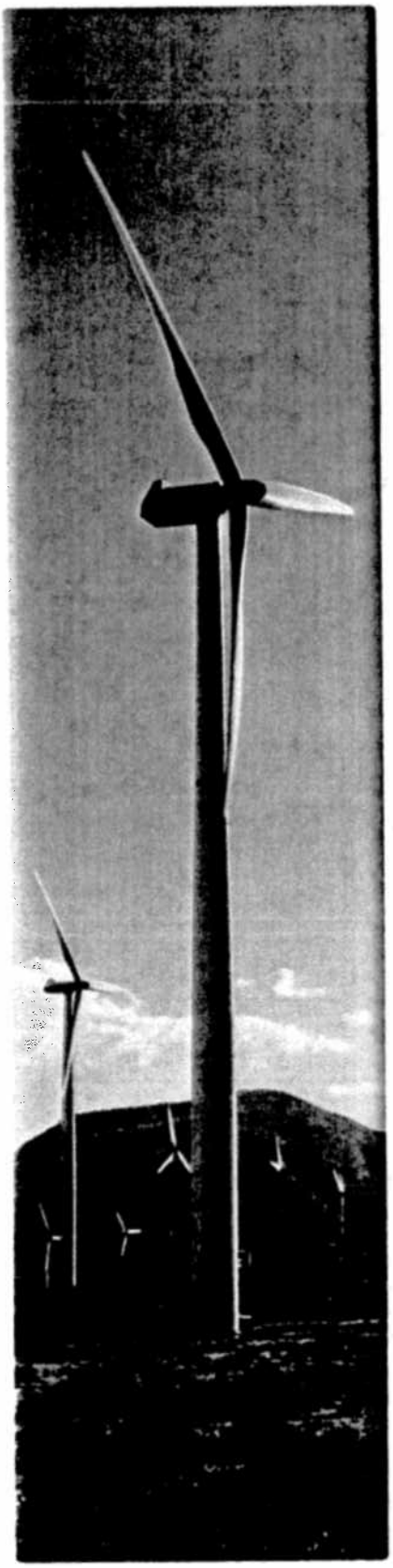
When Danish wind turbine blade manufacturer LM Glasfiber decided to expand into the US market in the year 2000, it helped lift the city of Grand Forks, North Dakota out of local economic slump. The city was still suffering from the aftermath of a devastating flood in 1997. The opening of the LM Glasfiber plant brought over 500 well paying jobs to town. Since then, Forbes magazine ranked Grand Rapids as 28th best small metropolitan area to do business.

Alpena, Michigan – ATI Casting

ATI Casting Service, a foundry that produces grey and ductile iron castings for wind turbines, recently reopened a closed auto industry foundry in Alpena, Michigan that had been a long-time source of 200 local jobs. The new $15 million casting facility has already hired 150 locals and hopes to expand as markets for its components in the U.S. grow over time.

Ephrata, Washington – Katana Summit

Katana Summit located a wind turbine tower manufacturing plant in Ephrata, Washington and quickly revitalized the region's railroad freight activity. Rail shipments have increased from 40 to 380 loads per year since the tower manufacturer came to town. The company spent approximately $11 million to expand a facility now capable of shipping out 150 turbine towers per year. It employs about 150 workers, pays up to $7 million in annual wages and contributes $47,000 annually in local building tax revenue.



Conclusion

As a bipartisan group of governors from diverse regions of the nation, members of the GWC share a common concern that our dependence on imported energy sources puts the nation's energy, economic and environmental security at risk. The GWC pledges to work with the Administration and Congress to achieve one of the principal goals identified during the recent presidential campaign—energy independence. GWC believes increasing the role that wind energy plays in meeting our energy needs is one of the best options to respond to this pressing challenge.

Wind energy is clean abundant, and affordable. The Upper Midwest has often been called the "Saudi Arabia" of wind power. The entire Great Plains offers ideal opportunities for building wind farms to meet the nation's growing appetite for wind power. Both West and East Coasts also offer cost-effective wind energy resources. With the right mix of federal and state policies, GWC aims to help spur strategic private sector investments to meet the 20 percent wind energy goal. Working toward this goal would spur new investments that can help stabilize our states' and nation's economy, reduce consumer energy costs, reduce dependence on imported fossil fuels and shrink the nation's trade deficit and carbon footprint, while simultaneously creating thousands of green jobs.

Transmission Lines
Voltage (kV)

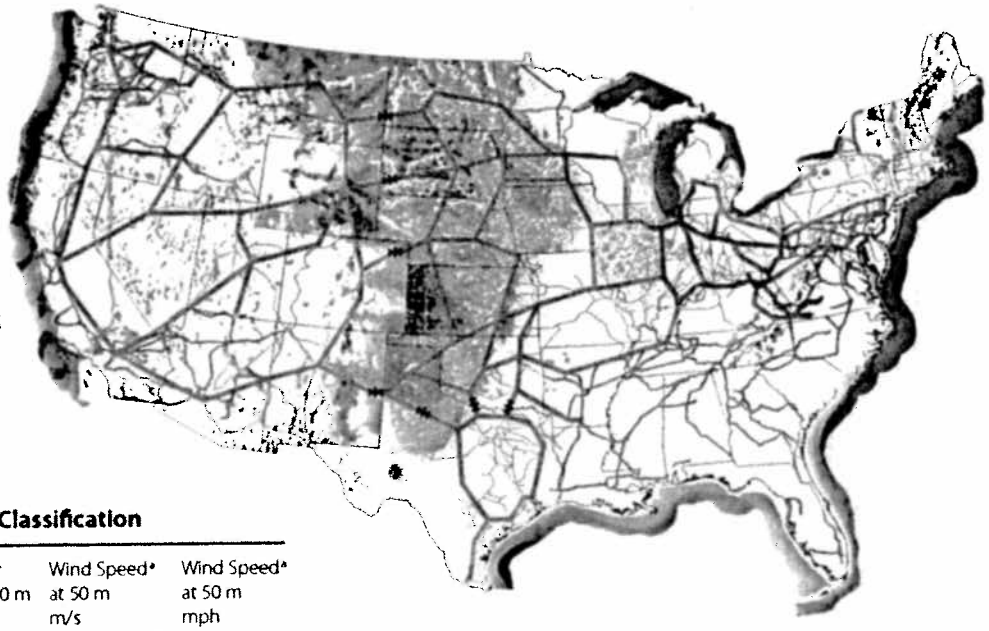
- 234 - 499
- 500 - 699
- 700 - 799
- 1000 (DC)

Source: POWERmap, powermap.platts.com. ©2007 Platts, a division of the McGraw-Hill Companies

Conceptual 765 kV Network

- Existing 765 kV
- New 765 kV
- AD-DC-AC Link

Source: American Electric Power (AEP)



This map shows the wind resource data used by the WinDs model for the 20% Wind Scenario. It is a combination of high resolution and low resolution datasets produced by NREL and other organizations. The data was screeded to eliminate areas likely to be developed onshore due to land use or environmental issues. In many states, the wind resource on this map is visually enhanced to show the distribution on ridge crests and other features.

Wind Power Classification

Wind Power Class	Resource Potential	Wind Power Density at 50 m W/m2	Wind Speed* at 50 m m/s	Wind Speed* at 50 m mph
3	Fair	300 - 400	6.4 - 7.0	14.3 - 15.7
4	Good	400 - 500	7.0 - 7.5	15.7 - 16.8
5	Excellent	500 - 600	7.5 - 8.0	16.8 - 17.9
6	Outstanding	600 - 800	8.0 - 8.8	17.0 - 19.7
7	Superb	800 - 1600	8.8 - 11.1	19.7 - 24.8

* Wind speeds are based on a Weibll k value of 2.0

Congress and the Administration should consider a number of policy options to rapidly expand wind power:

Adopt a National Renewable Electricity Standard

GWC recommends the adoption of a national Renewable Electricity Standard (RES) to require utilities to provide a minimum of 20 percent of their electricity from renewable sources (such as wind and solar). We believe the certainty and stability provided by such a national standard would lower the overall costs of wind development to electricity consumers.

Support Construction of New Interstate Electric Transmission "Smart" Grid

The U.S. will never fully develop our states' rich domestic wind resources without major improvements to the electric transmission system. National policy is needed to provide incentives for transmission developers and state agencies to collaborate in the siting and construction of a modern "smart" transmission grid. Implementing a smarter grid will also substantially increase the overall reliability of America's power system, further reducing electricity costs to consumers.

Expand U.S. Department of Energy's Work with States and the Wind Industry to Accelerate Innovation

Wind power technology is one of the best near-term economic development opportunities for all U.S. states. The manufacturing and assembly of wind turbine systems can revitalize the ailing U.S. manufacturing sector, opening up new lucrative green markets here and for export abroad. The GWC looks forward to expanding partnerships with the federal government and key wind industry stakeholders in order to maintain and ultimately advance the U.S. wind industry's relative competitive advantage in the global energy economy.

Adoption of a Long-Term Production Tax Credit for Wind Energy

This production tax credit (PTC) has been the primary federal incentive for wind energy over the last decade. While the GWC applauds the 3-year extension of this PTC in the federal stimulus law, a five year extension would have been better and a 10-year extension ideal. A longer-term policy would send the right signal to the marketplace that the U.S. wind market is committed to a sustained large-scale investment in wind power technology. The recent history of short-term extensions of the PTC can no longer be the norm and should be avoided in order to provide certainty to manufacturers and developers seeking to do business in the U. S.

Appendix A: NREL's Job Methodology

The ***20% Wind Energy by 2030*** job estimates were performed by the National Renewable Energy Laboratory (NREL). Their Jobs and Economic Development Impacts (JEDI) model serves as the foundation for the economic development benefit calculations cited in this report. This estimate of the amount of new wind power necessary to come on-line by 2030 to meet the 20 percent target did not assume that policies, such as the production tax credit included in the federal stimulus package, are in place. These projections also did not model the impacts of any regulations on carbon emissions.

However, this projection did assume the following: advances in domestic manufacturing of wind turbine components; training, labor, and materials for installation of wind farms and operations and maintenance (O&M) functions; and improvements in wind technology and electric power system infrastructure.

The JEDI model used to calculate potential economic and employment benefits that would accrue from this level of wind power penetration was first developed in 2002. The original goal was to demonstrate the state and local economic development impacts associated with developing wind power plants in the U. S. Subsequent enhancements made the model capable of performing county, regional and national job creation projections, too.

JEDI estimates future economic development impacts, including direct employment in the wind power sector. But JEDI also estimates the increase in overall economic activity associated with the construction and operating phases of new wind farms.

Another NREL model, called WinDS, was used to generate annual wind power installations for the ***20% Wind Energy by 2030*** report. The WinDS model shows that an annual installation rate of about 16 gigawatts per year (GW/year) reached by 2018 could result in generation capacity capable of supplying 20 percent of the nation's electricity demand by 2030. This annual installation rate is affected by the quality of wind resources selected for development as well as future wind turbine performance. Sustaining a 16 GW/year installation rate for wind power beyond 2030 would accommodate the repowering of aging wind turbine equipment as well as increased electricity demand, so that the nation's electricity demand would continue to be met by 20 percent wind.

The JEDI model evaluates three separate kinds of economic development impacts:

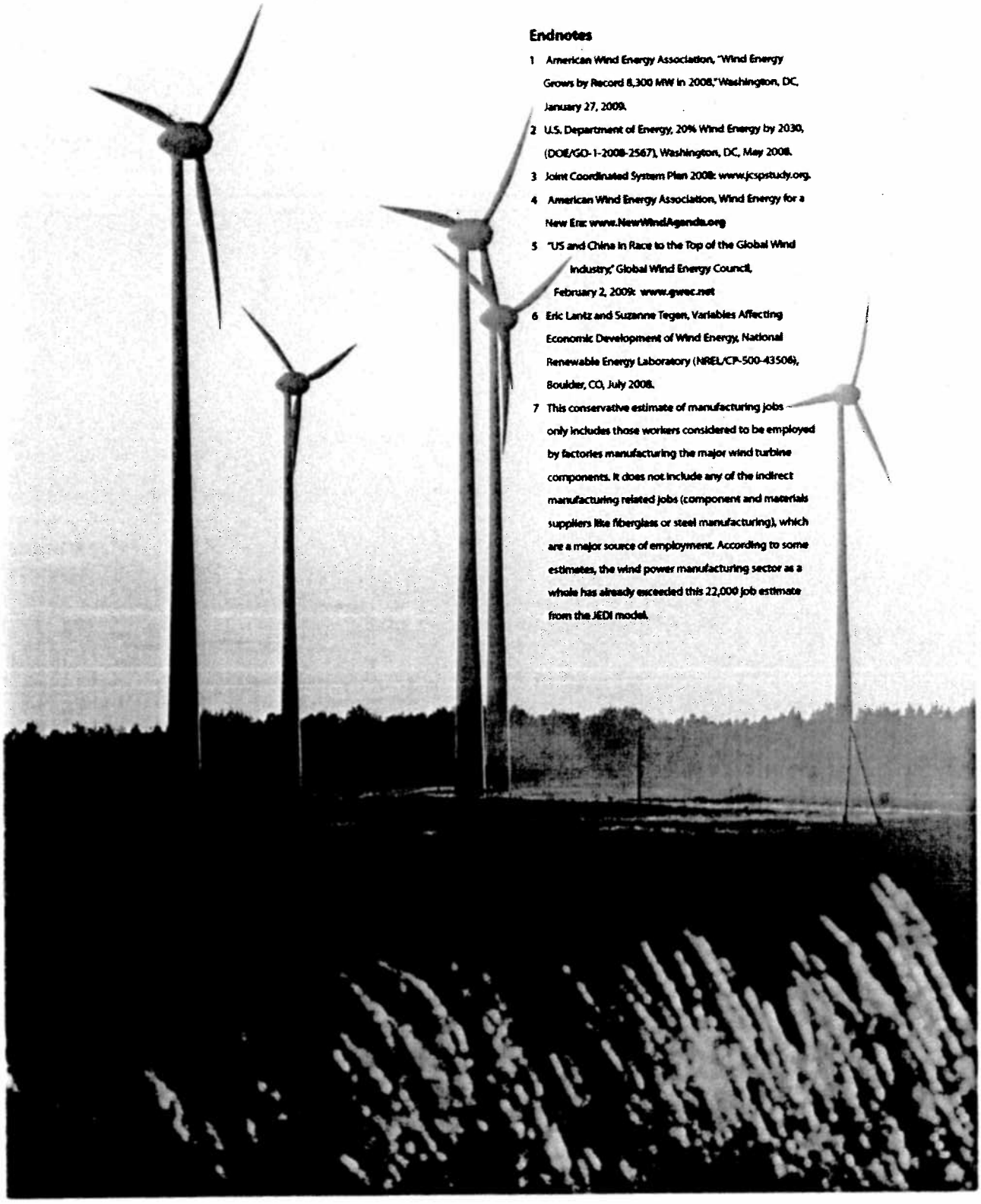
Direct impacts: On-site or immediate effects created by investment in a new wind project. In the JEDI model used for the ***20% Wind Energy by 2030*** report, the construction phase includes the on-site jobs of the contractors and crews hired to construct the plant as well as their managers and staffs. Direct impacts also include jobs at the manufacturing plants that build the turbines as well as the jobs at the factories that produce the towers and blades.

Indirect impacts: Increases 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. This includes the banker who finances the contractor and the accountant who keeps the contractor's books, as well as the steel mills, electrical part manufacturers and suppliers of other necessary materials and services.

Induced impacts: Changes in wealth that result from spending by people directly and indirectly employed by the wind farm. For example, when plant workers and other local workers receive income from expenditures related to the plant, they in turn purchase food, clothing and other goods and services from local businesses.

These three categories of employment gains would be spread out throughout the country, even in places such as the southeast which, generally speaking, does not feature adequate wind resources for local wind farm development. But both existing and new factories operating there can help serve the national wind power market.

The JEDI spreadsheet-based model for wind is free and available to the general public. It can be downloaded from the Wind Powering America website: www.windpoweringamerica.gov.



Endnotes

1 American Wind Energy Association, "Wind Energy Grows by Record 8,300 MW in 2008," Washington, DC, January 27, 2009.

2 U.S. Department of Energy, 20% Wind Energy by 2030, (DOE/GO-1-2008-2567), Washington, DC, May 2008.

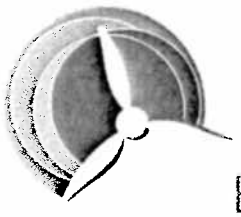
3 Joint Coordinated System Plan 2008: www.jcspstudy.org.

4 American Wind Energy Association, Wind Energy for a New Era: www.NewWindAgenda.org

5 "US and China in Race to the Top of the Global Wind Industry," Global Wind Energy Council, February 2, 2009: www.gwec.net

6 Eric Lantz and Suzanne Tegen, Variables Affecting Economic Development of Wind Energy, National Renewable Energy Laboratory (NREL/CP-500-43506), Boulder, CO, July 2008.

7 This conservative estimate of manufacturing jobs only includes those workers considered to be employed by factories manufacturing the major wind turbine components. It does not include any of the indirect manufacturing related jobs (component and materials suppliers like fiberglass or steel manufacturing), which are a major source of employment. According to some estimates, the wind power manufacturing sector as a whole has already exceeded this 22,000 job estimate from the JEDI model.



Governors' Wind Energy Coalition

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FORWARD
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Mission Statement

CWE's mission is to develop wind energy production through local planning, ownership, financing and maintenance of wind turbines. CWE further believes that we must protect Door County through suitable placement of wind turbines in appropriate areas, guided by a good neighbor policy, and that standards of honesty, transparency and cordiality must be the principles by which we do business. CWE best serves the common good by helping to provide pollution-free renewable energy and a more sustainable way of life for future generations of Door County.

What Can I do?

A good way to begin is to learn more about the concepts and practices that are the foundation of Community Wind Energy LLC. Below are some web sites that may get you started:

www.awea.org
www.hullwind.org
www.renewwisconsin.org
www.windenergyworks.org
www.windustry.org
www.windshare.ca

Community Wind Energy Works for Door County

www.communitywindenergy.us

Community Wind Energy LLC
PO BOX 123
Sturgeon Bay, WI 54235
920-746-4008
info@communitywindenergy.us

"Supporting locally owned, environmentally sound energy production."

Community Wind Energy Works for Door County

www.communitywindenergy.us

Wind Energy

Wind energy is simply the production of electricity from the powerful movement of wind. For thousands of years, wind has sailed ships, pumped water, and milled grain. Wind has been used to power land and water based enterprises in Door County for well over a hundred years. It is a resource that has been, and will continue to be, important in improving our way of life.

Door County is positioned on the peninsula with a great potential for wind energy production due in large part to the Niagara Escarpment.

Wind energy today is the fastest growing electrical energy producer with an annual growth rate of up to 25% worldwide.

Community-Owned Wind Energy

Community-owned wind is not only produced locally, but also locally owned. This ensures that more of our dollars are kept in Wisconsin, a state that spent ***over $18 billion for out of state fuel sources in 2006***. It also means we can provide investment income for local people, and employ local people to maintain and service the turbines.

Community-owned wind requires good citizenship—CWE intends to be a good neighbor and work together to make Door County a better place to live.

Investing in our Future—Local residents investing and owning a wind energy project demonstrate a stronger commitment to the community and its interests. Local ownership is crucial to local control and has a positive impact that counters the principles of outside developments using outside financial means. Revenues from any wind project remain in the local community.

Economic Benefits of Wind

Wind serves as the new ***cash crop*** for farms, orchards, and other local landowners, providing another source of income. Wisconsin is one of many Midwestern states rapidly losing farmland to outside development pressures.

A turbine's footprint is small enough (50ft x 50ft) that landowners may utilize the land right up to the turbine site. Wind energy supported by community investment keeps energy production local. Without other local energy fuel sources, wind is the sensible choice because it is pollution free and abundant. Wind energy may not lower our utility bills, but in the long term it has a stable and predictable fuel cost (free).

CWE believes that our energy production must have a health impact figured into its cost per kwh. Air pollution caused by burning fossil fuels contributes to lung diseases. After all, our health must remain priceless.

Who is CWE?

Community Wind Energy LLC (CWE) was formed by a group of year-round Door County residents who believe that the local use of wind power can significantly improve our way of life. CWE has organized itself with the goals to educate the public, to promote and establish wind energy as a major source of electricity to Door County homes, businesses, farms and orchards.

CWE is dedicated to the concept that less reliance on fossil fuels and nuclear energy will create a healthier, more sustainable community, reduce our dependence on imported oil, and improve our homeland security. CWE organized as a limited liability corporation for legal requirements.

It is our chosen business plan to reinvest profits from our venture into grants and gifts of renewable energy systems for medical, charitable, service and educational organizations. In addition, CWE plans to voluntarily share revenue with our local units of government.

Common Concerns with Wind Energy

Noise—Turbine technology today has come a long way in recent years. Turbines typically are at about the same sound level as normal family dinner conversation, or in the range of 50 decibels.

Safety— Turbines are designed to withstand over 100 mph winds. During high wind periods, turbines automatically shut down and turn out of the wind.

Ice—Turbine blades do not throw ice. When ice and snow form on the blades, the turbine automatically shuts down and upon melting, the snow/ice sheds to the ground, much like on a water tower or other tall standing structure.

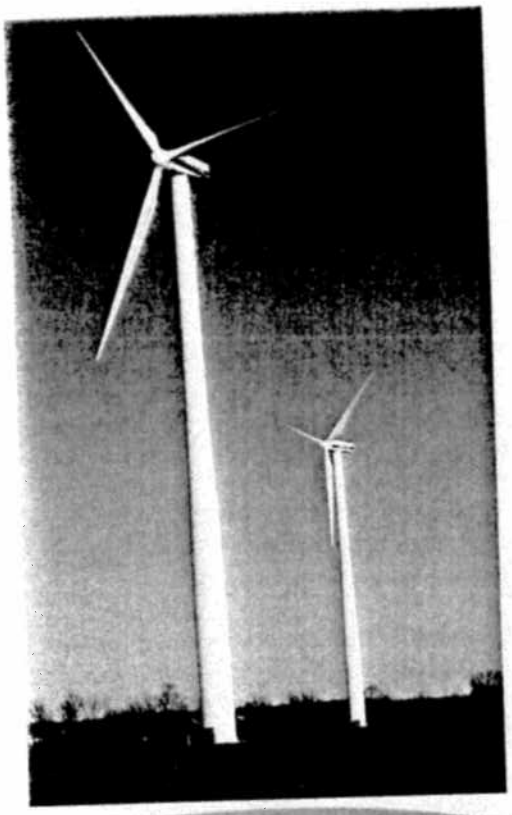
Stray Voltage—Turbines produce three-phase power for transmission. Stray voltage results from improperly grounded ***single-phase*** applications; therefore, turbines are not a stray voltage risk.

Groundwater—Installing wind turbines is no different than building foundations or other subsurface practices already taking place in Door County. CWE intends to take every measure to insure that our groundwater resource is protected and will do more to maintain the natural landscape than current trends.

Property Values—Two studies, including one with reference to a Kewaunee wind farm, show that nearby property values continue to increase in the presence of wind turbines.

Birds & Bats—Like the technology around wind turbines, the sting of them has also come a long way. Wind turbine placement today requires careful consideration of potential effects on raptors and migratory birds. Current research indicates that wind turbines cause far fewer bird deaths than other man-made and/or feline activities (1 in 10,000). A University of Wisconsin study sites that a single cat may be responsible for over eight bird deaths per year compared to two by a wind turbine.

Beauty—Beauty is certainly in the eye of the beholder. CWE is a group of local residents who also treasure the beauty of Door County's landscape. Unlike cell towers in our landscape, wind turbines reflect our commitment to existing land uses by providing energy for Door



Environmental Benefits of Wind

Wind energy production causes no pollution, unlike many other commonly used energy sources. Over 70% of the electrical energy produced for Door County is derived from burning coal. That is equivalent to eight 1000-foot ore boats full of coal per year! It also results in the yearly discharge of over 750,000 tons of carbon dioxide, sulphur dioxide, oxides of nitrogen, fly ash, and mercury. Additionally, there is no nuclear energy without nuclear waste.

Polluted air is also not new to Door County, as we ingest all the fossil fuel fallout from the south and west parts of the country on a regular basis.

We also know that mercury released from burning fossil fuels has polluted all of Wisconsin's lakes. By producing our own electrical needs from wind energy, we can do our part to stop polluting Door County and Wisconsin's air and water resources.

Community Wind Energy LLC

Who Are We?

Community Wind Energy LLC of Door County (CWE) was formed by a group of year-round residents who believe that the use of wind power can significantly improve the lives of our neighbors and ourselves.

CWE is organized with the goal of educating the public about wind energy and how we as a community can harness this renewable energy resource for the betterment of all.

CWE is committed to developing wind energy production through local planning, ownership, financing and maintenance of wind turbines.

CWE believes that our beautiful landscape needs to be protected through careful placement of wind turbines in appropriate areas.

CWE affirms that a good neighbor policy is the best policy for our county. We also think community control of the project through careful planning is the preferable method.

CWE is dedicated to the concept that less reliance on fossil fuels and nuclear energy will create a cleaner more sustainable community, reduce our dependence on imported oil, and contribute to our homeland security.

(over)

Name: _____ Phone: _____

Address: _____ Occupation: _____

City: _____ State: ____ Zip: _____ Email: _____

I'd like a turbine site review of my property: ____ I'd like to volunteer for CWE: ____

I'm interested as a possible investor: _____ Put me on your mailing list: _____

Community Wind Energy LLC
of Door County

(over)

P.O. Box 123, Sturgeon Bay WI 54235
www.communitywindenergy.us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A **Coalition** to preserve Wisconsin's Reliable and Affordable Electricity

Customers First!

Plugging you in to electric industry changes

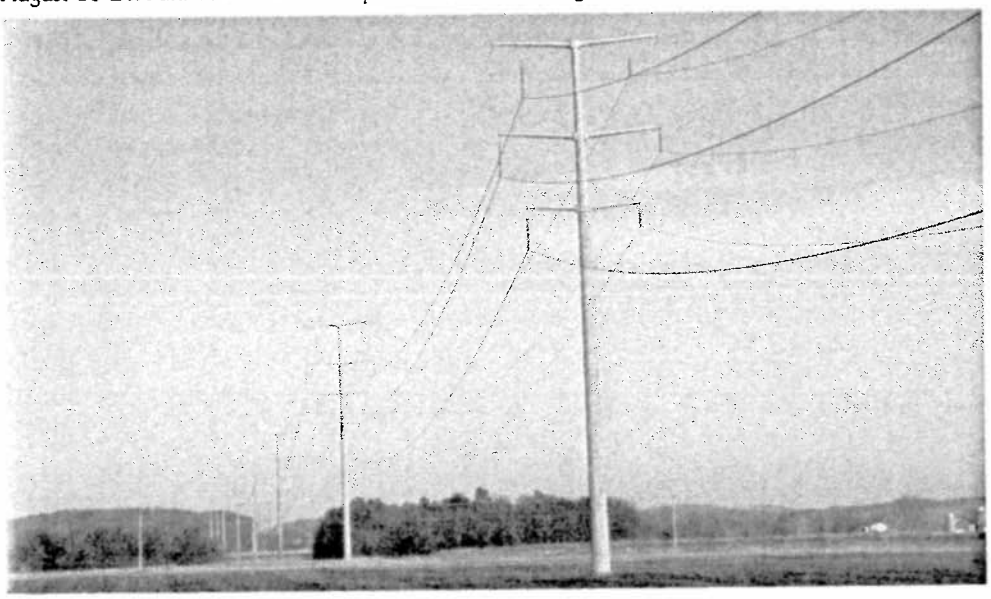
608/286-0784 • P.O. Box 54 • Madison, WI 53701 • www.customersfirst.org • SEPTEMBER 2009 • Vol. 14, No. 9

Study eyes transmission export paths

Likely routes for extra-high voltage transmission development crossing Wisconsin and other states will be the focus of a joint venture between an Ohio-based utility and an Iowa holding company looking to export Midwest wind energy to points east.

Electric Transmission America (ETA) is a transmission enterprise created by American Electric Power of Columbus and MidAmerican Energy Holdings Company of Des Moines. On August 18 ETA announced it would sponsor "a comprehensive study of the transmission needed in the Upper Midwest to support renewable energy development and to transport that energy to consumers in markets to the east."

The study is expected to produce recommendations for development of new, extra-high voltage transmission routes across the Dakotas, Iowa, Minnesota, Wisconsin, Illinois, Indiana, and Ohio. It will not be long in coming. The Strategic Midwest Area Transmission Study (SMARTransmission Study) is scheduled for completion in January.



In the August announcement, ETA President Lisa Barton said, "A critical component of our nation's approach to addressing climate change is the ability to harvest our most viable renewable generation resources."

Identifying the Dakotas, Minnesota, and Iowa as home to some of the nation's "richest renewable generation resources," Barton said the region's clean energy potential "cannot be developed unless we build very efficient, high-capacity transmission to bring this energy east to population and electricity load centers."

The ETA joint venture was created to identify and invest in transmission projects of 345-kilovolts (the largest currently existing in Wisconsin) and larger.

Even before the ETA study is completed, the Upper Midwest Transmission Development Initiative (UMTDI) is expected to weigh in. Consisting of regulatory commissioners and executive branch representatives from the Dakotas, Iowa, Minnesota, and Wisconsin, the UMTDI hopes by year's end to lay groundwork for detailed transmission planning that fairly allocates the cost of any needed system expansions.

New reversal for county wind regulation

For a second time this summer, an appellate court has told a Wisconsin county it can't impose its regulatory standards on a utility infrastructure project favored by the state.

Late in July, the District IV Court of Appeals affirmed a Dane County circuit judge's 2008 ruling that the American Transmission Company was not required to obtain a series of county environmental permits for projects already holding certificates of public convenience and necessity (CPCN) from the state's Public Service Commission.

The decision followed by less than two weeks the District II Court of Appeals ruling that invalidated Calumet County's ordinance placing local restrictions on wind energy development.

In the Dane County case, the company (ATC) petitioned for declaratory judgment last year when the county asserted that ATC needed to apply for shoreland and general erosion control permits and a wetland zoning permit under county ordinances, after the commission had issued CPCNs for three high-voltage transmission projects.

Continued on page 3...

THE WIRE is a monthly publication of the *Customers First!* Coalition—a broad-based alliance of local governments, small businesses and farmers, environmental groups, labor and consumer groups, retirees and low-income families, municipal electric utilities, rural electric cooperatives, wholesale suppliers, and an investor-owned utility. *Customers First!* is a coalition dedicated to preserving Wisconsin's reliable and affordable electricity.

If you have questions or comments about THE WIRE or the *Customers First!* Coalition, please call 608/286-0784.

KEEPING CURRENT

With CFC Executive Director Matt Bromley

We tend to enjoy some things much more when they happen infrequently. That's probably why consumer advocates, electricity providers, and others are savoring the recent decision by federal regulators ordering Union Pacific Railroad to grant rate relief and pay reparations to Oklahoma Gas & Electric Company (OG&E) for excessive charges on hauling coal from Wyoming's Powder River Basin to the utility's Muskogee Station power plant in Fort Gibson, Oklahoma.

Bromley

The case represents a situation all too familiar to Wisconsin utilities, energy customers, farmers, manufacturers, and other businesses that are "captive" to one railroad to move raw and finished products such as coal, fertilizer, grain, forest products, and paper. With no other transportation option, captive shippers are left to the mercy of railroads who can dictate how much they charge and the level of service they provide. Shippers can file a complaint with the federal Surface Transportation Board (STB), but this process is expensive, lengthy, and except for the rare occurrence such as the OG&E case, has mostly resulted in decisions that benefit the railroads.

The STB's order in the Union Pacific–OG&E dispute affirmed that a reasonable rate couldn't exceed 180 percent of the cost of providing the service. Based on projected coal shipments, the order will provide about $10 million a year in rate relief to OG&E for the next 10 years—a nice result for rail customers and consumers, but, unfortunately, the structure that has allowed railroads to abuse their monopoly power continues to exist.

Congress seems poised to make the structural changes needed to level the playing field and ensure consumers are fully protected. Legislation sponsored by Wisconsin Senator Herb Kohl and Representative Tammy Baldwin to remove the railroads' exemptions from our nation's antitrust laws has been reported favorably out of committees in both houses. And Senator John D. Rockefeller, a long-time champion of rail customers and new chair of the Senate Commerce, Science and Transportation Committee, is leading a bi-partisan effort to craft comprehensive legislation that will beef up oversight of the railroads, improve the rate-challenge process, and give shippers the appropriate protection of federal law.

The *Customers First!* Coalition is cautiously optimistic that rail reform legislation will pass in this Congress. Utilities and their customers should no longer have to bear the excessive costs caused by the monopoly power of railroads so clearly illustrated in the OG&E case.

Nuke plant requesting uprate

The Florida-based operators of the Point Beach nuclear power plant are asking federal regulators to allow a 17-percent increase—or "uprate" in industry jargon—in the facility's output.

The plant has already received an extension of its original 40-year federal operating license and will be allowed to continue running until 2033.

The two units combined now generate slightly more than 1,020 megawatts. The 170-megawatt uprate—for which no cost estimate was immediately available—would require actions to strengthen plant systems to bear greater heat and pressure.

Similar modifications have been proposed at several nuclear plants nationwide, including two in Florida owned and operated by FPL Group, the company that bought Point Beach from WE Energies and its other Wisconsin owners.

Energy saver tip

Think ahead. Farther.... Fall is a good time to plant trees, and some advance planning can pay off. Think about what you want to plant and whether the spot you pick will still make sense 20 or 30 years from now. In this part of the country, the right planting on the south and west sides of a house can help protect your home from excessive solar heating and the cooling bills that come with it.

Wind-siting bills on steady march

A state Senate committee last month endorsed creation of statewide wind-energy siting standards, leaving bills ready for floor action in both houses.

The vote in the Senate Committee on Commerce, Energy, Utilities and Rail was 6–1 to endorse passage of Senate Bill 185. The sole vote against the bill came from Sen. Neal Kedzie (R–Elkhorn), who cited concerns about statewide standards interfering with local control and doubts that wind energy is "the end-all or cure-all to all our energy problems."

Local control issues remain very much alive, as Calumet County plans a state Supreme Court appeal of the July appellate court decision overturning its wind-siting ordinance.

Regardless of the outcome there, the pending legislation anticipates counties and other political subdivisions of the state continuing to enact wind-siting ordinances, though any restrictions they could impose would be circumscribed by whatever administrative rules the Public Service Commission (PSC) may develop in carrying out the Legislature's directive to devise uniform standards.

A Senate committee amendment spells out that a council to advise the PSC in developing its rules must include representatives of municipalities that have wind ordinances. It also makes the council a permanent entity assigned to perform continuing study of wind-energy issues.

Possibly in anticipation of legislative action, Pierce County supervisors in August voted to loosen restrictions on small wind-energy systems. Instead of a public hearing, a town board recommendation, and a conditional use permit from the county, people planning to put up wind turbines with less than 100 kilowatts capacity will now only have to obtain an over-the-counter permit and pay $100, one-third the previous fee. There were no votes against the changes.

Renewables funding list available from OEI

A frequently updated list of funding opportunities for biofuel and renewable energy projects is available from Wisconsin's Office of Energy Independence and can be obtained by e-mail. Anyone interested can be placed on the distribution list by sending a request to OEI's Maria Redmond at maria.redmond@wisconsin.gov.

As of midsummer, the listing showed nearly 100 opportunities for clean energy projects. A categorized roundup of the information can also be viewed at the OEI web site, http://www.energyindependence.wi.gov/.

More wind added

More than 4,000 megawatts of wind-energy generation capacity have been installed so far this year, bringing total U.S. wind capacity to 29,400 megawatts, according to a tally in August by the National Rural Utilities Cooperative Finance Corporation (CFC).

Of the year's total to date, slightly more than 1,200 megawatts became available in the second quarter. The total installed wind capacity is now equivalent to about 2 percent of the U.S. electrical generation supply, CFC said.

TX retailers face tighter standards

The financial collapse of several electricity retailers in Texas last summer forced many customers to switch providers and pay higher rates, and now it's led regulators to set tougher standards for doing business in the state.

Some electricity retailers complain they'll now be required to guarantee prices that could become money-losers for them if wholesale-market volatility raises their costs. That was the undoing last summer of some companies that lacked sufficient capital reserves to ride out the effects of wholesale volatility.

But customers will now have more warning if they need to switch providers and will be able to do so more quickly. A provider planning to cancel a contract must now provide 14 days notice, and the switchover process can't take more than seven days. Previously, the changeover was allowed to take up to 45 days.

In addition, retailers must have investment-grade debt ratings and be good for at least $500,000 in credit, five times the previous requirement. Any new retailer will be required to maintain at least $1 million in equity.

Last summer five retailers quit the Texas market when they couldn't keep up with spiking wholesale prices. It prompted inquiries into whether power generators might have been avoiding long-term contracts to take advantage of higher prices on the daily spot market.

Wind regulation

Continued from front page...

The circuit court agreed with ATC that under Wisconsin law a county lacks authority to enforce any ordinance governing matters the commission (PSC) addressed or could have addressed in its CPCN proceedings.

Dane County appealed the judgment, challenging the meaning of statutory language that reads, "If installation or utilization of a facility for which a certificate of convenience and necessity has been granted is precluded or inhibited by a local ordinance, the installation and utilization of the facility may nevertheless proceed."

The appellate court said even if the county intended no more than to locally enforce what PSC orders required ATC to do, "The permit process in itself is an additional impediment or inhibiting factor" in carrying out the projects. But the court went on to say it appeared Dane County intended to go beyond what the PSC required.

"As the circuit court pointed out, the record shows that Dane County had already identified 'deficiencies' under its ordinances that it seeks to have American Transmission correct," the appellate court wrote.

Noting that local governments can participate in PSC proceedings and petition for review of decisions, the court of appeals said, "Indeed, Dane County did appear in the first of the three PSC proceedings conducted for the projects here, although it did not raise local environmental issues."

At press time, Dane County officials were said to be weighing another appeal—to the state Supreme Court.

Meanwhile, Calumet County supervisors approved a moratorium on all new wind projects until the end of this year or until the county adopts a zoning ordinance specifying setback distances and noise limits.

Those were the two main issues addressed by the invalidated county ordinance, and they are among the issues on which the PSC would establish uniform statewide standards under legislation advancing in both houses of the state Legislature.

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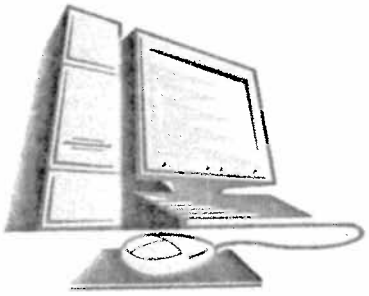

www.customersfirst.org

Quotable Quotes

"If you asked the average person on the street to quote you a stock price and guarantee it for the next 45 days, I don't think they'd be willing to do that. [but] That's the kind of risk retailers take under the new rule."

—Marcie Zlotnick, chairman and chief operating officer of Star Tex Power, criticizing new Texas regulatory requirements extending price guarantees for consumers, quoted in *The Houston Chronicle*, August 14, 2009

Help us share our messages with others. If you know of businesses or organizations that would like to learn more about protecting Wisconsin's reliable and affordable electricity, please feel free to copy and share with them all or part of this newsletter, or you can call 608/286-0784 to arrange an informational meeting.

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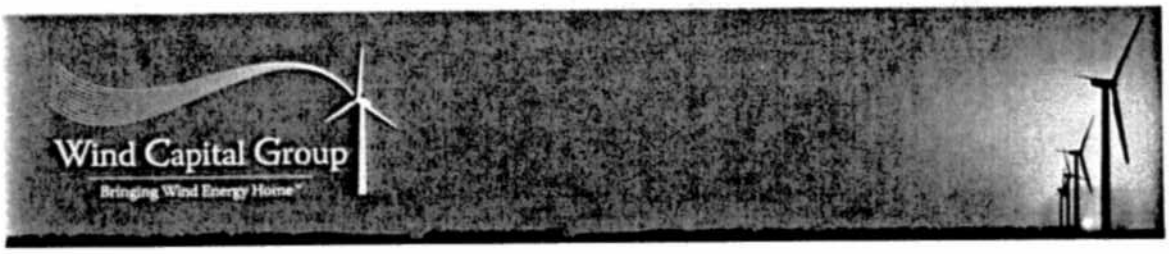
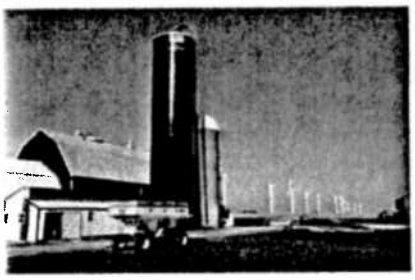


Winds of change blowing in Wisconsin

by Mark Hirsch, Photo Journalist, October 2007

Emerging from the corn and soybean fields like a row of majestic trees, 20 wind turbines dominate the horizon along Highway 18 in Montfort, Wis. In this small town historically supported by agriculture, a wind farm is harvesting a different type of crop.

Owned by FPL Energy, the Montfort Wind Energy Center produces enough electricity to power approximately 9,000 average Wisconsin homes. When they went online in 2001, they were among the largest turbines manufactured in the U.S.



Don Leix farm, Montfort Wind Energy Center, WI

Sitting at the lunch counter of the Tower Junction Restaurant across from the wind farm, Laverne Clifton reflects on the impact the FPL Energy wind farm has had on this small community in Southwestern Wisconsin. "When they first came to me about installing windmills on my property, it seemed too good to be true. Now it's just another good cash crop you don't have to worry about. You don't plant it, and it uses little land," said Clifton, a retired farmer who has three turbines on his property.

Whether they have turbines on their property or not, Clifton's neighbors share a similar sentiment. Evelyn Mueller, 82, lives next to three of the Montfort Wind Energy Center turbines and says, "I'm all for it. We should use our natural resources. They are not noisy. I don't think anyway. At night when it's quiet, it's a quiet swish. It almost lulls you to sleep."

From her patio, Evelyn Mueller can see three of the Montfort Wind Energy Center turbines. Mueller said, "It has absolutely no impact on my quality of life.

The Montfort site generated little controversy. Clifton could only remember one person initially opposed to the project because they were concerned it would scare their horses when riding near them. Seven years later, Clifton can think of no one who opposes them.

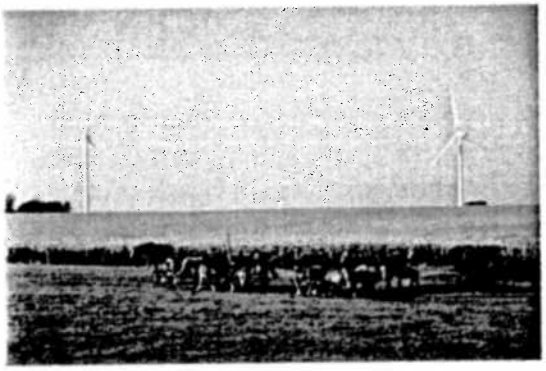
According to FPL Energy, owners of the Montfort Wind Energy Center, wind is the fastest growing renewable energy resource in the world. Supporters promote wind energy as a nonpolluting resource that can supplement other energy sources reducing our dependence on fossil fuels.

Montfort residents like Larry Johnsen understand and appreciate the value of wind energy. Johnsen who has three turbines on his property says, "Everyone wants to turn on a light switch and have electricity. I mean do we want another coal plant? Look at how many electrical devices we use today, cell phones, ipods, you name it."

Down the road from the Johnsen farm, Jen Thomas moved next to the wind farm in 2005.
"I can see the windmills from all four sides of my house and I'm not getting a paycheck from the power company so I don't have to say nice things, but the windmills don't bother me," said Thomas. Visiting homes along the wind farm site, it was difficult to find anyone who opposes or has any concerns about its impact on their quality of life.

Turbines at the Montfort Wind Energy Center blend in well with the Larry Johnsen farm. Johnsen has three of the wind turbines on his property and farms up to the base of each tower.

Jonas Gingerich, an Amish farmer who operates a goat dairy operation beside the wind farm currently has his farm listed with a local real estate company. Gingerich does not use electricity supplied by the public power grid. Because of rules dictated by his Amish lifestyle, his electricity comes from a diesel-powered generator that operates belt driven equipment. Regarding his proximity to the windmills, he said, "The windmills won't have anything to do with my farm sale. In fact, I wish I had one on my land."



Horses on the Jonas Gingerich farm graze in a pasture near the Montfort Wind Energy Center. Commenting about the windmills, Gingerich said, "I seldom hear them. They make no noise hardly at all. I hear the highway more than the windmills."

Acceptance of wind farm projects across the country has varied greatly. While the Montfort Wind Energy Center went up without much fanfare; other Wisconsin sites have generated more controversy. Two wind farm projects in Kewaunee County, Wis. initially generated significant opposition.

Visual impact as well as health and safety issues are among the concerns raised by wind energy opponents. Additionally, flicker, noise concerns and perceived reduction in real estate values dominate arguments against wind farms.

For residents of Red River and Lincoln in Kewaunee County, Wis., the meetings leading up to passage of conditional use agreements were divisive. Jule Famaree, 81, a Red River board member for 41 years said at the meetings, "Some was for it, some was against it. But now, eight years later, most are ok with it."

Life near wind turbines is what you make of it according to Rich Lohrey. Lohrey's home is the only residential dwelling on Cedar Road and sits in the middle of the 14 Wisconsin Public Service wind turbines at the Lincoln Wind Energy Facility.

Mary and Rich Lohrey, Algoma, Wis. Live in the only residential dwelling on Cedar Road near the WPS wind farm. They purchased their home after the wind farm was in operation and say they are very comfortable living beside the wind farm.

In the five years they have lived in the shadows of the Lincoln wind farm, they have responded to questions about all of the usual wind farm complaints. "Lots of folks stop to ask us about them if they will have them in their area. They want our thoughts about them," Rich said, adding, "The wind farm doesn't bother me, I think it's great."

Rich and Mary have heard all the horror stories about problems associated with windmills from noise issues to reduced property value. "They can't say they make that much noise because they don't. We lived next to Lake Michigan for nine years; if you want to hear noise, live next to the lake. We wanted a country place with buildings for our toys. The windmills had no impact on our purchase price, none at all," Mary said.

Note: As part of the design of its wind farms, Wind Capital Group utilizes a software program called WindFarmer® that analyzes the arc of the sun throughout the year to avoid "shadow flicker."

The issue of flicker or strobing caused by sunlight passing through the rotating blades is a very real problem depending on location of the turbines. It is also a problem that can be avoided when turbine installations are properly sited. For some residents, flicker is tolerable, for others, it can cause serious concerns.

"We have it very early in the morning in our bedroom. It's only like twice a year for a very short time. I can't even complain about that," says Mary Lohrey.

The impact of wind farms on wildlife, specifically bats and birds is often identified as another problem. Rich Lohrey is quick to dispel the fear of bird deaths saying, "As far as killing birds, I've walked around them many times and never seen a dead bird yet."

For wind farm construction, there are currently no standard guidelines for setbacks from dwellings. Many opponents feel there should be a minimum setback of 1000' from an occupied dwelling.

An access road leads to turbines in the WPS wind farm off of Pheasant Road at the Town of Lincoln in Kewaunee County, Wis. The turbine roads double as field access for farm equipment.

Another concern raised by opponents involves doing business with the energy companies. According to residents around the Montfort, Red River and Lincoln energy sites, the power companies have been responsible business partners and good neighbors.

Lonnie Fenendael operates a 700 head dairy operation near the Lincoln wind farm. He also has five of the WPS wind turbines on his property and rents additional cropland from Jeff and Wallace Pelnar who have the other nine WPS turbines on their property. He plants crops right up to the base of all 14 WPS turbines.

When his family was approached by WPS, Lonnie said, "They were a local company and wanted a contract. There were a lot of things I wanted too, like putting the turbines in a line if possible. They were very good about working it out. We negotiated on price and any land damage. They pay for damage to crops, etc. They are very good about it."

Several miles away at the MG&E Kewanee County Wind Farm, Kevin LeFevre had a similar experience. "They treated us good on everything. It was a good business deal for us. They altered the access road to satisfy us."

Opponents fear the impact construction of wind farms will have on roads and infrastructure. As a town board supervisor, LaVern Clifton is very happy with his experience. During construction of the Montfort wind farm, "They were very good about correcting any damage to roads, land, etc. The company paid the township for the cost of road repairs, etc. They bent over backwards to make things right." said Clifton.

As a landowner, Clifton has no regrets about his business relationship with the owner of the wind farm. "As neighbors, we don't even know they are around."

A turbine at the Montfort Wind Energy Center is framed by buildings on the Don Leix farm. Leix operates a 450 cow dairy operation, and is very happy with his business relationship with the owner of the wind farm.

Wisconsin is rated as one of the top 20 states with the highest wind energy potential. Based on a report published by FPL Energy, Wisconsin is capable of producing 58 billion kilowatt-hours annually. Despite opposition, the growth of wind power as an alternative to fossil fuel energy will continue in Wisconsin.

Don Leix, a farmer with three wind turbines on his property operates a 450 cow dairy operation near Montfort. Leix said, "We were skeptical at first, with the dairy and stray voltage, but we've had no problems." As far as impact on local real estate,"They have not affected anything here, its all good farm land."

When people ask Leix what he thinks about the wind turbines, he likes to ask them this question. "Do you use electricity?" Leix adds emphatically, "Nobody has told me no yet."


FORWARD
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AWEA AMERICAN WIND ENERGY ASSOCIATION

Wind Energy and Wildlife

As America and the world grapple with the immense problem of climate change, one energy source stands out as an abundant, affordable and readily available supply option: wind power. In May 2008, the U.S. Department of Energy released the *20% Wind Energy by 2030 Technical Report* (www.20percentwind.org), finding that wind power can supply 20 percent of America's electricity by 2030 and reduce projected emissions of carbon dioxide (CO_2), the leading greenhouse gas, by 25 percent.

This fact sheet is one in a series aimed at informing decision-makers and the public about this critically important option for America's energy future.

Did you know...?

A single 1-MW turbine displaces 1,800 tons of carbon dioxide, the primary global warming pollutant, each year (equivalent to planting a square mile of forest), based on the current average U.S. utility fuel mix.

To generate the same amount of electricity as today's U.S. wind turbine fleet (25,170 MW as of the end of 2008) would require burning 34.4 million tons of coal (a line of 10-ton trucks over 13,700 miles long) or 112 million barrels of oil *each year*.

Wind, a 100% clean energy source, is one of the healthiest energy options, and one of the most compatible with animals and humans. While birds do collide with wind turbines at some sites, modern wind power plants are collectively far less harmful to birds than are radio towers, tall buildings, airplanes, vehicles and numerous other manmade objects. Bird deaths due to wind development will never be more than a very small fraction of those caused by other commonly-accepted human activities, no matter how extensively wind is used in the future.

Avian studies have been carried out at many wind farm sites. They show that bird kills per megawatt (MW) average one to six per year or less, with the exception of a single 3-turbine plant in Tennessee that has recorded 11 per MW per year. These include sites passed by millions of migrating birds each year. At a few sites, no kills have been found at all.

A reasonable, conservative estimate is that of every 10,000 human-related bird deaths in the U.S. today, wind plants cause less than one. The National Academy of Sciences estimated in 2006 that wind energy is responsible for less than 0.003% of (3 of every 100,000) bird deaths caused by human (and feline) activities.

Individual bird deaths due to wind development will never be more than a very small fraction of those caused by other commonly accepted human activities and structures--house cats kill an estimated 1 billion birds annually in the U.S. alone, buildings 100 million to 1 billion, automobiles 60-80 million, power lines hundreds of thousands to as many as 175 million, according to the U.S. Fish & Wildlife Service (http://birds.fws.gov/mortality-fact-sheet.pdf) and other sources.

FOR MORE INFORMATION, PLEASE CONTACT:

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AWEA AMERICAN WIND ENERGY ASSOCIATION

Wind Energy and Wildlife

Despite the minimal impact wind development has on bird populations generally, the industry takes potential wildlife impacts seriously and continues to assess ways in which impacts can be lessened. Since the first concerns about wind energy and wildlife were raised, the wind industry has taken numerous steps to address legitimate concerns and ensure problems are not repeated at other wind projects.

National Wind Coordinating Collaborative
In 1994, shortly after raptor deaths in the Altamont Pass became a general concern, the wind energy industry joined with other stakeholders (government officials, environmental groups, utilities) to form the National Wind Coordinating Collaborative (NWCC), a multi-stakeholder collaborative aimed at addressing the wind/avian issue as well as other issues affecting the industry's future. NWCC has sponsored numerous meetings and academic papers to better understand wind energy's wildlife impacts - including updates to the environmental community about the latest wind-related research, events related to the biological significance of wind's impacts and a wind project permitting handbook. More information on NWCC activities is available at http://www.nationalwind.org.

Altamont Pass
The Altamont Pass was one of the first wind projects installed, and it remains the only wind development area in the U.S. that experiences significant bird deaths, specifically those of raptors or birds of prey (with "significant" defined as deaths of individuals of particular species that are numerous enough to possibly impact local populations of those species). While the industry recognizes that this situation is a real problem, it is largely limited to this one area and is not widespread. The Altamont Pass is unique - no other wind project combines a similar topography, very high raptor population, and old turbine technologies – and even at Altamont, the total number of bird collisions is quite low. Unfortunately, media coverage about Altamont often gives the impression that all wind power projects have a significant effect on birds, despite overwhelming evidence to the contrary.

Wind businesses have implemented many strategies to attempt to reduce bird impacts at Altamont Pass. Over the years, wind companies have painted wind turbine rotor blades, reduced rodent populations, added "perch guards" to prevent perching on turbine towers, and tested raptors' hearing, vision and avoidance capabilities to learn how to reduce bird impacts. One particularly successful strategy greatly reduced raptor electrocutions--based on earlier research, project owners modified their equipment by insulating wires, covering some exposed electric components on poles, and relocating overhead power lines to protect raptors. New projects that are built today have virtually all power lines within the project area buried. The industry is continuing to test new measures to reduce bird kills and to put into effect those that are helpful.

Even sites with high use by protected species need not necessarily be off limits to wind. At Foote Creek Rim in Wyoming, pre-construction surveys found that golden eagles frequently used the mesa's edge for hunting. The wind farm developer voluntarily redesigned the site to move the planned turbines 50 meters away from the rim, and the subsequent number of eagle deaths at the site was so small that the technical advisory committee was discontinued. A baseline and final mortality study for this project can be found at http://www.west-inc.com/wind_reports.php.

Following the realization that a problem existed with raptor kills in Altamont Pass, the wind industry has gone on to establish a record of building projects across the U.S. that are safe for birds. The industry has now responded rapidly to the discovery of a similar problem with bats in Appalachia.

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Continued...

Wind Energy and Wildlife

Bats and Wind Energy Cooperative

Bats can also collide with wind turbines. Before 2003, bat fatalities at wind farms were also generally low. However, in 2003, avian studies at a new wind power plant in West Virginia discovered bat kills in numbers much larger than previously known. Since then, fatalities have been documented at higher than expected rates in Pennsylvania, Alberta, New York State and some other locations. After the initial 2003 discoveries, supporters of wind energy and bats reacted quickly, forming a new organization, the Bats & Wind Energy Cooperative (BWEC), in late 2003. BWEC includes AWEA, Bat Conservation International, the U.S. Fish and Wildlife Service and the U.S. Department of Energy's National Renewable Energy Laboratory. This initiative raises millions of dollars to fund studies designed to reduce bat mortality. BWEC is focused on finding good site screening tools and testing mitigation measures, including ultrasonic deterrent devices to warn bats away from turbines. More information on the research efforts of the Bats and Wind Energy Cooperative can be found on its website: http://www.batsandwind.org/.

AWEA's Siting Handbook

AWEA's Siting Handbook (www.awea.org/sitinghandbook) is an online resource with extensive links to additional information. The Siting Handbook is designed to provide technical information and useful tools based on the industry's collective experience in siting wind energy projects. Information on the types of possible project impacts, the various studies a developer can commission to understand those impacts and methods to mitigate them are also included.

Environmental Impacts

New wind projects are carefully planned to minimize environmental impact, even though wind is already one of the cleanest, most environmentally friendly energy sources because it emits no air or water pollutants or greenhouse gases, requires no mining or drilling for fuel, uses no water and produces no toxic waste.

The wind industry welcomes scrutiny of, and comparison with, all of the impacts of all sources of electricity generation. Many extensive studies of bird collisions at wind farms have been carried out, a practice that stands in marked contrast to the lack of any systematic effort to monitor direct impacts on avian species from mining and drilling, power plant emissions or pollution, or habitat loss brought on by these activities. Any public or private research effort, regulatory effort or legislative proposal designed to quantify the impact of power generation on birds, bats and other wildlife should encompass all electricity sources - not just wind.

Environmental Impacts of Electricity Sources

	Wind	Nuclear	Coal	Natural Gas
Global Warming Pollution	None	None	Yes	Yes
Air Pollution	None	None	Yes	Limited
Mercury	None	None	Yes	None
Mining/Extraction	None	Yes	Yes	Yes
Waste	None	Yes	Yes	None
Water Use	None	Yes	Yes	Yes
Habitat Impacts	Yes	Yes	Yes	Yes

AWEA AMERICAN WIND ENERGY ASSOCIATION

Wind Energy and Wildlife

The list of environmental and wildlife impacts of other energy sources is long and varied, including:

- Habitat impacts from mining (coal, uranium), drilling (natural gas, oil), and compressing fuel (natural gas). Some of these effects are local, while others can extend over fairly broad areas.
- Habitat impacts from air and water pollution: acid rain, smog, mercury, drilling wastewater disposal (fossil fuels).
- Habitat impacts from global warming (fossil fuels). Significant changes in some species' ranges are already occurring, particularly in northern latitudes.
- Habitat impacts from thermal pollution of water (nuclear and fossil power plants).
- Habitat impacts from flooding of land and streamflow changes (hydro).
- Habitat impacts from waste disposal (coal).

While wind plants and their construction definitely have local impacts, the use of wind energy largely avoids these more far-reaching effects. The picture with human health impacts is similar. Air pollution in particular has been linked to a number of human ailments, including heart and lung problems. Greater use of wind energy will reduce these concerns.

Commitment to Wildlife Protection

The industry has been conducting avian studies at wind sites across the country for more than 20 years. Pre-construction wildlife surveys are common practice throughout the industry. Typically a wildlife consultant is retained, and efforts are made to contact state and federal fish and wildlife agencies and local wildlife groups (e.g., Audubon chapters, Izaak Walton League chapters) to identify any issues of possible concern. The consultant examines the proposed site and prepares a detailed report on impacts for review by the developer. Post-construction monitoring of bird kills at several wind sites in a wide variety of geographic locations (Vansycle Ridge, Oregon; Ponnequin, Colorado; Foote Creek Rim, Wyoming; Buffalo Ridge, Minnesota; Searsburg, Vermont; Garrett, Pennsylvania) has validated the industry's ability to assess risk to birds and build safe projects.

Land Use and Wildlife Habitat

All fuel extraction and energy generation activities affect habitat and land use. Mining, drilling, fuel transportation and waste treatment for fossil fuels can all be land-intensive activities, while pollution from fossil fuel combustion can affect broad geographic areas. A wind energy project can also be land-intensive, but the land is used quite differently. The "fuel extraction" and electricity generation take place at the same site year after year. Wind projects occupy anywhere from 28-83 acres per megawatt depending on local terrain, but only 2-5% of the project area is needed for turbine foundations, roads or other infrastructure.

Habitat fragmentation can occur at projects in relatively pristine areas due to trees being removed around turbines; also, new "edges" created in a forest (when parts of it are cleared for turbines or service roads) are detrimental to some species, and the presence of turbines causes some species or individual animals to avoid previously viable habitats. The wind energy industry is partnering with conservation groups and government agencies to avoid, minimize and mitigate these impacts where possible.

Given wind energy's very low environmental impact (no air or water pollution, no global warming pollutants, no waste) compared with other energy sources, it should remain the energy source of choice for anyone concerned about preserving the natural environment.


FORWARD
E PLURIBUS UNUM

The Shop Consulting

TO: Curt Bjurlin
FROM: Lance Walter
DATE: May 21, 2008
RE: Evansville Public Opinion Survey Questions

This memo is intended to answer question raised concerning some details about the survey conducted in the Evansville area on April 14-16, 2008. It is worth noting that most all of this information was contained in a letter and memo distributed to all elected officials in the Town of Union, City of Evansville and Rock County on May 1, 2008.

The Shop Consulting works with a wide variety of clients and pollsters and regularly assists in poll development. The Shop Consulting routinely provides technical support and raw data for polls samples to pollsters conducting surveys in Wisconsin.

Who conducted the poll?
Forward Strategies
Contact: Joel Gratz
608-250-5805

What was the purpose of the poll?
This was a very straightforward, short and simple poll designed to measure the level of support for constructing a wind project in the community. The poll was not designed to bias the caller in any manner about the project. In order to achieve this goal the script not only included a general question about support for wind energy, but also re-asked the question after using both positive and negative arguments commonly used in the debate over wind turbine sighting. The final script is available for review and I understand you have provided it to interested parties.

It is worth noting here that these results were consistent with other polls on this issue that have been performed in other areas also discussing the siting of wind projects in their communities and conducted by different firms. Ultimately, the debate over siting wind turbines is often dominated by a few very vocal residents in opposition of the project and providing local decision makers with a statistically valid poll on the issue may be the only accurate guage of public opinion available to them as they evaluate what the community as a whole thinks.

What was the range of the poll and how was the universe of callers selected?
The geographic area polled was the Evansville Water and Light Service Area. This is the universe of people that would be directly served by this project. This area was defined by a map provided by:

Pete Johnson, EIT
Staff Engineer
Forster Electrical Engineering
550 North Burr Oak Ave.
Oregon, WI 53575

The Shop Consulting

Using GIS technology all registered voters within this service area with valid phone numbers were identified and provided to the pollster. Information provided included municipality. The pollster then selected a random sample from this list that was representative of the population. Additional details about the exact process used to generate the random selection should be directed to the pollster.

The pollster was able to complete 349 surveys April 14-16 in this poll that produced an industry acceptable margin of error of +/- 4.63%.

After the poll results were available in whole and broken down by three areas, Town of Union, City of Evansville and all remaining area. These results have been provided and were also detailed in the correspondence to all elected officials.

A map of the area of the survey is also provided with this memo.

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