

SOCIAL AND ECONOMIC IMPACTS OF WIND POWER IN CORELATION WITH THE FINANCIAL CRISES

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Given the present day and age we live in, it is vital that the world considers the various natural resources available to us and how to best make use of them. Furthermore, it is imperative nowadays to look at the many environmentally friendly energy sources which will reduce the ill effects of global warming and provide a host of economic and social benefits too. One such beneficial resource is wind and the consequent conversion of wind energy into electricity. In fact, the advantages of wind energy are so immense that even the government has begun promoting it. Since generating electricity from wind doesn't emit any green house gases or produce any particulate emissions, it massively reduces the rate of global climate change, and at the same time doesn't contaminate our water resources such as lakes and reservoirs.

Wind energy provides security and stability in the national consumer energy market. By reducing a nation's dependency on foreign fossil fuels, such as coal and natural gas, spikes in fossil fuel costs or other supply disruptions will not have as much of an adverse impact on the national economy. Also the price of wind energy is relatively stable because there are no fuel costs, which is a major operating expense for most coal and gas fired electric generation facilities. Although wind farms occupy large swaths of land, wind turbine towers themselves take up less space, only a few meters at their base. This leaves space to utilize the land around the turbine tower for several other purposes, such as ranching or agriculture.

The application of advanced technologies has succeeded in making the conversion of wind energy much more resourceful and well-organized. Furthermore, wind is a proven clean, free and renewable form of energy that preserves our natural resources.

Wind energy conserves water resources as wind farms virtually require no cooling, as opposed to natural gas, coal and nuclear power plants that require a tremendous amount of water for cooling. In fact, electricity generation is the leading contributor to water withdrawals from our nation's water reservoirs.

Since wind turbines come in an array of different sizes, they are a great resource to generate energy in remote locations to support varying population levels.

The use of wind energy reduces Greenhouse Gas emissions, and increases security and stability by diversifying the national electricity portfolio.

Apart from environmental profits, there are many social and economic advantages too in promoting wind energy. One of these is that the promotion of wind energy assists in revitalizing rural economies, thereby creating jobs at the ground level, such as assembly workers, surveyors, engineers, lawyers, bankers, technicians, to name just a few. In doing so, it also benefits local communities, mainly in the form of property tax revenues and new types of income for landowners through land lease payments.

Keywords : wind energy, alternative source, ecological advantages

1. Wind energy, environmental impact

Wind energy is considered a green power technology because it has only minor impacts on the environment. Wind energy plants produce no air pollutants or greenhouse gases. However, any means of energy production impacts the environment in some way, and wind energy is no different.

Aesthetics and Visual Impacts – Elements that influence visual impacts include the spacing, design, and uniformity of the turbines.

Birds and Other Living Resources – Preconstruction surveys can indicate whether birds or other living resources are likely to be affected by wind turbines.

Global Warming – Wind energy can help fight global warming. Wind turbines produce no air emissions or greenhouse gases.

Lightning – Ongoing research and increased operator experience are improving the understanding of lightning and wind turbines.

Noise – Like all mechanical systems, wind turbines produce some noise when they operate. In recent years, engineers have made design changes to reduce the noise from wind turbines.

TV / Radio Interference – In the past, older turbines with metal blades caused television interference in areas near the turbine. Interference from modern turbines is unlikely because many components formerly made of metal are now made from composites.

2. Why Wind Energy?

Wind turbines of all sizes have become a familiar sight around the world for a wide variety of reasons, including their economic, environmental, and social benefits. The potential for wind energy is immense, and experts suggest wind power can supply up to 20% of U.S. and world electricity. Nevertheless, the United States currently produces less than 1% of our electricity from wind. The advantages and disadvantages of wind energy are detailed here to help you decide what the future of wind should be in the United States.

Economic Advantages

a) **Revitalizes Rural Economies:** Wind energy can diversify the economies of rural communities, adding to the tax base and providing new types of income. Wind turbines can add a new source of property taxes in rural areas that otherwise have a hard time attracting new industry. Each 100 MW of wind development in southwest Minnesota has generated about \$1 million per year in property tax revenue and about \$250,000 per year in direct lease payments to landowners.

b) **Fewer subsidies:** All energy systems are subsidized, and wind is no exception. However, wind receives considerably less than other forms of energy. According to Renewable Energy World magazine, conventional energy receives US\$300 billion in subsidies per year, while renewable energy has received less than US\$20 billion of taxpayers money in the last 30 years.

c) **Free Fuel:** Unlike other forms of electrical generation where fuel is shipped to a processing plant, wind energy generates electricity at the source of fuel. Wind is a native

fuel that does not need to be mined or transported, taking two expensive aspects out of long-term energy costs.

d) Price Stability: The price of electricity from fossil fuels and nuclear power can fluctuate greatly due to highly variable mining and transportation costs. Wind can help buffer these costs because the price of fuel is fixed and free.

e) Promotes Cost-Effective Energy Production: The cost of wind-generated electricity has fallen and today is depending on wind speed and project size.

f) Creates Jobs: Wind energy projects create new short and long term jobs. Related employment ranges from meteorologists and surveyors to structural engineers, assembly workers, lawyers, bankers, and technicians. Wind energy creates 30% more jobs than a coal plant and 66% more than a nuclear power plant per unit of energy generated.

Social Advantages

a) National Security/Energy Independence: Wind turbines diversify our energy portfolio and reduce our dependence on foreign fossil fuel. Wind energy is homegrown electricity, and can help control spikes in fossil fuel cost. Distributed generation facilities, like many community wind projects, provide a safeguard against potential terrorist threats to power plants.

b) Supports Agriculture: It is not often a new crop emerges from thin air. Wind turbines can be installed amid cropland without interfering with people, livestock, or production.

c) Local Ownership: A significant contribution to the worldwide energy mix can be made by small clusters of turbines or even single turbines, operated by local landowners and small businesses. Developing local sources of electricity means we import less fuel from other states, regions, and nations. It also means our energy dollars are plowed back into the local economy.

Environmental Advantages

a) Clean Water: Turbines produce no particulate emissions that contribute to mercury contamination in our lakes and streams. Wind energy also conserves water resources. For example, producing the same amount of electricity can take about 600 times more water with nuclear power than wind, and about 500 times more water with coal than wind.

b) Clean Air: Other sources of electricity produce harmful particulate emissions which contribute to global climate change and acid rain. Wind energy is pollution free.

c) Mining & Transportation: Harvesting the wind preserves our resources because there is no need for destructive resource mining or fuel transportation to a processing facility.

d) Land Preservation: Wind farms are spaced over a large geographic area, but their actual "footprint" covers only a small portion of the land resulting in a minimum impact on crop production or livestock grazing. Large buildings cannot be built near the turbine, thus wind farms preserve open space.

3. Disadvantages

a) A Variable Resource: Turbines produce electricity only when the wind blows. This variability is monitored and compensated in the same way utilities monitor demand changes each day, so there are not any actual changes in power supply for the end users.

b) Aesthetics: People have widely varied reactions to seeing wind turbines on the landscape. Some people see graceful symbols of economic development and

environmental progress or sleek icons of modern technology. Others might see industrial encroachment in natural and rural landscapes. There are many ways to minimize the visual impact of wind turbines, including painting them a neutral color, arraying them in a visually pleasing manner, and designing each turbine uniformly.

c) Shadow Flicker: Shadow flicker occurs when the blades of the rotor cast a shadow. Research has shown the worst-case conditions would affect, by way of light alteration, neighboring residents a total of 100 minutes per year, and only 20 minutes per year under normal circumstances.

d) Noise: Wind turbines are not silent. The sounds they produce are typically foreign to the rural settings where wind turbines are most often used, but as turbine technology has improved over the years, the amount of noise has fallen considerably. The sounds of wind turbines do not interfere with normal activities, such as quietly talking to one's neighbor.

e) Biological Resource Impacts: As with any construction project or large structure, wind energy can impact plants and animals, depending on the sensitivity of the area. Direct fatalities from collisions or electrocutions and loss of wildlife habitat and natural vegetation are the primary wildlife concerns associated with wind energy. Extensive environmental impact analysis are integral of project development to mitigate impacts as much as possible.

f) Construction: Wind systems can involve the transportation of large and heavy equipment. This can cause a large temporarily disturbed area near the turbines. Erosion is another potential environmental problem that can stem from construction projects. The single most reliable technique for limiting erosion is to avoid grading roads and to perform site reclamation post construction.

g) Radar: Radar interference by wind turbines is rare and easily avoided through technological improvements and proper siting of turbines that are close to sensitive areas. A number of U.S. government installations have both wind turbines and functional radar, and the British military has a track record of successfully addressing these challenges.

4. Impact of Financial Crisis on Wind Energy Installations Globally

Global Wind Energy Market Analysis and Forecasts to 2020 report gives details historical and current statistics relating to wind energy installed capacities and their growth scenarios until the year 2020. It also provides an analysis of the historical and forecast growth of installed capacity, and the market structure and regulatory policies that govern the world's key wind power countries. The report further includes information relating to the important cost, technological, market, and research and development trends on a global basis. It also analyzes the wind power deals that have taken place over the years and gives detailed profiles of the top five market players for each of the sub-sectors in the global wind energy industry. The report facilitates market analysis and forecasting of future wind energy industry trends. It helps identifying growth segments and opportunities in the energy industry. The news and deals portfolio provided in the report helps an investor to gauge the global wind energy market and accordingly direct their investment. Of the available renewable energy sources, wind is the most established commercial generating technology with highly effective and reliable equipment and machinery. It has observed tremendous growth, with the total installed capacity augmenting from 23,900 MW in 2001 to over 121,013 MW in 2008, reflecting an annual growth rate of 26% for the 2001 - 2008 period.

Annual Wind Energy Installations to be impacted by the Financial Crisis. The current financial crisis is severely affecting the growth of wind energy globally. The global wind energy industry is witnessing many cancellations of turbine orders, freezing up and sale of wind farms, and difficulties in securing financial aid for new projects. The worldwide annual wind energy installations will trickle down by more than 15% in the years 2009 and 2010, as against the growth rate of 35% in the new installed capacity of 2008, according to the report. This will further result in a dip in the demand for wind turbines. Increasing Mergers and Acquisitions to be the Outcome of Financial Crisis Wind farms are capital-heavy projects with significant up-front investment that can be financed only by large utilities and investment groups. The critical short-term challenge faced by most wind power developers is financing, particularly for under development projects. The economic downturn, resulting in the failure of some of the world's largest investment banks, has led to an increase in the cost of capital for wind energy projects. Against this backdrop, only a few large wind power companies will be in a position to pursue their project development plans. Shortage of financial resources with smaller players would give an opportunity to the big giants to takeover or form alliances with such companies, thereby increasing the level of consolidation in the wind energy industry.

Declining Share of Europe in By Region Break-up of Wind Energy Capacity

Though Europe is the leading region in terms of the current global cumulative wind energy installed capacity its share in the world's wind energy industry has dropped from over 73% in 2001 to 61% in 2007 and 54% in 2008. Also, the faster rate of wind energy growth in the US, China, India and Canada is increasing the share of the North American and Asia-Pacific regions in the global wind energy industry.

5. Wind Energy Today and Tomorrow

In just a few short decades wind energy has matured dramatically, making wind one of the fastest growing sources of electricity in the world today. Due to technological advancements, policy initiatives, and economic drivers, wind energy is now able to make a cost-competitive contribution to our growing energy needs. Wind Turbine Technology Turbines today are sleek and slender machines, a far cry from their bucolic wooden ancestors. Around the world, wind turbines of all sizes have become a familiar sight; ranging from home or farm-scale machines of 1 kilowatt, all the way up to arrays of large 3 megawatt machines. Modern wind turbines are up to the task of producing serious amounts of electricity. A popular sized machine in the U.S. today is a state-of-the-art 2 MW turbine that stands as tall as a 30-story building and costs roughly \$3.5 million installed. With a good wind resource, this size turbine can produce 6 million kWh of electricity each year, or enough energy to run 600 average. american households.

Wind Energy Around the Globe

Turbines are sprouting up around the globe in record numbers. By the end of 2007, there were nearly 94,000 MW of wind installed around the world, which is a significant rise from the 59,000 MW installed in 2005. The pace of growth is now greatest in the United States, where installed wind energy capacity grew by 45% in 2007. This growth makes the US the leading nation in new capacity installed for wind energy. Yet Germany continues to have the highest total wind capacity of any country with 22.3 GW. The U.S. is right behind them with 16.8 GW of total installed capacity and it is expected that the

U.S. will overtake Germany as the leader in installed wind capacity. The recent boom in renewable energy investment, including wind energy generation, is being aided through progressive policies and widespread public support.

In summary

The advancement of large-scale wind turbines has created energy that in some cases is cheap enough to compete with traditional electricity. Still in its early stages, wind power technology has the potential to greatly impact the economy, steering the United States and Europe from dependency on foreign oil to diversified energy sources. Wind power, no longer considered an alternative fuel, has found its way into the mainstream in certain regions of the country. As energy prices continue to rise and the world becomes increasingly aware of greenhouse gasses, wind power's popularity has grown.

The generation of wind power is directly proportionate to the amount of wind that exists in the environment, not demand. This is a major factor that prevents wind power from becoming the prevailing form of energy used in Europe and elsewhere.

You might think that since wind is a free resource, wind energy should be free or inexpensive. However, the infrastructure required to harness and transmit this energy carries a cost that is passed down to consumers. The popularity of wind turbines has risen, with celebrities such as Jay Leno adding smaller ones to building roofs. But these smaller devices are a long way from providing a viable amount of energy.

Technological advancements and supportive policy measures have the ability to drastically increase the future of wind energy development in our nation and our world. Wind power has the unique ability to provide even greater sources of distributed energy production, which means less risk and a stronger energy portfolio. America's ingenuity and drive for independence are well suited to increased wind energy development in the future. Stay tuned to advancements at industry and policy levels as wind energy continues to grow. For the sake of national security, rural economic revitalization, and resource preservation we must promote a renewable energy economy. Wind power can be a cornerstone of that sustainable energy future because it is affordable, provides jobs, substantial and distributed revenue, and treads lightly on our environment without causing pollution, generating hazardous wastes, or depleting natural resources. Embracing wind energy today will lay the foundation for a healthy society.

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