

Wind Energy as an Alternative Energy Resource

Geology 101

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Abstract

Wind energy is an innovative alternative energy resource used for electricity generation. Wind farms on shore and off shore provide clean, *emmission* free energy with benefits such as economic competition, water conservation, and renewable and environmental energy. Wind turbines are creating concern for ecological habitats and wildlife through increasing bird and bat mortality rates. Methods of preservation and improvement of wind farms are *occurring* through ecological safety organizations. Wind energy has negative and positive effects on Earth and is greatly expanding throughout the United States.

words in red are misspelled, caught by Word

Society is discovering new and effective alternative energy sources such as wind, solar, and geothermal energy in order to use our resources effectively without depleting the Earth and causing pollution. Wind energy has many benefits as a clean environmental alternative. Electricity from wind is a new and innovative form of technology with rapid growth of about 30% per year since 2005 (Sojda, 2008). The United States looks to resources such as alternative energy sources as a domestically available priority. The United States alone is planning on projecting over 155,000 turbines through out its landscape (Sodja, 2008).

Although wind energy has many benefits there are concerns due to the conflicts between turbines and wildlife. Wind farms cover the globe with turbines standing several *hundered* feet high and blades at least hundred feet long (Sodja, 2008). The mortality rate of birds and bats is greatly affected by wind turbines (Sojda, 2008). The sustainable alternative energy resource of wind energy comes with the price of species habitat disruption.

Significance

Benifits

Wind energy proves significant due to its inexpensive and clean process. There are many benefits to wind energy including economic development, renewability of wind energy, conservation of water and emissions during operation, and low environmental impact on humans and land. Wind energy is seen as a better alternative to coal-burning power plants because it does not cause air pollution and green house gases. As well as staying clear of the disposal of nuclear waste, wind energy is an effective alternative energy source.

Wind energy creates economic competition because it is favorable over coal and gas which are less friendly to the environment and are expensive for the community. The Colorado Public Service *Commision* determined wind energy to be the lowest cost of any resource

submitted to a solicitation bid by Xcel Energy, and unlike any other generation resource, wind energy does not create a future risk of increased fuel prices (National Renewable Energy Laboratory, 2005). Wind energy is a cost effective alternative for the economy.

Wind energy provides conservation for water because wind turbines do not consume water. Wind energy is different from most other electricity generation sources which use large amounts of water for the cooling of fossil and nuclear fuels. Approximately 77% of the United States fresh water use is for irrigation and electric generation, so wind energy is an effective alternative for *draught-stricken* areas of the world (National Renewable Energy Laboratory, 2005).

There are environmental and renewable *benefits* through the use of wind energy. There are no *emissions* of wind energy which helps to decrease the contribution of acid rain and snow, global climate change, mercury contamination, smog, and regional haze (National Renewable Energy Laboratory, 2005). Different from conventional fossil fuels, wind energy is renewable and abundant which proves *beneficial* for future generations (National Renewable Energy Laboratory, 2005).

Concerns

Although wind energy provides benefits for people and landscape, there are environmental concerns of bird and bat mortalities, species habitat disruption, and migratory bird routes (Sojda, 2008). This creates a *dilemma* between wildlife and wind energy that is difficult to tamper with because bird migration is so vast in terms of landscape and the development of wind turbines.

The death rate of birds and bats is rapidly increasing because of the expansive growth of wind turbines. Thousands of migratory birds are killed *annually* by the wind turbine rotors during

migration. This includes birds that are endangered and threatened determined by the Endangered Species Act (Sojda, 2008). Recent studies reveal large numbers of migratory tree-roosting bats that are killed due to these wind power facilities, mainly in the eastern United States (Arnett, Horn, Kunz, 2008). A study conducted at the Mountaineer Wind Energy Center in Tucker County, West Virginia, USA traced the flight behavior of migratory tree bats. Bats were seen to be foraging near operating turbines creating an even larger danger in terms of location. Utility-scale amounts of bats were found injured or dead beneath wind turbines, proving wind energy to be a significant threat to these creatures (Arnett 'et al,' 2008).

Natural environmental habitats are being disrupted and fragmented *through* the development of wind farms. The Western Governors' Association's Wind Task Force Report estimated that 50 to 70 wind towers, roads, and ancillary facilities that make up a wind farm cover about 5,000 acres (Sodja, 2008). Such large amounts of land devoted to wind farms in remote areas have threatening affects on the ecological habitats of wildlife.

Wind farms alter or end the routes of birds and bats migration. Birds crossing wind farm areas change their route to *avoid* light and blades in the air which changes their natural migration patterns (Sodja, 2008). Bats have been found trapped in the blade-tip vortices and struck directly by the rotating blades of wind turbines during their flights (Arnett 'et al,' 2008).

Data

Methods

Methods for improvement of wind energy structures in order to preserve the wildlife of birds and bats include long terms objectives to develop a model of important landscapes and how birds use them in order to make decisions on wind farm sites that are more protective of bird *speices*, both in flight and on land (Sodja, 2008).

Research organizations such as the Northern Rocky Mountain Science Center are creating developments to address bird migration elevations in terms of wind turbines, a risk assessment support system for wildlife friendly wind power, turbine management to minimize mortality, and alternative turbine development locations (Sojda, 2008).

Expansion

World's first deep water wind farm located in the Beatrice Field off the northeast coast of Scotland (Wayman, 2008).



In the United States, after natural gas wind energy is the second biggest source of new energy, says Mark Jacobson, an atmospheric scientist for Stanford (Wayman, 2008). The American Wind Energy Association (AWEA) estimates that last year, 30% of all new energy came from wind (Wayman, 2008). Today high winds are decreasing in rural areas and are mainly located in Texas and California. A new alternative to wind farms on shore are wind farms in coastal areas off shore. Members of the National Renewable Energy Laboratory estimate that offshore winds have the ability to account for 90% of the country's current electrical capacity (Wayman, 2008). Expansion in European countries bordering the North Sea have already started off shore wind farms and are said to have a higher performance with strong and constant wind.

Expansion is a delicate matter in terms of exploitation of the world's oceans. However, moving wind farms from land to offshore locations proves to be more effective. This is partly because trees, hills, and structures do not get in the way of blowing winds if located at sea, says Willet Kempton, a marine policy *scientis* (Wayman, 2008). Wildlife has not been accounted for in terms of research for offshore wind farms. The affects of migration do cross over seas and could increase the wildlife death toll.

Wind energy provides significant benefits as compared to other *electricity* generators such as economic development, conservation of water and emissions, renewability of wind energy, and low environmental impact on humans and land. However, the environmental impacts on wildlife such as bats and birds are greatly *devastating*. Birds and bats mortality rates are increasing and wind turbines are affecting migratory bird routes. Organizations of ecological protection and wildlife safety are making an effort to improve the conditions of wind farms in order to help sustain the lives of many endangered and threatened wildlife. Wind energy on shore and off shore is continuing to expand and aid in the world's electricity capabilities.

References

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- Is the topic one that can be adequately covered in the assigned length?
- Is innovation shown in choosing a topic and presenting it?
- Is the paper interesting to read?
- Does the paper emphasize concepts over terminology?

Organization and presentation of subject matter: (20 points) 15

- Are all parts present: title page, abstract, body of **at least five (5) pages**, references?
- Does the paper adequately cover its topic?
- Is its purpose clearly defined?
- Does the writer show good knowledge of the subject?
- Does the paper read like a serious, scientific paper?
- Is the paper well thought out?

Use of evidence to support paper's thesis: (20 points) 16

- Are points or discussions illustrated with good examples?
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- Does the discussion not raise unasked questions?
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- Does the paper read well?
- Is it relatively free of grammatical errors?
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- Do the references indicate thorough research/thought?
- Are the references valid and reproducible?

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- YES 5, NO 0