

Environmental Issues of Utility Scale Wind Power

Environmental Benefits of Wind Power

Wind power is a clean and renewable resource. It produces no air emissions and uses no water or fossil fuels for energy production. It does not contribute any fine particulate matter or ozone precursors, which is critical as Ohio currently has numerous counties that are in non-attainment for the fine particulate matter (PM2.5) and 8-hour ozone standards. Compared to many other standard methods of creating electricity, wind energy is much cleaner. In 2004, Ohio ranked first in the nation for emissions of sulfur dioxide and nitrogen oxide from the electric power industry (see chart below).

2004 Ohio Electric Power Industry Emission Estimates and National Rankings

	Thousand Metric Tons	National Rank
Sulfur Dioxide	1,050	1st
Nitrogen Oxide	254	1st
Carbon Dioxide	1830	3rd

Source: Energy Information Association. 2004. Ohio Electricity Profile. http://www.eia.doe.gov/cneaflectricity/st_profiles/ohio.html

There is definite potential for harnessing wind power in Ohio, which could potentially help to offset emissions of gases that are hazardous to human health and the environment. For example, the increasing rate of carbon dioxide in the atmosphere is widely accepted as the leading cause of global climate change, and sulfur dioxide is known to cause acid rain. Fossil fuel-based power plants are responsible for two-thirds of all mercury emissions in Ohio leading to direct and indirect wildlife mortality, numerous fish advisories for Ohio's waterways, and long-term environmental impacts. As Ohio's demand for energy increases, wind power could partially offset the need to construct new fossil fuel-based power plants.

Environmental Concerns of Wind Power

Wind facilities, as well as other forms of electric generation, have the potential for both direct and indirect wildlife impacts. With the realization that all of our daily activities impact the environment, understanding the magnitude of impact created by developing wind energy (versus other forms of energy) will help better define the industry's responsibilities to address these environmental concerns. Several individual wind power facilities have been documented to kill large numbers of birds and/or bats. Older styles of turbines in California with small, fast spinning blades and lattice bases were particularly bad for raptors that lived in and migrated through this region. While this model of turbine is not typically used for utility scale wind anymore, newer monopole turbines at several locations in the forested ridgetops of the midwest/eastern U.S. have resulted in high levels of bat mortality. Compared to historical wind power facilities, current facilities are using new wind turbine and blade technology and improved siting processes, in part to reduce wildlife impacts.

Present and emerging technological advances in the wind industry have and continue to increase awareness and interest in reducing potential wildlife conflict and will help to further lessen bird and bat impacts from new wind turbines. Still, careful and thoughtful site development must remain essential to avoid and minimize wildlife impacts. Furthermore, aside from mortality, birds, bats, and other wildlife may be displaced from areas of former habitat when wind turbines are installed. The number of turbine installations in any given area can be an important factor to consider. However, economies of scale often require wind-generating facilities to be composed of a large number of turbines spread over a wide area, which may create a barrier to travel for some species of wildlife. It is thought that wind turbine siting is the most significant factor in determining whether or not wildlife may be impacted. Ohio supports a rich diversity of wildlife, including birds and bats, some of which are protected by state and/or federal law. Some areas of Ohio, the marshes along western Lake Erie for example, are especially significant wildlife habitat, while predominantly urban or agricultural areas may not provide much suitable wildlife habitat.

Presently, there is a need for further research in terms of wind turbines' potential risk to migratory birds, bats and other wildlife species. Thus, to avoid and minimize situations where species could be impacted, it is generally recommended that wind turbines be sited as far as possible from high quality wildlife habitat areas such as wildlife refuges, streams, wetlands, lakes (including Lake Erie), and forests. Maps have been created by state and federal wildlife agencies to indicate areas of concern relative to wildlife and wind power development. These maps need to continue to be refined to most accurately reflect possible wildlife-turbine interactions as new information becomes available, and can be found on the Ohio Wind Working Group's website. Furthermore, studies are proposed in Ohio over the next few years to gain additional information on bird and bat use of different habitat types near Ohio's Lake Erie shoreline, where wind speed and bird numbers and diversity are greatest. Anyone proposing a wind power development in Ohio is encouraged to contact state and federal wildlife agencies to determine to what degree wildlife issues should be addressed. Funding methods (both public and private) should be discussed at an early stage and coordinated to facilitate good science and a streamlined process that does not unnecessarily hinder the responsible siting of projects.

Offshore (in-water) siting of wind turbines in Lake Erie is also being considered since wind speed over the water is generally greater than wind speed over the land. Siting of turbines in Lake Erie requires careful consideration of the ecological impacts that would occur due to turbine, transmission line, and associated infrastructure construction and operation. Because any project impacting Lake Erie (or other waters of the United States in Ohio) is regulated by the U.S. Army Corps of Engineers, Ohio Environmental Protection Agency, and Ohio Department of Natural Resources, any offshore wind project would be subject to the National Environmental Policy Act (NEPA), which requires careful evaluation of environmental impacts. Some examples of issues that must be considered include the following: the impact of the facility installation with respect to the benthic (lake bottom) environment; the impact noise and vibration generated during operation pose on the fisheries; turbine stability and operational patterns when impacted by ice flow accumulation and ice movement; and, the impact on migrating birds and resident waterfowl crossing the lake. Answers to these questions are important if offshore wind power development in Lake Erie is to be realized. For additional information, an explanation of NEPA can be found on the Ohio Wind Working Group's website.

Ohio also has the opportunity to review research completed or monitor on-going studies to gain a better understanding of the issues associated with wind development. For example, the Danish Energy Authority recently completed an offshore wind study in Europe. This multi-year environmental review of several offshore wind farms in Denmark has been issued in a final report titled “Danish Offshore Wind – Key Environmental Issues” and is located on the Ohio Wind Working Group’s website.

While wind power does have some environmental impact, so does every other form of energy production (as briefly mentioned in the opening paragraph). It is essential to weigh all the of the positive and negative effects of wind power compared to other forms of energy production to gain a better overall picture of the proportional impact wind turbines have on the environment now and in the future.

For More Information

For more information on environmental issues relative to wind power please see the Ohio Wind Working Group Environmental Action Team’s website:
<http://ohiowind.org/InsideOWWG/ActionTeams/EnvironmentalActionTeam.html>