



## Wind Energy Environmental Issues

*Wind power does not require fuel, create pollution or consume scarce resources.*

Wind energy has recently received renewed attention, in part because of its environmental advantages over conventional power plants fueled on coal, oil or natural gas. Wind power does not require fuel, create pollution or toxic waste or consume scarce resources. Despite these ideal characteristics, other effects of wind power can raise environmental and community concerns. Wind turbines generate noise and can be visually intrusive for nearby residents. They also can disturb wildlife and cause injury or death to birds.

In most cases, these and other potential problems can be mitigated through conscientious planning, research and early and frequent consultation with affected communities. Utilities, government agencies, environmental organizations and others must work together to ensure that serious issues are addressed thoroughly and effectively early in the development process.

Building a wind plant involves land clearing, construction of roads and transmission lines, and truck traffic. Wind turbines stand 30 to 50 meters above the ground, not including the blade rotor, which can extend to 50 meters in diameter. Highly visible turbines, often grouped by the dozen, sit on conspicuous ridges or hilltops.

Objections to the visual impact of wind turbines depend partly on location. Midwestern agricultural communities generally have welcomed wind projects. Windmills were common on American farms until the mid-20th century, and landowners are attracted to economic benefits of land rents and fees paid by plant owners. Wind projects located near more densely populated residential areas have occasionally roused opposition. In a few cases, nearby residents have objected to the aesthetic effects on foothill vistas.

*Community education about wind energy and its benefits can generate local support.*

Aesthetic concerns may be addressed through the use of modern turbines -- tubular towers and sleek, minimalist features contribute to a more attractive appearance. Further, some developers try to arrange a wind plant's turbines in an orderly fashion, giving a more purposeful and efficient appearance. Following the contours of a ridge, for example, helps turbines blend into the surroundings. Avoiding construction of conspicuous roads and clearings, burying transmission lines, and hiding buildings and structures behind ridges or vegetation are also prudent steps. Finally, educating nearby communities prior to construction about wind energy and its benefits can reduce opposition to visual effects.

Noise is another factor in wind projects siting. Residents who live within several hundred feet of a small plant or individual turbine may experience minor noise disturbance. Noise issues may be mitigated through zoning ordinances that specify allowable noise levels and distances between turbines and residential areas. Progress in turbine design also has reduced noise significantly since the first machines were installed in the early 1980s. Overall, wind turbine noise should be of minor concern to communities considering wind development today.

The potential effects of wind energy projects on wildlife and the environment first gained attention in the late 1980s. Birds -- especially federally protected golden eagles -- and red-tailed hawks -- were being killed

by wind turbines and high-voltage transmission lines near California's Altamont Pass. This sparked opposition to the project from environmental activists and aroused concern from the U.S. Fish and Wildlife Service.

*It is important to determine the effects a wind plant will have on bird populations.*

It is likely that serious conflicts with birds will be confined mainly to areas where large numbers of birds congregate or migrate, or where protected species are affected. Unfortunately, many of the traits that characterize good wind sites also are attractive to birds. Birds and wind turbines, however, are not completely incompatible. Research on bird populations and migratory patterns can indicate the potential effects of turbine placement. It is important to determine if the presence of a wind plant will result in a significant decrease in the total population of a bird species. In some cases, research will have to be augmented with continued monitoring during construction and operation to ensure wildlife safety.

For wind plants currently experiencing bird conflicts, the immediate task is to find practical measures to reduce bird deaths and injuries. Mitigation proposals include changing the color of wind turbine blades, using tubular towers with diagonal stringers, eliminating places for birds to perch on the towers (especially perches near uninsulated electricity transmission lines) and using radar to alert wind project operators to the passage of large flocks of birds. Federal and state agencies and environmental organizations are collaborating on a research program to address the bird issue.

Wind projects also must consider ecological impacts of project construction. Ecological studies have shown that birds and other animals avoid nesting or hunting in the immediate vicinity of wind turbines. Further, road construction and tree clearing can disrupt habitats and allow the introduction of unwanted species. The problem is compounded because some of the best prospective wind sites are located in remote, mountainous areas that support many different plant and animal species.

*Ecologically sensitive areas may preclude construction of some wind power projects.*

For these reasons, some ecologically sensitive areas will preclude construction of wind power projects. In other situations, it may be possible to mitigate or offset impacts on habitats. Specific mitigation efforts should be determined with the help of appropriate state and federal agencies and environmental organizations. Developers may engage in tree planting or create habitats for species displaced by wind projects. Finally, it is important to avoid soil erosion near access roads and turbine foundations. Soil conservation should be considered early in project design.

Most environmental concerns associated with wind power projects can be avoided through research and design and proper consultation with affected communities. Specific strategies to minimize effects will depend upon the circumstances of the wind project, but all situations will require involvement of affected stakeholders. A responsible approach will help to ensure that environmental issues do not greatly hamper the increased use of wind energy.

This brief was summarized by Jeff Dale, National Conference of State Legislatures, from a *Wind Energy Series Report* by Michael Brower, Brower & Company.

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*The Wind Energy Issue Briefs are a product of the National Wind Coordinating Committee (NWCC). The NWCC is a collaborative endeavor that includes representatives from electric utilities and support organizations, state legislatures, state utility commissions, consumer advocacy offices, wind equipment suppliers and developers, green power marketers, environmental organizations, and state and federal agencies.*

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