

## Wind Energy and Wildlife: Frequently Asked Questions



In the face of traditional energy generation's increasing challenges, clean, fuel-free wind energy offers compelling advantages: it produces no emissions, stabilizes energy prices, and provides abundant electricity for our escalating needs. Like all human activities, wind energy has some impacts, but our society, even with increased energy efficiency, demands a steadily growing amount of electricity. If that new electricity does not come from wind, it is likely to come from another source with far more damaging environmental consequences; for example, 67% of our electricity currently comes from fossil fuels, generating massive amounts of pollution and greenhouse gases, and many new fossil fuel power plants are being developed. So the question we must ask ourselves is: if not wind, then what?

### 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 (16,818 MW) would require burning 23 million tons of coal (a line of 10-ton trucks over 9,000 miles long) or 75 million barrels of oil *each year*



### Q: What direct impacts does wind have on wildlife?

**A:** 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.

A paper from the National Wind Coordinating Collaborative (NWCC) (Erickson et al.) found the leading human-related causes of bird kills, in the U.S. alone, include:

- cats (1 BILLION per year)
- buildings (100 million to 1 BILLION per year)
- hunters (100 million per year);
- vehicles (60 million to 80 million per year)
- communications towers (10 million to 40 million per year)
- pesticides (67 million per year)
- power lines (10,000 to 174 million per year)

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The NWCC paper also states that the wide ranges cited for other sources of avian deaths reflect the low level of research work done on those sources—wind energy is the most thoroughly studied by far, despite its small share of fatalities.

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 elsewhere. 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.

### **Q: What impacts does wind energy development have on land use and wildlife habitat?**

**A:** 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.

### **Q: What is the Altamont Pass? Are impacts at this project site typical?**

**A:** 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 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. 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.

The Altamont Pass is unique. No other wind project combines a similar topography, very high raptor population, and old turbine technologies. Bird mortality, especially raptor mortality, at other wind sites is already quite low, so most management techniques employed at Altamont are not likely to be applicable elsewhere.

Wind businesses have implemented many strategies to attempt to reduce bird impacts at Altamont. 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

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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. The industry is continuing today to test new measures to reduce bird kills, and to put into effect those that are helpful.

### **Q: Are there other turbine designs that may be safer?**

**A:** Developers of innovative wind turbine designs often claim that they are “bird friendly” or safe for birds. However, these claims are never supported by serious avian mortality surveys and must be viewed with skepticism. Also, as the wind industry has grown, the cost of entry has escalated—to bring a new utility-scale turbine design to commercial production would cost hundreds of millions of dollars.

Utility-scale wind turbines for land-based wind farms come in various sizes, with rotor diameters ranging from about 50 meters to about 90 meters, and with towers of roughly the same size. Wind turbines intended for residential or small business use are much smaller. Most have rotor diameters of 8 meters or less and would be mounted on towers of 40 meters in height or less.

There are two basic designs of wind electric turbines: vertical-axis and horizontal-axis (propeller-style) machines. Horizontal-axis wind turbines are most common today, constituting nearly all of the "utility-scale" (100 kW capacity and larger) turbines in the global market. This is not to say alternative turbine designs may not be more widespread in the future, but the economics of horizontal-axis machines in today's market make substitutions difficult, if not impossible, for projects originally planned for horizontal-axis turbines.

### **Q: How does wind compare to other energy sources in terms of its impact on wildlife?**

**A:** 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.

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## 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

### Q: What is the industry's position on impacts of wind energy development on wildlife?

**A:** The wind energy industry has worked hard since the early 1990s to reduce the impact of wind turbines on birds. Those efforts have largely been very successful -- wind turbines and birds can and do coexist successfully at many locations. The wind industry is now beginning a similar effort to understand and reduce the regional impact of wind turbines on bats where problems have arisen.

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.

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, and produces no toxic waste.

The wind industry welcomes scrutiny of, and comparison with, all of the impacts of all sources of power 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 power sources, not just wind.

### Q: What is the wind industry's commitment to wildlife protection?

**A:** The wind industry has implemented many practices leading to greater protection of the environment and wildlife.

- 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

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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. These surveys reduce the threat to birds to minimal levels; cats, hunters, glass windows, and communications towers are far more dangerous to birds.

- 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.
- 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. In 1994, shortly after raptor deaths in California's 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 and other issues affecting the industry's future.
- At the same time, the industry began funding research on bird kills and adopting practices (equipment changes to reduce bird electrocutions, use of tubular towers to reduce perching, testing of anti-perching devices and other measures) aimed at minimizing the impact of Altamont and other wind projects on birds. (It should be noted that while raptor deaths in Altamont Pass, one of the first and oldest wind projects, are definitely an issue, the overall number of bird kills there is very low—approximately one bird for every five turbines in the pass per year.)
- 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](http://www.west-inc.com/wind_reports.php).
- Prior to 2003, bat kills at wind farms studied were generally low. However, the frequency of bat deaths at a newly-constructed wind farm in West Virginia in 2003—far higher than at wind plants elsewhere in the U.S.—has caused concern, and subsequent studies at some other locations have indicated that bat collisions are a problem. 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. More information is available at <http://www.awea.org/news/news040303bat.html>. This effort, the Bats and Wind Energy Cooperative, is currently embarking on a new three-year agreement with substantially increased funding support from the wind industry.
- Although wind development may affect the habitat of sensitive grassland birds, it can also support preservation of habitat from suburban sprawl and other development that often has devastating impacts on wildlife. In some cases, in places like upstate New York and Kansas, installing a wind project has allowed families to stay on farms and ranches, preserving the open space important to many species.

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- The wind industry has supported development by the NWCC of a siting handbook and avian site evaluation guidelines used by wind developers to screen sites and provide research-based analysis that can avoid potential problems. The wind industry has also supported the NWCC's sponsoring of a series of national research summits examining wind energy's impacts on birds and bats. At these meetings, scientists present the latest research findings and talk with other stakeholders about research gaps and future needs. See [www.nationalwind.org](http://www.nationalwind.org) for more information.
- AWEA produced a Siting Handbook ([www.awea.org/sitinghandbook](http://www.awea.org/sitinghandbook)) and published it for free download. This web-based document describes the regulatory framework governing wind energy projects, and includes extensive technical discussions about the kinds of local impacts at wind project sites, how they can be studied and how they can be mitigated.