Slight change in wind turbine speed significantly reduces bat mortality

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While wind energy has shown strong potential as a large-scale, emission-free energy source, bat and bird collisions at wind turbines result in thousands of fatalities annually. Migratory bats, such as the hoary bat, are especially at risk for collision with wind turbines as they fly their routes in the forested ridges of the eastern U.S. This loss not only impacts the immediate area, but is also detrimental to ecosystem health nationwide -- that is, bats help with pest management, pollination and the dispersal of numerous plant seeds.

Since turbine towers and non-spinning turbine blades do not kill bats, some scientists have proposed shutting off or reducing the usage of wind turbines during peak periods of migration in the late summer and early fall months when bat activity and fatalities are highest.

In a study to be published online November 1, 2010 in *Frontiers in Ecology and the Environment* (e-View), a journal of the Ecological

Society of America, Edward Arnett from Bat Conservation International in Austin, Texas and colleagues examined the effects of changes in wind turbine speed on bat mortality during the low-wind months of late summer and early fall.

Currently, most wind turbines in the U.S. are programmed to begin rotating and producing power once wind speed has reached approximately 8 to 9 miles per hour (mph)—the wind speed at which turbines begin generating electricity to the power grid is known as the cut-in speed. Wind turbines with a low cut-in speed run more frequently than those set at higher cut-in speeds since they begin rotating at lower wind speeds.

The researchers found that, by raising the cut-in speed to roughly 11 mph, bat fatalities were reduced by at least 44 percent, and by as much as 93 percent, with an annual power loss of less than one percent. That is, programming the turbines to rotate only when the wind reached approximately 11 mph or higher caused the turbines to rotate less frequently and, therefore, killed significantly fewer bats. Because this was performed during months with seasonably low wind speeds already, the overall energy loss was marginal when the researchers calculated the annual power output.

"This is the only proven mitigation option to reduce bat kills at this time," said Arnett. "If we want to pursue the benefits associated with wind energy, we need to consider the local ecological impacts that the turbines could cause. We have already seen a rise in bat mortality associated with wind energy development, but our study shows that, by marginally limiting the turbines during the summer and fall months, we can save bats as well as promote advances in alternative energy."

Arnett and colleagues monitored 12 of the 23 turbines at the Casselman Wind Project in Somerset County, Pennsylvania in the Appalachian

Mountain region and recorded bat fatalities for 25 summer and fall nights in both 2008 and 2009. The researchers analyzed the fatalities following nights when the turbines were fully operational and when the turbines were set to the less sensitive cut-in speeds of roughly 11 mph and 14.5 mph. In both years, the researchers found at least one fresh bat carcass every night that the turbines were fully operational. Specifically, the researchers reported a mortality rate that was, on average, 3.6 to 5.4 times higher at the fully functioning turbines compared with the turbines set to the altered cut-in speeds.

According to John Hayes, co-author of the study from the University of Florida, "the findings are important step forward in building a comprehensive energy strategy with reduced environmental impacts."

"Rarely do you see such a win-win result in a study," said Arnett. "There is a simple, relatively cost-effective solution here that could save thousands of bats. This is good news for conservation and for wind energy development."

Provided by Ecological Society of America

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