



## Tilting Windmills: Dead Bats and the Search for Clean Energy

By Amy Mathews Amos

The long hard winter recedes. The April sun warms. Insects buzz around blooming flowers and leafing trees. Bats emerge from their caves, ready to fill their stomachs—and their ecological role—by consuming as many of those insects as they can after months of hibernating and fasting. Across America, bats save farmers more than \$3.7 billion each year by eating pests that would otherwise destroy crops, and reducing the need for pesticides. But fewer and fewer have emerged in recent years.

Since 2007, a deadly disease has swept through East Coast states and into the Midwest, wiping out more than 80 percent of the bats in some states. Scientists call it white nose syndrome, for the fuzzy white mask that forms on bats' noses. They know what causes it—a fungus that infects the skin, depletes fat reserves, and spreads easily in winter caves where thousands of bats congregate waiting for spring. But they don't know how to treat it.

And so biologists have watched helplessly as the disease marches north, south and west, far beyond the cave near Albany, New York where it was first detected, and wipes out bat colonies in 22 states and five Canadian provinces.

In the Allegheny Highlands of West Virginia, Maryland, and Pennsylvania, bats that dodge the disease in their winter caves run headlong into another threat when they emerge each spring: wind turbines. Spinning at up to 150 miles per hour, hundreds of massive wind turbines snake along the ridgetops of the Allegheny front like a miles-long conga line of giants, waving their arms to the beat of the wind. Since 2002, five facilities covering 50 miles of mountaintop have been constructed in West Virginia. At least one more facility has been approved by West Virginia's Public Service Commission and several more cover nearby ridgetops in Maryland and Pennsylvania.

In the push to move away from dirty fossil fuels such as oil, gas, and coal, the Obama Administration has promoted wind and other renewable energy sources as part of a diverse national energy portfolio. Wind energy doesn't emit carbon dioxide or methane (major contributors to climate change), pollute streams and rivers with wastewater and ash, or spill millions of gallons of oil in coastal waters. But it does kill bats—millions of them across the country. And West Virginia is where the deadly truth of wind turbines first emerged.

Ed Arnett was there at the beginning.

The Mountaineer wind facility in Tucker County, W.Va., had just come online in 2003, one of the first along the promising Allegheny front. Other sites in Europe and the western United States had documented dead birds under

wind turbines, and so as part of accepted protocol the operators at Mountaineer checked the ground beneath the turbines that first season. As expected, they found a lot of dead birds. What they didn't expect was all the dead bats; more than 2,000 of them in less than three months.

"Nobody was really looking (for bats)," says Arnett, a wildlife biologist brought in to study the problem. "The vast majority of protocols being implemented at that time were centered on large birds like eagles and hawks, so they weren't designed to find small creatures in the first place." That same summer, a site run by the Tennessee Valley Authority documented high bat kills. "At those two events the fatalities were considerably higher than had ever been recorded at any facility anywhere in North America for sure—and possibly in Europe at that time," says Arnett. Suddenly, bat kills at wind farms grabbed attention.

Concerned, the U.S. Fish and Wildlife Service (FWS) contacted Bats Conservation International, a conservation group dedicated to protecting bat species worldwide. Together, they formed the Bats and Wind Energy Cooperative with the Department of Energy's National Renewable Energy Lab and the American Wind Energy Association, a trade group that promotes wind energy development. Arnett was hired as the lead scientist to head up the cooperative's research program, document how many bats were being killed by wind facilities, and identify solutions. The idea was to find ways to reduce or eliminate the number of bats killed, while fulfilling the promise of wind energy as a sustainable green energy source.

Arnett and his team did a lot of good work. A meticulous researcher, Arnett examined how turbine lighting, location, and speed affect kills. He considered how many dead bats are probably scavenged by predators before anyone finds them, and how others can go undetected hidden in the leaves and plants below turbines. Based on his years of research, and considering other studies around the country, Arnett estimates that wind turbines killed roughly one to two million bats in the United States and Canada between 2000 and 2012. Other researchers have calculated even higher fatalities: around 600,000 to 800,000 killed in the United States in 2012 alone.

Because of their ability to echolocate, bats are better equipped than birds to detect rapidly spinning turbine blades and avoid flying into them. But by then, it's often too late. The intense decrease in air pressure around spinning blades causes bat lungs to expand rapidly, hemorrhaging sensitive lung tissue and killing them.

Perhaps most importantly, Arnett and other researchers identified solutions that would substantially reduce the number of bats killed. Most bat deaths occur when bats are most active: at low wind speeds in early evenings during the fall migration months of late summer and early fall.

At very low speeds, turbines typically aren't producing any electricity. They get connected to the grid only at what's known as the cut-in speed. But even below the cut-in speed the blades spin, and these low speeds can be the most deadly to bats. Arnett and other researchers have found that by raising the cut-in speed in the early evening hours of fall migration, and pitching the blades so that they don't capture the wind (a technique called feathering), bat deaths can be cut in half or more. Seems like a no-brainer: a targeted effective way to protect bats without losing much electricity.

But not all turbines can feather easily. In some cases, electronic programming can adjust the blade pitch across the system. In other cases, each turbine requires reprogramming separately. And in the worst cases, each individual turbine needs to be pitched manually.

"You can imagine what kind of nightmare that would be," says Arnett. "Companies aren't going to do it. They don't have the people power, and it costs too much money."

And no law requires them to do so. Birds are supposed to be protected by the federal Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act, which prohibit taking (including killing) migratory birds and eagles,

respectively. But although FWS estimates that 440,000 birds are killed each year by wind facilities in the United States, it almost never enforces the Migratory Bird Treaty Act against them. Many modern structures, not just wind turbines, routinely kill migratory birds that fly into them, including cell towers, lighted skyscrapers, and transmission towers. FWS might take action in extreme events, such as a mass killing, but it doesn't for routine deaths. And in December, the agency finalized rules allowing wind facilities to obtain permits to kill a certain number of golden eagles for up to 30 years, if they adopt certain conservation measures.

In contrast, bats have to fall back on the emergency room of wildlife conservation: the Endangered Species Act. A last resort when wildlife populations decline to dangerously low levels, the Act prohibits the "taking" (including killing) of any species listed by the federal government as threatened or endangered. Projects that routinely kill or otherwise harm listed species must work with the FWS to develop habitat conservation plans that reduce the deaths to acceptable levels. Once their plan is approved, they receive an incidental take permit, allowing them to "take" a certain number of animals each year as part of their normal operations.

For better or worse, the fate of all bat species in West Virginia may ride on the endangered status of a few. The Indiana bat and Virginia big-eared bat have been listed as endangered since 1967 and 1979 respectively. Because of dramatic declines from white nose syndrome, the Northern long-eared bat is expected to be listed this fall as well. And in coming years, what was once the most abundant bat in West Virginia, the little brown bat (yes, that's its real name) could join them.

White nose syndrome has wiped out little brown bat colonies across the Northeast, and groups like Bat Conservation International have called for emergency listing of this species under the Endangered Species Act. Operational changes that would reduce fatalities of Indiana bats and Virginia long-nosed bats from wind turbines, like raising the cut-in speed and feathering blades, would also reduce fatalities of all bat species, including little brown bats.

If a facility kills an endangered bat, protection efforts should kick in, including development of a habitat conservation plan outlining operational changes to reduce bat deaths. But many wind facilities are betting that they won't. "Finding an Indiana bat is difficult," says Cris Hein, who succeeded Arnett at Bat Conservation International and now runs the cooperative research program. "It's not only a rare species, I think it rarely interacts with turbines like a lot of other species do. And then finding it on the ground is very difficult. There are scavengers out there that might remove a carcass before anyone has a chance to find it. They decay, they're tiny, they blend, they fall in dense vegetation."

According to Hein, "If you don't find them all that often, then companies may choose to operate at risk and not voluntarily apply for an incidental take permit and do the habitat conservation plans." In other words, if you don't actually find a dead Indiana bat, you technically don't have to do anything.

### **A Warning Goes Unheeded**

In 2009, the nonprofit Animal Welfare Institute in Washington, D.C., and the citizen's group Mountain Communities for Responsible Energy challenged that notion. The Beech Ridge wind facility in Greenbriar County had applied to the West Virginia Public Service Commission for a 124-turbine facility crossing 23 miles of ridgetop in 2005. Based on the studies at Mountaineer, the risk assessment prepared by the company's own consultants, and the presence of local caves used by Indiana bats, FWS and West Virginia Department of Natural Resources (DNR) biologists warned developers repeatedly in letters, emails, and meetings that Beech Ridge had a high probability of killing large numbers of bats, including endangered species. They recommended three years of monitoring bat populations before construction to determine potential impacts and guide turbine siting. They also urged the development of a management plan that considered techniques like feathering blades below cut-in speeds after construction. But the Beech Ridge developers maintained that their facility was unlikely to kill Indiana bats, and the Commission approved the project in 2006.

The Animal Welfare Institute argued in federal District Court that, although no dead Indiana bats had yet been found, the likelihood that the facility would kill Indiana bats was high. It cited the years of warnings from FWS and DNR, testimony by expert witnesses, and evidence originally concealed by Beech Ridge's environmental consultant that Indiana bats used the site.

The court agreed, ruling that "like death and taxes, there is virtual certainty that Indiana bats will be harmed, wounded, or killed imminently by the Beech Ridge project in violation [of the Endangered Species Act] during the spring, summer, and fall." It overturned the Public Service Commission and ordered Beech Ridge to limit operations to winter months, when bats are hibernating, until it could develop an adequate habitat conservation plan with FWS. After years of effort, that plan was finalized in December 2013.

But the potentially precedent-setting promise of the Beech Ridge case remains unmet. For one thing, no one knows if the Beech Ridge habitat conservation plan will actually save local bats from extinction. For another, the WV Public Service Commission has continued to approve facilities that FWS and DNR repeatedly warn will kill endangered bats—as well as others bats.

The Beech Ridge plan sets a limited conservation goal: It requires operators to feather their blades below wind speeds of 4.8 meters per second to reduce deaths of *Myotis* bats (such as the little brown bat and the Indiana bat) by 60 percent, and deaths of all other bats by 50 percent over the 25 year life of the permit. Beech Ridge is required to monitor bat deaths each year, particularly during the fall migration when more than 80 percent of bat fatalities typically occur. If the feathering speed hasn't sufficiently reduced fatalities by 60 and 50 percent, then Beech Ridge is required to raise the speed until it does.

But bats are difficult to study. No one knows quite how many bats are out there now, and so no one knows how many additional bats can be killed each year before they disappear. Speaking about mitigation generally, Hein of Bats Conservation International notes, "We really don't know what the impact is on populations, or the level of minimization we might need to mitigate that impact. Is 50 percent reduction enough? We're not going to be able to answer that question any time soon."

Rather, the 60 and 50 percent reduction figures are based on what studies suggest can be achieved with little loss of generating capacity by the facility. Moreover, if Beech Ridge finds that feathering the blades at 4.8 meters per second reduces fatalities by more than 60 or 50 percent, it can lower the feathering speed and kill more bats. So no matter what happens, the habitat conservation plan will, at best, reduce bat deaths by only 60 percent.

Since its Beech Ridge decision, the Public Service Commission has considered at least four additional wind facilities for siting approval. In each case, letters obtained by activists under the Freedom of Information Act and the Commission's own public records show that FWS and DNR repeatedly warned developers that the facility was likely to kill endangered bats. They either urged companies to find alternative, less risky sites, or to monitor bat activity before and after construction and work with the agencies to develop plans that would reduce the number of bats killed. In three of those cases, the commission approved the facilities despite FWS and DNR concerns. In the fourth, local citizens raised \$87,000 to successfully argue that the information provided by developers about environmental impacts on Jack Mountain in Pendleton County was inadequate, and the Commission denied approval.

In 2012, operators of one of those approved facilities, AES's Laurel Mountain site, lost their bet: On a routine search one July morning, workers found an Indiana bat lying dead beneath a turbine.

### **Advocates Say Commission Lacks Expertise**

Larry Thomas, who led the Pendleton County fight, worries that someday the Jack Mountain developers will be back, filling in gaps in their previous application but still sidelining input from wildlife agencies. Thomas formed the Allegheny Highlands Alliance after his win to respond to the flood of inquiries he received from other citizen's groups fighting wind farms throughout the region, and has become a leader in several conservation groups concerned about their impacts. He wants to tighten the Public Service Commission's siting requirements so that input from wildlife agencies can't be ignored.

Currently, West Virginia's siting rules require energy companies to list any permits they're required to obtain from FWS or DNR. But no federal or state law actually requires a permit to take bats. The rules also require energy companies to submit bird migration studies, bird and bat risk assessments, and studies of the impacts of lighting on birds and bats as part of their application. These studies typically are completed by consultants hired by the energy companies themselves.

Once an application is submitted, the approval process functions like a trial, with three commissioners appointed by the Governor acting as judges. They hear evidence from the companies applying for approval; from commission staff with expertise in law, finance, and engineering; and from any interveners with sufficient resources and gumption to mount an argument. Each party can bring in expert witnesses and cross examine others' witnesses. The commissioners see only what the applicants, the staff, and interveners put before them, plus any public comments. They then balance the interests presented and make a decision.

But Thomas maintains the Public Service Commission lacks the expertise to evaluate wildlife impacts. He wants expert input from wildlife and historic preservation agencies to be an integral part of the approval process, including detailed habitat conservation plans outlining incidental take levels for endangered species before sites are approved. "The burden of proving wildlife impacts shouldn't be on citizens," says Thomas. He fears that if developers return to Jack Mountain, his community won't be able to afford the expensive expert studies and testimony that would be needed to counter the developers' consultants.

In the meantime, AES Laurel Mountain operators are now working with FWS to develop a habitat conservation plan and incidental take permit in the wake of the dead Indiana bat discovery. Correspondence from FWS shows that, prior to the Commission's siting approval, FWS had warned AES that cut-in speeds of less than 6 meters per second would likely kill endangered bats. Despite these warnings, all of AES' turbines were operating at 3.5 or 4.5 meters per second the night the Indiana bat was killed. Since the dead bat was found, AES says it's been curtailing the turbines during periods when the bats are most active and maintains that there have been no further impacts to Indiana bats at the facility.

Cris Hein, the biologist who oversees research for the Bat and Wind Energy Cooperative, is frustrated that the solutions his group has identified over the past decade aren't used more widely by the industry. "I hope we can start to see more conservation movement on the ground soon," he says. He and his organization are caught in the middle: Dedicated to protecting bats in the face of white nose syndrome and climate change, while trying to find ways to make wind energy work. "I think there are some proactive progressive companies out there, and I think there are others that for one reason or another either aren't able or aren't willing to take this issue seriously," he says.

Until they do, wind farms will simply be swapping one set of environmental problems for another; substituting the air and water pollution, climate change, and mining scars of fossil fuel production, for the loss of endangered species and the valuable pest control that bats, and many birds, provide. New rows of giant turbines will snake across Allegheny ridgetops, biologists will continue investigating the mystery of white nose syndrome, and tiny dead bats will get lost in the leaves beneath spinning blades.

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