



THE  
GREEN

# Footprint

Wind energy stands ready to combat climate change. But where will all those new windmills go?

BY MADELINE BODIN

Photographs by JIM RICHARDSON

**POWER PLAY:**  
The Elk River wind farm in Kansas will generate enough green electricity to power 42,000 homes annually. But the towers have been built on top of some of the last remaining tallgrass prairie habitat.

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**STANDING 20 FEET TALL AND** only a foot and a half thick, Teter Rock rises like a white sail above the grassland sea of Kansas' Flint Hills. Limestone like this slab underlies all of the Flint Hills, sweetening the region's grass and dulling any plow that dares till its thin soil. Replacing a stone cairn that helped 19th-century homesteaders navigate the open prairie, landowner Merle Teter cut this slab from the ground and hoisted it on end in the 1950s, where it has stood sentinel over this prairie ever since.

Of the 140 million acres of native tallgrass prairie that once blanketed the center of the continent, just 4 percent remains, says Rob Manes, The Nature Conservancy's director of conservation in Kansas. "The tallgrass prairie is almost all gone, and most of what is left is in the Flint Hills."

But Teter Rock no longer stands alone on the Flint Hills. This windy, rural landscape is ideal for wind power, and just beyond the horizon, 30 miles to the south, near Beaumont, Kansas, 100 wind turbines now tower above the prairie.

From a distance, the 389-foot-tall dove-gray turbines of the Elk River Wind Project seem impossibly big. The turbines rise higher than the Statue of Liberty, their slim rotors sweeping the sky. The black Angus cattle grazing around the base of one turbine at the far edge of the 7,900-acre project resemble ants.

According to the owner, Iberdrola Renewables, this farm can generate about 550,000 megawatt hours of energy, enough to power 42,000 homes for a year. The turbines here have the capacity to reduce carbon emissions by 475,000 tons per year compared with Kansas' current mix of power plants, which are mostly fueled by coal. That's the equivalent of taking 80,000 cars off the road.

Despite the pollution reductions, Elk River has had some unintended consequences for the landscape and for wildlife.

To the developer, these slight, grassy hills looked like a fine place to build a wind farm. But conservation groups saw something different. What had been nearly 8,000 acres of low-impact ranch land in one of the most threatened habitats in the world was now sliced by 20 miles of roads, 100 towers, transmission lines and a sizable electrical substation.

And that was just the beginning. Developers have plans on their drawing boards to build dozens of new projects in Kansas in the next few years alone. Across the country, wind is booming, and a number of these renewable-energy projects—which may be a crucial component to moving beyond fossil fuels and fighting climate change—have run afoul of efforts to protect habitat.

When it was built, the Elk River project caught The Nature Conservancy's team in Kansas by surprise. Since then, Rob Manes has been working overtime to steer wind farms away from the Flint Hills and other large, intact grasslands that make up much of the habitat for ground-nesting birds, including imperiled species such as the lesser prairie chicken.

Reforming wind power has practically become his full-time job. "I was hired to do a diverse job, but right now about 80 percent of my work involves wind power," says Manes. He has since been tapped to serve on a national committee hashing out steps for siting wind farms.

And that was before a new administration arrived at the White House and announced plans to tackle global warming by funding more renewable energy. Now, with the federal stimulus package's new tax credit for construction of wind farms potentially pumping billions into renewable energy, Manes' job just got a lot more interesting.

**IN THE PAST 20 YEARS**, wind power in the United States has been developed in surges and lulls. The surges have coincided with the availability of production tax credits, a federal subsidy of 2.1 cents for each kilowatt hour of renewable energy produced. The lulls come when the tax credits lapse.

This year's stimulus package restored the tax credits, which is helping end a lull created by the economic downturn, says Jimmie Powell, the Conservancy's senior policy advisor for energy.

"But that's just a blip on the screen," says Powell. National renewable-energy legislation mandating that a certain percentage of our nation's energy, perhaps 15 percent, come from renewable sources is under consideration, he says. (Renewables account for less than 3 percent of the energy mix today.) Also in the works are caps on carbon emissions, which would make renewable energy even more competitive with high-carbon fuels such as coal.

And it will be wind that takes the lead in filling the nation's renewable energy gap, says Powell, because it is already the most widespread. "Twenty-eight states have passed some type of renewable electricity standard," he says. "Wind is satisfying more than 60 percent of those requirements."

To get wind generating even a fifth of the nation's energy,

**WINDY FORECAST:**  
The Conservancy's Rob Manes is working to keep new wind farms out of tallgrass prairies and other threatened habitats.



"I believe that **alternative energy is essential to our future,**" Manes says. "There are some species that are important and imperiled, like the lesser prairie chicken, that could be unnecessarily pushed to the brink for wind energy, when it **is so easy to do right.**"

however, would require 15 times the current number of turbines, according to the Department of Energy.

Wind power typically uses more land to create energy than power plants fueled by coal and other forms of generation that emit large amounts of carbon and other pollutants. "Dramatic energy change is about dedicating a much larger part of the landscape to energy production," says Powell.

Estimates of how much of our nation's landscape will be needed for renewables can raise eyebrows. Powell and a team of Conservancy scientists calculate in an upcoming paper in *PLoS ONE*, the journal of the Public Library of Science, that the footprint of new energy development, including wind,

solar and biofuels, will occupy nearly 80,000 square miles of land by 2030—an area larger than the state of Minnesota.

That could be bad news for sensitive species like the lesser prairie chicken. Their distribution has declined 90 percent since the 1800s, and Manes says they are likely to be listed as a federally threatened species. A five-year study by Kansas State University found these ground-nesting birds avoid roads and just about any man-made structure, such as electricity transmission towers, where raptors and other predators might perch.

The danger for sage grouse, lesser prairie chickens and other ground-nesting birds, Manes says, is that their habitat



### Kansas Wind and Wildlands

Tallgrass prairie habitat and potential wind resources overlap in the largely untilled Flint Hills, which run north-south in the eastern third of the state.

- ▭ Untilled Lands
- Prairie Chicken Habitat on Untilled Lands
- 15.7 MPH Average Windspeed
- 16.8 MPH Average Windspeed
- 17.9 MPH Average Windspeed

“In 2030, there could be a big area in the country where you turn around and see wind turbines everywhere,” says Conservancy scientist Rob McDonald, the lead author on the *PLoS One* paper. “It could be in the middle of cornfields, and that would not be a big deal for us. But we start to get concerned when wind farms are proposed for the middle of threatened habitats.”

**MANES DOES NOT SPEND AS** much time in the field as he had hoped he would when he joined the Conservancy five years ago. In fact, on one early spring morning, he is sitting in a conference room at an office of the U.S. Fish and Wildlife

**WINDMILL CITY: Conservationists hope to steer wind farms into croplands near developed areas, like those near the town of Spearville, Kansas.**

Service outside Washington, D.C., preparing to weigh in on federal guidelines being developed for siting wind turbines. Not all of these meetings are long and boring, he deadpans. “Some are long and stressful.”

For more than a year, Manes and 21 other committee members from industry, government and conserva-

tion organizations have been gathering to hammer out guidelines for siting wind farms. The negotiations have, at times, been hard-fought, as there may be a lot at stake: Although the final rules will be voluntary, they will set something of a precedent for the wind industry.

The committee’s chair, Dave Stout, a U.S. Fish and Wildlife Service division chief, welcomes the group by pouring on the pressure to meet the committee’s October 2009 deadline. “Our new secretary of the interior, Ken Salazar from Colorado, is, of course, a great conservationist,” says

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it could be possible for a wind developer to sign a lease with a landowner and start raising turbines the next day.”

and the prairie states’ best wind resources largely overlap. “If it were all built out,” he says, “we could see the lesser prairie chicken disappear.” Other sensitive grassland species would likely decline as well.

Of further concern is that, unlike coal-burning power plants and other sources of electricity whose pollution drifts across state borders, wind farms generally do not require federal permits. In states where rural areas have few zoning laws, it could be possible for a wind developer to sign a lease with a landowner and start raising turbines the next day.

Stout. “But he’s also an energy guy. Wind power is going to get built. The question is, How do we do it right? The spotlight is on us.”

Next, group facilitator Abby Arnold plunges into the business at hand. “We need to know what concerns to address to get you all to agree,” she says, as she sets the latest 24-page draft set of guidelines on the table next to her.

“I like the approach,” says Andy Linehan, a director of permitting for Iberdrola Renewables, the owner of the Elk River wind farm in Kansas, as well as projects in California, Oregon and other states. For a moment, it looks as if the group is going to congratulate itself for a job well done and move on to fleshing out the draft.

But Manes and his colleagues won’t rubber-stamp anything until they see additional revisions aimed at protecting prairie chickens and other wildlife. Manes leans

Linehan pushes back, asking what the developers are supposed to do when data is incomplete—making site comparisons difficult. That’s reason enough to make this big-picture analysis optional, he says.

Manes replies, “I think we need to do the best we can with the information we have. For some places, there are good tools.” He points out that Linehan’s company already does landscape-level analysis, as does Horizon Wind Energy.

“So I know it can be done,” Manes says. “It must be good business practice or they wouldn’t be doing it.”

More is at stake here than a single provision in voluntary guidelines. To give the guidelines traction, the committee will later discuss incentives for compliance. Possible incen-

tives range from a green-power certification to a bonus on production tax credits. These alone are worth something to developers. Then there is the hope for some—and the dread for others—that these voluntary guidelines might someday become law.

Manes doesn’t show it, but he is pleased. This discussion has brought landscape-level planning a step closer to being included in the federal guidelines. It has also brought the idea of a public database to the table. The database Manes has in mind not only would provide maps of important environmental data, such as critical habitat for endangered species, but also would designate wind-friendly areas where turbines and wildlife are less likely to be in conflict.

**A GROWING BODY OF DATA** and analysis is allowing researchers to make more specific observations and projections about the effects of climate change. In the United States, scientists have already charted an average increase in temperatures of 1.5 degrees Fahrenheit in the past 100 years, as well as longer growing seasons, sea-level rises, earlier snowmelt and retreating glaciers.

The projected climate shifts for the Great Plains will be among the most severe. According to a new report from the National Oceanic and Atmospheric Administration, the plains will experience an average increase of 2.5 to 13 degrees Fahrenheit by 2090. (The variation depends on which emissions scenario is used. The greater the reduction in

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forward in his chair and speaks: “We need a prescription for dealing with landscape-level issues”—how wind projects may affect large, intact landscapes. The guidelines, he says, should direct wind developers to pay attention to wildlife from the very beginning, long before they even approach landowners to lease land for a project. In past meetings, wind developers have resisted requirements that they request information about potential development sites early in the process. They don’t want to risk tipping their hands to competitors. But this time, Manes has a plan to allay any misgivings.

Manes apologizes to the committee for “being the only onion in the petunia patch,” but then he proceeds to outline his solution for protecting wildlife and getting the developers the data they want. His plan is to compile new and already-existing maps of wildlife, wind and environmental data into a publicly accessible database. This would allow wind-power developers to get the information they need without revealing the specific locations where they plan to raise turbines.

**ON THE RANGE:**  
Only 4 percent of the world’s tallgrass prairies remain intact. Often remote and windy, several of these threatened landscapes have been targeted for wind development.





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including wind, solar and biofuels,  
could occupy nearly  
80,000 square miles of land by 2030—  
an area larger than the state of Minnesota.



**STAND OFF:** Nesting greater prairie chickens (above) and other birds avoid wind turbines, transmission towers and other man-made structures where raptors and other predators might be scoping for prey.

after all, how some species, such as sage grouse and the lesser prairie chicken, can be driven out of their habitats by wind development without a single bird ever touching a single turbine blade.

In Kansas and elsewhere, some wind-power developers are eager to work with the Conservancy and other conservation organizations to avoid placing their wind farms in migratory hot spots and other environmentally sensitive areas and to head off construction delays caused by environmental protesters.

“The Conservancy is one of the best environmental organizations to work with because of its practical ‘let’s try to work on this together’ point of view,” says Rene Braud, director of environmental affairs for Horizon Wind Energy, who has worked with Manes and the Conservancy’s Kansas team on siting issues.

**MANES IS CERTAIN THAT** a national set of detailed maps overlapping wind and wildlife resources is crucial to “doing wind power right.” That is because the Conservancy and its partners have already implemented a system of maps in Kansas. And local developers have responded enthusiastically. Horizon Wind Energy even worked with the Conservancy and the Ranchland Trust of Kansas to set aside protected lands to offset the footprint of one of its wind-farm developments.

“Our contacts in the wind industry said, Show us where we can develop our projects—so we did,” Manes says. The map shows the state’s native prairies, prairie chicken habitat, wildlife refuges and nature preserves, as well as where the best wind resources are. Now, when a wind developer wants to build in Kansas, the company knows which sites are likely to raise the ire of conservationists—and which areas aren’t.

The Conservancy has created similar maps in a handful of other states, including Colorado, Montana and Oklahoma. And in mid-2009, the Conservancy was awarded a contract to create a wind and wildlife resource map for the entire country. The map initiative is funded by the American Wind and Wildlife Institute, a coalition of wind-industry and conservation organizations with the aim of reducing conflicts between wind development and wildlife.

The Conservancy’s lead scientists in the North America region, Joe Fargione and Joe Kiesecker, are heading the project. The two expect to have a national map of wind resources, species and habitat types ready in about a year.

Instead of just showing places where wind-power development should be avoided, the maps will also help pinpoint windy locations where threats to wildlife are less of a concern. “Even the best projects will still have some effect,” says Kiesecker. “So we will also identify areas where developers could offset their impacts.”

**WHEN THE COMMITTEE** meeting in Washington, D.C., wraps up for the day, the team is a few steps closer to putting new guidelines into place. But more work—and more meetings—are needed before the final document will get a thumbs up from committee members.

A few days later, Manes takes a flight back to Kansas, where the prairie chickens have just begun doing their spring mating dances out on hilltops like the one where Teter Rock is perched. The hilltops are where the chickens like to strut and where wind developers like to build.

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emissions of heat-trapping gases, the smaller the temperature increase.) Other projected effects include an increase in droughts and heat waves.

The report also warns of ripple effects on native habitats and species, from a proliferation of invasives to harder times for local wildlife—especially ground-nesting birds like grouse and prairie chickens. “Grassland and plains birds, already besieged by habitat fragmentation, could experience significant shifts and reductions in their range,” finds the report.

Without drastic reductions in carbon dioxide emissions, grassland bird species may find themselves without any habitat. It’s something of a Catch-22 for the birds. Building a clean-energy infrastructure is crucial to saving their habitat—but not if the turbines and towers are built on top of their remaining range.

For Manes, the best of both worlds would be to direct wind-power development into existing farm fields and out of crucial habitats. Indeed, a number of well-sited wind farms across the country already produce clean electricity.

In 2008, wind turbines produced 48 billion kilowatt hours of electricity, according to the American Wind Energy Association. That’s enough energy to power 45 million U.S.

homes for one year. If the equivalent electricity were produced using conventional U.S. fuel supplies (largely coal and natural gas), 44 million tons of CO<sub>2</sub> would have been pumped into the air.

For a number of reasons, as the wind industry has boomed across the country, developers have encountered resistance to the siting of massive wind towers and turbines. One of the biggest concerns about wind farms has been birds and bats being struck by the wind turbines.

The wind industry counters these concerns, pointing to studies that show the number of turbine strikes is tiny compared with the number of birds killed by flying into windows or by domestic cats.

Even the wind-turbine siting committee back in Washington, D.C., has spent a considerable amount of time in the past year discussing threats to birds from twirling turbine blades. “It’s easy to get wrapped up in dead birds and bats,” Manes says. “It’s emotional.”

Manes is more concerned about habitat issues—whether the future of an entire species is put at risk, rather than how a few individuals are affected—or what he calls the “sub-population” effects of wind turbines on wildlife. He sees,