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Fields of Opportunity: Wind Machines Return to the Plains

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FIELDS OF OPPORTUNITY
WIND MACHINES RETURN TO THE PLAINS

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The last two decades have seen a rebirth of wind machines on the rural landscape. In ironic fashion the wind's kinetic energy has grown in significance through its ability to generate commercial amounts of electricity, the commodity that a few generations earlier hastened the demise of the old Great Plains windmill. Yet the reemergence of wind machines on the landscape has been slowed by local opposition. Many places across the country have seen resistance to the construction of vast wind turbine arrays. Although wind energy fulfills both the businessman's requirement for profit and the environmentalist's desire for clean electrical production, building hundreds of wind turbines to carry out this dual promise in one's "backyard" has been met with intense local protest. The literature has shown that wind energy is generally popular at a national level, but local wind farm developments have been the source of bitter opposition.[1] This opposition, which has appeared virtually everywhere wind farms have been proposed, is characterized as a NIMBY ("Not In My Backyard") phenomenon. That is, a majority of those opposed to a local wind farm agree with the need for wind energy, but for a number of reasons (increased noise, increased bird death, and aesthetic blight) they do not want the turbines located in their immediate area.[2]

The Great Plains, however, is an exception to this usual NIMBY experience. In fact, the residential reaction is better described as "Please In My Backyard," or PIMBY. The purpose of this essay is to better understand this regional PIMBY dynamic by describing the reactions of the major stakeholders living within northwestern Iowa's wind farm landscape. Through this examination we can come

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FIG. 1. *The headquarters for the Top of Iowa wind farm illustrates the size and style difference between the old windmills and the new wind turbines.* Photograph by author.

to appreciate why wind-powered machines, although opposed in other places, have again become part of the ideal rural landscape in the Great Plains, serving as beacons of economic prosperity and regional pride.

NIMBY PROBLEMS, PIMBY PROMISE

In the last two decades wind machines have become a resurrected feature on the American landscape. Engineers have taken the old Great Plains windmill, transformed it with creativity in engineering design, and supercharged it with the use of high-performance materials (Fig. 1). Today's modern wind turbines are able to churn out commercial amounts of domestic energy in a relatively inexpensive and nonpolluting fashion. An average turbine, rated at 1 megawatt (MW), can power over 300 American homes, and at the beginning of 2005, there were 6,740 MW of capacity in America spread throughout thirty states and 40,000 MW throughout the world.[3]

Wind energy is an alluring energy source. It is powered by a renewable resource that is abundant across the Great Plains, and converting wind's kinetic energy to electricity is relatively inexpensive and environmentally benign. In many places the cost of generating wind electricity is comparable or even less than the cost of generating electricity with coal, oil, natural gas, or uranium.[4] In fact, some have declared that if the positive externalities of wind energy and the negative externalities of conventional fuels were internalized, then wind energy would actually be the least expensive commercial electricity producer in the world.[5]

Local opposition is one of the most significant factors holding back the expansion of wind energy. Residents opposed to a wind farm not only slow down or even stop the specific

developments that they are opposing, but they also create negative publicity that jeopardizes the wind farm's chance of being successfully sited elsewhere.[6] The pitched battles between residents and wind energy developers have divided communities, increased utility skepticism of wind energy's stability, and lessened federal, state, and local government enthusiasm for wind energy expansion.[7] With the spread of these protests, NIMBY is quickly becoming NIABY ("Not In Anyone's Backyard"). This is especially vexing for wind energy advocates because the continued success of developing any promising alternative energy source hinges on continued federal subsidies (such as the protection tax credit), and Congressional representatives rarely support something new and controversial if it is unwanted by their constituents.

Scholars from many different academic disciplines realize the significance of this dilemma and have attempted to mollify the opposition by urging that wind energy developers educate the populace on wind energy's benefits, improve the aesthetic value of turbine arrays in regard to design and placement, and avoid avian migration zones.[8] Though developers have implemented these suggestions, the opposition has not softened. On the contrary, opposition has only grown in vigor, complexity, and organization. Currently, opposition groups in Washington, California, New Mexico, New York, Kansas, Wisconsin, West Virginia, Massachusetts, and Vermont will settle for nothing less than the total rejection of any proposed project in their area.[9]

Chris Taylor of Zilkha Energy stated that the organization, ferocity, and sophistication of the opposition groups have grown in alarming ways. In the case of the Kittitas Valley development in Washington, the opposition members hired lawyers, created a website, and have networked with their fellow "NIMBYs" across the country and around the world. He explained that they are politically savvy and know how to slow developments down or even stop them. "The reason for their existence is to stop the development," he said, adding that even though Zilkha Energy is using the quietest and sharpest-looking turbines on the market and has conducted local outreach and educational seminars and made modifications to lessen visual impact, local protest has only grown. He believes that the company can do nothing else to compromise with the opposition, and that his company's experience is similar to that of other developers across the nation.

We have come to an impasse where the dynamics of the opposition are well understood but have proven impossible to mitigate. Yet in the midst of this widespread opposition, a few wind farm developments have been successfully sited without any community protests. Wind farms in southwestern Minnesota, northwestern Iowa, western Kansas, West Texas, eastern Colorado, and eastern Wyoming have been proposed, constructed, and operated without any indication of NIMBY reactions (Fig. 2, Table 1).[10] In fact, local reaction has been quite positive and could be described as one of PIMBY. This departure from the NIMBY norm is an interesting phenomenon, as it contradicts the commonly accepted belief among wind energy advocates and scholars that there will always be some form of local opposition to the placement of a wind farm.[11] This new phenomenon also takes on a much larger significance when it is revealed that the Great Plains, which is where all of these PIMBY sites are located, happens to be one of the best wind resource regimes in the world. In fact, the area has been called the "Saudi Arabia of wind power."[12] If the potential wind-power capacity within the Great Plains were utilized with current turbine technology, then the region could theoretically supply more than the entire nation's electrical needs.[13]

To better understand wind energy's apparent success in rural agricultural areas, I conducted field research for three weeks in the summer of 2002 in the towns and countryside that surround northwestern Iowa's wind farms. I chose northwestern Iowa for a number of reasons: it was within most definitions of the Great Plains culture region,[14] it had three of the largest wind farms in the nation

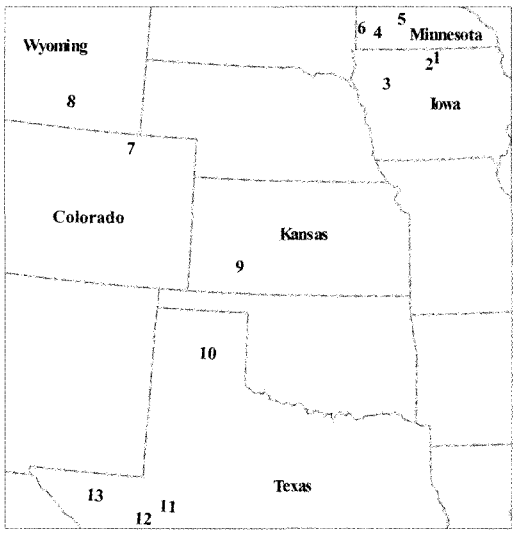

FIG. 2. *Location of wind farms developed without opposition. The Great Plains region is full of PIMBY examples.* Map created by author.

TABLE 1
WIND FARMS DEVELOPED WITHOUT OPPOSITION

Map number	Location	Number of turbines
1	Joice, IA	89
2	Clear Lake, IA	55
3	Alta, IA	257
4	Murray County, MN	73
5	Lake Benton, MN	143
6	Pipestone County, MN	138
7	Weld County, CO	54
8	Carbon County, WY	143
9	Montezuma, KS	170
10	White Deer, TX	80
11	McCamey, TX	107
12	Pecos County, TX	242
13	Culberson County, TX	152

less than one hundred miles apart from each other, and it had the largest number of local residents affected by PIMBY projects. The fact that thousands of citizens lived within view of these turbines was important because it contradicts any argument that wind farms in agricultural areas are acceptable because no one is around to see them. Iowa also presents the perfect laboratory for understanding the new relationship between wind energy and farmers, as more than 90 percent of the land in Iowa is dedicated to farming and the towns within this agricultural landscape have a close economic and social relationship with the farming community.

STUDY AREA CONTEXT

Although Iowa ranks only twenty-sixth in terms of area, it is the country's leader in total acres of harvested cropland. Iowa contains 90,000 operating farms, and over 86 percent of its 36 million acres are dedicated to row crop agriculture.[15] This percentage is even higher in the northwestern Iowa study area.

The topography of the study area represents the southern edge of Buffalo Ridge. This ridge creates the highest points in the state, approximately fourteen hundred feet, and because of its elevation, location, and rolling terrain the region is the windiest in Iowa and one of the windiest in the country with average yearly wind speeds approaching seventeen miles per hour.[16] The soils are rich and provide an excellent growing base for crops as can be witnessed by the miles upon miles of corn and soybean fields that dominate these rolling plains. Mixed amongst the waves of corn tassels and soybeans are some pastures and alfalfa hayfields. Ranching, however, has declined during the past twenty years, and so has the amount of pastureland.[17]

The towns in this area are like small islands amidst the ubiquitous seas of fields and farms. Most towns have between 2,500 and 5,000 residents. Four towns, Storm Lake, Clear Lake, Spencer, and Cherokee, have approximately 10,000 residents and two cities, Fort Dodge and Mason City, each have slightly fewer than 30,000 residents. The towns adjacent to or

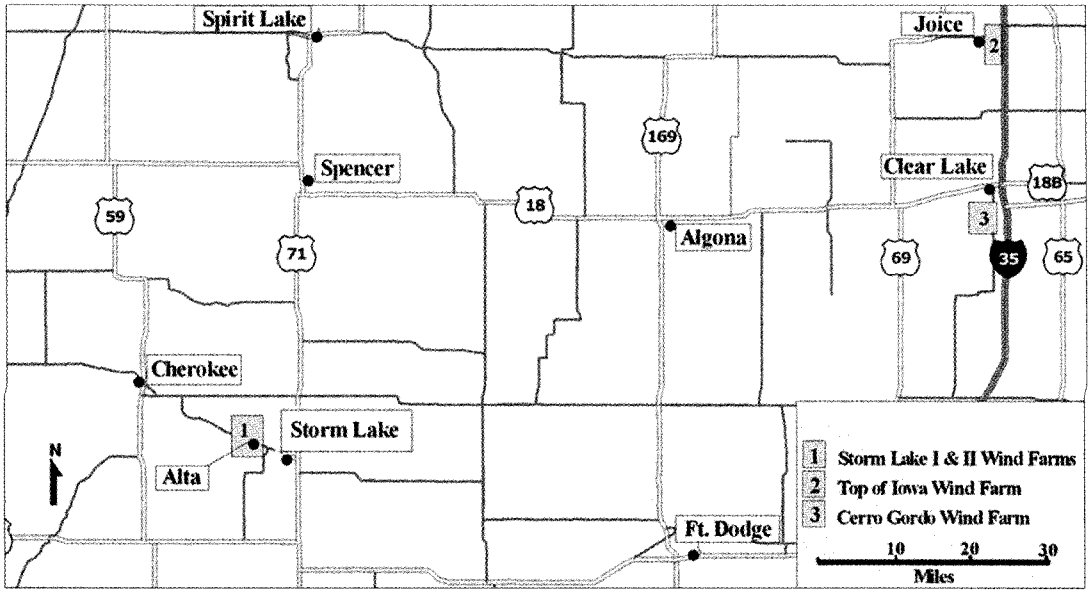

FIG. 3. *Northwestern Iowa study area.* Map created by author.

surrounded by the wind farms represent a good mix of this variation: Joice has 231 residents, Alta's population is 1,865, Clear Lake has 8,161 inhabitants, and Storm Lake, the largest of the "turbine towns," has 10,076 citizens. These four towns are the focus of the town portion of my study (Fig. 3).

A distinct farm ethic permeates both the town and country of the study area. Much of the land is characterized by agricultural scenes and icons such as expansive fields, countless cow and hog confinement buildings, silos, barns, grain elevators, grain bins, the pervading sound of truck radios tuned to country music or the AM frequency, tractor dealerships, an agriculture extension office, cafés filled with patrons wearing Pioneer and Dekalb seed hats, tractors flinging mud off their tires as they drive through town, a few slaughterhouses, and numerous seed company billboards. Everywhere a unique fusion of smells emanates from freshly mowed hayfields and front lawns, manure spreaders, diesel engines, and slaughterhouses.

WIND FARM CHARACTERISTICS

This northwestern Iowa study area consists of three large wind farms: Storm Lake I and II, Cerro Gordo, and Top of Iowa. Storm Lake I and II are located a few miles west of Storm Lake and surround the town of Alta. The wind farm began operation in 1999 and has 257 wind turbines generating 192 MW of electricity (Fig. 4). Highway 7 bisects the two, with 107 wind turbines to the north owned and operated by General Electric, which sells the 80 MW of electricity to Alliant Energy. The 150 turbines south of the highway are owned by Edison Capital, which sells the 112 MW of electricity to MidAmerican Energy. Each wind turbine is 212 feet tall from the ground to the blade hub. A total of sixty-five landowners have leased land to the wind farm, and each landowner receives approximately $2,000 per turbine per year for a thirty-year contract.[18]

The Cerro Gordo wind farm is located two miles southwest of Clear Lake and was also completed in 1999. Hawkeye Power Partners,

FIG. 4. *A line of trussed-tower wind turbines outside Alta, Iowa.* Photograph by author.

a subsidiary of Florida Power and Light, operates the wind farm and sells the electricity to Interstate Power Company. The wind farm is made up of fifty-five 750 kW wind turbines that stand 180 feet tall. The whole wind farm spans 2,100 acres, although only twenty-four acres are actually taken out of farm production. A total of fifteen landowners have leased land for wind turbines, with each landowner receiving different sums of money due to the turbines' different rates of electrical production, but generally they receive $2,000 per turbine per year for thirty years.[19]

The Top of Iowa wind farm was created as a joint venture between Midwest Renewable Energy and Zilkha Renewable Energy. It is located in Worth County just west of Interstate 35 and surrounds the small town of Joice. It was completed in November 2001 and consists of eighty-nine 900 kW turbines. The towers are 237 feet tall and the blades are 85 feet long, making the total height of the structure 323 feet when the blades are at their apex (Fig. 5). Each turbine earns the landowner approximately $2,400 per year in lease payments.[20]

Iowa currently has 632 MW of wind energy capacity, third in the United States behind only California and Texas, and the state has hundreds of new turbines planned for construction over the next two years.[21] One major reason for this success is the residents' PIMBY attitude toward wind farms.

EXPLORING PIMBY

To better understand this PIMBY attitude, I sought out and interviewed the residents living in and around the wind farms. After a few days of speaking with the residents, four major stakeholder groups emerged: city officials, town residents, rural landowners with turbines leased on their land, and rural residents living

FIG. 5. *A tubular-style wind turbine near Joice, Iowa.* Photograph by author.

within the wind farm but not leasing out their land for wind turbines. Each group has unique reasons why they chose to embrace the wind farms instead of working to block them from their landscape. The following section explores these reasons, and for ease of narration I placed the stakeholders into two general groups, town and country.[22]

TOWN

City officials were quite receptive to the idea of a wind farm being associated with their town.[23] Every mayor, city council person, and chamber of commerce member with whom I spoke had positive things to say about the development, and each reiterated that their town had experienced absolutely no opposition to the projects. The developers professed that because of where the turbines were situated, noise would not be a factor for the town residents. Each official said there had been no indications from impact statements that there would be an increase in bird deaths, but they added that that did not mean too much since avian mortality was not a concern for the residents of this area. There are no local chapters of environmental groups such as the Sierra Club or Audubon Society in the area, and the officials said that most farmers hoped the turbines would scare away or kill any birds hanging around their fields.

Although city officials have heard that a few birds have died from the nearby wind farm, no one in the area had suggested that the turbines be dismantled for that reason. In fact, each city official with whom I spoke told me that most citizens, including themselves, would be in favor of the wind farms expanding. Even if turbines were to be constructed closer to the towns, the officials did not believe there would not be much local conflict because, they indicated, noise from the turbines is not annoying, and the turbines bring in money to the area, give people something interesting to look at, enhance local identity, and represent economic progress.

Storm Lake mayor John Kruse said that the wind turbines are bringing in money for the community by generating tax revenue, creating jobs, helping farmers, and have even brought in a few tourists dollars. Kruse mentioned that there are a few tourists who stop by and want to know more about the wind farm. He said that the city put one of the wind turbine blades next to the lakefront to display how large they are, and the town has published a few fliers that describe the wind farm.

Kruse believed that although the turbines only bring in a few people to visit the town, they do not do anything to disrupt the community or blight the landscape. "This is a middle-class community and one way or another is agriculturally based," he said, indicating that most people are employed directly or indirectly because of the farmers. "IBP and Bil-Mar [slaughterhouses] rely on area hog and turkey producers and the shops and bank are dependent on a steady stream of farmer business," he said. "If there are

250 turbines and they generate $2,000 per year, then that is almost an extra half million dollars every year added to all the local farmer's budgets." He said that is important to Storm Lake because it is the largest city in the area and a lot of that money will be going to the town's businesses, creating an economic domino effect that will only help the community and the region.

Alta mayor Ed Williams has not heard anyone complain about the wind farm, and he emphasized how nobody in their right mind would want to block it. "I didn't know any people who opposed them. I don't understand why they would," he said. "If someone did want them taken down, then I hope they can sleep at night when farmers lose their farm and everyone's taxes go up to pay for the new school." He further stated, "No one born and raised in this area would do something so stupid." He said that he has not heard of them killing any birds but also said that the money that they bring in would be more important than "a few dead birds." He said that even if they killed hundreds of birds he didn't think it would change anyone's mind about the wind farm. "The money that they bring in is just too important to the community."

A Clear Lake Chamber of Commerce representative said that the population of the town almost triples in the summertime because of the popularity of the lake. "People from all over northern Iowa and southern Minnesota come to sail, fish, boat, or swim," she explained. She had not heard a single complaint from any of the tourists about the sight of the turbines detracting from their vacationing experience. She said that many tourists and visitors come into the chamber's office to find the best way to go see the turbines. She said that they put a section about the turbines in their brochure "What To Do in Clear Lake." They also put out a map to help people find the best viewing areas and the informational kiosk. She said that many area schools send children to the wind farm for educational field trips. "The windmills have not brought in a large amount of people, but they have brought in some and have given others another thing to go see and do," she said. They have done nothing but help the community, she explained further, and the community has been strongly supportive of the project and hopes it will expand.

Although the town residents do not live right next to the turbines, they do see them every day.[24] They do not have to drive out into the country to view the turbines, since Joice residents can see them from their front porches; the turbines have become a part of the city park experience for Storm Lake residents, and Clear Lake citizens have the twirling blades to keep them company while they are out fishing on the lake. All of the townsfolk with whom I spoke said that they are able to see the turbines every day, but few pay any attention to them. When the development was first starting up, many were curious and went out to the construction site to watch, but now they are just a normal part of the town and farmland scenery.

Many said that the visual attributes of the wind turbines do not matter because the wind farm's major role is to help the local family farmers with lease payments and create tax revenue for schools and roads. Although the residents are aware that the turbines create renewable energy, the major reason that they are accepted and fit the landscape so well is because the town residents, the largest stakeholder group, believe that the turbines are aiding farmers, giving their children better school facilities, and making the roads smoother, all at no additional cost to them.

Although the town residents can see them and are aware of them, they do not live in hearing distance of the turbines, so noise was not an issue when the developers proposed the project. Most residents said they would not mind if the project expanded closer to the towns because they have gone out to see and hear them and the benefit of more money for the area is worth the addition of a hardly noticeable hum. None of the residents brought up the fact that the turbines have killed or might kill birds.

There was gossip in Storm Lake and Alta that the turbines caused a drought the year after they were put up or that the turbines have caused it to be windier, but no one with whom I spoke actually claimed to believe the gossip.

However, it must have reached the operators of the Storm Lake wind farm because they brought a meteorologist in from Sioux City to explain to a local newspaper reporter that the turbines had no effect on atmospheric patterns or wind speeds.

For the most part, the townspeople saw the turbines less as energy icons and more as helping maintain the agricultural way of life. Many felt that the turbines were interesting additions that fit nicely into their landscape and distinguished their towns from other neighboring farm towns that were not so fortunate as to have a local wind farm. Jill Henderson of Alta said, "When one part of our community prospers everyone else prospers. I mean both in terms of money and overall, the wind farm helps some of the residents financially, plus they make our town that much more special."

Country

All the landowners with turbines on their property were farmers or retired farmers renting out their land to other farmers. All the participating farmers with whom I spoke about having turbines on their land were pleased with their turbines.[25] Their only concerns were about the compression of some of the field's soil during the construction of the wind farm, the interference of the blades with AM radio signals in some places, and having to farm around the base of the turbines. However, they thought that the payment they received more than compensated for any of these inconveniences. On average the landowners received $2,000 per turbine per year, and most had multiple turbines on their land.

These landowners also received benefits other than cash payments from the wind energy developers. The soil that was removed for the turbine supports was distributed by the construction company to wherever the farmer wanted it. This allowed the farmer to fill in low spots in other parts of the field or in other fields that needed leveling. Farmers also benefited from improved field access roads. Since it is expensive to build roads, many of the wind farm access roads are simply improved dirt trails that the farmers formerly used to get into the fields. The developers widened these trails and added gravel so that repair crews could access all turbines. Once the turbines were installed, the farmers had a more durable and extensive road network that allowed not only tractors and combines but even family cars access to the fields.

Another benefit is the creation of vegetable gardens. The wind turbines near Alta and Storm Lake are set on trussed towers that created a 1,600-square-foot area underneath the turbine that most landowners spray with weed control. However, Jenna Smith of Storm Lake told me of a family who created a garden in this area below the turbine and grew a variety of vegetables. They then sold the food in town during the farmer's market as "turbine food."

Farmers with turbines on their land received the greatest benefits; however, because of their proximity to the turbines they were also the most likely to experience external costs of the turbines. Bird death is sometimes considered an issue, but these farmers considered the potential for increased bird kills a positive impact since birds cost the farmers money by eating their crops and lowering their yields. Noise, another problem sometimes associated with wind power, was not considered a big disturbance. Only one landowner considered the turbines sometimes noisy, but they were not noisy enough to offset the benefits of his lease check. Many said that the turbines could be heard, but the sound was not irritating since it was a whirling sound and not a mechanical one. The landowner who thought them noisy maintained that if it were possible, he would welcome more turbines on his land.

The impact on visual aesthetics was not an issue with this stakeholder group since the turbines were seen as just another piece of farm machinery. The turbine reaped the wind and every four months the farmers received a check for its harvest. They were machines that made the fields they occupied much more productive; the turbines were not energy icons, they were agricultural icons.

Howard Dykema, a farmer near Alta, said that there were a few farmers who did not want them on their land because of the hassle of farming around them, but he said, "Once they were all put in I heard them wishing that they would have signed." He has not heard of anyone wanting them to be taken down. In fact, he has heard a great deal of people wishing they would put in more of them. "I would think they needed their head examined if they were against the wind farm," he exclaimed. "They don't make too much noise and they help out our community." He said that he really does not notice them anymore except when he checks to see if they are turning, because "if they are turning, I am making money."

Dykema went on to say, "They aren't like the old windmills, but the new tractors aren't like the old tractors either." He said that times change, and if farmers want to stay around they better keep up with the best way to produce from their land. "The turbines fit this place," he said, "and I can't imagine the land without them. I'm glad that my decision to sign brings in more money for the community. It brings in money for the nearby towns, it helps farmers with their expenses, and it gives us something to be proud of."

Al Vincent lives in Clear Lake and rents out his land to other farmers and his old farmhouse to a family. He moved to town a few years before the turbines were constructed but says, "Although I don't live right next to them I wouldn't mind to. I think they look great and I wouldn't mind living with them around me even if I wasn't getting paid." Vincent said that he still gets excited when he drives out and sees them up close. "You can see them from in town," he said, "but you really cannot understand how big they are until you go out and stand next to them." He said that they are quite impressive. "I guess some people could think they look ugly, but I haven't heard anything like that," and he added, "I bet people think that some silos or barns look ugly, too, but they don't complain about those things here. If people did, I would wonder why they had so much free time to go out and judge how pretty a barn looked."

Vincent dismisses any thought that money is driving the acceptance of the turbines. "I have not heard anyone complain who wasn't getting paid." Asked about the family who rents his farmhouse, he said, "They don't mind them. I think they said that it adds to their whole country experience, and I told them, then I should add on to their rent." Yet some of his neighbors who did not get turbines thought he was lucky, and they wished they had some on their land. He explained, "When they come up to you and say that you will get thousands of dollars every year for thirty years guaranteed you feel like you have won the lottery."

The landowners who live near turbines without actually leasing out their land have the greatest potential to perceive the wind farm in a negative way, since they experience the greatest potential costs of noise and visual degradation while garnering no monetary benefits.[26] They have to live just as close to the turbines as those who were courted by the energy developers but do not receive any payments. They hear the turbines while they are outdoors and see them turning every time they look out their window. Every few months their neighbor receives a handsome reward while they receive nothing. At night, they find themselves in a sea of blinking red lights, and in the morning and afternoon, a flickering shadow covers their home. Yet not a single one of these nonleasing landowners vocally opposed the project. I found that the main reason these landowners did not protest is that almost every single one was a farmer, and most were related to, or good friends with, their neighbor who had leased out land for the project. There were very few rural nonfarm residents in the countryside. As farmers, these adjacent landowners knew how tough times were, and if their neighbor, friend, or relative had a chance to make his or her life better, then they were not going to stand in the way.

Joe McMillan, a Clear Lake farmer, lives less than a half mile from the nearest turbine, but everywhere he looks outside his farmhouse he is able to see them. "I was not approached by

the company, but I heard they might expand the current setup by adding twenty more turbines and I hope I get a few of those." He said that his land is on high ground and he hoped that it would be good enough if an expansion were to be constructed. "I have gone down to their office to tell them I wouldn't mind one if they need to put more up. They basically told me to take a number."

Joe said that none of his friends or family complained. "We think they are a good idea for the farmer community." As for their visual qualities, he said, "I think they look fine. They give you something to look at and they are relaxing." He said that he likes them best in the winter when everything else is dead or dormant because they break up the monotony of the landscape. "When there is snow on the ground it is hard to see them but when you focus on them it is a really interesting sight. At night their lights were annoying, but lately it is not that big of a deal with all the cell phone towers going up."

Although Joe Niedermeyer, also a Clear Lake farmer, has no wind turbines on his land, he said, "If they came to me today, I would sign." He said that money, land, and houses are all important, but what he values the most are family and friends and the small community lifestyle. He said that the "machinery, cattle, and fields are not farming; they are just what you see. Farming is in the work and the feeling you get producing from the land." Times are changing, though. Farmers are starting to quit the business, and young people are moving to cities. He said, "This is not all happening overnight, but I have seen the changes increase in the past twenty years." He said that soon one corporation will probably own all the land that I see around his place, and the workers will be paid next to nothing and all live in some rundown building in the nearest city. "Farming, as it is known now, will cease to exist someday," he said. "Many people think that farmers will never disappear and that whatever bad things happen, things will stay the same, but I have news for them, the writing is on the wall." He said, "If companies come in here and put wind turbines all over it will only delay the inevitable." But he said it would be worth it. "Every day that these turbines can buy for this community is worth whatever they look like, and whoever said the place has to be look pretty anyway?" He said, "Go up to a three-hundred-pound hog covered in its own [manure] and tell me if you think that is beautiful. It is one of the ugliest things on Earth but to me it is a beautiful sight, because it allows me to live in this nice house, in this nice community."

Conclusion

Although the wind's destructive might is often loathed, the power of the wind has also been a major force in the development of agriculture in North America. For more than one hundred years, farmers used wind machines to transform the "Great American Desert" into amber waves of grain by capturing the gales that raged down the sloping plains. Before electricity's extension into the countryside, the wind machines supplied power for necessary farm tasks such as pumping water for crops and cattle and milling harvested grain. They were such an essential part of the early agricultural landscape that over eight million were scattered across the Great Plains by the early twentieth century.[27]

The old ways of catching the wind's capricious power have all but faded from the landscape. As you drive down interstates, highways, or dusty roads, a quick look to the horizons of rural America validates this bittersweet fact. In the distance a slow creaking of rusted blades in an overgrown pasture serves as an epitaph to an age that has passed. The power lines that are strung overhead, the mile-long trains full of coal that traverse the horizon, and the clouds of steam rising from distant cooling towers make it quite clear that there has been a radical shift in the nation's energy system and consequently the rural landscape. Wind farms are a part of this radical shift, and in many places residents have protested their addition to their vista. So many people have voiced concern that wind energy developers now expect

protests. However, this NIMBY norm has not been seen in the rural Great Plains.

In northwestern Iowa, residents do not perceive wind farm developments as invasive because they do not see the wind turbine as an industrial energy producer or as a reminder of an unsustainable lifestyle. The people are not interested in the turbine's "green image," energy clarity, or energy sustainability. Hardly anyone commented on the amount of electricity the turbines produced or on how the wind farm cuts down on power plant emissions from conventional power plants. In fact, many did not believe the turbines produced enough clean electricity to be of much ecological consequence. They accepted the wind farm because of its local economic benefits to the community. The turbines fit into the landscape because they fit into the local place dynamics. The turbines did not prohibit row crop agriculture, they enhanced it. In these communities when the turbine blades turn, struggling family farmers and depressed small towns are economically prospering.

In rural Iowa, the wind turbine has not changed the meaning of the landscape, the landscape has changed the meaning of the wind turbine. The residents have changed the wind turbine from a symbol of industry and energy to a symbol of agricultural prosperity and community pride. In this study area, more people likened the structures to farm equipment or some element representing the farm than to structures that produce electricity. Although there is clarity about the turbine's work, this work is seen not as energy production but as increased agricultural yield. This symbolic shift is due to the replacement of the normal sources of contention (bird death, noise, and visual aesthetic impact) with the creation of community benefits.

Steve Dryden, the developer for the Top of Iowa wind farm, has seen that the increased profit potential in areas where wind speeds are higher means nothing if the resident population is not behind the development. The towns in Iowa and other Great Plains communities may not have the most powerful winds in the country, but they have a populace that wants the wind farms in their "backyards." Dryden has seen that the longer the residents have lived in an area, the more likely they are to be connected to the agricultural community through employment, marriage, or friendship. These people are highly unlikely to protest such a good thing for the farmers. Dryden says that in the small rural agricultural communities in the Plains, "Everyone has been there for generations and knows each other. In that environment, you don't [dump] on someone because you know over time you will need that same guy's help down the road. And that's what true neighboring is all about." Dryden said that in the wind energy business, "Success is 1 percent innovation and 99 percent perspiration. As a developer, the big question for me is, how long do I want to sweat? Not long, so that's why I like Iowa. Period."

However, developers cannot keep placing wind farm after wind farm in northwestern Iowa's fields because the region is meeting its electrical transmission load. Without any additional transmission capacity, northern Iowa could at most triple its current production before maxing out. Therefore, to increase wind energy's potential, developers must expand their search for places whose residents will view a wind farm as a local benefit as they do in northwestern Iowa. It seems logical to look first for places that have local characteristics similar to this study area. Luckily, there are other places with similar situations, and I hypothesize they will also react positively to wind farm development.

This investigation has shown that residents in Iowa allow the turbines to be in their view because the lease payments and taxes from the wind energy companies aid their efforts to solve local economic problems, the turbines symbolically mesh with the agricultural landscape of production, and a close social connectivity allows the benefit of the few to spread to the whole community. I believe that the Great Plains is full of places that fit this description and represent millions of acres of potential development—Iowa is just a small part of this rural agriculture belt. It is a windswept region

covered by cropland and rangeland, filled with struggling farmers and ranchers, and dotted with declining small towns where residents have close ties with one another and with the agricultural economy.

Places where other wind farms have succeeded without protest, such as West Texas, southwestern Minnesota, northeastern Colorado, and western Kansas, fit this rural agricultural dynamic, and there are still plenty of potential sites like these to be developed. Hundreds of Great Plains communities are surrounded by productive fields and are led by farmer and rancher icons that are in danger of disappearing. Correctly sited wind farms not only offer an opportunity to enhance national environmental and energy sustainability, but in the Great Plains, they also offer economic hope, social sustainability, and regional pride.[28] One hundred years ago millions of windmills covered the Great Plains, and perhaps once again, in the near future, wind-powered machines will form an essential part of a prosperous agricultural landscape.

NOTES

1. "Wind farm" is a common term for an array of wind turbines. There is no historical evidence that documents when or where this term originated. Possible explanations are that the term "farm" is used because the blades are seen as "harvesting" the wind, or that wind machines were historically associated with rural agricultural landscapes. Those opposed to wind turbine arrays in their area usually refer to them as wind factories.

2. Wind energy's NIMBY problem is a popular issue that has been written about extensively. See Robert Thayer, *Gray World, Green Heart* (New York: John Wiley & Sons, 1994); Maarten Wolsink, "Wind Power and the NIMBY Myth: Institutional Capacity and the Limited Significance of Public Support," *Renewable Energy* 21, no. 1 (2000): 49-64; Paul Gipe, *Wind Energy Comes of Age* (New York: John Wiley & Sons, 1995); Robert Righter, *Wind Energy in America* (Norman: University of Oklahoma Press, 1996); and Lester Brown, *Eco-Economy: Building an Economy for the Earth* (New York: W. W. Norton, 2001). Perhaps no one has written more about NIMBY as it relates to wind energy landscapes than Martin Pasqualetti. See Pasqualetti, "Wind Power: Obstacles and Opportunities," *Environment* 46, no. 7 (2004): 22-38; "Living with Wind Power in a Hostile Landscape," in *Wind Power in View*, ed. Martin Pasqualetti, Paul Gipe, and Robert Righter, 153-72 (San Diego: Academic Press, 2002); "Wind Energy Landscapes: Society and Technology in the California Desert," *Society and Natural Resources* 14, no. 8 (2001): 689-99; "Morality, Space, and the Power of Wind Energy Landscapes," *Geographical Review* 90, no. 3 (2000): 381-94.

3. American Wind Energy Association, "Wind Energy Projects," http://www.awea.org/projects/index.html (accessed July 2005).

4. With a federal tax credit of 1.9 cents per kwh wind is a profitable energy source. This tax credit is essential for wind energy. The years in which this credit is not authorized see a dramatic decline in wind turbine construction. For more information, see American Wind Energy Association, "Energy Bill Extends Wind Power Incentive through 2007," http://www.awea.org/news/energy_bill_extends_wind_power_072905.html (accessed July 2005).

5. The economics of wind energy are methodically described in Gipe, *Wind Energy Comes of Age*; Brown, *Eco-Economy*; and Robert Redlinger, Dannemand Anderson, and Poul Erik Morthorst, *Wind Energy in the Twenty-First Century: Economics, Policy, Technology, and the Changing Electricity Industry* (New York: Palgrave/UNEP, 2002).

6. Gipe, *Wind Energy Comes of Age*.

7. Robert Righter, "Exoskeletal Outer-Space Creations," in *Wind Power in View*, 19-41; Pasqualetti, "Wind Power: Obstacles and Opportunities"; and Gipe, *Wind Energy Comes of Age*.

8. Gordon G. Brittan, "The Wind in One's Sails: A Philosophy," in *Wind Power in View*, 59-79; Gipe, *Wind Energy Comes of Age*; Pasqualetti, "Morality, Space, and the Power of Wind Energy Landscapes"; Pasqualetti, "Wind Power: Obstacles and Opportunities"; Righter, *Wind Energy in America*; Thayer, *Gray World, Green Heart*; Wolsink, "Wind Power and the NIMBY Myth"; and Wolsink, "Attitudes and Experiences about Wind Turbines and Wind Farms," *Wind Engineering* 13, no. 4 (1989): 196-206.

9. John Donelan, associate director, Alliance to Protect Nantucket Sound, telephone interviews by author, April 2003; Larry Patton, president, Protect the Flint Hills, telephone interviews by author, April 2003; Geoff Saunders, organizer, Kittitas County, Washington, wind farm protest group, phone interview by author, May 2003; Chris Taylor, project director, Zilkha Energy, telephone interview by author, May 2003.

10. John Dunlop, Great Plains representative, American Wind Energy Association, telephone interviews with author, August and September 2002; Tom Factor, director, Iowa Wind Energy

Institute, telephone interviews with author, August 2002; Lawrence Flowers, National Renewable Energy Laboratory (NREL), e-mail correspondence with author, August 2002.

11. Gipe, *Wind Energy Comes of Age.*

12. Brown, *Eco-Economy.*

13. Lester Brown, "U.S. Farmers Double Cropping Corn and Wind Energy," Earth Policy Institute, http://earth-policy.org/Alerts/Alert3.htm (accessed July 2003).

14. Sonja Rossum and Stephen Lavin, "Where Are the Great Plains? A Cartographic Analysis," *Professional Geographer* 52, no. 3 (2000): 543-52. The authors analyzed the varying boundaries and found that thirty-two of the fifty maps based on cultural characteristics of the Great Plains included Iowa.

15. U.S. Department of Agriculture, 2002 Agricultural Census, http://www.nass.usda.gov/census/census02/profiles/ia/cp99019.PDF (accessed July 2005).

16. Richard Lampe, professor of biology, Buena Vista University, phone interview with author, April 2003.

17. Ibid.

18. Different wind energy companies will pay landowners different amounts for the land they are leasing for the wind farm. However, in the case of Iowa the landowners receive a guaranteed minimum amount. Any additional payment depends on how much electricity is produced from the turbines. Most Iowa landowners reported that they receive between $2,000 and $2,400 per turbine per year.

19. Tad Miller, operator, Cerro Gordo wind farm, interview with author, September 2002.

20. Steve Dryden, assistant wind energy developer, Cerro Gordo wind farm, and primary wind energy developer for Top of Iowa wind farm, interview with author, September 2002.

21. American Wind Energy Association, "Wind Energy Projects."

22. The names of the public officials have not been altered, but the names of residents and farmers mentioned in this article have been changed to pseudonyms.

23. I interviewed the mayors of Alta and Storm Lake. In Clear Lake I spoke with members of the chamber of commerce and a city public relations employee.

24. I spoke with dozens of citizens in various types of encounters and had the chance to formally interview fourteen residents from Storm Lake, Clear Lake, Alta, and Joice.

25. I interviewed fourteen of the 115 landowners leasing land to the three wind farms and thirteen farmers who lived next to land with wind turbines in operation.

26. Steve Dryden, the lead developer for the Top of Iowa wind farm, did pay a small amount to farmers who lived near wind turbines within the Top of Iowa wind farm. He did not think the adjacent landowners would oppose the project, but after experiencing disastrous local protests in suburban Wisconsin, he just wanted to make sure.

27. Righter, *Wind Energy in America.*

28. Although I propose that the Great Plains is full of small-town residents, farmers, and ranchers who could be aided by wind farm development, some places will not be seen as adequate locations. Development in sacred places and landscapes, avian sanctuaries, or pristine landscapes such as the Flint Hills of Kansas are bound to create NIMBY opposition and thus should be avoided. Moreover, since this research focuses entirely on farming communities, future research needs to be done concerning ranchers and ranching communities and their reasons for accepting wind energy landscapes.