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BEFORE THE  
PUBLIC SERVICE COMMISSION OF WISCONSIN

Application of Forward Energy LLC for a Certificate of Public Convenience and Necessity to Construct a Wind Electric Generation Facility and Associated High Voltage Electric Transmission Facilities, to be Located in Dodge and Fond du Lac Counties

9300-CE-100

**FINAL DECISION**

This is the final decision regarding the request by Forward Energy LLC (Forward) that the Commission issue a Certificate of Public Convenience and Necessity (CPCN). Forward seeks Commission approval to build a wind-powered electric generating facility in Dodge and Fond du Lac Counties, as well as associated high-voltage electric transmission facilities. The application for a CPCN is APPROVED, subject to conditions and as modified by this order.

**Introduction**

Forward is a subsidiary of Invenergy Wind LLC. It is proposing to build a 200 megawatt (MW) wind turbine facility, consisting of up to 133 General Electric 1.5 MW turbines. These wind turbines are designed to have a lifespan in excess of 20 years and Forward anticipates that its project will have a 30-year life. Forward must also construct access roads to the turbines, an underground 34.5 kilovolt (kV) electric collector system to gather the power from each turbine, a section of overhead 34.5 kV collector line, and new electric substation facilities for interconnecting to the existing electric transmission system. American Transmission Company LLC (ATC), which owns the high-voltage transmission system in eastern Wisconsin, operates a

138 kV transmission line that passes through the eastern portion of the project area and Forward intends to interconnect with this line.

Forward has identified a project area consisting of approximately 32,400 acres of land, in the towns of Byron and Oakfield (Fond du Lac County) and the towns of Lomira and LeRoy (Dodge County). Forward proposes to install its western-most turbines 1.2 miles from the Horicon National Wildlife Refuge and Horicon Marsh State Wildlife Area (collectively, Horicon Marsh). Approximately 97 percent of the project area is agricultural land. Although Forward is proposing to use 133 sites within this area, it has identified a total of 167 site alternatives.

To date, Forward has negotiated contracts with four Wisconsin electric utilities for the sale of its electric power. These contracts are with Wisconsin Public Service Corporation (70 MW), Madison Gas and Electric Company (40 MW), Wisconsin Public Power, Inc. (40 MW), and Wisconsin Power and Light Company (50 MW). State law promotes the use of renewable resources to produce electricity. Under Wis. Stat. § 196.378, Wisconsin has created a Renewable Portfolio Standard that requires Wisconsin utilities to acquire an increasing portion of the electricity they sell to retail customers from renewable resources. For 2005, these utilities must produce at least 1.2 percent of their electric power from renewable resources. By 2011, this minimum level will increase to 2.2 percent, and the Governor's Task Force on Energy Efficiency and Renewables developed a consensus recommendation to raise the portfolio standard to 10 percent of total retail sales by 2015. The contracts these four utilities have signed with Forward will help them meet the Renewable Portfolio Standard. In addition, Wisconsin's Energy Priorities Law establishes a priority list of preferred methods for meeting future

electricity demands. Wis. Stat. § 1.12(4) ranks energy conservation and noncombustible renewable resources such as wind power as the state's highest preferences.

Forward has expressed its desire to construct its plant this year and commence electric production no later than December 31, 2005, in order to qualify for a federal Production Tax Credit (26 U.S.C. § 45) that promotes the development of renewable resources. By doing so, Forward would receive an income tax credit of 1.9 cents/kilowatt hour (kWh), plus an inflation adjustment, for the first 10 years of production. The current law applies only to wind and biomass facilities that become operational by December 31, 2005. Federal legislation to extend this tax credit is pending in Congress, but its passage is uncertain.

Forward initially discussed its proposed project at open community meetings in 2003 and 2004. Dodge County requires that Forward receive a Conditional Use Permit for the entire project and a Land Use Permit for each turbine. Fond du Lac County does not have county-wide zoning, but Forward must receive Conditional Use or Special Use Permits from the towns of Byron and Oakfield. In the spring and summer of 2004 Forward also contacted Commission staff, the Wisconsin Department of Natural Resources (DNR) Office of Energy and staff of the Horicon Marsh State Wildlife Area, and the U.S. Fish and Wildlife Service (USFWS) at Horicon National Wildlife Refuge. At the state level, in addition to a CPCN from this Commission, Forward may need one or more of the following DNR permits: a Chapter 30 permit if construction involves the placement of bridges over navigable waterways; a Wisconsin Pollution Discharge Elimination System permit for stormwater management; and a permit for land disturbance activities that affect endangered resources. At the federal level, the Federal Aviation Administration (FAA) regulates the heights and location of proposed facilities that may affect

aviation at public airports, and the Bureau of Indian Affairs and local tribal authorities may review construction practices in order to protect cultural and archeological resources that could be found on the site.

On September 29, 2004, Forward filed its CPCN application with the Commission. The Commission reviewed this application but declared it incomplete on October 19, 2004. Commission staff received additional data from Forward until, on January 12, 2005, Forward filed its revised and updated application. The Commission found Forward's revised application to be complete on January 18, 2005. This declaration of completeness commenced the statutory 180-day period for Commission review of Forward's project, which expires on July 17, 2005. Under Wis. Stat. § 196.491(3)(g), if the Commission fails to take final action within this period, the CPCN application is approved by law.<sup>1</sup>

The Commission and DNR prepared a joint Environmental Impact Statement (EIS) for this project. The two agencies published their draft EIS on March 8, 2005, and provided a 45-day period for the submission of public comments about this draft. The agencies then issued their final EIS on May 19, 2005. Both a CPCN application and an EIS must receive a public hearing, which the Commission held on June 20-22, 2005. The issues for hearing were as follows:

- a. Should the Commission grant a CPCN for this project, pursuant to Wis. Stat. §§ 1.12, 196.025 and 196.491?
- b. Has the Commission's review of this project complied with the Wisconsin Environmental Policy Act, pursuant to Wis. Stat. § 1.11 and Wis. Admin. Code ch. PSC 4?

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<sup>1</sup> State law allows the Commission to seek one 180-day extension from Dane County Circuit Court, but the Commission did not do so in this docket.

The Commission held hearings in Madison, Wisconsin, to receive technical testimony on these issues from Forward, RENEW, the Horicon Marsh System Advocates (HMSA), and Commission staff on June 20, 2005 (a list of parties is attached as Appendix A). The following day it held morning, afternoon, and evening hearings within the project area to receive testimony from members of the public at the Brownsville Community Club, Brownsville, Wisconsin. In order to broaden public participation, the Commission also allowed the public to submit comments in writing. On June 22, 2005, the Commission completed its hearings in Madison by accepting evidence from the remaining technical witnesses of the parties and Commission staff. Persons who appeared and testified are listed in the Commission's files. The parties that appeared before the Commission are named in Appendix A of this order.

The Commission conducted its hearings as Class 1 contested case proceedings, pursuant to Wis. Stat. §§ 196.491(3)(b) and 227.44. After receiving pre-hearing briefs on June 17, 2005, and post-hearing briefs on June 29, 2005, the Commission deliberated on this matter at its July 8, 2005, open meeting and rendered an oral decision.

### **Findings of Fact**

1. Forward is proposing to construct a merchant plant, as defined in Wis. Stat. § 196.491(1)(w). Forward will not provide retail electric service, nor is it a public utility or an affiliate of a public utility.
2. Determining whether energy conservation, renewable resources, or other energy priorities listed in Wis. Stat. §§ 1.12 and 196.025, or their combination, will be cost-effective alternatives to Forward's proposed facility is not possible when the project under consideration is

a merchant plant, because the CPCN applicant is not required to submit information about the project's costs.

3. The Forward project, as modified by this order, is reasonable and in the public interest after considering alternative locations, individual hardships, safety, reliability, and environmental factors.

4. The Forward project, as modified by this order, will not have undue adverse impact on other environmental values such as, but not limited to, ecological balance, public health and welfare, historic sites, geological formations, the aesthetics of land and water, and recreational use.

5. The Forward project, as modified by this order, will not unreasonably interfere with orderly land use and development plans for the area involved.

6. The Forward project, as modified by this order, will not have a material adverse impact on competition in the relevant wholesale electric service market.

7. A brownfield site for the project is not practicable.

### **Conclusions of Law**

The Commission has jurisdiction under Wis. Stat. §§ 1.11, 1.12, 44.40, 196.02, 196.025, 196.395, 196.40, and 196.491 to issue a certificate authorizing Forward to construct and place in operation a 200 MW wind-powered electric generation facility and to impose the conditions specified in this Final Decision.

### **Opinion**

The Commission must implement two fundamental legal standards when reviewing any CPCN application. The first, known as the Energy Priorities Law, establishes the preferred

means of meeting Wisconsin's energy demands in Wis. Stat. § 1.12 and 196.025(1). The second, known as the Power Plant Siting Act, prohibits any person from commencing construction of a large electric generating facility that is designed for operation at 100 MW or more, without first receiving a CPCN. Wis. Stat. § 196.491(3)(d)3. lists the standards the Commission must apply in order to determine whether a proposed project meets the public interest standard of the Power Plant Siting Act. The standards of each law are discussed in detail below.

### **Energy Priorities Law**

The Energy Priorities Law creates the following priorities:

**1.12 State energy policy. (4) PRIORITIES.** In meeting energy demands, the policy of the state is that, to the extent cost-effective and technically feasible, options be considered based on the following priorities, in the order listed:

- (a) Energy conservation and efficiency.
- (b) Noncombustible renewable energy resources.
- (c) Combustible renewable energy resources.
- (d) Nonrenewable combustible energy resources, in the order listed:
  - 1. Natural gas.
  - 2. Oil or coal with a sulphur content of less than 1%.
  - 3. All other carbon-based fuels.

In addition, Wis. Stat. § 196.025(1) declares, "To the extent cost-effective, technically feasible and environmentally sound, the commission shall implement the priorities under s. 1.12(4) in making all energy-related decisions . . . ." Since wind is a noncombustible renewable resource, Forward's proposed electric facility fits within the second-highest statutory priority.

The Commission implements the energy priorities by determining whether any higher-priority alternatives to a CPCN project would be cost-effective, technically feasible and environmentally sound. Forward, however, is not a public utility that sells electricity at retail, nor is it a public utility affiliate. It is a private entity, proposing to construct a wholesale

merchant plant.<sup>2</sup> The Commission's review of CPCN applications for merchant plants is more limited than for public utility plants. Under Wis. Stat. § 196.491(3)(d)2. and 3, a merchant plant CPCN applicant need not demonstrate that its facility would meet the reasonable needs of the public for electricity and the Commission may not consider economic factors when evaluating the application. The Energy Priorities Law ranks energy conservation and efficiency as its highest priority, but without information about need and project cost the Commission cannot determine whether energy conservation would be a more cost-effective alternative. For these reasons the Commission concludes that the Forward project complies with the Energy Priorities Law.

### **Site alternatives**

Wisconsin's Power Plant Siting Act requires that a CPCN applicant must submit site alternatives for the Commission's consideration. Wis. Stat. § 196.491(3)(d)3. prohibits the issuance of a CPCN unless, after considering "alternative locations," the Commission finds that the project site is in the public interest, and Commission rules implement this provision by requiring that the CPCN application include information about at least two proposed sites for the proposed facility. Wis. Admin. Code § PSC 111.53(1)(e) and (f). In addition, under

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<sup>2</sup> Wis. Stat. § 196.491(1)(w) states:

1. "Wholesale merchant plant" means, except as provided in subd. 2., electric generating equipment and associated facilities located in this state that do not provide service to any retail customer and that are owned and operated by any of the following:
  - a. Subject to the approval of the commission under sub. (3m)(a), an affiliated interest of a public utility
  - b. A person that is not a public utility.
2. "Wholesale merchant plant" does not include an electric generating facility or an improvement to an electric generating facility that is subject to a leased generation contract, as defined in s. 196.52(9)(a)3.



Wisconsin's Environmental Policy Act, a state agency's EIS must consider alternatives to a proposed action. Wis. Stat. § 1.11(2)(c)3.

The Commission's standard for reviewing proposed site alternatives is to determine whether each proposed site is "reasonable," *i.e.*, is a feasible location for the project that would not directly conflict with any of the statutory criteria for granting a CPCN, and whether the sites are sufficiently distinct to offer different packages of costs and benefits that present the Commission with a choice. The Wisconsin Supreme Court affirmed this standard just a few weeks ago in *Clean Wisconsin et al. v. Public Service Commission of Wisconsin and Wisconsin Department of Natural Resources*, 2005 WI 93, ¶¶ 66-70.

Forward's CPCN application complies with this standard. The company's selection of a project location required several years of study, involving a three-tiered siting process. First, Forward conducted a state-wide evaluation of which regions across Wisconsin would have an adequate wind resource. Based on the meteorological data it collected, Forward identified the Eden, Wisconsin area as a region, approximately 60 miles in diameter, with a strong wind resource and proper exposure to prevailing westerly winds. At its second level of inquiry, Forward sifted and winnowed alternate locations within the Eden, Wisconsin region based on certain key criteria, including: the sufficiency of available land; proper topographic elevation; the feasibility of potential turbine layouts; the existence of nearby electric substations and transmission lines; community and landowner support; environmental compatibility; and the potential to use brownfield sites. Forward then used a more refined set of criteria to exclude possible areas, such as buffer zones around the towns of South Byron, Lomira and LeRoy and

around the village of Brownsville,<sup>3</sup> and to define the project location now before the Commission.

Not only has Forward considered numerous potential locations, but at its preferred location Forward is offering a far larger area for the construction of its project than is needed to build the wind farm at full size. Forward has identified 167 alternative turbine locations, even though it requires no more than 133 sites to develop a full-scale, 200 MW facility. By offering the Commission the ability to select proper locations within the greater project area that will comprise an approved project, Forward is placing before the Commission a wide variety of feasible alternative locations, limited only by the requirement that Forward must use strings of contiguous sites in order to collect the electricity through its underground electric system. HMSA, however, focuses upon the overall project boundary and asserts that, since all the turbine locations are within this boundary, they are all part of a single project location. In effect, this party is arguing that the various permutations of turbines do not offer distinct packages of costs and benefits and thereby do not provide a real choice.

The boundaries of Forward's project surround a huge area, approximately 50 square miles. This is far larger than the company needs to complete its project; instead, these boundaries encompass not just a full-scale wind farm but also alternatives. The 167 sites being offered have a variety of different characteristics. For example, some sites are closer to airports while others are closer to the Horicon Marsh, to the Neda Mine, to the Niagara Escarpment, to residential areas, or to the village of Brownsville. Each of these locations has different environmental implications. Some locations have the engineering advantage of greater wind potential, while others are closer to existing infrastructure such as roads and transmission lines.

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<sup>3</sup> These buffer zones are shown on the attached map of the approved project area.

These differences allow the Commission to consider numerous configurations for the project (including configurations that would produce less than the entire 200 MW), each with a unique package of costs and benefits. The Commission therefore concludes Forward is offering the Commission real choices and has satisfied the requirement that it provide alternative locations for this project.

A second issue concerning site alternatives is the type of site selected. Wis. Stat. § 196.491(3)(d)8. demands that CPCN applications for large electric generating facilities must use brownfield sites “to the extent practicable.” State law defines a brownfield site as an abandoned, idle or underused industrial or commercial site, whose expansion or redevelopment is hindered by environmental contamination. Wis. Stat. § 560.13(1)(a). Forward is proposing a greenfield site but, as noted in the EIS, only eight of the 60 brownfield sites in Wisconsin are located outside the city of Milwaukee and only three of these are found in southeastern Wisconsin, where viable wind resources are available. None of these sites has sufficient cleared land to be a feasible option.

### **Environmental impacts**

When deciding whether a CPCN project is in the public interest, the Power Plant Siting Act requires that the Commission consider, among other factors, environmental impacts. Under this statute, the Commission must determine that:

**196.491 (3)(d)3.** The design and location or route is in the public interest considering . . . environmental factors . . . .

. . . .

4. The proposed facility will not have undue adverse impact on other environmental values such as, but not limited to, ecological balance, public health and welfare, historic sites, geological formations, the aesthetics of land and water and recreational use.

Overall, the Forward project would have few serious effects on natural resources because it avoids most of the impacts that other means of generating electric power create. The only significant areas of environmental concern are potential impacts to groundwater, birds and bats.

*Environmental impacts that the Forward project avoids*

As a wind-powered project, Forward avoids a number of major environmental impacts that are caused when an electric generating plant uses combustible fuels. This is one of the primary reasons why the state promotes renewable energy resources.

Unlike combustible fuels, wind energy does not contribute to the significant problems of global warming, acid deposition, ozone depletion, and mercury accumulation in fish. The air pollution impacts that a wind-energy plant like Forward can avoid are substantial. Wind energy emits none of the “criteria” air pollutants that are regulated under the federal Clean Air Act: small particulate matter; sulfur dioxide; carbon monoxide; volatile organic compounds; and nitrogen oxides.<sup>4</sup> Wind energy produces no greenhouse gases, the electric industry’s principal contribution to global warming and climate change, nor hazardous air pollutants such as sulfuric acid, hydrochloric acid, ammonia, benzene, arsenic, lead, formaldehyde and mercury. If a coal-fired plant were to replace Forward’s energy production, it would annually emit 707,000 tons of carbon dioxide as well as the following levels of criteria pollutants: 513 tons/year of carbon monoxide; 242 tons/year of nitrogen oxides; 13 tons/year of volatile organic compounds; 340 tons/year of sulfur dioxide; 17 tons/year of sulfuric acid; and 160 tons/year of small particulate matter.<sup>5</sup> The Forward project will produce none of these pollutants.

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<sup>4</sup> See 42 USC 7409 and Wis. Admin. Code ch. NR 405.

<sup>5</sup> Estimated annual emissions of the coal plant most recently approved by the Commission, Weston Unit 4.

Not only does a wind-powered electric generating plant emit no air pollution, but it also generates no solid waste. The Forward project would avoid the “scrubber” waste caused by ash and flue gas desulfurization, and the thousands of tons per year of fly ash and bottom ash that coal-fired plants produce. Wind turbines produce no ash of any kind and require no scrubbers or landfill space.

Water quantity and quality are also important environmental issues in Wisconsin. Natural gas-fired combined cycle plants and coal-fired electric plants consume very large quantities of water and must rely on high-capacity wells or surface water, and the water loss created by these projects can create serious siting concerns. For example, the Weston 4 coal plant recently approved by this Commission will draw over 310 million gallons of water per year from the Wisconsin River, most of which will be evaporated as part of the cooling process. Using water in this manner to displace waste heat must be managed carefully to avoid creating thermal pollution problems for surface water bodies. In contrast, the operation of a wind-powered plant requires virtually no water at all.

Although the operation of a wind farm does not affect waters of the state, construction and decommissioning could do so. Forward’s only potentially significant impact on water resources concerns groundwater protection. The local bedrock is frequently fractured because of the area’s karst geology and construction or removal of the turbines could expose existing fractures or crack the bedrock further, allowing contaminants to enter the local aquifers. Replacing polluted wells could be a substantial expense for neighboring landowners.

Forward has developed a pre-construction plan to avoid this problem. It will first obtain rock cores at each turbine site where the foundation may extend into bedrock, in order to

determine the existing condition of the rock. If the core indicates unsound subsurface rock, Forward will use construction techniques that minimize fractures and quick-setting cements and anchors. Forward states that it will not rely upon drilling, blasting or hammering on the bedrock, which can cause fracturing, and that it can use berms and sheeting to divert rainwater from open excavations. To the extent possible, Forward will not install underground cabling in bedrock but will use trenches and avoid blasting or hammering.

Forward is not proposing to install any of its turbines in wetland areas. The project area is primarily uplands, used intensively for agricultural purposes. Although some of Forward's project facilities could cross waterways, the record indicates that these actions should not adversely affect these areas because Forward has committed to bore the underground electric collector system beneath streams. DNR will also regulate the construction of any access roads over navigable streams, through the issuance of permits under Wis. Stat. ch. 30.<sup>6</sup> For stormwater management, Forward will need a Wisconsin Pollution Discharge Elimination System permit from DNR, pursuant to Wis. Stat. ch. 283.

*Potential impacts to birds*

The principal environmental concern raised by this project is the potential for adverse effects to birds, because of the project site's proximity to important natural areas. The region surrounding the project area holds a diverse array of high-quality habitats, which attract large quantities of both common and rare avian species. Of greatest concern is the fact that the western border of the project area hugs the eastern edge of Horicon Marsh, which is both a State Wildlife Area and a National Wildlife Refuge. The Horicon Marsh has been recognized globally

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<sup>6</sup> Wis. Stat. ch. 30 regulates structures and deposits and other forms of development in or over navigable waters and on lakebeds, riverbeds, and shorelands.

as a “Wetland of International Importance” under the United Nations Ramsar Convention on Wetlands; it is one of only 21 such sites in the United States. In addition, smaller parcels of federally-protected Waterfowl Production Areas, state-protected Glacial Habitat Restoration Areas, other state Wildlife Areas, lakes, and wetlands are found in the area surrounding Horicon Marsh. Although the Forward project area does not provide significant habitat potential because it is 97 percent agricultural, the Horicon Marsh and neighboring wetlands attract large numbers of resident and migrating birds, including rare and exceptional species, that move throughout this general region.

Researchers have studied bird fatality rates at other, existing wind farms in the U.S., and their work shows that both migratory and resident birds sometimes collide with wind turbines. In this country, the annual avian mortality rate at operating wind farms is low, ranging from less than one bird per turbine to eight birds per turbine. Scientists have researched avian mortality at wind farms that are, in some important aspects, similar to the Forward project area—wind farms in the Midwest, near wildlife sanctuaries, and in migration corridors. The larger studies found that bird mortality rates are insignificant for common species, but birds use Forward’s proposed location more heavily than the other areas studied. In addition, the research has not completely addressed the susceptibility of rare bird species and those whose populations are in decline to collisions with wind turbines, or the potential of wind turbines to displace birds from the area. On the whole, however, the record indicates that other man-made hazards such as tall communications towers with guy wires, brightly lit buildings, glass windows and automobiles pose greater risks to birds than wind turbines. In addition, the presence of feral cats in Wisconsin is estimated to kill many millions of birds annually and the mowing of hay threatens

grassland bird habitat. These are known problems for avian species, likely of far greater impact than mortality from wind turbines.

The two principal questions involving avian impacts are the need for more site-specific research before approving this project and the proper setback from the Horicon Marsh. Each issue is discussed below.

Expert witnesses from DNR, Forward, and HMSA who testified at the Commission's hearings disagree about the likelihood that this project will cause significant biological harm to avian wildlife, but they agree that the state of the science cannot yet answer this question definitively. Forward performed an on-site, pre-construction survey of birds in April and October-November 2004. Its contractor, Curry & Kerlinger, LLC, prepared a report of this survey in a document titled "Abundance and Behavior of Migrant Waterfowl and Other Birds at the Forward Wind Energy Center, Dodge and Fond du Lac Counties, Wisconsin," dated December 2004. This report supplemented an earlier "Phase I Avian and Bat Risk Assessment," also performed by Curry & Kerlinger, LLC. The December 2004 Report and Phase I Report confirmed that birds visit the project site very heavily during migration seasons and that the proximity of this project to the Horicon Marsh could cause greater than average avian mortality. DNR and the USFWS criticized the design of the work, however, and the EIS concluded that this 2004 study was inadequate to characterize the diversity and abundance of birds and habitat use in the area. As a result, Forward is currently in the midst of additional studies, which it designed in consultation with DNR, USFWS, and Commission staff. It won't complete these studies until Fall 2005, after the date when Forward must commence construction if the project must be operating by December 31, 2005.



Dr. John Kaspar, professor emeritus at the University of Wisconsin-Oshkosh and the expert witness testifying on behalf of HMSA, proposed that Forward should survey the site for at least two full years (all four seasons, each year) before construction commences. However, the research at other wind farms to date has not shown significant bird mortality. In addition, delaying construction could reduce or eliminate the renewable energy available from a project that has so many environmental benefits, if the federal wind tax credit expires on December 31, 2005. For these reasons, the Commission finds that requiring more pre-construction studies beyond the two years of data that have been and will be collected in 2004 and 2005 is not in the public interest.

In addition to pre-construction studies, USFWS recommended that Forward perform two or more years of post-construction avian studies using peer-reviewed research protocols. The EIS describes a possible survey design that would not only address bird mortality but also study breeding, nesting, foraging and flight behavior in the project area, using Before-After Control Impact research protocols similar to those established in the 2005 studies and investigating how bird concentrations may relate to proximity to the Horicon Marsh. Forward agrees that post-construction mortality studies should occur and the Commission finds it reasonable to require that Forward complete this post-construction research. In addition, post-construction research should address related topics such as bird breeding, nesting, foraging and flight behavior to the extent practicable. Rather than further prescribe the length or nature of the studies in this order, the Commission directs Forward to consult with Commission staff, USFWS and DNR about the survey design.

The second major issue concerning avian impacts is the proper setback from the eastern boundary of the Horicon Marsh. Forward is proposing a 1.2 mile buffer between the Marsh and Forward's nearest, western-most turbines. Many organizations opposed placing this project in such close proximity to the Marsh. The Friends of Horicon National Wildlife Refuge, Horicon Marsh Bird Club, John Muir Chapter of the Sierra Club, Ducks Unlimited, Wisconsin Metro Audubon Society, and Madison Metro Audubon Society proposed setbacks of three to five miles. The Izaak Walton League recommended that the Commission delay its decision until more data is collected, and the Citizens Natural Resources Association of Wisconsin asked the Commission to deny the CPCN application outright. In a November 18, 2004, letter to Commission staff, the USFWS initially recommended a larger setback of three to four miles from the Marsh. Subsequently, the USFWS revised its recommendation to a two-mile setback. When Dodge County issued a Conditional Use Permit to Forward on April 25, 2005, one of the conditions it imposed was a three-mile setback based upon the earlier recommendation of the USFWS.<sup>7</sup> Forward asserts that a three-mile setback would eliminate over 60 of the 167 potential sites for turbines, most of which are located where it has identified the greatest wind energy potential.

The research at existing wind farms tends to show that birds do successfully avoid wind turbines, because the mortality rates are low. Given the international importance of the Horicon Marsh as an avian refuge, however, and the fact that dispositive pre-construction studies cannot be performed in a timely manner, prudence demands that the Commission err on the side of protecting this outstanding natural resource. Forward properly notes that the western-most

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<sup>7</sup> Forward has appealed this condition to the Dodge County Board of Adjustments, arguing that the county lacks authority under Wis. Stat. § 66.0401 to impose such a requirement, but this appeal was still pending as of the Commission's decision date.

portion of its project area offers the advantages of greater wind potential, willing landowner hosts and fewer non-participating residents located nearby, but moving the project further away from Horicon Marsh is a common sense means of mitigating the risk to birds because a reasonable person can conclude that this will likely reduce the concentration of birds flying through, or foraging around, wind turbines. Expanding the setback from the Horicon Marsh is a conservative method of controlling the risk of undue adverse impacts to the environment, as required under Wis. Stat. § 196.491(3)(d)3. and 4, that need not significantly reduce the project's size or output. A larger setback will also protect the aesthetics of land and water and recreational use, which Wis. Stat. § 196.491(3)(d)4. further requires. Principal recreational uses of the Horicon Marsh are bird watching, nature studies, and enjoyment of the natural area. The Forward project could interfere with these activities, as demonstrated by photo simulations of the landscape from viewing locations within the Marsh. A greater setback will reduce the intrusive nature of the project, so tourists and others can still appreciate the serenity and natural beauty of the Horicon Marsh.

For these reasons, the Commission requires that Forward install no wind turbines west of the line that is two miles from the properties owned by USFWS and comprising the existing eastern boundary of the Horicon Marsh. The USFWS recommended this as a minimum setback. The setback will displace the two western-most turbine strings, in which Forward would otherwise install 30 turbines. Forward can move these turbines elsewhere, which means it can still install up to 133 wind turbines and produce up to 200 MW. Forward argued that this setback could reduce the maximum potential energy production by as much as 15.4 million kWh per year. The record evidence supporting this contention was inconclusive and, in any event, this

reduction would amount to only 2.5 percent of the project's potential energy generation. The Commission is also willing to consider revisiting this setback, after the 2005 Avian Studies are completed and the data is properly analyzed. If Forward requests, the Commission may reopen this proceeding, and if Forward demonstrates that the likely avian impacts would be low, the Commission is willing to consider moving the setback line closer to the Horicon Marsh. In the alternative, Forward can simply design its entire project entirely outside the two-mile setback area.

The Horicon Marsh is a national treasure. Given that the current scientific knowledge about protecting avian life in the project area is uncertain, the public interest requires this more cautious approach.

*Potential impacts to bats*

Another potentially significant environmental issue concerns the protection of bats in the area. The Neda Mine State Natural Area Bat Hibernaculum is located approximately 10 miles from the nearest proposed Forward turbine site. This abandoned iron ore mine, owned and managed by the University of Wisconsin, is an overwintering site for as many as 150,000 bats. The wetlands of the area may provide important foraging and roosting areas for bats that dwell at the Neda Mine. Seven species of bats are known to occur in Wisconsin, two of which are of special concern. Although the occurrence of bats in this state and their behavior are not fully understood, bats are known to be more sensitive to losses than other species because of their low reproductive rates and some studies at other wind farms have shown greater mortality rates for bats than for birds.

Project opponents argued that both pre-construction and post-construction research should be required to help identify bat behavior and mortality. Thorough pre-construction studies would be lengthy and extremely expensive, however, possibly delaying the project for years and costing hundreds of thousands of dollars. Forward's expert witness, Mr. Russ Romme, testified that pre-construction studies have not been performed elsewhere, but at the Buffalo Ridge project in Minnesota in 2001 and 2002 no relationship between bat activity and bat mortality could be observed. The Forward project area, being highly agricultural, provides only marginal habitat for bats and is already some distance removed from the Neda Mine. For these reasons the Commission concludes that pre-construction bat surveys are not needed, but finds that post-construction mortality research will advance scientific knowledge about the potential impacts of wind farms upon bat populations. Forward is willing to conduct a post-construction fatality study and a population viability analysis with associated sensitivity analyses, which will be useful for determining impacts of future wind power development in Wisconsin and for evaluating cumulative impacts to bats from the expansion of wind power in the state. The post-construction bat research is best melded with Forward's post-construction bird studies, and Forward shall consult with Commission staff, DNR, and the USFWS regarding its proper design.

### *Mitigation*

The USFWS and DNR each have enforcement authority under the Migratory Bird Treaty Act, 16 U.S.C. § 703, *et seq.*, and under the Endangered Species Act, Wis. Stat. § 29.604. These are the proper agencies to address means of mitigating any adverse impacts to avian species or to listed species, as needed.

### **Private airports**

Inside the Forward project area are four private airports, plus two more just north of the project boundary.<sup>8</sup> The Mittelstadt airport consists of two runways, one north-south and the other east-west. Some of the owners testified that the installation of turbines would hinder the use or safety of their private airports, and the record also includes testimony on this subject from an employee of the Wisconsin Department of Transportation (DOT) Bureau of Aeronautics and a retired employee of the FAA.

State and federal aviation standards do not apply to these airports because they are private, not public. Although the FAA governs the use of navigable airspace throughout the country, its extensive regulations do not cover private airports. The agency's regulations concerning "Objects Affecting Navigable Airspace" are found at 14 C.F.R. pt. 77. The FAA uses these regulations to establish safety standards for determining obstructions that may be too high or that would interfere with the flight path of a plane that is taking off or landing, but these standards apply to airports available for public use only.<sup>9</sup> Nonetheless, several local airport owners and users indicated their desire that the Commission should impose the same standards for airport clearances to protect these private airports. According to the EIS, the Bureau of Aeronautics staff agreed that invoking these standards would help preserve runway safety.

If the 14 C.F.R. pt. 77 clearances around public airports were used around the private airports in the Forward project area, wind turbines could not be located within a 5,000 to 9,000 foot radius of the runways. In fact, Dodge County did impose this restriction as one of the

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<sup>8</sup> The FAA formally defines even private landing and takeoff areas as being "airports." 14 C.F.R. § 157.2. For this reason, in this order the Commission uses the phrase "private airport" rather than the more commonly used term, "private airstrip."

<sup>9</sup> 14 CFR 77.13(a) and 77.21(c).

conditions of its Conditional Use Permit. Its effect would be the displacement of approximately 84 proposed wind turbine sites.

Other witnesses offered different mechanisms for protecting the private airports. HMSA subpoenaed the testimony of Mr. Gary Dikkers, the Airspace Manager of the Bureau of Aeronautics. He testified about the potential effects of air turbulence downwind of a wind turbine and proposed that the Commission establish “turbulence buffer zones” around the airports. These zones would be 2,000 feet wide, protecting the takeoff legs and standard traffic patterns for descent to landing. If the Commission were to adopt these turbulence buffer zones, approximately 70 different turbine sites would be displaced. Forward’s expert witness Mr. John Chevalier, who had worked as an attorney for FAA, challenged the need for turbulence buffer zones in general and the size of the zones in particular. He maintained that, even if turbulence buffer zones are needed, those proposed by Mr. Dikkers would extend more than 400 feet high, well above the area where the wind turbines produce air turbulence. Mr. Chevalier suggested the Commission could apply only the FAA’s “end of runway” standards to keep clear the final approach paths to the private airports, as described in 14 C.F.R. § 77.25(c)(1), (d)(1)(i) and (d)(2)(i). This suggestion would create a trapezoidal area of protection, 250 feet wide at the near end of the runway and extending for a distance of 5,000 feet, at which point the trapezoid is 1,250 feet wide. Mr. Chevalier described this as the only area where a plane would be at or below the height of a wind turbine. His alternative would move only a few wind turbine sites, as Forward has already designed the project to keep wind turbines out of these trapezoidal zones at each end of all the runways but two. Although Mr. Chevalier did not propose protecting the west

end of a Mittelstadt runway, applying his trapezoidal zones uniformly would include that runway end. Forward concedes that the turbines inside this protected area can be moved.

Commission staff provided other alternatives, combining Mr. Chevalier's trapezoidal areas with more focused turbulence protection that considers prevailing wind patterns and covers only upwind areas (assuming prevailing winds are from the west) where a plane would drop below 450 feet in its takeoff or landing traffic pattern. Commission staff's alternatives would displace 16 to 34 turbine sites.

Forward challenges the legal basis for selecting any alternative that would regulate the safety of navigable airspace. It asserts that the federal government has entirely preempted the area of air safety standards, citing federal court decisions such as *Abdullah v. American Airlines, Inc.*, 181 F.3d 363, 367 (3<sup>rd</sup> Cir. 1999). On the other hand, the state of Wisconsin already invokes explicit statutory authority, as a land use regulation, of obstacles to flight. For example, Wis. Stat. § 114.135(6) and (7) authorize DOT to control the erection of buildings, structures, towers and other objects over 500 feet tall, or within the 40:1 climbing gradient near public airports, while Wis. Stat. § 114.136 allows counties and municipalities to protect the aerial approaches to airports they own. In addition, towns may regulate the location and height of structures in the vicinity of an airport under Wis. Stat. § 60.61(2)(f).

Wis. Stat. § 196.491(3)(d)3. directs the Commission to examine safety issues when it reviews a proposed CPCN project, and it has considered means of protecting the safety of airports numerous times when reviewing other CPCN applications. For example, it has rerouted a transmission line to avoid a private airport, has modified transmission towers to avoid creating problems for aerial pesticide applicators, has ordered the transmission company to place marker



balls on new lines, and has directed the company to build a line underground where it passed near an airport.

Even if federal preemption does override the Commission's active use of its safety authority, the Commission is still obliged to consider the interaction between wind turbines and these private airports under other provisions of state law. Wis. Stat. § 196.491(3)(d)3. states that the Commission must determine whether the location of a project "is in the public interest considering . . . individual hardships," and Wis. Stat. § 196.491(3)(d)4. declares that a CPCN project may not have an undue adverse impact on "recreational use." Furthermore, Wis. Stat. § 196.491(3)(d)6. declares that a proposed facility may not "unreasonably interfere with the orderly land use and development plans for the area involved," and the private airports are part of the area's existing land use. This is not an area preempted by federal law. As the federal court explicitly declared in *Gustafson v. City of Lake Angelus*, 76 F.3d 778, 785 (6<sup>th</sup> Cir. 1996), "[E]nvironmental impact and land use compatibility are matters of local concern and will not be determined by the FAA." The Commission therefore bases its evaluation of the interaction between the Forward project and the private airports upon its authority to regulate land use under these laws, not upon the regulation of navigable airspace.

Wind turbines located within the trapezoidal zones described by Mr. Chevalier clearly conflict with the existing private airports, since they are obstacles that a plane could hit. In order to protect each runway end of the six airports, Forward must relocate turbine sites that are within a trapezoidal zone at the end of any runway.

Downwind turbulence from wind turbines is a matter of greater dispute. When the Bureau of Aeronautics' Airspace Manager developed his theory on turbulence buffer zones, he

based their size on the fact that wind turbines are typically spaced six to eight rotor diameters apart (approximately 2,000 feet). He considered this the spacing needed to allow turbulence from an upstream wind turbine to die down, compared the possible turbulence from the rotor blades to what would be created by the wings of a large commercial airliner, and concluded that wind turbines should be spaced 2,000 feet from areas where the small planes that use these private airports are in their final stages of landing or takeoff. Forward challenged the concept that unsafe turbulence would persist at such a distance, arguing that wind turbines are spaced in a wind farm to account for array loss, not turbulence. Forward also introduced the testimony of a pilot who, accompanied by one of the private airport owners, flew through downwind turbulence from two operating wind farms in test flights. This witness concluded that the turbulence would not cause a plane to sink or roll suddenly and stated that buildings, trees and hills can produce greater turbulence problems on cross wind landings. The airport owner, as a passenger in the plane, agreed with these conclusions. The Commission finds Forward's evidence credible, but a single day of testing is not enough to demonstrate conclusively that wind turbines can successfully integrate with the airports. Other portions of the record, such as the "February 13, 2005, Wind Generator Resolution" of the Wisconsin Agricultural Aviation Association, suggest that this turbulence could make flying a loaded crop dusting plane difficult or dangerous.

The Commission concludes that some turbulence buffer zones are needed to make the Forward project compatible with existing land uses. It is reasonable to focus only on upwind turbines near the takeoff and landing zones because, based on the evidence in this record, turbulence from a wind turbine is only likely to become a problem upwind from a plane that is flying at or below the height of a turbine, *i.e.*, during takeoffs and landings. In this area, the

prevailing winds are from the west. The Commission, however, must also account for the record's uncertainty as to the intensity of turbulence and consider the adverse financial impacts to the airport's neighbors, if turbines are moved off their property. Forward properly points out that Wis. Stat. § 114.03 vests ownership of the space above a landowner's property to that landowner. For these reasons, the Commission rejects the larger buffer zones proposed by Mr. Dikkers, and will impose zones of a smaller size, in more restricted areas. The map attached to this order shows upwind buffer zones that are 1,000 feet wide, protecting each of the six north-south runways and their trapezoidal zones from westerly winds. As the Forward project is currently designed, the buffer zones will only move some turbines near the Wunsch and Mittelstadt airports because Forward has reached agreement with Mr. Baier and is not proposing to install wind turbines close to the other airports. Forward may not install turbines inside the trapezoidal zones or these limited buffer zones, at any of the airports in the project area, unless the airport owner consents.

### **Land use and local development plans**

The Commission's consideration of the interaction between Forward's project and the existing private airports is just one part of its obligation to examine potential conflicts with local land use and development plans under Wis. Stat. § 196.491(3)(d)6. The Commission must examine both the existing uses of the area and the plans of the counties and local municipalities.

The vast majority of Forward's project area is currently used for agricultural purposes; 97 percent of the total area is dedicated for row crops, small grains, or hay. Deciduous woodlands comprise about 2 percent and residences only about 0.26 percent of the land area.

Forward's proposed facilities are in land zoned Agricultural (A-1) or Prime Agricultural (A-2), and the project qualifies as a special use under local zoning ordinances.

The Forward project needs a Conditional Use Permit from Dodge County which, as described above, was issued on April 25, 2005. Two of the permit's conditions (a three-mile setback from Horicon Marsh and the imposition of FAA 14 C.F.R. pt. 77 regulations to protect private airports) would prohibit the use of all but a few of the proposed turbine locations in that county and substantially constrain available space within the project area. State law, however, limits local authority over wind energy systems. A county or municipality may restrict the installation of a wind project only under certain circumstances:

**66.0401 Regulation relating to solar and wind energy systems. (1)**

**AUTHORITY TO RESTRICT SYSTEMS LIMITED.** No county, city, town, or village may place any restriction, either directly or in effect, on the installation or use of a solar energy system, as defined in s. 13.48(2)(h)1.g., or a wind energy system, as defined in s. 66.0403(1)(m), unless the restriction satisfies one of the following conditions:

- (a) Serves to preserve or protect the public health or safety.
- (b) Does not significantly increase the cost of the system or significantly decrease its efficiency.
- (c) Allows for an alternative system of comparable cost and efficiency.

Any controls beyond these specified areas are prohibited, and even a county or municipality's issuance of a Conditional Use Permit is tempered by these restrictions on local regulation. *State ex rel. Numrich v. City of Mequon Board of Zoning Appeals*, 242 Wis. 2d 677, 626 N.W.2d 366, 2001 WI App 88, ¶ 23.

Fond du Lac County does not have a land use plan, but it is experiencing housing development pressures in the project area. At the time of hearing, the town of Byron was in the process of completing a Comprehensive Plan and the town and village of Oakfield have

developed a Joint Land Use Plan. This Joint Land Use Plan describes the town's interest in attracting some residential development, while preserving the best farmland for agricultural production and protecting the environmental quality of important natural features. In Dodge County, the town of LeRoy and village of Lomira have their own land use plans, while the village of Brownsville is currently preparing a 30-year comprehensive growth plan. A priority of the town of LeRoy is to control development, so it will "protect the integrity of the LeRoy environment and the farmers' right to farm." It states that both industrial and residential development must fit within the character of the area and directs residential development away from farming operations. As another means of protecting prime farmland, the town of LeRoy's plan will locate public infrastructure and utilities to prevent negative effects on agriculture. The Comprehensive Plan of the village of Lomira also declares its intent to preserve farmlands wherever possible. These plans will become part of Dodge County's Development Plan, which complements the local communities' desire to protect environmental resources and prime agriculture lands and avoid residential sprawl. The county also issued an Agricultural Preservation Plan in 2002. As these plans make clear, a central focus of the local communities is the preservation of agriculture.

Wind energy generally does not interfere with agricultural uses of land, and Forward's project will actually have a positive impact on farming because participating farmers will receive supplemental income to support their agricultural practices. Forward's easement payments to these farmers will be in the range of \$4,000 to \$5,000 annually, continuing for the life of the facility. In addition, Forward will reimburse farmers for lost revenues due to land taken out of production and lost Conservation Reserve Program payments, and will repair damage to any

drainage systems. On the other hand, the presence of wind turbines will make aerial pesticide application with airplanes more difficult or even impossible; although helicopter spraying and ground application are generally feasible alternatives, they have disadvantages and the presence of turbines will disrupt pesticide spraying services both for farmers who host the wind turbines and for neighboring farmers who do not. The vegetable processing companies that employ aerial sprayers have not, however, voiced objection to the Forward project. They have stated their willingness to depend on ground applications where aerial spraying is unavailable, and will continue to contract with local growers in the area.

Overall, this project will promote the preservation of agricultural lands, which furthers a principal goal of local land use plans. Forward will also select its turbine locations in order not to impair future growth within municipal boundaries and is willing to keep its turbines at least a minimum distance away from the residences of those who have not signed easements. In Fond du Lac County, Forward is voluntarily willing to impose a minimum distance that conforms to Wisconsin's "Draft Model Wind Ordinance," 1,000 feet from the residences of those who do not host turbines and 450 feet from the residences of those who host turbines. Dodge County has enacted a "Wind Energy System Ordinance" that imposes a minimum setback of three times the turbine's height, or 1,194 feet, from residences. The Commission therefore finds that the proposed project is consistent with local land use and development plans, as required under Wis. Stat. § 196.491(3)(d)6.

The village of Brownsville makes an additional request. At the Commission's public hearings Mr. Harold Johnson, the village President, introduced a resolution declaring that any turbines within one mile of the village's current borders would conflict with its growth plan.

Brownsville asks the Commission to impose a one-mile setback because the village is expecting to double in size by the year 2025. Such a setback would displace approximately nine turbine sites from the town of Lomira, which surrounds the village. In its brief to the Commission, the town states that the joint extraterritorial zoning committee of these two municipalities should make decisions about any such setback, and the committee has taken no action to date.

According to the town, the zoning ordinances of Dodge County currently control this extraterritorial area because the joint committee has not yet adopted a comprehensive zoning plan. The Commission finds that the village of Brownsville's request can be properly handled at the local level, pursuant to Dodge County's ordinances and any authority that the extraterritorial zoning committee may acquire. Local government, acting within the constraints of Wis. Stat. § 66.0401, is the proper entity to make decisions about this extraterritorial area.

Finally, the unincorporated community of South Byron requests one change to the project. Forward proposes to build its electric collector circuits underground to the extent practicable, but plans to build an overhead 34.5 kV line to move the electricity to the substation. This overhead line would run through the community of South Byron, which prefers that it either be rerouted or installed underground. Forward stated that an underground line could be feasible, and if so, the Commission finds that underground construction through South Byron is in the public interest. If Forward determines that underground construction is not feasible, it shall advise the Commission of the basis for this determination and may seek approval of an alternative means of construction through South Byron. In the alternative, Forward can move its overhead line so it no longer passes through South Byron.

### **Property values**

Landowners who won't host turbines have raised concerns about whether the presence of these turbines would decrease the value of their property. HMSA and Forward both provided evidence on this subject, as did numerous neighboring landowners who testified at the Commission's public hearings. If the record were to show that a proposed CPCN project would significantly harm property values, Wis. Stat. § 196.491(3)(d)3. would require the Commission to consider the extent to which this constitutes an "individual hardship."

The company's witness battled HMSA's witness regarding the likelihood of harm to property values of neighboring landowners. Mr. Peter Poletti, a real estate appraiser testifying for Forward, prepared a report on the effect of the Rosiere and Lincoln wind projects in Kewaunee County, and the Mendota Hills wind project in Illinois, on neighboring property values. He concluded that these wind farms have not caused any significant difference in the price paid for agricultural land or small residential tracts, and the Forward project is located to minimize its effect on property values. Mr. Poletti also examined prior studies of property values around operating landfills and transmission lines, which he used as surrogates for more extensive research data on wind energy facilities, and drew the same conclusion. Mr. Kevin Zarem of Metropolitan Appraisal, testifying on behalf of HMSA, offered a contrary opinion. He focused only on land values, not on the value of improved property, finding that the project could reduce the value of land by 17 to 20 percent because of impacts on the view shed. Mr. Zarem challenged Mr. Poletti's conclusions for lack of market sales data, and testified that insufficient real estate transactions have occurred near existing wind farms to draw reasonable conclusions. To compensate for this lack of data, Mr. Zarem examined two suburban Milwaukee subdivisions,



with transmission lines passing nearby, as surrogates. However, the lots closest to the transmission lines were also covered by a tree planting restriction (prohibiting trees inside the transmission easement), which may have affected the value of lots that Mr. Zarem considered.

Because the use of transmission line impacts as a substitute for wind farm impacts on property values is not substantiated in this record, the Commission assigns greater weight to Mr. Polletti's report on the property value impacts of actual wind farms. Nonetheless, the record in this docket does not resolve the question of property value impacts. As stated in the EIS, the aesthetic impact of wind turbines in the large area that constitutes a wind farm can be vastly different across the view shed. The value of agricultural land is likely to increase because Forward will protect agricultural uses of the area, but the effect upon residential property is more uncertain.

Some members of the public argued that Forward should develop a "property value protection plan," which would provide assurance that property owners would not be harmed by the presence of the wind farm if they sell their land. The village of Brownsville adopted Resolution 2005-3, urging the Commission to direct that Forward enter into such a plan with Dodge County. The village President noted that the siting committee of local municipalities had negotiated such a plan earlier this year with a local landfill. A landfill protection plan, however, is crafted under Wis. Stat. § 289.33, which imposes a negotiation and arbitration process involving the local governmental entities and the developer of solid and hazardous waste facilities. Others suggested that Forward could have garnered greater local support for its project by reallocating some of its revenues to non-host, neighboring landowners. Forward opposes

both a property value protection plan and a reallocation of revenues as being vague and unworkable.

The state of Wisconsin offers a version of property value protection through its generous shared revenue program. Wis. Stat. § 79.04(6) and (7) grant payments of state funds to local counties and municipalities, to encourage them to host electric generating plants. These payments are based on the size of the facility; in addition, the state provides supplemental payments for baseload plants of 50 MW or larger and for plants that rely on renewable resources. Shared revenues offset the property tax burden of local residents and last throughout a generating plant's operating life. Depending on where Forward ultimately locates its wind turbines, the maximum annual shared revenue payments would be:

Town of LeRoy	\$ 182,500/year
Town of Lomira	\$ 32,500/year
Town of Byron	\$ 102,500/year
Town of Oakfield	\$ 87,500/year
Dodge County	\$ 301,000/year
Fond du Lac County	\$ 266,000/year

Not only will local governments and their taxpayers receive substantial annual shared revenues from this project, but Forward has agreed to reasonable setbacks for residences. Furthermore, Dodge County's Conditional Use Permit requires that Forward submit a letter of credit or other financial equivalent, guaranteeing that the turbines are properly removed when the facility reaches the end of its life. Forward has sited its turbines to reduce or eliminate any shadow flicker from moving blades. It pledges to work with landowners to mitigate any remaining effects of flicker, and also to mitigate any problems with television, radio, internet or telecommunications interference caused by the turbines.

The Commission finds that the combination of shared revenues and county requirements, as well as Forward's commitments and its decommissioning letter of credit, will protect landowner hosts and neighbors from significant potential impacts to property values. For these reasons, a property value protection plan or reallocation of revenues are unnecessary.

Some members of the public who appeared at the Commission's public hearings do raise concerns about individual hardships. Forward is directed to work with those residents who testified regarding their particular potential adverse health and safety consequences, and to the extent practicable to mitigate these effects for Mr. John Immel and Mr. John Panzer.

Two other area residents addressed the matter of construction vehicles on local roads. The Commission agrees that Forward must repair road damage as soon as practicable and not wait until after construction is completed.

## **Noise**

Some residents of the project area raised concerns about possible adverse impacts from turbine noise. Dodge County has a noise ordinance, though Fond du Lac County does not. Under the Dodge County ordinance, the residential limit from a wind energy facility is 55 decibels A-weighted (dBA) during the day and 50 dBA at night. The record indicates that, even assuming a worst case scenario where every one of the possible turbine sites is in use at maximum output, the noise produced would comply with Dodge County's ordinance and be generally equivalent to levels found in most quiet residential suburbs. The noise levels for these turbines are also consistent with guidelines of the U.S. Environmental Protection Agency for noise in residential areas, and the Commission finds that the turbines will be sufficiently quiet to avoid undue hardship.

The Commission's "Noise Measurement Protocol" requires that a project applicant also perform a post-construction noise analysis, as soon as practicable. Forward agrees to perform these measurements of post-construction noise and vibration, within three months after it commences commercial operation. Forward shall consult with Commission staff prior to conducting this analysis.

### **Protecting archeological, historical and cultural places**

Within the borders of the project area are several archeological sites, three of which could be affected by installation of the underground electric collector circuits. The Wisconsin Historical Society (WHS) has determined that these are each important sites that must be protected.

Forward states that it will use a WHS-qualified archeologist to identify the boundaries of these three listed sites, if it locates any of its facilities in their vicinity. Without properly determining their boundaries in advance, however, Forward will be unable to know whether its project design may cross into and damage these sites. To avoid such a situation, Forward shall use a WHS-qualified archeologist to identify the boundaries of all three sites before commencing any construction within one mile of an archeological site.

Although three sites are known to exist in the project area, others may also be present. Mr. Christopher Gieriek testified at the Commission's public hearings that the area has a high potential for other archeological locations, whose cultural artifacts frequently are identifiable only to a trained eye. Mr. Gieriek stated that campsites and village sites are likely to be present near the Niagara Escarpment, and he recommended that a qualified archeologist survey the region. Forward will develop an Unanticipated Finds Plan to provide direction to the

construction crews if they discover archeological or cultural resources. On cross-examination, Forward's witness declared that the company is willing to use WHS or a WHS-qualified archeologist to provide instruction to its workers in advance, and that they will contact a qualified archeologist if they have any question about field findings. Forward declares that it will cease construction and notify WHS if any of these resources are found. The Commission finds these procedures to be satisfactory if, in order to ensure that the construction crews are actively searching for artifacts, Forward hires a WHS-qualified archeologist to visit the construction sites periodically. Forward shall work with Commission staff to set a reasonable schedule of visits.

### **Geological formations**

Under Wis. Stat. § 196.491(3)(d)4, the Commission must consider whether a CPCN project would impose undue adverse impact on environmental values such as geological formations. The project area is located east of the Niagara Escarpment, a long, upland land form that extends through Door County. Along the Niagara Escarpment are found some of Wisconsin's best wind energy resources, but the Escarpment also erodes easily and some protected species live in its cool limestone talus slopes and cliffs. Forward agrees to protect this ridge by keeping its facilities at least 3,500 feet from the Niagara Escarpment. The bedrock underlying the project area can also be fragile, as described above, but Forward states that its construction practices will avoid fracturing the bedrock or allowing surface water to penetrate. The Commission finds that this CPCN project will not impose undue adverse impacts on geological formations.

### **Material adverse impacts to wholesale competition**

Wis. Stat. § 196.491(3)(d)7. requires that Forward have “no material adverse impact on competition in the relevant wholesale electric service market.” Forward is a new, independent entrant in the market and would be a relatively small operator of electric generating facilities in Wisconsin. No party asserts that Forward’s entry into the electric service market would harm wholesale competition, and the Commission finds that Forward’s project will comply with the statutory requirement.

### **Commitments made by Forward**

In addition to the conditions the Commission is imposing in this order and the Best Management Practices that Forward will be required to use under any DNR permits it may receive, Forward has voluntarily made a substantial number of commitments and concessions. For example, Forward agrees to construct its project in a manner that will minimize habitat fragmentation and avoid groundwater impacts; it will prepare plans to control soil erosion, sediment control, and stormwater pollution; it will use proper lighting to meet FAA standards without disturbing birds flying through the area; it will schedule the heavy hauls of trucks during normal working hours and avoid peak traffic periods unless required by permitting agencies or local governments; it will strive to route its underground collector circuits around wetlands and water bodies and place the circuits close to its turbine access roads; it will keep the turbines at least 1,000 feet from the homes of those who do not host turbines, at least 450 feet from the homes of turbine hosts, at least 1,200 feet from schools, hospitals and churches, and at least 3,500 feet from the Niagara Escarpment; it will not install facilities in riparian habitat south of the village of Brownsville, in forests or in native habitats; it will compensate farmers for crop

losses caused by construction activities and restore farm fields that its equipment crosses; it will coordinate project construction to minimize local electric outages; it will properly store hazardous materials and control dust; it will hire local construction workers and purchase local construction materials, where available; and it will remove the facilities when its easements terminate and restore the disturbed areas.

Forward's commitments are valuable elements of its project and their fulfillment is a necessary condition of this order. Forward is a limited liability corporation within a holding company structure; it will be contracting much of its work out to third parties and may choose to transfer the project to an affiliate or an independent entity. In order to ensure compliance regardless of what entity performs the work or owns and operates the plant, Forward's commitments and all of the other conditions of this order must be binding upon Forward and its agents, contractors, successors and assigns.

### **Locating project facilities within the approved area**

Forward requests that the Commission grant it flexibility in selecting turbine sites and determining their precise final location. Forward states that it needs this flexibility in order to meet the needs of participating landowners, comply with its other commitments, and stay outside the excluded zones. The Commission agrees. Forward may install up to 133 turbines and may build a project that is up to 200 MW in size as long as it complies with all setbacks, commitments and other conditions of this order. Forward must submit project layout revisions to the Commission, providing exact GIS locations for each turbine.

Wind energy projects have a unique feature that is not found in other forms of electric utility generation: they can be expanded incrementally, one turbine at a time. Although the

Forward project is sized at a level that requires a CPCN from the Commission, Forward could choose to expand inside the project area in the future without any further Commission approval. As long as its additions are less than 100 MW in size, Forward would not need another CPCN. Such expansions, however, could become a means of negating the conditions imposed by this order. It would not be in the public interest to grant a CPCN to a project developer that prohibits certain areas from development, only to find that the developer subsequently “adds” more turbines to the project in those excluded zones. For this reason the Commission considers Forward to be requesting a CPCN for its entire project area. The Commission will treat any future additions that Forward or its agents, contractors, successors, assigns or corporate affiliates may make in the project area as incremental expansions of the CPCN and subject to all the setbacks, commitments and conditions that are expressed in this order. Forward and its agents, contractors, successors, assigns and corporate affiliates may not expand this project in any manner that may violate a setback, commitment or condition without the Commission’s advance approval. Any other approach to a project such as this would not be in the public interest because it would allow a developer to nullify the Commission’s conditions.

### **Public health and welfare**

As the Wisconsin Supreme Court recently declared, issuing a CPCN is a legislative determination involving public policy and statecraft. *Clean Wisconsin*, 2005 WI 93, ¶ 35. The Power Plant Siting Act assigns to the Commission the role of weighing and balancing many factors, which often compete and conflict. When rendering a decision, the Commission must ultimately determine whether a CPCN will promote the public health and welfare.



The Forward wind-powered electric generating facility is a renewable resource that offers significant benefits to the state of Wisconsin. The air pollution and greenhouse gas emissions it avoids, the lack of solid waste, and the fact that it consumes virtually no water are important environmental benefits. As a substantial element of utility strategies to meet their required renewable energy portfolios, Forward will support the state's goal of increasing its reliance upon renewable resources and will help diversify Wisconsin's pool of electric generating facilities.

The principal concern for this project is its proximity to the Horicon Marsh and the potential risks it may impose on avian life. Given that the Horicon Marsh is a wildlife refuge of international importance, its resources well deserve protection. Although the scientific research to date on operating wind farms does not indicate bird mortalities of biological significance, these studies are not definitive, and protecting the public health and welfare requires the Commission to err on the side of caution. For these reasons, a greater setback from the Marsh is in the public interest. The further avian and bat research that the company is willing to perform also promotes the public interest.

Forward's proposed design generally fits well with existing land uses but for the need to keep wind turbines further away from existing private airports. The Commission recognizes that moving turbine sites away from the Marsh and from the airports may affect the financial interests of some landowners who have agreed to host turbines, but Forward can relocate these turbines elsewhere and redistribute its easement payments without reducing the total amount paid.

The project helps preserve agriculture in an area that is 97 percent farmland. This is an important goal of local land use plans. Forward is not guaranteeing to protect property values in

the area, but the shared revenues it will produce and its commitments regarding project design, construction and operation are offsetting project benefits.

After weighing these and the other elements of Forward's project, including all conditions imposed by this order, the Commission finds that issuing a CPCN will promote the public health and welfare and is in the public interest. Given the need for this project, it is reasonable to require that Forward commence construction within 18 months of the date this order is issued.

### **Compliance with WEPA**

Wis. Stat. § 1.11 requires all state agencies to consider the environmental impacts of "major actions" that could significantly affect the quality of the human environment. In Wis. Admin. Code ch. PSC 4, the Commission has created three tables that categorize the types of actions it undertakes for purposes of complying with this statute. Table 1 identifies proposed projects that qualify as major actions, for which an EIS is always needed; Table 2 lists proposals with the potential to significantly affect the quality of the human environment, for which the Commission will produce an environmental assessment (EA) in order to determine whether an EIS is needed; and Table 3 describes actions that normally require neither an EIS nor an EA. The Forward project fits within Table 2, item br., as a new wind-powered electric generating facility larger than 10 MW. Because of the project's size and proposed location, though, the Commission decided that an EA was not necessary and proceeded directly to prepare an EIS.

The Commission worked jointly with DNR. The two agencies sent mailings and press releases soliciting comments, questions and concerns, developed agency contacts to answer questions, and held local scoping sessions at which members of the public could learn about the

project and relate particular concerns about its environmental impacts. The Commission and DNR released a draft EIS dated March 8, 2005, comprising approximately 250 pages, which it distributed broadly to interested persons. The agencies encouraged people to respond with concerns and criticisms during a 45-day public comment period, after which they revised the draft and prepared the final EIS. The final EIS corrected, updated and doubled the size of the draft EIS. The Commission then waited 30 days to allow public review before holding its hearings on Forward's CPCN application and the final EIS.

The Commission finds that the draft and final EIS comply with the requirements of Wis. Stat. § 1.11 and Wis. Admin. Code ch. PSC 4.

### **Certificate of Public Convenience and Necessity**

Forward Energy LLC may commence construction of a wind-powered electric generation facility of up to 200 MW, as described in its project application and modified by this Final Decision.

### **Order**

1. Forward shall construct its project in conformance with the design specified in its application and subject to the conditions specified in this order.
2. Forward shall provide the Commission with GIS data location information for every turbine site and other project facilities, when it determines their location. This data shall be compatible with state government standards.

3. Forward shall promptly inform the Commission of any substantial scope or design modifications in the approved facilities.

4. All commitments and conditions of this order shall apply to Forward and to its agents, contractors, successors and assigns.

5. Construction, operation and decommissioning are subject to each of the specific conditions set out in Appendix B.

6. Until its facility is fully operational, Forward shall submit semiannual progress reports to the Commission that summarize the status of construction, the anticipated date of the start of construction, the anticipated in-service date, the status of environmental control activities, and the overall percent of physical completion. Forward shall include a summary of its consultations with DNR and other agencies concerning the issuance of necessary permits. The reports shall list dates, names, and the results of each contact and the company's progress in implementing prescribed environmental protection or control standards. Forward shall include the date when construction commences in its report for that six-month period. The first report is due for the six-month period ending January 31, 2006, and each report shall be filed within 31 days after the end of the six-month period.

7. Forward shall notify the Commission in writing within 14 days of any decision not to proceed with its project or to enter into any partnership or other arrangement with a third party concerning the ownership or operation of the facility.

8. The CPCN for the Forward project takes effect only after DNR issues all permits and approvals that it identified, pursuant to Wis. Stat. § 196.491(3)(a)3.a., as being required prior to construction of the facility. In all other respects, this order takes effect on the day after it is mailed.

9. Forward shall commence construction no later than 18 months after the latest of the following dates:

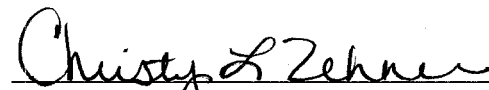
- a) The date this order is mailed.
- b) The date on which Forward has been issued every federal and state permit, approval, and license that is required prior to commencement of construction.
- c) The date on which every deadline has expired for requesting administrative review or reconsideration of every federal and state permit, approval, and license that is required prior to commencement of construction.
- d) The date on which Forward has received the final decision, after exhaustion of judicial review, in every proceeding for judicial review described in Wis. Stat. § 196.491(3)(j).

10. Upon showing of good cause, the Commission may grant an extension to the deadline specified in par. 9. If Forward does not commence construction within this deadline or any extension the Commission may grant, the CPCN is void.

11. Jurisdiction is retained.

Dated at Madison, Wisconsin, July 14, 2005

By the Commission:

  
Christy L. Zehner  
Secretary to the Commission

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Attachments

See attached Notice of Appeal Rights

Notice of Appeal Rights

Notice is hereby given that a person aggrieved by the foregoing decision has the right to file a petition for judicial review as provided in Wis. Stat. § 227.53. The petition must be filed within 30 days after the date of mailing of this decision. That date is shown on the first page. If there is no date on the first page, the date of mailing is shown immediately above the signature line. The Public Service Commission of Wisconsin must be named as respondent in the petition for judicial review.

Notice is further given that, if the foregoing decision is an order following a proceeding which is a contested case as defined in Wis. Stat. § 227.01(3), a person aggrieved by the order has the further right to file one petition for rehearing as provided in Wis. Stat. § 227.49. The petition must be filed within 20 days of the date of mailing of this decision.

If this decision is an order after rehearing, a person aggrieved who wishes to appeal must seek judicial review rather than rehearing. A second petition for rehearing is not an option.

This general notice is for the purpose of ensuring compliance with Wis. Stat. § 227.48(2), and does not constitute a conclusion or admission that any particular party or person is necessarily aggrieved or that any particular decision or order is final or judicially reviewable.

Revised 9/28/98

APPENDIX A  
(CONTESTED)

In order to comply with Wis. Stat. § 227.47, the following parties who appeared before the agency are considered parties for purposes of review under Wis. Stat. § 227.53:

FORWARD ENERGY LLC

Peter L. Gardon  
Reinhart Boerner  
PO Box 2018  
Madison, WI 53701-2018  
(Phone: 608-229-2200 / Fax: 608-229-2100)  
(Email: [pgardon@reinhartlaw.com](mailto:pgardon@reinhartlaw.com))

HMS ADVOCATES, INC.

Geoffrey A. Baker  
Dowell Baker, P.C.  
229 Randolph Street  
Oak Park, IL 60302  
(Phone: 708-660-1413 / Fax: 312-873-4466)  
(Email: [gabaker@dowellbaker.com](mailto:gabaker@dowellbaker.com))

RENEW WISCONSIN

Curt F. Pawlisch  
Cullen Weston Pines & Bach LLP  
122 West Washington Avenue, Suite 900  
Madison, WI 53703  
(Phone: 608-251-0101 / Fax: 608-251-2883)  
(Email: [pawlisch@cwpb.com](mailto:pawlisch@cwpb.com))

TOWNS OF BYRON, LEROY, LOMIRA AND OAKFIELD

John A. St. Peter  
Edgerton, St. Peter, Petak & Rosenfeldt  
10 Forest Avenue  
Fond du Lac, WI 54935  
(Phone: 920-922-0470 / Fax: 920-922-9091)  
(Email: [jstpeter@lawfdl.com](mailto:jstpeter@lawfdl.com))

PUBLIC SERVICE COMMISSION OF WISCONSIN

*(Not a party, but must be served)*

610 North Whitney Way  
P.O. Box 7854  
Madison, WI 53707-7854

Please file documents using the Electronic Regulatory Filing System (ERFS) which may be accessed through the PSC website: <https://psc.wi.gov>.



## APPENDIX B

1. To minimize or avoid impacts on avian resources, any additional permanent meteorology towers installed by the applicant in the project area shall be constructed as free-standing, unguyed structures.
2. To minimize or avoid impacts on avian resources, Forward shall install electric collector lines underground to the extent practicable. New overhead lines shall be configured per Avian Power Line Interaction Committee guidelines.
3. To minimize or avoid impacts on avian resources, Forward shall minimize the amount of habitat removed when constructing project facilities. Brush, forest, grass, and farm crops shall be permitted to grow up as close to project facilities as possible.
4. To minimize impacts on avian resources, Forward shall construct no turbines within two miles of the existing eastern boundary of the Horicon Marsh, as shown on the attached map. Forward shall complete its 2005 Avian Studies. After doing so, Forward may petition the Commission to reopen the proceeding for a determination as to whether the likely avian impacts are sufficiently low to justify moving the setback line closer to the Marsh.
5. Forward shall conduct a post-construction study on birds, immediately following construction of the project. Forward shall consult with the USFWS, DNR, and Commission staff regarding study design and methodology. Data collected during the study shall be submitted to agency staff on a quarterly basis. Prior to beginning this study, Forward shall obtain a permit from the USFWS authorizing it to possess bird carcasses under the Migratory Bird Treaty Act.
6. Forward shall conduct a post-construction bat study that includes two components: a population viability analysis and a fatality study. Forward shall consult with the USFWS, DNR, and Commission staff regarding study design and methodology. Data collected during the study shall be submitted to agency staff on a quarterly basis.
7. Forward shall consult with the FAA and Wisconsin Department of Transportation to determine the appropriate lighting for the facilities. During these consultations Forward shall seek lighting requirements that provide adequate aviation safety, reduce potential impacts on migratory birds and bats, and minimize aesthetic impacts. Optimal lighting is red or white strobe lights, with the longest permissible off cycle, placed on turbines 0.5 mile apart on the outer ring of turbines. Sodium vapor and other bright lights may not be used after dark at any project facility.
8. Forward may not erect wind turbines in the areas excluded around the private airports without the prior consent of the airport owner. In addition, Forward may not erect wind turbines in the buffer zones it has proposed around the towns of Lomira and LeRoy, the community of South Byron, and the village of Brownsville. These excluded areas and buffer zones are shown on the attached map.

9. Forward shall prepare a soil erosion and sediment control plan prior to commencement of construction. Forward shall use best management practices to minimize the effects of soil erosion. Forward's plan shall list these practices for construction at turbine sites and on underground and overhead collector routes.
10. Forward shall prepare a stormwater pollution prevention plan. This plan shall include pollution control measures and best management practices for protection of both surface water and groundwater. In addition, Forward shall use the Wisconsin Construction Site Best Management Practice Handbook to prepare all construction plans.
11. Before commencing any construction within one mile of any of the three known archeological sites within the project area, Forward shall use a WHS or a WHS-qualified archeologist to identify the boundaries of the three sites. Forward shall use a WHS or a WHS-qualified archeologist to provide instruction to its workers in advance, and they shall contact a qualified archeologist if they have any question about field findings. Forward shall cease construction and notify WHS if any of these resources are found. Forward shall prepare an Unanticipated Finds Plan, to use in the event it discovers previously unknown archeological or cultural resources during construction. The plan shall describe the outer boundaries of known archeological sites and how impacts to those sites will be avoided during construction. The plan shall include contact information for the WHS, and shall provide for immediate work stoppage in the area of the find, pending further direction from WHS. Forward shall use a WHS-qualified archeologist to visit construction sites periodically for the purpose of ensuring that the construction crews are actively searching for and protecting artifacts.
12. Forward shall work with local officials to develop an Emergency Response Plan. The plan shall provide for consultation between Forward and local responding agencies, and describe in detail the type of work and equipment that will be present during construction and operation of the facilities. Forward shall provide any special equipment that would be needed to respond if it is not currently available.
13. Forward shall use potable water when coring to test bedrock conditions. Forward shall seal these borings, as required by DNR.
14. Forward shall use construction techniques that avoid cracking of bedrock caused by pressure and vibration during installation of foundations and other project facilities. Such construction techniques include rotary installation of anchors and rotary borings with a tricone bit, rather than rotary installation combined with hammering or concussion, blasting, and hammering on the bedrock.
15. Forward shall use best management practices and construction techniques that avoid the movement of surface water into groundwater during installation of foundations and other project facilities. Such construction techniques include: use of air rotary boring with a tricone bit, combined with air pressure forced down the bore hole to remove chips and cuttings as opposed to water and mud rotary boring; building berms in construction areas where surface water is present; diversion of surface flow away from open construction sites; and sealing foundation sites. Upon completion of construction of foundations,

Forward shall backfill the foundation with native soil to 95 percent standard proctor. Forward shall backfill its underground collector circuit trenches with material of identical permeability to the pre-existing and surrounding soils. Forward shall raise the soil surfaces around structures so surface water flows away from the structures.

16. Forward shall coordinate construction and operation of the facility, to the extent practicable, with local units of government and permitting authorities.
17. Forward shall obtain necessary permits and approvals for transporting equipment and materials and shall use licensed haulers to transport equipment and materials. Construction traffic shall be limited to normal working hours, except in emergencies or where required by permitting agencies or local governments. Forward shall coordinate heavy hauls by truck of turbine equipment to coincide with “non-peak” traffic periods and shall consult with local officials regarding the delivery of heavy and oversized loads. Construction traffic shall utilize roadways with sufficient capacity to handle the expected volume of construction traffic. Prior to construction, an independent engineer shall document the condition of local roads used to haul heavy loads. Forward shall repair damage it causes to the roads as soon as practicable, and shall be responsible for the cost of repairs.
18. Forward shall, to the extent practicable, avoid placing project facilities in wetlands and water bodies.
19. Forward shall use a minimum setback for its turbines of at least 440 feet (1.1 times the height of the turbine) from property lines, roads, and above-ground utilities.
20. Forward shall use a minimum setback for its turbines of at least 450 feet from residences of turbine hosts and 1,000 feet from residences of those not hosting turbines, unless agreed to by the residents.
21. Forward shall use a minimum setback for its turbines of 1,194 feet from schools, hospitals, or churches.
22. Forward shall locate all turbines in a manner that reduces or eliminates turbine-related shadow flicker on residences, and shall avoid flicker at Mr. Immel’s residence to the extent practicable. Forward shall work with affected landowners to mitigate the impacts of shadow flicker.
23. No turbine or other project facility may be constructed within the path of line-of-sight communication technology.
24. If the facilities contribute to television, radio, internet, or telecommunications interference, Forward shall work with affected parties to mitigate such interference. Mitigation may include improving the antenna, changing the antenna location, supplying satellite television, and installing relays to re-transmit and boost the signal.
25. No project facilities may be located in fragile cliff habitats and riparian habitat in Sections 22, 23, 27, 28, and 33 of T14N, R16E and sections 4 and 9 of T13N, R16E. No

project facilities may be located within 3,500 feet of the edge of the Niagara Escarpment, to avoid impact to fragile cliff habitats. No project facilities may be located in riparian habitat, south of the village of Brownsville. No project facilities may be located in forested patches, native habitat, and native grass lands in Sections 6 and 8 of T13N, R17E.

26. Forward shall continue to work with interested parties, such as landowners, airport owners, neighbors, and government officials regarding the location of project facilities.
27. Forward shall comply with the requirements of the National Electric Safety Code when constructing, maintaining and operating its facility.
28. Overhead collector line poles, construction equipment, and other construction materials and equipment shall be placed outside of water bodies and wetland areas.
29. Forward shall either install its 34.5 kV electric collector line underground through the unincorporated community of South Byron, build an overhead 34.5 kV electric collector line that does not pass through that community, or request Commission approval of an alternative construction method through South Byron if underground construction is not feasible.
30. Forward shall work with Mr. Panzer and design its facilities so they produce no electric fields on Mr. Panzer's property that could impair the operation of his pacemaker.
31. To the extent practicable, Forward shall avoid wetlands and water bodies when finalizing the routes for underground collector circuits. To the extent practicable, Forward shall locate these collector circuits adjacent to turbine access roads and in a manner that will reduce landowner impacts. The underground collector circuits shall be placed in 48-inch deep trenches, and shall be buried to a depth sufficient to meet the requirements of the National Electrical Safety Code, whichever is greater.
32. Forward shall bore the underground collector circuits underneath any wetlands or water bodies that must be crossed. Forward shall use best management practices to minimize the effect of construction on wetlands and water bodies.
33. Forward may not install underground cable in bedrock. If bedrock is encountered close to the surface and the cable trench must extend into the bedrock, Forward shall cut a trench into the bedrock with saws. The trench shall be backfilled with bentonite or a bentonite slurry mixture. The remaining portion of the trench shall be backfilled with native soils.
34. Forward shall coordinate construction of project facilities to avoid or minimize outages to local electric distribution service. When outages of local electric distribution service are necessary, Forward shall consult with the local electric distribution company and affected customers to coordinate the outages.
35. To the extent practicable, Forward shall access its turbine locations from main roads over existing field lanes or newly constructed gravel access roads. Forward shall avoid

moving construction equipment across agricultural fields to the extent practicable and shall obtain prior landowner permission before doing so. Wherever construction equipment travels across agricultural fields, Forward shall restore the fields and soils to their original condition as soon as practicable after completing construction activities at each turbine location.

36. Forward shall consult with property owners to identify the location of drain tiles, drainage swales, and other existing facilities. During construction, Forward shall minimize damage to existing drain tiles and other facilities in agricultural areas. Forward shall repair to “like new condition” any damage to such facilities as soon as practicable.
37. In agricultural areas disturbed during construction, Forward shall use accepted techniques to decompact the soil to original density prior to construction as soon as practicable after it completes construction at the turbine location.
38. Forward shall compensate landowners for crop loss caused by construction activities.
39. As soon as practicable after it completes construction activities at each turbine location, Forward shall restore to their original condition all areas disturbed during construction that are not necessary for operating the facilities, such as crane pads and material laydown areas. Restoration shall include the removal of construction debris.
40. After construction is complete, Forward shall maintain its turbine access roads to a width of approximately 15 feet. Forward shall restore areas beyond the 15-foot width to their original condition as soon as practicable after completing construction at that turbine location.
41. During construction and operation of the project, Forward shall store hazardous materials within an appropriate containment area. Forward shall use best management practices to prevent and control spills of hazardous materials during construction and operation of the project. Forward shall prepare a plan for proper disposal of contaminated soil or other materials.
42. During construction and operation of the project, fueling of vehicles shall take place at commercial fueling facilities, to the extent practicable.
43. If on-site refueling of vehicles is required, Forward shall implement appropriate spill control measures and make appropriate safety equipment available. Forward shall take all necessary precautions to avoid spilling hazardous materials on soil surfaces.
44. Forward shall control dust resulting from construction activities using standard construction practices, including watering exposed surfaces using tanker trucks, covering disturbed areas, and reduced speed limits on construction sites. Forward shall gravel all access road surfaces to avoid dust during normal operation of the facilities.
45. Forward shall use municipal water supplies for construction and potable water.

46. Forward shall measure post-construction noise levels, as required by the Commission's "Measurement Protocol for Sound and Vibration Assessment of Proposed and Existing Electric Power Plants," within three months after it commences commercial operation. Forward shall consult with Commission staff before commencing its noise and vibration analysis and shall submit a report of the sound level measurements to the Commission as soon as practicable after operation of the facility commences.
47. Where practicable, Forward shall hire construction workers from the local communities and obtain construction materials from the local area.
48. Upon termination of the project facility easements, Forward shall remove all above-ground facilities. Forward shall remove all below-ground facilities to a depth of four feet. Upon decommissioning, Forward shall restore the disturbed areas to pre-construction conditions. Reclamation shall include leveling, terracing, mulching, and other necessary measures to prevent soil erosion. Forward shall use best management practices during removal of its facilities to avoid groundwater contamination.

# Docket 9300-CE-100 Final Decision Map



TOWN OF  
OAKFIELD

Oakfield

TOWN OF  
BYRON

See Notes

FOND DU LAC CO

DODGE CO

TOWN OF  
LEROY

Brownsville

Lomira

TOWN OF  
LOMIRA

*Horicon  
National  
Wildlife  
Refuge*

Two-Mile Setback Distance From  
Current USFWS-Owned Properties

*Horicon  
Marsh  
Wildlife  
Area*

Ke

## Legend



Private Airport Approach Surfaces -  
No Wind Turbines Without Consent  
of Airport Owner



Private Airport Upwind Turbulance  
Buffer Areas - No Wind Turbines  
Without Consent of Airport Owner



Forward's Voluntary Exclusion  
Areas - See Notes Below



Current Properties Owned By  
USFWS and Operated As The  
Horicon National Wildlife Refuge



Two-Mile Exclusion Area From  
The Current Boundary of Horicon  
National Wildlife Refuge - No Wind  
Turbine Installations

— Project Boundary

### Notes:

No project facilities within the exclusion area along the Niagara Escarpment.  
No wind turbine facilities within the remaining exclusion areas.