

Cedar Ridge Wind Farm

Building a Wind Farm on the Niagara Escarpment

Fond du Lac County, WI

Photographs courtesy Alliant Energy.

On Dec. 15, 2008, the Cedar Ridge Wind Farm in Fond du Lac County, WI began generating power for the Wisconsin Power & Light Co. (WPL), a subsidiary of Alliant Energy, Madison. WPL owns the wind farm.

The 68-megawatt (MW), \$149 million wind farm consists of 41 Vestas V82 1.65 MW wind turbines and spans 12.2 square miles in the townships of Eden and Empire in south-central Wisconsin.

Development

Midwest Wind Energy, Chicago, IL (MWE/312-787-6081) – the original developer of the project – began development of the wind farm in 2004.

According to Senior Project Developer Tim Polz, Midwest Wind Energy identified 3,000 acres of farmland along the Niagara Escarpment in Fond du Lac County as a Class IV wind resource.

The *Britannica Online Encyclopedia* says the Niagara Escarpment is a 650-mile ridge that stretches east from southeastern WI through Ontario and terminates east of Rochester, NY. The crest stands from 250 to 1,000 feet above surrounding lowlands.

“The state of Wisconsin had collected wind data and made that information public,” says Polz. “That study was key to our focusing in on the Niagara Escarpment and the Eden/Empire area for wind farm development.”

Polz says other factors that drew MWE to investigate the region for

development was MWE’s familiarity with the region and community acceptance.

“We were also developing the Butler Ridge Project about 40 minutes south in Dodge County,” says Polz, “so we were familiar with the area. We knew from the welcome we received in Eden and Empire that this site was a good fit.”

Polz says that when MWE began talking with Alliant in 2005 about owning and operating the Cedar Ridge wind farm, they invited Alliant to attend some of the public information meetings.

“It was evident to them that there was a lot of community support for this project,” says Polz. “It’s hard to do a project like this without the support of the community.”

Option to Buy

In 2004, says Alliant Energy Project

Facility Highlights

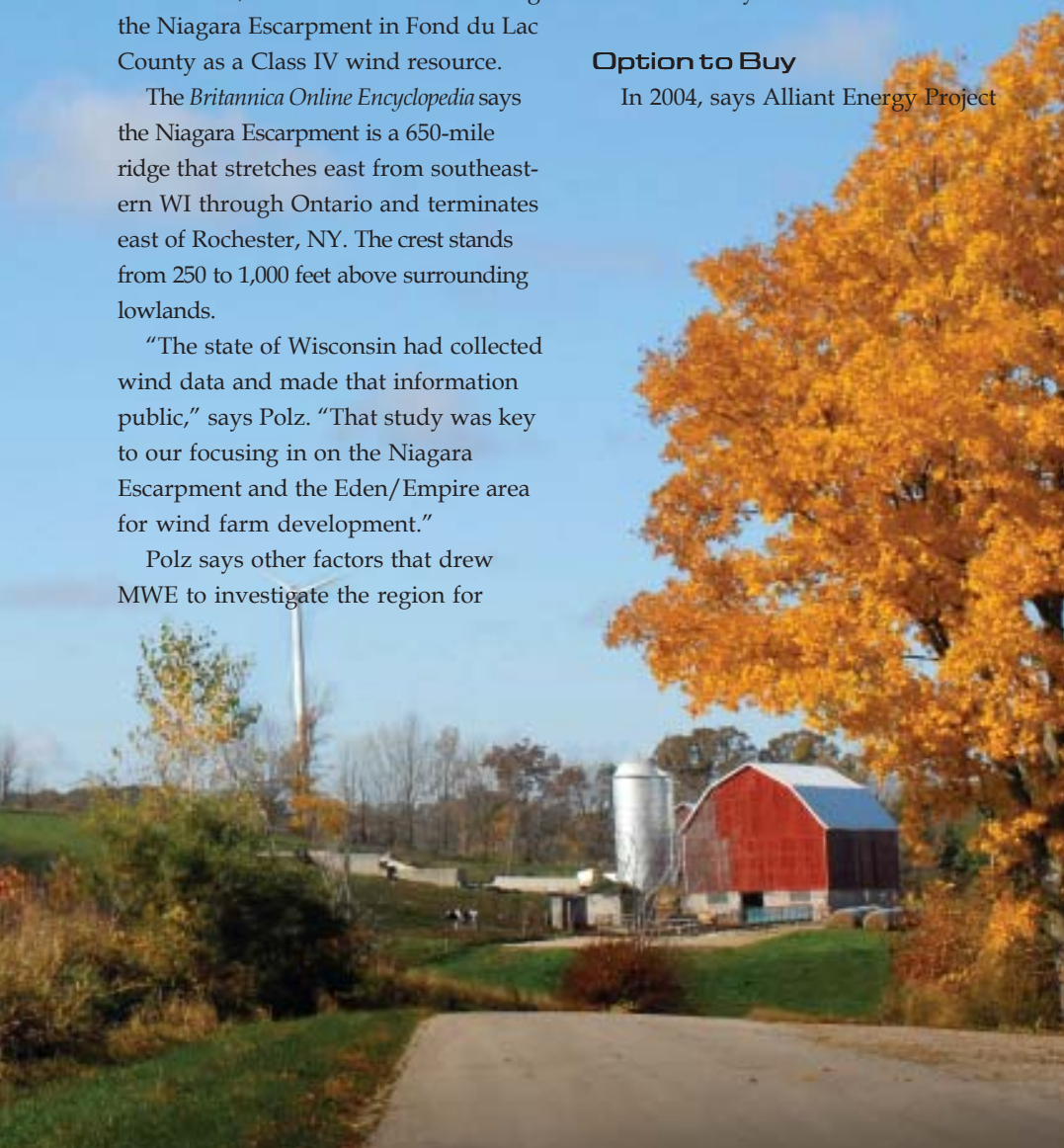
Location: Eden and Empire Townships, Fond du Lac County, WI
Size: 68 MW, 41 turbines spread out across 12.2 square miles
Project Cost: \$149 million excluding AFUDC (came in under budget)
Developer: Midwest Wind Energy and Alliant Energy
Owner: Alliant Energy
Project Capacity: 68 MW
Connector & Transmission System: 138 kV
Substation: 138 kV to 34.5 kV
Utility: Alliant Energy - WP&L
Commissioning: Vestas
Date On Line: Dec. 15, 2008 all 41 turbines officially commissioned
Power System: Underground 34.5 kV Collector System

Turbine Features

Turbines: Vestas V82 1.65 MW
Tower: 262 ft. from ground to hub
Blade Length: 136 ft.
Pad Construction: Spread Footing
Rotor: 82 meter diameter
Onboard Computer: Vestas TAC II Controller
Gears: Winergy and Hansen
Transformer: GE Prolec

Key Personnel:

Project Managers: Pat Riley and Pat Ringler
Operations & Maintenance Director: Manny Morrell



The Cedar Ridge wind farm's administration building is Leadership in Energy and Environmental Design (LEED) gold certified.



Manager Pat Riley, WPL issued a Request for Proposals (RFP) to secure a Power Purchase Agreement (PPA) with a wind farm which was operating or under construction. "Then, in 2005," says Riley, "Alliant Energy made a shift in strategy and we decided instead of purchasing wind energy, we wanted to own wind power."

According to Riley, MWE proposed the Cedar Ridge site in response to the RFP.

"This site had the highest net capacity factor (NCF) of any of the projects submitted in response to the RFP," says Riley, "so Alliant Energy's representatives contacted Midwest Wind Energy about their interest in selling the project."

By December 2005, the two companies had negotiated an option for Alliant to purchase the development rights to the site from Midwest Wind Energy.

On July 20, 2006, Alliant exercised that option and purchased the Cedar Ridge wind farm as a turnkey development.

Agreements and Permits

According to Riley, MWE had established several key deliverables for this project prior to its transfer to Alliant Energy. These included:

- **Joint Development Agreement (JDA)** with Eden and Empire townships.
- **Initial wind turbine layout.**
- **FAA determination of no hazards.**
- **Preliminary bird and bat study.**

(Alliant completed the avian and bat study.)

• **Landowner leases and agreements**—The agreements involved four groups in the leasing process:

- 31 landowners with wind turbines on their property.
- Neighbor agreements providing annual payments to non-participating land owners whose primary residence is within 1/3 mile of a wind turbine.

- Cable easements where underground cable runs through property.
- Setback waivers. The JDA specifies how far wind turbines must be placed from property lines of non-participating landowners. If Alliant wanted to place a wind turbine within those set limits, they were required to negotiate a special landowner agreement.

In addition to finalizing the agreements established by MWE, Alliant Energy handled the following:

Certificate of Authority. As a public utility, when Alliant Energy took over ownership of the project they filed a Certificate of Authority (CA) with the Wisconsin Public Service Commission.

According to Riley, a project of less than 100 MW can file a CA which does not require an environmental impact study or mandatory public hearings, and has no time limit for the PSC to rule.

If the Cedar Ridge wind farm had been larger than 100 MW, a Certificate of Public Convenience and Necessity (CPCN) would have been required. A CPCN requires a mandatory environmental impact study and public hearings, and the PSC must rule on the application within 180 days (365 days with an extension) of its submission.

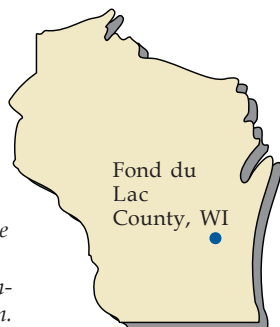
Alliant Energy Media Relations Representative Steve Schultz says Alliant filed its CA with the Wisconsin Public Service Commission in September 2006 and it was approved in May 2007.

Wind Turbine Acquisition. Riley says Alliant Energy began shopping for wind turbines even before completing the purchase of the site.

"We issued an RFP for turbines in April 2006," says Riley. "They were incredibly scarce then—only one company said there was even a possibility of getting turbines in 2007."

Alliant Energy Site Manager Manny Morrell says that in 2006 most turbine manufacturers were scheduling deliveries two years out so Alliant requested

The Cedar Ridge Wind Farm is located in the townships of Eden and Empire in Fond du Lac County, in south-central Wisconsin.



Some of the wind farm's turbine sites required that notches be cut into the woods or hillside to lay down blades during rotor assembly.



proposals for delivery in 2007 or 2008.

“Most manufacturers at that time required a 25% down payment with a 500 MW minimum order,” says Morrell.

In January 2007, Alliant Energy learned that Vestas had turbines available. They began negotiations and signed an agreement with Vestas in June 2007 for delivery of 41 V82 wind turbines starting in May 2008.

Construction

Morrell says construction began in September 2007 with civil work completed by Thanksgiving.

Alliant Energy crews constructed the substation during the winter months, and in April 2008 construction workers were mobilized at the site.

Alliant Energy handled its own construction services and was the electrical contractor for the substation. Hooper Corp., Madison, WI (608-249-0451), served as electrical contractor for the collector system and carried out fiber installation.

Oscar J. Boldt Construction, Appleton, WI (920-739-6321), took care of tower erection and crane rental. Sanderfoot Wind and Excavating, Neenah, WI (920-886-8717), built the foundations.

A 138-kilovolt transmission line route runs through the Cedar Ridge site, so no new transmission lines were needed to connect to the electric grid. A substation built near the transmission line transfers the power from the 34.5 kV underground collector system to American Transmission Company’s 138 kV transmission system.

Alliant Energy’s Schultz says approximately 150 people were employed at the height of construction in 2008.

Terrain Challenges

Riley says many of the turbines at the Cedar Ridge wind farm stand on top of glacial drumlins.

Wikipedia states that a drumlin is an

elongated whale-shaped hill formed by glacial action and may be more than 150 feet high and more than 1/2-mile long.

Riley says that topography created some challenges during construction.

“The foundations weren’t any problem because they were all typical

spread foundations,” says Riley. There was, however, some difficulty in trenching and building crane paths.

Trenching. “There are a fair amount of artesian springs here,” says Riley. “We’d find them on the sides of hills going up a slope when we

The advertisement features a central image of a black industrial control unit with green terminal blocks on top and bottom. The unit has several digital displays and indicator lights. The text 'Turningpoint' is prominently displayed on the front panel. The background is a solid light green color with a large white plus sign in the upper right corner.

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started trenching.” Riley says when they came to a spring, the trenchers would be re-routed or the path matted over.

Turbine Erection. Another construction challenge involved turbine erection.

“Because we were working on top of hills, we had a limited amount of space to build out the turbine,” says Riley.

He explains that on sites with the most severe limitations, crews were unable to lay down components – instead they had to haul components up one piece at a time.

“Sometimes we had to grade out a flat area to assemble the crane and turbine components,” says Riley. He explains that in some places they cut a notch out of the hill to lay down a blade while assembling the rotor.

“Sometimes we would have one blade resting on 50 feet of flat area then cantilevered out as the ground fell away,” says Riley. Crews sometimes needed to cut a notch into the woods or into the hillside on an uphill slope so the blade could extend during assembly.

According to Riley, Alliant was careful to consult with landowners before and during construction and to place all roads, crane paths, and underground collector systems where the landowners preferred.

“Our first design for crane paths limited our slope to less than 10% which is ideal,” says Riley. “However, area farmers have spent years stabilizing the slopes on the hills around here so they asked us to go along the fence lines.” Riley says the different path was a bit steeper, but the contractors found a way to adjust.

Morrell says the hilly topography can be a challenge for maintenance services if it’s necessary to bring in a crane, but when the company keeps access roads plowed successfully, and stays ahead of icing, the site is accessible through the winter.

Christine Coates, editor

Cedar Ridge Wind Farm Supplier List

Avian Studies	Curry & Kerlinger, LLC
Banking & Financial Services	Alliant Energy
Bat Studies	BHE Environmental
Blades, Nacelles & Towers	Vestas
Bolts & Fasteners	Vestas
Certification & Testing	Vestas and Alliant Energy
Concrete Services	Carew Concrete & Supply Co.
Construction Services	Alliant Energy
Controls/Monitors	Vestas Online Business SCADA
Crane Rental	Oscar J. Boldt Construction
Electrical Contractor (Collector System)	Hooper Corporation
Electrical Contractor (Substation)	Alliant Energy
Electrical Interconnection	American Transmission Company
Electrical System Design	Alliant Energy
Engineering & Planning and Field Services	Alliant Energy
Environmental Consulting	
.....	RMT Inc. and Natural Resources Consulting Inc.
Excavation Services	Baumhardt Sand & Gravel
Feasibility Studies	Midwest Wind Energy
Fiber Installation	Hooper Corporation
Fiber Splicing ...	Hooper Corporation and Evergreen Technical Services
Foundations	Sanderfoot Wind & Excavating
Grid Connection Equipment	S&C Electric
Legal Services	Whyte Hirschboeck Dudek S.C.
Operation & Maintenance	Vestas 2-year Service Agreement
Permitting	RMT Inc.
Project Development and Management	Alliant Energy
Risk Management	Alliant Energy
Site Assessment	Midwest Wind Energy
Site Development	Midwest Wind Energy and Alliant Energy
Substation Design	Alliant Energy
Surveying & Mapping	RMT Inc.
Tools & Tensioning, Torque Wrench Calibration	
.....	Oscar J. Boldt Construction
Tower Erection	Oscar J. Boldt Construction
Transformer	Waukesha Electric Systems
Transmission Services	American Transmission Company
Transportation & Logistics	Lone Star Transportation
Turbine Performance Monitoring	Alliant Energy and Vestas
Utility	Alliant Energy-WP&L
Wind Assessment	RMT Inc. and WindLogics
Wind Assessment Towers	NRG Systems