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Details:

(FORM UPDATED: 08/11/2010)

WISCONSIN STATE LEGISLATURE ...
PUBLIC HEARING - COMMITTEE RECORDS

2009-10

(session year)

Senate

(Assembly, Senate or Joint)

Committee on ... Commerce, Utilities, Energy, & Rail (SC-CUER)

COMMITTEE NOTICES ...

- Committee Reports ... **CR**
- Executive Sessions ... **ES**
- Public Hearings ... **PH**

INFORMATION COLLECTED BY COMMITTEE FOR AND AGAINST PROPOSAL

- Appointments ... **Appt** (w/Record of Comm. Proceedings)
- Clearinghouse Rules ... **CRule** (w/Record of Comm. Proceedings)
- Hearing Records ... bills and resolutions (w/Record of Comm. Proceedings)
  (**ab** = Assembly Bill) (**ar** = Assembly Resolution) (**ajr** = Assembly Joint Resolution)
  (**sb** = Senate Bill) (**sr** = Senate Resolution) (**sjr** = Senate Joint Resolution)
- Miscellaneous ... **Misc**

* Contents organized for archiving by: Gigi Godwin (LRB) (July/2011)

RENEW Wisconsin
222 South Hamilton Street, Madison, WI, 53703 • 608.255.4044 • www.renewwisconsin.org

13 May 2009

Senator Jeff Plale
Chair, Senate Committee on Commerce, Utilities and Rail
Room 313 South, State Capitol
Madison, WI 53708

Representative James Soletski
Chair, Assembly Committee Energy and Utilities
Room 307 West, State Capitol
Madison, WI 53708

Dear Sen. Plale and Rep. Soletski:

On behalf of RENEW Wisconsin's directors and members, we applaud your leadership in establishing a rational and science-based approach to permitting wind turbines in Wisconsin. As I indicated in my testimony yesterday, RENEW Wisconsin's 340 members are strong supporters of SB 185 and AB 256, which, if passed, will create a process for resolving the numerous roadblocks that have effectively stalled nearly 600 MW of windpower projects. We also would like to compliment you on the judicious and even-handed manner with which you conducted the hearings yesterday, and the extra efforts you undertook to accommodate everyone who came to the hearing to testify on the legislation.

Due to the press of time, I was not able to discuss the initiatives Wisconsin's universities and technical colleges are undertaking to prepare the state's workforce to participate meaningfully in the emerging renewable energy economy. As indicated in the accompanying press release, the U.S. Department of Energy awarded last week more than $1,000,000 to Wisconsin universities and technical colleges to develop an educational infrastructure capable of placing tomorrow's professionals and skilled technicians in the rapidly growing windpower industry. If the recent DOE awards are any indication, Wisconsin stands ready to make the most of its educational investments.

We are grateful for your outstanding leadership. Please do not hesitate to call on us for any assistance that we can offer to help pass SB 185 and AB 256.

Sincerely,

Michael Vickerman

Michael Vickerman
Executive Director

c: Senate Committee on Commerce, Utilities and Rail
C: Assembly Committee on Energy and Utilities

RENEW Wisconsin

222 S. Hamilton Street, Madison, WI 53703 • (608) 255-4044 • www.renewwisconsin.org

May 13, 2009

MORE INFORMATION
Ed Blume
608.819.0748
eblume@renewwisconsin.org

State snares federal dollars for wind energy work

In the most recent round of federal renewable energy solicitations, Wisconsin led all states in capturing project dollars aimed at overcoming market and workforce development challenges associated with wind energy.

The U.S. Department of Energy (DOE) announced that three post-secondary schools captured more than $1 million for projects to expand the supply of professionals and skilled technicians that can serve the growing wind energy industry in Wisconsin and the Upper Midwest. The Wisconsin projects were among the 53 projects that DOE selected to receive up to $8.5 million

The University of Wisconsin-Madison is set to receive two workforce development grants totaling more than $500,000. Also receiving grants in the workforce development category are University of Wisconsin-Milwaukee and Lakeshore Technical College in Manitowoc County.

DOE also awarded a grant to RENEW Wisconsin, a statewide renewable energy advocacy organization, to build up an on-line resource center to promote market acceptance of windpower.

"Our success in receiving these awards is a reflection of the State of Wisconsin's strong commitment to expanding the wind energy marketplace here," said Michael Vickerman, executive director of RENEW Wisconsin.

RENEW Wisconsin proposed in its grant application to develop a one-stop online source of information for wind developers, state and local policymakers and regulators, and the general public.

MORE

The web site will include documents and links to relevant state and federal statutes and rules, facts sheets on everything from aesthetics to court decisions, zoning, and other resources, as well as a calendar of upcoming workshops, seminars, training, briefings, grant opportunities, RFPs, and other relevant events and opportunities.

In the educational arena, the UW-Madison will provide short courses in wind power plant design, construction and operations and develop curriculum to integrate wind energy systems curriculum into power engineering education programs. Elsewhere in the state, UW-Milwaukee intends to create a wind energy educational collaborative in southeastern Wisconsin, while Lakeshore Technical College will develop additional partnerships to boosts its ongoing wind technician training programs.

DOE Awards in Workforce Development

- The Board of Regents of the UW System (Madison, WI) - A Continuing Education Short Course and Engineering Curriculum to Accelerate Workforce Development in Wind Power Plant Design, Construction, and Operations - $119,135
- Lakeshore Technical College (Cleveland, WI) - POWER - Purposeful Partnerships Coordinating Wind Education Resources - $199,236
- University of Wisconsin (Madison, WI) - Integration of Wind Energy Systems into Power Engineering Education Programs at UW-Madison - $399,931
- University Wisconsin-Milwaukee (Milwaukee, WI) - Southeast Wisconsin Wind Energy Educational Collaborative - $330,184

DOE Awards in Market Acceptance:

- RENEW Wisconsin (Madison, WI) - Sowing the Seeds for a Bountiful Harvest: Shaping the Rules and Creating the Tools for Wisconsin's Next Generation of Wind Farms - $93,348

Full list of awards and DOE news release at
http://www.energy.gov/news2009/print2009/7381.htm.

--END--

RENEW Wisconsin is an independent, nonprofit 501(c)(3) organization that acts as a catalyst to advance a sustainable energy future through public policy and private sector initiatives. More information on RENEW's Web site at www.renewwisconsin.org.

Testimony of Joel Haubrich, We Energies to the Assembly/ Senate

PUBLIC HEARING

Committee on Energy and Utilities/ Committee on Commerce, Utilities, Energy, and Rail

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The committee will hold a public hearing on the following items at the time specified below:

The Committee will hold a joint public hearing with the Senate Committee on Commerce, Utilities, Energy, and Rail

Assembly Bill 256/ Senate Bill 185

Relating to: regulation of wind energy systems and granting rule-making authority.

On behalf of We Energies, I am submitting our application to the PSCW for the Glacier Hills Wind Park. The application was submitted on June 18, 2008. We anticipate receiving a final order by the end of 2009. The application will give the Committees a glimpse at the rigorous review all utility energy projects must endeavor prior to construction.

The proposed Glacier Hills Wind Park is located in the towns of Randolph and Scott in Columbia County.

Project Size
The wind project is being designed to accommodate up to 90 wind turbines that would generate as much as 207 megawatts (MW) of electricity - enough capacity to power approximately 45,000 homes. The final size and capacity of the project will depend on permit requirements, the turbine model installed and the configuration of the turbines.

The Need
We are pursuing additional wind energy to meet customer demand and the state of Wisconsin's Renewable Portfolio Standard. Our customers are demanding more renewable energy through our Energy for Tomorrow program, which allows customers – residential, commercial and industrial – to purchase all or a portion of their energy from renewable sources.

Additionally, the state's Renewable Portfolio Standard requires Wisconsin utilities to generate 10 percent of their energy from renewable sources by 2015. Currently, We Energies' supply portfolio includes approximately 3 percent from renewable energy.

Approvals and Timeline
As a regulated utility, We Energies is required to obtain authorization from the Public Service Commission of Wisconsin to construct the project. The Certificate of Public Convenience and Necessity application was filed on Oct. 27, 2008.

In addition, we work with the local communities and numerous other agencies including: Wisconsin Department of Natural Resources, Federal Aviation Administration, Wisconsin Department of Transportation, U.S. Fish and Wildlife Federation, U.S. Army Corp of Engineers, Wisconsin State Historical Society and National Heritage Inventory.

Construction
Construction is anticipated to be completed within one year from the start of activities. Approximately six months are needed for site preparation, the installation of turbine foundations and cabling. An additional six months are needed for turbine erection.

WISCONSIN ELECTRIC POWER COMPANY

APPLICATION FOR CERTIFICATE OF PUBLIC CONVENIENCE AND NECESSITY

GLACIER HILLS WIND PARK

PSC Docket No. 6630-CE-302

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A. INTRODUCTION

Wisconsin Electric Power Company (Wisconsin Electric or the Company), a Wisconsin public utility, pursuant to the requirements of Wis. Stats. §§ 196.49, 196.491 and 196.52 and Wis. Admin. Code §§ PSC 111.51, 111.53, 112.05, 112.06 and 4.10 hereby applies for a Certificate of Public Convenience and Necessity (CPCN) and any other authorization required to construct and place into utility service a wind turbine electric generation facility to be known as the Glacier Hills Wind Park[1] (or Glacier Hills or the Project) located in Columbia County, Wisconsin.

Wisconsin Electric requests approval to construct and place in utility service 90 wind turbines (and associated auxiliary facilities) with a total capacity of up to 207 megawatts (MW) of electric generation and an installed cost of up to $526 million, exclusive of AFUDC and ATC switchyard costs. Proposed potential sites are described in the Technical Support Document (TSD).

B. PURPOSE AND NECESSITY **(PSC 111.53 (1)(b))**

In March 2006, Wisconsin revised the requirements for renewable energy generation (Act 141). The Wisconsin renewable energy generation requirement is referred to as the Renewable Portfolio Standard (RPS). For each "electric provider," which includes an electric utility such as Wisconsin Electric, Act 141 defines "baseline renewable percentage" as the average of the energy provider's renewable energy percentage for 2001, 2002 and 2003. Wisconsin Electric's baseline renewable percentage is 2.27%. Act 141 provides that for the years 2006, 2007, 2008 and 2009, each energy provider may not decrease its renewable energy percentage below its baseline renewable percentage. Act 141 further provides that for the year 2010 each electric provider must increase its renewable energy percentage so that it is at least 2 percentage points above the provider's baseline renewable percentage. For Wisconsin Electric, the renewable energy percentage required for 2010 is 4.27%. In addition, Act 141 states that for the year 2015, each electric provider must increase its renewable energy percentage at least 6 percentage points above the provider's baseline renewable percentage. For Wisconsin Electric, the renewable energy percentage required for 2015 is 8.27%.

To meet the RPS a phased approach is required to either purchase or construct and operate renewable energy resources. In 2006, Wisconsin Electric hired Navigant Consulting to study and determine the most cost-effective approach to comply with the RPS. The study determined that the most cost-effective technology to provide the large amount of renewable energy needed to comply with the RPS was utility-scale wind generation. Navigant's conclusion is consistent with the Commission's September 2008 Strategic Energy Assessment Draft Report, which states;

> "Currently, wind generation is the lowest cost renewable energy option."

The Company has implemented renewable energy generation tariffs to purchase renewable energy generated by customers using biogas, solar and wind; and is investigating other

[1] Wisconsin Electric has designated this proposed wind electric generating facility the Glacier Hills Wind Park. The facility has previously been referred to as the Randolph Wind Farm or the Randolph Wind Project in various communications with the public and regulatory agencies.

renewable generation resources such as biomass and solar photovoltaic to supply some of the RPS requirement.

In order to meet the 2015 RPS mandate, Wisconsin Electric needs to secure wind-powered capacity as set forth in the following table (See Section 1.4.1 of the TSD). The table shows capacity additions that will be needed for the year. For this table, calculations assume the capacity is available mid-year.

Year	MW of New Wind-Powered Capacity
2009	0
2010	0
2011	0
2012	362
2013	0
2014	100
2015	200
2016	0

With the very favorable economic cost for securing the site and the Project's many positive attributes, Glacier Hills will contribute significantly to the next increment of renewable capacity needed to comply with the RPS.

C. PROJECT DESCRIPTION

As part of Wisconsin Electric's sale of the Point Beach Nuclear Plant to FPL Energy in 2007, Wisconsin Electric obtained an option to acquire the Project. Wisconsin Electric exercised the option in October 2007 and closed on the acquisition in July 2008. The purchase included a Midwest Independent System Operator (MISO) Large Generator Interconnection queue position as well as 100% of the membership interests in Randolph Wind, LLC which holds certain assets related to the development of the wind farm project including easement options, meteorological equipment and data and certain permits. Since exercising the option, Wisconsin Electric has completed a broad range of detailed technical and economic evaluations of the Project to support the preparation of this application.

The Project was selected from a number of potential renewable energy projects as the best alternative to pursue next in the Company's strategy to comply with the requirements of Wisconsin's RPS. The Project has several important strengths such as established land control, quality of transmission, location in close proximity to the Company's service territory and strong community support.

In accordance with Wis. Stat. § 30.025 (1m) and PSC 111.51(2), on May 21, 2008 Wisconsin Electric met with PSC and Wisconsin Department of Natural Resources (DNR) Staff to inform them of the Company's intent to file a CPCN application and consult the Staff on what additional information would be required for the application.

In accordance with Wis. Stats. §196.491(3)(a), on August 15, 2008, Wisconsin Electric filed the Engineering Plan for the Project with the DNR. In a September 9, 2008, response to the Company, the DNR identified the permits and/or approvals that may be required prior to construction or operation. On October 2, 2008, Wisconsin Electric filed the designated permit applications.

The following sections provide an overview of the key Project elements, each of which is covered in greater detail in the TSD. The TSD contains all of the information called for by Wis. Stats. §196.491, PSC 111.53, and the PSC's "Application Filing Requirements for Wind Energy Projects in Wisconsin, Version 4.4," as well as additional information identified in meetings with PSC Staff.

D. PROJECT COMPONENTS (PSC 111.53(1)(a))

The Project site is comprised of approximately 7,500 acres for which easement agreements have been entered into with 41 landowners. The major components of the Project are identified and described below along with a discussion of the unique challenges created by the strong global demand for and limited supply of wind generation equipment.

1. Wind Turbines and Auxiliary Facilities

Demand for renewable energy has been growing rapidly across North America, Europe and developing nations such as China. In the United States, the market has been driven by the increased demand for renewable energy by consumers, the Federal Production Tax Credit and the implementation of renewable portfolio standards by state governments. The unprecedented demand in the market has consumed turbine production for 2009 and much of 2010.

This very strong "sellers' market" provides substantial leverage to turbine manufacturers that are currently accepting only firm equipment orders (i.e. purchase option agreements are not available) that provide no flexibility to cancel orders. To minimize financial risks, Wisconsin Electric has determined that a practical and effective way to maintain a level of negotiating leverage is to seek approval for a range of similar turbines that are all technically well suited for the Project. This approach worked very effectively for the Company's Blue Sky Green Field project because the Company was able to secure turbines at a very competitive price after the CPCN was issued.

While the turbines under consideration provide a relatively wide range of rated power output (1.5 MW to 2.3 MW), their physical characteristics are very similar. The maximum blade tip height varies by less than 26.3 feet between the largest and smallest wind turbine models. Furthermore, the lifecycle production costs for all of the units fall in a relatively narrow band. Wisconsin Electric has provided information on all of the wind turbine candidates and has taken a conservative approach when evaluating siting characteristics (e.g. using the largest turbine dimensions for visual and shadow simulations). Retaining flexibility to evaluate and select from more than one turbine model provides the best opportunity to maximize renewable generation at the site, maintain negotiating leverage in the turbine equipment market, and minimize project

costs and financial risks.

The Project is designed to accommodate 90 wind turbines. Each wind turbine will be mounted on top of a tubular steel tower. Each tower is fastened at the base to a buried, reinforced concrete foundation. The turbines under consideration will have a hub height of approximately 80 meters (262.5 feet) and blade lengths of between 38.5 and 46.5 meters (126.3 to 152.6 feet) with total blade tip heights of 118.5 to 126.5 meters (388.8 to 415.1 feet). Each turbine will require an access drive to the site, a crane pad for erection of the turbine and an equipment laydown area in the immediate vicinity of the turbine site. Power generated by the turbines will be collected via a 34.5 kV collection system and connected to the transmission system via a 34.5/138 kV step-up transformer (refer to Section 1.2.1, Generation facilities, of the TSD).

2. Interconnection Substation

The Project substation will interconnect with the ATC transmission system along 138 kV line X-6, approximately 5 miles west of North Randolph Substation in the Town of Scott. The proposed substation is comprised of two major parts. The Wisconsin Electric part ("Vaughn Substation") will house the collector feeders, feeder breakers, power factor correction equipment, low side bus, step up 34.5/138 kV transformer and high-side transformer breaker. The ATC switchyard will contain the 138 kV bus, circuit breakers and 138 kV connection to X-6. The substation is located ¼ mile north of Vaughn Road on Inglehardt Road.

3. Operations and Maintenance (O&M) Facility

The O&M facility consists of offices, control room, locker rooms, spare parts storage and an indoor garage. Paved and graveled employee and equipment parking lots are provided at the O&M site. The O&M building would have dimensions of approximately 56 feet by 160 feet (~9,000 ft^2), an overall height of less than 20 feet. It will be metal framed structure, constructed on an at-grade slab and similar in design to a farm shop (refer to Section 2.6, Operations and Maintenance Building, of the TSD).

E. PROJECT COST (PSC 111.53 (1)(c))

Wisconsin Electric estimates the maximum capital cost of the Project to fall into the range of $341 to $526 million, exclusive of AFUDC and ATC switchyard costs, depending on the turbine model selected.

Detailed cost information is provided in Section 1.6.1, Capital Cost of the TSD.

Energy modeling for the project was conducted using EGEAS software. EGEAS models Wisconsin Electric's energy demand against existing generation resources and potential resources including new generation to help identify the timing and cost of future generation needs. EGEAS models Wisconsin Electric as a closed system, and does not include MISO market impacts. The analysis performed for this project included "Non-Carbon Constrained" scenarios in which no costs are associated with carbon dioxide emissions. It also included a series of "Carbon Constrained" scenarios in which carbon dioxide emissions costs are modeled

assuming CO_2 costs based on elements of proposed federal legislation and the Governor's Task Force on Global Warming recommendations.

Among the analyses performed, Glacier Hills Wind Park was compared to an expansion plan that did not include the Project or other source of renewable generation (an RPS non-compliant scenario). This analysis showed the cost associated with the Project employing a representative turbine is $117 million (2008 NPV) more than non-compliance; the premium associated with generating approximately 12 million MWh of wind energy over the thirty-year life of the project.

A description of the EGEAS modeling is provided in Section 1.3.5 of the TSD. Results are presented and discussed in Section 1.6.3, Comparative costs of the alternatives, of the TSD.

F. SUPPLY ALTERNATIVES (PSC 111.53(1)(d))

Wisconsin Electric fully evaluated supply alternatives (including a "no-build" option) and project location alternatives. Wisconsin Electric examined other wind projects inside and outside Wisconsin and both built by Wisconsin Electric or by others. Based on a comparative analysis of these projects, the Glacier Hills Wind Park was identified as the "preferred project alternative." Relative to other wind and renewable energy supply options under consideration by the Company, Glacier Hills is in the best position to move forward quickly through the planning, design, permitting and construction process.

For a full discussion, see Section 1.4.1, Supply Alternatives of the TSD.

G. PROPOSED SITES (PSC 111.53(1)(e))

The general project area for the proposed wind farm is in the northeast portion of Columbia County, Wisconsin. The Glacier Hills Wind Park is proposed for construction in the Towns of Randolph and Scott, and is entirely located on private land or public Right of Way. The area was identified by FPL Energy based on the availability of wind resources, transmission access, and other relevant siting factors. The project area covers approximately 17,300 acres, including approximately 7,500 acres under easement agreements, and is composed primarily of agricultural land.

The land under lease has acceptable wind resources and the appropriate characteristics to host up to 118 turbines. This provides ample alternative turbine sites to satisfy statutory requirements and to provide flexibility that may be needed during construction. Refer to Sections 1.4.2, and 1.5, of the TSD for a description of the project area and turbine site selection processes.

H. BROWNFIELD SITE CONSIDERATION (PSC 111.53(1)(em))

In applying for a CPCN for a large electric generating facility the applicant is to use a brownfield site "to the extent practicable." Wis. Stat. § 196.491(3)(d)8. A "brownfield site" is defined 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).

It is not practicable to use a brownfield site for the Project. Most brownfield sites – abandoned, idle or underused industrial or commercial sites -- are limited to a few acres in size. The project area is 17,300 acres. To the best of our knowledge, there is no one brownfield site or set of contiguous brownfield sites with appropriate wind and other characteristics that would be large enough to accommodate the Project as a whole. Nor is it practicable to use a brownfield site for location of any individual turbines. Wisconsin Electric performed a Phase 1 Environmental Assessment of the entire project area in search of known sites of contaminated soils and groundwater. None of the sites identified in that process within the Project Area meet the statutory definition of a "brownfield site." In addition, none of the individual sites that were identified are suitable for location of a wind turbine because the land is currently being used for a purpose that would conflict with placement of a wind turbine or the site does not meet the remaining siting criteria critical to obtaining the best generation of electrical energy from a wind turbine.

Thus, it is not "practicable" to utilize a brownfield site for the Project as a whole or for individual turbine locations within the project area.

I. ENTITIES AFFECTED BY THE PROJECT (PSC 111.53 (1)(f))

Several units of federal, state, regional, and local government, as well as members of the public are affected by this project. Appropriate permits will be obtained, as necessary, prior to installation of the new facilities as discussed in Section 1.8, Required Permits and Approvals, of the TSD.

J. CONSTRUCTION SCHEDULE (PSC 111.53(1)(f))

The Construction Schedule is discussed in Section 3.1.1, of the TSD. The critical path of the schedule shows that with PSC approval of the Project in July, 2009, the Project can be placed into utility service by the end of December, 2011 thereby meeting the projected need date of December 31, 2011.

K. ENVIRONMENTAL IMPACT INFORMATION (PSC 111.53(1)(f))

Based on Wis. Admin. Code PSC 4, Table 2, Wisconsin Electric believes that construction of the Glacier Hills Wind Park is a Type II action. Information necessary for preparation of an Environmental Assessment and/ or an Environmental Impact Statement is provided in the attached TSD.

L. COMMUNITY AND CULTURAL IMPACT INFORMATION (PSC 111.53(1)(f))

Relevant information is provided in the attached TSD. A list of property owners affected by the Project, as well as information regarding the Company's public outreach related to the Project, is presented in Section 13.0, Landowners Affected and Public Outreach of the TSD.

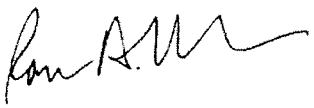
M. CONCLUSION

For the reasons stated in this Application and based on the information contained in the Technical Support Document, Wisconsin Electric requests that the Commission:

1. Issue a Certificate of Public Convenience and Necessity and any other necessary approvals authorizing Wisconsin Electric to construct and place in utility service 90 wind turbines and associated facilities of a type selected by Wisconsin Electric with a total capacity of up to 207 MW of electric generation;
2. Approve a project cost not to exceed $526 million, not including AFUDC and ATC switchyard costs;
3. Approve placement of the 90 turbines and auxiliary facilities at any of the 118 sites identified in the TSD except to the extent the Commission finds any of the sites unacceptable, and provided that all other necessary permits and rights required for the Project are obtained;
4. Authorize Wisconsin Electric to make minor siting modifications as outlined in Section 3.0 of the TSD without Commission Staff review or approval and to make more substantial siting modifications subject to Staff's prior review and approval;
5. Make a determination that it is prudent for Wisconsin Electric to enter into Joint Development Agreements with the Towns of Randolph and Scott, the proposed JDA is included in TSD, Appendix E; and
6. Approve the merger of Randolph Wind, LLC into Wisconsin Electric.

Dated this 24th day of October, 2008

Respectfully submitted,



Roman A. Draba
Vice President Regulatory Affairs and Policy
Wisconsin Electric Power Company

CPCN APPLICATION

TECHNICAL SUPPORT DOCUMENT

GLACIER HILLS WIND PARK

PSC DOCKET NO. 6630-CE-302

TABLE OF CONTENTS

APPENDICES

Z. ENVIRONMENTAL INFORMATION

LIST OF TABLES

LIST OF FIGURES

ACRONYM LIST

ATC	American Transmission Company
CPCN	Certificate of Public Convenience and Necessity
DATCP	Wisconsin Department of Agriculture, Trade and Consumer Protection
EGEAS	Electric Generation Expansion Analysis System
FAA	Federal Aviation Administration
kV	kilovolt
kWh	kilowatt-hour
LLC	Limited Liability Corporation
MISO	Midwest Independent System Operator
MW	Megawatt
MWh	Megawatt-hour
NRHP	National Register of Historic Places
NWI	National Wetland Inventory
PSC	Public Service Commission of Wisconsin
PTC	Federal Production Tax Credit
RMP	Risk Management Plan
SCADA	Supervisory Control and Data Acquisition
SWPPP	Storm water pollution prevention plan
USACE	United States Army Corps of Engineers
USGS	United States Geological Survey
USFWS	United States Fish and Wildlife Service
WDNR	Wisconsin Department of Natural Resources
WDOT	Wisconsin Department of Transportation
WHS	Wisconsin Historical Society
WPDES	Wisconsin Pollutant Discharge Elimination System

COMMON DATA

(Values that appear in multiple locations in the TSD)

Access road construction corridor width	50 ft
Access road total miles	20
Access road final width	16 ft
Acres under lease	7,500
Crane route corridor width	50 ft
Crane path width	34 ft
Hub height	262.5 ft
Hub height	80 m
Largest turbine MW	2.3
Longest blade	152.6 ft
Longest blade	46.5 m
Minimum MW	135
Maximum MW	207
Number of turbines required	90
O&M area permanent acres	5
O&M area temporary acres	20
O&M Building area	9,000 ft^2
Project area acres	17,300
Shortest blade	126.3 ft
Shortest blade	38.5 m
Shortest turbine	388.8 ft
Shortest turbine	118.5 m
Smallest turbine MW	1.5
Substation parcel acres	20
Substation permanent acres	10
Substation temporary acres	20
Tallest turbine	415.1 ft
Tallest turbine	126.5 m
Total number of viable sites	118
Turbine site acres disturbed	1.6
Turbine site acres permanent (incl. crane pad)	0.15

1.0 PROJECT DESCRIPTION AND OVERVIEW

This document has been prepared in accordance with Wis. Stats. §196.491, PSC 111.53, and the guidance provided in Application Filing Requirements for Wind Energy Projects in Wisconsin, Version 4.4, May 2008. Additional information as a result of initial and subsequent consultation with PSC and DNR staff is also provided.

1.1 GENERAL PROJECT LOCATION AND DESCRIPTION

1.1.1 Project Location

The general project area for the proposed wind farm is in the northeast portion of Columbia County, Wisconsin. The Glacier Hills Wind Park[2] (or Glacier Hills or the Project) is proposed for construction in the Towns of Randolph and Scott. A general map of the project area and a map of the project area showing proposed facilities are provided in Appendix H. Please see the following figures:

Figure 1.1-1 Project Location
Figure 1.1-2 Project Facilities

The project area boundary encloses approximately 17,300 acres.

Within the Project Area, there are easement agreements with land owners providing approximately 7,500 acres readily available for wind project development.

The Project as proposed requires 90 wind turbines with a rated capacity from 135 to 207 MW of electric power depending on the turbine model installed.

The Project as proposed provides 118 viable wind turbine sites. As described in Section 1.5, Turbine Site Selection, Wisconsin Electric has selected 90 preferred sites and 28 alternate sites.

1.2 OWNERSHIP AND OPERATING ENTITY

1.2.1 Generation facilities

The acquisition of the wind farm project was part of a transaction with FPL Energy in which Wisconsin Electric transferred ownership of Point Beach Nuclear Plant to FPL Energy in 2007. As part of that transaction, FPL Energy offered Wisconsin Electric an option to acquire the Project. Wisconsin Electric exercised the option in October 2007 and closed on the acquisition in July, 2008. The purchase included a position in the Midwest Independent System Operator (MISO) Large Generator Interconnection as well as 100% of the membership interests in

[2] Wisconsin Electric has designated this proposed wind electric generating facility the Glacier Hills Wind Park. The facility has previously been referred to as the Randolph Wind Farm or the Randolph Wind Project in various communications with the public and regulatory agencies. Within this Technical Support Document, the historic names will be used where appropriate.

Randolph Wind, LLC which held the assets related to the development of the wind farm project including easement agreements, meteorological equipment and data, and certain permits.

At this time Wisconsin Electric possesses the necessary control of lands required for alternative and preferred turbine sites, cables and roads, and O&M facility via easements and easement and purchase options. A list of landowners and facilities to be located on each parcel is provided in Appendix D, Landowner Agreements.

While the development rights and landowner agreements are in the name of Randolph Wind, LLC, a wholly owned subsidiary of Wisconsin Electric Power Company (Wisconsin Electric or the Company), the Project will be owned and operated by Wisconsin Electric, a public utility as defined in Wis. Stat. §196.01(5)(a). Subject to the Commission's approval under Wis. Stat. §196.52, the LLC will be merged into Wisconsin Electric. For purposes of this document the Project will be described as it will exist following the merger.

Wisconsin Electric will own and operate the generation facilities which include the turbines, collector system, generator step up transformers, associated control systems and equipment and other improvements.

1.2.2 Transmission interconnection facilities

A new switching station will be located on a green field site adjacent to the existing 138kV transmission line X-6 that runs in an east-west direction through the southern portion of the Project Area. This existing 138kV transmission line runs between the North Randolph and Portage substations and is owned by American Transmission Company (ATC).

ATC will construct, own and operate the switching station. The transmission interconnection facilities include the 138 kV bus, circuit breakers, and a 138 kV connection to X-6.

Wisconsin Electric will own[3] the property on which the transmission interconnection facilities are constructed. Wisconsin Electric will grant exclusive and perpetual easements to ATC for the proposed and any future transmission facilities. The 20 acre parcel is sufficient to accommodate the ATC switching station and the Project's 34.5/138kV generator step up transformer substation ("Vaughn Substation"), with sufficient space remaining for possible future expansion.

1.3 PROJECT NEED/PURPOSE

Based on the forecast and existing Wisconsin Electric owned generation (less retirements) and power purchases, no additional capacity or energy is necessary to meet projected demands and provide planning reserve margin through 2019. However, March 2006, Wisconsin revised the requirements for renewable energy generation (Act 141). The Wisconsin renewable energy generation requirement is referred to as the Renewable Portfolio Standard (RPS). To meet the RPS a phased approach is required to either purchase or construct and operate renewable energy resources.

[3] As of the initial filing date of the CPCN Application, Wisconsin Electric is in negotiations for purchase options for substation property.

1.3.1 Renewables needed in the future

For each "electric provider," which includes an electric utility such as Wisconsin Electric, Act 141 defines "baseline renewable percentage" as the average of the energy provider's renewable energy percentage for 2001, 2002, and 2003. Wisconsin Electric's baseline renewable percentage is 2.27%. Act 141 provides that for the years 2006, 2007, 2008 and 2009, each energy provider may not decrease its renewable energy percentage below its baseline renewable percentage. Act 141 further provides that for the year 2010 each electric provider must increase its renewable energy percentage so that it is at least 2 percentage points above the provider's baseline renewable percentage. For Wisconsin Electric, the renewable energy percentage required for 2010 is 4.27%. In addition, Act 141 provides that for the year 2015, each electric provider must increase its renewable energy percentage so that it is at least 6 percentage points above the provider's baseline renewable percentage. For Wisconsin Electric, that percentage is 8.27%.

Based on the company's most recent load forecast dated August 20, 2008, in 2010 the company will need to provide about 1.1 million MWh of electricity from renewables. In 2015, the company will need to provide about 2.2 million MWh per year of renewable energy and/or Renewable Resource Credits (RRCs).

Table 1.3-1 shows Wisconsin Electric's current renewable energy sources and forecasted RPS supply gap. As of the beginning of 2008 the Company has banked 900,000 MWh of RRCs. The Table shows how the combination of current sources and credits are projected to be used to meet yearly requirements. Note that if no more renewable energy sources are acquired, a shortfall of about 260,000 MWh arises in 2012 and that the shortfall increases to about 1,400,000 MWh, when the RPS requirement is increased in 2015.

Table 1.3-1 RPS Need Forecast

Wisconsin Electric Renewable Resources (in MWh)					
	RPS Requirement	Current Production used to meet RPS	RRCs used to meet RPS	Total	Annual RPS Shortfall
2008	590,193	463,070	127,123	590,193	0
2009	587,499	458,300	129,199	587,499	0
2010	1,095,036	452,728	642,308	1,095,036	0
2011	1,089,217	302,886	786,331	1,089,217	0
2012	1,091,510	517,936	307,598	825,534	265,976
2013	1,099,873	518,071	0	518,071	581,802
2014	1,107,237	643,296	0	643,296	463,942
2015	2,156,822	776,283	0	776,283	1,380,539
2016	2,169,898	768,712	0	768,712	1,401,186

Notes:

1. Current energy generation is first placed in RRC banks. When banks are not sufficient to meet demand, real-time energy is applied directly to the RPS.
2. Construction of Glacier Hills by the end of 2011 will push the RPS shortfall out to 2013. Additional sources of renewable energy would then be needed to keep pace with RPS requirements.

Section 1.4.1, Supply Alternatives presents a scenario for closing the RPS requirement gap and how Glacier Hills fits within that scenario.

1.3.2 Renewable energy currently owned and operated as defined by the RPS requirements for additional renewable energy

1.3.2.1 Total existing renewable generation capacity (2008)

Hydro	73.8 MW
Wind	146.5 MW
Purchased:	
Hydro	0.29 MW
Wind	65.5 MW
Biogas	35.0 MW

1.3.2.2 Total energy produced by renewable assets in previous calendar year by generation type (2007)

Hydro	383,563 MWh
Wind	53,270 MWh
Biogas	154,281 MWh

1.3.2.3 Amount of renewable energy acquired through PPAs (2007)

Wind	53,270 MWh
Biogas	154,281 MWh

1.3.2.4 Amount of RRC credits purchased

Wind	33,931 MWh

1.3.3 Expected annual energy output for the project

The expected output for the Project is provided in Appendix N, Table 1.6-4,.

1.3.4 Other Need Not Covered in Section 1.3.1

1.3.4.1 Demand and Energy forecast

The chart below is the August 20, 2008 load forecast for Wisconsin Electric and is used in the EGEAS modeling for this application.

Table 1.3-2 Wisconsin Electric Load Forecast

Year	Peak Demand (MW)	Annual Energy (GWh)	Year	Peak Demand (MW)	Annual Energy (GWh)
2008	6,017	33,247.8	2023	7,277	38,112.5
2009	6,122	33,220.9	2024	7,354	38,388.5
2010	6,171	33,485.0	2025	7,433	38,666.6
2011	6,281	34,192.1	2026	7,513	38,947.0
2012	6,400	34,769.8	2027	7,593	39,229.7
2013	6,499	35,172.4	2028	7,675	39,514.6
2014	6,596	35,600.0	2029	7,757	39,801.8
2015	6,688	36,018.5	2030	7,840	40,091.3
2016	6,765	36,318.8	2031	7,925	40,383.1
2017	6,855	36,687.4	2032	8,010	40,677.2
2018	6,900	36,765.4	2033	8,096	40,976.8
2019	6,974	37,030.5	2034	8,183	41,272.7
2020	7,048	37,297.8	2035	8,271	41,574.0
2021	7,123	37,567.2	2036	8,360	41,887.7
2022	7,200	37,838.8	2037	8,450	42,183.9

1.3.4.2 Describe how the availability of purchase power was analyzed

See Section 1.3.4.4.

1.3.4.3 Identify plant retirements forecast over the next 20-25 years

Planned retirements used in the EGEAS modeling include:

- Oak Creek units 5, 6, 7 and 8 at the end of 2030.
- Oak Creek unit 9 at the end of 2008.
- Presque Isle Units 3 and 4 at the end of 2009.

1.3.4.4 Describe how the existing and expected applications for generation from Independent Power Producers (IPPs) have been factored into your forecast

Existing power purchases are modeled in the EGEAS analysis. Purchases include:

- LSP combined cycle contract ending at the end of 2021 for 234 megawatts.
- Zion #1 peaking unit contract ending at the end of 2011 for 150 megawatts.
- Zion #2 peaking unit contract ending at the end of 2012 for 150 megawatts.
- LSP extension contract ending at the end of 2011 for 12 megawatts.
- Ameren-Elgin contract ending at the end of 2008 for 116 megawatts.
- Badger Wind renewable contract ending at the end of 2011 for 25.5 megwatts.
- The FP&L Point Beach Nuclear Plant unit 1 contract ending at the end of 2030 for 516 megawatts which increases to 583 megawatts in 2010.
- The FP&L Point Beach Nuclear Plant unit 2 contract ending at the end of 2032 for 517 megawatts which increases to 584 megawatts in 2011.

Future IPP applications are dealt with in the EGEAS modeling in the following way. A planning alternative for 50 megawatts of peaking capacity with a one-year duration was added to reflect short-term power purchases. Longer-term transactions are reflected in the other planning alternatives. EGEAS doesn't differentiate between owned generation and IPP purchases. Therefore, when the need for additional baseload, peaking, intermediate load or renewable energy is identified in the modeling, it is assumed that the need could be met either by constructing company owned generation or through a long-term PPA.

1.3.4.5 Energy Priorities Law, Wis. Stats. §§ 1.12 and 196.025(1)

Wis. Stat. § 196.025 states "To the extent cost-effective technically feasible and environmentally sound, the Commission shall implement the priorities under § 1.12 (4) in making all energy-related decisions." Wis. Stat. § 1.12 (4) establishes the following priorities:

> (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 resources.
> (c) Combustible renewable energy resources.
> (d) Nonrenewable combustible energy resources in the order listed:
>
> 1. Natural gas.
> 2. Oil or coal with sulfur content of less than 1 percent.
> 3. All other carbon-based fuels.

The whole purpose of this project is to construct and place in operation wind turbines, which constitute "noncombustible renewable resources," the second option listed in the priorities list, in order to comply with the renewable portfolio standard established by Act 141. The only option ranked higher in the priorities list is "energy conservation and efficiency." The application of Wis. Stat. § 1.12 (4) and § 196.025 to investor-owned electric public utilities was modified by Act 141, as follows:

> In a proceeding in which an investor-owned electric public utility is a party, the commission shall not order or otherwise impose energy conservation or efficiency requirements on the investor-owned electric public utility if the commission has fulfilled all of its duties under § 196.374 and the investor-owned electric public utility has satisfied the requirements of § 196.374 for the year prior to the commencement of the proceeding, as specified in § 196.374 (8).

Wis. Stat. § 196.025 (1) (b). As explained below in Section 1.3.4.6, Wisconsin Electric has complied with the requirements of § 196.374. Consequently, the proposed project satisfies the requirements of the Energy Priorities Law.

1.3.4.6 Compliance under Wis. Stat. § 196.374 for energy efficiency

Wis. Stat. § 196.374 requires energy utilities to spend 1.2% of their annual operating revenues to fund energy efficiency and renewable resource programs. Under the law, energy utilities may request funding to implement voluntary programs that are in addition to the 1.2% required. Wis. Stat. § 196.374 (8) provides that an energy utility that spends the full amount required in any year is considered to have satisfied its requirements under this section. Wisconsin Electric has satisfied its requirement for 2007 and expects to satisfy its requirement for 2008.

In its Order dated June 18, 2008 (05-UR-103), the Public Service Commission of Wisconsin approved Wisconsin Electric's voluntary natural gas energy efficiency programs for 2008 and 2009.[4] Additionally, in accordance with Condition 71 of the Final Decision in 05-UR-103[5] and Wisconsin Administrative Code Chapter PSC 137.08, Wisconsin Electric submitted its Energy Efficiency 2009-2011 Plan on August 7, 2008.[6]

1.3.5 EGEAS Modeling

Study Design:

Economic modeling for the Glacier Hills project was conducted using the EGEAS generation expansion planning software program. The program constructs an optimal 30 year generation expansion plan to match projected demand (i.e., Wisconsin Electric's August, 2008 load forecast). In addition to modeling a 30-year study period, a 30-year extension period is also modeled to address terminal value considerations (a longer term look into the future). Wisconsin Electric's existing generation fleet is programmed into the model, along with the cost profile of new generation alternatives (planning alternatives). Then, as demand increases over the years, the program can choose among different generation alternatives to meet that demand in the most cost effective manner. Future electric power generation alternatives are selected by EGEAS by how well they fit with existing generating resources, considering their construction and operating cost characteristics. A key consideration in determining operating costs of existing and new generation is the cost of fuel; Wisconsin Electric's August, 2008 fuel price forecast was used to predict those costs.

To compare the relative cost of potential generation supply plans, an optimized expansion plan is first calculated. An optimized resource plan is created when EGEAS is allowed to develop an expansion plan from a variety of planning alternatives; such as coal plants, gas plants, nuclear, renewable generation and short-term purchases. Planning alternatives are selected by the program based on how well they fit with existing resources, and by their construction and operating cost characteristics. EGEAS generates thousands of expansion plans and then identifies the least cost plan as the "optimal" plan.

[4] PSC Electronic Regulatory Filing System (ERF) PSC Ref. # 96441.

[5] PSC Electronic Regulatory Filing System (ERF) PSC Ref. # 88448.

[6] PSC Electronic Regulatory Filing System (ERF) PSC Ref. # 98610.

Given the optimal expansion plan, a variety of different sensitivities can then be explored to determine the cost of a proposed project in different operating environments.

Two scenarios were considered in the analysis; one in which no carbon dioxide (CO_2) legislation is enacted to reduce generating system carbon emissions (a non-carbon constrained world), and one in which system CO_2 emissions are capped and CO_2 allowances are traded (a carbon constrained world). The carbon constrained scenario was developed based on assumptions developed by the Governor's Task Force on Global Warming. Within these two scenarios, numerous sensitivities were conducted to further measure the cost impacts of the Project. Additional sensitivities were also conducted to identify the cost of meeting the Renewable Portfolio Standard (RPS) in both a non-carbon constrained and a carbon constrained world.

A representative turbine from those under consideration for the Project was used to model the sensitivities described above. In addition to these sensitivities, EGEAS runs were created to determine the system cost impact of each of the turbines currently being considered for the Project.

All EGEAS modeling was done using hourly wind profiles and the Non-Dispatchable Technology (NDT) methodology of EGEAS. The wind profiles were developed from site specific wind studies completed for this project.

Planning Alternatives (Electric energy supply alternatives)
The planning alternatives used in the study are explained below. Cost and operating information is detailed in Section 1.6.3.

Advanced Coal Units: Advanced coal units are generically modeled as next generation coal-fired technology. They could be improved efficiency super-critical pulverized coal units or integrated gasification combined cycle units.

Coal units were first made available to the EGEAS model in 2018, due to the length of project development, licensing and construction. Coal units were modeled as 500 MW units and projected to be constructed in pairs.

Combined Cycle Units: Combined cycle units are fueled with natural gas and operated more efficiently than other gas-fired units, however, they cost more to build. Combined cycle units were first made available to the model beginning in 2016. Combined cycle units are similar in size to coal units at 545 MW and were constructed in pairs.

Combustion Turbine Units: Combustion turbine (CT) units are built as inexpensive sources of capacity. These natural gas fueled units have low construction costs. CT units were first made available to the model in 2012. CT units were modeled as 150 MW units.

Short-term Purchases: Since it takes time to plan and construct generating units, 50 MW one-year purchases were made available to the model from 2009 through 2017 in order to meet load growth. CT unit costs were used as the basis for the cost per MWh of these purchases.

Biomass: These units were modeled as generic "open loop" biomass, and represent a mixture of technologies. The defining characteristic of open loop biomass systems is that they do not grow their own fuel source, but rely on outside sources for fuel. They were sized at 50 MW, which is a large size for this type of technology. The amount of biomass is limited by long-term local fuel availability. For this reason, a 400 MW limit was placed on the development of this technology over the 30 year study period. Units were first made available in 2015.

Generic Wind: Generic wind units were modeled with the average cost of all turbines being considered for the Glacier Hills project. An hourly wind profile was used for generic wind. The capacity factor used reflects some mix of Wisconsin and out-of-state wind, allows for future improvements in technology and reliability.

No LMP cost differentials were applied to this alternative. However, this is an inherent risk of purchasing wind from distant generation sources, which needs to be considered when evaluating specific projects.

Since assumptions for generic wind were based on improved future capacity factors, this planning alternative was not designed to compete directly with Glacier Hills. Generic wind was first made available in 2013. In the non-carbon constrained scenarios generic wind was limited to 800 MW, nameplate capacity. This reflects the practical limit of economically feasible wind generation potentially available to Wisconsin Electric. This constraint is derived from limited number of desirable wind farm locations in Wisconsin, and the limitations on MISO deliverable wind, given current transmission constraints and LMP differentials to Wisconsin Electric.

Glacier Hills Wind: The project was modeled at a nominal 162 MW with the cost and operating profile provided in Table 1.6-4. The project was made available in 2012 as a planning alternative and in other scenarios as a forced-in option.

Nuclear: In one of the Carbon Constrained sensitivities a nuclear planning alternative was included. This option was modeled with a 500 MW unit size, and was first made available in 2020.

The Non-Carbon Constrained Scenario:

The non-carbon constrained scenario reflects assumptions with respect to fuel prices and load growth. The scenario focuses on the RPS and does not include assumptions in the pricing of, or caps on CO_2 emissions due to possible future federal legislation. Since the Glacier Hills project is contributing towards compliance efforts related to the RPS, the RPS is not modeled in this scenario. The exception to this is sensitivity 1-12-F in which the cost of RPS compliance is modeled. The analysis begins with case 1-1 in which an optimized plan was developed in which Glacier Hills was made available as a planning alternative. Other sensitivities were then compared to the optimized plan as described below, and are also summarized in Table 1.6-5.

The Non-Carbon Constrained Scenario/ Glacier Hills Evaluation:

Case 1-1: Optimized Base Case (Base Case): The optimized plan did not select the Glacier Hills project in 2012. Therefore, to identify the cost associated with Glacier Hills a sensitivity was run in which Glacier Hills was forced into the expansion plan in 2012 (case 1-1-F).

Case 1-1-F: Glacier Hills Forced-in in 2012: When the project was forced into service in 2012, it cost $117 million more than the Base Case. This reflects the cost associated with this project in achieving RPS compliance.

Case 1-2-F: No Production Tax Credit (PTC): When the project was forced into service and did not receive the $21.00 per MWh production tax credit, the cost of the project compared to the Base Case increased to $231 million.

Case 1-3: Low Load Forecast Optimized: The Base Case was modified with a 10% reduction in the demand and energy forecast. Glacier Hills was not selected into the expansion plan.

Case 1-3-F: Low Load Forecast GH Forced-in: Glacier Hills was forced-in in 2012. The project cost $109 million more than the Low Load Forecast Optimized Case.

Case 1-4: High Load Forecast Optimized: The Base Case was modified with a demand and energy forecast that was increased by 10%. Glacier Hills was not selected in the optimized case.

Case 1-4-F: High Load GH Forced-in: When Glacier Hills was forced-in in 2012, the case cost $72 million more than the High Load Forecast Optimized case.

Case 1-5: Low Fuel Forecast Optimized: The Base Case was modified with a reduction in fuel costs of 5%. Glacier Hills was not selected into the optimized Base Case.

Case 1-5-F: Low Fuel Forecast GH Forced-in: When Glacier Hills was forced into the low fuel forecast expansion plan, the plan cost $112 million more than the optimized case.

Case 1-6: High Fuel Forecast Optimized: The Base Case fuel forecast was increased by 5%. Glacier Hills was not selected into the Base Case.

Case-1-6-F: High Fuel Forecast GH Forced: The cost of forcing Glacier Hills into the expansion plan was $86 million more than the cost of the optimized case.

Case-1-7-F: 10% Planning Reserves for Glacier Hills: When the project contribution toward reserves for Glacier Hills was reduced from 15% to 10%, and the project was forced into service in 2012, the project cost was $122 million more than the optimized Base Case (1-1).

Case-1-8-F: 20% Planning Reserves for Glacier Hills: When the project contribution toward reserves for Glacier Hills was increased from 15% to 20%, and the project was forced into service in 2012, the project cost $107 million more than the optimized case.

Case 1-9-F High O&M Cost of GH: In this sensitivity the O&M cost to operate Glacier Hills was increased by 10%. The forced-in project premium was $125 million compared to the optimized case (1-1).

Case 1-10-F Low O&M Cost of GH: O&M costs were reduced by 10%. The cost of the project compared to the optimized case was $109 million.

Case 1-11-F High Project Cost Case with GH Forced-in: This sensitivity was developed to identify a "worst case" outcome for the project. O&M costs were increased by 10%, capital costs were increased by 10% and the production tax credit was eliminated. When Glacier Hills was forced-in in 2012, it was $289 million more than the optimized case (1-1).

Case 1-12: Non-compliant Base Case: This sensitivity was conducted to determine the cost of compliance with the existing Wisconsin Renewable Portfolio Standard (RPS). Glacier Hills was removed from the case. An optimized Base Case was then run for comparison against a scenario in which an RPS compliant plan was developed.

Case 1-12-F: RPS Compliant Case: In this case Glacier Hills, a 2014 biomass project, and solar projects in 2013 and 2015 were forced in. Wind generation reflecting the RPS build schedule was also forced into service. Compared to the non-compliant base case (1-12), the compliant case had a $648 million cost premium.

The Carbon Constrained Scenario:

A carbon constrained scenario was created to assess the value of the Glacier Hills project in the event that carbon emission legislation is enacted. In the absence of any more definitive guidance, system CO_2 caps and allowance costs were developed using the assumptions presented by the Governor's Task Force on Global Warming. Allowance prices were associated with system CO_2e emissions beginning in 2014 at $17 per metric ton and increased to $155 per metric ton by 2037. Allowance prices were increased at the rate of inflation thereafter. The cap and trade recommendation as modeled had a profound impact on the cost of generation, the dispatching of existing units and the future integrated resource plan.

The impact of such a policy on the overall economy would be far reaching, and would affect key modeling inputs. For this reason, accurate modeling of a carbon constrained world is challenging. Several assumptions were made about the impact on key modeling variables due to carbon legislation. Natural gas demand is assumed to rise by $2.00 per million Btu starting in 2014. The limit on generic wind installed capacity was increased from 800 to 1,600 MWs reflecting the expectation that investment in additional transmission resources would be made to make more wind resources deliverable into the MISO market, and that avoidance of allowance costs would encourage development of more wind projects.

Finally, nuclear energy was considered as an option to reduce greenhouse gas emissions. Since construction of new nuclear generation is currently prohibited by law in Wisconsin, the carbon constrained Base Case did not use a nuclear generation planning alternative. None the less, the base case was modified in a separate sensitivity to allow for nuclear as a planning alternative.

Case 2-1: Optimized Carbon Constrained Sensitivity: The impact of operating within a carbon constrained scenario increased system costs increased from $42 billion in the Non-Carbon Constrained Optimized Base Case (1-1) to $92 billion in the carbon constrained sensitivity (Case 2-1) . EGEAS selected the Glacier Hills project in 2012, indicating that the cost impact of the Project reduced system costs. All biomass and generic wind generation made available as planning alternatives were selected up to the limits allowed. Combined cycle and combustion turbine generation were also selected as needed into the optimized case.

Case 2-1-O: Glacier Hills is Forced Out of the Base Case:
To determine the cost of Glacier Hills in a carbon constrained world, the base case was modified by not offering Glacier Hills as a planning alternative. When this is done, the cost of the expansion plan increases by $84 million, indicating that adding the Glacier Hills reduces system costs by that amount.

Case 2-2: Nuclear Planning Alternative Sensitivity: The addition of nuclear generation as a planning alternative reduced the cost of the Carbon Constrained Optimized Sensitivity (2-1) from $92 billion to about $61 billion. The Glacier Hills project was still selected as was all additional generic wind that was made available. Unlike the optimized sensitivity in which nuclear was not offered as a planning alternative, no combined cycle units were selected and only one biomass unit was selected into the optimized case.

Case 2-4: RPS Compliance Base Case: The sole purpose of the RPS Compliance Base Case is to isolate the cost of the current RPS, establish the relative value of RPS compliance within the postulated carbon constrained world. To measure this cost, all renewable projects not currently in operation were removed from the model. . Additionally, since the carbon constrained sensitivities are so greatly impacted by generic wind, this planning alternative was eliminated from the Base Case and RPS Compliant Case. When these modifications were made, the cost of the Base Case was $95.2 billion.

Case 2-4-F: RPS Units Forced-in: The RPS Compliance Base Case was then modified by forcing in Glacier Hills, a biomass project in 2014 and solar projects in 2013 and 2015, and generic wind units in order to achieve RPS compliance. The model installed fewer combined cycle units and more combustion turbines. Biomass units were still selected up to their limits. The cost of the plan was $93.8 billion, which was a $1.4 billion reduction from the Base Case. In a carbon constrained world, RPS compliance actually results in cost savings in comparison to not meeting RPS requirements.

Turbine Model Comparisons: Each of the turbine models currently being considered for the Project were then forced into the model and compared. The results of these modeling runs are shown in Table 1.6-5 in Appendix N.

Conclusions:
In the current operating environment the Glacier Hills project as modeled costs a premium of about $117 million. Sensitivities conducted on the base case result in a range of project cost premiums from about $70 to $290 million. The remaining cost of RPS compliance (additional wind projects) is expected to be about $650 million.

Under a carbon constrained environment, wind is a valuable resource and all available generic wind as well as the Glacier Hills project is selected into the carbon constrained base case. Under the carbon legislation that was modeled, construction of the Glacier Hills project is in the customers' best interest, saving about $84 million in system costs. Implementing the RPS also reduces system costs by about $1.4 billion.

1.4 ALTERNATIVES

As described below, Wisconsin Electric fully evaluated supply alternatives (including a "no-build" option) and project location alternatives. As a result of this process, the Randolph project (now known as Glacier Hills Wind Park) was identified as the "preferred project alternative." Relative to other wind and renewable energy supply options under consideration by the Company, the Glacier Hills Wind Park is in the best position to move forward quickly through the planning, design and construction process.

1.4.1 Supply Alternatives

Act 141 requires Wisconsin Electric to obtain 8.27% of its energy in 2015 from renewables. In order to determine how best to comply with that mandate, Wisconsin Electric engaged Navigant Consulting to advise it on the economics of various renewable resources. The Navigant study looked at both customer-sited ("distributed") technologies and central station technologies, including wind facilities of various sizes, rooftop and central station photovoltaics (PV), biomass, and hydro. Navigant's conclusion, contained in its March 11, 2007, Final Report, was that central station or utility-scale wind-powered generation is the most economical means of complying with Act 141. Navigant's conclusion is consistent with the Commission's September 2008 Strategic Energy Assessment Draft Report, which states on page 43:

> [T]he state has implemented a renewable energy portfolio requirement. Currently wind generation is the lowest cost renewable energy option.

Given that wind generation is currently the lowest cost renewable energy option, the next question to be addressed in analyzing supply alternatives is how Wisconsin Electric can best proceed to secure the wind-powered capacity it needs in order to comply with Act 141. Compliance could be achieved by a wind-powered capacity expansion plan as follows:

Table 1.4-1 Wisconsin Electric Wind Power Capacity Needs

Year	MW of New Wind-Powered Capacity[7]
2009	0
2010	0
2011	0
2012	362
2013	0
2014	100
2015	200
2016	0

This wind-powered capacity expansion path is motivated by two considerations: (1) Wisconsin Electric needs 662 MW of additional wind powered capacity by 2015 to comply with Act 141 and (2) the best way to proceed is by securing in sequence "increments" of capacity in the 100-200 MW range. 100MW to 200MW sized projects provide wind resource diversity, a paced program to undertake projects and manage the financial and non-financial resources needed to complete them, diversified development risk, and are more likely to be compatible with transmission system availability. Wisconsin Electric has concluded that it would be impractical either to build or to acquire in the marketplace larger "increments" of wind-powered capacity on a more compressed schedule.

In order to evaluate what renewable energy supply alternatives might be available, in October of 2007 Wisconsin Electric issued an RFP seeking proposals from persons interested in selling partially or fully developed renewable energy generating facilities with capacity of up to 200 MW. Potential projects could include any type of generating technology, such as wind, biomass, solar, and hydroelectric.

Nine different parties responded to the RFP, proposing 12 separate projects that were compliant with the RFP requirements:

- Eight wind-powered projects from five applicants totaling 870 MWs.
- Two solar-powered projects totaling 10 MWs.
- One biomass project totaling 24 MWs.
- One project that did not count as renewable energy.

[7] The table shows capacity additions that will be needed for the entire year and therefore must be in-service by December 31 of the preceding year.

All of the proposed projects were evaluated for utility scale application, economic feasibility, deliverability, ease of development, and overall ability to move forward quickly. All eight wind projects were short-listed for further consideration. The two solar projects were dismissed as not cost competitive with the wind projects. The biomass proposal was also not cost competitive and also raised concerns about the ability to guarantee the feedstock.

At about the same time the RFP was issued, Wisconsin Electric exercised an option it had received as part of its sale of the Point Beach Nuclear Plant to Florida Power & Light. FP&L had taken preliminary steps toward developing a wind farm in the Towns of Randolph and Scott in Columbia County. Those preliminary steps included collection and analysis of extensive wind data, securing land control through easement options with land owners, securing preliminary FAA determinations, and substantially advancing an Interconnection Request for a Large Generator Facility with the MISO. Under the terms of the option, for a payment of $10 Wisconsin Electric could take over the Randolph project, with no obligation to proceed any further with it. Wisconsin Electric exercised the option in October of 2007, preserving the right to procure the project assets at some later date.[8]

To better understand the state of development of the wind project assets that would be obtained by acquiring the Randolph project, Wisconsin Electric began a due diligence process of the Randolph project. This process included third party review of wind data, a third party review of land owner easement agreements, internal staff review of all project documents including permit applications, and a third party review of the environmental assessment performed for the project area. This work also included the submittal of several data requests to Florida Power and Light for specific project information. As a follow-up to these data requests, Wisconsin Electric staff met with Florida Power and Light staff to review all available project data. This effort was ongoing during the same time Wisconsin Electric began review of the RFP wind projects.

It was then decided that the Randolph project, an expansion of the Blue Sky Green Field Wind Farm called "Blue Sky Green Field II" or "BSGF II," and the eight RFP projects would be considered and evaluated together, to determine which of these 10 projects was best suited to move forward quickly and supply the next increment of wind energy need to comply with the Act 141 mandate.

As part of the RFP process, Wisconsin Electric received a written proposal from each of the five wind applicants. These proposals varied greatly in terms of the amount of project information provided. Some applicants offered very detailed project data, while others provided very limited data. To better understand each project, and assess each project relative to the other wind projects, Wisconsin Electric requested an in person meeting with each applicant. Each applicant was offered a two hour meeting, where the first hour was an opportunity for the applicant to share details about their company and project(s), and the second hour was an opportunity for Wisconsin Electric staff to ask questions of each applicant and learn more about each wind project. The goal of this process was to gain as much information as possible about the following topics:

[8] In July 2008 Wisconsin Electric closed on the purchase.

- Project location and size
- Wind capacity
- Percent of required land under some form of control
- Interconnection/Deliverability
- The potential for expanding the number of turbines that can be constructed within the project area
- The Number of permit approvals and development agreements in hand versus the number yet to be obtained
- Ease with which the project can be constructed, *i.e.*, local workforce options, proximity to nearest port and transportation infrastructure

Wisconsin Electric staff met with four of the five applicants in person, and had a conference call with the fifth. During these meetings the applicants provided additional information about their projects. Some of the information was provided verbally through discussion, while presentation materials were also provided.

Wisconsin Electric believed that through this data gathering process, sufficient project knowledge was gained such that a project's attributes and shortcomings could be assessed relative to key criteria such as economic feasibility, deliverability, ease of development, and overall ability to move forward quickly. This information was then considered with respect to each of the RFP projects, as well as how the projects compared to both the Randolph and BSGF II wind projects.

The pertinent data about each of the 10 projects was then shared with company management. The management team considered each project's attributes and shortcoming relative to a key criterion, that being which of the ten projects was in the best position to move forward quickly and allow Wisconsin Electric to secure in a timely and economical fashion the next increment of wind-powered capacity it needs in order to comply with the Act 141 mandate.

Although a number of the projects represent viable opportunities and will continue to be considered for Act 141 compliance going forward, the Randolph project stood out as the preferred alternative for securing wind-powered capacity in the near term. Of the ten projects, Randolph (now Glacier Hills) is considered the most economically viable project that is in the best position for immediate development. The list below summarizes some of the project attributes that placed Randolph ahead of the other projects under consideration.

- Size of project matched the need for 150-200 renewable MWs by the end of 2011 to fill a projected 2012 Act 141 compliance gap
- Verifiable wind capacity factors based on long-term monitoring.
- Nearly 100% land control
- Advanced stage interconnection service request that was on track for approval as an unconstrained Network Resource that was not dependent on substantial network upgrades (This was of particular importance given how disruptive transmission constraints can be to a project schedule.)
- Expandability. Based on the good opportunity to expand the site, the Company submitted an additional 150MW Interconnection Request to MISO for a Large Generating Facility

in April 2008. This request is on track to coordinate with the interconnection request submitted by FPLE.[9]

- Support of the local community
- Located in Wisconsin with nearby port and transportation infrastructure as well as Wisconsin Electric staff resources
- The Wisconsin location provides substantial contracting and employment opportunities to Wisconsin business and workers.
- The exposure of the Company's customers to Locational Marginal Price fluctuations across MISO is reduced by placing the wind generating facility in close proximity to the Company's customers.

In summary, based on its multi-faceted evaluation process, Wisconsin Electric concluded that in order to move forward in complying with Act 141 it should seek a CPCN to construct the Project to supply the next increment of renewable capacity called for by its wind powered resources expansion plan.

1.4.1.1 Renewable fuel options considered/ why not selected

Renewable Energy Supply Options Not Selected

In order to meet the RPS requirements, the company continues to evaluate various forms of renewable energy and seeks to maintain its supply portfolio diversity. However, at this time wind energy is the most cost competitive resource available and as such is expected to meet the majority of the company's renewable energy needs. The following outlines why these other renewable fuels have not been selected as preferred methods of supply under this project application. In addition, information is provided on active programs involving these resources, as the Company continues to work towards a balanced and diversified renewable generation portfolio.

1.4.1.1.1 Solar

Wisconsin Electric is actively incorporating solar energy into its renewable energy portfolio. Customer located small capacity solar generation is supported by Wisconsin Electric through its solar Buy-Back Program. The Buy-Back Program was approved by the PSCW in late 2005, and currently accounts for about 327 MWh a year of solar energy purchases.

The company continues to investigate practical ways to add solar energy to its renewable energy portfolio. However, solar energy is not generally cost competitive with wind energy, which limits the appeal of solar energy as a major source of renewable energy to meet the RPS.

1.4.1.1.2 Biomass

[9] See Section 2.4.6, Transmission Interconnection.

Biomass resources include generation of electricity from landfill gas (discussed separately), municipal and agricultural waste and waste wood. Investment in biomass facilities tends to be riskier than investment in wind energy because the fuel supply for biomass needs to be secured for the life of the plant in order to ensure continuous operation of the facility. This fuel supply certainty is difficult to obtain. Fuel supply also determines the plant location, which may not be near load or in a desirable Locational Marginal Pricing generator node. Therefore, there are potential additional transmission impacts to consider.

Wisconsin Electric currently has contracts in place for the purchase of approximately 5,500 megawatt hours of renewable energy per year from agricultural waste. Wisconsin Electric also has a biogas buy-back tariff that purchases the output from facilities with a capacity of not greater than 1000 kW that generate electricity using anaerobic digestion. Wisconsin Electric currently has two customers on the biogas buy-back tariff and anticipates purchasing approximately 4,300 MWh of renewable energy from these 2 facilities. At this time, biomass is not a feasible alternative to be a major source of renewable energy to meet the RPS.

1.4.1.1.3 Hydro

Wisconsin Electric currently purchases about 2,500 MWh per year of hydro renewable energy, and generates about 383,000 MWh of hydro renewable energy from its own fleet. Hydro generation is economically competitive with wind generation. However, the potential to add additional hydro generation to meet the RPS is limited, since there are few locations in which new hydro plants can be built.

1.4.1.1.4 Landfill Gas

Renewable generation from landfill gas is the most economically competitive alternative to wind generation. Wisconsin Electric currently purchases about 218,000 MWh of landfill gas generation per year. The Company will continue to seek landfill gas opportunities; however, at this time it is unlikely that landfill gas can contribute significantly to meeting the RPS requirements.

1.4.1.1.5 Fuel Cell

At present Wisconsin Electric believes that fuel cell technology is neither technically nor economically feasible as a source of renewable energy as a supply alternative.

1.4.1.1.6 Purchase of Renewable Resource Credits (RRCs)

Wisconsin Electric may purchase RRCs to comply with the RPS requirements. Wisconsin Electric currently purchases about 100,000 MWh per year of RRCs from the Top of Iowa wind farm in Joice Iowa. RRCs are created from excess renewable energy from other Wisconsin electric providers from generation facilities that were placed in service after January 1, 2004. Currently there are no RRCs available from Wisconsin electric providers and Wisconsin Electric anticipates due to the increases in the RPS in 2010 and 2015 that no RRCs will be available.

1.4.1.2 Purchase Power Agreements (PPAs) considered or why a PPA was not considered for this project

The Glacier Hills project provides a unique and attractive opportunity for Wisconsin Electric to secure the next increment of renewable energy. In order to comply with Act 141, the Company anticipates that future portions of its needed renewable supply portfolio will be provided via PPAs. However, the unique attributes of Glacier Hills make the Project an excellent fit and opportunity within the Company's renewable energy program. As such, PPAs were not considered to be an alternative to the Project.

Below is a brief discussion of the unique attributes of the Glacier Hills project that make it the appropriate choice for the next increment of renewable energy for Wisconsin Electric's customers:

- Local residents have been very positive at the numerous public meetings that Wisconsin Electric has held, including a well attended open house at the Blue Sky Green Field project where residents from the Glacier Hills area could get a feel for how turbines fit in with the community
- Community leaders at the local and county level have been receptive to our project plans and definitive development agreements are being negotiated
- A solid wind energy resource is present based on substantial wind data collected over several years from numerous met tower locations
- Land control exists for all wind turbine locations and members of the community regularly inquire about opportunities to site additional turbines on their property
- Environmental analyses, including avian and bat studies, have been concluded and have confirmed the suitability of the project within the natural environment and compatibility with agricultural activities
- The Project will require approximately 15 full time positions located at the site once it enters commercial operation. We expect that a majority of these positions will be filled from the community
- Construction of the Project will require an estimated 400,000 to 500,000 labor hours at the site, with a large majority provided from the regional community. Additionally, there are numerous off-site economic benefits associated with supplying materials, components, and construction support services.
- The Towns and the County will collectively receive payments of between approximately $540,000 and $800,000 from the State of Wisconsin under the current shared revenue formula for the benefit of their residents
- Wisconsin Electric acquired the Glacier Hills site at an extremely low cost of $10. This low cost provides a substantial economic benefit
- A 99MW transmission interconnection agreement is in place and the second 150MW transmission interconnection request is in the later phases of evaluation and design, confirming the ability to not only support the current project, but also accommodate future expansion
- FAA Determinations of No Hazard have been received

- The Project site is in close proximity to Wisconsin Electric's service territory, allowing the Company to use its skilled workforce to ensure the Project's safe and reliable operation
- The Project site is located close enough to our Blue Sky Green Field Wind Farm to allow us to realize operational economies
- As a Company owned facility, our customers will avoid the gross receipts taxation associated with facilities operated in Wisconsin by third parties

Advanced stage project sites, such as the Glacier Hills site, with strong community support, landowner collaboration, and excellent transmission interconnections are rare and valuable and should be pursued in the interest of effectively and efficiently providing renewable energy. The Project has the added benefit of providing substantial benefits for Wisconsin residents.

1.4.1.3 No-Build Option

The Company does not believe it could meet the current Act 141 requirements through any means other than constructing utility scale wind developments and/or entering into PPAs. Therefore, a no-build option is not a preferred alternative to development of the Glacier Hills Wind Park.

Further, the Company does not consider the option to purchase green tags or other renewable credits a viable supply alternative. Under Act 141 only Renewable Resource Credits (RRCs), the renewable energy that a utility provider generates in excess of its RPS requirement, can be traded to another utility provider to meet RPS requirements. Since all Wisconsin utilities covered under Act 141 are subject to increasing RPS requirements, the supply of RRCs is expected to be very limited.

1.4.2 Project Area Selection

As discussed at length in Section 1.4.1, Supply Alternatives Wisconsin Electric issued an RFP seeking renewable energy generating facilities with a capacity up to 200 MW to help the Company comply with the Act 141 mandate. Thirteen separate proposed projects were received from nine different parties, with each proposed project involving a discrete project area or site. From this list, eight of the 13 projects, all of which were wind farms, were short listed for further evaluation. In addition to these eight, wind farm proposals, Wisconsin Electric also evaluated the Randolph site, and the Blue Sky II wind farm (an expansion of the existing Blue Sky Green Field project). In all, ten separate wind projects were evaluated, located variously in Iowa, Minnesota, Southwestern Wisconsin, Southeastern Wisconsin, and in East Central Wisconsin.

As described in detail in Section 1.4.1, Wisconsin Electric conducted a thorough, multi-faceted evaluation of these ten projects and their corresponding sites. As explained in Section 1.4.1, the conclusion reached was that the Randolph project, located on a site in Columbia County, offers the best opportunity for Wisconsin Electric to secure in a timely and economical fashion the next "increment" of wind-powered capacity it needs in order to comply with the Act 141 mandate.

1.5 TURBINE SITE SELECTION

1.5.1 Individual factors or characteristics used to select turbine sites

Wisconsin Electric identified turbine sites considering the following factors and characteristics:

- Control of Land: Turbines must be located on property controlled by Participating Landowners[10]
- Setbacks (See Section 1.5.3): Areas were eliminated based on minimum setback distances to existing land uses such as houses, roads, and property lines.
- Microwave Communications: Worst Case Fresnel Zone areas were eliminated.
- Airports: Any Cone of approach areas would be eliminated.
- Natural Environment: Areas to be avoided if possible were identified. These included wetlands, waterways, any threatened and endangered species/habitat, historical and archaeological resources, and forested lands.
- Resource Preservation: These included any lands under the Farmland and Ranch Preservation Program (FRPP), Managed Forest Law (MFL) and the Conservation Reserve Program (CRP). Compatibility of these areas with wind farm facilities was considered.
- Wind: Sites with acceptable access to the wind resource were identified, taking into account land contour, elevation, prevailing wind direction, and accounting for a turbine's impact on other turbines (wake losses) by using separation distances between turbines.
- Auxiliary Facilities (Cable routes, access roads and crane routes): In identifying turbine sites, the following goals and characteristics were considered – least impact to the land; avoidance of wetlands, forests, and structures; minimum distance to the interconnection point; and efficient construction.

The net result of the turbine site identification process was the identification of a total of 138 potential turbine sites, including a determination that cable routes and access roads could be constructed.

Through an integrated, iterative, and multi-discipline process, Wisconsin Electric sought to optimize the initial turbine layout and define the final Project proposal. Given the potential turbine sites this process sought to:

- maximize the efficiency of the turbine array,
- minimize the actual or potential impact on the natural environment, and

[10] Proposed Development Agreements with the Towns of Randolph and Scott define Participating and Non-Participating landowners. Special Condition 11.(a)(iv) For purposes of this Agreement "Participating" shall mean a property owner or property (including a residence) that is subject to an agreement, authorization or easement with Owner to place Wind Turbines upon or near such property. If a property owner owns more than one parcel or residence, the property owner is considered "Participating" for all the property owners' parcels or residences. "Non-Participating" shall mean all property owners or property (including a residence) which are not Participating property owners or property.

- minimize the impact on residents.

During this process, Wisconsin Electric determined that 118 feasible turbine sites would be carried forward for the final definition of the Project.

1.5.2 Information on how turbine site characteristics and type of turbines chosen factored into the selection of final turbine sites

PSC's application filing requirements set a standard for number of alternate turbine sites.[11] Applying this standard, it was determined that a 90 turbine project could be offered yielding as alternate sites (or 31% greater than the 90 sites needed). To determine which of the 118 sites would be designated "Preferred" and which would be offered as "Alternate", Wisconsin Electric performed wind energy calculations for each turbine model under consideration, performed field verification and surveys of natural features, and met individually with participating landowners.

The information gathered was evaluated by a multi-discipline team through an iterative process, converging on those turbines which constitute a preferred 90 turbine array. The following describes the goals of the each iteration:

- maximize the efficiency of the turbine array by performing energy calculations for each turbine model,
- minimize the actual or potential impact on the natural environment by maximizing distances to environmentally sensitive areas, such as wetlands, waterways and woodlots, while maintaining the goal of minimizing impact on residents,
- minimize the impact on residents by maximizing the distance of turbines to Non-Participating homes and property lines,
- minimize the impact on residents by maximizing the distance of turbines to Participating homes and accommodating owner requests, and
- maximize construction efficiency and minimize construction cost by considering ease of site access.

Early in the process, it became apparent that the type of turbine did not affect turbine site selection; each turbine type performed similarly for a given array configuration.

The result of this process is the preferred turbine array of 90 turbine sites. Of the remaining 28 sites, any could be used as alternates. However, as discussed above, the alternates would carry different, though acceptable, impacts and costs as compared to the optimized preferred turbine array.

[11] Application Filing Requirements for Wind Farm Energy Projects in Wisconsin, v4.4, May 2008, p 8.

In addition, turbine site location also carries tangible attributes (differences) such as division of Shared Revenue[12] and landowner expectations.[13]

Should the Commission find one or more of the preferred sites unacceptable, or if a condition develops prior to construction prohibiting the use of one or more preferred site, Wisconsin Electric proposes to select and use a site from the set of available alternate sites. That selection will apply the preferred array determination methods and goals described above.

It should be noted that any revised array may require minor adjustments to the approved array (i.e., acceptable turbine sites) to minimize the new turbine location wake effects. In addition, cable routes, access roads and cross-country crane routes may need to be re-engineered to optimally accommodate the adjustment. Finally, construction permit applications may need to be revised to cover the revised routes. Description of the implications of the possible permutations and combinations of these adjustments are not practicable at this time. However, Wisconsin Electric is confident that any adjustment required will not materially impact project schedule nor materially alter environmental impacts described in this document.

1.5.3 Turbine setback distances

Wisconsin Electric has established setback distances from certain buildings, boundaries and public roads and utilities. The setbacks are consistent with those used in Wisconsin Electric's Blue Sky Green Field wind farm. These setbacks, included in the proposed Joint Development Agreements (JDA), are provided in Table 1.5-1.

No setback waivers are required for any preferred or alternate site.

[12] See Section 12.2.3

[13] Preferred and alternate sites were communicated during landowner meeting.

Table 1.5-1 Minimum Setbacks

Setback Type	Description	JDA	JDA minimum[14]
Occupied Buildings	Schools, hospitals, churches or public libraries	1000 ft	1000 ft
Residences	Participating residences (measured to home)	600 ft	1.1XTH
Residences	Non-participating residences (measured to home)	1000 ft	1.1XTH
Other Buildings	Other buildings, (barns, farm outbuildings, etc.)	not addressed	0 ft
Property Boundaries	Participating property lines	0 ft	0 ft
Property Boundaries	Non-participating property lines	1.1 X TH	1.1XTH
Roads and Highways	Public Road ROW	1.1 X TH	1.1XTH
Overhead Communication and Electric Lines	Not including lines to individual houses or outbuildings	1.1XTH	1.1XTH
Overhead Utility Service Lines	Lines to individual houses or outbuildings	0'	0'
TH = Tip Height (measured at the highest point of the blade tip). *Distances measured from turbine tower centerline.*			

1.6 COST

1.6.1 Capital Cost

Wisconsin Electric estimates the capital cost of the Project to be between $341.3 million and $525.6 million depending primarily on the generating capacity of the turbine selected. It should be noted that the cost of most of the turbines under consideration fall within a relatively narrow band on a $/kW basis.[15] The estimate of costs by major plant account is shown below.

[14] The proposed Joint Development agreements with the Towns of Randolph and Scott permit a homeowner to waive a residence setback. The permissible waiver may not allow turbine placement closer to the residence than 1.1 times the total height of a turbine.

[15] Refer to Section 1.6.3, Comparative costs of the alternatives.

Table 1.6-1 Project Cost

Capital	Plant Account	(in millions)
Land & Land Rights	234003	$ 2.1
Structures and Improvements	234123	$ 8.5
Generators	234423	$ 446.4
Accessory Electrical Equipment	234523	$ 50.6
Communication Equipment	239700	$ 1.4
Allowance		$ 15.2
Sub-total		$ 524.2
Expense		
CPCN Development Costs	234423	$ 1.4
Total Gross Project Cost		$ 525.6

1. The cost estimates are expressed in year-of-occurrence dollars.
2. The cost of the project will be met from internal sources and/or from the issuance and sale of securities.
3. Cost estimates are for 90 wind turbines rated at 2.3 MW each, which is the largest wind turbine under consideration. Cost estimates will be reduced accordingly if smaller wind turbines are installed.
4. Turbine pricing and delivery schedule are not firm until CPCN approval is obtained and down payment is received by turbine supplier.
5. Cost estimates do not include ATC items and AFUDC.

1.6.2 Terms and conditions of all lease arrangements

1.6.2.1 Turbine site lease

There are 3 documents that constitute "turbine site leases;" A Wind Farm Easement Agreement ("Agreement"), a First Amendment to Wind Farm Easement Agreement ("Amendment"), and an Option Notice Letter ("Letter"). In addition to these overarching agreements, there is a specific Utility Easement Agreement solely addressing the collector system. Samples are provided in Appendix D. The major commercial aspects of these agreements are presented in this section.

The Agreement provides for an option to acquire easements for the construction, operation, maintenance, and decommissioning of wind turbines and associated facilities.[16] The Amendment provided an extension to the option term. The option was exercised via the Letter, mailed to Owners between April, 2007, and September, 2007.

Having exercised the option, Wisconsin Electric possesses certain easement rights over the owner's property.[17] The initial term of the easement commenced on the date specified in the Letter. The easement term ends twenty (20) years after the date all wind turbines and improvements have been constructed and installed and the wind project becomes commercially operational. The term may be extended two additional five (5) year successive periods, providing

[16] Agreement, par. 3.

[17] Refer to Agreement, par. 4 for easement type and descriptions.

for a thirty (30) year easement term. Annual payments for wind turbines and compensation for other varied uses are provided to owner.[18]

Costs associated with the Agreement are included in the cost estimates for the Project. Further, allowance for crop damage compensation to the owner is also included.

1.6.2.2 Setback waivers

The Project has no setback waiver agreements.

1.6.2.3 Neighbor agreements

The Project has no neighbor agreements.

1.6.2.4 Wis. Stat. § 196.52(9)(a)3(b) (i.e., "leased generation contract")

The Glacier Hills Wind Park will be a Wisconsin Electric-owned rate-base asset. Therefore, Wis. Stat. § 196.52(9)(a)3(b) does not apply.

1.6.2.5 Affiliated Interest Approvals Required

Approval of the merger of the Randolph Wind, LLC into Wisconsin Electric is required and is requested in the Application for the Glacier Hill CPCN.

Approval of the interconnection agreements (Section 2.4.6) between Wisconsin Electric, MISO and ATC will be required. It is anticipated that the ATC will apply for these approvals as the interconnection agreements are executed.

Wisconsin Electric costs associated with the interconnection agreements and costs of associated studies are included in the cost estimates for the Project.

1.6.3 Comparative costs of the alternatives

The following is a list of tables discussed and referenced throughout this section. These tables are included in Appendix N. Confidential information is provided to the PSC. In the public version, confidential information is not presented.

Table 1.6-2 Operating Statistics of New Generation Options in EGEAS - Confidential
Table 1.6-3 Tax Depreciation Rates
Table 1.6-4 O&M and Capital Costs Used in EGEAS - Confidential
Table 1.6-5 Glacier Hills EGEAS Analysis - Confidential

The generation options used in the economic modeling of the Glacier Hills project include other forms of renewable generation as discussed in Section 1.4.1 as well as the conventional

[18] Refer to Agreement, Exhibit D, Easement Compensation.

generation options used to model the integrated resource plan. The cost assumptions for both types of generation are presented in this section, since both types of generation impact the economics of project.

Renewable Generation Options:

Wind Generation:
In the EGEAS modeling the Glacier Hills Wind Park is modeled using cost information for a representative turbine and generic wind units are modeled using the average of cost information for turbines under consideration.. The Glacier Hills project uses hourly wind data from a wind study completed at the Glacier Hills location, which produced a capacity factor that include allowances for planned and forced outages. Generic wind is modeled using an hourly profile and the capacity factor also includes allowances for planned and forced outages. However, a lower forced outage rate for generic wind is used to reflect Wisconsin Electric's expectation about future wind project capacity factors, where equipment reliability and preventive maintenance are likely to improve with experience as well as potential projects from higher wind regimes. Generic wind is used as a planning alternative in the EGEAS integrated resource plan modeling, and is also used in a modeling run to estimate the cost of compliance with the Renewable Portfolio Standard. As a planning alternative, generic wind is first made available in 2013, due to the lead time required to plan, license and construct a facility.

In the base case modeling wind units receive Production Tax Credits ($21 per megawatt hour for the first ten years of the project), and benefit from accelerated depreciation. Table 1.6-4 presents the detailed costs for the Glacier Hills project and for generic wind.

Biomass Generation:
Biomass generation is modeled in three ways. Existing biomass is modeled as existing generation at a cost of $74.11 per MWh with a 2.91% per year rate of inflation. Biomass is added as a planning alternative in 50 MW units. Biomass units are assumed to be eligible for Production Tax Credits. The Base Case assumes that they receive production tax credits for open loop biomass systems. The generic biomass alternative is first made available in the modeling in 2015.

Solar:
. The construction cost of solar energy is about $7,500 per kilowatt, and solar generation is modeled with a fifteen-percent capacity factor. Based on these cost characteristics solar energy is not cost competitive with other forms of renewable generation and therefore not modeled as a planning alternative in the resource plan for this project.

Hydro:
Wisconsin Electric's owned hydro generation is included as existing generation in the EGEAS modeling. New hydro is sometimes available in the form of small power purchase agreements from existing facilities. The energy from the purchase of an existing hydro facility by Wisconsin Electric does not qualify as renewable under Act 141. Since only very rarely are new sites available for the development of new hydro facilities, the very limited availability of additional hydro generation does not warrant modeling it with a planning alternative.

Fuel Cells:
Fuel cell technology is not sufficiently developed to be a viable source of renewable energy.

Conventional Generation Options:
The economic modeling for the Glacier Hills project includes the following conventional generation options. The associated cost and operating information for the alternatives discussed in this section is available in Table 1.6-2.

Advanced Coal:
Advanced coal units are generically modeled as next generation coal-fired technology. They could be improved efficiency Super-critical Pulverized Coal (SCPC) units or Integrated Gasification Combined Cycle (IGCC) units. Both technology options are configured for carbon capture. However, carbon capture technology is not incorporated into the units at the time of construction, but could be added later at an additional cost as needed.

Coal units are modeled as two unit plants with the second unit being placed in-service one year after the first unit is completed. The first unit is modeled with a higher construction cost than the second, since it is assumed to include common costs associated with both units. The units are modeled at 515 megawatts of capacity each. Due to licensing and construction lead times, these units are first made available in 2018.

Combined Cycle Units:
Like the Advanced Coal units, combined cycle units also employ the two unit plant assumption with capacities of 545 megawatts for each unit. The combined cycle units used as planning alternatives do not employ oil back-up, but pay a fixed price for non-interruptible fuel supply. They are first made available in the modeling in 2016.

Combustion Turbine Units:
Combustion turbine units are available in 150 megawatt blocks. Up to 750 megawatts of combustion turbine generation can be constructed in any year. They are modeled with a fixed price for non-interruptible fuel supply, and are available starting in 2012.

Short-term Purchases:
Short-term purchases are one-year 50 megawatt power purchase contracts that are modeled based on the cost of combustion turbine generation. The contracts are available from 2009 through 2017 to serve as an alternative to combustion turbines for short-term needs, until other planning alternatives are available.

Units that are modeled as planning alternatives, which includes Generic Wind, Biomass, Advanced Coal, Combined Cycle, Combustion Turbines and short-term purchases are selected into the optimized (least cost) expansion plan based on their economic merit. The optimal Base Case is then compared to an alternative case in which the Glacier Hills project is forced into the expansion plan in 2011.

1.6.4 Effect of the proposed project on wholesale market competition

Under the CPCN statute, the PSCW may issue a CPCN only if it determines, among other things, that "The proposed facility will not have a material adverse impact on competition in the relevant wholesale electric service market." § 196.491(3)(d)7, Wis. Stats.

An analysis of competition requires consideration of market power, that is, whether a firm can profitably maintain prices above competitive levels by a significant amount on a sustained basis. This is referred to as horizontal market power. Firms with market power can profitably increase the price of a product in a relevant market by restricting supply either by physically or economically withholding capacity from the market, thereby raising prices and earning a higher profit on energy that is sold in the market. Vertical market power refers to a firm's ability and incentives to use its market position over a product or service to affect competition in a vertically-related business or market. Examples are control over transmission and fuel inputs that might affect competition in energy markets.

Wisconsin Electric has turned over operational control of its transmission system to American Transmission Company, which, in turn, has turned over operational control to the Midwest Independent System Operator ("MISO"). This eliminates any concern with respect to transmission-electric vertical issues. Further, there is no basis for any finding that Wisconsin Electric and its affiliates are capable of erecting any barriers to market entry. Wisconsin Electric's affiliate, Wisconsin Gas, owns local distribution facilities; however, the Federal Energy Regulatory Commission ("FERC") has established a rebuttable presumption that such ownership does not permit a seller to raise entry barriers.[19] In addition, Wisconsin Electric and its affiliates do not own or control sites for generation capacity development sufficient to be used to create barriers to entry. Finally, Wisconsin Electric and its affiliates do not own or control sources of fuel supplies, but do control some fuel transport assets (i.e., own or lease rail cars). However, there is no basis to conclude that such control would allow Wisconsin Electric and its affiliates to raise entry barriers.

With respect to horizontal market power issues, the issue is whether the addition of a 135 - 207 MW wind facility, owned by Wisconsin Electric, will adversely affect competition in the wholesale electricity market. The relevant geographic market in which Wisconsin Electric operates is the MISO Energy Market region.[20] Under the screening methodology employed by the FERC to determine horizontal market power in wholesale markets, a lack of horizontal market power can be shown (1) if load can be served without an applicant's generation ("Pivotal

[19] *Market-Based Rates for Wholesale Sales of Electric Energy, Capacity, and Ancillary Services by Public Utilities*, Order No. 697, 72 Fed. Reg. 39,904 (July 20, 2007), FERC Stats. & Regs., ¶ 31,252 (2007) (Order No. 697) at P21.

[20] According to the horizontal market power screen implemented by the FERC to assess market power in wholesale markets, sellers located in and members of Regional Transmission Organizations ("RTOs") and Independent System Operators ("ISOs") may use the geographic region under the control of the RTO/ISO as the default relevant market. Order No. 697. FERC has clearly rejected arguments that WUMS is the default relevant submarket for purposes of conducting the indicative horizontal market power screens for market-based rate applications. On August 22, 2008, in Docket No. ER08-1176-000, the FERC accepted amendments to Wisconsin Electric's market-based rate tariff to remove restrictions that prohibited bilateral sales of capacity and energy at market-based rates within WUMS.

Supplier Analysis"), and (2) for each of the four seasons, whether the applicant has a dominant position in the relevant market ("Market Share" analysis).[21] If an entity fails to pass either screen, there is a presumption of horizontal market power and further analysis is required.[22] Wisconsin Electric passes both screens.

With the beginning of MISO operations in 2002, the introduction of day-ahead and real-time locational margin price ("LMP") energy markets beginning April 1, 2005, and the implementation of market mitigation measures and an Independent Market Monitor,[23] concern over the potential for the exercise of horizontal market power by Wisconsin Electric or other market participants is significantly reduced. The MISO mitigation measures apply to specific conduct only when the conduct exceeds well-defined conduct thresholds and when the effect on market outcomes of the conduct exceeds well-defined market impact thresholds. Using these thresholds, the mitigation measures are designed to allow prices to rise efficiently to reflect legitimate supply shortages while effectively mitigating inflated prices associated with artificial supply shortages in transmission constrained areas resulting from physical or economic withholding.[24] Because the WUMS and North WUMS subregions of MISO are each defined as "Narrow Constrained Areas" ("NCAs"),[25] tighter market power mitigation measures are in effect in those areas than in the MISO generally.[26]

The FERC recently adopted a "rebuttable presumption that the existing Commission-approved RTO/ISO mitigation is sufficient to address market power concerns in the RTO/ISO market,

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[21] 18 C.F.R. § 35.37 (2008).

[22] *Id.*

[23] The Independent Market Monitor reports to MISO's Board of Directors and reports its findings to FERC, State Regulatory Commissions, and MISO.

[24] MISO Tariff, Sheet No. 747.

[25] "A Narrow Constrained Area is an electrical area identified by the IMM [Independent Market Monitor] that is defined by one or more Binding Transmission Constraints that are expected to be binding for at least five hundred (500) hours during a given twelve (12)-month period and within which one (1) or more suppliers are pivotal." MISO Tariff, Sheet No. 758.

[26] "Because the market power concerns regarding NCAs are higher due to their chronic nature, the conduct and impact thresholds are substantially lower than for BCAs [Broad Constrained Areas]." *2006 State of the Market Report*, Midwest ISO, Prepared by Potomac Economics, Ltd., Independent Market Monitor for the MISO, July 2007, p. 110, located at

http://www.midwestiso.org/publish/Document/24743f_11ad9f8f05b_-7b890a48324a/2007%20MISO%20SOM%20Report_Final%20Text.pdf?action=download&_property=Attachment

"A Broad Constrained Area is an electrical area in which sufficient competition usually exists even when one or more transmission constraints are binding, or into which the transmission constraints bind infrequently, but within which a transmission constraint can result in substantial locational market power under certain market or operating conditions." MISO Tariff, Sheet No. 761.

including mitigation applicable to RTO/ISO submarkets."[27] Moreover, the presence of the MISO energy market, which is subject to the market monitoring and mitigation discussed above, provides a centralized market that suppliers can access as an alternative to bilateral transactions, and acts as a balance on the ability to attempt to raise prices in bilateral transactions.

The addition of a 135-207 MW wind facility does not alter any conclusion with respect to the effectiveness of market mitigation measures in addressing Wisconsin Electric's ability to exercise market power. By delegated letter order issued April 18, 2008, FERC accepted Wisconsin Electric's Change of Status Report pertinent to the Randolph Wind Farm project and determined that the addition of the facility does not affect the facts on which FERC relied in granting Wisconsin Electric's market-based rate authority.

Moreover, the addition of new supply into the market should be viewed as pro-competitive, and its contribution to meeting Wisconsin's Renewable Portfolio Standard should not be ignored.

In addition, the proposed wind-powered capacity has characteristics that make it less amenable to exercising market power than traditional fossil-fueled generation. In particular, it depends on the wind to produce power. As a result, a wind farm is likely to have an annual average capacity factor in the range of 30% (which means its annual average expected output is only in the range of 30% of its capacity). Since wind resources are not dispatchable, these resources are price-takers in the MISO Energy Market, and, as such, are not capable of exerting pricing strategies indicative of exercising market power.

On the basis of these facts, the Commission should conclude that the proposed facility will not have a material adverse impact on competition in any relevant market.

1.6.5 Estimate of the expected life span for the power plant

The design life for the Project is 30 years. This is consistent with the 30 year term of the landowner easement agreements. Wisconsin Electric believes that a 30 year operational life can be reasonably achieved by the turbines under consideration provided the turbines receive adequate maintenance. Wisconsin Electric has included the costs of a preventive maintenance program in our cost estimate for a 30 year life. In support of the expected life of the turbines, easement agreements with land owners span 30 years from the date the turbine begins operation.[28]

The EGEAS analyses use 26 yrs as the average book life of the facilities and major equipment.

[27] *Market-Based Rates for Wholesale Sales of Electric Energy, Capacity, and Ancillary Services by Public Utilities*, Order on Rehearing and Clarification, 123 FERC ¶ 61,055 (2008) (Order No. 697-A).

[28] Wind Farm Easement Agreement, sec. 5.1.

1.6.6 Decommissioning at the end of the project's life

Decommissioning focuses on removal of turbines and towers and includes removal of concrete foundations to four feet below grade.[29] [30] Other features such as the operations/maintenance building may remain and be used for other purposes. Underground cables are left in place (after being cut off well below grade) because removing them would cause more disruption to the land than abandoning them in place. The land used for the wind turbines and associated equipment will be restored to its original condition. Roads, at the landowner's request, may be left intact.[31] Restoration typically includes grading and replanting areas where foundations, roads, and buildings were located.

Removed parts can either be sold into the used wind turbine market (where old turbines are reconditioned and resold), sold for their scrap value, or disposed. If a secondary market for the used equipment is not available, it would be typical for the tower, frame, bearings, gearbox, and generator to be recycled as scrap metal, and the fiberglass components such as blades and the nacelle cover to be cut down in size and disposed of.

Wisconsin Electric estimates the cost of decommissioning the wind turbines will be zero. Steel from the towers will be sold as scrap metal to offset the expenses of removing the towers, foundations and access roads.

Generally, removal costs are collected in rates over the average service life of a power plant through depreciation expense.

1.7 IPPs Only – MISO and Project Life Span

1.8 Required Permits and Approvals

1.8.1 Approvals and Permits

Table 1.8-1 identifies each permit and approval type required at the federal, state, and local level for the Project. Wisconsin Electric is taking the necessary steps to ensure that appropriate permits and approvals will be obtained to enable construction in accordance with the planned schedule.

It should be noted that as of the date of this document, the Towns have not yet definitively identified all permit types but may elect to consider some additional kind of permit for project activities and facilities to memorialize their concurrence with Wisconsin Electric's construction requirements and standards.

Wisconsin Electric will keep the PSC informed of any and all developments along these lines.

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[29] Proposed Joint Development Agreements, Towns of Randolph and Scott, Exhibit B.

[30] Wind Farm Easement agreement, sec. 7.8.

[31] Proposed Joint Development Agreements, Towns of Randolph and Scott, Exhibit B.

Table 1.8-1 Permits, Notices, and Approvals

Agency	Interest or Permit	Contact	Application/ Notice Date	Status
Federal				
Federal Aviation Administration	Impacts on aviation	Michael Blaich 770-909-4329	8/13/2008[32]	Response Received
Bureau of Indian Affairs	Cultural and archaeological resources	Various Tribes (see App. Z)	9-26-08	Pending
U.S. Fish and Wildlife Service	Migratory Bird Treaty Act and the Endangered Species Act	Louise Clemency 920-866-1717	08/18/2008	Response Received
U.S. Army Corps of Engineers	Impact of project construction activities on waterways and wetlands	Kyle Zibung 715-345-7911	10/01/2008	Response Pending
National Telecommunications and Information Administration-Department of Commerce	Determine if project will impact Federal Government communication links	Ed Davison 1401 Constitution Avenue N.W. Washington DC 20230	9/22/2008	Response Pending
State				
Public Service Commission	CPCN for construction of a large generating facility	Jim Lepinski 608-266-0478	10/27/2008	Response Pending
Department of Natural Resources	Wisconsin Pollutant Discharge Elimination System (WPDES) permit	Jim Bertolacini 608-264-8971	10/02/2008	Response Pending
Department of Natural Resources	Endangered species review and permitting (if needed)	Shari Koslowsky 606-266-4382	07/24/2008	Response Pending

[32] Application for preferred turbine sites. Application for alternates will follow FAA determination for preferred sites.