Environmental Report

EcoHarmony West Wind Project

In the Matter of the Application of EcoHarmony West Wind, LLC,
for a Certificate of Need for a Large Energy Facility,
a 280 MW Wind Energy Farm in Fillmore County

PUC Docket No. IP-6688/CN-08-961

Energy Facilities Permitting
85 7th Place East, Suite 500
Saint Paul, MN 55101

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Responsible Governmental Unit	Project Proposer
Minnesota Office of Energy Security	**EcoHarmony West Wind, LLC**
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Abstract

On October 22, 2008, EcoHarmony West Wind, LLC (applicant), filed a certificate of need application with the Minnesota Public Utilities Commission (Commission) for the EcoHarmony West Wind Project (project). The applicant is proposing to construct a 280 megawatt (MW) large wind energy conversion system in Fillmore County, Minnesota.

The proposed project is a large energy facility as defined by Minnesota Statute 216B.2421. Accordingly, it requires the Minnesota Department of Commerce to prepare an environmental report (ER) for the project (Minn. Rules 7849.1200).

Office of Energy Security (OES), Energy Facilities Permitting (EFP) staff is responsible for preparing the ER required for the certificate of need. This report has been prepared as per Minnesota Rule 7849.1100-2100. The report is part of the record which the Commission will consider in making a decision on a certificate of need for the project.

Information about this project can be found on the Commission's energy facilities permitting website: http://energyfacilities.puc.state.mn.us/Docket.html?Id=19910, or obtained by contacting Larry Hartman, Office of Energy Security, 85 7th Place East, Suite 500, St. Paul, Minnesota 55101, phone (651) 296-5089, e-mail: larry.hartman@state.mn.us.

Documents in the record for this project can be found on the eDockets system by searching for the year "**08**" and number "**961**" at: https://www.eDockets.state.mn.us/EFiling/search.jsp.

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1.0 Introduction

On October 22, 2008, EcoHarmony West Wind, LLC (applicant), filed a certificate of need application with the Minnesota Public Utilities Commission (Commission) for the EcoHarmony West Wind Project (project). The applicant is proposing to construct a 280 megawatt (MW) large wind energy conversion system in Fillmore County, Minnesota.

The project will be sited in an area of approximately 23,000 acres and will consist of wind turbines with a rated output between 1.5 and 3.0 MW in such number and combination as to yield 280 MW. Facilities associated with the project include gravel access roads, a new substation, an operation and maintenance building, meteorological towers, and an electrical collection system. The project will interconnect to the transmission grid through a 161 kilovolt (kV) transmission line, approximately 8.5 miles long, which will connect the new substation to a switching station and an existing 161 kV transmission line owned by ITC-Midwest.

In addition to a certificate of need (CON), the project requires a site permit for the wind farm, and a route permit for the 161 kV transmission line from the Commission. The site permit (WS-08-973) and route permit (TL-09-601) are being considered by the Commission in separate dockets.

The proposed project is a large energy facility as defined by Minnesota Statute 216B.2421. As a result, it requires the Minnesota Department of Commerce to prepare an environmental report (ER) for the project (Minn. Rules 7849.1200). Office of Energy Security, Energy Facilities Permitting (OES EFP) staff has prepared this ER to fulfill this requirement. The ER is part of the record which the Commission will consider in making a decision on a CON for the project.

The proposed project is intended to produce renewable energy in furtherance of Minnesota's renewable energy objectives. Accordingly, alternatives examined in this ER are limited to "eligible energy technologies" that support these objectives (Minn. Stat. § 216B.1691). These alternatives include: (1) a generic 280 MW wind generation project sited elsewhere in Minnesota, (2) a 106 MW biomass plant, and (3) a "no build" alternative.

Section 2 of the ER outlines the regulatory framework governing the project. Section 3 describes the proposed project. Section 4 describes alternatives to the project. Section 5 describes the potential impacts of the no build alternative. Section 6 discusses the potential human and environmental impacts of the project and alternatives, including possible mitigations. Section 7 discusses the availability and feasibility of alternatives. Section 8 describes the additional permits that may be required for this project.

Sources of Information

Information for this report is drawn from multiple sources, which are noted throughout. Primary sources include EcoHarmony's applications to the Commission:

- Application for Certificate of Need, EcoHarmony West Wind Project – 200 MW, October 22, 2008[1]
- Site Permit Application for Large Wind Energy Conversion System, EcoHarmony West Wind Project, January 26, 2009.[2]

Additional information has been incorporated from earlier, related Environmental Quality Board and Department of Commerce reports.

[1] Application for Certificate of Need, EcoHarmony West Wind Project – 200 MW, October 22, 2008 [hereafter CON Application], https://www.edockets.state.mn.us/EFiling/edockets/searchDocuments.do?method=viewDocument&documentId={ACC437E7-DDEE-4E32-86FE-7CF28FE1B90F}&documentTitle=5586889.

[2] Site Permit Application for Large Wind Energy Conversion System, EcoHarmony West Wind Project, January 26, 2009 [hereafter Site Permit Application], http://energyfacilities.puc.state.mn.us/resource.html?Id=19912.

2.0 Regulatory Framework

EcoHarmony West Wind, LLC, is proposing to construct the EcoHarmony West Wind Project in Fillmore County, Minnesota. The project is a large wind energy conversion system as defined in the Wind Siting Act (Minn. Stat. § 216F). The project is designed to produce 280 megawatts (MW) of power and thus is a large energy facility per Minnesota Statute 216B.2421.

In accordance with Minnesota Statute 216B.243, no large energy facility may be sited or constructed in Minnesota without issuance of a certificate of need (CON) by the Minnesota Public Utilities Commission (Commission). Accordingly, on October 22, 2008, the applicant submitted a certificate of need application to the Commission. On January 15, 2009, the Commission issued an order accepting the application as complete and authorizing an informal review process.[3]

The informal review process includes several steps designed to develop a record upon which a CON decision can be made, including: (1) a notice and comment period, (2) analysis by Department of Commerce, Office of Energy Security, Energy Regulation and Planning (OES ERP) staff, (3) analysis by Office of Energy Security, Energy Facility Permitting (OES EFP) staff, and (4) a public hearing conducted by an administrative law judge (ALJ). Based on the ALJ's hearing report and entire record, Commission staff will make a recommendation to the Commission on issuance of the certificate of need. The Commission is the final decision-making body.

2.1 Environmental Report

Per Minnesota Rule 7840.1200, the analysis provided by OES EFP staff takes the form of an environmental report (ER). The ER provides an analysis of potential human and environmental impacts of the project, as well as alternatives to the project. To develop the ER, OES EFP staff is required to conduct at least one public meeting in the proposed project area. The purpose of the meeting is to advise the public of the project and to solicit public input into the scope of the ER. A "scope" is a determination of what needs to be assessed in the ER in order to fully inform decision-makers and the public about the possible impacts of the project and potential alternatives.

OES EFP staff held a public information and scoping meeting on April 15, 2009, in Harmony, Minnesota. Approximately 62 persons attended the meeting. A public comment period followed the meeting; the comment period closed on May 20, 2009. Ten written comments were received during the comment period – five letters from citizens, four letters from state agencies, and one letter from the applicant.

[3] Order Accepting Application as Complete and Authorizing Informal Review Process, January 15, 2009, https://www.edockets.state.mn.us/EFiling/edockets/searchDocuments.do?method=viewDocument&documentId={5CA480D3-F20F-4B77-AF4C-0230F72E3BE9}&documentTitle=5701317.

On July 13, 2009, the applicant requested from the Commission an increase in project size from 200 MW to 280MW.[4] Based on the scoping comments received, the applicant's request for an increase in project size, and the rules governing the scope of an ER (Minn. Rules 7849.1500), the Director of OES issued a scoping decision on September 14, 2009 (Appendix A). This environmental report has been developed in accordance with the scoping decision.

As noted above (and in the scoping decision), a public hearing conducted by an ALJ will be held in the project area to further develop the record for a Commission decision. This ER will be introduced into the record by OES EFP staff.

2.2 Permits

Site and Route Permits

In addition to a certificate of need, the proposed project requires a site permit for the wind farm (Minn. Stat. §216F.04) and a route permit for the 161 kilovolt (kV) transmission line (Minn. Stat. § 216E.03) which will connect the project to the electrical transmission grid. These permits are issued by the Commission and are being considered by the Commission in separate dockets.[5] A site permit (authorizing the siting and constructing of the project) may not be issued before a certificate of need has been issued for the project (Minn. Stat. § 216B.243).

Additional Permits

In addition to approvals issued by the Commission, the project will require permits and approvals from federal agencies, additional state agencies, and local governments. These permits are discussed in Section 8.

Public Participation

The Commission relies on public participation in its certificate of need and permitting processes. Public participation enables the development of a thorough record. Citizens can ensure notice of these processes by placing their names on the appropriate OES project contact lists. Citizens can sign up for the EcoHarmony West Wind project lists on line:

- Site Permit and Certificate of Need: http://energyfacilities.puc.state.mn.us/Docket.html?Id=19910
- Route Permit: http://energyfacilities.puc.state.mn.us/Docket.html?Id=24696

Citizens may also have their names placed on these project lists by contacting OES project manager Larry Hartman, (651) 296-5089, larry.hartman@state.mn.us.

[4] Applicant Letter to Commission, July 13, 2009, https://www.edockets.state.mn.us/EFiling/edockets/searchDocuments.do?method=showPoup&documentId={E7879520-0D33-4F8C-8F0D-B2EE7EB2EBE7}&documentTitle=20097-39567-01.

[5] The Commission docket number for the site permit is: WS-08-973; see http://energyfacilities.puc.state.mn.us/Docket.html?Id=19910. The docket number for the route permit is: TL-09-601; see http://energyfacilities.puc.state.mn.us/Docket.html?Id=24696.

3.0 Description of the Proposed Project

EcoHarmony West Wind, LLC, is proposing to construct the EcoHarmony West Wind Project, a 280 MW wind farm in Fillmore County, Minnesota. EcoHarmony West Wind, LLC, is a wholly-owned subsidiary of EcoEnergy Wind, LLC. EcoEnergy Wind will develop and manage the project. The project is intended to produce renewable energy in furtherance of Minnesota's renewable energy objectives (Minn. Stat. § 216B.1691).

3.1 Project Location

The project will be located in southeastern Minnesota, in the townships of Harmony, Bristol, York, Carimona, Forestville, and Preston – all in Fillmore County. The project boundary encompasses approximately 50,000 acres (Figure 1). The area is predominantly in agricultural use with a relatively low population density.

The general topography of the project site is rolling hills with long low ridges and intermittent drainage ways and minor streams. The site includes a number of broad ridges with elevations approximately 1,350 feet above mean sea level. Surrounding elevations are lower by as much as 150 to 200 feet. The primary ridge in the area lies in an easterly to westerly direction and is a prominent landscape feature. The project area includes karst topography – a landform shaped by the slow dissolution of limestone bedrock.

3.2 Project Description

The EcoHarmony West Wind project will have a nameplate capacity of 280 MW. A final decision on turbine selection and design has not been made, but the project will consist of turbines with a rated output between 1.5 and 3.0 MW in such number and combination as to produce 280 MW. Characteristics of turbines that may be used for the project are shown in Table 1. Turbines are typically placed on towers 80 meters (262 ft.) in height. Rotor diameters vary from 77 to 101 meters (253 to 331 ft.).

Some site permit conditions for large wind energy conversion systems (LWECS) are based on criteria which are dependent on turbine size.[6] Turbines must be placed within the project boundary and meet all permit conditions. Accordingly, the final siting ("micro-siting") of wind turbines for the project will depend on, among other factors, the size of the turbines chosen for the project. A preliminary turbine layout is shown in Figure 2.

Each turbine tower will be secured by a steel-reinforced concrete foundation that varies in size and design depending on soil and substrate conditions. A control panel inside the base of each turbine tower houses communication and electronic circuitry. Each turbine will be connected to

[6] For example, turbine setbacks from the project boundary and all non-participating lands are expressed in rotor diameters (RD). Rotor diameters vary with turbine size.

a supervisory control and data acquisition (SCADA) system via fiber optic cable. The SCADA system allows for real-time monitoring and control of turbine operation.

Facilities associated with the project include gravel access roads, a collection substation, an operation and maintenance (O&M) building, meteorological towers, and an electrical collection system. The project will connect to the transmission grid through a 161 kilovolt (kV) transmission line, approximately 8.5 miles long, which will connect the collection substation to a switching station and an existing 161 kV transmission line southeast of the town of Harmony, Minnesota (see Figure 1). The area of direct land use will be between 47 and 94 acres for turbines and access roads (approximately 0.5 acres per turbine), with an additional 10 acres required for the collection substation and O&M building.

Electricity generated by each turbine is stepped up by a pad-mounted transformer at the base of each turbine to a collection line voltage (34.5 or 69 kV). The collection lines, along with SCADA fiber optic cable, will be buried to a depth of approximately 4 feet. The collection lines will carry power from the turbines to the collection substation, sited near the geographic center of the project. Power entering the collection substation will be transformed to a voltage of 161 kV. The collection substation will be sited on approximately 5 acres and will be fenced to prevent unauthorized access. Power from the collection substation will be transmitted via an overhead 161 kV transmission line to a switching station southeast of Harmony, Minnesota.

Gravel roads will provide access to turbine sites for construction, maintenance, and eventual decommissioning. Turbine layout will attempt to minimize the length and extent of access roads. Roads will be constructed with crushed limestone aggregate base over a woven geotextile fabric. Roads will be maintained over the life of the project to keep them in good working condition.

The size and location of the operation and maintenance building has not yet been determined. The building will be able to accommodate a staff of 8 to 12 employees with work space suitable for maintaining turbine components.

3.3 Project Cost and Schedule

The cost for developing and constructing the EcoHarmony West Wind project is estimated at $475 million dollars for a 200 MW project (approximately $2.375 million per MW).[7] Thus, a 280 MW project will cost roughly $665 million dollars. The applicant anticipates beginning construction on the project approximately 2 months after receiving a site permit from the Commission. Construction would take approximately one year; commercial operation would follow one month thereafter.

[7] Site Permit Application, Section 11.0

4.0 Description of Project Alternatives

This section describes alternatives to the EcoHarmony West Wind project. Typically, alternatives to the project would include generation facilities of all types, including plants that use coal, natural gas, fuel oil, or similar non-renewable fuels. Alternatives would also include constructing transmission facilities (to import energy) in lieu of generation. However, the proposed project is intended to produce renewable energy in furtherance of Minnesota's renewable energy objectives. Accordingly, alternatives considered here are technologies eligible to be counted toward these objectives.[8]

Alternatives to the EcoHarmony West Wind project examined in this ER include: (1) a generic 280 MW wind generation plant (LWECS) sited elsewhere in Minnesota, (2) a 106 MW biomass plant, and (3) a "no build" alternative.

4.1 280 MW LWECS

An alternative to the proposed project, which would utilize an eligible renewable energy (wind), is a large wind energy conversion system (LWECS) sited elsewhere in Minnesota. Such a project could, theoretically, be a 280 MW project or a combination of smaller dispersed project. The analysis in this ER will attempt to describe differences in the impacts associated with a generic 280 MW wind project sited in Minnesota and the EcoHarmony West Wind project, sited in Fillmore County.

4.2 106 MW Biomass Plant

A biomass alternative to the proposed project would be an eligible renewable energy alternative. There are various possible sources of biomass fuel that could be used. St. Paul District Energy, a combined heat and power facility in downtown St. Paul, is fueled primarily by waste wood and has an electric generation capacity of 25 MW. The 55 MW Fibrominn plant in Benson burns turkey litter. The Laurentian Energy Authority operates facilities in Hibbing and Virginia with a combined capacity of 35 MW that convert wood, wood wastes, and agricultural biomass into electricity.

The biomass alternative analyzed in this ER is one that would burn a combination of hybrid willows, poplars, and corn stover, with natural gas as a backup fuel. This alternative is considered because such a plant, the NGPP Minnesota Biomass, LLC, electric generation facility, has already undergone environmental review in Minnesota, and data regarding potential environmental impacts associated with such a plant are available. Additionally, given the likely available feedstock in the project area, such a biomass plant is feasible.

[8] Minn. Stat. § 216B.1691, Subd. 1. Eligible energy technologies include technologies that generate electricity from solar, wind, hydroelectric, hydrogen, or biomass.

The NGPP project was reviewed by the Environmental Quality Board (Board) in 2003 when it prepared an environmental assessment worksheet (EAW) on the proposed facility.[9] At the time that it was reviewed by the Board, the NGPP project was a 38.5 MW project. The analysis that was conducted on that facility by the Board is valid for use as an alternative analysis in this ER. The EcoHarmony West Wind project will have a capacity of 280 MW, with an estimated capacity factor of 38 percent. The biomass alternative examined in this ER is an appropriately-sized generation alternative.[10]

4.3 No Build Alternative

The no build alternative means that no wind project is constructed. The analysis for this alternative will consider the potential benefits and drawbacks of not constructing the proposed project.

[9] EQB Docket No. 03-67-EAW-NGP Biomass [hereafter Minnesota Biomass EAW] ; see http://energyfacilities.puc.state.mn.us/Docket.html?Id=4452

[10] 280 MW x 0.38 = 106 MW. The biomass alternative, because it has natural gas backup, is assumed for analysis purposes to have a capacity factor of 1.0. Scheduled and unscheduled maintenance would make the effective capacity factor slightly less than 1.0.

5.0 The No Build Alternative

Analysis of the no build alternative involves a discussion of the environmental impacts of continuing the status quo. For example, with a proposed highway project, the no build alternative would take into account the impacts associated with continuing to have traffic increase along existing roads and highways and for development to occur along these existing arteries. Potential impacts and benefits of the no build alternative for the EcoHarmony West Wind project are discussed here

5.1 Impacts

At least three categories of impacts can be identified if the EcoHarmony West Wind project is not built – (1) a hampering of the state's ability to meet its renewable energy objective, (2) the loss of economic benefits in the project area, and (3) the likely negative impact of providing replacement electricity from a non-renewable energy source.

Renewable Energy Objectives

Minnesota has committed to a renewable energy objective of generating 25 percent of its electricity from eligible renewable sources by the year 2025.[11] Minnesota utilities forecast the need for 4,700 to 6,500 MW of additional renewable generation by the year 2025 to meet this objective.[12] If the EcoHarmony West Wind project is not built, it could hinder the ability of the state to meet its renewable energy objective. There are wind resources in other parts of the state and wind farms could be placed in these areas (Figure 3). However, the wind resources of the state are finite. The wind resource in the project area is very good, and, if untapped, could hinder the state's ability to meet its renewable energy objective.

Loss of Economic Benefits

If the EcoHarmony West Wind project is not built, there will be a loss of economic benefits in the project area. Landowners would lose approximately $22 million dollars over twenty years in lease payments.[13] Local governments would lose wind energy production tax revenues estimated at approximately $750,000 dollars annually. The EcoHarmony West Wind project is expected to generate approximately 100 construction jobs for local contractors (temporary) and approximately 12 operational jobs (permanent). These employment opportunities and their associated income would be lost if the project is not built.

[11] Minn. Stat. § 216B.1691
[12] CON Application, Section 4.0
[13] CON Application, Section 4.4

Replacement with a Non-Renewable Resource

If the EcoHarmony West Wind project is not built, the electrical power it would have produced would need to be replaced, likely with a non-renewable energy resource.[14] Though the impacts associated with non-renewable sources vary, it is possible to estimate, as an example, the impact of replacing the EcoHarmony West Wind project with coal energy. The EcoHarmony West Wind project will produce approximately 600 gigawatt-hours annually (GWh/yr). If this energy were produced by Xcel Energy's Sherco plant (a coal-fired plant), the plant would emit pollutants[15], including approximately:

- 900 tons/yr of nitrous oxides (NO_x)
- 900 tons/yr of sulfur dioxide (SO_2)
- 717,000 tons/yr of carbon dioxide (CO_2)

Nitrous oxides (NO_x) are greenhouse gases that cause ozone and related respiratory illnesses.[16] Sulfur oxides (SO_x) can cause acid rain and human respiratory illness.[17] Carbon dioxide (CO_2) is the most important greenhouse gas and is responsible for global warming and associated impacts including significant changes to world weather systems and ecosystems.[18]

5.2 Benefits

Benefits of not building the EcoHarmony West Wind Project would include avoidance of potential human and environmental impacts associated with the project. These impacts are discussed in Section 6 of this ER.

[14] In 2008, non-renewable energy sources accounted for approximately 92 percent of Minnesota's electrical energy supply. Energy Policy and Conservation Report ("Quad Report"), 2008, http://www.state.mn.us/mn/externalDocs/Commerce/Quadrennial_Report__2008_091509012935_2008-QuadReport.pdf.

[15] Minnesota Energy Planning Report, 2001, http://www.state.mn.us/mn/externalDocs/Commerce/Energy_Planning_Report_121602022402_2002PlanningRpt.pdf. Emission rates per unit of electricity estimated at 0.003 lbs/kWh (NO_x, SO_2) and 2.39 lbs/kWh (CO_2).

[16] Health and Environmental Impacts of NO_x, http://www.epa.gov/air/nitrogenoxides/.

[17] Health and Environmental Impacts of SO_2, http://www.epa.gov/air/urbanair/so2/.

[18] Climate Change 2007: Synthesis Report, Summary for Policymakers, An Assessment of the Intergovernmental Panel on Climate Change (IPCC), http://www.ipcc.ch/.

6.0 Human and Environmental Impacts

This section discusses the potential human and environmental impacts of the EcoHarmony West Wind project and project alternatives. The alternatives include: (1) a generic 280 MW wind generation plant (LWECS) sited elsewhere in Minnesota, and (2) a 106 MW biomass plant. The potential impacts of the no build alternative are discussed in Section 5. Additionally, this section discusses mitigation strategies for potential impacts.

6.1 Air Emissions – Criteria Pollutants

Electric generation facilities have the potential to emit air pollutants during construction and operation. Minnesota Rule 7849.1500 requires this ER to examine emissions of the following pollutants: sulfur dioxide (SO_2), nitrogen oxides (NO_x), carbon dioxide (CO_2), mercury (Hg), and particulate matter (PM). These common pollutants (other than mercury) are known as criteria pollutants.[19]

EcoHarmony West Wind Project

The EcoHarmony West Wind project will emit no criteria pollutants during operation. A minimal amount of these pollutants will be produced during construction, e.g., due to the operation of heavy machinery. Transmission lines, under certain conditions, produce limited amounts of ozone and nitrogen oxide emissions. Emissions of these pollutants will be minimal.

Generic 280 MW LWECS

A generic 280 MW LWECS would emit no criteria pollutants during operation, and would have ancillary emissions (construction, transmission line) similar to those from the EcoHarmony West Wind project.

106 MW Biomass Plant

A 106 MW biomass plant would emit criteria pollutants (see Table 2). These pollutants are based on a plant similar to the NGPP Minnesota Biomass plant (see Section 4). Each of these pollutants has potential to cause to human and environmental health impacts. Sulfur oxides (SO_x) cause acid rain and human respiratory illness.[20] Nitrous oxides (NO_x) are greenhouse gases that cause ozone and related respiratory illnesses.[21] Carbon dioxide (CO_2) is a greenhouse gas that is, in part, responsible for global warming and associated impacts including significant changes to world ecosystems.[22] Mercury can cause impaired neurological development in children.[23] Inhalation of particulate matter causes human respiratory illness.[24]

[19] What Are the Six Common Air Pollutants?, http://www.epa.gov/air/urbanair/.
[20] Health and Environmental Impacts of SO_2, http://www.epa.gov/air/urbanair/so2/.
[21] Health and Environmental Impacts of NO_x, http://www.epa.gov/air/nitrogenoxides/.
[22] Climate Change 2007: Synthesis Report, Summary for Policymakers, An Assessment of the Intergovernmental Panel on Climate Change (IPCC), http://www.ipcc.ch/.
[23] Health Effects, http://www.epa.gov/mercury/effects.htm.
[24] Health and Environment, http://www.epa.gov/air/particlepollution/health.html.

Because these pollutants are diffused into a global atmosphere, regional impacts are difficult to quantify. However, impacts due to particulate matter and ground-level ozone can be localized. Particulate matter and ozone are the pollutants of most concern in Minnesota, and they are tracked regionally by the Minnesota Pollution Control Agency.[25] Because the plant is fired primarily with biomass, net impacts from carbon dioxide will be minimal – locally and globally. Carbon dioxide released by the plant will be incorporated into plant matter which, in time, will serve as fuel for the plant. The plant will operate, to a great extent, as a closed carbon dioxide loop.

Mercury exists throughout the environment; however, the primary source of mercury in air emission is coal, i.e., the burning of coal in a coal-fired power plant. The biomass plant considered here would use biomass as a primary fuel and natural gas as a backup fuel. Thus, emissions of mercury, and related impacts, are anticipated to be minimal.

Mitigation

Emissions of some criteria air pollutants can be mitigated through control technologies. Nitrous oxides emissions could be reduced by approximately 75 percent through use of a selective non-catalytic reduction (SNCR) system on the biomass boiler.[26] Particulate matter emissions could be reduced by 90 percent with add-on devices such as a multi-cyclone and dust collector.[27]

In addition to the use of control equipment to mitigate pollutant impacts, a 106 MW biomass plant would conduct a best available control technology (BACT) analysis. The BACT analysis is a requirement of new facilities under federal new source review prevention of significant deterioration (PSD). A BACT analysis and implementation could limit emissions from the plant to less than those presented in Table 2.

6.2 Air Emissions – Hazardous Air Pollutants and Volatile Organic Compounds

Electric generation facilities have to potential to emit air pollutants during construction and operation. Minnesota Rule 7849.1500 requires this ER to examine emissions of hazardous air pollutants (HAP) and volatile organic compounds (VOC). These classes of pollutants are known or suspected of causing cancer and other serious health effects.[28]

EcoHarmony West Wind Project

The EcoHarmony West Wind project will not emit HAPs or VOCs during operation. There are petroleum-based fluids used in the operation of wind turbines. These fluids include: gear box oil, hydraulic fluid, and gear grease. These fluids have a low vapor pressure and thus release of VOCs will be minimal. A minimal amount of HAPs and VOCs will be produced during construction, e.g., due to the use of diesel fuel in heavy machinery.

[25] Air Quality Index for Minnesota, http://aqi.pca.state.mn.us/.
[26] Minnesota Biomass EAW.
[27] Id.
[28] About Air Toxics, http://www.epa.gov/ttn/atw/allabout.html;

Generic 280 MW LWECS

A generic 280 MW LWECS would have HAP and VOC emissions similar to the EcoHarmony West Wind project.

106 MW Biomass Plant

A 106 MW biomass plant would emit HAPs and VOCs (see Table 3). These pollutants are based on a plant similar to the NGPP Minnesota Biomass plant (see Section 4). Because these pollutants are diffused into a global atmosphere, regional impacts are difficult to quantify. The only area in Minnesota with a cancer risk due to HAPs greater than 100 in a million is the Minneapolis - Saint Paul metro area.[29] The emissions from the biomass plant are, compared with other sources, relatively small.

Mitigation

It is possible to mitigate HAP and VOC emissions with control technologies. However, given the relatively small amounts of HAP and VOC emissions compared with the costs of control equipment, it is likely that control technologies will not be employed.

6.3 Visibility Impairment

Wind turbines are tall towers with large, rotating blades. Consequently, they can impair visibility or otherwise impact the visible environment. This section discusses potential impacts related to visibility including shadow flicker, impacts on the viewshed, and the lighting of turbines.

Shadow flicker is the intermittent change in light intensity due to rotating wind turbine blades casting shadows on the ground. Shadow intensity, or how "light" or "dark" a shadow appears at a specific receptor, will vary with the distance from the turbine. Closer to a turbine, the turbine blades will block out a larger portion of the sun's rays and shadows will be wider and darker. Receptors located farther away from a turbine will experience thinner and less distinct shadows since the blades will not block out as much sunlight. Shadow flicker is reduced or eliminated when buildings, trees, blinds, or curtains are located between the turbine and receptor.

EcoHarmony West Wind Project

The EcoHarmony West Wind project would, to some degree, impair visibility and cause shadow flicker. The project would introduce industrial wind turbines to an otherwise rural countryside. The potential impact of such an introduction depends somewhat on the aesthetic of the observer. For some, wind turbines are an intrusion on a rural landscape. For others, wind turbines have a grace that is harmonious with a rural landscape. Fillmore County is predominantly rural with an agricultural base. Wind turbines, as gatherers of a renewable wind harvest, are in some sense compatible with a rural, agricultural heritage.

[29] Summary of Results for the 2002 National-Scale Assessment, http://www.epa.gov/ttn/atw/nata2002/risksum.html.

The Minnesota Department of Natural Resources (DNR) has noted the project could impair views from the Forestville/Mystery Cave State Park.[30] The park abuts the northwest corner of the project boundary and provides a variety of activities, including hiking, camping, birding, horseback riding, and fishing.[31] Additionally, the Cherry Grove Wildlife Management Area and Cherry Grove Blind Valley Scientific and Natural Area, which could be used by citizens and from which turbines may be visible, could have views impaired.

Wind turbines, per Federal Aviation Administration (FAA) requirements and because of their height, would be lighted.[32] In general, turbines have flashing white lights during the day and red lights during the evening.

Mitigation

Mitigation of visibility impairments and shadow flicker is best accomplished by proper siting of the project and individual wind turbines. In general, siting wind projects in rural areas minimizes human impacts. Visibility impacts could be mitigated by siting wind projects outside of areas deemed valuable by the state, e.g., state parks, wildlife areas. Even if a project is located near a state park (as is the case here with Forestville/Mystery Cave State Park), impacts can be reduced by individual turbine siting.

Setbacks from individual turbines, as embodied by Minnesota's general permit standards, mitigate visibility impacts.[33] Wind turbines must be set back from non-participating properties a distance of 5 rotor diameters (RD) on the prevailing wind direction and 3 RD on the non-prevailing wind direction. The potential setback distances for the EcoHarmony West Wind project are shown in Table 1. Additionally, wind turbines must be set back from residences a sufficient distance to meet Minnesota noise standards.[34] These setbacks minimize the general visibility of the wind turbines and also shadow flicker. Finally, turbines are designed to be a uniform off-white color to blend in with the horizon and reduce visibility impacts.

Lighting required by the FAA is similar to that for other tall structures in rural areas, and mitigation is not expected to be necessary.

Generic 280 MW LWECS

A generic 280 MW LWECS located elsewhere in Minnesota would have visual impacts and mitigation strategies similar to that of the EcoHarmony West Wind project. Impacts could be

[30] Letter from DNR to Office of Energy Security, May 15, 2009; https://www.edockets.state.mn.us/EFiling/edockets/searchDocuments.do?method=showPoup&documentId={ECEBC662-299E-430A-89C2-DF17E66D4426}&documentTitle=20099-41734-01.
[31] Forestville/Mystery Cave State Park, http://www.dnr.state.mn.us/state_parks/forestville_mystery_cave/index.html.
[32] FAA Advisory Circular AC 70/7460-2K, HTTP://RGL.FAA.GOV/REGULATORY_AND_GUIDANCE_LIBRARY/RGADVISORYCIRCULAR.NSF/0/22990146DB0931F186256C2A00721867/$FILE/AC70-7460-2K.PDF.
[33] PUC Order Establishing General Permit Standards, http://energyfacilities.puc.state.mn.us/documents/19302/PUC%20Order%20Standards%20and%20Setbacks.pdf.
[34] Minnesota Rules Chapter 7030 at all residential receivers (homes). Residential noise standard NAC-1, L50 50 dBA during overnight hours.

mitigated by possibly locating in a more rural area of Minnesota; however, such a location would need to also have wind resources similar to those in Fillmore County. Impacts could also be mitigated by utilizing wind turbines capable of generating more energy. For example, a 280 MW project consisting of 1.5 MW turbines requires 187 turbines; a similar project consisting of 3.0 MW turbines requires 93 turbines. The larger turbines would create a larger individual "eyeprint," but the smaller number of turbines would likely create a relatively smaller visual impact for the project.

106 MW Biomass Plant

A 106 MW biomass plant would impair visibility in the immediate area of plant, and to the extent a stack plume is visible, in the greater area. A biomass plant would not cause shadow flicker due to the lack of exterior moving parts that may cast alternating shadows.

A biomass plant would be industrial in nature with many buildings, conveyors, wood silos, biomass piles and a boiler stack. The building that houses the boiler is likely to be at least 100 feet tall. The conveyors, wood silos, and biomass piles could range from 30 to 50 feet in height. The plant buildings, conveyors, silos, and wood piles would likely be lighted to allow for nighttime operation. Lighting would also be necessary for wood fuel loading/unloading points, truck scales, and vehicle parking areas.

The estimated height for the boiler stack is approximately 150 feet. Particulate matter control devices would capture most of the particulates from the boiler exhaust gas stream. Thus, the majority of the plume from the boiler stack would be water vapor. This transparent plume may be seen during cold weather conditions, but would likely be virtually clear during warm weather. If taller than 200 feet, the boiler stack may require FAA lighting, similar to wind turbines.

Mitigation

Mitigation of visibility impairment is best accomplished through selective location of the biomass plant. The site for the biomass plant does not need to be a rural, agricultural setting. The plant could be located in an industrial location allowing it to blend in with other industry. Thus, the plant could be located away from state parks and wildlife areas. However, the biomass plant would need to be located in an area where biomass is readily available in large quantities. Vegetative screening (trees, shrubs) could be used to partially block views of the industrial buildings, silos, conveyors, and boiler stack.

6.4 Ozone Formation

Large electric power generating facilities, such as biomass facilities, have the potential to produce reactive organic gases, which can lead to ground-level ozone formation. Wind turbines do not produce ozone or ozone precursors. Minnesota Rules 7849.1500, subpart 2 requires that this ER address anticipated ozone formation.

Ozone can cause human health risks, and can also damage crops, trees, and other vegetation.[35]

[35] Ozone, http://www.epa.gov/Ozone/. Air Quality – Ozone, http://www.health.state.mn.us/divs/eh/air/ozone.htm.

EcoHarmony West Wind Project

The EcoHarmony West Wind project would not produce ozone or ozone precursors. Thus, there would no human or environmental impacts due to ozone formation.

Generic 280 MW LWECS

A generic 280 MW LWECS would have ozone formation similar to the EcoHarmony West Wind project.

106 MW Biomass Plant

A 106 MW biomass plant would produce ozone precursors (e.g., NO_x, VOC) that would lead to ozone formation. Impacts from ozone can be localized. However, the state of Minnesota is designated as in attainment for ozone by the Environmental Protection Agency (EPA). Given this status, ground level ozone formation and associated impacts are anticipated to be minimal.

Mitigation

Ozone formation could be mitigated by mitigating ozone precursors. See discussion in Sections 6.1 and 6.2 regarding nitrous oxides (NO_X) and volatile organic compounds (VOC) respectively.

6.5 Fuel Availability

Large electric power generating facilities require some type of fuel. This section discusses the availability of fuel for the proposed project and alternatives.

EcoHarmony West Wind Project

The EcoHarmony West Wind project relies on wind to generate electricity. Winds are generated by earth and solar processes; accordingly, the fuel for the project is a very long-term renewable resource. Wind is not consumed by wind turbines. Wind that passes through a wind turbine does release energy to the turbine and turbulence is created in the wake of the turbine. Thus, to operative effectively, turbines must be setback a distance from other turbines.[36]

The actual availability of wind varies considerably across Minnesota, and has been analyzed by the Minnesota Department of Commerce.[37] Wind resources in Fillmore County are relatively good (see Figure 3). Estimated wind speed at turbine hub height (80 meters) for the EcoHarmony West Wind project is 17.0 – 17.9 miles per hour (7.6 to 8.0 meters per second).[38] Power generation by the project depends not only on how quickly the wind blows (how much energy it contains), but also how frequently it blows. Wind turbines generate power only when

[36] The distance between turbines necessary for effective operation is approximately 6 rotor diameters (RD) on the non-prevailing wind axis and 10 RD on the prevailing wind axis. Accordingly, Minnesota requires setbacks of 3 x 5 RD for each turbine. See, PUC Order Establishing General Permit Standards, http://energyfacilities.puc.state.mn.us/documents/19302/PUC%20Order%20Standards%20and%20Setbacks.pdf.
[37] Wind Resource Analysis Program 2002, http://www.state.mn.us/mn/externalDocs/Commerce/WRAP_Report_110702040352_WRAP2002.pdf.
[38] Site Permit Application, Section 5.2.

the wind is blowing.[39] This frequency is expressed as capacity factor, i.e., how much power the turbine is generating compared to how much it could generate if it was operating all the time. Capacity factors of 35 to 40 percent are typically achievable in Minnesota for large wind farms. The EcoHarmony West Wind project is estimated to have a capacity factor of 38 percent.[40]

Generic 280 MW LWECS

A generic 280 MW LWECS would utilize the same fuel as the EcoHarmony West Wind project – wind. To be economically feasible, a 280 MW LWECS sited elsewhere in Minnesota would need to be placed in a good wind resource. The availability of good, undeveloped wind resources in Minnesota remains high. Impacts on the fuel (wind) resources would be similar to those for the EcoHarmony West Wind project.

106 MW Biomass Plant

A combination of wood chips and agricultural biomass would be the main fuel sources for a 106 MW biomass plant. Natural gas would be used as a fuel backup. Such a plant would consume approximately 110,000 tons of biomass per month. There are currently no biomass plants of this size currently operating in Minnesota.[41]

It is possible that rail could be used for delivery of fuel to the plant, depending on its location. However, the most likely method of delivery for wood and agricultural biomass fuel would be by semi-trailer trucks. Trucks would likely deliver wood and agricultural biomass by loads of 20 tons or greater. The biomass facility would operate 24 hours a day, but fuel delivery would likely be mainly limited to between the hours of 6 AM and 6 PM. The total number of daily truck trips is estimated to be approximately 180. The origin of the biomass trucks and the total trip length required for delivery would depend on the location of the biomass source relative to the biomass plant.

A back-up fuel source would be required for the biomass plant, to assist with plant start-up and to sustain the plant temporarily when the biomass fuel supplies are low. Natural gas would be used as a backup fuel. The construction of a natural gas pipeline would be required to deliver the natural gas to the biomass plant.

Potential impacts to the environment related to fuel for a biomass plant include possible degradation of the environment due to biomass removal (e.g., increased soil erosion due to removal of agricultural biomass; loss of wildlife habitat), air pollution due to biomass transport, and the impacts associated with building a natural gas pipeline.

[39] See Table 1 which list includes “Cut-in Wind Speeds”, i.e., the minimum wind speed necessary for the turbine to operate.
[40] Site Permit Application, Section 13.0.
[41] Xcel Energy’s Bay Front power plant in Ashland, Wisconsin generates approximately 76 MW, and is moving toward becoming a 100% biomass plant, http://www.xcelenergy.com/Company/Environment/Renewable%20Energy/Pages/Biomass.aspx.

Mitigation

Impacts related to fuel for a biomass plant could be mitigated by using guidelines for biomass harvest that minimize impacts and by siting the plant to minimize impacts related to biomass transportation. As an example, the Minnesota Forest Resource Council (MFRC) has developed woody biomass harvest guidelines to lessen impacts to wildlife habitat.[42] In order for mitigation to work, the biomass plant would need to require that its biomass suppliers follow biomass harvest guidelines.

6.6 Associated Transmission Facilities

Electrical generation facilities typically require transmission lines to connect to the transmission grid. This section discusses these associated transmission facilities and their potential impacts.

EcoHarmony West Wind Project

The EcoHarmony West Wind project would collect the electrical power generated by turbines through an underground collection system (34.5 or 69 kV). These collection lines will carry power to a collection substation (near the center of the project), where it will be transformed to a voltage of 161 kV. Power from the collection substation will be transmitted by an overhead 161 kV transmission line, approximately 8.5 miles long, to a switching station southeast of Harmony, Minn.

Impacts from the project's associated transmission facilities would include impacts due to construction and impacts due to operation. Construction impacts would include impacts related to land clearing and materials transport. Operation impacts would include impacts related to electromagnetic fields (EMF), noise, and visibility. Power moving through a transmission line creates EMF. These fields decrease with distance from the transmission line. The primary potential impact is possible generation of stray voltage in nearby, ungrounded structures.

During wet weather, water can be ionized adjacent to transmission lines creating a crackling noise. Visual impacts of a transmission line depend on context. High visual impacts likely occur when a line is located near areas with relatively higher population densities, e.g., residential, recreational, and scenic areas.

Mitigation

Construction impacts could be mitigated by minimizing the amount of land clearing required. For example, the transmission line could be routed along existing corridors (roadways, utility corridors). Operation impacts could be mitigated by placing transmission lines away from population densities. Visual impacts could also be mitigated by transmission line design and pole placement.

The 161 kV transmission line associated with the EcoHarmony West Wind project is being permitted separately from the project itself (see Section 2.2). The site permit application for the

[42] Forest Biomass and Biofuels Harvest, http://www.frc.state.mn.us/initiatives_policy_biofuels.html.

transmission line includes further discussion of potential impacts of the line and mitigation strategies.[43]

Generic 280 MW LWECS

A generic 280 MW LWECS would have transmission facilities similar to the EcoHarmony West Wind project. Accordingly, potential impacts and mitigation strategies are also similar. The primary driver of potential impacts is likely the length and voltage of the transmission line required to connect the wind project to the transmission grid. A relatively longer line or higher voltage would create greater construction and operation impacts.

106 MW Biomass Plant

A 106 MW biomass plant would have transmission facilities similar to the EcoHarmony West Wind project; however an underground collection system and collection substation would not be required. The plant would include a transformer at the plant to transform the voltage to transmission levels and a transmission line between the plant and a substation where the power would enter the grid.

Potential impacts and mitigation strategies would be similar to those for the EcoHarmony West Wind project. Again, the primary driver of potential impacts is likely the length and voltage of the transmission line required to connect the biomass plant to the transmission grid. A relatively longer line or higher voltage would create greater construction and operation impacts.

6.7 Water Resources

This section discusses potential impacts to water resources from electrical generation facilities. These water resources include (1) water appropriations, (2) surface and ground waters, and (3) wetlands.

6.7.1 Water Appropriations

EcoHarmony West Wind Project

The EcoHarmony West Wind project would require water appropriations for potable and sanitary water for the operations and maintenance facility. Water would be supplied through either rural water or a single domestic-sized well. This amount of water used would be roughly equivalent to the amount consumed by a residence or farmstead in the area, and would likely not require mitigation.

[43] EcoEnergy 161kV High Voltage Transmission Line, http://energyfacilities.puc.state.mn.us/Docket.html?Id=24696.

Generic 280 MW LWECS

A generic 280 MW LWECS would have water appropriations similar to the EcoHarmony West Wind project.

106 MW Biomass Plant

A 106 MW biomass plant would require water appropriations for energy production (process water) and sanitation. Process water could come from a well; however, a municipal water source may also be required. For some aspects of the process, such as in the cooling tower, effluent water from a wastewater treatment facility could be used. Thus, the sources of water would depend on the type and availability of water sources near the facility location.

The required quantity of water would be dependent on plant design and water quality. Functions within the plant that require water include cooling, sanitation, washing, and separations. The average anticipated water use would be 1,704 gallons per minute. If a source of effluent water were available, the appropriation of well or municipal water would be relatively lower. If the plant used only well or municipal water, the water appropriation would be relatively higher. Based on anticipated water use, the plant would require a water appropriations permit from the Minnesota Department of Natural Resources (DNR).[44]

Mitigation

Mitigation of well water and municipal water use by the plant could be achieved through plant equipment choices and through the use of effluent water (water that has already been appropriated). If municipal water were used for the plant, modifications or an expansion of the municipal water treatment plant be required to accommodate the increase in demand.

6.7.2 Surface and Ground Waters

EcoHarmony West Wind Project

Potential impacts to surface and ground waters are most likely during construction of the EcoHarmony West Wind project. The project requires the placement of turbines and the construction of access roads with a direct land use between 57 and 104 acres (see Section 3.2). This construction will disturb soils, e.g., heavy machinery use, digging, trenching. This disturbance could create soil erosion, with soils entering surface and ground waters. Additionally, construction will create impermeable surfaces that may increase the energy of flowing waters, leading to soil erosion.

The project area is a gentle rolling plain between the Root River and Upper Iowa River watersheds. A significant feature of the area is its karst topography. Karst landforms develop where mildly acidic groundwater contacts soluble limestone bedrock. Over time, this contact can dissolve portions of the bedrock, creating cracks and voids which can serve as conduits for surface waters to enter underlying aquifers. Thus soil and other materials which enter surface waters can be commuted relatively easily to ground waters.

[44] Water Use Permits, http://www.dnr.state.mn.us/waters/watermgmt_section/appropriations/permits.html.

Mitigation

Potential impacts to surface and ground waters can be mitigated by several strategies. Soil erosion prevention measures can be employed. The project will be required to obtain a National Pollution Discharge Elimination System / State Disposal System (NPDES/SDS) stormwater permit from the Minnesota Pollution Control Agency.[45] This permit is designed to minimize contamination of surface waters during construction. Proper siting of the turbines and associated facilities can reduce the potential for water contamination. Turbines sited on high ground, away from surface waters, have less potential for impacting surface waters. Additionally, turbines sited on competent bedrock have less potential to impact ground waters. The project will create new impermeable surfaces in the project area. However, the 57 to 104 acres represents less than a 0.5% increase in impermeable surface in the 23,000 acre project area. This increase is expected to have a minimal impact on surface and ground waters.

Generic 280 MW LWECS

A generic 280 MW LWECS would have surface and ground water impacts similar to the EcoHarmony West Wind project. However, if sited in an area of Minnesota without karst topography, potential impacts to ground water would be relatively less.

106 MW Biomass Plant

A 106 MW biomass plant would have the potential to impact surface and ground waters. However, relative to a wind farm, its impacts would be concentrated into a contiguous area. The plant could impact surface and ground waters during construction, e.g., soil erosion into surface waters. Additionally, the plant would create impermeable surfaces.

Mitigation

Mitigation measure would be similar to those for the EcoHarmony West Wind project, i.e., using soil erosion prevention measures, proper siting. Because construction efforts for a biomass plant would be concentrated in one area, the effectiveness of mitigation measures could be greater relative to a wind farm. That is, it's likely easier to track and control proceedings on one site (biomass plant) than on multiple sites (wind turbines).

6.7.3 Wetlands

EcoHarmony West Wind Project

Potential impacts to wetlands are most likely during construction of the EcoHarmony West Wind project. The siting of turbines or associated facilities in wetlands would impair their functioning. This impairment would lead to the loss of service provided by wetlands, e.g., wildlife habitat, flood control, water filtration, pollution control.

Mitigation

The primary means of mitigating impacts to wetlands is to avoid them. If project facilities are located away from wetlands, impacts will be minimal. Wetlands are identified and mapped by

[45] Stormwater Program for Construction Activity, http://www.pca.state.mn.us/water/stormwater/stormwater-c.html.

federal, state, and local agencies to assist project developers in avoiding them. Nonetheless, field assessments are frequently necessary to establish boundaries and ensure proper siting.

Generic 280 MW LWECS

A generic 280 MW LWECS would have wetland impacts similar to the EcoHarmony West Wind project. However, if sited in an area of Minnesota with relatively fewer wetlands, potential impacts to wetlands would be relatively less.

106 MW Biomass Plant

A 106 MW biomass plant would have wetland impacts similar to the EcoHarmony West Wind project. However, effective siting of a single plant (albeit larger) to avoid wetlands would likely be easier than the siting of multiple wind turbines. Thus, potential impacts could be less than that for the EcoHarmony West Wind project.

6.8 Wastewater

Large electric generation facilities have the potential to generate significant amounts of wastewater. This section discusses potential impacts from wastewater generation.

EcoHarmony West Wind Project

The EcoHarmony West Wind project does not create wastewater during the generation of electricity. However, wastewater would be created by the operation and maintenance (O&M) building. This wastewater would likely be discharged into a septic system associated with the building. The potential impacts of this wastewater and septic system are anticipated to be minimal. Thus, mitigation of the impacts, beyond a properly functioning septic system, is not required.

Generic 280 MW LWECS

A generic 280 MW LWECS would have wastewater impacts similar to the EcoHarmony West Wind project.

106 MW Biomass Plant

A 106 MW biomass plant would have process and sanitary wastewater discharges. The amount of wastewater discharge would depend on the water sources used for the plant (see Section 6.7.1). If well and municipal water are used, anticipated average wastewater discharge would be 225 million gallons per year. If effluent water is also utilized, wastewater discharge would increase to 623 million gallons per year.

Mitigation

Wastewater impacts could be mitigated by proper processing. The most likely scenario is transference of the wastewater to a municipal sewage system for treatment and release. Wastewater could be held or pre-treated at the biomass plant. Holding could reduce discharges through evaporation. However, holding introduces risks related to storing wastewater away from surface and ground waters.

6.9 Solid and Hazardous Wastes

Large electric generation facilities have the potential to generate solid and hazardous wastes. This section discusses potential impacts from such wastes.

EcoHarmony West Wind Project

The EcoHarmony West Wind project would create solid and hazardous wastes. Solid wastes would be generated during construction, e.g., scrap wood, plastics, cardboard, wire. Small amounts of solid and hazardous wastes would be generated during operation, e.g., oils, grease, hydraulic fluids, solvents. Lubricants and fluids would be stored at the operation and maintenance building.

Solid and hazardous wastes, if not properly handled, can contaminate surface and ground waters. This contamination can cause human health impacts, e.g., cancer.[46]

Mitigation

Solid wastes would be disposed of according to the Fillmore County solid waste plan. Hazardous wastes would be used appropriately. Leaks or spills would be mitigated using appropriate clean up techniques. A listing of all potentially hazardous materials related to the project will be maintained for the project. It is not anticipated that the project will require a hazardous waste license. Hazardous waste generation would likely fall below the quantity required for a very small quantity generator license (220 pounds per month).[47]

Generic 280 MW LWECS

A generic 280 MW LWECS would have solid and hazardous waste impacts similar to the EcoHarmony West Wind project.

106 MW Biomass Plant

A 106 MW biomass plant would create solid and hazardous wastes. Solid wastes would be generated during construction, e.g., scrap wood, plastics, cardboard, wire. Solid waste generated from operations would consist primarily of ash from the biomass boiler. Small amounts of hazardous wastes would be generated during operation, e.g., oils, grease, hydraulic fluids, solvents. Hazardous materials would likely be stored on site, e.g., diesel fuel.

Mitigation

Mitigation of wastes would be similar to the EcoHarmony West Wind project. Ash generated by the plant would be held on-site in an ash holding facility or removed to an off-site disposal facility. Storage tanks would be registered and maintained in accordance with Minnesota Pollution Control Agency (MPCA) guidelines.

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[46] Volatile Organic Compounds (VOCs) in Minnesota's Ground Water, http://www.pca.state.mn.us/water/groundwater/gwmap/voc-fs.pdf.
[47] Very Small Quantity Generator Hazardous Waste Collection Program, http://www.pca.state.mn.us/publications/w-hw2-50.pdf.

6.10 Noise

Large electric generation facilities have the potential to generate noise. This section discusses potential impacts from such noise.

Noise can be defined as unwanted or inappropriate sound. Sound has multiple characteristics which determine whether a sound is too loud or otherwise inappropriate. Sound travels in a wave motion and produces a sound pressure level. This sound pressure level is commonly measured in decibels (dB). Sounds also consists of frequencies, e.g., the high frequency (or pitch) of a whistle. Most sounds are not a single frequency but a mixture of frequencies. Finally, sounds can be constant or intermittent. The perceived loudness of a sound depends on all of these characteristics.

Typically a sound meter is used to measure loudness. The meter sums up the sound pressure levels for all frequencies of a sound and calculates a single loudness reading. This loudness reading is reported in decibels, with a suffix indicating the type of calculation used. For example, "dB(A)" indicates a loudness reading using an A-weighted calculation (or "scale").

The State of Minnesota has promulgated noise standards designed to ensure public health and minimize citizen exposure to inappropriate sounds (see Table 4).[48] The rules for permissible noise vary according to land use, i.e., according to their noise area classification (NAC). In a residential setting, for example, noise restrictions are more stringent than in an industrial setting. Rural residential homes are considered NAC 1 (residential), while agricultural land and agricultural activities are classified as NAC 3 (industrial). The rules also distinguish between nighttime and daytime noise; less noise is permitted at night. The rules list the sound levels not to be exceeded for 10 percent and 50 percent of the time in a one-hour survey (L_{10} and L_{50}) for each noise area classification.

Potential human impacts due to noise include hearing loss, stress, annoyance, and sleep disturbance.[49]

EcoHarmony West Wind Project

The operation of wind turbines in the EcoHarmony West Wind project would produce noise. Turbines produce mechanical noise (noise due to the gearbox and generator in the nacelle) and aerodynamic noise (noise due to wind passing over the turbine blades).[50] Perceived sound characteristics would depend on the type/size of turbine, the speed of the turbine (if turning), and the distance of the listener from the turbine.

[48] Minn. Rules 7030.0040, Noise Standards, https://www.revisor.leg.state.mn.us/rules/?id=7030.0040.
[49] Occupational and Community Noise, World Health Organization, http://www.who.int/mediacentre/factsheets/fs258/en/.
[50] Public Health Impacts of Wind Turbines, Minnesota Department of Health, May 22, 2009, http://www.health.state.mn.us/divs/eh/hazardous/topics/windturbines.pdf.

Wind turbines produce audible, low frequency sound and sub-audible sound (infrasound). These sounds can have a rhythmic modulation due to the spinning of the turbine blades.[51] Impacts due to these sound characteristics are subjective, i.e., human sensitivity, especially to low frequency sound, is variable. However, in general, low frequency sounds can cause annoyance and sleep disturbance.[52]

Mitigation

The primary means of mitigating sound (noise) produced by wind turbines is proper siting. Turbines must be sited to comply with noise standards in Minnesota Rules 7030.[53] For rural residential areas in Fillmore County, this means that sound levels must meet an L_{50} standard of 50 dB(A) (see Table 4). The distance that turbines are setback from residences would depend on the type and size of turbine. Setback distances could range from 500 to over 1000 feet. Cumulative noise impacts must also be considered. That is, if there are multiple turbines in the vicinity of a residence, the standards set by Minnesota Rules 7030 must still be met. This may require further setbacks.

Setback requirements are enforced by site permits issued by the Commission for wind farms. The Commission is currently reviewing public health setbacks related to wind farms to determine if they remain appropriate and reasonable.[54] For this project, the applicant has committed to a 1000 foot setback from all residences to mitigate potential noise impacts.[55] The applicant has conducted sound modeling for this project and has mapped anticipated sound levels within the project area (Figure 4).

Generic 280 MW LWECS

A generic 280 MW LWECS would have noise impacts similar to the EcoHarmony West Wind project.

106 MW Biomass Plant

A 106 MW biomass plant would create noise during operation from a variety of sources including the turbine/boiler building, conveyor/reclaiming system, hammer mill and bale choppers, front end loaders, and idling trucks. Based on noise studies, the plant would need to be located approximately 2,100 feet from a residence to the meet the daytime L_{50} standard of 60 dB(A), and approximately 6,200 feet from a residence to meet the nighttime L_{50} standard of 50 dB(A). These are conservative estimates – they are based on maximum equipment operation and have not been adjusted for possible noise shielding.

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[51] Id.
[52] Id.
[53] Minn. Rules 7030.0040, Noise Standards, https://www.revisor.leg.state.mn.us/rules/?id=7030.0040
[54] Commission Investigation into Large Wind Energy Conversion Systems Permit Conditions on Setbacks and the Minnesota Department of Health Environmental Health Division's White Paper on Public Health Impacts of Wind Turbines, CI-09-845, http://www.puc.state.mn.us/puc/energyfacilities/012254#windhealth.
[55] Site Permit Application, Section 8.3.3.

Mitigation

Sound (noise) from the biomass plant could be mitigated by proper siting. A study would likely be required to ensure that noise standards are met for all local residents. Enclosure of heavy equipment would reduce noise impacts. Vegetative screening, planted to lessen visual impacts, would provide noise mitigation. Fuel windrows could provide noise attenuation. Hours of operation, e.g., for fuel delivery or heavy equipment operation, could be managed to reduce noise impacts and meet daytime and nighttime standards.

6.11 Traffic

Large electric generation facilities have the potential to generate traffic during construction and operation. This section discusses potential impacts from increased traffic in the project area.

EcoHarmony West Wind Project

Delivery and installation of wind turbines for the EcoHarmony West Wind project would produce physical and logistical traffic impacts. Wind turbine components are large and heavy, and may overload county and townships roads. Additionally, equipment used to erect turbine towers and install turbines are of substantial size and could physically impact roads.

Logistically, the movement of equipment and components over local roads could impede the movement of regular traffic. County Highway 44, a larger arterial road within the project area, has an average daily traffic volume of approximately 750 vehicles.[56] Some loads could impede traffic flow due to size (e.g., turbine tower); other loads could impede traffic flow due to sheer number (e.g., concrete trucks). Maximum traffic volumes are likely during tower foundation pouring and tower assembly.

No operational traffic impacts are anticipated with the project. Movement of components, materials, staff, and other resources to maintain the turbines is expected to be minimal relative to existing traffic patterns.

Mitigation

Mitigation of potential traffic impacts could be mitigated by several means. Physical impacts could be mitigated by routing components and equipment over proper roads, i.e., roads capable of carrying anticipated loads. Road improvements could be made prior to construction such that options for heavy-load traffic are increased. Roads that are damaged by heavy loads could be repaired.

Logistical impacts could be mitigated by planning and education. Coordination with road authorities and primary road users (e.g., schools, businesses) would facilitate timing and logistics that minimize traffic impacts. Education about the project, schedules, and primary road users would raise awareness and minimize traffic impacts.

[56] 2005 Traffic Volume, General Highway Map, Fillmore County, http://www.dot.state.mn.us/traffic/data/maps/trafficvolume/2005/counties/fillmore.pdf.

Generic 280 MW LWECS

A generic 280 MW LWECS would have traffic impacts similar to the EcoHarmony West Wind project.

106 MW Biomass Plant

A 106 MW biomass plant would create traffic impacts during construction and operation. Biomass plant components are large and heavy, and could physically impact local roads. Delivery of components could also cause logistical impacts. Because the plant would be constructed at a single site, as opposed to multiple turbines sites within the EcoHarmony West Wind project, logistical impacts would be relatively less.

Operation of the biomass plant would impact local roads physically and logistically. An estimated 180 daily truck trips would be required to deliver biomass fuel to the plant (see Section 6.5). These truck trips would, over time, wear down local roads. They would also impact local traffic patterns. For example, an additional 180 trips on a County Highway 44, a larger area road, would increase daily traffic volume by approximately 24%.

Mitigation

Mitigation strategies for potential traffic impacts would be similar to those for the EcoHarmony West Wind project.

6.12 Property Values

Large electric generation facilities have the potential to impact property values. This section discusses potential valuation impacts from the operation of a generation facility in the project area.

EcoHarmony West Wind Project

The EcoHarmony West Wind project would be located in Fillmore County in southeastern Minnesota. The county has a population of approximately 20,850 persons.[57] The home ownership rate is approximately 81%.[58]

The impact on property values due to the project are difficult to quantify because of the multitude of factors that influence a property's market value, including schools, parks, acreage, neighborhood characteristics, and improvements. A direct influence on property value is often the status of the housing/land market, i.e., a buyer's market or a seller's market.

Potential valuation impacts due to the EcoHarmony West Wind project can be extrapolated from impacts due to wind projects built in other parts of the state. Wind projects have been developed in the Buffalo Ridge region of southwestern Minnesota since the mid-1990s. A relatively large number of wind turbines are located near the City of Lake Benton in Lincoln County. According to the Lincoln County Assessor's Office, property values have increased approximately $500-1000/acre when lease payments (wind rights payments) are transferred to the new land owner. In

[57] U.S. Census Bureau, Fillmore County, Minnesota, http://quickfacts.census.gov/qfd/states/27/27045.html.
[58] Id.

addition, properties without turbines that are adjacent to those with turbines have not experienced a change in value.

The Renewable Energy Policy Project (REPP) conducted a statistical analysis to determine the extent to which property values are influenced in the vicinity of wind projects.[59] Ten communities in the United States were studied within a five mile radius of a wind project. The study indicated that property values were not negatively impacted within the viewshed of a wind project. Lawrence Berkeley National Laboratory is currently conducting a study on the potential impacts of wind projects on property values.[60] Initial results indicate that there is no statistical evidence that property values near wind projects are negatively impacted. However, there may be isolated instances where property values are impacted.

Mitigation

Negative impacts to property value due to the EcoHarmony West Wind project are not anticipated; thus, mitigation is not necessary. This inference does not preclude the possibility that in specific instances, property values may be negatively impacted. Such impacts can likely be mitigated by siting turbines away from residences and viewsheds.

Generic 280 MW LWECS

A generic 280 MW LWECS would have property value impacts similar to the EcoHarmony West Wind project.

106 MW Biomass Plant

A 106 MW biomass plant would have the potential to negatively impact property values near the plant site and possibly along roads used to transport biomass. However, as with the EcoHarmony West Wind project, impacts on property values due to a plant are difficult to quantify because of the multitude of factors that influence a property's market value. For example, if biomass for the plant were supplied by neighboring land parcels, these parcels might experience an increase in property value.

Mitigation

Because the plant is sited in one location (as compared to multiple turbine locations), property value impacts could be mitigated by proper siting. However, impacts due to increased truck traffic would extend beyond the plant and would be more difficult to mitigate. Traffic routing, timing, and related logistics could mitigate aspects of the traffic and potential impacts.

[59] The Effect of Wind Development on Local Property Values, May 2003, http://www.repp.org/articles/static/1/binaries/wind_online_final.pdf.
[60] The Impact of Wind Facilities on Residential Property Values, http://www.windpoweringamerica.gov/pdfs/workshops/2009_summit/hoen.pdf.

6.13 Wildlife

Large electric generation facilities have the potential to impact wildlife, directly and through impacts on habitat. This section discusses potential wildlife impacts from the operation of a generation facility in the project area.

The project area and surrounding landscape is used primarily for agricultural purposes (approximately 70% by land cover). Scattered patches of grassland, forested hillsides, and wetlands comprise the remaining wildlife habitat in the area. A number of animal species have adapted to agricultural landscapes with interspersed uncultivated patches. In such areas, crops provide seasonal cover and food, while uncultivated areas provide long-term cover and food. A variety of mammals are typical in this landscape including squirrel, rabbits, mice, deer, fox, and skunk. Reptiles and amphibians in this landscape are associated with wetlands, waterways, and forested areas. Typical reptiles and amphibians include snakes, salamanders, and frogs. Birds and bats are found in this landscape, including grassland birds, migratory birds, and waterfowl that feed on post-harvest grains in fields.

EcoHarmony West Wind Project

The EcoHarmony West Wind project would negatively impact select wildlife in the project area. Impacts related to construction are likely minimal. The physical footprint of a wind turbine is relatively small. Direct land use for the project is anticipated to be between 57 and 104 acres (turbines, access roads, operation and maintenance building). This is less than 0.01% of the estimated project acreage (23,000 acres). Additionally, the land used for the project would likely be agricultural land; such land is relatively poorer habitat for wildlife.

Impacts on ground animals due to operation of the project would be minimal. However there would be negative impacts to animals that fly, e.g., birds and bats. Birds can collide with spinning turbine blades. Bats can avoid turbines blades, but appear to suffer injury to their respiratory systems when they fly through low pressure wakes near turbine blades.[61]

Studies have been conducted throughout the Midwest in an attempt to quantify bird and bat mortality due to wind turbines. A study of bird mortality rates at a wind farm in Iowa resulted in estimated mortality rates between 0.3 and 0.8 birds/turbine/year.[62] This estimate is similar to results from studies in other states where mortality rates ranged between < 1 to 2.83 birds/turbine/year.[63] Studies conducted in the Buffalo Ridge region of southwestern Minnesota resulted in estimated bird mortality rates between 1.0 and 4.5 birds/turbine/year.[64] Nocturnal migrants suffered relatively more mortalities; local grassland species suffered relatively less. The studies noted that birds tend to avoid turbine towers, but utilized the surrounding habitat.

[61] Extreme Pressure Changes near Blades Injures Bat Lungs, http://www.ucalgary.ca/news/aug2008/batdeaths.
[62] Bird and Bat Behavior and Mortality at a Northern Iowa Windfarm, Jain, 2005 http://www.batsandwind.org/pdf/Jain_2005.pdf.
[63] Id.
[64] Avian Monitoring Studies at the Buffalo Ridge, Minnesota Wind Resource Area: Results of a 4-Year Study, http://energyfacilities.puc.state.mn.us/documents/AvianMonitoringBuffaloRidge.pdf.

Overall, studies of bird mortalities near wind farms indicate that mortality will occur but in such numbers as to be insignificant from population standpoint.

Bats typically utilize forests, riparian corridors, and wetlands as feeding habitat due to higher nocturnal insect densities in these areas. The Iowa wind farm study estimated bat mortality rates between 6 and 9 bats/turbine/year.[65] The Buffalo Ridge studies estimated bat mortality rates between 0.25 and 2.0 bats/turbine/year.[66] Relatively less information is available about local bat populations within Minnesota. Thus, the population impact of bat moralities due to wind farms is uncertain.

Mitigation

Impacts to ground animals are expected to be insignificant and mitigation is not required. Impacts to birds and bats could be mitigated by siting. Siting away from bird habitat (grasslands, forested areas, riparian areas) and bat feeding areas (forest, riparian areas, wetlands) would reduce bird and bat mortalities. Birds and bats fly relatively less in windy conditions. Wind turbines operate in windy conditions and require a minimum wind speed ("cut-in" speed, see Table 1). Thus, impacts to birds and bats may be mitigated by employing turbines with a relatively higher cut-in speed or by using SCADA system controls to implement a higher cut-in speed.

Generic 280 MW LWECS

A generic 280 MW LWECS would have wildlife impacts similar to the EcoHarmony West Wind project. The project area for the EcoHarmony West Wind project includes karst topography and caves (including Forestville/Mystery Cave State Park). Thus, the area provides relatively better habitat for bats. Bat mortalities for a wind farm sited elsewhere in Minnesota would likely be less than that for the EcoHarmony West Wind project.

106 MW Biomass Plant

A 106 MW biomass plant would have wildlife impacts similar to the EcoHarmony West Wind project, excepting impacts on birds and bats. The plant would be constructed on an approximately 80 acre site. This acreage would be removed from use as wildlife habit. However, the land used for the project would likely be agricultural land; such land is relatively poorer habitat for wildlife. Impacts from operation of the plant are anticipated to be minimal. Emissions from the plant (e.g., hazardous air pollutants) could, through impacts to the environment, impact wildlife. The extent of this impact is uncertain.

[65] Bird and Bat Behavior and Mortality at a Northern Iowa Windfarm, Jain, 2005 http://www.batsandwind.org/pdf/Jain_2005.pdf.

[66] Avian Monitoring Studies at the Buffalo Ridge, Minnesota Wind Resource Area: Results of a 4-Year Study, http://energyfacilities.puc.state.mn.us/documents/AvianMonitoringBuffaloRidge.pdf.

7.0 Feasibility and Availability of Alternatives

This section describes the feasibility and availability of alternatives to the EcoHarmony West Wind project.

EcoHarmony West Wind Project

The EcoHarmony West Wind project is feasible and available.

Generic 280 MW LWECS

A generic 280 MW LWECS is feasible and likely available. Wind farms are in development across the state and Minnesota's wind resources are sufficient to facilitate a 280 MW project. Feasibility and availably are dependent on the ease of interconnection to the electrical transmission grid. In some parts of the state, the transmission grid is very near capacity and the connection of additional generating capacity is not easily achieved.

106 MW Biomass Plant

A 106 MW biomass plant is feasible and likely available. There is not currently a biomass plant of this size in Minnesota. Thus, there may be equipment, financing, logistical, or other impediments that limit the ready availability of a 106 MW plant.

No Build Alternative

The no build alternative is feasible and available, but would not further Minnesota's renewable energy objectives.

8.0 Required Permits

The EcoHarmony West Wind project will require permits and approvals from entities other than the Minnesota Public Utilities Commission. Federal, state, and local permits or approvals that have been identified for construction and operation of the project are listed in Table 5.

Figures

Figure 1 - Project Boundary Map

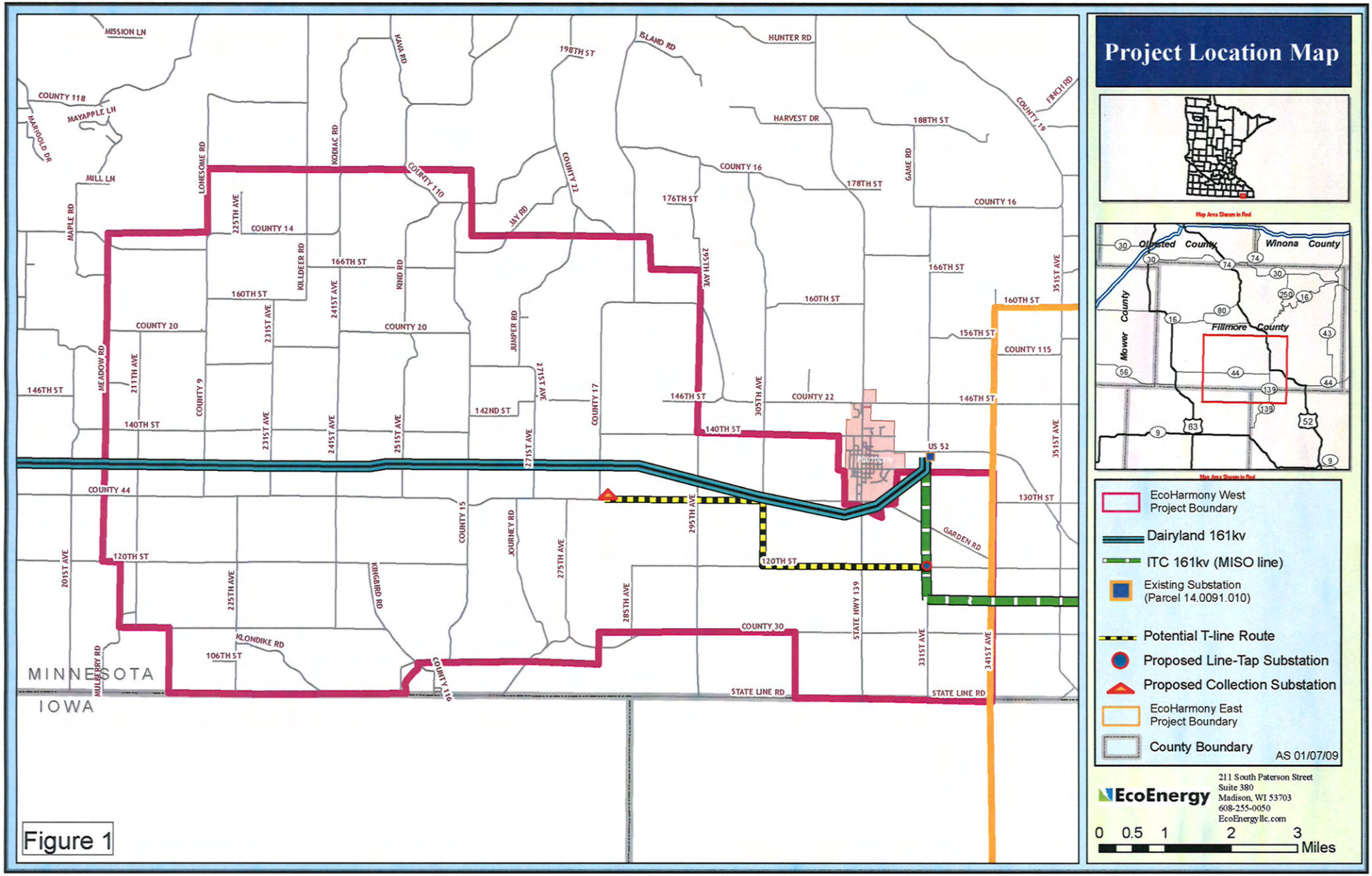


Figure 2 - Draft Turbine Layout

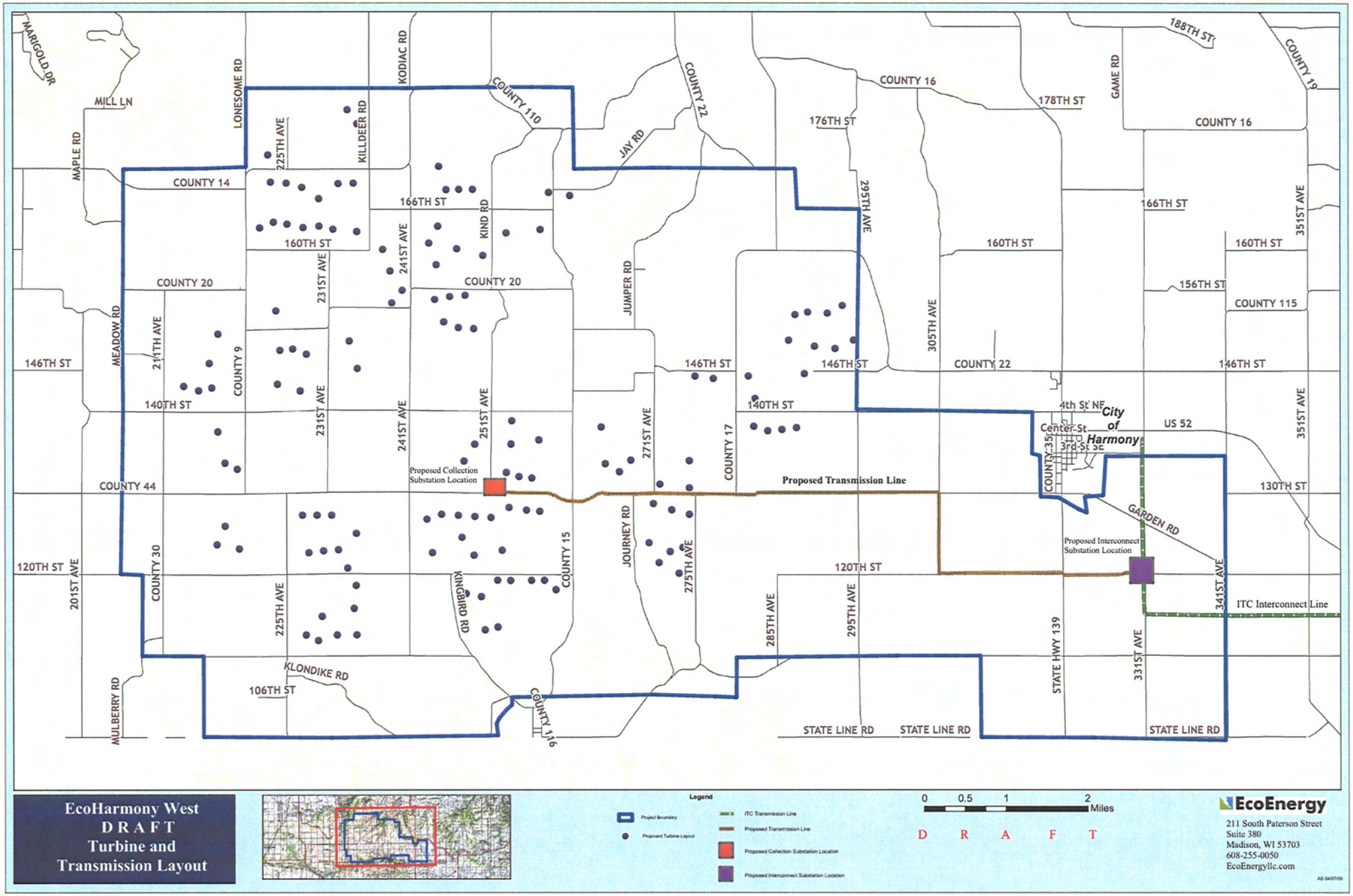
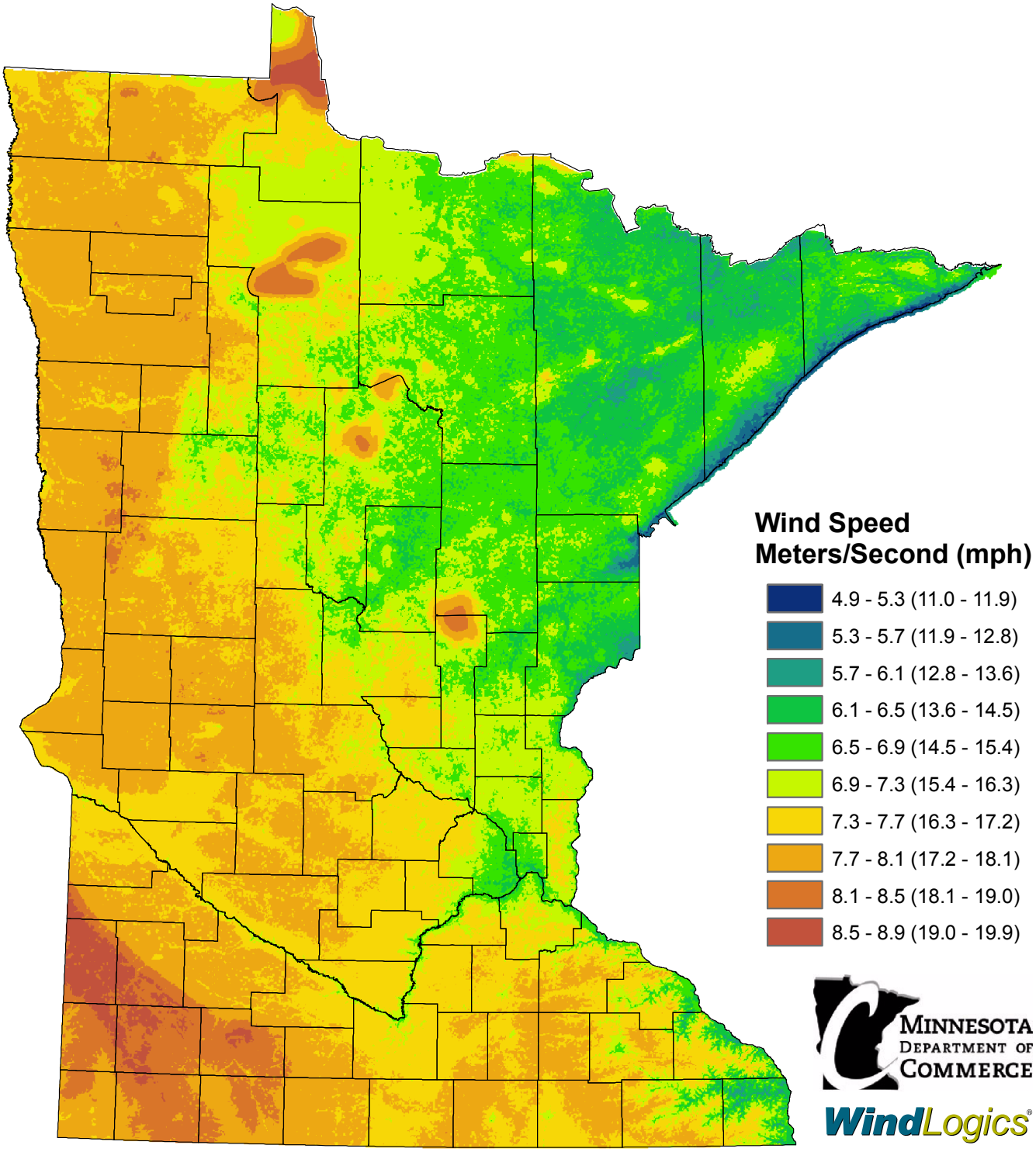


Figure 3 - Wind Resource Map

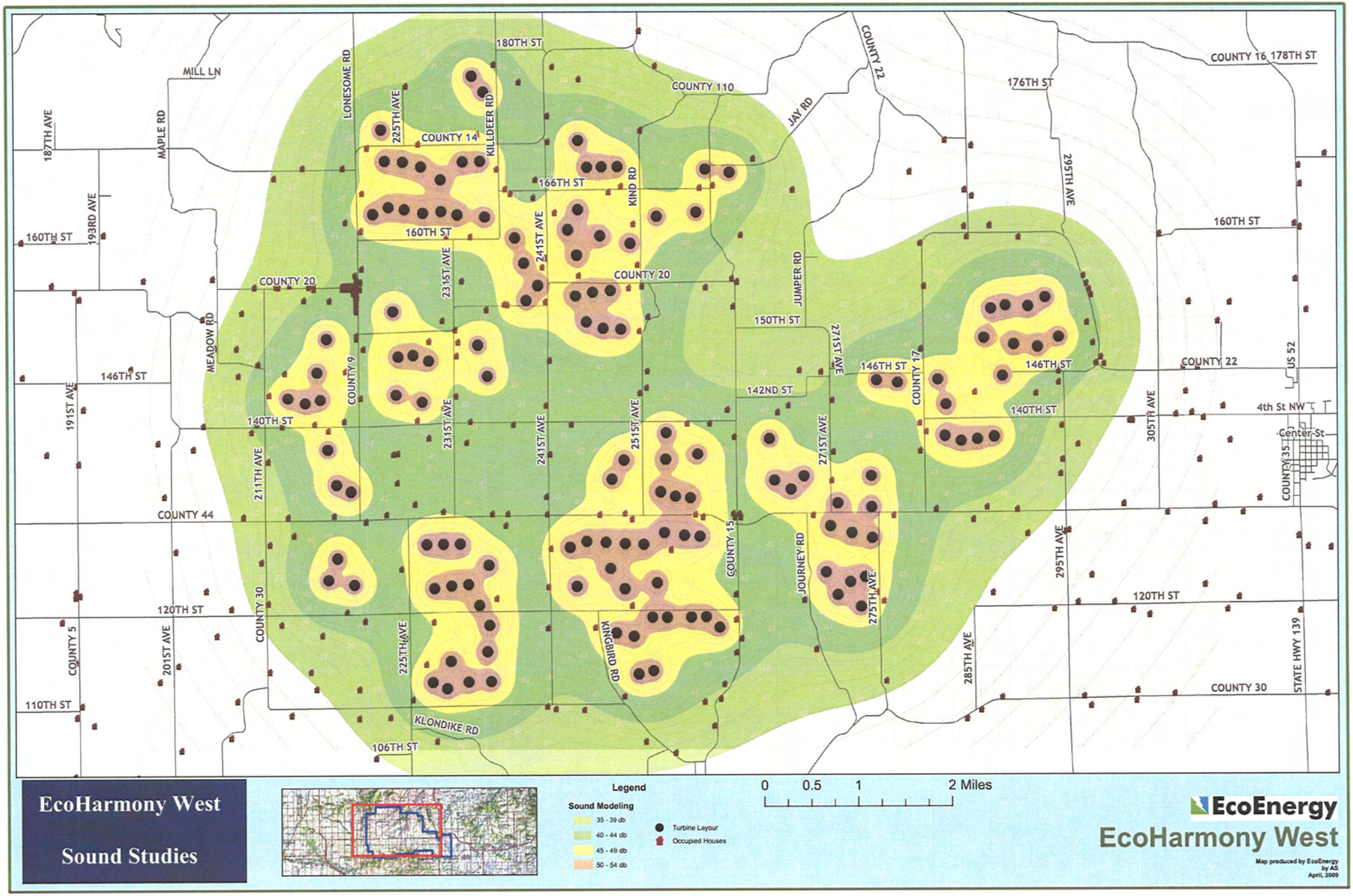
Minnesota's Wind Resource by Wind Speed at 80 Meters



This map has been prepared under contract by WindLogics for the Department of Commerce using the best available weather data sources and the latest physics-based weather modeling technology and statistical techniques. The data that were used to develop the map have been statistically adjusted to accurately represent long-term (40 year) wind speeds over the state, thereby incorporating important decadal weather trends and cycles. Data has been averaged over a cell area 500 meters square, and within any one cell there could be features that increase or decrease the values shown on this map. This map shows the general variation of Minnesota's wind resource and should not be used to determine the performance of specific projects.

January 2006

Figure 4 - Sound Modeling Map



Tables

Table 1 – Wind Turbine Specifications[1]

Characteristic	General Electric 1.5 MW	Acciona 1.5 MW	Suzlon 2.1 MW	Siemens 2.3 MW	Vestas 3.0 MW
Hub Height	80 m (262 ft)	80 m (262 ft)	80 m (262 ft)	80 or 100 m (262 or 328 ft)	80 m (262 ft)
Rotor Diameter	77 m (253 ft)	82 m (269 ft)	88 m (289 ft)	101 m (331 ft)	90 m (291 ft)
Total Height	119 m (390 ft)	122 m (400 ft)	124 m (407 ft)	129 or 149 m (423 or 489 ft)	125 m (410 ft)
Cut-in Wind Speed	3 m/s (6.7 mph)	3 m/s (6.7 mph)	4 m/s (8.9 mph)	4 m/s (8.9 mph)	4 m/s (8.9 mph)
Rated Capacity Wind Speed	11.8 m/s (26.4 mph)	10.5 m/s (21.5 mph)	14 m/s (31.3 mph)	12.5 m/s (27.8 mph)	15 m/s (33.6 mph)
Cut-out Wind Speed	25 m/s (55.9 mph)	20 m/s (44.7 mph)	25 m/s (55.9 mph)	25 m/s (55.9 mph)	Not Available
Maximum Sustained Wind Speed	Over 45 m/s (100.7 mph)	Over 45 m/s (100.7 mph)	Over 45 m/s (100.7 mph)	59.5 m/s (133 mph)	Over 59.5 m/s (133 mph)
Rotor Speed	10.1 to 20.4 rpm	10.7 rpm	15.1 to 17.7 rpm	6 to 16 rpm	16.1 rpm
Distance to 50 dB(A) Noise Level	623 ft	650 ft	850 ft	902 ft	Not Available
3 Rotor Diameters	231 m (758 ft)	246 m (807 ft)	264 m (866 ft)	303 m (994 ft)	270 m (886 ft)
5 Rotor Diameters	385 m (1263 ft)	410 m (1345 ft)	440 m (1443 ft)	505 m (1656 ft)	450 m (1476 ft)

m = meters, ft = feet, m/s = meters per second, mph = miles per hour, rpm = revolutions per minute

[1] Adapted from Site Permit Application, Table 7.1

Table 2 – Biomass Plant Emissions, Criteria Pollutants[1]

Pollutant	lbs/kWh	tons/year
Sulfur Dioxide (SO_2)	3.46 E-04	160.5
Nitrogen Oxides (NO_x)	1.98 E-03	919.6
Carbon Dioxide (CO_2)	2.67[2]	1.24 E06[3] (zero net emissions)
Mercury (Hg)	4.79 E-08	0.022
Particulate Matter (PM)	7.13 E-04	333.1

lbs/kWh = pounds per kilowatt-hour

[1] Adapted from Minnesota Biomass EAW, http://energyfacilities.puc.state.mn.us/Docket.html?Id=4452. Boiler heat input capacity = (106/38.5) x 527.5 MMBtu/hr = 1452 MMBtu/hr.
[2] AP-42, Fifth Edition, Volume 1, Chapter 1 External Combustion Sources, Section 1.6 Wood Residue Combustion in Boilers, http://www.epa.gov/ttn/chief/ap42/ch01/final/c01s06.pdf.
[3] Because the plant is fired with biomass (excepting natural gas backup) there would be no net carbon dioxide emissions from the plant. Carbon dioxide released from the plant would be integrated into new biomass materials which, in time, would be harvested and used to fire the plant.

Table 3 – Biomass Plant Emissions, Hazardous Air Pollutants and Volatile Organic Compounds[1]

Pollutant	lbs/kWh	tons/year
Hazardous Air Pollutants (HAPs)	5.55 E-04	257.7
Volatile Organic Compounds (VOCs)	1.80 E-04	83.7

lbs/kWh = pounds per kilowatt-hour

[1] Adapted from Minnesota Biomass EAW, http://energyfacilities.puc.state.mn.us/Docket.html?Id=4452. Boiler heat input capacity = (106/38.5) x 527.5 MMBtu/hr = 1452 MMBtu/hr.

Table 4 – Minnesota Noise Standards[1]

Noise Area Classification[2]	Daytime		Nighttime	
	L_{50}[3]	L_{10}	L_{50}	L_{10}
1	60	65	50	55
2	65	70	65	70
3	75	80	75	80

[1] Minnesota Rules 7030.0040, https://www.revisor.leg.state.mn.us/rules/?id=7030.0040. Standards expressed in dB (A).
[2] Minnesota Rules 7030.0050, https://www.revisor.leg.state.mn.us/rules/?id=7030.0050. The noise area classification is based on the land use activity at the location of the receiver (listener).
[3] Minnesota Rules 7030.0020, https://www.revisor.leg.state.mn.us/rules/?id=7030.0020. "L_{50}" means the sound level, expressed in dB(A), which is exceeded 50 percent of the time for a one hour survey. "L_{10}" means the sound level, expressed in dB(A), which is exceeded ten percent of the time for a one hour survey.

Table 5 – Permits and Approvals[1]

Agency	Type of Approval
Federal	
Federal Aviation Administration	Notice of Proposed Construction or Alteration; No hazard determinations; Notice of Actual Construction (Form 7460-2)
U.S. Army Corps of Engineers	Wetland (Section 404) Permit
U.S. Fish and Wildlife Service	Consultation and review of project.
Federal Energy Regulatory Commission	Exempt Wholesale Generator Status
State of Minnesota	
Minnesota Public Utilities Commission	Certificate of Need
Minnesota Public Utilities Commission	LWECS Site Permit
Minnesota State Historical Preservation Office	Cultural and Historic Resources Review
Minnesota Board of Water and Soil Resources	Wetland Conservation Act Approval
Minnesota Department of Natural Resources	Pubic Water Works
	License to Cross Public Lands and Waters
	Consultation and review of project
Minnesota Pollution Control Agency	NDPES Stormwater Permit for Construction
	State Water Quality (Section 401) Certification
	License for Small Quantity Generator of Hazardous Waste
Minnesota Department of Health	Water Well Permit
	Plumbing Plan Review
Minnesota Department of Transportation	Driveway Permit; Utility Access Permit, Highway Access Permit; Work Within Right of Way Permit
	Oversize and Overweight Permit
	Tall Towers Permit

[1] Potentially required permits and approvals for the EcoHarmony West Wind Project. Adapted from Site Permit Application, Section 15.0.

Local Permits	
Fillmore County	Building Permits, Conditional Use Permits
	Driveway Permit; Utility Permit
	Individual Septic Tank Systems Permit
	Oversized Load Moving Permit; Moving Permit
	Sign Permit
Townships	Road Access Permits

Appendices

Appendix A

Environmental Report
Scoping Decision

In the Matter of the Application of EcoHarmony West Wind, LLC, for a Certificate of Need for a Large Energy Facility, a 280 MW Wind Energy Farm in Fillmore County

ENVIRONMENTAL REPORT SCOPING DECISION
PUC Docket No. IP-6688/CN-08-961

The above matter has come before the Director of the Office of Energy Security (OES) for a decision on the content of the environmental report (ER) to be prepared for the EcoHarmony West Wind Project ("project"). EcoHarmony West Wind, LLC, a Minnesota limited liability company, is proposing to construct the project.

The proposed project is a 280 megawatt (MW) large wind energy conversion system located in Fillmore County, Minnesota. A final decision on turbine selection and design has not be made, but the project will consist of turbines with a rated output between 1.5 and 3.0 MW in such number and combination as to yield 280 MW. Facilities associated with the project include gravel access roads, a new substation, an operation and maintenance building, meteorological towers, and an electrical collection system.

The project will interconnect to the transmission grid through a 161 kilovolt (kV) transmission line, approximately 8.5 miles long, which will connect the new project substation to a switching station and an existing 161 kV transmission line owned by ITC-Midwest.

The project requires a certificate of need (CON), a site permit for the wind farm, and a route permit for the 161 kV transmission line from the Minnesota Public Utilities Commission (Commission). The site permit (WS-08-973) and route permit (TL-09-601) are being considered by the Commission in separate dockets.

On October 22, 2008, EcoHarmony West Wind, LLC, filed a certificate of need application with the Commission for the EcoHarmony West Wind project.[1] On January 15, 2009, the Commission issued an order accepting the application as complete and authorizing an informal review process. The proposed project is a large energy facility (Minn. Stat. § 216B.2421). As such, it requires the Minnesota Department of Commerce to prepare an environmental report (ER) for the project (Minn. Rules 7849.7030).

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[1] The applicant requested a certificate of need for a 200 MW project. On July 13, 2009, the applicant requested that the Commission consider the EcoHarmony West Wind project to be a 280 MW project. To address the possibility that the Commission will grant a certificate of need for this larger size, the environmental report for this project will examine alternatives of this size.

A public meeting was held on April 15, 2009, in Harmony, Minnesota, to receive comments on the scope of the environmental report. Approximately 62 persons attended the meeting. Concerns raised by attendees included potential impacts related to noise, flicker, aesthetics, traffic, property values, and the general appropriateness of the project for the region, given its karst topography.

A public comment period followed the meeting; the comment period closed on May 20, 2009. Ten written comments were received during the comment period – five letters from citizens, four letters from state agencies, and one letter from the applicant. Issues raised by commenters included setbacks (noise, flicker, aesthetics, viewshed), and potential impacts on wetlands, waters, and bats.

The proposed project is intended to produce renewable energy in furtherance of Minnesota's renewable energy objectives. Accordingly, alternatives examined in the ER will be limited to "eligible energy technologies" that support these objectives (Minn. Stat. § 216B.1691). These alternatives include: (1) a generic 280 MW wind generation project sited elsewhere in Minnesota, (2) a 106 MW biomass plant, and (3) a "no-build" option.

Having reviewed the matter, consulted with the OES Energy Facility Permitting staff, and in accordance with Minnesota Rules 7849.7050 and 7849.7060, I hereby make the following scoping decision:

MATTERS TO BE ADDRESSED

The environmental report for the EcoHarmony West Wind project will address and provide information on the following matters:

1.0 Description of the EcoHarmony West Wind Project

Project description and location
Sources of information

2.0 Regulatory Framework

3.0 Description of Alternatives

3.1 Generic 280 MW wind project
3.2 A 106 MW biomass plant
3.3 No-build option

4.0 Human and Environmental Impacts (Impacts reviewed for each alternative)

- 4.1 Emissions – pollutants
- 4.2 Emissions – hazardous air pollutants
- 4.3 Visibility impairment
  - Shadow flicker
  - Viewshed
  - Turbine lighting
- 4.4 Fuel availability
- 4.5 Associated transmission facilities
- 4.6 Ozone formation
- 4.7 Water
  - Water appropriations
  - Surface waters
  - Ground water / karst topography
  - Wetlands
- 4.8 Wastewater
- 4.9 Solid and hazardous wastes
- 4.10 Noise
- 4.11 Traffic
- 4.12 Property values
- 4.13 Wildlife impacts
  - Bats

5.0 Mitigation Measures

- 5.1 EcoHarmony West Wind project
- 5.2 Generic 280 MW wind project
- 5.3 A 106 MW biomass plant
- 5.4 No-build option

6.0 Feasibility and Availability of Alternatives

- 6.1 EcoHarmony West Wind project
- 6.2 Generic 280 MW wind project
- 6.3 A 106 MW biomass plant
- 6.4 No-build option

7.0 Required Permits

ISSUES OUTSIDE OF THE ENVIRONMENTAL REPORT

The environmental report will not consider the following matters:

1. Impacts or mitigative measures associated with specific sites, including specific tower or road locations for the proposed project and alternatives.

2. The negotiation and content of easement agreements by which land owners are paid for property rights, including wind rights.

3. Any alternatives not specifically described in this scoping decision

SCHEDULE

The environmental report will be completed in October 2009. A public hearing will be held in Fillmore County before an Administrative Law Judge after the environmental report has been issued and notice served.

Signed this 14th day of September, 2009

STATE OF MINNESOTA
DEPARTMENT OF COMMERCE
OFFICE OF ENERGY SECURITY

William Glahn, Director