Wind Energy Site Assessment

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Focus on Energy Coupon - Non-Residential

Client Name **Mary XXXXX**			*Date of Site Visit* **May 14, 2010**		*Date of Report* **June 7, 2010**	
Site Address **Fremont Road**			*City* **Algoma**	*State* **WI**	*Zip* **54201**	
County **Kewaunee**			*Municipality* **Ahnapee Twp**			
Email			*Phone*	*Cell*		
Electric Utility **WPS**	*Phase* **Single**		*Annual Energy Usage* **12,000 kWh**	*Energy Usage Rate* **$0.12/kWh**		
Service Amperage and Location of Service Panel: **100A – East side of house** *Breaker Space?* **May need modifying depending on size of system**			*2nd Service Amperage and Location* **N/A**			
Acreage of Property **10**	*Latitude:* **44.6069**	*Longitude:* **-87.4817**	*Customer Indicated Soil Type* **Clay**			
Distance/Direction from Airport Name **4 miles NE of Walter's Agri-Center**				*Elevation:* **640'**		
Technology *Wind PV SDHW* *X*	*Reason for Investigating Renewables* *Reduce Cost Clean Energy Other* *X X*		*Maintenance* *Self Contract Both* *x*			
Installation Timeline **2010**	*Wind Speed at 60m* **6.4 m/s 14.3 mph**		*kW Range of Systems* **5kW – 20kW**			

Wind System Location Options:

Site 1 Location **175′ NW of House**			*Wire run Distance* **200 ft**	*Elevation* **640 ft**
Wind Shear Factor α **.35**	*Min. Tower Hgt* **100′**	*Wind Speed* **11.0 mph**	*Turbulence Intensity Factor* **20%**	
Displacement Height **35 feet**	*Displacement Direction* **W, N**		*% of Output affected by Displacement* **40%**	

Wind System Options

KW Range of Turbines	5kW – 20kW
Range of Tower Heights	106′ – 130′
Range of Annual Output	6,881-11,519 kWh/yr
Range of Costs Before Incentives	$51,000 – $63,737

Specific Concerns: Location of guy wires will need to be addressed due to the close proximity of the tower site to the garden. The uneven terrain surrounding the tower base should be discussed with an installer for placement of a tilt down tower.

Average Wind Speed at hub Height:
11.2 mph at 106′ hub height
11.4 mph at 110′ hub height
11.8 mph at 120′ hub height
11.9 mph at 126′ hub height
12.1 mph at 130′ hub height

Turbines Considered for Site:

Endurance S-343, 5kW
Bergey Excel-S, 10kW
Ventera VT-10, 10 kW

THIS SITE ASSESSMENT WAS CO-FUNDED BY FOCUS ON ENERGY
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Executive Summary

In order to better understand the terminology and information provided in this Wind Site Assessment Report, please read the accompanying document entitled Wind Supplement. The Wind Supplement will provide the background information needed to understand how the site assessor made determinations for the possible wind system locations, tower heights, wind speeds, energy outputs and costs.

Project Overview

Mary XXXXX and her son Deron XXXXX are exploring the feasibility of installing a small wind energy system at Mary's farm to offset their electric consumption. A wind site assessment was done in 2003 and they have been considering a 5kW-10kW size system.

Mary XXXXX operates XXXXX's Green Plant, LTD, a non-profit business, selling organic vegetables to the local food pantry. The site is located in Ahnapee Township, Kewaunee County, WI.

ELECTRIC LOAD ANALYSIS and CONSIDERATIONS

Monthly average KWh use: 1,000 kWh
Utility service category: Farm Service
Electric panels: Single Phase/240 volt, 100 amp

Electric Panel Considerations

A 100 Amp single phase electric service panel is located in the basement of the house. The panel has sufficient room for adding the systems recommended in the report. The wire run from the turbine site to the outside service panel would be approximately 200'.

Figure 1- 100 Amp Service Panel

Description of electrical usage, most significant electrical loads, present and future

The house draws the majority of the electric load. Many energy efficient measures have been implemented in the last two years. The electric hot water heater, electric clothes washer and dryer, refrigerator, stove and freezer in basement have all been replaced with energy star rated models. Most of the lighting has been converted to compact fluorescent bulbs. The client is in the process of installing new energy efficient windows on the first floor and intends to replace the second floor windows by the end of the year. An oil furnace is used for heating.

General Recommendations for Energy Efficiency

Improving efficiency in energy consumption will result in a lower, overall renewable energy system cost. Every dollar invested in reducing energy consumption can save approximately $3-$5 in renewable energy system costs. Reducing loads will have a very significant and direct impact on the cost of the system needed to meet the owner's electrical energy needs. Most efficiency improvements should be implemented before installing any renewable energy system.

Replacing an old refrigerator or freezer with a new Energy Star model could save as much as 75% of the electrical usage. For example, a more energy efficient model refrigerator could save as much as $100.00 per year. For more information on appliance energy rating go to: http://www.energystar.gov/index.cfm?fuseaction=refrig.calculator. Eliminating appliances that are not used often, such as freezers or multiple refrigerators could save as much as $300-$400 each year per year depending on the age and type of unit that was eliminated. Additionally, switching to compact fluorescent bulbs would save up to 75 percent less energy (electricity) than incandescent light bulbs, and last up to 10 times longer.

Specific Recommendations for Energy Efficiency

All lights should be changed to compact fluorescent lighting. This is a relatively easy means of being more energy efficient that can see immediate results. Replacing older windows will increase the overall efficiency of the home.

SITE INFORMATION

General Site Overview

The XXXXX's property is located approximately 2 miles West of the town of Algoma, WI and the shore of Lake Michigan in Northeastern Kewaunee County.

The surrounding land is mostly open farmland with some wooded parcels to the North, East and West. The denser wooded areas are all 10'-20' lower in elevation from the proposed site and most are located to the Northwest, North and East and not in the prevailing wind direction. The house and barn are located in the Southeastern quadrant of the property. The soil in this area consists primarily of clay.

(See Aerial photos on the following pages)

Aerial Photo of proposed Tower Site: 500’ radius view

= Proposed tower site

= XXXXX property outlined

= 500’ Radius

Figure 2 - 500' Radius View

Aerial Photo of proposed Tower Site: 3/4 mile radius view

= Proposed tower site

XXXXX property outlined

Service Panel and Site for Disconnect

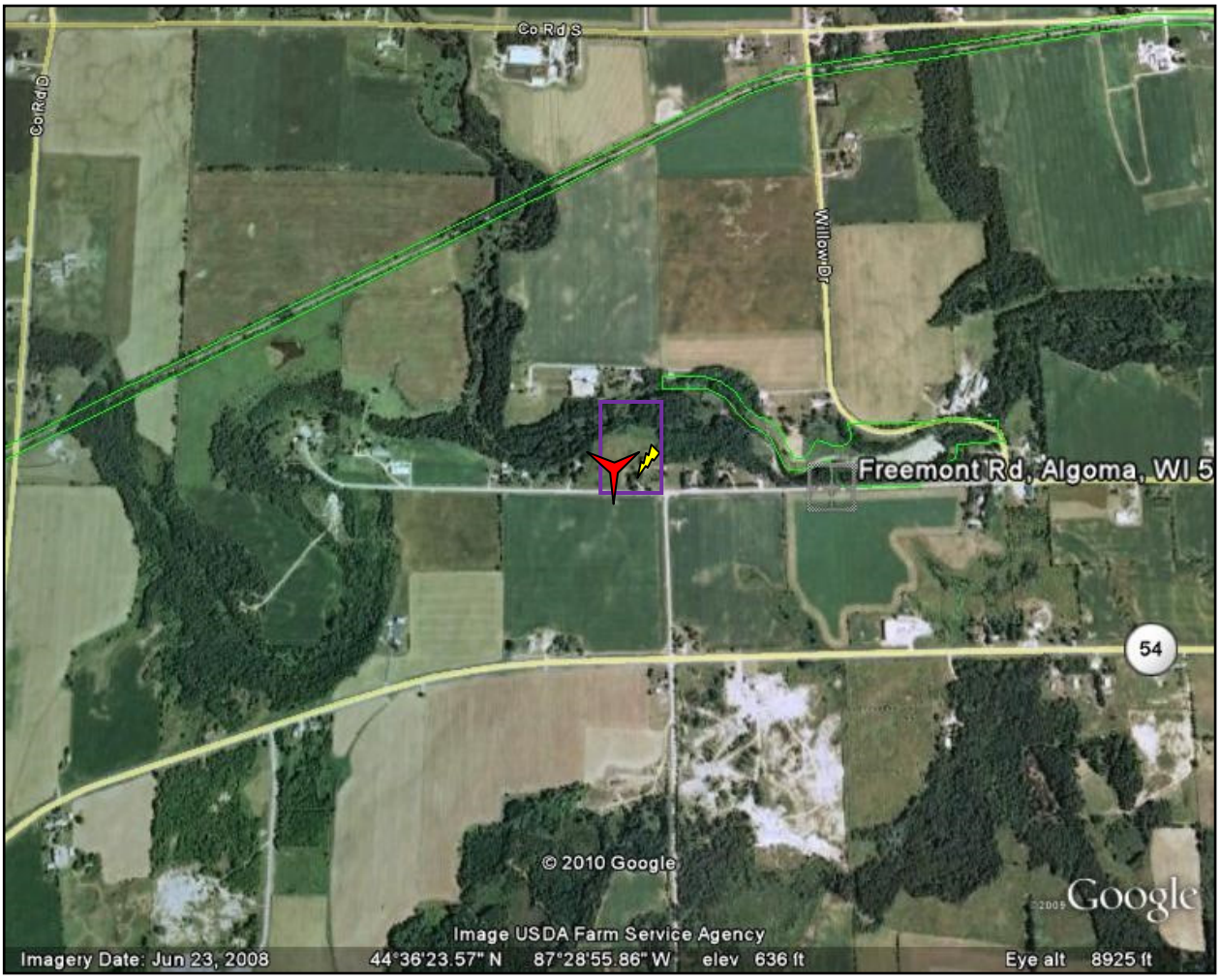


Figure 3 - Aerial Photo of proposed tower site: 3/4 mile radius view

Aerial Photo of proposed Tower Site: 2 mile radius view

Proposed tower site =

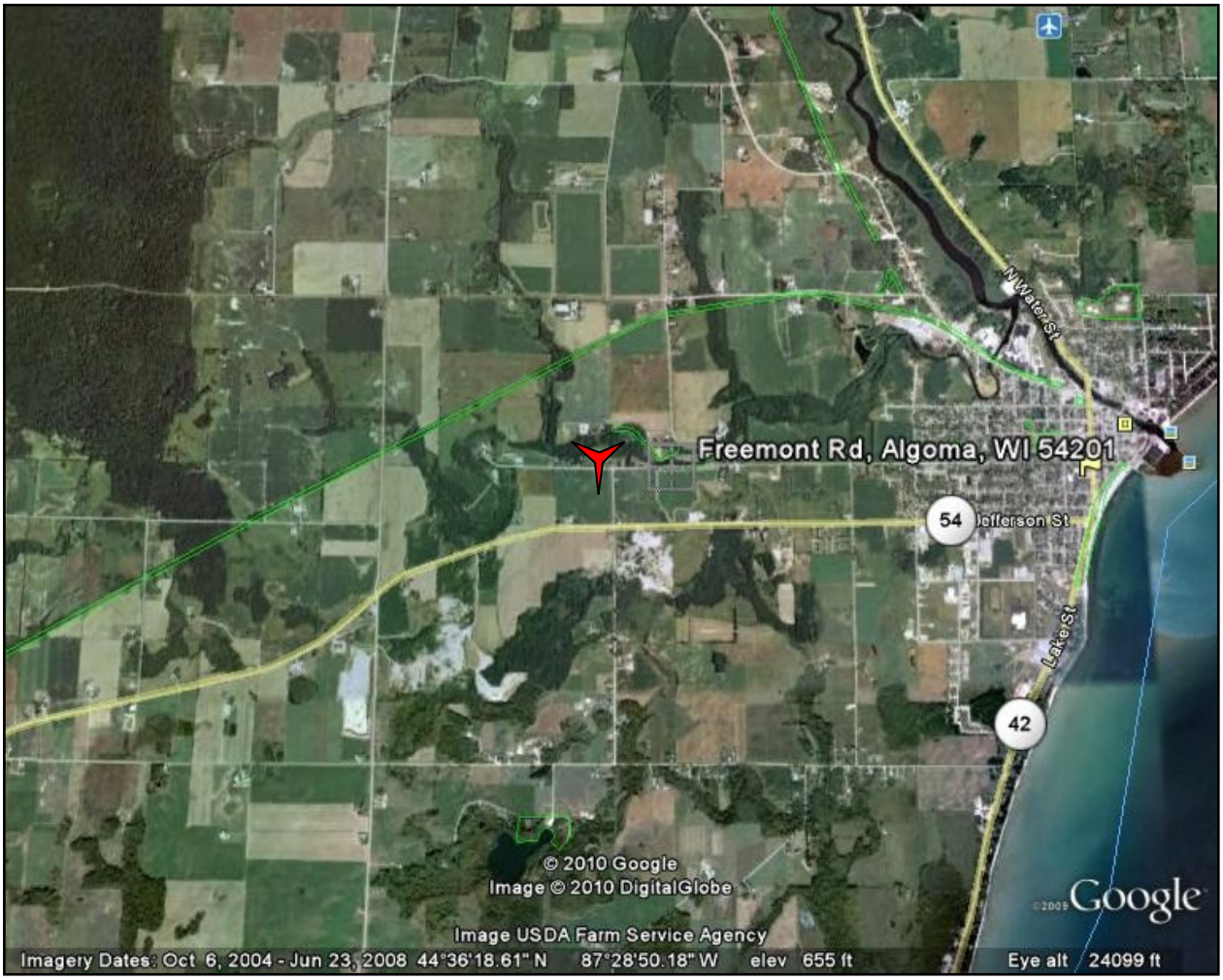


Figure 4 - Aerial Photo of site 2 mile radius

Soil Considerations

The soil in the area is primarily clay and should allow for a standard tower foundation.

Topographical Overview

The XXXXX's property is approximately 640′ in elevation. The surrounding land within a 3.0 mile radius has gentle slopes and changes in elevation with elevations that range from 580′ to the East at Lake Michigan to 700′ about 3 miles West of the site.

West of the site, the elevation remains fairly consistent for 1/2 mile and then begins to gradually increase to 675′ near the Ahnapee State Trail located 2.5 miles West of the proposed site. The elevation continues to increase to 700′ 3 miles West of the site.

South of the site is an open field with no significant obstacles within 1 mile. The gently rolling elevations gradually ascend to 700′, 1/2 mile South of the site, and descend to 680′ at County Road K located 1-1/4 miles South. From this point, the elevation remains fairly consistent South of Cty Road K with some slight rolling hills.

East of the site, the elevation gently descends for 2.5 miles from the site to 580′ at the level of Lake Michigan.

North of the site, the elevation gently descends for 1.5 miles before ascending to 650′ over 2 miles from the site.

Topographical Map: 1/2 Mile Radius View
XXXXX Property outlined
Tower Site =

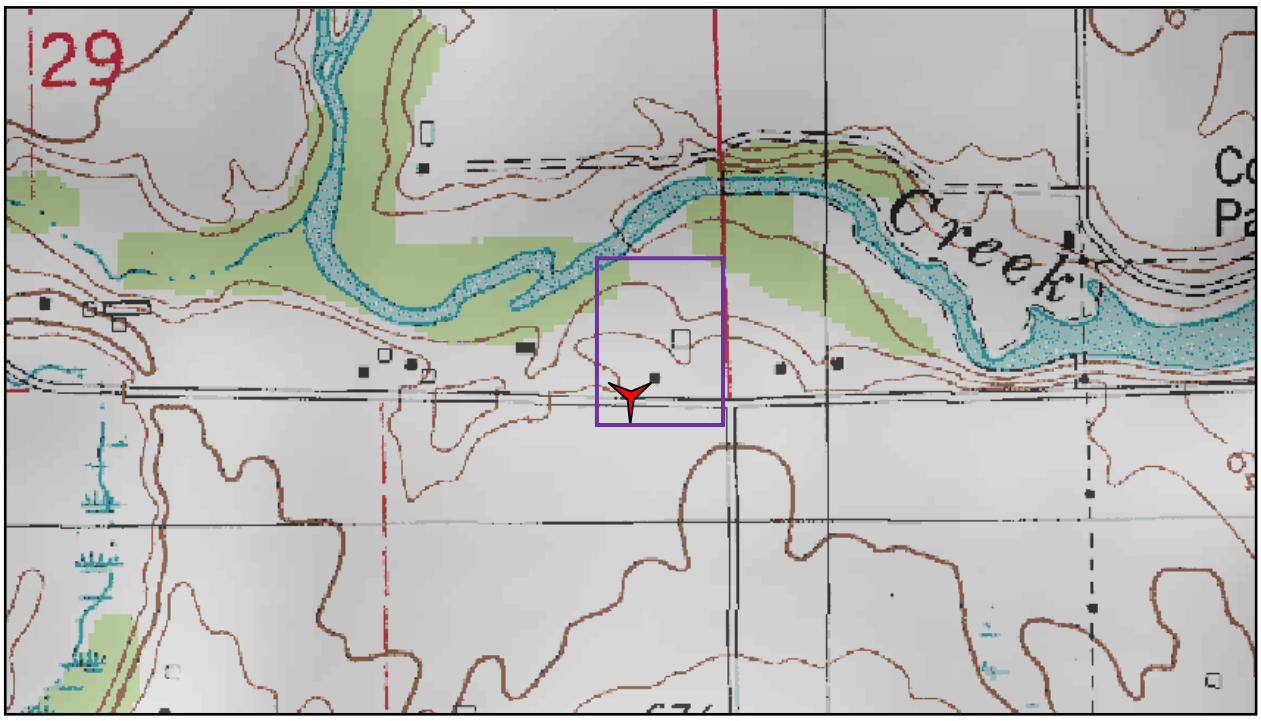


Figure 5 - Topographical Map 1/2 mile radius view

Topographical Map: 3.5 Mile Radius View
Tower Site =

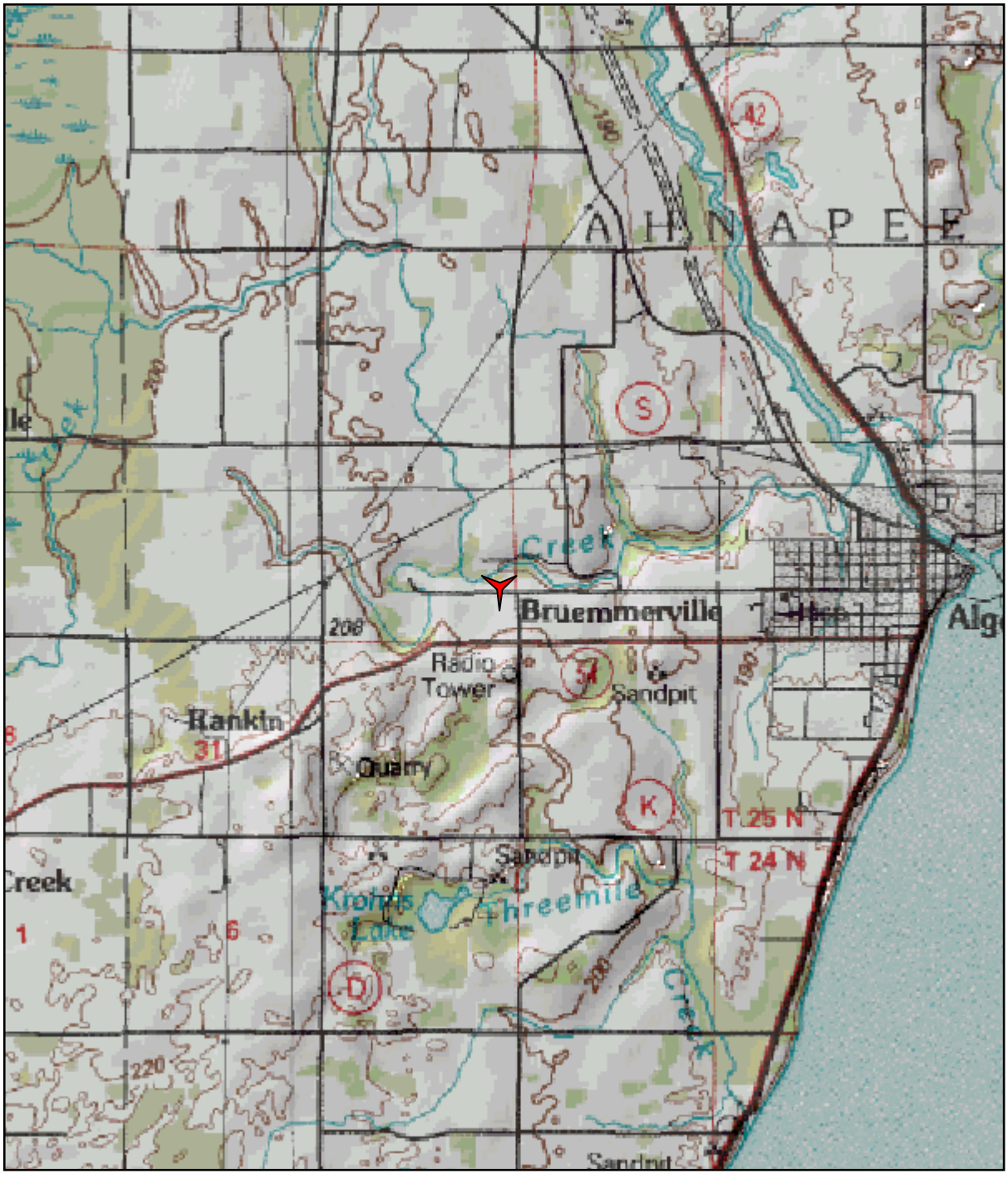


Figure 6 - Topographical Map 3.5 mile radius view

Specific Site Information

To the West of the proposed tower site:

SW of the proposed tower site is open farm land for over 1/2 mile. There is a patch of trees 1/2 mile SW that will have little effect on the wind resource at the site. To the West is a grouping of trees consisting of a mix of deciduous and evergreen trees. The trees are located approximately 300′ from the proposed site and are 10′ lower in elevation. These trees may grow to 60′. (See West view photos below) The prevailing winds come from the West and South, therefore these trees will be considered when determining the minimum tower height. Beyond the trees is open farm land for 1/2 mile.

Figure 7 - South West view from site

Figure 8 - West view from site

To the North of the proposed tower site:

North of the site is open farmland for 325′ until reaching a heavily wooded parcel. The trees are primarily evergreens and are 15′ lower in elevation than the proposed site.
(See North view photos below)

Figure 9 - North West view from site

Figure 10 - North view from site

To the East of proposed tower site:

East of the proposed tower site is a barn and relatively open land beyond that structure for 700′. NE of the site is open land with a heavily wooded parcel located 450′ from the site. The wooded area is 15′ lower in elevation than the proposed site. (See East view photos below)

Figure 11 - North East view from site

Figure 12 - East view from the site

To the South of the proposed tower site:

South of the proposed tower site is open farm land for approximately 1/2 mile before reaching a wooded parcel. The home and a few deciduous trees are located roughly 125′ feet SE of the site. These obstacles are not in the prevailing wind direction but may have some effect and will be considered in the minimum tower height. (See South view Photos below)

Figure 14 - South East view from site

Figure 13 - South view from site

Tree Flagging and other landscape observations

Tree flagging can be used to indicate the prevailing wind direction at a site. Tree flagging is indicated by the deformity of tree growth on one side of the tree. There is not much evidence of tree flagging at the site. The lack of tree flagging does not imply that there is not a good wind resource at this site.

Tower Siting

The proposed site for the tower is to the North West of the house. This is one of the higher elevations on the property and offers good access to prevailing winds to the South. The site is located 200′ West of the house, 130′ from the property line to the West and 175′ from the property line to the South along Fremont Road. A new meter will be installed for grant purposes as the client would like to purchase and operate the wind turbine under her non-profit business.

Ahnapee Township has a wind ordinance in effect. A conditional use permit will have to be applied for before proceeding with an installation. A standard set back from the property line is 1x the total wind system height which is calculated at the blades highest point.

Advantages of Site:

- Open access to the South prevailing wind direction.
- Set back distance from the nearest property line will meet the town wind ordinance requirements.
- Easy access for excavation and tower construction.
- Wire run to point of connection is approximately 200′.

Disadvantages of site:

- Uneven terrain surrounding tower base will need to be considered for tilt-up tower construction and erection.

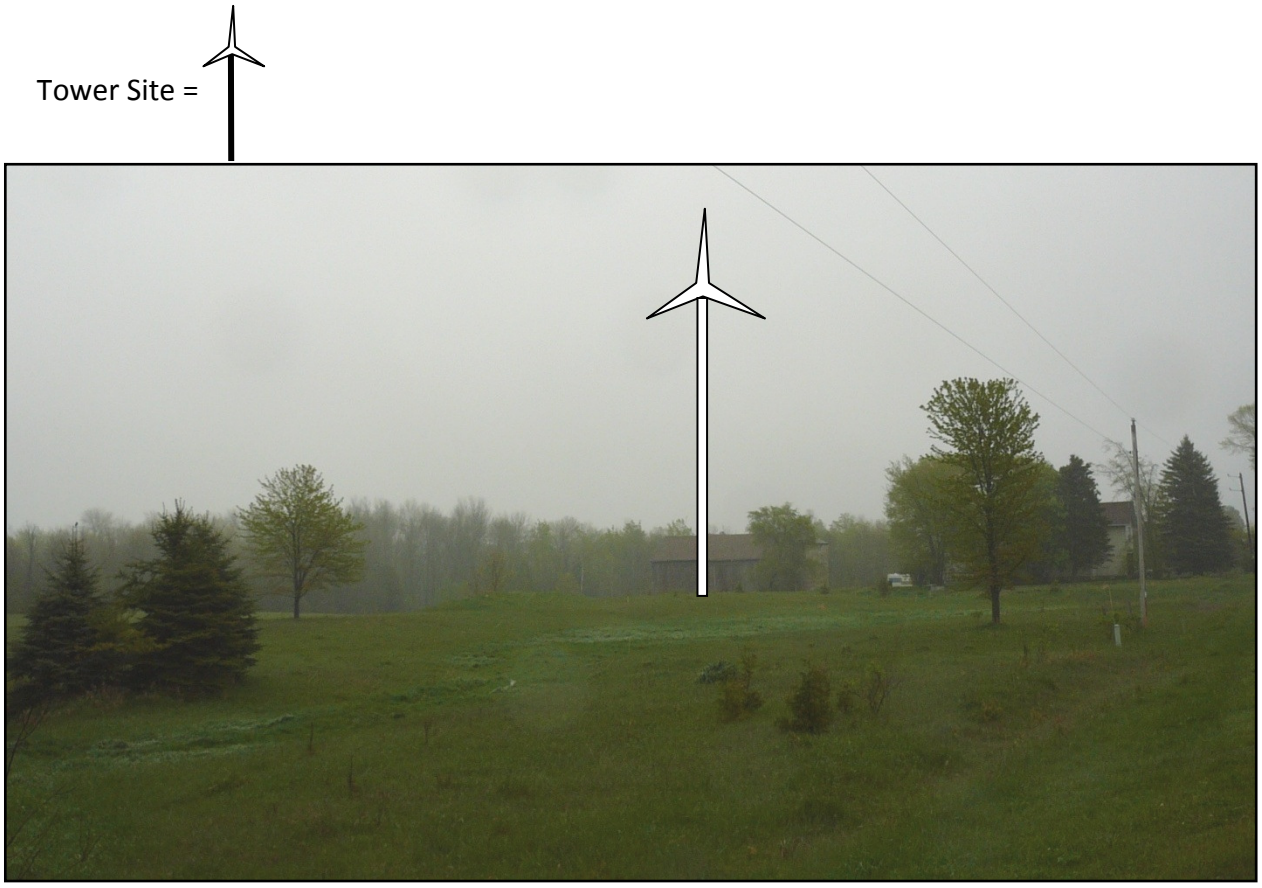


Figure 15 - Looking NE at turbine site

Minimum Tower Height

To help avoid wind turbulence, which negatively affects the wind generator output and can produce unwanted wear on the turbine parts over a long period of time, two general rules are followed.

1) Position the lowest point of the turbine rotor at least 30′ above the highest obstruction within 500′.

Or, if there are no tall obstructions within 500′:

2) The Minimum Tower Height = 60′ + blade length (if blade length <15′)
   Minimum Tower Height = 80′ + blade length (if blade length is >15′)

There are trees located to the East, North and West, as well as a few trees surrounding the home. Some of these trees may potentially reach 60′ in height and will be considered in the minimum tower height calculation.

The minimum tower height for a clear wind resource in all directions would be 100 feet. This is calculated from the following: Highest object within 500 feet is 60′ high in comparison with the tower site (60′ + 30′ feet for clearance + 10′ blade length of the smallest 5 kW turbine recommended =100 feet). (60+30+10′=100′) 100′ is a standard tower height.

Minimum tower height: 100 feet

Below are the tallest obstructions within a 500′ radius of the tower site that were considered in the minimum tower height calculation.

Object around Wind system site	Direction	Height of Obstruction (Mature Height if Trees) (ft)	Distance from Tower (ft)	Relative Elevation to Tower Base +/-(ft)	Relative Height of Obstruction (ft)
Tree Line	W	60′	260′	-10	50′
Deciduous Trees surrounding house	SE	60′	135′	0	60′
Tree line	N	60′	300′	-13	47′
Tree Line	NE	60′	400′	-10	50′

Based on these obstructions the minimum tower heights are shown in the table below for a variety of wind turbines. This selection of wind turbines is considered in the appropriate size range for this site based on interests expressed by the clients. Details on each of these turbines can be found in the Wind Supplement.

Turbine	Rated Output	Blade Length (ft)	Minimum Tower Height (ft)	Available Tower Heights
Endurance S-343	5kW	10	**100**	106′, 126′
Bergey	10kW	12	**102**	120′, 140′
Ventera	10kW	11	**101**	110′, 130′

WIND RESOURCE and PREVAILING WINDS

The wind rose graph is used to determine the prevailing wind direction at any site. The wind rose graph illustrates the percent of total time and percent of total wind energy that the wind is in each of the sixteen direction sectors. The blue bars illustrate the percent of total energy and the gray bars illustrate the percent of total time that the wind is in each of the sixteen direction sectors.

Wind Rose # WI 2240-1520 from the AWS Truwind database shows the prevailing winds at the site are from the West and South. (See wind rose below)

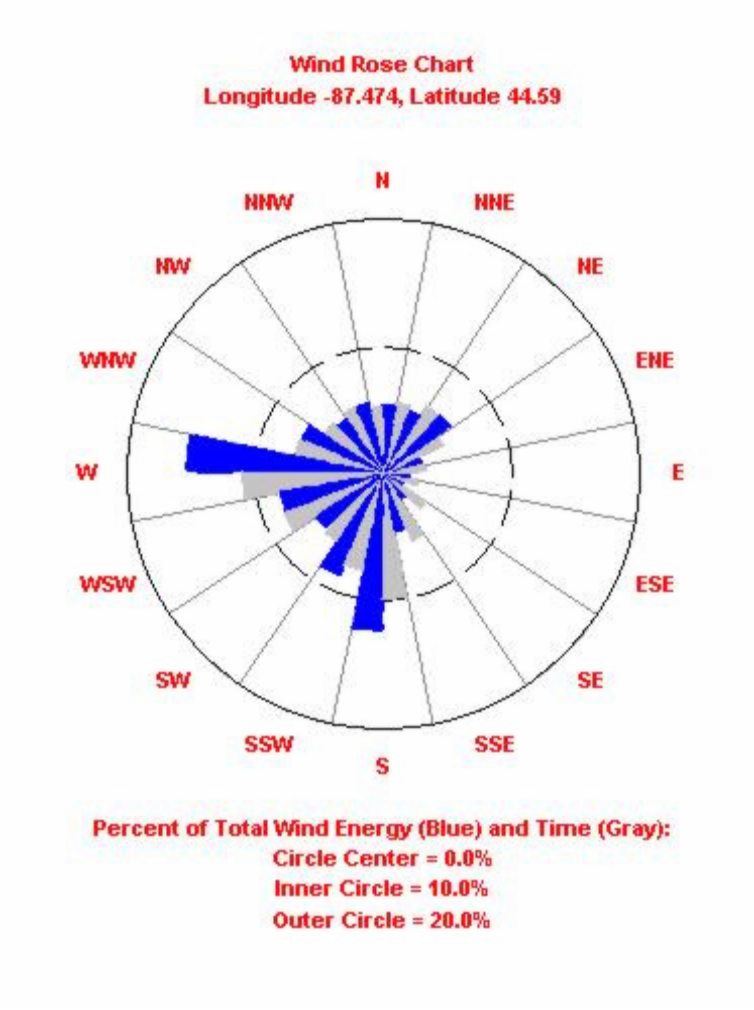


Figure 16 - Wind Rose

Wind Speed Calculation at Hub Height

Also See Wind Report Supplement pages 5-8.

60m Map image zoom view:

= XXXXX's property

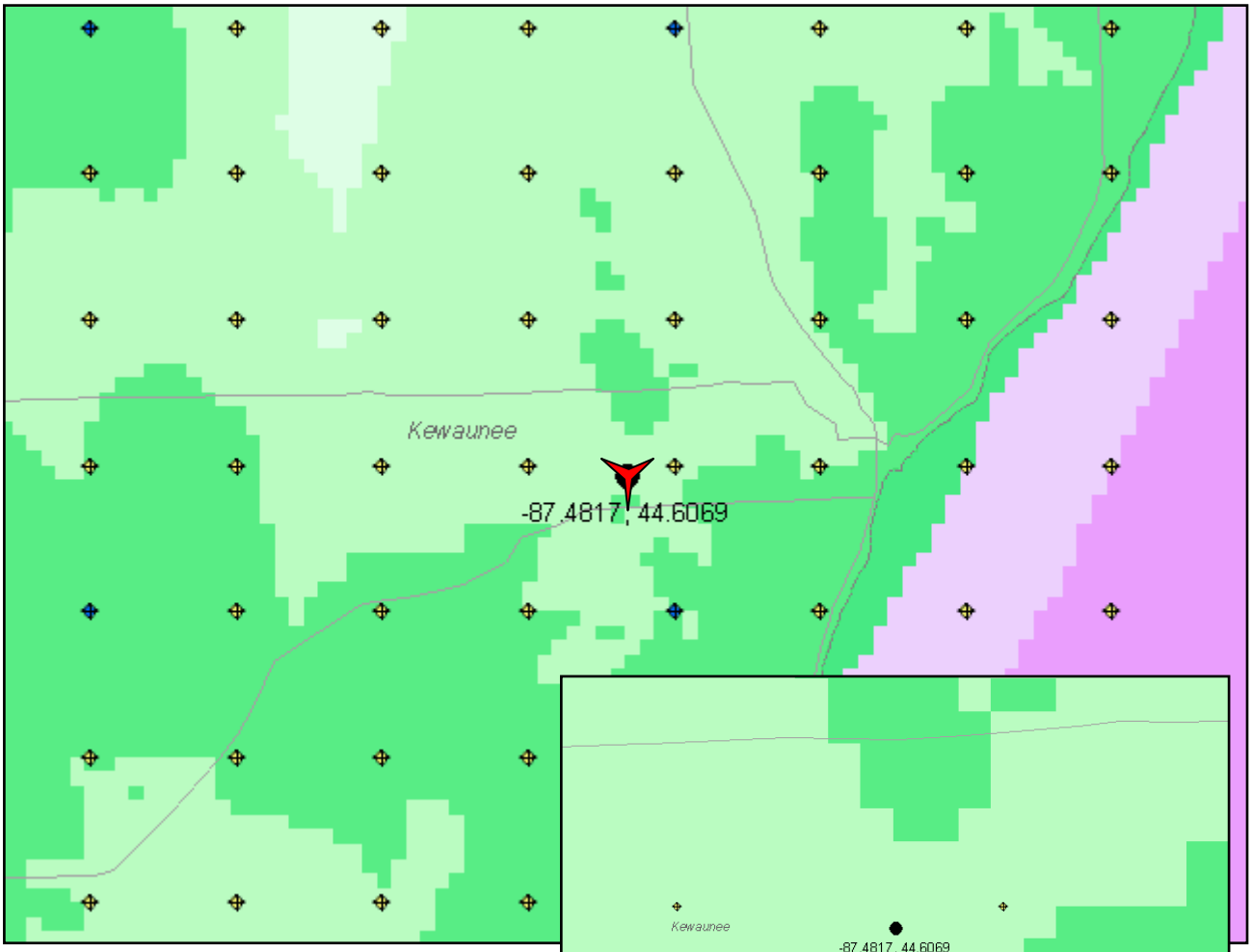
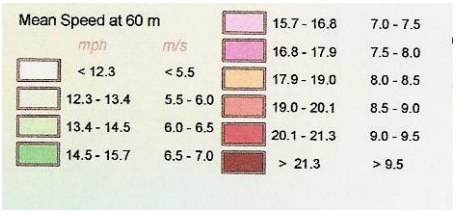


Figure 17 - 60 Meter map zoom view of site



Wind Speed Estimate

Also see Wind Report Supplement pages 5-8.

How well the wind turbine performs is based on the speed and the consistency of the wind intercepted by the turbine; a continuous high-speed wind being the best condition. Once the average annual wind speed at a specific site is determined, it can be used to estimate how a variety of turbines will perform at this site.

The method used to determine the wind speed at a specific site is explained in the Wind Report Supplement on page 7.

The 2007 map at 60 meters shows the annual average wind speed at the proposed site to be 14.3 mph. For this site we will use an average wind speed (Vo) of 14.3 at 197 feet. This is a good wind speed for Wisconsin.

The wind shear coefficient (α) used for the assessed property is .35 due to the effect the buildings and trees will have on the wind shear at the site.

Displacement Factor

In a wooded area where the turbine site is surrounded by trees or many buildings/houses, the wind speed at hub height must also be adjusted by a displacement factor. The displacement factor for this site is calculated as (75% average mature height of evergreen trees around the site in relation to the tower site). The trees around the site are an average of 30′ tall in relation to the tower site but could potentially reach 60′; therefore, the displacement factor would be 45′ (60′ x .75). Since the trees are 10′ lower in elevation than the tower site we can subtract that from 45′ making our displacement factor 35′.

Using the equation on pg. 8 of the wind report supplement, the average wind speed at the hub height of 100 feet is calculated to be **11 mph** as averaged with 40% displacement height and 60% non-displacement height.

The turbines recommended for the site are also available on taller towers with different hub heights than the minimum tower height for site. A taller tower would provide for an increased wind speed which therefore increases the turbine output. Using the above equation, the wind speed for taller hub heights are as follows:

11.2 mph at 106′ hub height
11.4 mph at 110′ hub height
11.8 mph at 120′ hub height
11.9 mph at 126′ hub height
12.1 mph at 130′ hub height

Turbulence Intensity

For the purposes of wind system performance, a "TI" Turbulence Intensity factor is used to indicate how gusty a wind site will be. Turbulent sites with gusty winds have a TI factor of greater than 15% and can have adverse effects on energy production and increase maintenance due to more stress on the mechanical parts of the turbine. **A Turbulence Intensity factor of 20% is used in calculating system performance for this site.**

FAA Regulations

See Wind Report Supplement page 22.

Since the tower site is below the 200 foot level and there is not a public airport within 4 miles, no notice will be required to be filed with the FAA.

Zoning Considerations

See Wind Report Supplement pages 22-23.

Tower Choices:

There are several types of towers that can be used for residential size wind systems; the details of each tower type can be found in the Wind Report Supplement pages 9-10.

Wind System Recommendations

The following turbines are recommended for this site (See Appendix for system specifications)

Endurance Wind Power
http://www.endurancewindpower.com/

Bergey Excel-S
http://www.bergey.com/

Ventera VT10
http://www.venteraenergy.com/index.htm

SYSTEM PERFORMANCE

The Performance Table below reflects systems on a 100′ tower with 11 mph hub height wind speed, 106′ tower with an 11.2 mph hub height wind speed and a 110′ tower with an 11.4 mph hub height wind speed. The table is based on energy use of 12,000 kWh/yr. Performance figures are shown per turbine. Turbine performance is estimated and not guaranteed. A Turbulence Intensity factor of 20% is used in calculating system performance for this site. A displacement factor was used 40% of the time.
(*Table based from Seventh Generation Energy Systems, Wind Turbine Performance Model, version 10.75 output calculator)*

SITE INPUTS	**Mary XXXXX**				
Annual Energy Use (kWh/yr) =	12,000		Wind Shear Exp. =	0.25	per site assessment
Site Wind Speed from Map (mph) =	14.3	from wind map	Weibull K =	2.00	assume k = 2
Map Wind Speed Height (m) =	60	from wind map	Turbulence Intensity =	18%	per site assessment
Recommended Tower Height (ft) =	100	per site assessment	Displacement Factor	40%	
Site Altitude (ft) =	640	from topo map			

100′, 106′ and 110′ Tower Performance Table

Manufacturer	Endurance	Bergey	Ventera
Model	S-343	Excel-S	VT-10
Nameplate Capacity (kW)	5.0	10.0	10.0
Turbine capacity at 11 m/s (kW)	5.0	8.0	7.1
Output Voltage (V)	240	240	240
Phase	1	1	1
Rotor Diameter (ft)	21.0	23.0	22.0
Rotor Diameter (m)	6.4	7.0	6.7
Tower Height (ft)	**106**	**100**	**110**
Tower Height (m)	32	30	34
Total Structure Height AGL (ft)	117	112	121
Total Structure Height AGL (m)	36	34	37
PERFORMANCE			
Wind Speed at Hub Height (mph)	11.2	11.0	11.4
Annual Energy Output (kWh)	6881	9669	8581
Monthly Energy Output (kWh)	573	806	715
Wind Percent of Facility Energy Use	57.3%	80.6%	76.5%
Excess Energy Production (kWh/yr)	0	0	0
Turbine Capacity Factor at Rated Output	16%	11%	10%
Turbine Capacity Factor at 11m/s Output	16%	14%	14%

Taller towers are available for all systems specified on page 21. These taller towers would provide for an increased wind speed which would increase turbine output. The availability of a taller tower should be discussed with an installer.

The Performance Table below reflects systems on 120′ with an 11.8 mph hub height wind speed, 126′ with a 11.9 mph hub height wind speed and 130′ tower with 12.1 mph hub height wind speed. The table is based on energy use of 12,000 kWh/yr. Performance figures are shown per turbine. Turbine performance is estimated and not guaranteed. A Turbulence Intensity factor of 20% is used in calculating system performance for this site. A displacement factor was used 40% of the time. (*Table based from Seventh Generation Energy Systems, Wind Turbine Performance Model, version 10.75 output calculator)*

SITE INPUTS	**Mary XXXXX**				
Annual Energy Use (kWh/yr) =	12,000		Wind Shear Exp. =	0.35	per site assessment
Site Wind Speed from Map (mph) =	14.3	from wind map	Weibull K =	2.00	assume k = 2
Map Wind Speed Height (m) =	60	from wind map	Turbulence Intensity =	20%	per site assessment
Recommended Tower Height (ft) =	120	per site assessment	Displacement Factor =	40%	
Site Altitude (ft) =	644	from topo map			

120′, 126′ and 130′ Tower Performance Table

Manufacturer	Endurance	Bergey	Ventera
Model	S-343	Excel-S	VT-10
Nameplate Capacity (kW)	5.0	10.0	10.0
Turbine capacity at 11 m/s (kW)	5.0	8.0	7.1
Output Voltage (V)	240	240	240
Phase	1	1	1
Rotor Diameter (ft)	21.0	23.0	22.0
Rotor Diameter (m)	6.4	7.0	6.7
Tower Height (ft)	**126**	**120**	**130**
Tower Height (m)	38	37	40
Total Structure Height AGL (ft)	137	132	141
Total Structure Height AGL (m)	42	40	43
PERFORMANCE			
Wind Speed at Hub Height (mph)	11.9	11.8	12.1
Annual Energy Output (kWh)	8083	11519	10129
Monthly Energy Output (kWh)	674	960	844
Wind Percent of Facility Energy Use	67.3%	96%	84.4%
Excess Energy Production (kWh/yr)	0	0	0
Turbine Capacity Factor at Rated Output	18%	13%	12%
Turbine Capacity Factor at 11m/s Output	18%	16%	16%

SYSTEM COSTS

Final system costs are based on Focus on Energy grants available which are based on the system performance from the estimated wind speed for the site and tower height. System costs vary depending on tower selection and installation costs. Obtaining all grants is not guaranteed.

The table below shows estimated installed system costs with the maximum amount assumed for the Focus on Energy and USDA incentives. The Fed Tax Credit amounts per year would be determined by your tax advisor. Costs are shown with the Endurance S-343 on a 126′ Tilt-Up Tower, the Bergey XL-S on a 120′ Freestanding Lattice Tower and the Ventera on a 130′ Freestanding Lattice Tower. The table is based on energy use at 12,000 kWh / year with a utility rate of $0.174/kWh, which is averaged over the 20 year turbine life at a 4% annual rate escalation.

System	Endurance S-343	Bergey XL-S	Ventera VT10
System Costs	126′ Tower	120′ Tower	130′ Tower
System Cost and installation	$51,000	$63,737	$62,000
Cost per kW @ 11m/s system rating	$1,449	$1,150	$973
Operating & Maintenance cost per year	$510	$637	$620
Incentives and Grants			
Focus on Energy Reward Factor	1.85	1.45	1.59
Max Focus on Energy Reward available	$14,990	$16,686	$16,082
Focus on Energy Reward percent of cost	29.39%	26.18%	25.94%
System Cost after Focus on Energy Incentive	**$36,010**	**$47,051**	**$45,918**
WPS Matching Focus on Energy Grant	$14,990	$16,686	$16,082
System Cost after grants	**$21,020**	**$30,365**	**$29,836**
Financial Summary			
Net system cost after Incentives	**$21,020**	**$30,365**	**$29,836**
Electric Bill savings per year	$1,563	$2,228	$1,959
Revenue from Excess Energy	$0	$0	$0
Total Savings per year less O&M	$1,053	$1,590	$1,339
Lifetime $/kWh over 25 Years	$0.17	$0.16	$0.18

The table for system costs is based on an electric billing rate of $0.174 per kWh. Electric rates have increased in Wisconsin on average 5.5% each year since 2000 and are expected to keep rising each year. Although the current rate for electric is $0.117/kWh, electric rates are expected to increase over the life of the system; therefore lowering the simple payback. A conservative annual utility rate increase of 4% is used in the simple payback calculation over the 20 year system life.

O&M (operating and maintenance) is generally 1-2% of the installed system cost per year for 20kW and less machines. Annual preventative maintenance is required for any of the recommended systems and should be performed by a qualified installer.

FUNDING

See Wind Report Supplement pages 20-21.

The Focus on Energy and USDA grants are taxable to a business.

Focus on Energy Incentives: In the state of Wisconsin, the Focus on Energy program offers **Cash Back Rewards** for systems rated 20kW or less to support system installations for Wisconsin residents who are in the service territory of participating utilities. Focus on Energy also offers an **Implementation Grant** for systems 20kW-100kW. Funds and application times may be limited. The owner should contact Focus on Energy to confirm incentives. Grant incentives for 2010 need to be applied for by Dec. 31, 2010. See the Focus on Energy website for updates on incentives. Within 30 days of the approval of your Focus on Energy Incentive, the building or conditional use permit must be applied for with your municipality. This permit must be secured within 90 days of the Focus on Energy incentive. It is usually best to apply for the building permit just before you send in the grant application in case you run into any permit approval delays. Building permits are usually good for 1 year, so if it is immediately approved you will still have time for construction.

Small Wind Systems Tax Credit: The Emergency Economic Stabilization Act of 2008, H.R. 1424, was enacted into law and includes a new federal-level investment tax credit (ITC) to help consumers purchase small wind turbines for home, farm, or business use. Owners of small wind systems with 100 kilowatts (kW) of capacity and less can receive a **credit for 30% of the total installed cost of the system**. **For residential customers, this amount is taken after the Focus on Energy grants. For business customers, the full 30% of the installed cost before any other incentives can be taken.** The credit will be available for equipment installed through December 31, 2016. The tax credit can also be taken in the form of a grant from the US Treasury Dept. If the customer is taking the USDA grant, the Fed Tax Credit of 30% cannot be taken as a grant and would simply be a tax credit. Direction to obtain this grant is in process. **Exercising the tax credit or grant should be discussed with your tax advisor.**

CONCLUSION and RECOMMENDATIONS

Mary XXXXX's property is located in an area of the state with higher average winds speeds than most of Wisconsin. The higher wind speeds and open landscape will ensure good system performance and production. With the available grant from Focus on Energy and matching WPS grant, the installation of a wind system at the XXXXX's is feasible. The inevitable increase of electric rates also makes the project more feasible by lowering the simple payback of the wind energy system. Installing a wind system will allow Mary to fix a portion of her electric costs now and in the future. The recommendations to lower electric consumption should be followed to reduce consumption before a wind system is installed.

The installation of a wind system at the XXXXX's site would be a progressive example of the future of energy production. They could produce approximately 57-96% of their electric needs with the turbines recommended in this report.

The cost table on page 22 of this assessment reflects systems on the taller tower heights. These taller towers are available for all of the systems recommended. If a taller tower is used it would increase system performance due to higher wind speeds. Greater system performance would increase excess energy production, which would lower the total system payback.

What follow up, if any, needs to be done by the client.
Also see Wind Report Supplement

- Review/contact qualified installers list for current prices and installation costs. (A list of certified Full Service Wind System Installers in WI is attached)
- Check with **WPS** to discuss the grid intertie procedures and requirements, insurance issues, and to verify buy-back rates. The renewable energy inter-connection contact at WPS is John Christiano at 920-433-1869.

Materials enclosed with site audit: FULL SERVICE INSTALLER LIST