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Details:

(FORM UPDATED: 08/11/2010)

WISCONSIN STATE LEGISLATURE ...
PUBLIC HEARING - COMMITTEE RECORDS

2009-10

(session year)

Senate

(Assembly, Senate or Joint)

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

COMMITTEE NOTICES ...

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

INFORMATION COLLECTED BY COMMITTEE FOR AND AGAINST PROPOSAL

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

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

Noise, Sleep, and Illness

Some people say a wind turbine is no louder than the refrigerator in your kitchen. Others say it sounds like a tennis shoe bouncing around in a clothes dryer or standing near a small concrete mixer. Listen to the sound of a wind turbine and judge for yourself.
ABC NEWs wind turbine recording

The Mayo Clinic found that noise affects your sleep. If you do not get a good nights sleep you will get sick. Wind turbine can cause enough noise to disturb sleep if the noise level is above 35 decibles. Wind turbines must be kept far enough away from a home at night so that people can sleep.

A 1.7 Megawatt turbine produces 35 decibels at a distance is 10,000 feet when producing full power output.

The Meyo clinic found that the snoring of your bed parner can cause you to have sleep apnea. They find that there may be a serious health impact because of this.
Mayo Clinic-Snoring and Sleep Quality

The Mayo clinic found that even in a hospital where patients are recovering that the noise levels were affecting their sleep.
Mayo Clinic - hospital noise study

The Mayo clinic gives reports on the relationship between sleep Apnea and Cardiac death.
mayo clinic sleep Apnea Cardiac death

Dr. Nina Pierpont has many patients who have gotten sick after living near wind turine noise.
Wind turbines noise causes illness

If you have a high speed Internet connection, you can listen to Dr. Pierpont speak about wind turbine noise and illness.
Dr. Nina Pierpont talks about noise

A news report on wind turbine noise in Oregon

The world Health Organization says that loud noise from many sources is making people sick.
World Health Organization

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Changes in Wind Turbine Setbacks
Note that Setbacks can have both Physical Safety Rationale for Reasons of Protection from Injury And Noise Rationale for Reasons of Annoyance and Health Effects

Location / Nation	Original Setback and Basis	Revised Setback and Basis
United Kingdom	Derek Taylor -1991 "How to Plan the Nuisance Out of Wind Energy" suggested setback from wind turbines with a 30 metre rotor to roadways and lot lines, of 50 metres adequate to a lightly traveled road, 100 metres to a heavily traveled road, and 120 to 170 metres to a home.	UK Noise Association – 2006 states, "It would be prudent that no wind turbine should be sited closer than 1 mile (1600 metres) from the nearest dwellings … Wind farms should only be located in areas where the "swish, swish, swish" of the turbines will not cause noise problems for people."
United Kingdom – Scotland	From the limits identified above …	Scottish Planning Policy SPP6 – Renewable Energy (2007) http://www.scotland.gov.uk/Publications/2007/03/22084213/20 … When considering spatial policies, planning authorities may consider it helpful to introduce zones around communities as a means of guiding developments to broad areas of search where visual impacts are likely to be less of a constraint. PAN 45 confirms that development up to 2 km is likely to be a prominent feature in an open landscape. The Scottish Ministers would support this as a separation distance between turbines and the edge of cities, towns and villages …
France	From no limits for safety setbacks … Original setbacks were that noise at night should not exceed 3 dBA above background sound at night (background may be 25 to 30 dBA at night in rural areas)	Administrative Court of Appeal – Lyon, April 2006, determined a "zone of protection of 500 metres" from wind turbines to areas where people can be. Academy of Medicine, March 2006 recommended a setback of 1500 metres from wind turbines to homes until an epidemiological study could be carried out to determine health effects.
Nova Scotia	Pubnico Point Wind Farm – No standard – resulted in setback from turbine to home of 370 metres, and sound up to 13 dbA above the Ontario limit of 40 dBA.	Glen Dhu Wind Farm – October 2008, established setbacks of 1200 metres from homes of participating residents, and 1440 metres from non-participating residences.
The Netherlands	In 2000 used sound limits with a rising limit as ground level wind speed rose. Limit was 40 dBA at 1 m/s and increased to 50 dBA at 12m/s. *(Ontario used this as a model to develop its sound limits, although Ontario limits allowed 53 dBA at 12m/s, and continue to allow 51 dBA at 11 m/s even after revision).*	In 2007, the Netherlands changed to a fixed upper limit for wind turbine sound of 40 dBA – recognizing the change in wind profile at night. The Netherlands is currently investigating a new monitoring method based on Lden. This is a rating of community noise exposure that differentiates between daytime, evening and nighttime noise exposure, and penalizes nighttime noise.

Germany	Rural noise from wind turbines is limited to 35 dBA at night.	*Compare Ontario's 51 dBA nighttime limit and Germany's 35 dBA limit - note that every 6 dBA (e.g. 35 vs 41 dBA) difference means the turbines in Germany will be twice as far away as in Ontario – a 12 dBA difference (e.g, 35 vs 47 dBA) means they are 4 times further away in Germany than Ontario.*
Sweden	Limits noise to 35 dBA in recreational areas in evening and at night, and to 40 dBA in residential areas at night. The measurement must be done with 10 metre wind speeds of 8 m/s. *Ontario regulations permit 45 dBA at 8 m/sec.*	
European Union		Within the European Union the Commission has made a proposal for common noise immission level descriptions and evaluation methods. It is primarily intended for traffic noise but can be expanded to include other areas, such as wind power noise. It suggests an equivalent annual average sound level (Lden) where the night level has a penalty of 10 dBA and the evening level of 5 dBA. The day is in this case is 12 hours, the evening 4 hours and the night 8 hours.
New Zealand	NTS6808:1998 "The Assessment and Measurement of Sound From Wind Turbines" requires the calculation of a background noise level prior to construction of a wind farm. NTS68001:1991 limits sound from all activity except wind turbines to 35 dBA from 8:00 PM to 7:00 AM. NTS6808 limits sound from wind turbines to 40 dBA or 5dBA over background sound. Sounds with a "special audible characteristic" (clearly audible tones, impulses, or modulation of sound level) shall have a 5 dBA penalty.	The Environmental Court of New Zealand issued a decision July 20, 2007, that required that when the background sound conditions are at 25 dBA or less, the noise from a wind farm shall not exceed 35 dBA at any dwelling as an absolute limit. *Sound levels in rural Ontario are typically less than 35 dBA at night. Yet, Ontario continues to have guidelines that allow up to 51 dBA, and rejects applying a penalty for cyclic noise as New Zealand does.*
Hydro One-System Networks	2005 to Dec 2007 – setback of overall height of turbine (tower plus blade radius) to edge of right of way. Dec 2007 to July 2008 – increased setback to greater of 150 metres or overall height of turbine.	As of July 2008 increased setbacks to edge of right of way for 500 kV assets (critical assets) of 500 metres, to 230 kV (redundant assets) of 250 metres, and to 115 kV assets (for which loss tends to be an inconvenience but not a significant one) of 150 metres.
CanWEA – Proposed By-Laws for Rural Municipalities in Ontario	Recommends setbacks to lot lines of non-participating property, road right of ways, or non residential buildings on a participating property need not exceed blade length plus 10 metres (typically 51 metres) Recommends setbacks to residential buildings should not be less than 200 metres (or as required to meet MOE CofA requirements)	*Interesting to compare the 51 metres that CanWEA reconnnds to protect the lives of people, compared to the 500 metre safety setback that Hydro One calls for to protect its critical assets.* *From this should one conclude that the lives of people do not matter as much as a hydro line?*

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Distance vs Decibels

A comparison of 95 db, 105 db, and 110 db wind turbine

The chart gives the calculated results for a single wind turbine with no temperature inversion present. The sound would seem much louder during a temperature inversion.

95 db TURBINE		105 db TURBINE		110 db TURBINE	
Distance Feet	decibels	Distance Feet	decibels	Distance Feet	decibels
3.28	95.1	3.28	105.0	3.28	110.0
30	75.8	30	85.8	30	90.8
100	65.4	100	75.3	100	80.3
200	59.3	200	69.3	200	74.3
300	55.8	300	65.8	300	70.8
400	53.3	400	63.3	400	68.3
500	51.4	500	61.3	500	66.3
600	49.8	600	59.8	600	64.8
700	48.5	700	58.4	700	63.4
800	47.3	800	57.3	800	62.3
900	46.3	900	56.2	900	61.2
1000	45.4	1000	55.3	1000	60.3
1100	44.5	1100	54.5	1100	59.5
1200	43.8	1200	53.7	1200	58.7
1300	43.1	1300	53.0	1300	58.0
1400	42.4	1400	52.4	1400	57.4
1500	41.8	1500	51.8	1500	56.8
1600	41.3	1600	51.2	1600	56.2
1700	40.8	1700	50.7	1700	55.7
1800	40.3	1800	50.2	1800	55.2
1900	39.8	1900	49.7	1900	54.7
2000	39.3	2000	49.3	2000	54.3
2500	37.4	2500	47.4	2500	52.4
3000	35.8	3000	45.8	3000	50.8
4000	33.3	4000	43.3	4000	48.3
5000	31.4	5000	41.3	5000	46.3
6000	29.8	6000	39.8	6000	44.8
7000	28.5	7000	38.4	7000	43.4
8000	27.3	8000	37.3	8000	42.3
9000	26.3	9000	36.2	9000	41.2
10000	25.4	10000	35.3	10000	40.3
				11000	39.5
				12000	38.7
				13000	38.0
				14000	37.4
				15000	36.8
				16000	36.2
				17000	35.7
				18000	35.2
				19000	34.7
				20000	34.3

At the present time (1-14-2009), the Wisconsin Public Service Commission allows a wind turbine to be within 1000 feet of a house; this regulation needs to be reconsidered. After 20 years,the turbines are replaced with

newer larger wind turbines; larger wind turbines produce more noise.

If the home owner agrees, a wind turbine can be built within 600 feet of a home. The home owner can move but the wind turbine stays. The next person has to live with the noise. Apparently, wind turbines can be very noisy. The wind turbine contracts are for 30 years or more.

When the turbines are operating at full power:
At 1,000 feet, the 95 db turbine produces 45 db.
At 1,000 feet, the 105 db turbine produces 55 db.
At 1,000 feet, the 110 db turbine produces 60 db.

After over 20 years experience with wind turbines, the Europeans consider 43 db a reasonable sound level during the day-light hours.
This occurs at 1300 ft for the 95 decibel turbine.
This occurs at 4000 ft for the 105 decibel turbine.
This occurs at 7000 ft for the 110 decibel turbine.

The World Health Organization recommends 35 db for sleeping.
This occurs at 3000 ft for the 95 decibel turbine.
This occurs at 10000 ft for the 105 decibel turbine.
This occurs at 12000 ft for the 110 decibel turbine.

A 0.85 Megawatt turbines (95 decibels) in Northeast Illinois. JONESBURG
A 1.67 Megawatt turbines (105 decibels) near ~~Julesburg,~~ WI.
To be built, 2.0 Megawatt turbines (110 decibels) near Randolph, WI.

A wind turbine produces less noise, if you slow it down and have it produce less electricity. You would do this during an open house for safety reasons but normally you generate as much electricity as you can.

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HTTP://WWW.MATH3.COM

ALL IN LOWER CASE

Distance vs Decibels of Noise

for 0.8 megawatt turbine at 95 decibel

The chart gives the calculated results for a single wind turbine with no temperature inversion present. The sound would seem much louder during a temperature inversion.

PAGE 1 11-28-07 Conversion AREA 4XPI (R^2) Meters^2	95 decibel source Intensity Vibration of air Watts/square Meter	Intensity comparison To 1,000 ft Value	Sphere spreading Intensity comparison To 10,000 ft Value	Distance Feet	11-28-07 sound PAGE 3 decibels	Lou Con To 1 Valu
12.6	0.0032000000	92950.62	9295062.5	3.28	95.1	
1050.7	0.0000382521	1111.11	111111.1	30	75.8	
11674.6	0.0000034427	100.00	10000.0	100	65.4	
46698.4	0.0000008607	25.00	2500.0	200	59.3	
105071.4	0.0000003825	11.11	1111.1	300	55.8	
186793.6	0.0000002152	6.25	625.0	400	53.3	
291865.0	0.0000001377	4.00	400.0	500	51.4	
420285.5	0.0000000956	2.78	277.8	600	49.8	
572055.3	0.0000000703	2.04	204.1	700	48.5	
747174.3	0.0000000538	1.56	156.3	800	47.3	
945642.5	0.0000000425	1.23	123.5	900	46.3	
1167459.8	0.0000000344	1.00	100.0	1000	45.4	
1412626.4	0.0000000285	0.83	82.6	1100	44.5	
1681142.2	0.0000000239	0.69	69.4	1200	43.8	
1973007.1	0.0000000204	0.59	59.2	1300	43.1	
2288221.3	0.0000000176	0.51	51.0	1400	42.4	
2626784.7	0.0000000153	0.44	44.4	1500	41.8	
2988697.2	0.0000000134	0.39	39.1	1600	41.3	
3373959.0	0.0000000119	0.35	34.6	1700	40.8	
3782569.9	0.0000000106	0.31	30.9	1800	40.3	
4214530.0	0.0000000095	0.28	27.7	1900	39.8	
4669839.4	0.0000000086	0.25	25.0	2000	39.3	
7296624.0	0.0000000055	0.16	16.0	2500	37.4	
10507138.6	0.0000000038	0.11	11.1	3000	35.8	
18679357.5	0.0000000022	0.06	6.3	4000	33.3	
29186496.1	0.0000000014	0.04	4.0	5000	31.4	
42028554.4	0.0000000010	0.03	2.8	6000	29.8	
57205532.4	0.0000000007	0.02	2.0	7000	28.5	
74717430.1	0.0000000005	0.02	1.6	8000	27.3	
94564247.5	0.0000000004	0.01	1.2	9000	26.3	
116745984.5	0.0000000003	0.01	1.0	10000	25.4	

A 0.8 megawatt wind turbine when operating at full output produces more than 95 decibels of noise. A turbine can be adjust remotely to reduce or increase electrical output and noise.

The chart shows that 45 db (decibels) occurs at 1,000 feet. Smaller wind turbines produce less electrical output less and noise if they rotate at the same rate as larger wind turbines.

After over 20 years experience with wind turbines, the Europeans consider 43 db the maximum amount of noise that they want to hear from a wind turbines; 43 db occurs at 1,300 ft from the turbine.
The 35 db level recommend by the World Health Organization for sleeping is at 3,200 feet from the wind turbine.

The chart show the vibrational Intensity in the air measured in watts per square meter and the sound level that a person will hear measured in decibels at various distances from the wind turbine. The distances are given in feet but the calculations are done using metric units.

Vibration intensity is the power or energy of the sound vibration in the air. The decibel is a unit which measures the loudness that a person hears. There are at least three different equations that can be used to calculate the decibel. The equation used here compared the vibrational intensity to the weakest sound a person can hear. The weakest sound a person can hear is 0.000000000001 or 1 E-12 watts per square meter. The weakest sound you can hear is a very quiet whisper.

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Distance vs Decibels of Noise

The chart gives the calculated results for a single wind turbine with no temperature inversion present. The sound would seem much louder during a temperature inversion.

sound spreading as a sphere from a 105 decibel source

Conversion AREA 4XPI (R^2) Meters^2	Intensity Vibration of air Watts/square Meter	Intensity comparison To 1,000 ft Value	Intensity comparison To 10,000 ft Value	Distance Feet	sound decibels	Loud Com To 1(Va
12.6	0.0316000000	92950.62	9295062.5	3.28	105.0	1
1050.7	0.0003777394	1111.11	111111.1	30	85.8	
11674.6	0.0000339965	100.00	10000.0	100	75.3	
46698.4	0.0000084991	25.00	2500.0	200	69.3	
105071.4	0.0000037774	11.11	1111.1	300	65.8	
186793.6	0.0000021248	6.25	625.0	400	63.3	
291865.0	0.0000013599	4.00	400.0	500	61.3	
420285.5	0.0000009443	2.78	277.8	600	59.8	
572055.3	0.0000006938	2.04	204.1	700	58.4	
747174.3	0.0000005312	1.56	156.3	800	57.3	
945642.5	0.0000004197	1.23	123.5	900	56.2	
1167459.8	0.0000003400	1.00	100.0	1000	55.3	
1412626.4	0.0000002810	0.83	82.6	1100	54.5	
1681142.2	0.0000002361	0.69	69.4	1200	53.7	
1973007.1	0.0000002012	0.59	59.2	1300	53.0	
2288221.3	0.0000001735	0.51	51.0	1400	52.4	
2626784.7	0.0000001511	0.44	44.4	1500	51.8	
2988697.2	0.0000001328	0.39	39.1	1600	51.2	
3373959.0	0.0000001176	0.35	34.6	1700	50.7	
3782569.9	0.0000001049	0.31	30.9	1800	50.2	
4214530.0	0.0000000942	0.28	27.7	1900	49.7	
4669839.4	0.0000000850	0.25	25.0	2000	49.3	
7296624.0	0.0000000544	0.16	16.0	2500	47.4	
10507138.6	0.0000000378	0.11	11.1	3000	45.8	
18679357.5	0.0000000212	0.06	6.3	4000	43.3	
29186496.1	0.0000000136	0.04	4.0	5000	41.3	
42028554.4	0.0000000094	0.03	2.8	6000	39.8	
57205532.4	0.0000000069	0.02	2.0	7000	38.4	
74717430.1	0.0000000053	0.02	1.6	8000	37.3	
94564247.5	0.0000000042	0.01	1.2	9000	36.2	
116745984.5	0.0000000034	0.01	1.0	10000	35.3	

A 1.65 megawatt wind turbine when operating at full output produces more than 105 decibels of noise at a wind speed of 13 m/sec. Large wind turbines produce more electricity but they also produce more noise.

If you stand near a wind turbine, it may seem relatively quiet. The noise produced by the wind turbine depends on wind speed, temperature, power out, distance from the wind turbine, and your hearing ability. A lot of the noise produced by a wind turbine is below the human hearing range; you can't hear it but it still affects you. Men seem to hear the lower frequencies more than woman.

The chart shows that 55 db (decibels) occurs at 1,000 feet. This is consider reasonable by many companies that install wind turbines.

After over 20 years experience with wind turbines, the Europeans consider 43 db the maximum amount of noise that they want to hear from a wind turbine during the day-light hours; 43 db occurs at 4,000 ft from the turbine.
The 35 db level recommend by the World Health Organization for sleeping is at 1,000 feet from the wind turbine.

Notice that 43 db occurs at 4,000 ft. This is the current value that the Europeans consider reasonable after over 20 years experience with wind turbines. The 35 db level recommend for sleeping by the World Health Organization is at 10,000 feet (1.9 miles) from the wind turbine.

The chart show the vibrational Intensity in the air measured in watts per square meter and the sound level that a person will hear measured in decibels at various distances from the wind turbine. The distances are given in feet but the calculations are done using metric units (which is the official measurement system of the United States and most of the world).

Vibration intensity is the power or energy of the sound vibration in the air. The decibel is a unit which measures the loudness that a person hears. There are at least three different equations that can be used to calculate the decibel. The equation used here compared the vibrational intensity to the weakest sound a person can hear. The weakest sound a person can hear is 0.000000000001 or 1 E-12 watts per square meter. The weakest sound you can hear is a very quiet whisper.

The calculations are on the next page.

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Calculation Explained

A	B	C	D
x= Log(y)	db = 10 log(VI / 1E-12))	10.5 =log(VI / 1E-12)	VI = P / A or P =V I x A
10^x= y			IF R = 1 METER
	105db =10 log(VI / 1E-12)	10^10.5= VI / 1E-12	P = VI X (4 PI R^2)
2 = log (100)			P = 0.3969 WATTS
10 ^ 2 = 100		(10^10.5) (1E-12) = VI	
		0.031622776602 = VI	
		0.0316 = VI	
		Watts / square meter	

Vibration intensity is the power or energy of the sound vibration in the air. The decibel is a unit which measures the loudness that a person hears.

There are at least three different equations that can be used to calculate the decibel. The equation used here compared the vibrational intensity to the weakest sound a person can hear. The weakest sound a person can hear is 0.000000000001 or 1 E-12 watts per square meter (a very quiet whisper).

In column A, we have an equation involving logarithms and it's equivalent equation using exponents. The decibel equation is in column B. The decibel value in this case is 105 db.

The total noise produced by the source should be measured in watts but wind turbines give the total noise in decibels. The equation for the decibel is used to determine the watts per square meter at the wind turbine. A 1.65 MW turbine is rated at 105 decibels or 10.5 bels.

VI in the equation is the unknown. The energy value that is used for comparison is 1 E-12 watts/square meter (the weakest sound most people can hear). The last equation in column B is devided by ten and becomes the first equation in column C. The equation is change from its logarithmic form to the exponent form. Using algebra and a calculator, the VI (vibrational intensity of the wind turbine) is determined to be .0316 (to three significant figures).

The equation for power,vibrational intensity, and area is given in column D. Normally you know the power output of the sound source and use it to determine the decibel level at a distance from the source. In this case, we have the decibel level and are trying to find the power of the source.

The area in the equation is the surface area of the sphere through which the energy is passing. The equation for area of a sphere is A = 4 (3.14) Radius squared. In optics the radius of 1 meter is chosen when calibrating a light bulb. The wind turbine companies do not tell how they calilbrate the noise output of the wind turbine.

The nacelle of a wind turbine is a lot bigger than a sphere with a 1 meter radius. It is rectangle of about 3 meters by 3meters by 8 meters or an area of 2 ends 3 x 3 and 4 sides 3 x 8. This is 18

+ 96 or 114 square meters. The area of a sphere with a radius of 1 meter would be 4 x 3.14 x 1 x 1 or 12.6 square meters.

If the two areas are compared (114/12.6 = 9) the area of the nacelle is 9 times the area of the sphere. I used the area of the sphere for the table. If I had used the area of the Nacelle, all the values of vibratiion intensity would be 9 times larger and the decibel levels would all be 9 decibles larger. When sound experts measure the wind turbine noise at 1000 feet from this size turbine they get approximately 55 decibels which is what the value is in the table.

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Calculation Explained continued

A 1.65 MW turbine is rated at 105 decibels or 10.5 bels.

The noise source (wind turbine) should be measured in watts but wind turbine companies give the total noise in decibels and most of the time don't give a value at all.

Vibration intensity is the power or energy of the sound vibration in the air. The decibel is a unit which measures the loudness that a person hears. If the vibrational intensity is made 10 times greater, the sound becomes twice as loud. This is a 10 decibel increase on the sound scale.

Some people can detect a change of 2 decibels but most people require a change of 3 decibels to notice a change in loudness of a sound if the frequency is unchanged. If the frequency is change or the sound is produced by a beat, people will notice the sound; if the sound change occurs frequently, it can be very annoying. Wind turbines can produce that type of sound.

The weakest sound a person can hear is 0.000000000001 or 1 E-12 watts per square meter (a very quiet whisper).

Sound is a sensation heard by the ear caused by the vibrational intensity on the ear. This is most common in air but people can also hear sound under water . decibels = 10log(Vibrational Intensity / 1E-12 watts per square meter

The decibel equation is a logrithmic equation. Because of the way the inner ear is constructed, if a person is exposed to an increase of ten times the vibrational intensity, it seems like the sound is only twice as loud.

The values of decibels and intensity in the chart are based on equations and represent and ideal situation. In an actual situation, these values would be larger because the sound waves are affected by reflection, refraction, absorption, temperature, and other wave interactions.

Different sound experts could make measurement under similar conditions and get variations in their readings of several decibels. It they measured the sound at different times of the day or under different weather conditions, there could be large differences in the decibel readings in the chart.

The total noise produced by the source should be measured in watts but wind turbines give the total noise in decibels. The equation for the decibel is used to determine the watts per square meter at the wind turbine. A 1.65 MW turbine is rated at 105 decibels or 10.5 bels.

VI in the equation is the unknown. The energy value that is used for comparison is 1 E-12 watts/square meter (the weakest sound most people can hear). The last equation in column B is devided by ten and becomes the first equation in column C. The equation is change from its logarithmic form to the exponent form. Using algebra and a calculator, the VI (vibrational intensity of the wind turbine) is determined to be .0316 (to three significant figures).

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source.

The area in the equation is the surface area of the sphere through which the energy is passing. The equation for area of a sphere is A = 4 (3.14) Radius squared. In optics the radius of 1 meter is chosen when calibrating a light bulb. The wind turbine companies do not tell how they calilbrate the noise output of the wind turbine.

The nacelle of a wind turbine is a lot bigger than a sphere with a 1 meter radius. It is rectangle of about 3 meters by 3 meters by 8 meters or an area of 2 ends 3x3 and 4 sides 3 x 8. This is 18 + 96 or 114 square meters. The area of a spherewith a radius of 1 meter would be 4 x 3.14 x 1 x 1 or 12.6 square meters.

If the two areas are compared (114/12.6 = 9) the area of the nacelle is 9 times the area of the sphere. I used the area of the sphere for the table. If I had used the area of the Nacelle, all the values of vibratiion intensity would be 9 times larger and the decibel levels would all be 9 decibles larger. When sound experts measure the wind turbine noise at 1000 feet from the this size turbine they get approximately 55 decibels which is what the value is in the table.

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Distance vs Noise in Decibels

For a 2.0 Megawatt (110 decibel) Wind Turbine

The chart gives the calculated results for a single wind turbine with no temperature inversion present. The sound would seem much louder during a temperature inversion.

PAGE 1 11-28-07 110 decibel source 11-28-07 1

Conversion AREA 4XPI (R^2) Meters^2	Intensity Vibration of air Watts/square Meter	Intensity comparison To 1,000 ft Value	Intensity comparison To 10,000 ft Value	Distance Feet	PAGE 3 decibels
12.6	0.1000000000	92950.62	9295062.5	3.28	110.0
1050.7	0.0011953778	1111.11	111111.1	30	90.8
11674.6	0.0001075840	100.00	10000.0	100	80.3
46698.4	0.0000268960	25.00	2500.0	200	74.3
105071.4	0.0000119538	11.11	1111.1	300	70.8
186793.6	0.0000067240	6.25	625.0	400	68.3
291865.0	0.0000043034	4.00	400.0	500	66.3
420285.5	0.0000029884	2.78	277.8	600	64.8
572055.3	0.0000021956	2.04	204.1	700	63.4
747174.3	0.0000016810	1.56	156.3	800	62.3
945642.5	0.0000013282	1.23	123.5	900	61.2
1167459.8	0.0000010758	1.00	100.0	1000	60.3
1412626.4	0.0000008891	0.83	82.6	1100	59.5
1681142.2	0.0000007471	0.69	69.4	1200	58.7
1973007.1	0.0000006366	0.59	59.2	1300	58.0
2288221.3	0.0000005489	0.51	51.0	1400	57.4
2626784.7	0.0000004782	0.44	44.4	1500	56.8
2988697.2	0.0000004203	0.39	39.1	1600	56.2
3373959.0	0.0000003723	0.35	34.6	1700	55.7
3782569.9	0.0000003320	0.31	30.9	1800	55.2
4214530.0	0.0000002980	0.28	27.7	1900	54.7
4669839.4	0.0000002690	0.25	25.0	2000	54.3
7296624.0	0.0000001721	0.16	16.0	2500	52.4
10507138.6	0.0000001195	0.11	11.1	3000	50.8
18679357.5	0.0000000672	0.06	6.3	4000	48.3
29186496.1	0.0000000430	0.04	4.0	5000	46.3
42028554.4	0.0000000299	0.03	2.8	6000	44.8
57205532.4	0.0000000220	0.02	2.0	7000	43.4
74717430.1	0.0000000168	0.02	1.6	8000	42.3
94564247.5	0.0000000133	0.01	1.2	9000	41.2
116745984.5	0.0000000108	0.01	1.0	10000	40.3
141262641.3	0.0000000089	0.01	0.8	11000	39.5
168114217.7	0.0000000075	0.01	0.7	12000	38.7
197300713.9	0.0000000064	0.01	0.6	13000	38.0
228822129.7	0.0000000055	0.01	0.5	14000	37.4
262678465.2	0.0000000048	0.00	0.4	15000	36.8
298869720.4	0.0000000042	0.00	0.4	16000	36.2
337395895.3	0.0000000037	0.00	0.3	17000	35.7
378256989.9	0.0000000033	0.00	0.3	18000	35.2
421453004.2	0.0000000030	0.00	0.3	19000	34.7
466983938.1	0.0000000027	0.00	0.3	20000	34.3

A 2.0 megawatt wind turbine when operating at full output produces 110 decibels of noise. Larger wind turbines produce more electricity than smaller ones but they also produce more noise. The turbine can be adjust remotely to reduce or increase electrical output and noise. The more power they produce, the more income the company receives.

The chart shows that 60 db (decibels) at 1,000 feet.
After over 20 years experience with wind turbines, the Europeans consider 43 db the maximum amount of noise that they want to hear from wind turbinesduring day-light hours; 43 db occurs at 7,000 ft from the turbine.
The 35 db level recommend by the World Health Organization for sleeping is at 18,500 feet (3.4 miles) from the wind turbine.

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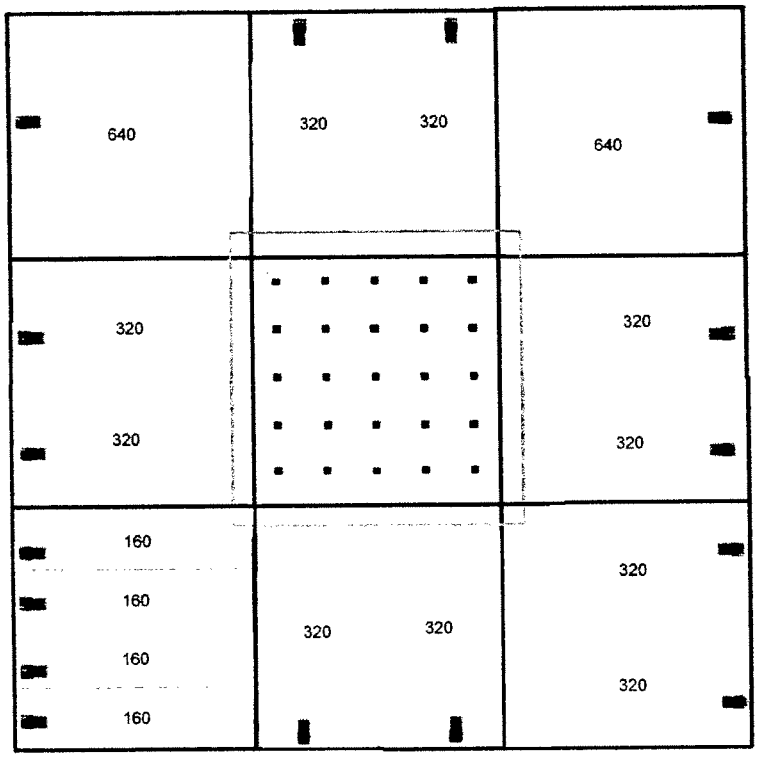
wind topics

A wind farm design that causes less problems for the Neighbors

Wind Turbine noise is the biggest problem for people who live near wind turbines. The latest medical information suggest that this noise is causing health problems. There will be lawsuits which will cause problems for the electric utilities.



The wind farm located 3 miles northwest of Palm Springs, California has 4,000 wind turbines. It use to be 5 miles from the city but the wind turbines and the city are now approximately 2 miles apart.

The 4,000 wind turbines have to make a lot of noise. Apparently, the noise is reduced by keeping the wind turbines in one area and 2 miles away from the people. The midwestern states are more populated than the dessert areas of the west but the same ideas can be used. This sketch shows how I think a wind farm should be built to improve wind turbine safety. The ideas can be applied to build similar wind farms. The area involved is nine 1 mile squares which have approximately 640 acres each. The 25 wind turbines are space 1000 feet apart in the center square.

The farms are located in the surround eight squares. The outer eight squares are divided into farms of various acreage with the farm buildings located on the outside perimeter of the squares. The farm buildings are about 5,000 feet from the nearest turbines; this should noise levels to less 43 db or less if 110 db turbines are used.

The farmers can work their fields near the wind turbines but they should be wearing hearing

protection. The decibel level should be about 55 db. The pink area on the sketch represents a 500 foot wide area which no farmers will enter for safety reasons. This area could be used for electrical substations, storage, and repair buildings.

The heavy black line represent the county roads. Pole with lightning arrestors should be put on farm buildings and along the roads to reduce static charges in thunder clouds. This should help reduce lightning strikes on wind turines; lightning strikes are suspected of causing wind turbine blade cracks. No every county is cut up into 1 mile squares but the same ideas can be applied. If you find an area which could form a similar square perimeter but covered more ground, you could have larger farms or more wind turbines in the center square.

Power plants are not built just to last for 30 years; once a site has been found for wind turbines, they will be there for 100 years or more; Every 20 or so years the old turbines will be replaced with new turbines which produce more electricity but less noise than the previous turbines.

Having the turbines in a group should reduce construction and maintenance cost. There will be cost for buying the center 1 mile square, for moving farmers, buying up farms, and surveying out new lot lines. It will be less costly if an area is chosen where few farmers are living; it cost money to move or build buildings for farmers on the outer perimeter. The more farms involved in the project the more complicated it becomes.

Wind turbine noise can be reduced to safe levels in several ways:

1. The turbines should be built farther from the people so that the noise is below safe decibel limits.

2. Smaller wind turbines should be built in populated areas to reduced noise levels to safe levels. The Chart for the 2.0 megawatt (110 db) wind turbine shows that it would require large distances between people and wind turbines to avoid unsafe noise levels.

3. Wind turbines should be built in locations where temperature inversions are less likely to occur. Wind Farms built on level ground or small hillls away from large bodies of water (lakes) have the least problems with noise caused by temperature inversions.There will problems with temperature inversions caused by air masses moving into an area but these can not be avoided.

Wind farms built within 10 miles of large bodies of water such as Lake Michigan or Lake Winneabago in Wisconsin usually have temperature inversion problems. Wind farms built on the sides of mountains cause problems for people living at lower levels at distances of 2 to 4 miles from the turbines.

4. No one person is an expert on how to build the perfect wind farm, you need the input of a lot of people who work in that area. Accurate, honest information is needed and that is difficult to get. Before a wind farm is build, a sound expert who has years of experience measuring industrial noise and turbine noise should be consulted. There is a shortage of experienced sound experts who make wind turbine measurements.

Organizing this material on wind turbines was a challenge. I have read about wind turbines for about two years and have visited several wind farms. I have degrees in physics and mathematics. I asked a sound expert to explain sound pulses of wind turbine noise.

Richard James (the sound expert) **explained wind turbine sound pulses with examples that you do not find in most physics texts. He has measured wind turbine noise and other industrial noise all over the United States for more than 30 years.**

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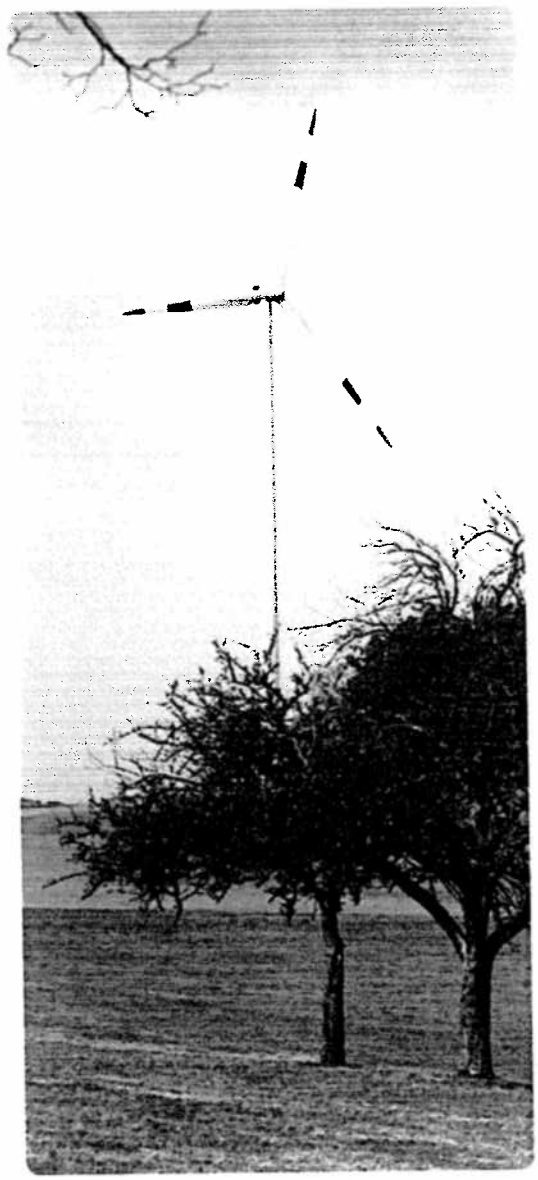
wind topics

V82-1.65 MW

Creating more from less

Vestas®

No. 1 in Modern Energy



Optimised for low and medium winds

With its large rotor and powerful generator, the V82 is an excellent performing turbine for sites with low and medium wind conditions. Our hydraulic Active-Stall® technology ensures that the rotor gathers the maximum power from the prevailing wind, while minimising loads and controlling output. Active-Stall® provides failsafe protection in all conditions and, above its rated wind speed, maintains a steady output of 1.65 MW. With the V82, we have designed a wind turbine that offers unparalleled performance at a cost-effective price.

Grid compliance

As wind turbines capture more of the electricity market each year, they have an increasingly significant role to play in grid management. Fortunately, the V82 meets most grid demands, and with the installation of our advanced grid compliance system, the V82 will actually help stabilise the grid. The turbine can run at full capacity during grid disturbances. Vestas grid support features full load and static phase compensation to enhance reactive power regulation and thus keep the power factor in range. Moreover, our grid support provides continuous active and reactive power regulation to maintain voltage balance in the grid, as well as fault ride-through in the event of disturbances.

High reliability

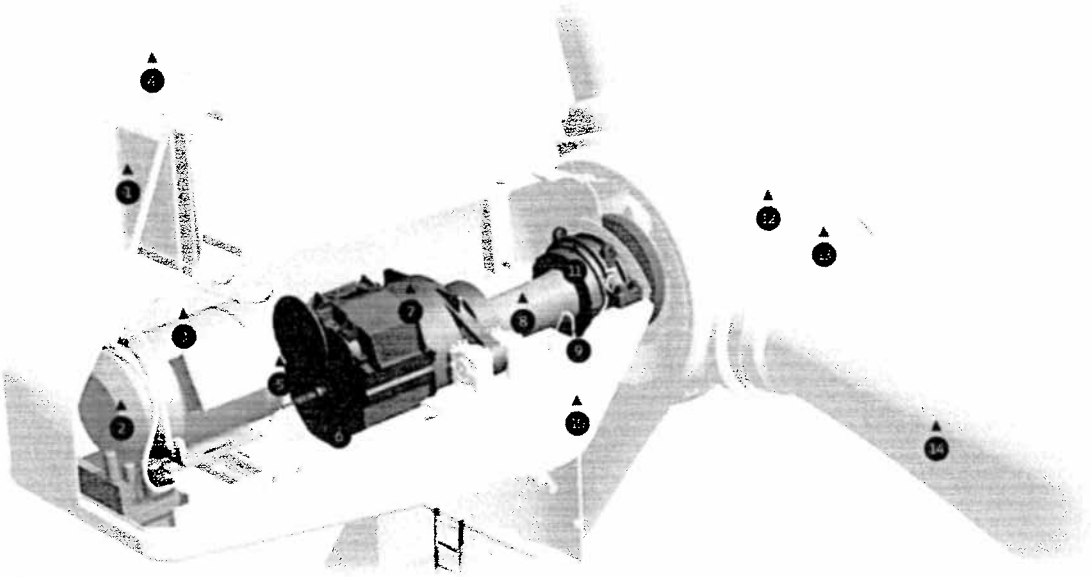
Det Norske Veritas (DNV) has certified the V82 as meeting the strictest standards in the wind industry. Aided by a simple design, which makes service and maintenance easier than most other turbines in the megawatt class, it has a high degree of operational availability. In addition, the nacelle is based on the thoroughly tested design of previous models. To date, more than 1,400 wind turbines featuring this platform design have been installed on sites with conditions ranging from arctic to tropical.

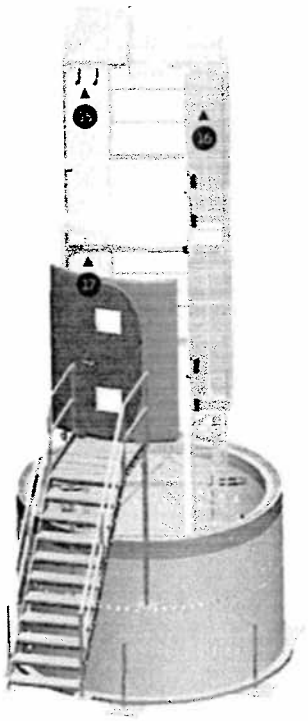
Proven Performance

Wind power plants require substantial investments, and the process can be very complex. To assist in the evaluation and purchasing process, Vestas has identified three factors that are critical to wind turbine quality: energy production, power quality and sound level.

We spend months testing and documenting these performance areas for all Vestas turbines. When we are finally satisfied, we ask an independent testing organisation to verify the results – a practice we call Proven Performance. At Vestas we do not just talk about quality. We prove it.

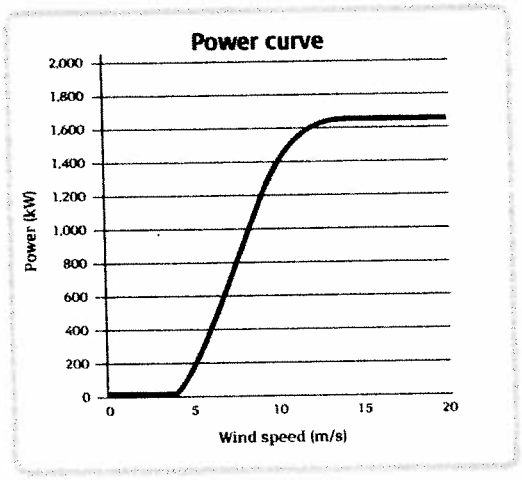
Technical specifications

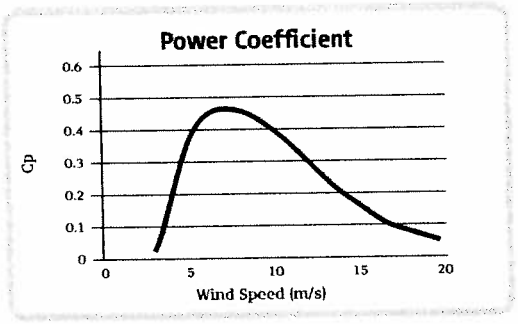


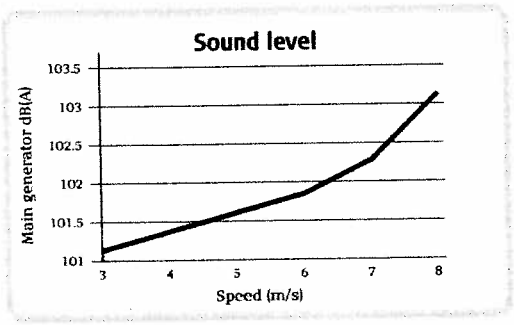


Example of tower internal configuration.

1. Cooler
2. Generator
3. Nacelle controller
4. Anemometer windvanes
5. Coupling
6. Mechanical brake
7. Gearbox
8. Main shaft
9. Yaw gears
10. Machine foundation
11. Main bearing
12. Hub controller
13. Pitch system
14. Blade
15. Main panel
16. Phase compensation
17. Ground controller







Rotor

Diameter:	82 m
Area swept:	5,281 m²
Nominal revolutions:	14.4 rpm
Number of blades:	3
Power regulation:	Active-Stall®
Air brake:	Full blade pitch by three separate hydraulic pitch cylinders.

Tower

50Hz, 230V:	Hub height (approx.) 78 m
60Hz, 110V:	Hub height (approx.) 70 m, 80 m

Operational data

Cut- in wind speed:	3.5 m/s
Nominal wind speed:	13 m/s
Cut-out wind speed (10 minutes):	20 m/s

Generator

Type:	Asynchronous water cooled
Nominal output:	1,650 kW
Operational data:	50/60 Hz 690/600V

Gearbox

Type:	Planetary/helical stages

Control

Type:	Microprocessor-based monitoring of all turbine functions with the option of remote monitoring. Output regulation and optimisation via Active-Stall®.

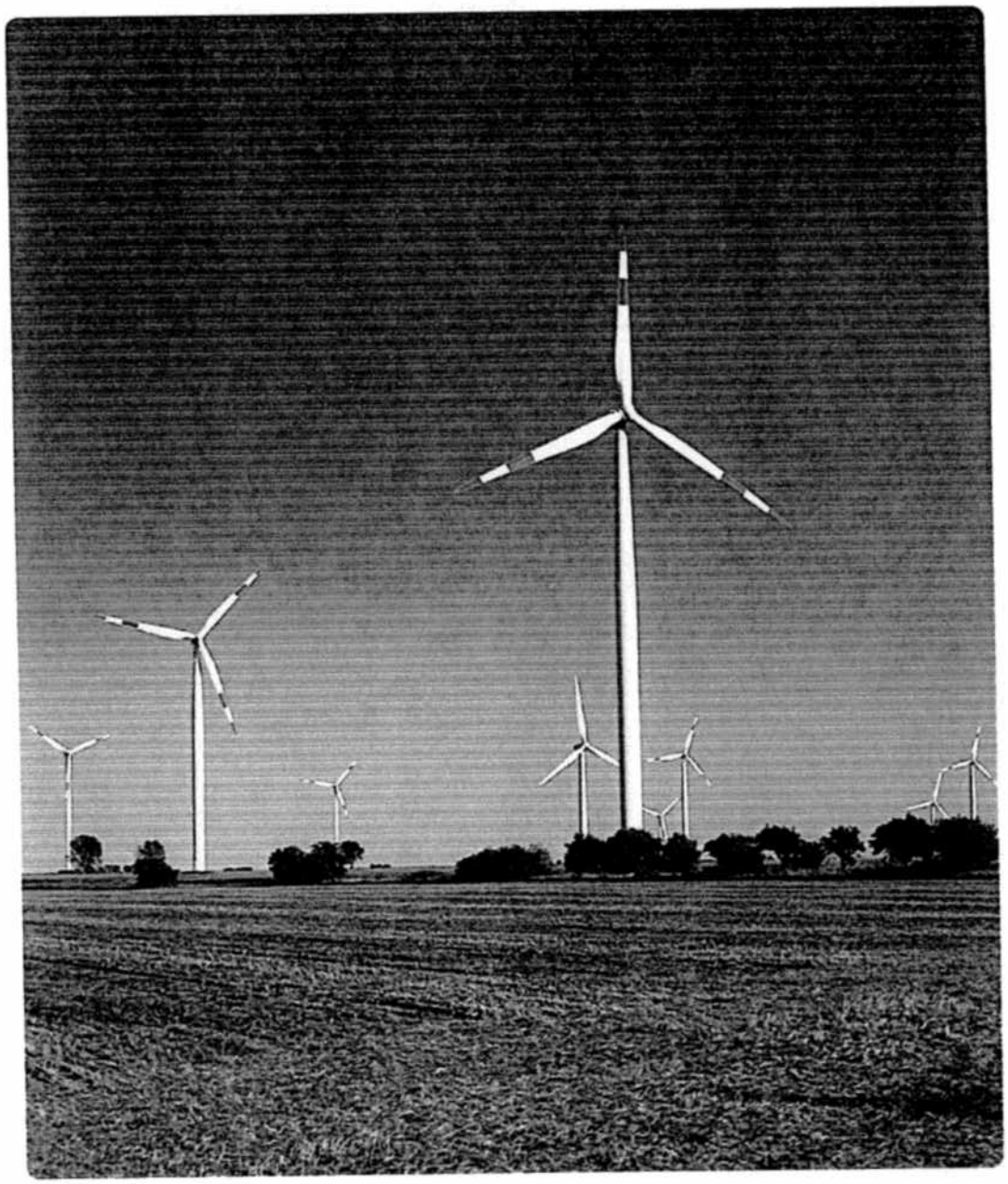
Weight

Nacelle:	52 t
Rotor:	43 t
Towers:	
50Hz, 230V	
Hub height:	IEC IIA
78 m	115 t
60Hz, 110V	
Hub height:	IEC IIA
70 m	105 t
80 m	125 t

t = metric tonnes.

All specifications subject to change without notice.

Creating more from less



With the V82 wind turbine, Vestas has created a turbine well suited for large wind farms, where grid compliance issues are solved at the substation level. This means that investments in grid equipment at the turbine level can be avoided.

The V82 is an extremely competitive turbine in its class in areas with low and medium winds. A stall-regulated wind turbine, it has been optimised for sites with an average wind speed of just 6.5 m/s at hub height, while a breeze of as little as 3.5 m/s is all that is needed to start production. The V82 operates in ambient temperatures ranging from -30 to +40 celsius degrees.

Vestas Wind Systems A/S
Alsvej 21
8900 Randers
Denmark
Tel. +45 97 30 00 00
Fax +45 97 30 00 01
vestas@vestas.com
www.vestas.com

To see a complete list of our sales and service units, visit www.vestas.com

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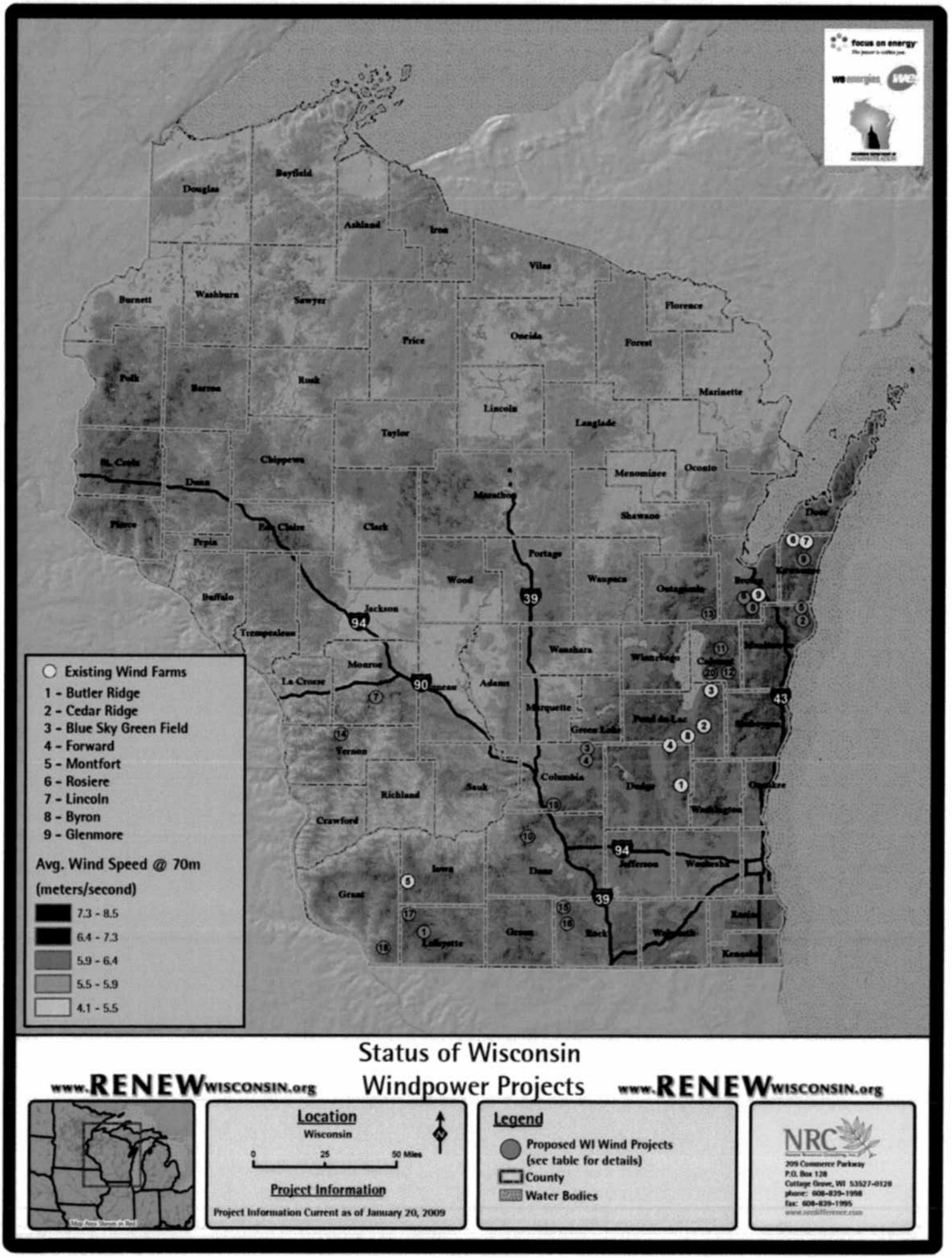

Status of Wisconsin Windpower Projects

www.RENEWWISCONSIN.org

www.RENEWWISCONSIN.org

Location
Wisconsin
0 25 50 Miles

Project Information
Project Information Current as of January 20, 2009

Legend
- Proposed WI Wind Projects (see table for details)
- County
- Water Bodies

NRC
209 Commerce Parkway
P.O. Box 128
Cottage Grove, WI 53527-0128
phone: 608-839-1998
fax: 608-839-1995


FORWARD
E PLURIBUS UNUM

Solicitation Information
22 April 09

Request for Proposals # 7240880

Title: Onshore Wind Turbine Partnership Proposal

Submission Deadline: 19 May 09 @ 2:00 PM (Eastern Time)

Questions concerning this solicitation must be received by the Division of Purchases at questions@purchasing.state.ri.us no later than **5 May 09 at 12:00 Noon (ET)** .Questions should be submitted in a *Microsoft Word attachment.* Please reference the RFP / LOI # on all correspondence. Questions received, if any, will be posted on the Internet as an addendum to this solicitation. It is the responsibility of all interested parties to download this information.

SURETY REQUIRED: No

BOND REQUIRED: No

Jerome D. Moynihan, C.P.M., CPPO
Administrator of Purchasing Systems

Vendors must register on-line at the State Purchasing Website at www.purchasing.ri.gov

Note to Vendors:

Offers received without the entire completed three-page RIVP Generated Bidder Certification Form attached may result in disqualification.

THIS PAGE IS NOT A BIDDER CERTIFICATION FORM

SECTION 1 – INSTRUCTIONS AND NOTIFICATIONS TO PROPOSERS:

The Rhode Island Department of Administration/Division of Purchases, on behalf of The Rhode Island Department of Environmental Management, is soliciting proposals for a private partner to support the Rhode Island Energy Independence 1 wind power project, from qualified respondents, and in accordance with the terms of this Request for Proposals and the State's General Conditions of Purchase.

This solicitation, and subsequent award, is governed by the State's General Conditions of Purchase, which is available at www.purchasing.ri.gov

The scope of work is described herein.

Potential respondents are advised to review all sections of this solicitation carefully and to follow instructions completely, as failure to make a complete submission as described elsewhere herein may result in rejection of the proposal.

Alternative approaches and/or methodologies to accomplish the desired or intended results of this procurement are encouraged. However, proposals which depart from or materially alter the terms, requirements, or scope of work defined by this Request will be rejected as being non-responsive.

All costs associated with developing or submitting a proposal in response to this Request, or to provide oral or written clarification of its content shall be borne by the respondent. The State and the Town assume no responsibility for these costs.

Proposals are considered to be irrevocable for a period of not less than sixty (60) days following the opening date, and may not be withdrawn, except with the express written permission of the State Purchasing Agent.

The State and the Town reserve the right to unconditionally accept or reject any and all proposals.

Proposals misdirected to other State or Town locations or which are otherwise not present in the Office of Purchases at the time of opening for any cause will be determined to be late and may not be considered.

It is intended that an award pursuant to this request will be made to a prime contractor, who will assume responsibility for all aspects of the work. Joint venture and cooperative proposals will be considered, and subcontractors are permitted, provided that their use is clearly indicated in the respondent's proposal, and that the joint venture partners and subcontractor(s) proposed to be used are identified in the proposal. No assignment of this contract by the prime contractors should be permitted.

The contract shall be awarded in two components, one being for projects constructed on State property and the other that will be constructed on the Town of Narragansett's property. If there is a significant savings in project cost or an increase in revenues, the contract may include a bundled component for a combined State and Town project, providing both parties agree to the terms and provisions of the awarded proposal.

An original proposal plus four (4) copies, are required, including Standard Form 330 (available on the Purchasing Website on the Standard Forms page), as well as other details including personnel, experience, and qualifications data. The State reserves the right to make an award or to reject any or all proposals based on what it considers to be in its best interest.

Evaluation of proposals will include consideration of competence and specific experience in onshore wind turbine projects to provide the required services; experience and qualifications of personnel; availability of personnel, equipment and facilities to perform expeditiously; past performance with respect to control of costs, quality of work, ability to meet deadlines; the submittal of a formal work plan; evidence of fiscal capacity and the proposed payment to State / Town for use of the property and yearly power generation revenues.

Respondents are advised that reimbursable expenses, to include sub-consultant services, that may be included in the contract award resulting from this solicitation shall not exceed actual cost incurred x 1.06.

Persons or firms practicing Architectural and/or Engineering Services in the State of Rhode Island must possess a proper registration and Certificate of Authorization in accordance with Rhode Island General Laws.

A copy of the current Rhode Island Certificate of Authorization for the firm and current Rhode Island registration(s) for the individual(s) who would perform the work must be included behind the front page of each copy of the Proposal.

An offeror who does not have a current Rhode Island Certification of Authorization for the firm and current Rhode Island registration(s) must acknowledge non-compliance with this requirement and confirm in writing that, if selected for the project, will expedite acquisition of a Rhode Island registration(s) and Certificate of Authorization(s), the attainment of which will be required before an award will be made. The letter of acknowledgement must be included behind the front page of each copy of the Proposal.

The Board of Design Professionals can be contacted as follows:

Board for Design Professionals
1511 Pontiac Avenue (Bldg 68-2)
Cranston, RI 02920
Tel: 401-462-9530
Fax: 401-462-9532
Website: www.bdp.state.ri.us

The respondent's Proposal may be disqualified and removed from consideration if the Proposal fails to include the required current Rhode Island Certificate of Authorization for the firm and current Rhode Island registration(s), or, in absence of these documents, to acknowledge need to acquire them prior to award if selected.

In accordance with Title 7, Chapter 1.1 of the General Laws of Rhode Island, no foreign corporation, a corporation without a Rhode Island business address, shall have the right to transact business in the state until it shall have procured a Certificate of Authority to do so from the Rhode Island Secretary of State (401-222-3040). *This is a requirement only of the selected vendor(s).*

Bidders are advised that all materials submitted to the State of Rhode Island for consideration in response to this Request for Proposal will be considered to be public records, as defined in Title 38 Chapter 2 of the Rhode Island General Laws, without exception, and will be released for inspection immediately upon request, once an award has been made.

Interested parties are instructed to peruse the Division of Purchases website on a regular basis, as additional information relating to this solicitation may be released in the form of an addendum to this RFP.

The respondent should be aware of the State's Minority Business Enterprise (MBE) requirements, which addresses the State's ten per cent (10%) participation by MBE's in all State procurements. For further information, contact the MBE Administrator, at (401) 574-8253 or visit the website at http://www.mbe.ri.gov

Awards resulting from this Request will be subject to the State's General Conditions of Purchase, which are available through the Internet at www.purchasing.ri.gov.

Questions, in **Microsoft Word Format**, concerning this solicitation, may be e-mailed to the Division of Purchases at questions@purchasing.state.ri.us no later than the date & time indicated on page 1 of this solicitation. Please reference the RFP # on all correspondence.

Responses to questions received, if any, will be provided, as an Addendum to this RFP, and posted on the Rhode Island Division of Purchases website at (www.purchasing.ri.gov) It is the responsibility of all interested respondents to download this additional information. *If technical assistance is required to download, call the Help desk at (401) 222-3766*

SECTION 2 – PROJECT DESCRIPTION

Introduction

The State of Rhode Island (State) and the Town of Narragansett (Town) recognize the benefits of renewable energy, and have goals to reduce air emissions from the electric generation sector, as well as to benefit from long-term electrical energy price stability and to maximize the economic development potential inherent in renewable energy projects. Rhode Island has abundant wind energy resources and would like to use it to increase the states renewable energy resources

The State, Rhode Island Department of Environmental Management and the Town own and operate beach facilities, parks and management areas, and municipal parcels some of which are sited along the coast with a good wind resource that could potentially support utility scale wind turbines. The State and Town recognize the significance of these properties and that their primary purpose is to provide public benefit. The State and Town also recognize the need to increase revenues for the State of Rhode Island and Town and that wind power development on one or a combination of these sites has the potential to be a new revenue source for the State and Town and to provide for the electric needs of the facilities. Done properly, the State and Town could benefit from this new revenue source without compromising the existing public recreational, scenic and wildlife benefits that these sites provide.

Additionally, the State and Town recognize the financial benefit of "behind the meter" applications for small land-based projects in Rhode Island. In these applications, the wind resource and turbine size are matched to the electricity demand at an existing facility to offset existing electricity costs and to provide revenue where the supply exceeds demand at the facility. This project takes this consideration into account to maximize behind the meter benefit for all potential sites contained herein.

The State, through its Department of Environmental Management, and the Town are seeking a company with experience in the design/development, construction, financing and operation and maintenance of wind turbines to partner in the construction of a limited number of wind turbines on three potential State and two Town of Narragansett properties all located within in the Town of Narragansett.

This proposal's goal is to maximize revenue and provide energy needs for the State and Town over the life of the facility. Therefore, the State and Town are seeking proposals from developers for a project on one or a combination of three State sites and two Narragansett sites that maximize revenues for the State and Town. The State and Town do not have the capital to purchase the wind turbines; however, the State and Town controls the properties where the wind turbines can be located.

State /Town will accept proposals that would allow development of the State/Town parcels under the following scenarios:

1. The developer will own, operate and maintain the turbines and lease property from State /Town. The lease could be a flat payment, a flat payment with a premium payment dependent upon the amount of energy produced, or payment plus the provision of power to state park and/or beach facilities.
2. The turbines would be jointly owned by State/Town and the developer. Revenues from energy production will be split between the partners.
3. State/Town will own the wind turbines and provide payments to the developer based on generated electricity from the units.

4. Other scenarios that could be agreed upon by the State or Town and the developer.

The wind turbines will be limited to the following three DEM controlled properties: Camp Cronin, Black Point and property on the southwest side of the Galilee Escapeway Road. The proposed Town of Narragansett properties include the Scarborough Treatment Plant on Ocean Rd, adjacent to the State's Scarborough Beach, and the Department of Public Works site on Westmoreland St., approximately ½ mile east of Mariner Square. Responder should identify which site or sites it is interested in for wind turbine development.

When determining siting of the wind turbines the developer will use the DEM Guidance document entitled "Terrestrial Wind Turbine Siting Report" and will comply with all other Federal, State, and local rules, regulations, laws and ordinances including any deed restrictions.

RIDEM Division of Parks and Recreation and the Town of Narragansett are the owners and operators of the facilities and will have full design review and approval authority for this project. The proposal will address how or if the project will require review, approval or contact with the following organizations to meet state, municipal or federal rules or regulations. The proposal will specifically address requirements of the following organizations:

- Coastal Resources Management Council
- RI Department of Environmental Management
- RI Historical Preservation and Heritage Commission
- RI State Building Code Commission
- RI State Fire Marshal
- Any deed restrictions on any of the properties
- Galilee Oversight Committee (Town of Narragansett subcommittee)
- Federal Aviation Administration
- Any other Federal, State, and/or local rules or regulations not listed above should also be identified in the proposal

The proposal will also address the following:

- Assumptions used to determine the energy generation capacity of the sites where the turbines will be located.
- Information that the proposed facilities will meet siting, noise, public safety, icing and avian concerns raised in the "Terrestrial Wind Turbine Siting Report".
- Any operational considerations to address conditions when the wind turbines operations might be limited in order to be safely operated.
- Any steps that need to be taken to reduce public risk especially under high wind and icing conditions.
- The issue of risk needs to be addressed in a comprehensive manner since the wind turbines may be collocated with Rhode Island active or passive public recreational facilities including camps, beaches and/or trails.
- All costs associated with delivery of energy in a bilateral contract arrangement from a wholesale power supplier. To the extent that transmission costs would be borne by the project, either new lines or upgrades, they should be included in the revenue projections.
- Detail all operation and maintenance costs by year for the duration of the project life.

The State/Town will consider a lease / operation time period not to exceed 20 years. The proposal shall include:

- A yearly rental fee and a percent of gross revenues,
- A payment schedule to the state for the lease/power share arrangements being proposed;
- Decommissioning cost and process to decommission the turbines, and
- Yearly operation and maintenance costs.
- The yearly fee and the expected lifetime payment provided to State/Town over the lease / operation time period.
- Any lease with State/Town will not be assignable without State/Town approval

In order to compare proposals, it will be assumed that a benchmark project would be built entirely with State/federal funds and entirely State/Town owned. In other words the benchmark would give the state maximum revenue by building the largest project/turbines we could afford with our own money. The developer will compare the proposed project to the benchmark project.

In the event that this project is determined to be a project of Economic Concern as designated by the Rhode Island Department of Economic Development; the State and Town will prioritize the review of any permits needed as required by this designation.

Rhode Island Renewable Energy Portfolio Standard

Under R.I.G.L. § 39-26-1, the State mandates that a portion of the electricity sold by retail electricity sellers in the state be from renewable energy sources, documented by renewable energy certificates (REC's). This provides an additional revenue stream to renewable energy generators for qualifying facilities, of which the project contemplated by this solicitation will be one. Proposers should consider this additional revenue stream in the development of the pricing proposal.

The State/Town desire that the REC's generated by this project be used to satisfy the Rhode Island requirement, and proposers should commit to this in their proposals. Any REC's generated in excess of the Rhode Island requirement may be sold into the REC markets in other states.

Power Purchase Contracts

Rhode Island is developing a means to execute long-term contracts for renewable energy. This will be done either through the distribution companies, a quasi-public state power authority, or both. With either mechanism, the State/Town will use its best efforts to assure a long-term contract for energy produced by the facility.

Proposal Evaluation Premises

The State and Town are seeking qualified proposers with a history of success in major electrical energy facility project development, and in particular land based wind power project development. Proposals will be ranked in accordance with the type of project experience demonstrated by the proposer. Proposals involving State sites only will be evaluated exclusively by the State, proposals for Town sites only will be evaluated exclusively by the Town. Proposal which include both State and Town sites will be evaluated by a joint committee representing State and Town interests. Ranking factors are delineated in the Proposal Criterion Ranking chart below.

Proposal Ranking Criterion		
Proposal valuation Criterion	Weight	Considerations
Experience	10%	1. Number of on-shore wind power facilities: a. Completed b. In permitting
	10%	2. Energy generating capacity of facilities built and operated
	15%	3. Vendor specific experience: a. Competence and general experience to provide the required services; b. Experience and qualifications of personnel; c. Availability of personnel, equipment and facilities to perform expeditiously; d. Past performance with respect to control of costs, quality of work, ability to meet deadlines; e. The submittal of a formal work plan; f. Evidence of fiscal capacity
Completion of project	20%	4 Ability of the contractor to complete construction of the wind turbines by 12/31/2010
Price Proposal	20%	5. Lowest construction price, $/MW-h
Revenue Sharing	25%	6. Highest yearly land rental fee, and energy production generation %.

Consistent with State/Town goals, proposals will be evaluated to give the highest priority to the project that maximizes revenues for the State and Town and provide maximum customer side "behind the meter" electricity to the State or Town facility at the turbine site. The State and Town expect that final pricing will be negotiated with the successful respondent, and that proposed pricing will be within a range of plus or minus ten percent (10%) of final pricing. The State and Town reserve the right to terminate negotiations based on final pricing if it is above the proposed price plus ten percent (10%).

Proposal Elements

At a minimum, proposals shall contain the following elements:

1. A completed and signed three-page RIVIP generated bidder certification cover sheet (downloaded from the RI Division of Purchases Internet home page at www.purchasing.ri.gov

2. A completed and signed W-9 Form downloaded from the RI Division of Purchases Internet home page at www.purchasing.ri.gov by clicking on RIVIP, then General Information and then Standard Forms.

3. Qualification statement for the firm or team, including, but not necessarily limited to:

   a. The experience of the firm or, for a team, the experience of each team member in land based wind energy generation project development, and other energy generation project development.

b. The experience of key firm or team members in wind energy generation project development and other energy generation project development.

c. An organizational chart for the project team indicating the name of the team member, the team reporting structure and a narrative describing the responsibility of the team member.

d. Financial information demonstrating the capability of the firm or team to complete the project successfully. Audited financial statements are not required for this proposal, but will be prior to the beginning of final price negotiations. Significant deviation in the audited financial statements from information submitted with the proposal will be cause for termination of final negotiations.

e. Other information at the discretion of the proposer that will demonstrate the firm or team's ability to meet the State's goals for this project.

4. Price Proposal and Proposed State Revenue Estimate - as described above.

5. A project schedule including all major activities from notice to proceed to project operation.

6. In addition to the multiple hard copies of proposals required, Respondents are requested to provide their proposal in electronic format (CDROM). Microsoft Word / Excel OR PDF format is preferable. Only one (1) electronic copy is requested. This CD should be included in the proposal marked "ORIGINAL".

7. The proposal will be broken into two sections. The first will outline the proposal for DEM controlled properties. The second will be for properties controlled by the Town of Narragansett. The proposal should indicate if there are significant savings in project cost or an increase in revenues or an economy of scale by bundling a component for a combined State and Town project.

END

Terrestrial Wind Turbine Siting Report

Date: January 13, 2009

Table of Contents

Attachments

Tables

I. Executive Summary

This report is based on an interest in public-private establishment of land based wind turbines on State owned land. Assumptions were made on likely scale of equipment. The number of turbines was limited by the understanding of National Grid transmission capacity within the region. An internet search was conducted to evaluate siting setback criteria for commercial sized wind turbines. Information was gathered from international, state and county governments. A Rhode Island specific public safety criterion was also added. Noise was an issue that was raised in the research for siting of wind turbines. Table 3 is a summary of the recommended wind turbine siting criteria for an assumed scale turbine.

II. Siting Criteria

A. Setback Distances

The criteria jurisdictions used to site wind turbines from roads, property lines and structures were researched. Attachment A is the summary of this work. The siting criteria was varied and depended on the state and municipality. New England state requirements were investigated along with the states that have permitted the most wind turbines in the US, i.e., Texas and California. It was interesting to note that Texas did not have criteria that set out minimum siting distances to property lines and structures. Many of their wind power proposals are in their Panhandle, which is not densely settled and has a lot of existing oil derricks. Texas is expanding transmission line access in this area to about $3-5B. This expenditure will ensure that power from the expected growth of wind turbine generated electricity in this area will be able to be transported to other areas in their grid that need power. The majority of the siting criteria came from rural counties in the Midwest. In most instances their approach was a simple requirement of the turbines being placed away from structures, roads and property lines calculated on a factor based on the size of the wind turbine.

[1]"In California, wind turbine setbacks vary by county. The counties typically base the setback on the maximum of a fixed distance or a multiple of the overall turbine height. A common setback is three times the overall turbine height from a property line. There is no evidence that setbacks were based on formal analysis of the rotor fragment hazard.

The most comprehensive study of wind turbine rotor failures places the risk of failure at approximately 1 in1000 turbines per year. The maximum range of a rotor fragment is highly dependent on the release velocity that is related to the blade tip speed. Tip speed tends to remain constant with turbine size; therefore, the maximum range will tend to remain constant with turbine size. In the analysis of rotor fragment trajectories, the most comprehensive models yielded results that showed the shortcomings of simpler methods. Overall, the literature shows the possibility of setbacks for larger turbines may be based on a fixed distance and not the overall height.

California was developing analytical data that would determine minimum setbacks. At this time, the work has not been completed and they do not have science-based standards. The state recommends that a comprehensive model of the rotor fragment hazard be developed based on the results of the literature review. This tool would then be used with a variety of turbine sizes with the objective to develop risk based setback standards."

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[1] **PERMITTING SETBACK REQUIREMENTS FOR WIND TURBINES IN CALIFORNIA**
Prepared For: California Energy Commission - Public Interest Energy Research Program
Prepared By: California Wind Energy Collaborative November 2006

Until a scientific risk based standard is developed, DEM should consider a siting-criteria for placement of a wind turbine near property lines, permanent residential structures, roads and trails that would be 1.5 times the hub height plus the rotor radius. This is the distance recommended in Massachusetts and a number of other states. This would provide for an adequate margin of safety factor in the event of a structure failure.

[2]European Experience –
Dutch NOVEM Report
The Netherlands Agency for Energy and the Environment (NOVEM) wrote a handbook on wind turbine siting due to the risk posed by wind turbines. The overall report is summarized in English by Braam and Rademakers (2004) from the Energy Research Centre of the Netherlands, ECN, and the report was published in Dutch in 2005 (Braam, van Mulekom et al. 2005).

The appendix from the handbook reviews data from two large databases of wind turbines in Denmark and Germany. The database covers turbine operation from the 1980s until 2001. The authors analyzed the data and recommended values of risk for the following failure events:
- Failure at nominal operating rpm 4.2×10^{-4}
- Failure at mechanical breaking (~1.25 time nominal rpm) 4.2×10^{-4}
- Failure at mechanical breaking (~2.0 time nominal rpm) 5.0×10^{-6}

The authors compared these results to earlier values developed by European agencies in the earlier 1990s, with the overall blade failure rate declining three times. It is expected that with the maturity of the industry blade failures will continue to decrease. Documented blade failures and distances were also reported in the handbook. The maximum distance reported for an entire blade was 150 m, for a blade fragment the maximum distance reported was 500 m."

It should be noted the technology of wind turbines has changed. Towers are being built taller and the rotational speeds of the rotors have slowed considerable and rotors are lighter. This would mean the support structures are subjected to lower dynamic stresses. The failure rates of the older technology machine may not apply to the newer structures.

B. Noise Criteria
In the U.S., although no applicable federal noise regulations exist, the U.S. Environmental Protection Agency (EPA) has established noise guidelines. According to the EPA website, it "identifies a 24-hour exposure level of 70 decibels as the level of environmental noise which will prevent any measurable hearing loss over a lifetime. Likewise, levels of 55 decibels outdoors and 45 decibels indoors are identified as preventing activity interference and annoyance. These levels of noise are considered those which will permit spoken conversation and other activities such as sleeping, working and recreation, which are part of the daily human condition.

The levels are not single event, or "peak" levels. Instead, they represent averages of acoustic energy over periods of time such as 8 hours or 24 hours, and over long periods of time such as years. For example, occasional higher noise levels would be consistent with a 24-hour energy average of 70 decibels, so long as a sufficient amount of relative quiet is experienced for the remaining period of time.

[2] Ibid, Appendix A

Noise levels for various areas are identified according to the use of the area. Levels of 45 decibels are associated with indoor residential areas, hospitals and schools, whereas 55 decibels is identified for certain outdoor areas where human activity takes place. The level of 70 decibels is identified for all areas in order to prevent hearing loss."

At the present time, there are no common international noise standards or regulations for sound pressure levels. In most countries, however, noise regulations define upper bounds for the noise to which people may be exposed. These limits depend on the country and may be different for daytime and nighttime.

For example, in Europe, as shown in Table 1, fixed noise limits have been the standard.

Table 1
European Community Standards for Exposure to Acceptable Sound Pressure Levels

Country	Commercial	Mixed	Residential	Rural
Denmark			40	45
Germany				
(day)	65	60	55	50
(night)	50	45	40	35
Netherlands				
(day)		50	45	40
(night)		40	35	30

Most states do not have noise regulations, but many local governments have enacted noise ordinances to manage community noise levels.

Noise will be a major issue in siting wind turbines. States have taken two approaches. The first is to develop noise requirements that must be met by the turbines. Massachusetts developed a model zoning ordinance or by-law that allows construction of wind facilities by special permit. (Attachment B – Section 6.3). This model ordinance is based on the Massachusetts Department of Environmental Protection (DEP) regulation of noise emissions as a form of air pollution under 310 CMR 7.00, "Air Pollution Control". The Massachusetts noise regulation sets two specific limits. The first require the source not to increases the broadband sound level by more than 10 dB(A) above ambient. Broadband noise is a sound whose sound pressure level distribution over the frequency spectrum has no dominant peaks, varying smoothly with frequency. Broadband sound is often caused by the interaction of wind turbine blades with atmospheric turbulence, and also described as a characteristic "swishing" or "whooshing" sound. The second requirement limits the production of a "pure tone" condition that increases sound pressure levels by 3 decibels or more. Tonal sound is defined as sound at discrete frequencies. It is caused by components such as meshing gears, non-aerodynamic instabilities interacting with a rotor blade surface, or unstable flows over holes or slits or a blunt trailing edge.

Setting hard and fast noise standards may not prevent noise complaints. Wind turbine noises are not constant and change with the variation of wind speed. This variation of wind speed will also change the background noise levels, i. e., the higher the wind speed, the higher the background noise level. If tonal noises are present, higher levels of broadband background noise are needed to effectively mask the tone(s). In this respect, it is common for community noise standards to incorporate a penalty for pure tones, typically 5 dB(A). Therefore, if a wind turbine meets a sound pressure level

standard of 45 dB(A), but produces a strong whistling, 5 dB(A) are subtracted from the standard. This forces the wind turbine to meet a standard of 40 dB(A).

Setting noise standards through regulation may not take into account site conditions such as vegetation, which acts as a noise suppressor and background noise such as traffic, wind noises and if at an ocean setting, the sound of the waves on the beach. In the second approach, states/ counties have required a site-specific noise study to be conducted in the vicinity of the installation of a wind turbine. The noise study would allow for actual measurements of background noise levels and would also take into account impacts of vegetation. The noise study would account for local conditions and would determine if the wind turbines could meet noise standards prior to construction of the turbines.

C. Icing

The Finnish Meteorological Institute [3] assessed the safety risks from wind turbine icing. There is a need to develop safe distances to protect the public from discharges from ice build-up from a turbine. It should be noted that theoretical calculations can generate safety distances, but wind turbines do not act in a perfect world of no friction and do react to the laws of aerodynamics. Wind turbine blades operate in a similar manner as an airplane wing foil. It is the principle of "lift" that provides the power that turns the turbine blades. Turbine blades will slow down as ice adheres to the rotor blades because the lift characteristics are changed. According to the Finnish study, "a risk assessment methodology which has been used to demonstrate that the risk of being struck by ice thrown from a turbine is diminishingly small at distances greater than approximately 250 meters from the turbine in a climate where moderate icing occurs."

D. Public Safety

There were no specific public-safety siting criteria noted in the other state's siting criteria. One could argue all of the other siting distances would constitute public-safety criteria. In the case of Rhode Island, all sites being investigated are located on DEM controlled property. In many instances, the locations are at public beaches or at areas where public recreation activities take place. Criteria should be set that would protect the public from unforeseen mechanical or maintenance problems. A suggested criteria could be 1½ times the height of the turbine and it be applied to all trails, blue ways and other areas where the public could be injured by a mechanical mishap.

E. Avian and Bat Consideration –

The Division of Fish and Wildlife analyzed the possible impacts of wind turbine on avian resources. In their analysis, they suggested consideration for a 100-200 yard buffer along the coast. Young passerines often get blow off course, especially during fog events and head for shore at daylight. They are often exhausted and stop at the first available cover near the dunes. The Division also indicated DEM should avoid siting a wind turbine on East Matunuck Beach due to the piping plover issue.

F. Siting Criteria Summary

Table 2 sums the information collected on state and local siting criteria, international and state noise criteria, and icing. The table represents the minimum and maximum distances that states and localities have established for siting wind turbines.

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[3] Assessment Of Safety Risks Arising From Wind Turbine Icing, A report undertaken as part of a project entitled "Wind Energy in Cold Climates", Colin Morgan, Ervin Bossanyi, Mr. Henry Seifert, April 2, 1998

The impacts of a noise standard are unknown. If we were to adopt the most stringent noise standard in a residential area, it would result in the Dutch requirement that ambient noise levels in residential areas not exceed 35 DB in the evening. This standard is significantly lower than the lowest US requirement of 50 DB in a residential area. It recommendation that if DEM were to be involved with the siting and regulation of wind turbines, the agency should make siting contingent on the developer demonstrating the project can meet the 35 DB (in the evening) noise levels in a residential area.

Table 2

Summary of US Siting Criteria of Wind Turbines

Criteria	Minimum Distance or Noise Std. / (Jurisdiction)	Maximum Distance or Noise Std. / (Jurisdiction)
Distance from Property Line	50 feet / (NYS Energy R&D Authority)	810 ft / (Calumet County). WI) 1260 ft / (MN Wind Farm Setback)
Distance from Nearest Structure	1.1 times height of the tip of the turbine blade (~ 450 feet) / (PA Municipality Planning code Model Ordinance)	1500 feet / (Geary County KS and NYS Energy R&D Authority)
Distance from Roads	250 feet / (MN PUC)	Door County. WI 1000 ft or 3 X Wind turbine height* (1215 ft)
Icing		250 M ~ 820 feet
Public Safety		1 ½ times the total height of a turbine. (607.5 ft.)
Noise Standard Based Distance from Property Line	50 DBA / 45 DBA Pure Tone (Wisconsin Model Ordinance)	65 DB / (Riley KS)
Noise Standard Based Distance from Nearest Structure	50 DB / (NYS Energy R&D Authority, MN PUC) 10 DB above ambient / Door County WI)	55 DB/ (PA Municipality Planning code Model Ordinance)
Distance from shoreline (RI recommendation for avian concerns.)	300 feet	600 feet

- A 1.5 MW GE Turbine has a 77-meter diameter rotor plus a 61 to 85 meter hub height. (Maximum height (77.2 + 85 m equals 123.5m or ~ 405 ft.)

G. Rhode Island Recommended Wind Turbine Siting Criteria

The above section provides a summary of the current research done on siting industrial wind turbines. One of the major issues raised in the research is that the technology of wind turbines has changed considerably in the last five years and appears to continue to be dynamic today. Older turbines were generally smaller units that had high rotor speed and rotor blades were heavier that today's composite rotors. There is some work on risks associated with the older units, but there is not a lot of information on turbine failure on the newer units. One of the biggest concerns with location of wind turbines is proper safety distances from residential units, roads and human access. In Rhode Island, the state should require performance standards for the installation of wind turbines on state properties. One of the major issues that needs to be considered is the setting of adequate buffering in the event of catastrophic failure caused by a turbine operating beyond design speed.

According to the National Renewable Energy Laboratory "Modern wind turbines rely on three independently controlled pitch systems. Any one [of those systems] can save the machine from a [runaway] like that. They have their own battery supply systems, fault detection system and internal diagnostics. The master controller monitors all the subordinate control systems (back brake, lubrication system, yaw drive, anemometers, power system, as well as the pitch system). If any one of the sensors behaves abnormally it creates a fault and the machine shuts down." These systems should be required of any turbines that are located on state property.

Rhode Island should also require developers to meet American Wind Energy Association (AWEA) and the European International Electrotechnical Commission (IEC) wind turbine design standards to minimize the risk of wind turbine failure.

Based on the research available and the suggestions that wind turbines meet US and European standards, the following setback standards are recommended:

Table 3

Summary of Proposed Rhode Island Siting Criteria of Wind Turbines

Criteria	Minimum Distance or Noise Std. / (Jurisdiction)
Distance from Property Line	1.5 times the hub height plus the rotor radius
Distance from Nearest Structure	1.5 times the hub height plus the rotor radius
Distance from Roads	1.5 times the hub height plus the rotor radius
Icing	820 feet
Public Safety	1.5 times the hub height plus the rotor radius
Noise Standard Based Distance from Nearest Structure	Developers of a wind turbine project must demonstrate the ability of the project to meet 35DBA in the evening, 45 DBA in the daytime for residential areas and can not increase background tonal sound by 3 DB.
Distance from shoreline (RI recommendation for avian concerns.)	300 feet

H. Operational Considerations

The operation of wind turbines, in certain conditions, would require the imposition of some operational restrictions. The restrictions would be based on the model, size and operational characteristics of the wind turbine which might logically vary by site and risk analysis. A potential vendor would need to address conditions when the wind turbines could be safely operated. The operator would need to specify steps that need to be taken to reduce public risk especially under high wind and icing conditions. The whole issue of risk would need to be addressed in a comprehensive manner since the wind turbines may be collocated with Rhode Island active or passive recreational facilities like camps, beaches and trails.

Attachment A – State and County Setback Distances

Jurisdiction	Wind Turbine - Distance from Property	Wind Turbine -Distance from Nearest Structure	Noise Standard- Distance from property line	Noise Standard- Distance from Nearest Structure	Distance from Roads	Date of Enactment	Variances Allowed
California Energy Commission	The setback literature reviewed in this report does not provide an analytical rationale for determining wind turbine setbacks					November 2006	
Connecticut (Does not have wind specific siting requirements. All major energy projects go through a similar siting process.							
Illinois - Pike County Zoning Board	There is also a minimum setback of 1.1 T from the nearest property line. (T = the height of the tower plus the length of one blade)	The ordinance specifies a "setback" of three times the turbine height (the height of the tower plus the length of one blade), referred to as "3 T," from homes. However, turbines sited on a landowner's property may be as close as 1.1 T if the landowner consents.				5/24/2004	
Kansas							
a. Butler County	No turbines shall be located closer than 500 feet or the total height of the turbine plus 50 feet, whichever is greater, from property lines of any property not included in the Conditional Use Permit.	No turbine shall be located closer than 1000 feet from a residential structure. Turbines shall be located no closer than the total height of the turbine plus 50 feet from a common agricultural/residential accessory structure.			No turbines shall be located closer than 500 feet or the total height of the turbine plus 50 feet, whichever is greater, from public roads.		
b. Geary County		Individual wind turbines shall be set back from residential structures a minimum of 1500 feet.	• The noise level measured at the property line of the project	Commercial wind energy conversion systems should be located in			

			property shall not exceed 55 decibels at any time ("A" or "C" weighted). At the nearest existing residence or residence where a permit has been issued prior to the time an application has been filed pursuant to these regulations, the following shall be the standard: 26dB – IEC 61-4400 or actual measured at nearest residence – noise baseline + 10.	areas where there are adequate setbacks from residential areas and rural homes so that noise from the turbines is not an intrusion.			
c. Riley County	Individual wind turbines shall be set back from all property lines coincident with or outside of the project boundary a distance equal to one and one-half times the turbine height		The noise level caused by the operation of the project, measured at five feet above ground level at the property line coincident with or outside the project boundary, shall not exceed 65 decibels (A weighted) and shall not exceed 50 decibels (C-weighted) if it is determined that a pure tone noise is generated by the project.				

d. Wabaunsee County (5)	a setback from the nearest property line a distance equal to twice the height of the system,				setback from the nearest public road right-of-way a distance equal to the height of the system, including the rotor blades, plus an additional 50 feet.		
Massachusetts - Division of Energy Resources – Model Ordinance	Wind turbines shall be set back 100 feet from the nearest property line and private or public way.	Wind turbines shall be set back a distance equal to 1.5 times the overall blade tip height of the wind turbine from the nearest existing residential or commercial structure	See Noise Standard- Distance from Nearest Structure	The wind facility shall conform with DEP's, Noise Regulations (310 CMR 7.10). Facility can not: **(a)** Increases the broadband sound level by more than 10 dB(A) above ambient, or **(b)** Produces a "pure tone" condition that exceeds the two adjacent center frequency sound pressure levels by 3 decibels or more. These criteria are measured both at the property line and at the nearest inhabited residence. An analysis prepared by a qualified engineer shall be presented to demonstrate compliance with these noise standards.		Unknown	The special permit granting authority may reduce the minimum setback distance as appropriate based on site-specific considerations, if the project satisfies all other criteria for the granting of a special permit under the provisions of this section.

Michigan Energy Office, Dept. of Labor and Economic Growth (3)	The distance between a Utility Grid wind energy system and the property lines of adjacent non-leased properties including public rights of way shall be at least the height of the wind turbine tower including the top of the blade in its vertical position. Where property is leased on both sides of a public right of way, a wind energy system may be placed no closer than one rotor radius from the closest edge of the right of way. The distance between an On Site Use wind energy system and the owner's property lines shall be at least 1 ½ times the height of the wind energy system tower including the top of the blade in its vertical position.		The sound pressure level generated by a Utility Grid wind energy system shall not exceed 55 dB(A) measured at the property lines between leased and non-leased property. This sound pressure level shall not be exceeded for more than 3 minutes in any hour of the day. If the ambient sound pressure level exceeds 55 dB(A), the standard shall be ambient dB(A) plus 5 dB(A).				
Minnesota (MN) Public Utilities Commission (1)	Current setbacks are three rotor diameters on the secondary wind axis and five rotor diameters on the predominant axis. This same applies to public lands.	At least 500 ft and sufficient distance to meet state noise standard.		Project must meet MN Noise Standards NAC 1, L50 50 dBA during overnight hours at all residential receivers (homes). Setback distance is calculated based on site layout and turbine for each residential receiver.	A minimum of 250-foot turbine setback from the edge of public road rights-of-ways. Setbacks should be developed and applied to state trails on a case-by-case basis	January 11, 2008	

New York State Energy Research & Development Authority Model Ordinance	Variable distances from 50 feet to 1.5 times the sum of proposed structure height plus the rotor radius.	Variable distances from 1.5 times the sum of proposed structure height to 1500 feet.	Noise shall not exceed 55 dBA, measured at the site property line.	Audible noise shall not exceed fifty (50) dBA for any period of time, when measured at any residence, school, hospital, church or public library existing on the date of approval of the wind energy facility.	No less than 1.5 times the sum of proposed structure height plus the rotor radius.	Unknown	
North Carolina - Currituck County, NC	1.5 times wind turbine height	2.5 times wind turbine height			1.5 – 2.5 times wind turbine height		
Pennsylvania Municipalities Planning Code (MPC) Model Ordinance (2)	All wind turbines shall be set back from the nearest property line a distance of not less than the greater of the maximum setback requirements for that zoning classification where the turbine is located* or 1.1 times the turbine height, whichever is greater.	Set back from the nearest occupied building should not be less than the greater of the maximum setback requirements for that zoning classification where the turbine is located* or 1.1 times the turbine height, whichever is greater. For non non-participating landowner's property, a set back distance of not less than five (5) times the hub height should be established.		Audible sound from a wind energy facility shall not exceed fifty (55) dBA, as measured at the exterior of any occupied building on a non-participating landowner's property.	All wind turbines shall be set back from the nearest public road a distance of not less than 1.1 times the turbine height, as measured from the right-of-way line of the nearest public road to the center of the wind turbine base.	4/24/06	Yes, if literal enforcement will exact undue hardship because of peculiar conditions pertaining to the land in question and provided that such waiver will not be contrary to the public interest.
Vermont -	For petitions involving wind-generating facilities, notice must be provided all towns wholly or partially within a radius of a **minimum of ten miles** of each proposed turbine. (2) The petitioner must include an assessment of the impact on all towns within this **ten-mile** radius. (3) The petition must include a view-shed						

	analysis that includes an analysis of aesthetic impacts for a ten-mile radius from the proposed project site.						
Vermont ANR- Large-Scale Renewable Energy Projects are not presently an allowable use of ANR lands. In the event a future statewide assessment shows that the best site(s) for such projects are on ANR lands, then the Agency may consider revising this policy and to allow for consideration of individual projects through the pertinent long range management planning process.							
Wisconsin – Model Wind Ordinance	Each Wind Turbine shall be set back from the nearest property line a distance no less than 1.1 times its Total Height, unless appropriate easements are secured from adjacent property owners, or other acceptable mitigation is approved by the Committee.	Each wind turbine shall be set back from the nearest residence, school, hospital, church or public library, a distance no less than the greater of (a) two (2) times its total height or (b) one thousand (1,000) feet	Audible sound shall not exceed fifty dBA for any period of time when measured at the property line of any residence, school, hospital, church or public library. A pure tone, such as a whine, screech, or hum, audible sound due to		Each wind turbine shall be set back from the nearest public road a distance no less than 1.1 times its total height, determined at the nearest boundary of the underlying right-of-way for such public road.		If the event audible sound exceed the audible sound standards, a waiver may be granted if: a. Written consent from the affected property owners has been obtained stating that they are aware of the audible sound standards, and that consent is granted

			wind energy facility operations shall not exceed forty-five (45) dBA				to allow sound levels to exceed the audible sound standards; and b. If the applicant wishes the waiver to apply to succeeding owners of the property, he can record permanent a sound impact easement which describes the benefited and burdened properties.
a. Calumet County WI	1800 feet			Turbine noise shall not exceed 5dB over the current background sound levels during the quietest part of the day (night). Excessive low-frequency noise at any nearby residence will require shut-down of the offending turbine			
b. Door County WI	1.1 times the total height of a wind turbine	Not less than twice the total height of the turbine or 1,000 feet or whichever is greater from an inhabited structure.		50 decibels near any residential or related areas. If an audible sound can be heard in the area, the limit is 45 decibels.	1,000 feet or three times the total height of a turbine, whichever is greater.		

Renewable Energy Research Laboratory, UMass, Amherst Wind Turbine Acoustic Noise White Paper (6)	The setback distance from property lines is determined by local building codes, and typically takes the height of the structure into consideration, e.g. 1.5 times the turbine height.		If a wind turbine is proposed within a distance equivalent to three times the blade-tip height of residences or other noise-sensitive receptors, a noise study should be performed and publicized.			January 2006	
Nina Pierpont, MD, PhD – Wind Turbine Syndrome (Testimony in NY hearing 3/7/06)		8000 ft					

(1) Wind turbines cannot be place in wetlands.
(2) The Facility Owner and Operator shall make reasonable efforts to minimize shadow flicker to any Occupied Building on a Non-participating Landowner's property.
(3) The applicant shall conduct an analysis on potential shadow flicker at occupied structures. The analysis shall identify the locations of shadow flicker that may be caused by the project and the expected durations of the flicker at these locations from sunrise to sunset over the course of a year. The analysis shall identify problem areas where shadow flicker may affect the occupants of the structures and describe measures that shall be taken to eliminate or mitigate the problems.
(4) Shadow flicker is not explicitly regulated. When a maximum number of hours of allowed shadow flicker per year is imposed for a neighbor's property (such as 30 hours/year for one wind-energy project in Germany), this number refers to those hours when the property is actually used by the people there and when they are awake. Denmark has no legislation regarding shadow flicker, but it is generally recommended that there be no more than 10 hours per year when flicker is experienced.
(5) All tower structures shall be located such that the maximum potential distance of ice throw from any individual structure shall be on the land owned by the leasers on which the structure is located. Specific documentation shall be provided to quantify the basis of the distance assumed and shall be included with the application materials. Ice throw shall not be allowed onto public roads or adjoining property.
(6) For public safety, ridgeline winter trails may need to be moved away from the base of the tower to a distance of 2-4 times the blade-tip height, depending on the site.

Attachment B – Massachusetts Model Amendment to a Zoning Ordinance

Model Amendment to a Zoning Ordinance or By-law: Allowing Wind Facilities by Special Permit

Prepared by:
Massachusetts Division of Energy Resources
Massachusetts Executive Office of Environmental Affairs

1.0 Purpose

The purpose of this by-law is to provide by special permit for the construction and operation of wind facilities and to provide standards for the placement, design, construction, monitoring, modification and removal of wind facilities that address public safety, minimize impacts on scenic, natural and historic resources of the city or town and provide adequate financial assurance for decommissioning.

1.1 Applicability

This section applies to all utility-scale and on-site wind facilities proposed to be constructed after the effective date of this section. It does not apply to single stand-alone turbines under 60 kilowatts of rated nameplate capacity.

Any physical modifications to existing wind facilities that materially alters the type or increases the size of such facilities or other equipment shall require a special permit.

2.0 Definitions

Utility-Scale Wind Facility: A commercial wind facility, where the primary use of the facility is electrical generation to be sold to the wholesale electricity markets.

On-Site Wind Facility: A wind project, which is located at a commercial, industrial, agricultural, institutional, or public facility that will consume more than 50% of the electricity generated by the project on-site.
Height: The height of a wind turbine measured from natural grade to the tip of the rotor blade at its highest point, or blade-tip height.
Rated Nameplate Capacity: The maximum rated output of electric power production equipment. This output is typically specified by the manufacturer with a "nameplate" on the equipment.
Special Permit Granting Authority: The special permit granting authority shall be the board of selectmen, city council, board of appeals, planning board, or zoning administrator as designated by zoning ordinance or by-law for the issuance of special permits, or by this section for the issuance of special permits to construct and operate wind facilities.
Substantial Evidence: Such evidence as a reasonable mind might accept as adequate to support a conclusion.
Wind Facility: All equipment, machinery and structures utilized in connection with the conversion of wind to electricity. This includes, but is not limited to, transmission, storage, collection and supply equipment, substations, transformers, service and access roads, and one or more wind turbines.
Wind Monitoring or Meteorological Tower: A temporary tower equipped with devices to measure wind speeds and direction, used to determine how much wind power a site can be expected to generate.
Wind turbine: A device that converts kinetic wind energy into rotational energy that drives an electrical generator. A wind turbine typically consists of a tower, nacelle body, and a rotor with two or more blades.

3.0 General Requirements

3.1 Special Permit Granting Authority No wind facility over 60 kilowatts of rated nameplate capacity shall be erected, constructed, installed or modified as provided in this section without first obtaining a permit from the special permit granting authority. The construction of a wind facility shall be permitted in any zoning district subject to the issuance of a Special Permit and provided that the use complies with all requirements set forth in sections 3, 4, 5 and 6. All such wind energy facilities shall be constructed and operated in a manner that minimizes any adverse visual, safety, and environmental impacts. No special permit shall be granted unless the special permit granting authority finds in writing that:

(a) the specific site is an appropriate location for such use;

(b) the use is not expected to adversely affect the neighborhood;

(c) there is not expected to be any serious hazard to pedestrians or vehicles from the use;

(d) no nuisance is expected to be created by the use; and
(e) adequate and appropriate facilities will be provided for the proper operation of the use.

Such permits may also impose reasonable conditions, safeguards and limitations on time and use and may require the applicant to implement all reasonable measures to mitigate unforeseen adverse impacts of the wind facility, should they occur.
Wind monitoring or meteorological towers shall be permitted in all zoning districts subject to issuance of a building permit for a temporary structure and subject to reasonable regulations concerning the bulk and height of structures and determining yard-size, lot area, setbacks, open space, parking, and building coverage requirements

3.2 Compliance with Laws, Ordinances and Regulations

The construction and operation of all such proposed wind facilities shall be consistent with all applicable local, state and federal requirements, including but not limited to all applicable safety, construction, environmental, electrical, communications and aviation requirements.

3.3 Proof of Liability Insurance

The applicant shall be required to provide evidence of liability insurance in an amount and for a duration sufficient to cover loss or damage to persons and structures occasioned by the failure of the facility.

3.4 Site Control

At the time of its application for a special permit, the applicant shall submit documentation of actual or prospective control of the project site sufficient to allow for installation and use of the proposed facility. Documentation shall also include proof of control over setback areas and access roads, if required. Control shall mean the legal authority to prevent the use or construction of any structure for human habitation within the setback areas.

4.0 General Siting Standards

4.1 Height Wind facilities shall be no higher than 400 feet above the current grade of the land, provided that wind facilities may exceed 400 feet if:

(a) the applicant demonstrates by substantial evidence that such height reflects industry standards for a similarly sited wind facility;
(b) such excess height is necessary to prevent financial hardship to the applicant, and
(c) the facility satisfies all other criteria for the granting of a special permit under the provisions of this section.

4.2 Setbacks

Wind turbines shall be set back a distance equal to 1.5 times the overall blade tip height of the wind turbine from the nearest existing residential or commercial structure and 100 feet from the nearest property line and private or public way.

4.2.1 Setback Waiver

The special permit granting authority may reduce the minimum setback distance as appropriate based on site-specific considerations, if the project satisfies all other criteria for the granting of a special permit under the provisions of this section.

5.0 Design Standards

5.1 Color and Finish

The special permit granting authority shall have discretion over the turbine color, although a neutral, non-reflective exterior color designed to blend with the surrounding environment is encouraged.

5.2 Lighting and Signage

5.2.1 Lighting

Wind turbines shall be lighted only if required by the Federal Aviation Administration. Lighting of other parts of the wind facility, such as appurtenant structures, shall be limited to that required for safety and operational purposes, and shall be reasonably shielded from abutting properties.

5.2.2 Signage

Signs on the wind facility shall comply with the requirements of the town's sign regulations, and shall be limited to:

(a) Those necessary to identify the owner, provide a 24-hour emergency contact phone number, and warn of any danger.

(b) Educational signs providing information about the facility and the benefits of renewable energy.

5.2.3 Advertising

Wind turbines shall not be used for displaying any advertising except for reasonable identification of the manufacturer or operator of the wind energy facility.

5.2.4 Utility Connections

Reasonable efforts shall be made to locate utility connections from the wind facility underground, depending on appropriate soil conditions, shape, and topography of the site and any requirements of the utility provider. Electrical transformers for utility interconnections may be above ground if required by the utility provider.

5.3 Appurtenant Structures

All appurtenant structures to such wind facilities shall be subject to reasonable regulations concerning the bulk and height of structures and determining yard sizes, lot area, setbacks, open space, parking and building coverage requirements. All such appurtenant structures, including but not limited to, equipment shelters, storage facilities, transformers, and substations, shall be architecturally compatible with each other and shall be contained within the turbine tower whenever technically and economically feasible. Structures shall only be used for housing of equipment for this particular site. Whenever reasonable, structures should be shaded from view by vegetation and/or located in an underground vault and joined or clustered to avoid adverse visual impacts.

5.4 Support Towers

Monopole towers are the preferred type of support for the Wind Facilities.

6.0 Safety, Aesthetic and Environmental Standards

6.1 Emergency Services The applicant shall provide a copy of the project summary and site plan to the local emergency services entity, as designated by the special permit granting authority. Upon request the applicant shall cooperate with local emergency services in developing an emergency response plan.

6.1.1 Unauthorized Access

Wind turbines or other structures part of a wind facility shall be designed to prevent unauthorized access.

6.2 Shadow/Flicker

Wind facilities shall be sited in a manner that minimizes shadowing or flicker impacts. The applicant has the burden of proving that this effect does not have significant adverse impact on neighboring or adjacent uses through either siting or mitigation.

6.3 Noise

The wind facility and associated equipment shall conform with the provisions of the Department of Environmental Protection's, Division of Air Quality Noise Regulations (310 CMR 7.10), unless the Department and the Special Permit Granting Authority agree that those provisions shall not be applicable. A source of sound will be considered to be violating these regulations if the source:

(a) Increases the broadband sound level by more than 10 dB(A) above ambient, or

(b) Produces a "pure tone" condition – when an octave band center frequency sound pressure level exceeds the two adjacent center frequency sound pressure levels by 3 decibels or more. These criteria are measured both at the property line and at the nearest inhabited residence. Ambient is defined as the background A-weighted sound level that is exceeded 90% of the time measured during equipment hours. The ambient may also be established by other means with consent from DEP. An analysis prepared by a qualified engineer shall be presented to demonstrate compliance with these noise standards. The special permit granting authority, in consultation with the Department, shall determine whether such violations shall be measured at the property line or at the nearest inhabited residence.

6.4 Land Clearing, Soil Erosion and Habitat Impacts

Clearing of natural vegetation shall be limited to that which is necessary for the construction, operation and maintenance of the wind facility and is otherwise prescribed by applicable laws, regulations, and ordinances.

7.0 Monitoring and Maintenance

7.1 Facility Conditions The applicant shall maintain the wind facility in good condition. Maintenance shall include, but not be limited to, painting, structural repairs, and integrity of security measures. Site access shall be maintained to a level acceptable to the local Fire Chief and Emergency Medical Services. The project owner shall be responsible for the cost of maintaining the wind facility and any access road, unless accepted as a public way, and the cost of repairing any damage occurring as a result of operation and construction.

7.2 Modifications
All material modifications to a wind facility made after issuance of the special permit shall require approval by the special permit granting authority as provided in this section.

8.0 Abandonment or Decommissioning

8.1 Removal Requirements Any wind facility which has reached the end of its useful life or has been abandoned shall be removed. When the wind facility is scheduled to be decommissioned, the applicant shall notify the town by certified mail of the proposed date of discontinued operations and plans for removal. The owner/operator shall physically remove the wind facility no more than 150 days after the date of discontinued operations. At the time of removal, the wind facility site shall be restored to the state it was in before the facility was constructed or any other legally authorized use. More specifically, decommissioning shall consist of:

(a) Physical removal of all wind turbines, structures, equipment, security barriers and transmission lines from the site.
(b) Disposal of all solid and hazardous waste in accordance with local and state waste disposal regulations.
(c) Stabilization or re-vegetation of the site as necessary to minimize erosion. The special permit granting authority may allow the owner to leave landscaping or designated below-grade foundations in order to minimize erosion and disruption to vegetation.

8.2 Abandonment
Absent notice of a proposed date of decommissioning, the facility shall be considered abandoned when the facility fails to operate for more than one year without the written consent of the special permit granting authority. The special permit granting authority shall determine in its decision what proportion of the facility is inoperable for the facility to be considered abandoned. If the applicant fails to remove the wind facility in accordance with the requirements of this section within 150 days of abandonment or the proposed date of decommissioning, the town shall have the authority to enter the property and physically remove the facility.

8.3 Financial Surety
The special permit granting authority may require the applicant for utility scale wind facilities to provide a form of surety, either through escrow account, bond or otherwise, to cover the cost of removal in the event the town must remove the facility, of an amount and form determined to be reasonable by the special permit granting authority, but in no event to exceed more than 125 percent of the cost of removal and compliance with the additional requirements set forth herein, as determined by the applicant. Such surety will not be required for municipally or state-owned facilities. The applicant shall submit a fully inclusive estimate of the costs associated with removal, prepared by a qualified engineer. The amount shall include a mechanism for Cost of Living Adjustment.

9.0 Term of Special Permit

A special permit issued for a wind facility shall be valid for 25 years, unless extended or renewed. The time period may be extended or the permit renewed by the special permit granting authority upon satisfactory operation of the facility. Request for renewal must be submitted at least 180 days prior to expiration of the special permit. Submitting a renewal request shall allow for continued operation of the facility until the special permit granting authority acts. At the end of that period (including extensions and renewals), the wind facility shall be removed as required by this section.

The applicant or facility owner shall maintain a phone number and identify a responsible person for the public to contact with inquiries and complaints throughout the life of the project.

10.0 Application Process & Requirements

10.1 Application Procedures

10.1.1 General

The application for a wind facility shall be filed in accordance with the rules and regulations of the special permit granting authority concerning special permits.

10.1.2 Application

Each application for a special permit shall be filed by the applicant with the city or town clerk pursuant to section 9 of chapter 40A of the Massachusetts General Laws.

10.2 Required Documents

10.2.1 General

The applicant shall provide the special permit granting authority with ___ copies of the application. All plans and maps shall be prepared, stamped and signed by a professional engineer licensed to practice in Massachusetts. Included in the application shall be:

10.2.2 - Name, address, phone number and signature of the applicant, as well as all co- applicants or property owners, if any.

10.2.3 - The name, contact information and signature of any agents representing the applicant.

10.2.4 - Documentation of the legal right to use the wind facility site, including the requirements set forth in 10.3.2(a) of this section

10.3 Siting and Design

The applicant shall provide the special permit granting authority with a description of the property which shall include:

10.3.1 Location Map *(Modify for On-Site Wind Facilities)*

Copy of a portion of the most recent USGS Quadrangle Map, at a scale of 1:25,000, showing the proposed facility site, including turbine sites, and the area within at least two miles from the facility. Zoning district designation for the subject parcel should be included; however a copy of a zoning map with the parcel identified is suitable.

10.3.2 Site Plan

A one inch equals 200 feet plan of the proposed wind facility site, with contour intervals of no more than 10 feet, showing the following:

(a) Property lines for the site parcel and adjacent parcels within 300 feet.

(b) Outline of all existing buildings, including purpose (e.g. residence, garage, etc.) on site parcel and all adjacent parcels within 500 feet. Include distances from the wind facility to each building shown.

(c) Location of all roads, public and private on the site parcel and adjacent parcels within 300 feet, and proposed roads or driveways, either temporary or permanent.

(d) Existing areas of tree cover, including average height of trees, on the site parcel and adjacent parcels within 300 feet.

(e) Proposed location and design of wind facility, including all turbines, ground equipment, appurtenant structures, transmission infrastructure, access, fencing, exterior lighting, etc.

(f) Location of viewpoints referenced below in 10.3.3 of this section.

10.3.3 Visualizations *(Modify for On-Site Wind Facilities)*

The special permit granting authority shall select between three and six sight lines, including from the nearest building with a view of the wind facility, for pre- and post-construction view representations. Sites for the view representations shall be selected from populated areas or public ways within a 2-mile radius of the wind facility. View representations shall have the following characteristics:

(a) View representations shall be in color and shall include actual pre-construction photographs and accurate post-construction simulations of the height and breadth of the wind facility (e.g. superimpositions of the wind facility onto photographs of existing views).

(b) All view representations will include existing, or proposed, buildings or tree coverage.

(c) Include description of the technical procedures followed in producing the visualization (distances, angles, lens, etc.).

10.4 Landscape Plan (*Utility-Scale Wind Facilities Only)*

A plan indicating all proposed changes to the landscape of the site, including temporary or permanent roads or driveways, grading, vegetation clearing and planting, exterior lighting, other than FAA lights, screening vegetation or structures. Lighting shall be designed to minimize glare on abutting properties and except as required by the FAA be directed downward with full cut-off fixtures to reduce light pollution.

10.5 Operation & Maintenance Plan

The applicant shall submit a plan for maintenance of access roads and storm water controls, as well as general procedures for operational maintenance of the wind facility.

10.6 Compliance Documents

If required under previous sections of this by-law, the applicant will provide with the application:

(a) a description of financial surety that satisfies 8.3 of this section,

(b) proof of liability insurance that satisfies Section 3.3 of this section,

(c) certification of height approval from the FAA,

(d) a statement that satisfies Section 6.3, listing existing and maximum projected noise levels from the wind facility.

10.7 Independent Consultants – (*Utility-Scale Wind Facilities Only)*

Upon submission of an application for a special permit, the special permit granting authority will be authorized to hire outside consultants, pursuant to section 53G of chapter 44 of the Massachusetts General Laws. As necessary, the applicant may be required to pay not more than 50% of the consultant's costs.

Attachment C - National Park Service Conversion Policy

§ 59.3 Conversion requirements.

(a) *Background and legal requirements.*

Section 6(f)(3) of the L&WCF Act is the cornerstone of Federal compliance efforts to ensure that the Federal investments in L&WCF assistance are being maintained in public outdoor recreation use. This section of the Act assures that once an area has been funded with L&WCF assistance, it is continually maintained in public recreation use unless NPS approves substitution property of reasonably equivalent usefulness and location and of at least equal fair market value.

(b) *Prerequisites for conversion approval.*

Requests from the project sponsor for permission to convert L&WCF assisted properties in whole or in part to other than public outdoor recreation uses must be submitted by the State Liaison Officer to the appropriate NPS Regional Director in writing. NPS will consider conversion requests if the following prerequisites have been met:

(1) All practical alternatives to the proposed conversion have been evaluated.

(2) The fair market value of the property to be converted has been established and the property proposed for substitution is of at least equal fair market value as established by an approved appraisal (prepared in accordance with uniform Federal appraisal standards) excluding the value of structures or facilities that will not serve a recreation purpose.

(3) The property proposed for replacement is of reasonably equivalent usefulness and location as that being converted. Dependent upon the situation and at the discretion of the Regional Director, the replacement property need not provide identical recreation experiences or be located at the same site, provided it is in a reasonably equivalent location. Generally, the replacement property should be administered by the same political jurisdiction as the converted property. NPS will consider State requests to change the project sponsor when it is determined that a different political jurisdiction can better carry out the objectives of the original project agreement. Equivalent usefulness and location will be determined based on the following criteria:

(i) Property to be converted must be evaluated in order to determine what recreation needs are being fulfilled by the facilities which exist and the types of outdoor recreation resources and opportunities available. The property being proposed for substitution must then be evaluated in a similar manner to determine if it will meet recreation needs which are at least like in magnitude and impact to the user community as the converted site. This criterion is applicable in the consideration of all conversion requests with the exception of those where wetlands are proposed as replacement property. Wetland areas and interests therein which have been identified in the wetlands provisions of the Statewide Comprehensive Outdoor Recreation Plan shall be considered to be of reasonably equivalent usefulness with the property proposed for conversion regardless of the nature of the property proposed for conversion.

(ii) Replacement property need not necessarily be directly adjacent to or close by the converted site. This policy provides the administrative flexibility to determine location recognizing that the property should meet existing public outdoor recreation needs. While generally this will involve the selection of a site serving the same community(ies) or area as the converted site, there may be exceptions. For example, if property being converted is in an area undergoing major demographic change and the area has no existing or anticipated future need for outdoor recreation, then the project sponsor should seek to locate the substitute area in another location within the jurisdiction.

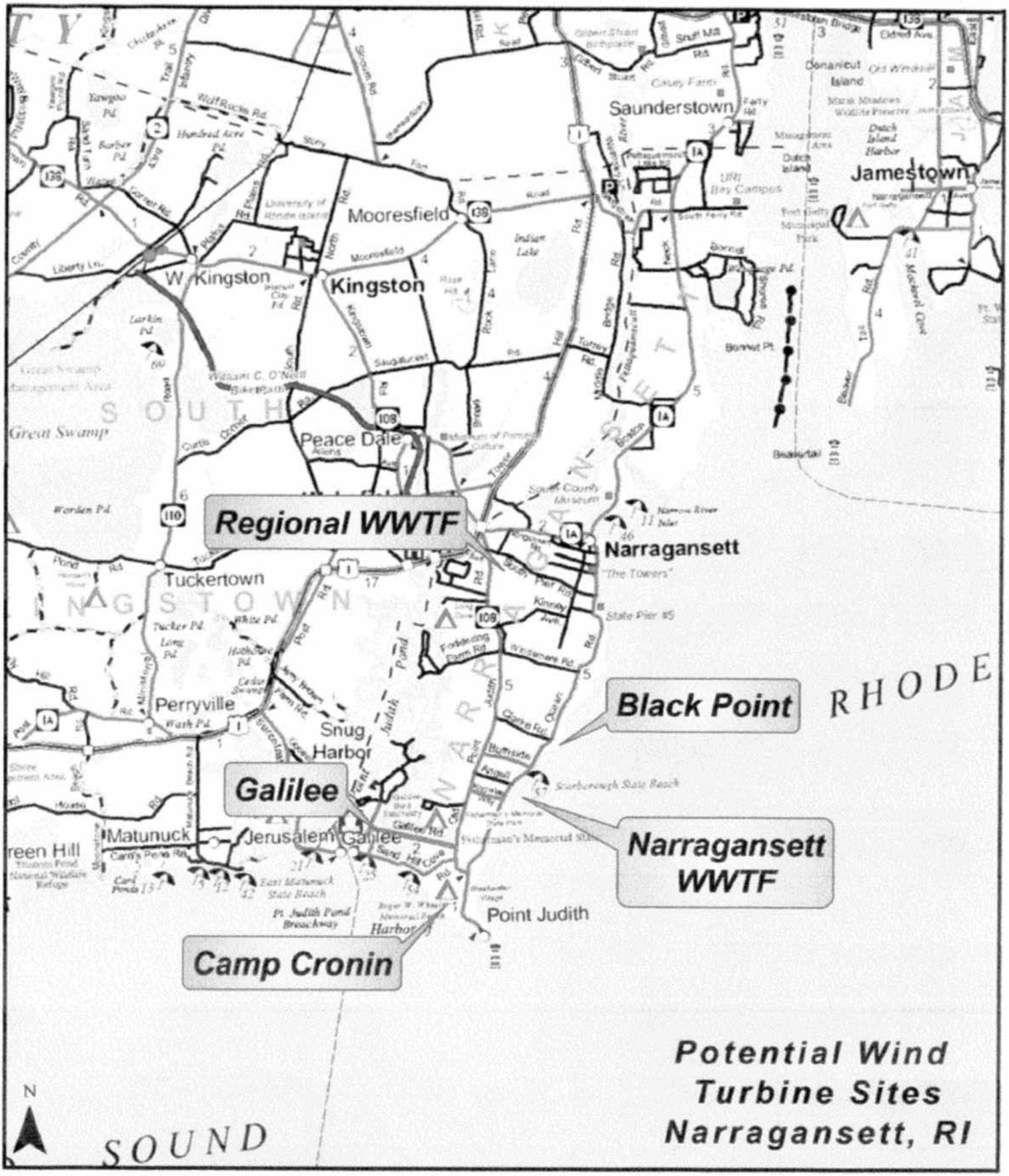
Should a local project sponsor be unable to replace converted property, the State would be responsible, as the primary recipient of Federal assistance, for assuring compliance with these regulations and the substitution of replacement property.

(iii) The acquisition of one parcel of land may be used in satisfaction of several approved conversions.

(4) The property proposed for substitution meets the eligibility requirements for L&WCF assisted acquisition. The replacement property must constitute or be part of a viable recreation area. Unless *each* of the following additional conditions is met, land currently in public ownership, including that which is owned by another public agency, may not be used as replacement land for land acquired as part of an L&WCF project:
(i) The land was not acquired by the sponsor or selling agency for recreation.
(ii) The land has not been dedicated or managed for recreational purposes while in public ownership.
(iii) No Federal assistance was provided in the original acquisition unless the assistance was provided under a program expressly authorized to match or supplement L&WCF assistance.
(iv) Where the project sponsor acquires the land from another public agency, the selling agency must be required by law to receive payment for the land so acquired. In the case of development projects for which the State match was not derived from the cost of the purchase or value of a donation of the land to be converted, but from the value of the development itself, public land which has not been dedicated or managed for recreation/conservation use may be used as replacement land even if this land is transferred from one public agency to another without cost.
(5) In the case of assisted sites which are partially rather than wholly converted, the impact of the converted portion on the remainder shall be considered. If such a conversion is approved, the unconverted area must remain recreationally viable or be replaced as well.
(6) All necessary coordination with other Federal agencies has been satisfactorily accomplished including, for example, compliance with section 4(f) of the Department of Transportation Act of 1966.
(7) The guidelines for environmental evaluation have been satisfactorily completed and considered by NPS during its review of the proposed 6(f)(3) action. In cases where the proposed conversion arises from another Federal action, final review of the State's proposal shall not occur until the NPS Regional office is assured that all environmental review requirements related to that other action have been met.
(8) State intergovernmental clearinghouse review procedures have been adhered to if the proposed conversion and substitution constitute significant changes to the original Land and Water Conservation Fund project.
(9) The proposed conversion and substitution are in accord with the Statewide Comprehensive Outdoor Recreation Plan (SCORP) and/or equivalent recreation plans.
(c) *Amendments for conversion.* All conversions require amendments to the original project agreements. Therefore, amendment requests should be submitted concurrently with conversion requests or at such time as all details of the conversion have been worked out with NPS. Section 6(f)(3) project boundary maps shall be submitted with the amendment request to identify the changes to the original area caused by the proposed conversion and to establish a new project area pursuant to the substitution. Once the conversion has been approved, replacement property should be immediately acquired. Exceptions to this rule would occur only when it is not possible for replacement property to be identified prior to the State's request for a conversion. In such cases, an express commitment to satisfy section 6(f)(3) substitution requirements within a specified period, normally not to exceed one year following conversion approval, must be received from the State. This commitment will be in the form of an amendment to the grant agreement.
(d) *Obsolete facilities.* Recipients are not required to continue operation of a particular facility beyond its useful life. However, when a facility is declared obsolete, the site must nonetheless be maintained for public outdoor recreation following discontinuance of the assisted facility. Failure to so maintain is considered to be a conversion. Requests regarding changes from a L&WCF funded facility to another otherwise eligible facility at the same site that significantly contravene the original plans for the area must be made in writing to the Regional Director. NPS approval must be

obtained prior to the occurrence of the change. NPS approval is not necessarily required, however, for each and every facility use change. Rather, a project area should be viewed in the context of overall use and should be monitored in this context. A change from a baseball field to a football field, for example, would not require NPS approval. A change from a swimming pool with substantial recreational development to a less intense area of limited development such as a passive park, or vice versa, would, however, require NPS review and approval. To assure that facility changes do not significantly contravene the original project agreement, NPS shall be notified by the State of *all* proposed changes in advance of their occurrence. A primary NPS consideration in the review of requests for changes in use will be the consistency of the proposal with the Statewide Comprehensive Outdoor Recreation Plan and/or equivalent recreation plans. Changes to other than public outdoor recreation use require NPS approval and the substitution of replacement land in accordance with section 6(f)(3) of the L&WCF Act and paragraphs (a) through (c) of this section.

[51 FR 34184, Sept. 25, 1986, as amended at 52 FR 22747, June 15, 1987]



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