

February 6, 2013

Board of Zoning Adjustments  
City of San Leandro

c/o Elmer Penerande  
City Planning Dept.

COMM. DEVEL. DEPT.

FEB - 7 2013

SAN LEANDRO  
RECEIVED

**Comments on Application for Variance — Wind Turbine at 2539 Grant Avenue**

**Recommendations**

You should (1) deny the application for variance because it cannot be supported by required findings and (2) recommend to the city council that it adopt a moratorium on installation of wind turbines in order to explore the conditions under which such turbines will be permitted in the city.

**Background**

We urgently need need to develop energy sources other than oil and coal but at the same time,, particularly because of the urgency, we also need to proceed in an orderly manner that does not place undue, unwanted, and unnecessary burdens on the environment and on ourselves.

The proposal for the wind turbine at Halus Power Systems first caught my attention because of its location near the San Lorenzo Creek and the shoreline. I have long been active in advocating for progressive policies regarding creeks, flood control, and shoreline development. A decade ago I founded the Friends of San Lorenzo Creek. I am also interested in promoting alternatives to oil- and coal-dependent power systems. Thus, in addition to my concerns for due process, discussed below, I am concerned that inappropriate siting of alternative energy sources will have the effect of undermining popular support for these alternatives.

**The Noise Issue**

The applicant has provided the City with information about the design criteria noise emissions of the wind turbine it wishes to install. There are two material and important issues with respect to this information. I am familiar with these issues because one of my specialties as a public interest lawyer is federal regulations for airport planning, particularly regulations concerning aircraft noise and abatement.

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First, use of the A-weighted decibel to calculate noise, as done for the applicant's wind turbine, eliminates the low-frequency air pressure waves produced by wind turbines and helicopters and other rotating machines. The low-frequency spectrum has distinctive adverse effects on humans and wildlife, effects that are entirely different from the higher-frequency sounds within the range of human hearing. Low-frequency sound waves are largely vibratory, at least for humans, and are a documented source of feelings of anxiety and dread that have physiological effects. Low-frequency noise is detected using the C-weighted decibel.

In the record presented to you for the Feb. 7 hearing there is no quantitative evidence concerning low-frequency sound of the wind turbine and its potential impact on humans and wildlife in the sensitive shoreline environment. Indeed, there is no evidence in the record that this issue was even considered. (For a good summary of the research of health effects of wind turbine noise, see "Noise Radiation from Wind Turbines Installed Near Homes: Effects on Health, with an Annotated Review of the Research and Related Issues," Barbara Frey and Peter Hadden, Feb. 2007, posted at [www.windturbineoisehealthhumanrights.com](http://www.windturbineoisehealthhumanrights.com).)

Second, the information about the design criteria noise emissions of the wind turbine, provided by the applicant, is based on guidelines that are not current. The design standards of the manufacturer (a company in Denmark) comply with 1993 guidelines of the Danish Ministry of the Environment (see "Noise Resume of Vestas V29-225 kW Wind Turbine" submitted by applicant).

The Danish Ministry of the Environment recently revised its Statutory Order on Wind Turbines to include limits for low-frequency noise. The ministry has explained this change: "It was earlier the opinion of the [Danish] Environmental Protection Agency that low-frequency noise from wind turbines does not constitute a problem, since the noise levels do not exceed the limits for the 'normal noise' from wind turbines. But there has been concern about low-frequency noise in areas where wind turbines are being planned. Industry, municipalities, and citizens have thus requested specific rules for this type of noise." (See **attachments 1 and 2** from the ministry: "Noise from Wind Turbines" and "Q&A: Low-frequency Noise from Wind Turbines".)

While the Danish Statutory Order does not apply to turbines certified before 2012, I bring this up to illustrate that low-frequency noise is now a matter of regulatory concern. In addition to the question of impacts from wind turbines, the U.S. Federal Interagency Committee on Aviation Noise in recent years has established low-frequency noise as a research and regulatory priority, a major step forward since aviation interests have fought hard for decades to preserve use of the A-weighted decibel in measuring aircraft noise and thus continue to ignore the predominant source of annoyance in aviation noise.

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### **Definition of a Structure in the Zoning Ordinance**

There are strong reasons, based on the language of the city's zoning ordinance, to expect that the standards for "structures" in the city's zoning ordinance are meant to apply to buildings and other stationary structures, not "structures in motion". To assume that the term "structure" in the zoning ordinance includes "structures in motion" (i.e., structures whose principal function is to be in motion) can lead to absurdities in the interpretation of the zoning ordinance.

The zoning ordinance defines "structure" (sec. 1-304) as "anything constructed or erected that requires a location on the ground," including swimming pools but not walls. The zoning ordinance separately addresses "mechanical structures" (such as HVAC structures and generators that sit on top of buildings) and telecommunications towers.

If the city wishes to include "structures in motion" in standards that apply to "structures", it should do so expressly in the zoning ordinance.

In the "Applicant's Statement" included in your meeting packet, Halus Power Systems claims that the "zoning authority" for the wind turbine is in sec. 2706(A), which is a list of permitted uses in an IG zone. This list includes "(32) Telecommunications Antennae and/or Alternative Tower Structures up to sixty (60) feet in height. [See Section 4-1686: Wireless Telecommunication Facilities {as per Ordinance No. 98-009}]". The language appears to mean telecommunications towers only; what is meant by "alternative tower structures" is anyone's guess, but it is not reasonable to interpret this as something other than a tower supporting telecommunications antennae.

### **The Variance**

Variations are one means (the other is the conditional use permit) for providing reasonable and fair flexibility in implementing zoning standards. The notion of the variance, and the rules and guidelines for granting a variance, are well established in California case law. A variance cannot be a way around zoning standards. It is intended to provide relief in the form of minor variations where the strict application of a standard would create an undue burden on a particular parcel. Variations thus arise from the condition of the land and nothing more.

The City of San Leandro has adopted these well-established rules for granting variations in its zoning ordinance (secs. 5-2202(A) and 5-2212(B)).

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The applicant is asking the city to give it a major exception to the height standard, allowing it to erect a structure of 100 feet (80 foot tower plus 20 foot rotating propeller), which would exceed the zoning standard by 67 percent. The magnitude of the variation alone is contrary to the well-established purpose of variances.

Further, this exception is not predicated on any features of the applicant's parcel that would deprive him of parity when the height standards are applied to similar parcels. Absent this, your board cannot make the first finding required by city's zoning ordinance (sec. 5-2212(A)):

1. That because of special circumstances or conditions applicable to the subject property, including narrowness and shallowness or shape, exceptional topography, or the extraordinary or exceptional situations or conditions, strict application of the requirements of this article would result in peculiar and exceptional difficulties to, or exceptional and/or unique hardships upon, the owner of the property.

You are required to make all findings stated in the ordinance, so that failure to support any one finding is fatal to approval of the variance. ("Failure to make all the required findings under subsections A, B, or C shall require denial of the application for a use permit." Sec. 5-2212(D).)

I stress again that the "special circumstances or conditions" on which a variance is predicated are features of the parcel. All other factors are immaterial and irrelevant under the law. Granting a variance is a "quasi-judicial" action — it cannot legally supplant a legislative action, i.e., adopting zoning standards. Apart from the question of due process of law, using variances to override zoning standards is bad planning practice leading to disorderly and inequitable city planning and eventually eroding public faith in the official planning process.

The city planning staff in its recommended findings of fact for the variance cites the following "special circumstances" of the applicant's parcel:

- (1) "Irregular flag shape of the lot, its sizeable land area".
- (2) The lot "is not immediately adjacent to occupied properties".
- (3) The lot's "clear and unobstructed location to the westerly San Francisco Bay winds, which make it a candidate for the proposed turbine."
- (4) "The flag lot moves the turbine away from street view".
- (5) "The large size of the lot provides adequate setbacks from adjacent properties and uses by situating it on the center of the large parcel."

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None of these are circumstances or conditions of the applicant's parcel that put him at a disadvantage compared to owners of all other parcels subject to the height limit. Instead, staff cites five reasons why the applicant's parcel is an ideal location for installation of a wind turbine generator. But such reasons are completely irrelevant to the rationale for a variance mandated by the city zoning ordinance and by well-established California law.

If parcels nearest the bay are ideal for wind turbine generators, the city should develop an overlay district or other planning measure that will promote and permit wind turbines. But approving variances to an existing zoning standard is not a lawful means to that end.

### **Impact on Property Values**

I found nothing in the meeting packet for Feb. 7 that addresses the question of the potential adverse impact of the proposed wind turbine on nearby residential property values. While the cause/effect of such impacts are very difficult to demonstrate, evaluation of such impacts is a recognized specialty in real estate appraisal. (See for ex. *Real Estate Damages: Applied Economics and Detrimental Conditions*, 2nd ed., Randall Bell, Appraisal Institute. I first learned of this book because of its treatment of the question of noise impacts from the Sea-Tac International Airport.)

If the proposed wind turbine is built, and owners of property near the proposed wind turbine were to discover later in time that the market value of their property had been affected, a complex (and expensive) round of litigation could result involving the city as well as Halus Power Systems.

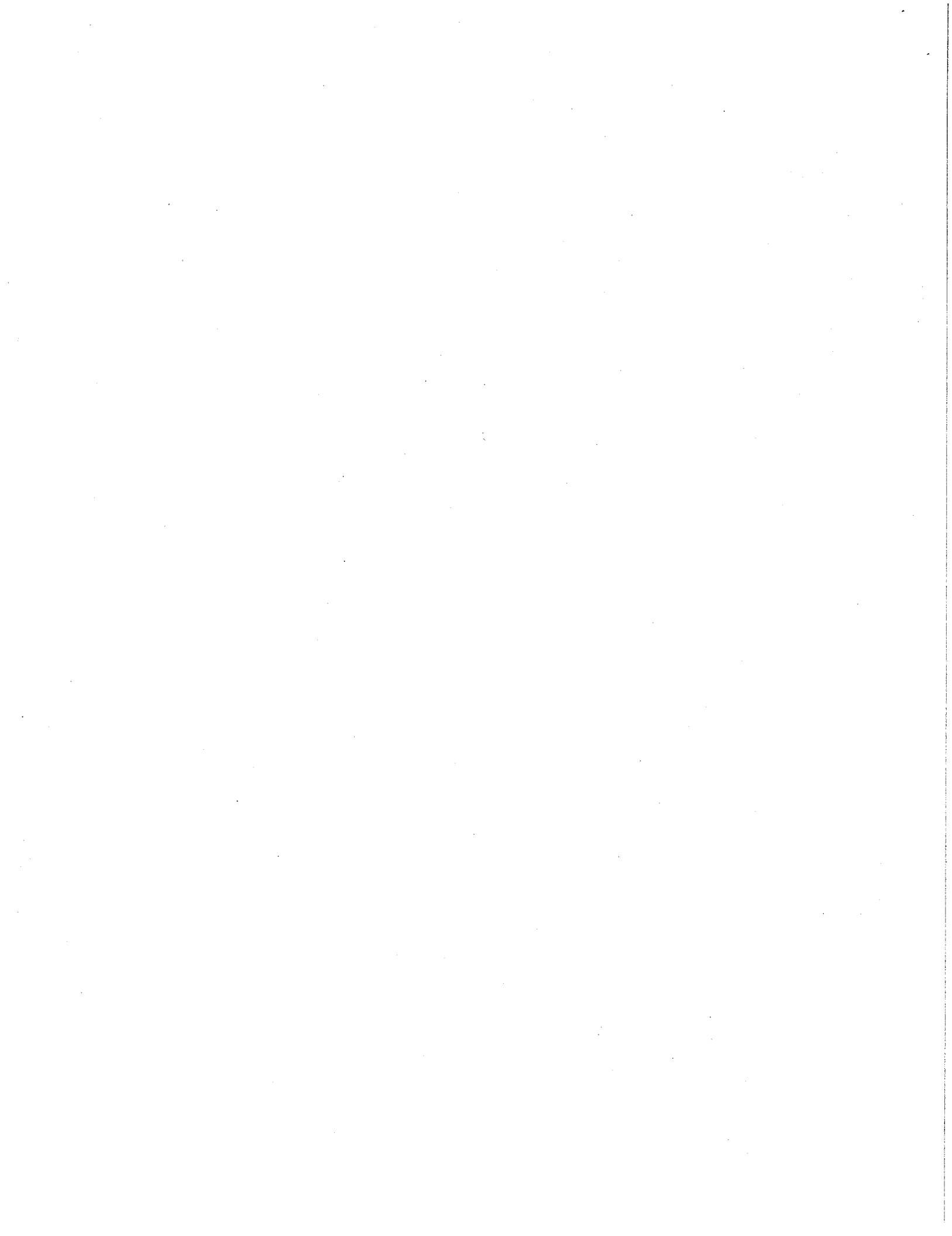
I enclose for your consideration a letter from a real estate appraiser saying that while the question of adverse impact is open, there is likely such an impact from wind turbines (**attachment 3**).

Respectfully,



Howard Beckman, Esq.  
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San Lorenzo 94580  
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- Encl: (1) "Q&A on Low-frequency Noise," Danish Ministry of Environment  
(2) "Noise from Wind Turbines," Danish Ministry of Environment  
(3) Letter from David Maturen on impact of wind turbines on property value



## **Danish Ministry of the Environment**

### **Environmental Protection Agency**

#### **Q&A: Low frequency noise from wind turbines**

The Environmental Protection Agency has revised the Statutory Order on Wind Turbines to include limit values for low frequency noise. The new limit values apply to turbines that are registered after January 1st 2012 where the new statutory order entered into force.

[Link to an English translation of the revised Statutory Order on noise from wind turbines.](#)

Please note that the Statutory Order is valid for wind turbines in Denmark, and that the methods for calculation of wind turbine noise are adapted to Danish conditions. This goes for the values stated for correction for ground effect, which are based on the general applicable method Nord 2000, as well as for the values stated for sound insulation of dwellings, which are based on measurements of sound insulation at low frequencies in 14 representative Danish dwellings.

[Read more about the regulation of noise from wind turbines \(in Danish\)](#)

[Read more about wind turbines on the Wind Turbine Secretariat website \(Danish Nature Agency\) \(in Danish\)](#)

#### **Questions & answers:**

##### **What is low frequency noise?**

Noise is unwanted sound. Noise can involve both high-pitched sounds (from high frequency sound waves) and deep sounds (from low frequency sound waves). Low frequency noise can for example be the hum or buzz from a compressor, rumble from a boiler or a combustion plant or the rumbling of an idling engine.

Wind turbine noise emanates from the rotation of the blades and from the nacelle machinery. The noise from the blades is a characteristic swishing sound, which varies in rate with their rotation. Normally this does not contain much low frequency noise. Noise from the machinery can consist of both a high-pitched wailing (high frequency) and buzzing sounds (low frequency).

Low frequency noise is technically defined as noise within the frequency range of 10 – 160 Hz (between 10 and 160 cycles per second).

##### **Is low frequency noise a problem in relation to wind turbines?**

It was earlier the opinion of the Environmental Protection Agency that low frequency noise from wind turbines does not constitute a problem, since the noise levels do not exceed the limits for the 'normal noise' from wind turbines.

But there has been concern about low frequency noise in areas where wind turbines are being planned. Industry, municipalities and citizens have thus requested specific rules for this type of noise.

A detailed analysis, by the Environmental Protection Agency, of several specific projects based on new industry information has indicated that the new rules can be a challenge for certain new types of serial produced wind turbines in specific situations.

No evidence suggests that low frequency noise is more dangerous than other forms of noise.

### **Are giant wind turbines a particular source of low frequency noise?**

All turbines can emit low frequency noise, irrespective of their size either in terms of electrical power (megawatts) or height.

Current knowledge of the subject is that large wind turbines emit more noise than small ones, and should therefore not be located as close to properties. However, there is no clear correlation between the size of the wind turbine and the level of low frequency noise it emits. This depends more on construction type than on size.

In general there is no clear connection between the size of a wind turbine and the characteristics of the emitted sound, other than large wind turbines rotate slower so the blade noise is modulated with a lower period.

### **Do wind turbines emit infrasound, and is this dangerous?**

Wind turbines also emit infrasound, which is sound at very low frequencies. Infrasound is sensed in the same way as other sounds and is audible to the human ear if sufficiently strong. When infrasound is audible, it becomes annoying. Where infrasound is inaudible, it does not affect health.

The wind turbines we know in Denmark today emit very weak infrasound, which is below hearing threshold, even when in close proximity. Infrasound does therefore not pose a problem in regard to modern wind turbines. The technical definition of infrasound is sound that is lower in frequency than 20 Hz (fewer than 20 cycles per second).

### **What is the new limit value for low frequency noise?**

The new regulation is based on a 20 decibels (dB) limit for the low frequency noise level, calculated indoors, for wind speeds both of 6 and 8 m/s.



The limit value for noise from wind turbines is 44 dB outdoors near residences in the open country and 39 dB in residential areas, for a wind speed at 8 m/s.

**What are the consequences of the new limit value for low frequency noise?**

After the new noise regulation has entered into force on January 1st 2012, wind turbines registered with municipalities will have to comply with both the current limit values for the 'normal noise' and the new limit value for low frequency noise

The municipality has an obligation to inspect wind turbines to ensure that noise disturbance is not excessive and can require wind turbine owners to have the noise generated by their turbines measured to ensure that regulations are complied with. This also applies to the new limit for low frequency noise.

**What about existing wind turbines?**

The rules do not affect turbines that are registered with the municipalities earlier than January 1st, 2012. It will apply only to turbines that are registered after the Statutory Order entered into force January 1st 2012.

When existing wind turbines are renewed, the new regulations will apply to the replacement turbines.

**What should I do if I am having problems with low frequency noise?**

If noise has become a nuisance and the problem cannot be solved by contacting the company (or wind turbine owner) causing the noise, you can take the matter to the municipality.

Municipalities are the supervisory authority of wind turbine noise monitoring. Only wind turbines registered with the municipality after January 1st 2012 are subject to the binding limit for low frequency noise.

**If a wind turbine has recently been registered with the municipalities, will it exceed the new low frequency noise limit value?**

In general, the Environmental Protection Agency does not expect problems relating to low frequency noise from wind turbines that keep current limits for the 'normal noise'.

In preparing the new regulations, the Environmental Protection Agency has found that certain serial produced wind turbines may have difficulties complying with the noise limit for low frequency noise in some specific situations.

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[http://www.mst.dk/English/Noise/wind\\_turbine\\_noise/low\\_frequency\\_noise\\_from\\_wind\\_turbines/low\\_frequency\\_noise\\_from\\_wind\\_turbines\\_FAQ.htm](http://www.mst.dk/English/Noise/wind_turbine_noise/low_frequency_noise_from_wind_turbines/low_frequency_noise_from_wind_turbines_FAQ.htm)]

# Noise from wind turbines

**Wind turbines emit a relatively weak but characteristic noise. The noise is mainly generated by the movement of the blades through the air. This produces a swishing sound in rate with the rotation of the blades, as well as noise from the turbine machinery. Machine noise can have a tonal character which is particularly annoying.**

## **Noise limits are set for both weak and strong winds**

Wind turbines must observe the noise limits in accordance with the Statutory Order on wind turbines. The noise limits apply to the total noise from all wind turbines and are set for both weak winds, when noise is found to be most annoying, and stronger winds. When the noise meets the noise limits it do not mean that the noise is inaudible. The limits have been laid down to ensure that no significant disturbance is experienced.

Read more about the Statutory Order on wind turbines (in Danish)

Download noise thermometer (PDF, 120KB), which provides examples of noise generation at various decibel levels.

## **Noise is calculated, because precise measurements are difficult to achieve**

The noise from wind in trees and bushes makes it impossible to take sufficiently precise measurements of wind turbine noise at neighbouring properties under the necessary wind conditions. In addition to the wind noise, traffic noise and sound from birds and from noise sources inside or near the dwelling may disturb measurement of the low noise levels in question. Regulations governing noise experienced by neighbouring properties therefore calculate noise annoyance based on the wind turbines' noise emission.

Noise emission is measured relatively close to the wind turbine using a microphone mounted on a large plate on the ground. Here there is much less influence from the background noise. At the same time the wind speed is measured or preferable derived from the produced power, as this corresponds better to the wind speed acting on the blades. The wind turbine noise emission is determined on this basis.

Noise emissions are measured under both very windy conditions (8 m/s at 10 m height) and less windy conditions (6 m/s) to reflect the two sets of noise limits.

The calculation of the amount of noise emitted to neighbouring properties is very simple, because the noise is emitted from a significant height. The calculation presupposes downwind sound propagation. The calculated noise level is almost always higher than actual noise experienced by neighbouring properties.

## **Modern turbines emit significantly less noise**

The latest wind turbines are considerably quieter than the first models of the 1970s and 1980s. In particular, noise from the gears and generator has been reduced. The modern wind turbine's nacelle is noise insulated and the generator and gears are mounted so that noise is dampened as much as possible. The design of the blades has been developed to mitigate noise.

NOISE FROM WIND TURBINES

Noise from a modern wind turbine is commensurate with that of a tractor. A typical 1980s turbine generating 100 kW and a 1990s turbine generating 500 kW both emit approx. 100 dB. This is only slightly less than a typical modern turbine generating 2-3 MW.

[Read more about regulations on noise from wind turbines](#)

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DT: September 9, 2004  
TO: Michigan Wind Working Group  
c/o John Sarver, Energy Office  
RE: Impact of Wind Turbine Generators on Property Values

First of all I wish to thank you for including me in your email distribution list relative to the proceedings of the Wind Working Group. I have an interest in the topic as a Kalamazoo County Commissioner concerned with land use and regulation and as real estate appraiser interested in the issue of external obsolescence (loss or depreciation to property value from outside the property boundary). That economic obsolescence can come from adverse (nuisance) impacts such as visual (loss of viewshed), blade flicker (strobe effect), noise, ice throw from blades in winter, and other environmental impacts from ancillary installations. I am not aware of any plans to put a wind farm in the vicinity of any property that I own, so I have no personal interest one way or the other in this matter, other than wanting the rights all parties to be respected and protected.

I understand that you have as an item of discussion at your September 9, 2004 meeting the issue of property values. I have had some experience with research on this matter. Unfortunately, I have a prior commitment that day and will likely not be able to attend your meeting. Perhaps your committee is already aware of these valuation issues and studies, but I think that they are important to note in the context of promoting wind farms in our state.

As the Vice Chair of the International Right of Way Association's Valuation Committee, I had the opportunity to moderate a session at our International Education Conference in Philadelphia this June. I invited the authors of the two most often quoted studies on the issue of wind farms and property values. Fred Beck of the Renewable Energy Policy Project (REPP) and Dr. David Tuerck of the Beacon Hill Institute at Suffolk College both presented the findings of their respective studies. Both studies are available on the internet: [www.repp.org](http://www.repp.org) and [www.beaconhill.org](http://www.beaconhill.org).

The REPP study, *The Effect of Wind Development on Local Property Values*, is a 78 page report which was published in May 2003. They studied 10 areas of the country. The study surveyed assessed values and properties within 5 miles of a wind farm and showed no diminution in value to those properties due to the presence of the wind farms. Critiques have been made regarding the methodology used in that study.

The Beacon Hill Institute issued an initial 53 page report in October 2003 - *Blowing in the Wind: Offshore Wind and the Cape Cod Economy* and a follow up 34 page report in March 2004 - *Free but Costly: An Economic Analysis of a Wind Farm in Nantucket Sound*. The studies focus on Nantucket Sound in Massachusetts relative to the Cape Wind Associates proposed 130 wind turbine generator (WTG) offshore wind farm. The 2003 study projected 1) a small decline in tourism resulting in a loss of 1,173 to 2,533 jobs and 2) a decline in property values of 4.6% (10.9% for waterfront property) or \$1.35 billion and a concomitant loss in tax revenue to the area of \$8 million. Criticisms of that report have also been made.

**Attachment 3**

The Tennessee Valley Authority (TVA) study on a proposed wind farm in Tennessee consisting of 13 to 16 WTGs reviewed literature on the issue. Appendix F of the study cites several studies on wind farms and their impacts. Among those are:

1. The April 1996 Danish study: Social Assessment of Windpower - Visual Effect and Noise from Windmills - Quantifying and Evaluation. It concluded that 13% of people living near windmills considered them a nuisance. Property values showed a loss in housing prices from \$2,900 (for one WTG) to \$16,000 (for a 12 unit wind farm).
2. The ongoing study in Wisconsin thought to be done in 2003. My conversation with Steve Brick of the Energy Center of Wisconsin indicated that as of this Spring their study was not finished.
3. The TVA study does mention the value of a viewshed as a percentage of the value of improved property at 8% in Fairfax, Virginia and a South Carolina analysis regarding vacant lot premiums of 147% for an ocean view, 115% for a creek or marsh view, and 39% for a golf course view.

The 2002 Strutt & Parker study of the Edinbane Windfarm on the Isle of Skye notes that the proposed 41 turbines would have a major impact on the locality. They estimated that nearby property values would decline by over \$1 million. They also note at 6.18 of their report that "In Germany, Estate Agents report diminution in values of between 20% to 30% for properties in sight of wind farms. We understand that FPD Savills have reported similar levels of depreciation for properties in Norfolk."

The report of the Township of Lincoln Wind Turbine Moratorium Committee, Kewaunee, Wisconsin (2000 to 2002) notes that the Town of Lincoln building inspector compiled a list of home sales. The list compared the property's selling price as a function of the distance to an existing 22 WTG farm in the area. His conclusions were:

1. Sales within 1 mile of the wind farm prior to the installation were 104% of the assessed values and
2. Properties selling after the wind farm introduction in the same area were at 78% of the assessed value.

Anecdotal evidence from real estate agents near Victoria, Australia indicates a 20% to 30% decrease in property values for homes near WTGs.

A court case referenced in the February 14, 2004 edition of the Daily Telegraph (UK) refers to a house near Askam in the Lakes District. The buyers were not informed of the pending installation of 4 WTGs which were 360' tall and 550 yards from their new home. No mention was made in the seller's disclosure form, despite the fact that the seller had protested the proposed wind farm installation to the local government indicating a large loss in value to their property. The court, after listening to chartered surveyors (appraisers) for both sides, concluded that the property had suffered a 20% decline in value.

The above listing is not exhaustive, but a brief mention of studies that discuss the impact on communities and nearby property values by WTGs.

Is the "jury" still out on the impact of WTGs on property value? Yes, though there do appear to be several indications that a loss in value to neighboring properties is real possibility. Can any state agency conclude that wind farms do not have the potential for causing a nuisance and devalue nearby properties and cause a "taking"? No. Whatever report the Wind Working Group comes up with, it should be informational only, include the differing opinions that are out there, not be used to usurp local land use authority in regulating WTGs just like any other land use nor to deny property owners their rights. In

our quest for "energy independence" for our society in general, let us not forget the potential for economic loss to individuals as an unintended consequence. We should be prepared to compensate adjacent owners for any property rights (value) taken as a result of the introduction of wind farms.

Sincerely,  
David C. Maturen, SR/WA  
Certified General Real Estate Appraiser  
Kalamazoo County Commissioner

Original document in pdf format [here](#).

