

# Large wind turbines - noise and neighbours

**Author names:**

## Abstract

Because wind turbines are growing and getting higher and higher, peoples opposition to living next door to wind turbines is also growing. This we have seen all over the world.

The visual influence of the large wind turbines as well as the turbines influence on nature and landscape is worrying the neighbours. People are also anxious about the value of their properties.

The biggest anxiety is the noise from these large machines. We know that large wind turbines are producing more noise than small ones. The low frequency noise is contributing to people's anxiety. Specialists are not agreeing on the problems from this kind of noise - and they are not agreeing on how to measure this kind of noise or how to read the measurements. Not in Denmark at least. It is very important that scientists find reliable measuring methods for low frequency noise – it is also important to determine how low frequency noise affects people.

In my neighbourhood Kappel, Lolland Denmark – DONG Energy – a firm owned by the Danish State - wants to establish testing facilities for 7 (150 – 200 meters high) off shore wind turbines (40 MW) in an area with 600 houses and 600 summer houses. The testing area is smaller than 3 square kilometres.

Of course people in Kappel are upset and anxious because of all the negative effects these large wind turbines will cause to area and peoples welfare.

## Introduction

During the latest years Wind Turbine Industry has focused on producing large – very large – and very effective wind turbines. It seems that the slogan for this industry is:

“Large is good!”

“Larger is even better!”

Once wind turbines were everyone's possession – if you wanted to. It was possible for ordinary people to buy the small turbines witch had a size that people could accept. The people who made a profit on the wind turbines were also the ones who had to deal with the negative side effects from the wind turbines.

This has now changed.

Only big national or international companies (or very wealthy people) can afford large investments with modern wind turbines demand. To day investors live far away from the turbines and therefore it is easier for them to close their eyes and ears from the visual damage and the noise from these large wind turbines. Therefore the visual and acoustic problems are neglected. It is important to remember that investing in wind turbines are often a very profitable business.

Neighbours who can look forward to living close to such mastodons (as turbines at 125 – 200 meters in height and wings larger than football fields) say “no thank you!” to these prospects.

The anxieties from the neighbours are met with comments like: “No problems – it is only the NIMBY effect – (not in my back yard)”. Wind power enthusiasts are portraying these neighbours as people who don’t care about the climate or our planet - while the wind turbine actors heroically are fighting for us all.

It is politically incorrect to say anything negative about wind power energy.

Noise measurements are often paid by the investors and therefore the neighbours don’t find these measurements to be reliable.

The problems are known all over the world and therefore several organisations like: ...

[www.EPAW.org](http://www.EPAW.org) (European protest against wind power)

[www.wind-watch.org](http://www.wind-watch.org)

[www.stilheden.eu](http://www.stilheden.eu)

[www.landskapsskydd.se](http://www.landskapsskydd.se)

[www.visigernej.dk](http://www.visigernej.dk) (my group)

... are founded. Just to mention a few. You can find lots of them. People really don’t want to live so close to large wind turbines. They are anxious and they are fighting against the wind turbine industry and the companies. Well knowing that they have really, really powerful enemies.

But it is important to remember what these neighbours groups are fighting for –They are fighting for their environment - for the landscape – nature - and for their quality of life.

The neighbours only have one possibility – to turn to the scientists to get valid information. **It is important that the scientists are impartial.** A conference like this is of **great** value. You must understand that the neighbours have had many bad experiences fighting against so powerful adversaries and therefore are very suspicious about measurements sponsored by the wind power industry and the large companies who want to raise these

giant wind turbines. The companies have lobbyists placed in governments – municipalities and any place where it is perhaps possible to influence decision-makers.

## EFP06

2006 AAU and Delta started working together on a large project called EFP06: “Low Frequency Noise from Large Wind Turbines – Quantification of the Noise and Assessment of the Annoyance”

Unfortunately disagreement came up. AAU did not find the measurements made by DELTA sufficient and had several complaints to some of the measurements which AAU found incorrect.

AAU’s scientists retired from the project because they found it was impossible to make an investigation of the low frequency noise and annoyance to the neighbours caused by the turbines. The reason was that AAU found that DELTAS measurements and conclusions were some times misleading.

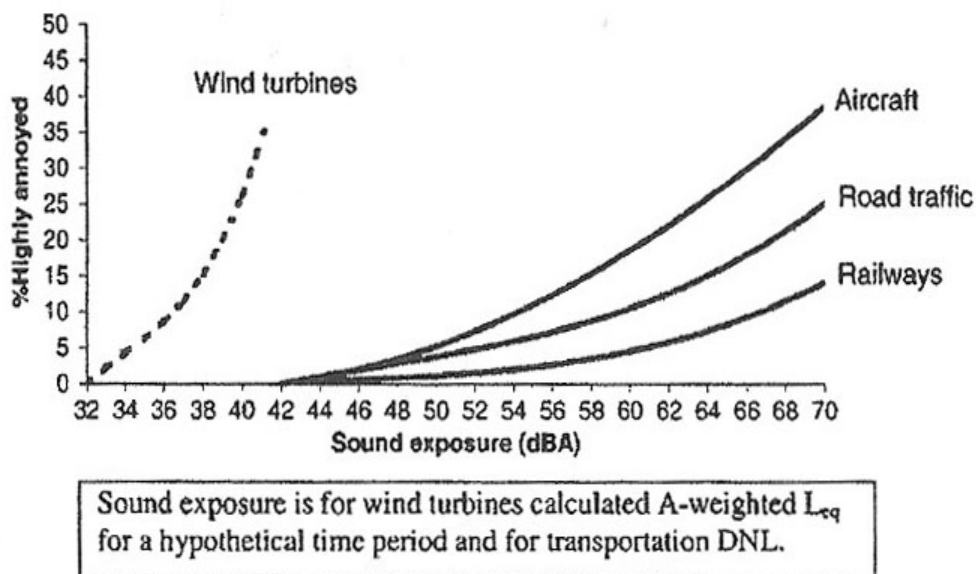


Fig. 1) Eja Pedersen and Kerstin Persson Wayes article: Perception and annoyance due to wind turbine noise - a dose-response relationship, Journal of the Acoustical Society of America, vol. 116(6), December 2004, pp. 346-3470.

The curve shows that it is not always easy to live next door to elder commercial wind turbines. We know that it is true because we live next to 24 small wind turbines. Depending on the wind and the temperature the noise can be very annoying. Some times you must close your windows if you want peace during night time.

Low frequency noise indoors by 44 dB outdoors

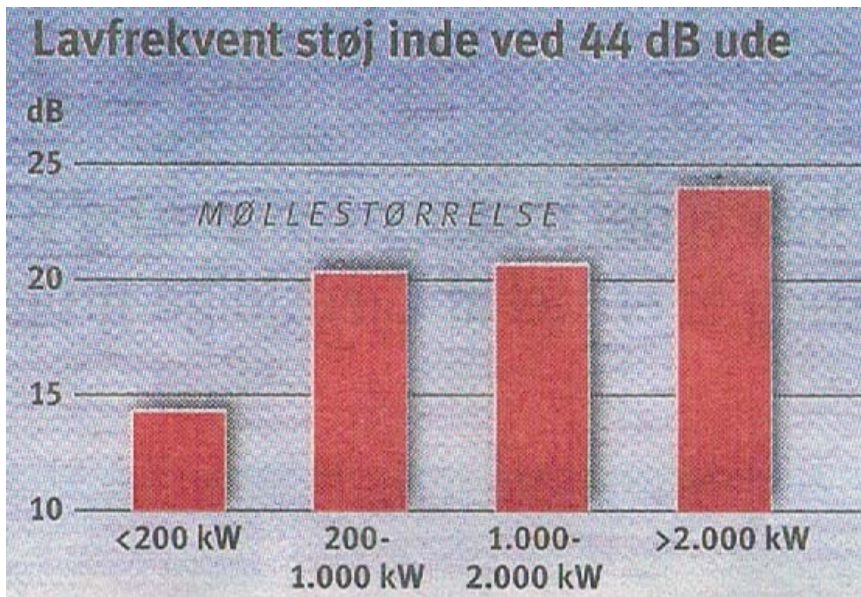


Fig. 2) (Berlingske Tidende 08.05.2008) Kæmpemøller larmer mere.  
(Giant wind turbines are making more noise than small ones.  
Low frequency noise indoors by 44 dB outdoors)  
Diagram by Berlingske - on the basis of measurements made by DELTA.

Miljøstyrelsen in Denmark – Danish Energy Authority - decided to support DELTA – even though some of the measurements made by DELTA indicated the limits for low frequency noise were exceeded (fig.2)

Again it is politically incorrect to say anything negative about wind power!

As a layman I will accentuate following conclusion from DELTAS report<sup>0)</sup>:

“The large wind turbines investigated in this project are all prototypes at an early stage of development, subject to changes also with respect to the noise emission. From the measurements in this project on these large wind turbines it was found that there were tones in the noise at low frequencies for several of the investigated turbines. This is not unusual for prototypes and usually the fully developed commercial wind turbines are improved on the noise emission, especially concerning audible tones in the noise.”

We will like to ask:

How can DELTA know anything about that?

Why have DELTA made measurements on prototype turbines if the results are more or less useless because they don't apply to commercial wind turbines?

Large Wind turbines are producing more noise than small ones.

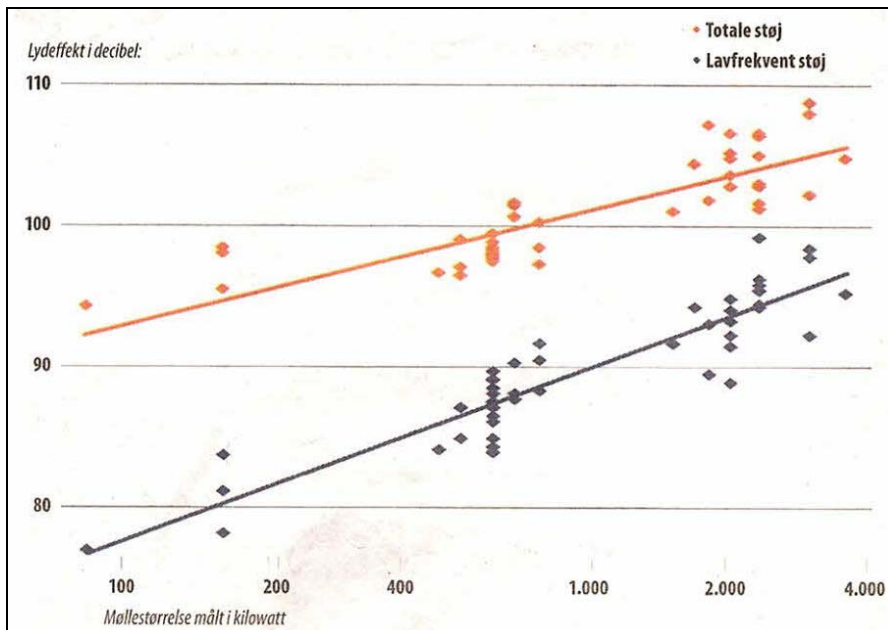


Fig. 3) (Berlingske Tidende 03.10.2008)

This curve shows that large WTB's give more noise than small ones.

The measurements are made by DELTA0<sup>0</sup>). The sound is measured near by the turbines.

The curve is expounded by Professor Henrik Møller, AAU.

Also DELTAS measurements showed excesses for low frequency noise on 10 – 12 occasions. No matter what you call the noise - if the noise from the wind turbines is disturbing the neighbours - it is a very severe thing. People have the right to relax in their homes.

Large wind turbines must be placed on the sea or in much desolated areas.

## Kappel - Lolland – Denmark

Lolland is an island in the south of Denmark. And on Lolland there are numerous wind turbines. Already now Lollands wind turbines are producing more than a 100 time's the electricity people in Lolland need. Most of the neighbours find that energy produced by wind turbines is OK - as long as the turbines have a decent size and the noise is reasonable.

For the time being we in Kappel have 24 small wind turbines at 50 meters placed along the coast. The turbines are from 1990. They are owned by DONG ENERGY. DONG Energy is a company partly owned by the Danish state (73 % stock majority).



Fig. 4) Map over Kappel ([www.visigernej.dk](http://www.visigernej.dk))

We have learned to live with the 24 small turbines (even though they from time to time produce too much noise) – but we say “No thank you!!!” when we are confronted by a project like the one I am going to present to you now.

DONG wants to establish a testing area for off shore wind turbines on land and therefore they want to replace the 24 small wind turbines with 7 turbines at 150 – 200 meters high + (2 masts at 200 meters to warn flight traffic):

- 4 turbines at 5 MW
- 2 turbines at 6 MW
- 1 turbine at 8 MW

As you can see these turbines will produce 40 MW – good business for DONG – perhaps good business for the wind power industry - but this grotesque plan is a disaster for the people in Kappel.

The wind turbines will be placed in an area less than 3 square kilometres. Because of noise limits of noise the project demands that DONG Energy buys several properties in the area. If people don't want to sell their houses the municipality has allowed expropriation.

With the new plan DONG Energy goes just to the limits for noise – and even exceeds these limits as you can see from the map. Furthermore the turbines will stand until they are worn out – not only in the testing period.

The neighbourhood consists of about 600 houses and 600 summer houses in a distance of 4,5 km.

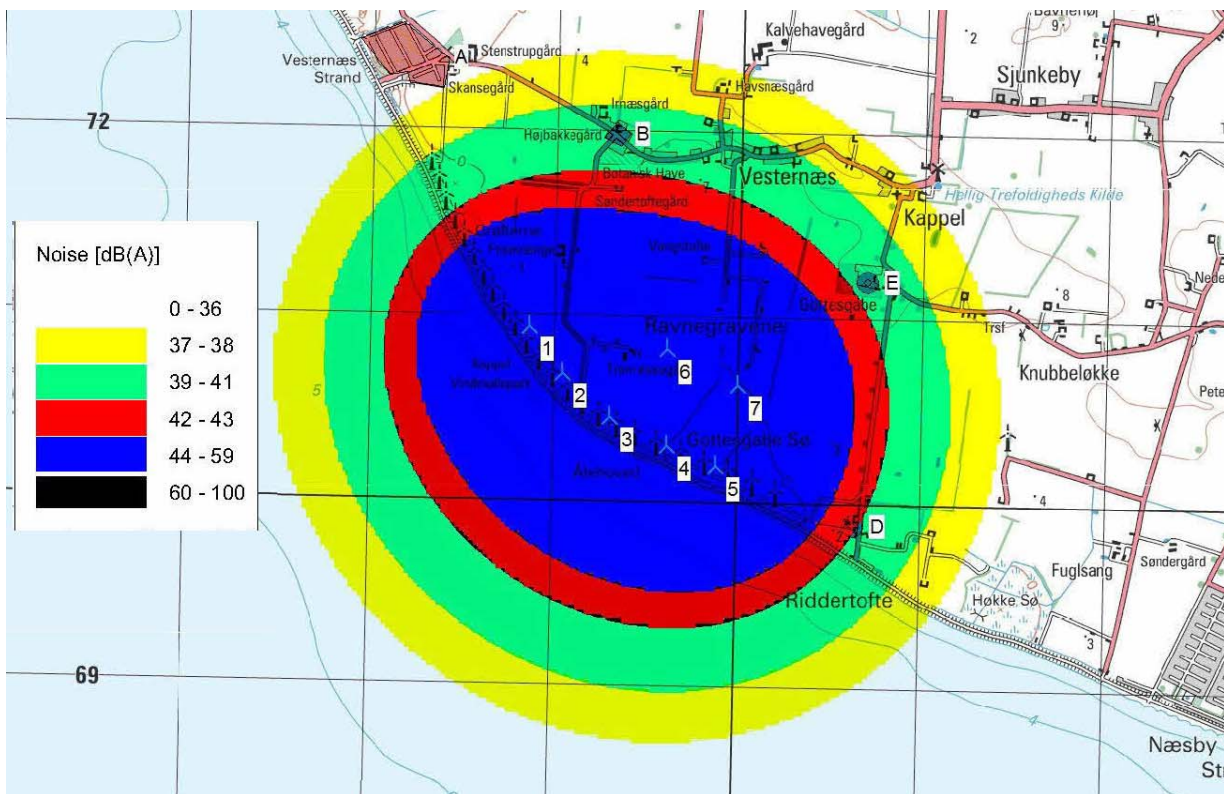


Fig. 5) Map over the testing area for off shore WTB's in Kappel. The map is showing noise from the 7 wind turbines (DONG Energy February 2009).

## Rules and regulations for wind turbines in DK

### 1) Distance to neighbours:

Wind turbines must have a distance at 4 times the total height of the turbine to the nearest neighbour.

### 2) Noise:

Upper noise limit at wind speed 6: 37 dB in recreational areas and 42 dB in the open land

Upper noise limit at wind speed 8: 39 dB in recreational areas and 44 dB in the open land

It is furthermore recommended that the shadows cast by the wings of the wind turbine only disturb the neighbour's houses maximum 10 hours a year. **This regulation is not respected.** Not in Kappel at least.

<sup>3)</sup> From the year 2009 it is possible for people in Denmark to be compensated if the value of their property is reduced more than 1 % caused by **new** large wind turbines. The compensation has to be paid by the owner of the wind turbine. The loss will be valuated by an impartial estate agent.

Of course this is better than nothing – but the wind turbine neighbours would certainly prefer to have wind turbines regulations increased.

And how can a few thousand kroner help you if you can not stand to live in your home??

## Low frequency noise

A regulation from Miljøstyrelsen (Danish Energy Agency):

**“Orientering nr. 9/1997 om lavfrekvent støj, infralyd og vibrationer i eksternt miljø”**

mentions limits for low frequency noise for industries and machines – this limit is normally 20 dB indoors but - strangely –

Danish Energy Agency has decided that this regulation doesn't include low frequency noise from wind turbines.

Danish Energy Authority explains this decision by a rather illogical conclusion that: there will be no problems with low frequency noise if limits of “common” noise are observed. If this conclusion is the case you could ask just why wind turbines are excluded.

DELTA's measurements have actually shown that there are problems with low frequency noise from large turbines (Fig. 2 + 3) – According neighbour's and AAU's opinion DELTA tries to underestimate these facts - and therefore the neighbours are even more anxious. They feel that the truth is purposely hidden from them.

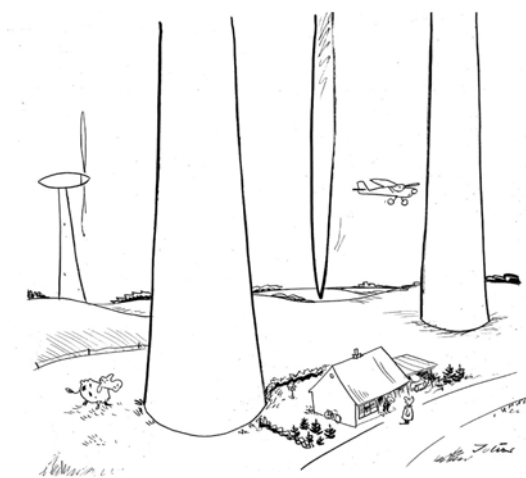


Fig. 6) (“Dagens Julius” Folketidende 02.10.2007 Trods massive protester er kæmpe-vindmøllerne på vej.)  
 (“In defiance of massive protests gigantic wind turbines are on the way”)

Kan De ikke fortælle mig, hvorfor De ikke vil være med at nedbringe CO2-udslippet med vedvarende grøn energi? (Please tell me why you don't want to reduce the release of CO2 by using “green energy”?)



## Conclusion

Common people are not able to decide which methods of measurement are correct and give trustworthy results. But common people who will have to live next door to large wind turbines also have to suffer from the noise and the visual effects from the turbines. Therefore it is of the utmost importance that noise problems are taken seriously and scientists can investigate independently of the wind power industry.

And to the politicians we have a request.

Wind power gives us electricity without CO<sub>2</sub>.  
But it also gives lots of problems.

Please take care that you are not creating another form of pollution when you are making decisions about where to raise these gigantic machines.

And most of all – consider the neighbours living next door to the turbines. **Now a 'days regulations are far from sufficient.**

Large wind turbines should only be established on sea or far away from populated areas!

“Not in anyone’s backyard!”

## NIABY

### References:

- <sup>0)</sup> EFP06-Project, Low Frequency Noise from Large Wind Turbines, Summaries and Conclusions on Measurements and methods, DELTA 2008 (AV 140/08)
- <sup>1)</sup> Cirkulære om placering for og landzonetilladelse opstilling af vindmøller. (30. juni 1997)
- <sup>2)</sup> Bekendtgørelse nr. 1518. Bekendtgørelse om støj fra vindmøller. (14. december 2006)
- <sup>3)</sup> VE-loven (18. december 2008)

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