

Science Is Not About Consensus, But Testing Hypotheses

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Proposed Ministry of the Environment Regulations to Implement the
Green Energy and Green Economy Act, 2009

Prepared by: Grant Church
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Dear Marcia Wallace,

Executive Summary

My primary concern is with the windmill setback issue. The ministry has made a good start on this, but there is room for improvement. The absence of the use of the C scale in determining setbacks shows a lack of understanding by ministry staff.

I can't get over how the ministry failed to set appropriate setbacks at the existing windfarms. Residents fought tooth and nail because they were concerned that windmills were being placed too close to their homes. They went to the Ontario Municipal Board (OMB) only to be ruled against. The OMB would just say it was up to the Ministry of the Environment. The wind industry had a field day, and now people are suffering because of it.

Is 68dBA as quiet as a whisper? CanWEA says that 300-600m is a suitable setback to bring the noise down to the level of a whisper. A whisper is 15dBA. One home at the Amaranth windfarm had readings of 68dBA from a windmill 457m away. The company had to shut down the windmill permanently and four others at night. They have even bought up homes where people were having problems.

This is another good example of the so called “quiet as a whisper” CanWEA touts. Since when does a whisper keep somebody awake at night? Is this where you got the idea that 550m might be a suitable setback? It didn’t work there; why would it work elsewhere? This excerpt is about a couple who lived in EPCOR’s Kingsbridge wind farm.

Across the road, 65-year-old Ernie Marshall and his wife Sharon have put their property and retirement house up for sale, claiming the nearby turbines have destroyed their quality of life.

"They said the turbines would be whisper quiet," he said. "But I'm awake from them all the time."

Marshall blames the wind farm for his health problems, which began when he suffered a stroke that impaired his vision.

"It's all the stress from the noise and not sleeping," he said. He also claims the windmills upset livestock and pets.

"I had to get rid of my ponies. They were too restless. My dogs - they were always so quiet - went crazy and chewed up my wicker chair."

He's had to reduce the asking price for his property, which is about 550 metres from the nearest wind tower, but still hasn't had any offers.

"When (EPCOR) first came in and started proposing the turbines, we took their word for everything. We didn't know what these things would be like. I was even interested at first. We were the guinea pigs."

Marshall has a long list of names and phone numbers of people he says are just as dismayed by the turbine noise and unsightliness as he is. The opponents have been voicing their concerns to town council, asking for greater setbacks and noise controls. (Wind Farms Fuel Controversy, Windsor Star, September 7, 2007)

The Ripley Windfarm, which has a 700m minimum setback, has been as much of a tragedy as elsewhere. There are homes further away than the minimum, yet they still have problems. The proponent was asked to do a study on the noise issue in February, but there is still no report and no resolution to this problem that has drug on for 18 months. This excerpt from a Ripley resident’s letter is heartbreaking.

After 5 months of severe symptoms we begged for sleep and were billeted in town paid for by the windmill company. Our homes were totally disconnected from and isolated from Hydro One and put on standalone generators for months. We were very ill from the effects of the unfiltered power (electrical pollution) and the blade sound and vibrations coming into our homes, but, some improvement was noted. Two small

sections of high voltage lines were buried passed our homes, which helped to some extent. Our homes are still not the healthy environments we experienced for some 19 to 36 years prior to Nov. 2007. Your home Mr. McGuinty is it still healthy? Each of the above facts, I have informed your office by phone.

At the Port Elgin consultation meeting, it was mentioned that you made your proposed setbacks based on the experience of existing wind farms. At the Toronto meeting, I asked how did you calculate the setbacks and what formulas did you use? I was told the question had already been answered. There was no formula given. In my question I had mentioned the two formulas I used gave a setback of 1300m. I also said that I had consulted with an engineer who is an expert in this field, and that he had found the same thing.

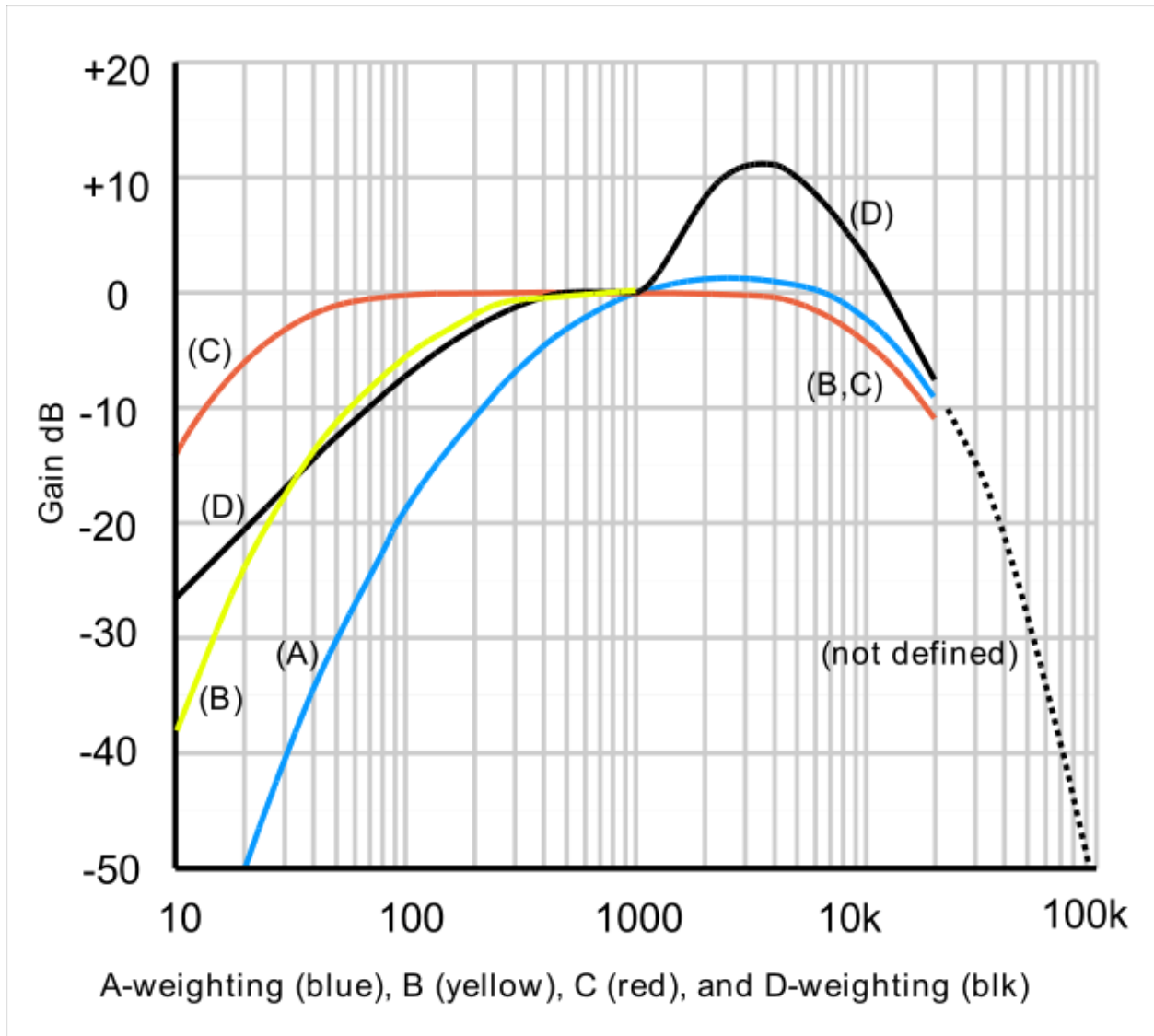
It appears as if you have just made some guesstimates. There probably was a political directive to make a compromise.

Imagine what would happen if you built a bridge or an airplane or a roller coaster and ignored engineering principles to satisfy a political agenda. Bridges would collapse, planes would fall from the sky, and roller coaster riders would burst blood vessels because the G forces were too high. Your management of the wind issue has done just that. People are suffering and fleeing their homes because of political compromise.

Why Use The C Scale

I experimented with a sound meter at work, which is a very noisy environment. You can flip between the A and C scales and get very different readings. The C scale always gave a higher reading, sometimes as much as 20dB. This indicates that some of the noise is below 1000Hz. Low frequency noise penetrates obstacles better than high frequency noise. At the street curb outside of the plant, the noise was down to 43dBA but was 53dBC. This might explain why people are suffering even though it satisfies the dBA limit. As far as I understand, the following graph shows that the dBC scale is more accurate, although there is much more to sound than just the dB reading. Almost half of the keys on a piano are below 200Hz with the lowest being 27.5 Hz. The A scale would under read them by 10-40dB. The UK Noise Association recommends using the C scale.

Many acousticians would argue that, when measuring low-frequency noise, 'C' weighting should be used rather than the conventional 'A' weighting which doesn't pick up the lowest sounds. **They are backed up by the noise experts at the World Health Organisation who argue that "when prominent low-frequency components are present, noise measures based on 'A' weighting are inappropriate.** The difference between dB(C) and dB(A) will give crude information about the presence of low-frequency components in noise, but if the difference is more than 10dB, it is recommended that a frequency analysis of the noise is performed." Other people argue that only when there is a 20dB difference is there likely to be significant low-frequency present (UK Noise Study, pg 12)



http://en.wikipedia.org/wiki/File:Acoustic_weighting_curves.svg

There is a case for ‘C’ weighting to be used in measuring wind farm noise as ‘A’ weighting doesn’t fully capture the low frequency content. ‘G’ weighting is most appropriate for measuring infrasound. (UK Noise Study, pg 15)

However, low-frequency may be underestimated because of the persistent use of ‘A’ weighting in measuring the noise, rather taking ‘C’ weighted measurements. (UK Noise Study, pg 20)

UK Noise Association Recommendation

The guidelines should require the use of 'C' weighting (and 'G' weighting for infrasound) as well as 'A' weighting when measuring the noise from turbines in order to fully capture the low-frequency element. (UK Noise Study, pg 21)

If you want to have the best regulations in the world, you should heed their advice.

Shadow Flicker

Shadow flicker that windmills produce is torture. Imagine being in a room with somebody turning the light on and off for an hour or two. Make sure windmills are placed in such away that shadow flicker isn't caused where people live or other building where they gather at. It shouldn't be cast over a roadway either. This quote from the UK noise study says it all.

Over the years the military has been aware of the way a combination of persistent low-frequency noise, infrasound and visual strobing can destabilise the human body. Some doctors are arguing it at least merits serious investigation to understand whether this sort of cocktail can explain the extreme effect wind farms have on some people's health, **an effect seemingly out of all proportion to the noise they make.** (UK Noise Study, pg 16)

Setback Calculations

The setback matrix that you have proposed is far better than what we've had in the province to date, but are they adequate? At the Enbridge Kincardine windfarm, you were required to use the ISO 9613-2 specification to calculate setbacks, but you went outside of that and made the setbacks closer. It is not clear how you calculated these new setbacks. Certainly they fail the ISO 9613-2 specification. At the consultation meetings, you claimed to have looked at literature from other jurisdictions and considered the current wind complexes in the province.

In a phone conversation with a MOE program advisor, I was unable to get answers to questions concerning calculations. She was very helpful and gave some good advice. I asked to see the worksheets for the calculations like a teacher asks a student to show their work in getting the answer, but to no avail. My MPP's assistant tried contacting the ministry, but all he got was that the setbacks were determined through consultations.

This is how I calculated it. Wind shear would definitely add to this, but I see that you have decided not to include wind shear according to a fact sheet sent to me by the program advisor.

Formula 1: Decibels of Change $20 \times \log(\text{distance } 1/\text{distance } 2)$
Required dB drop: 102dB - 40dB = 62dB

I started with a distance of 1m and found that it took 1300m to get the sound down to 40dB
 $20 \times \log(1300\text{m}/1\text{m}) = 62.3\text{dB}$

Formula 2: 6dB drop for every doubling of distance

When I tried the 6dB drop for each doubling of distance, it worked out to about the same.

Starting with a distance of 1m from the windmill it goes 2, 4, 8 16, 32, 64, 128 256, 512, 1024. So 10 doublings X 6 = 60. To take it to the required 62dBA drop to get it from 102 - 40 it works out to about 1366m.

To get the fraction of the next doubling requires a further calculation to get 62dB.

1024 + 1024 = 2048
1024m/6dB = 171m/dB
2dB X 171m/dB = 342m

There is preliminary information that up to seven windmills at the Ripley Wind Power Project may be out of compliance. The setback was a minimum of 700m, so it doesn't surprise me. The proponent did a sound study in 2008, but refused to give copies to the affected residents saying that it met ministry guidelines. In other words they were lying.

According to Hansard from the London meeting reviewing the Green Energy Act, four windmills at the Amaranth windfarm are set at low rpm during the day to comply and shut right off at night time. The closest one is 700m with the others being more distant.

UK Noise Study Setback Recommendation

It would be prudent that no wind turbines should be sited closer than 1 mile away from the nearest dwellings. This is the distance the Academy of Medicine in Paris is recommending, certainly for the larger turbines and until further studies are carried out. **There may even be occasions where a mile is insufficient depending on the scale and nature of the proposed development.** (UK Noise Study, pg 21)

A recent Nova Scotia windfarm has a setback of 1.44km for non-participating residents.

I recommend that the minimum mandatory setback be 1.5km growing to 2km in the matrix. Noise studies can be done on larger and noisier windfarms, but there should be no reductions below 2km.

Lot Line and Roadway Setbacks

Hydro One has a 500m windmill setback on 500kv lines. This is for a good reason. Windmills have thrown blades and completely flown apart throwing pieces up to 400m. We should have the same protection.

Even the wind industry warns of perils, as you can see in these pictures. The sign says, "During potential icing conditions stay back 305m from turbines." The windmill is 150m from the highway.



Recommendations

- 1) The minimum mandatory setback from a receptor (wherever people live or gather) should be 1.5km.
- 2) The matrix table for setbacks should range from 1.5km to 2.0km.
- 3) When noise studies are required for louder windmills and larger groupings, the setback should be no shorter than 2.0km.
- 4) Include wind shear in the setback calculations.
- 5) The setback from lot lines, roadways, and railways should be 500m
- 6) The C scale should be used along with the A scale in measuring sound levels taking the higher of the two readings.
- 7) Do extensive testing in the existing windfarms to test setbacks to make sure they are adequate.
- 8) Shut down windmills that are not compliant.
- 9) Don't allow any more windmills to be erected until we have the new regulations in place.
- 10) Make sure all setbacks are adequate to prevent shadow flicker on receptors and roadways.
- 11) The overall nature of this cocktail of sound (all aspects of sound), shadow flicker, vibration, and stray voltage need to be considered.
- 12) Regardless whether a property owner is a participant or non-participant, children are to be deemed to be non-participants and granted the full protection of the law.

I hope that you will seriously consider what I have suggested and not compromise health and safety.

Sincerely,

Grant Church

Reference

The UK Noise Study is called "Location, Location, Location" Published by The Noise Association, July 2006