

**Report on Wind Turbine Noise Conference – 2009
And Impressions of Wind Turbines in the European Union**

**Prepared for Members of Wind Concerns Ontario
And Others With an Interest**

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Summary:

From May 15 to June 22, Jean and Bill Palmer had the opportunity to travel from New York City on a cruise ship via Nova Scotia, St. Pierre and Newfoundland, to visit the countryside of Ireland (North and South), England (Liverpool, Plymouth, Dover and Newcastle), Scotland (Edinburgh), France (Le Harve), Norway (Oslo), Sweden (Gothenburg and Stockholm), Poland (Gdansk), The Netherlands (Rotterdam), Germany (northern area of Fehmarn and Kiel), and Denmark (Islands of Lolland, Bornholm, cities of Copenhagen and Aalborg, and by train for most of the length of Denmark between Copenhagen and Aalborg.) Yes, it was a great vacation, but it was enlightening to see wind turbines first hand in many places of Europe.

The trip ended with participation and presentation of a paper at the Third International Wind Turbine Noise Conference at Aalborg, attended by about 150 delegates from 25 countries at which about 50 technical papers were presented on the subject of wind turbine noise. The trip gave the opportunity to discuss the subject of wind turbines with a great number of people, including other passengers on the cruise ship, local tour guides, participants and other speakers at the Wind Turbine Noise conference, and in some cases to read about the subject in local newspapers.

This report is not a fully comprehensive overview of the trip, but it picks out highlights that I believe are related to the issue of wind turbines in Ontario (and elsewhere). These notes are shared with the hope that they may be of interest to readers. There is no doubt that the notes record my impressions, rather than every detail, so perhaps some might think that they are not fully balanced, but I can only assure the reader that every attempt has been made to ensure that all statements are factual and truthful. The notes may be passed on to any interested person, and if they raise specific questions, feel free to send them along and I'll try to respond as I can.

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Impressions:

My first impression is that while we saw wind turbines in many locations, in no case did we observe turbines located so that any home has as many turbines in proximity as seen in Ontario. When I spoke to other delegates about this fact at the Wind Turbine Noise Conference (abbreviated as WTN from here on) the common reply was, “No, we do not locate turbines near homes, if possible.” Many I spoke to expressed surprise that Canada, which they see as “so big” would locate turbines near to people, as they said, “There is no need for you to do that, we are a small country so it is a challenge for us, but you are such a large county, surely you can get turbines away from people.” To know that we have people with 10 turbines within 1000 metres of their home was a shock to many delegates.

Large array of turbines on land as we have in Ontario are rare. In Denmark for example, turbines are typically arranged in arrays of 3 or 4 in a neat line, with a gap of 4 km or so before the next array. As a result they do not have the same visual impact as in Ontario, where they become dominant. Typically there are no homes near the turbines at all, although in some cases I could see perhaps one home located within 500 metres of 1 (small) turbine. In other cases turbines are located in industrial settings (as seen in the Netherlands).



Here’s a case of a three turbine array (probably 600 kW with 21 metre blades on 50 metre towers) with one house perhaps 500 metres from the nearest turbine. It is the exception rather than the norm. The next page shows a typical Danish array, and then a Swedish fishing village, with no homes near the turbines.



In contrast, here is a comparable Ontario picture:



We did see some large offshore arrays south of the Danish Island of Lolland, but they appear to be some km offshore. A resident of the island, Kirsten Nielsen, noted that the offshore turbines are not a significant sound problem as about 8 km offshore, but she is fighting the “repowering” of a number of small on-shore turbines with 7 large (150 to 200 metre high) test turbines being assessed for offshore usage by an onshore installation near the community of Karrel. These turbines will include 4 x 5 MW machines, 2 x 6 MW machines, and 1 x 8 MW machine to be located within several km of the community.

A piece of the Lolland offshore array is shown below.



South of the Lolland array, there is a large array on the German coastline, but again there are no houses seen in the area. (I spent lots of time on deck with my binoculars!)



Similarly, offshore of Liverpool in the UK, there are two arrays of 25 and 36 turbines, but they are quite some distance from shore. On shore turbines are at the end of an industrial spit. In the south of England, a new array is located in East Sussex, near the town of Rye. However, when local people were asked if anyone lives near the array (no homes could be seen) the reply was no. It does appear that we could learn from the Europeans.

My second impression was gained during the WTN presentations. It was clear from presentations by Swedish, Norwegian, Dutch, English, French, Italian, and American presenters that there is a strong political will to increase the number of wind turbines, and that this goal was set before the implications are understood. A Dutch presenter noted that because of a government wish to increase wind turbine output, since they are a small country with little available space to locate the turbines, the options are to go offshore, or to increase the allowable sound power levels to be received by receptors. The latter was not specifically the request of the government authorities, but it became the ultimate result. The author did not seem concerned about the implications.

The issue became particularly clear during a presentation on the morning of the last day, when three authors in succession reported on the need to 1) increase the sound power level at receptors (in the UK) so as to avoid installing more wind farms (which would cost more), 2) to accept sound power levels above the national limit (in France) as a manner of achieving an acceptable level of risk ... this floored me, as the risk being spoken of was the risk of lost production, not of risk to the public that were to be protected. Then, 3) (in Italy) of the necessity to accept sound levels above the national limit as the turbine installers would not permit a lost production due to power reductions for sound abatement above 4%.

I found myself on my feet telling the assembled audience that as one “grey haired” engineer in a field of dark haired ones (an observation Jean made on the first night, that I was quite a bit older than most of those attending), that I was amazed at what I was

hearing. As engineers, I told them, we are the ones the public expects to protect them, and we had just heard three presenters speak of exceeding limits set to protect the public without consequences. Money was driving their decisions, I challenged, not their obligation to protect people. After the session, I spoke to the session chair to apologize for my lecturing of the speakers, but he concurred with me that it was a valid comment, as the group was losing sight of the need of protecting the public. In the lunch break; two of the three speakers came to speak to me, to thank me for my comments, and to note that they had felt uncomfortable with their presentation, but that it seemed to be what was expected. Whether I ignited any pangs of conscience will remain to be seen, but it is a troubling impression. As we enter the global economy, and as every nation speaks of the effects of the recession (felt more severely in Europe than in Canada so far), everyone is trying to achieve the best profit and the best bottom line. It does not bode well for public protection in any endeavor (not just wind turbines.) It made me think as I flew home, what cost cutting measures had been applied to the aircraft, to save a bit.

My third impression came from talking to people, both fellow passengers during the cruise (when you live with a group for 14 to 27 days at a time you get beyond talking about the weather) as well as conference participants and tour guides. At our dinner table of 10, the conversation often turned to wind turbines, and not at my instigation. I had admitted early on why I was on the cruise and where I was headed (to the WTN Conference.) A number of those present had pretty strong views about wind turbines, and their dislike for them. In fact none on board seemed to be supportive of wind turbines, yet recognized them to be a political darling, so they were not saying anything. However, when the surface was scratched, their feelings came out, and they were interested to know my point of view. Similarly, tour guides in both Sweden and Denmark spoke proudly about the wind turbines we passed, but when they were asked aside from the group, they admitted to problems with public acceptance. This gave me the clear impression that the speaking to our neighbours is critical to each of us, to gradually get the message back to the politicians who do not recognize that people are not happy with their decisions.

For me, the “penny dropped” while in the city of Gdansk, Poland, “the city of solidarity.” Like most of my generation, I had heard of the revolt of the shipyard workers in the city of Gdansk, and how it had resulted in the demise of the communist party and the rise to power of Lech Walesa, as the leader of the people. However, the bits never fully fit for me, and it was only when visiting the “Solidarity Museum” in Gdansk, did I realize how the people there saw the progression. The situation of the people in Poland was desperate. For them, the turning point was when John Paul II as a new Pope came back to Poland and delivered a hard hitting speech telling the people that their situation was unacceptable, and how they needed to address the situation together. See the following link for a brief overview of the situation, which explains it well.

<http://www.religion-cults.com/pope/communism.htm>
(Pope John Paul II and Communism)

From the remarks of the Pope, that the people “were not who the leaders said they were”, it became a progression to realize “don’t be afraid, change the image of the land.” The “Solidarity” movement rose, and the displays went on to show how the communist party gradually fell apart across Eastern Europe, and the brick wall crumbled. It made me realize that we too are facing a brick wall of politicians who may not have our best interests at heart. Our situation, while nowhere near as dark as that of the people of Poland, requires a similar approach of solidarity, and speaking the truth. Note too the remarks that the Pope recognized that the problem was not just communism, it was also seen in the western capitalistic society, as we cease to care for each other, and only about profit. For those offended by my remarks, recognize that I am not a Roman Catholic; so quoting a pope is not normal for me. There is a problem, “we are not who they say we are,” and through solidarity we need to keep telling the truth, and standing up for our neighbour, and resolution will happen! By the way, the only T-Shirt I bought myself on the trip was a Polish “Solidarnosc” one.

Here is an example, perhaps a poor one. One of the last presentations at the conference was a DVD presented by Paul Botha of Meridian Energy of New Zealand to show to community groups when planning on installing wind turbines in their area. (You may remember the name of Paul Botha as one quoted by Dr. Ramani Ramakrishnan in his review for the MOE of the work of Frits van den Berg. Dr. Ramakrishnan was very complementary of a report prepared by Mr. Botha about sound propagation that countered the work of Frits van den Berg). The 15 minute video about turned my stomach. It started about with scenes of electrical users noting, “if there’s one thing we find difficult to live without it is electricity.” However, the video continued, “generating electricity from oil and coal causes climate change, nuclear just freaks people out”, and as it smoothly continued, “but it is really cool to get our electricity from nature, from the wind.” The look of turbines, is just a matter of taste the narrator continued, as he expressed his love of how sleek they looked, (later they were described several times over as “totally spectacular, beautiful ... I’m really drawn to them ... it is a pleasure to drive under them ... “ and so on.)

The video had lots of snips about how noisy things we live with are, like flushing the toilet or a noisy party, and compared background to infrasound ... as if it was a meaningful comparison, noting things like, “the idea that infrasound is bad to your health is fallacious”, “you cannot hear anything”, “noise and infrasound are non issues – just cannot be an issue to your health” and on and on. At the end, in the discussion period, one participant raised the point that “in most wind concerns groups someone will know something about sound, and will not be impressed by someone running around with a sound level meter talking while he takes measurements.” He cautioned about the use of the video. Geoff Leventhall, who was chairing the session, noted that none of the “protestors” were still present (both Jane and Julian Davis from the UK, and Kirsten Nielsen and her brother Bent Christensen from Denmark had left after lunch to make their trip home). It left me again to stand up saying, “No we are not all gone.” Dr. Leventhall had the gall to suggest, “But you have a foot in each camp.” I told him that the only camp I stood for was the truth, and had the video been shown to me to try to convince me of anything, I would have been likely to throw something at the presenter. I

added that issues do exist and cannot be glossed over without addressing them. If they believed turbines could not be heard, I invited them to come visit the ones I had taken measurements at, when the sound did go up at night, as presented in my paper. Then I told them that I was insulted and offended if they felt my nearly 40 years of Engineering was “shit”, and sat down before I added anything even more inflammatory. Up to then, I had tried hard to “be good” but I’m afraid that I finally snapped. At the conclusion, the chair of the University of Aalborg Acoustics Department (the local conference organizer) came up to me and thanked me for my comment. So, in conclusion, keep saying what needs to be said. Someone is listening. The truth cannot be suppressed forever. I close with a favourite quote, “In this world you will have trouble, but take heart, I have overcome the world.” (John 16:33)

Significant Learning:

The conference was useful. A full listing of the papers can be found on the conference website <http://www.windturbineoise2009.org/> . A number of papers were of particular interest:

- Dr. Eja Pedersen (Sweden) – “Effects of Wind Turbine Noise on Humans”
 - Summarizes results of Swedish and Dutch studies, and notes that while the study did not detect specific health effects, it did note correlation between sound and annoyance – although she did not know what that does to people in the long run.
 - In the question period at the end of the 4 papers in her section, I asked Dr. Pedersen if she had any comment about the fact that the Minister of Energy and Infrastructure in Ontario had stated that her study had been used to show that no further health effects study was needed in Ontario (as requested by Dr. Robert McMurtry to the Legislative Standing Committee studying the Green Energy Act.) The response of Dr. Pedersen was particularly clear; “You can tell them in Ontario they were wrong. We only did a small piece of the study, and we want to see a larger study conducted.”
 - I spoke to both Dr. Eja Pedersen (Halmstad University) and Dr. Kristen Persson Wayne (University of Gothenburg) who have worked together many times in the past in health effects studies about their possibly participating in an Ontario health effects study. They were both interested. They noted that funding would be an issue, as the study would probably cost at least \$100,000. A possibility discussed was that perhaps the EU would fund the study since the EU countries are the primary beneficiaries of selling wind turbines to Ontario (although this may change if the Ontario government sets up a contract with Suzlon of India). We agreed to keep in touch.
- Kirsten Nielsen (Denmark) – “Large Wind Turbines – Noise and Neighbours”
 - Her point was that fighting the large energy company “DONG Energy, owned by the Danish state, is a struggle as no one is listening to concerns. It was a familiar story. We talked quite a bit about how perhaps the

- learning of Wind Concerns Ontario might benefit her, such as banding together with others with similar concerns.
- Her presentation provided quite a bit of background about the Danish system, such as minimum setbacks (4 times total turbine height) and noise limits - 37 dBA in recreational areas, 42 dBA in open land at low wind speeds, and 39 dBA in recreational areas, 44 dBA in open land at high wind speeds. (Makes the proposed Ontario limits look reasonable).
 - Notes that if a turbine is to be installed, a person is compensated before the erection for anticipated loss in property value, but as Kirsten noted, that can be of no value if the property cannot be enjoyed or sold.
 - In Denmark, low frequency limits apply for all sound sources *except* wind turbines.
- Dave Bennett (New Zealand) – “Seismic Effects on Residents from 3 MW turbines.”
 - Discussed vibration effects 2.8 km away from wind turbines
 - See also the last paper I note, by Irene Fiori.
 - Curiously there was a representative of the United Nations present who was interested in the impacts of wind turbine generated vibration on their ability to monitor for nuclear testing. In the back of my mind I was thinking of the seismic monitoring being done at the nuclear waste storage site at the Bruce, located some 2 km away from the nearest turbines. (Mind you the conventional steam turbines at the site probably produce more vibration, I also reflected.)
 - Stefan Oerlemans (The Netherlands) – “Prediction of wind turbine noise directivity and swish”
 - This paper was on the same subject as mine. In discussion with Dr. Oerlemans, he noted that he would try to update his research to take into account the nighttime effect that I had predicted, since he noted that he had actually not done much monitoring of wind turbines at night as I had. His presentation noted that the “swish” might explain why wind turbines are so annoying (the same point I was making in arguing that the penalty for cyclic noise should be used in Ontario.)
 - Discussed directivity of the swish sound to result in a greatest sound at the cross winds and at a distance of about 1 km from the turbine, not closer.
 - Bill Palmer (Canada) – “A New Explanation for Wind Turbine Whoosh – Wind Shear”
 - I was specifically noting the change in effect of swoosh at night – the paper resulted in no specific questions, but was generally accepted.
 - Dick Bowdler (UK) – “Wind Shear and its Effect on Noise Assessment”
 - Quite a detailed presentation on wind shear. Not much new, but a useful overview.
 - K. Boopathi (India) – “Assessment of Acoustical Noise From a Wind Turbine in India.”
 - He noted that India has about 11,000 MW of wind turbines, but that they are well separated from the people. I asked how many residences would have 10 turbines within 1000 metres as in Ontario. He replied none, but

- later promised to formally reply to me with the details. An interesting point in a country with far more population density than Ontario I thought.
- Nick McCabe (Canada) – “Recent developments in assessment guidelines for sound from wind power projects in Ontario.”
 - Discussed the new proposal of the MOE for Renewable Energy Projects.
 - Some discussion about the requirement to monitor low frequency. Geoff Leventhall noted that would be a first anywhere and asked the basis for it.
 - It was noted that it was in response to the presentation of Dr. McMurtry, so was a political olive branch but it was not known what if anything it would mean in reality.
 - He noted that with the ability to do site specific studies, there might not be much change in any setbacks from current values.
 - Erik Kalapinski (USA) – “Wind Turbine Acoustic Modeling with ISO 9612-3”
 - A good discussion about the limitations of the ISO code
 - Thomas Sorensen, Bo Sondergard, and Birger Plovsing (Denmark) presented three papers on NORD 2000, a new code being verified to permit it to be used for wind turbines.
 - Discussed how it differs from ISO 9613-2
 - Matthew Cand (UK) – “Wind Farm Predictions and Comparison with Measurements”
 - A treatise that suggested it was not necessary to apply all the conservative limits, since by doing so you would lose the ability of siting some turbines, resulting in a need to build more wind farms with fewer turbines each (at a higher cost)
 - Interesting only to know the way some think
 - Francois Costes (France) – “A Risk Management Strategy Related to Wind Farm Noise Emissions.”
 - I looked forward to this presentation, then learned that the risk management being presented was the risk of having to derate (so as to not achieve a wind farm’s objectives) if noise was excessive, and the goal was to reduce lost production
 - Andrea Bartolazzi (Italy) – “Optimization of energy production of a large windfarm with noise constraints”
 - Discussed the problem of how to address a wind farm that was planned, and yet would not achieve noise limits, yet the proponent did not want to change it.
 - Proposed some restriction of turbine output to achieve limits, but the proponent was unwilling to lose more than 4% in output.
 - Noted, “It was impossible to do the measurements to protect all receivers”
 - Some discussion of Italian limits (55 dBA daytime, 45 dBA at night, but more importantly a limit of “differential” of 3 dBA at night – wind turbine not to add more than 3 dBA to the background – yet unable to shut down the turbines to actually measure the background.

It was after the three above presentations that I found myself on my feet lecturing the assembled audience about the need for engineers to protect the public and that the profit bottom line should not be their only driver.

- Roberto Ziliani (Italy) – “Wind Farm Noise Measurements and Residual Noise Estimation by Modeling”
 - More on trying to derive the change from background, when the proponents would not permit shutting down the turbines to actually measure it. By now I was getting sick of hearing the same story.
- Paul Botha (New Zealand) – “An alternative approach to explaining wind farm noise to community groups”
 - See my comments above. At this point I “lost my composure”.
- Irene Fiori (Italy) – “A study of the seismic disturbance produced by the wind park near the gravitational wave detector GEO-600”
 - Interesting in that the paper showed how it was possible to show seismic effects 6 km away from a wind farm and how it resulted in a restriction to site new wind farms further than this from a sensitive scientific facility. Interesting that equipment gets protected, but not people, I thought.

I have the CD with the copies of all papers, and if some of particular interest, let me know and I might be able to loan you the CD to read the presentations of interest.

Conclusion:

Certainly the use of wind turbines is growing rapidly, and people everywhere are seeing the effects of political decisions to “look green” by building wind turbines, without considering the implications of the decision. It becomes clear that the norm up to now in most countries is to site turbines further away from people than is being done in Ontario.

The effects of the global recession are obvious everywhere, but more so in Europe than in North America it seems. Thus, we can expect to face considerable opposition to any “go slow” initiative from countries supplying wind turbines, as they are a remaining supply product for nations that have lost the majority of their heavy industry over the last 20 years.

Sadly, the accepted position seems to be that limits set to protect people are “environmental speed limits” and like many treat highway speed limits, are meant to be broken with no consequence. The economic bottom line is driving decisions, not protecting people. There is no solid basis for safe setbacks, anywhere, and that is a need.

Individuals like Eja Pedersen and Kristen Persson Wayne, who are trying to determine what the actual impact of wind turbines on people are few and far between. Yet, like in the case of the Polish solidarity movement, it is only when ordinary citizens stand together and say, “this is not who we are” to their political leaders that change will happen, and that the root of change is the principle of looking after our neighbour.