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PAN 45

Assessment of Wind farm Noise

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16th July 2001

1 INTRODUCTION

I have been a supporter of wind energy and other forms of renewable energy for some 35 years. I have carried out noise assessments for both “sides” in planning applications and adopt the same method of assessment whoever employs me. It is my view that the method of assessing wind farm noise in PAN 45 is flawed.

There is broad agreement in standards and in Local Authority practice for methods of assessing industrial and other noise affecting existing noise sensitive properties. In PAN 45 noise from all renewable energy developments other than wind farms is assessed using methods that are broadly consistent with general practice in Scotland, particularly in rural Scotland. The one exception is the method of assessing wind farm noise. Wind farms are assessed by a quite different method that could result in noise levels at nearby housing being more than 15dBA above that required for other noise sources or nearly three times as loud.

Ironically, there is a reason why wind farms should be treated more stringently than other noise sources. Most noise, for example that from a biomass development which has similar importance in renewable energy development, has the potential of being controlled at source at a later date by silencing or by barriers. Wind farms, once constructed, cannot practicably have noise reduced at source or by barriers.

This paper sets out the reasons why I believe that the method of assessment used in PAN 45 is not right.

2 NORMAL PRACTICE IN SCOTLAND

Where a new noise is to be introduced into a residential area it is normal to set a noise limit relative to the pre-existing background noise.

Typical planning conditions imposed by rural local authorities (and sometimes urban ones) require that the new noise be no more than 5dB above the pre-existing background. This is based on the procedure set out in British Standard 4142. Some recent examples are:

2.1 Co-Op Retail Store, Portree in 2002

The Highland Council originally applied the condition that:

All plant machinery and equipment installed on the site or used as part of the development (including ventilation and refrigeration plant) shall be of a type, and shall be insulated, installed operated and permanently maintained, so as to be inaudible when measured at any point on the site boundary.

An alternative condition was proposed by the developer and accepted by the council that:

Noise of plant from the development should not exceed the background noise level by more than 5dBA or, if the noise is tonal, should not exceed the background noise at all at any noise sensitive property.

The background noise at Home Farm Road was assessed at 28dB.

2.2 New factory for Vestas at Machrihanish in 2001

At this new factory (ironically the factory that makes wind turbines) Argyll and Bute Council require that:

The rated noise level from the development shall not exceed the predetermined ambient noise level (the $L_{90}(A)$) at the nearest noise sensitive properties at the former RAF housing, by more than 5dB(A). All measurements are to be taken in accordance with BS4142: 1997 with the measurement periods being 1 hour for the period 0800-2200 hours and 5 minutes for the period 2200-0800 hours.

The night time background noise was agreed at 27dBA

2.3 An Lanntair Arts Centre, Stornoway in 2002

Comhairle nan Eilean Siar required that:

The level of noise emitted from the site shall, throughout the life of the development, not exceed the background levels by more than 5dBLAeq as measured one metre in front of the nearest noise sensitive façade.

The night time background noise was measured at 35dBA but this was due to nearby air conditioning units. A realistic level has yet to be agreed.

3 WHAT IS BACKGROUND NOISE

BS4142 provides the method of assessing industrial noise in areas where there is existing housing. The existing background noise is measured (at different times of the day if necessary) using the measure L_{A90} . This is the level exceeded for 90% of the time – in other words it is close to the minimum.

3.1 Low Background Noise

In low background noise levels much is often made of the suggestion that BS4142 precludes its own use where background levels are less than 30dBA. The current standard actually says that *the method is not suitable when the background and rating noise levels are both*

very low. Very low is defined as 30dB for the background level and 35dB for the rating level. As I understand it the lower limit for the use of BS4142 was set because to use the standard at low noise levels might **under-estimate** rather than over-estimate the likelihood of complaints.

In any case, the fact is that some measure of loss of amenity needs to be applied below a background level of 30dB and there is nothing better at present than to use the same measure relative to background. In the first two examples of planning conditions that I have given in section 2 above, the background noise level was less than 30dB but the method was nevertheless still used.

3.2 Wind

BS4142 also requires that measurements be made with wind speeds less than 5m/s. Clearly this needs some modification for wind turbines because they do not generally operate until wind speeds reach about 4m/s and it would be unreasonable to base the assessment in calm conditions when the turbines would not be working. BS4142 is looking for the noise level in the quietest normal circumstances. With wind farms it would be reasonable to make background noise measurements when wind speeds at the development site were in the range at which the turbines operate.

3.3 The Meaning of L_{A90}

We are generally required by local authorities to measure at the quietest part of the period in question. It is not acceptable to take an average of the L_{A90} values over, for example, a whole night time period.

Consider the situation in which a series of 10 minute L_{A90} was taken over a period of time – say over 3 hours at the quietest part of the night – and at the same time a single L_{A90} measurement made over the 3 hour period. The correct L_{A90} for the period would be that taken over the three hour period. There is no direct relationship between the three hour L_{A90} and the 10 minute measurement but an average of the 10 minute measurement would give a result too high, the real figure would be nearer the minimum of the 10 minute measurements.

It has been our practice to take the average and the standard deviation of a group of 10 minute measurements and to define the period L_{A90} as the average less one standard deviation. For example at the Portree Co-Op development mentioned above it was agreed that:

In accordance with BS4142 the background noise should be measured as L_{A90} and the noise from the development as L_{Aeq} . Measurements of L_{A90} over any specific period should be carried out in wind speeds less than 5m/s and during a representative part of the period including the quietest part of the period. The measurements should be made in intervals of between 5 and 15 minutes. The

average and standard deviation of all the measurements should be calculated and the background noise taken as the average less one standard deviation.

4 PAN 45 WIND FARM ASSESSMENT

PAN45 recommends assessing wind farm noise in a quite different way from other renewable energy developments. This is the way set out by the Noise Working Group preparing *The Assessment and Rating of Noise from Wind Farms*. This was prepared and published by ETSU for the Department of Trade and Industry which is the government department charged with the promotion of industry, not with the protection of the environment.

4.1 The Assessment Method

The method of assessment in the report is very badly reasoned as is indicated clearly in the Executive Summary

In paragraph 8 it states that limits should be set relative to the background noise in most cases.

In paragraph 11 it reaches the same conclusion as in paragraph 8 except in low noise backgrounds.

In paragraph 13 consideration also has to be given to circumstances where a more simplified approach, based on a fixed limit, may be appropriate.

In paragraph 22 the limit of 5dBA above background is itself limited during the day to a lower level of turbine noise of 35-40dBA. This means that where the background noise is less than 30-35dBA the relative method of assessment is not applicable.

In paragraph 23, for night time, a fixed limit of 45dBA (43dB, L_{A90}) whenever the background noise is less than 38dBA.

The relative method that seemed so important in paragraph 8 is finally abandoned in favour of a fixed limit for, not a minority of cases, but usually for a large proportion of cases. In the case of the Edinbane proposal the developer did not even consider it necessary to measure background noise as the relative method of assessment was abandoned completely. In my view this is quite unacceptable and quite at odds with their own starting point.

4.2 Background Noise

The noise working group preparing the ETSU report have either not understood the principle of L_{A90} or have chosen to ignore it. As I have indicated above, the point about L_{A90} is that it is a measurement close to the minimum during the period under investigation. The

methodology used by ETSU is to average 10 minute values of L_{A90} and relate them to wind speed either by applying a best fit polynomial or by binning them into wind speed bands. The effect of this is that, at any particular wind speed, the background noise level taken is the average, or close to the average, of all the measurements taken at that wind speed. As I have indicated in paragraph 3.3, this is not the correct approach to assessing the L_{A90} .

Although official Scottish Executive guidance, this document is seriously flawed in respect of wind farms which are treated, without any justification, quite differently from any other renewable energy development or indeed any industrial development of any kind.

There is no reason why wind farms should be separately treated. It could be argued that, because noise from turbines cannot be reduced at source whereas most other noise sources can, the higher limits should be allowed. It is my view that the opposite is true. Because there is no effective way of reducing turbine noise once they are operating a more stringent condition should be applied.