

**Scientific Commentary on the UK
Government's Department of Business, Energy
and Industrial Strategy (DBEIS)
"Scoping review of current onshore wind
turbine noise assessment guidance."**

Document number IARO21-6

December 2021

International Acoustics Research Organization

IARO is an international group of researchers with a mission to investigate acoustical environments, especially with respect to features that affect humans and animals, and to publish the results. IARO holds the ethics approval for the CSI-ACHE, the Citizen Science Initiative into Acoustical Characterisation of Human Environments, the results of which are publicly disseminated.

Contacts:

IARO, 37 Ferguson St, Palmerston North, 4412, New Zealand

Tel: +64 21 270 7575

Email: contact@iaro.org.nz

Website: <https://iaro.org.nz>

Authors of this Report *(alphabetical)*

Mariana Alves-Pereira, Ph.D., Universidade Lusófona, Lisbon, Portugal

Huib Bakker, Ph.D., Massey University, Palmerston North, New Zealand

Philip Dickinson, Ph.D., (ret.), Auckland, New Zealand

Richard Mann, Ph.D., University of Waterloo, Waterloo, Ontario, Canada

Rachel Summers, BSc., Massey University, Palmerston North, New Zealand

Contents

A. EXECUTIVE SUMMARY	4
B. BACKGROUND	6
C. GOALS	7
D. DISCLAIMER.....	7
E. CONTEXTUALIZATION	8
F. DBEIS SCOPING REVIEW.....	10
G. DBEIS SURVEY QUESTIONS.....	12
H. EXCLUSION OF INFRASOUND & LOW FREQUENCY NOISE	16
I. ETSU-R-97: A DISCLAIMER THAT VITIATES THE ENTIRE DOCUMENT	21
J. ETSU-R-97 IS UNRELATED TO PUBLIC HEALTH PROTECTION	22
K. “WHAT YOU CAN’T HEAR CAN’T HURT YOU”	23
L. CLOSING PERPLEXITIES	24

A. EXECUTIVE SUMMARY

1. This Scientific Commentary was prepared by Scientists concerned with the health of human communities living in the vicinity of wind power stations.
2. This Scientific Commentary seeks to inform policy decision-makers of the challenges that wind energy has brought to human communities
3. This Scientific Commentary deconstructs the complex technical issues that frequently obfuscate the matter of wind turbine noise.
4. This Scientific Commentary was prompted by the call for a Scoping Review on the current Onshore Wind Turbine Noise Assessment Guidance, on behalf of the Department of Business, Energy and Industrial Strategy (DBEIS).
5. The DBEIS Scoping Review on Onshore Wind Turbines specifically excludes any discussion on infrasound and low frequency noise, thus contradicting its stated objective.
6. The document known as ETSU-R-97 (*The assessment and rating of noise from wind farms*), published in 1996, is the core guideline of the wind turbine noise assessment guidance currently in practice in the UK, and on which DBEIS bases its public policy.
7. The UK Government, through DBEIS, relies on ETSU-R-97 in spite of the dubious and questionable nature of the “veracity or accuracy of any facts or statements”¹ contained in ETSU-R-97, as is self-acknowledged by the signatory authors in their initial disclaimer.
8. ETSU-R-97 chooses to ignore the infrasound and low frequency noise emissions from onshore and offshore wind turbines.
9. Medical expertise is conspicuously absent from the list of the Members of the Working Group responsible for ETSU-R-97, and yet, ETSU-R-97 is touted as appropriate for the protection of Public Health against wind turbine noise.
10. The noise limits suggested by ETSU-R-97 are based on:

“Existing standards and guidance relating to noise emissions

¹ ETSU-R-97, page 0

- *the need of society for renewable energy sources to reduce the emission of pollutants in pursuance of Government energy policy*
- *the ability of manufacturers and developers to meet these noise limits*
- *the researches of the Noise Working Group in the UK, Denmark, Holland and Germany*
- *the professional experience of members of the Working Group in regulating noise emissions from wind turbines and other noise sources*
- *the discussion of the issues at meetings of the Noise Working Group and with others with appropriate experience.”²*

11. Unsurprisingly, given the absence of representatives of the medical community, noise limits suggested by ETSU-R-97 do not prioritize, or even conscientiously consider, the health and well-being of UK citizens.

12. The ultimate purpose of the DBEIS Scoping Review is, as yet, unclear.

² ETSU-R-97, Executive Summary, page iii

B. BACKGROUND

1. It has come to our attention that the Government of the United Kingdom, through its Department of Business, Energy and Industrial Strategy (DBEIS), has commissioned a Scoping Review on the current assessment guidance regarding onshore wind turbine noise.
2. IARO scientists welcomed and applauded this initiative taken by DBEIS.
3. Particularly since, in 2021 alone, IARO scientists were involved in the following Public Inquiries held in Ayrshire, Scotland:
 - a. **Rigghill Wind Power Plant** (ongoing)
ITPE Energies Acoustics Consulting, for the wind developer
 - b. **Arcleoch Wind Power Plant Extension** (WIN-370-2), 7 March
Hoare Lea Acoustics Consulting, for the wind developer
 - c. **Clauchrie Wind Power Plant** (WIN-370-3), 10 May
Hayes McKenzie Acoustics Consulting, for the wind developer
 - d. **Rigghill Wind Power Plant Appeal** (Ref: PPA-310-2034), 27 August
ITPE Energies Acoustics Consulting, for the wind developer
4. Upon closer inspection of the requirements and limitations imposed by DBEIS on their Scoping Review, it became clear that incongruities existed between its stated objective and the information that would actually be gathered, i.e., the conditions DBEIS imposed on its Scoping Review contradict the stated objectives.
5. Very specifically, where wind turbine 'noise' is concerned, the Scoping Review limits the topics to:
 - a. Amplitude Modulation (AM), and
 - b. Tonality.
6. Question: Why is the topic "Infrasound and Low Frequency Noise" not included?
7. DBEIS has also limited their Scoping Review to invited organisations only.

8. Questions: Why?

In addition to the Wind Industry-related enterprises and professional acoustic consulting firms, what other organizations have been invited to participate in this Scoping Review?

The populational groups most directly affected by the current wind turbine noise assessment guidance (i.e., human communities who now have wind power plants as neighbours) appear to have been summarily excluded from this Scoping Review. Why?

C. GOALS

9. Policy-making authorities are oftentimes unfamiliar with the issue of acoustics and/or acoustics and health.
10. The primary goal of IARO's Scientific Commentary to the DBEIS Scoping Review is to deconstruct the technical complexities associated with the matter at hand, and that contribute to the (wilful?) obfuscation of this issue.
11. It is the goal of this Scientific Commentary to facilitate the understanding of the competent decision-making authorities regarding the contradictions and incongruities self-imposed by DBEIS on its own Scoping Review.
12. In doing so, some aspects of the core document currently regulating wind turbine noise in the UK (ETSU-R-97) will be discussed.

D. DISCLAIMER

13.

- a. The authors of this Scientific Commentary are not party to anti-technology sentiments.

- b. Wind turbines are considered by the authors as welcome additions to modern technological societies.
- c. The Scientific Commentary provided herein has one, and only one, agenda—that of pure scientific inquiry.
- d. In no way can, or should, this Scientific Commentary be construed as a document arguing for or against the implementation of wind turbines, or any other industrial complexes.
- e. There are no commercial, financial, or professional agreements (contractual or otherwise) between the authors of this report and any persons or parties involved in the wind turbine sector or persons or parties who stand against the implementation of wind turbines.
- f. This Scientific Commentary was provided *pro bono*.

E. CONTEXTUALIZATION

14. It may be surprising to those reading this report that, all over the world, including the UK:
- a. Citizens living in the vicinity of onshore wind power stations have been complaining of adverse health effects, also observed in pets and livestock;
 - b. Citizens living in the vicinity of onshore and offshore wind power stations have formed small, grass-roots groups in order to challenge the 'wind industry';
 - c. Numerous ongoing legal proceedings are opposing private citizens, or groups of private citizens, to the 'wind industry';
 - d. Many of the ongoing and concluded legal proceedings are subjected to non-disclosure agreements, or gag orders.
15. In the UK, the current situation that sees residential communities opposed to existing and planned wind power stations has been ongoing for three decades, since the operation of the first wind turbines in 1991 at Delabole in Cornwall—hub height: 32m, blade length: 17 m. In 2021, the Arecleoch wind turbines in Scotland have a hub height of 83 m, and a blade length of 69 m. Figure 1 is reproduced from industry literature.

Rotor size development

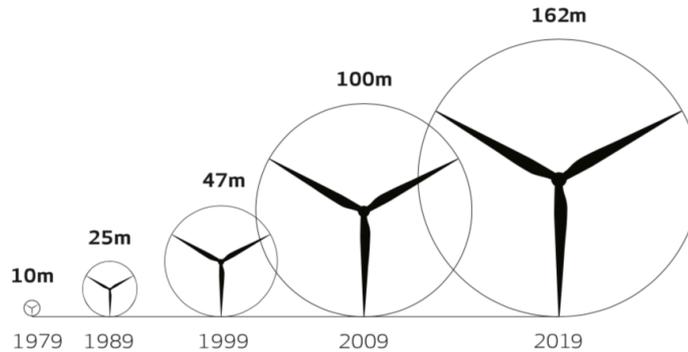


Figure 1. Evolution of the size of wind turbine rotor blades³.

16. In addition to the stroboscopic effect (which, in the sole case of wind turbines, is termed 'shadow flicker') and the decreased visual amenity, wind turbines also produce 'noise.'
17. A part of the 'noise' produced by wind turbines is of a unique type, that is not properly contemplated in current assessment guidance: pulsed infrasound and low frequency noise.
18. The immediate and long-term effects of this unique type of 'noise' on human health are, for the most part, not investigated.
19. It would therefore seem appropriate and natural that the UK governmental agency responsible for "Energy and Industrial Strategy" would take a strong interest in this matter, particularly given their "Energy White Paper: Powering our net zero future."⁴
20. On the other hand, it would seem equally appropriate that the UK governmental agency responsible for the protection of Public Health should also take a strong interest in this matter.

³ Vestas Wind Systems A/S, 2019. "EnVentus Platform" Brochure. <https://www.vestas.com/en/products/enventus-platform/enventus-platform>

⁴ <https://www.gov.uk/government/publications/energy-white-paper-powering-our-net-zero-future>

F. DBEIS SCOPING REVIEW

21. It is worthwhile to review the wording used by DBEIS in the Introduction section of the Scoping Review on wind turbine noise assessment guidance⁵.

“The purpose of the review is to determine whether the guidance adequately ensures that wind farm turbine noise is managed effectively and consistently in line with current Government policies on noise (...), accounts for contemporary technological and acoustical developments, and (if not), what updates may be necessary to achieve this.”

22. The first part of this statement is unequivocal—the purpose of this Scoping Review is to ensure that the current assessment guidance is “in line” with current Government policies on noise. Presumably, this means, in line with ETSU-R-97⁶.
23. The second part is more surprising because it acknowledges the possibility that contemporary technological and acoustical developments *might not* be accounted for in the current assessment guidance.
24. Lastly, the purpose of this Scoping Review seems to be the gathering of information on what type of updates could be introduced into the existing assessment guideline to account for the hypothetical technological and acoustical developments.
25. The recognition of the need to gather information is further corroborated by item 3) in the excerpt below:

“This survey is divided into three main parts:

- 1) questions about topics addressed in the current UK wind turbine noise guidance,*
- 2) questions about wind turbine technology and wind farm design, and*
- 3) a request for any other evidence or suggestions that may be relevant to the intentions of this scoping review.”*

⁵ <https://www.smartsurvey.co.uk/s/ZJ1E81?fbclid=IwAR1MCDZDxYF5AndTiM5AgT3f6rUj>

⁶ ETSU-R-97: The assessment and rating of noise from wind farms. The Working Group on Noise from Wind Turbines, Final Report September 1996.

26. The purpose of this information gathering exercise is explained as follows:

“[T]he current review will inform a decision on whether any future guidance development is required (...).”

27. It is further added that:

*“[N]o guidance development is being undertaken (...); but any potential subsequent development of guidance is likely to be accompanied by a consultation stage (...) However, please ensure you raise any **key issues** that you feel should be considered at this stage” [bold in the original text].*

28. In the meantime, as would be expected:

“This review and engagement does not affect any material considerations of the current UK onshore wind turbine noise assessment guidance within ongoing planning applications and decisions, which remain as referenced in the relevant authority policies.”

29. Offshore wind turbines are excluded from this Scoping Review.

30. Lastly, the Introduction informs:

“Your responses to this engagement will be an important part of ensuring that the wind turbine noise assessment guidance in the UK is consistent with Government policies, and remains suitable.”

31. In Paragraph 21 above, a small portion of the statement of purpose of the Scoping Review was truncated, and is now reproduced below:

*“The purpose of the review is to determine whether the guidance adequately ensures that wind farm turbine noise is managed effectively and consistently in line with current Government policies on noise **and achieving ‘Net Zero’[1] greenhouse gas emissions by 2050**, accounts for contemporary technological and acoustical developments (...).” [our bold].*

[1] Achieving the Government’s ambitious 2050 Net Zero target will require significant increases in renewable electricity generation, and we will need to increase deployment across a range of technologies, including onshore wind. Our recent Energy White Paper: Powering our net zero future stated that we will need sustained growth in the capacity of onshore wind over the next decade, alongside solar PV and offshore wind.”

32. A brief review of the above-mentioned 2050 Net Zero White Paper reveals a preponderance of discussion on *offshore* wind power stations, with only 2 entries for “onshore wind.” Offshore wind power is excluded from the DBEIS Scoping Review.

G. DBEIS SURVEY QUESTIONS

33. Having laid out the stated purpose of this Scoping Review in Section E, it is now of interest to see what types of questions were included in this survey.
34. This survey can be taken online,⁷ by invited organizations only.
35. Figure 2 shows the Definitions used in the survey.
36. “Amplitude Modulation” and “Tonality” are two features associated with ‘noise’ emitted by wind turbines—both exclusively imply the existence of *audible* disturbances.
37. Notably, there is no entry for “Infrasound” nor for “Low Frequency Noise,” although the item associated with “Amplitude Modulation” may cover some aspects of the audible, low frequency noise emissions.

⁷ <https://www.smartsurvey.co.uk/s/ZJ1E81?fbclid=IwAR1MCDZDxYF5AndTiM5AgT3f6rUj>

PLEASE READ THIS PAGE CAREFULLY BEFORE CONTINUING WITH THE SURVEY

Term	Meaning
<i>Current UK wind turbine noise assessment guidance</i>	<p><i>ETSU-R-97 The Assessment and Rating of Noise from Wind Farms (1996), the Institute of Acoustics Good Practice Guide to the Application of ETSU-R-97 (2013) and its six Supplementary Guidance Notes (2014)</i></p> <p>It is acknowledged that further individual devolved UK administration noise guidance is also in place, both wind turbine specific and non-specific.</p> <p>It is also acknowledged that the SGNs to the IOA GPG do not officially form part of the guidance endorsed by all devolved administrations, due to the publication dates (specifically, the Northern Ireland Assembly and Scottish Government endorsements preceded the SGN publications). However, it is believed that the IOA GPG SGNs are widely viewed as representing best practice guidance around the UK.</p>
<i>Government policies on noise and Net Zero</i>	<p><i>The UK devolved administration governmental policies on noise and achieving net zero targets for greenhouse gas emissions relevant in any UK nation to which your professional experience is applicable</i></p> <p>If your experience encompasses more than one UK nation, please provide details of any divergence in your responses as they concern the context of the policies of each devolved administration, as appropriate.</p>
<i>Amplitude modulation</i>	<i>A sound characteristic associated with the regular rotation of the wind turbine blades, sometimes described as 'swishing', 'whooshing', 'whoomphing', or 'thumping'</i>
<i>Tonality</i>	<i>A sound characteristic sometimes described as 'droning', 'humming', 'ringing', or 'whistling'</i>

Figure 2. Screen shot of the survey webpage-Definitions².

38. Following the questions related to identification of the participant in the survey, the pivotal question appears: see Figure 3.

BEIS review of onshore wind turbine noise assessment guidance



Department for
Business, Energy
& Industrial Strategy

44%

Adequacy of current UK wind farm noise assessment guidance

Q1.2: Which description most closely matches your view on the adequacy of the current UK wind turbine noise guidance in ensuring wind turbine noise is managed effectively and consistently in line with Government policies on noise and Net Zero? *

- A) Adequate, no updates necessary
- B) Mostly adequate, but requires some updating or amendment
- C) Inadequate and requires substantial revision
- D) Not sure

[Save and Continue Later](#) [Previous Page](#) [Next Page](#)

Figure 3. Screen shot of the survey webpage—Pivotal Question².

39. Figure 4 shows the next screen of the survey in which the participant is asked to choose from a list of topics associated with wind turbine noise assessment, indicating which topic would require updating.

Topics requiring updating

Q1.3: Which (if any) of the following topics relevant to the current UK wind turbine noise assessment guidance do you consider need to be updated? (Choose as many as applicable) *

- Fundamental approach (holistic view of the guidance on managing wind turbine noise)
- Baseline determination (pre-development environment)
- Measurements of sound or meteorology
- Consideration of atmospheric, meteorological, or topographical influences on sound
- Evaluation of sound characteristics
- Sound predictions
- Noise impact assessment (including cumulative impact)
- Noise controls (including noise limits, effects thresholds, and use of planning conditions)
- Compliance determination and enforcement
- Uncertainty
- Anything else not listed above (please specify in comments)

Figure 4. Screen shot of the survey webpage—Topics Requiring Updating².

40. The following screen in the survey lists these same topics and invites the participant to outline the updates believed to be required.

Q1.4: Please could you briefly outline the updates you believe need to be made to the current UK wind turbine noise assessment guidance, and identify any publicly accessible evidence you are aware of that would support or inform the updates indicated? (Please enter your responses under headings from the topics listed below that are most closely applicable to your suggestion)

41. Lastly, specific questions are posed, as shown below:

Q2.1: Do you have any specific experience or research knowledge of the potential influence of wind farm or wind turbine design or age on sound emissions? *

Q3.1: Please could you identify any publicly accessible evidence you are aware of that could be relevant to the development of any future UK wind turbine noise assessment guidance and is not already mentioned in your previous responses?

Q3.2: Please could you briefly outline any suggestions you have for how any future UK wind turbine noise assessment guidance could be developed and maintained to provide a stable platform for development planning and assessment, while ensuring that it is kept up to date with robust scientific evidence?

H. EXCLUSION OF INFRASOUND & LOW FREQUENCY NOISE

42. IARO represents a group of scientists who, collectively, hold over 100 years of scientific experience in the field of infrasound and low frequency noise, and its effects of human health. Since 2016, our researchers have been recording and analysing acoustical data in and near homes located in the vicinity of onshore wind power stations, in the following countries (alphabetical): Australia, Canada, Denmark, England, France, Germany, Ireland, New Zealand, Northern Ireland, Portugal, Scotland, Slovenia, and The Netherlands. Prior to 2016, all IARO scientists were already working either in acoustics alone or in acoustics and health.
43. All research conducted by IARO is part of the Citizen Science Initiative for Acoustic Characterization of Human Environments (CSI-ACHE), the research protocols for which have been approved by the New Zealand Ethics Committee (application number NZEC19_12).
44. In a nutshell, IARO provides citizens with continuous (weeks), high-resolution infrasound and low frequency noise recordings, during which time citizens log their symptoms in a diary.
45. Diaries are then time-matched with the recorded acoustic environment.
46. This methodology has been allowing IARO scientists to pin-point what type of acoustical disturbances are present when citizens claim to be most impacted by wind turbine 'noise.'
47. The ultimate goal of IARO Scientists is to contribute to the establishment of dose-response relationships for infrasound and low frequency noise exposures, in both environmental and occupational settings.
48. The high-resolution methodology for recording acoustic environments as employed by IARO scientists is not prescribed by any guideline or legislative document.

49. IARO’s methodology is, however, in compliance with the axioms of The Scientific Method and Evidence-based Medicine.

50. And now, some of those technical complexities arise.

Table 1 compares three major noise assessment parameters that clearly distinguish the methodology prescribed by ETSU-R-97 and the scientific methodology used by IARO Scientists.

Table 1: Comparison of noise assessment parameters used by ETSU-R-97 and IARO

Parameter	ETSU-R-97	IARO
<i>Temporal resolution</i>	<i>10-minute averages</i>	<i>1-second</i>
<i>Frequency resolution</i>	<i>1/3rd of an octave</i>	<i>1/36th of an octave</i>
<i>Frequency weighting</i>	<i>A-weighting</i>	<i>Unweighted</i>

51. Table 1 reflects a progression that is analogous to going from the hand-held magnifying glass to the table-top microscope.

Features that were previously unseen are now revealed and can be quantified.

52. IARO scientists have always found that images can greatly aid in the understanding of more complex technical issues. Figures 5, 6 and 7 provide a visual comprehension of the complexity of acoustics. A composite image with this data is provided at the end of this Commentary.

53. Figure 5A and 5B are not visually different.

In terms of ETSU-R-97 requirements (red bars), no significant difference exists between these environments. Moreover, in both, noise levels are below 30 dBA.

And yet, on July 22 (Fig 5A) the couple slept peacefully, while on July 29 (Fig 5B), they were unable to sleep, and were compelled to take medication.

Are they hallucinating? Are they suffering from some psychosomatic pathology? Is this evidence for the existence of a nocebo effect?⁸

⁸ A psychosomatic disorder in which the patient believes s/he has contracted some illness, but no organic basis for illness exists; the opposite of the “placebo effect.”

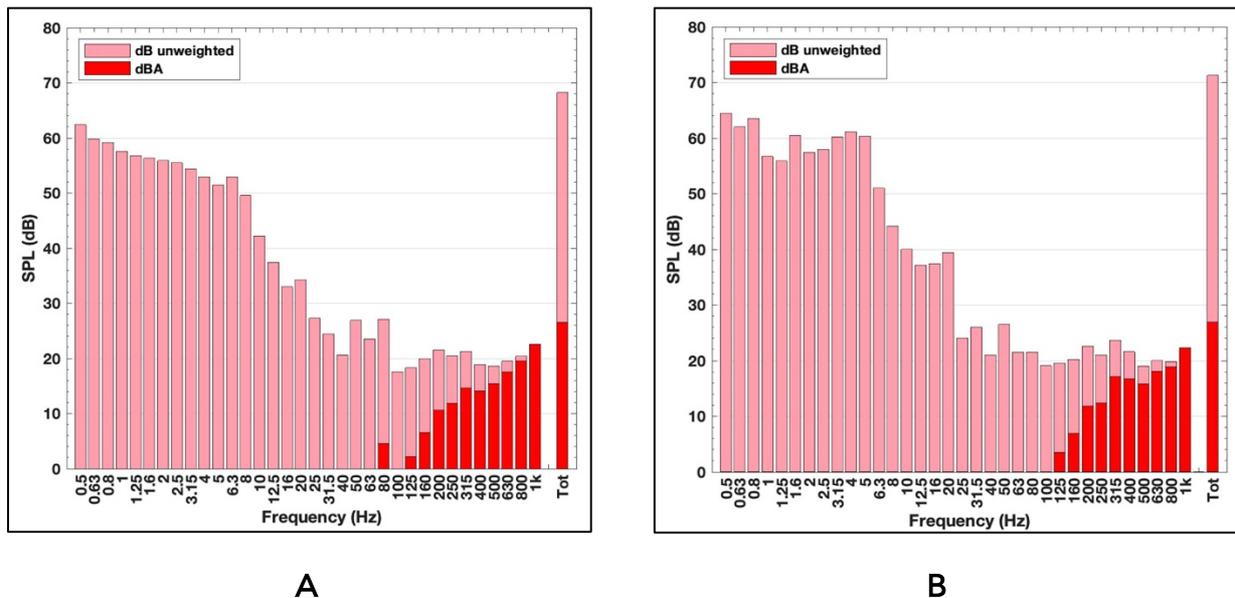


Figure 5. 1/3 octave band analyses of the acoustic environment within a bedroom of a home located near a wind power station. **A:** 22 July at 04:00, couple slept peacefully. **B:** 29 July at 03:20, couple required medication.

These images are analyses performed with a frequency resolution of 1/3rd of an octave (1/3rd octave band analysis), within the frequency range of 0.5—1000 Hz. Additionally, data is analysed over segments of 10-minute time averages.

The **red bars** reflect the 'noise' levels that are **measured under ETSU-R-97 constraints**, with the application of the A-frequency weighting filter, yielding the dBA (decibel-A) metric.

The **pink bars** reflect the 'noise' levels that are **actually present** in the bedroom, measured in unweighted (or linear) decibel units.

54. By observing the acoustic environment with methodologies that are free of the ETSU-R-97 constraints, a much different picture is obtained—one that exonerates citizens of suspicion of having developed psychosomatic disorders.
55. Figure 6 shows the exact same data as that presented in Figure 5, but with a higher resolution analysis.

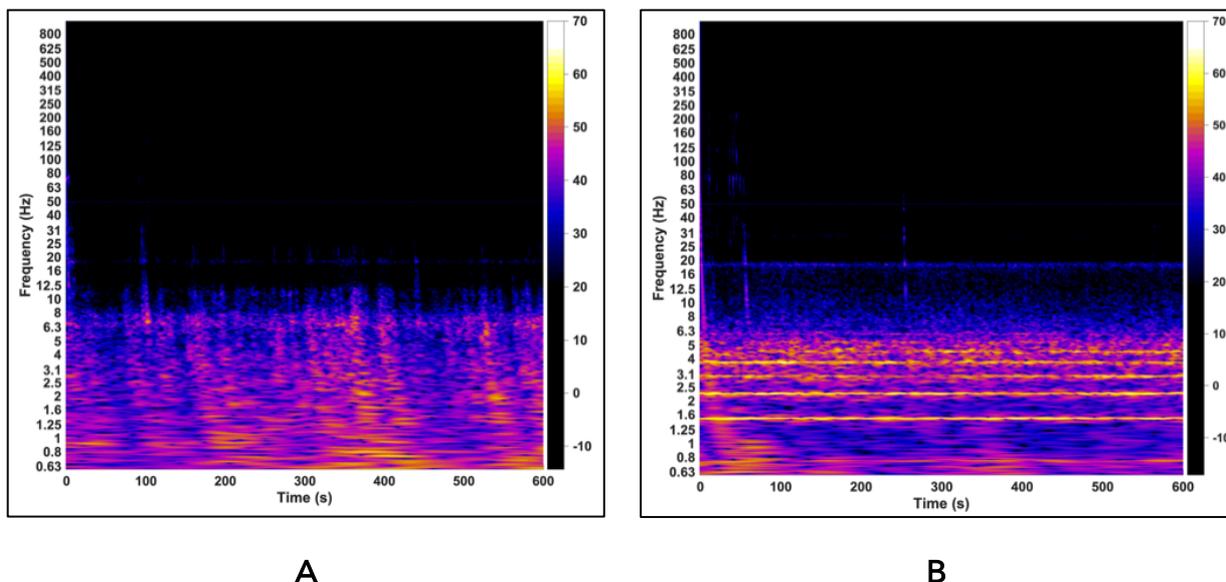


Figure 6. 1/36 octave band analyses of the acoustic environment within a bedroom of a home located near a wind power station. **A:** 22 July at 04:00, couple slept peacefully. **B:** 29 July at 03:20, couple required medication.

These images are analyses performed with a **frequency resolution of 1/36th of an octave** (instead of a 1/3rd octave band resolution), within the frequency range of 0.5—1000 Hz. The images reflect the same 10-minute segment as is shown in Figure 4, but instead of the 10-minute time average, they show a **second by second (600 seconds)** breakdown of the environment.

The colour-bar reflects the unweighted noise levels, at each 1/36th octave and at each second.

56. Figure 6B clearly exhibits straight horizontal lines, stretching throughout the 600-second interval, with levels reaching up to 60 dB, and all occurring at frequencies below 5 Hz. This was on the sleepless morning of July 29th, when medication was required.

These acoustic phenomena are not present in Figure 6A, which was the morning of July 22nd, when couple slept peacefully.

57. These horizontal lines correspond to the acoustic output of wind turbines. They can be mathematically matched to the technical specifications of each wind turbine make and model. They are called *wind turbine acoustic signatures*.

58. Another view of the same data might be helpful. Figure 7 shows the same numerical data as that used to construct the images presented in Figures 5 and 6. These images reflect the absence of elevated peaks of acoustic energy on the morning

I. ETSU-R-97: A DISCLAIMER THAT VITIATES THE ENTIRE DOCUMENT

62. The 175-page document titled “The assessment & rating of noise from wind farms,” known as ETSU-R-97, has an opening statement which is fully transcribed below:

“This report was drawn up under the direction of the Noise Working Group. While the information contained in this report is given in good faith, it is issued strictly on the basis that any person or entity relying on it does so entirely at their own risk, and without the benefit of any warranty or commitment whatsoever on the part of the individuals or organisations involved in the report as to the veracity or accuracy of any facts or statements contained in this report. The views and judgements expressed in this report are those of the authors and do not necessarily reflect those of ETSU, the Department of Trade and Industry or any of the other participating organisations.”⁹

63. It is acknowledged that a certain level of protection against liability suits may be required for a document of this nature, and hence the following statement is understandable:

“...it is issued strictly on the basis that any person or entity relying on it does so entirely at their own risk...”

64. As Scientists, however, the second part of the ETSU-R-97 opening statement is astonishing:

*“While the information contained in this report is given in good faith, it is issued strictly (...) **without the benefit of any warranty or commitment whatsoever (...) as to the veracity or accuracy of any facts or statements contained in this report**” (our bold).*

65. What an extraordinary statement! It is very difficult for Scientists to read this statement and simply proceed with validating the remainder of the report.

66. Lest the readers of this Commentary be misguided into thinking that this type of wording is some sort of standard practice, IARO scientists would like to make the following very clear:

⁹ ETSU-R-97, Page 0

To the best of their knowledge to date, the IARO scientists that are signatories to this Scientific Commentary, stand behind the veracity and accuracy of all statements contained in this document.

67. It is shocking that a policy-decision document which has served as the core document for wind turbine noise assessments, with direct implications on Public Health, and where scientific evidence is of critical importance, is absent of any accountability or responsibility.

J. ETSU-R-97 IS UNRELATED TO PUBLIC HEALTH PROTECTION

68. It might now be interesting to list the people and entities who knowingly co-signed a document of (self-acknowledged) questionable veracity and dubious accuracy¹⁰:

Members of the Noise Working Group:

Mr R Meir, Chairman	DTI
Dr M L Legerton, Secretary	ETSU
Dr M B Anderson	Renewable Energy Systems
Mr B Berry	National Physical Laboratory
Dr A Bullmore	Hoare Lea and Partners
Mr M Hayes	The Hayes McKenzie Partnership
Mr M Jiggins	Carrick District Council
Mr E Leeming	The Natural Power Company Ltd
Dr P Musgrove	National Wind Power Ltd
Mr D J Spode	North Cornwall District Council
Mr H A Thomas	Isle of Anglesey County Council
Ms E Tomalin	EcoGen Ltd
Mr M Trinick	Bond Pearce Solicitors
Dr J Warren	National Wind Power Ltd

¹⁰ Two of the commercial enterprises represented in this Working Group are still closely involved in current wind turbine planning procedures (see Paragraph 3b and 3c).

69. Questions: Who represented the medical community?

If no medical expertise was relied upon, how is it that ETSU-R-97 has become the forefront document presumably contributing to the protection of Public Health, as far as wind turbine noise is concerned?

70. The answers to these questions become obvious in the first paragraph of the Executive Statement, transcribed below (our bold and italics):

*“This document describes a framework for the measurement of wind farm noise and gives indicative noise levels thought **to offer a reasonable degree of protection** to wind farm neighbours, **without placing unreasonable restrictions on wind farm development or adding unduly to the costs and administrative burdens on wind farm developers or local authorities.** The suggested noise limits and their reasonableness have been **evaluated with regard to regulating the development of wind energy in the public interest.** They have been presented in a manner that **makes them a suitable basis for noise-related planning conditions or covenants within an agreement between a developer of a wind farm and the local authority**” (Executive Summary, page iii).*

71. ETSU-R-97 seems to be (yet another) example where an industrial sector is directly involved in the preparation of governmental ‘guidelines’ that shape policy-decisions and that minimize or outright ignore potentially harmful emissions generated by that particular industrial sector.

K. “WHAT YOU CAN’T HEAR CAN’T HURT YOU”

72. This is the outdated notion on which ETSU-R-97 is based: “what you can’t hear can’t hurt you.”

73. It is this same outdated notion that explains why infrasound and low frequency noise is conspicuously excluded from the DBEIS Scoping Review.

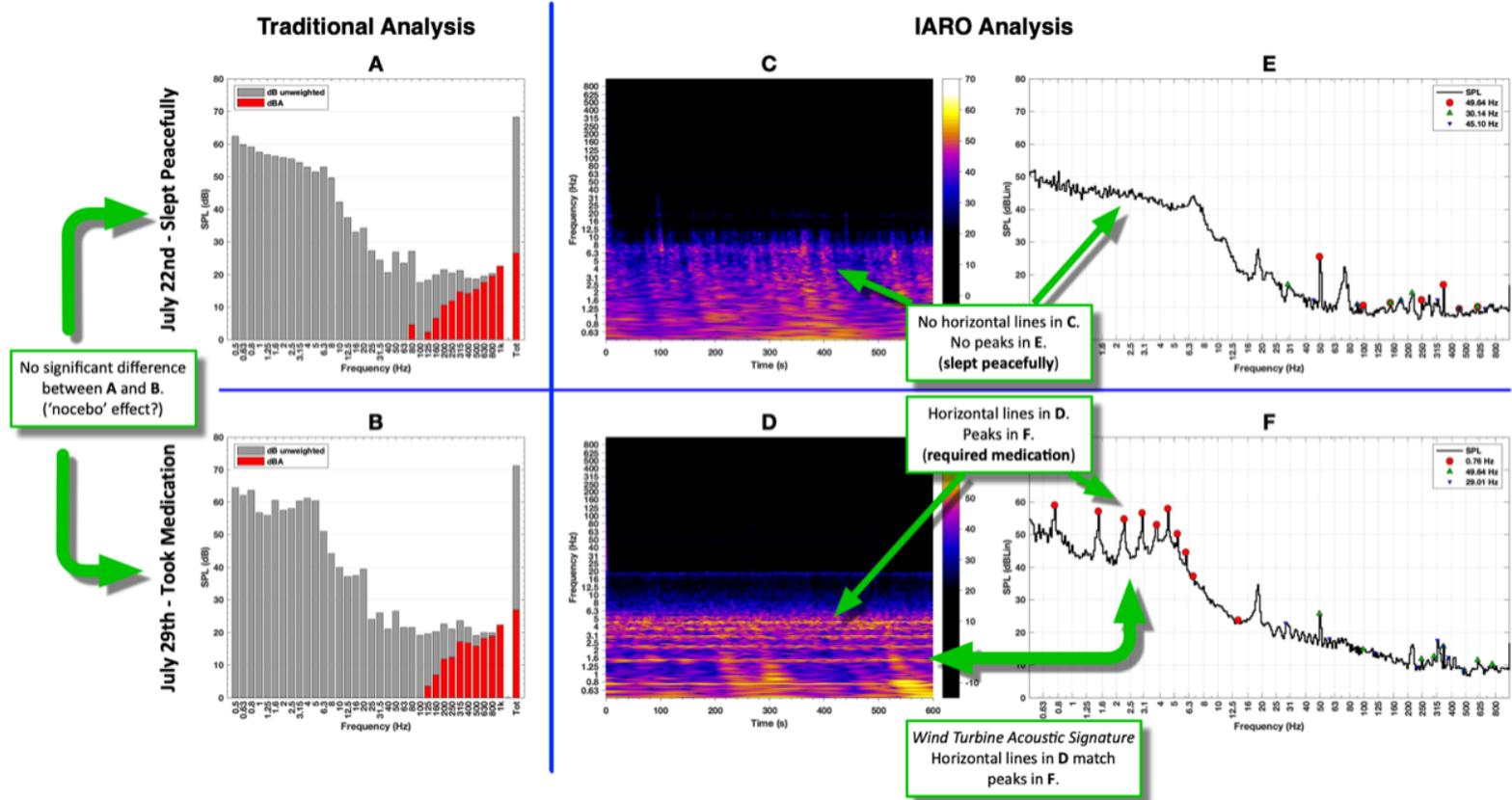
74. Since infrasound is inaudible at the levels generated by wind turbines, it is considered by some to be irrelevant to human health.

75. In fact, those who ‘complain about wind turbine noise’ when levels are below the ETSU-R-97 mandated levels, are often ridiculed and labelled as suffering from the ‘nocebo effect.’⁸

76. This outdated notion justifies the use of the A-frequency-weighting (yielding the dBA unit) (See Table 1).
77. It is also used to justify the claim that wind turbine acoustic signatures have no effect on health as they occur below the human hearing threshold.

L. CLOSING PERPLEXITIES

78. If the medical community was not represented in the preparation and publication of ETSU-R-97, how can the UK Government allow ETSU-R-97 be used to establish public policy with direct implications on Public Health?
79. What was the purpose of the DBEIS Scoping Survey, considering that a critical part of the problem was specifically excluded from discussion, namely, infrasound and low frequency noise?
80. If offshore wind power plants are the focus (almost exclusively) of the currently imposed "2050 Net Zero target," why is the "2050 Net Zero target" being used by DBEIS to justify onshore wind turbine development?
81. If the "2050 Net Zero target" is of such paramount importance, why were offshore wind power plants specifically not included in the DBEIS survey? Both onshore and offshore wind turbines have the same type of acoustic signatures.
82. If the veracity and accuracy of *any* statement contained in ETSU-R-97 is questionable, as is self-acknowledged, how can it conscientiously be used to establish public policy?
83. Why does the UK Government, through DBEIS, rely on ETSU-R-97 for protecting the UK population against wind turbine noise?
84. These and several other critical issues, relevant for the well-being of the UK population, could have been opened for discussion with the DBEIS Scoping Survey. Regrettably, they were not.



Composite Figure—Please see full legend on next page

Legend for the Composite Figure:

Comparison between the acoustic environments (10-minute recordings) in a bedroom of a home located close to wind power plants. On 22 July (at 04:00), the couple slept peacefully (A, C, E). On 29 July (at 03:20), medication was taken at 04:00 to 'deal with the noise' (B, D, F).

A and B

- Acoustic analysis using a 1/3rd octave resolution.
- Red bars indicate sound pressure levels in dBA, as required by ETSU-R-97.
- Overall noise levels are below 30 dBA and therefore, well within the ETSU-R-97 guideline.
- Grey bars indicate the sound pressure levels actually existent in the environment.
- No visual difference between A and B.

C and D

- Acoustic analysis using a 1/36th octave resolution.
- Straight horizontal lines are present in D—29 July, sleepless night
- No horizontal lines in C—22 July, slept peacefully
- Evident visual difference between C and D.

E and F

- Periodograms showing peak level.
- No peaks on July 22—slept peacefully.
- Prominent peaks on July 29—sleepless night requiring medication.

Takeaway message:

ETSU-R-97 requirements are insufficient to predict human health effects and are irrelevant for protecting Public Health against wind turbine noise immissions.