

2019 ANNUAL REPORT

INDEPENDENT SCIENTIFIC COMMITTEE ON WIND TURBINES

2020

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INDEPENDENT SCIENTIFIC COMMITTEE ON WIND TURBINES

2020

20 April 2020

The Hon Angus Taylor MP Minister for Energy and Emissions Reduction Parliament House CANBERRA ACT 2600

Dear Minister

2019 Annual Report of the Independent Scientific Committee on Wind Turbines

Pursuant to the Committee's Terms of Reference, I am pleased to provide the fourth Annual Report to the Australian Parliament on the activities of the Independent Scientific Committee on Wind Turbines.

The Report on the activities of the Committee has been prepared by the Secretariat with input from the Committee members.

The Report covers activities in the period from 1 January 2019 through to 31 December 2019.

The Committee was reappointed at the end of 2018 and values the opportunity to continue monitoring research, both here and overseas, in relation to understanding the impact of sound from wind turbines on sleep and health, in particular.

The Committee values the opportunity to continue delivering on its Terms of Reference by supporting the National Wind Farm Commissioner to consider the harmonisation of wind farm noise standards across states and territories, and providing advice to the Government on the needs to consider changes to existing standards, based on a review of the World Health Organization's Environment Noise Guidelines, and the two ongoing National Health and Medical Research Council projects.

Yours sincerely

John Davy

John Davy Chair Independent Scientific Committee on Wind Turbines iscwt-secretariat@industry.gov.au

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Background

On 9 October 2015, the then Minister for the Environment, the Hon Greg Hunt MP, announced that the Independent Scientific Committee on Wind Turbines ('the Committee') had been established to build on the work of the National Health and Medical Research Council (NHMRC) and provide advice on the science and monitoring of potential impacts of wind turbine sound on health and the environment. The Committee provides an Annual Report to the Australian Parliament. The establishment of this Committee was part of the Government's commitment to respond to community concerns about wind farms.

In November 2018, following an internal review, the Committee was extended for a further three-year term with a slightly revised Terms of Reference.

Members

The Committee is chaired by:

Adjunct Professor John Davy RMIT University and CSIRO.



The Chair of the Committee is Adjunct Professor John Davy. Professor Davy has been an Adjunct Professor of RMIT University since 2009 and a part time Principal Research Scientist with CSIRO since 2005. Research interests include the prediction of diffuse field sound insulation, the directivity of sound insulation, the directivity of the radiation of sound from openings, reverberant and anechoic sound fields, microphone turbulence screens, urban noise and building acoustics measurements.

Professor Davy has been a fellow of the Australian Acoustical Society since 2008 and is currently a member of the Physical Performance Testing Accreditation Advisory Committee of the National Association of Testing Authorities, Australia.

Other members of the Committee are:

Professor Simon Carlile

Head of the Auditory Neuroscience Laboratory, School of Medical Science, University of Sydney and Senior Technical Lead, [X] The Moonshot Factory, Mountain View, CA, USA.



Professor Simon Carlile is the Head of the Auditory Neuroscience Laboratory in the School of Medical Sciences at the University of Sydney and also leads an interdisciplinary group of researchers and developers at Alphabet's R&D company, [X] in the USA. Professor Carlile's expertise covers hearing science including hearing impairment and the development and applications of virtual auditory space technologies.



Clinical Professor David Hillman AM

Department of Pulmonary Physiology and Sleep Medicine, Sir Charles Gairdner Hospital Perth, WA. Centre for Sleep Science, University of Western Australia.

Professor Hillman is an emeritus sleep physician at the Department of Pulmonary Physiology and Sleep Medicine at Sir Charles Gairdner Hospital in Perth, Western Australia and a former director of the West Australian Sleep Disorders Research

Institute, and a senior principal research fellow at the Centre for Sleep Science, University of Western Australia. He is a respiratory physiologist, anaesthetist and sleep physician. His clinical and research interests focus on the physiology of the respiratory system and upper airway and their relationship to respiratory disease, sleep disorders and anaesthesia. He has published extensively in these and related areas.

Professor Hillman is a fellow of the Australian and New Zealand College of Anaesthetists, the Royal College of Physicians of Edinburgh and an honorary fellow of the Royal Australasian College of Physicians. He is a Clinical Professor at the University of Western Australia and a past president of the Australasian Sleep Association and of the Society of Anesthesia and Sleep Medicine. He is founding chair of Australia's Sleep Health Foundation, a national charity devoted to improving sleep health.

Dr Kym Burgemeister

Principal, Arup.



Dr Burgemeister is a Principal at Arup with over 20 years' experience as an acoustic engineer. He specialises in measuring, predicting and assessing noise and vibration from industry and transport infrastructure. He has worked on major highway and railway projects in Australia, the UK and the US and wrote the draft Victorian guidelines for the assessment of wind turbine noise. Dr Burgemeister's role at Arup is to describe and help clients and their stakeholders understand how acoustics and vibration affects their projects in a comfortable and an easy to understand way.

Dr Burgemeister is the Noise and Vibration Technical Expert for the Infrastructure Sustainability Council of Australia (ISCA), providing technical advice regarding noise and vibration aspects of their rating credits.

Terms of Reference

The former Department of the Environment and Energy conducted an internal policy review of the role of the Committee in 2018. The review acknowledged that investment in wind farms remains strong and the concerns have not been fully resolved in either the community or the scientific literature. Accordingly, the Government agreed to extend the term of the Committee, as well as update its Terms of Reference to provide particular focus on supporting the National Wind Farm Commissioner's efforts to harmonise noise standards and monitoring associated with wind turbines and the ongoing provision of advice to Government regarding ongoing investigations.

The Committee's revised Terms of Reference communicated in December 2018 are stated below.

Terms of Reference

The Committee is convened as an independent, multidisciplinary, expert group to improve science and monitoring of the potential impacts of sound from wind turbines (including low frequency and infrasound) on health and the environment.

The Committee will provide advice on:

- the development of Australian methodologies and frameworks in sound measurement and standards for wind farms, including in the field of infrasound and low frequency sound
- innovation in cost-effective, continuous sound monitoring of wind farms
- options for wind farm operators to maximise transparency such as by providing information on wind speed, operational statistics, operating hours and sound monitoring.

The Committee will monitor and periodically review progress in understanding the potential health impacts of wind farms and comment on further possible research developments to support standards and measurement protocols. An important part of the Committee's role is bringing together partners to inform their work, including linking to the work being undertaken through the National Health and Medical Research Council (NHMRC).

The Committee complements the work of the National Wind Farm Commissioner to identify needs and priorities for monitoring efforts to deliver transparency of information.

The Committee will:

- support the National Wind Farm Commissioner to consider the harmonisation of wind farm noise standards across states and territories
- provide advice to Government on the need to consider changes to existing standards, based on a review of the World Health Organization's Environment Noise Guidelines, and the two ongoing NHMRC projects.

The Committee will provide an Annual Report to the Australian Parliament reporting on delivery against these Terms of Reference and other achievements. The Committee will operate for a further 3 year period until December 2021.

The work of the Committee

The Committee's work has concentrated on examining the sources of disturbance associated with living in proximity to wind turbines, existing sounds limits across Australia, the basis for these limits and how disturbance might be best defined with a view to future harmonisation of state-by-state sound limits.

Our considerations have led to the publication of two open access peer reviewed learned journal papers available at <u>https://doi.org/10.1016/j.apacoust.2018.06.009</u> and <u>https://doi.org/10.1177/2331216518789551</u>.

The Committee meets regularly with the chief investigators of the two NHMRC funded research projects on the effects of wind turbine noise on humans and with the National Wind Farm Commissioner and some of his staff.

The Committee is paid on a daily rate as determined by the Remuneration Tribunal. Committee members are only paid for the hours of attendance at meetings. The Committee utilises video conferencing facilities for meetings and is provided with support from a part time secretariat in the Department of the Environment and Energy. This secretariat moved to the Department of Industry, Science, Energy and Resources on 1 February 2020.

Total costs for the Committee for 2019 were \$12,390.16.

Meetings

The Committee met on 3 occasions between January 2019 and December 2019.

Thursday 14 March 2019

Topics discussed included:

- the Committee members' reappointment to the Independent Scientific Committee on Wind Turbines, noting this was their first meeting under their new term.
- the expansion to the Committee's Terms of Reference and a reduction in the number of meetings each year.
- agreeing to invite the National Wind Farm Commissioner and the two National Health and Medical Research Council (NHMRC) project leads to provide updates at one meeting each per year.
- continued discussion on the World Health Organization (WHO) report, agreeing that the report was broadly consistent with the Committee's findings.
- discussed the harmonisation of guidelines and discussed the Health Canada and Danish studies
- agreed to continue monitoring new papers and provide updates to the members through email and in Committee meetings.
- Further discussion on the Committee's 2018 annual report which agreed steps to finalise the report.

Thursday 18 July 2019

Topics discussed included:

- a progress update on one of the two NHMRC funded investigations of the relationship between wind turbine noise and sleep ("Establishing the physiological and sleep disruption characteristics of wind farm versus traffic noise disturbances in sleep") with its chief investigator, Dr Peter Catcheside, who joined the meeting for this purpose and provided the Committee with an update.
 - The Committee asked questions about the study and provided their advice to Dr Catcheside.
- a briefing from the National Wind Farm Commissioner Mr Andrew Dyer. The Commissioner provided an update and overall summary of his 2018 annual report. The Commissioner advised that in 2018 complaints relating to wind turbines were shifting away from health-related complaints to planning and construction complaints. It was also noted that there were no complaints about vibration levels in 2018.
 - The Committee discussed how they could support the Commissioner as referred to in their Terms of Reference. The Commissioner advised the Committee would be able to provide input into future submissions and consultation processes for wind turbine guidelines.
 - The Committee discussed the difficulty in finding auditors who have experience with wind farms

- the Committee continued discussions on their annual report and agreed on next steps with the Secretariat to finalise the report.
- the Committee discussed thresholds of sound pressure level and disturbance and discussed recent noise and health papers.

Thursday 21 November 2019

Topics discussed included:

- a progress update on the second NHMRC funded project from Dr Brett Toelle and Associate Professor Nathaniel Marshall ('Multidimensional Assessment of the Health Impacts of Infrasound: Two Randomised Controlled Trials').
 - The Committee discussed and provided advice to the project leads relating to volunteers and noise sensitivity tests.
- a discussion of two papers ('Comparison between perceptual responses to traffic noise and wind farm noise in a non-focused listening test' and 'wind farm infrasound detectability and its effects on the perception of wind farm noise amplitude modulation') that were presented at the Acoustics 2019 Conference.
- the Committee's draft 2019 annual report.
- communication strategies the Committee could utilise to provide details of their research and findings to the general public.
- The Chair of the Committee Prof. Davy advised he had been invited to participate in a round table discussion with state regulators hosted by the National Wind Farm Commissioner. This was in line with the Committee's Terms of Reference to support the National Wind Farm Commissioner to consider the harmonisation of wind farm noise standards across states and territories.

Other activities/initiatives

- The Chair of the Committee, Prof. Davy participated in the round table meeting with state regulators.
 - Hosted by the National Wind Farm Commissioner, the meeting provided an opportunity for the Chair to explain different types of noise measurements, levels and studies and provide an overview of the WHO report which addressed wind turbine noise.
- The Committee provided their input into a request for input into the South Australian Wind Turbine Guidelines.
- The Committee used their meetings to discuss recent research and papers to keep abreast of current issues and findings.

Environmental Noise Guidelines for the European Region

As noted in the Committee's 2018 annual report, the World Health Organization (WHO) released Environmental Noise Guidelines for the European Region [1] in 2018. These guidelines conditionally recommend a maximum outdoor level of wind turbine noise to which residences are exposed of L_{den} equals 45 dBA. At first glance this appears to be different from the LA90(10min) limit of 35 dBA recommended by members of the committee [2]. This apparent difference of 10 dBA is due to the use of different measures of wind turbine noise and rounding. The WHO limit is rounded to the nearest 5 dBA and the limit proposed by the committee members is rounded to the nearest 1 dBA. Both WHO and the committee members determined the outdoor sound level at which 10 % of the population are highly annoyed by wind turbine noise. Reading the sound levels from the graphs to the nearest 0.1 dBA gives Lden equals 43.7 dBA for the WHO limit and LA90(10min) equals 35.3 dBA for the limit proposed by the committee. If the distribution of wind turbine sound levels is the same during the day, evening and night [3], the WHO limit is equivalent to $L_{Aeq(10min)}$ equals 37.3 dBA. The Committee's limit is also equivalent to $L_{Aeq(10min)}$ equals 37.3 dBA [4]. Thus, the two limits are the same and the committee strongly recommends that the Australian states and territories harmonise their different wind turbine sound limits using this common recommended limit. It should however be recognised that the uncertainty of this limit is still rather large, but it is the best that can be achieved in the foreseeable future. The WHO limit is based on four studies, while the limit proposed by the committee members is based on those same four studies and two more recent studies. It is interesting that the addition of the two more recent studies did not change the proposed limit. This gives more confidence in the proposed limit.

1. World Health Organisation: Environmental Noise Guidelines for the European Region. In. World Health Organisation Regional Office for Europe, Copenhagen, Denmark, (2018)

2. Davy, J.L., Burgemeister, K., Hillman, D.: Wind turbine sound limits: current status and recommendations based on mitigating noise annoyance. Appl. Acoust. **140**, 288-295 (2018). doi:https://doi.org/10.1016/j.apacoust.2018.06.009

3. van den Berg, F.: Criteria for wind farm noise: Lmax and Lden. Paper presented at the Euronoise 2008, Paris, June 29-July 4 2008

4. ETSU-R-97: The assessment and rating of noise from wind farms. In., pp. 1-153. Department of Trade and Industry, London, (1996)