LETTER TO THE EDITOR

Paul Miskelly, Mittagong, NSW
paul.miskelly@aapt.net.au

Response to article by S. Cooper, "Wind farm noise - an ethical dilemma for the Australian Acoustical Society?", *Acoustics Australia* **40**(2), 139-142 (2012)

I would like to add to the discussion raised by Mr Steven Cooper's article "Wind farm noise – An ethical dilemma for the Australian Acoustical Society?", *Acoustics Australia* **40**(2), 139-142 (2012).

Letters from Kym Burgemeister and Marshall Day Acoustics (both in *Acoustics Australia* **40**(3), December 2012), each make the important point that there is a need to *balance* the impacts from any given technology on local residents against its benefits to the wider community. It is the latter – the supposed benefits or, "*the greater good*", provided by wind farms - that I wish to address here.

The wind industry and its academic supporters tell us that, while individual wind farms produce an electricity output that is variable, that by spreading a number of wind farms across a wider region, their combined output becomes sufficiently smoothed so that, with a little balancing from gas turbine generation, the combination can readily replace coal-fired powerstations. See, for example, Diesendorf [1]. Thus, we are told, wind farms provide a direct benefit to the wider community by reducing the CO_2 emissions from fossil-fuelled generation. This, I understand, has become a generally accepted view among the government policymakers involved in the wind farm approval process.

I am an electrical engineer. I thought to test this smoothing hypothesis [2]. The operator of the eastern Australian grid, the Australian Energy Market Operator (AEMO) publishes, on a daily basis, the previous day's operational data for all registered generators. The data is published as the output at each 5-minute data point for all such times in the 24-hour period, that is, 288 data points for each of more than 300 generators on that grid. There is now a total of some 2700 MW of installed wind farm capacity spread across the eastern Australian grid, the most far-flung grid on earth, over a region that is 1200 km in its east-west extent, and some 500 km over a north-south extent, making this network of wind farms one of the most widely dispersed in the world. I thought to analyse the performance of this network of wind farms for the full calendar year 2010. At that time, the total installed wind capacity totalled a little over 2500 MW, incidentally making it a larger capacity than that of a single coal-fired powerstation.

In light of the generally accepted view stated above, the results were little short of astonishing. Not only is there no appreciable smoothing of the wind farm output, but there occur very frequently through the course of a year what can only be termed common-mode failures of the entire wind farm fleet. I chose a figure of 2% of installed capacity as the minimum acceptable level of output. (I am advised by other electrical engineers that this figure is "kind" to the wind industry: those others would have chosen a figure of 5% as the minimum acceptable figure, a figure that would have resulted in an even worse result.) Using my 2% minimum figure as the failure criterion, the wind farm fleet failed on some 109 occasions in 2010. To provide some perspective, the unscheduled outage of one major conventional powerstation once a year would be deemed unacceptable. This is a direct comparison, in terms of presently installed wind farm capacity, but, in addition, the failure of the entire conventional generation fleet – for this is also a direct comparison – on any single occasion, would be regarded as catastrophic, and would result in a national inquiry.

In addition to the common-mode failure, there were numerous occasions through the calendar year where wind output dropped rapidly from high values, requiring the rapid response of fast-acting gas turbine generation to fill the gap. The rapid response requirement results in inefficient operation of such plant, resulting in excessive CO_2 emissions at such times. Inhaber [3] determined, using a conservative approach, that as a result of this excessive fuel consumption, that where wind installed capacity approaches 20 percent of total installed generation capacity (the Federal government's renewable energy target), any resulting CO_2 emissions saving is completely nullified by the inefficiencies resulting from the frequent, rapid ramping.

This result is due entirely to the prevailing meteorology: the frequent passage of large high-pressure systems cause occasions where the wind is not blowing anywhere across the entire grid [2]. As a result, increasing the wind farm fleet is no solution to the common-mode failure problem. Indeed, continued increase in installed capacity would merely result in the increased risk of catastrophic grid collapse, as a consequence of the increased absolute magnitude of the swings in wind farm output. Miskelly and Quirk [4] also address the impact of these wind-caused sudden variations in demand.

These findings concur with the empirical observations being made in both the UK and Germany, for example, where there is a new understanding, based on operational experience, that wind energy is both not decreasing CO_2 emissions to any appreciable extent, but is also placing the continued operational security and reliability of those countries' respective grids under increasing strain.

I respectfully suggest to members of the AAS that, in the light of these findings, it is time to give serious consideration to the possibility that the "*greater good*" to be had from grid-connected wind farms is not only minimal, but that it is indeed likely to be non-existent. Therefore, any noise impacts on nearby residents resulting from the operation of wind farms are totally unacceptable.

As a result of these findings the ethical issue raised by Steven Cooper takes on a new importance: given that it is

clear from these findings that wind energy technology on the eastern Australian grid is a colossal failure in terms of meeting its stated objective, I suggest that currently-misguided policy strategies by governments require a robust response from AAS members. For example, in NSW, as a first such response, the present exemption of wind farms from the stringent requirements of the NSW INP now require, I suggest, that AAS members practising in that jurisdiction lodge objection regarding that exemption as a matter of urgency with the relevant departmental Directors-General.

Paul Miskelly
BE, MEngSc (both degrees in Electrical Engineering)

REFERENCES

[1] M. Diesendorf, *The base-load myth*, The Drum, ABC, 2011 www.abc.net.au/unleashed/97696.html (last accessed July 2013)
[2] P. Miskelly, "Wind Farms in Eastern Australia – Recent Lessons", *Energy & Environment* **23**(8), 1233-1260 (2012)
[3] H. Inhaber, "Why wind power does not deliver the expected emissions reductions", *Renewable and Sustainable Energy Reviews* **15**(6), 2557-2562 (2012)
[4] A. Miskelly and T. Quirk, "Wind Farming in South Eastern Australia", *Energy & Environment* **20**(8)-**21**(1), 1249-1256 (2009-2010)

Inter-Noise 2014

MELBOURNE AUSTRALIA 16-19 NOVEMBER 2014

The Australian Acoustical Society will be hosting Inter-Noise 2014 in Melbourne, from 16-19 November 2014. The congress venue is the Melbourne Convention and Exhibition Centre which is superbly located on the banks of the Yarra River, just a short stroll from the central business district. Papers will cover all aspects of noise control, with additional workshops and an extensive equipment exhibition to support the technical program. The congress theme is *Improving the world through noise control*.

Key Dates
The dates for Inter-Noise 2014 are:
Abstract submission deadline: 10 May 2014
Paper submission deadline: 25 July 2014
Early Bird Registration by: 25 July 2014

Registration Fees
The registration fees have been set as:

Delegate	$840	$720 (early bird)
Student	$320	$255 (early bird)
Accompanying person	$140	
Congress Banquet	$130pp	

The registration fee will cover entrance to the opening and closing ceremonies, distinguished lectures, all technical sessions and the exhibition, as well as a book of abstracts and a USB containing the full papers.

The Congress organisers have included a light lunch as well as morning and afternoon tea or coffee as part of the registration fee. These refreshments will be provided in the vicinity of the technical exhibition which will be held in the main foyer of the Congress Centre. Expressions of interest in participating in the exhibition have already been received from overseas and local exhibitors and there is also the possibility of gold, silver or bronze sponsorship. For more details refer to the Congress website or contact Dr Norm Broner, NBroner@globalskm.com

The Congress Banquet is not included in the registration fee, however, as it will have a strong Australian theme and feature the opportunity for delegates to take photographs of themselves with native Australian animals, it should prove to be a major attraction.

Technical Program
After the welcome and opening ceremony on Sunday 16 November, the following three days will involve up to 12 parallel sessions covering all fields of noise control. The first Plenary lecture will be by Prof. Jung-Woo Choi from Korea on an emerging topic: *Sound Sketch: its theory and application using speaker arrays*. Prof. Lex Brown from Australia will close the technical program by reviewing: *Soundscape planning as a complement to environmental noise management*.

The Keynote lectures will cover four important areas of the Congress, notably Aircraft Noise, Active Noise Control, Wind Turbines and LFN as well as Building Acoustics /Noise Effects on Humans.

At this stage, over 100 international and Australian based experts have agreed to help with the organisation of the 80 proposed special sessions, covering all the major areas of noise control. The following broad topics are in the early planning stage:

- Active Noise Control (4 sessions)
- Aeroacoustics (6 sessions)
- Building Acoustics (10 sessions)
- Human Reaction - Occupational Noise (7 sessions)
- Industrial Noise and Vibration (6 sessions)
- Maritime – Underwater (5 sessions)
- Road/Vehicle Noise and Vibration (10 sessions)
- Wind Turbine and LFN (5 sessions).

A more complete listing of the session topics will be progressively added to the Congress website.
Abstract and paper submission, as well as registration, will also be through the Congress website, which is
www.internoise2014.org