

The Senate

Community Affairs
References Committee

The Social and Economic Impact of Rural Wind Farms

June 2011

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43rd Parliament

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ABBREVIATIONS

| | |
|--------|---|
| AEMC | Australian Energy Market Commission |
| AEMO | Australian Energy Market Operator |
| AER | Australian Energy Regulator |
| COAG | Council of Australian Governments |
| GWh | Giga watt hour |
| MCE | Ministerial Council on Energy |
| MRET | Mandatory Renewable Energy Target |
| MW | Mega watt |
| NECA | National Electricity Code Administrator |
| NEM | National Electricity Market |
| NEMMCO | National Electricity Market Management Company |
| NPA–EE | National Partnership Agreement on Energy Efficiency |
| RET | Renewable Energy Target |

RECOMMENDATIONS

Recommendation 1

2.44 The Committee considers that the noise standards adopted by the states and territories for the planning and operation of rural wind farms should include appropriate measures to calculate the impact of low frequency noise and vibrations indoors at impacted dwellings.

Recommendation 2

2.58 The Committee recommends that the responsible authorities should ensure that complaints are dealt with expeditiously and that the complaints processes should involve an independent arbitrator. State and local government agencies responsible for ensuring compliance with planning permissions should be adequately resourced for this activity.

Recommendation 3

2.69 The Committee recommends that further consideration be given to the development of policy on separation criteria between residences and wind farm facilities.

Recommendation 4

2.101 The Committee recommends that the Commonwealth Government initiate as a matter of priority thorough, adequately resourced epidemiological and laboratory studies of the possible effects of wind farms on human health. This research must engage across industry and community, and include an advisory process representing the range of interests and concerns.

Recommendation 5

2.102 The Committee recommends that the NHMRC review of research should continue, with regular publication.

Recommendation 6

2.103 The Committee recommends that the National Acoustics Laboratories conduct a study and assessment of noise impacts of wind farms, including the impacts of infrasound.

Recommendation 7

3.99 **The Committee recommends that the draft National Wind Farm Development Guidelines be redrafted to include discussion of any adverse health effects and comments made by NHMRC regarding the revision of its 2010 public statement.**

CHAPTER 1

INTRODUCTION

1.1 This introductory chapter covers the conduct of the inquiry and provides some background to the technology and operation of wind farms and their distribution in Australia.

Terms of reference

1.2 On 27 October 2010, the Senate referred the following matter to the Committee for inquiry and report by 30 April 2011:

The social and economic impacts of rural wind farms, and in particular:

- (a) any adverse health effects for people living in close proximity to wind farms;
- (b) concerns over the excessive noise and vibrations emitted by wind farms, which are in close proximity to people's homes;
- (c) the impact of rural wind farms on property values, employment opportunities and farm income;
- (d) the interface between Commonwealth, state and local planning laws as they pertain to wind farms; and
- (e) any other relevant matters.

The reporting date was subsequently changed to 23 June 2011.

Conduct of the inquiry

1.3 The inquiry was advertised in *The Australian* on 10 and 24 November 2010, on 8 December 2010 and again on 2 February 2011. The inquiry was also advertised on the Internet. The committee received more than 1000 submissions, many letters and other documents, and had access to much published information. Public hearings were held in Canberra on 25 March and 17 May, Ballarat on 28 March, Melbourne on 29 March and Perth on 31 March 2011. The Committee conducted site visits to the Waubra and Hepburn wind farms in Victoria on 28 March 2011.

1.4 The Committee thanks all those who made submissions, gave oral evidence or in other ways assisted in the inquiry.

Structure of the report

1.5 The report is structured broadly to reflect the details of the committee's terms of reference. Following a brief introduction, the Committee considers noise and any adverse health effects in Chapter 2, planning laws in Chapter 3 and property values, employment and farm income in Chapter 4.

Wind farms

1.6 A wind farm is a group of wind turbines in the same location used for production of electric power. A large wind farm may consist of several hundred individual wind turbines, and cover an extended area of hundreds of square kilometres, but the land between the turbines may be used for agricultural or other purposes. Wind farms may also be located offshore.¹

1.7 In 2009 there were 85 Australian wind farms, 57 of which were in Victoria, South Australia and Western Australia (nineteen in each state). The capacity of all these installations amounted to 1703 MW, with 48 percent of total capacity in South Australia.² (In South Australia, the Australian Energy Market Operator expects that by mid-2011, conventional energy sources will generate 3699 MW while 1150 MW will be generated from wind.)³ More wind farm developments have been approved by the various state authorities since 2009 and many more are planned.

1.8 According to an Australian Government study the wind energy industry has been the fastest growing renewable energy source, largely because it is a proven technology, and has relatively low operating costs and environmental impacts.⁴ Turbines are increasing in size and may be up to 150 metres in diameter or, as one witness expressed it, 'as high as from the flag on top of the Sydney Harbour Bridge to the waterline'.⁵ Bigger turbines increase the swept area of the blades and proportionally increase the wind energy captured. These turbines need to be further from each other, with implications for the area needed for each farm. Some evidence to the inquiry also suggested that the increased size of modern wind turbines could potentially intensify any health problems related to noise and vibrations.

Commonwealth responsibility

1.9 Planning and compliance issues for wind farms are matters for the state governments, although the states have devolved some of these responsibilities to local governments. Generally, proposals for wind farms of more than 30 MW capacity are

1 *WIKIpedia the free encyclopedia*, http://en.wikipedia.org/wiki/Windmill_farm, accessed 14 April 2011.

2 *Australian Energy Resource Assessment*, Geoscience Australia and ABARE, 2010, Canberra, Chapter 9, https://www.ga.gov.au/products/servlet/controller?event=GEOCAT_DETAILS&catno=70142, accessed 18 March 2011.

3 Mr David Swift, Australian Energy Market Operator, *Committee Hansard*, 17 May 2011, p. 2.

4 *Australian Energy Resource Assessment*, Geoscience Australia and ABARE, 2010, Canberra, Chapter 1, https://www.ga.gov.au/products/servlet/controller?event=GEOCAT_DETAILS&catno=70142, accessed 18 March 2011.

5 Mr A G Hodgson AM, *Committee Hansard*, 31 March 2011, p. CA 17.

dealt with by the responsible state government minister. Planning and compliance issues are dealt with in detail in Chapter 3.

1.10 Incentives for the development of renewable energy, which includes wind farms, are provided by Commonwealth Government legislation, in particular the *Renewable Energy (Electricity) Act 2000*, as amended, which creates a guaranteed market for electricity generated from renewable sources. The Renewable Energy Target (RET), which is established by the legislation, is for 20 percent of Australia's electric energy to be generated from renewable resources by 2020.⁶ As noted earlier, wind, as the most advanced of the current renewable energy technologies, is expected to contribute significantly to meeting the RET. It is estimated that the share of wind energy in total electricity generation will increase from 1.5 percent in 2007-2008 to 12.1 percent in 2029-30.⁷ The number of wind farms in Australia therefore can be expected to increase dramatically in the next few years.

1.11 The Commonwealth also has responsibility for certain aspects of the development of wind farms, such as air safety, and it may become involved in planning processes under the provisions of the *Environment Protection and Biodiversity Conservation Act 1999*. That Act is intended to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places, which are defined in the EPBC Act as matters of national environmental significance.

1.12 In accordance with the Act, the responsible minister may declare the proposed development of a wind farm to be a controlled action, which requires that an environmental assessment be made of the impacts of the controlled action. The minister then may or may not approve the controlled action under the EPBC Act.

1.13 Additionally, if a proposal for a wind farm were to include development on Crown Land, the provisions of the Commonwealth *Native Title Act 1993* would apply.

1.14 Commonwealth Government agencies with research interests in health and the sciences may contribute to understanding issues related to the development of wind power and wind farms. CSIRO, the National Health and Medical Research Council (NHMRC) and the National Acoustics Laboratories (NAL) were able to assist the Committee by providing evidence to the inquiry. The NHMRC produced a document in 2010 on wind turbines and health and in June 2011 convened a scientific forum on

6 Senate Environment, Communications and the Arts Legislation Committee, *Renewable Energy (Electricity) Amendment Bill 2010 [Provisions]; Renewable Energy (Electricity) Charge Amendment Bill 2010 [Provisions]; Renewable Energy (electricity) (Small-scale Technology Shortfall Charge) Bill 2010 [Provisions]*, June 2010, Commonwealth of Australia 2010, p.1.

7 *Australian Energy Resource Assessment*, Geoscience Australia and ABARE, 2010, Canberra, Chapter 9, https://www.ga.gov.au/products/servlet/controller?event=GEOCAT_DETAILS&catno=70142, accessed 18 March 2011.

wind farms and human health.⁸ NAL is the research division of Australian Hearing, a statutory authority under the Commonwealth Department of Human Services. NAL undertakes scientific investigations into hearing, hearing habilitation and rehabilitation and the effects of noise on people, including the prevention of hearing loss.⁹

National Wind Farm Development Guidelines

1.15 The Commonwealth Government is also involved in the process for the development of wind farms through the Council of Australian Governments (COAG). The Environment Protection and Heritage Council (EPHC) of COAG has released draft *National Wind Farm Development Guidelines* 'to complement existing planning and development processes, taking into consideration that these are best practice guidelines, and are not mandatory'.¹⁰ Publication of the draft guidelines followed from an EPHC report on impediments to responsible wind farm development, which was made in response to 'growing community concerns'.¹¹ The Commonwealth's role in the development of the guidelines is limited to the Department of Climate Change and Energy Efficiency providing the chair of the relevant intergovernmental working group.¹²

8 *Wind Turbines and Health: A Rapid Review of the Evidence*, July 2010, Australian Government, National Health and Medical Research Council.

9 National Acoustics Laboratories: <http://www.nal.gov.au/current-research-profile.shtml> (accessed 21 June 2011).

10 *National Wind Development Guidelines DRAFT*, Environment Protection and Heritage Council of the Council of Australian Governments, July 2010, p. 1.

11 *National Wind Development Guidelines DRAFT*, Environment Protection and Heritage Council of the Council of Australian Governments, July 2010, p. 1.

12 Mr Andrew Bailey, First Assistant Secretary, Renewable Energy Efficiency Division, Department of Climate Change and Energy Efficiency, *Committee Hansard*, 25 March 2011, p. CA 5. See Chapter 4 for more information on the development of the Draft Guidelines.

CHAPTER 2

NOISE AND ANY ADVERSE HEALTH EFFECTS

Wind farm noise

2.1 Wind turbines convert wind energy to rotational energy and acoustic energy. The rotational energy produces electricity; the acoustic energy produces sound.

2.2 According to a report commissioned by the Clean Energy Council (the Sonus Report), which was submitted in evidence by the Council, and which was quoted by a number of witnesses, 'the acoustic energy generated by a wind turbine is of a similar order to that produced by a truck engine, a tractor, a large forklift or a range of typical earthmoving equipment. However, a wind turbine is a stationary source that operates in conjunction with other turbines in a generally windy environment, is located high above the ground and has different noise characteristics compared to these other noise sources'.¹

2.3 Sound attenuates with distance, in general at a rate of 6 dB per doubling of distance. A number of factors influence the attenuation of sound, including terrain, vegetation, buildings and atmospheric conditions. The pitch (frequency) of the sound is also a factor. Low frequency sound attenuates at about half the rate as higher frequencies.² Noise standards in different jurisdictions in Australia and overseas take these factors into account in setting minimum distances between wind farms and dwellings.

2.4 The Sonus Report identified two sources of noise from a turbine – mechanical noise from the gear box and generator and aerodynamic noise. The aerodynamic noise, which is produced by the rotation of the turbine blades through the air, dominates.³

2.5 Witnesses described this aerodynamic noise in different ways, but most agreed that it is characterised by 'swish' and 'thump'. A British acoustic consultant, Mr Dick Bowdler, who has specialised in wind farm noise since 1993, submitted that the dominant characteristic of turbine noise that cannot be mitigated completely is amplitude modulation or AM. He provided the following information:

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- 1 *Wind Farms Technical Paper, Environmental Noise*, Prepared for Clean Energy Council, November 2010, Sonus Pty Ltd, Adelaide, South Australia, p. 6. Note: Some of the data and conclusions reached in this report have been criticised by Dr Hanning, *Submission 955*, pp 41-42.
 - 2 *Public Health Impacts of Wind Turbines*, Minnesota Department of Health, Environment Health Division, May 2009, p. 23.
 - 3 *Wind Farms Technical Paper, Environmental Noise*, Prepared for Clean Energy Council, November 2010, Sonus Pty Ltd, Adelaide, South Australia, p. 7.

All modern large turbines exhibit AM and this has been explained by Oerlemans ... when the observer is close to the turbines and at greater distances in specific directions. The effect is merely the directivity and Doppler amplification of the noise. Upwind or downwind of the turbine this reduces quite rapidly with distance but Oerlemans has shown that it can project over longer distances in the cross wind directions. This is what is often called “swish”. If it is present in the noise at a receiver, the noise is perceived as being more annoying than if the noise has no modulation. It can become impossible not to notice the noise.⁴

2.6 Mr Bowdler informed the Committee that there appears also to be another type of AM:

It is sometimes called thump on the basis that some people including Salford University, van den Berg and me have suggested that it has a faster rise time than the swish described by Oerlemans ... It is also frequently perceived indoors which may be understandable if it is around the same frequency as the weak resonance region of double glazing units.⁵

2.7 A report by Delta, a Danish acoustics consultancy, for the Danish Energy Authority found that the lower frequencies dominate indoors 'as here the changes in the lower part of the spectra will be perceived to a higher degree than outdoors'.⁶

2.8 Less technical descriptions of the sound made by wind turbines varied from 'like a jet that never lands' to 'the noise made by a distant refrigerator'.

2.9 The noise produced by a wind farm may be different from that produced from individual turbines. Under steady wind conditions the noise from a wind farm may be exacerbated by synchrony among noises from more than one turbine. It has been suggested that if the dominant frequencies of different turbines vary by small amounts, an audible beat or dissonance may be heard.⁷

2.10 Wind turbines produce sound at a range of frequencies, from high to very low, including very low frequencies that are not normally audible to the human ear. These low frequencies are called infrasound. It was asserted that infrasound is not a significant feature of modern wind farms⁸ but, according to Mr William Huson, an

4 *Submission 218*, pp [2], [3]. *Note*: Mr Bowdler has been a noise consultant for 40 years. He has been a Fellow of the [UK] Institute of Acoustics since 1977.

5 *Submission 218*, pp [2], [3].

6 *Low frequency noise from large wind turbines*, Delta, http://www.madebydelta.com/delta/Business_units/TC/Services+by+technology/Acoustics/Low+frequency+noise/Low+frequency+noise+from+large+wind+turbines.page, Summary, accessed 16 May, 2011.

7 *Public Health Impacts of Wind Turbines*, Minnesota Department of Health, Environment Health Division, May 2009, p. 14.

8 See, for example, *National Wind Farms Development Guidelines – Draft*, July 2010, Environment Protection and Heritage Council, Adelaide, SA, p. 9.

acoustics consultant, that assertion is not true,⁹ and an official UK Advisory Group has found that infrasound is present.¹⁰

2.11 An Italian study found that infrasound from wind turbines may be detected at some distance from the turbines:

Among these [low frequencies], the most energetic is that at frequency 1.7 Hz which, under particular conditions (i.e., low cultural noise and strong wind) can be clearly observed at epicentral distances as large as 11 km. At this particular frequency, waves depict a complicate pattern of attenuation with distance, characterised by a marked decrease in the decay rate for ranges larger than 2500–3000 m.¹¹

2.12 There was evidence that the design of modern turbines has resulted in less noise. While this may be true of turbines of similar capacities, there was evidence that the noise from a typical 0.5 MW turbine in 1996 was 100 dB(A), but that a typical 3MW turbine in 2011 produces 107 dB(A).¹² (Planned industrial wind farms in Australia, for example, the Moorabool wind farm, usually incorporate turbines of this capacity.)

2.13 Dr Alan Watts of the Carcoar Medical Centre submitted that :

Small increases in the diameter of a wind turbine's rotor area can lead to substantial increases in the effects of wind speed (because the area of a circle is (πr^2) which thus results in an exponential increase in the production of sound waves (specifically infrasound or low frequency vibration). This is a problem with modern wind turbines where increasing size will potentially cause intensifying infrasound related health problems.¹³

2.14 A great deal of information was submitted about the effects of the noise produced by wind farms on individuals living in close proximity to them. A number of persons who were living within one kilometre or so of functioning wind farms submitted that their quality of life had been diminished. The Committee also received many accounts of adverse health effects in submissions and during its hearings. A significant number of submissions gave actual accounts of serious symptoms of ill health that witnesses said occurred after wind turbines began operating in close proximity to their residences.

9 *Submission 759*, pp 5–6.

10 *Health Effects of Exposure to Ultrasound and Infrasound: Report of the independent Advisory Group on Non-ionising Radiation*, Documents of the Health Protection Agency Radiation, Chemical and Environmental Hazards, February 2010, Health Protection Agency, UK.

11 *Seismic Noise by Wind Farms: A Case Study from the VIRGO*, Gravitational Wave Observatory, Italy. Gilberto Saccorotti, Davide Piccinini, L'ena Cauchie, and Irene Fiori, p. 18.

12 Mr Dick Bowdler, *Submission 218*, p. [6].

13 Dr A C Watts, *Submission 888*, p. 2.

2.15 However, Dr Mark Diesendorf, Deputy Director of the Institute of Environmental Studies, University of NSW, informed the committee that noise from wind farms is rarely an issue beyond 500 metres:

Noise is rarely a problem beyond a distance of 500 m and very few dwellings in Australia are within 400 m of a large wind turbine. Licence conditions for wind farms should, and mostly do, set objective, measurable noise limits. On the rare occasions where these limits are surpassed, for example, resulting from a faulty turbine or sound propagation resulting from peculiar topography, affected residents can have the problem fixed or the offending turbine shut down.¹⁴

2.16 The Committee did not receive any evidence from people who are living near the turbines and who are receiving recompense for the use of their land. The reasons for this are unclear. Several witnesses claimed that the host landholders are subject to 'gag' orders under the terms of their contracts with the developers. This was denied by the industry, although the industry stated that some commercial confidentiality clauses are included in contracts during the planning stages. Mr Geiger, Managing Director, WestWind Energy, stated that:

... our landholders are not subject to any gag orders with regard to health or any other impacts.¹⁵

2.17 The Victorian Government Planning Panel that inquired into the Moorabool Wind Energy Facility found that noise limits and limits on shadow flicker do not necessarily apply to host dwellings because 'such dwellings are effectively part of the wind farm'.¹⁶

Quality of life issues

2.18 Wind farms introduce into rural environments sounds, and levels of sound, that had not been present in the environment before the advent of the wind farms. These sounds may be perceived as intrusive and detrimental to the amenity of people affected by them. The Sustainable Energy Association of Australia stated that '...much of the significance of this issue...appears to arise from a change in the noise environment and this change has had some amenity impact'.¹⁷ However, the Association stated that noise concerns are able to be met under existing guidelines and regulatory regimes.¹⁸

14 *Submission 204*, p. 4.

15 *Committee Hansard*, 29 March 2011, p. CA 84.

16 Moorabool Wind Energy Facility Permit Application 20091012877, Panel Report, September 2010, p. 6.

17 Mr Neil Prentice, Advisory Services Manager, Sustainable Energy Association of Australia, *Committee Hansard*, Canberra, 31 March 2011, p. CA 3.

18 *Committee Hansard*, Canberra, 31 March 2011, p. CA 3.

2.19 CSIRO informed the committee that:

... changes in noise inputs in a residential landscape are important even if they are not linked with identifiable health impacts. The perceived tranquillity of the local landscape for the local population is often highly valued. The introduction of a new sound, from which the surrounding residents receive no direct benefit, heavily impacts on their acceptance and support of the technology.¹⁹

2.20 In Mr Bowdler's opinion, the major factor that determines the impact of a new noise source is perception. Referring to the UK experience with wind farms Mr Bowdler stated that if people feel that they are not being treated fairly, they will perceive, rightly or wrongly, that:

Their lives will be blighted by these developments

They will gain no benefit

They pay subsidies in the form of Tax

They pay more for electricity

Developers make all the money.²⁰

2.21 Mr Bowdler concluded that 'The result is that that people believe that government and developers are covering something up. This merely reinforces the views of those people who already believe that there is something mysterious about wind farm noise'.²¹

2.22 One witness, who has 30 wind turbines within two kilometres of his home, the nearest 600 metres away, stated that:

The types of noises that we experience depend on wind direction. The noises range from a doof-doof noise, like you would hear from a subwoofer at a party down the street, to a constant jet rumble. We can also hear the generator noise, like a fridge when it fires up—that electrical sound—and at times a whooshing noise, like a stick being swung through the air quickly. These noises are not just for a minute or two but can go on all night, not to mention the day. On average, we would say that we have interrupted sleep at least three to four nights a week and on some occasions up to five ..., this has been since they [the turbines] have been commissioned. I have tried to escape from the continuous noise by relocating to one of the four bedrooms in the house, only to be awakened by the noise from other turbines. My wife actually goes to sleep with ear plugs in. This continuous interruption to and lack of sleep has enormous impact on our lives, our business and our

19 'Wind energy comes of age - California and Denmark', *Energy Policy* (19) 8:756–767, p. 763. Gipe, P. (1991), Quoted in CSIRO, *Submission 579*, p. 4.

20 Mr Dick Bowdler, *Submission 218*, p. [6].

21 Mr Dick Bowdler, *Submission 218*, p. [6].

future. Last week the noise could be heard over the television inside the house.²²

2.23 Mr Dean, a farmer whose properties are near the Waubra Wind Farm, informed the Committee that his family was so badly affected that they had to move to Ballarat, but that he had to return to his farm from time to time:

I tried to stay away from the farm as much as I could but I had to make a dollar somehow so we went back. Every time I went back if the turbines were going it would probably take me 10 days to get over it.²³

Noise standards

2.24 Governments attempt to meet noise problems associated with wind farms by applying standards that are intended to ensure that the sound levels do not exceed certain limits and that the amenity of the people living in proximity to the wind farms is not unnecessarily adversely affected. The standards apply in the development planning process and in compliance measures on completion of the turbines.

2.25 The Clean Energy Council stated that the standards applied in Australia are among the most stringent in the world²⁴ but, as the Sonus report commented:

Regardless of the stringency of the base noise level or the available masking effect of the ambient environment, wind farm standards and guidelines are not established to ensure inaudibility.²⁵

2.26 The setting of wind farm noise standards is a matter for the state or local government authorities. Different jurisdictions apply different standards e.g. Government of South Australia Wind Farms Environmental Noise Guidelines July 2009, New Zealand Standard NZS 6808: 2010 Acoustics – Wind Farm Noise. The different standards do not vary greatly from one another. Base noise levels (generally 35dB(A)) and background noise limit margins (5 dB(A)) are specified. The *Australian Standard 4959 – 2010 Acoustics – Measurement, prediction and assessment of noise from wind turbine generators* does not appear to be applied in any jurisdiction, although the EPHC draft guidelines suggest that it should form the base for any noise assessment.²⁶

2.27 Sonus reports that the standards and guidelines include the following:

22 Mr Stephen Coleman, *Committee Hansard*, 28 March 2011, p. CA 46.

23 *Committee Hansard*, 28 March 2011, p. CA 10.

24 Mr MJ Warren, Chief Executive Officer, Clean Energy Council, *Committee Hansard*, 29 March 2011, p. CA 20.

25 *Wind Farms Technical Paper, Environmental Noise*, Prepared for Clean Energy Council, November 2010, Sonus Pty Ltd, Adelaide, South Australia, p. 20.

26 *National Wind Farm Development Guidelines Draft July 2010*, Environment Protection and Heritage Council, Adelaide, SA, p. 37.

- Objective standards that provide a base noise limit and a background noise related limit...;²⁷
- A background noise and wind speed measurement procedure to determine the applicable background noise related limits at each dwelling;
- A noise level prediction methodology to enable a comparison of the predicted noise level from the wind farm against the noise limits at each dwelling;
- The required adjustments to the predicted noise levels to account for any special audible characteristics of the wind farm noise;
- A compliance checking procedure to confirm the operational wind farm achieves the predicted noise levels at each dwelling.²⁸

2.28 There was evidence that the assessment methodologies contained in the standards that applied to some wind farm developments are now out of date. The Pyrenees Shires submitted in relation to the NZ6808:1998 standard used in Victoria in relation to one wind farm that:

... the recent experience with the Waubra wind farm, where 32 noise complaints have been received by Council and DPCD since the first turbine was commissioned 18 months ago shows that this noise standard is in urgent need of replacement.²⁹

2.29 The Committee is aware in this regard that the Victorian *Wind energy facility provisions* were amended in March 2011 to ensure that the noise impacts of wind turbines will in future be in accordance with the *New Zealand Standard NZS6808:2010, Acoustics – Wind Farm Noise*.³⁰

2.30 Local councils submitted that they are significantly under-resourced to deal with wind farm complaints and to oversee that wind farms are complying with noise standards. The Committee is aware of the avenues of appeal against development application approvals by state or local government. Planning panels, tribunals and courts are interested in ensuring that the various conditions, including the noise

27 *Note:* The *base noise limit* in Australia is either 35dB(A) or 40dB(A). The *background noise related limit* allows wind turbines to generate higher noise limits as the wind strengthens. This concept is based on the expectation that the background noise, for example, the noise in the trees will increase with higher wind speeds. The background noise related limit is set at 5dB(A) in Australia.

28 *Wind Farms Technical Paper, Environmental Noise*, Prepared for Clean Energy Council, November 2010, Sonus Pty Ltd, Adelaide, South Australia, p. 18.

29 *Submission 646*, pp 1–2.

30 *Advisory Note 35, March 2011, Amendment VC78, Wind energy facility provisions – Clause 52.32*, Department to Planning and Community Development, State Government of Victoria, p. 1.

standards, have been properly met. However, the question arises whether the standards are appropriate for their intended outcomes. The standards are not without their critics.

2.31 The Committee received a number of submissions that pertained to concerns regarding noise standards. Several submissions relayed concerns that relevant noise standards may not sufficiently address concerns regarding any adverse health effects. Noise Measurement Services in a report commissioned by Mr and Mrs Dean stated, in relation to the Waubra Wind Farm:

It is concluded that wind farm noise prediction, as implemented under NZS6808 (the New Zealand wind farm standard) is not adequate in assessing potential adverse effect and implementation of the standard does not and will not provide an acceptable level of amenity. Application of the standard does not provide a conservative assessment of sound levels that may be experienced under different meteorological conditions.³¹

Noise measurement

2.32 The measurement of noise as used in the Standards is dB(A). This measure was explained as being appropriate because it simulates human hearing.³² Dr Warwick Williams, a Senior Research Engineer at the National Acoustic Laboratories, explained that the A-weighting heavily discounts the low frequencies and the very high frequencies.³³ A-weighting discounts infrasound as it is below the level of human hearing.

2.33 Many persons who complain of the noise produced by wind farms refer to noise that lies within the low frequency range, and to infrasound (sound of less than 20 hertz). As discussed earlier, the 'thump' which apparently is produced by wind turbines and which causes distress to some people is a low frequency sound. According to the Sonus report, over large distances, whilst the absolute level of sound in all frequencies declines, the relative level of low frequency noise increases compared with mid and high frequencies. The Sonus report states that low frequency sound can be easily measured, and 'the C-weighting network (dB(C)) has been developed to determine the human perception and annoyance due to noise that lies within the low frequency range'.³⁴

2.34 Mr Huson submitted that neither the C-weighting nor the A-weighting is appropriate for the measurement of very low frequencies:

31 *Noise Impact Assessment Report: Waubra Wind Farm*, Mr & Mrs N Dean, Report No 1537 - Rev 1 – July 2010, Noise Measurement Services, p. 7.

32 *Wind Farms Technical Paper, Environmental Noise*, Prepared for Clean Energy Council, November 2010, Sonus Pty Ltd, Adelaide, South Australia, p. 9.

33 *Committee Hansard*, 17 May 2011, p. CA 7.

34 *Wind Farms Technical Paper, Environmental Noise*, Prepared for Clean Energy Council, November 2010, Sonus Pty Ltd, Adelaide, South Australia, p. 9.

If we were to investigate lower frequency sound levels from wind farms we cannot use the C-weighting or the A-weighting since these attenuate low frequency sound <20 Hz significantly. The G-weighting is designed to quantify infrasound below 20 Hz.³⁵

2.35 Dr Geoff Leventhall, a British acoustics consultant, informed the committee that:

...as environmental noise control criteria are A-weighted, they tend to under-rate potentially problematic low frequency environmental noise. This has led low frequency problems to be left to continue, whilst higher frequency problems are fixed more quickly. As a result, where genuine low frequency noise problems have occurred, their continuance leads to the development of undue stress in those affected. There is also a body of very stressful, unsolvable noise problems, described as “low frequency” by those affected, where detailed investigations cannot discover a specific noise source.³⁶

2.36 The Noise Management Services report commissioned by Mr and Mrs Dean on the noise impact of Waubra Wind Farm suggested that:

There are many possible ways that low frequency sounds may influence the ear at levels that are unrelated to hearing sensitivity. As some structures of the ear respond to low frequency sound at levels below those that are heard, the practice of A-weighting (or G-weighting) sound measurements grossly underestimates the possible influence of these sounds on the physiology of the ear. The high infrasound component of wind turbine noise may account for high annoyance ratings, sleep disturbance and reduced quality of life for those living near wind turbines.³⁷

2.37 A number of witnesses informed the committee that the low-frequency noise from a wind farm was too little to adversely affect nearby residents. Mr Matthew Rebbeck, Technical Director, RES Australia Pty Ltd, informed the committee that:

The dBG levels in the Adelaide CBD are, for example, 76 decibels; at a local beach, 75 decibels; a gas-fired power station nearby, 74 decibels; at a cliff face, 69 decibels; and then we are down to the wind farms, 67 and 63 decibels, at 185 and 200 metres downwind of the closest turbine. Of course, the nearest neighbours are normally much further away than that.³⁸

2.38 The EPHC draft guidelines state that an assessment of low-frequency noise is not required as part of the pre-construction phase or post-construction monitoring phase for wind farms. This is because 'low frequency noise and infrasound levels

35 *Submission 759*, p. 5.

36 *Submission 465*, p. 9.

37 *Noise Impact Assessment Report: Waubra Wind Farm*, Mr & Mrs N Dean, Report No 1537 - Rev 1 – July 2010, Noise Measurement Services, p. 142.

38 *Committee Hansard*, 25 March 2011, p. CA 67.

generated by wind farms are normally at levels that are well below the high levels required to cause any health effects'.³⁹

2.39 This statement appears to have been based on the findings of a Sonus report, *Infrasound Measurements from Wind Farms and Other Sources*,⁴⁰ which was commissioned by Origin Energy. Mr Huson submitted that he had reviewed the data presented in that report and had found that it reached very questionable conclusions.⁴¹ Mr Dean informed the Committee that he had measured sound at the beach and between turbines 300 metres away with an imported SVAN 959 machine and concluded:

It is all high-frequency noise at the beach and it is all infrasound, below 20 hertz, at Waubra between the turbines. That is low-frequency infrasound that our bodies cannot bear.⁴²

2.40 Pacific Hydro submitted that infrasound emissions from operational wind farms are significantly below recognised perception thresholds of 85dB(G)⁴³ and Dr Diesendorf submitted that:

Infra-sound used to be a problem with some of the early wind turbines in Europe. However, according to recent European studies, modern wind turbines emit generally very low levels of infra-sound, virtually undetectable at a range of 500 m and much less than comes from motor vehicles on nearby roads. Although there have been several studies, there is no scientific evidence that infra-sound from wind turbines located at a distance greater than 500 m is a health hazard.⁴⁴

2.41 The Committee was informed that Denmark 'the home of wind power' has flagged regulation of infrasound at wind farms and that Japan last year started a four-year study in the effects of infrasound from wind farms. The British Government also has announced that it has begun 'to review the issues that which often cause concern to local communities—such as the assessment of noise and the flickering effect when blades rotate'.⁴⁵

39 Draft National Wind Farm Development Guidelines – 2 July 2010, EPHC, p. 39.

40 Sonus Pty Ltd, *Infrasound Measurements from Wind Farms and Other Sources*, Prepared for: Pacific Hydro Pty Ltd, November 2010.

41 Submission 759, pp 6–7.

42 *Committee Hansard*, 28 March 2011, p. CA 3.

43 *Submission 653*, p. 9.

44 *Submission 204*, p. 4.

45 Mr Hodgson, *Committee Hansard*, 31 March 2011, p. CA 13. See Japanese, Danish and UK press reports of government announcements, submitted by Mr Hodgson, *Additional Information*, 11 April 2011. See also Wikipedia, http://en.wikipedia.org/wiki/Environmental_impact_of_wind_power, accessed 26 May, 2011.

Committee view

2.42 Although infrasound from modern turbines may be less than from older models, it is nevertheless present. The relevant standards applied in Australia rely only on the dB(A) measurement which does not take infrasound and low frequencies fully into account. If the Australian standards were to include an appropriate measurement of low frequency noise, including infrasound and vibration, governments and developers may find that at least some of the opposition to wind farms might be alleviated. In that context Mr Huson commented that:

In the absence of applicable research it may be appropriate to set target infrasound noise limits indoors, that are easily measured, at 75 dB(G). Wind farm proponents regularly espouse that modern wind farms do not cause such sound levels so there should be no complaints from that quarter if such [a] precautionary target were to be set.⁴⁶

2.43 Similarly, the Danish Delta report suggested that:

For projects where outside noise levels are close to the existing noise limits for wind turbines it will be good practice to perform calculations of the indoor low frequency noise impact. This will ensure that appropriate low frequency noise levels are met and hopefully contribute to minimize groundless anxiety in cases with no low frequency impact.⁴⁷

Recommendation 1

2.44 The Committee considers that the noise standards adopted by the states and territories for the planning and operation of rural wind farms should include appropriate measures to calculate the impact of low frequency noise and vibrations indoors at impacted dwellings.

Compliance with Noise Standards

2.45 The Victorian Minister for Planning suggested that non-compliance with standards may be a primary issue for sites where communities report negative health impacts and that authorities need to ensure there is thorough assessment against the appropriate standards.⁴⁸

2.46 Development licences for wind farms generally require developers to monitor and report on their compliance with approved noise standards. This report may be made to a government agency or may at least be made available for audit by

46 *Submission 759*, p. 8.

47 Low frequency noise from large wind turbines, Delta, http://www.madebydelta.com/delta/Business_units/TC/Services+by+technology/Acoustics/Low+frequency+noise/Low+frequency+noise+from+large+wind+turbines.page, accessed 16 May, 2011.

48 *Submission 651*, p. 3.

government. However, some witnesses suggested that compliance was not being adequately monitored.

2.47 Once wind farms begin to operate, different jurisdictions take somewhat different approaches to enforcing compliance with noise standards.

2.48 In South Australia one of the requirements of a wind farm licence is that the operator complies with a Safety, Reliability, Maintenance and Technical Management Plan which covers noise. AGL informed the Committee that the company's plan is regularly audited by the Essential Services Commission of South Australia.⁴⁹ In New South Wales operators are required to establish procedures for dealing with complaints. It is not clear, however, whether the procedures are satisfactory. The NSW Legislative Council Committee that inquired into rural wind farms reported that noise pollution, including from electricity generation, is covered by the *Protection of the Environment Operations Act 1997*, but that wind power generation is not covered. That Committee reported that it was concerned about:

... the reasons why wind power is excluded from being a scheduled activity when all other types of electricity generation (other than solar power) are included. Reasons for this are ambiguous and have resulted in the blurring of what was initially a very clear process for addressing noise pollution in NSW.⁵⁰

2.49 In Victoria, there is some dispute about which level of government is responsible for operators' compliance with the conditions. Mr Chris Hall, the Senior Town Planner with the Pyrenees Shire Council, informed the Committee that:

The current position of the state government in its policy guidelines is that councils are responsible for enforcing and administering all planning permits regardless of the 30-megawatt demarcation or whether or not they were called in under the section 96 call-in powers under the Planning and Environment Act. We have had legal opinions—one from a QC and the other from a well-respected planning lawyer—to the contrary that unequivocally back the council position that, in situations where those applications are called in, the minister actually becomes the responsible authority for administering and enforcing the permit.⁵¹

2.50 Local governments stated that they lack the resources and the expertise to ensure that wind farms comply with development approvals. Councils also expressed concern with the suggestion that they should be required to enforce compliance with plans for which they have had no responsibility.⁵²

49 Answer to a Question on Notice, 20 April 2011.

50 *Rural Wind Farms*, 16 December 2009, NSW Legislative Council General Purpose Standing Committee No. 5, p. 63.

51 *Committee Hansard*, 28 March 2011, pp CA 38–39.

52 *Committee Hansard*, 28 March 2011, p. CA 39.

2.51 In all jurisdictions, it seems that complaints about excessive noise are made to the wind farm operators in the first instance.

2.52 The wind farm operator Pacific Hydro informed the committee that it receives few complaints⁵³ and that the complaints it receives are taken seriously. Mr Rebbeck of RES Australia informed the Committee that his company talks to the landholders concerned and does any further noise measurements that are required. He stated that:

We invariably find that the reason for the valid noise complaints is that there is a mechanical failure with the closest turbine or a nearby turbine, so you are getting a tonal noise from that turbine. Tonal noise is picked up very well by the human ear. That is above and beyond your planning limits. You are effectively exceeding your planning limits. Once you fix that turbine and you correct that problem with the turbine and the turbines are operating within their planning guidelines, we do not have any noise complaints.⁵⁴

2.53 Addressing complaints to the operators may however lead to perceptions that the complaints are not taken seriously or are unreasonably dismissed as invalid. In relation to the Waubra wind farm, Mr Dean claimed that it was only after 12 months of operation that the company started to register complaints.⁵⁵ Mr Dean submitted that the operator designs and writes its own noise management plan and that does not work because the operator 'remains in control of everything'. The operator can thus assert that there is no substance to a complaint.⁵⁶ The operator, Acciona, disputed Mr Dean's assertion.⁵⁷

2.54 Operators' reporting requirements also may be an issue. Mr Hall stated that:

With respect to post-commissioning noise compliance monitoring of developments, under the condition requirements of many permits, there has not been a requirement for testing data to be provided until 12 months after the commissioning of the last turbine. That is resulting in 20-plus month delays in the data being made available to the public and obviously in the department being able to investigate any breaches, such as in the Waubra situation. We had to wait over 14 months before we could find out some of the issues that have arisen there.⁵⁸

An Independent arbitrator?

2.55 Mr Dean submitted that:

53 Mr Lane Crockett, *Committee Hansard*, 29 March 2011, p. CA 74, stated that Pacific Hydro had not received any complaints in the 10 years the Codrington facility has been operating.

54 *Committee Hansard*, 25 March 2011, p. CA 71.

55 *Committee Hansard*, 28 March 2011, p. CA 13.

56 *Committee Hansard*, 28 March 2011, p. CA 14.

57 *Correspondence*, dated 24 March 2011.

58 *Committee Hansard*, 28 March 2011, p. CA 39.

It seems very strange to me that there is not an independent moderator for this situation, when we say there is a problem and they (Acciona) say there is no problem. After all, it is in the company's interests for there not to be a problem, so they take control of as much as they can and use their influence to get the outcome they want, it is ridiculous there is no third, completely independent party to resolve the situation.⁵⁹

2.56 In response to a question from the Committee, witnesses representing the wind farm operators stated that they would be prepared to report quarterly to government on the complaints that they receive and stated that in some Australian jurisdictions this may already be required.⁶⁰

Committee view

2.57 The Committee considers that if they do not already do so the responsible planning approval authorities should ensure that complaints about noise from wind farms are dealt with as soon as the complaint is received. This process should involve an impartial arbitrator. Additionally, there appears to be some confusion about the responsibility for investigating complaints between the different levels of government. If this confusion were resolved investigation of breaches of the noise standards would be facilitated.

Recommendation 2

2.58 The Committee recommends that the responsible authorities should ensure that complaints are dealt with expeditiously and that the complaints processes should involve an independent arbitrator. State and local government agencies responsible for ensuring compliance with planning permissions should be adequately resourced for this activity.

Setbacks

2.59 In Australia buffer zones exist between wind farms and residences. These zones are determined by the attenuation of sound from the wind turbines and require that measurements are made at residences that fall within a sound 'contour' of the proposed wind farm. In theory the noise from wind turbines should attenuate to the legislated levels within a set distance. However, the noise perceived at residences will be determined by a number of other factors including the size, number and mechanics of the turbines, topography and prevailing winds.

2.60 It has been suggested that the establishment of prescribed buffer zones (setbacks) would be preferable to a noise-based setback to help preserve the amenity of residents from the noise and flicker effects created by wind farms. Mr Peter Wingett, representing the Prom Coast Guardians Inc., stated that:

59 *Submission 647*, p. 11.

60 Mr B Wickham and Mr L Crockett, *Committee Hansard*, 29 March 2011, p. CA 81.

Adequate mandatory setbacks and rigorous enforcement of maximum noise standards would reduce the adverse impacts on properties neighbouring wind farms. A minimum setback of two kilometres or 20 times the maximum height, including the blades, of wind turbines to the nearest dwelling would be a desirable first step.⁶¹

2.61 The State Government of Victoria has recently amended the state's *wind energy facility provisions* to mandate that applications for the establishment of wind farms should include a plan showing all dwellings within two kilometres of a proposed turbine.⁶² (The amendment also requires, among other things, that the applications include a concept plan of associated transmission infrastructure, electricity utility works and access road options.)

2.62 It is not known how this requirement will work in practice and therefore whether it will necessarily lead to a two kilometre buffer zone. The Victorian Planning and Environment Law Association suggested that because it is one of the assessment matters that need to be brought to the attention of the planning application that it will form part of the assessment criteria from now on.⁶³

2.63 Wind farm developers and some other witnesses considered that prescribed buffer zones, such as a two kilometre setback, are not appropriate. The Clean Energy Council argued that because every wind farm and every community is different, because there are different geography and topography, and different prevailing winds, each application should be assessed on audible noise.⁶⁴ The Sustainable Energy Association of Australia stated that:

... a buffer zone should be entirely dependent on the actual physical characteristics of the wind farm, such as the number and size of turbines, its siting and location, and the acoustic factors in the area—these are used by the wind industry to determine what the zone should be. A blanket buffer zone does not face the realities of what is actually there. So we perfectly accept that there is a noise place and a noise amenity issue, but we do not believe a blanket zone is best practice either here in Australia or globally.⁶⁵

2.64 Buffer zones may also be needed to ensure that residences are not affected by shadow flicker. Shadow flicker is caused by rotation of the turbine blades casting intermittent shadows. This gives the appearance of flickering and the effect can be visually annoying. The standards applied in the different Australian jurisdictions seek to limit shadow flicker for nearby residences. Mr Geiger stated that:

61 *Committee Hansard*, 28 March 2011, p. CA 20.

62 *Advisory Note 35, March 2011*, Amendment VC78, Wind energy facility provisions – Clause 52.32, Department to Planning and Community Development, State Government of Victoria, p. 1.

63 Mr P O'Farrell, *Committee Hansard*, 29 March 2011, p. CA 108.

64 Mr M Warren, *Committee Hansard*, 29 March 2011, p. CA 21.

65 Mr N Prentice, *Committee Hansard*, 31 March 2011, p. CA 4.

... if we follow the New Zealand standard on noise, then the setbacks due to complying with the noise standards are generally greater than the setbacks required to avoid shadow flicker. So that is an issue that we do not expect to occur in Australia. With our German operations, the noise limits are much less stringent. We go as close as 300 metres to the closest house with some of our installations there. At that distance shadow flicker would be an issue.⁶⁶

2.65 Mr Burn from WestWind Energy stated that standards applied in at least some Australian jurisdictions specify that no more than 30 hours of shadow flicker per year should be experienced by affected dwellings.⁶⁷

2.66 Setback requirements to adequately prevent any adverse health effects have been rigorously debated. While the wind industry is against setback distances, a large number of submissions to the inquiry from researchers and concerned community members called for setback distances ranging from 2 km to 10 km.

Committee comment

2.67 A difficulty with a prescribed setback distance is that, in terms of noise and shadow flicker, the distance may either be too great or too little. If the setback is too great then this could limit the industry and possibly affect the amount of renewable power generation in Australia. If the distance were too little, residents affected adversely would not have any redress.

2.68 The Committee considers that the application of scientific measurements for sound and for shadow flicker to alleviate problems for wind farm neighbours may be preferable to prescribed setbacks. Prescribed setbacks are arbitrary and may be too great or too small. In addition, there is also some dispute about the noise standards set by governments and the noise measurements used. The matter is not necessarily settled. The Committee suggests that further consideration be given to the development of policy on separation criteria between residences and wind farm facilities.

Recommendation 3

2.69 The Committee recommends that further consideration be given to the development of policy on separation criteria between residences and wind farm facilities.

Wind Farms and Health

2.70 Much of the evidence that the Committee received in relation to claimed adverse health effects of wind turbines focussed on 'Wind Turbine Syndrome' (WTS).

66 *Committee Hansard*, 29 March 2011, p. CA 87.

67 Mr P Burn, Project Development, WestWind energy Pty Ltd, *Committee Hansard*, 29 March 2011, p. CA 88.

This term was first used by Dr Nina Pierpont, an American medical practitioner, to describe a group of symptoms suffered by some people who have lived in close proximity to wind farms. The core symptoms of this condition as described by Dr Pierpont are as follows:

- Sleep disturbance
- Headache
- Visceral vibratory vestibular disturbance
- Dizziness, vertigo, unsteadiness
- Tinnitus
- Ear pressure or pain
- External auditory canal sensation
- Memory and concentration deficits
- Irritability, anger
- Fatigue, loss of motivation.⁶⁸

2.71 A number of witnesses stated that they had suffered some or all of the above symptoms and attributed their ill health to the noise and in particular the low frequency noise and infrasound⁶⁹ from wind turbines.⁷⁰ Some stated that they had been so badly affected that they had to leave their homes at considerable cost and inconvenience.⁷¹

2.72 Professor Simon Chapman, Expert Adviser, Climate and Health Alliance and Professor, Public Health, University of Sydney criticised Dr Pierpont's work on a number of grounds. He considered that the sample used was too small and unrepresentative in terms of the medical history of the respondents to the survey; that the respondents had not been medically examined; that Dr Pierpont's book had not been peer-reviewed; and that Dr Pierpont did not have any other publications in the field.⁷²

68 *Wind Turbine Syndrome: A Report on a Natural Experiment*, Nina Pierpont, K-Selected Books, Santa Fe, New Mexico, 2009, p. 51.

69 Infrasound is sound that is lower than normal hearers can hear. The limit is about 20 hertz, but some people can hear sounds lower than that limit. Sounds at these low frequencies have very long wave lengths and at sufficient volume can cause vibrations, including in the human body.

70 See, for example, Dr S Laurie, *Submission 390*, p. 13, noting that she has provided case histories for 60 people to the committee in confidence.

71 See Mr C Stepnell, *Submission 129*, p. [3] and Mr N Dean, *Submission 647*, p. 2.

72 *Committee Hansard*, 29 March 2011, pp CA 115-117.

2.73 Mr Briddy, a farmer from Lexton, Victoria, stated that although his homestead is 5.5 kilometres from the Waubra wind farm, due to the topography he has problems with the vibrations from the turbines, including having trouble sleeping.⁷³

2.74 Mr Stepnell, whose home was 900 metres from wind turbines at Waubra, informed the Committee that after about six months the turbines began to affect his health:

It started with the headaches and the tingling in the head and then eventually the sleep problems—waking up at two to three in the morning and not being able to go back to sleep. It was just every night, maybe until five or six nights of absolute fatigue set in and then you would sleep. It took that long to do it and then away you go again. Then eventually I had heart palpitations, which were a massive concern.⁷⁴

2.75 Mr Stepnell and his wife consulted a medical practitioner who offered to prescribe anti-depressants, but as they were unwilling to turn to medication to live in their home, they bought a house in Ballarat, which was a huge financial cost.⁷⁵

2.76 Mrs Kearns, who lives on a 16 hectare property in close proximity to the approved Moorabool wind energy facility, stated as follows:

My brief anecdotal evidence re health effects is as follows: on 4 January this year, my husband and I decided to visit Waubra to view the wind farm. It was a cool, rather overcast day, not too windy. We spent over one hour and then went home. At 2 o'clock the next morning, I woke with severe chest pain. I had enough sense to take my blood pressure reading. I have no history of hypertension. I am very healthy normally. My blood pressure was 211 over 103, so health professionals know that that is far too high. I should have stroked out. I called the ambulance and I was transported to hospital and admitted to ICU for 24 hours. Further tests disproved any cardiac condition, so the diagnosis was probably stress, just from the worry.⁷⁶

2.77 Dr Sarah Laurie, Medical Director of the Waubra Foundation, submitted details of her 'field observations' of more than 60 affected persons in three states. These persons described that they suffered from the symptoms identified by Dr Pierpont. Many of the individuals interviewed had never heard of Dr Pierpont or WTS. Dr Laurie informed the Committee that her findings were consistent with those of a UK and also an Australian rural general practitioner who noticed that some of their patients were reporting those symptoms after wind farms began operating in their vicinity.⁷⁷

73 *Committee Hansard*, 28 March 2011, p. CA 54.

74 *Committee Hansard*, 28 March 2011, p. CA 5.

75 *Committee Hansard*, 28 March 2011, p. CA 5.

76 *Committee Hansard*, 28 March 2011, p. CA 55.

77 *Submission 390*, pp 10–16.

2.78 Dr Laurie also submitted that elevated blood pressure and associated heart problems were occurring among people affected by wind turbines.⁷⁸ Professor Gary Wittert, a senior consultant endocrinologist at Royal Adelaide Hospital, who had access to the blood pressure readings of those involved, stated that 'no assertion could be made that there was any relationship between mean overnight turbine power and elevations of blood pressure'.⁷⁹

2.79 Most witnesses, including those representing wind farm developers,⁸⁰ accepted that some people in the vicinity of wind farms have become ill, but suggested, firstly, that these peoples' problems were not caused by the noise from farms *per se* and, secondly, that work had not been done to indicate that the incidence of the reported symptoms among that group of people was higher than in the rural population generally.

2.80 Mr Rebbeck of RES Australia, for example, informed the committee that 'nobody disagrees that high levels of low-frequency noise cause health impacts'.⁸¹ He referred to research involving fighter pilots and truck drivers.

2.81 A Portuguese study reported that:

... there are acoustical events that are not necessarily processed by the auditory system, but that nevertheless cause harm. Infrasound and low frequency noise (ILFN, <500Hz) are acoustical phenomena that can impact the human body causing irreversible organic damage to the organism, but that do not cause classical hearing impairment. Acoustical environments are normally composed of all types of acoustical events: those that are processed by the auditory system, and those that are not.⁸²

2.82 Mr Bowdler agreed that some people who have lived close to wind turbines have become ill, but he did not consider that this was caused by any peculiarity of the sound generated by wind turbines. Mr Bowdler submitted that most of the subjects in Dr Pierpont's investigation had a genuine grievance related simply to the loudness of the noise. He observed that half were less than 750 metres away from a turbine and the nearest 350 metres.⁸³

78 *Submission 390*, pp 17–18.

79 *Committee Hansard*, 31 March 2011, p. 33.

80 See, for example, Mr A Thompson, Director Development, Acciona Energy, *Committee Hansard*, 29 March 2011, p. CA 72.

81 *Committee Hansard*, 25 March 2011, p. CA 67.

82 *Public health and noise exposure: the importance of low frequency noise* Mariana Alves-Pereira (ERISA-Universidade Lusófona, Lisbon, Portugal) and Nuno A. A. Castelo Brancob, (Center for Human Performance, Alverca, Portugal), Paper presented at Inter-Noise 2007 Conference, 28–31 August 2007 Istanbul, Turkey.

83 *Submission 218*, p. [2].

2.83 Dr Leventhall submitted that the hypotheses put forward by Dr Pierpont lack credibility and do not appear to have any scientific basis. He submitted that:

The so called 'wind turbine syndrome' cannot be distinguished from the stress effects from a persistent and unwanted sound. These are experienced by a small proportion of the population and have been well known for some time.⁸⁴

2.84 Dr Leventhall has also written that he is 'happy to accept these symptoms, as they have been known to me for many years as the symptoms of extreme psychological stress from environmental noise, particularly low frequency noise. The symptoms have been published before ...'⁸⁵ He also submitted that:

Once antagonisms have been developed, even the slightest perception of a noise may lead to stress and, in its turn, long term stress may lead to somatic effects. However, this is not a function of the characteristics of the noise alone, but of the noise and listener in combination.⁸⁶

2.85 Professor Seligman informed the Committee that:

From the engineering and physiological perspectives, there is no mechanism for consistent adverse effects of noise from wind farms beyond the distance at which the noise falls below background levels. This is typically a few hundred metres for modern equipment. However it is accepted that under some atmospheric conditions, wind farms are audible at a distance. Salt states that his study "raises the POSSIBILITY that the dislike / disturbance of individuals by wind turbine noise may be related to the long-term stimulation of the outer hair cells with infrasound." However the atmospheric effect mentioned above is exceptional and not long-term.⁸⁷

2.86 Dr Williams suggested that the noise in itself may not be the only factor in people reporting adverse effects from wind farms. He stated that:

In some cases, the aspect of the noise problem is a focal point that is focusing other people's fears, apprehensions and perceptions as to maybe what wind farms are. It may not be the noise, because everything I have been able to look at basically says that, in the normal expectation of levels that you will receive, the infrasound will not have a physical effect on people's bodies.⁸⁸

2.87 A report on a field study undertaken in the Netherlands in 2007 with 725 respondents, which was published in the Journal of the Acoustical Society of America in August 2009, concluded that:

84 *Submission 465*, p.11.

85 *Wind Turbine Syndrome – An Appraisal*, Dr G Leventhall, p. 9. Appendix to *Submission 465*.

86 *Submission 465*, p. 5.

87 *Submission 353*, p. [3].

88 *Committee Hansard*, 17 May 2011, p. CA 8.

Wind turbine sound is easily perceived and, compared with sound from other community sources, relatively annoying. Annoyance with wind turbine noise is related to a negative attitude toward the source and to noise sensitivity; in that respect it is similar to reactions to noise from other sources. This may be enhanced by the high visibility of the noise source, the swishing quality of the sound, its unpredictable occurrence, and the continuation of the sound at night.⁸⁹

The study also found that people benefiting from the turbines are less likely to be annoyed by it.⁹⁰

2.88 Mr Rebbeck commented that, with 150,000 wind turbines operating globally, it would seem likely that any genuine adverse health effects would have been widely researched and published by now.⁹¹

2.89 Many other witnesses who asserted that there are not any adverse health effects from wind farms relied on a survey of the literature published by the National Health and Medical Research Council (NHMRC) that concluded, among other things:

There are no direct pathological effects from wind farms and that any potential impact on humans can be minimised by following existing planning guidelines.⁹²

2.90 Professor Anderson, the Chief Executive Officer of NHMRC, informed the Committee that:

I do want to make a point to anybody who is relying on this.

We regard this as a work in progress. We certainly do not believe that this question has been settled. That is why we are keeping it under constant review. That is why we said in our review that we believe authorities must take a precautionary approach to this. That is what we do say in medicine anyhow, but this is very important here because of the very early stage of the scientific literature. In any area we make statements on, we are robust, we are used to being criticised from all sorts of directions and we cannot be responsible for the use that others make of the literature ...⁹³

2.91 The NHMRC's 'rapid review' of the evidence concluded, among other things, that '[t]here is currently no published scientific evidence to positively link wind turbines with adverse health effects'. That statement has been relied on by developers

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90 *Response to noise from modern wind farms in the Netherlands*, Eja Pedersen, Frits van den Berg, Roel Bakker and Jelte Bouma, *Journal of the Acoustical Society of America* 126 (2), August 2009, pp 634–643.

91 *Committee Hansard*, 25 March 2011, p. CA 66.

92 *Wind Turbines and Health: A Rapid Review of the Evidence*, July 2010, Australian Government National Health and Medical Research Council, p. 8.

93 *Committee Hansard*, Perth, 31 March 2011, p. CA 87.

in the wind industry to suggest that Australian research had settled the question of any adverse health effects. However, as stated by Professor Anderson, the NHMRC is keeping the matter under review and on 7 June 2011 the Council held a forum in Canberra to further investigate the health impact of wind farms with a view to updating the public statement.

2.92 The NHMRC report was not the only study relied on by those who claimed that wind turbines do not adversely affect people's health. A study commissioned by American Wind Energy Association and the Canadian Wind Energy Association concluded that:

- (a) Sound from wind turbines does not pose a risk of hearing loss or any other adverse health effect in humans.
- (b) Subaudible, low frequency sound and infrasound from wind turbines do not present a risk to human health.
- (c) Some people may be annoyed at the presence of sound from wind turbines. Annoyance is not a pathological entity.
- (d) A major concern about wind turbine sound is its fluctuating nature. Some may find this sound annoying, a reaction that depends primarily on personal characteristics as opposed to the intensity of the sound level.⁹⁴

2.93 Some witnesses queried the impartiality of this study on the grounds that it was commissioned by the wind industry.⁹⁵ While not accepting that argument in relation to that particular study or any other study the Committee acknowledges that the claim could be made against any study whether financed by the supporters or opponents of the wind industry.

2.94 Even some government studies, which may in many circumstances be considered to be independent, also may be open to criticism because governments have a vested interest in the development of the wind industry through policies intended to encourage or support generation of electricity from renewable sources.⁹⁶

2.95 It would therefore be difficult to satisfy all those who are interested in the health effects of wind turbines that a reliable independent study could be commissioned. Nevertheless, witnesses supported the notion that thorough epidemiological studies are needed. Dr Pierpont informed the Committee that 'what

94 *Wind Turbine Sound and Health Effects: An Expert Panel Review*. Colby et al, Prepared for American Wind Energy Association and Canadian wind Energy Association, December 2009, p. 5-2.

95 See, for example, Dr Pierpont, *Committee Hansard*, 25 March 2011, p. CA 19.

96 The UK Government has commented on the 'democratic deficit' relating to the development of wind farms in that country, See footnote 37.

are needed are clinical large-scale epidemiologic studies and lab studies'.⁹⁷ Mr Holmes a' Court, Chairman, Hepburn Wind, stated that '[a] small number of people living near a small fraction of wind farms in Australia do not currently feel that their concerns are being adequately investigated. It is in everybody's interests that these complaints are independently, rigorously and transparently investigated'.⁹⁸ Another witness, Dr Crisp, who represented Doctors for the Environment Australia questioned whether such research was worth doing given the weight of the scientific evidence and the competition for the research dollar.⁹⁹

2.96 Recent reports of Government of Victoria Planning Panels have suggested that that government should consider commissioning independent research in health impacts associated with wind farms.¹⁰⁰

2.97 A number of witnesses suggested that any adverse health effects from wind power generation should be viewed in the context of ill health caused by other forms of power generation, especially respiratory conditions associated with fossil fuel generation.¹⁰¹ Given its terms of reference the Committee has not further considered this suggestion.

Committee comment

2.98 The Committee does not doubt that some people living in close proximity to wind farms are experiencing adverse health effects, but these are not necessarily caused by the noise characteristically produced by wind turbines. However, there were suggestions, concerns and opinions expressed that infrasound produced by the turbines is a cause of adverse health symptoms similar to those described as 'Wind Turbine Syndrome' by Dr Pierpont.

2.99 Adverse health effects may be caused by wind turbines but they may be caused by factors other than noise and vibration, such as stress related to sleeplessness or perceptions of harm. There is insufficient rigorous research to know the answer.

2.100 In view of the reported cases of illness and the possible consequences that any adverse health effects may have on communities' acceptance of wind farms the

97 *Committee Hansard*, 25 March 2011, p. CA 22.

98 29 March 2011, p. CA 63.

99 *Committee Hansard*, 31 March 2011, p. CA 57. Note: Doctors for the Environment Australia is a voluntary association of medical practitioners with a particular interest and expertise in the effects of and relationship between environmental degradation and changes in human health.

100 Moorabool Wind Energy Facility: Panel application 2009012877, *Panel Report*, September 2010, p. 6. Mortlake Wind Energy Facility: Moyne Planning Scheme, *Panel Report*, 10 August 2010, p. 78.

Committee considers that soundly-based studies of these matters should be undertaken as a matter of priority.

Recommendation 4

2.101 The Committee recommends that the Commonwealth Government initiate as a matter of priority thorough, adequately resourced epidemiological and laboratory studies of the possible effects of wind farms on human health. This research must engage across industry and community, and include an advisory process representing the range of interests and concerns.

Recommendation 5

2.102 The Committee recommends that the NHMRC review of research should continue, with regular publication.

Recommendation 6

2.103 The Committee recommends that the National Acoustics Laboratories conduct a study and assessment of noise impacts of wind farms, including the impacts of infrasound.

CHAPTER 3

THE INTERFACE BETWEEN COMMONWEALTH, STATE AND LOCAL PLANNING LAWS AS THEY PERTAIN TO WIND FARMS

3.1 Although the wind energy industry depends on emissions reduction laws enacted by the Commonwealth and state parliaments,¹ the planning of wind energy facilities is a matter principally for the states and local governments.

3.2 In this chapter the Committee considers some of these laws and processes, using the planning system in NSW as an illustrative case. Climate change policies, the future interface of planning laws and the formation of national wind farm guidelines are also considered.

Commonwealth climate change policies

3.3 In recent years, the Commonwealth Government's climate change policies have affected the pattern of generation technologies across the National Electricity Market (NEM).² In particular, the Government has introduced two schemes which have encouraged investment in renewable energy and particularly in wind energy: the Mandatory Renewable Energy Target (MRET) scheme; and the Renewable Energy Target (RET) scheme.

The Mandatory Renewable Energy Target scheme

3.4 In June 2000, the Government introduced the national MRET scheme.³ The scheme required electricity retailers and other large electricity buyers to purchase an additional 2 percent of their electricity from renewable or specified waste-product energy sources by 2010 (equating to 9 500GWh).

The strategic importance of this legislation is not only that it delivers on a key aspect of [Australia's] commitment in Kyoto [to set targets for renewable electricity generation by 2010]. It is not only that it achieves significant greenhouse gas reductions, of up to seven million tonnes per year. It is also that it represents a big step along the road of 'greening' our electricity generation sector—a sector which represents the single largest contributor to Australia's total greenhouse emissions.⁴

1 See, for example, *Renewable Energy (Electricity) Act 2000* (Cth) and *Climate Change Act 2010* (Vic).

2 Australian Energy Regulator, *State of the Energy Market 2010*, p. 22.

3 *Renewable Energy (Electricity) Act 2000*.

4 Dr Sharman Stone MP, Parliamentary Secretary to the Minister for the Environment and Heritage, *House Hansard*, 22 June 2000, p. 18 030.

3.5 In response, there was a marked increase in the number of large-scale wind farm proposals and developments.⁵ However, wind generation continues to account for only a small proportion of the NEM electricity mix. In 2010, wind generation accounted for approximately 3 percent of capacity, supplying 2 percent of output.⁶

The Renewable Energy Target scheme

3.6 In August 2009, the Australian Government expanded the MRET scheme by creating the national RET scheme. The expanded scheme set a target of 20 percent renewable energy generation by 2020 (a fourfold increase of the existing target to 45 000GWh).⁷

3.7 At present, wind energy accounts for almost one quarter of Australia's clean energy generation (22.9 percent). In the past year, approximately 5 000GWh of electricity (powering over 700 000 homes) was generated by 1052 wind turbines across 52 operating wind farms.⁸

3.8 According to the Clean Energy Council, and other submitters to this inquiry:

Wind power is likely to be the dominant technology during the early years of the [RET]. It is currently the least expensive form of renewable energy and has a proven track record of being rolled out on a large scale.⁹

3.9 The Australian Government's climate change policies are evidence of its support for wind farms as an important source of renewable energy.¹⁰ However, while the Commonwealth is a key player in the national energy market, and specifically the NEM, its practical involvement is limited.

3.10 Each state and territory is constitutionally responsible for energy matters within its own jurisdiction. Consequently, the national energy policy is mainly implemented at the state and territory level using existing planning systems.¹¹

5 Ministerial Council on Energy, Wind Energy Policy Working Group, *Integrating Wind Farms into the National Electricity Market, Discussion Paper*, March 2005, p. ii.

6 Australian Energy Regulator, *State of the Energy Market 2010*, p. 21.

7 *Renewable Energy (Electricity) Amendment Act 2009*

8 Clean Energy Council, *Clean Energy Australia 2010*, December 2010, p. 52. Acciona's Waubra Wind Farm north-west of Ballarat in Victoria is currently the largest in the country, with 128 wind turbines spread over 173square kilometres.

9 Clean Energy Council, *Clean Energy Australia 2010*, December 2010, p. 8. Also, see Clean Energy Council, *Submission 67*, p. 1; TRUenergy Pty Ltd, *Submission 611*, p. 2; and Tasmanian Renewable Energy Industry Development Board, *Submission 624*, p. 1.

10 State and territory governments are equally supportive: see, for example, Minister for Planning, Victorian Government, *Submission 651*; and NSW Government, *Submission 819*.

11 The Commonwealth is responsible for energy matters within Commonwealth jurisdictions.

Planning systems

3.11 The multiplicity of planning systems, and the numerous requirements of each system at the state and local government levels, can cause confusion and uncertainty, with the interface between planning systems not necessarily transparent or well understood. The NSW Legislative Council's inquiry into *Rural wind farms* (the NSW Inquiry) received such evidence, as did this inquiry.¹²

3.12 The Construction Forestry Mining and Energy Union (Construction and General Division) told the committee that there should be greater co-ordination between the three tiers of government, as well as clarification of their respective roles:

The different roles and responsibilities of the respective tiers of government is not generally understood by members of the general public and finding your way through the maze of government regulation, even using the tools such as the internet, can be daunting to those experienced in such matters.¹³

3.13 However, as noted by Wind Prospect Pty Ltd, a wind farm developer operating in a number of jurisdictions, Australian planning processes are generally similar:

[A]ll require the provision of detailed environmental assessments of wind farm proposals, require a public consultation process to be undertaken and contain provision for public submissions on the development applications.¹⁴

3.14 For illustrative purposes, the planning system of New South Wales is described below in some detail.

The planning system in New South Wales

3.15 New South Wales does not have specific legislation for the development of wind farms. Proposals are instead assessed under a number of environmental planning instruments, including: the *Environmental Planning and Assessment Act 1979* (NSW); *Environmental Planning and Assessment Regulation 2000*; State Environmental Planning Policies (SEPPs); and Local Environmental Plans (LEPs).¹⁵

12 NSW Legislative Council, General Purpose Standing No. 5, *Rural wind farms*, Report 31–December 2009, Chapter 5.

13 Construction Forestry Mining and Energy Union (Construction and General Division), *Submission 638*, p. 4. Also, see Western Plains Landscape Guardians Association, *Submission 645*, p. 7; and Acciona Energy, *Submission 650*, p. 9.

14 *Submission 328*, p. 7.

15 As of 1 July 2009, Regional Environmental Plans (REPs) are no longer part of the hierarchy of environmental planning instruments. All existing REPs are now deemed State Environmental Planning Policies (SEPPs).

Environmental planning instruments

3.16 The *Environmental Planning and Assessment Act 1979* (NSW) is the principal legislation used to guide planning and development in New South Wales. In particular, Part 3 of the Act sets out the plan-making system, including the mechanisms by which certain developments are assessed and approved.

3.17 SEPPs and LEPs are legal documents that regulate land use and development in a specific area. SEPPs are generally made by the Minister for Planning, while LEPs are prepared by councils to guide planning decisions for local government areas.

3.18 Development Control Plans (DCPs), prepared in accordance with the *Environmental Planning and Assessment Act 1979* (NSW), are also used to help achieve the objectives of a LEP by providing specific, comprehensive requirements for certain types of development or locations.¹⁶

Other documents

3.19 Developers have also had available to them documents other than the legislative instruments described above. In 2002, for example, the *NSW Wind Energy Handbook* was published, providing information on all aspects of wind energy development.¹⁷ Another example is the Australian Wind Energy Association's 2006 *Best Practice Guidelines for Implementation of Wind Energy Projects in Australia* (see below).¹⁸

3.20 More recently, the NSW Government has been developing guidelines to provide information on state specific assessment processes and requirements. These guidelines will also provide clarification for NSW stakeholders on the interface between Commonwealth, state and local wind farm requirements. The NSW Government plans to release the NSW Wind Farm Planning Guidelines in 2011.¹⁹

Assessment and approval processes

3.21 In mid-2008, the NSW Government commenced a reform of its planning system. As part of that reform, the NSW Department of Planning introduced a streamlined planning approvals regime for renewable energy, covering both small-

16 NSW Department of Planning: <http://www.planning.nsw.gov.au/PlanningSystem/Legislationandplanninginstruments/tabid/67/1anguage/en-US/Default.aspx>, accessed 5 April 2011.

17 Sustainable Energy Development Authority of NSW, *NSW Wind Energy Handbook*, 2002: http://www.industry.nsw.gov.au/_data/assets/pdf_file/0003/306048/nsw-wind-energy-handbook.pdf, accessed 5 April 2011.

18 AusWind, *Best Practice Guidelines for Implementation of Wind Energy Projects in Australia*, December 2006, p. 7.

19 NSW Government, *Submission 819*, pp 10–11.

scale and large-scale systems. Renewable energy proposals are now considered under Parts 3A, 4 and 5 of the *Environmental Planning and Assessment Act 1979* (NSW).²⁰

3.22 Part 3A of the Act sets out the planning approvals regime for major infrastructure and other projects, including 'critical infrastructure' projects. Renewable energy proposals with a capital cost of more than \$30 million (or \$5 million in an environmentally sensitive area of state significance) are considered a major project.²¹ 'Critical infrastructure' projects are a type of major project deemed by the Minister for Planning to be essential to the State for economic, social or environmental reasons.

3.23 According to the NSW Department of Planning, only a minority of major projects covered by Part 3A of the Act are declared 'critical infrastructure'.²² However, renewable energy projects with the capacity to produce at least 30MW of electricity are classified as 'critical infrastructure'²³ which would result in a large number of wind farms being assessed by the Minister for Planning rather than councils. (In Victoria, until recently a similar situation existed whereby the Planning Minister was the responsible authority for wind farm proposals where the capacity would exceed 30MW. In 2010, in that state the majority of wind farm permit applications were determined by the Planning Minister.)²⁴

3.24 Under Part 4 of the *Environmental Planning and Assessment Act 1979* (NSW), which deals with small-scale developments, local government councils are the responsible authority for all wind farm approvals. The relevant SEPP is SEPP (Infrastructure) 2007, which defines small wind turbines (a wind turbine with a generating capacity of less than 100kW), small wind turbine systems (a system comprising one or more small wind turbines each of which feed into the same grid or battery bank) and wind monitoring towers.²⁵ A council's LEP and/or DCP might also contain additional planning controls.

20 NSW Department of Planning: see <http://www.planning.nsw.gov.au/StrategicPlanning/RenewableEnergy/tabid/394/language/en-US/Default.aspx>, accessed 7 April 2011. Part 5 of the *Environmental Planning and Assessment Act 1979* (NSW) sets out environmental assessment requirements.

21 Paragraph 24 of Schedule 1 of the SEPP (Major Projects) 2005. \$30 million is equivalent to a generating capacity of 10-15MW: see NSW Government, Department of Planning, *Fact Sheet, Renewable energy development under Part 3A*, April 2010.

22 NSW Government, Department of Planning, *Fact Sheet 6, Critical infrastructure and Part 3A of the Act*, October 2009.

23 NSW Government, Department of Planning, *Fact Sheet, Renewable energy development under Part 3A*, April 2010.

24 Victorian Planning and Environment Law Association, *Submission 654*, pp 2-3.

25 Part 3 Division 4 of the SEPP (Infrastructure) 2007.

The Part 3A environmental assessment and approval process

3.25 Under the Part 3A planning approvals regime, the Director-General of the NSW Department of Planning prepares the environmental assessment requirements. These requirements outline the key issues that a proponent must address in its environmental assessment of a proposed project. The requirements are specifically tailored to each project and are referred to as Director-General's Requirements.

3.26 In preparing the Director-General's Requirements, relevant public authorities (such as the Department of Environment, Climate Change and Water and local councils) may be consulted. For some projects, a planning focus meeting may be held to help determine the scope of issues and level of assessment required.

3.27 The Director-General's requirements also outline any consultation requirements and may require the proponent to include, as part of their environmental assessment, a statement of commitments setting out the actions the proponent is prepared to undertake for environmental management and mitigation measures on-site, or development contributions.²⁶

Witnesses' comment on the planning process

3.28 Several submissions commented on the assessment and approval process for major and 'critical infrastructure' projects for which the NSW Minister for Planning is the responsible authority. The Clean Energy Council submitted that the planning system provides an overarching framework to assess proposed actions by balancing the benefits of a wind farm development with any impacts. In relation to impacts, the Clean Energy Council submitted:

Extensive and exhaustive assessments are undertaken by proponents prior to submitting a development application to determine whether a wind farm is feasible on a specific site and as to whether there are any potential environmental or social issues that will impact upon the viability of a proposal. In addition to this, proponents engage a range of stakeholders at early stages of feasibility to determine whether there are any further environmental, cultural or amenity impacts that need to be understood and managed as part of the development.²⁷

3.29 In contrast, other submissions did not support the Part 3A assessment and approval process. In their view, the planning system favours wind farm developers at the expense of councils and local communities.²⁸

26 NSW Government, Department of Planning, *Fact Sheet 2, Steps in the Part 3A assessment process*, October 2009.

27 *Submission 67*, p. 4. Also, see Friends of the Earth Australia, *Submission 325*, p. 7; Tasmanian Renewable Energy Industry Development Board, *Submission 624*, p. 1; and RES Australia Pty Ltd, *Submission 644*, p. 2.

28 For example, Mount Alexander Sustainability Group, *Submission 247*, p. 6; Molonglo Landscape Guardians Inc., *Submission 582*, pp 20–21.

3.30 The was informed that a similar situation exists in Victoria where the planning system allows for stakeholders²⁹ to make submissions and presentations on a wind farm proposal:

These processes enable a wide range of issues relating to the wind farm proposals to be addressed, and their impacts assessed...The Victorian processes are open and transparent and satisfactorily allow, and encourage, public participation.³⁰

3.31 However, Prom Coast Guardians cited its experience with the Dollar–Foster North wind farm proposal and submitted that councils and local communities essentially had no voice in relation to wind farm proposals determined by the Victorian Planning Minister. In its view, the public consultation process was deficient:

Where a Panels Victoria hearing was convened to consider a proponent's application and objectors submissions, the hearing was required to 'give due weight' to the state government guidelines. The proponents usually had the resources to retain expert witnesses to present evidence favourable to their position, as well as lawyers to argue their case and to cross-examine objectors. Local communities and councils in rural areas did not have the resources to match this state government and corporate overkill...In the unlikely event that a panel hearing found in favour of the objectors, the Planning Minister did not have to accept the recommendations, or make them public and could issue a permit anyway. This made a lot of people in South Gippsland feel that the whole process disenfranchised them.³¹

Role of local government

3.32 State and territory government assessment and approval processes do not always produce the outcome desired by at least some councils and local communities. Councils and local communities have indicated to the Committee that, where the state government is the responsible authority, the interface with local planning laws is not adequate.

South Australia

3.33 In 2003, the South Australian Government inserted objectives and principles into local area development plans to encourage and guide wind farm development. The Environmental Defenders Office (SA) supported these changes which encourage the development of renewable energy sources in appropriate locations and submitted that:

29 'Stakeholder' is defined in the EPHC draft *National Wind Farm Development Guidelines* as any individual, business or group who may live or work in proximity to a wind farm, or who may have an interest or association with a wind farm developer or its potential impacts.

30 Victorian Planning and Environmental Law Association, *Submission 654*, p. 3.

31 *Submission 146*, pp 2–3. Also, see Pyrenees Shire Council, *Submission 646*, p. 3.

The principles included such matters as ensuring wind farms are sited, designed and operated in a manner that:

- (a) does not significantly detract from significant visual and landscape character elements of the area;
- (b) utilises elements of the landscape, materials and finishes that minimises visual impact;
- (c) minimises the potential for adverse impact on areas of native vegetation, conservation, environmental, geological, tourism or heritage significance;
- (d) does not impact on the safety of aircraft and the operation of airfields and designated landing strips; and
- (e) minimises the potential for nuisance or hazard to nearby property owners/occupiers, road users and wildlife.³²

3.34 Evidence from the Northern Areas Council was not so supportive. The Council argued that the 2003 objectives and principles do not represent local policy. Not only are councils obliged to implement the state wind farm policy but they find it difficult to amend state-wide policies:

A Council's ability to unilaterally change, add to, modify, strengthen or tighten these established policies is very much limited. A Council is unlikely to 'win' any argument with the Minister to accept amendments and additions to his own State-wide policies.³³

3.35 According to the Northern Areas Council, its local community considers that the state policy does not adequately protect residents and the environment from perceived adverse impacts resulting from the operation of wind turbines. In its view, there is a need for a stronger planning focus in the development plan to better balance economic benefits with the environmental and social consequences of wind farms.³⁴

3.36 Another South Australian council, the Southern & Hills Local Government Association also expressed dissatisfaction with the 2003 objectives and principles.

[T]hey are pretty general in nature, although there are other council wide planning principles and objectives that can be applied to different aspects of this type of development. The issue is that the conditions are of a general nature and making a case to support or reject can mean paying for expert consultants. Over the last several years, international and interstate standards have become more detailed and more 'performance based', seeking to establish greater setback distances to more adequately deal with low frequency sound impacts on human health etc. The Planning Principles

32 *Submission 640*, pp 1–2.

33 *Submission 861*, p. 1.

34 *Submission 861*, pp 1–2. This evidence was similar to that received from Molonglo Landscape Guardians.

within South Australia have not been updated since they were introduced in 2003.³⁵

New South Wales

3.37 Similar views to those above were held by some witnesses from NSW, including the Molonglo Landscape Guardians and the Upper Hunter Landscape Guardians.

3.38 Molonglo Landscape Guardians submitted that the NSW Government interferes in local planning instruments.³⁶ Molonglo Landscape Guardians also objected to state and territory governments using statutory powers to override the wishes of local communities. Three examples were cited as evidence: first, the announcement of the Renewable Energy Precincts (see below); second, the availability and use of call-in powers; and third, the quashing of community views by the 'greater good' argument.³⁷

3.39 The Upper Hunter Landscape Guardians submitted that its council does not have a DCP in relation to wind farm development as the council does not see any value in developing such a DCP when the state government can choose to 'ignore local guidelines'.³⁸

3.40 In essence, the Committee heard that there is a disconnect between the state government and some councils, which represent the interests of their local communities. This point was also made in the evidence of the Victorian Planning and Environmental Law Association, who explained the different policy drivers as follows:

Councils are run to represent the community and as a result, influence from the local community can affect decisions at a local level. For example, residents are generally opposed to major change within the community. On the other hand, policy at the Commonwealth or State level can be driven and respond to state wide and Commonwealth issues, such as meeting obligations under Commonwealth's Large-scale Renewable Energy Target.³⁹

35 *Submission 53*, p. 2.

36 *Submission 582*, pp 19–20.

37 *Submission 582*, pp 20–23. The submission also argues that the NSW Government's streamlined planning approvals regime for renewable energy proposals accords such proposals special treatment: see p. 20.

38 *Submission 80*, p. 4.

39 *Submission 654*, p. 9.

Victoria

3.41 Several submissions particularly commented on one state policy, which, when implemented, might significantly alter the manner in which wind farm development proposals are assessed and approved.

3.42 The Victorian Planning Minister advised that the Victorian Government is committed to empowering councils to play the lead role in the location of future wind farms. In addition to vesting primary responsibility for determinations with councils, the state government submitted that it will provide councils with technical and ongoing support from appropriate state agencies, as necessary.⁴⁰

3.43 Some submitters expressed concern with this policy. Origin Energy Limited, for example, argued that, in general, it is more efficient and appropriate for a state planning department, or minister, to determine planning consents for large-scale wind farms. It gave a number of reasons for its position:

- other infrastructure projects of a corresponding size are typically determined at state, not council level;
- state departments have the appropriate resources, both in terms of capacity and technical expertise;
- wind farms can sometimes be divisive within a local community—increasing biases and pressures upon a local council. The state government would most likely be independent from the more localised issues;
- large projects can be located across more than one local government area. Again, state government would usually be best placed to handle these cross-boundary projects (including where a transmission line associated with the project crosses another local government area); and
- state-based decision makers often have a broader perspective to consider and account for higher-level policy settings such as state renewable energy targets, the RET and Australia's Kyoto target.⁴¹

3.44 As discussed in Chapter 2, some Victorian councils expressed concern with their ability to assess wind farm development proposals.⁴²

40 *Submission 651*, p. 4.

41 *Submission 591*, pp 15–16. Also, see Dr James Prest, *Submission 631*, p. 2 and WestWind Energy Pty Ltd, *Submission 655*, p. 12.

42 For example, CSIRO, *Submission 579*, p. 6 and Union Fenosa Wind Australia, *Submission 340*, p. 5. Also, see Vestas–Australian Wind Technology Pty Ltd which submitted that the number of wind farm applications approved over the past ten years has developed a body of precedents for councils: *Submission 712*, p. 5.

3.45 The Committee for Portland, for example, considered the policy proposal impractical and backward. Its submission argued that councils do not have the requisite expertise or resources. Accordingly, state governments, which can engage technical experts, should remain responsible for the complexity and compliances associated with wind farm developments.⁴³

3.46 Pyrenees Shire Council agreed with the Committee for Portland's comments regarding local councils' abilities to assess wind farm proposals. It reported that councils often need to engage specialist consultants to assist with the assessment of complex noise reports; many councils (due to resourcing constraints) accept a lot of expert evidence on face value; and councils defer hard decisions to a secondary consent phase of endorsing management plans.⁴⁴

3.47 Pyrenees Shire Council also commented that the proposal would:

[P]lace massive resourcing constraints on local governments' already limited resources, and unless significant support can be provided by specialist staff from [Department of Community and Planning Development] this model is seen as being unworkable.⁴⁵

3.48 The Committee notes that the Victorian Minister for Planning submitted that the Government proposes to provide support to councils affected by the new policy. However, the nature and extent of this support, as well as any terms and conditions, are not yet known.

Community consultation

3.49 A key theme to emerge in many submissions was the extent of community consultation.

3.50 Thomsons Lawyers in South Australia act for several wind farm developers. Its submission commented positively on the amount of council and local community involvement in the wind farm planning process:

The local Council usually has significant involvement in the planning process and ensures that the community is not disadvantaged by the development. In fact, where most wind farms are developed, the Council has encouraged that development by providing for wind farm development (which meets certain requirements) in its development plan. Of course, notwithstanding the inclusion of a wind farm development in the development plan, such developments are often subject to significant public

43 *Submission 614*, p. 3. Also, see Ballarat Renewable Energy and Zero Emissions Inc., *Submission 720*, p. 7. For further comments regarding compliance issues see Lal Lal and Elaine Landscape Action Group, *Submission 867*, p. 6 and Moyne Shire Council, *Submission 169*, p. 4.

44 *Submission 646*, p. 2.

45 *Submission 646*, p. 2.

consultation. Further, the ultimate decision of the planning body is, in most jurisdictions, subject to judicial review.⁴⁶

3.51 Many submissions did not, however, share these views. Instead, it was claimed that state and territory governments do not satisfactorily engage with local communities, either at commencement or during the development phase.

3.52 In New South Wales, one example cited was the designation of six Renewable Energy Wind Precincts for the state: the New England Tablelands, Upper Hunter, Central Tablelands, NSW/ACT Cross Border Region, Snowy–Monaro and the South Coast. These cover 47 local government areas.

3.53 According to the NSW Department of Planning, the precincts are a community partnership initiative in areas where significant future renewable energy development is expected—especially wind farms—designed to give local communities a voice and a stake in renewable energy development. Precinct advisory committees are to be formed in each of the six precincts. A key focus of the committees will be to enhance consultation and engagement. To help facilitate improved engagement, the precinct advisory committees will include broad community representation.⁴⁷

3.54 The Upper Hunter Landscape Guardians submitted that, in spite of the designation of the Upper Hunter as a Renewable Energy Precinct, a precinct advisory committee with local representation has not been established. Nor, it stated, did anyone from the NSW Government visit the area and meet with the local community prior to the designation of the area as a Renewable Energy Precinct.⁴⁸

3.55 The Molonglo Landscape Guardians submitted that the main role of the precinct advisory committees appears to be 'to convince local governments and their communities of the benefits of establishing industrial wind installations in their areas'. Furthermore:

Top–down coercion of local residents and their councils by a heavy–handed and 'wind–happy' state government will not encourage 'local buy–in and ownership'. It will simply further disenfranchise rural communities.⁴⁹

3.56 More broadly, the Collector Community Association submitted that the NSW planning system is 'immature'. In particular, the Association stated that the community engagement model is poor, causing 'immediate community–wide concern where feelings of anxiety, helplessness, and disempowerment echo around the community'. In addition, the planning regime does not 'support the imbalance of resources to equip

46 *Submission 363*, p. 2.

47 NSW Department of Planning:
<http://www.planning.nsw.gov.au/StrategicPlanning/RenewableEnergy/tabid/394/language/en-US/Default.aspx> (accessed 12 April 2011)

48 *Submission 80*, pp 1 and 4.

49 *Submission 582*, p. 21.

the community to achieve a better understanding of the impacts of a wind farm development'.⁵⁰

3.57 The Western Plains Landscape Guardians Association stated that the lack of community consultation in wind farm planning processes is alarming and breaks down many rural communities. Its submission suggested that consultation throughout all planning stages would ease community division and enable fairer outcomes for the community.⁵¹

3.58 CSIRO submitted that it is currently conducting a preliminary study into the factors affecting societal acceptance of wind farms in Australia. One of the factors promoting wind farm acceptance is transparent and inclusive planning processes from an early stage.⁵²

Committee view

3.59 The Committee acknowledges evidence that some residents feel excluded from wind farm policy decisions affecting their local communities. It considers that affected communities should be informed of wind farm proposals in their area from the outset. It is the responsibility of the wind farm developer to ensure that effective and transparent community consultation is carried out early in the process, including but not limited to an allowance of adequate time to deliberate and provide feedback on the effect that the wind farm will have on the community. Should the proposal be significantly altered at any time during the planning process, then the local community should also be informed of the fact and be provided with an opportunity to comment on the amendment to the original application.

3.60 The Committee also considers that information provided to an affected community should contain sufficient detail as to what is proposed and how that proposal will impact on the community to allow residents to comment objectively. It would be helpful for the information to direct residents to sources of further assistance (such as the state planning body) should they wish to pursue a course of inquiry.

3.61 To the extent that planning systems do not already contain such provisions, the Committee considers that those systems' community engagement models should be examined with a view to improving stakeholder and community consultation.

The future interface of planning laws

3.62 Many submissions addressed specific aspects of planning laws at the state and local government levels. This evidence informed the Committee of the interface—both positive and negative—between those two tiers of government.

50 *Submission 574*, pp 1–2.

51 *Submission 645*, pp 7–9.

52 *Submission 579*, p. 2.

3.63 However, contributors to the inquiry had little to say regarding the interface with Commonwealth planning laws. This is not surprising given the Commonwealth's limited role in the planning processes. The comments that the Committee did receive were general in nature and directed toward improving certainty and efficiency in national wind farm policy.

3.64 Origin Energy Limited, for example, submitted that having appropriate and efficient planning processes is critical to supporting the growth of the renewable energy industry. Accordingly, Origin Energy Limited supported the following features in wind farm planning processes:

- expediency (such as a prescribed maximum timeframe for determination);
- well defined and streamlined approval processes (avoiding potentially redundant and/or multiple approval hurdles, ensuring that relationships and responsibilities amongst the various regulatory bodies are clearly defined, and coordination of issues across different departments/authorities within the state system as well as coordination between different levels of Government);
- simplified, clearly defined and consistently applied protocols, standards and criteria for environmental and technical assessment; and
- certainty (definitive and stable policy and regulatory frameworks enable better investment decisions to be made with respect to the wind industry).⁵³

3.65 Many submissions focussed on one of these features, submitting that while it is desirable to have effective environmental standards:

[C]urrent Australian standards and guidelines for wind farm developments are already among the most rigorous in the world.⁵⁴

3.66 For that reason, many submitters did not support any further regulation of the wind industry, although they considered that Australian wind farm planning processes could be improved.⁵⁵

3.67 The Clean Energy Council, for instance, submitted:

There are numerous planning requirements currently in place at Federal, State and local government levels. The interplay of these existing federal, state and local planning laws already create a sometimes ineffective and

53 *Submission 591*, p. 14.

54 Denmark Community Windfarm, *Submission 227*, p. 2. Also, see Roaring 40s, *Submission 242*, p. 2; The Windturbine Company, *Submission 297*, p. 2; GV Community Energy Pty Ltd, *Submission 345*, p. 2; Hydro Tasmania, *Submission 606*, p. 2; Windlab Developments Pty Ltd, *Submission 725*, p. 3.

55 For example, Bayside Climate Change Action Group, *Submission 592*, p. 3.

unnecessary hurdle to the development process of wind farms with differing regulatory controls in different jurisdictions making it more cumbersome for developers working across jurisdictions. Adding additional regulatory controls would only act to add to this red tape and make wind energy more expensive.⁵⁶

3.68 Acciona Energy agreed, stating that securing a wind farm planning permit is time consuming and costly, a situation created by complex and inconsistent regulatory approval systems in each jurisdiction. In its view, there is an environmental policy disconnect between all three tiers of government:

The development of renewable energy is supported by high level climate change policy at both Commonwealth and State level. There is however a disconnect between that high level policy and local environmental objectives applied by state and federal referral authorities.⁵⁷

3.69 Windlab Developments Pty Ltd also saw a need to improve national uniformity and consistency:

We find that the planning process in our Australian market is more complex and less efficient than elsewhere and is often due to the interaction of the often conflicting Federal, State and local government planning requirements. Providing for more universal and consistent regulation across all levels of statutory authority would help to reduce red tape and hopefully make wind power less expensive.⁵⁸

3.70 Dr James Prest from the Australian National University Australian Centre for Environmental Law & Centre for Climate Law and Policy argued that the RET is an important way in which to meet Australia's climate change mitigation obligations. This involves removing and addressing legal, institutional and practical barriers to renewable energy investment. Dr Prest recommended:

Attention should be given to reviewing how the existing legal framework in all Australian jurisdictions presents barriers to wind energy projects.

...

[T]here is insufficient justification for the enactment of special purpose Commonwealth legislation specifically regarding wind energy, which would be used to intervene in State and Territory approval of wind farms. Nationally significant matters (with the exception of climate change) are adequately addressed by the *Environment Protection and Biodiversity Conservation Act 1999* (Cth).

56 *Submission 67*, p. 4. Also, see Denmark Community Windfarm, *Submission 227*, p. 2; The Windturbine Company, *Submission 297*, p. 2; Bayside Climate Change Action Group, *Submission 592*, p. 3; and Friends of the Earth Australia, *Submission 325*, p. 7.

57 *Submission 650*, p. 9. Also see Victorian Planning and Environmental Law Association which argues that Victoria's planning regime is multi-layered and takes into account Commonwealth, state and local government planning policies: *Submission 654*, p. 10.

58 *Submission 725*, p. 3.

...

Specific purpose Commonwealth regulation would violate the principle of consistency in regulation. It would be unprecedented for the Commonwealth to step in and apply regulatory requirements to one particular energy industry to the exclusion of all others.⁵⁹

Committee view

3.71 The Committee acknowledges that, as in many areas of national interest, where there are different constitutional responsibilities and intergovernmental cooperation is required, there is a degree of complexity in the interface between Commonwealth, state and local wind farm planning laws. However, there is a need for greater certainty, consistency and transparency in Australia's wind farm planning processes.

Formation of national wind farm guidelines

3.72 As previously mentioned, the Australian Government has limited practical involvement in planning wind energy facilities but COAG has developed draft national wind farm guidelines as a means of promoting consistency in state and territory planning processes.

A brief background to national guidelines

3.73 At the national level, industry best practice guidelines were released by the Australian Wind Energy Association (also known as AusWind and now the Clean Energy Council) in 2002.⁶⁰ The aim of the guidelines was to facilitate the development of high quality wind energy projects, including setting out the steps that proponents needed to undertake in the development of a wind farm.⁶¹

3.74 Almost concurrently, COAG established the EPHC to address broad national policy issues relating to environmental protection (particularly in regard to air, water, and waste matters) and heritage (natural, Indigenous and historic).⁶² However, it was not until April 2008 that the EPHC requested its Standing Committee to examine:

[T]he impediments associated with wind farm development in Australia and to establish whether it is possible to enhance confidence from the community and industry in the wind farm planning and assessment

59 *Submission 631*, p. 2.

60 The AusWind best practice guidelines were updated in 2006.

61 AusWind, *Best Practice Guidelines for Implementation of Wind Energy Projects in Australia*, December 2006, p. 7.

62 Welcome to the Environment Protection and Heritage Council website, <http://www.ephc.gov.au>, accessed 21 April 2011.

processes through the development of a national wind farm code or by other means.⁶³

3.75 After a six month long inquiry, the Standing Committee identified a number of issues that it described as 'impediments' to the sustainable development of wind farms, namely: local amenity/environmental nuisance; ecological and heritage impacts; community engagement; and other (miscellaneous) issues.⁶⁴

3.76 The Standing Committee also commented on the wind farm assessment and approval systems in the states and territories. It found that these systems 'are generally robust and working well':

Each of the jurisdictions has a well-developed process for the approval of new developments, including the assessment of potential environmental impacts. These processes are generally supported by a range of documentation, including policies, regulations, guidelines, zoning schemes, planning overlays and the like. Planning regulations also define the responsible authority, the statutory consultation process (including nature and length of public exhibition periods), the review process and rights of appeal. While the generic nature of the processes and documentation is similar between jurisdictions, there are local differences due to the historic development of these in each jurisdiction.⁶⁵

3.77 In conclusion, the Standing Committee found that there would be merit in developing government-endorsed National Wind Farm Development Guidelines. Such guidelines would ensure a higher degree of consistency and transparency in the planning, assessment, approval and environmental monitoring of wind farms, as well as increase community acceptance and support for wind farms.⁶⁶

3.78 In October 2009, the EPHC released its first draft *National Wind Farm Development Guidelines* for a two month consultation period. In June 2010, the EPHC released a second draft *National Wind Farm Development Guidelines* (the Draft Guidelines) for a 12 month consultation period.

63 Environment Protection and Heritage Council, *Report on Impediments to Environmentally and Socially Responsible Wind Farm Development*, November 2008, Attachment 1, p. 47.

64 Environment Protection and Heritage Council, *Report on Impediments to Environmentally and Socially Responsible Wind Farm Development*, November 2008, p. 4.

65 Environment Protection and Heritage Council, *Report on Impediments to Environmentally and Socially Responsible Wind Farm Development*, November 2008, p. 5.

66 Environment Protection and Heritage Council, *Report on Impediments to Environmentally and Socially Responsible Wind Farm Development*, November 2008, p. 5 and Recommendation 1, p. 6.

3.79 The ultimate aim of the Draft Guidelines is to improve the transparency and consistency of each state and territory's process for assessing wind farm proposals by clearly outlining the key principles and issues for consideration.⁶⁷

3.80 The Draft Guidelines address a range of issues which are unique or significant to wind farm development and operation: Community and stakeholder consultation; Wind turbine noise; Visual and landscape impacts; Birds and bats; Shadow flicker; and Electromagnetic interference. For these six key topics, the Draft Guidelines provide detailed methodologies.⁶⁸

3.81 In addition, the Draft Guidelines comment on Aircraft safety and lighting; Blade glint; Risk of fire; Heritage; and Indigenous heritage. However, the Draft Guidelines 'do not have detailed methodologies [for these issues] because the solution is relatively simple or is covered well in other planning processes and documents'.⁶⁹

3.82 The Standing Committee makes the point:

The Guidelines are not intended to be mandatory; every jurisdiction has a different statutory process for assessing wind farm proposals and it is not the intention of the Guidelines to change these. Opting for the release of draft Guidelines allows each jurisdiction to assess how the Guidelines could be best adopted within their processes.⁷⁰

3.83 Some states and territories already have best practice guideline documents in place for the development and operation of wind farms.⁷¹

Commentary on the Draft Guidelines

3.84 The future interface between national and state/territory planning laws would depend upon the extent to which a state or territory commits to the Draft Guidelines. Notably, many submissions did not endorse the Draft Guidelines in their current form. Instead, these submissions described a number of perceived deficiencies and in some instances, suggested ways in which the Draft Guidelines should be amended.

67 Environment Protection and Heritage Council, *National Wind Farm Development Guidelines – Draft*, July 2010, p. 1.

68 Environment Protection and Heritage Council, *National Wind Farm Development Guidelines – Draft*, July 2010, p. 2.

69 Environment Protection and Heritage Council, *National Wind Farm Development Guidelines – Draft*, July 2010, p. 2.

70 Environment Protection and Heritage Council, *National Wind Farm Development Guidelines – Draft*, July 2010, p. 5.

71 Planning WA, Planning Bulletin 67, Guidelines for Wind Farm Development (2004); Environment Protection Authority South Australia, Wind Farms Environmental Noise Guidelines (2009); and Sustainability Victoria, Policy and Planning Guidelines for Development of Wind Energy Facilities in Victoria (2009), respectively.

Consistency with state/territory planning laws

3.85 The Clean Energy Council conceded that national guidelines have the potential to encourage greater consistency between planning regimes and remove impediments to development. However, the Council did not support the Draft Guidelines. In its view, the Draft Guidelines:

[O]nly add serious impediments to wind farm development beyond those imposed on other infrastructure investments, reducing certainty for the planning assessment process by introducing additional, often conflicting guidelines. This would add additional costs and delays to wind farm developers without delivering improved outcomes.⁷²

3.86 Similarly, the NSW Government supported the concept of national guidelines but submitted that the Draft Guidelines are neither practicable nor accessible to all stakeholders:

Feedback on the guidelines at a NSW industry workshop convened in late 2010 focussed on the perceived complexity of the assessment process under the draft guidelines and deviation from accepted practices in existing assessment requirements, particularly regarding noise.⁷³

The Upper Hunter Landscape Guardians supported comprehensive national guidelines, including noise and setback guidelines for which the Draft Guidelines do not make provision: There should be a consistent Australian noise standard for industrial wind farms and that standard should ensure that non-hosting residents within a 10km radius of the wind farm are adequately protected.⁷⁴

3.87 Union Fenosa Wind Australia, a rural wind farm developer in both Victoria and New South Wales, agreed with the opinion of the Clean Energy Council, and added that there are two great drawbacks with the Draft Guidelines:

- the adoption of stringent measures to govern noise impacts without recommending uniform noise limits; and
- the legitimising of unverified claims of infrasound-induced sickness.⁷⁵

72 *Submission 67*, p. 5. Also, see Wind Prospect Pty Ltd, *Submission 328*, p. 8; Origin Energy Limited, *Submission 591*, p. 16; Westgate Community Wind, *Submission 702*, p. 5; Vestas–Australian Wind Technology Pty Ltd, *Submission 712*, p. 6; and GE Energy, *Submission 798*, p. 3.

73 *Submission 819*, p. 10.

74 *Submission 80*, p. 4.

75 *Submission 340*, p. 4.

Commonwealth involvement in state/territory planning systems

3.88 Infigen Energy, the largest wind farm owner and operator in Australia informed the that the Commonwealth should not be involved in the state and territory planning systems:

It is a fundamental tenet of any planning system that there be one set of planning rules and regulations and one 'responsible authority' to approve or reject planning applications. If there are two sets of planning 'rules', there will inevitably be conflicts between the two sets of rules and how is the proponent, or the community, to know which of the two rules are to be followed?⁷⁶

3.89 Infigen Energy submitted that the Commonwealth should leave each state and territory to use its well-developed environment assessment framework for wind farms without the imposition of a complex and conflicting set of national guidelines.⁷⁷

3.90 The District Council of Grant questioned whether adoption of the Draft Guidelines would result in the passage of enabling (federal) legislation. In South Australia, for example, councils' development plans do not cover a number of issues encompassed by the Draft Guidelines (such as potential wind turbine noise, vibrations and adverse health effects). The District Council of Grant contended that, if the Australian Government were to pass legislation, a framework similar to that of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (see below) could apply in relation to rural wind farms.⁷⁸

3.91 Vestas–Australian Wind Technology Pty Ltd argued that adoption of the Draft Guidelines would inhibit achievement of Australia's RET by discouraging investment in renewable energy resources:

For Australia to move from its existing level of renewable energy (currently less than 10%) up to the Government's target of 20% will require a concerted effort to attract the necessary investment in new renewable energy capacity. This is also the case with respect to reducing greenhouse emissions from the energy sector.

The draft Guidelines do not help Australia achieve these policy targets in any respect at all. In fact they are a model example of how not to encourage investment and jobs in clean energy.⁷⁹

3.92 Some submissions from wind energy developers were especially critical of the noise assessment provisions of the Draft Guidelines.

76 *Submission 652*, p. 9. Also, see Acciona Energy, *Submission 650*, pp 9–10.

77 *Submission 685*, pp 7–8.

78 *Submission 685*, p. 8.

79 *Submission 712*, p. 6. Also, see, for example, Mr Terry Lee, *Submission 728*, p. 10; and Bendigo Sustainability Group, *Submission 754*, p. 6.

3.93 According to Wind Prospect Pty Ltd, the Draft Guidelines' noise assessment provisions do not necessarily align with those of the states and territories. Australian Standard AS 4959–2010: Acoustics: Measurement, Prediction and Assessment of noise from Wind Turbine Generators, is different in some respects from the standards used in the states and territories. Wind Prospect stated that the EPH draft guidelines 'unfortunately only serve to add further confusion and uncertainty to the development process'.⁸⁰

3.94 GE Energy submitted that:

[T]he base noise level requirement of 35 or 40dB(A) provided in the main assessment tool in Australia is already significantly more stringent than the World Health Organisation's recommended guideline value of 45B(A).⁸¹

3.95 Origin Energy Limited referred to a report which it had commissioned into the effect of the Draft Guidelines' proposed noise requirement. The technical consultancy, Sonus, reported that the guideline, which includes a 5 dB penalty for 'unpredictable audible characteristics', could require the removal of two-thirds of proposed turbines from a typical project.⁸² Origin Energy Limited submitted that that this would create an unviable situation for any new wind farm project and suggested that the 'noise section' be rewritten prior to any further consideration of its adoption by the states.⁸³

Committee view

3.96 The Committee has noted the criticism of the Draft Guidelines but considers that they could provide for greater transparency and consistency for planning for wind energy facilities.

3.97 The Committee notes that the Draft Guidelines are not in their final form and there is scope for amendment in line with feedback received during the EPHC consultation process.

3.98 The draft guidelines also need to reflect revisions that are being made by NHMRC to its 2010 public statement regarding any health effects of wind farms.

Recommendation 7

3.99 The Committee recommends that the draft National Wind Farm Development Guidelines be redrafted to include discussion of any adverse health effects and comments made by NHMRC regarding the revision of its 2010 public statement.

80 *Submission 328*, p. 8.

81 *Submission 798*, pp 5–6.

82 Sonus Pty Ltd, *Draft National Wind Farm Development Guidelines, Review of Noise Aspects*, November 2010, p. 7.

83 *Submission 591*, p. 15.

Environment Protection and Biodiversity Conservation Act 1999

3.100 In November 1997, COAG agreed in principle to the Heads of Agreement on Commonwealth and State roles and responsibilities for the Environment (the Agreement).⁸⁴ Subsequently, all heads of government and the Australian Local Government Association signed the Agreement, aiming to create a more effective framework for intergovernmental relations on the environment.⁸⁵

3.101 A number of key aspects of the Agreement have been implemented by the Australian Government with the enactment of the *Environment Protection and Biodiversity Conservation Act 1999* (the EPBC Act).

3.102 The EPBC Act is the Australian Government's primary piece of environmental legislation. It provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places. These are defined in the EPBC Act as matters of 'national environmental significance.'

3.103 The EPBC Act applies to any group or individual whose actions may have a significant impact on a matter of national environmental significance. Therefore, in some instances, the Commonwealth will be involved, to a degree, in the assessment and approval of a wind farm proposal.

3.104 While some submissions mentioned the EPBC Act, few submitters commented on its interface with state and territory environmental planning systems.⁸⁶ Commentary referred only briefly to the practical assessment and approval procedures under the EPBC Act.

3.105 The EPBC Act includes a mechanism to ensure that federal, state and territory governments do not duplicate their environmental protection functions or otherwise create inefficiencies. Under this mechanism, the Australian Government may enter into an agreement with a state or territory government, under which the state or territory may assess proposals that might affect matters of national environmental significance.

84 Council of Australian Governments' Communiqué, 7 November 1997: http://www.coag.gov.au/coag_meeting_outcomes/1997-11-07/index.cfm, accessed 20 April 2011.

85 Heads of agreement on Commonwealth and State roles and responsibilities for the environment, Preamble: see <http://www.environment.gov.au/epbc/publications/coag-agreement/preamble.html>, accessed 20 April 2011.

86 For example, NSW Government, *Submission 819*, p. 10.

3.106 At present, all states and territories are parties to a bilateral agreement with the Commonwealth, allowing the state and territory governments to assess compliance with the EPBC Act.⁸⁷

3.107 Suzlon Energy Australia Pty Ltd expressed its support for the EPBC mechanism.⁸⁸ In contrast, the Environmental Defenders Office (SA) Inc. indicated that enabling a state or territory to assess matters referred under the EPBC Act narrows the scope for opinion, as well as potentially limiting appeal rights (as occurs under section 48E of the *Development Act 1993* (SA)).⁸⁹

Committee view

3.108 The Committee considers that the EPBC Act does not require amendment specifically to address issues arising from the development of wind farms. However, the various levels of government should be clear as to which party has the responsibility for which aspect of planning. The responsible authority should be then be well resourced and should adopt very clear and transparent consultation processes.

87 Department of Sustainability, Environment, Water, Population and Communities: see <http://www.environment.gov.au/epbc/assessments/bilateral/index.html>, accessed 7 April 2011. The Western Australia bilateral agreement is currently being revised, as is the New South Wales bilateral agreement.

88 Suzlon Energy Australia Pty Ltd, *Submission 593*, p. 6.

89 *Submission 640*, pp 3–4.

CHAPTER 4

PROPERTY VALUES, EMPLOYMENT OPPORTUNITIES AND FARM INCOME

4.1 In this chapter the Committee considers the effects of the establishment of wind farms on the values of rural properties. Also included in this chapter is information on employment opportunities presented by the development of the wind industry and the income of landholders who host wind turbines and landholders who live near them.

Property values

4.2 Property values tend to capture people's perceptions of the impacts of rural wind farms, such as noise, visual amenity, biodiversity, fire risk and social cohesion.¹

4.3 Large-scale wind power generation is a relatively new phenomenon in Australia and the effects of the establishment of wind farms on rural property values are not known with any certainty.² For this reason, some witnesses have relied on overseas studies for their submissions on land valuations.

4.4 There is, however, one recent, Australian study that has been cited by a number of witnesses.

4.5 A 'preliminary assessment' report prepared for the NSW Valuer General, which was referred to in a number of submissions, reached several (qualified) conclusions as to the effect of the development of wind farms on property values. The results were qualified because wind farms 'have been developed in locations generally removed from densely populated areas...the small samples of sales transactions available for analysis limited the extent to which conclusions could be drawn'.³

4.6 In brief, the report concluded that:

- Wind farms do not appear to have negatively affected property values in most cases.
- A property's underlying land use may affect the property's sensitivity to price impacts:

1 *An economic assessment of the proposed McHarg Ranges wind farm*, Report by Access Economics Pty Limited for Residents against Turbines of Tooborac, Access Economics, December 2008, p. 41.

2 See, for example, Victorian Minister for Planning, *Submission 651*, p. 4.

3 *Preliminary Assessment of the Impact of Wind Farms on Surrounding Land Values in Australia: NSW Department of Lands*, DuPonts in association with PRP Valuers and Consultants, Prepared for NSW Valuer General, August 2009, p. 2.

- (i) No reductions in sale price were evident for rural properties or residential properties located in nearby townships with views of the wind farm.
- (ii) The results for rural residential properties (commonly known as 'lifestyle properties') were mixed and inconsistent; there were some possible reductions in sales prices identified in some locations alongside properties whose values appeared not to have been affected ...⁴

4.7 In its submission CSIRO referred to 'an earlier assessment of 78 property sales around the Crookwell wind farm in NSW over the period 1990-2006 [that] found no reductions in property values'.⁵ That study included a comparison of sales of property within six kilometres of a wind farm with sales of those not in the 'viewshed' of the farm.⁶

4.8 The Committee heard anecdotal evidence that suggested that proximity to wind farms may lead to lower prices in some cases. A number of submitters referred to a document produced by an experienced Australian estate agent that stated that land adjacent to wind farms could lose from 30 percent to 50 percent of its value.⁷ One witness informed the Committee that:

... we have an 80-acre property, so therefore it is lifestyle. ... We had it valued originally at \$380,000 to \$400,000, and the last offer we received was \$230,000. That is a loss of \$150,000, and for people that have just reached the age of 30, that is a massive, massive loss and a big drawback for us and our young family.⁸

4.9 Mrs Anne Schafer, whose lifestyle property at Berrybank in Victoria will be in close proximity to a large number of turbines, was concerned that the property will be devalued:

It is hard to prove this, and the wind farm companies will certainly not let anything happen to make it look as though values have dropped, but common sense in itself says that if you are living on a lifestyle property next to 100 turbines surrounding you on three sides, for goodness sake, it is worth nothing. You are out there for the ambience, for the lifestyle, and you

4 *Preliminary Assessment of the Impact of Wind Farms on Surrounding Land Values in Australia: NSW Department of Lands*, Duponts in association with PRP Valuers and Consultants, Prepared for NSW Valuer General, August 2009, p. 2.

5 CSIRO, Submission 579, p. 5.

6 *Preliminary Assessment of the Impact of Wind Farms on Surrounding Land Values in Australia: NSW Department of Lands*, DuPonts in association with PRP Valuers and Consultants, Prepared for NSW Valuer General, August 2009, p. 8.

7 Email message from an Elders Real Estate valuer, quoted by A and J Hodgson, *Submission 837*, p. 3.

8 Mrs T Kehoe, *Committee Hansard*, 28 March 2011, p. CA 69.

have an industrial complex next to you. Of course all of these properties are going to be devalued. It is just sheer common sense.⁹

4.10 Another witness submitted that in the vicinity of Toora it had been reported that properties had been devalued by 30 percent and were difficult to sell.¹⁰

4.11 A report prepared by Access Economics Pty Limited for Residents Against Turbines of Tooborac suggested that the use of the land (agricultural or amenity) is important when considering the impact of wind farms on land values. The report noted that, to the extent that land values are adversely impacted by a wind farm, the cost is borne by a relatively few surrounding property owners. The report reads in part:

From a policy perspective, it is debatable whether paying for what is a genuine public good – greenhouse gas abatement – should fall so disproportionately on so few.¹¹

4.12 Acciona submitted that:

... in rural areas the main factor influencing a property's value is the land's productivity. This is a function of its resource endowment and its condition, both of which are unaffected by the presence of a wind farm nearby.

...

In reference to properties hosting the wind turbines, wind farms should have a direct positive effect on their value. These properties receive a long term, reliable revenue stream for the placement of a wind turbine that coexists easily with other and uses, i.e. it does not materially affect the productivity of the land, generally occupying around 1.5-2% of the total land area. In some cases, the provision of improved access tracks and supply of power to remote areas of a property may also create improvements in the land's productive capacity.¹²

Overseas studies

4.13 Origin Energy submitted that overseas studies have found there is little to suggest that wind farms impact negatively on the value of neighbouring properties. Origin drew the Committee's attention to a Sustainability Victoria publication that referenced studies carried out in the USA and Denmark.¹³

9 *Committee Hansard*, 28 March 2011, p. CA 59.

10 Assessment of Economic Impacts of the Oaklands Hill Wind Farm Proposal Prepared by Peter Prasser for The Grampians Glenthompson Landscape Guardians Inc, *Submission 349*.

11 *An economic assessment of the proposed McHarg Ranges wind farm*, Report by Access Economics Pty Limited for Residents against Turbines of Tooborac, Access Economics December 2008, p. 50.

12 *Submission 650*, p. 7.

13 *Wind Energy Myths and Facts*, Sustainability Victoria, May 2007, p. 11, quoted in Origin Energy, *Submission 591*, p. 11.

4.14 The Danish study referred to above evaluated the costs to nearby households caused by the visual effects and noise of nearby windmills. This evaluation was done partly by means of a house price survey. The study found, among other things, that in certain cases there are considerable costs for a few households. Houses which lay close to a single windmill were approx. DKK 16,200 (approx. \$3000) cheaper than other houses – with parity of other factors – and houses which lay close to a windmill park with 12 windmills were DKK 94,000 (approx. \$17000) cheaper – with parity of other factors.¹⁴

4.15 The Clean Energy Council (CEC) cited an overseas study undertaken by the US Department of Energy's Lawrence Berkeley National Laboratory (LBNL). That study found that even for homes situated within a one-mile distance of a wind project, no persuasive evidence of a property value impact had been found.¹⁵ The study was based on site visits, data collection and analysis of almost 7,500 single-family home sales in areas where wind farms have been developed.¹⁶ Despite reaching the above conclusion, the report suggested that the primary goal of further research should be to concentrate on those homes located closest to wind facilities where the least amount of data are available.¹⁷

4.16 The CEC also referred to a Canadian study that concluded that 'where wind farms are clearly visible, there was no empirical evidence to indicate that rural residential properties realised lower sale prices than similar residential properties within the same area that were outside of the 'viewshed' of a wind turbine'.¹⁸

4.17 A study of land values in Texas (USA) indicated that values of rural land diminished by 27 to 50 percent as the result of the establishment of a wind farm.¹⁹ The study, which was presented to a Wind and Wildlife Conference in 2009, compared

14 *Social Assessment of Wind Power; Visual Effect and Noise from Windmills Quantifying and Evaluation*. Jorge Jordal-Jorgensen, AKF, April 1996, Summary. <http://www.windaction.org>, accessed 1 June 2011.

15 *The Impact of Wind Power Projects on Residential Property values in the United States: A Multi-Site Hedonic Analysis*, Ben Hoen, Ryan Wiser, Peter Cappers, Mark Thayer and Gautam Sethi, Ernest Orlando Lawrence Berkeley National Laboratory, Environmental Energy Technologies Division, December 2009, p. 75, <http://eetd.lbl.gov/EA/EMP>, accessed 2 June 2011.

16 *Submission 67*, pp 8–9.

17 *The Impact of Wind Power Projects on Residential Property Values in the United States: A Multi-Site Hedonic Analysis*, Ben Hoen, Ryan Wiser, Peter Cappers, Mark Thayer and Gautam Sethi, Ernest Orlando Lawrence Berkeley National Laboratory, Environmental Energy Technologies Division, December 2009, p. 75, <http://eetd.lbl.gov/EA/EMP>, accessed 2 June 2011.

18 *Submission 67*, p. 9.

19 Friends of Collector, *Submission 836*, p. 8.

direct sales of seven properties in south Texas.²⁰ Interestingly, the presenter of the paper noted that the highest use of Texas rangeland is now 'recreational use', which includes what would be described in Australia as 'lifestyle properties'.

4.18 Another study from the USA was submitted by an experienced professional real estate appraiser, Mr Michael McCann, to the Adams County Board (Illinois, USA) in relation to a proposed wind farm in the county. Mr McCann suggested that there would be a 25 percent loss factor for homes in the footprint of the wind farm, and an average 5 percent value diminution factor for all homes in the 2-mile zone.²¹ Mr McCann also criticised the LBNL report, stating that the study tended to minimise the impacts, 'as the carefully crafted language in the report's executive summary appears to indicate is the case'.²²

4.19 Although there were conflicting views expressed, there were sufficient indications in the evidence to suggest that the value of rural lifestyle properties in close proximity to wind farms may be adversely affected by the establishment of the wind farms. Agricultural properties near wind farms which do not host turbines may not be similarly affected, although there could be some diminution of values if dwellings on the properties are situated very close to turbines. There might also be some negative effects on agricultural property values if those properties could not utilise aerial applications of fertiliser, seeds and pesticides.²³

4.20 The value of properties that are hosts to wind turbines should increase provided of course that the rights to rentals for the turbines are transferable with the sale of the property. It was argued by wind farm developers that turbines occupy only a minute percentage of the land and may improve it to the extent that tracks are maintained and that some electric facilities might be available in areas of properties where they had not been before.²⁴

Compensation and property guarantees

4.21 Some witnesses suggested that because wind farms devalue adjacent properties the developers should pay compensation to those affected. Mrs Read, Secretary, Western Plains Landscape Guardians, stated that:

20 Derry T Gardner, Gardner Appraisal Group Inc., Impact of Wind Turbines on Market Value of Texas Rural Land, prepared for South Texas Plains Agriculture Wind and Wildlife Conference, 13 February 2009, American Wind Power Center and Museum, Lubbock, Texas. <http://texas-wildlife.org>, Accessed 2 June 2011.

21 Michael S McCann, McCann Appraisal, LLC, Submission to the Chairman and members of the Adams County Board, 8 June 2010, p. 16.

22 Michael S McCann, McCann Appraisal, LLC, Submission to the Chairman and members of the Adams County Board, 8 June 2010, p. 14.

23 See Aerial Agricultural Association of Australia, *Submission 2*.

24 See, for example, Mr Burn, *Committee Hansard*, 29 March 2011, p. CA 93.

Developers of wind farms have a duty to pay compensation for loss of property value to neighbouring or affected properties.²⁵

4.22 Mr Jonathon Upson, Senior Development Manager, Infigen Energy, when commenting on the matter of compensation for neighbouring property holders, quoted at length from a decision of the NSW Land and Environment Court in relation to the Cullerin Range wind farm, as follows:

Commissioner Tim Moore responded to the Landscape Guardians group's argument that neighbours should be compensated for the blight and perceived loss of property values by stating:

Such a proposition faces a number of insurmountable hurdles.

The first is that the wind farm, as earlier noted, is a permissible use on all of the parcels of land upon which it is proposed to be located ... If the concepts of blight and compensation, as pressed by the Guardians, were to be [adopted and] applied to this private project (a proposition which I reject) then any otherwise compliant private project which had some impact in lowering the amenity of another property ... would be exposed to such a claim.

Creating such a right to compensation (for creating such a right it would be) would not merely strike at the basis of the conventional framework of land use planning but would also be contrary to the relevant objective of the [Planning] Act ...for the promotion and co-ordination of the orderly and economic use and development of land.²⁶

4.23 Mr Upson argued that if every proposed infrastructure development—a rail line, a hospital, a power line, a shopping centre, a freeway—were subject to every neighbour being able to put their hand out for compensation according to their perceived amenity impact, the planning system would descend into chaos and few, if any, development projects would ever proceed. He stated that:

We believe that wind farm projects are just another infrastructure project and we should be treated with the same rules and regulations that other infrastructure project go by.²⁷

4.24 If it were decided to compensate households that experience adverse effects from a project, it would be difficult to determine how an appropriate level of compensation might be set, who should be compensated and who should pay. The NSW Legislative Council Committee recommended that the state minister should commission research into compensation options and that the research should

25 *Committee Hansard*, 28 March 2011, p. CA 23.

26 *Committee Hansard*, 29 March 2011, pp CA 93–94.

27 *Committee Hansard*, 29 March 2011, p. 94.

investigate options including the purchasing of affected properties and/or the provision of monetary compensation by the developer.²⁸

4.25 At the moment host landholders gain financial benefits but neighbours miss out. This leads to problems within communities. CSIRO suggested that the issue might be addressed by implementing alternative models of compensation, as follows:

Alternative models of compensation could involve agreements to formally share royalties between landholders whose properties host the turbines on a sliding scale with the immediate neighbours who experience visual intrusion (as assessed by the wind farm design). In addition, often the 'community fund' established by the wind farm developer is directed into the local council's consolidated revenue. An alternative approach to address inequitable financial gains would be to direct this to those community members most negatively impacted.²⁹

4.26 The Clean Energy Council submitted that:

The planning and approvals systems that operate throughout Australia provide a transparent process open to third party representations to ensure potential impacts at regional, local and site levels are thoroughly assessed and developments are only granted planning permits if they meet the established planning policies and provisions or have conditions imposed to ensure they comply. This process already provides opportunities for both developers and land owners to enter into commercial arrangements outside of the regulated approval process.³⁰

4.27 Mr William Elsworth, a resident of Smeaton, Victoria, stated that developers should be required to give property guarantees. He informed the Committee that:

In America it is starting to happen where local authorities are making wind companies provide a property guarantee for people who neighbour wind farms to protect those people.³¹

4.28 Mr Elsworth's claim that property guarantees are given in at least some counties in the United States of America is supported in Mr McCann's submission to the Adams County Board.³²

28 *Rural wind farms*, NSW Parliament, Legislative Council General Purpose Standing Committee No. 5, Report 31, December 2009, p. 83.

29 *Submission 579*, p. 6.

30 *Submission 67*, p. 9.

31 *Committee Hansard*, 28 March 2011, p. CA 63.

32 Michael S McCann, McCann Appraisal, LLC, Submission to the Chairman and members of the Adams County Board, 8 June 2010, p. 6.

Committee view

4.29 Although the impact of wind farms on property values is unclear, the value of some properties that are close to turbines may be adversely affected. In most cases, the Committee understands that planning processes such as setbacks are designed to avoid such situations. However, for such properties, government agencies might consider including in the planning processes provisions such as those suggested by CSIRO, which have been discussed in paragraph 4.25 above. In this regard, the Committee notes existing arrangements in New South Wales, whereby the planning minister can require a property acquisition clause to be included in a planning approval, if requested by the affected landowner.

Employment opportunities

4.30 CSIRO informed the Committee that 'job creation in wind farm construction and, to a lesser extent, in operation of the wind farm, was the second-highest aspect cited in support of wind farm development in the CSIRO media analysis. Financial benefits through indirect opportunities were also cited, including tourism potential'.³³

4.31 Mr Thompson, Director Development, Acciona Energy, informed the Committee that the Australian wind industry provides 2148 full-time equivalent jobs, which is expected to increase to more than 19 000 by 2020. Acciona had projects worth in the order of \$1.5 billion over the next three to four years and expected to employ more than 500 workers during the construction of the projects and 60 during operations.³⁴ AGL stated that its wind farms at Hallett in South Australia had employed an average of 98 construction workers at any one time from 2005 to 2010.³⁵ Other developers also provided data on employment on their projects.³⁶

4.32 Significant indirect employment may result from the development of wind farms. A report commissioned by AGL on the economic impact of the Hallett wind farms (SKM report) used a multiplier of three to estimate the numbers of indirect jobs generated by the development of Hallett. The multiplier was based on one that was used in an earlier report which in turn used a calculation of the European Wind Energy Association. According to the SKM report, the figure may be conservative because 'it is significantly lower than the national multiplier for the electricity, gas and water sector (over 6) and the non residential construction sector (over 4)'.³⁷ Using this

33 *Submission 579*, p. 5.

34 *Committee Hansard*, 29 March 2011, p. CA 68.

35 Ms S McNamara, *Committee Hansard*, 25 March 2011, p. CA 64.

36 See, for example, Mr T Mitchell, Union Fenosa Wind Australia, *Committee Hansard*, 25 March 2011, p. CA 68.

37 *Economic Impact Assessment of the Hallett Wind Farms*, Final Report, Sinclair Knight Merz, 8 July 2010. p. 40.

multiplier, the SKM report suggested that the Hallett project could have generated an extra 2400 full time equivalent job years.³⁸

4.33 Flow-on employment effects may be observed at Keppel Prince Engineering in Portland, Victoria, which employs 150 people dedicated to wind farm activity. The company has built wind farms in Australia and has exported parts to New Zealand and Portugal.³⁹ Another example is American Superconductor Corporation which sells solutions that help connect wind and solar farms to the grid and which has recently opened its first office in Australia.⁴⁰

4.34 Not all of the jobs generated by a wind farm development will be in the local region, although the industry attempts to employ locally wherever possible. Workers in the regions will not have all the necessary skills, but the following workers and businesses may benefit directly:

- Domestic scale electricians
- Transport operators
- Machine operators
- General labourers
- Quarries
- Concreters⁴¹

4.35 Indirect benefits will also accrue to local businesses, such as stores and providers of accommodation, who provide services for the workers. Many of these local benefits will be temporary, however, because the construction phase is much more labour intensive than the operations and maintenance phase. Nevertheless, employment in the regions of wind farms should increase somewhat in the longer term and may be bolstered to the extent that rentals paid to host landholders and rates paid to local governments remain in those regions.

4.36 Acciona submitted that 200 people were employed on the construction of Waubra and 30 people are employed on operations and maintenance.⁴² Origin Energy submitted that a general rule of thumb is that for every 25 turbines three on-site jobs are generated.⁴³

38 *Economic Impact Assessment of the Hallett Wind Farms*, Final Report, Sinclair Knight Merz, 8 July 2010. p. 44.

39 Mr Stephen Garner, General Manager, Keppel Prince Engineering Pty. Ltd., *Submission 294*.

40 Mr John Wright-Smith, Australian Sales Manager, American Superconductor Corp., *Submission 486*.

41 *Economic Impact Assessment of the Hallett Wind Farms*, Final Report, Sinclair Knight Merz, 8 July 2010, p. 45.

42 *Submission 650*, p. [8].

43 *Submission 591*, p. 12.

4.37 The construction of wind turbines requires some skills that are not readily available in the rural regions where wind farms are developed and in some cases not in Australia. However, the industry attempts to employ local people. Acciona submitted that:

Whenever possible, we source employment locally. For example, our Waubra Wind Farm in rural western Victoria sourced approximately 80% of the jobs from the region during both the construction and operations and maintenance phases of the project.⁴⁴

4.38 Acciona also submitted that:

The wind energy sector contributes to building skilled employment, which is particularly relevant to addressing skill gaps and providing a pathway for industry growth in the renewable energy industry, a long-term and worldwide industry. As an example of the upskilling of the local workforce, at ACCIONA Energy we provide in-house training for tradespeople to become technicians that acquire both electrical and mechanical skills. Moreover, many of the skills are transferable to other industries, both locally or further afield.⁴⁵

4.39 Employment on wind farms is concentrated and hence easily measured, but it is not easy to estimate employment effects in the wider economy. As discussed, some of these flow-on effects will be positive, resulting from the economic activity generated by wind farm developments. Negative effects could result from increased electricity prices and opportunity costs (if the investment in wind power were at the expense of other economic activities).

4.40 The Committee received little information about negative employment effects and nothing from an Australian perspective. One submitter, the Australian Landscape Guardians (ALG) referred to work done in Spain that found that increased power costs from wind energy in that country caused the loss of 2.2 jobs for every job created in the wind industry. On that basis, ALG estimated that the 84 jobs generated by the Stockyard Hill project would destroy 184 jobs—a net loss of 100 jobs.⁴⁶

4.41 The study to which ALG referred is a *Study of the Effects on Employment of Public Aid to Renewable Energy Sources*, from King Juan Carlos University in Spain.⁴⁷ That study has been criticised on a number of grounds, including that it deviates from the traditional methodologies used to estimate job impacts and that it lacks transparency and supporting statistics. The criticism is contained in a paper

44 *Submission 650*, p. [8].

45 *Submission 650*, p. [8].

46 *Supplementary Submission 6*, p. 25.

47 Alvarez, G.C.; Merion Jara, R.; Rallo Julian, J.R. (2009). *Study of the Effects on Employment of Public Aid to Renewable Energy Sources*. King Juan Carlos University. March 2009.

produced by the National Renewable Energy Laboratory which is operated for the US Department of Energy by the Alliance for Sustainable Energy.⁴⁸

4.42 In Australia it has been estimated that the cost of electricity will increase by about 4 to 5 percent as a result of the implementation of the RET.⁴⁹ Mr Swift, Executive General Manager Corporate Development, Australian Energy Market Operator, told the Committee that wind power at the moment is significantly more expensive than gas or coal generation. He indicated that the additional cost was equivalent to the price of Renewable Energy Certificates which were trading at about \$39 per MWh.⁵⁰ The Committee did not receive evidence that would have allowed it to estimate the employment effects of this cost on business in other sectors of the Australian economy.

Committee view

4.43 In the absence of relevant data it is not possible to calculate the net employment effects of the development of the wind industry on the Australian economy. However, the Australian industry clearly generates many jobs especially in the regions and will continue to generate significant levels of direct and indirect employment. The Committee supports the development and use of a skilled local workforce both in the construction and maintenance of wind farms.

4.44 In the Committee's view, even if the net gains in employment were small, the public good, i.e., greenhouse gas abatement, which is produced by the wind industry, should be taken into account.

Farm income

4.45 Landholders who host turbines receive some recompense for the long-term use of their land. Landholders who adjoin wind farms do not, although in some cases they may be subject to as much nuisance from the facility as those who benefit financially. This has been identified as a major issue in this inquiry.

4.46 For the hosts, the income received from rent or lease of their land to wind farm operators may be the difference between having a viable business and losing their livelihood. Infigen Energy submitted that several families participating in its Lake Bonney wind farm indicated that the lease payments had been the difference

48 Eric Lanz and Suzanne Tegen, *NREL Response to the Report Study of the Effects on Employment of Public Aid to Renewable Energy Sources* from King Juan Carlos University (Spain), White Paper NREL/TP 6A2-46261, August 2009, p. 5.

49 McLennan Magasanik Associates, *Impacts of Changes to the Design of the Expanded Renewable Energy Target*, May 2010, quoted in the Senate Environment, Communications and the Arts Legislation Committee Report on the Renewable Energy (Electricity) Amendment Bill 2010 [Provisions] and two associated bills, June 2010, p. 6.

50 *Committee Hansard*, 17 May 2011, p. CA 6.

between them being able to continue farming and having to sell out.⁵¹ It is therefore understandable that there is an incentive for some farmers to encourage the development of wind farms. For others who do not benefit financially there may be costs in terms of living amenity or even financial costs from living and working in close proximity to wind turbines.

4.47 In theory, everyone living in a region where a wind farm is established should receive some indirect financial benefit from increased employment and economic activity, or from the contributions made by wind farm operators to local government and local community organisations. Acciona informed the Committee that:

... in Victoria, a typical rate contribution from a wind farm is \$40,000 + \$900 per megawatt of rated capacity per annum. Over 20-25 years of a 100 MW wind farm, this can equate to \$130,000 per year or \$3.6 million (indexed to CPI) in local rates in aggregate.

...

The Community Benefit Fund for Waubra Wind Farm, for example, provides \$64,000 per year (indexed to CPI) which will contribute over \$1.6 million to that community over the initial term of the project.⁵²

4.48 The Committee did not receive any detailed information in relation to the financial benefits obtained by farmers who lease land to wind farm operators. The operators are not prepared to make this information public and the hosts are bound by commercial confidentiality agreements. Some host landholders are reluctant to release this information. Some submitters provided estimates. These estimates ranged widely, but indicated that leasing land to wind farm operators is at the least a good supplement to other farm income. Infigen Energy submitted that press reports had suggested that lease payments were from \$8000 to \$10 000 a year.⁵³ Mr Hodgson from the Friends of Collector suggested that most landholders receive \$12 000 to \$15 000 per year for turbines but that at Collector Transfield is proposing to pay \$2500 per turbine which he described as 'woefully inadequate'.⁵⁴

51 *Submission 652*, p. 6.

52 *Submission 650*, p. 9.

53 *Submission 652*, p. 6.

54 *Submission 837*, p. 4.

Committee view

4.49 The Committee considers that the wind industry generally makes a significant contribution to farmers' incomes either directly through the payment of rent to individual landholders or indirectly to other landholders through increased economic activity in the region and payments to local councils and community organisations.

Senator Rachel Siewert

Chair

ADDITIONAL COMMENTS

SENATOR JUDITH ADAMS

THE SOCIAL AND ECONOMIC IMPACT OF RURAL WIND FARMS

This inquiry drew an enormous response from international and Australian researchers and wind farm developers as well as from the general public.

| | |
|-------------------|------|
| Total Submissions | 1017 |
| Pro - Wind Farms | 535 |
| Anti - Wind Farms | 468 |
| Neutral | 14 |

Throughout the inquiry the statement from the National Health and Medical Research Council (NHMRC) has been relied upon by developers in the wind industry to suggest that Australian research had settled the question of any adverse health effects, caused by living in close proximity to wind turbines.

The NHMRC's 'rapid review' of the evidence concluded that: 'There is currently no published scientific evidence to positively link wind turbines with adverse health effects'.

NHMRC gave evidence at the Inquiry, Senate Budget Estimates and held a scientific forum on 7 June 2011—'Wind Farms and Human Health'.

The forum was facilitated by Dr Gael Jennings with the opening address by Professor John McCallum (NHMRC), Professor Geoffrey Leventhall and Professor Mariana Alves-Periera formed the first Scientific Panel to speak on 'Current evidence and health impacts'.

The second Scientific Panel comprised Dr Bob Thorne—human perception and infrasound and Dr Simon Chapman—psycho-social factors.

The third panel comprised Dr Sarah Laurie (Chair), Ms Bernie Janssen, Mr Donald Thomas and Mr David Page—personal stories.

A summary was presented by the NHMRC's Chief Executive Officer Professor Warwick Anderson. After lunch small group workshop sessions were held, at which evidence gaps, public concerns and other issues were discussed.

Following the scientific forum, Professor Anderson presented a communiqué on the day's proceedings:

Wind Farms and Human Health Scientific Forum 7 June 2011

I am pleased to provide a preliminary communiqué on today's Wind Farms and Human Health Scientific Forum.

The constructive approach taken by all participants will assist the National Health and Medical Research Council in its review of its Public Statement on Wind Turbines and Health.

In developing the Forum, we were committed to achieving a balance of representatives. The forum was attended by consumers, leading international researchers, Australian researchers and industry representatives. As a result of the wide range of views that were brought to the Forum, NHMRC will be able to continue to build on its understanding of the issues.

Today, we heard presentations about the acoustic issues in audible and sub-audible noise, the experiences of people living near wind farms and a discussion about some of the sociological and psycho-social factors that need to be taken into consideration.

We also invited our participants to work together to discuss a range of questions. Their responses to those questions will be considered by Council as part of the review of the NHMRC statement.

The NHMRC has the responsibility under its legislation, and the capacity, to provide health advice. We can provide an objective overview of the scientific literature to help to balance out where information is unclear or missing.

The NHMRC will ask its Council, which comprises eminent researchers and the Chief Medical Officers of the States and Territories, to consider the outcomes of today's Forum and an NHMRC literature review as part of its review of its Statement.

Today's Scientific Forum was the first time that NHMRC has used web streaming. This made the presentations and discussions in the morning session available to a wide range of people. We are pleased that we were able to provide that accessibility in Australia and internationally.

Finally, I would like to thank the speakers and participants who came together today to discuss their research and experience with wind farms. I am grateful for their willingness to give us their time today.

NHMRC Council meeting

As NHMRC informed the Committee on 21 June 2011:

At the NHMRC Council meeting held on 16 and 17 June 2011, Council members considered the outcomes of the forum and recommended that NHMRC commissions experts to systematically review the scientific literature, especially focussing on the possible health impacts of audible noise and infrasound.

Depending on the results of this review, the NHMRC Public Statement would be updated and consideration would be given to targeted research in this area.

NHMRC will continue to keep the Community Affairs Committee informed of their work on this important issue.

As a member of this Committee I am pleased that the NHMRC is prepared to continue investigating the issue of any adverse health effects caused by wind turbines.

In April I had the opportunity to join a Parliamentary Delegation to travel to Denmark, Sweden and Greece. Renewable energy was the main issue the delegation undertook to study and the three countries we visited all had a large number of wind farms.

We met with a number of wind farm developers and all were of the opinion stated by the NHMRC that 'there is currently no published scientific evidence to positively link wind turbines with adverse health effects'.

Community groups in all three countries were concerned about health issues that may have been caused by living close to wind turbines. To date they do not have any peer reviewed scientific evidence to substantiate their concerns.

An independent study partly funded by the Danish government and published in the *Acoustical Society of America Journal* June 2011 confirms:

beyond any doubt that the low-frequency part of the spectrum plays an important role in the noise at neighbours and that the low-frequency sound must be treated seriously in the assessment of noise from large turbines.¹

This published peer reviewed research from June 2011 has found that:

...results confirm the hypothesis that the spectrum of wind turbine noise moves down in frequency with increasing turbine size. The relative amount of emitted low frequency noise is higher for large turbines than for small turbines...

Large turbines affect the same area—or possibly even larger areas—with noise when compared to small turbines with the same total installed electric power.²

As a Western Australian Senator I am concerned at the number of proposed wind farms that are to be constructed in rural Western Australia. It appears that wind farm developers are taking advantage of the generous subsidy offered by the Government to meet renewable energy targets.

The height of the turbines is increasing and the latest wind farm proposal to be constructed at Williams in the Central Great Southern Region of Western Australia will have turbines of 194 metres.

1 Henrik Møller and Christian Sejer Pedersen, 'Low-frequency noise from large wind turbines', *Journal of the Acoustical Society of America*, June 2011, 129(6), p. 3735. This research was commissioned by Delta.

2 Henrik Møller and Christian Sejer Pedersen, 'Low-frequency noise from large wind turbines', *Journal of the Acoustical Society of America*, June 2011, 129(6).

Lack of early community consultation has caused a great deal of angst in small rural communities where wind farms are to be developed and it seems unfair that Local Governments have been given the responsibility to make the decision as to whether the application is to be approved.

If it is proved that adverse health effects are caused by living in close proximity to wind turbines it will be essential that a setback ruling is legislated. Currently there is no setback rule in Western Australia.

Senator Judith Adams

Liberal Party

FAMILY FIRST

ADDITIONAL COMMENTS

Family First initiated a Senate inquiry in order to allow for proper consideration of a number of concerns that were raised with our office and in particular, to investigate claims that wind farms are causing adverse health effects for residents living in close proximity to them.

What has become evident during the Senate hearings is that there is an enormous divergence of views expressed by the proponents and opponents of wind farms. There have also been serious concerns about the over-reliance by wind farm developers on the National Health and Medical Research Council's rapid review of evidence, and public statement on wind farms and health, both released in July 2010.

A number of submissions have sought to highlight the economic benefits or pitfalls of Australia's renewable energy policy and whether wind power has a viable future in this country. However, Family First's main focus has always been on whether or not wind turbines pose a serious health risk to local residents.

Health

There have now been many inquiries, of which this Senate committee investigation is just one, that have uncovered numerous cases where adverse health effects have been attributed to wind farms.

These issues have been identified in cases around the world, wherever wind farms have been built. As a result, there have been reviews of the public health effects of wind farms not only in Australia but internationally. Many of these reviews, however, have been confined to examination of the existing literature, rather than conducting new research that directly targets the issues. Examples include a 2008 report by the Chatham-Kent Public Health Unit for the Chatham-Kent Municipal Council in Canada, a 2011 report by Delta consulting for the Danish Ministry of the Interior and Health, and the 2010 NHMRC rapid review of evidence on wind farms and health.

Research consistently shows that the noise from wind farms at levels below those required by planning guidelines is annoying to nearby residents and causes sleep disturbance. It would also appear that there is a link between the symptoms of stress and disturbance by wind farm noise. There are also other serious health symptoms reported by some of these residents. There is no adequate research to explain these cases.

We simply do not know enough about the health effects on individuals and communities that find themselves adjacent to these large developments. As a consequence, Family First remains concerned about the use made by wind farm

developers of the NHMRC's rapid review of evidence on wind farms and health. Family First thinks the NHMRC's evidence to this committee is critical:

We regard this as a work in progress. We certainly do not believe that this question has been settled. That is why we are keeping it under constant review. That is why we said in our review that we believe authorities must take a precautionary approach to this. That is what we do say in medicine anyhow, but this is very important here because of the very early stage of the scientific literature.¹

It is notable that, since the NHMRC has given evidence to the inquiry, it initiated a scientific forum on the issue, initiated a systematic review of the literature, and may update its previous statements.²

While this is encouraging, the misuse of the NHMRC's work by developers has damaged the perceived independence of the NHMRC in the eyes of those in affected communities. Mr Mitchell from Australian Landscape Guardians said 'The NHMRC and the state departments of health have not got off their chairs. They do not know what is going on'.³

Dr Pierpont commented of the study that it was:

A really pitiful and dubious document, and I have just reviewed it. It has also been reviewed by Dr Robert McMurtry in Canada, a dean at a medical school. I am also a PhD scientist, and I know about evidence. The sources used in this document are mostly government sources and other non-scientific, non-peer reviewed sources, and of the peer reviewed sources they cite, one of them I know well, which is the Pederson and Persson Waye, and they misused their information...

Many of the sources it cites are also direct wind industry documents, from the American and Canadian Wind Energy Association and the Australian Wind Energy Association. These are not independent sources, these are industry documents. This is not scientific critique. There is an obvious conflict of interest in what these documents and people have to say.⁴

Dr Laurie remarked:

I must admit that when I read the NHMRC document not only was I disturbed; I was a little appalled. There was a lack of recognition about the conflict of interest and the issues which were emerging even then, back in July, particularly in Waubra in Victoria. There were reports emerging then. To just ignore people I think was unconscionable.⁵

1 Professor Warwick Anderson, *Committee Hansard*, 31 March 2011, p. CA 87.

2 NHMRC, correspondence to the committee, 21 June 2011.

3 Mr Peter Mitchell, *Committee Hansard*, 28 March 2011, p. CA 18.

4 Dr Nina Pierpont, *Committee Hansard*, 25 March 2011, p. CA 19.

5 Dr Sarah Laurie, Waubra Foundation, *Committee Hansard*, 29 March 2011, p. CA 39.

The committee has recommended that the NHMRC review of evidence should continue, with regular publication. However, Family First believes that there must now be a role for an independent organisation in reviewing the existing literature. A body that operates at arm's length from government should review the evidence and the work of the NHMRC to date. This could be a university research centre with expertise in medical research and policy, or a research and policy institute. Organisations that could conduct such an independent review include the Sax Institute, which conducts evidence check reviews in the areas of health policy and medicine.⁶

It is also necessary that new research be conducted on the health issues themselves. Family First endorses the committee's recommendation that the National Acoustics Laboratories (NAL) conduct a study and assessment of noise impacts, including the impacts of infrasound.

However, NAL's mission is 'to lead the world in research and development that improves the way hearing is assessed, hearing loss is prevented, and hearing loss is rehabilitated'. This is a much narrower brief than the full range of health issues associated with wind farms.

Broader research must be conducted. The committee has recommended that the Commonwealth Government initiate as a matter of priority thorough, adequately resourced epidemiological and laboratory studies of the possible effects of wind farms on human health. Family First endorses this, and emphasises that there must be a sense of urgency.

It is also vital that the research be peer-reviewed, and be conducted by individuals and organisations that do not have an ongoing relationship with the wind energy industry. Organisations that could conduct this research include the Australian National University's National Centre for Epidemiology and Population Health (NCEPH). Family First also notes the evidence of Dr Laurie, indicating there are existing research proposals ready to be undertaken that could be funded.⁷ These should be given serious consideration.

Planning controls

Family First notes that the current trend is toward tightening controls around wind farm development, and believes that this is for good reason. The Victorian government has recently revised its planning guidelines for wind farms. The revisions have included setting more stringent noise limits in low-noise environments:

6 Sax Institute, Evidence Check Reviews, <http://www.saxinstitute.org.au/policyresearchexchange/EvidenceCheckReviews.cfm?objid=945#Types>, accessed June 2011.

7 Dr Sarah Laurie, Waubra Foundation, *Committee Hansard*, 29 March 2011, p. CA 40.

The *New Zealand Standard NZS 6808:2010, Acoustics – Wind Farm Noise* (the Standard) specifies that a noise limit of 40 decibels is appropriate for the protection of sleep, health and amenity of residents at most locations... Importantly, the Standard also sets out a process to determine if a more stringent limit should apply in specific noise sensitive locations (discussed below).

All wind farm applications will need to be assessed to determine if the location warrants application of the Standard's more stringent 'high amenity noise limit' of 35 decibels as set out in Section 5.3 of the Standard. The high amenity standard applies in special circumstances, such as in an environment where the background noise level is particularly low.⁸

Evidence received by the committee strongly suggests that most, if not all, wind farm developments outside built-up areas should require the high amenity standard.

Victoria has also set a greater distance as the guidelines for notification of affected neighbours:

Responsible authorities should ensure affected parties are fully informed of a proposed Wind energy facility development. It is suggested that all property owners with dwellings within 2 km of a proposed turbine are notified of a proposal, as a minimum.

The New South Wales Legislative Council Committee report on rural wind farms recommended that the NSW Minister for Planning 'include a minimum setback distance of two kilometres between wind turbines and residences on neighbouring properties in the *NSW Planning and Assessment Guidelines for Wind Farms*'.⁹

Family First recognises that establishing guidelines for any development project can be complex. However, planning controls must take account of the nature of the proposed development and its potential adverse impacts.

In this regard, Family First notes that independent studies have shown that residents are annoyed by wind farm noise at far lower decibel levels than they are by road and aeroplane noise.¹⁰ Family First believes that planning controls and development guidelines should reflect this fact.

8 Victoria Planning Provisions, 'Amendment VC78 - Wind energy facility provisions - Clause 52.32', Advisory Note 35, March 2011, http://www.dpcd.vic.gov.au/_data/assets/pdf_file/0011/59897/AN35-Amendment-VC78-wind-energy-facility-provisions.pdf, accessed June 2011.

9 NSW Legislative Council General Purpose Standing Committee No. 5, *Rural wind farms*, December 2009, p. 68.

10 Delta, for the Danish Ministry of the Interior and Health, *Relationship between noise from wind turbines and health effects*, March 2011; Frits van den Berg et al., Project WINDFARM perception: Visual and acoustic impact of wind turbine farms on residents, June 2008, <http://www.epaw.org/documents/WFp-final-1.pdf>, accessed June 2011.

Recommendation 1

Family First recommends that, at a minimum, planning controls and development guidelines in all states and territories should require that wind farm proposals meet the high amenity noise limit in Section 5.3 of *New Zealand Standard NZS 6808:2010, Acoustics – Wind Farm Noise*.

Recommendation 2

Family First recommends that, at a minimum, planning controls and development guidelines in all states and territories should require all property owners with dwellings within 2 km of a proposed turbine to be notified of a development proposal.

Recommendation 3

Family First recommends that the EPHC's draft *National Wind Farm Development Guidelines* be revised to reflect the position outlined in the two recommendations above.

Recommendation 4

Family First recommends that, in addition to immediately acting on the above recommendations, all states and territories should review their planning controls and development guidelines for wind farms within three years to consider whether new research on the health impacts of wind farms warrants further tightening of development conditions, including possible mandatory setbacks.

Senator Steve Fielding

Family First Party

APPENDIX 1

SUBMISSIONS AND FORM LETTERS RECEIVED BY THE COMMITTEE

Submissions

- 1 Ms Helen White
- 2 Aerial Agricultural Association of Australia *plus* Attachments
- 3 Mr Paul Cross
- 4 Eyre Peninsula Local Government Association
- 5 Ms Vicki Mitchell
- 6 Australian Landscape Guardians
 - Supplementary Submission
- 7 Mr Dave Clarke
- 8 Friends of Arran Lake / Central Bruce Grey Wind Concerns
Ontario (WCO) *plus* Attachments
- 9 Mrs Suzanne Giddins
- 10 Name Withheld
- 11 Name Withheld
- 12 Mr Chris Kirk *plus* Attachments
- 13 Dr. Nina Pierpont, MD, PhD
- 14 Name Withheld
- 15 Mr Ken and Mrs Rosemary Rees
- 16 Mrs Lee Watt
- 17 Mr Tony Edney
- 18 Mr Richard Dewick
- 19 Mr Peter Russell-Clarke
- 20 Artists for the Environment Landscape Guardians
- 21 Mrs Heather and Mr John McMahon
- 22 Dr David Spooner
- 23 Upper Lachlan Shire Council *plus* Attachments
- 24 The Alliance to Protect Prince Edward County *plus* Attachment
- 25 Mr P C Wilson
 - Supplementary Submission

- 26 Mr Bryan Leyland
- 27 Mr Val Martin *plus* Attachments
- Supplementary Submission
- 28 Mrs Judith Meulblok
- 29 Mr Glenn R. Schleede *plus* Attachment
- 30 Mr Grant Church *plus* Attachment
- 31 Mr Andrew S. Reed
- 32 Viscount Christopher Monckton of Brenchley *plus* Attachment
- 33 Ms Jutta Reichardt *plus* Attachment
- Supplementary Submission
- 34 Mr Bert Mulder
- 35 Confidential
- 36 Mr Graeme Combe
- 37 Name Withheld
- 39 Mr Warwick Lister-Kaye
- 40 Mr Derek Partington *plus* Attachment
- 41 Dr Arline L. Bronzaft
- 42 Mr Simon Brown
- 43 Dr Kothar Terleth
- 44 Mr John Graham
- 45 Mr John Holliday
- 46 Mr Alain de la Charie
- 47 Mr Ian Albery
- 48 Prof. Hans-Günter Appel
- 49 Confidential
- 50 Tom and Susan Reakes
- Supplementary Submission
- 51 Ms Noreen Marshall
- 52 Mr Henrik Wachtmeister
- 53 Southern and Hills Local Government Association *plus* Attachments
- 54 Dr. Helen Schwiesow Parker *plus* Attachment
- Supplementary Submission
- 55 Mr Wiiam Oxenham

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| 56 | REpower Australia <i>plus</i> Attachment |
| 57 | Ms Lilli-Ann Green |
| 58 | Dr. Calvin Martin <i>plus</i> Attachments |
| 59 | Ms Maureen Anderson |
| 60 | Name Withheld |
| 62 | Ararat and District Historical Society (Langi Morgala Museum) |
| 63 | Mr David Tozer |
| 64 | Ms Christine Sawyer |
| 65 | Mr Joe Keynes |
| 66 | Mr Malcolm Linke |
| 67 | Clean Energy Council <i>plus</i> Attachments <ul style="list-style-type: none">• Supplementary Submission |
| 68 | Ms Wendy Rainbird |
| 69 | Mr Bob Wallace |
| 70 | Ms Margaret Burbidge |
| 71 | Ms Becky Heffernan |
| 72 | Ms Pam DiLorenzo |
| 73 | Mr Darryl Baxter |
| 74 | Mr Daryl O'Flaherty |
| 75 | Mr Geoffrey Clark |
| 76 | Mrs Megan Read |
| 77 | Name Withheld |
| 78 | Mr Timothy Novice |
| 79 | Name Withheld |
| 80 | Upper Hunter Landscape Guardians Inc |
| 81 | Mr Geoffrey Nyoni-Tonks |
| 82 | Name Withheld <i>plus</i> Attachment |
| 83 | Name Withheld |
| 84 | Mrs Amanda Coe |
| 85 | Mr Robert Broadbent <i>plus</i> Attachment |
| 86 | Name Withheld |
| 87 | Name Withheld |
| 88 | M Meika Loofs Samorzewski |

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| 89 | Mr Peter Stone |
| 90 | Name Withheld |
| 91 | Name Withheld |
| 92 | Mr David Eddey |
| 93 | Ms Tania Neville |
| 94 | Flyers Creek Wind Turbine Awareness Group |
| 95 | Mr Roger Bilney |
| 96 | Mr Case Smit |
| 97 | Ms Elizabeth Banks |
| 98 | Mr Andrew Grant |
| 99 | Ms Yvonne McRae |
| 100 | Mrs Helen Darbyshire |
| 101 | Mr Stuart Darke |
| 102 | Mr Peter Hansford, Woodend Integrated Sustainable Energy Group |
| 103 | Ms Sandra Hawkins |
| 104 | Edythe Anderson and Rosemary Holmes |
| 105 | Ms Jan Robbins |
| 106 | Confidential |
| 107 | Mr Jim Dunstan <i>plus</i> Attachment |
| 108 | Dr Rachel Robbins |
| 109 | Mrs Janine Hannan |
| 110 | Codrington Rural Fire Brigade |
| 111 | Ms Barbara Ashbee |
| 112 | Dr Bob Thorne |
| 113 | Mr Gordon Monsborough |
| 114 | Ms Muriel Scholz |
| 115 | Ms Carmen Krogh and Beth Harrington |
| 116 | Tanya, Bernard and children |
| 117 | Mr Alex McRae |
| 118 | Mr Rohan Arden, Safety Ba6 |
| 119 | Ms Janet Rice |
| 120 | Doug and Pauline Boatman |
| 121 | Anne and Allan Schafer |

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|-----|---|
| 122 | Ms Lorna Gilmore |
| 123 | Mr Alan Gillespie-Jones |
| 124 | Ms Marguerite Marshall |
| 125 | Ms Holly Marsh |
| 126 | Mr Douglass Cahill |
| 127 | Dr Bob Rich |
| 128 | Mr Craig Gaymer |
| 129 | Mr Carl Stepnell |
| 130 | Ms Samantha Stepnell |
| 131 | Ms Cheryl Small |
| 132 | Mr Douglas Hopkins |
| 133 | M C Robinson |
| 134 | Mr Roger Lillecrapp |
| 135 | Mr Graeme Leslie, Ararat Clay Target Club Inc. |
| 136 | Angela and Frank Kearns <i>plus</i> Attachments |
| 137 | Mr Michael Nugent |
| 138 | Nick and Lyndsey Ward |
| 139 | Ms Joy Ringrose |
| 140 | Ms Megan Bliss |
| 141 | Ms Tracey Sleet |
| 142 | Confidential |
| 143 | Susan and Alexander Dennis |
| 144 | NAWAG |
| 145 | Mr Kalvin Bartlett |
| 146 | Prom Coast Guardians Inc. <i>plus</i> Attachments |
| 147 | Ms Tracey Stringer |
| 148 | Mr David Tranter, Canwin |
| 149 | Mr Wayne Marsh |
| 150 | Confidential |
| 151 | Mr Andy Simpson |
| 152 | Dr George Deutsch |
| 153 | Mr Michael Weadon |
| 154 | Mr Peter Stafford |

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| 155 | Mr David Dawson |
| 156 | Mr David Price |
| 157 | Mr Dennis Long |
| 158 | Mr Norman McMurray |
| 159 | Ms Margret Lockwood |
| 160 | Mr Ian McBurney |
| 161 | Greenpeace Australia Pacific <i>plus</i> Attachment |
| 162 | Ms Heather McLaughlin |
| 163 | J and L Kinghorn |
| 164 | Mr Neil Barrett |
| 165 | Name Withheld |
| 166 | Mr Keith Staff <i>plus</i> Attachment |
| 167 | Mr David Robertson |
| 168 | Mrs Janet Walsh |
| 169 | Moyne Shire Council <i>plus</i> Attachments |
| 170 | Ms Gail Dawes |
| 171 | Ms Rosa Dawes |
| 172 | Name Withheld |
| 173 | Ms Petra Tiemann, Fuer Mensch und Natur Gegenwind Schleswig-Holsten e.V. |
| 174 | Mr Pascal Goux |
| 175 | Mr David Perry |
| 176 | Waubra Football and Netball Club |
| 178 | Dr Philip Machanick <ul style="list-style-type: none">• Supplementary Submission |
| 179 | Mr Don Jelbart |
| 180 | Kieron and Shirley Moore |
| 181 | Mr Michael Sayn |
| 182 | Name Withheld |
| 183 | Ms Jill Whitford |
| 184 | Ms Vivian Parish |
| 185 | Mr Tim Brady |
| 186 | Mr Zachary Casper |

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| 187 | Ms Kathy Williams |
| 188 | Mr Lorne Smith |
| 189 | Mr Fabienne Chapuis Hini, Association les Travers du Vent |
| 190 | Mr William Graham |
| 191 | Moya and Dermot Murphy |
| 192 | Ms Kirsten Mielsen |
| 193 | Ms Mireille Bonin, Terre Citoyenne |
| 194 | Ms Elizabeth Grieb |
| 195 | Mr Patrick Ryan |
| 196 | Mr Laurie Derrick, Lawrence Derrick and Associates |
| 197 | Mr Kurt van Wijck |
| 198 | Confidential |
| 199 | Ms Mary Prell |
| 200 | Mr Allan Barrett |
| 201 | Mr Geoff Kennedy |
| 202 | Mr Duane Chilcott |
| 203 | Mrs Lee Harrison |
| 204 | Dr Mark Diesendorf, Institute of Environmental Studies, University of New South Wales |
| 205 | Ms Sue Svenson |
| 206 | Ms Wilma Western |
| 207 | Mr Ingrid Radford |
| 208 | Mr Ulf Lindberg |
| 209 | Ms Jessie Wells |
| 210 | Mr Bernie Millane |
| 211 | Ms Sue Scarman |
| 212 | Mr Robert Scarman |
| 213 | Ms Noelene Nelson |
| 214 | Mr Gregory Olsen |
| 215 | Ms Lyn Hovey |
| 216 | Ms Dallas Kinnear |
| 217 | Name Withheld |
| 218 | Mr Dick Bowdler |

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|-----|---|
| 219 | Mr Colin Davidson |
| 220 | Mr Brian Burke |
| 221 | Mr Peter Hall |
| 222 | Confidential |
| 223 | Name Withheld |
| 224 | Mrs Christine Howie |
| 225 | Ms Deb Saunders |
| 226 | Mr Robert Meek |
| 227 | Mr Craig Chappelle, Denmark Community Windfarm Inc. |
| 228 | Mr Peter Reefman |
| 229 | Mr Brendan Ryan |
| 230 | Mr Josh Nash |
| 231 | Ms Kelly Mapleston |
| 232 | Mr Terry Teoh |
| 233 | Mr Kevin Quigley |
| 234 | Mr Peter Cook, Dandenong Ranges Renewable Energy Association Inc. |
| 235 | Name Withheld |
| 236 | Mr Kevin Ramholdt |
| 237 | Carmel and Kevin Simpson |
| 238 | Mr Rob Tozer |
| 239 | Ms Margaret Whitehead, Friends of Pallister's Reserve |
| 240 | Mr John Droz jr. |
| 241 | Mr Stephen Crowe |
| 242 | Mr Steve Symons, Roaring s Renewable Energy Pty Ltd |
| 243 | Mr Allan Brown |
| 244 | Name Withheld |
| 245 | Mrs Judy Mackinnon |
| 246 | Mr Steve Phillips |
| 247 | Mount Alexander Sustainability Group |
| 248 | Rodney and Margaret Read |
| 249 | Name Withheld |
| 250 | Ms Janet Kay |

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| 251 | Mr Nigel Baker |
| 252 | Epuron Pty Ltd |
| 253 | Ms Anna Grabis |
| 254 | Mr Angus King |
| 255 | Robert and Jill Warner |
| 256 | Liz Traeger and Dennis Dale |
| 257 | Mr Michael Balshaw |
| 258 | Ms Trish Jelbart |
| 259 | Mrs Caroline Harvey |
| 260 | Mr Toni Ryan |
| 261 | Dr Rob Phillips |
| 262 | Name Withheld |
| 263 | Mr David Morgans |
| 264 | Mr Mauri Johansson, National Association of Neighbors to Giant Land Wind Turbines |
| 265 | Ms Vicky Wood, Stop Molesworth Wind Farm |
| 266 | Mr David Clarke |
| 267 | Mr Michael Muldoon |
| 268 | Mr Ray Martin |
| 269 | Dr John R. Etherington <i>plus</i> Attachment |
| 270 | Name Withheld |
| 271 | Dr Bill Parker |
| 272 | Mr Graham Sturzaker |
| 273 | Ms Alicia Webb |
| 274 | Mr David Mitchell, Ararat and District Woodies Club Inc. |
| 275 | Save Our Scenery |
| 276 | Mr Dennis Workman |
| 277 | Mr Peter Skeel Hjorth |
| 278 | Mr Derek Wrigley |
| 279 | Mr Cliff Wallis |
| 280 | Name Withheld |
| 281 | Ian and Trixy Allott |
| 282 | Name Withheld |

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| 283 | Ms Collette McLean |
| 284 | Mr Adam Gray |
| 285 | Mr Alex Krisman |
| 286 | Mr Douglas Evans |
| 287 | Mr Jim King |
| 288 | Ms Mellissa Helbig |
| 289 | Robert and Margaret Whitehead |
| 290 | Environment Victoria |
| 291 | Dr John Foster |
| 292 | Mr Ben Courtice |
| 293 | Confidential |
| 294 | Keppel Prince Engineering Pty Ltd |
| 295 | Mr Harold Bracegirdle |
| 296 | Mr Marcus O'Brien |
| 297 | The Wind Turbine Company |
| 298 | Mrs and Mr Maureen and David Coleman |
| 299 | Mr Jon Strachan |
| 300 | Name Withheld |
| 301 | Ms Prudence Thompson |
| 302 | Ms Greer Taylor |
| 303 | Mr Alastair Greenall |
| 304 | Dr John Wells |
| 305 | Mr Bill Gresham |
| 306 | Mr Richard Paltridge |
| 307 | Mr Jim Allen |
| 308 | Dr Jim McDonald |
| 309 | Mr Robert Boelen |
| 310 | Climate Change Balmain-Rozelle |
| 311 | Ms Patricia Asch |
| 312 | Mr Peter Goddard |
| 313 | Ms Heather Flavel |
| 314 | Mr Christopher Stroud |
| 315 | Name Withheld |

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| 316 | Name Withheld |
| 317 | Mr David E. Rentsch |
| 318 | Mr Bryan Lyons |
| 319 | Mr Martin Lloyd-Smith, North-Western Agricultural Society Inc. |
| 320 | Ms Linda and Danny Kenna |
| 321 | Mr Stephen Coleman |
| 322 | Ms Jocelyn Mitchell |
| 323 | Mrs Patricia Gabb |
| 324 | Mr and Mrs Ken and Lorraine Kay, BOLT BOY |
| 325 | Friends of the Earth Australia |
| 326 | Mr Yarrow Andrew |
| 327 | South West Sport |
| 328 | Wind Prospect Pty Ltd <i>plus</i> Attachments |
| 329 | Mr Richard Keech |
| 330 | Ms Penelope Coleman |
| 331 | The Carbon Sense Coalition |
| 332 | Ms Olivia Holmes a Court |
| 333 | The Oil Mallee Association of Australia (Inc) <i>plus</i> Attachments |
| 334 | Confidential |
| 335 | Mr Ben Madin |
| 336 | Mr Charles Martin |
| 337 | Ms Gabriella Hont |
| 338 | Dr Charles Cranfield |
| 339 | Mr and Mrs M.G and J.H Ginger |
| 340 | Union Fenosa Wind Australia |
| 341 | Mr and Mrs Rob and Margaret McDonald |
| 342 | Mr David Dowie |
| 343 | Emerald for Sustainability |
| 344 | Ms Susan Clarke |
| 345 | GV Community Energy |
| 346 | Mr Malcolm Mckelvie |
| 347 | Dr Gordon Monro |
| 348 | Crystal Brook Community Association |

- 349 Grampians - Glenthompson Landscape Guardians Inc. *plus*
Attachment
- 350 Mr and Mrs Douglas and Carol Mac Donald Haddow
- 351 Ms Lisa Dinning
- 352 Mr and Mrs Graeme and Catherine Keating
- 353 Prof Peter Seligman
- 354 Hughes Family Superannuation Fund
- 355 Mr Rodney Brew *plus* Attachment
- 356 Mr Anthony Brown
- 357 Name Withheld
- 358 Mr Robin Friday
- 359 Confidential
- 360 Mr and Mrs Lois and Kenneth Townsend
 - Supplementary Submission
- 361 Confidential
- 362 Mr Barry Murfett
- 363 Thomsons Lawyers
- 364 Glenelg Shire Council
- 365 Name Withheld
- 366 pitt and sherry
- 367 Mrs Robyn Brew *plus* Attachment
- 368 Mr Doug Rolfe
- 369 Name Withheld
- 370 Mr Steven Gallina *plus* Attachment
- 371 Confidential
- 372 Mr Graham Laurie
- 373 Dr Daniel Magasanik
- 374 Ms Di Colman
- 375 Mr Gilles Beau
- 376 Mr Adam Long
- 377 Climate Action Canberra *plus* Attachments
- 378 Mr Shaun Scallan
- 379 Mrs Belinda Wehl

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| 380 | Mr Robert Mittag |
| 381 | Mrs Ann Lees |
| 382 | Ms Sarah Lloyd |
| 383 | Mr Igor Brandao |
| 384 | Name Withheld |
| 385 | Mrs Heather Hicks |
| 386 | Name Withheld |
| 387 | Mrs Noreen Wills |
| 388 | Name Withheld |
| 389 | Mr Gerry Noonan, The Parkville Association |
| 390 | Dr Sarah Laurie, Waubra Foundation |
| 391 | Andrew and Janice Robertson |
| 392 | Mr Jonathan W. Peter |
| 393 | Mr Darren Briggs |
| 394 | Mr Thomas Greig |
| 395 | Mr Allan Meers |
| 396 | Mr Paul Buchanan |
| 397 | Mrs Cheryl Shea |
| 398 | Ms Michelle Jones |
| 399 | Ms Bronwyn Fackender |
| 400 | Dr Mary-Faeth Chenery |
| 401 | Mr Lindsay Marriott |
| 402 | Ms Vanessa Webb |
| 403 | Ms Carolyn Ingvarson |
| 404 | Ms Karen Sutherland |
| 405 | Ms Vicki Horrigan |
| 406 | Mr David Munro |
| 407 | Mr Simon Rush |
| 408 | Mr Russell Brian |
| 409 | Ms Anna Fabigan |
| 410 | Mr Angus Smith |
| 411 | Roger and Elizabeth Chafer |
| 412 | Jill and Gary Seddon |

- 413 Ms Christine Anne Nova Johnston
- 414 Mr Peter Forster, Environmental Farmers Network
- 415 Mr Danny Halstead
- 416 Mr Peter Leitner, Trans Pacific Projects Pty Ltd.
- 417 Mr Peter Coleman
- 418 Mr Phil Cole
- 419 Mr Nick Lilley
- 420 Mr Adrian and Mrs Margaret Bufton
- 421 Ms Julia McLellan
- 422 Mr Graeme Tonkins
- 423 Mr Stuart Whiting
- 424 Mr Paul Denham Reid Houghton
- 425 Ms Lexie Noble
- 426 Mr Bernhard Voll
- 427 Mr Randall Bell
- 428 Mr Alan Wood
- 429 Ms Jillian Adams
- 430 Ms Emma Clayton
- 431 Mr Brian Carpenter
- 432 Mr John Robert Birrell
- 433 Mr David Grosmann
- 434 Confidential
- 435 Mr Gerry Bolt
- 436 Ms Valerie Wheatstone
- 437 Mr John Flavel Campbell
- 438 Ms Martha R. Hills
- 439 Mr Joe Hoogland , Measurement Engineering Australia Pty Ltd
- 440 Ms Kate Hook
- 441 Mr Michael Hulme
- 442 Mr Colin Dooley
- 443 Mr Adam Blakester
- 444 Mr Dale Park
- 445 Mrs Ann B Brown

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| 446 | Ms Ann Parris |
| 447 | North East Region Sustainability Alliance |
| 448 | Mr Brian Wolfenden |
| 449 | Ms Caroline Marshall |
| 450 | Ms Caroline Peacock |
| 451 | Ms Cassandra Franzose |
| 452 | Mr Charlie Prell |
| 453 | Mr Chas Holmes |
| 454 | Mr Chris Anderson |
| 455 | Ms Meredith Kleinig |
| 456 | Mr Michael S McCann |
| 457 | Ms Sue Warren |
| 458 | West Hills Farm Pty Ltd |
| 459 | Ms Nettie Pena |
| 460 | Blair Fox Pty Ltd |
| 461 | Name Withheld |
| 462 | Name Withheld |
| 463 | Ms Helga Hung <i>plus</i> Attachment |
| 464 | Confidential |
| 465 | Dr Geoff Levanthall |
| 466 | Australian Volunteer Coast Guard Association |
| 467 | Wind Pacific |
| 468 | Maxim Renewable |
| 469 | Mr Daniel Sacchero |
| 470 | Mr David Sewell |
| 471 | Ms Lisa Alexander |
| 472 | Mr David Macilwain |
| 473 | Professor David Morris |
| 474 | Dr David Osmond |
| 475 | Mr David Sims |
| 476 | Confidential |
| 477 | Confidential |
| 478 | Ms Marion Parsonage |

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| 479 | Mr Martin Wynne |
| 480 | Mr Andrew Reid <i>plus</i> Attachment |
| 481 | Mr Simon Magasanik |
| 482 | Ms Barbara Nash |
| 483 | Ms Michelle Croker |
| 484 | Ms Peggy Kay Lowrey |
| 485 | Mr Madisen Cook |
| 486 | Mr John Wright-Smith, American Superconductor Corp. (NASDAQ: AMSC) |
| 487 | Ms Sonja Lane, WindWorks! Northwest <i>plus</i> Attachments |
| 488 | Ms Jennifer Blamey |
| 489 | Mr Russell Crook, Karni Engineering |
| 490 | Ms Karin Hensen |
| 491 | Mr David Edmonston |
| 492 | Mr Gordon Mitchell |
| 493 | Mr Richard Moreton |
| 494 | Mr Mick Carlson |
| 495 | Mrs Liz Diamond |
| 496 | Mr Rob Keiller |
| 497 | Mr Rod Ladd, Ladd Electrical Pty Ltd |
| 498 | Mr Mark Learmonth |
| 499 | Ms Cyril Cram , Portland Coast Guard |
| 500 | Rosalind and Peter Lowe |
| 501 | Hepburn Relocalisation Network |
| 502 | Ms Pam Atkins |
| 503 | AGL Energy Limited <i>plus</i> Attachments |
| 504 | Ms Gillian Wells |
| 505 | Mr Warren Yates |
| 506 | Mr Stephen Higgs |
| 507 | Mr Roy Whitworth |
| 508 | Carol Grills and Doug Beaumont |
| 509 | HR and MJ Johnston |
| 510 | RC and EM Grills |

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| 511 | Mr Sean O'Rourke |
| 512 | Mr George Jones |
| 513 | John and Elizabeth Fincher |
| 514 | Ms Kathi Summer |
| 515 | Mr Matthew Forwood |
| 516 | Ararat Greenhouse Action Group Inc. |
| 518 | Sutherland Climate Action Network (SCAN) |
| 519 | Ms Fiona Fulton |
| 520 | Ms Sarah Benson |
| 521 | Name Withheld |
| 522 | Mr Leighton Evans |
| 523 | Lake Bolac Eel Festival |
| 524 | Wind Pacific (Aust) Pty Ltd |
| 525 | Mr Michael Nolan |
| 526 | Prof Frank Fisher <i>plus</i> Attachments |
| 527 | Ms Linda Webster, Save our Stainmore |
| 528 | Ms Sharon Dohnt <i>plus</i> Attachments |
| 529 | Mr Luc Rivet, EPAW <i>plus</i> Attachments |
| 530 | Mr. P.S. and Mrs. V.C.K. Metcalfe |
| 531 | Rae and Bruce Jarrett |
| 532 | Name Withheld |
| 533 | Mr Matthew Neil Armstrong |
| 534 | Mr Jonathon Tree |
| 535 | Mr Glenn Bailey |
| 537 | Anne Marie Beinke and Stuart William Beinke |
| 538 | Mr Mal Corcoran |
| 539 | Mr Pat Sharkey, Gweebarra Conservation Group |
| 540 | Dr Daniel Shepherd <i>plus</i> Attachment |
| 541 | Confidential |
| 542 | Wollongong Climate Action Network |
| 543 | Ms Bernadette Daubin, Fédération vent d'Anjou |
| 544 | Ms Jolanta Loritz-Dobrowolska, Towarzystwo Ochrony Przyrody i Krajobrazu |

- 545 Mr Robert Boyle
- 546 Ms Larelle Dean
- 547 Mrs Jean Dooley
- 548 Mr Dimetre Triadis
- 549 Mr Everard Linke
- 550 Ms Pamela Reeves
- 551 Mr Ben Purcell
- 552 Transition Kurilpa
- 553 Confidential
- 554 Dr Neil I Smith
- 555 Mr Peter Stephens
- 556 Sustainable Jamboree
- 557 Mr Will Elsworth
- 558 Mr Jim Elsworth
- 559 Hip Pocket Workwear and Safety Ballarat
- 560 Mr Hugh Piper
- 561 Ms Kate Owe-Young
- 562 Dr Paul Ebert
- 563 Mr Don Harvey
- 564 Country Fire Authority
- 565 Mr Adam Shepherd
- 566 Mrs Marie Burton
- 567 Lions Club of Ararat
- 568 Mr and Mrs Meryl and Peter Holland
- 569 Dr Lindsay Quennell
- 570 AMDOCS
- 571 Mr Adrian Ciccocioppo
- 572 Mr and Mrs Jason and Lisa Lehmann
- 573 Mr David Macilwain
- 574 Collector Community Association
- 575 Mr D F Rowbottom
- 576 Scott and Jodie Dennis
- 577 Mr Brian Gallagher

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| 578 | Mr Russell Jones |
| 579 | CSIRO |
| 581 | Ms Liz Zorondo |
| 582 | Molonglo Landscape Guardians Inc |
| 583 | Mr Pat Horan |
| 584 | Mary and Epiphnie Cassar <i>plus</i> Attachments |
| 585 | Mr and Mrs Harry and Kerrie Buskes |
| 586 | Mr Nick King, Orange Climate Action Now (OCAN) |
| 587 | Mr Kingsley Slipper |
| 588 | Mr Peter Dawes |
| 589 | Mr David Bruce King |
| 590 | Mr Glenn Osboldstone |
| 591 | Origin Energy Limited |
| 592 | Bayside Climate Change Action Group |
| 593 | Suzlon Energy Australia Pty Ltd |
| 594 | Cairns and Far North Environment Centre Inc |
| 595 | Mr and Mrs James and Pamela McGregor |
| 596 | Mr and Mrs Geoffrey and Rosemary Pearce |
| 597 | Codrington Wind Farm Tours |
| 598 | Mr Simon Nelson |
| 599 | Dr Keith Ayotte |
| 600 | Mr Tom Green |
| 601 | Rydal District Landholders Association <i>plus</i> Attachments |
| 602 | Locals Into Victoria's Environment (LIVE) |
| 603 | Rising Tide Newcastle |
| 604 | Mr Colin Briggs |
| 605 | Climate and Health Alliance |
| 606 | Hydro Tasmania |
| 607 | Mr Jerome Coleman |
| 608 | Dr Peter Turner |
| 609 | Mr Bruce Easton |
| 610 | Mr and Mrs William and Isabel McLaren |
| 611 | TRUenergy Pty Ltd |

- 612 Mr John Burke
- 613 100% Renewable Community Campaign
- 614 Committee for Portland
- 615 Australian Environment Foundation
- 616 Noske Group
- 617 Mr Andrew Gabb *plus* Attachments
- 618 Consolidated Power Projects
- 619 Ms Janice Marshall
- 620 SkyFarming Pty Ltd
- 621 Ms Janet Souter
- 622 Mr and Mrs Ruth and Rod Corrigan
- 623 Community Power Agency
- 624 Tasmanian Renewable Energy Industry Development Board
- 625 Mr David Myer
- 626 Mr Philip Schier
- 627 Civil and Allied Technical Construction Pty Ltd
- 628 Mr Simon Holmes à Court
- 629 Mr David Maughan *plus* Attachments
- 630 Mr and Mrs Tom and Lin Butcher
- 631 Australian Centre for Environmental Law *plus* Attachment
- 632 Beyond Zero Emissions
- 633 Industry Capability Network
- 634 Moreland Energy Foundation Limited
- 635 Mr Tim Brady
- 636 Climate Action Newtown
- 637 Mr Deiny Peterson
- 638 CFMEU (Construction and General Division)
- 639 Mrs Sue Bell
- 640 Environmental Defenders Office (SA) Inc.
- 641 Transfield Services *plus* Attachment
- 642 Ms Janene Webb
- 643 Mr Malcolm Lambert
- 644 RES Australia Pty Ltd

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| 645 | Western Plains Landscape Guardians Association (WPLGA) |
| 646 | Pyrenees Shire Council |
| 647 | Mr Noel Dean <i>plus</i> Attachment |
| 648 | Ms Janine Dean |
| 649 | Mr Rod Dean |
| 650 | ACCIONA Energy |
| 651 | Minister for Planning, Victorian Government |
| 652 | Infigen Energy |
| 653 | Pacific Hydro <i>plus</i> Attachment <ul style="list-style-type: none">• Supplementary Submission |
| 654 | Victorian Planning and Environmental Law Association <ul style="list-style-type: none">• Supplementary Submission |
| 655 | WestWind Energy Pty. Ltd |
| 656 | Sustainable Energy Association of Australia Inc. (SEA) |
| 657 | The Western Australian Farmers Federation (Inc.) (WAFarmers) |
| 658 | Ms Annie Gardner |
| 659 | Mr Gus Gardner |
| 660 | Peter Prasser and Judy Vanrenen |
| 661 | Mr John O'Shea |
| 662 | Confidential |
| 663 | Confidential |
| 664 | Mr Noel Thomas |
| 665 | Mrs Enid Thomas |
| 666 | Ms Maggie Reid |
| 667 | Mr Donald Thomas |
| 668 | Mr Paul Thompson <i>plus</i> Attachment |
| 669 | Ms Catherine Bayne |
| 670 | Mr John Carter |
| 671 | Ms Kirstie Jamieson |
| 672 | Mr Gunther Wilhelm |
| 673 | Mr Peter Nash |
| 674 | Mr Stuart Schafer |
| 675 | Leesa and Jonathon Inglis <i>plus</i> Attachment |

- 676 Mr Richard Evans
- 677 Ms Berni Janssen
- 678 Ms Sarah Cook
- 679 Ms Sarah Cole
- 680 Mrs Catherine Williams
- 681 Ms Shelley McDonald
- 682 Mr Mike Noske
- 683 Geoff Putland and Christine Thompson
- 684 Ms Robin Sharrock
- 685 District Council of Grant
- 686 Ms Jan Perry
- 687 Mr John Leddin
- 688 Ms Melanie Robertson
- 689 Ms Linda Zibell
- 690 Ms Rosemary Lathouris, Katoomba Climate Action Now
- 691 Cr Alison Clarke
- 692 Mr Phillip King
- 693 Mr Chris Judd
- 694 Mr Malcolm Lambert
- 695 Ms Ming Wu
- 696 Mr David Carr
- 697 Mr Steve Lockart
- 698 Sally and John Hoskins
- 699 Mr Edward Fernandez
- 700 Dr Kaye Scholfield and Ms Mexie Butler, Potter Rural Community
Research Network
- 701 Mr Paul Kretschmer
- 702 Westgate Community Wind
- 703 Upper Hunter Shire Council
- 704 Mr Frank Hannan
- 705 Mr Jim Wiegand
- 706 Ms Karin Green
- 707 Ms Felicity Crombach

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| 708 | Mr Jamie Finch |
| 709 | Ms Fran Birrell |
| 710 | Ms Anita Crisp, Central Local Government Region of Councils, South Australia |
| 711 | EPURON Pty Ltd |
| 712 | Vestas Australian Wind Technology P/L <i>plus</i> Attachment |
| 713 | Mr Andrew Chapman |
| 714 | Ms Sonia Trist |
| 715 | Dr Dave Burraston and Ms Sarah Last <i>plus</i> Attachments |
| 716 | Name Withheld |
| 717 | Mr Hamish Officer |
| 718 | Name Withheld |
| 719 | Name Withheld |
| 720 | Ballarat Renewable Energy and Zero Emissions Inc (BREAZE) |
| 721 | Mr Hamish Cumming |
| 722 | North West Minerals Province |
| 723 | Ms Lyn Hamilton |
| 724 | Darren and Kerrie Robinson |
| 725 | Windlab Developments Pty Ltd |
| 726 | Ms Mary Dougherty, Embark |
| 727 | Ms Julie P Townrow |
| 728 | Mr Terry Lee, Regional Development Australia, Adelaide Hills, Fleurieu and Kangaroo Island |
| 729 | Mr Andrew John Allerton Scott |
| 730 | Mr James Miele |
| 731 | Name Withheld |
| 732 | Mr Simon Holmes a Court, Hepburn Wind (Hepburn Community Wind Park Co-operative Ltd) |
| 733 | Enhar |
| 734 | GL Garrad Hassan |
| 735 | Mr Danny Walsh |
| 736 | Mr James Purcell |
| 737 | Mr Trevor Berrill |
| 738 | Frank Eden and Iris Domeier |

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| 739 | Mr Neil Jenkin |
| 740 | Name Withheld |
| 741 | Mr Stefan Gsaenger, World Wind Energy Association |
| 742 | Alternative Technology Association (ATA) |
| 743 | Vipac Engineers and Scientists Ltd |
| 744 | Mr Jack Gilding |
| 745 | Mr John Zubrzycki |
| 746 | Mr Shaun Blackie |
| 747 | Mr Michael Wilson |
| 748 | Jo and David Gebhardt |
| 749 | Ms Jillian Staton-Regazzo |
| 750 | Ms Sonia Teitel |
| 751 | Mr John Michelmore |
| 752 | Australian Wind Energy Institute (AWEI) |
| 753 | Ms Joan Liley |
| 754 | Bendigo Sustainability Group |
| 755 | Mr David Fletcher |
| 756 | Ms Kati Thompson |
| 757 | B.J. Hall and F.M. Raschka |
| 758 | Dr Peter Morgan |
| 759 | Mr William Huson <i>plus</i> Attachment |
| 760 | Name Withheld |
| 761 | Mr Fred Davies |
| 762 | Mr Greg Fletcher |
| 763 | Mr Bertrand Rossi |
| 764 | Mr RV and Mrs PJ Barbero |
| 765 | Association for Geoconservation, Hong Kong |
| 766 | Alain and Isabelle Ducatillon |
| 767 | Dr David Colby |
| 768 | Ms Christine Lovelock |
| 769 | Mr Richard Kelly |
| 770 | Robert, Anthony and Gordon Kelly |
| 771 | Cr Geoff White |

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| 772 | Mr Mark Wills |
| 773 | Mr Mike Lewis, RPG Australia |
| 774 | Mrs Amanda Straw |
| 775 | Mr Brian Gallagher <ul style="list-style-type: none">• Supplementary Submission |
| 776 | Mr John B Howard |
| 777 | Mr Gabrielle Leago |
| 778 | Mr John Harvey, Central Victorian Greenhouse Alliance |
| 779 | Confidential |
| 780 | Mr Adrian Lyon <i>plus</i> Attachment |
| 781 | Mr William Holmes a Court |
| 782 | Confidential |
| 783 | Mr Alex Cross |
| 784 | Mr Matthew Saward, Circular Head Council |
| 785 | Confidential |
| 786 | Mr John Brenan |
| 787 | Karen and Peter Corbett, Powerhouse Productions |
| 788 | Confidential |
| 789 | Mr Daniel Ardoin, ASSOCIATION VIGI-EOLE |
| 790 | Mr Rob Spehr |
| 791 | Rowan and Theresa Huxtable, Wollongong Climate Action Network |
| 792 | CAETS Noise Control Technology Committee |
| 793 | Middelgrundens Windpower Co-operative |
| 794 | Confidential |
| 795 | Mr Kevin Bennewith |
| 796 | Mr Ralph Kuhn |
| 797 | Mr Colin Schaefer |
| 798 | Mr Kirby Anderson, GE Energy |
| 799 | Mr Peter McLaughlin <i>plus</i> Attachments |
| 800 | Mr Don Fairbrother |
| 801 | Australian Psychological Society |
| 802 | Noise Watch Australia Inc. |

803 Confidential
804 Name Withheld
805 Mr Jeff Rowe
806 Ms Lynden Riley
807 Mr Mick Kerin
808 Ms Tracy Strange
809 Mayor Daryl Quilliam, Circular Head Council
810 Mr David Brooks, Parkesbourne/Mummel Landscape Guardians
Inc.
811 Mr Kim Derriman
812 Confidential
813 Mr Brian Wolfenden
814 John and Rhonda Spehr
815 Mr Frank Brennan, WATTLE RANGE COUNCIL
816 Mr Todd Palmer
817 Mr Richard Bell
818 BlueScope Steel
819 NSW Government
820 Ms Maria C Lopez Leyro
821 Mr Tom Robertson
822 Mr Matthew Donoghoe
823 Mr Gary Cunningham
824 Els Tielemans and Johan Debast
825 Kate and Michael de Kleuver
826 Ms Helen Bignell
827 Ms Elizabeth Atkins *plus* Attachment
828 Mr Peter Robertson
829 Doctors for the Environment Australia
830 Mr Mark Duchamp, Climate Change and Alternative Energies,
Iberica
831 Mr Paul Manning
832 Confidential
833 Dr David Moncrieff *plus* Attachment

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| 834 | Confidential |
| 835 | Mr David Jackson |
| 836 | Friends of Collector Inc <i>plus</i> Attachments |
| 837 | Tony and Judy Hodgson |
| 838 | Mrs Renate Metzger <i>plus</i> Attachments |
| 839 | Sarah and Philip Hawker <i>plus</i> Attachments |
| 840 | Name Withheld |
| 841 | Ron and Chris Jelbart |
| 842 | Ms Lindy Sharp |
| 843 | Mr N.B Carter |
| 844 | Dr Andrew Lothian |
| 845 | Dr John Merory |
| 846 | Confidential |
| 847 | Confidential |
| 848 | Mr David McLaren <i>plus</i> Attachments |
| 849 | Confidential |
| 850 | National Health and Medical Research Council |
| 851 | Mr Gilbert Wilson |
| 852 | Mr Gerry Meyer <i>plus</i> Attachments |
| 853 | Confidential |
| 854 | Confidential |
| 855 | Ms Kay Stafford <i>plus</i> Attachments |
| 856 | Confidential |
| 857 | Confidential |
| 858 | Mr Andrew Greenwood |
| 859 | Confidential |
| 860 | Mr Timothy Le Roy |
| 861 | Northern Areas Council <i>plus</i> Attachments |
| 862 | Confidential |
| 863 | Mr Wes Crisp |
| 864 | Confidential |
| 865 | Ms Sue Corrigan <i>plus</i> Attachment |
| 866 | Mr Stephen Mitchell |

- 867 Lal Lal and Elaine Landscape Action Group
- 868 Confidential
- 869 Confidential
- 870 Mr Brian Osborne
- 871 The Mundoora Bowling Club Inc
- 872 Melbourne Energy Research Institute (MEI)
- 874 Mr Michael Addison
- 875 Ms Astrid Kaupert, translated by Dr Claus Dirnberger (NAATI ID)
- 876 Mr Hans Ulrich Schroeder, Bundesverband Landschaftsschutz e.V (BLS), translated by Dr Claus Dirnberger (NAATI ID)
- 877 Dr Klaus Peter Krause, translated by Dr Claus Dirnberger (NAATI ID)
- 878 Mr Bertrand Rossi, Castelnau de Levezou Cultural Centre, translated by Sabine Bouladon (NAATI ID)
- 879 Mr Claude Reboul, The Wind Blowing Through the Mountains Association, translated by Sabine Bouladon (NAATI ID)
- 880 Mr Francois Talon, La croisee des vents Association, translated by Sabine Bouladon (NAATI ID)
- 881 Mr Herve Texier, translated by Sabine Bouladon (NAATI ID)
- 882 Mr Jean Pierre Riou, translated by Sabine Bouladon (NAATI ID)
- 883 Confidential
- 884 Mr Nick Pastalatzis
- 885 Boorowa District Landscape Guardians Inc
- 886 Ms Jackie Rovensky
- 887 Mr Charlie Arnott
- 888 Dr Alan Watt OAM
- 889 Ms Cherie Draper
- 890 Mr David Mackay
- 891 Name Withheld
- 892 Ms MairiAnne Mackenzie
- 893 Confidential
- 894 Dr Caroline Cook
- 895 Dr Kathryn Antioch *plus* Attachments
- 896 Port Fairy Consolidated School

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| 897 | Dr Carl Phillips |
| 898 | Cr Gilbert Wilson |
| 899 | Mr Craig Falconer |
| 900 | Association de Defense des Collines du Pic d'Estelle |
| 901 | Ms Teresa Paltridge |
| 902 | Mr Steven Jeffery |
| 903 | Michael and Robyn Phyland |
| 904 | Ma Karen Jones <i>plus</i> Attachment |
| 905 | Mr John Howard |
| 906 | Infigen Energy |
| 907 | Mr William Grainger |
| 908 | Mr Noel Carter |
| 909 | Mr Phillip Evans |
| 911 | Ms Jenny Wall |
| 912 | Name Withheld |
| 913 | Mr Terry O'Brien |
| 914 | Mr Rupert Elvins |
| 915 | Mr Russell Jones |
| 916 | Mr Darren Sexton |
| 917 | Chelsea Heights EarthCarers Group |
| 918 | Ms Melinda Munn |
| 919 | Mr Lynden Lee |
| 920 | Mr Leigh Roberts |
| 921 | Ms Jenny Klingberg |
| 922 | Friends of the Great South West Walk |
| 923 | Ms Angela Munro |
| 924 | Mr Ashley Peake |
| 925 | Dr Barbara Fraser |
| 926 | Mr Ben Walsh |
| 927 | Ms Bethany Hoyer |
| 928 | Blade Repairs Australia |
| 929 | Dr Caroline Cook |
| 930 | Mr Darren Stephens |

931 Mr Gerard Wheeler
932 Friends of Cape Nelson Landcare/Coastcare
933 Mr John Doyle
934 Ms Linda Zibell
935 Ms Susan Wills
936 Mr Tony Foti
937 Ms Paulette Crawley
938 Mr Nilesh Patel
939 Ms Nikki Friend
940 Mr George Browne
941 Redrock Central Cleaning
942 Climate Action Moreland
943 Mr Declan Peake *plus* Covering Letter
945 Ms Ann Gardner
946 Mr Gus Gardner
947 Mr Andrew Reid *plus* Attachment
948 Name Withheld *plus* Covering Letter
949 Mr Martin Shield
950 Mr John Faint
951 Ms Wanda Allott
952 Anne and Allan Schafer
953 Mr Brendan Jarrett
954 Confidential
955 Dr Chris Hanning *plus* Covering Letter
956 Mr Mark Cool
958 Ms Marg Kelly
961 Mr John Faint, Waterloo and District Concerned Citizens Group
962 Confidential
963 Veronica and Keith Smith
964 Mr Lyall Frazer
965 Harden Shire Council
966 Mr Murray Woods
967 Confidential

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| 968 | Michael and Margo Rees |
| 969 | Ms Leanne Robinson |
| 970 | Mr Tim Otter |
| 971 | Mr Jim Robinson |
| 972 | Ms Barbera Powell |
| 973 | Clare and Gerald Miller |
| 974 | Ms Janet Jackson <i>plus</i> Attachments |
| 975 | Mr Carlos Andrade |
| 976 | Ms Elizabeth McGregor |
| 977 | Mr Anthony Briody |
| 978 | Tom and Lin Butcher |
| 979 | Mr Robert R Addison |
| 980 | Kaye and Howard Draffin |
| 981 | Mr Ray Sullivan |
| 982 | Mr Ernst Weyhausen, NewEn Australia Pty Ltd <i>plus</i> Attachment |
| 983 | Confidential |
| 984 | Mr Edward Coleridge |
| 985 | Ms Geraldine Foti |
| 986 | Ms Anne Gutasukas |
| 987 | Ms Wendy McGarvie |
| 988 | Irene and David Willison |
| 989 | Mr Rodger Weste, Max Crane and Equipment Hire (SA) Pty Ltd |
| 990 | Mr Geoff Bailey |
| 991 | Mr Dale Askew |
| 992 | Ms Carey Wakely |
| 993 | Mr Ben Lipplegoes |
| 994 | Mr Dom Brabender |
| 995 | Mr Rodney Ryan |
| 996 | Mr Des Bowman |
| 997 | Mr Matthew Malseed |
| 998 | Mr David Mills |
| 999 | Mr Martin Logan |
| 1000 | Mr Adam Currie |

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| 1001 | Mr Matthew Kohlman |
| 1002 | Mr Will Little |
| 1003 | Mr Luke Van Heugten |
| 1004 | Mr Sonny Chapman |
| 1005 | Mr Allan Waters |
| 1006 | Ms Helen Henry |
| 1007 | Ms Wendy Rawiri <i>plus</i> Attachments |
| 1008 | Ms Brigitte Reiche |
| 1009 | Mr Alasdair Stuart |
| 1010 | Mr Steve Wikes |
| 1011 | Ravi and Saskya |
| 1012 | Moonies Hill Energy Pty Ltd |
| 1013 | Confidential |
| 1014 | Mr Thomas Paltridge |
| 1015 | Country Guardian |
| 1016 | Vent de Raison |
| 1017 | Mr Pierre Bonn |

Form Letters

- 1** Form Letter Style 1, Received from approximately 1100 Individuals.
- 2** Form Letter Style 2, Received from approximately 35 Individuals.
- 3** Form Letter Style 3, Received from approximately 17 Individuals
- 4** Form Letter Style 4, Received from 2 Individuals.

APPENDIX 2

ADDITIONAL INFORMATION RECEIVED BY THE COMMITTEE

Acciona Energy

- Response to possible adverse comment, received 24 March 2011

Aerial Agricultural Association of Australia

- Answers to a Question on Notice from Mr Phil Hurst, CEO, received 25 March and 27 April 2011.

AGL

- Answer to a Question on Notice received 20 April 2011.

Artists for the Environment Landscape Guardians

- *An Economic Assessment of the proposed McHarg Ranges wind farm*, report by Access Economics Pty Ltd, received 28 March 2011

Australian Landscape Guardians

- Wind farm noise, received 5 April 2011

Australian Psychological Society and the Climate and Health Alliance

- Answer to a Question on Notice, Comments on Draft National Wind Farm Development Guidelines, received 4 May 2011.

Barry, Ms Lynda

- Interviews with families living near wind turbines in Wisconsin, US
- 'Mars Hill Wind Turbine Project, Health Effects - Pilot Study', M. A. Nissenbaum [PowerPoint presentation]

Burraston, Dr David

- Document on local meteorological impacts of large-scale wind farms, received 13 April 2011
- *Air Emissions due to Solar and Wind Power*, Paper, received 14 April 2011
- Energy Ventures report on decommissioning of wind turbines at Beech Ridge, USA, received 14 April 2011
- *Incorporating wind into a Natural Gas Turbine Baseline Power System Increases Nitrous Oxide and Carbon Dioxide Emissions from the Gas Turbines*, Paper, received 14 April 2011
- Testimony of Dr Jay Apt to the US House of Representatives Committee on Energy and Commerce, received 14 April 2011

CSIRO

- Answers to Questions on Notice from hearing on 25 March 2011, received 27 April 2011.

Davis, Ms Sarah

- Confidential

Dean, Mr Noel

- Extracts from documents: Origin energy: Department of Health and Ageing: Minneapolis Star Tribune: Waubra Wind Farm Noise Impact Assessment for Mr and Mrs Dean.
- Answer to question on notice received 7 May 2011
- Acciona Energy - *Waubra Wind Farm Operational (Stage 2) Environmental Management Plan Version 1.1*, February 2008. Received 7 May 2011
- Correspondence from Noise Measurement Services and Acciona Energy, received 10 April 2011
- Power point presentation and extracts from Dr Salt's paper on infrasound, received 10 April 2011
- Noise measurement data at Dean residence

Department of Climate Change and Energy Efficiency

- Answers to Questions on Notice received 2 May 2011.

Doctors for the Environment

- Answers to questions on notice received 9 May 2011
- Answer to a Question on Notice in relation to the NHMRC Rapid Review, received 7 April 2011.

Doolan, Mr Con

- Confidential

Evans, P and MA

- Glen Innes wind farm: "Statement of Facts and Contentions 2010", received 7 February 2011.

Falconer, Mr Craig

- "Submission for the Dollar Wind Farm Proposal", received 7 February 2011.

Friends of the Earth Australia

- Report: *Wind farms and Community Engagement in Australia: A Critical Analysis for Policy Learning*, received 31 March 2011.

Greenpeace

- Energy Shock: Confronting higher prices, received 25 March 2011
- Wind energy and electricity prices, received 25 March 2011
- Electricity from renewable energy sources, received 25 March 2011
- '2009 Wind Technologies market report', received 25 March 2011
- Answers to questions on notice and letter from Greenpeace Research Laboratories received 20 April 2011.

Information received via Fax. Sender Unknown.

- Letter(fragment) relating to Lal Lal wind farm, received February 2011

Fraser, Mr Andrew

- Letter: Concerns relating to Macarthur Wind farm, received 13 December 2010

Frey, Ms Barbara

- 'Noise radiation from wind turbines installed near homes: effects on health', B. Frey and P Hadden

Fricker, Ms Ally

- 'The Answer is blowing in the Wind', pamphlet written and produced by Ally Fricker, illustrations by Evie Leonard.

Hodgson, Mr A

- Danish, Japanese and British Press reports on health issues, received 9 April 2011
- NHMRC report: email message, received 9 April 2011

Hepburn Wind

- Photograph of protest; email from Australian Environment Foundation to Australian Landscape Guardians; List of submissions in support of wind farms, received 29 March 2011
- Weblink to noise compliance requirements, received 8 April 2011
- Data on pre-construction noise monitoring, received 8 April 2011

Hindmarsh, Dr Richard, Snr Associate Professor

- "Wind Farms and Community Engagement in Australia: A Critical Analysis for Policy Learning".

Krogh, Ms Carmen

- 'First International Symposium, The Global Wind Industry and Adverse Health Effects: Loss of Social Justice?' Messages of Support.
- Ms Carmen Krogh and from The Society for Wind Vigilance: 'Annoyance, A Clinical Misnomer?' poster by Brett Horner, BA, CMA.

- 'The Relationship of Increased Mood Alterations and Industrial Wind Turbines - Implications and Social Justice', poster by Lorrie Gillis, Protocol Administrator, and Carmen Krogh, BscPharm.

Laurie, Dr Sarah

- European Heart Journal, 7 February 2011 - "Sleep duration predicts cardiovascular outcomes: a systematic review and meta-analysis of prospective studies."

LeRoy Mr John

- Received 30 March 2011

Lowrey, Ms P

- Article – Infrasound: The Hidden Annoyance of Industrial Wind Turbines – Professor Claude Renard., received 3 March 2011

Ms Carmen Krogh and The Society for Wind Vigilance

- 'An Integrative Curriculum for the Winds of Change - Advancing Critical Thinking about the Michigan Wind Rush', poster by Elizabeth E. Wheatley, PhD.
- 'VOW - Victims of Wind', poster by Barbara Ashbee.
- 'Policy and Political Process - the Consequences', poster by Barbara Ashbee and contributors globally (VOW).

Medical Officer of Health

- Report to the Board, Ontario, Canada - 21 January 2011.

McMurtry, Professor Robert, University of Western Ontario

- Evidence of Known Adverse Health Effects Related to Industrial Wind Turbines, Submitted to the Appeal for Renewable Energy Approval issued to Kent Breeze Corp. and MacLeod Windmill Project Inc. (Kent Breeze Wind Farms) c/o Suncor Energy Services Inc., EBR Registry Number 011-1039Chatham-Kent

National Health and Medical Research Council

- Answers to questions on notice received 24 May 2011

North West Minerals Province

- Blueprint for the Future Development of the North West Minerals Province

Oil Mallee Australia.

- Health issues: press clippings, received 16 February 2011

Pierpont, Dr Nina

- Pierpont rebuttal to McCunney affidavit, received 18 January 2011
- "Author Preprint" (June 2010), author Dr. Alec N. Salt

Phyland, Mr Michael and Mrs Robyn

- Presentation: Lal Lal wind farm, received 16 February 2011.

Putland, Mr Geoff and Ms Christine Thompson and the Glen Innes Landscape Guardians

- NSW Legislative Council Committee report on rural wind farms

Pyrenees Shire Council

- Council Land Valuation Report, received 30 March 2011

Russell, Ms Kathy

- Quadrant Article, July 2010 - "The Great Renewable Energy Rort", by Kathy Russell.
- Reference from Quadrant Article, "Driving Investment in Renewable Energy in Victoria, Options for a Victorian market-based measure", 1 February 2006

Society for Wind Vigilance

- First International Symposium on Adverse Health Effects from Wind Turbines - No Rules, No Caution, No Accountability – Paper: No global standards
- First International Symposium on Adverse Health Effects from Wind Turbines - No Rules, No Caution, No Accountability – Paper: How we got here
- First International Symposium on Adverse Health Effects from Wind Turbines - No Rules, No Caution, No Accountability – Paper: Wind turbine noise
- First International Symposium on Adverse Health Effects from Wind Turbines - No Rules, No Caution, No Accountability – Paper: Wind turbine noise and sleep
- Infrasound - Your ears "hear" it but they don't tell your brain, by Alec N. Salt PhD
- First International Symposium on Adverse Health Effects from Wind Turbines - No Rules, No Caution, No Accountability - Paper: The Consequences, Violation of Social Justice
- First International Symposium on Adverse Health Effects from Wind Turbines - No Rules, No Caution, No Accountability - Paper: Loss of Social Justice?

Vestas Australia Wind Technology Pty Ltd

- Weblink to Wind Energy Update – Dong Energy, received 29 March 2011
- Article by Gary Norris, "Ontario Court Dismisses Appeal on Wind Farm Health Concerns", March 3, 2011, received 14 March 2011.
- Copy of Ontario Superior Court of Justice decision, received 14 March 2011

Victorian Planning and Environment Law Association

- Planning issues: power point presentation and newsletter article, received 4 April 2011

Wittert, Professor Gary

- Answer to a Question on Notice received 3 May 2011.

**CORRESPONDENCE RECEIVED BY THE
COMMITTEE**

Fisher , Mr Joseph

- Correspondence received, 7 February 2011

Hewitt , Mr and Mrs Jeremy and Belinda

- Correspondence received, 10 April 2011

Linke, Ms Amy

- Correspondence received, 9 February 2011

Marlow, Mr Leigh

- Correspondence received, 8 March 2011

Nardin, Mr Xavier

- Correspondence received, 11 February 2011

Pacific Hydro

- Response to potential adverse comment

Paine , Ms Lynn

- Correspondence received, 10 February 2011

Ribbons, Mr Ben

- Correspondence received, 25 January 2011

WestWind Energy

- Response to potential adverse comment

APPENDIX 3

PUBLIC HEARINGS

Friday 25 March 2011

Parliament House, Canberra

Committee Members in attendance:

Senator Rachel Siewert (Chair)

Senator Judith Adams

Senator Sue Boyce

Senator Carol Brown

Senator Mark Furner

Senator Steve Fielding

Witnesses

Department of Climate Change and Energy Efficiency

Mr Andrew Bailey, First Assistant Secretary, Renewable Energy Efficiency Division

Mr David Tonna, Director, Strategy and Partnerships Branch, Renewable Energy Efficiency Division

Dr Nina Pierpont, Private capacity

Commonwealth Science and Industrial Research Organisation (CSIRO)

Dr Peta Ashworth, Group Leader, CSIRO Science into Society Group

Dr Nina Hall, Social Scientist, SCIRO Science into Society Group

Greenpeace Australia Pacific

Mr Julien Vincent, Climate and Energy Campaigner

Aerial Agricultural Association of Australia Ltd

Mr Phillip Hurst, Chief Executive Officer

Dr James Prest, Private Capacity

AGL Energy Ltd

Mr Nigel Bean, Head - Generation Development

Ms Sarah McNamara, Head - Government Affairs

RES Australia Pty Ltd

Mr Matthew William Rebbeck, Technical Director

Union Fenosa Wind Australia

Mr Guillermo Alonso, Technical Manager
Mr Thomas Mitchell, Development Manager
Mr Shaq Mohajerani, Engineering Manager

Union Fenosa Wind Australia Crookwell 3

Mr Matthew Donoghoe, Landholder

Monday 28 March 2011

University of Ballarat, Ballarat

Committee Members in attendance:

Senator Rachel Siewert (Chair)
Senator Claire Moore (Deputy Chair)
Senator Steve Fielding

Witnesses

Mr Carl and Mrs Samantha Stepnell, Private Capacity

Mr Noel Dean, Private Capacity

Australian Landscape Guardians

Mr Paul Miskelly, Member, Technical and Economic Committee
Mr Peter Mitchell, Member, Technical and Economic Committee

Artists for the Environment Landscape Guardians

Mr Peter Russell-Clarke, President

Prom Coast Guardians Inc

Mr Alexander McKinlay, President
Mr Peter Wingett, Secretary
Dr Alan Lacey, Public Officer

Grampians-Glenthompson Landscape Guardians Inc

Mr Adrian Lyon, Secretary
Mrs Judy Vanrenen, President
Mrs Helen Lyon, Committee Member

Western Plains Landscape Guardians

Mr Andrew Charles Gabb, Chair
Mr David Jackson, Committee Member
Mrs Megan Read, Secretary

Moyne Shire Council

Mr Russell Guest, Manager, Strategic Planning

Glenelg Shire Council

Mr Sydney Deam, Group Manager Planning and Economic Development

Ms Sharon Kelsey, Chief Executive Officer

Pyrenees Shire Council

Mr Stephen Cornish, Chief Executive Officer

Mr David Clark, Councillor, Mitchell Riding

Mr Chris Hall, Senior Town Planner,

Chepstowe Wind Farm Action Group

Mrs Jenny Bruty, Leader, Rural Zone Landowners Group

Mr Per Bernard, Private Capacity

Mrs Robyn Brew, Private Capacity

Mr Tony Briddy, Private Capacity

Mr Stephen Coleman, Private Capacity

Mrs Suzanne Dean, Private Capacity

Mr James Elsworth, Private Capacity

Mr William Elsworth, Private Capacity

Mr Richard Leigh Evans, Private Capacity

Ms Karen Jones, Private Capacity

Mrs Angela Kearns, Private Capacity

Mr Graeme Keating, Private Capacity

Mrs Cathy Keating, Private Capacity

Mrs Tanya Kehoe, Private Capacity

Mr Richard Kelly, Private Capacity

Mr Brian Kermond, Private Capacity

Dr David Mackay, Private Capacity

Mr Peter McLaughlin, Private Capacity

Mr John McMahon, Private Capacity

Mrs Heather McMahon, Private Capacity

Mrs Renate Metzger, Private Capacity

Ms Melanie Robertson, Private Capacity

Mr Allan Schafer, Private Capacity

Mrs Anne Schafer, Private Capacity

Mr Peter Seligman, Private Capacity

Mr Martin Shield, Private Capacity

Mr Donald Thomas, Private Capacity

Ms Alicia Webb, Private Capacity

Tuesday 29 March 2011

St James Court Conference Centre, Melbourne

Committee Members in attendance:

Senator Rachel Siewert (Chair)

Senator Claire Moore (Deputy Chair)

Senator Judith Adams

Senator Sue Boyce

Senator Steve Fielding

Witnesses

Vestas Australian Wind Technology Pty Ltd

Mr Ken McAlpine, Director, Policy and Government Relations, Asia-Pacific Region

Ballarat Renewable Energy and Zero Emissions

Mr Andrew Bray, Community Campaigner

Clean Energy Council

Mr Russell Marsh, Policy Director

Mr Matthew Warren, Chief Executive Officer

Waubra Foundation

Dr Sarah Laurie, Medical Director

Country Fire Authority Victoria

Mr Geoffrey Conway, Deputy Chief Officer, Emergency Management

Hepburn Wind

Mr Simon Holmes à Court, Chairman

Acciona Energy

Mr Brett Wickham, Director Generation

Mr Andrew Thomson, Director Development

Infigen Energy

Mr Jonathon Upson, Senior Development Manager

Origin Energy Ltd

Mr Kyle Russell, Group Manager Development

Pacific Hydro Pty Ltd

Mr Lane Crockett, General Manager Australia

WestWind Energy Pty Ltd

Mr Phil Burn, Project Developer

Mr Tobias Geiger, Managing Director

Wind Pacific (Australia) Pty Ltd

Mr Craig Eyes, Director

Friends of the Earth Australia

Mr Cam Walker, Campaigns Coordinator

Victorian Planning and Environment Law Association

Mr Peter O'Farrell, Board Member,

Ms Jane Sharp, Executive Director

Climate and Health Alliance

Dr Susie Burke, Board Member and Senior Psychologist, Public Interest, Environment and Disaster Response, Australian Psychological Society

Professor Simon Chapman, Expert Adviser, and Professor of Public Health, University of Sydney

Ms Elizabeth Reale, Board Member and Federal Professional Research Officer, Australian Nursing Federation

Mr Andrew Cox, Private capacity

Thursday 31 March 2011

Legislative Assembly, Perth

Committee Members in attendance:

Senator Rachel Siewert (Chair)

Senator Claire Moore (Deputy Chair)

Senator Judith Adams

Senator Sue Boyce

Senator Steve Fielding

Witnesses**Sustainable Energy Association of Australia**

Mr Neil Anthony Prentice, Advisory Services Manager

Friends of Collector Inc

Mr Anthony Hodgson AM, Inaugural President

Western Australian Farmers Federation Inc

Mr Dale Park, Senior Vice President

Professor Gary Wittert, Private Capacity

Doctors for the Environment Australia

Dr George Crisp, WA Representative

Mr Roger Bilney, Private Capacity

Ms Helen Bignell, Private Capacity

Mrs Elizabeth Atkins, Private Capacity

Oil Mallee Association of Australia Inc

Mr Lex Hardie, President

National Health and Medical Research Council

Professor Warwick Anderson AM, Chief Executive Officer

Professor John McCallum, Head of Research Translation Group

SkyFarming Pty Ltd

Mr Andrew Woodroffe, Technical Director

Collgar Wind Farm Pty Ltd

Mr Alistair Craib, Chief Executive Officer

Moonies Hill Energy Pty Ltd

Dr Sarah Rankin

West Hills Farm Pty Ltd

Mr Mathew Rosser

Tuesday 17 May 2011

Parliament House, Canberra

Committee Members in attendance:

Senator Rachel Siewert (Chair)

Senator Claire Moore (Deputy Chair)

Senator Judith Adams

Senator Sue Boyce

Senator Steve Fielding

Witnesses**Australian Energy Market Operator**

Mr David Swift, Executive General Manager Corporate Development

National Acoustic Laboratories

Dr Warwick Williams, Senior Research Engineer