

Australia's approach to adverse health effects from wind farms: legal and policy guidelines and environmental impact assessments at federal and state level

by Anna Davies*

A flexible precautionary approach to health impacts from wind turbine noise and shadow flicker, which are considered social issues by planning authorities,¹ has developed to differing degrees throughout Australia. This paper examines shadow flicker and noise, including low frequency noise and infrasound, from wind turbines, because anecdotal evidence connects them to adverse health effects in Australia and internationally.² Health issues relating to transmission lines, air safety, the stability of turbines or other construction problems are not discussed.³

Australia currently has approximately '1,345 wind turbines in 59 operating wind farms.'⁴ As '2000–2500' turbines are required to reach Australia's 2020 Renewable Energy Target⁵ and it is cheaper to build wind farms closer to residential areas and the electricity network,⁶ health effects must be addressed from the beginning of any wind farm development. This will help to reduce community pressure to limit construction⁷ and stress on rural populations.⁸ Adverse health effects are considered by wind farm

regulations at a federal and state level and by wind farm proponents and authorities in environmental impact assessments ('EIAs').

This essay focusses on the federal planning framework, the requirements of New South Wales ('NSW'), Victoria and Tasmania and EIAs from NSW, Western Australia ('WA') and Tasmania. It argues that the precaution taken is appropriate and proportionate to any health risk, although there are potential areas of improvement in regard to infrasound assessment as identified in *The Social and Economic Impact of Rural Wind Farms Report 2011* ('Senate Committee Report').⁹

Precautionary approach

The precautionary principle has been invoked in many forms worldwide¹⁰ due to ambiguity with its formulation and application.¹¹ Taking a strict interpretation, where there is 'a threat of serious or irreversible environmental damage and scientific uncertainty as to the environmental damage' there is an obligation to avoid the threat of damage,¹² and the precaution taken must be proportionate to the seriousness of that threat.¹³ More flexible interpretations state that where there is scientific uncertainty but the threat is not serious, decision makers have authority to use measures such as risk assessment to avoid any prospect of harm.¹⁴ The National Health and Medical Research Council ('NHMRC') and the *Draft NSW Planning Guidelines: Wind Farms* ('NSW Guidelines') have explicitly adopted a precautionary approach to wind farms and health effects.¹⁵ In contrast, other planning authorities and wind farm proponents have not adopted such an approach. However they have considered similar factors in practice. This paper considers whether these approaches are justified.

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1 NSW Government, *Draft NSW Planning Guidelines: Wind Farms* (NSW Government Planning and Infrastructure, 2011) 8.

2 Jim Cummings, *Wind Farm Noise and Health: Lay summary of new research released in 2011* (April 2012) Acoustic Ecology Institute <www.acousticecology.org/wind/>

3 Australian Government, *A Critical Decade: Generating a Renewable Australia* (Climate Commission, 2012) 7.

4 Clean Energy Australia, *Wind Energy* (2013) Clean Energy Australia Report 2011 <<http://cleanenergyaustraliareport.com.au/tech-talk/wind-power/>>

5 Ibid.

6 Lisa Caripis and Anna Kallies, 'Planning away' Victoria's renewable energy future? Resolving the tension between the local and global in wind farm developments' (2012) 29 *Environmental and Planning Law Journal* (EPLJ) 415, 416.

7 Andrew Newman, 'Creating the power for renewal: Evaluation of New South Wales' renewable energy planning law changes and suggestions for further reform' (2012) 29 *EPLJ* 498, 502.

8 Cummings, above n 2.

9 Senate Standing Committees on Community Affairs ('SSCCA'), Parliament of Australia, *The Social and Economic Impact of Rural Wind Farms*, (23 July 2011) 2.70.

10 Poul Harremoës and European Environment Agency, 'Late lessons from early warnings: precautionary principles 1896-2000' (2001) 22 *Environmental Issue Report* 1, 12.

11 *Bridgetown Greenbushes/Friends of the Forest v Department of Land Conservation and Management* (1997) 18 WAR 102, 118.

12 *Telstra v Hornsby Shire Council* (2006) 67 NSWLR 256, 269 [128].

13 Ibid [128], [131].

14 Jacqueline Peel, 'Interpretation and Application of the Precautionary Principle: Australia's Contribution' (2012) 18(1) *Review of European Community and International Environmental Law* 1, 27-28; *Gippsland Coastal Board S C & Ors* (No 2) [2008] VCAT 1545; *Leatch v Director-General of National Parks & Wildlife* (1993) 81 LGERA 270.

15 NHMRC, *Public Statement: Wind Turbines and Health* (2009) Australian Government, 2 <www.nhmrc.gov.au/_files_nhmrc/publications/attachments/new0048_public_statement_wind_turbines_and_health.pdf>; NSW Government, *Draft NSW Planning Guidelines: Wind Farms* (NSW Government Planning and Infrastructure, 2011) 8.

Threat of serious or irreversible damage?¹⁶

There are claims that noise causes problems such as sleep deprivation, cardiovascular disease and vertigo, and that shadow flicker causes seizures.¹⁷ Professor Simon Chapman has recorded over 150 health problems associated with wind farms.¹⁸ Media and community concern about such adverse effects has been more prominent on mainland Australia than in Tasmania due to larger wind farms located closer to residential areas. In Waubra, Victoria, some residents sold their homes because they attributed their sudden ill health to the nearby turbines¹⁹ which make up Australia's biggest wind farm.²⁰ Chapman argues ill health from turbines is caused by a 'communicated disease' which is psychologically and not physically related.²¹ Numerous reports state that there is no evidence of health effects,²² but others assert that 5–15% of people living nearby are affected health-wise by turbines, which explains sporadic anecdotal complaints.²³

It is submitted that any health risks from wind turbines are manageable. The NHMRC has stated that wind farms have 'no direct pathological effects' and that risks to human health are managed by current planning requirements.²⁴ The *Draft National Wind Farm Development Guidelines* ('National Guidelines') acknowledge that noise, low frequency sound and infrasound at certain levels can cause adverse health effects, however, wind turbines do not emit them at harmful levels.²⁵ Additionally, they recognize that shadow flicker is 'a potential risk' for epileptics but any risk is insignificant.²⁶ They also assert that adequate assessment is in place to deal with potential health consequences from visual impacts and annoyance.²⁷ Furthermore, the CSIRO determined that appropriate management and community engagement can reduce stress caused by wind

farm development.²⁸ Therefore the precautionary principle is not invoked strictly because there is no serious threat of adverse health effects.

Lack of full scientific certainty?²⁹

The NHMRC has stated that there is 'insufficient published scientific evidence to positively link wind turbines with adverse health effects.'³⁰ This has been reiterated by the Australian Government who emphasised 'there is no strong evidence either way.'³¹ The Senate Committee Report acknowledged adverse health effects might be caused by noise, vibration, or stress but the evidence was inconclusive.³² Chapman has asserted that future research must take into account affected persons' past medical histories and the timing of complaints in relation to media scares to help ascertain the true causes of their illnesses and any psychogenic problems.³³

The Environment Protection Authority ('EPA') (Tas) has recognized 'unresolved issues' regarding special audible characteristics ('SACs') from turbines.³⁴ Noise assessment is difficult because turbine noise is hard to differentiate from background noise.³⁵ Both increase with wind speed.³⁶ Further study into infrasound assessments and epidemiology has been advocated and is occurring.³⁷

There appears to be more certainty in regard to shadow flicker as the National Guidelines state that the risk of seizure is '1 in 10 million.'³⁸ Shadow flicker is also easier to assess because special equipment can take into account the wind turbine's location in relation to the sun and the extent of the shadow flicker on 'sensitive receivers.'³⁹

16 *Telstra v Hornsby Shire Council* (2006) 67 NSWLR 256, 269 [128], [131].

17 SSSCA, above n 9.

18 Simon Chapman, 'Wind turbine syndrome: a classic 'communicated' disease' (20 July 2012) *The Conversation* <<http://theconversation.edu.au/wind-turbine-syndrome-a-classic-communicated-disease-8318>>

19 Australian Broadcasting Corporation, 'Against the Wind', *Four Corners*, 25 July 2011 (Andrew Fowler).

20 Australian Government, *A Critical Decade*, above n 3.

21 Chapman, above n 18.

22 Simon Chapman and Therese Simonetti, *Summary of main conclusions reached in 17 reviews of the research literature on wind farms and health* (30 January 2012) <www.dkvind.dk/html/nyheder/2012/pdf/100212_litteraturstudie.pdf>

23 Cummings, above n 2, 14.

24 Australian Government, *Wind Turbines and Health, A Rapid Review of the Evidence* (NHMRC, July 2010) 8.

25 Environment Protection and Heritage Council (EPHC), *National Wind Farm Development Guidelines* (July 2010) 9, 64.

26 *Ibid* 12.

27 *Ibid* 9, 41.

28 Nina Hall et al, *Summary of Acceptance of Rural Wind Farms in Australia* (CSIRO Science into Society Group 2012) 5, 6.

29 *Telstra v Hornsby Shire Council* (2006) 67 NSWLR 256, 271 [140].

30 NHMRC, *Public Statement: Wind Turbines and Health* (2009) Australian Government, 2 <www.nhmrc.gov.au/_files_nhmrc/publications/attachments/new0048_public_statement_wind_turbines_and_health.pdf>

31 Australian Government, *Government Response to the Senate Community Affairs References Committee Report on The Social and Economic Impact of Rural Wind Farms* (Department of Health and Ageing, July 2012) 3.

32 SSSCA, above n 9, 2.99.

33 Chapman, above n 18.

34 EPA, *Environmental Assessment Report Cattle Hill Wind Farm NP Power Pty Ltd* (2011) 74.

35 Bob Thorne, 'The Problem with 'Noise Numbers' for Wind Farm Noise Assessment' (2011) 31(4) *Bulletin of Science, Technology and Society* 263.

36 EPHC, above n 25, 9.

37 Australian Government, *Government Response*, above n 31, 4. For example, a group from Adelaide University are researching infrasound noise from turbines and analysing how they produce noise: *Wind farm study aims for quiet achievement*, ABC News (online) 28 November 2012 <www.abc.net.au/news/2012-11-28/wind-farm-study-aims-for-quiet-achievement/4396918>Booking.com

38 EPHC, above n 25, 149.

39 *Ibid* 12, 149.

Precaution is appropriate

A flexible precautionary approach has been taken by proponents and authorities as the serious threat threshold is not established. This is justified due to the degree of scientific uncertainty, especially regarding infrasound. If precaution is only employed when the threat of serious harm is established, the damage may be irreversible and any action too late.⁴⁰ Caution through planning and impact assessments is not a misallocation of resources as it is impossible to conclude that there is no risk⁴¹ and psychogenic health problems and ignorance should not be ignored.⁴² Development must not halt under community and media pressure but as there is some threat, decision-makers can take the safer path by addressing health effects.⁴³ This takes into account social and political factors not just cost-effective ones.⁴⁴ Increased acknowledgement of health effects and community engagement may help reduce public stress, NIMBY reactions and community opposition.

A proportional response?⁴⁵

As there is clear scientific uncertainty in regard to health risks from infrasound but no serious threat, a low level of precaution would be expected so as to fit in with the proportionality requirement.⁴⁶ An even lower level would be expected for shadow flicker as there is more certainty.⁴⁷ In *Telstra v Hornsby Shire Council*,⁴⁸ safety factors were already embedded into the planning requirements and satisfied the precautionary principle.⁴⁹ It is submitted decision-makers do not have to choose the easiest option if there are a number of choices which fit within a proportional precautionary range.⁵⁰ They can select the most suitable approach and degree of risk for their jurisdiction.

40 Peel, above n 14, 28.

41 Harremoës, above n 10, 11.

42 Ibid 193.

43 G M Bates, *Environmental Law in Australia* (Lexis Nexis Butterworths, 7th ed., 2010) 230.

44 Ibid.

45 *Telstra v Hornsby Shire Council* (2006) 67 NSWLR 256, 277 [166].

46 Ibid.

47 Lee Godden and Jacqueline Peel, *Environmental Law Scientific Policy and Regulatory Dimensions* (Oxford University Press, 2011) 248; *Friends of Hinchinbrook Society Inc v Minister for Environment (No 2)* (1997) 69 FCR 28.

48 (2006) 67 NSWLR 256.

49 Godden, above n 47, 259.

50 *Telstra v Hornsby Shire Council* (2006) 67 NSWLR 256, 277 [166].

Federal framework

In applying the precautionary principle, the NHMRC recommends continuous assessment of research and conforming to planning standards to minimise any risk.⁵¹ The government has stated that due to the lack of evidence, it is hard to ascertain 'what course of action to take, if any.'⁵² This is a typical governmental reaction in regard to anecdotal adverse health complaints and contradicts the purpose of the precautionary principle.⁵³ However, the government has supported continuing research recommended by the Senate Committee Report and plans to prioritise epidemiological and laboratory studies into health impacts, assessment of noise and infrasound impacts and ensure the continuation of NHMRC research.⁵⁴ A review of wind farms and health effects by the NHMRC is currently underway.⁵⁵

The Senate Committee Report stipulated that the National Guidelines need to reflect the NHMRC's precautionary approach.⁵⁶ Although the National Guidelines are not mandatory, they provide a reference point for all states, especially those who do not have wind farm specific guidelines.⁵⁷ The National Guidelines state that if a direct connection is made between wind turbines and health then they will be updated.⁵⁸ However, the government has refused to update them as some states are developing their own guidelines which other states can refer to.⁵⁹

The Senate Committee Report acknowledged that current standards require audible noise assessment at the planning stage but no infrasound or low frequency noise assessment.⁶⁰ The National Guidelines discuss misconceptions surrounding infrasound and conclude that assessment within the approval process cannot be justified as the levels produced do not cause health problems.⁶¹ They stipulate that infrasound and low frequency assessment is only required when a complaint is made and the relevant authority requests it.⁶² This could now be considered inadequate as the Senate Committee Report

51 NHMRC, above n 30, 2.

52 Australian Government, *Government Response*, above n 31, 3.

53 Harremoës, above n 10, 1.

54 Australian Government, *Government Response*, above n 31, 4.

55 NHMRC, *Wind Farms and human health* (2013) Australian Government <www.nhmrc.gov.au/your-health/wind-farms-and-human-health>

56 SSCCA, above n 9, 3.98.

57 Ibid 3.82.

58 Australian Government, *Government Response*, above n 31, 3.

59 Ibid 5.

60 SSCCA, above n 9, 2.42.

61 EPHC, above n 25, 9, 66.

62 Ibid 9.

has suggested a 'precautionary target' be established at 75dB(G) regarding infrasound indoors.⁶³ However, the government has left infrasound assessment to the states.⁶⁴ This is appropriate as planning laws are their responsibility and depend on local priorities,⁶⁵ but infrasound assessment within the approval process will help to alleviate community concern more promptly and prevent later complaints.⁶⁶

An agreement made between a proponent and landowner can circumvent planning guidelines and may permit higher noise levels.⁶⁷ When this occurs, reference should be made to the appropriate authority for approval.⁶⁸ The 'minimum noise level limit' should only be increased by 5dB and no louder than 45dB unless the home is insulated.⁶⁹ The proponent must explain any negative consequences to the landowner.⁷⁰ Importantly, community consultation is reiterated throughout the National Guidelines.⁷¹ However, it is noteworthy that 'turbine hosts' are usually not worried about noise or shadow flicker impacts.⁷²

The National Guidelines require shadow flicker assessment to reduce annoyance; not any risk to epileptics.⁷³ However, health risks are minimised regardless of its purpose due to situational requirements and use of buffers.⁷⁴ The distance between private dwellings and wind farms is determined by the states⁷⁵ and the Senate Committee Report concluded that as noise setback requirements are larger than shadow flicker setbacks, health issues from shadow flicker would be unlikely.⁷⁶

According to the *Best Practice Guidelines for implementation of wind farm projects in Australia* ('Best Practice Guidelines'), there are no negative health effects from wind farms.⁷⁷ However, an impact assessment is necessary to determine 'environmental, social, health and economic effects' of any proposed wind farm.⁷⁸ This ensures community understanding and identifies

any problem areas that need to be managed.⁷⁹ Noise and shadow flicker assessment is required but not due to adverse health effects, and infrasound or low frequency sound is not mentioned.

These two guidelines provide a thorough assessment guide for noise and shadow flicker and are sufficiently proportionate in accounting for any health risk. It is noteworthy that their approach has been followed in Tasmania and is less rigorous than the new Victorian and NSW Guidelines.

Victorian framework

The *Policy and Planning Guidelines for Development of Wind Energy Facilities in Victoria* ('Victorian Guidelines') take a 'precautionary approach' requiring 2km between dwellings and turbines unless consent of the owner is obtained.⁸⁰ Furthermore, a limit of 30 hours per year for shadow flicker⁸¹ and stringent New Zealand noise standards⁸² which are stricter than the *South Australia Environment Protection Authority Environmental noise guidelines: Wind farms* (SA Noise Guidelines), have been implemented.⁸³ However this approach is due to amenity concerns not health complaints.⁸⁴ Other than a general statement regarding the assessment of 'human wellbeing,' there is no mention of human health, infrasound or low frequency sound.⁸⁵ However, such requirements would mitigate adverse health effects and the National Guidelines and Best Practice Guidelines are also referred to.⁸⁶

NSW framework

In contrast, NSW has explicitly adopted a precautionary approach to health and wind turbines.⁸⁷ The NSW Guidelines require assessment of low frequency noise and consideration of shadow flicker in relation to health effects.⁸⁸ This is distinguishable from the National Guidelines but within a range of proportional responses because the Senate Committee Report supported infrasound assessment at the approval stage. The NSW

63 SSCCA, above n 9, 2.42.

64 Australian Government, *Government Response*, above n 31, 3.

65 Newman, above n 7, 499.

66 SSCCA, above n 9, 2.42.

67 EPHC, above n 25, 49.

68 Ibid.

69 Ibid 48.

70 Ibid 49.

71 Ibid 54.

72 Hall, above n 28, 6.

73 EPHC, above n 25, 149.

74 Thorne, above n 35, 290.

75 Australian Government, *Government Response*, above n 31, 4.

76 SSCCA, above n 9, 2.64.

77 Auswind, *Best Practice Guidelines for implementation of wind farm projects in Australia* (Clean Energy Council, December 2006).

78 Ibid 39.

79 Auswind, above n 77.

80 Victorian Government, *Policy and planning guidelines for development of wind energy facilities in Victoria*, (Department of Planning and Community Development, July 2012) 23.

81 Ibid 31.

82 Caripis, above n 6, 423.

83 EPA, *EAR Cattle Hill*, above n 34.

84 Victorian Government, above n 80, 23.

85 Ibid 30.

86 Ibid 21.

87 NSW Government, above n 1, 7.

88 Ibid.

Guidelines also require reference to recent research,⁸⁹ discussions with the community about health,⁹⁰ a 35dB noise limit,⁹¹ shadow flicker assessment within 2km and also a maximum of 30 hours per year of shadow flicker.⁹² Some argue these requirements are too onerous.⁹³ Under the National Guidelines, shadow flicker assessment is required in relation to annoyance so this is not an overly burdensome requirement that it occur in relation to health.

Also a 2km setback requirement from homes is required unless there is consent or it falls under a 'gateway process'.⁹⁴ The 'gateway process' allows a proponent to apply for a Site Compatibility Certificate.⁹⁵ This permits them to proceed to the next level of approval without obtaining the owner's consent as long as they discuss noise, low frequency and shadow flicker in their application.⁹⁶ Public comments can then be made and the Joint Regional Planning Panel considers whether to approve it.⁹⁷ This is an additional precautionary measure.

Tasmanian framework

Tasmania provides 6.6% of Australia's wind energy,⁹⁸ but has no specific wind farm guidelines. Wind farms must receive local council approval,⁹⁹ and as all current wind farms are over 30MW,¹⁰⁰ they have been Level 2 developments under the *Environmental Management and Pollution Control Act 1994* (Tas).¹⁰¹ Therefore they must be referred to the EPA. A precautionary approach when making decisions is an objective of this Act but is not mandatory.¹⁰² Proponents must submit a Development Proposal and Environmental Management Plan ('DPMEP') to the EPA.¹⁰³

The *DPEMP General Guidelines* require coverage of health impacts which do not fall under other assessment areas.¹⁰⁴ The *Environmental Impact Assessment: A Guide* does not mention health but requires the DPEMP to cover 'all significant environmental, social and economic effects' including mitigation measures.¹⁰⁵ Health effects are an important factor especially for intergenerational equity,¹⁰⁶ but as these are mere guides and not specific to wind farms, the lack of reference to health considerations is justified.

The EPA recommends reference to the National Guidelines.¹⁰⁷ They can refer to it and other state guidelines to give them more specific guidance regarding health effects when creating appropriate approval conditions.¹⁰⁸ Additionally, federal approval under the *Environment Protection and Biodiversity Conservation Act 1996* (Cth) ('EPBCA') is usually required due to the impact on threatened and migratory bird species. The proponent is bound to comply with any approval conditions¹⁰⁹ but can challenge specific conditions in the Resource Development and Planning Tribunal.¹¹⁰ Assessments in progress and completed assessments, including permit conditions, are available on the EPA website from 2008 onwards.¹¹¹ This increases the information available to concerned community members.

Health considerations in EIAs

Consideration of health impacts from noise and shadow flicker have occurred sporadically in wind farm EIAs but any analysis has varied. Generally development has occurred in remote rural areas with few surrounding residents and so health concerns have not been prominent.¹¹² However, health considerations have become more relevant as wind farms have been proposed closer to residential and recreational areas and media and community concern has increased.

89 NSW Government, above n 1, 21.

90 Ibid 7.

91 Newman, above n 7, 508.

92 NSW Government, above n 1, 20.

93 Newman, above n 7, 498.

94 NSW Government, above n 1, 3.

95 Ibid.

96 Ibid.

97 Ibid 2-3.

98 Clean Energy Australia, above n 4.

99 *Land Use Planning and Approvals Act 1993* (Tas).

100 Letter from Simon Wilcox (DPIPWE) to Anna Davies, Tasmania, 5 August 2012.

101 *Environmental Management and Pollution Control Act 1994* (Tas), Schedule 2, 7(f).

102 Ibid s 3(h).

103 Environmental Defenders Office (EDO), *Development Controls Chapter 5* (2012) EDO <www.edohandbook.org/doku.php?id=ch5>

104 EPA, *General Guidelines for the preparation of a Development Proposal and Environmental Management Plan for Level 2 activities and 'called in' Activities* (2012) 21.

105 EPA, *Environmental Impact Assessment: A Guide* (2010) 3.

106 Harremoës, above n 10.

107 EPA, *Guidance Documents* (2012) <<http://epa.tas.gov.au/regulation/guidance-documents>>

108 For example, 46 conditions were placed on the Cattle Hill Wind Farm project; *NP Power Pty Ltd v. Central Highlands Council* [2012] TASRMPAT 56 [2].

109 EDO, above n 103.

110 *NP Power Pty Ltd v. Central Highlands Council* [2012] TASRMPAT 56 [2].

111 EPA, *Completed Assessments*, (2012) <<http://epa.tas.gov.au/regulation/completed-assessments>>

112 EPA, *Wind Farms*, (2012) <<http://epa.tas.gov.au/regulation/wind-farms>>

In the past noise assessment occurred in Tasmania but not in relation to health effects. The *Draft EIA for King Island Wind Farm* in 1994 stated that 'low frequency noise may be detected' at nearby residences.¹¹³ The 2002 *DPEMP Draft Guidelines for Heemskirk Wind Farm* required noise assessment in regard to surrounding shacks at Trial Harbour.¹¹⁴ Furthermore, noise was discussed in the *Woolnorth DPEMP* which was completed in 2000, because the closest building was 600m away and other residential dwellings were within 2–5km of the development.¹¹⁵ These assessments can be contrasted with more recent ones.

The 2008 *Silverton Wind Farm's Environmental Assessment Report* (EAR) discussed health impacts due to community concern. The project consisted of 598 turbines in a sparsely populated area of Western NSW.¹¹⁶ Visual amenity and impacts on horses and horse riding were also an issue.¹¹⁷ The EAR acknowledged health concerns surrounding infrasound but dismissed them,¹¹⁸ and no infrasound assessment occurred.¹¹⁹ The new NSW Guidelines would now require such assessment. The EAR acknowledged the potential for negative health consequences from shadow flicker but such low levels would not affect horse riders.¹²⁰ Landowners who were financial participants and in close proximity would be the only ones affected¹²¹ and so a 200m buffer was suggested to reduce any risks to them from shadow flicker.¹²²

The *Silverton EAR* displays adverse health effects were considered in NSW before any express precautionary approach and specific wind farm guidelines. This is reinforced by the express precautionary approach taken in 2009 regarding noise, blade flicker and health impacts from the Gullan Range Wind Farm in NSW.¹²³ Although shadow flicker and noise did not unreasonably affect the surrounding population,¹²⁴ a night-time assessment of noise was to be undertaken.¹²⁵

The *Silverton EAR* can be compared with the *Collgar EAR*, which was completed in the same year and made no reference to health effects, infrasound or low frequency noise but considered audible noise and shadow flicker adequately.¹²⁶ At the time no statute dealt with wind farm development,¹²⁷ but the SA Noise Guidelines were followed.¹²⁸ The proposed 127 turbines¹²⁹ would impact upon only 14 residences in WA compared to the larger population affected in the Silverton Township.¹³⁰ Therefore community concern and media attention in WA may have been less. Financial participants were also the closest to the turbines and the only ones affected by excessive noise levels at high wind speeds, whereas noise at non-participants complied with the SA Noise Guidelines.¹³¹ It was stated that shadow flicker was only an issue if residences were within 500m; however the closest residence was 786m away.¹³² All surrounding owners were consulted and any noise complaints were to be managed.¹³³

The 2004 *Musselroe EAR* appears similar to the 2008 *Collgar EAR* as it does not mention infrasound and only considers audible noise and shadow flicker.¹³⁴ Musselroe Wind Farm is currently under construction in Tasmania. The *DPEMP Guidelines* required noise within 2km and shadow flicker on nearby residents to be addressed.¹³⁵ Noise controls were implemented despite 'no formal guidelines',¹³⁶ no reference to health and only 5% of the locals being concerned about noise.¹³⁷ Changes to the location of the turbines ensured noise standards were met.¹³⁸ Once in operation, monitoring will ensure compliance and the accuracy of predictions.¹³⁹

113 Hydro-Electric Commission, *King Island Wind Power Project: Draft EIA* (1994) 25.
 114 DPIPWE, *Draft Guidelines for the preparation of a development proposal and environmental management plan for Hydro Tasmania Proposed Heemskirk Wind Farm Project Near Trial Harbour, Western Tasmania* (2002) 22; Hydro Tasmania, *Heemskirk Wind Farm: DPEMP: Project Summary* (2003).
 115 Hydro-Electric Corporation, *West Coast Wind Farm: Woolnorth North West Tasmania DPEMP Volume 1: Main Report* (2000) 111.
 116 Silverton Wind Farm Developments Pty Ltd, *Environmental Assessment* (2008) 228.
 117 Ibid 92.
 118 Ibid 195.
 119 Heggies Pty Ltd, *Silverton Wind Farm Noise Impact Assessment Report Number 40-1487* (2008) 2.
 120 Silverton Wind Farm Developments, above n 116, 195.
 121 Ibid 198.
 122 Ibid.
 123 *King v Minister for Planning* [2010] NSWLEC 1102 [23].
 124 Ibid [649].
 125 Ibid [134].

126 Bayley Environmental Services, *Proposed Collgar Wind Farm Environmental Assessment Report No J08005* (2008) 1.

127 Ibid 4.

128 Western Australian Planning Commission, 'Guidelines for Wind Farm Development,' (2004) 67 *Planning Bulletin Western Australia* 4.

129 Bayley Environmental Services, above n 126, 1.

130 Silverton Wind Farm Developments, above n 116, 127.

131 Bayley Environmental Services, above n 126, 18, 24.

132 Ibid 24.

133 Ibid 25.

134 DPIPWE and Hydro Tasmania, *Environmental Assessment Report: Musselroe Wind Farm Project* (Hydro Tasmania, 2004).

135 DPIPWE, *Draft guidelines for the preparation of a development proposal and environmental management plan for Hydro Tasmania proposed Musselroe Wind Farm Project near Cape Portland, north east Tasmania* (2002) 23, 28.

136 Hydro Tasmania, *Musselroe Wind Farm Project: development proposal and environmental management plan: Volume 2 - Wind farm site* (2003) 270.

137 Hydro Tasmania, *Musselroe Wind Farm Project: development proposal and environmental management plan: Volume 1 - Project description and commitments* (2003) 61.

138 Hydro Tasmania, *Volume 2*, above n 136, 265.

139 DPIPWE and Hydro Tasmania, above n 134, 102.

The *Musselroe EAR* acknowledged health issues with shadow flicker and blade glint,¹⁴⁰ but denied any health risk due to the low frequency.¹⁴¹ The limited account of health effects can be explained as there were seventeen surrounding landowners,¹⁴² but only four were residences.¹⁴³ Furthermore the *DPEMP Guidelines* were created in 2002 and the EAR in 2004 when health effects were not prominent in the media.

The Proposed Cattle Hill Wind Farm in Tasmania, which involves the construction of 100 turbines and requires federal approval, takes a similar approach to the *Silverton EAR* and conforms to the National Guidelines and SA Noise Guidelines.¹⁴⁴ Although the 2011 EAR refers only once to human health,¹⁴⁵ this can be justified due to its remote location near Lake Echo and the fact that community concern revolved around impacts on the wedge-tailed eagle and aboriginal heritage.¹⁴⁶ Health risks were mentioned in the 2010 *Noise Assessment Report*¹⁴⁷ but infrasound was not. Health effects were not an issue as fisherman would be near the site for only short periods.¹⁴⁸ Only three out of five nearby dwellings were classified as 'sensitive receivers'¹⁴⁹ because two were participating landowners.¹⁵⁰ A contract was to be organised between the proponent and the owners of one property that would be affected by excessive noise even though they did not occupy it permanently.¹⁵¹ In the DPEMP, there were provisions to manage noise and reassessment will be required after three months into operation.¹⁵²

Infrasound was discussed separately due to media attention but there was no obligation to examine it.¹⁵³ The difficulties with measuring SACs and the limited understanding of their causes was acknowledged.¹⁵⁴ However, there was no risk to human health because receivers were more than 1km away,¹⁵⁵ infrasound was well below the 85dB(G) threshold,¹⁵⁶ and any unresolved issues were taken into account by

sufficient buffers.¹⁵⁷ This was a conservative approach at the time,¹⁵⁸ however the Senate Committee Report has since recommended a precautionary level of 75dB(G).¹⁵⁹ Commitment 17 in the planning permit stipulated that if noise complaints were made during operation, SACs including infrasound, would be monitored.¹⁶⁰ This is consistent with the National Guidelines.

Health in regard to shadow flicker was also considered.¹⁶¹ The *Visual Impact Assessment* noted shadow flicker affected five residential properties and lake users.¹⁶² The DPEMP concluded that any health impacts were minor;¹⁶³ the turbines would rotate too slowly and views of the turbines would be limited, thus any risk was insignificant.¹⁶⁴

Noise and health impacts remain a concern in communities who will be affected by future wind farm development. The proposed Low Head Wind Farm near George Town, Tasmania was recently recognized as a controlled action under the EPBCA. Although only 12 turbines are to be built in 2014,¹⁶⁵ and early assessment indicates noise will not be an issue for the surrounding population, the wind farm's website refers to a Canadian Wind Energy Association ('CanWEA') webpage which dismisses any claims of adverse health effects from infrasound.¹⁶⁶ This information was produced by CanWEA in 2008. The proponents could easily find a more recent dismissal of health concerns. However, it is positive to see continuous community engagement since September 2011,¹⁶⁷ which has included consultation with land and business owners within a 5km vicinity of the proposed site.¹⁶⁸

140 DPIPWE and Hydro Tasmania, above n 134, 114.

141 Ibid.

142 Hydro Tasmania, *Volume 1*, above n 137, 51.

143 Hydro Tasmania, *Volume 2*, above n 136, 266.

144 Fiona Keserue et al, *Cattle Hill Wind Farm: DPEMP* (SEMF, 2010) 161.

145 EPA, *EAR Cattle Hill*, above n 34.

146 Ibid 13.

147 EPA, *Cattle Hill Wind Farm Noise Assessment Report No 3671_01* (VIPAC Engineers & Scientists Ltd, 2010).

148 Ibid 12.

149 Ibid 2.

150 Ibid.

151 Fiona Keserue and Edith O'Shea, *Executive Summary: Cattle Hill Wind Farm: DPEM Plan* (SEMF, 2010) 34.

152 Ibid 35.

153 Keserue et al, above n 144, 168.

154 Letter from VIPAC Engineers and Scientists to NP Power Pty Ltd regarding Cattle Hill Wind Farm – Comments on Infrasound, 26 February, 2010, 1.

155 EPA, *Cattle Hill Noise Assessment*, above n 147, 2.

156 Keserue et al, above n 144, 169.

157 EPA, *EAR Cattle Hill*, above n 34, 74.

158 EPA, *Cattle Hill Noise Assessment*, above n 147, 2.

159 SSCCA, above n 9, 2.42.

160 EPA, *NP Power Cattle Hill Wind Farm Amended Permit* (Central Highlands Council (Planning Authority) 2012).

161 Keserue and O'Shea, above n 151, 52.

162 EPA, *Visual Impact Assessment Cattle Hill Wind Farm Report No 09600* (Context Landscape Design Pty Ltd, 2010).

163 Keserue and O'Shea, above n 151, 52.

164 Keserue et al, above n 144, 257.

165 Low Head Wind Farm Pty Ltd, *Social* (2012) <www.lowheadwindfarm.com.au/project/social>

166 Low Head Wind Farm Pty Ltd, *Links* (2012) <www.lowheadwindfarm.com.au/links>; CanWEA, *Windy Myths: Get the Facts* (2008) <www.canwea.ca/wind-energy/myths_e.php>

167 Nick Clark, 'Plan for Low Head wind farm' *The Mercury* (online) 20 December 2012 <www.themercury.com.au/article/2012/12/20/368746_tasmania-news.html>

168 Low Head Wind Farm Pty Ltd, *Invitation for Public Comment on Referral* (6 July 2012) Australian Government, 19 <www.environment.gov.au/cgi-bin/epbc/epbc_ap.pl?name=current_referral_detail&proposal_id=6450>

Community engagement has also been emphasised in relation to the two billion dollar wind farm proposal on King Island, Tasmania. If built it will be the largest in Australia.¹⁶⁹ Hydro stated that the project will not go ahead unless the King Island community grants a 'social licence'.¹⁷⁰ Hydro has also increased the consultation period with the community due to their concerns.¹⁷¹ Currently, only one person has voiced concerns about adverse health effects.¹⁷² Such engagement will increase the chances of successful development.¹⁷³

Conclusion

Although slightly different, the federal and state approaches fall into a range of proportional precautionary responses and display the precautionary principle's flexible application whether expressly employed or not. They help to avoid any health threat becoming serious and account for varying degrees of scientific uncertainty. Health concerns are dismissed as relatively insignificant but their consideration by planning authorities and wind farm proponents from the beginning of a proposal helps to inform concerned parties, reduce opposition in affected areas and ensure smoother developments in the future.

Precaution exists through sufficient planning steps. The EIAs display an increased recognition of potential health effects. They expressly discuss impacts from shadow flicker

which is consistent with the most recent NSW Guidelines,¹⁷⁴ yet not required by the National Guidelines. The National Guidelines require assessment of infrasound only when a complaint is made; however it is now a requirement at the approval stage in NSW and this is supported by the Senate Committee Report. There may be an increased expectation that infrasound is assessed earlier because it is the biggest health-related concern and most uncertain area. Management of low frequency noise concerns at this stage will be beneficial if Australia wants to avoid having to resort to offshore wind farms as in Denmark.¹⁷⁵

Wind farm development must continue in Australia as it is inexpensive despite initial upfront costs,¹⁷⁶ can be used extensively¹⁷⁷ and reduce electricity prices.¹⁷⁸ As research is occurring at a national and state level, planning standards can be reviewed and assessments altered as required or expected. Both the NSW and Victorian Guidelines are in draft form and relatively new. It will be interesting to see their future implementation including the impact of NSW's express precautionary approach, whether they act as a precedent for other states and any impact on wind farm opposition and development.

169 Peter Boyer, 'Sustainable Future isn't Easy' *The Mercury* (Hobart) 4 December 2012, 15.

170 Helen Kempton, 'The ball is in islander's court' *The Mercury* (online) 29 November 2012 <www.themercury.com.au/article/2012/11/29/367205_tasmania-news.html>; AAP, 'Community key to Hydro plan' *The Mercury* (online) 28 November 2012 <www.themercury.com.au/article/2012/11/28/367193_todays-news.html>

171 ABC, 'Extra time for wind farm survey' *ABC News* (online) (19 March 2013) <www.abc.net.au/news/2013-03-19/extra-time-given-for-giant-wind-farm-comment/4582152>

172 Michelle Paine, 'King Island's \$2b windfall' *The Mercury* (online) 28 November 2012 <www.themercury.com.au/article/2012/11/28/367117_most-popular-stories.html>; Helen Kempton, 'The ball is in islander's court' *The Mercury* (online) 29 November 2012 <www.themercury.com.au/article/2012/11/29/367205_tasmania-news.html>

173 Newman, above n 7, 514.

174 Keserue and O'Shea, above n 151, 52.

175 Newman, above n 7, 505.

176 *Ibid* 498.

177 SSCCA, above n 9, 3.8.

178 Australian Government, *A Critical Decade*, above n 3, 15.