

# Wind farms



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# Outline

- What are wind farms
- What health effects are mentioned
- What exposure pathways have been hypothesised
- What is the health evidence
- What tools can we use to assess wind farms
- Lessons learnt

# Wind farms

*Windfarms - a development that commonly aggregates the output of multiple wind turbines through a central connection point to the electricity grid*

*Wind turbine – a device that converts the force of the wind into a rotational force, which is used to propel an electric generator to create electricity*



# Wind farms

- Large scale – over \$30 million (or \$10 million in an environmentally sensitive area) see SEPP (State and Regional Development) 2011
- Small scale – see SEPP (Infrastructure) 2007

Capital Investment Value	Development category	Assessment by	Determination by
less than \$5 million	Local development	Council	Council
\$5-30 million <sup>1</sup>	Regional development	Council	Joint Regional Planning Panel
\$30 million or more (or \$10 million in an environmentally sensitive area) <sup>2</sup>	State significant development	Department of Planning and Infrastructure	Planning Assessment Commission

<sup>1</sup>Under Schedule 4A of the Environmental Planning and Assessment Act 1979 (NSW)

<sup>2</sup>Under State Environmental Planning Policy (State and Regional Development) 2011

# Concerns

- Health complaints – Headache, sleep disturbance, anxiety, nausea, vertigo, body vibration, cancer.
- Simon Chapman have compiled 247 health complaints

[http://ses.library.usyd.edu.au/bitstream/2123/10501/5/Wind\\_Disease\\_List.pdf](http://ses.library.usyd.edu.au/bitstream/2123/10501/5/Wind_Disease_List.pdf)

- Other complaints – visual amenity, loss in property value, societal disharmony

# Hypothesised exposures for health symptoms

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- Noise - (audible and infrasound)
- Shadow flicker - epilepsy
- Electromagnetic radiation

# National Health and Medical Research Council (NHMRC) review

- Looked at over 4000 papers but found only 13 (3 direct, 10 supporting) were suitable for in depth review
- Examined 4 lines of evidence
  - Direct
  - Mechanistic
  - Parallel
  - Background

# National Health and Medical Research Council (NHMRC) review

## Examined

- Noise
  - physical and mental health,
  - annoyance,
  - sleep disturbance,
  - quality of life,
  - Infrasound and low frequency noise, and
  - perception
- Shadow flicker, and
- Electromagnetic radiation

# National Health and Medical Research Council (NHMRC) review

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## Noise (physical and mental health)

*No direct evidence that exposure to wind farm noise affects physical or mental health*

- Health effects from noise are only known to occur at levels higher than what is likely to be experienced at close proximity to a wind farm
- Parallel evidence suggests there is unlikely to be any significant physical or mental health effects at distances greater than 1500m from a windfarm

# National Health and Medical Research Council (NHMRC) review

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## Noise (annoyance)

*Consistent but poor quality direct evidence that wind farm noise is associated with annoyance.*

- However bias and confounding may explain this
- Annoyance was higher when the turbines were visible and less if received economic benefit
- Confounding may include demographic, psychological and biological factors, attitudes and perceived degree of control

# National Health and Medical Research Council (NHMRC) review

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## Noise (sleep disturbance)

*Less consistent poor quality direct evidence of an association between sleep disturbance and wind farm noise.*

- However bias and confounding may explain this

# National Health and Medical Research Council (NHMRC) review

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## Noise (quality of life)

*Less consistent poor quality direct evidence of an association between poorer quality of life and wind farm noise.*

- However bias and confounding may explain this

# National Health and Medical Research Council (NHMRC) review

## Noise (Infrasound and low frequency)

*There is no direct evidence (available). Experimental evidence has shown few, if any, effects on bodily functions.*

- However this evidence relied on exposures of shorter time periods and greater intensities.
- Infrasound reported in the vicinity of wind farms has been reported at levels significantly below the accepted audibility threshold of infrasound frequencies and at levels similar to other locations (beach, gas fired power station, road)

# National Health and Medical Research Council (NHMRC) review

## Noise (Perception)

- Noise from wind farms generally in the range of 30 - 45 dBA at a distance of 500 – 1500m
- Noise from wind farms generally in the range of 30 - 35 dBA beyond 1500m, therefore

*It is unlikely that (the noise) will be disturbing at distances greater than 1500m*

- The noise is similar to many other natural and human made sources, however the whoosh is unique and may influence how the noise is perceived

*Laboratory studies suggest both negative and positive expectations of the effect of infrasound may influence its perception.*

# National Health and Medical Research Council (NHMRC) review

## Noise (Parallel and mechanistic evidence)

*There is no evidence to suggest that health effects from wind farm noise (including infrasound) would differ from health effects of other noise sources at similar levels.*

*Wind farms would be unlikely to cause health effects at distances of more than 500m , where noise levels are generally less than 45 dBA, where effects on sleep are likely to be modest at a population level*

*At distances of more than 1500m from wind farms, where the wind farm noise level may be in the order of 30 – 35 dBA, sleep disturbance is unlikely*

# National Health and Medical Research Council (NHMRC) review

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## Shadow Flicker

- Insufficient direct evidence but parallel evidence suggests the risk of triggering a seizure among epileptics is low

# National Health and Medical Research Council (NHMRC) review

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## Electromagnetic radiation

- No direct evidence on which to draw conclusion but indirect evidence shows that the levels close to wind farms are less than the average electromagnetic radiation inside and outside suburban homes.
- Electromagnetic radiation levels much higher than those experienced at wind farms have not been shown to have human health impacts

# National Health and Medical Research Council (NHMRC) review

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## Conclusion

*There is no consistent evidence that wind farms cause adverse health effects in humans*

# National Health and Medical Research Council (NHMRC) review

## Recommendations

Amongst other things.....

*...further investigation of the broader social and environmental circumstances that influence annoyance, sleep disturbance, quality of life and health effects ....*

*Factors that may influence changes to health effects may include people's expectations of their environment, perceived loss of control, aesthetics and impacts on visual landscape, impacts on land values, uneven distribution of financial benefits, local community relationships and exposure to other noise sources.*

# National Health and Medical Research Council (NHMRC) review

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## Further research

- Professor Guy Marks –research health effects of infrasound
- Associate Professor Peter Catchside – comparison of sleep disturbance of wind farms and traffic noise

# DRAFT NSW Planning Guidelines Wind Farms



Draft

NSW PLANNING GUIDELINES  
WIND FARMS

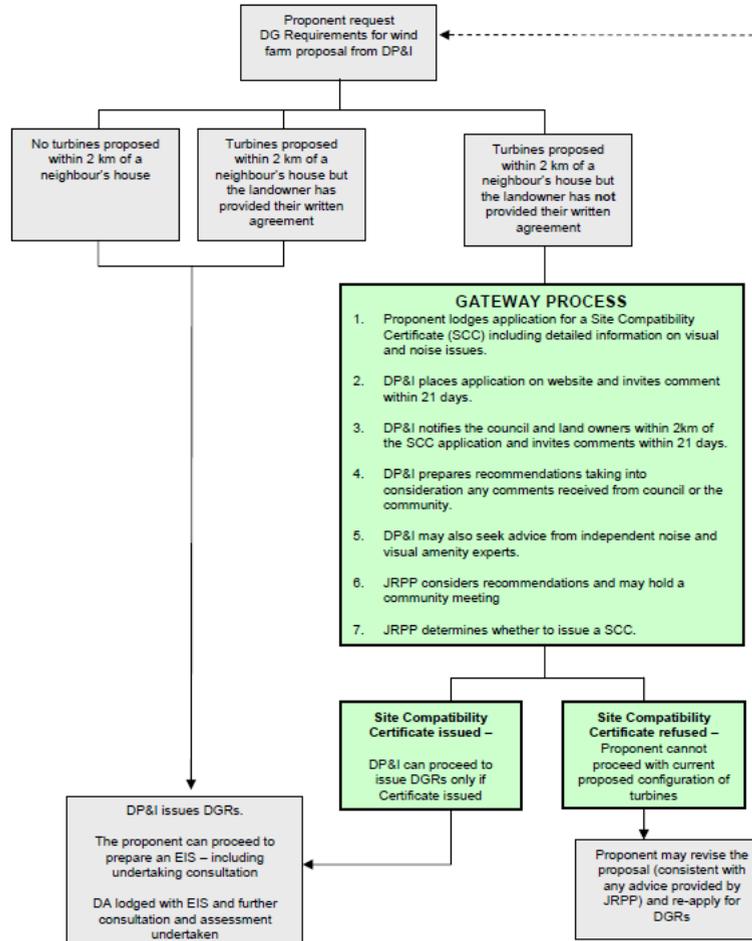
A resource for the community, applicants and consent authorities

December 2011



# Proximity to turbines

Figure 1 – Proposed Gateway Process for Wind Farm Proposals in NSW



# Community Consultation

- Must show that effective consultation has occurred prior to lodgement of environmental assessment and form a Community Consultation Committee

# Visual amenity

- Visibility of the proposed development
- Locations and distances from which the development can be viewed
- Landscape values and their significance
- Sensitivity of the landscape features to change  
(emphasis on neighbours impacted with 2km)

# Noise

- Instructional guidelines on how to assess the noise, the report of which must be included in the EIS

# Lessons learnt



