

There's power in wind: fact sheet

Why do we need clean energy?

The climate is changing. The majority of climate scientists from around the world confirm greenhouse gases in our atmosphere have been increasing since the industrial revolution, prompting a wide range of climate shifts that have the potential to threaten our environment and our way of life if greenhouse gas levels continue to rise¹.

Australia is particularly vulnerable to climate change. Our environmental, social and economic security is at risk unless we play our part in the global effort to reduce greenhouse gas emissions².

Electricity generation in Australia is responsible for more than a third of our greenhouse gas emissions³. Eighty per cent of Australia's electricity currently comes from coal⁴. Therefore, any attempt to reduce greenhouse gas emissions must focus on the energy sector and support the transition to clean, less polluting technologies⁵.

Fortunately, Australia has some of the world's best clean energy sources, many of which are already powering Australian homes and businesses.

Making full use of our abundant clean energy resources - like wind, solar, hydro, wave and geothermal - has the potential to meet Australia's growing energy needs as well as create new job opportunities and export markets⁶.

A clean energy economy will create new opportunities, jobs and provide other social, economic and environmental benefits to both current and future Australian generations.

Australia's clean energy future

The Federal Government has committed to reduce Australia's greenhouse gas emissions to 5 per cent below 2000 levels by 2020⁷.

The government has also committed to ensuring that 20 per cent of Australia's electricity supply will come from renewable energy sources by 2020⁸.

Clean energy has a key role to play in meeting these goals.

The national 20 per cent Renewable Energy Target, a carbon price and other measures that support the expansion of clean energy and reduced greenhouse gas emissions will all play an important role in the transition to a clean energy economy.



There's power in wind



Clean Energy Council

The power of wind

Australia has some of the best wind resources in the world.

Wind energy is currently the most cost-effective renewable energy resource in Australia.

It involves the generation of electricity from the naturally occurring power of the wind.

Wind turbines capture wind energy within the area their blades pass through. The blades in turn drive an electrical generator to produce power for export to the electricity grid.

Unlike conventional sources of electricity generation, like coal, no water is required for wind farm operation and no greenhouse gases are produced.

A single wind turbine can produce enough energy to supply up to 2,000 average households each year and save around 1 tonne of greenhouse gas for every megawatt produced⁹.

Sites where there is strong, consistent wind are the most appropriate locations for wind farms.

Noise

Wind turbines are one of the quietest forms of energy generation currently available.

Turbines emit most noise in the mid-frequency range (between 200 and 1000Hz). However, due to a range of effects, including their height from the ground and the impact of wind, it is a low frequency noise (between 200 to 10 Hz) that we actually hear¹⁰.

Sound with a frequency of less than 20Hz is known as 'infrasound'. This type of sound is very common both in natural and man-made environments. Humans cannot hear infrasound, but just like audible sound, it produces very low energy vibrations of the air.

Cars, buildings, the waves of the ocean and even playground equipment all produce both low frequency noise and infrasound.

Infrasound measurements taken from wind turbines at distances of 200 metres record infrasound in the order of 25 decibels. This is well below the threshold outlined in many established guidelines - including Queensland's Department of Environment and Resource Management and the UK's Department of Environment, Food and Rural Affairs - to protect against the potential disturbance from infrasound. Infrasound levels also decrease at distances further from the source¹¹.

Wind turbines today are significantly quieter than those built 20 years ago due to improvements in design.

Many wind farms have viewing platforms at nearby roadsides. A visit to a wind farm is highly recommended to see the power of wind first hand.



There's power in wind



Clean Energy Council

Health

Wind energy has an excellent health track record. The Australian wind industry takes any health concerns very seriously. There is no peer-reviewed scientific evidence that wind turbines have an impact on health, despite claims by anti-wind farm activists that wind turbines can have a negative impact.

Tens of thousands of people around the world live near wind farms without suffering ill effects. Many have done so for several decades.

In Australia, the National Health and Medical Research Council (NHMRC), Australia's peak health and medical research advisory group, conducted a review of current scientific literature and stated: "There is currently no published scientific evidence to positively link wind turbines with adverse health effects."¹²

It is suggested by the NHMRC that anyone who experiences adverse health effects may in fact be experiencing stress-related symptoms fuelled by misinformation about wind turbines, but not the turbine itself¹³. These symptoms may include sleeplessness, headaches or racing heartbeat.

Anti-wind activists have also claimed that non-audible perception of infrasound, felt as vibrations in the body, can make people sick. However, it is not possible to physically experience infrasound below the established threshold of hearing¹⁴.

Current evidence concludes there is no evidence of health effects arising from infrasound or low frequency noise generated by wind turbines¹⁵.

In fact, there are many health benefits that come from using wind energy over conventional forms such as coal and gas. As wind energy is greenhouse gas free, it improves overall air quality by reducing the amount of pollution. The World Health Organisation says that wind power represents one of the most benign of all forms of electrical generation (alongside some other renewable technologies) in terms of direct and indirect health effects¹⁶.

Reliability

Many modern economies have been able to secure up to 20 per cent of their electricity needs from wind energy.

For example, in Spain, wind now accounts for 16.6 per cent of total power consumption¹⁷.

In Australia, wind farms are situated in areas that record productive (around 8 metres per second) and consistent winds and provide wind energy to the grid about 90 per cent of the time¹⁸.

The power grid is a dynamic system, designed to ramp up or down to respond to changing demand. Back-up energy is required for all types of generation including wind, gas and coal.

Wind turbines are also designed to generate electricity under a range of conditions, including extremely hot weather. Turbines manufactured for Australian conditions can generally operate at temperatures up to 50°C¹⁹.



There's power in wind



Clean Energy Council

Efficiency

Wind farms are efficient because they do not produce wasted heat. Coal power stations can only extract 25 per cent of the energy in their fuel compared to 50 per cent in wind²⁰.

Wind turbines also do not use any water to generate electricity, whereas a large coal-fired power station such as Hazelwood in Victoria uses at least 11 billion litres of fresh drinking water each year²¹.

Cost

Wind energy is currently the most cost-effective source of renewable energy in Australia and it continues to reduce in price – it has already dropped by 80 per cent in 25 years²².

Electricity produced by wind farms is currently more expensive than conventional fuel sources. Best estimates put an equivalent cost of \$60 to \$80 per megawatt hour (MWh) for onshore wind power, compared with \$31 to \$40/MWh for coal and \$37 to \$44 MWh for natural gas. However, these price estimates do not include the cost of pollution – and wind power is the only pollution free option of the three²³.

As the world moves to reduce greenhouse gas emissions to respond to the threat of climate change, polluting technologies will become more expensive and clean technologies will become cheaper.

Wind farms are not responsible for rises in electricity bills. In recent years, power price rises have been mainly driven by increased power grid costs, and increasing demand. The cost of power grid upgrades and maintenance are the biggest single driver of power price hikes²⁴.

In fact, renewable energy schemes that encourage investment in wind and solar power have found to only contribute between 4 and 7 per cent to the total cost of power bills, while at the same time delivering Australia's main response to the economic threat of climate change²⁵.

Fire safety

Wind monitoring masts and turbines are insulated against lightning strikes, providing a safe path for lightning to strike the ground.

Despite scare campaigns by anti-wind activists, there is no recorded instance of lightning strikes to wind turbines or monitoring masts causing a bushfire in Australia.

Wind turbines are also built to limit fire risk both in their design (with automatic shutdown systems for any malfunction) and in the material selection.

Australia's country fire authorities are always consulted in the development of wind farms to ensure there is adequate access to the site via road, in case of emergency.



Birds

There have been some alarming claims about wind farms contributing to large numbers of bird deaths. Most of these can be traced to a single wind farm built in the United States around 30 years ago that was poorly sited in the flight path of migratory birds.

In Australia, planning conditions require extensive research on local bird life before and after construction, and as a result, bird deaths are rare. In Victoria, a study of the population of the Brolga in south-west Victoria found declining numbers were the result of loss and degradation of habitat and predation of foxes, not wind farms in the region²⁶.

Compared to bird deaths from collisions with buildings, electricity lines, cars, pesticides, communication towers and cats, the effect of wind farms on birdlife is small.

About the Clean Energy Council

The Clean Energy Council is the peak body of renewable energy companies in Australia. We are passionate about the value of clean energy to communities and the power of wind to cut pollution.

For more information please visit cleanenergycouncil.org.au



There's power in wind



Clean Energy Council

- 1 Intergovernmental Panel on Climate Change (2007) Fourth Assessment Report http://www.ipcc.ch/publications_and_data/publications_and_data_reports.shtml
- 2 CSIRO (2009) Fact Sheet: Australia vulnerable to climate change <http://www.csiro.au/resources/Climate-Change-Vulnerable.html>
- 3 Department of Climate Change and Energy Efficiency (2009) Australian National Greenhouse Accounts: National Inventory by Economic Sector, p.1 <http://www.climatechange.gov.au/~media/publications/greenhouse-acctg/national-inventory-by-economic-sector-2009.pdf>
- 4 Australian Coal Association (2008) Coal and its uses – electricity generation http://www.australiancoal.com.au/coal-and-its-uses_coal-uses-overview_electricity-generation.aspx
- 5 Garnaut Climate Change Review (2008) Chapter 20: Transforming energy <http://www.garnautreview.org.au/chp20.htm>
- 6 The Climate Institute (2011) Jobs growth in a low pollution economy, p.1 http://www.climateinstitute.org.au/images/reports/tci_joblossesmythbuster_may2011.pdf
- 7 Department of Climate Change and Energy Efficiency (2011) National Targets <http://www.climatechange.gov.au/government/reduce/national-targets.aspx>
- 8 Department of Climate Change and Energy Efficiency (2011) About the renewable energy target <http://www.climatechange.gov.au/government/initiatives/renewable-target.aspx>
- 9 Sustainability Victoria (2007) Wind energy myths and facts, p.2 http://www.futureenergy.com.au/downloads/Sustainability_Victoria_Myths_Facts_about_Wind_Farms.pdf
- 10 Sonus Pty Ltd (2010) Wind farms technical paper - environmental noise, p.10 <http://www.cleanenergycouncil.org.au/cec/resourcecentre/reports.html>
- 11 *ibid*, p.10
- 12 The National Health and Medical Research Council (2010) Wind turbines and health – public statement, p.1 http://www.nhmrc.gov.au/_files_nhmrc/file/publications/synopses/public_statement_wind_turbines_and_health.pdf
- 13 The National Health and Medical Research Council (2010) Wind turbines and health - evidence review p.4 http://www.nhmrc.gov.au/_files_nhmrc/file/publications/synopses/evidence_review_wind_turbines_and_health.pdf
- 14 Moeller, H and C.S Pedersen (2004) 'Hearing at low and infrasonic frequencies' *Noise and Health*, v.6 issue 23, p.37-57
- 15 The National Health and Medical Research Council (2010) Wind turbines and health - evidence review p.4 http://www.nhmrc.gov.au/_files_nhmrc/file/publications/synopses/evidence_review_wind_turbines_and_health.pdf
- 16 British Wind Energy Association, "Wind Turbine Syndrome", FAQs p.2 http://www.cleanenergycouncil.org.au/cec/technologies/wind/turbinefactsheets/mainColumnParagraphs/o/text_files/fileo/wind_turbine_syndrome.pdf



- 17 Global Wind Energy Council (2010) Global Wind Report p.15
http://www.gwec.net/fileadmin/images/Publications/GWEC_annual_market_update_2010_-_2nd_edition_April_2011.pdf
- 18 Sustainability Victoria (2007) Wind energy myths and facts, p.6
http://www.futureenergy.com.au/downloads/Sustainability_Victoria_Myths_Facts_about_Wind_Farms.pdf
- 19 Sustainability Victoria (2007) Wind energy myths and facts, p.7
http://www.futureenergy.com.au/downloads/Sustainability_Victoria_Myths_Facts_about_Wind_Farms.pdf
- 20 *ibid*, p.6
- 21 International Power (2010) Hazelwood Power Station – The Facts, p.2
<http://www.ipplc.com.au/uploads/2010/09/fs-Hazelwood-Myth-Facts.pdf>
- 22 Sustainability Victoria (2007) Wind energy myths and facts, p.8
http://www.futureenergy.com.au/downloads/Sustainability_Victoria_Myths_facts_about_Wind_Farms.pdf
- 23 Melbourne Energy Institute (2009) Wind power
<http://energy.unimelb.edu.au/uploads/MeiWindv05.pdf>
- 24 ROAM Consulting Pty Ltd (2011) Impact of renewable energy policies on retail electricity prices
<http://www.cleanenergycouncil.org.au/cec/mediaevents/media-releases/March2011/Electricity-prices.html>
- 25 ROAM Consulting Pty Ltd (2011) Impact of renewable energy policies on retail electricity prices
<http://www.cleanenergycouncil.org.au/cec/mediaevents/media-releases/March2011/Electricity-prices.html>
- 26 Department of Sustainability and Environment, The South-West Victoria Brolga Research Project, <http://victorianbrolgastudy.com.au/>



There's power in wind



Clean Energy Council