# Wind Farms

## Frequently Asked Questions

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| Question | Answer |
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| **What is a wind farm?** | A wind farm is a collection of wind turbines that generate electricity by harnessing the power of wind. |
| **Who assesses and approves wind farms to be built?** | Depending on the state or territory where the wind farm is located, the approval for a wind farm is determined at Local or State Government level. Various assessments of a wind farm are required throughout its planning and development phase, under Federal, State and Local legislation. |
| **How do wind turbines work?** | Wind turbines are designed to convert wind into mechanical energy by rotating the turbine blades. The mechanical energy is converted into electricity via a generator in the nacelle. Electricity is then transported via underground cabling to a substation. Here, electricity produced by the turbines is converted to high-voltage electricity, then fed into a transmission line for distribution into the grid. |
| **Where does the electricity go?** | Electricity is fed into a transmission line for distribution into the grid. |
| **How tall are wind turbines in Australia?** | The height of a turbine in Australia can vary depending on the manufacturer and model of the turbine, typical height from ground to the tip of the blade ranges from around 80 to 270 metres. Typically, a Planning Permit for a project outlines the maximum tip height allowable for turbines on a specific project. |
| **How many blades do wind turbines have?** | Wind turbines in Australia typically have three blades, some turbine models used internationally have 2 or 4 blades. |



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| **What are blades made from?** | Blades are typically made from glass/carbon composites and polymer materials. |
| **What are turbine towers made from?** | Tower components are typically made from steel and iron materials. |
| **When do turbines start/stop working?** | Turbines typically start operating when wind is around 3-4 metres per second (cut in speed) and stop when wind is around 25 metres per second (cut out speed). |
| **Can wind turbines operate in extreme weather conditions?** | Wind turbines are designed to operate in a range of weather conditions but may need to be shut down during extreme weather events (high wind speeds) to prevent damage. |
| **What is the lifespan of a wind farm?** | A wind farm will typically operate for between 25 and 30 years. |
| **What happens to wind turbines at the end of their lifespan?** | Typically, specific project permit for a wind farm includes provisions related to decommissioning. At the end of their lifespan, wind turbines are typically decommissioned and removed from the site. The blades and other components of the turbine can be recycled or reused, while the concrete foundation is typically left in place. In future, it's likely wind farms could be repowered, which would likely include considerations like new planning permit requirements, technology and infrastructure upgrades and grid capacity etc. |
| **What are the maintenance requirements for wind turbines in Australia?** | Wind turbines require regular inspections and maintenance. Requirements vary depending on the location and conditions of the turbine. |



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| **How much land is needed to build a wind farm?** | The amount of land depends on the overall number of turbines to be installed, with considerations to turbine size and spacing requirements between turbines. |
| **Who usually owns the land where wind farms are located?** | Typically, wind farm owners/operators will enter long term lease agreements with local landowners for the purpose of constructing and operating a wind farm. |
| **Can local landowners continue farming land if they have turbines constructed on their property?** | Typically, the wind farm infrastructure (wind turbines, cabling, internal roads, substation and operations and maintenance facilities) occupies a small portion of the overall project area and local landowners can continue their farming practices. |
| **Apart from turbines, what else is constructed on a wind farm?** | Typically, a wind farm will also require the construction of internal access roads, cabling between turbines, operational and maintenance facilities and a substation. |
| **What is the cost of building a wind farm in Australia?** | The cost of building a wind farm in Australia depends on a range of factors, including the size of the project, location, and technology used. However, according to the Clean Energy Council, the cost of building a new wind farm in Australia has fallen significantly in recent years, and is now one of the cheapest forms of new electricity generation. |
| **What are the benefits of wind energy for regional communities in Australia?** | Wind energy can bring a range of benefits to regional communities in Australia, including direct and indirect job opportunities, contract and supply opportunities, investment in local infrastructure, and a source of reliable and affordable electricity. Some wind farm projects also offer community benefits programs, which provide funding for local community projects and initiatives. |
| **What is the capacity factor of a wind turbine?** | The capacity factor of a wind turbine is the ratio of the actual electricity generated by the turbine over a period of time to the maximum possible output of the turbine over the same period. The capacity factor of a typical wind turbine in Australia is around 30-40%. |



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| **Are wind farms reliable sources of electricity?** | Wind farms are an intermittent source of electricity, meaning the energy output can be affected by changes in wind speed and direction. Typically, wind farms constructed in locations where there is a consistent wind resource, which can help to ensure reliability. |
| **What are the environmental impacts of wind farms in Australia?** | Wind farms in Australia can have a range of environmental impacts. Typically, environmental impacts are assessed by the relevant regulators during the planning and development phase of a wind farm. If a project is granted a permit (or planning approval) it typically sets out conditions related to managing any environmental impacts for the project. |
| **What impact do wind farms have on birds and bats?** | Wind farms can have an impact on local birds and bats; however, the impact is generally considered to be low compared to other human activities like urbanisation such as transmission lines or agriculture or introduced species such as cats. |
| **Are wind farms noisy?** | Wind turbines do create sound, like the ocean, cars, tractors, even the wind itself. The sound they make can be described as a cyclic whooshing or swishing sound. Usually, it is possible to carry on a conversation at the base of a wind turbine without having to raise your voice. While wind turbines do produce some noise, modern wind turbines are designed to be as quiet as possible. Each specific project permit for a wind farm includes specific noise limits for operational wind turbines. |
| **What steps are taken to ensure wind farms are not too loud?** | During the development of a wind farm, detailed noise studies are undertaken by specialist consultants who apply the environmental noise guidelines and standards to predict noise levels for a proposed project. |
| **Are wind farms monitored for noise?** | Wind farms are required to meet strict noise requirements which are put in place through the approval process. The final layout and turbine selected for a project must meet the applicable noise limits set by relevant legislation and guidelines. Monitoring of noise is undertaken once a wind farm is operational to ensure noise requirements are being met. |



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| **What is the impact of wind turbines on property values?** | There is limited reliable, impartial research or evidence which establishes a correlation between real estate values and proximity to wind turbines. The most recent and relevant study carried out in Australia was commissioned by the NSW Office of Environment and Heritage and published by planning consultancy Urbis in July 2016. This report comprised both an analysis of available sales data and a 'literature review' of Australian and international studies (including a 2009 report prepared for the NSW Valuer-General's office). |
| **Do wind farms impact human health?** | The Australian Government National Health and Medical Research Council (NHMRC) outlines that there is currently no consistent evidence that wind farms cause adverse health effects in humans, see full statement here.<br><br>The Australian Medical Association (professional body for doctors in Australia), outline evidence does not support the view that the infrasound or low frequency sound generated by wind farms, as they are currently regulated in Australia, causes adverse health effects on populations residing in their vicinity. Individuals residing in the vicinity of wind farms who do experience adverse health or well-being, may do so as a consequence of their heightened anxiety or negative perceptions regarding wind farm developments in their area. Individuals who experience heightened anxiety or diminished health and well-being in the context of local wind farms should seek medical advice. See full statement here. There have been multiple scientific, peer-reviewed studies on wind farm noise that have found that infrasound from wind farms is not a problem and does not cause negative health effects. Wind farms are considered a safe and clean source of renewable energy. |
| **Is cultural heritage taken into consideration?** | Legislation regarding the protection of cultural heritage varies across Australian states and territories. Typically, a cultural heritage assessment forms part of initial studies as does consultation with local Indigenous groups to ensure cultural heritage is protected. |

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| **How long does it take for a wind turbine to be carbon neutral?** | A life cycle assessment (LCA) evaluates a wind farm during its lifetime, including raw materials, manufacture, transport, service and operation, and end-of-life (including measurement of CO2- equivalent emissions).An LCA indicates the environmental performance of a wind farm in terms of return on-energy over the life cycle of the project. This provides an indication of the energy balance of project, showing the relationship between the energy requirement over the whole life cycle of the wind farm (i.e., to manufacture, operate, service and end-of-life) versus the electrical energy output from the wind farm. This energy payback period is measured in 'months to achieve payback', where the energy requirement for the life cycle of the power plant equals the energy, it has produced. At this 'breakeven' point, wind turbines become energy neutral. Based on a LCA for the wind turbine type to be installed at Flat Rocks Wind Farm Stage 1 {with comparable plant parameters), the payback period is approximately between 7- 9 months. |