MOAH CREEK
wind farm

Frequently Asked Questions

About Wind Farms

HOW DO WIND TURBINES WORK?

Wind turbines are designed to transform wind into mechanical energy through the rotation of turbine blades. This mechanical energy is then converted into electricity using a generator housed in the nacelle, and the generated electricity is subsequently fed directly into the grid.

Wind turbines are designed to maximise energy output at low wind speeds, and 'depower' as wind speed increases, up to a certain 'cut out speed'. However, the electricity generated by the turbine is proportional to the wind speed cubed, up to their rated wind speed. For example, a wind turbine in 8m/s will generate 8 times as much power as that same turbine in 4m/s.

This is why it's important to place turbines in locations with consistent high winds to achieve the lowest cost generation for customers. Looking at a wind resource map of Australia, areas with a high average wind speed are often difficult to find close to where demand for electricity is high.

HOW BIG ARE WIND TURBINES?

Modern onshore wind turbines, or Wind Turbine Generators (WTG), are generally 200- 270m high at the tallest point; the tip. The hub - where the blades connect to the nacelle (which houses the generator and other equipment) - typically varies from 90 - 160m. Wind turbine blades usually range between 40 - 90m. Although larger, modern wind turbines are designed to reduce acoustic impact.

During the permitting process, projects usually get approval for a large 'envelope' of wind turbine dimensions. When it is time to select the WTGs, the latest, most innovative and often larger turbine can be used on site. Taller, larger wind turbines can reach greater wind speeds at higher altitudes and can also generate efficiencies for a project through economies of scale for roads, foundations, cables and so on.

The dimensions of WTGs are important to consider when designing the spacing between turbines in order to minimise wake losses and maximise efficiency. WTGs are delivered to site in multiple parts before assembly and so the component dimensions must also be considered when planning the transportation route to site.

WHO MAKES WIND TURBINES?

Wind turbines are manufactured by specialised companies, often referred to as 'Original Equipment Manufacturers' (OEMs). They are available as 'off the shelf' products for purchase by projects. Wind turbine components have some variability. For example, a tower can range between 5-7 sections. The OEM will choose the component number, given the project site's conditions. CQP's projects will use premium quality wind turbines provided by leading manufacturers. A competitive tender process run by CQP will ensure the best wind turbine is selected for the project based on their cost and quality.

The components for the wind turbines are expected to be imported. Where possible, we will source other materials for the entire wind farm locally.

HOW LONG WILL THE WIND FARM LAST? IS IT PERMANENT?

A wind farm will typically have a lifespan of 25-30 years. The site conditions determine the design and lifespan of the turbines, based on the wind loads placed on the components. The components of the wind farm will have long term warranties of 25-30 years.

The operations and maintenance (O&M) phase of a project will ensure it is performing as expected. Rigorous analysis and works will be undertaken to ensure the project is operating efficiently and economically.

Following operations, consideration will be given to extending the life of the project. It is common that wind farms are 're-energised' at the end of life. This is because the project fundamentals will not have changed, at which point the condition of all wind farm components will be assessed for re-use or to be replaced.

When it comes time to decommission the wind farm, the aim is to return the land in a state similar to its pre-development condition. This involves the removal of most infrastructure (but leaving tracks in place), remediation of the land, and making it available for the same activities as before, such as agriculture.

HOW LONG DOES IT TAKE TO BUILD A WIND FARM?

The construction time frame depends on the project size and the number of workers on site. For a 372MW wind farm, a 24 - 30 month time frame is expected. Preparation during the development phase is completed to ensure an efficient construction period reducing the impact on communities.

HOW ARE WIND FARMS BUILT? WILL BLASTING BE USED?

During construction of a wind farm, the first step is to establish the initial site set up where fencing, temporary offices and laydowns are constructed. After that, earthworks machinery will start to build access roads, both internal and external to the project area, to transport equipment and materials to the site. Access to the turbine locations will next permit digging for turbine foundations, and installation of the foundations. Some earthworks and foundations are also required for overhead poles, before substation and the wind farm's permanent offices.

Blasting is one method used to remove earthworks on projects such as wind farms, however it introduces safety and environmental concerns as well as being higher in cost. Wind farms do not usually seek planning approval for blasting as a work method initially due to the preliminary nature of the project at the time of application. During the detailed design stage, further geotechnical investigations are typically carried out across the whole extent of a wind farm, helping the team to understand the conditions and construction challenges. As a project continues through development and construction, a detailed schedule of construction activities is maintained which will help the project team make decisions, including whether blasting should be considered. Although the cost may be higher, it can save time. If blasting is required, the developer will have to be apply for appropriate permitting.

Following the civil works, electrical infrastructure can be installed. This involves installing either underground or overhead cables, usually located close beside the access tracks, from each turbine to a central collection point, the substation, and then any works connecting to the grid. For the Moah Creek Wind Farm, there are no new transmission lines from the site substation to the grid, as the project will be connecting to the transmission line which traverses the site.

Turbines are then transported to the site and assembled. Large cranes are used to lift the tower sections, nacelle (containing the generator and gearbox), and rotor assembly into place.

Before wind turbine installation, civil and electrical works are undertaken requiring multiple crews. Working in different sections of a wind farm. Additionally, small teams of each speciality also remain after their works are completed for the remainder of the construction period e.g. although civil works finish first, a small team will stay to manage rehabilitation and finalise any outstanding tasks.

The last stage of building a wind farm is the commissioning stage to enable the wind farm to connect to the grid. Commissioning often coincides with the handover to the team who will be operating and maintaining the wind farm after construction.

HOW IS A SITE SELECTED FOR A WIND FARM?

Selecting a wind farm site involves a comprehensive evaluation and balancing process. This process considers various factors to ensure optimal energy production and minimal environmental impact.

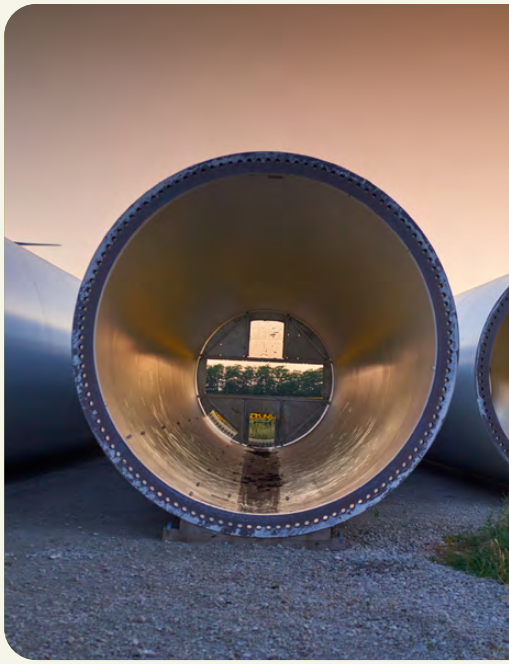
Some key considerations are:

- Wind resource assessment and other meteorological conditions
- Geographical, topographical and waterway considerations
- Accessibility
- Land use and zoning
- Existing environmental values and potential impacts
- Grid connection
- Infrastructure and services
- Social and community values
- Cultural Heritage
- Economic viability
- Regulatory and permitting requirements.

Such criteria are also taken into account when considering the siting of each element of a wind farm. This includes where the substation is placed within a wind farm, or which way road alignment should go etc. A development phase wind farm design will be conservative in its assumptions, and seek approvals for a broader 'envelope', including a micrositing zone. This broader envelope allows for later optimisation, flexibility, and avoidance of unforeseen constraints.

IS WIND POWER AN EFFICIENT FORM OF POWER GENERATION?

Wind farms are cheap and reliable sources of renewable energy over their lifetime. Generation capacity, capacity factor and efficiency are important but differing measures in the energy industry.



Capacity, measured in megawatts (MW) or kilowatts (kW), indicates the maximum electricity generation potential of a power station or wind turbine (sometimes 'nameplate'). Therefore, it would take 4 projects of the same size as Moah Creek Wind Farm (planned to produce 372MW) to be equivalent to Stanwell Power Station (1445MW).

The capacity factor gauges how much a plant actually generates over a time frame compared to if it always generated at maximum power, typically ranging from 30% to 45% in a year for wind farms. By contrast, Stanwell Power Station achieves higher capacity factors, with 67.4% in FY 21/22 and 63.7% in FY 20/21. This is consistent with the capacity factor for coal-fired power plants operating in the National Electricity Market (NEM) generally which was ~67% in 2020 (IEEFA, 2021). The capacity factor of gas-fired power plants in the NEM in 2020 was 16% (IEEFA, 2021). It should be noted that the NEM functions on a cost-effective principle. Consequently, if, during a specific bidding period, one energy source is more costly than another within the system, the system operator (AEMO) will not direct it to operate.

Efficiency varies among energy sources. Wind turbine generators range from 30-45% of the energy in the wind being converted to electricity, reaching 50% during peak wind. According to Betz Law, the maximum power extractable from wind is 59%. By comparison, Australian coal-fired power plants typically have an efficiency of 38% of the energy in the fuel being converted to electricity, while high-efficiency, low-emission (HELE) coal plants can reach 42-47%.

Sources:

Capacity vs Capacity Factor
https://www.energy.gov/ne/articles/what-generation-capacity#:~:text=The%20Capacity%20Factor&text=It%20basically%20measures%20 how%20often,of%20the%20time%20in%202021

Capacity Factor of CFPP
https://ieefa.org/wp-content/uploads/2021/06/Australias-Gasfired-Recovery-Under-Scrutiny_June-2021.pdf

Energy Efficiency of CFPP
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https://css.umich.edu/publications/factsheets/energy/wind-energy-factsheet

Stanwell Power Corporation Annual Report 21/22
https://www.stanwell.com/story/annual-reports/
https://reneweconomy.com.au/australias-best-performing-wind-and-solar-farms-in-2021-and-the-leading-states/

ARE WIND TURBINES MADE OF SUSTAINABLE MATERIALS?

Around 85-95% of a wind turbine, by weight, is made from materials that can be recycled. Their outer shell, shafts, gearing and electrical components are typically made from steel, copper, aluminium, other precious metals and recyclable plastics. There is minimal oil used for the lubrication of some parts. This oil is contained within appropriate bunds within the shell of the wind turbine structure.

Wind turbine blades are made from different materials, most of which are fibreglass or carbon fibre. Composite materials, such as thermoset polymers, glass fibre, and carbon fibre, pose greater recycling challenges. These materials are commonly used to manufacture wind turbine blades, as well as the covers for the nacelle and hub.

The blades have a protective coating called polyurethane based lacquer that is non-toxic and contains negligible amounts of bisphenol A. The blades are specifically designed to have high resistance to weathering so will not emit either dangerous amounts of bisphenol A (BPA) or microplastics into the surrounding environment (including waterways).

ARE TURBINE BLADES DISPOSED OF, REUSABLE OR RECYCLABLE?

Wear on wind turbine blades often make them unsuitable for reuse for their original purpose. However, there are several innovative ways that turbine blades or their raw materials can be reused or recycled in other building materials, or repurposed for entirely new structures.

Engineers and scientists have found a way to turn fibreglass into a key component for the production of cement, an important material used in everyday construction. Whole blades have been repurposed as bike sheds in Denmark, noise barriers for highways in the US, 'glamping pods' across festival sites in Europe, or as parts of civil engineering projects, such as pedestrian footbridges in Ireland.

In recent years, leading wind turbine manufacturers have announced blade recycling innovations and products, demonstrating the industry's ongoing commitment to sustainability.

WHAT IS THE EMBEDDED ENERGY, SOMETIMES CALLED LIFE CYCLE ANALYSIS (LCA), OF A WIND TURBINE?

Under typical wind conditions, it takes between two months to a year for a wind turbine to recoup all the energy invested in its manufacturing.

Nalukowe et.al's study; "Life cycle assessment of a wind turbine" (2006), concluded that wind energy is as efficient and energy-profitable given that the amount of energy generated is 20.24 times greater than energy consumed over the wind turbines life time.

The renewable energy industry in Australia and globally is actively working with other industries to lower the carbon footprint of the key components for wind farms such as steel and concrete. In Australia, there are several initiatives underway. For example, Energy Estate is a founding member of the Materials Embodied Carbon Leaders Alliance (MECLA) which was founded by WWF and has a goal of reducing embodied carbon in the building and construction industry. Energy Estate also works closely with Beyond Zero Emissions which has published the "Zero Carbon Industry Plan Rethinking Cement" report (2017) which outlines strategies for reducing carbon-related emissions from the cement industry.

About the Developer

WHO IS CQP, THE DEVELOPER OF THE MOAH CREEK WIND FARM?

Moah Creek Wind Farm is wholly owned by Central Queensland Power (CQP), a joint venture (JV) between RES Australia and Energy Estate.

This JV was established to collaboratively develop a portfolio of renewable energy projects in the Central Queensland region. This portfolio approach ensures long term regional growth, accounts for grid complexities and is of adequate scale to replace existing coal and meet the energy needs of industrial users in the region.

The RES Group develop, construct and operate renewable energy assets across the world. Over the past 40 years RES has delivered more than 23 GW of renewable energy projects across the globe and supports an operational asset portfolio exceeding 12 GW worldwide.

Energy Estate is passionately committed to accelerating the diversification and decarbonisation of the energy sector and is proud to be the leading developer and strategic designer of advanced industrial precincts across Australia. With its partners, Energy Estate is developing large scale renewable energy and green hydrogen projects in Queensland and New South Wales, as well as internationally.

CQP has extensive internal expertise to deliver renewable energy projects, however, also relies on reputable and qualified consultants including; Umwelt, AHS, DNV, Lat27, Aviation Projects, Access Traffic Consulting, Marshall Day and LEC Land and Environment Consultants.

WHO IS CLEANCO?

CleanCo is a publicly owned energy generator, developer, and retailer, supporting Queensland to transition to clean energy in a sustainable way while driving regional growth and jobs. CleanCo delivers reliable, affordable, low-emission energy to large commercial and industrial businesses seeking decarbonisation pathways.

HOW IS CLEANCO INVOLVED WITH CQP?

CleanCo has agreements with CQP to progress its development of a portfolio of 2.3 GW wind and solar projects in Central Queensland. The agreement is an innovative and market-leading arrangement that allows CleanCo exclusive access to projects currently being matured through to development by CQP.

Under the agreement, CleanCo and CQP will rigorously assess and shortlist projects which deliver the best outcomes for the environment, communities, industry and Queensland's overall renewable energy transformation. Projects assessed as having the potential for delivering the best outcomes will be progressed to development phase by CleanCo and CQP under a Project Option Agreement (POA). At the end of development, before construction, CleanCo will decide whether to exercise the option and buy the project from CQP.

HOW IS CLEANCO INVOLVED IN WITH MOAH CREEK WIND FARM?

CleanCo has a Project Option Agreement with CQP for the Moah Creek Wind Farm project. This means CleanCo will be an active partner as CQP continues to develop Moah Creek Wind Farm. After the development phase and before construction commences, CleanCo will decide whether to exercise the option to own the project.

WHO WILL BUILD AND OPERATE THE WIND FARM?

Wind farms are typically built and operated by contractors acting for the owner. For construction, it is common to have two primary construction contractors:

- Original Equipment Manufacturer (OEM) performing a Supply and Install (S&I) Contract and
- Balance of Plant (BOP) Contractor to be managed by the Principal.

Following construction, an Operations and Maintenance (O&M) Contract takes effect.

If CleanCo does not exercise its option to buy the Moah Creek Wind Farm, CQP will seek another investor, who will also be offered construction and operation management services.

WHO ASSESSES RENEWABLE ENERGY PROJECTS?

Renewable energy projects are subject to stringent local, state and Commonwealth government laws and regulations. In order to gain the relevant development, construction and operational approvals and permits, project are assessed under relevant laws and regulations. The relevant agencies assess each projects using internal specialists, and in some cases specialist consultants.

The Moah Creek Community

DO WIND FARMS CONSIDER FIRST NATIONS AND CULTURAL HERITAGE?

The Darumbal People are the Traditional Custodians for the Moah Creek Wind Farm Project with deep and continual connection to land, sea, sky, waterways and community. Listening to and learning from all First Nations people is a cornerstone to the CQP development process. CQP works with First Nations people from the early stages of projects to explore opportunities for genuine partnerships and long-term benefits. CQP is committed to fully understanding First Nations peoples' relationship with and use of the land, to minimise any impact on the cultural heritage importance of our proposed site.

Wind farms are required to adhere to all legal regulations concerning the preservation of cultural heritage. For CQP projects we seek to enter into voluntary Cultural Heritage Management Plans (CHMP) with the respective First Nations groups to identify and mitigate impacts, ensure the project is sustainably developed, and to ensure a cultural legacy remains for future generations.

For the Moah Creek Wind Farm a voluntary CHMP has been signed and registered. We are also negotiating an Indigenous Land Use Agreement, as well as a Partnership and Benefits Agreement with the Darumbal people.

HOW CLOSE WILL A WIND TURBINE BE TO LOCAL DWELLINGS?

We design our projects to ensure that wind turbines are generally set back a minimum of 1500m from sensitive land uses, which includes dwellings, short term accommodation, and other community facilities. This meets the Queensland Government guidelines around the siting of wind turbine infrastructure.

For the Moah Creek Wind Farm Project, our analysis indicates there are 72 dwellings within a 5km radius of a wind turbine. According to the Australian Bureau of Statistics Census in 2021, the Rockhampton region's average number of people per household is 2.5, so we have estimated there are around 200 people living within a 5km radius of the project.

HOW TO HAVE YOUR SAY IN THE PROJECT?

For projects the size of this wind farm it is important that we build and maintain strong, and positive relationships with the neighbours, the community and other stakeholders based on trust, respect, authenticity and openness. During the development phase of a project, CQP's approach is to undertake extensive consultation with a wide range of relevant stakeholders in order to address questions from the community, explore issues or feedback, and understand local constraints.

In line with our committment to continuously engage with stakeholders throughout our project's life a project website, letters, newsletters, information sessions and discussions on a community, group or personal scale are among the many methods by which the project team will communicate with the community and other stakeholders.

WHAT IS A COMMUNITY CONSULTATIVE COMMITTEE?

We will establish a 'Community Consultative Committee' (CCC) for our renewable energy projects. A CCC is established prior to construction and comprises community representatives who volunteer to engage regularly with the project team. The role of this committee is to facilitate structured and productive communication between CQP and the community about the project, encourage community participation in decision making processes and address any concerns the community may have regarding its processes. We are starting the process to establish the CCC for this project now. https://www.moahcreek.com/project-committees

Economics

HOW MANY JOBS WILL BE CREATED, AND WILL THEY BE SOURCED LOCALLY?

During construction, the Moah Creek Wind Farm will create employment opportunities for an estimated 400 full time equivalent jobs. During its 25 – 30 year operational lifetime, the project will create around 15 equivalent full-time jobs.

Local employment opportunities will be available for a range of services and equipment needed for construction of renewables projects. We are committed to using local contractors, workers and service providers so that our project delivers economic and social benefits to both the community that will host the wind farm, and to the region.

CQP has and will continue to participate in a wide range of industry events to make contractors aware of opportunities in renewable projects.

WHAT KINDS OF CAREERS ARE INVOLVED IN WIND FARMS?

If you are looking to start a career in renewables or transition to a career in renewables, there are many ways you can be involved in this exciting and growing industry.

Explore wind farm-related job opportunities through the following resources:

Visit the Clean Energy Council's Careers page at: https://www.cleanenergycouncil.org.au/advocacy-initiatives/workforce-development/careers-guide.

Find careers information related to the QLD Jobs and Energy Plan at https://www.publications.qld.gov.au/dataset/clean-energy-workforce-roadmap/resource/57272966-0265-4a95-87b4-fcbc92a30ed6?inner_span=True.

The above is a non-exhaustive list of career opportunities from wind farm construction. There are also indirect opportunities in the industry such as being a paramedic, owning a food truck or providing accommodation.

HOW ELSE WILL THE COMMUNITY BENEFIT FROM THE PROJECT?

CQP will establish a 'Community Benefit Scheme' for our renewable energy projects, involving both broad and targeted benefits. This scheme will providing benefits to the direct neighbours of the project through what is called a 'Neighbour Shared Benefits Scheme'. A community fund will allocate money to the broader community e.g. local schools, businesses, sports groups etc. The Community Benefit Fund is to be administered by a Community Fund Committee established closer to the time of construction. This is separate to the Community Consultative Committee.

DO WIND FARMS AFFECT LOCAL TOURISM?

Wind Farms can alter both close and distant regional views, including popular local tourist destinations such as lookouts. There have been studies done on the relationship between tourism and wind farms using information from overseas and within Australia. One example is 'Wind Energy and Tourism: Industry impacts and opportunities for 'wind farm tourism' by Dr. Barrie Shannon. This study concludes that "stakeholders have significant fears of negative impacts, [but] there is little evidence that they come to be." In fact, empirical evidence appears to be positive with visitors drawn to the area for reasons including "technology, infrastructure design, pro-environmental causes and curiosity". Eco-tourism and regenerative tourism opportunities can thrive in communities near wind turbines, especially with added infrastructure like visitor centres, viewing platforms, and recreational trails.

Source: Dr Barrie Shannon Wind Energy & Tourism

DO WIND FARMS DECREASE PROPERTY VALUES?

The proximity of visibility of a wind farm to a property to a wind farm does not necessarily lead to a decline in property value. Numerous global studies and independent research in Australia conducted over the past decade have found no substantial link between wind turbines and decreases in property values.

An independent report commissioned by the NSW Office of Environment and Heritage entitled Review of the Impact of Wind Farms on Property Values (Urbis 2016) concluded that there was no evidence of wind turbines causing value drops. This was particularly relevant for rural properties engaged in primary production, as "there is no direct loss of productivity resulting from wind farms". This study also found no evidence that wind farms impact the sale prices for residential or lifestyle properties.

Resources for further reading include:

- The independently prepared report for the NSW Government (Urbis, 2016) is located: https://www.environment.nsw.gov.au/resources/communities/wind-farm-value-impacts-report.pdf
- NSW Department of Lands report www.valuergeneral.nsw.gov.au/__data/assets/pdf_file/0006/195315/Preliminary_assessment_impact_of_wind_farms_on_surrounding_land_values_in_Australia.pdf
- NSW Department of Lands report www.valuergeneral.nsw.gov.au/__data/assets/pdf_file/0006/195315/Preliminary_assessment_impact_of_wind_farms_on_surrounding_land_values_in_Australia.pdf reported in Wind Energy the Facts, Clean Energy Council, March 2013.

COULD MY RATES ON MY PROPERTY BE IMPACTED BY THE WIND FARM?

Surrounding landowners who are not a part of the project and continue to use their properties for rural purposes, should not see an increase in their underlying statutory land value or differential rating category, as a result of the wind farm in their area.

CQP follows best industry practice, and is covering the financial difference to the host landowners for the increased cost of rates, for those leased areas, where the use will be changed from pastoral to energy production.

DO WIND FARMS REQUIRE GOVERNMENT SUBSIDIES?

Wind farm and solar farm projects throughout Australia do not rely on government subsidies, but are instead financed through equity and long-term bank loans. Projects often enter into agreements called Purchase Power Agreements (PPA's) with governments or businesses to sell the power produced. This creates a reliable income stream for the project.

Whilst ARENA provides support for unique renewable energy research, innovations, or demonstration projects, this support will not be sought for the Moah Creek Wind Farm. In addition, the Large-scale Renewable Energy Target (LRET) in Australia is not a direct subsidy. Rather, it is a government policy mechanism designed to encourage the development of large-scale renewable energy projects. The LRET is forecast to end in 2030.

Health and Way of Life

ARE THERE ANY HEALTH RISKS ASSOCIATED WITH WIND FARMS?

Across the globe, there are more than 300,000 installed wind turbines, with a significant number situated in proximity to populated regions (including densely populated areas). Extensive research carried out by prominent health and medical research organisations has found no evidence of the link between wind turbines and adverse health conditions. This research includes publications by:

- World Health Organisation
- Australia's National Health and Medical Research Centre
- Macquarie University and the Woolcock Institute of Medical Research
- UK Health Protection Agency
- US National Research Council

If you would like to be provided with information as to how you can access any of this research, please ask one of our team or email us at info@moahcreek.com

CAN FARM OR DOMESTIC ANIMALS BE AFFECTED BY WIND FARMS?

There is no evidence wind turbines will adversely affect domestic animals or livestock. Once accustomed to the new infrastructure, they are often seen rubbing against the turbines and seeking shade under the towers.

Wind farm construction and operation co-exists with normal farming operations and stock. Management plans will be put in place to ensure gates, trenches, driving, and operations are all carried out to ensure the ongoing wellbeing of the landowners' stock.

DOES WIND TURBINE NOISE IMPACT PROJECT NEIGHBOURS?

To gain development approval, a wind farm must prove that the noise levels caused by construction and operational activities, including the operating noise of equipment, adheres to stringent limits for nearby residences. These limits are specifically formulated to guarantee that the noise generated by the wind farm remains non-intrusive for the average individual.

The preliminary noise assessment at the development stage of a project must be updated and reported to the relevant authorities as the project evolves. This report could include any relevant monitoring or agreements required, and capture any changes such as final equipment selection.

In QLD the threshold criterion for wind farms is 35 decibels (dB)(A) at 1500m away. For context, 30 dB(A) is equivalent to a whisper and 40 dB(A) is equivalent to a quiet library. Noise issues to the community should be raised to CQP, and, when established, the Community Consultative Committee (CCC).

The following video exemplifies the noise generated by wind turbines:
https://www.youtube.com/watch?v=v-sUDSwsE_w&t=216s

ARE WIND TURBINES FITTED WITH WARNING SIRENS?

No, wind turbines do not typically have or require sirens to warn of strong winds. Each wind turbine has a wind monitoring device installed (anemometer) and cut off will happen automatically in the case of high wind speeds (around 95 km per hour).

WHAT ARE THE CUMULATIVE IMPACTS OF ALL RENEWABLE ENERGY PROJECTS IN THE AREA?

The potential cumulative impact of planned developments in the area is considered under the Environment Protection Biodiversity Conservation (EPBC) Act 1999.

CQP is developing several wind, solar and storage projects in the Central Queensland Renewable Energy Zone (QREZ). Potential cumulative impacts are taken into consideration in the siting and design of each project. We are working with local and regional conservation and advocacy groups to establish how we can collaborate in addressing cumulative impacts of renewable energy projects. Once we have our development and environmental approvals, we will also look to collaborate with other developers who have obtained planning consent. We are committed to collaborating as an industry to minimise impacts and deliver shared infrastructure and enduring outcomes across Central Queensland.

WHAT IS WIND TURBINE SHADOW FLICKER AND HOW IS IT REGULATED?

When light shines on rotating wind turbine blades, intermittent shadows, known as shadow flicker may be cast on surrounding areas.

In Queensland, the suggested modelling assumptions require wind farm projects to compute the 'zone of influence of shadows,' determined by multiplying a distance of 265 meters by the maximum blade chord. No evaluation is necessary for sensitive land uses beyond this zone, as the probability of any shadow flicker impacts caused by the project turbines is considered low.

For Moah Creek Wind Farm the maximum blade chord is 4.7 m creating a zone of influence of approximately 1,246 m. All identified sensitive receptors are more than 1,246 m from the proposed turbine locations. As a result, a detailed shadow flicker assessment was not required due to the limited risk and low likelihood for there to be any shadow flicker impacts from our proposed turbines.

HOW CAN THE VISUAL IMPACT OF WIND TURBINES ON A LANDSCAPE BE MITIGATED?

We acknowledge that wind turbines can alter the landscape, and we are dedicated to collaborating with communities to minimise the visual impact of our wind farms. We actively encourage individuals and groups with inquiries about visual impact and potential solutions to engage with us in the early stages of our projects.

Landscape and Visual Impact Assessments (LVIA) are commonly completed by wind farms as part of the development approval application to determine the potential impacts to the scenic amenity and landscape values of the region of the proposed wind farm. An LVIA also considers scenic amenity improvements such as lighting, uniformity of turbine spacing etc. CQP has provided an LVIA for the Moah Creek Wind Farm Project as part of the development application. If you wish to receive a copy of this please send an email to info@moahcreek.com or speak to one of our team.

DO WIND FARMS AFFECT AIR QUALITY?

Management of dust levels during construction is a normal requirement of construction projects, including wind farms. Dust suppression methods, and frequent onsite measurements and assessments are conducted to limit ecological impacts, ensure the safety of those working on site, the safety of the surrounding community, and to meet compliance requirements for sediment control.

Given renewable energy construction projects are often in rural areas, CQP understands the importance of dust management to ensure access to safe water as many residents will rely on tank water.

DO WIND FARMS CAUSE ELECTROMAGNETIC INTERFERENCE?

Properly designed and maintained wind farms can protect pre-existing radiocommunications from EMI-related impacts and comply with electromagnetic compatibility standards to ensure minimal interference.

Interference with radiocommunication signals mainly happens from the physical presence of the turbines causing obstruction, diffraction, scattering, or near-field effects. This could interfere with a community's ability to access important mobile or TV services.

Wind farms must conduct pre and post construction assessments of EMI impacts as part of regulatory requirements. If interference occurs, mitigations, rectifications and solutions are required by the project.

Wind farms must install high quality and effective communication networks to ensure reliable and accessible communications, especially in the case of an emergency.

DO WIND TURBINES POSE A THREAT TO AVIATION SAFETY?

Wind farms require careful consideration of the necessary changes in operational procedures for aviation operators. Aviation Impact Assessments, including consultation with aircraft operators, are conducted by projects as part of the development approval process. This assessment will identify mitigation measures from the introduction of tall structures into the landscape.

The frequency of aviation related incidents involving wind farms is extremely low globally. None have been recorded in Australia.

CAN I FLY THROUGH A WIND FARM?

In order to fly through a wind farm, a pilot must to give due regard to wind turbines as physical obstacles as well as the hazard created downstream by the wake of the wind turbines. Further questions should be directed to the Civil Aviation Safety Authority (CASA) or the project team.

Regarding aerial firefighting, the relevant Rural Fire Service (QFES in Queensland, RFS elsewhere in Australia), will be notified of the presence of a wind farm through the regular development approval process. The QFES will perform their own risk assessments and conduct any operations giving regard to the presence of the wind farm (as they would with any other significant hazards). There will be an arrangement in place to stop WTG blade motion under certain emergency conditions, such as QFES aerial fire-fighting operations.

The National Council For Fire & Emergency Services, formerly Australasian Fire and Emergency Services Council (AFAC) has developed a national position on wind farms. This includes development of wind farms, their operations in relation to bushfire prevention, preparedness, response and recovery. This is set out in the document "Wind Farms and Bushfire Operations." This document recommends that "aerial personnel should assess risks posed by aerial obstacles, wake turbulence and moving blades in accordance with routine procedures."

A helpful resource is: https://www.afac.com.au/insight/doctrine/article/current/wind-farms-and-bushfire-operations-doctrine.

WHAT KIND OF TRAFFIC WILL BE CREATED BY THE CONSTRUCTION OF WIND FARMS?

Wind farms generate traffic through the delivery of personnel, materials, equipment, and turbine components during its construction and operating life. Traffic associated with the operational phase of a wind farm is expected to be minimal (approximately 15 full time employees on site). For wind farm construction this traffic is created in rural areas which have not previously been exposed to this volume. During construction, when most vehicle deliveries are expected, traffic requires careful consideration and management. Proximity of projects to major highway routes is ideal, for preventing unnecessary traffic on and upgrades to local roads.

The vechicles involved in wind farm construction can include light vehicles, semi-trailers, trucks and special transport vehicles. Once they arrive on site many vehicles will remain within the project area for construction purposes.

Due to the increased traffic, road upgrades and road use permits, as well as traffic impact assessments must be sought or completed by wind farm projects throughout their lifetime, particularly at the time of development. This is done by the project's relevant authorities, with consultation from relevant stakeholders.

The Community Consultative Committee to be established by CQP for Moah Creek Wind Farm will consider and monitor traffic impacts and identify appropriate measures in order to best manage the impact of the increase in vehicle movements to the site.

WHO COVERS THE COST OF POTENTIAL UPGRADES TO & MAINTENANCE FOR LOCAL ROADS?

To ensure the safety of all road users, road upgrades are commonly required for renewable energy construction projects. The need for road upgrades is determined through consultation between community, the contractors moving components, and the relevant authority or council.

It is the responsibility of the renewable energy construction project to pay for the upgrades of public roads.

Renewable energy projects typically enter into an Infrastructure Agreement with the relevant local councils or other road authorities regarding the required mitigation works on the identified roads. This likely includes a requirement for projects to carry out and pay for dilapidation surveys of roads involved in the project before, during and after construction and pay for any remediation works in line with industry best practice. This agreement will also determine the roles and responsibilities for long term maintenance.

WHO COVERS THE COST OF POTENTIAL UPGRADES TO & MAINTENANCE OF LOCAL ELECTRICAL TRANSMISSION INFRASTRUCTURE?

CQP will incorporate the expenses associated with electrical transmission upgrades required to connect and operate the project in the electricity grid into the overall project funding. This encompasses both construction and maintenance costs throughout the project's lifespan.

Environment

WHAT ARE THE ENVIRONMENTAL BENEFITS OF WIND FARMS?

The Moah Creek Wind Farm is expected to produce enough emissions free power per year equivalent to:

- Displacing 780,000 tonnes of CO2 emissions per annum, or
- Powering 195,000 homes per annum, or
- Removing 230,000 Internal Combustion Engine (ICE) cars from the road per annum, or
- Planting 18 million trees per annum

During operations, wind farms do not require any fuel, let alone polluting fuels. Fossil fuels are the main source of greenhouse gas emissions and accelerate global warming, putting the health of all living systems at risk. Fossil fuels also cause acid rain by emitting noxious gases, such as nitrogen oxides and sulphur dioxide. Acid rain impacts local environments, damaging plants and waterways, as well as disintegrating infrastructure such as roofs and fences.

DO WIND FARMS DRIVE UP LAND CLEARING?

The latest QLD land clearing data shows that 89% of land clearing per year was conducted for grazing (2023). According to the Queensland Conservation Council, "if we built enough wind farms to support Queensland's entire energy transition requirements it would equate to only 5.5% of the land clearing that is currently occurring across the state every single year."

The overarching approach of the CQP development team to deal with any project design risk (environmental, safety etc) is firstly to avoid, and then minimise, substitute (choose an alternative), or finally mitigate (ameliorate the impact) when necessary. This is in alignment with the engineering hierarchy of controls best practice.

As a result, the design of the Moah Creek Wind Farm project prioritises the use of previously cleared areas, which account for 40% of the total project disturbance footprint and utilises existing access tracks and road reserves. Outside of this, the majority of proposed native vegetation clearing is in areas mapped as 'least concern' vegetation communities under Queensland's Native Vegetation Act 1999. Vegetation communities identified as of concern and "endangered" represent 0.4% and 0.5% of the project footprint respectively.

DO WIND FARMS HAVE TO COMPLY WITH THE NATIVE VEGETATION MANAGEMENT ACT 1999 (QLD)?

Yes, wind farms in Queensland must comply with the Native Vegetation Management Act 1999 (QLD). Furthermore, wind farm developments across all jurisdictions must comply with all relevant state and federal environmental legislation, including the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act).

DO WIND FARMS IMPACT BIODIVERSITY? HOW ARE THE BIODIVERSITY IMPACTS OF WIND FARMS ASSESSED?

CQP's approach is to develop wind farms using the principles of avoidance, minimisation, substitution, or where necessary mitigation to reduce the biodiversity impacts of a project. It's important to note that the impact of wind farms on biodiversity is a complex and site-specific issue.

Detailed flora and fauna studies are completed during the development phase in order to understand the impact of the project. These surveys are conducted based on guidelines provided by the assessing agency. The outcomes of the ecology field surveys are a key input into the project's layout and impact avoidance.

Following review of the proposed wind farm development application material, management conditions, mitigations, and biodiversity offsets are often prescribed to meet the requirements of the Native Vegetation Management Act 1999 and EPBC Act.

WILL THE MOAH CREEK WIND FARM IMPACT THE GREAT BARRIER REEF?

The Moah Creek Wind Farm has been identified as a low-risk impact to the Great Barrier Reef. The project is located approximately 60km west of the coast and will not directly impact on the estuarine or marine environment. However, it is acknowledged that several Matters of National Environmental Significance (MNES) are located downstream of the Project Study Area, including:

- Great Barrier Reef Marine Park.
- Great Barrier Reef World Heritage Area.
- Great Barrier Reef National Heritage Place.

The Project will implement appropriate measures to prevent impacts on the Great Barrier Reef. To date, a Stormwater Management Plan, a Conceptual Erosion and Sediment Control Plan (ESCP) and a preliminary Vegetation and Fauna Management Plan (VFMP) have been prepared for the project. These plans cover water and sediment quality, management of rehabilitation and stabilisation respectively.

DO WIND FARMS IMPACT SOIL SALINITY?

Soil salinity can be caused by several factors, including clearing of land, which is also known as dryland salinity. Clearing of deep-rooted and perennial vegetation can lead to changes to water table levels, which may increase soil salinity near the surface. Irrigation is another cause of salinity due to the repeated waterlogging of soils and subsequent evaporation leading to a concentration of salts in the upper soil profile.

Due to the relatively narrow clearing corridors associated with wind farms, the likelihood of soil salinity resulting from a wind farm project is expected to be lower than the broader areas cleared for cropping or similar activities. For the Moah Creek Wind Farm project, dryland salinity will not be caused as most of the project is on ridgelines and well above the water table. The ancillary infrastructure proposed for the flatter, lower areas of the project are not a sufficient size to impact ground water levels.

Soil testing is typically completed as part of geotechnical investigations during detailed design of renewable energy projects. This testing will identify the need for any enhancement to ensure that the soils are appropriately stabilised during the life of the project.

DO WIND FARMS IMPACT SOIL EROSION?

Wind farms typically involve earthworks to create access tracks and other project infrastructure. Given that wind farms are typically located in greenfield sites, any earthworks create potential for erosion. Erosion and sediment control is a critical consideration on any major construction project, particularly in Central Queensland where erosive soils and intense rainfall can cause significant pollution incidents.

It is a regulatory requirement in Queensland to have an Erosion and Sediment Control Plan (ESCP) written by a certified Erosion and Sediment Control specialist. Erosion control methods, including frequent onsite measurements and assessments are conducted to limit ecological impacts, ensure the safety of those working on site, the safety of the surrounding community, and to meet compliance requirements for sediment control. Measures could involve drainage systems, dust suppression, sediment collecting ponds and rumble grids. A preliminary ESCP has been prepared for the Moah Creek Wind Farm and will continue to evolve as the project progresses.

ARE BIRDLIFE & BATS IMPACTED BY WIND TURBINES?

We acknowledge that bird and bat fatalities may occur due to collisions with wind turbines. Wind turbines can also affect bats through barotrauma; a phenomenon where rapid air pressure changes cause tissue damage to air-containing structures, most notably the lungs.

Overall, however, wind turbines have a relatively minor impact on bird populations when compared to other human-related causes such as cats, vehicles, and buildings. Climate change also poses a significant threat to nearly half of all bird species.

Wind farms must conduct extensive 'bird and bat utilisation surveys' preconstruction, during construction and post construction as part of the approvals process. State and Commonwealth approvals typically require wind farms to develop, report and adhere to a Bird and Bat Adaptive Management Plan (BBAMP) for a project. This identifies the necessary maintenance and monitoring measures required to reduce bird strike as much as possible.

HOW DOES CONSTRUCTION ENSURE THE PROTECTION OF ANY ANIMALS THAT MAY BE PRESENT?

It is mandatory for wind farms to have a Vegetation and Fauna Management Plan (VFMP) as part of the broader CEMP to manage and mitigate impacts to flora and fauna during construction and operation of the project.

It is a development approval requirement that an ecologist or suitably qualified fauna spotter inspects the project construction area prior to any clearing activities. Any animal recovered will be relocated in accordance with the CEMP.

VFMPs often provide species specific recommendations. For example, if a trench is left open at night during construction works, shelter, water and ramps must be provided for any animals unable to get themselves out of the trench.

Other management methods include NO-GO zones, inspections, informing the workforce of endangered and protective species, presence of landowner stock, and enforcing a 40km/h on site speed limit to prevent animal strikes.

WHAT MEASURES WILL BE IMPLEMENTED TO ADDRESS PEST ANIMALS DURING A WIND FARM'S OPERATION?

The project's management of land-related concerns, including pest animals, will adhere to the laws set by the federal, state, and local governments, as well as relevant land management practices specifically relevant to for the project. It is expected that pest animal control, including for cats, foxes, wild dogs, and wild boars will be contained within our Construction and Environmental Management Plan (CEMP), as these species are known to be present at the Moah Creek Wind Farm site. Management activities could involve trapping or appropriate baiting including baiting warning signage.

HOW MUCH WATER DOES A WIND FARM NEED?

Typically, around 2 megalitres of water is required per wind turbine during the construction period, based on the water usage for other wind projects constructed in Queensland (so 120 megalitres in total for a wind farm of 60 wind turbines). Water is used in construction for concrete batching, soil conditioning during access track construction, dust suppression, and for the construction workforce (i.e. potable water and sewage). To put this in context, the coal-fired Stanwell Power Station has a water licence which entitles it to use up to 24,000 megalitres of water per annum.

During operation, the water requirements will be minimal and significantly lower than during construction. Typically, the water used on an operational wind farm consists of drinking water, water for amenities and weed control activities.

DO WIND TURBINES CREATE FIRES?

Wind turbines utilise advanced technology to reduce the risk of catching fire. The cost of damaging wind farm assets, or damaging host or neighbouring landowner properties has incentivised innovation. Wind turbines utilise a range of measures such as fire detection systems, bunds, sensors and controls, appropriate materials, shutdown, isolation procedures and lightning protection to prevent fires.

DNV GL, an internationally accredited registrar and classification society, estimates the rate of fire in wind turbines at 1 in 2,000 each year.

In the case that a wind turbine catches a fire, appropriate actions will be taken according to the relevant management plan in place with the relevant Rural Fire Service (QFES in Queensland, RFS elsewhere in Australia). A recent incident in January 2023 in NSW underscored the merit of the BMP (Bushfire Management Plan) that was in place as well as the firebreak role of the wind farm's access tracks. These plans were instrumental in preventing a potential escalation of a grass fire in a neighbouring field.

Regarding the broader wind farm, the risks associated with fires including their occurrence, probability, and impact, differ between the construction and operational phases of wind farms. Vegetation management and the safe use and maintenance of equipment is also critical for preventing fires on wind farms. For example, wind farm owners typically allow grazing, lawn mowing and weed control near the turbine locations, and commonly work with landowners to coordinate backburning activities.

Sources:
https://reneweconomy.com.au/turbine-fire-at-one-of-new-south-waless-oldest-wind-farms-under-investigation/
https://www.cleanenergycouncil.org.au/news/in-case-of-fire-a-real-life-experience-at-a-wind-farm-site#:~:text=The%20wind%20farm%27s%20access%20tracks,air%20and%20ground%20crew%20actions.

WHAT MEASURES ARE TAKEN ON A WIND FARM FOR BUSHFIRE RISK?

Australian wind farms must have a Bushfire Management Plan (BMP) in place, incorporating a site-specific hazard assessment. This plan must address potential bushfire intensity areas, identify hazards and ignition risks, and outline mitigation measures during both construction and operation and design.

This BMP must be developed through a collaborative process with relevant stakeholders and is prescribed in the development approval conditions. The BMP typically mandates on-site firefighting equipment to be installed during construction. The BMP will also detail vegetation management, including mowing or grazing near a wind turbine to maintain an appropriate Asset Protection Zone.

As well as the development of the BMP through a collaborate process with the relevant Rural Fire Service (QFES in Queensland, RFS elsewhere in Australia), the BMP will detail that the project team, RFS and all relevant stakeholders participate in annual preparedness meetings. These meetings include inductions, infrastructure familiarisation, safety protocols, and bushfire response training. It is important that all stakeholders remain up to date on the BMP so that they can safely respond in the case of an emergency.

CQP values the expertise of local rural fire brigades, recognising their voluntary nature and limited resources. CQP is committed to collaborative management approaches.

In 2013, during a grass fire at a South Australian wind farm ignited by lightning, the access roads built for the wind farm proved beneficial for firefighters. These access tracks, initially installed for wind farm construction and maintenance, served as a natural firebreak, enhancing onsite accessibility, enabling effective back burning. This unexpected advantage positively impacted response times and the local fire brigade's ability to combat fires on the wind farm or neighbouring properties.

Sources:
https://www.cleanenergycouncil.org.au/news/in-case-of-fire-a-real-life-experience-at-a-wind-farm-site

WILL THE PROJECT FACILITATE THE SPREAD OF WEEDS?

Managing weeds is a significant concern throughout the construction and ongoing operation of wind farms and is typically evaluated and addressed throughout a project's life. The movement of construction traffic and soil disturbance on the project site may elevate the risk of weeds. To mitigate this risk, a comprehensive Weed Management Plan will be developed and integrated into the Construction Environmental Management Plan for the project. This plan will encompass measures such as vehicle washdown procedures and site access planning and restriction.

MOAH CREEK wind farm

TO FIND OUT MORE ABOUT THE PROJECT, REGISTER FOR PROJECT UPDATES OR IF YOU HAVE ANY OTHER QUESTIONS YOU WOULD LIKE ANSWERED PLEASE VISIT MOAHCREEK.COM OR

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