



STARFISH HILL WIND FARM ~ FLEURIEU PENINSULA ~ SOUTH AUSTRALIA



STARFISH HILL
Wind Farm

The Starfish Hill Wind Farm is South Australia's first wind energy generation venture

The Starfish Hill Wind Farm will reduce Australia's greenhouse gas emissions by up to 2.1 million tonnes of CO₂ equivalent during its forecast 25-year operating life.

The Starfish Hill Wind Farm has assisted in establishing South Australia as a leader in large-scale renewable energy production in Australia.

The 34.5 megawatt (MW) capacity wind farm contributes to the State's electricity demands and expands the State's generation sources.

Starfish Hill also reduces the State's reliance on coal and gas and helps avoid the "losses" associated with transporting electricity long distances.

The power generated by the wind farm is more than sufficient to meet the annual needs of the Fleurieu Peninsula and Kangaroo Island.

Local businesses have developed new skills and expertise in this green energy industry, putting them in a strong position to bid for other similar work not only in South Australia but also interstate.

Tarong Energy will be seen as pioneers of wind energy in South Australia

The Starfish Hill Wind Farm is South Australia's first wind farm representing a total investment of \$65 million in the State.

Starfish Hill provides enough energy to meet the needs of about 18,000 households, representing 2% of South Australia's residential customers, and it adds 1% to the available generation capacity in South Australia. All electricity generated is sold to AGL for the South Australian domestic market.

The wind farm has two major elements:

- ▲ a 34.5 MW wind farm comprising 23 turbines each of 1.5 MW capacity, and
- ▲ a 25 km overhead transmission line to connect the wind farm to the ETSA Utilities electricity distribution network at Yankalilla.

Tarong Energy, the wind farm owner, commissioned NEG Micon, a world-leading supplier of wind generation turbines to construct the wind farm.





“From the very beginning of this project Tarong Energy has sought to do the right thing by the local community, the environment and for the greater good of South Australia.

“They consulted widely in the community, were keen to meet the toughest standards set by Government and have set an example of the way developments should be conducted.”

South Australian Energy Minister the Hon. Patrick Conlon MP.



The Starfish Hill Wind Farm is near Cape Jervis on the Fleurieu Peninsula

The wind farm is located across two hills, Starfish and Salt Creek, with 8 turbines on Starfish Hill and 15 on Salt Creek Hill.

The site was selected for the following reasons:

- ▲ consistently strong winds,
- ▲ low impact on native flora and fauna,
- ▲ sparse settlement and previously cleared farming and grazing land,
- ▲ accessibility through proximity to a main transport link (Main South Road) and proximity to the electricity grid.

Selecting the positions of wind turbines on the site involved the following considerations:

- ▲ minimising environmental impact,
- ▲ maximising energy output while minimising the distance between wind turbines, and
- ▲ meeting the Environment Protection Authority's (EPA's) guidelines.



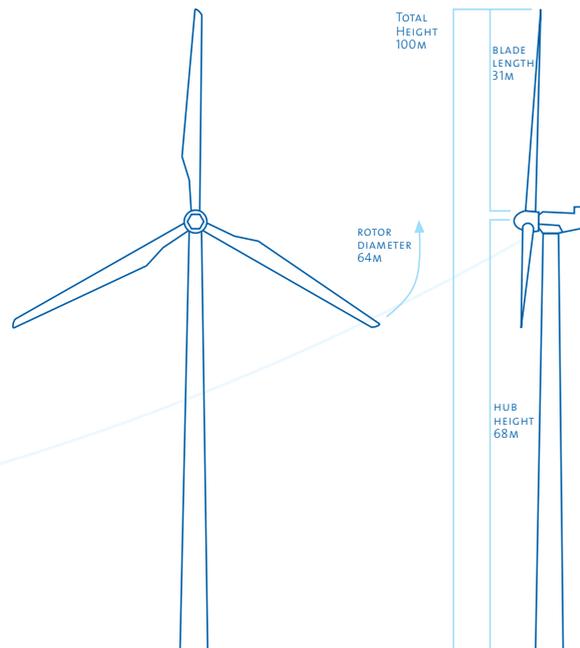
How the wind farm works

Wind turbines convert the energy of the wind into electricity. The turbines are spun slowly by the wind. This in turn, spins a generator to produce electricity. This electricity travels through a transformer and into the local electricity network for distribution to homes.

Almost all wind turbines producing electricity consist of blades that rotate around a horizontal hub. The hub is connected to a gearbox and generator which are located inside the nacelle (the large part at the top of the tower where all the electrical components are located).

Wind turbines start operating at wind speeds of 4 to 5 metres per second (around 16 kilometres per hour) and reach maximum power output at around 15 meters per second (around 53 kilometres per hour). At very high wind speeds, i.e. gale force winds, (25 metres per second, 90 kilometres per hour) wind turbines shut down to avoid damage to the equipment.

The blades rotate at 11 rpm in low wind conditions and 17 rpm at higher wind speeds to maximise energy production.





The Starfish Hill Wind Farm has already had positive results for the Fleurieu Peninsula

During construction and commissioning, it employed up to 50 people, with most coming from South Australia. A further 30 people were involved in construction of the transmission line. Flow-on benefits to the local business community were achieved from servicing the needs (accommodation, food, travel etc) of people employed during construction.

Also, 15 South Australian companies directly benefited from providing products and services required for the wind farm and transmission line components of the project.

These South Australian companies won work totalling more than \$25 million.

The wind farm is enhancing the Fleurieu Peninsula's tourist profile through its emphasis on renewable energy. Wind farms are popular with visitors in Australia and overseas. The Starfish Hill Wind Farm - close to Adelaide and the McLaren Vale wine region - attracts a large number of tourists and an ongoing interest from educational institutions.



The transmission line for the wind farm provides a substantial boost to the security of electricity supply for the Fleurieu Peninsula and Kangaroo Island. It brings forward by six years ETSA Utilities' long-term plans for the region, thus providing these benefits now.

The new 66kV transmission network is capable of carrying four times the quantity of electricity as the existing 33kV ETSA Utilities' owned line. When used in tandem with the existing line, the new network will provide greater reliability of supply and is expected to meet the electricity demand requirements of the region for several decades. This new transmission line will also provide opportunities for further developments in the region.

Environmental considerations

The Starfish Hill Wind Farm will reduce Australia's greenhouse gas emissions by up to 2.1 million tonnes of CO₂ equivalent during its forecast 25-year operating life.

The Project Development Application incorporated detailed planning and environmental impact assessments including consideration of native vegetation, flora and fauna, indigenous and European heritage, bird life, visual amenity, noise, tourism and economic impacts.

Due to the region's long involvement with dairy and sheep farming there are extensive areas of pasture, and the wind turbines are positioned on this cleared land.

The overall environmental impact is low and the impact on native vegetation was minimised through:

- ▲ Applying self-imposed "exclusion zones" for the siting of wind turbines at the site avoiding remnant native vegetation.
- ▲ Selecting and designing a transmission line corridor avoiding, where possible, native vegetation clearance.

All Environment Protection Authority (EPA) guidelines were met during the construction of the site and are being maintained throughout its operation. This included guidelines for stormwater management and temporary storage of construction materials.

Visual impact was assessed by the Development Assessment Commission and is relatively low due to the wind farm layout, the nature of the farming land and the relatively isolated location of the site. Visual amenity assessments were conducted during the initial planning process.

Although slight noise from the wind turbines is noticeable in the immediate vicinity, it reduces with distance. Natural features such as terrain and vegetation also help to reduce noise. The wind farm was designed to comply with EPA noise requirements and meets all noise guidelines and standards of the EPA and Planning South Australia.

In early 2002, background noise measurements were undertaken at nearby locations. Monitoring and testing is continuing during the operation of the wind farm to ensure compliance.





“I am appreciative of Tarong Energy’s efforts to reduce the disturbance to locals as well as its friendly and cooperative attitude.

“I believe that Tarong Energy’s consultative and communicative efforts have been quite unusually thorough and I have nothing but admiration for the way in which it has set about it.”

Local resident Bill Leckie.

Local community input

Tarong Energy is committed to developing and managing the wind farm in a way that considers the requirements of local communities.

A consultative approach started early and included community information sessions at Yankalilla and discussions with the Yankalilla District Council and landowners.

Some significant project modifications were required to accommodate community input, particularly in relation to the new transmission line. The line’s original corridor was revised to avoid built-up areas in Second Valley. A 400-metre section of the line near Yankalilla was also placed underground following comment from the Yankalilla District Council about visual impact.

The wind farm’s 4.5 kilometre connector cable to the Cape Jervis Substation was also placed underground following community comment.

While this undergrounding involved additional costs to Tarong Energy, it was adopted in the interests of ensuring the project incorporated community requirements and minimised environmental impact.

Tarong Energy is committed to continuing its involvement in the local community and is sponsoring community and education programs in the Fleurieu Peninsula.



How the wind farm was built

- 1 Equipment delivered to Port Adelaide wharves from Europe.
- 2 Delivery to site of major equipment including towers, blades and nacelles.
- 3 Foundations prepared.
- 4 Bottom section of the tower is welded to the foundations
- 5 Middle section of tower is connected to the bottom section.
- 6 Top section of tower is connected to the middle section. The towers are about 68 metres tall.
- 7 The nacelle is bolted to the top of the tower. The nacelle holds the gearbox, generator, brakes and yaw gear for each wind turbine generator. The nacelle weighs 43 tonnes.
- 8 The rotor and blades are connected to the nacelle. The blades are about 32 metres long. From the ground to the tip of the blade, the wind turbine generator is about 100 metres high.



Tarong Energy

Tarong Energy is an active competitor in the National Electricity Market (NEM) generating about a quarter of Queensland's electricity supply.

Established in July 1997 following a restructure of the Queensland Electricity Industry, Tarong Energy has developed structures and strategies to enable the Corporation to strive towards achieving its mission to be acknowledged as Australia's best performing energy business.

About 380 people work across Tarong, Tarong North, Starfish Hill Wind Farm and Wivenhoe Power Stations, the corporate office in Brisbane and Terra Gas Trader (TGT) - the Corporation's South Australian-based wholesale gas trading business.

Tarong Energy has a strong and consistent record of performance in all principal business activities including operations, safety, environmental management, trading, risk management and project development.





CONSTRUCTION ORGANISATIONS

Wind Farm

NEG Micon supported by:
 Air-Ride Technologies Group Pty Ltd
 Consolidated Power Projects Australia
 Flight Brothers Pty Ltd
 Rex J Andrews Pty Ltd
 SDS Ausminco
 StrongForce Pty Ltd
 Toshiba International Corporation Pty Ltd

Transmission Connection Works

ETSA Utilities

Technical Consultants

Garrad Hassan Pacific Pty Ltd

ACKNOWLEDGED ORGANISATIONS

AGL
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 Country Fire Service
 District Council of Yankalilla
 ElectraNet SA
 Electricity Supply Industry Planning Council
 Energy SA
 Environment Protection Authority
 Essential Services Commission of South Australia
 FFYE Surveyors & Engineers
 Greening Australia (SA) Inc
 In Front Management
 Industrial Supplies Office

Measurement Engineering Australia
 Michels Warren
 Minter Ellison
 National Electricity Code Administrator
 National Electricity Market Management Company Ltd
 Office of Economic Development (formerly DIT)
 Planning SA
 SA Police (Traffic Support Branch)
 Sinclair Knight Merz
 Transport SA
 Vivienne Wood Heritage Consultant Pty Ltd

Tarong Energy acknowledges and appreciates the support of the local communities.



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