

# SUSTAINABLE ENERGY

AGL Energy Limited is developing the Macarthur Wind Farm with its joint venture partner, Meridian Energy, which will be the largest wind farm in the Southern Hemisphere.

MAIN CONSTRUCTION COMPANY : Leighton Contractors  
OWNERS : AGL Energy Ltd & Meridian Energy  
PROJECT MANAGEMENT : KBR  
VESTAS ELECTRICAL DESIGN : Consolidated Power Projects  
CIVIL DESIGN : Robert Bird Group  
GEOTECHNICAL ENGINEERS : Coffey Geotechnics  
PROJECT END VALUE : \$1 Billion  
COMPLETION : End of 2012

**AGL Energy Limited, one of Australia's leading renewable energy companies and largest private owner, operator and developer of renewable generation assets is developing the Macarthur Wind Farm with its joint venture partner, Meridian Energy.**

The project will become the largest wind farm in the Southern Hemisphere and is located approximately 16km east of the township of Macarthur in Western Victoria. The Wind Farm will consist of 140 wind-turbines that can generate enough clean, green energy with capacity to generate 420 MW of renewable energy to power the equivalent of 220,000 average Victorian households per year, with greenhouse gas emission savings of over 1.7 million tonnes per annum. The Macarthur Wind Farm will contribute to the governments expanded Renewable Energy Targets, aimed at creating a sustainable energy future for all Australians, which aims to have 20% of the country's electricity generated from renewable sources by 2020.

The Macarthur Wind Farm project has been subject to a wide range of comprehensive studies including the potential impact on ecology, landscape, cultural heritage, visual amenity and other environmental factors

such as noise. These studies have been complemented through a panel hearing process whereby interested stakeholders were provided with the opportunity to comment on the development and provide additional proposals for consideration by the panel. The outcome of this process was the successful issue of a planning permit to build and operate the Macarthur Wind Farm.

An Engineer Procure and Construct (EPC) contract has been placed with a Leighton Contractors / Vestas Consortium for the delivery of the project. Leighton is a leading national construction company bringing substantial expertise to the construction phase whilst Vestas, the world's largest manufacturer of wind turbines, brings state of the art technology, quality and reliability to the project to ensure the wind farm's success over the longer term.

The wind turbines will be constructed of materials that minimize the visual impact on the landscape, including coloured finishes that blend with the landscape and which are non-reflective. AGL is one of Australia's largest investors in renewable energy investments and in their experience, wind farms bring significant economic growth and benefits to local communities and the broader region in general.

**Image** The Macarthur Wind Farm will contain 140 wind-turbines, enough energy to generate power to 220,000 Victorian households.

AGL and Meridian, through their development of the Macarthur Wind Farm, have invested several millions of dollars into local infrastructure, including roads. In particular, the Macarthur-Hawkesdale Road has been redeveloped between Macarthur and the wind farm site, as has Tarrone North Road from Woolsthorpe to Heywood Road to the Tarrone site. Additional funding has also been provided directly to both Moyne Shire and VicRoads to facilitate maintenance programs of their respective road assets. These upgrades, funding and ongoing regular contact between AGL, its contractors, Moyne Shire Council and VicRoads is just part of our commitment to the community.

AGL, Meridian and their project partners continue to invest in local community projects and assist local community groups with funding for equipment to support key local health care and emergency services groups. Long after construction is complete, AGL and Meridian will continue to support the local community through its community funding programs.

**For more information contact AGL Energy Limited, 120 Spencer Street Melbourne VIC 3000, website: [www.agl.com.au/macarthur](http://www.agl.com.au/macarthur)**



## A COMMITMENT TO SERVICE AND QUALITY

Sinclair Knight Merz (SKM) is working with AGL Energy Ltd (AGL) to deliver high-profile renewable energy projects, and in the process, is continually enhancing its capacity to provide high-value technical and owner's engineering services to the wind farm sector.

By combining leading project delivery and specialist consulting skills with excellence in technology and facility management, SKM consistently delivers sustainable solutions.

As owner's engineer for wind farms under construction, such as AGL's 420MW Macarthur wind farm, SKM verifies the quality, quantity and performance of deliverables being undertaken by the contractor (under Engineering Procurement and Construction – EPC contracts) and ensures compliance with those EPC contracts and other regulatory requirements.

SKM was engaged in a number of roles, from the initial stages of the Macarthur Wind Farm project, to owner's engineer.

- Development Application for Meridian
- Pre-Construction Tender Prep for AGL
- Connection Studies for AGL
- Preconstruction Tender Negotiation Assistance AGL
- Construction Owners Engineer

*“SKM provides engineering solutions that cover every phase of wind farm development”*

David Pollington, SKM Team Leader - Renewable Energy said, “This kind of work has its challenges. The complexities lay in the wind farms themselves, the balance of plant (civil, roads and electrical services), and providing, in partnership with sub-consultants, renewable generation expertise in an emerging market.”



Virtual teaming and in-house up-skilling has played a role in developing the generation team's skills. SKM has called upon its UK generation team with this particular expertise as well as recruiting local specialists to enable a “one-stop shop” service to the market.

Patrick Hill, SKM's General Manager, Power and Energy, said, “It's an important sector for us to continue to develop in line with our overarching renewable energy strategy. In recent years we have delivered services to support more than 8000 MW of wind energy globally”.

SKM is a leading projects firm, with global capability in strategic consulting, engineering and project delivery. It operates in three regions: Asia Pacific, the Americas and EMEA (Europe, Middle East & Africa), deploying some 7,000 people from more than 40 offices.

SKM provides engineering solutions that cover every phase of wind farm development and have undertaken work for developers, constructors, operators and investors.

The specialised range of services provided by SKM for the development of wind farms

such as Macarthur includes:

- Site prospecting and pre-feasibility assessment
- Wind monitoring and energy yields
- Environmental impact assessment and consenting
- Network analysis including connection studies
- Wind farm design and specification
- Wind farm infrastructure design and specification
- Procurement
- Construction management
- Operation and maintenance
- Due diligence, insurance and risk assessment
- Owner's Engineer

SKM is an organisation with a proud history that embraces shared values and an open culture. The team boasts a commitment to service and quality, with high standards of safety and business ethics, along with a leading edge approach to delivering a sustainable future.

**For more information contact Sinclair Knight Merz (SKM),** contact: David Pollington, SKM Team Leader, Renewable Energy, phone 03 6221 3719, email [DPollington@globalskm.com](mailto:DPollington@globalskm.com)



# LEADING THE WAY

**Below** SMB's work involved building access tracks into both sites and construction of the substation plateau and all associated storm water and conduit installation.



SMB Civil Pty Ltd was initially engaged by Leighton's Construction to complete the civil works for the Tarrone and Macarthur substations. The works involved building access tracks into both sites and construction of the substation plateau and all associated storm water and conduit installation.

Following the successful completion of the civil works, SMB Civil went on to secure the contract to complete the Macarthur transmission line which ran from the north of the windfarm site and headed south to meet the Tarrone substation. These particular works involved the building of access tracks, excavation of the bases, blinding of concrete,

reinforcing steel, setting of bolt cluster, setting up Pecaform, backfill of Pecaform, pouring foundation, pouring pedestal footing and then backfill and site clean up.

With the local area experiencing a very wet season, it was challenging for SMB Civil to build a roadway and hardstand in such adverse conditions. The 1.4km roadway into the Tarrone substation was built through areas where water was approximately one-meter deep and created vast issues with mud and dewatering.

The substation and roadway at the Macarthur site were built on a large flat area that

was waterlogged from the continuing wet conditions. The Transmission line was constructed in very varied conditions that included clay, mud and basalt rises along with environmentally sensitive areas where the utmost care was taken to avoid Native Vegetation issues.

SMB Civil believed the only way to provide a successful outcome was to import oversize basalt rock to the site and place a minimum base of 400mm and forming up to one metre in depth for the worst affected areas. This rock was placed over the top of a Geofabric layer which has certainly helped make the roads and traffic areas more secure. The

rock was then interlocked using a 75mm minus product from Holcim Quarries which proved to be a brilliant and highly suitable product for the application. This solution enabled the combination of all the materials to provide the perfect bridging layer for such sodden conditions.

SMB Civil was formed in 2007 to provide innovative and cost effective solutions to clients throughout South Australia and Western Victoria. In 2008, SMB Civil merged with Diamond Concrete and Construction Australia to successfully form a fully integrated civil construction company which provides a diverse range of services that include:

- Wind Farm Infrastructure
- Road construction
- Bulk Earthworks, Civil and Infrastructure projects
- Industrial and Commercial Structural concrete
- Water, wastewater, sewerage and gas infrastructure projects
- Land Development and Sub Divisions
- Detailed Excavation works.
- A modern fleet of heavy equipment ensures consistent reliability of assets and expansive range of capabilities.

SMB Civil is a progressive company that is passionate about delivering projects safely,

economically and with superior quality. The companies demonstrated capability enables them to foster lasting relations and partnerships with valued clients and suppliers. Having offices in Adelaide and Mount Gambier, along with a soon to be opened Victorian branch, SMB Civil can service a vast area.

*For more information contact SMB Civil Pty Ltd, 357 Commercial St West Mount Gambier SA 5290 phone 08 8723 6277, email admin@smbcivil.com.au, SMB Civil Pty Ltd, 81 King William Street Kent Town SA 5071, phone 08 81 320015, email jim.crawford@smbcivil.com.au*

Below New Era Media documented each stage of the wind farm construction process.



## TECHNOLOGY FOREFRONT!

Vestas Australian Wind Technology and Leighton Contractors Ltd formed a consortium to deliver the Macarthur Wind Farm and contracted New Era Media to document each stage of the wind farm construction.

From early road building, trenching, foundation works to transport, erection and operation of the turbines, New Era Media has captured high quality images and video for the consortium. These images and videos have been used in such things as advertising, signage, newsletters, internal training programs and inductions. All of the images are uploaded to an online image viewer so the various companies can see progress on site through a simple media gallery.

Throughout the project, New Era Media produced "Project Update" videos, which outlined the current project status and future goals. From feedback received, these "Project Update" videos were very beneficial and have been used in board meetings as well as pre start safety meetings. The updates were also uploaded to the main clients intranets and selected videos have been released for public viewing.

Following the official opening of the Macarthur Wind Farm, a hard cover photo book will be produced. It will contain a selection of the images that have been taken including the construction documentary video, on Blu-ray and DVD. The professional and stylish book will feature foil embossing, and high quality paper. These will be available to the people and businesses involved with the project to provide a lovely reminder of their experience on the project.

Along with their documentary work, New Era Media supplied the consortium with two 360 Time Lapse Camera Systems. New Era Media's "360 CAM" is a 360° panoramic time-lapse camera system, a self-contained ultra high-resolution photographic system. The pictures produced are very high quality ranging between 40 and 80 megapixels, far superior to other construction cameras. Being able to capture 360 degrees is a massive advantage over conventional "construction site cameras" as it meant the consortium required only two cameras to view a large part of the site. The 360° time-lapse camera systems can be powered by AC mains power or by an optional solar system and the images are uploaded to a server over connected Ethernet or 3G wireless.

The camera system allowed the construction project management teams to track progress of the site from anywhere in the world with the images available online. Photos from any selected date, at 30-minute intervals during daylight hours, can be viewed. The online viewer has full screen and zooming functions and can also be made available on the client's website for public viewing. The images also provide additional site security.

Over the period of the project, thousands of images have been captured. These high-resolution images are gathered and turned into a high definition time-lapse movie, which covers the project from start to finish. It's amazing to watch a large project develop as the different seasons of the year pass by and this will form part of the final video.

Throughout the project, the team at New Era Media visited the site at strategic stages to carry out documentary work, interview a range of people making sure all stages are captured. The team has also been on call for special events such as the Prince of Denmark site visit.

New Era Media brought extensive experience to the Macarthur Wind Farm project. The team had previously provided their services on the Waterloo Wind Farm, which is located in South Australia south of Clare. The Waterloo Wind Farm features 37 turbines and has been operational since 2010.

The team at New Era Media aim to understand each client's individual needs and ensure their requirements are clearly identified and delivered until complete satisfaction is achieved. They take care of the entire process, from conception of ideas right through to distribution across several mediums including DVD, Blu-ray, USB, print or the Internet.

There's an abundance of contemporary and creative ideas amongst the New Era Media team to aid in delivering content in new and exciting ways.

New Era Media can be contacted by phone or email to answer any questions, organise a meeting or to construct a custom quotation for your media objectives

*For more information contact New Era Media, phone 08 8121 8199, email [info@neweramedia.com.au](mailto:info@neweramedia.com.au), website [www.neweramedia.com.au](http://www.neweramedia.com.au)*



## EARTHLIY CONNECTIONS

**Cowland Electrical provided an experienced team of electricians to install the tower's main Earthing grids at the Macarthur Wind Farm project along with a driller and drill rig to install grounding earth rods around the base of the each wind turbine.**

Cowland Electrical's staff were tasked with the responsibility of designing, wiring & the connection of all power services to the offices & administration buildings and site compound, as well as the connection of generators, trenching underground mains power supplies and all communication and network cabling.

The use of Cad Welding was a technique that Cowland Electrical used for the connecting of the Earthing grid cables and earth rods at the base of each of the Macarthur Wind Farm towers. A new vertical drilling rig was acquired to install these Earthing rods with approximately 650 rods being installed across the project. All the Earthing installation had to be Quality controlled with Cowland Electrical having their own Q&A staff.

The Macarthur wind farm covers approximately 5,500 hectares of freehold agricultural land and is located approximately 16km east of Macarthur in South Western Victoria.

Cowland Electrical Contractors Pty. Ltd. is a local contractor from Hamilton Victoria and was first registered in November 1993 by directors Barry & Melinda Cowland. Over time the family business has grown to now employ 25 full time staff and specialize in large Commercial & Industrial Electrical installations along with & all types of repairs, vertical drilling & horizontal directional drilling, cable trenching & excavating, Telstra undergrounds & Data network Cabling.

Cowland Electrical services a wide area across all of country Victoria. The company also supplies and services communications equipment such as GME and Uniden UHF two way radios, aerials, GPS units and hires satellite phones.

Cowland Electrical undertakes all electrical and electronic appliance repairs and services, also commercial catering equipment. The Company installs and services TV aerials, Car audio and in car phone installations and is the service agent for many well known brands including Sony, Sharp, Panasonic, LG, Electrolux, Kenwood, JVC, GME and Uniden.

Cowland Electrical has been recognised as one of Australia's best providers of high quality, safe and environmentally friendly electrical services with a newly acquired accreditation and membership from Master Electricians Australia.

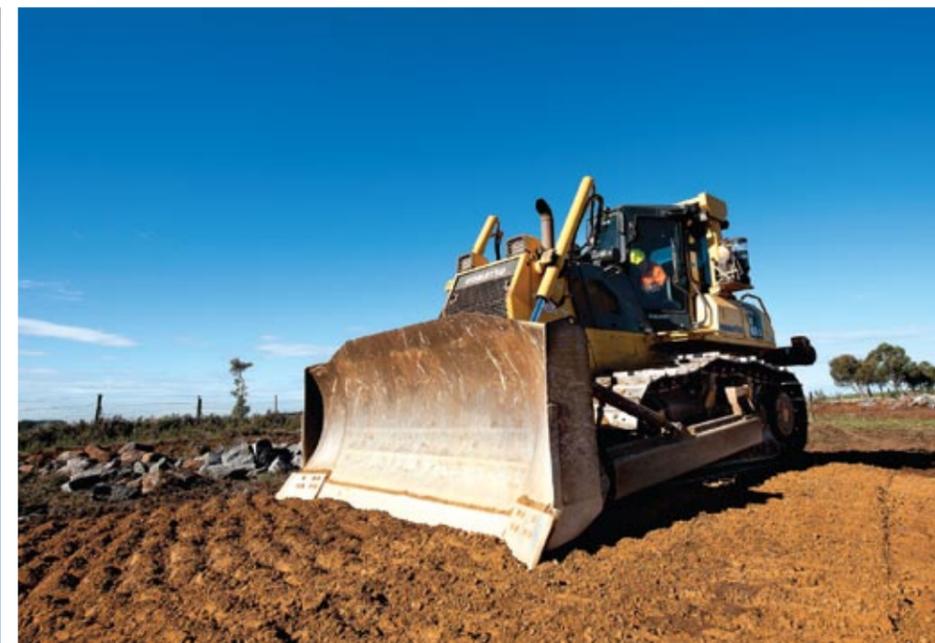
To be considered and approached by Master Electricians Australia, Cowland Electrical Contractors had to agree to be audited for safety and quality plus adhere to a strict code of practice. They also had to demonstrate that a comprehensive safety management system was in place to protect both themselves and their customer's and offer all customers a 12 month guarantee on workmanship. Cowland Electrical are extremely proud of their new accreditations status due to the extensive selection criteria in place. Only the finest members of the electrical industry are invited to become Master Electricians.

*For more information contact Cowland Electrical Contractors, 8 Peck St Hamilton VIC. 3300, phone 03 5572 2766 / 0407 722 767, fax 03 5572 3500, email cec.electrical@westnet.com.au*



# LIFELONG AMBITION

**Below** Gellies Earthmoving was appointed as one of the earthmoving contractors to work on the site preparations for the Macarthur Wind Farm project.



**Gellie's Earthmoving commenced work at the Macarthur Wind Farm in January 2011.** The company was appointed as one of the earthmoving contractors to work on the site preparations.

The Macarthur Wind Farm, which is located in the Moyne Shire, Western Victoria, is a \$1 billion green power project undertaken by the AGL-Meridian Energy Joint Venture.

The Wind Farm features 140 wind turbines and is expected to produce 420mW of green

energy or enough to power 220,000 homes, with a greenhouse gas saving expected to be 1.7 million tonnes annually.

The project was constructed on 5,500 hectares of farmland and was lead by the Leighton-Vestas consortium.

Gellie's Earthmoving utilised two New Holland tractors (TJ450 & TJ425) & scoops to work on the earthworks side of the project & two Kenworth T650's with semi side tippers. The Company added a

second Kenworth T650 to their collection just prior to the commencement of works. Two bulldozers also worked at the Wind Farm.

In June 2011 the Komatsu D65EX-15 commenced work onsite & in October 2011 the Komatsu D155AX-5 was introduced to assist with the removal of rock.

The site preparation works involved boxing out road formations and tower bases and included more than 100 kilometres of service

roads within the Macarthur Wind Farm site. A significant part of the construction was the cut and fill work where up to 500mm of topsoil was removed in some areas. This topsoil was stockpiled for future leveling and some was reused around the turbine pad sites.

Gellie's Earthmovings Director, Ned Gellie developed a keen interest for earthmoving at a young age. As a child he realised a love for machinery & earthmoving, in particular bulldozers. Ned spent many hours pushing

sand & dirt around with his toys & at age 24 he bought his first Bulldozer.

In response to this passion, Gellie's Earthmoving was launched in 1983 with the purchase of a Fiat Allis 14B bulldozer. From there, the team has grown tremendously and now employs more than 20 extremely experienced operators & owns an array of earthmoving equipment.

The team has worked on many notable projects and has built strong ties with leading

builders and developers. They have recently carried out work on the Eastlink Road project in Melbourne, which incorporates 45 kilometres of road, along with the Waubra Wind Farm near Ballarat.

**For more information contact Gellie's Earthmoving,** 7507 Mortlake Ararat Road Maroona VIC 3377, phone 03 5354 7542, Ned Gellie: 0427 132 216 Jake Gellie: 0409 951 411

## CIVIL SOLUTIONS

**Porthaul Civil Construction have been effectively providing civil construction works for more than 18 years.** The company is quickly growing into a well-respected Civil Construction Company who is known for providing diverse solutions to their clients needs.

Porthaul Civil Construction are members of the Civil Contractors Federation and are a systems certified contractor. They also hold an R1 Vicroads accreditation, giving their clients the assurance that each and every job will be delivered successfully the first time. The team at Porthaul Civil Construction were contracted to provide

portions of road construction and electrical trenching for the Macarthur Wind Farm project.

The Macarthur Wind Farm is the largest wind farm in the southern hemisphere, and one of the largest wind farms in the world. It will join AGL's market leading suite of renewable energy generation assets. The wind farm is situated near Hamilton, 260 kilometres west of Melbourne, in the Shire of Moynes.

With a large range of equipment on hand and an extensive team of experienced civil workers, Porthaul Civil Construction are

capable of coping with all jobs regardless of size or complexity.

Some of the many projects that have been undertaken by Porthaul Civil Construction include:

- Maritime Discovery Centre.
- Sub divisions throughout Victoria
- Wind farm roads and hardstands - Cape Bridgewater & Codrington
- Dutton Way Rock Wall project.
- Port of Portland mineral sands foundation & surge pile.
- Portland to Nelson Highway rehabilitation

work.

- Vestas Blade Factory
- The new Portland RSPCA site/road works
- Colac Aldi store
- 8km Casterton/Dartmoor road rehabilitation
- Portland Main Street - underground power installation and
- Myamyn Woodchip Mill

Porthaul Civil Construction is part of a larger entity which undertakes bulk transport, general freight, transportation of refrigerated goods, quarry materials and machinery along with storage solutions.

At Porthaul, they strive to provide customers with the most effective and efficient way to meet their diverse transport and construction needs. Whether this be carting bulk goods, carrying out civil works or supplying various materials, they work as a team to ensure prompt, efficient and price competitive services. Their management and qualified staff take great pride in the quality and presentation of their fleet.

Porthaul is highly committed to workplace safety. They have worked hard to achieve their impeccable safety record, with work safe practices that boast safe trucks, healthy drivers

and superior management systems. Porthaul prides itself on having conscious staff within the company and have been recognised for their achievements in safety practices. They have received official approval from the Industry Accreditation Council. For their customers, these benchmarks in employee safety practices provide high confidence in Porthaul, and complete piece of mind.

*For more information contact Porthaul Civil Construction, phone 03 5521 7116, email info@porthaul.com, website www.porthaul.com*



Below Exile Concrete Pumping provided concrete pumping for the bases of the towers at the Macarthur Wind farm.

## FIRST BASE



The Macarthur Wind Farm is set to generate enough clean, green energy to power approximately 220,000 average Victorian households each year, with greenhouse gas emission savings of over 1.7 million tonnes per annum over the life of the project.

Exile Concrete Pumping provided concrete pumping for the bases of the towers. They used a new 32 meter pump for the bulk pours, which performed perfectly for the Macarthur Wind Farm. The pump was commissioned specifically for this project and featured a large pumping capacity. They also used their 37, 28 and 32 meter pumps for blindings and substation pours.

Located in Portland, Exile Concrete Pumping work on commercial and industrial projects. They have recently completed projects such as Ararat Prison and Mount Gambier Market Place.

Exile Concrete Pumping is a small, family business but has proven their ability to produce outstanding results on the largest of projects. These results were achieved on

projects such as Mortlake Power Station and Cape Nelson Wind Farm.

Ben Gibson, Structures Manager for Leighton Constructions spoke highly of Exile Concrete Pumping. 'Exile Concrete Pumping have been an integral part of the successful delivery of the Macarthur Wind Farm Project which involved pumping over 80,000m<sup>3</sup> of concrete for turbine bases, substation footings, and overhead line foundations,' said Ben Gibson.

'From their first day on site, all of the crew demonstrated a willingness to go beyond standard practice to help us deliver new safety initiatives and achieve fantastic production. In all aspects of the work, Exile have demonstrated a fantastic level of professionalism and their ability to join in and become part of the team is a great credit to all of the crew. They have been a pleasure to work alongside for over 12 months.'

For more information contact Exile Concrete Pumping, 142 Cockatoo Valley Road Portland VIC 3305 mobile 0427 236 980, email [exilepumping@bigpond.com](mailto:exilepumping@bigpond.com)



## QUALITY & EFFICIENCY

Days Electrical Contracting P/L have provided their services on the Macarthur Wind Farm project by laying approximately 100,000 meters of various size HV cables including active cable & earth wire. Days Electrical Contracting also supplied a trenching contractor to assist with the installation works & were involved in the construction & installation of the switch yard on the Macarthur site. The company sourced a new self loading cable trailer which made the task much more efficient.

Days Electrical Contracting P/L successfully overcome the difficulty of dealing with large cable drums on site. The drums had a height of 4.2 metres, a width of 2.1 metres and weigh between 6-12 tonne.

Established in 1983, Days Electrical Contracting P/L have been providing an outstanding service to South West Victoria region. They perform all types of industrial electrical installation work and related repairs as well as domestic and commercial work. The team are willing to travel wherever necessary to provide their clients with a service that boasts quality and efficiency.

About 80% of the work, and the main focus of Days Electrical Contracting P/L is within industrial projects and maintenance. Their industrial client base includes Leighton Contractors, Portland Aluminum (Alcoa), Incitec Pivot, Impact Fertilisers and GrainCorp, with projects varying in size from \$30,000 to \$3.2m.

Days Electrical Contracting P/L have a solid history working with Australian Wind Farms. They have been involved in many projects including Codrington Wind Farm, Yambuk Wind Farm, Cape Nelson Wind Farm and Cape Bridgewater Wind Farm.

Apart from the numerous Wind Farm projects, Days Electrical Contracting P/L specialises in the field of solar installations. The team features fully certified solar installers and they can arrange for the whole process to be complete including works with accredited designers.

For more information contact Days Electrical Contracting Pty Ltd, email [admin@dayselectrical.com.au](mailto:admin@dayselectrical.com.au) phone 03 5523 4636 fax 03 5523 6457 REC: 20439, website [www.dayselectrical.com.au](http://www.dayselectrical.com.au)

Below Day's Electrical laid approximately 100,000 meters of various size HV cables including active cable & earth wire.

