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CONSTRUCTION FACT SHEET

# BODANGORA WIND FARM

MAY 2017

# OVERVIEW

Bodangora wind farm development project is located near Wellington, New South Wales (NSW) in the area originally inhabited by the Wiradjuri people.

The Bodangora wind farm project was developed by Infigen Energy (Infigen).

## Development

Project development started in 2009 by analysing wind resource maps and transmission line capacity, and erecting two met masts to monitor the wind resource.

The Bodangora wind farm project will comprise 33 wind turbines, a substation, access tracks and an electrical collection system of underground and overhead cables on the land of seven host landowners. The wind farm will have an installed capacity of 113.2 MW, which can generate enough electricity to supply ~49,000 NSW homes a year.

Project Approval for the proposed Bodangora wind farm was received from the NSW Planning Assessment Commission in August 2013.

## Construction

Bodangora wind farm will be built under an engineering, procurement and construction (EPC) contract by a consortium comprising:

- General Electric (GE)
- Civil & Allied Technical Construction (CATCON)

The project construction time is approximately 18 months and full commercial operation is expected to be in the second half of 2018.

## Key statistics

BODANGORA WIND FARM	
Capacity	113.2 MW
Annual output	~361 GWh
NSW households powered annually	~49,000/year
Developer, owner, operator	Infigen
Construction time	~18 months
EPC provider	GE and CATCON consortium
Wind turbine model	GE 3.43 MW
Grid operator	TransGrid
Grid connection voltage	132kV
Operation and maintenance	20-year agreement with GE
WIND TURBINES	
Number of wind turbines	33
Model	GE 3.4-130
Tower height (hub height)	85 metres
Tower material	Steel
Rotor diameter	130 metres
Start-up wind speed	3 metres/second
Maximum wind speed	13 metres/second
Cut-off wind speed	25 metres/second
Rotor speed	8 to 13 rpm
Blade length	63.7 metres
Blade material	Glass fibre reinforced plastic

# DEVELOPMENT

## Community engagement

In 2009 Infigen approached the community around Bodangora in Central West NSW in relation to developing a wind farm on the hills surrounding Mount Bodangora. Having collected sufficient wind data and undertaken studies on environmental and social impacts of the project, Infigen applied for a project development approval.

Infigen developed good working relationships with representatives of the council, landcare, neighbours, landowners, residents, and business owners by meeting regularly in Wellington and reporting on the progress of the project development and address community concerns. The Bodangora Community Consultation Committee (CCC)<sup>1</sup> was formed in June 2012.

Infigen Community information sessions were held in the Comobella Hall on 2-3 September 2011. The project application was on public display in the Wellington Shire Council between 8 June-6 August 2012. The CCC will continue to meet, as required, throughout the construction and operation of the wind farm.

In Wellington Infigen engaged with the Wiradjuri Council of Elders, the Wellington Council, the Wellington Times, local businesses, and landowners of properties located within a 4-kilometre radius of the Bodangora wind farm development project.

With the support of the host landowners and many businesses and individuals, the Bodangora wind farm was approved by the NSW Planning Assessment Commission in August 2013.

## Environmental assessment

The significance of direct and indirect impacts on biodiversity was assessed during the consultation process and incorporated in project development. External specialists undertook ecological surveys to understand any environmental sensitivities and environmental impacts. The results of these investigations were provided to the NSW Office of Environment and Heritage and NSW Planning Assessment Commission.

The *Bodangora Wind Farm Project Approval*<sup>2</sup> requires Infigen to demonstrate its environmental performance during construction and operation of the wind farm by meeting the conditions in relation to aviation hazards, bird and bat monitoring, noise and vibration, bushfire risks, waste management, community consultation, and decommissioning.

## Key statistics

BODANGORA COMMUNITY CONSULTATION	
Bodangora Community Consultation Committee formed	20 June 2012
Public information days	2-3 September 2012
Public display of Project Application and Preliminary Environmental Assessment documents	8 June 2012-6 August 2012
Project approved by NSW Planning Assessment Commission	30 August 2013

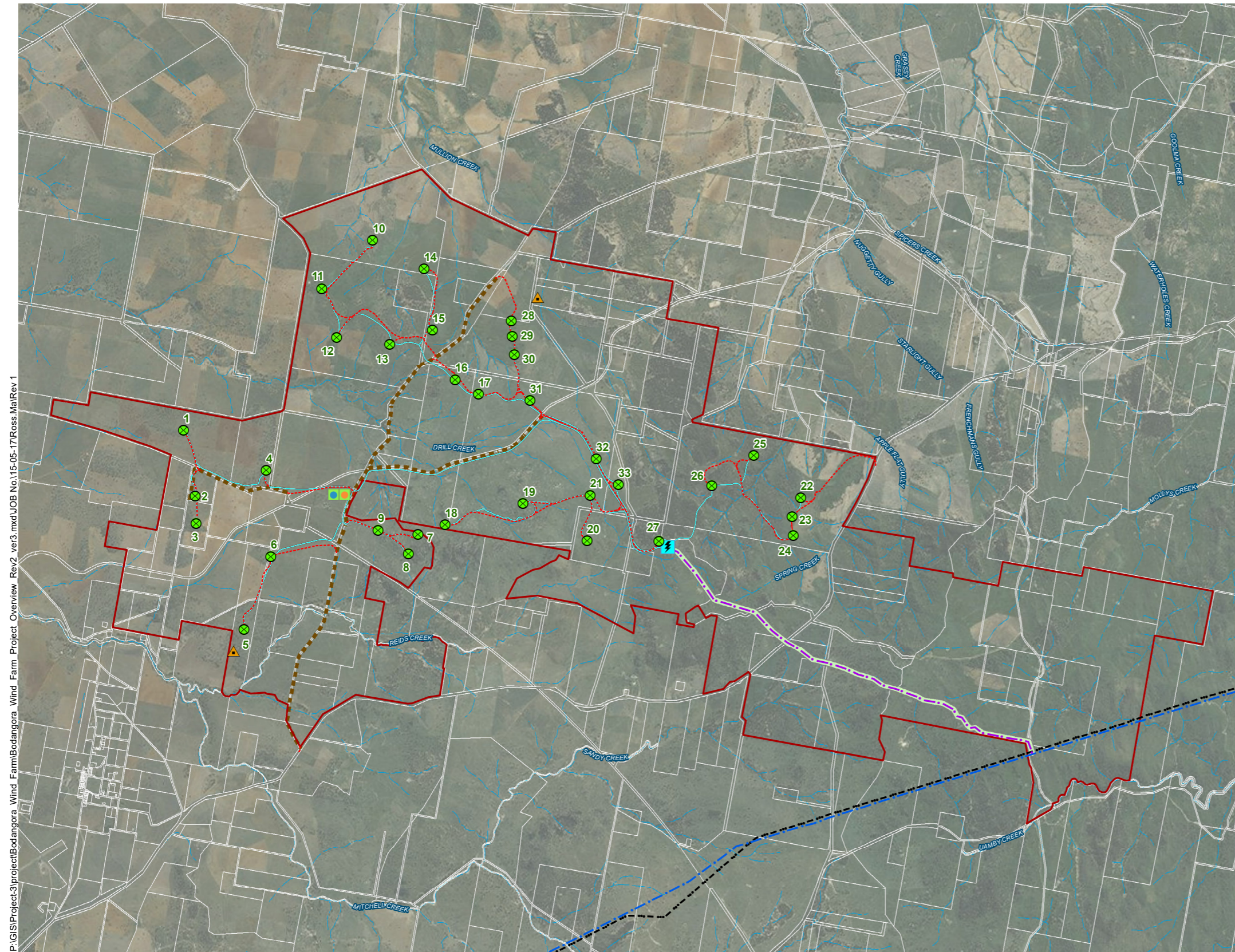
### Key Concerns and Conditions of Consent

*Wind generation technology is a non-invasive and sustainable form of electricity generation. It requires no water for cooling purposes, and is compatible with other land uses such as farming. Like other forms of infrastructure, key issues of interest influencing development and operation are: native vegetation and biodiversity, landscape and visual amenity, noise, health, property values, blade glint, and shadow flicker. When reviewing project applications, the planning authorities address community concerns in relation to these issues in their assessment. Project approvals are granted together with conditions of approval that must be followed by the wind farm operator during the life of the project. The conditions typically include requirements for environment management and rehabilitation plans, noise restriction, and mitigation of visual impacts.*

<sup>1</sup> Bodangora CCC meeting minutes and the CCC's Chairman's reports are available at: [infigenenergy.com/bodangora/community/meeting-minutes](http://infigenenergy.com/bodangora/community/meeting-minutes)

<sup>2</sup> The Bodangora wind farm project documents, including the Project Approval, are available to view on the NSW Department of Planning & Infrastructure website at the following link: [majorprojects.planning.nsw.gov.au/index.pl?action=view\\_job&job\\_id=4291](http://majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=4291)

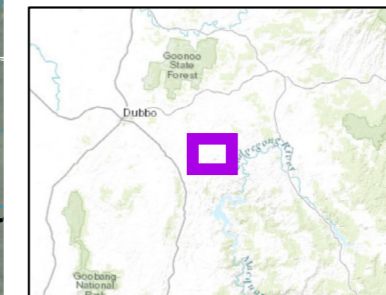
# PROJECT MAP<sup>1</sup>



## Legend

- Wind Turbine Layout
- ▲ Met Masts
- ⚡ Substation
- O&M Facility
- Site Compound
- Existing 132kV Line
- Existing 330kV Line
- Cabling
- 132kV Line
- ▭ 132kV Line 100m Route Corridor
- Access Track
- Road Upgrade
- ~ Waterways
- ▭ Project Area
- ▭ Cadastre

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1:60,000 @ A3  
 0 1,000 2,000 m

Projection: GDA 1994 MGA Zone 55

Bodangora Wind Farm  
 FIGURE : Project Overview

<sup>1</sup> Variations to the project visible on this map may occur during the wind farm construction

# PROJECT FINANCE

The Clean Energy Finance Corporation (CEFC), a provider of capital to the clean energy sector in Australia, and NORD/LB, a leading bank in Germany, are the debt providers to the project, having provided a senior loan of \$163 million. Infigen has contributed \$73 million net equity, and owns 100% of the equity interests in the Bodangora wind farm project.

Infigen secured a power purchase agreement with EnergyAustralia for 60% of the output (electricity and Large-scale Generation Certificates) from the the Bodangora wind farm. The term of the PPA is from the commercial operations date of the wind farm to 31 December 2030. The balance of output will be available for Infigen to contract to commercial and industrial customers, or to sell on the spot or wholesale market.

## About CEFC

The CEFC invests, applying commercial rigour, to increase the flow of finance into the clean energy sector. Its mission is to accelerate Australia's transformation towards a more competitive economy in a carbon constrained world, by acting as a catalyst to increase investment in emissions reduction. It does this through an investment strategy focused on cleaner power solutions, including large and small-scale solar, wind and bioenergy; and a better built environment, with investments to drive more energy efficient property, vehicles, infrastructure, and industry. The CEFC also invests with co-financiers to develop new sources of capital for the clean energy sector, including climate bonds, equity funds, aggregation facilities and other financial solutions. The CEFC operates under the Clean Energy Finance Corporation Act 2012. For more information please visit: [www.cleanenergyfinancecorp.com.au](http://www.cleanenergyfinancecorp.com.au)

## About NORD/LB

NORD/LB was a pioneer in renewable energy project finance and since mid-1990s has financed over 13 GW of renewable projects worldwide. Including Bodangora wind farm this now includes over 320 MW in Australia. NORD/LB has built up a team of 12 renewable energy finance specialists to support its clients as they enter the growing Asia-Pacific renewables market. In 2016, NORD/LB ranked the world's fourth largest Mandated Lead Arranger in Renewable Energy, with USD1.8 billion financed across 42 projects. For further information please visit: [www.nordlb.com](http://www.nordlb.com)

## Key statistics

PROJECT FINANCE	
Total project cost	~\$236 million
Construction facility amount	~\$163 million
Infigen net equity	~\$73 million
Facility providers	CEFC, NORD/LB
Tenor	17.5 years (including construction)
Interest rate	10 year \$A swap plus margin
POWER PURCHASE AGREEMENT	
Volume	60% of annual project output
Offtake party	EnergyAustralia
Tenor	From commercial operations date to 31 December 2030

*Once operational, the Bodangora wind farm is expected to produce enough energy to meet the needs of over 49,000 homes, making an important contribution to the renewable energy capacity in New South Wales. Importantly, the project will also deliver regional employment opportunities and support local communities through funding and sponsorship of local initiatives.*

Andrew Gardner  
CEFC Wind Sector Lead

*Together with the CEFC, we are proud to have been able to support Infigen and GE with their Bodangora wind farm by providing a long-term financing package, tailored to the project's partially-contracted revenue structure. NORD/LB is committed to developing its presence in the Australian energy market with renewable energy generation being at the core of our strategy.*

Olaf-Alexander Wiedemann  
CEO, NORD/LB Asia-Pacific

# CARBON FOOTPRINT & ECONOMIC BOOST

## Environmental benefits

Generation from Bodangora wind farm will avoid approximately eight million tonnes of carbon dioxide equivalent (tCO<sub>2</sub>e) emissions<sup>1</sup> in the electricity sector in Australia.

## Life cycle emissions

During the construction of the Bodangora wind farm a life-cycle assessment will be conducted to estimate indirect emissions associated with manufacturing and the delivery of wind turbine components, cables and foundation materials, and construction of the wind turbines.

Life cycle assessment of wind farm emissions can be divided into five stages:

1. Material processing (extraction and processing of raw materials)
2. Component manufacturing (towers, transformers, nacelles, rotors, generators, and blades)
3. Wind farm construction (fossil fuels burned to deliver components, pouring foundations, cabling, and assembling of turbines on site)
4. Wind farm operating (transportation and material inputs require oil-based materials, fugitive emissions associated with gas contained in circuit breakers of high-voltage switchgear)
5. Wind farm decommissioning (deconstruction, disposal of materials, and land reclamation)

The most material environmental impacts of wind farms are attributable to extraction and processing of raw materials to manufacture components, cement and cables. There are emissions associated with delivery of components and equipment to the wind farm site during construction and operation. Electricity consumption and fuel consumption of the machinery in the component manufacturing process and maintenance occurs in construction and operation phases.

## Economic benefits

The project will create a substantial number of jobs and stimulate significant economic activity in the local region. Approximately 120 direct jobs will be required during construction and seven full time jobs during the wind farm operating life.

Many additional services will be procured from local businesses to operate and maintain the wind farm, including environmental surveying, health and safety, and earth moving. Indirect economic flow-on benefits over the life of the wind farm are estimated to be approximately \$15 million<sup>2</sup> through trade with surveyors, hotels, and restaurants.

## Payments to community

Direct community payments of approximately \$3 million will be made over the course of construction and operation of the wind farm.

Under a Voluntary Planning Agreement with the Dubbo Regional Council, approximately \$2,125,000 will be contributed towards the Bodangora Community Benefit Fund to help local community groups and organisations; and towards road construction and maintenance.

A Bodangora Community Enhancement Fund will also be set up once the wind farm is operating, and will receive 2% of revenue from a designated wind turbine. The Fund will be administered by a rotating community committee.

## Key statistics

ENVIRONMENTAL AND COMMUNITY BENEFITS	
Greenhouse gas abatement	~8 million tCO <sub>2</sub> e
Employment during construction	~120 jobs
Employment during operation	~7 jobs
Direct community contributions	~\$3 million
Indirect economic benefits <sup>2</sup>	~\$15 million

*The Australian energy market is in transition from a high emissions past to a lower emissions future. Over 75% of Australia's electricity generation is supplied by coal-fired plants. Much of this capacity is due to retire over the next two decades — creating the opportunity for cleaner sources of generation.*

Ross Rolfe  
Managing Director, Infigen Energy

<sup>1</sup> Calculation includes transmission losses and average NSW emissions intensity factor of 0.9 tCO<sub>2</sub>e/MWh

<sup>2</sup> Estimation calculated using the 2012 SKM report "Benefits of Wind Energy in Australia", available at [www.cleanenergycouncil.org.au/technologies/wind-energy.html](http://www.cleanenergycouncil.org.au/technologies/wind-energy.html)

# PROJECT CONSTRUCTION MILESTONES

## Key milestones

GE and CATCON provide the engineering, procurement and construction of the Bodangora wind farm project. The construction time is approximately 18 months and full commercial operation is targeted to be in the second half of 2018.

During this time key milestones to the progress of the construction are:

1. Complete geotechnical surveys
2. Site mobilisation
3. Commence earthworks and access road construction
4. Pour first turbine foundation
5. Commence substation construction
6. Commence transmission line construction
7. First turbine delivered on site
8. Commence wind farm commissioning
9. Commercial operation

## Questions and feedback

Questions and feedback about the project can be provided to Infigen through phone, email or post at all times.

- Phone (24-hour line): 1800 917 372
- Email: [bodangora@infigenenergy.com](mailto:bodangora@infigenenergy.com)
- Post: Infigen Energy, Level 22, 56 Pitt Street, Sydney, NSW, 2000

Infigen's complaint management process involves acknowledging receipt of a complaint with the stakeholder as soon as practicable, normally within seven days; and resolution of their complaint within 30 days where possible. Any complaint not resolved within 30 days of being received shall be referred to the general counsel of Infigen.

Complaints can also be submitted to the Office of the National Wind Farm Commissioner. For more information, please visit [www.nwfc.gov.au](http://www.nwfc.gov.au) or call 1800 656 395.

## Bodangora wind farm layout

