



# Windorah solar farm a beacon of sunlight

The Windorah solar farm is Ergon Energy's first use of this innovative solar energy technology.

It consists of five mirrored dishes 13.7 metres across, each supported on a concrete base and steel mast structure with a total height of 14.5 metres.

The mirrors reflect and concentrate sunlight on to a high-capacity solar cell in a central point at the front of the dish. Each cell generates approximately 26kW of electricity, depending on season, time of day and cloud cover.

Commissioned in 2009, the solar farm has the capacity to generate up to 360,000 kilowatt hours (kWh) of electricity each year - electricity that would otherwise have required 100,000 litres of diesel to be used by the town's diesel generators. The actual output is affected by factors such as the weather and customer demand for electricity.

Different combinations of dishes will be used at different times, with some dishes being parked and not used while others are generating power.



## Why has Ergon Energy built a solar power station?

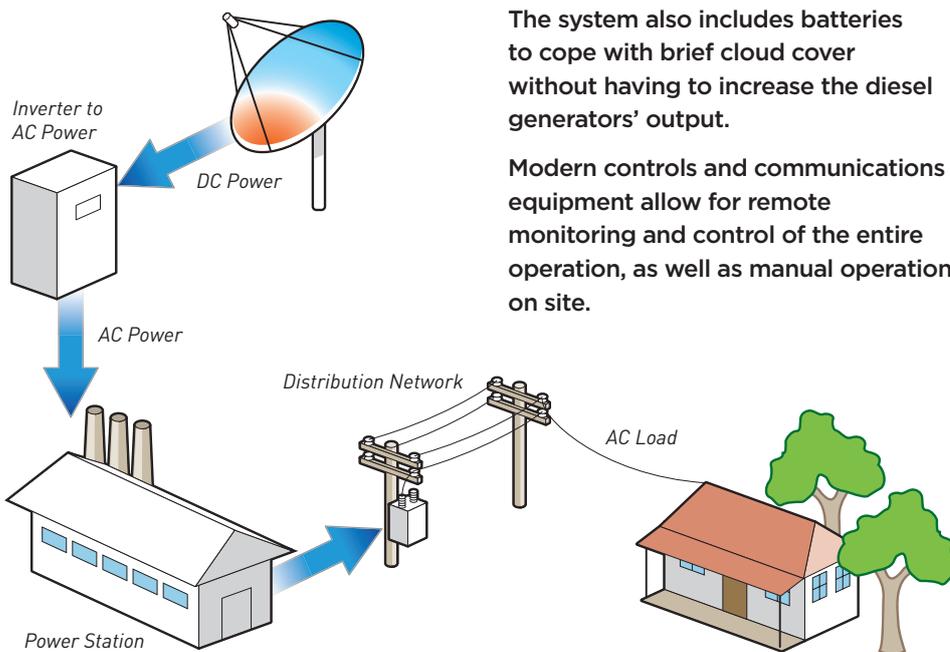
Ergon Energy is implementing viable alternatives to diesel generation for communities remote from the electricity grid.

Solar power is an obvious technology for use in western Queensland, which has very high solar radiation, with an annual average of seven to eight sunshine hours a day over nearly 200 clear days a year.

Windorah, with around 100 residents, was chosen to host the solar farm as it is the ideal size for trying out the new technology. It also has a diesel power station with technology that is able to easily interact with the solar farm.

Ergon Energy owns and operates the solar farm. It was supplied and built by Australian firm Solar Systems and Ergon Energy designed the systems to integrate the solar farm's output into the overall power distribution system.

The integration of the two sources of electricity to maximise the use of solar power is a matter of continuing research and investigation as Ergon Energy has had to develop its own technology for this project. It will continue to work on refining the technology to get the best out of the solar farm.



## How a solar farm works

The five mirror dishes are located on Ergon Energy land next to the diesel power station. They are aligned north-south and separated to avoid them shading each other in the early morning and late afternoon.

Each dish contains 112 mirrors; each mirror is 1100mm x 1100mm.

Like giant sunflowers, the dishes face and follow the sun so that as much sunlight as possible falls on the mirrors. They face the exact location of sunrise, and begin to produce electricity from first light. At the end of the day, the dishes track back around to the east ready for the next day's operation.

The mirrors concentrate the sunlight 500 times onto a panel of high-efficiency, satellite-quality photovoltaic (PV) cells which convert the sun's energy into electricity and feed it into the town's electricity network.

While the solar farm is producing power, the town's diesel generators will operate at reduced output. At night, or when there is too much cloud for the dishes to generate power, the generators will seamlessly be brought back to sufficient capacity to supply the town's needs.

The system also includes batteries to cope with brief cloud cover without having to increase the diesel generators' output.

Modern controls and communications equipment allow for remote monitoring and control of the entire operation, as well as manual operation on site.

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## The technology

The solar concentrator technology used in the farm is a new way of generating electricity directly from the sun.

The PV cells are 35 per cent efficient. That means they convert 35 per cent of the sunlight falling on them into electricity. This represents world-leading efficiency in production technology, and contrasts with 10-12 per cent operating efficiency from conventional flat-plate PV cells.

The solar dishes operate any time the sun is not obscured by cloud with the highest output in the middle of the day.

## Technical specifications

The dishes: Structure height: 14.5m  
Structure width: 13.7m

Each dish has:

- a concrete support base
- a steel mast to hold the superstructure, 2-axis drive mechanism and tracking motors
- a steel frame to support the mirrors and receiver
- 112 curved mirrors - each 1100mm x 1100mm - made out of glass, polymer and steel laminate and aligned to concentrate the sun on to the receiver solar panel at 500x
- a solar receiver, which contains the PV modules, power and cooling arrangement
- control and tracking system

Typical peak production: 130kW

Expected quantity of electricity produced: 100,000 to 360,000kWh per yr

Expected diesel reduction: 30,000 to 100,000 litres per yr

### Electrical facts per dish (nominal):

Voltage at Maximum Power Point (MPP): 265V DC @ SOC, typical 265V DC

Current at Maximum Power Point (MPP): 132A @ SOC, typical 110A

Electrical Output: 35kW DC @ SOC, typical 26kW DC

### Customer Service

13 10 46

7.00am - 6.30pm

Monday to Friday

Ergon Energy Corporation Limited ABN 50 087 646 062

### Faults only

13 22 96

24 hours a day,

7 days a week

### Life-Threatening Emergencies only

Triple Zero (000) or 13 16 70

24 hours a day, 7 days a week

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