



Birdsville Organic Rankine Cycle geothermal power station

A town often described as the most isolated in Australia and famous for its annual outback race meeting, also has another unique claim to fame. Located in the most south-western corner of Queensland, the tiny community of Birdsville is home to the only utility owned operating geothermal power station in Australia.

The station is also one of the few low-temperature geothermal stations in the world, and draws on a free-flowing bore into the Great Artesian Basin that has existed for more than 50 years.

It provides 80kW of electricity for customer use - about 30 per

cent of Birdsville township's power depending on seasonal demand. The remainder is supplied by three 300kW diesel-fueled generators.

The existing system draws water at 98 degrees celsius, up a 1.28 km deep bore from the artesian aquifer. The water is run through a heat exchanger where a fluid is evaporated into a pressurised gas which drives a screw expander and alternator to produce electricity.

The partly-cooled water is channelled into a pond for further cooling and reticulation into the town's water supply and the lagoon.



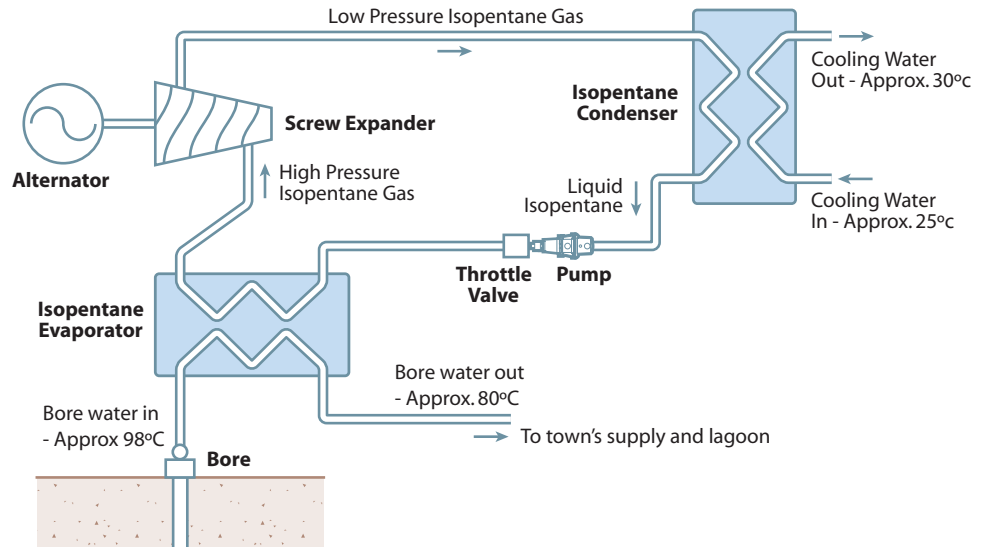
History

In the early 1960's a six inch bore was drilled to a depth of 1280 metres on the edge of Birdsville town. The pressure of the water exiting the bore was used to drive a hydro electric generator with a capacity of 8kW. The hydro power station was in operation from 1965 until 1976, when the town transferred to diesel generation.

In 1992 the Capricornia Electricity Board (CAPELEC) commissioned the existing Organic Rankine Cycle Engine (ORCE) geothermal power generator. The power plant was built by Enreco Pty Ltd of Alice Springs. The ORCE began generating power in 1992 and ran for about 9000 hours until the end of 1994. Operations were suspended as the ORCE used Freon gas which had been recognised as environmentally unfriendly.

In 1999, CAPELEC became part of Ergon Energy. The new company then partnered with Enreco and the Queensland Sustainable Energy Innovation Fund (QSEIF) to upgrade the ORCE to using Isopentane instead of Freon.

It again began producing electricity in late 2001 and ran until late 2004. Operations were suspended to enable a major upgrade to meet Australian safety and other standards. It was recommissioned into operation in December 2005.



Organic Rankine Cycle - how it works

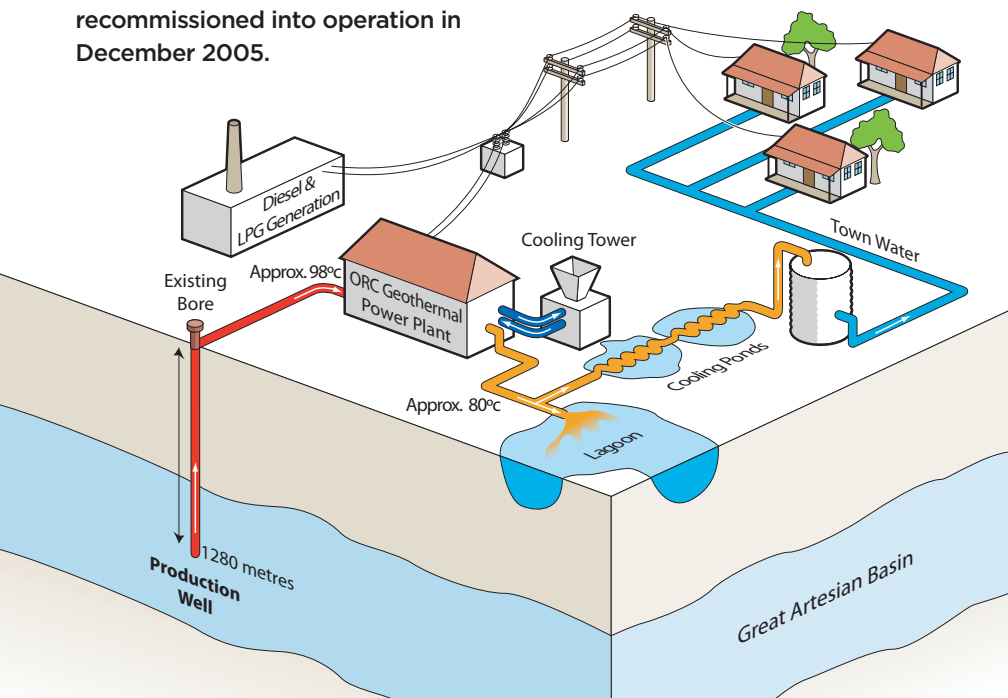
The Organic Rankine Cycle uses similar principles to a refrigeration circuit to generate energy.

At Birdsville, hot water from the bore passes into a heat exchanger-evaporator, where the heat from the water is transferred into liquid Isopentane, which has a low boiling point.

The Isopentane is thus transformed into a high-pressure gas. The pressure drives a screw expander which rotates

an alternator to produce electricity which flows into the town's electricity network.

Once the gas has passed through the screw expander it has low pressure but is still hot. It is cooled via another heat exchanger-condenser which uses water to remove the heat and condense the gas back into a liquid form ready for recycling back through the heating-power generation cycle.



Technical specifications

Power generating capacity:	120kW gross
Parasitic losses:	40kW
Net output for distribution:	80kW
Artesian bore:	Single - 1280 metres deep
Water flow in to power station:	27 l/s @ -98°C
Water flow out of power station:	27 l/s @ -80°C
Birdsville's total electricity demand:	Min. - 120kW Max. 300+kW
In an average calendar year	
The geothermal system provides:	520,116kWh
Total power generation:	1,756,009kWh
Equates to:	- 30%

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