Energy Resources in the Bulloo Shire- Hydro Power- Wind- Solar- Oil & Gas

Thargomindah's Hydro Power Plant

Thargomindah, like many western towns is situated over the Great Artesian Basin.

In 1891, drilling commenced on a bore to supply the town with water, and in 1893 a good supply was struck at a depth of 2,650 feet or 808 m, with the water coming out of the bore at a temperature of 84℃. The water in the underground Artesian Basin is pressurized. It is trapped beneath a thick layer of sandstone formed by a layer of sediment, and when a bore is drilled, the water is forced out under pressure. In 1924, it was recorded that the bore had a daily output of 670,000 gallons with a 70-foot high plume of boiling water at full force, which registered a temperature of 86℃ or 178° F. Today, its flow is about 340,000 gallons at 248kPa with a temperature of approximately 84℃.

At about the same time, 1893/1894, the local Sawmill owner, Mr Paterson is thought to have purchased an electric generator in Brisbane for the town's first electric lighting plant. This generator was operated by a steam engine to power the plant. The engine on site at the Hydro Power display is similar to the one used here.

By 1898, the Bulloo Divisional Board purchased Paterson's Plant, and as a consequence, in September 1898, Thargomindah became the first town in Australia, and the third in the world to produce hydro electric power for street lighting by using the water pressure from the Artesian Basin. The town was also the first to have reticulated water in Australia.

The Board then offered for tender, a contract to couple the Power Plant to the Artesian Bore for power generation and town use. There were two offers - one from Brisbane for 900 Pounds and one from a local contractor for 160 Pounds.

As the Board preferred to support local businesses, they accepted the offer from the local Blacksmith, a Mr Joe Hood, who was also the local Bandmaster. Joe Hood built a water wheel to the design of Mr Holmes, who was the Engineer to the Board, and it was installed in a casing made from a water tank, and was coupled to two 110 Volt Generators by a belt. The tanks originally came to Thargomindah from Bourke by Bullock Wagon with water for the town, prior to the old bore being drilled.

The original wheel, which had been made locally, was replaced by a Pelton Wheel, which was designed in Melbourne and later updated with a Triumph Pelton Wheel. These wheels were valued at 50 Pounds in 1919, and had the individual buckets directly aligned opposite each other around the wheel. The turbine produced 20 Horsepower, and approximately 15 Kilowatts of power from the two 100 Volt DC generators. A jet of water from the Artesian Bore drives the Pelton Wheel. It is connected

to dynamos by a shaft, and uses the energy of the water to provide electricity.

As the demand for electricity rises, a valve is opened to increase the speed of the Water Wheel, and when the load decreases, the water pressure is reduced.

The power was carried into the town, a distance of 1 km, by overhead wires, which was a breach of the Electric Light and Power Act of Queensland of 1896, due to the potential danger of fallen wires. In 1898, government electrician, John Hesketh, reported to Cabinet that the scheme would not be commercially viable, so a variation to the law was introduced and accepted on the 24th January 1899 allowing the use of overhead wires.

Lighting in the town was connected daily from 5.30pm to 11.30pm.

This method of power operation continued until 1951 when there were applications for house lighting by 50 people, and hydro power was replaced by diesel generators, which were in operation until 1988, after which time power was supplied from Cunnamulla via the National Grid.

The hydro electric plant ran continuously for 54 years without a breakdown. The only time that there was any type of failure was when a local operator got drunk on Saturday's and failed to turn the generators on.

The Thargomindah Artesian Hydro Power Plant is believed to be the oldest, still workable unit in Australia and possibly the world.

The new sealed Town Bore, which was commissioned in July 1999, has an average temperature of 82°C, is 820 m deep, with a flow of 5,720,000 litres per day at a force of 1,200kPa.

Windmills

Since the discovery of artesian water, windmills have played a major role in Australia's history. The ability to pump water from depth using windpower has enabled large tracts of land to be opened up to pastoralists, and created a whole new job description, the bore runner. Some of the first windmills (1876) in Australia were manufactured in Toowoomba of timber, based on designs of windmills already available in the US.

In 1893 the Zephyr mill, designed by J A (Alfred) Griffiths, was the first geared windmill manufactured in Australia. As well as being geared for easier starting, the Zephyr had a wheel on the upwind side of the tower, but was still of wooden construction. A geared windmill uses gears in the engine to increase the rotational speed of the windmill's wheel before converting the circular motion to the plunger motion. This is in contrast to a direct action mill in which the windmill's circular motion is

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converted to the plunger motion by means of a crank. One turn of the wheel converts to one complete up-and-down stroke. Direct acting mills allow for deep bores which need slower pumping and more torque, as against low lift situations where geared windmills are most efficient.

The Southern Cross windmill, as designed and named by Bert Griffiths, became one of the great successes of the Toowoomba Foundry. This mill was such a simple, inexpensive and efficient mill that, by 1910, it had almost eliminated American mills from the Australian market. In 1990, the Southern Cross Foundry in Toowoomba passed the 200,000 unit milestone.

Maintenance of windmills has always been an issue, in terms of the amount of maintenance required, and the safety of those undertaking this. In 1911 the Southern Cross mill superseded the 1903 mill and it had a patented automated oiling system which "oils itself for nine months".

Over time, further improvements to windmill design have included galvanised parts, fully enclosed working parts and internal oiling systems.

Solar Power for Pumping

Safety of workers and lack of staff to maintain windmills have long been issues in remote areas, however the development of solar power, and its' use has the potential to completely revolutionise many stations. Combine solar power with satellite technology, and it is possible to monitor water levels and switch pumps on and off remotely.

Once a very expensive technology, prices for solar equipment have dropped in recent years and will continue to do so in future. Combine the drop in equipment prices with over 200 full sun days per year, and the Outback is the ideal place to use solar power.

A typical solar powered pumping system consists of a solar panel array that powers an electric motor, which in turn powers a bore or surface pump. The water is often pumped from a bore into a storage tank that provides a gravity feed, so energy storage is not needed for these systems.

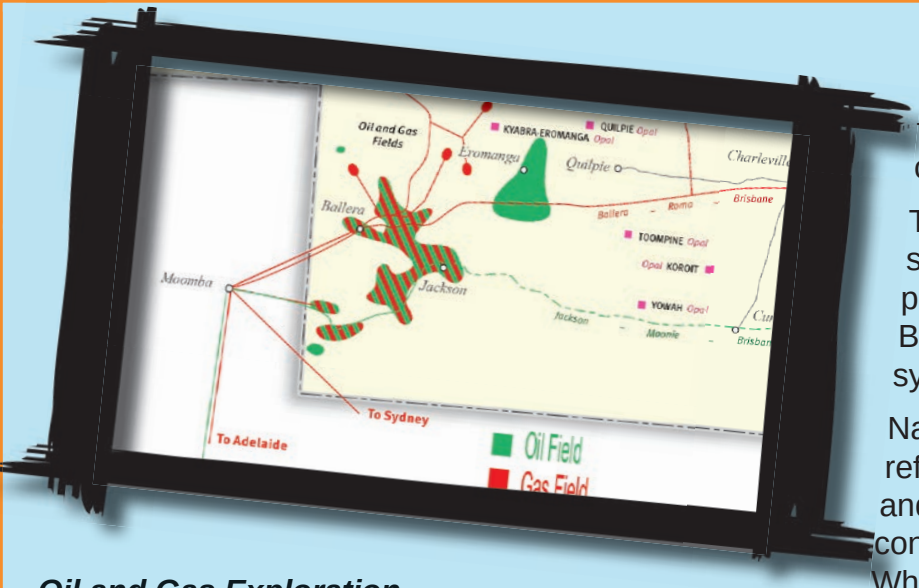
Since the need for water is greatest on hot sunny days solar technology is an obvious choice for this application. Pumping water using PV technology is simple, reliable, and requires almost no maintenance.

Solar for Domestic Power

Just north of the Bulloo Shire, in the Barcoo Shire, the town of Windorah plays host to one of Queensland's first solar farms. Through the use of energy harnessing discs, this farm is able to supply the full day time needs for the town.

In a private project, AACo has developed its' own off-grid stand-alone solar power system, to run one of their cattle stations in Outback Queensland. This solar installation reduces the costs and greenhouse gas emissions from diesel generators, which would normally run 24/7. The two 70kVA diesel generators on site were permanently shut down, saving approximately 36,000 litres of diesel fuel annually.

Solar power is not a cost effective alternative for household power for many station owners at present, however in the near future this will no longer be the case.



Oil and Gas Exploration

Santos has explored for oil and gas in the north-east of South Australia since 1954 and south-west Queensland since 1962. Today the Cooper Basin development is Australia's largest onshore resource project with an active exploration program maintained.

Santos produces sales gas, ethane, crude oil and gas liquids from the basin. Sales gas and ethane are processed at both the Moomba and Ballera plants, with liquids transported to Port Bonython for crude oil and gas liquids processing. Moomba is located close to the original oil and gas discoveries and over time activity has fanned out from Moomba to the point where there are now fields more than 100 km away.

Ballera is located in south-west Queensland, approximately 90 km east of the South Australia/ Queensland border and about 950 km north of Adelaide.

South-west Queensland crude oil is processed at Jackson and then transported to the Lytton terminal in Brisbane for distribution to customers.

The Cooper Basin contains approximately 190 gas fields and 115 oil fields currently on production. These fields contain approximately 820 producing gas wells and more than 400 producing oil wells which feed into production facilities at Moomba in South Australia and Ballera in Queensland through approximately 5,600 km of pipelines and flowlines via 15 major satellite facilities incorporating field boost compression (65 satellite compressors, 15 nodal compressors).

The Moomba facility also incorporates substantial underground storage for processed sales gas and ethane, while Ballera has a smaller underground storage system for processed sales gas.

Natural gas liquids are recovered via a refrigeration process in the Moomba plant and sent together with stabilised crude oil and condensate via pipeline to Port Bonython near Whyalla, South Australia.

Ethane is sent to Qenos in Sydney via a dedicated pipeline. Sales gas is sent to Adelaide and Sydney via pipelines from Moomba and sales gas is sent to Mt Isa and to Brisbane via pipeline.

Whilst it is not possible to visit oil or gas plants in the Bulloo Shire, information boards explaining the processes involved are to be found outside the major facilities at Jackson and Ballera.

Below: Decommissioned oil donkey at the Thargomindah Hydro Display

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