Environment

NRG Gladstone Operating Services and the Joint Venture participants are committed to protecting the environment.

The participants have taken a proactive role by investing millions of dollars in environmental programs to ensure Gladstone Power Station continues to meet or exceed World Environmental Best Practice.

Fabric filters have been fitted to remove dust from the flue gas. This dust (flyash) is then reclaimed and a significant portion is sold. Other waste products from the station are recycled where possible or are treated, monitored and controlled to avoid harmful effects on the environment.

These improvements have greatly benefited the station and the surrounding community.

As part of the environmental response strategy, NRG is participating in the Greenhouse Challenge, a voluntary program to reduce emissions of greenhouse gases.

Regular Environmental Awareness training conducted at NRG actively encourages all employees to consider energy consumption and protection of the environment in all their day-to-day activities.

Customers

The Gladstone Power Station sells most of its electricity to Boyne Smelters under a long-term contract. The station remains interconnected with the Queensland electricity grid and the remainder of the power generated is committed to the State.

Key Facts

- The station is located on an 80 hectare site, five kilometres north-west of Gladstone
- The station contributes 1,680 megawatts (6 x 280) capacity to the State grid. The Boyne Smelters consumes 60% of the station's output
- Approximately 11,000 tonnes of coal are used each day
- Construction began in March 1971 and finished in February 1982
- Commissioning dates: Unit 2 August 1976, Unit 1 August 1977, Unit 3 April 1978, Unit 4 February 1979, Unit 5 January 1981 and Unit 6 February 1982
- Each of the three chimney stacks is 153 metres high
- Concrete used in the main foundations is equal to the amount used for the bases of approximately 10,000 homes
- Steel used in construction of the station is equal to the amount used to make approximately 32,500 motor vehicles
- The station requires 245 million litres of cooling water every hour—enough to fill the Gladstone Swimming Pool every 30 seconds

Community

NRG fosters and maintains a positive relationship with the local community.

NRG's community assistance program supports and enhances the quality of life in the Gladstone area by focusing on the needs of disadvantaged groups, youth support programs, education, public safety and environmental programs. NRG aims to support programs that promote long term solutions and prevention efforts.

NRG has provided funding and resources for the development of a bicycle path to the station and been a major supporter of community events such as Clean-up Australia Day and the Gladstone Harbour Festival.

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NRG

NRG Gladstone Operating Services Pty Ltd

Ownership and Operation

The Gladstone Power Station is a world-class facility providing customers with safe, reliable, low-cost electricity. Since 1994, the station has been operated by NRG Gladstone Operating Services on behalf of Joint Venture participants Comalco Ltd (42.125%), NRG Energy Inc (37.5%), SLMA GPS Pty Ltd (8.50%), Ryowa II GPS Pty Ltd (7.125%) and YKK GPS (Queensland) Pty Ltd (4.75%).

Headquartered in Princeton, New Jersey, NRG Energy Inc is a leading competitive energy provider founded in 1989. NRG owns and operates a vriety of energy related operations worldwide.

History

The 1960s saw the beginning of a new era of decentralised settlement in Queensland.

The Gladstone Alumina Refinery and the proposed aluminium smelter, together with massive nearby mining ventures, highlighted Central Queensland's status as the state's major growth area. Gladstone's central location meant the Gladstone Power Station would become a key energy provider for the whole of Queensland.

Site investigations began in mid-1969 with preliminary earthworks starting in March 1971. The Government designated the State Electricity Commission of Queensland as the construction authority for the new station and the then Southern Electricity Authority of Queensland (SEAQ) became the constructor and supervising consultant for the project. Premier Jo Bjelke Petersen officially opened the Station in September 1976.

SEAQ was responsible for the initial operation of the station. Following the reorganisation of the State's electricity supply industry in July 1977, the Queensland Electrical Generating Board assumed total control of the station's operation and construction.

Initially, Gladstone Power Station was expected to comprise four boiler turbo generator units. In 1975, the station's capacity was increased to 1,680 megawatts by the addition of two similar units.

In October 1988 a $42 million refurbishment program improved the station's performance and availability and made it more competitive with new generation stations at Tarong and Callide 'B'.

When Comalco started planning the Boyne Island Smelter expansion in 1988 they sought a secure source of power and competitively-priced energy. To provide certainty of cost and security of supply, the option to purchase Gladstone Power Station was floated.

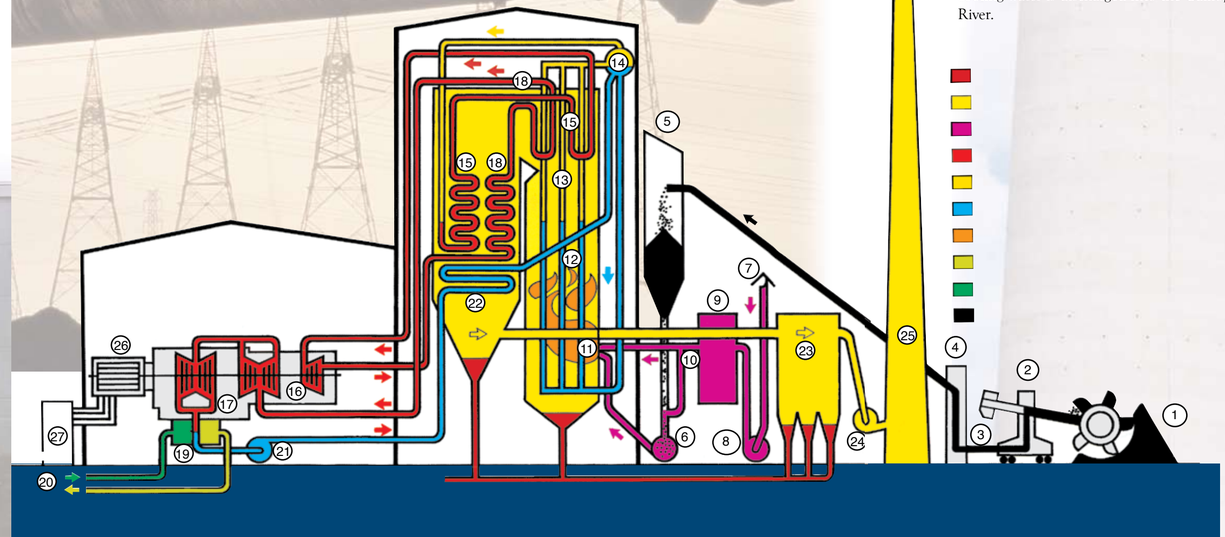
Following extensive and detailed negotiations the sale of the station to the GPS Joint Venture was finalised in March 1994 and was a precondition to a commitment from certain Joint Venture associates to build a third aluminium potline at the Boyne Island Smelter at a cost of over $900 million.

Adding the third potline at Boyne Island has ensured the Gladstone Power Station will continue to play a vital role in the growth of the Gladstone region for many years to come.

NRG Gladstone Operating Services Pty Ltd

How Electricity is Made

1. **Coal** railed to power station and stockpiled
2. **Stacker reclaimer** loads coal onto conveyor
3. **Conveyor**
4. **Coal transfer tower**
5. **Bunkers** feed coal into pulverising mills
6. **Pulverising mills** grind coal into a fine powder.
7. **Air inlet**
8. The **forced draught fan** forces air through preheaters
9. **Air preheaters**
10. **Hot air duct** where hot air is directed to burners or pulverising mills
11. **Burners**
12. **Furnace** where coal mixes with hot air and burns at high temperatures
13. **Tubes** inside the boiler. Heat produced in the boiler raises the temperature of water circulating in the tubes to produce steam
14. **Steam drum** where steam passes through at high pressure (16,890 kilopascals)
15. Steam is heated further in **super-heater**
16. Steam is fed through **high pressure cylinder** of the steam turbine at 541°C. Steam is returned to the reheater then passed through the intermediate and low pressure cylinders of the turbine
17. **Intermediate and low pressure cylinders**
18. **Reheater**
19. Steam cooled in **condenser.**
20. **Sea water** from Auckland Inlet used to cool steam in the condenser
21. **Feed pump** pumps condensed steam (condensate) through economiser
22. Condensate pumped through **economiser** back to steam drum (14) to be reheated
23. Combustion gases pass through the air preheaters to the **fabric filters**
24. **Induced draught fan** forces cleaned gases into the main flue and out through the 153 metre chimney
25. **Chimney**
26. **Rotating alternator** generates electricity
27. **Generator transformer** converts electricity to high voltage for connection to state power grid



Plant Description

Gladstone Power Station is Queensland's largest, with a generating capacity of 1,680 megawatts. The station was sited to take advantage of seawater for cooling and to be near Central Queensland's vast coal reserves.

The station's six, 280 megawatt turbogenerators each output 16,200 volts to transformers that convert the power to a level suitable for transmission at 132,000 or 275,000 volts.

Coal Supply

Each year approximately four million tonnes of coal are railed to the station from coal-fields in Central Queensland.

Coal is stockpiled after unloading, then reclaimed from the stockpiles by two stacker reclaimers at a rate of 800 tonnes an hour, or via a covered slot bunker system that provides dry coal storage for extended operation in wet weather. Sufficient coal is stockpiled on site to run the station at maximum output for several weeks.

Cooling Water Supply

The station requires 245 million litres of cooling water every hour—enough to fill the Gladstone swimming pool every thirty seconds. Saltwater pumped from Auckland Inlet passes through the station's condensers to condense spent steam to water for repeated use in the boilers. The cooling water is discharged into the Calliope River.

Stacks

The 153 metre chimney stacks provide a natural draught that assists in the removal of the boiler flue gas. Two boilers are connected to each of the three stacks. Water reservoirs, for emergency fire-fighting, are located in the base of the stacks.

Control System

Gladstone Power Station's complex operations are controlled by modern computer systems, allowing all operations to be monitored in a single control room.

Boilers

Coal is burned in the boilers to generate steam from water at high pressure and temperatures.

Each of Gladstone's six generating units has been designed with high dynamic response, to enable the unit to change load quickly.

Turbogenerators

Each of the six 280 megawatt turbogenerators weighs about 700 tonnes and is compromised of three steam turbines directly coupled to a generator. Hydrogen is used to cool the generators which spin at 3,000 revolutions a minute.