

**THERMAL POWER STATION
LOCATED IN CENTRAL QUEENSLAND**

Stanwell Power Station

In addition, Stanwell is an active participant in a range of research and development projects and has dedicated substantial resources towards investigating clean coal technologies, including integrated gasification combined cycle and geosequestration.

In 2005 Stanwell made a \$2 million commitment to support land care initiatives in Central Queensland. This commitment has provided support for:

- a joint venture with Forestry Plantations Queensland to establish a 99-hectare hardwood plantation in the buffer lands bordering Stanwell Power Station,
- Rockhampton Regional Council Street and Park Tree Master Plan which focuses on major street and park tree planting in Rockhampton, and
- the Gracemere Wetlands Restoration Project which improved the habitat and environmental values at Gracemere.

In December 1996 Stanwell Power Station officially gazetted a 640-hectare parcel of land as a nature refuge to provide sanctuary for wildlife. This was the first nature refuge formally set aside by an industrial organisation in Queensland.

> Community

The power station provides significant employment and business opportunities within the Central Queensland region. Stanwell encourages the procurement of local goods and services. As a member of the Central Queensland community, Stanwell understands that local investment supports business development and promotes the availability of a skilled workforce in the region.

The corporation supports regional development initiatives through a dedicated program of sponsorships, education programs, and other community relations activities.

> Fuel supply

The station's boilers burn low sulphur black coal sourced from various Central Queensland mines. The coal is transported to Stanwell Power Station by rail. When operating at full load, Stanwell Power Station burns approximately four million tonnes of coal each year.

> Water supply

Water is essential for producing steam to drive the power station's turbines. It is also essential for cooling the station. Stanwell Power Station sources its water supply from the Fitzroy River.

> Stanwell Energy Park

Stanwell Energy Park is a 3,800 hectare industrial development site adjacent to Stanwell Power Station. Stanwell Energy Park has the potential to become one of Australia's largest industrial precincts, ideally suited for energy intensive industries. Within Stanwell Energy Park, large-scale industries can benefit from cost-competitive and reliable supply of power, water, steam, gas, coal, transport, and other industry essential services.



About Stanwell

Stanwell is a Queensland Government owned corporation with an energy portfolio comprising coal and hydro facilities throughout Queensland. Currently, Stanwell trades more than 30 per cent of the State's electricity requirements.

Statistics

Capacity	1,400 MW
No. of Generating Units	4
Powered Equivalent	14 million x 100 watt light bulbs
Commissioned	1993-1996

> About the project

With a capacity to generate 1,400 megawatts (MW), Stanwell Power Station is the corporation's major operating site and one of the largest industrial developments undertaken in Queensland. Stanwell Power Station supplies reliable electricity for distribution to customers via the state's high voltage electricity grid, assisting industrial growth in Queensland.

The power station is highly automated and achieves both an efficient, effective workplace and high asset performance through the application of innovative technology and organisational design.

These innovations have been recognised both nationally and internationally. Stanwell Power Station currently holds a world record for 1,073 days of continuous operation on Unit 4.

> Size and scale

Stanwell Power Station became fully operational in 1996 and is located on 1,600 hectares of land. Construction of the station took seven years, with infrastructure built to withstand cyclonic winds.

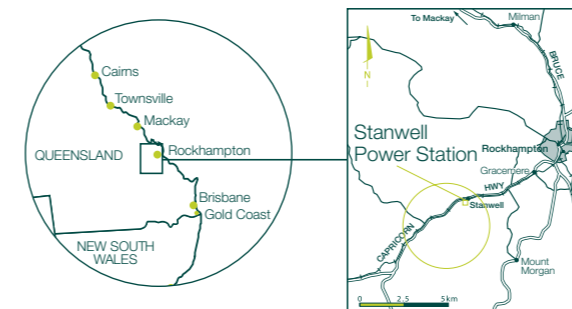
There are four generating units at Stanwell Power Station, each with a capacity of 350 MW. The four units and their components are housed in a 20-storey boiler house and a turbine hall the length of three football fields.

The station features a 210-metre-high chimney stack which was constructed using approximately 750,000 bricks. Two of the station's most impressive structures are the cooling towers. Each tower stands 130 metres high (about the height of a 40-storey building) and is 100 metres in diameter. Fifteen thousand cubic metres of concrete was poured for each tower. The plume seen coming from the cooling towers is steam, lost through evaporation during the water cooling process.

> Environment

Stanwell Power Station operates under an Environmental Management System compliant with the international standard ISO 14001. As a major power generator, Stanwell Power Station is progressing a number of initiatives to reduce emissions and to provide long-term environmental benefits to both Stanwell and the community, including the:

- upgrade of turbine equipment to reduce greenhouse gas emissions,
- reduction of raw water consumption, and
- recycling of existing on-site water resources.



Stanwell Power Station is located 22 kilometres west of Rockhampton in Central Queensland.

> How electricity is made at Stanwell Power Station



4 Pulverisers

The pulverisers grind the coal into a fine powder. Inside the pulverisers, which are sometimes called mills, there are steel balls the size of large beach balls which roll around to crush the coal. There are six pulverisers for each unit.

3 Boiler Bunker and Coal Feeder

Each of the boiler bunkers holds approximately 350 tonnes of coal. The coal feeder regulates the flow of coal from the bunker to the pulveriser.

2 Coal Stockpile

The coal is stockpiled until required in the boiler bunkers. When operating at full load, Stanwell Power Station burns about four million tonnes of coal a year.

1 Train

Low sulphur black coal from various Central Queensland mines is transported via rail to the station.

14 Cooling Towers

There are two 130-metre-high cooling towers—both designed to withstand cyclonic winds. After circulating in the condenser, the cooling water, which is now about 10 degrees hotter, flows back to the cooling tower. This water is cooled by air and then falls back into the bottom of the cooling tower to be recycled through the condenser again. The absorbed heat from the water is released into the atmosphere. The plume from the cooling towers is just water vapour (or steam) lost through evaporation during the cooling process.

13 Generator Transformer

The last step in the electricity generation process is the generator transformer. It increases the electricity voltage from the stator from 20,000 V to 275,000 V. This allows the power to be transported efficiently through the state-wide electricity grid, and to you as a customer, at the end of the distribution system.

12 Generator

Each unit has a generator. The main components of the generator are the rotor and the stator. The turbine drives the rotor while the stator remains still. An electric current is applied which creates a magnetic field – similar to the workings of an electric magnet. The rotation of the magnetic field causes an alternating electric current to flow in the windings of the stator and out to the generator transformer **13**.

11 Condenser

The used steam is condensed to water and this water is pumped back to the boiler and the process starts again. Heat from the condensing steam is removed by other recycled water which is returned to the cooling tower **14** for cooling.

10 Turbine

As super heated steam passes from the boiler through the turbine, the steam pressure drops from about 17,000 kilopascal (kPa) to close to a perfect vacuum of about 12 kPa absolute. This causes the turbine to rotate at 3,000 revolutions per minute.

9 High Concentration Slurry Disposal

The particles collected by the electrostatic precipitators are conveyed to silos, where they are mixed with water and ash. This creates a slurry which is pumped to the ash disposal area. The slurry dries hard like cement and can be walked on within several days. Low amounts of water in the ash means that the risk of water table contamination is much reduced. An ongoing land rehabilitation program is being carried out on the disposal area.

8 Chimney

The gases that pass through the electrostatic precipitators are discharged up the 210-metre-high chimney. There are four flues within the chimney—one for each unit.

7 Electrostatic Precipitators

The gases, ash, and particles from the burnt coal are drawn through the electrostatic precipitators. There are two precipitators per unit. They use large plates to collect the ash, dust, and fine particles out of the gas. The particles are attracted to the plates, then collected in hoppers and are carried away by a conveyor belt.

6 Superheater

Steam from the boiler is further heated in the superheater and passes through high pressure pipework to the turbine. It is hot enough (541°C) to make the steam pipe glow a dull red. High temperatures are used to make the process more efficient.

5 Boiler

Each unit has a boiler which is a large room with boiler tubing attached to its inside walls. There is about 200 km of tubing inside each boiler. If the boiler tubing from all four units was laid flat it would almost stretch from Brisbane to Mackay. Coal from the pulverisers is mixed with warm air and is burnt inside the boiler. The burning coal heats the water flowing through the boiler tubes. When the water temperature gets high enough it converts to steam.