

## Swanbank ash builds bridges (and roads)

*'We're recycling ash, a by-product from the operation of the Swanbank Power Station, to be used in the \$2.5 billion Ipswich Motorway Upgrade Project.*

*This is a great opportunity to reuse a material, such as fly ash, which would normally have to be stored as a waste.*

*Our ash is being mixed with crusher dust and cement to make a solid fill underneath the road.*

*We're supplying Swanbank ash for the Dinmore to Goodna stretch of the upgrade, and in the first two months of the project, more than 1,000 cubic metres of ash was used by the construction team.*

*It's great to know that our ash will be literally supporting the construction of an eight kilometre, eight-lane motorway, including bridges and interchanges, which is expected to carry more than 120,000 vehicles every day.'*

**Darryl Myers, Project Officer, Swanbank Power Station**





# Portfolio performance

## Progress 2008/2009

- Completed a \$70 million dual overhaul as part of a mid-life refurbishment program at Callide B Power Station.
- Achieved milestone of 64 days of continuous generation at Kogan Creek Power Station.
- Completed Operations and Maintenance training strategy review across all sites.
- Completed *Value Plus*, a company-wide review to identify areas to optimise value and focus spending to achieve greater returns.

CS Energy's business strength lies in its diverse portfolio of operating plant, spread over four locations. Using a mix of coal, natural gas, coal seam methane and landfill gas, it has ten generators supplying electricity to the National Electricity Market, allowing it to remain competitive and flexible in the marketplace. It also supplies energy to the North West Minerals Province which is isolated from the national grid.

CS Energy's portfolio recorded a reliability of 90.8 per cent and sent out 16,675 gigawatt hours in 2008/2009, up 8.1 per cent on the previous year.

A change in operating regime at Callide C Power Station saw an improvement in reliability, but boiler technical issues remain. Performance at Swanbank B Power Station was affected by boiler reheater tube failures. Kogan Creek A Power Station coal and ash systems need some further modifications to achieve required reliability.

Long-term asset management for CS Energy's portfolio is carried out by the Portfolio Services group. Based in Brisbane, the team has expertise in engineering, environment, chemistry and asset and overhaul management. The Brisbane-based team works in partnership with technical staff at the sites.

Drawing this expertise together, rather than replicating resources at each of the sites, is a recent development for CS Energy and, during 2008/2009, the team successfully completed its first major challenge, a five-week dual outage at Callide B Power Station. Part of the mid-life refurbishment of the station, the outage was completed on budget.

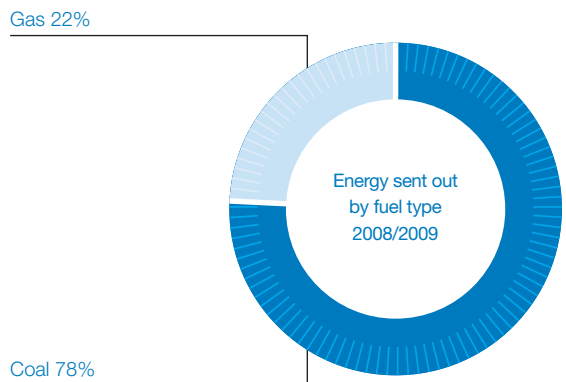
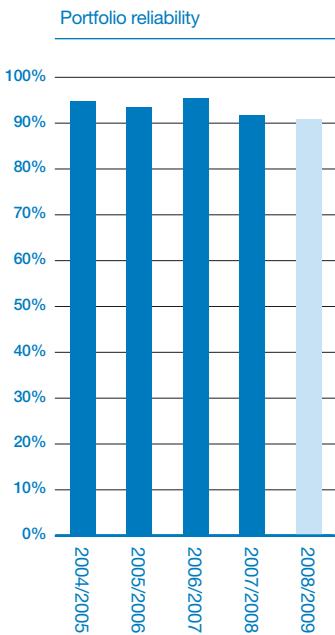
A major operational review, *Value Plus*, was completed during the year, examining the effectiveness of asset management and maintenance processes across the business. Three objectives resulted from the review:

- reducing the portfolio forced outage factor to below 2 per cent;
- reducing the time and cost of overhauls by 20 per cent; and
- reducing the unit cost of production.

Programs of work have been developed and commenced to deliver these outcomes and, during 2009/2010, project teams will work with Operations and Portfolio Services staff to implement strategies across the business.



Brad Jones, Overhaul Co-ordinator and Jody Holland, Overhaul Planner, oversaw a busy overhaul schedule at Mica Creek Power Station during the year.



# Kogan Creek A Power Station

The Company's newest generating unit, Kogan Creek Power Station, successfully completed its first full year of operation, generating 4,800 gigawatt hours and achieving 87.5 per cent reliability. In June 2009, the team celebrated a station record of 64 days of continuous generation at full capacity.

Commissioned in 2007, this base load, coal-fired station sets an Australian benchmark for environmental performance and innovative design. Kogan Creek A Power Station is dry-cooled, which means it uses one-tenth of the water of a similar wet-cooled power station. Generating up to 750 megawatts from a single boiler, turbine and generator, it is the largest single-unit generating plant in Australia.

While the station is still experiencing some technical issues with its coal and ash handling systems, the Company expects station reliability to increase as system improvements are progressively implemented and site operational staff become more familiar with the new plant.

The major project currently under way at the station is the design and construction of a new ash pipeline system. The construction tender process will commence in July 2009, and the pipeline is expected to be installed and operating by early 2010.

This system will transport ash from the station to the mine, where it will be encapsulated within mine spoil as part of the mine rehabilitation process. Currently, ash is taken to an interim ash storage area until the construction of the first ash cell at the Kogan Creek Mine is completed.

During 2008/2009, the majority of the construction of the ash cell was completed, with about 2.5 million cubic metres of overburden put in place to form the cell walls.

The station now employs more than 40 staff, as well as 30 maintenance contractors. A new site manager, Ivan Mapp, was appointed in January 2009 and changes to the site's organisational structure were implemented during the year, as operating requirements were more accurately determined.

In the coming year, Kogan Creek A Power Station will prepare for an outage in August 2009, to ensure the unit is reliable through to its next overhaul and, in particular, over the summer period 2009/2010.

The adjacent Kogan Creek Mine operated efficiently during the 2008/2009 year, delivering 2.4 million tonnes of high-quality, low-sulphur black coal to meet the station's demand. The coal is delivered using a four-kilometre conveyor at an average rate of 8,000 tonnes per day. The mine is operated by Golding Contractors and throughout the year, the mine's workforce number remained stable at approximately 52 personnel, and achieved an excellent environmental and safety record.

A focus for the mine team during 2008/2009 was understanding how the coal impacts the station's performance. Work was completed on blending the coal from the coal seams to produce a uniform product to improve handleability, boiler performance and ash volumes. Rehabilitation work also started on the out-of-pit overburden dump, using topsoil reclaimed from pre-mining activities. This topsoil will be seeded with a mixture of grasses in the 2009/2010 year, when weather and soil conditions are favourable.



## Looking forward 2009/2010

- Prepare for first major overhaul in August 2010.
- Complete construction and commission the ash disposal system to the mine.
- Manage the scraper chain ash volume to maintain station load factors.

# Swanbank Power Station

The aging Swanbank B Power Station is currently the focus of a life extension review, the outcome of which is expected to be presented to the CS Energy Board early in the 2009/2010 financial year. A refurbishment program is being considered and, if economic, would see the station operate beyond the current expected closure date of 2011.

This year, Swanbank B achieved a reliability of 81.4 per cent, which is down on the previous year's result of 94.7 per cent. This outcome was due to flooding as a result of heavy rain in November 2008, combined with age-related equipment failures and technical challenges following the introduction of recycled water at the station.

The station has been operating on recycled water since September 2007, which is piped to site from the Queensland Government's advanced waste water treatment plant at Bundamba. The introduction of recycled water has meant the station stopped taking water from the Wivenhoe Dam, alleviating pressure on the region's main water supply. However, recycled water, combined with other drought management measures, such as increasing the number of times water is recycled in the cooling system, resulted in unforeseen scaling in the condensers. This resulted in unplanned outages to clean the condensers using high-pressure equipment.

Swanbank E continues to operate consistently, recording a reliability result of 96 per cent for 2008/2009, which is an increase from the previous year, due

partly to the replacement of defective turbine blades during a major outage in 2007/2008.

In October 2008, the Department of Environment and Resources Management (DERM) approved a Transitional Environmental Program, which included the use of a low-height bund and a dry reclaim stockpile in the Swanbank ash dam area to increase the site's ash storage capacity. It is actively pursuing a number of reuse opportunities for the ash from the station, including the upgrade of the Ipswich Motorway and other local infrastructure projects, to recycle the ash.

In July 2008, Swanbank Power Station was the subject of national media attention when nine Greenpeace protestors cut the perimeter fence and entered the site, and four scaled the Swanbank B station south chimney, staying up the chimney overnight. There was no impact on generation and the protestors were brought down safely under the charge of local police.

Expansion of the Swanbank site, with the proposed development of the gas-fired Swanbank F Power Project, is still under review. While the project team progresses plans for the construction of a new gas turbine on the old Swanbank A site, the Company continues to seek additional gas supplies for both Swanbank E and to underwrite the Swanbank F development. For more information on its gas activities, please see page 42 of this report. Further information about the Swanbank F Power Project is on page 43.



## Looking forward 2009/2010

- Complete the business case to extend the life of Swanbank B beyond 2011.
- Proactively seek beneficial uses of recycled ash in various infrastructure projects.
- Finalise gas arrangements for Swanbank E and to underwrite the new gas-fired Swanbank F Power Project.

# Callide Power Station

A \$200 million mid-life refit program is currently underway at Callide B Power Station, which will see the station's operational life extended to at least 2028.

The five-year upgrade program commenced in October 2007, and major components of the program were completed in June 2009 with the successful dual outage of both B station units – the largest outage on site since B station was constructed in 1988.

More than 500 contractors and up to 100 CS Energy site and corporate staff were involved in the dual overhaul, which resulted in more than 270,000 hours of work on site. The project was the culmination of several years planning as well as extensive off-site design and manufacturing work.

The dual outage enabled work to be carried out on shared plant, as well as the Unit B2 control system, turbine, condenser, generator and boiler.

The Callide B mid-life refit program will finish in 2010, when final work is carried out at Unit B1.

The Callide B Power Station recorded 89.7 per cent reliability for 2008/2009, reflecting the two-month outage and the station's need for these mid-life works.

The Callide C Power Station, which is owned in a joint venture with InterGen, recorded a reliability of 86.5 per cent, slightly up from 81.9 per cent last year. This result is largely due to work undertaken to help rectify ongoing technical issues with the Callide C boilers.

Since commissioning in 2001, Callide C's boiler manufacturer, IHI, maintained responsibility for some boiler components. In 2007/2008, agreement was reached on these latent defect claims and as a consequence, CS Energy and InterGen accepted responsibility for the asset. Since then, action has been taken to help resolve these issues and boost the station's reliability. One of the initiatives implemented this year is to operate the station at its nominal 405 megawatts rather than its maximum capacity of 450 megawatts. The joint venture owners are expecting the station's reliability to improve further under this operating regime.

Callide A Power Station will be a leading demonstration of near-zero emission electricity generation from coal using oxyfuel combustion and geosequestration.

This \$206 million project was officially opened in November 2008, with the first work being carried out on the 30 megawatt A4 unit. CS Energy, through the Callide Power Station, is providing the Operations and Maintenance support for the Callide Oxyfuel Project. More information about this significant clean coal project can be found on page 39.

Callide Power Station also welcomed a new site manager during the year, Kevin Harney, who took up his post in August 2008.

Water is a major issue for the Central Queensland region. However the dam levels at the Station's main water supply, Awoonga Dam, remain relatively stable at 55 per cent capacity. Water is piped from Awoonga Dam to the Callide Dam for use by the station and the town. The current Awoonga Dam level represents about three years of water for the station and the town. It continues to monitor these levels and work with local agencies to ensure responsible use of this precious resource.



In conjunction with the local shire council and Queensland Treasury Corporation carbon accounting specialists, the station conducted a carbon footprint of its non-operating buildings. This report contained several recommendations to reduce its footprint, and the station will be carrying out these initiatives in the coming year.

## Looking forward 2009/2010

- Finalise extension of the agreement for ongoing coal supply with Anglo Coal.
- Conduct a major overhaul on Unit C3, to further improve Callide C's reliability.
- Complete work on the pyrite extraction from coal mills at Callide C.
- Continue to work with Callide Oxyfuel Project joint venture partners in the next stage of this significant demonstration project.

# Mica Creek Power Station

Mica Creek Power Station continues to perform strongly, recording a system reliability figure of 99.9 per cent for 2008/2009, up slightly from the previous year's figure of 99.6 per cent.

The station underwent several planned maintenance outages during the year to ensure the plant continues to supply reliable electricity to the townships of Mount Isa and Cloncurry, and to industrial customers in the North West Minerals Province.

This year, however, the demand for electricity in the region decreased, as global economic conditions affected some of Mica Creek's major industrial customers.

Six weeks of monsoonal rains and flooding in January 2009 and February 2009 also impacted on the station's performance and caused some plant outages and load shedding. Flooding of local rivers isolated the station and caused staffing challenges. The rain brought relief in terms of water supply for the station, as dam levels had fallen to 11 per cent and severe water rationing was being planned.

A major, multiple-unit trip at the Mica Creek Power Station on the afternoon of 24 December 2008 caused blackouts in the townships of Mount Isa and Cloncurry and the loss of supply to some of its industrial customers. This trip was caused by two lightning strikes on the transmission line, which sent a fault through the system, causing two generators to trip. CS Energy personnel were able to restore all tripped units after only a couple of hours.

The Company has identified some structural concrete degradation in

A Station, and has sought specialist advice to repair and monitor several areas in the station. This year it spent more than \$650,000 to repair high-priority areas and will continue with a planned program of repairs in the coming year.

During 2008/2009, a significant overhaul on A5 saw the replacement and upgrade of major parts in this unit. An inspection outage on C station was also successfully completed, and a major overhaul on A6 commenced in June 2009.

CS Energy is still investigating the redevelopment of Mica Creek, which will both extend the life of the station and increase its efficiency. During 2008/2009, the Queensland Government sponsored an inquiry to determine a least-cost solution for the supply of electricity to the region.

CS Energy supports the review and provided information for analysis, and it anticipates a formal tender process will take place in the coming year to market-test a range of possible options to deliver long-term power to the North West Minerals Province. This decision-making process necessarily delays any decision on the Mica Creek Power Station Renewal Project and, while CS Energy is participating in this process, it continues to pursue alternative gas supplies to improve the overall economics of local generation in Mount Isa.



## Looking forward 2009/2010

- Continue the planned program of repair to A station concrete degradation.
- Complete a major inspection of B1 in August 2009.
- Provide development and skill improvement opportunities to retain staff.

# Resources

CS Energy uses black coal, natural gas, coal seam methane (CSM) and landfill gas to fuel its power station portfolio.

In the last ten years, CS Energy has increased the proportion of gas-fired generation in its portfolio, and it looks to invest in the latest technology for both coal and gas-fired plant. The Company continues to make its current plant as efficient as possible, and sustain its business growth through low-emission technology and the responsible use of its natural resources.

Water is the other key input in electricity generation and the Company uses recycled water, raw water and town water in its operations. Each site has water management strategies in place to maximise the efficient use of this precious resource and the success of these strategies is gauged through water use intensity, which shows how much water is used per unit of energy sent out.

Using coal to generate electricity creates the by-product fly ash. Normally stored in ash dams, fly ash can also be recycled for use in concrete manufacturing, soil enhancement or as fill. In 2008/2009, around 128,487 tonnes of ash from Callide and Swanbank power stations were sold for beneficial reuse.

## Making the most of black coal

Each of CS Energy's three coal-fired power stations uses black coal, supplied through long-term agreements.

Black coal for the Swanbank Power Station is supplied by either truck or rail from the Acland open cut mine, on the Darling Downs, which is owned and operated by New Hope Coal Australia Limited.

Callide Power Station is supplied with black coal by conveyor belt from the adjacent Callide Coalfields under a contract with a subsidiary of Anglo Coal Australia, which owns and operates the Callide Mine.

Coal for Kogan Creek A Power Station is supplied by a four kilometre conveyor belt from the adjacent Kogan Mine, which is owned by the CS Energy group and mined by Golding Contractors under long-term contract. As a contingency, the New Hope mine at Acland is able to deliver limited quantities of coal by truck to Kogan Creek A Power Station, if needed.

## Tracking water use across the portfolio

CS Energy measures its water use by looking at total consumption, as well as water use intensity, which shows how many megalitres of water it uses per gigawatt hour of energy sent out (ML/GWhso).

This year its total water consumption was 24,201, a 4.4 per cent decrease on last year's figure of 25,325 megalitres. A full year of operation at Kogan Creek A Power Station was responsible for a slight increase in water usage, however this was balanced by lower generation at Callide B and C power stations due to several months of outages at these sites.

CS Energy's water intensity has also decreased this year, due to the introduction of the dry-cooled Kogan Creek A Power Station. The Company recorded 1.45 ML/GWhso in 2008/2009, a decrease from 1.64 ML/GWhso recorded in 2007/2008.

The majority of water used at the Callide Power Station comes from the Gladstone Area Water Board's Awoonga Dam, and is piped to the Callide Dam to minimise evaporation. The station has an additional minor allocation from the Callide Dam, which also provides the Banana Shire with drinking water. Despite recent rain in Queensland, the Callide Valley remains in drought, and CS Energy is currently investigating opportunities to dry-cool the Callide Plant to help reduce the pressure on water supplies in the region.

Swanbank Power Station continues to source the majority of its water from the Western Corridor Recycled Water Project. The station also has an agreement to supplement this supply with small quantities of water from Berry's Lagoon, when it is available after rain. Water from the Wivenhoe system is no longer needed, releasing over 20,000 megalitres a year back into the Brisbane area water supply.

Kogan Creek Power Station has a dry-cooling system and consumes only 1,500 megalitres of water a year at full load, approximately one-tenth the consumption of a similarly sized conventionally cooled plant. The station's water is supplied from local bores.

Mica Creek Power Station receives water from the Leichhardt supply system and Rifle Creek Dam. The station cycles its cooling water up to 12 times through the power station and provides its effluent water for reuse by Xstrata mining operations. This year, the station supplied 310.2 megalitres of water to the mine, down slightly on last year's figure of 381.5 megalitres, reflecting water conservation measures on site, outages of the steam units and reduced customer demand.

## Reusing ash to reduce resource consumption

Ash (fly ash and furnace ash) is a by-product of coal combustion, and can be stored in ash dams or recycled. Fly ash is most commonly recycled and used as a cement replacement in concrete, which has an added benefit of reducing the amount of greenhouse gas associated with this industry.

Recycled ash can also be used in the reclamation of mining voids, as a soil improver, an adsorbent for oil waste removal, or as fill in large civil engineering projects such as highway embankments.

In 2008/2009, CS Energy recycled 128,487 tonnes of ash from the Callide and Swanbank power stations. This is a 20 per cent increase from the amount recycled in 2007/2008. CS Energy currently supplies ash to Cement Australia, Global Cement, Renewed Resources and Transpacific from these stations. At Kogan Creek A Power Station, the Company is currently designing an ash pipeline system which will take the ash from the power station back to the coal mine to fill the mine voids and enable mine rehabilitation.

CS Energy is a member of the Ash Development Association of Australia, which promotes the beneficial use of power station fly ash.

## Increasing gas-fired generation

CS Energy has a long-term strategy of reducing its portfolio carbon intensity through fuel diversity. Its expanding gas portfolio, and activities in upstream gas supply, underpin this business objective.

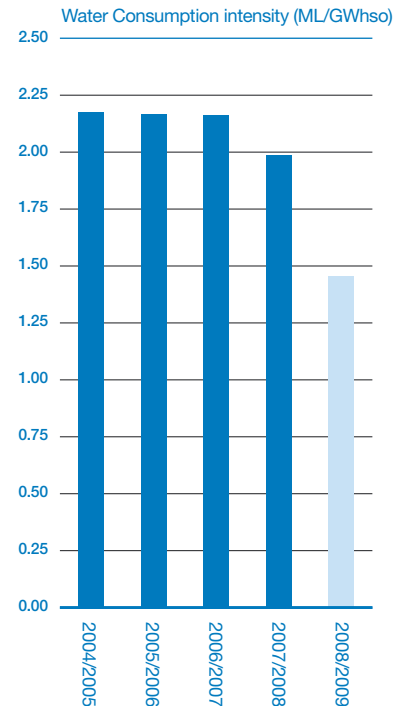
The Company has gas purchase agreements in place to supply existing gas-fired plant at Mica Creek and Swanbank E, but the long-term business strategy depends on securing additional gas for future success.

Mica Creek Power Station is fuelled by gas from Santos' south west Queensland fields, via the Carpentaria Pipeline. In south east Queensland, CS Energy sources gas for Swanbank E from Santos' Scotia CSM field, Queensland Gas Company's Berwyndale South CSM field, Mosaic's conventional gas field near Wallumbilla and the CS Energy/Arrow Energy CSM joint venture at Kogan North.

CS Energy's strategy of combining long-term gas agreements with investment positions in natural gas and CSM development fields will provide a diverse mix of supply and reduce supply risk. Gas development work in 2008/2009 focused on:

- Arrow Energy's Kogan North CSM field, near Chinchilla;
- Mosaic Oil's operations in the Surat-Bowen basin;
- Queensland Gas Company's Berwyndale CSM field;
- Santos' Scotia CSM field near Roma; and
- Metgasco's Casino CSM field in northern New South Wales.

For more information on gas developments, see page 42 of this report and the CS Energy website. [👉](#)



Bores 3.1%

Western Corridor 24.7%

Dams 72.2%

