

# Coal is an important and valuable resource in eastern Australia.



The NSW Government is taking the lead in low emissions coal technologies as part of a commitment to reduce greenhouse gas emissions by 60% by 2050.



**In New South Wales, coal production is valued at \$19.3 billion (2008-09). In 2008-09, 103.3 million tonnes of coal worth an estimated \$17.1 billion were exported from NSW.**

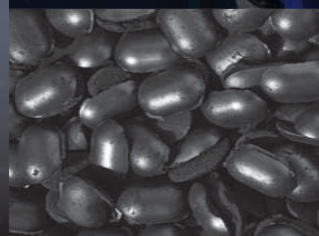
**In addition, cheap and reliable electricity generated from NSW coal-fired power stations underpins Australia's largest domestic market.**

**This form of power generation currently emits 38 per cent of NSW total greenhouse gas emissions of ~165 million tonnes.**

**The NSW Government is active in reducing these carbon dioxide (CO<sub>2</sub>) emissions through a number of initiatives including investing in carbon capture and storage (CCS) and other clean coal technologies.**

**The government established the NSW Clean Coal Council which provides strategic advice on how best to support clean coal research and development (R&D) in NSW.**

**Through the \$100 million Clean Coal Fund, the NSW Government is supporting a diverse range of CCS projects aimed at driving the commercialisation of low emissions coal technologies.**



# New South Wales takes the lead in clean coal technologies



Projects supported by the \$100\* million Clean Coal Fund

## New South Wales CCS Demonstration Project

A \$150 million project is planned to demonstrate post-combustion capture, transport and permanent geological storage of CO<sub>2</sub> (up to 100,000 tonnes of CO<sub>2</sub> per annum in a saline aquifer by 2014) from a black coal power station.

NSW Government, Commonwealth Government and Australian Coal Association Low Emission Technology (ACALET) have signed a funding agreement (\$28.3m) with Delta Electricity for a 'Development and Approvals' Stage (Stage 1) for the Delta Demonstration Project.

A separate CO<sub>2</sub> Capture Pilot Plant (3,000 t. yr) has been operating for two years, a joint venture between Delta Electricity and the Commonwealth Scientific and Research Organisation (CSIRO).

This pilot project has recently received additional R&D funding (*see overleaf*). The pilot project results will feed into the Delta CCS Demonstration Project.

## NSW Storage Capacity Project

In a joint venture with the Commonwealth Government and ACALET, NSW is undertaking a \$54 million regional stratigraphic drilling program to:

- Identify storage for the NSW CCS Demonstration Project; and
- Identify high potential reservoirs for long term CO<sub>2</sub> storage.

## \$13 million R&D Program

Ten projects have been funded as part of a comprehensive \$13 million R&D program to drive technological developments in low emissions coal technologies that cover the full breadth of coal application in NSW including (*see overleaf*):

*\*All monetary amounts are in Australian dollars*

For more information go to the website below or contact:

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New South Wales Clean Coal Council

[www.dpi.nsw.gov.au/minerals/resources/low-emissions-coal](http://www.dpi.nsw.gov.au/minerals/resources/low-emissions-coal)



**Industry &  
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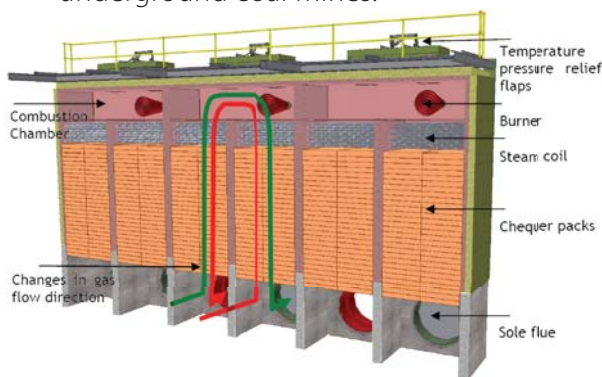
# Projects supported by the NSW Clean Coal Fund's \$13 million R&D program



## Fugitive methane emissions from coal mines

### Greenhouse Abatement Facility Demonstration

Centennial (Coal) Mandalong Pty Ltd will field-trial an exciting new technology termed a VAM-RAB (Ventilation Air Methane Regenerative After Burner) that promises to oxidise > 99% of fugitive methane emissions escaping from underground coal mines.

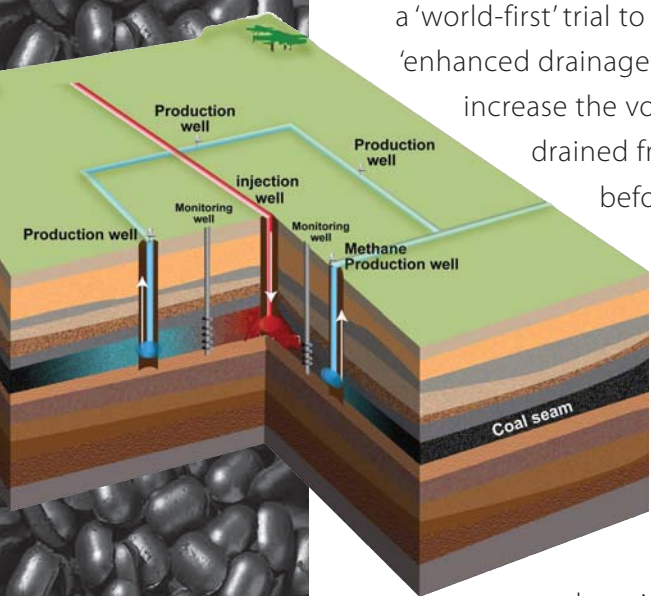


### Reducing Fugitive Emissions from Open Cut Coal Mines

The CSIRO Centre for Environment, Social and Economic Research will undertake a 'world-first' trial to confirm whether 'enhanced drainage' techniques can

increase the volume of methane gas drained from a NSW coal mine before open-cut mining commences. The

drained greenhouse gas can be used for power generation rather than being uncontrollably released into the atmosphere during the mining process.



## Coal combustion and electricity generation efficiency

### Development and Optimisation of the Direct Carbon Fuel Cell

The University of Newcastle will research and develop a Direct Carbon Fuel Cell. This technology has the capacity to generate electricity with much higher thermal efficiencies (~70-80%) than engines and turbines (~35-55%), which would result in less fuel and hence fewer greenhouse gas emissions per unit of electricity generated. In addition, the fuel cell emissions are almost entirely pure CO<sub>2</sub> which are therefore ready for storage.

### A Simple Heat Engine for Sustainable Coal Generation

ourSUN Pty Ltd will undertake an independent techno-economic assessment to confirm the potential of their provisionally patented engine designed to generate electricity with high thermal efficiency (~65-69%). Given this efficiency, the Combined Brayton Rankine Cycle Mark II engine would generate relatively low emissions electricity.

### Diesel Engine Development

UCC Energy Pty Ltd will further develop their process of producing Ultra Clean Coal by chemically removing most of coal's impurities and ash. The end product will be trialled as a coal-water fuel for firing in a highly efficient diesel engine to generate electricity and hence

# Projects supported by the NSW Clean Coal Fund's \$13 million R&D program



could provide an alternative pathway to low emissions power based on coal.

## Chemical Looping Based Air Separation Technology

The University of Newcastle's Priority Research Centre for Energy will undertake research into a novel way of chemically separating out oxygen from air for use in oxy-fuel combustion and IGCC. The Chemical Looping Air Separation process is expected to greatly reduce the greenhouse gas emissions generated during existing air separation processes and could open the door to the uptake of cheaper, low emissions electricity generation.

## Post-combustion capture of CO<sub>2</sub>

### Further Development of an Ammonia Capture Process

CSIRO Energy Technology will receive funding support to continue a field-based pilot study into the use of an aqueous ammonia process to capture CO<sub>2</sub> emitted in the flue gas from NSW coal-fired power stations. The funds will assist in upgrading the pilot plant and moving it from Delta Electricity's Munmorah Power Station to Vales Point Power Station so that this critical research program can continue.

### Site Trials of Novel CO<sub>2</sub> Capture Technology

CSIRO Coal Technology will investigate the ability of a new type of carbon fibre composite material to capture CO<sub>2</sub> from a Delta Electricity Power Station. The

effect of real flue gas on the operation and performance of an adsorption test unit will be tested. Information on the technology's commercial application of will also be generated.

## Storage of captured CO<sub>2</sub>

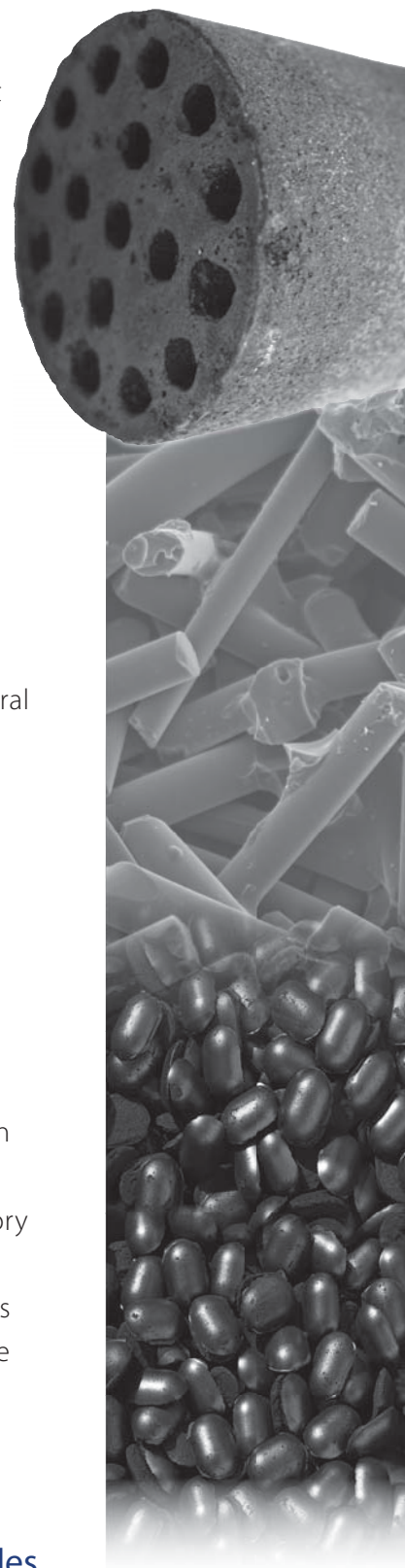
### Permanent Large Scale CO<sub>2</sub> Storage by Mineral Carbonation

The GreenMag Group and University of Newcastle's Priority Research Centre for Energy will undertake a 'world-first' program of building and operating a mineral carbonation plant. Mineral carbonation takes advantage of a natural process whereby CO<sub>2</sub> is captured in mineral deposits resulting in it being permanently stored in rocks.

## Public consultation and community awareness

### Managing Clean Coal Technology Project Risk

The University of Newcastle's Australian Institute of Social Inclusion and Wellbeing will use Actor-Network Theory to gain an understanding of how the general public perceives developments in low emissions coal technologies. The study will assist in developing ways for government and industry to raise public awareness and to consult more effectively.



New South Wales  
Clean Coal Council