

# case study

## Australia

Illawarra Coal & WestVamp - Mining for the Future

**BHP Billiton Illawarra Coal is serious about reducing greenhouse gas emissions and has a long history of successfully using waste coal mine methane gas for power generation.**



The Company's A\$30 million investment in the West Cliff Ventilation Air Methane Project (WestVAMP) takes its commitment even further. Rolled out with the support of a A\$6 million contribution from the Australian Greenhouse Office Greenhouse Gas Abatement Program, WestVAMP is capable of mitigating a significant portion of greenhouse gas emissions from operations, generating electricity at the same time.

## What is Methane?

Methane is released from coal seams and the surrounding strata as a result of natural erosion or faulting and also due to anthropogenic mining activities. When either surface or underground mining of a coal seam takes place, methane is constantly released during the process of extracting the coal. These emissions can cause problems from a safety perspective, due the explosive properties of the gas, and environmentally due to methane's role as a greenhouse gas.

Methane is one of the five non-carbon dioxide GHGs covered by the Kyoto Protocol. The Intergovernmental Panel on Climate Change indicates that the global warming potential (GWP) of methane is around 25 times greater than that of CO<sub>2</sub>. This means that for a given volume of emitted methane, the resulting global warming effect will be 25 times stronger over one hundred years than for the same volume of CO<sub>2</sub>.

## Keeping the Mine Safe

For almost two decades Illawarra Coal has been capturing and utilising methane gas which, for safety reasons, is drained from coal seams prior to mining. The gas has been piped to gas engine power plants near the townships of Appin and Douglas Park since 1995, reducing the Company's annual greenhouse gas emissions by 2.5 million tonnes and producing enough energy to power around 60,000 homes each year.

However, not all the methane associated with the coal seam is able to be drained and small percentages of methane are present in ventilation air which is exhausted from the underground operations.

To address this, BHP Billiton Illawarra Coal, in partnership with international emission control specialist MEGTEC Systems AB, established a pilot plant at its Appin site to trial the use of VOCSIDIZER® technology to use methane in the ventilation air for electricity generation. The success of this pilot led to the establishment of WestVAMP



WestVAMP power plant received the Australian Institute of Energy's Excellence in Energy Award in 2007

which has a wide potential application for global methane abatement and power generation.

## WestVAMP Project

WestVAMP, a new type of power plant, uses the extremely dilute methane in the ventilation air from West Cliff mine to generate electricity. It uses up to 20% of the mine ventilation air to achieve a further reduction in greenhouse gas emissions for BHP Billiton Illawarra Coal of 250,000 tonnes of carbon dioxide equivalent every year – the same as eliminating emissions from 45,000 cars each year or producing enough electricity for 20,000 homes.

Methane concentrations in mine ventilation air are typically less than 1.25% by volume, which is not freely combustible with conventional combustion systems.

## How does it Work?

The technology is based on the VOCSIDIZER® technology pioneered by MEGTEC Systems AB. It works by merging two conventional technologies - emission control technology and a steam cycle power plant. The boiler process is based on flameless, single bed,

regenerative oxidation in a unit called the VOCSIDIZER®. WestVAMP converts low concentration methane to carbon dioxide and water vapour through an oxidation, or flameless combustion process. High efficiency heat exchangers recover the large levels of thermal energy released to produce high quality steam. This steam is used to drive a conventional steam turbine – generating 5MW of electricity for use within the West Cliff mine.

## Reducing GHG Emissions

Illawarra Coal's WestVAMP and its previous initiatives reduce the amount of methane that would otherwise have been vented directly to the atmosphere. By reducing GHG emissions by about 2.5 million tonnes of carbon dioxide equivalent each year during the past five years, Illawarra Coal provides the largest single contribution to greenhouse gas emission reduction in New South Wales.

WestVAMP has been recognised with three awards, winning the Australian Institute of Energy's Excellence in Energy Award in 2007; followed by the US EPA's recognition of Technology Provider MEGTEC Systems AB for the Project with its Climate Protection Award; and most recently receiving the BHP Billiton HSEC Excellence Award in the Environment Category ■