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ANSWERS TO QUESTIONS ON NOTICE
Innovation, Industry, Science and Research Portfolio
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AGENCY/DEPARTMENT: COMMONWEALTH SCIENTIFIC AND INDUSTRIAL RESEARCH ORGANISATION

TOPIC: Coal gasification

REFERENCE: Written Question–Senator Eggleston

QUESTION No.: BI-56

What is the estimated potential in Australia for underground coal gasification? Where are the likely sites around the country for these sites? What are the major problems with the technology as it stands right now? (Weekend Australian 10/4/2010).

ANSWER
No detailed analysis of all Australian coal resources has been conducted to determine the potential application of underground coal gasification (UCG) in Australia. A World Energy Council (2007) report estimated that 44 billion tonnes of coal in Australia could be suitable for UCG. This figure seems to be based on an estimated proportion of Australia's recorded coal deposits that are not suitable for conventional underground mining, rather than a rigorous resource analysis. Stewart (1984) indicated approximately 2.8 billion tonnes of coal were suitable in the existing mining areas of the Newcastle Coal Measures (NSW), Ipswich Coal Field (QLD), Collie Coal Field (WA) and Leigh Creek Coal Field (SA). Notably, this neglects resources in Surat, Galilee and Tarong Basins (Qld), Walloway and Arckaringa Basin (SA), Gippsland Basin (Vic), Perth Basin (WA) and off-shore deposits (NSW) that have either active projects or proposed operations by one or more companies that have plans to expand UCG operations. Exploration by industry is ongoing and proven resource statements are regularly issued to market.

Current small-scale operations are located near Chinchilla (Linc Energy), Dalby (Carbon Energy) and Kingaroy (Cougar Energy) in Queensland with the operators planning for expansion at these sites. Linc Energy has also announced development of another site near Orroroo in South Australia. These existing operators and other companies, such as Metrocoal, Liberty Resources, Clean Global Energy, Eneabba Gas and Central Petroleum, have been investigating sites throughout Central and South-Eastern Queensland, Gippsland, Hill River (north of Perth) and Central Australia. Future Energie has also applied for exploration permits for offshore coal stretching from north of Newcastle to near Wollongong.

A CSIRO review of underground coal gasification (Beath, 2009) concluded that the main risks associated with UCG technology are:

Poor site selection–For example, areas with sensitive groundwater supplies or where subsidence impacts could affect surface structures. Industries facing similar risk profiles (e.g. underground coal mining) have established regulations and techniques to determine and mitigate likely impacts.

This report outlines preferred UCG site characteristics to inform industry and help achieve optimum UCG operational performance while minimising environmental impacts.

Excessive operating pressure – High pressures can result in product gas being forced into the surrounding coal seam and the overlying strata, with some components being potentially toxic or environmentally damaging. Guidelines have been proposed by the industry to minimise the likelihood of this occurring. Key to reducing this risk is the installation of reliable monitoring and control equipment.

Well failures – Both a safety and environmental risk due to high temperature and pressure gas leakage. Well designs must meet Australian and state regulations, but reliable construction quality depends on the development of skills in the local drilling industry.

Undetected geological structures – Geological surveying has limits on accuracy that could result in operations being affected by unidentified faults or other anomalies, potentially leading to unexpected process behaviour. The selection of suitable UCG pilot plant infrastructure for specific sites can reduce this risk by identifying and addressing geological structure issues at more frequent intervals during the drilling process.

Residual organics – The UCG process generates a range of organic compounds and some of these are likely to remain after operations have ceased. Verification that undesirable compounds will not migrate away from the site into useful groundwater resources will depend on hydrological modelling. Hydrological modelling software is available for predicting groundwater flow; however sites distant from useful groundwater will be preferred until confidence in the techniques for avoiding these problems grows.

References:

Stewart, I. McC. (1984) *In-Situ Gasification of Coal for Australia*, NERDDP/EG/84/297, National Energy Research, Development and Demonstration Program (Australia).

World Energy Council (2007) "2007 Survey of Energy Resources", World Energy Council (http://www.worldenergy.org/publications/survey_of_energy_resources_2007/623.asp (Free access) Accessed 18/06/2010)

Beath, AC (2009) *Review of Underground Coal Gasification*, ACARP Project Report C18007. (http://www.acarp.com.au/abstracts.aspx?repId=C18007 (Purchase required)