

MINING & MINERALS

THE FUTURE OF UNDERGROUND COAL GASIFICATION IN SOUTH AFRICA

South Africa has approximately 242 billion gross tons in situ coal resources and reserves of which approximately 66 billion tons of coal resources and reserves are deemed to be recoverable. Twenty five percent of this is uneconomical to mine by means of conventional mining methods due to the depth of the coal seams. The use of underground coal gasification (UCG) technology to extract synthetic gas from coal, deemed to be uneconomical to mine could be another game changer for the South African economy, (similar to the potential of shale gas), through the optimised use of South Africa's coal resources and reserves to ensure national energy security.

UCG, (*Overview of the South African Coal Value Chain, October 2011*) is a technology where coal is ignited underground with a controlled flow of oxidant gas, (such as air, enriched air etc.) and water. It converts the coal into synthetic gas, of which the gas is directly used as fuel, co-fired with other fuels such as natural gas, or coal and can power gas turbines for electricity generation. UCG technology appears to offer great economic opportunities for South Africa to exploit large quantities of coal resources as the technique enables:

- lower operating and implementation costs than conventional coal mines;
- high efficiency extraction of energy from coal without the need for conventional mining operations, stockpiling, reclaiming and transportation, or the generation of mining waste from overburden, discard and ash;
- reduced underground infrastructure and elimination of below ground personnel which would otherwise be unsafe, un-minable or uneconomical to mine; and
- carbon capture options.

Despite all the possible advantages UCG may have for South Africa's energy security and ensuring compliance with South Africa's undertaking to reduce its carbon emissions, there is a lot of uncertainty with the regulatory requirements for the extraction of UCG gas. The Department of Mineral Resources (Regulator), has attempted to clarify the position of the extraction of syngas utilising UCG technology by the insertion of the word "gasification" after the word "underground" as part of the definition of "mine" in the 2014 Amendment Bill to the Mineral and Petroleum Resources Development Act (MPRDA), as amended. The Amendment Bill further intends to introduce a definition for gasification that reads "*a process applied to non-mined coal seams, using injection and production wells drilled from the surface, which enables the coal to be converted in situ into gas.*"

It is recognized that there are fundamental differences between what constitutes a mining operation for minerals and what constitutes a production operation for gas or oil in terms of the MPRDA. Any person holding a mining right is not entitled to conduct a production operation for gas, as gas in the wide sense constitutes petroleum in terms of the MPRDA. The extraction of coalbed methane gas from coal

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seams constitutes a production operation in terms of the MPRDA (and not mining), requiring a production right and not a mining right. The definition of petroleum specifically excludes coal, bituminous shale or other stratified deposits which can be obtained by destructive distillation or gas arising from marsh or other surface deposits from petroleum.

The intention of the Regulator, however, appears to be that the extraction of syngas utilising UCG technology constitutes a mining technique as opposed to a production technique for Oil & Gas. This will be in line with the position held in other countries such as Canada and Australia. The Regulator has also specifically excluded UCG from the Technical Regulations released by the Minister of Mineral Resources for exploration and production operations issued on 3 June 2015. Despite this there may well be a need for specific technical regulations relating to UCG to be issued as government departments such as Water Affairs also deems syngas as an unconventional gas, (similar to coal-bed methane and shale gas).

Regulatory clarity and certainty for the commercial development of UCG projects is required on a number of aspects relating to the extraction of UCG gas, namely:

- the licensing framework;
- environmental framework (ie possible contamination of water through fractured rocks [similar to shale gas]);
- water use licenses and technical (production wells, design requirements, equipment etc.); and
- resource and reserve valuation standards for funding requirements by investors or bankers.

By creating a clear regulatory framework for the exploitation of UCG gas (similar to shale gas) in South Africa, the government will encourage investors to invest in the realisation of commercially viable UCG projects, bringing South Africa a step closer to realising some of its economic objectives set out in the National Development Plan. There are already signs that the government recognizes the potential of delivering much needed energy security. Therefore, exploiting uneconomic coal reserves through the use of UCG technology and specifically including UCG technology in the Request for Information for the Design of Gas to Power Programme could prove to be viable. This is a positive step, however, a number of other principle legislation, including subordinate legislation regulating UCG needs to be streamlined in order to ensure that these projects become a reality.

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