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Fact Sheet

CLEAN COAL TECHNOLOGIES

The burning of fossil fuels, including coal, is regarded by most scientists as a major contributor to the climate change phenomenon. The widespread availability and relative low cost of coal, compared to other energy sources, means that the world cannot abruptly suspend its dependence on coal without dramatically affecting quality of life. Burning coal for energy is thus realistically not going to change in the near future – the International Energy Association projects that coal will still be the single biggest primary energy source in 2030, accounting for 35% of all the electricity generated in the world.

The world's relative dependence on coal does not mean that the role of coal burning in global climate change will continue unchecked. A variety of options, referred to as "Clean Coal Technologies", are being researched and implemented throughout the world, with South Africa and Eskom making significant contributions to this field.

What are Clean Coal Technologies?
Clean Coal Technologies (CCTs) use coal for power generation in more environmentally acceptable and economically viable ways. They include processes that can be applied before, during and after utilisation. There are two basic approaches when it comes to developing Clean Coal Technologies. The first is to develop more thermally efficient systems that use less coal to generate the same amount of power, with an associated reduction in emissions. This has the advantage of reducing the extent of flue gas cleaning required. The other is to enhance and develop new methods to effectively clean the emissions in an affordable manner.

A number of Clean Coal Technologies have already been developed - some can be retrofitted, whilst others involve new plants. Eskom's research programme includes work on both combustion-related technologies and gasification.

1. Combustion technologies

- ***Super-critical pulverised fuel***

This involves increasing the steam temperature and pressure in a conventional pulverised fuel plant. "Pulverised fuel" refers to the coal being crushed to a fine powder before being blown into the boiler, resulting in immediate combustion.

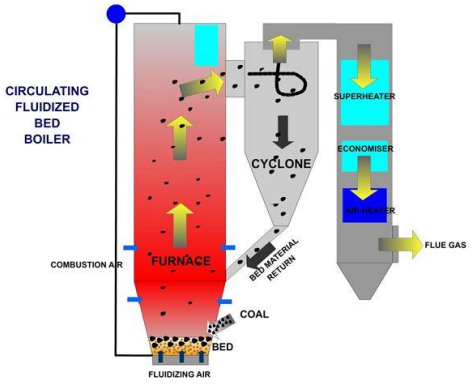
Although South African power stations are of sub-critical design, the preferred option for new stations being built is that of super-critical. The current efficiency of Eskom's plants is between 33% and 36%. With super-critical design, an improvement of 2,5% can be gained, resulting in less coal being burnt and less emissions being released.

- ***Fluidised Bed Combustion (FBC)***

FBC involves the fluidisation and combustion of a bed of coal at high temperature. The addition of a sorbent to the coal is an effective way of mitigating the environmental impacts of the process. During the combustion process, the sorbent "scrubs" the gases that are released.

A number of FBC units are currently operating in the USA, Europe and China, but the technology is currently not economically viable for South Africa to adopt. The immaturity of the technology and lack of economies of scale would result in capital costs approximately 20% higher than those of conventional power plants. Adding to the challenges of FBC in the South African context is the fact that limestone and dolomite, the sorbents used in the combustion process, are not widely available.

The advantages of FBC include being able to burn extremely low grade coal and using significantly less water in the control of emissions when compared to conventional pulverised fuel plants. Despite its gas cleaning properties, however, FBC is not considered to be a true CCT as it is less efficient that an equivalent pulverised fuel plant.

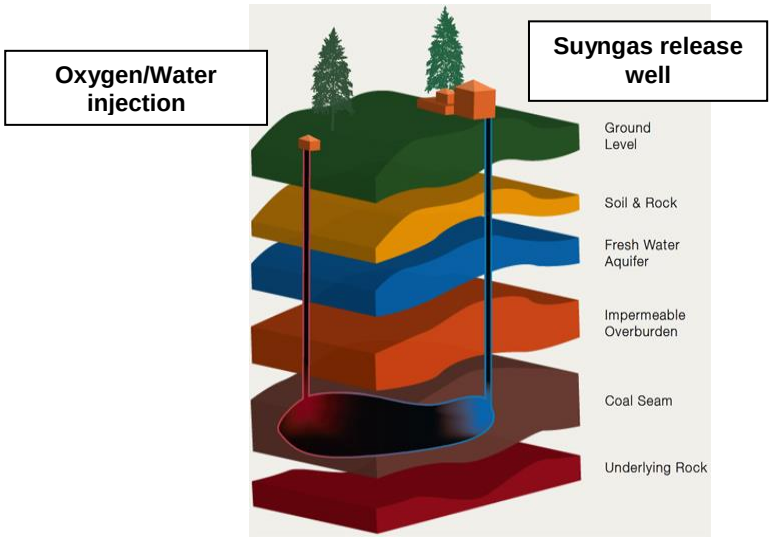


2. Gasification technologies

By gasifying coal, the energy in it can be more efficiently used than in combusting the solid coal. Another advantage of this technology is that the gas can be pumped to where it is needed – a significantly more efficient and cost-effective mode of transport than truck or rail. The gas can also be applied more widely. This technology can be used for power generation in highly efficient gas turbines or fuel cells.

- ***Underground Coal Gasification (UCG)***

UCG involves the in situ, or underground, gasification of a coal seam and the extraction of the synthetic gas, which is then pumped to where it is to be used.



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