

SA COAL RESERVES, AFTER THE ACT

FOSSIL FUEL FOUNDATION INDABA 2004

10th SOUTHERN AFRICAN CONFERENCE ON COAL SCIENCE AND TECHNOLOGY

10 – 12 NOVEMBER 2004, Indaba Hotel, Fourways, Randburg, Gauteng

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South Africa

ABSTRACT

South Africa is a country of many unique occurrences. One of these is the fact that the coal industry, one of the strongest and most efficient in the world, comprises few but very large producers, generating the bulk of the total output, while small mines, although relatively large in numbers, cannot contribute much in quantity or quality to the total production. As a consequence of the new *Mineral and Petroleum Resources Development Act*, which has also been promulgated inter alia, to promote BEE, with a carefully designed formula for promotion and assistance from public and private sectors, the structure of the industry is about to change. The changes will comprise:

- ⇒ optimisation of the recovery of the best quality remaining reserves, i.e. those within the Central Coal Basin (Witbank, Highveld Ermelo and South Rand Coalfields), where most of the coal-related infrastructure is located, and
- ⇒ opening of a number of small new collieries that will provide products for the local as well export markets.

These changes will take place in the milieu of the induction and implementation of clean coal technologies, to control and reduce solid, liquid and gaseous emissions associated with combustion processes and to improve boilers operating efficiency.

The benefits and pitfalls of domestic coal supply, as thermal energy and various other applications are discussed, as well as the potential impact that the diversification of energy sources may have on main coal users.

INTRODUCTION

Due to the low cost and relative abundance of coal in South Africa, it provides about 75% of its primary energy requirements. More than 90% of electricity in South Africa is generated from coal-fired thermal power stations. Furthermore, after gold and the platinum group metals, coal is the third largest mineral export earner in South Africa today. However, the status of the country's coal reserves has not recently been quantified.

One of the prevailing ideas is that coal reserves are abundant and will last for another 250 years. The opposite belief and concern, is that the better reserves in the central basin have been totally depleted and what is left is only low-quality small-pockets too difficult to extract economically. As a result, the coal industry will cease to exist in about 20 years. The real picture is not yet known. The last comprehensive study on reserves and resources was completed 22 years ago, and the new review will only be ready in 12 – 18 months. According to the available information it is clear that although the country doesn't have 250 years of reserves, there is plenty of good quality coal in the central basin that can still be exploited and used for the local market as well as exports.

THE DE JAGER REPORT TWENTY TWO YEARS LATER

The latest estimates of South Africa's coal resources and reserves are based on the 1983 FSJ de Jager Report reviewed by JH Bredell in 1987. In both reports, the Waterberg coalfield reserves feature highly. These figures have given prominence to the idea that the Waterberg will be the next area to mine, once the Central Basin reserves are depleted.

In 1983 de Jager produced a very thorough and well-researched report, making use of all the coal reserve information then available. The author had a clear understanding of coal science, characteristics and marketing. For the first time a report gave *coal saleable products' reserves*, instead of the *in situ* or '*raw*' reserves given by earlier reports. It took about two years to complete during which time the research team was provided with industry's information on coal resources and reserves held by all private companies. As a result of this well planned and executed project, figures produced in the report, led to a clear understanding of the future of coal in the country. They also prevented the over-regulation of the coal trade by government when our coal export industry was just emerging and needed the support required to make it what it is now, one of the world's largest and most competitive ones. The report promoted the local industry and proved to government that South African coal reserves, in spite of the poor "*raw*" qualities, had good potential for export after beneficiation. Reserves were somewhat exaggerated by the lack of information in areas like the Waterberg, where inadequate information, was used to calculate recoverable reserves.

At the time of the de Jager Report South Africa was still finding its feet in coal science, and the report served as a brilliant tool for the industry. Now times are different and the needs of the coal industry have changed. The word 'reserves', then loosely used to define a block with some mineable potential, implies much more. As defined by the SAMREC code, of May 2000: *"a coal reserve is economically mineable material derived from a measured and/or indicated coal resource. It is inclusive of diluting materials and allows for losses that may occur when the material is mined. Appropriate assessments, which may include feasibility studies, have been carried out, including consideration of, and modification by, realistically assumed mining, coal processing, economic, marketing, legal, environmental, social and governmental factors. The assessments must demonstrate at the time of reporting that extraction is reasonably justifiable. A coal reserve must be based on an evaluation that demonstrates that extraction of a coal resource is justified at the time of the valuation and that an*

economic mine plan has been defined. A coal reserve can be quoted on a mineable in situ basis, but must be quoted on a Run-of-Mine (ROM) basis and a saleable basis. "

In 1987, Bredell made an appraisal of the de Jager Report in the light of a slightly changed set of economic parameters. This was not a full study of South Africa's reserves and although it gave a more conservative reserve figure, it did not consider reserves lost, after the release of the 1983 report.

THE CENTRAL BASIN REMAINING RESERVES

The 1983 de Jager's 58.4 billion tons of recoverable coal reserves were reduced to 55.3 billion tons by Bredell and then the Minerals Bureau, using SAMREC code's definition of reserves, re-assessed and reduced the remaining reserves, to 28.9 billion tons or 52% of the 1987 figure. The total tonnage of coal exploited from 1982 (year of the de Jager Report's calculation of reserves) to 2003, amounts to 5.3 billion tons of ROM coal. At the present production rate of 302 Mt/a, and expecting annual production increase of 3% to 6%, the remaining reserves will only last until approximately 2050. The Central Basin reserves (Witbank, Highveld, Ermelo, South Rand and N. KwaZulu-Natal coalfields) contain 90 percent of the country's total recoverable reserves, while Waterberg Kumba Resources' re-calculated reserves are only 3 percent.

Therefore, the future of the coal industry is mainly dependant on the utilisation and optimisation of the recovery of the Central Basin reserves.

The *National Coal Resources and Reserves Evaluation Project*, which began some years ago, has not yet been completed. Industry and government are keen to see the results of this study that will update the South African reserve and resource figures of 1983 and bring them in-line with present reality. The study has reached its final phase and the results will in all likelihood be released in June 2005.

MINING COMPANIES PORTFOLIOS

A study of the Witbank Coalfield's collieries that was completed a few years ago indicated a mineable reserve of 3.4 Billion tons. However, some of the mines did not show information on reserves, and outstanding mine's reserves were estimated by using the current annual production and the life of the mine. The non-committed reserves, i.e. reserves outside the mines' blocks, were not quantified. However, according to available confidential information, another 10 Billion tons of reserves exist in the Coalfield. Including the Highveld and Ermelo Coalfields, the total reserve are in the range of 25 Billion tons. This coal, with a reasonable fraction of export quality products, constitutes the bulk of the reserve figure mentioned earlier.

It is difficult to predict how these non-committed reserves will be used. Some will probably be sold, leased or used in joint ventures with economic empowerment companies, while others will be opened as greenfield or brownfield expansions when the main coal producers decide to increase or sustain their coal output.

PRIVATELY OWNED COAL BLOCKS

Mining rights attached to surface rights are also available, but do not constitute a large component of the total remaining reserves. In general, these small to medium sized blocks (from 8 Mt to 30 Mt), are been offered to new companies. These coal resource blocks usually require a capital investment to do the evaluation to accurately assess and calculate the mineable reserves. Their potential will be evaluated as part of a Central Basin DME project.

ECONOMIC EMPOWERMENT IN COAL

The remaining good quality reserves are mainly spread throughout the Central Basin in what the big mining operators consider blocks too small to mine. These blocks are potentially accessible to economic empowerment companies. Many coal mineral rights owners, including some of the established coal mining companies, are willing to lease or sell them. This provides an opportunity for economic empowerment companies to obtain them. Most coal expertise in geology, exploitation, processing, transportation and marketing previously employed by large companies, is now available on a consultancy basis.

To be able to have a profitable coal mine, it is better to have several products, i.e. processing the "raw" output; produce several saleable commodities. The extra revenue obtained from better grades, locally and in the export markets, assists to make the mine feasible. Economic empowerment companies also require the infrastructure necessary to access the market, such as a terminal allocation, a siding, a rail connection to a coal terminal and to inland markets. New economic empowerment coal entrants, by the nature of the size of their reserves and the economics of their mines, do not have sufficient resources to conduct business deals either in the local or export markets. Since coal is a bulk commodity, size of mine is a major requirement for success. It is foreseen that in order for small economic empowerment companies to be successful they might to have join forces and operate together, sharing the existing infrastructure, or at least as a group benefit from a common market platform.

EXPORT INFRASTRUCTURE AND LOGISTICS

The very important role played by the Richards Bay Coal Terminal (RBCT) and its coal export infrastructure is well known to the people in the industry. It is RBCT that made our coal export industry so successfully competitive in terms of World coal trade. The South Dunes Coal Terminal (SDCT) is about to be launched, which will increase the RBCT capacity by 10 Mt/a. The new terminal and the RBCT shareholders' decision to permit non-shareholders the limited use of the terminal facilities will make many small mines viable. Using RBCT to export coal will likely convert smaller coal reserves into potential export mines, offering them the opportunity to become economically feasible operations.

The successfully concluded negotiations between a government led Task Team and RBCT representatives will now permit a number of BEE companies to enter the South African coal export market. This will facilitate the optimal usage of coal resources previously deemed uneconomic.

THE WATERBERG

This coalfield, due to the large resources it contains, was earmarked for exploitation when all other reserves run out. According to new reserve estimates released by Kumba Resources, there are many economic constraints associated with mining the Waterberg that preclude the opening of new collieries in this area. Kumba is looking at new technologies to extract the energy contained in this coalfield while Anglo has for many years been investigating its Coal Bed Methane (CBM) potential. This brings us back to the question of whether the Waterberg coal resources outside the Kumba block will ever be converted to reserves and committed to conventional coal mining. The area's long distance from the existing coal markets, as well as its lack of water and infrastructure, will prevent the establishment of mines, other than a Grootegeluk-type mine, producing an 80%-plus of steam coal dedicated to supply a close by power station.

SOUTH AFRICA'S FUTURE ENERGY PROSPECTS

Natural gas as a source of energy possesses substantial environmental benefits when compared with the use of coal. However, due to lack of gas reserves, it contributes only about 1.6% of the country's primary energy supply. All of the natural gas is converted into synthetic liquid fuels by the state-owned Mossgas plant.

Natural gas from Mozambique will soon be available in South Africa. As the major facilitator of this project, Sasol will use substitute coal with gas to act as a feedstock for the Sasolburg plant and a small portion of the Secunda plants. All the coal gasification activities in Sasolburg will be phased out by 2004, with a small amount of coal being used for steam and power generation. The replacement of coal by natural gas for some Sasol plants may lead to an increase in the lifespan of the reserves, particularly in the Sasolburg Coalfield.

Mozambican gas, together with all other gas reserves, such as the Forrest Oil and the Namibian's Kudu fields, is minimal when compared to South African coal reserves. It is clear, in volume and price, there is nothing to match coal as the country's energy provider.

What about reserves for the future? Within the next 40 - 50 years, when our reserves will be almost totally depleted, technology will come to our rescue. Technology from the IEA Clean Coal Science Agreement (CCS) will soon be available to make coal combustion, especially for power generation, more acceptable to environmentalists and will substantially decrease the emissions from power stations.

The recently completed assessment of coal discards by the DME, is attracting numerous companies, many of them international, to apply for coal discards' reclamation permits. Most likely, many discard dumps, with some energy content, will also be utilised for Fluidised Bed Combustion (FBC). This source of energy will prolong the life of the reserves utilised for power generation.

CONCLUSION

According to Roger Wicks in "The Future Role of Coal" (Coal Magazine, February 2004:15); *"Coal has a key role to play as part of a sustainable energy future and the demands that the industry faces present numerous opportunities.*

Current developments and emerging technological advancements will ensure coal is part of a cleaner energy future.

Analysing the present coal reserve situation it must be concluded that for the industry, this is only the end of another phase. With the aid of new technologies and the present openness of the country to coal combustion research, especially from groups like the IEA Agreement on CCS, coal is the sunrise industry in South Africa.