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## SOUTH AFRICA'S COAL INDUSTRY OVERVIEW, 2014

DIRECTORATE MINERAL ECONOMICS



*Richards Bay Coal Terminal*



**mineral resources**

Department:  
Mineral Resources  
**REPUBLIC OF SOUTH AFRICA**

# SOUTH AFRICA'S COAL INDUSTRY OVERVIEW, 2014

## DIRECORATE MINERAL ECONOMICS

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## **1. INTRODUCTION**

South Africa's coal reserves are ranked amongst the top 10 largest in the world. The country's economy is extremely dependent on coal fired power production, which provides almost three quarters of total primary energy. Despite the country's attempts at diversifying energy, coal is expected to play a major role in the foreseeable future. This report will discuss the occurrences of coal, key players, recent developments, relevant legislation and challenges as well as opportunities in the South African coal industry.

## **2. OCCURRENCE**

South Africa has 19 coal fields within the Karoo Super Group. The country's coal resources rank fifth in the world with total recoverable reserves estimated at 66.7 billion tons. The Waterberg, Highveld, Witbank, Free State and Ermelo fields have the greatest proportion of remaining reserves. The Mpumalanga coalfields are fast depleting, this was revealed by the recent resource and reserve coal study conducted by national geo-scientific repository, the Council for Geo-Sciences, in collaboration with Eskom, which indicated that coal in Mpumalanga has declined from 28.1Bt to 12.4Bt.

However, the future of coal mining in South Africa lies in the Waterberg coal basin. The study asserts that opening the Waterberg region for large scale mining is vital to the future of the South African coal mining industry.

The carbon content in South Africa's coals increases eastwards; with a decrease in the number of seams and their thickness. Consequently, Mpumalanga and Limpopo coals are usually classified as bituminous, occurring in seams up to several metres thick, while KwaZulu-Natal coals are often anthracitic and are found in relatively thin seams.

South Africa's collieries range in size from small operations with output limited to a few thousand tons to large operations like Secunda, which is this country's largest underground coal mining complex, with an annual production capacity of about 35 million tons. Almost 90 per cent of the country's saleable coal is mined in the Mpumalanga.

### **3. MINING METHODS**

Both opencast and underground mining methods are employed in South Africa for extraction of coal reserves. There are three different mining methods that are commonly used in underground mines in South Africa. The most common technique is the 'bord and pillar' method. This method is ideal for relatively shallow deposits where overlying rock pressure is low. Seams are mined leaving in situ coal pillars, which are big enough to support the roof indefinitely. This method currently permits around 65 percent of the available coal to be extracted.

When the overlying rock requires no restrictions, maximum extraction can take place. There are two major underground total extraction systems employed in South Africa.

In rib-pillar extraction, a continuous miner machine cuts a roadway up to 1,5 kilometres in length through the coal and five metres from the edge of the area to be mined. This leaves a five metre-wide band of coal in the form of a long, isolated rib pillar along one side of the tunnel. With the aid of timber or hydraulic props to hold up the now unstable roof, the continuous miner cuts away the rib pillar in a series of curved cutting sweeps. The machine repeats the cycle by mining into the remaining coal area, again cutting a tunnel and leaving a rib pillar.

The other total extraction method is long wall mining. The area being mined is usually 3 to 4 km long and 250 to 450 metres wide and, basically consists of a corridor in which one wall and the roof are formed by steel supports, capable of resisting hundreds of tons of pressure from the subsiding mine roof above. The second side of the corridor is formed of coal and is the actual face from which coal is

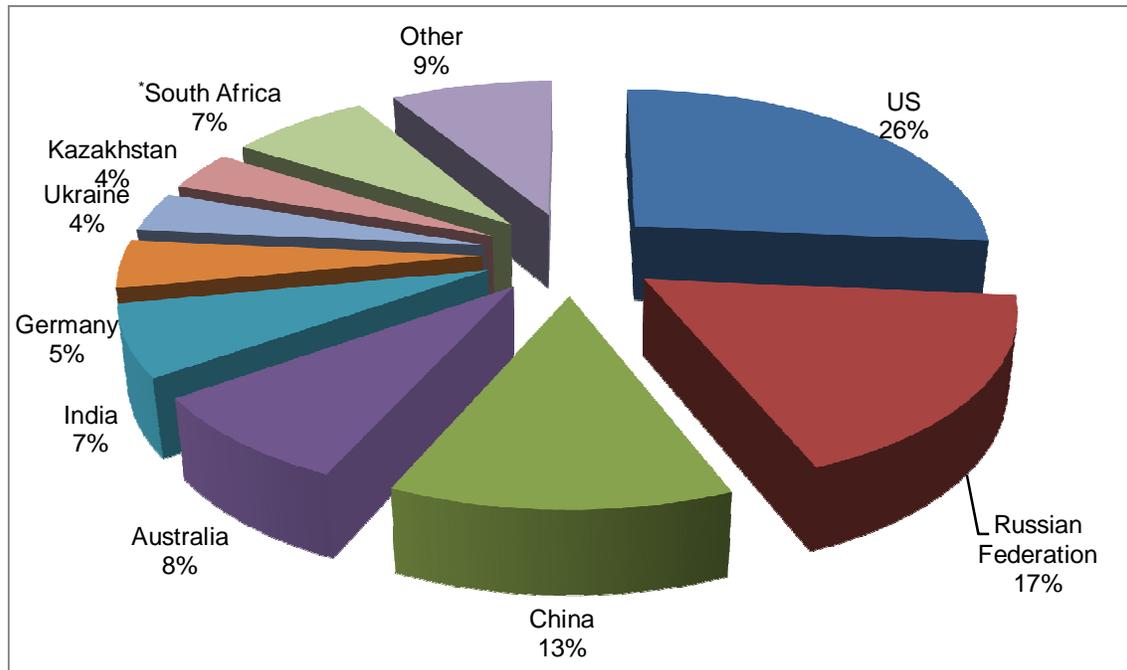
cut. A mechanical coal cutter, bearing two large revolving shearing drums with steel picks, runs the whole length of the coal face on rafts. This cuts into the coal and widens the corridor during each sweep, thus advancing the coal face. The cut coal falls on to a conveyor and is drawn out of the long wall face. Hydraulic rams linked to the line of props push the conveyor and coal cutter forward into the newly-mined-out space in the face. In turn, each hydraulic support is then released from its position and hauls itself forward after the advancing face, reinstalling its steel canopy against the recently exposed area of face roof.

Opencast, also known as surface mining is only economic when the coal seam is near the surface. This method recovers a higher proportion of the coal deposit than underground mining as approximately 90 percent or more of the coal can be recovered. The overburden soil and rock is first broken up by explosives; before being removed by draglines or by shovel and truck. Once the coal seam is exposed, it is drilled, fractured and systematically mined in strips. The coal is then loaded on to large trucks or conveyors for transport to either the coal preparation plant or directly to where it will be used.

#### **4. GLOBAL SUPPLY**

Global reserves of coal amounted to 897.48 billion tons in 2012. The US had the largest reserves at 26.4 percent, followed by Russia's 17.5 percent and China's 12.8 percent. South Africa holds approximately 7.4 percent of global coal reserves (Fig. 1).

FIGURE 1: GLOBAL COAL RESERVES, 2012

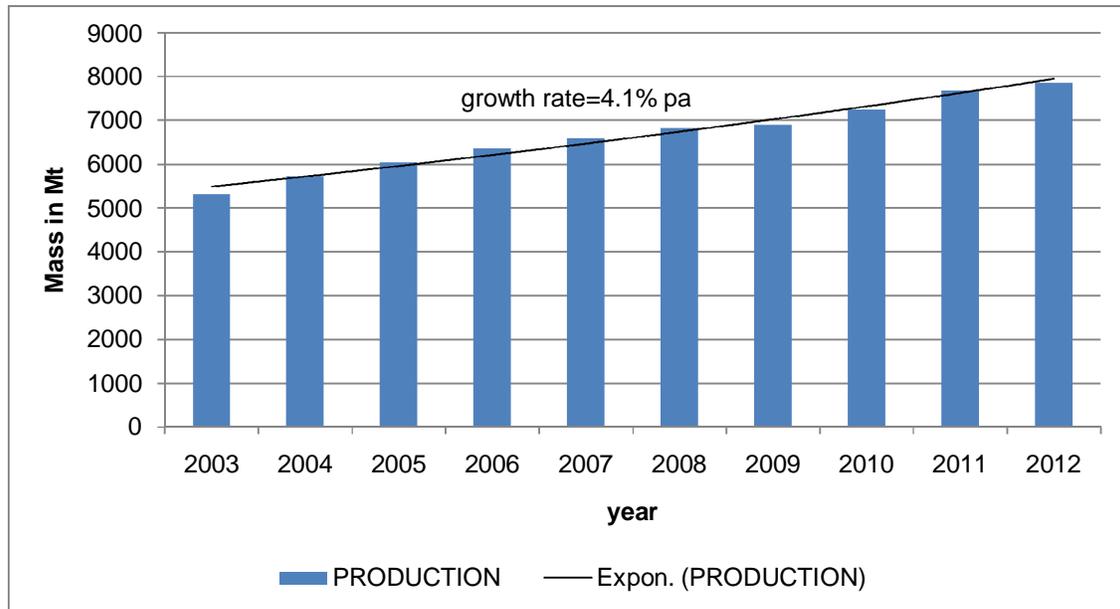


Source: BP world statistics, 2013

DMR, Mineral Economics

Global coal production has been growing at an annual average of 4.1 percent since 2003, as a result of increased production of steam and coking coal, driven by increasing demand from major consuming markets (Fig.2). However, in 2012 global coal production increased by 2 percent to 7 864.5 Mt compared with 7 691.6 Mt in 2011, due to growth in production from China and Indonesia, which offset the decline in the US. China was still the largest producer of coal accounting for 47.5 percent of global production, followed by the US at 13.4 percent and Australia at 6.3 percent. South Africa, at 3.8 percent was ranked at number 7 in the world.

FIGURE 2: GLOBAL PRODUCTION OF COAL, 2003-2012

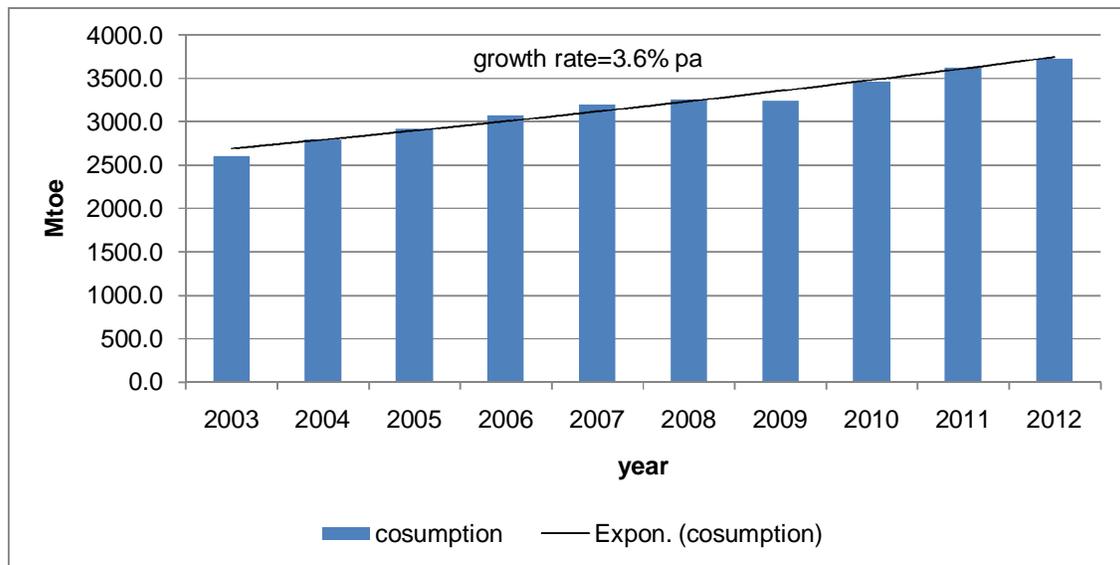


Source: BP world statistics, 2013

## 5. GLOBAL DEMAND

Global consumption of coal has been increasing at an annual average of 3.6 percent since 2003, driven by growth in China and India (Fig.3). However, in 2012, coal consumption grew by 2.5 percent to 3 730 million tons oil equivalent (Mtoe) from 3 629 Mtoe. This figure is well below the 10-year average, but coal is still the fastest-growing fossil fuel in the world. China consumed 50 percent of global coal output followed by the US's 11.7 percent and India's 8 percent.

FIGURE 3: GLOBAL CONSUMPTION OF COAL, 2003-2012



Source: BP world statistics, 2013

The most commonly used coal in the world is steam coal (thermal coal), which is primarily used in power generation and coking coal (metallurgical coal), which is mainly used in steel production. Several chemical products can be produced from the by-products of coal. Refined coal tar is used in the manufacture of chemicals, such as creosote oil, naphthalene, phenol, and benzene. Ammonia gas recovered from coke ovens is used to manufacture ammonia salts, nitric acid and agricultural fertilisers. Thousands of different products such as soap, aspirins, solvents, dyes, plastics and fibres, such as rayon and nylon have coal or coal by-products as components.

## 6. GLOBAL TRADE

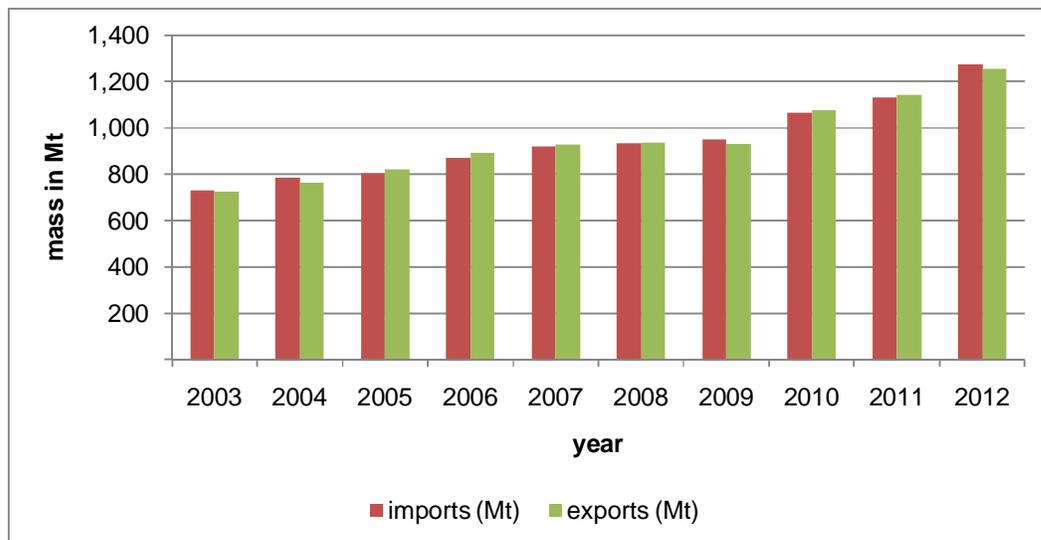
Despite its robust growth, total international trade still represents a small share of coal production. Only 17 percent of hard coal output is traded internationally. The global coal market remains a thin market dominated by few players. Small changes are able to shake and reshape the market. Both global exports and imports have grown by 5.6 percent since 2003 (Fig.4). In that same period, 80 percent of SA's coal exports went to Europe. However, in 2007, more than half of SA's coal exports were

diverted to Asia, mainly India and China, as Europe's economy weakened. The move extended to all Atlantic suppliers, who developed Asian-oriented export strategies, attracted by the surge in Asian imports.

Global exports of all types of coal increased by 9.7 percent in 2012, reaching 1 225.3 Mt compared with 1 144.1 Mt in 2011. Indonesia was the largest coal exporter in 2012, with exports reaching 382.6 Mt, followed by Australia and Russia at 301.5 and 134.2 Mt, respectively.

Total world coal imports rose 12.5 percent to 1 276 Mt in 2012 from 1 134 Mt in 2011. At 289 Mt, China was the world's largest importer of coal in 2012, followed by Japan and India at 184 and 160 Mt, respectively.

FIGURE 4: GLOBAL COAL TRADE, 2003-2012



Source: IEA COAL REPORT, 2013

## **7. SOUTH AFRICA**

The South African economy depends very heavily on coal for its power generation. The commodity is a major source of energy in the country, accounting for 95 percent of electricity production, 70 percent of primary energy production and 30 percent of petroleum liquid fuels.

### ***7.1. Structure of the Industry***

South Africa's coal production is dominated by five mining companies: Anglo American Thermal Coal, Exxaro Resources, Sasol Mining, BHP Billiton Energy Coal South Africa (Becs) and Xstrata. Together, these companies account for over 80 percent of the country's yearly saleable coal production.

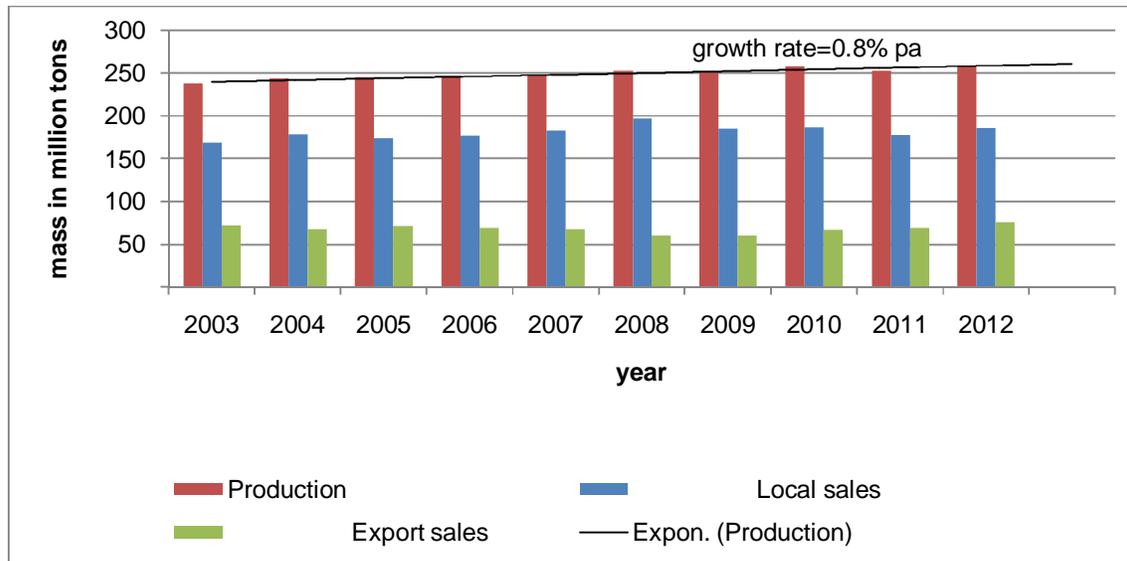
While South African coal production is dominated by a handful of large companies, there are also many small and medium-sized producers, developers and explorers active in the sector. Some of these have been involved in South African coal mining for many years, but the majority is relatively new to the market. The presence of a large number of smaller companies in South Africa's coal-mining industry has had the benefit of broadening the spread of wealth derived from this sector. However, many of the smaller participants in the coal-mining industry have reported facing operational challenges.

### ***7.2. Supply-Demand and Prices***

According to the South African coal resource and reserves study, South Africa's coal reserves amounted to 66.7 Bt and was ranked 5<sup>th</sup> in the world in 2012. South Africa's coal production has been increasing at less than one percent since 2003, which is well below the global average of 4 percent (Fig.5). Nevertheless, it is sufficient to keep it amongst the top producing countries in the world. Local and export tonnages have also been relatively static in the period under review both growing at less than one percent.

In 2012 the production of coal increased by 2.3 percent to 258.6 Mt compared to 252.8 Mt in 2011. Both local and export sales mass increased by 4.5 and 10.5 percent, respectively.

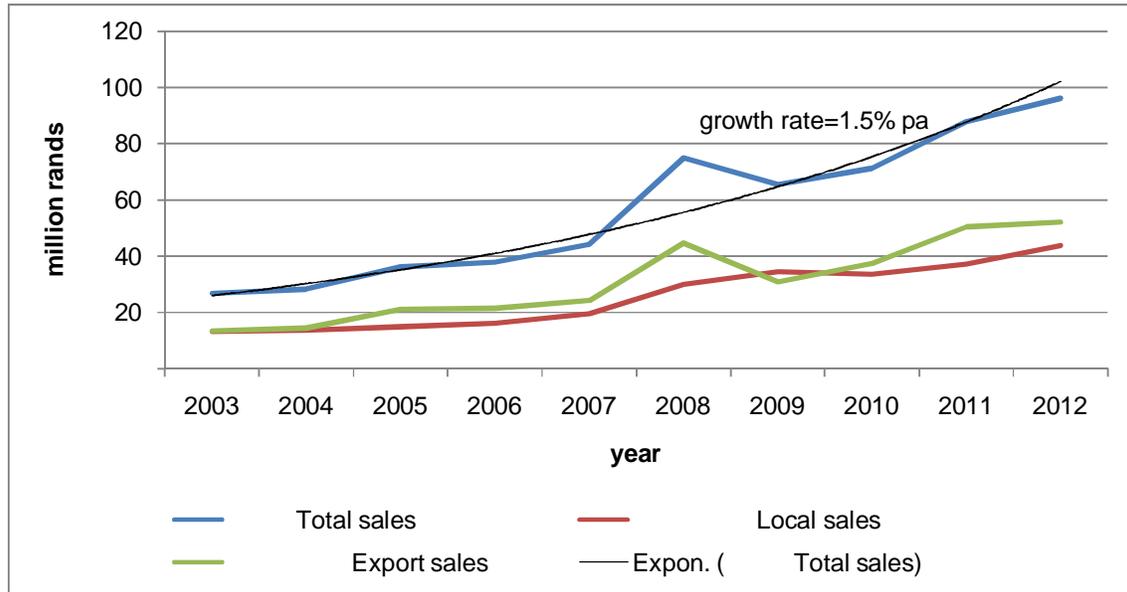
FIGURE 5: SOUTH AFRICA'S PRODUCTION AND SALES VOLUMES OF COAL, 2003-2012



Source: DMR, Directorate Mineral Economics

South Africa's total sales of coal have been increasing at an average of 1.5 percent annually since 2003, as a result of higher prices (Fig.6). Export sales contributed about 74 percent to total sales, while local sales contributed the remaining 26 percent. Export sales peaked in 2008 due to increased demand from Asia and locally, demand from Eskom also increased because they were experiencing shortages in coal supply, which led to load shedding throughout the country.

FIGURE 6: SOUTH AFRICA'S SALES OF COAL, 2003-2012

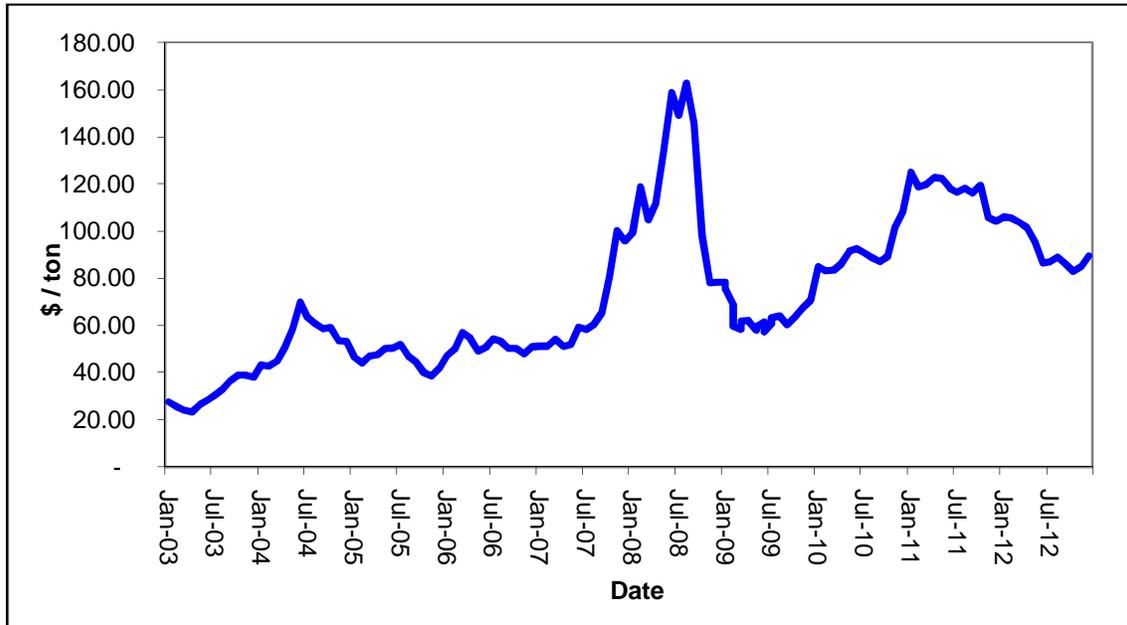


Source: DMR, Directorate Mineral Economics

The Richards Bay Coal Terminal (RBCT) free on board (FOB) price of South African coal has been increasing gradually from 2003, however it began to peak towards the end of 2007. In August 2008, the price reached a record high at \$162.95/t, mostly driven by the international markets where the country's coal was in demand. However, by June 2009, the price had dropped to \$57.40/t, as demand weakened due to the financial economic crisis.

The price started to gradually rise again towards the end of 2010 due to stronger demand from Asia, reaching a peak of \$125/t in January 2011 after which it started spiraling downward for the remainder of the year, as demand diminished. In 2012, prices continued trending downward reaching a low of \$89.44/t in December of that year (Fig.7).

FIGURE 7: RBCT COAL PRICE, 2003-2012



Source: Richards Bay Coal Terminal (RBCT)

Local coal demand is dominated by the electricity sector, which accounts for about 66 percent of local sales. A further 23 percent of local coal demand comes from the synthetic fuels (synfuels) industry. The balance comes from industrial and metallurgical industries as well as small coal merchants and mining.

Although South Africa uses coal extensively in the domestic economy, about 27 percent of its production is exported, mainly through the Richards Bay Coal Terminal, with the remainder exported through Maputo and Durban, making South Africa the sixth largest coal exporting country in the world. For the first time since 2003 the country exceeded the 70 million tons mark, exporting about 76 million tons of coal in 2012, a 10.5 percent increase from 2011. This generated R52.2 billion in revenue compared to R50.5 billion in the same period.

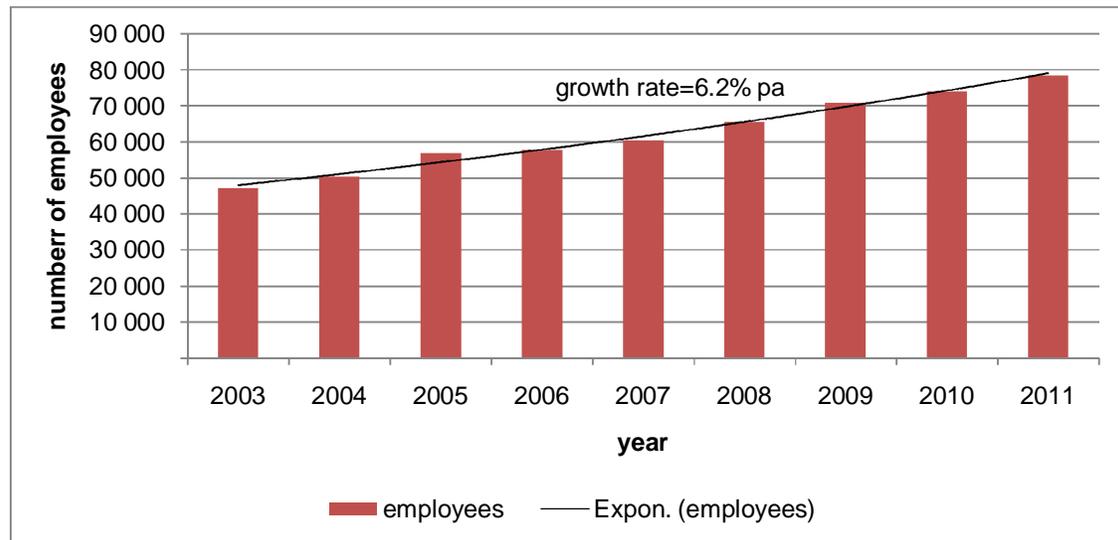
Historically, Europe was the primary destination for South African coal exports. However, in recent years, India and China have emerged as prominent export destinations for South African coal, due to surging power generation requirements in these countries as well as subdued demand from Europe as a result of the economic crisis. In 2012, Asia accounted for approximately 61.5 percent of South Africa's coal

exports from 58.1 percent in 2011. Europe and the Middle East both decreased their exports to 15.9 and 13.2 percent in 2012, from 18.4 and 11.1 percent, respectively in 2011.

## 8. EMPLOYMENT

Employment in the coal industry has been increasing at an annual average of 6.2 percent (Fig.8). This is as a result of new projects coming on stream as well as expansions from various coal mines regardless of the labour unrest for the past two years. The sector's employment increased from 47 239 people in 2003 to 78 580 in 2012; with women employment increasing by approximately 70 percent in that same period.

FIGURE 8: SOUTH AFRICA'S COAL INDUSTRY EMPLOYMENT, 2003-2012



Source: DMR, Directorate Mineral Economics

## **9. RECENT DEVELOPMENTS**

Anglo American Inyosi Coal's (AAIC), New Largo project is one of the biggest coal projects in the country. This project will supply Eskom's Kusile power station with coal for about 40 years. This project is planned to be developed in two stages. The first stage includes a 23 km overland conveyor, which will run from the existing Phola processing plant to Kusile power station and an opencast mine. Stage 2 of the project involves the construction of a new opencast colliery and associated infrastructure. Anglo American anticipates that this project could achieve production volume of up to 11-million tonnes a year by 2017. This project is estimated to cost between R16 and R20 billion to develop. However, Eskom has agreed to share the costs. Feasibility studies on the project were completed in 2012 and it is expected to be presented for board approval once all environmental permits have been obtained for both stages of the project and the coal supply and other commercial agreements have been concluded.

Grootegeeluk Medupi expansion project, which is owned by Exxaro Resources, entails a brownfield's expansion of Exxaro's Grootegeeluk mine. Coal will be mined from the existing opencast pit at an accelerated rate, with the mine's current production increasing from 19 to 34 million sales tons a year. It was expected that the total project expenditure will be about R10.2 billion. However, the revised budget has increased to R700 million, owing to a combination of factors, including additional escalations, labour unrest, steel shortages and additional scope that has been added to the project. The coal supply ramp-up will commence during the second half of 2014 and is expected to continue until the second half of 2016.

Also in the Waterberg, Exxaro is pursuing the development of the Greenfield Thabametsi project. The project will entail the development of an open pit mine and beneficiation complex to supply an on-site independent power producer (IPP) and other markets. A second-phase development at Thabametsi could result in the mine providing Eskom with between 20 Mt and 30 Mt a year, depending on rail developments. The project is expected to cost between R900 million to a billion, with an estimated time frame of 2015 to 2025. A prefeasibility study was completed in 2013, and a bankable feasibility study has commenced at the beginning of 2014.

Sasol mining's Shondoni coal project will result in the construction of a new mine to replace output from Sasol's mature Middelpunt coal mine, which is nearing the end of life. The extractable reserve at Shondoni is estimated at about 190 Mt, which indicates that it will operate for approximately 20 years at the full production delivery of 10.5Mt a year and will include surface infrastructure, as well as an 18 km overland conveyor system. This project is valued at R5.6 billion and was scheduled for completion in the first quarter of 2014, which could not be confirmed at the time of writing.

Coal of Africa Limited (CoAL) is engaged in the development of two projects in Limpopo, the Vele colliery and the Makhado coking coal project. The Vele project has the potential to produce five-million tons a year of coking coal, starting at a level of one-million tons a year. Phase 1 of the Vele project is valued at R450-million, while Phase 2 will cost a further R2.35-billion. The Vele mine is already in production and ramp-up to two-million tons a year is expected by 2016. The Makhado project could produce five-million tons of coal a year, dependent on market conditions.

Junior miner Continental Coal's Penumbra project, in Mpumalanga, is already in operation as of November 2013. The company is advancing off take agreements and financing and strategic partnership discussions ahead of the initial open pit development of its De Wittekrans project, in Mpumalanga. Optimisation work completed for the feasibility study on this project in the December 2012 quarter identified the opportunity to develop a major mining operation to produce 3.6-million tons a year of run-of-mine coal over a 33-year mine life, with yearly sales of up to 2.4-million tons of a thermal coal product. Continental Coal contends that this product will be ideally suited to the Asian export market and the South African domestic market.

Firestone Energy Limited is an independent, Australian exploration and development company, which has entered into a Joint Venture with Sekoko Resources (Pty) Ltd, through which Firestone Energy has acquired the right to 60 percent participation interests in the Waterberg Coal Project located in Lephalale area, Limpopo Province.

The feasibility study for this project is completed and the development of an opencast mining operation to produce 10 million tonnes of coal (Product) per annum for Eskom for an initial term of 30 years has commenced and supply of coal to two Mpumalanga power stations could begin in the last quarter of 2014. The project is estimated to cost R0.5 billion to establish the first phase of the operation while the Net Present Value (NPV) is estimated between R300 and R500 million. The first stage of the project is to develop the Smitspan mine, which has substantial measured thermal coal resources and to develop the Vetleegte mine, which is a substantial metallurgical coal deposit.

Resource Generation (ResGen) is pursuing the development of the Boikarabelo coal project, in Limpopo. The mine will be developed in a two-phased approach to limit upfront capital expenditure. The first phase will deliver about 12-million tons of run-of-mine coal a year, which will equate to about six-million tons of product coal. Of this, three-million tons are destined for the export market and three-million tons will be sold domestically. Phase 2, planned for 2018, will ramp up production to 20-million tons of product coal. The capital cost for the project is estimated at \$630-million.

A quantification of national coal resources and reserves was last undertaken in 1982. The recent coal resources and reserve study presents an update of sheer volumes of this important and critical mineral commodity that remains available in order to objectively inform appropriate policy options to protect national interest and attract necessary investment for development. The study was undertaken by the national geo-scientific repository, the Council for Geo-Sciences, in collaboration with Eskom.

In summary, the study indicates that overall coal resources and reserves increased from the 1987 estimate of 55.3 billion tons to 66.7 billion tons (Bt). However, there has also been a substantial downward revision of the coal remaining in the Mpumalanga coalfield. It is estimated that the total reserves in the Mpumalanga basin declined by 56 percent from 28.1Bt in 1987 to 12.4Bt.

## **10. POLICY AND REGULATORY FRAMEWORK**

The coal sector has seen key legislative interventions over the past decade meant to ensure that all South Africans benefit from the exploitation of the country's mineral resources and attract investment into this sector.

The National Development Plan (NDP) envisages that by 2030, South Africa will have an energy sector that promotes economic growth and development through adequate investment in energy infrastructure. The sector should provide reliable and efficient energy service at competitive rates, while supporting economic growth and job creation. More specifically, South Africa should have adequate supply security in electricity and in liquid fuels, such that economic activity, transport, and welfare are not disrupted. Prices for energy are likely to be higher in future, but will still be competitive compared with South Africa's major trading partners. In addition, more than 90 percent of the population should enjoy access to grid connected or off-grid electricity within 20 years.

South Africa's Constitution provides for redressing historical socio-economic inequalities and discrimination. Black economic empowerment (BEE) is central to government's economic transformation strategy of empowering historically disadvantaged South Africans (HDSAs). The Broad-Based Socio-Economic Empowerment Charter for the South African Mining Industry of 2002 and the Broad-Based Black Economic Empowerment Act (2003) established targets for increasing HDSA representation in management to 40 percent and transferring ownership of 26 percent of mining assets to HDSAs by 2014.

Black-empowerment objectives were incorporated in the Minerals and Petroleum Resources Development (MPRD) Act No 28 of 2002. The Act also indicates profound changes in mineral resource rights. The legislation transferred ownership of mineral rights to the state, which is now empowered to grant, control, administer prospecting or mining rights, subject to various conditions. Since 2004, when the legislation became effective, old order rights were converted to new order rights. Codes of Good Practice for the Minerals Industry were gazetted in April 2009, in terms of the MPRD Act, and further define objectives in terms of black ownership, management control, employment equity, human resource development, preferential procurement, community and rural development, beneficiation, and housing and

living conditions. The Mining Charter is a tool used to ensure compliance with the codes. The Mining Charter was amended in 2010 and a new declaration was undertaken with all mining stakeholders. The Department of Mineral Resources has undertaken a process to review the Charter this year.

However, there are sections in the MPRDA that are currently being amended. And the most vital for the coal industry is that the amendments will make provision for the Minister of Mineral Resources to declare certain minerals as strategic to help further industrialize the country's economy through local value addition.

In terms of the current proposals contained in the amendments to the MPRD Bill, coal should be considered as a strategic mineral. This proposal understands that much needed coal investments for project development are balanced with socio-economic development imperatives. The Bill is emphatic on development of mechanisms to give effect to the provision through development of regulations after consultation with key stakeholders.

## **11. COAL ROAD MAP**

South African Coal Roadmap (SACRM) was released in 2013 to explore the interventions required for the domestic coal industry to maximise the commodity's contribution to the South African energy mix. Developed through a collaboration of stakeholders in the local coal value chain, including the government and industry stakeholders, the roadmap adopted a scenario-based approach to determine the implications of following a certain coal route.

It further identified constraints that required urgent remedial interventions to ensure energy security for Eskom, which from 2015 will need 60 Mt of coal for the country's developing power stations. The roadmap indicated that, to ensure that existing coal-fired power stations remained operational, additional coal contracts must be secured, while the development of new mines was fundamental. Modelling and available data suggested that sufficient coal resources existed in the Central basin to supply existing power stations and the Kusile power station over their expected service

lives. However, this statement might be reviewed as a result of the recent resource and reserve coal study.

Most significantly is that, the availability of the coal did not guarantee its delivery to the power stations, which depended on a number of factors, including the ability to open new mines and to develop associated transport infrastructure adequately and on time. What is critical to opening up new coalfields, including the Waterberg, is the development of infrastructure, including water pipelines, rail lines, the transmission grid and urban development.

Furthermore, the SACRM advised that infrastructure and new mine development would need to be accompanied by a legislative and policy environment conducive to mining investment and accompanied by an agreement on a fair pricing model.

Meanwhile, despite the expected coal supply deficit from 2015, the document emphasised the need to continue to capitalise on coal exports, as this is a critical source of foreign revenue. South African coal exports totalled 76 Mt in 2012. The document suggested that sufficient coal reserves and resources remained in the Central basin to grow total exports to a peak of some 90 Mt/y by 2023. However, there must be a mechanism that aligns export growth with meeting domestic utility requirements. Required actions should include the continued expedition of currently planned upgrades in capacity on the rail line from the Central basin to the Richards Bay Coal Terminal (RBCT) and continued expansion planning in line with demand requirements.

## **12. ENVIRONMENTAL ISSUES**

The South African law requires that steps be taken in all phases of mining to minimise the impact on the environment. Some of the most serious environmental challenges in the coal mining industry relate to water, with any contamination of mine water having far-reaching consequences, which go beyond the area being mined and its ecosystem. One such challenge is acid mine drainage metal-rich water that is formed through a chemical reaction that occurs between water and rocks containing sulphur-bearing minerals. This acidic run-off dissolves heavy metals that are also

present in the ground, such as copper, lead and mercury, into ground and surface water. Mining operations are said to contribute to at least 78 percent of the sulphur content in the water countrywide.

The growing interest in coal mining in the Waterberg has raised concerns about the potential threat to the natural environment and scarce water resources, as well as the tourism and agriculture industries of Limpopo. Although South Africa needs the electricity generation capacity offered by the Waterberg's coal, it is feared that coal-related environmental problems could arise, such as those experienced at the eMalahleni coalfields. Pollution from the eMalahleni coalfields entered the river systems, either directly through discharge points, or indirectly through seepage.

One other challenge is the quantities of Greenhouse Gas (GHG) emitted through electricity generation and Coal-to-Liquid (CTL) processes. The country's heavy reliance on coal to generate electricity and produce liquid fuels to meet its growing energy demands to power its growing economy is the main reason for the high carbon intensity. Higher economic growth is likely to raise the levels of Greenhouse Gas (GHG) emissions even further. South Africa is ranked among the top 20 countries with the highest GHG emissions. Consequently, during the Copenhagen Climate Change negotiations in 2009, South Africa committed to reducing its GHG emissions by 34 percent by 2020 and 42 percent by 2025 on condition of availability of adequate financial, technological and other support.

As a result, government is considering a number of mechanisms in order to meet its commitments including the use of policy instruments such as carbon taxation and emissions trading schemes. According to the discussion paper released by National Treasury, carbon tax seeks to reduce emissions through a price mechanism directly while emissions trading schemes establish targets for specific levels of emissions through the trade in allowances. The pricing of carbon domestically, outside of an international arrangement will present opportunities that pursue emission reduction and revenue raising simultaneously while encouraging lower carbon emissions, greater energy efficiency and the use of cleaner, low carbon technologies. Details of the proposed carbon taxes were tabled in February 2012 and for implementation in 2016.

South Africa is also planning to diversify its energy basket to reduce reliance on coal. It needs to explore the potential benefits of developing competitive green industries and jobs, including in the renewable energy and energy efficiency sectors. The country has a huge potential to improve the efficiency with which it uses energy and hence reduce the carbon footprint. However, energy conservation alone will not solve South Africa's energy challenges.

Further energy supply options will be necessary and within this context, some hard decisions will need to be made on coal's future contribution to South Africa's energy-economy and how many more coal-based investments South Africa should make. South Africa has finalised its white paper on the climate change mitigation strategy, where government has overseen the development of long term mitigation scenarios, not as a specific policy but rather as a roadmap or set of strategic options.

### **13. BENEFICIATION**

The Beneficiation strategy outlines energy as one of the five value chains for the advancement of selected mineral commodities through various stages of beneficiation. Coal is one of the commodities identified for potential beneficiation in order to meet future energy needs. Considering that coal is currently the most abundant and affordable of all fossil fuels, the Beneficiation Strategy sees this as continuing to play a vital role in meeting local energy demand.

However, given the high levels of harmful emissions associated with coal-generated electricity and other fuels produced from coal, it has become increasingly important for Clean Coal Technology (CCT) such as carbon capture and sequestration (CCS) to be considered. While beneficial to the greening of the economy and reduction of South Africa's carbon footprint, the development of these technologies could make it difficult to predict the net effect of substitutability on the overall product cycle.

## **14. CHALLENGES FACED BY THE INDUSTRY**

The South African coal mining industry is facing several challenges. The most significant of these is railway capacity constraints hindering the transportation of coal to the Richards Bay Coal Terminal (RBCT), where it is shipped to the export markets. Transportation and logistics constraints increase the costs of freight, which, ultimately, increase the final selling price, making South Africa's coal exports potentially uncompetitive in international markets.

However, the South African government is currently looking at rolling out 43 major infrastructure projects worth R3.2 trillion as part of its plan to improve infrastructure. The Presidential Infrastructure Coordinating Committee (IPCC), which is a panel chaired by the president of the republic, was formed to coordinate and monitor government's infrastructure spending. The objective of infrastructure development is to boost the country's economic growth and create jobs.

In addition, the coal mining industry is faced with depleting coal deposits and a decline in the quality of coal resources. Some mines have failed to secure long-term supply contracts and have to rely on the spot market. The mining, transport and combustion of coal also pose several health and environmental threats, contributing to water and air pollution.

Inadequate and expensive water supplies, to the Waterberg coal basin, coupled with difficult geological conditions, are likely to restrain the potential large-scale mining activities in the area in the short to medium term.

## **15. OUTLOOK**

In conclusion, growth in South African coal production will be driven primarily by domestic power demand. However, despite South Africa having a number of years' worth of coal reserves, and coal being the cheapest electricity generation option, environmental constraints (climate change, acid mine drainage, and water shortages) will more than likely mean that total coal-fired generating capacity will peak soon after 2020. Domestic demand for coal will plateau and then fall as old

coal-fired power stations are de-commissioned. Nonetheless, new coal mines will have to be developed as existing mines exhaust their reserves (especially in the Witbank coalfield) and as Eskom and Independent Power Producers (IPPs) (and perhaps Sasol) expand their production in the period before 2020.

South Africa's local demand for coal is forecast to grow significantly, largely driven by power utility Eskom. In the next 40 years, Eskom will require four-billion tons of coal, and two-billion tons will need to come from new sources. Eskom is estimating that mining investments of close to R100 billion will be required to ensure that the necessary quantities of coal are available. Additional local demand is also anticipated to grow as a result of an expected expansion in synthetic fuels production. Furthermore, demand for South African coal in the export market could also continue to grow, with demand from China and India expected to remain strong.

The most important factor in allowing coal mining companies in South Africa to meet the anticipated demand growth for their products is the development of appropriate infrastructure to facilitate project development and coal logistics. A key logistical input necessary for growth relates to rail infrastructure. There is currently a gap between rail and port capacity in the coal mining industry, with rail capacity falling short of export capacity at the country's ports. Rail utility Transnet, however, is pursuing a major investment project aimed at boosting the country's capacity to transport coal by rail.

In addition, projects are being considered to enhance the capacity of the country's ports to enable coal exports. Richards Bay Coal Terminal is considering a sixth expansion phase and Transnet is considering projects at other ports to enable additional coal exports. A project is also under consideration at the Maputo port, in Mozambique. While logistical projects are being pursued to enable higher levels of coal production, several mining projects are also in the pipeline. Many of these are located in the Waterberg, which is expected to become South Africa's new hub of coal mining activity.

The Waterberg, which is currently home to only one operating mine, is believed to represent South Africa's single biggest opportunity for coal mining growth. However, the development of this project depends on an appropriate investment environment.

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