

COAL AS A STRATEGIC RESOURCE IN SOUTH AFRICA

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The higher price of oil and gas has positioned coal as the premium source of energy. This is likely to remain so as electricity demand is steadily rising.

Listed as a strategic resource to the South African economy, coal attracts approximately 20% of the workforce of the mining sector. The national beneficiation strategy intends to develop this mineral wealth to its full potential for the benefit of the population. This paper explores the implication of coal as a strategic resource and discusses whether this may benefit the South African economy. Supply, demand, and geopolitical factors are considered.

A framework for coal as a strategic resource is proposed while the need for clear differentiation between critical and strategic resources is highlighted. Concerns raised by investors in the mining industry are also discussed.

The proposed framework is expected to contribute towards planning for a secure future of coal. South Africa is rich in mineral resources, therefore, it is necessary to explore the future of coal as a strategic resource; and establish benefits and evaluate the impacts, including whether it will benefit the economy.

Keywords: Coal, strategic resource, critical resource, South African economy, energy, industrialisation

INTRODUCTION

There are different types of energy resources in the world. Sources of fuel or energy are coal, natural gas and natural oil. The end-product is dependent on the utilisation; direct utilisation is mostly for metallurgical purposes and power or fuel. The indirect utilisation from liquid, gas, and minerals will result in the end-product mostly for power/fuel, metallurgical, optical, chemical products, and trace elements (EIA, 2007).

Higher prices of oil and natural gas have caused coal to be a main source of electricity generation including the environmental concerns related to nuclear waste. Coal will not be replaced easily as a source of energy in Southern Africa. It is supplying fuel for 39% of the world's electricity generation. (EIA, 2009).

The supply of resources might be a likely factor providing potential conflict in the country and the world at large (Anderson, 1998). Availability and adequacy of resources is a national and world concern. A strategy for such resources is critical for a country. Production of coal constitutes mining related activities such as ownership, reserves and resources (depletion), technology, capacity and capability, capital investment, labour, infrastructure and coal terminal for export. Coal is important in the South African economy and is a primary energy source for electricity generation.

South Africa experienced shortage of coal supply at the state-owned power utility company that resulted in power outages.

The country also experienced a protest action by truck drivers and trucking companies due to concerns and fear of changes in supply mode of coal to the power stations. There are organisations and people calling for stopping of coal mines and the damage mines are causing to the environment and communities.

Department of mineral resources indicated that the government will consider declaring certain minerals such as coal and iron ore as strategic for the country. The main purpose of this decision is for industrialisation in South Africa. An announcement of the list of strategic minerals was expected during the 2015 state of the nation address. The mining industry and investors were concerned about the intention to declare minerals strategic.

Security of supply, adequacy and availability of coal resources will require government to have a clear strategy about its mineral resources. Population is increasing in South Africa. The growth of electricity demand can result in the depletion of Eskom’s generation reserves, which may lead to shortfall in coal supply. Shortfall in coal supply may be due to economic development and emerging economies (Humphreys, 1995) with increase in the demand of coal of lesser quality from countries such as China and India.

The increase in demand may lead to poor quality coal supply to Eskom. Some analysts have said that restricting coal exports in order to ensure security of supply to Eskom will negatively affect South Africa’s economy and will hinder investment in the mining sector.

COAL DEPOSITS IN SOUTH AFRICA

South Africa is rich in coal resources; commercial mining of coal started in 1857 and ranked as the sixth largest producer in the world. The production of coal is from different sources, which include private, and public companies. Approximately 70% of the coal is located in the Waterberg, Witbank, and Highveld coalfields and lesser amounts in the Ermelo, Free State State and Springbok Flats coalfields (see Fig.1). There are conditions such as coal quality; mining conditions which tend to become barriers for immediate conventional exploitation in the Waterberg, Free State and Springbok flats coalfields (Hancox et al, 2014).

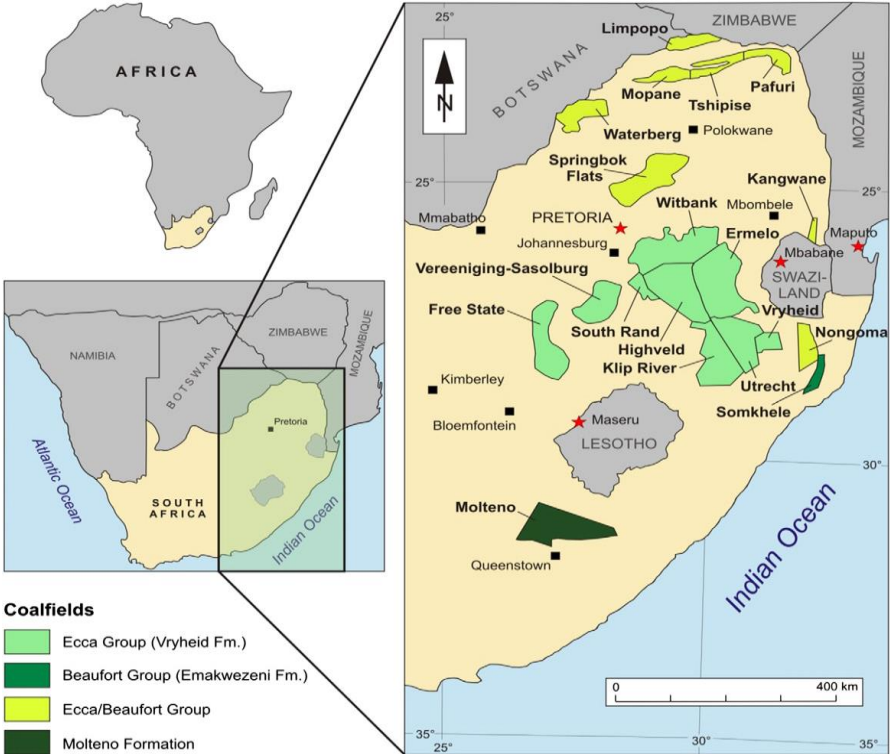


Figure 1: Coalfields of South Africa, (after Hancox et al, 2014)

Most of the higher grade coals in the central basin have been mined out and new mines have to deal with lower quality resources (Cadle et al, 1993). Two thirds of South Africa's coal reserves and resources are in the Waterberg. As coal reserves in the central basin diminish, a new heavy haul rail corridor to the Waterberg coalfield in Limpopo will need to be developed within an overall infrastructure investment plan that also addresses additional water supplies for the Lephalale area.

All coals contain mineral matter that can be removed through physical cleaning (Cairncross et al, 1987). In coal preparation and beneficiation, it is vital to understand coal characteristics, liberation processes of mineral matter, separation of coal from ash material and disposing of ash or waste material to the environment in a responsible manner (EIA, 2007)

The understanding of the character of coal of coal is important (Cairncross et al, 1988). Major challenges to exploit coal include water challenges, infrastructure, environments, poor roof conditions and depth including complex geology. These challenges can be addressed by; new extraction technologies, technology for exploiting coal in situ, suitable uses, markets for low grade, high ash coal, thin seam extraction, economic mining of both pillar coal, and utilisation of lower grade coals. In addition, clean coal technologies, coal cost, and quality, environmental considerations, sustainable development, growth of the economy, and regulations contribute to the use of coal as a primary energy source (Jeffrey, 2005).

Coal has been selected as one of the important resources in the beneficiation strategy of South Africa. The aim of the strategy is to advance development through the optimisation of linkages in the mineral value chain, facilitation of economic diversification, job creation and industrialisation and to ensure that South Africa's mineral wealth is developed to its full potential and to the benefit of the population (DMR, 2011).

STRATEGIC IMPORTANCE OF COAL

Strategic minerals are essential for the continuance of modern industry and can come from supply sources, which can be restricted at any time, depending mostly on essential uses and vulnerable supplies. Coal was not considered as a strategic resource previously and the ten identified strategic minerals were chrome, platinum metals, manganese, cobalt, vanadium, titanium, antimony, andalusite, chrysotile asbestos and industrial diamonds (Anderson et al, 1984). Classification of strategic resources may change for certain minerals according to availability of substitutes or technological changes, which may render particular uses obsolete (Haglund, 1984).

Strategic minerals or resources are needed for military and industrial or commercial purposes that are essential to renewable energy, national defense equipment, medical devices, electronics, agricultural production and common household items (DoD, 2010). They are essential for use but subject to potential supply disruptions, few or no satisfactory substitutes that exist and their absence will result in economic or social consequences. (NRC, 2007).

South Africa's coal deposits currently represent a relatively cheap and reliable source of energy. The country depends mostly on coal for power generation. Coal is the primary energy source for domestic electricity generation. It is also a feedstock for the production of a portion of the country's liquid fuel through Sasol. South Africa is the only country in the world that is operating commercial coal to liquids synfuel plants and used in metallurgical industry (Hancox et al, 2014).

Coal is used as a source of revenue and has played an important role in the South African economy. It is more important than gold in the economy, coal contributed R51 billion compared to gold that contributed R31 billion in 2013. The total income for the mining industry in 2015 was R419,5 billion. In comparison with 2012 and 2015, the large increases reported for mining of coal and lignite was more than R21,9 billion. Looking at the period between 2012 and 2015, the mining of coal and lignite group gained the biggest share of income by 3.7 percentage points from a percentage contribution of 24,4% in 2012 to 28,1% in 2015. In terms of employment, the number of people employed in the mining industry as at the end of June 2015 was 490 146. The employment contribution in the mining of coal

and lignite was 97 952 people, which is 20% of the total employment in the mining industry (StatsSA, 2015).

Many people will lose their jobs(i.e. those directly employed on the coal mines and power stations, Sasol, and metallurgical industries, and then others indirectly dependent on those sectors, like service providers, transporters (road and rail), engineering manufacturers, road builders, other related stakeholders including families who would suffer if there was to be no salary coming from employment.

Depositional age of coals in South Africa range from Early Permian to late Triassic (Hancox et al, 2014). The focus should not only be in tons of reserves available but also costs of production, location of the reserves and production, time frames about the concern regarding reliability and availability of mineral supplies. Mining operations tend to use lower-cost mineral resources first (large deposits, shallow, high quality and easy to process metallurgical). Companies can now look at lower quality deposits provided the costs are off-set by improvements in extraction and processing. This way the limit to availability of resources will be addressed.

Markets do not always solve every problem for resource investment. Government play an important role in marketing of resources such as free and open international trade, regulatory approval, and facilitation of information, research and development. Market pressures can be important in encouraging investment and insurance against mineral supply risks (Achzet et al, 2013).

ASSESSMENT METHODS OF STRATEGIC IMPORTANCE

Different methods can be used and applied to assess whether the mineral or resource is critical and strategic (Spiers et al, 2013). Security of supply, availability, and adequacy and sustainability aspects (Buchert et al, 2009) should be considered in the assessment. The long-term mineral availability is more than 10 years and determined by the function of geological, technical, environmental, social, political and economic factors (Desire, 2014).

Geological factors refer to the existence of the resource, technical (can we extract and process it), environmental and social (can we produce it in environmentally and socially accepted ways), political (how do governments influence availability through their policies and actions) and economical (can we produce it at a cost users are willing and able to pay). In the short and medium term, availability is less than 10 years, refers to instances where the significant restrictions to supply may occur due to physical unavailability or higher prices (Helbig et al, 2016).

In addition, major and minor factors such as supply (geological availability, economic availability and recycling), geopolitical (policy and regulation, geopolitical risk and concentrated supply), demand (future demand and substitutability), including other factors such as cost-reduction through technology and innovation, environmental issues, economic importance and coverage of the media remain critical to evaluate a strategic resource (EU, 2014).

South Africa should utilise its coal resource optimally to meet required domestic coal supply to maintain national security, economic growth and employment. It is important to ensure domestic security of coal supply for existing power stations and comprehensive plan for mining the coalfields. The demand for energy especially coal in the country is projected to increase (See figure 2).

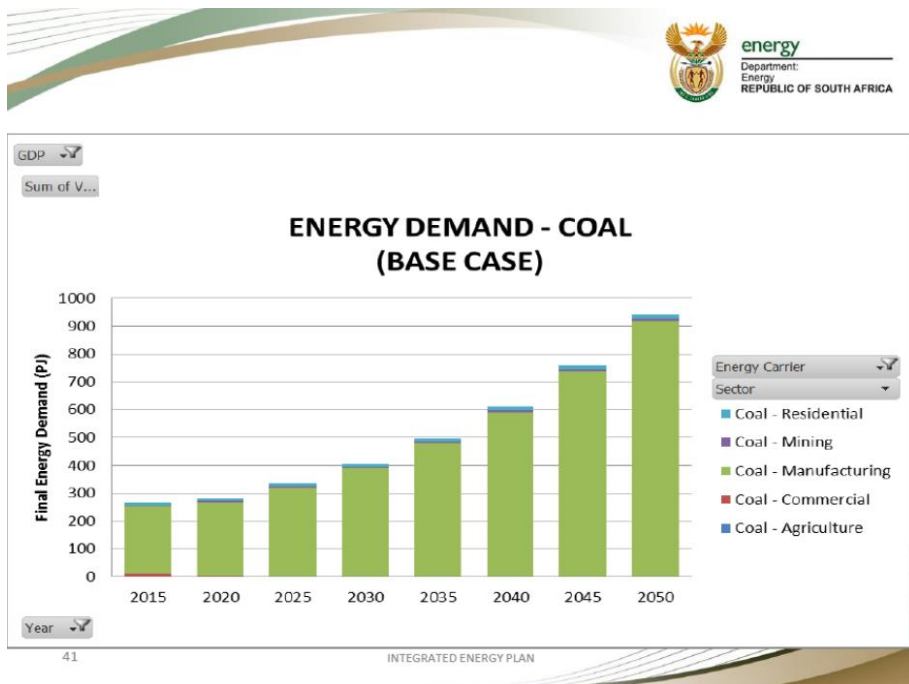


Figure2: Projected energy demand for coal (DoE, 2016).

Electricity is important for different industries. The country is aiming for industrialisation and manufacturing will require adequate electricity (see figure3).

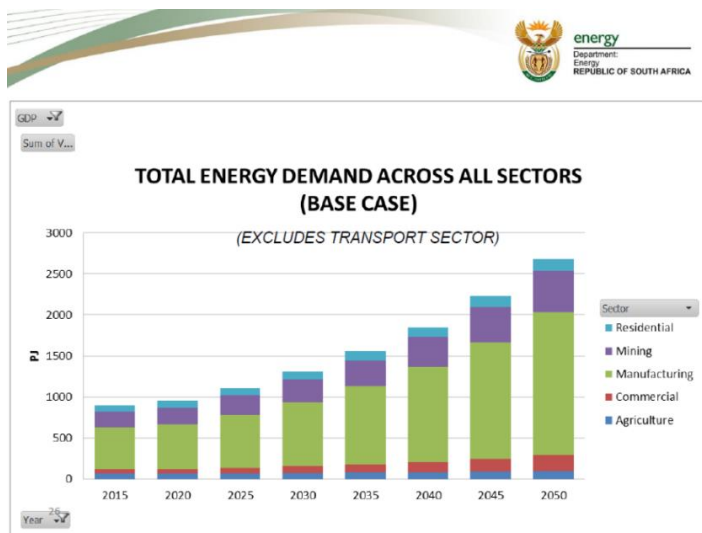


Figure3: Projected energy demand for coal (DoE, 2016).

The government should encourage and enable exploration activities to identify economic recoverable coal seams and shale gas. In the process of ensuring coal as a strategic resource, the following will be critical for the country,

- a. rail infrastructure development to unlock coal deposits in Waterberg; extending existing lines in the central basin and upgrading the line to Richards bay; alternative ways through other ports of entry
- b. investigation of the shale and coal bed methane;
- c. greater collaboration with different stakeholders;
- d. security of supply;
- e. export;
- f. new technologies to provide for cleaner coal use;
- g. empowerment of communities and new companies in the coal industry;
- h. Exploration, research and development

Coal prices are deregulated and the industry is mostly private owned. Growth in coal exports needs to be balanced with the need for domestic coal-supply security. Policy measures should be in place to ensure supply, however, government should be cautious in applying policy measures which might have unintended consequences.

DISCUSSION AND CONCLUSION

The main issue is whether adequate supplies of resources can be obtained in ways that minimise damage to the environment and disruptions to local communities. South African coal deposits currently represent a relatively cheap, reliable source of energy, coal is carbon intensive, and in the medium to long term, its maximum use may place the country in a difficult situation to participate globally once there is implementation of restrictions on carbon emissions to mitigate climate change.

South Africa depends mostly on coal for power generation. There is coal for export and coal of a lesser quality that stays in the country. Government needs to secure future coal. It must take necessary steps needed to secure billions of tons of thermal coal supplies for the state-owned power utility company (Eskom). Other plans for alternative sources and renewable energies such as solar, wind, gas, platinum fuel technology, etc. to address electricity shortage cannot completely substitute coal.

There is a great interest in coal from the government and mining industry especially existing coal producers, who may have concerns if coal is a strategic resource. Clarity is required on how this will affect the coal mining operations, investors and economy of the country and whether mining will be cost-effective. It may also led to decisions about the interest of the country versus the interest of investors and shareholders. The impact on direct and indirect employment including associated services and personnel will be huge if coal was to stop being mined. Many people will lose their jobs (i.e. those directly employed on the coal mines and power stations, Sasol, and metallurgical industries, and then others indirectly dependent on those sectors, like service providers, transporters (road and rail), engineering manufacturers, road builders, other related stakeholders including families who would suffer if there was to be no salary coming from employment.

Abundant coal reserves have led to a historical dependence on coal as a source of electricity and still South Africa experienced electricity shortage, which affected citizens, business and other related stakeholders. Considering the energy situation in the country, the analysis and understanding of the future of coal is crucial for the economy. Security of supply of coal to power stations is important including adequacy and sustainability.

Clearly developed framework and criteria to declare coal strategic will be good for the country; SA economy will benefit; coal mining will be cost-effective; great benefits for all stakeholders; direct and indirect socio-economic impacts on employment will be minimised and security of supply will also be achieved. Coal as a strategic resource will enhance the economic and strategic position of South Africa.

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