SOUTH AFRICA YEARBOOK 2012/13

Mineral Resources

South Africa is known for its abundance of mineral resources. It is estimated to have the world's fifth-largest mining sector in terms of gross domestic product (GDP) value and its mining companies are key players in the global industry.

Accounting for a significant proportion of world production, South Africa's total reserves remain some of the world's most valuable, with an estimated worth of R20,3 trillion (US$2,5 trillion).

South Africa holds the world's largest reported reserves of gold, platinum group metals, chrome ore and manganese ore, and the second-largest reserves of zirconium, vanadium and titanium.

The Department of Mineral Resources is tasked with promoting and regulating the country's minerals and mining for transformation, growth and development. Its ultimate goal is to ensure that all South Africans derive sustainable benefit from the country's mineral wealth.

In March 2012, South Africa moved up 13 places to 54th out of 93 jurisdictions in the latest Fraser Institute 2011/12 Survey of Mining Companies, which ranks the world's most attractive regions for mining investment.

The survey is based on the opinions of mining executives representing 802 mineral exploration and development companies.

In his 2012 Budget Speech, the Minister of Finance, Mr Pravin Gordhan, announced increased provision of resources to develop port and rail infrastructure, which is crucial to the mining industry. This added to the country's attractiveness as an investment destination.

Legislation and policies

Some key legislation and policies relating to the Department of Mineral resources are:

- The Mineral and Petroleum Resources Development Act (MPRDA), 2002 (Act 28 of 2002). The promulgation of the MPRDA in 2004 introduced a policy of equal access to South Africa's mineral resources. This democratic mineral dispensation introduced the policy of socio-economic responsibility, which was to be achieved through the application of black economic empowerment policy by ensuring that the historically disadvantaged South Africans are brought into the mainstream of

By May 2012, the Department of Mineral Resources received more than 3 500 applications online via the South African Mineral Resources Administration Online System for prospecting rights, mining permits and mining rights. Aimed at ensuring transparency and end administrative blunders, the Ministry of Mineral Resources launched the system in April 2011.

mining. However, challenges experienced in the implementation of these policies resulted in the need to review the MPRDA, 2002. The objectives of the review are to:

- provide for a detailed consultation process
- support the beneficiation strategy
- streamline the licensing process to avoid delays and inefficiencies
- provide for enhanced punitive measures
- improve the current construct of the Act and to remove ambiguities, and provide clarity on the mining of associated minerals.

- The Mineral Health and Safety Inspectorate of the Department of Mineral Resources, established in terms of the Mine Health and Safety Act (MHSA), 1996 (Act 29 of 1996) as amended, is responsible for protecting the health and safety of mine workers and people affected by mining activities.
- The Geoscience Amendment Act, 2010 (Act 16 of 2010) expands the functions of the Council for Geoscience (CGS) by:
  - mandating the CGS to be the custodians and curators of geotechnical information, to be a national mandatory advisory authority in respect of geohazards related to infrastructure development, to undertake exploration and prospecting research in the mineral and petroleum sectors and to add to the functions of the council
  - putting mechanisms in place to address problems associated with infrastructure development on dolomitic land
  - empowering the CGS to be the custodian of all geotechnical data to compile a complete geotechnical risk profile of the country
  - enabling the CGS to become the custodian of technical information relating to exploration and mining.
- The Mining Charter: The Broad-Based Socio-Economic Charter for the South African Mining Industry, known as the Mining Charter, was first published in April 2004. During 2010, the Department of Mineral Resources unveiled the revised Mining Charter 2010, which updates and expands upon a set of empowerment targets (originally set in the Mining Charter 2002), with emphasis on a target of 26% black ownership of the country's mining assets by 2014.

To ensure the efficacy of the beneficiation strategy, which was approved by Cabinet in June 2011, certain amendments to all relevant legislation will be effected. These include the Precious Metals Act, 2005 (Act 37 of 2005), the Diamond Amendment Act, 2005 (Act 29 of 2005), and Section 26 of the MPRDA, 2002.

Five value chains were prioritised from the selected commodities in the strategy, namely:

- iron and steel: beneficiating iron ore, chrome, manganese, nickel and vanadium
- energy commodities: focusing on coal and uranium
- auto catalytic converters and diesel particulate filters: beneficiating platinum group metals
- pigment and titanium metal production
- jewellery manufacturing: to increase beneficiation of platinum group metals, diamonds and gold.

Funding

The Department of Mineral Resources tabled a budget of R1 169 billion for the 2012/13 financial year, an increase of R130 million from the previous budget of R1 039 billion.

This increase was largely earmarked for research and development in the minerals and mining industry, through the Council for Mineral Technology and Research (Mintek) and the CGS.

The budget was allocated as follows:

- R239 million for administration
- R154 million for mine health and safety
- R180 million for mineral regulation
- R596 million for mineral policy and promotion.

Included in these figures is an amount of R560 million allocated for transfers and subsidies to departmental agencies, public and private enterprises.

The South African mining industry's total income in 2011, using quarterly unadjusted data from Statistics South Africa, was estimated at R489 billion. Expenditure was estimated at R484 billion.

Some R148,6 billion was spent on purchases and operating costs such as timber, steel, explosives, electricity, transport and uniforms; R88,7 billion was paid on salaries and wages for mine employees (slightly higher than the Department of Mineral Resources' estimate of R87 billion); R46,5 billion on capital expenditure; R38 billion on depreciation and impairments; and R17,2 billion paid on interest.

The mining industry also contributes to the national fiscus through royalties taxes, having paid R4,4 billion and R5,5 billion in 2010 and 2011, respectively.

It is important to dispel the myth that all mined products are exported in raw form with very little downstream beneficiation taking place locally. Nearly 100% of South Africa's cement and building aggregates are made locally and 80% of the country's steel is manufactured locally from locally mined iron ore, chrome, manganese and coking coal; using furnaces that are 95% powered by electricity from coal-fired power stations (the 20% imported steel is speciality steel products not made locally).

Over 30% of South Africa's liquid fuels are produced within the country from locally mined coal and 95% of electricity is generated in power plants that use locally mined coal. Most domestic chemicals, fertilisers, waxes, polymers and plastics are manufactured using locally mined minerals and coal and 13% of the world's platinum catalytic converters are made in South Africa.

Role players

Mining Qualifications Authority (MQA)

The MQA was established as a sector education and training authority and facilitates the development of appropriate knowledge and skills in the mining, minerals and jewellery sectors to:

- enable the development and transformation of the sector
- contribute to the health, safety and competitiveness of the sector
- improve access to quality education and training for all
- redress past inequalities in education and training.

The MQA is responsible for:

- developing and implementing a sector skills plan
- developing unit standards and qualifications for the sector
- establishing, registering, administering and promoting learnerships and apprenticeship
- maintaining the quality of standards, qualifications and learning
- disbursing grants from the skills development levy.

Chamber of Mines

The Chamber of Mines of South Africa is a prominent industry employers' organisation. Its purpose is to advance, promote and protect the collective interests of its members.

Its mandate includes monitoring, investigating, analysing and considering matters of collective interest to its members and providing recommendations on the position to be taken.

Where appropriate, the Chamber of Mines represents its members and provides technical and expert assistance on matters affecting their collective interest.

For its members in the gold and coal sectors, the Chamber of Mines negotiates wages and conditions of employment with trade unions representing mining employees.

Members of the Chamber of Mines account for about 90% of South Africa's mining production by value and employ about the same percentage of the mining industry's labour force.

Some environmental issues affect the integrity of the industry. To tackle these, the chamber has, among other things, engaged in:

- liaising with biodiversity stakeholders to develop the Biodiversity Guideline that will be user-friendly for environmental managers within the mining industry
- facilitating the industry's involvement with government and other stakeholders to develop and implement the plan to manage the scourge of acid mine drainage
- supporting the development of best practices for mine water management through the Department of Water Affairs, such as the draft guideline on water conservation and water demand management.

South African Diamond and Precious Metals Regulator (SADPMR)

The SADPMR regulates the diamond, platinum and gold industries and accelerates beneficiation in the jewellery industry.

The SADPMR's objectives are to:

- ensure that precious metal and diamond resources are exploited and developed in the best interests of all South Africans
- promote equitable access to and local beneficiation of precious metals and diamonds
- promote the development of precious metal and diamond enterprises
- advance broad-based socio-economic empowerment
- ensure compliance with the Kimberley Process Certification Scheme.

Its functions regarding diamonds include:

- implementing, administering and controlling all matters relating to the purchase, sale, beneficiation, import and export of diamonds
- establishing diamond exchange and export centres to facilitate the buying, selling, export and import of diamonds.

While the South African Diamond Board had an essentially regulatory role, the SADPMR has a promotional role as well.

Through administering licences and export approvals, the SADPMR ensures that local demand for diamonds and precious metals is catered for, and that there is growth in local beneficiation of diamonds and precious metals.

Council for Mineral Technology and Research (Mintek)

Mintek is the national mineral research organisation, specialising in mineral processing, extractive metallurgy and related areas. Working closely with the mineral resources industry and other research and development institutions, Mintek provides service testwork, process development and optimisation, consulting and innovative products to clients worldwide.

Mintek is an autonomous statutory organisation that reports to the Minister of Mineral Resources.

About 30% of its annual budget is funded by the State Science Vote, with the balance provided by contract research and development, sales of products and services, technology licensing agreements, and joint-venture private sector companies.

Council for Geoscience (CGS)

The CGS was established in 1993 under the Geoscience Act, 1993 (Act 100 of 1993). The CGS grew from its humble beginnings in 1912 as the Geological Survey of the country to be recognised as one of the best geoscience institutions in the world.

The CGS is mandated to carry out systematic geological, geophysical, geochemical, marine geoscience, metallogenic and engineering geological mapping of South Africa. The council is also able to provide commercial geoscientific services.

The CGS participates in a variety of Southern African Development Community (SADC) projects aimed at promoting the economic development of the African sub-continent.

International cooperative projects that have been carried out, or are in progress, include geological mapping, geochemical and geophysical surveys, and the production of maps in many countries, either on a bilateral basis or collaboratively in the SADC region.

In December 2010, the Geoscience Amendment Act, 2010 (Act 16 of 2010), was passed by Parliament. It is aimed at refocusing the objectives of the CGS to promote the search for and exploitation of any mineral in the country and

to act as a national advisory authority in the areas of geohazards and geo-environmental pollution.

State Diamond Trader

The State Diamond Trader buys and sells rough diamonds to promote equitable access to and beneficiation of diamond resources. It is a state-owned entity that addresses distortions in the diamond industry and corrects historical market failures to develop and grow South Africa's diamond cutting and polishing industry.

The State Diamond Trader sells to approved customers through its application and approval process. The entity is eligible by law and proclamation to purchase up to 10% of the run of mines from all diamond producers in South Africa.

African Mining Partnership (AMP)

The AMP, whose main function is to drive the New Partnership for Africa's Development (Nepad) mining initiatives, was established during the African Mining Minister's meeting in Cape Town in February 2004.

South Africa, as a major role player in this body, has played an important role as the Secretariat, in hosting as well as coordinating the affairs of the AMP.

The AMP has been successfully merged with the African Union Conference of Ministers Responsible for Mineral Resources Development during the last Plenary Meeting in February 2010, which was hosted by South Africa.

African Diamond Producers' Association (ADPA)

ADPA is an intergovernmental organisation that seeks to strengthen the level of influence African diamond-producing countries have on the world diamond market. It implements policies, strategies and laws that assist the generation of diamond profits from foreign diamond mining companies to its member states.

The organisation was formed in November 2006 as a continental branch of the African Diamond Council, Africa's supreme diamond governing body.

The Department of Mineral Resources received Cabinet approval to participate in the ADPA in 2009. The ADPA has three organs, namely the Council of Ministers, Executive Secretariat and the Meeting of Experts. The Council of Ministers constitutes 18 African countries, 11 of which – including South Africa – are full members, while the remainder enjoy observer status.

For South Africa, membership of this association presents an opportunity to position itself strategically among diamond-producing countries in Africa. It could add significant impetus to diamond beneficiation initiatives and also boost its aim of becoming the beneficiation hub and gateway to Africa.

Mining industry

The discovery of world-class diamond and gold deposits in the latter half of the 19th century laid the foundation for the emergence of South Africa from an essentially agricultural to a modern industrial economy. The mining industry subsequently covered a wide-ranging spectrum of minerals, in which South Africa has an exceptional geological/mineral endowment.

With significant resources of gold, uranium, chrome, manganese, platinum group metals, titanium minerals, vanadium, coal, limestone, vermiculite and zirconium, South African mining real estate remains attractive for development.

South Africa has significant known reserves and resources of mineral commodities, with almost 60 minerals being actively mined and prospects for exploitation of an additional two new minerals in the short to medium term. A large number of these known reserves were discovered using conventional exploration methodologies. For this reason, there still lies considerable residual potential for discovery of world-class deposits using modern exploration technology.

This is further supported by existing mining infrastructure, which enables investors to leverage maximum value from their investment while simultaneously contributing to socio-political improvement.

In 2011, the mining sector accounted for 8,8% of GDP. If the indirect multiplier and induced effects of mining are included, the overall contribution to GDP is closer to 18%. Real mining GDP of R99,4 billion in 2011 was still smaller than peak mining GDP of R105,4 billion achieved in 2007, just prior to the global financial crisis.

The mining sector real fixed investment, which rose strongly in 2007 and 2008 (up 31,3% and 27,5%, respectively) was hard hit by the global financial crisis and domestic constraints, and consequently only grew by 8,1% in 2011. Not only did the financial crisis hit prices, but domestic constraints including regulatory uncertainty, infrastructure constraints and other issues also affected investment by mining companies.

However, mining still accounted for 20% of private sector investment and 12,3% of total investment in the economy in 2011. The mining sector continued to be a key component of the Johannesburg Stock Exchange and accounted for 29% or R1,4 trillion of the All-Share Index at the end of 2011.

The total 2011 mining production decreased by 0,2%, with platinum group metals production up 1,6%, coal decreased by 0,2%, iron ore production decreased 1,4%, manganese production grew by 21% and diamond production decreasing by 21%. Gold production fell by 4,2%, a much slower rate of decline versus the 4,9% decline in production recorded in 2010.

South African mineral sales rose by 23% to R370,6 billion in 2011. This means that the value of mineral sales in nominal terms has exceeded the pre-crisis levels.

The improvement in mineral sales was driven by the 13,6% increase in the value of platinum group metals sales to R83,9 billion, the 22,3% growth in coal sales to R87,8 billion, the 30% rise in gold sales to R68,9 billion, the 44% rise in iron ore sales to R62,7 billion, and the 30% increase in chrome ore sales to R8,6 billion. In 2011, manganese sales decreased by 7% to R9,9 billion, from R10,7 billion in the previous year. Gold, platinum group metals, iron ore and coal accounted for 82% of South Africa's total mineral sales in 2011.

Total primary mineral sales exports increased by 25,8% to R282 billion in 2011. This accounted for 38% of South Africa's total merchandise exports.

In the past decade, the mining sector has contributed just over R1,9 trillion to both the country's GDP and export earnings, in real money terms.

BHP Billiton's Metalloys manganese smelter in Meyerton, south of Johannesburg, was unveiled in March 2012. The M14 furnace is currently the largest new investment in the manganese industry in the country and has expanded BHP's production capacity by 81 MVA. The furnace is designed to produce 120 000 kt of high-carbon ferromanganese per year.

Job creation

Beneficiation is one of the components of the department's growth strategy, as it has the potential to create jobs and contribute to the economic development of the country.

To this end, Cabinet has approved the beneficiation strategy as well as two implementation plans for the five value chains. The remaining three value-chain implementation plans will be completed during the course of 2012.

The mining sector employed 513 211 people in 2012, compared to 498 906 in 2010. In 2012, the mining sector helped to create 1 353 383 jobs, which can be segmented as follows:

- 16,2% of the total formal non-agricultural employment in the country
- 514 760 jobs directly and 838 623 jobs indirectly in the industries that either supply goods and services to the mining sector, use mining products for downstream value addition, or are related to the spending multipliers from mining and mining employees in the economy
- given a dependency ratio of about 10 to 1, about 13 500 000 people were directly dependant on the 1 353 383 jobs created by the mining sector for their daily food.

Mine health and safety

The Mine Health and Safety Inspectorate of the Department of Mineral Resources is responsible for protecting the health and safety of mineworkers or people affected by mining activities, by being responsible for implementing mine health and safety legislation.

The inspectorate was established in terms of the Mine Health and Safety Act, 1996, as amended, for the purpose of executing the statutory mandate of the Department of Mineral Resources to safeguard the health and safety of mine employees and communities affected by mining operations.

The activities of the inspectorate focus on achieving a safer and healthier mining industry for all. It works closely with industry and worker unions to reduce the incidence of mine accidents, with stakeholders committing themselves to continuously reduce fatalities by at least 20% a year.

This is to be achieved by reducing mining-related deaths, injuries and ill health through the formulation of national policy and legislation, the provision of advice, and the application of systems that monitor and enforce compliance with the law in the mining sector.

The inspectorate is also pursuing a strategy to eliminate silicosis and noise-induced hearing loss, also known as occupational deafness, by 2013.

By the end of October 2012, there had been 82 fatalities in the mining industry for the year, a 15% reduction on the 97 fatalities during the same period in 2011.

Although deaths resulting from fall-of-ground in mines decreased by about 19%, from 47 in 2010 to 38 in 2011, it remains the major contributor to fatalities. The number of mine injuries decreased by 15%, from 3 436 in 2010 to 2 918 in 2011.

In 2011, for the first time in five years, there were no mine-disaster accidents. A mine-disaster accident is a single event that results in the deaths of four or more employees.

Small-scale mining in South Africa

The Department of Mineral Resources deems the role of small-scale mining critical in community upliftment, job creation and poverty alleviation.

The department's small-scale mining strategy provides a framework for creating a sustainable sector that is characterised by growth and development, and contributes to rural development, job creation and poverty alleviation through community-linked small, medium and micro-enterprise projects.

Small-scale mining projects that fall within the Presidential poverty nodes will receive special attention. The Department of Mineral Resources aims to identify and demarcate areas with mineral deposits and foster economies-of-scale by forming community clusters.

Small-scale mining projects and government-supported initiatives are also to be linked with financial institutions.

Sustainable development

Mine environmental management forms an integral part of the management of mineral resources in South Africa. To manage the environmental impact of mining effectively, the department undertakes research, develops mine environmental policies, legislation and strategies, provides strategic guidance on mine environmental management, mine rehabilitation, water ingress, mine environmental legacies and sustainable development.

Environmental management in the mining sector seeks to reframe government's approach towards the sector's impact on the environment to ensure the security and good health of future generations.

All three pillars of sustainable development are considered by fostering integrated mineral

The inaugural Mining Lekgotla was held in June 2012 in Midrand, Gauteng. The two-day lekgotla brought together over 1 000 representatives of government, industry and labour to map a way forward on how to improve the global competitiveness of the South African mining industry and its contribution to the country's economy.

development that promotes social integration, and creating wealth while promoting responsible mining, as well as greening the mining industry.

Implementation of the mining sector strategy is a key priority aimed at growing the South African mining industry sustainably, while simultaneously transforming it meaningfully.

Rehabilitation of mines

Rehabilitation of derelict and ownerless mines continues to be a key area of focus for the department, given the urgent and mammoth task at hand.

However, rehabilitation of mines is a costly exercise and only a certain number of sites can be rehabilitated every year, depending on the funds allocated to the programme.

To implement the strategy for the management of derelict and ownerless mine sites in 2012/13, the department has prioritised 12 projects for rehabilitation. Additional funds have been allocated to implement the strategy in 2013/14.

Acid mine drainage

Acid rock drainage occurs as a result of reactions between sulphide minerals, oxygen and water, catalysed by bacteria. The mining of sulphide-rich materials exposes sulphide minerals to the elements, accelerating the natural process and forming acid mine drainage.

The sulphuric acid generated in these reactions can mobilise other components of materials, often resulting in high concentrations of toxic heavy metals in the rivers and streams that drain mining areas.

A budget of R225 million has been approved for 2011/12 and 2012/13 for the pumping and neutralisation of acid mine drainage in the Witwatersrand area.

A feasibility study for a long-term solution to address acid mine drainage associated with the East Rand, central and West Rand underground mining basins started in December 2011 and is expected to be concluded by mid-2013.

Concerted efforts are made to ensure that the mines are regularly monitored for compliance to their water-use licences. By March 2012, 58% of the 61 mines monitored were compliant, which is an improvement from 33% of the 43 mines monitored in 2010.

South Africa dominated global gold production in the 20th century and in one year – 1970 – accounted for 79% of the entire world's production. It is estimated that South Africa has produced some 40 000 tons of gold since the start of recorded history – about one third of the total worldwide.

There are 35 large-scale gold mines currently operating in South Africa, including the record setting TauTona mine, which extends 3,9 km (approximately 2,5 miles) underground. TauTona means "great lion" in Setswanan.

Cape Town plays host to the annual Indaba Mining Conference, one of the largest gatherings of mining stakeholders, which attracts nearly 10 000 people representing more than 1 000 companies.

Mineral wealth

South Africa's mineral wealth is typically found in the following well-known geological formations and settings:

- the Witwatersrand Basin yields some 93% of South Africa's gold output and contains considerable uranium, silver, pyrite and osmiridium resources
- the Bushveld Complex is known for platinum group metals (with associated copper, nickel and cobalt mineralisation), chromium and vanadium-bearing titanium-iron ore formations as well as large deposits of industrial minerals, including fluorspar and andalusite
- the Transvaal Supergroup contains enormous resources of manganese and iron ore
- the Karoo Basin extends through Mpumalanga, KwaZulu-Natal, the Free State as well as Limpopo, hosting considerable bituminous coal and anthracite resources
- the Phalaborwa Igneous Complex hosts extensive deposits of copper, phosphate, titanium, vermiculite, feldspar and zirconium ores
- kimberlite pipes host diamonds that also occur in alluvial, fluvial and marine settings
- heavy mineral sands contain ilmenite, rutile and zircon

- significant deposits of lead-zinc ores associated with copper and silver are found in the Northern Cape near Aggeneys.

The bulk of the known mineral resources and reserves were discovered using conventional exploration methods, but the country still has significant potential for additional discoveries of world-class deposits, using modern exploration technologies.

South Africa has the world's largest resources of platinum group metals (87,7% of world total), manganese (80%), chromium (72,4%), gold (29,7%) and alumino-silicates. South Africa also accounts for over 40% of global production of ferrochromium, platinum group metals and vanadium.

It is the world's leading producer of chrome ore, vermiculite and alumino-silicates, and is among the top three producers of gold, manganese ore, titanium minerals and fluorspar.

The South African mining industry contributes 51,7% of world ferrochromium exports and 54% of alumino-silicates, and is one of the world's largest exporters of platinum group metals, gold and vanadium, and a significant exporter of manganese ore. Other important export commodities include ferro-manganese and fluorspar.

Although South Africa is probably the largest exporter of vanadium, gold and platinum group metals, it is not possible to rank it because of the unavailability of export data from other producing countries.

Gold

In 2011, global gold production increased by 2,8% to 2 818 tons (t). The largest growth was seen on the African continent, with production in seven countries rising by four tons or more. South Africa retained its position as the fifth-largest contributor to global production, at 191 t (6,8% of the total). This is 2% lower than 2010 levels.

In 2011, the gold price rose to a record US$1 569 per ounce on the back of increased global uncertainty. The continued fragility of the global economy and debt overhangs in advanced economies, together with vulnerable housing and equity markets, continued to force policy makers in advanced economies to be cautious, which continued to support rising gold prices.

The Council for Scientific and Industrial Research announced in August 2012 that it had developed a process to manufacture titanium powder for industrial and medical applications. This is an important step forward for South Africa's drive to establish a new industry that will add value to locally mined titanium, instead of exporting it.

The gold mining sector remained a key contributor to the South African economy in 2011 and accounted for R68,9 billion in foreign currency earnings or 10,7% of total merchandise exports, and about 2% of GDP. Approximately 5% of production was sold locally at a value of R3,6 billion, while the balance of production (95%) was exported at a value of R65,3 billion.

In 2011, the local gold mining industry employed 145 561 people, with employees earning R20,9 billion in salaries and wages. The industry further invested R11,8 billion in capital expenditure in the country in 2011.

Coal

The global coal production market was negatively affected by the natural disasters in Japan and Australia in 2011. South Africa was unable to fill the export gap from these regions, as it still experienced rail-capacity constraints.

In 2011, South African coal production decreased by 1,7% to 252,8 million (M) t. Total coal sales by value increased by 23% from 2010, to an amount of R87,8 billion. Approximately 72% of production was sold locally at a value of R37,3 billion, while the balance of production (28%) was exported at a value of R50,5 billion.

The coal sector accounted for 7,7% of merchandise exports in 2011, making it the fourth largest component after platinum group metals, gold and iron ore. Exports from the Richards Bay Coal Terminal increased to 65,5 Mt in 2011, but still short of its full potential at 91 Mt.

In 2011, the number of people employed in the local coal mining industry increased by 6%

to 78 580, with employees earning R16,1 billion in salaries and wages.

Platinum group metals

The platinum group metals sector is one of the largest components of the South African mining sector, measured in GDP, export earnings and contribution to the economy.

In 2011, the platinum group metals industry generated R84 billion in sales, was responsible for 36% of the country's mining exports (17% of total merchandise exports) and had significant direct, indirect and induced multipliers into the rest of the economy, which made it a significant contributor to the fiscus.

The sector took strain in 2011. On the demand side, it experienced material surpluses of product and depressed demand, resulting in depressed prices.

On the supply side, the industry experienced high operating costs, which led to a significant portion of local producers being in a marginal position, given current prices.

The following challenges were identified:

- high cost structures of the platinum group metals mining sector
- platinum surplus as a result of weakness in the European market, further exacerbated by the increased availability of scrap and recycled metal
- low price of platinum group metals
- substitution of platinum by palladium
- declining competitiveness of the sector.

Stakeholders agreed to explore practical solutions to reduce costs and improve the viability of the sector, through strategic partnerships and a collective vision.

In 2011, South Africa's platinum group metals production increased marginally by 2,6% from 244,2 t to 250,6 t.

Platinum production increased by 4,7% to 151 t. South Africa accounted for 83,8% of primary rhodium production, 74,9% of primary platinum production and 34,8% of primary palladium production. Local production of platinum group metals in 2011 was essentially in line with 2010, despite a challenging environment.

The platinum group metals sector employed 194 479 people in 2011, an increase of 7% from 2010, with employees earning R30,5 billion in salaries and wages.

Platinum

The global platinum market swung into oversupply of approximately 13,4 t in 2011.

Recycling rose by 12% to 62,2 t. Gross demand for platinum, excluding recycling, increased by 2% from 245,9 t to 251,8 t, due to heavy purchasing demand in the glass and petrochemical industries.

Platinum demand in heavy-duty diesels increased, but was offset by a drop in light-duty diesel vehicles and reduced buying from Japanese manufacturers.

Given that Europe is the South African platinum group metals mining industry's biggest market (accounting for 27% of global platinum demand), the sovereign debt crisis in the eurozone and the resulting recession in that region materially affected the local platinum group metals industry.

Jewellery demand remained strong at 77 t, up 2% from its 2010 levels.

The platinum price in 2011 averaged US$1 721 per ounce, trading about 7% higher than the 2010 average of US$1 611 per ounce. Platinum reached a high of US$1 887 in August, with a low of US$1 354 in December of the same year.

Palladium

The global supply of palladium in 2011 remained at 228,9 t. Increased production from North America and Zimbabwe was off-set by a drop in sales from Russian state inventories.

South African palladium production decreased by 3% from 82,1 t in 2010, to 79,6 t in 2011.

Gross palladium demand, excluding recycling, decreased by 13% in 2011, to 262,8 t. A strong automotive sector, however, pushed up gross palladium demand by 8% to 187,6 t in 2011.

Gross jewellery demand decreased by 15% from 18,5 t in 2010 to 15,7 t in 2011.

The palladium price in 2011 averaged US$733 per ounce, trading about 39% higher than the 2010 average of US$526 per ounce. A deep sell-off in the exchange-traded fund market and the perception of weaker fundamentals caused the palladium price to fall from its highs of US$850 during the first three quarters of 2011, to trade at US$700 for the rest of the year.

Rhodium

Despite a growth in demand, the rhodium market remained in surplus in 2011 by 0,4 t, as a result of higher supplies and recycling. A modest growth in demand was outpaced by a rise in supplies and higher volumes of metal recovered from scrap autocatalysts.

Total supply grew by 4% to 23,8 t, largely due to increased supplies from North America and Zimbabwe. South African rhodium increased by 1,4% to 19,9 t, from 19,7 t in 2010.

Gross demand for rhodium increased by 2,1% in 2011 to 28,2 t, due to capacity-building in the glass industry and investment in a new rhodium exchange-traded fund.

The first physically backed rhodium exchange-traded fund was launched by Germany's Deutsche Bank in May 2011, and attracted steady new investment (on aggregate) of 529 t for the year.

Gross autocatalyst demand decreased by 2% to 22,1 t due to lower output by Japanese car manufacturers. This was caused by the earthquake in Japan in March 2011, which vastly affected vehicle production and hence rhodium purchases for use in autocatalysts. Japanese manufacturers are the largest users of rhodium in gasoline after-treatment processes.

The rhodium price in 2011 averaged US$2 022 per ounce, trading about 18% lower than the 2010 average of US$2 458 per ounce. The rhodium price reflected weaker fundamentals, reaching a two-and-a-half year low of US$1 400 by the end of 2011.

Chromite

In 2011, South Africa's chromite production decreased by 1,4% to 10,7 Mt. Domestic sales grew by 29% to R5,4 million from R4,2 million in the previous year, while export sales grew by 32% from R2,5 million to R3,2 million in 2011. Total sales increased by 30% to R8,6 million.

The sector employed 16 389 people, and paid R2,7 billion in salaries and wages.

In May 2012, the South African Chamber of Commerce and Industry introduced a new scale on which copper theft is measured – the Copper Theft Volume Indicator. According to the indicator, the amount of copper stolen in South Africa dropped from R27 million in April 2012 to R23 million in May 2012. This translates into 356 tons stolen in May 2012, almost 16% less than April 2012.

Ferrous minerals

South Africa plays a significant role as a source of ferrous minerals. The country is the largest producer of chromium and vanadium ores and a leading supplier of their alloys. It is also a significant producer of iron and manganese ores, and a minor producer of ferrosilicon and silicon metal. Ferrous minerals are produced from some 32 mines and 23 ferroalloys smelters.

Over the last decade, increasing portions of the production of chrome, manganese and vanadium ore have been processed to value-added alloys in line with the drive for beneficiation, whereas the bulk of growth in iron ore production has been exported.

Copper

Palabora, a large copper mine, smelter and refinery complex managed by the Palabora Mining Company at the town of Phalaborwa in the Limpopo province, is South Africa's only producer of refined copper. Producing about 80 000 t per year, it supplies most of South Africa's copper needs and exports the balance.

Useful byproduct metals and minerals include zirconium chemicals, magnetite and nickel sulphate as well as small quantities of gold, silver and platinum. Palabora's large block cave copper mine and smelter complex employs approximately 2 200 people.

Palabora also owns a nearby vermiculite deposit, which is mined and processed for sale worldwide. Vermiculite is a versatile industrial

mineral with hundreds of uses. Palabora is South Africa's leading copper producer. Located 360 km north-east of Pretoria, close to the Kruger National Park, Palabora is also a major source of vermiculite and baddeleyite (zirconium oxide).

In 2011, South African copper production increased by 7% to 89 300 t. Domestic sales grew by 25% to R3,9 million from R3,2 million in the previous year, while export sales grew by 24% from R1,2 million to R1,5 million.

The international copper spot price fell to an average of about R62 498 per metric ton in June 2012, from about R66 638 in May 2012, and about R69 564 in March 2012.

Iron ore

In 2011, South Africa produced 58,1 Mt of iron ore, which was 1,2% lower than the previous year's total. Domestic sales decreased by 7% to 9,8 Mt, while export sales grew by 9% to 58,4 Mt. Local sales were valued at R4,2 billion, while export sales realised R58,4 billion.

Total iron ore sales grew by 44% overall to R62,7 billion, making iron ore the fourth-largest component of the South African mining industry by sales value. Iron ore exports accounted for 9% of total merchandise exports. In 2011, the sector employed 22 343 people and paid R6,5 billion in salaries and wages.

Manganese

South Africa accounted for 24% of the global manganese production in 2011, followed by China (20%) and Australia (17%).

In 2011, local manganese production increased by 21% to 8,7 Mt. Of the total production, 6,8 Mt was exported at a value of R8,6 billion, while the balance was sold domestically at a value of R1,3 billion. The export sales value decreased by 5% compared to 2010. This was owing to a 19% drop in the price received per ton, from R1 560 to R1 265.

The sector employed 7 356 employees in 2011 (25% up from 2010), and paid a total of R1,3 billion in salaries and wages.

Diamonds

The diamond industry continued to improve in 2011. With an estimated 75% of cut diamonds destined for North America, Japan and Europe, the growth in these regions has driven up demand, together with a higher demand in China and India.

Leading producers by value are Botswana (27%), Russia (19%), Canada (18%) and South Africa (12%). South African diamond production decreased by 20% from 8,9 million carats in 2010 to seven million carats in 2011. The value of rough diamonds produced rose significantly by 26% to approximately R14,4 billion.

In 2011, global diamond retail sales rose by 18% to US$70,8 billion, with the United States of America (USA) market accounting for 38%, Japan 8%, India 12%, China 11% and Hong Kong 2%.

The value of the diamond content in retail jewellery sales in 2011 appreciated by 29% to US$23,6 billion, with R22,6 billion from recently mined rough diamonds or inventories.

Hence, the balance of R1 billion in value, as estimated by the International Diamond Exchange, is from recycled diamonds, which represents approximately 4,4% of all polished diamonds sold at polished wholesale prices. Pipeline participants therefore need to bear this factor in mind, especially when estimating supply-and-demand trends.

The Kimberley Process Certification Scheme figures show that global production is not growing in volume, but that demand is driving up prices.

The International Diamond Exchange price index estimated diamond prices appreciating strongly by 17% in 2011. Even with the strong performance during 2011, polished diamond price gains remained in line with their long-term compound annual growth rate of about 4% annually.

Factors positively affecting diamond prices include:

- consumer demand growth in the USA, Chinese and Indian markets

- re-stocking of diamonds and diamond jewellery by retailers in virtually all markets
- higher rough diamond prices, which were passed along, in part, throughout the diamond pipeline.

In 2011, the number of people employed in the local diamond mining industry increased by 5% to 12 030, with employees earning R2,1 billion in salaries and wages.

Industrial minerals

There are some 680 producers of industrial minerals in South Africa, of which almost half are in the sand and aggregate sector.

There are some 153 producers of clays (brick-making and special), 40 limestone and dolomite, 79 dimension stone, 28 salt and 20 silica producers. The bulk consumption of industrial minerals is realised in the domestic market, as most are low-priced commodities and sold in bulk, making their economic exploitation highly dependent on transport costs and distance to markets.

In 2011, South African aggregate sand production decreased by 0,6% to 52,3 Mt, though the sales value increased by 5% to R4 million. The sector employed 7 086 people and paid a total of R737 739 in salaries and wages.

Geology

South Africa has a long and complex geological history dating back more than 3 700 billion years. Significant fragments of this geology have been preserved, and along with them mineral deposits.

The preservation of so much Archaean geology, dating back more than 2 500 million years, has resulted in the Archaean Witwatersrand Basin, as well as several greenstone belts, being preserved. Ten of the more significant geological formations in South Africa are discussed below.

Barberton mountain land

This beautiful and rugged tract of country with some of the oldest rocks on Earth is found south of Nelspruit, Mpumalanga. The renowned Barberton Greenstone Belt, the largest of its kind in South Africa, contains remnants of original crust, dated at around 3,5 billion years old.

The greenstone formations represent the remains of some of the earliest clearly decipherable geological events on the Earth's surface. Silica-rich layers within the greenstone have revealed traces of a very early life form – minute blue-green algae. Granites surround the formations and gneisses that are more than 3 000 million years old. Gold, iron ore, magnesite, talc, barite and verdite are mined in the area.

Witwatersrand

The geology and gold mines of the Witwatersrand (Ridge of White Waters) are world famous. Nearly half of all the gold ever mined has come from the extensive Witwatersrand conglomerate reefs that were discovered in 1886, not far from Johannesburg's city centre. The Witwatersrand is the greatest goldfield known to mankind. More than 50 055 t of gold have been produced from seven major goldfields distributed in a crescent-like shape along the 350-km long basin, from Welkom in the Free State in the southwest, to Evander in the east.

The geology of the region can be seen at many outcrops in the suburbs of Johannesburg. The sequence is divided into a lower shale-rich group and an upper sandstone-rich group. The latter contains the important gold-bearing quartz-pebble conglomerates. These "gold reefs" were formed from gravels transported into the basin and reworked 2,75 billion years ago. The gold and uranium originated from a rich source in the hinterland.

It is estimated that the Karoo Basin contains 485 trillion cubic feet of gas – nearly 14 trillion m^3. In September, Cabinet approved the lifting of a moratorium on the exploration of this gas via hydraulic fracturing (fracking). While licences could be issued under certain circumstances, the task team suggested that:

- SKA South Africa work closely with the department to ensure that the project is not compromised
- ongoing research be carried out on the environmental impact of fracking
- new, better methods for exploration are developed.

Bushveld Complex and escarpment

The Bushveld Complex extends over an area of 65 000 km^2 and reaches up to eight kilometres in thickness. It is by far the largest known layered igneous intrusion in the world and contains most of the world's resources of chromium, platinum group metals and vanadium.

This mega-complex was emplaced in a molten state about 2 060 billion years ago into pre-existing sedimentary rocks, through several deep feeder zones.

The impressive igneous geology of the Bushveld Complex can best be viewed in Mpumalanga, in the mountainous terrain around the Steelpoort Valley. The imposing Dwars River chromitite layers, platinum-bearing dunite pipes, the discovery site of the platinum-rich Merensky Reef, and extensive magnetite-ilmenite layers and pipes near Magnet Heights and Kennedy's Vale are in this area.

The Great Escarpment of Mpumalanga is one of South Africa's most scenic landscapes. This area features the iconic Bourke's Luck Potholes, which have become a major tourist attraction. They are actually dolly tubs, a typical erosion form which erodes the rock of the riverbed forming tubs of various sizes resembling cylindrical rock sculptures. The area is also known for the magnificent Blyde River Canyon and the dolomite formation in which giant stromatolites bear witness to the 2,5-billion-year-old fossiled remains of vast oxygen-producing algae growth.

Drakensberg Escarpment and Golden Gate Highlands National Park

The main ramparts of the Drakensberg range, reaching heights of more than 3 000 m, lie in KwaZulu-Natal and on the Lesotho border. These precipitous mountains are the highest in southern Africa and provide the most dramatic scenery.

They were formed by the partial erosion of a high plateau of basaltic lava, which is more than 1 500 m thick, and covers the Clarens sandstones. Prior to its erosion, the continental basalt field covered significantly more of the continent.

The uKhahlamba-Drakensberg Park, which covers 243 000 hectares, has been declared a world heritage site. More than 40% of all known San cave paintings in southern Africa are found here.

The scenic Golden Gate Highlands National Park in the Free State features spectacular sandstone bluffs and cliffs. The sandstone reflects a sandy desert environment that existed around 200 million years ago. Dinosaur fossils are still found in the area.

Karoo

Rocks of the Karoo Supergroup cover about two thirds of South Africa and reach a thickness of several thousand metres. The sedimentary portion of this rock sequence reveals an almost continuous record of deposition and life, from the end of the Carboniferous into the mid-Jurassic periods, between 300 million and 180 million years ago.

Karoo rocks are internationally renowned for their wealth of continental fossils, and particularly for the fossils of mammal-like reptiles that show the transition from reptiles to early mammals, and for their early dinosaur evolution. During this long period of the Earth's history, southern Africa was a lowland area in the centre of the Gondwana supercontinent.

Initially, the prehistoric Karoo was a place of vast glaciation. It then became a shallow inland sea, before this was replaced by huge rivers, with lush flood plains and swampy deltas, which dried out to form a sandy desert. Finally, vast outpourings of continental basaltic lava accompanied by the break-up of Gondwana occurred.

Diamond fields

Kimberlite is the primary host-rock of diamonds and was first mined as weathered "yellow ground" from the Kimberley mines, starting in 1871 at Colesberg koppie, now the site of the Big Hole of Kimberley. At increasing depths, less-weathered "blue ground" that continued to yield diamonds was encountered.

The discovery of kimberlite-hosted diamonds was a key event in South Africa's economic

and social development, and paved the way for the later development of the Witwatersrand goldfields.

Kimberlite originates as magma from very deep below the surface, and typically occurs as small volcanic pipes and craters at the surface. Included within solidified kimberlites are fragments of deep-seated rocks and minerals, including rare diamonds of various sizes.

The Orange and Vaal rivers' alluvial diamond fields and the rich West Coast marine diamond deposits all originated by erosion from primary kimberlite pipes.

Meteorite impact sites

Impacts by large meteoritic projectiles played a major role in shaping the surface of the Earth.

One such site is the Vredefort Dome, the oldest and largest visible impact structure known on Earth. The Vredefort Dome is on the world heritage list. It lies some 110 km south-west of Johannesburg, in the vicinity of Parys and Vredefort in the Free State and North West.

This spectacular and complex geological feature, measuring 70 km across, was caused by the impact of a 10-km wide asteroid some two billion years ago. Only a partial ring of hills remains of the dome, created by the rebound of rock below the asteroid's impact site. The original crater – now eroded – is estimated to have been between 250 km and 300 km in diameter.

The Vredefort structure comprises a core zone of granitic rocks, surrounded by a ring-like collar zone of younger bedded formations. Only the north-western portion of the structure remains visible. The south-eastern half was flooded by sediments of the Karoo Supergroup, which cover the Free State.

About 40 km north of Pretoria is a small bowl-shaped meteorite-impact crater, termed Tswaing. Just one kilometre in diameter, this is one of the best-preserved and accessible impact craters of its kind on Earth. It was created about 220 000 years ago when a meteorite of about 50 m wide slammed into the Earth, and is one of the few impact craters containing a crater lake.

Pilanesberg

The Pilanesberg Complex and National Park, located some 120 km north-west of Johannesburg in North West, is a major scientific attraction which includes a number of unique geological sites.

The complex consists of an almost perfectly circular, dissected mountain massif some 25 km in diameter, making it the third-largest alkaline ring complex in the world.

The geology reflects the roots of an ancient volcano that erupted some 1,5 billion years ago. The remains of ancient lava flows and volcanic breccias can be seen.

The dominant feature of the complex is the concentric cone sheets formed by resurgent magma that intruded ring fractures created during the collapse of the volcano.

There are old mining sites for fluorite and dimension stone, and a non-diamond-bearing kimberlite pipe in the region.

Cradle of Humankind

This world heritage site extends from the Witwatersrand in the south to the Magaliesberg in the north, and is considered to be of universal value because of the outstanding richness of its fossil hominid cave sites.

The Sterkfontein area near Krugersdorp is the most prolific and accessible fossil hominid site on Earth. It comprises several scientifically important cave locations, including Sterkfontein, Swartkrans, Drimolen, Kromdraai, Gladysvale and Plover's Lake, all of which have produced a wealth of material crucial to palaeoanthropological research.

Table Mountain and the Cape Peninsula

Table Mountain is arguably South Africa's best known and most spectacular geological feature, comprising a number of major rock formations.

The earliest of these are the deformed slates of the Malmesbury Group, which formed between 560 million and 700 million years ago.

Coarse-grained Cape granite intruded about 540 million years ago. The Table Mountain

Group, which started forming about 450 million years ago, consists of basalt, reddish mudstone and sandstone that is well exposed along Chapman's Peak. Overlying this is the light-coloured sandstone that makes up the higher mountains and major cliff faces of the Cape Peninsula, as far south as Cape Point.

Much younger sandy formations make up the Cape Flats and other low-lying areas adjacent to Table Mountain. The Table Mountain Group continues further inland across False Bay in the strongly deformed Cape Fold Belt.

Conclusion

South Africa's mining sector has a current conservative in situ value estimated at US$2,5 trillion with an economically exploitable lifespan of 150 years. Starting from this premise, together with its social partners, organised labour, other state departments and business, the Department of Mineral Resources has developed a growth and transformation strategy that identifies binding constraints to the sector's growth potential.

The process not only unpacked the realistic growth potential of South Africa's mining industry, but also recognised factors responsible for poor performance and exposed key issues that hold back the growth, competitiveness and transformation potential of the sector.

This strategy contains a set of recommendations encompassing solutions that can realistically unleash the mining sector's real growth, employment and transformation potential to enable the sector to become a key growth industry for South Africa.

Beneficiation is one of the components of the growth strategy, since it has the potential to create jobs and contribute to economic development. With government's target of 16 million people employed by 2014 and considering that about 500 000 of the more than 13 million employed citizens work in the mining sector, growing and diversifying the mining and minerals sector is crucial to meeting employment targets. The beneficiation strategy, approved by Cabinet, entails the transformation of minerals to a higher value product, which can either be consumed locally or exported.

The mining industry's competitiveness to a large extent depends on the degree to which it adopts green technologies and sound environmental practices. The sector therefore needs to balance sustainability with growth. To this end, through the implementation of more stringent regulations, the industry has become safer, as well as more socially and environmentally conscious.

Companies are required to allow for environmental trust funds and rehabilitation of disturbed land. There is also a R70-million project in place to solve the legacy problem of acid mine drainage.

The department continues to emphasise the importance of mining operations being conducted in a healthy and safe environment. To achieve this, it will ensure that mines adopt a leading practice, as well as taking critical steps to enhance health and safety.

The Mine Health and Safety Act, 1996 is being reviewed to strengthen enforcement provisions, reinforce penalties, provide clarity in certain definitions and expressions and effect amendments to ensure consistency with other laws, particularly the MPRDA, 2002.

The goal is ultimately to ensure maximum benefit from the country's mineral wealth to all South Africans, including the poorest of the poor.

Acknowledgements

Chamber of Mines
Council for Geoscience
Department of Mineral Resources
Eskom
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