



CHAMBER OF MINES  
of South Africa

# MINE SA 2016

Facts and Figures

Pocketbook



**457,698**  
direct jobs



approximately  
**4.5 million**  
dependants  
supported



**R116.7 billion**  
annual employee earnings

#MiningMatters #ItAddsUp



CHAMBER OF MINES  
of South Africa

**REGISTERED OFFICE**

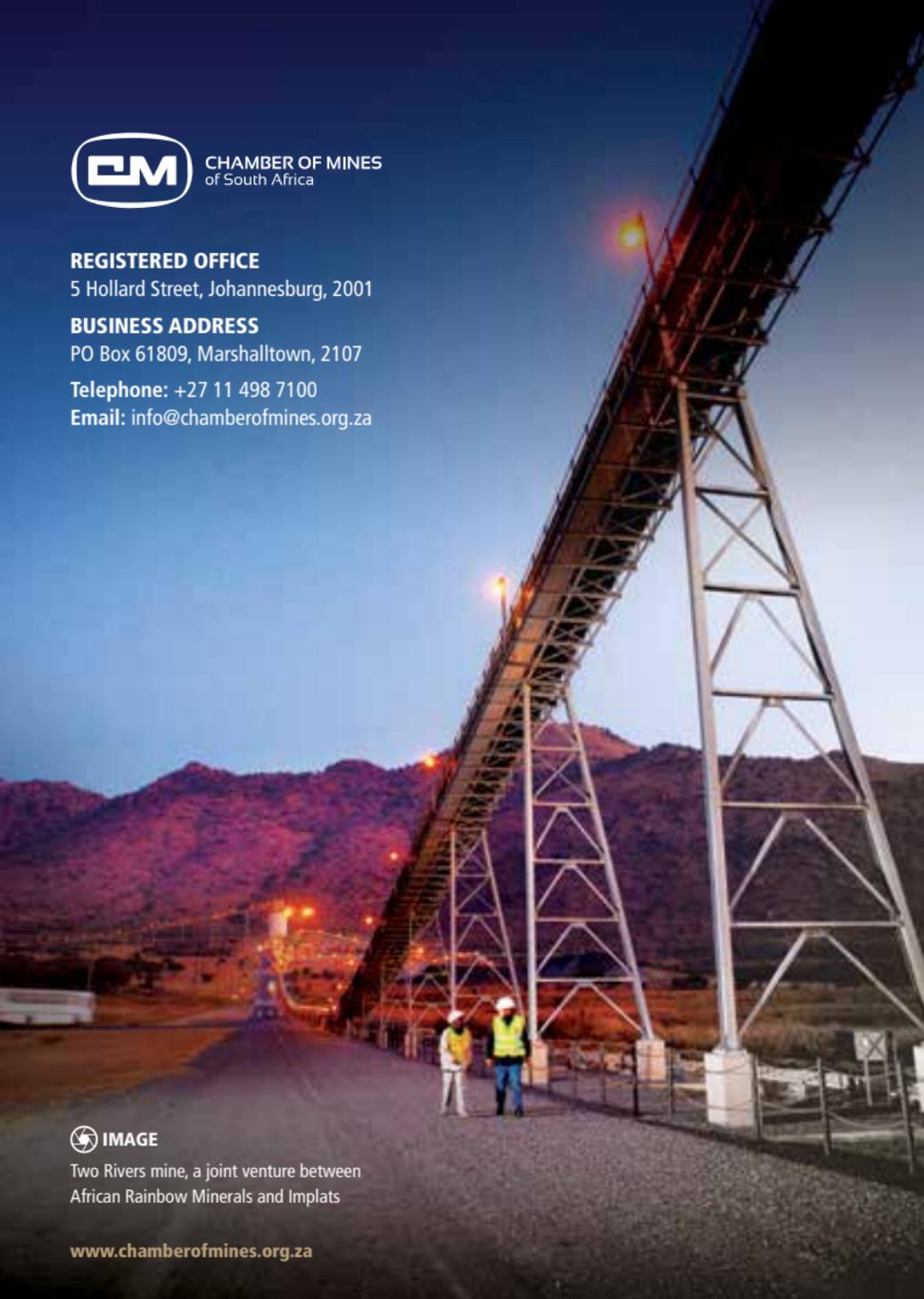
5 Hollard Street, Johannesburg, 2001

**BUSINESS ADDRESS**

PO Box 61809, Marshalltown, 2107

**Telephone:** +27 11 498 7100

**Email:** [info@chamberofmines.org.za](mailto:info@chamberofmines.org.za)



 **IMAGE**

Two Rivers mine, a joint venture between  
African Rainbow Minerals and Implats

[www.chamberofmines.org.za](http://www.chamberofmines.org.za)

The Chamber of Mines of South Africa is a mining industry employers' organisation that supports and promotes the South African mining industry. The Chamber serves its members and promotes their interests by providing strategic support and advisory input.

A key role of the organisation is to facilitate interaction among mining employers to examine policy issues and other matters of mutual concern to crystallise and define desirable industry standpoints. Consultation and collaboration are voluntary and never encroach on the autonomy of members.

The Chamber also acts as a principal advocate for mining in South Africa to government, communicating major policies endorsed by its members. A further vital function of the organisation is to represent some sectors in collective bargaining with organised labour.

Chamber members subscribe and adhere to a Membership Compact, a mandatory code of ethical business conduct.



*"We must overcome many challenges but, every day in South Africa, as we mine to new depths, we strive to reach new heights. Mining shapes the world around us, from the bridges we cross, to the way we communicate, from the air we breathe and the roads that connect us, to the innovations of tomorrow. If it's not grown, it's mined..."*

**Roger Baxter**, Chief Executive Officer

Chamber of Mines

January 2017



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Gold



Platinum



Diamonds



Coal

Other



# OUR MINERALS

# HISTORY

## SNAPSHOT



First diamond discovered in South Africa, near Hopetown, in 1867 – called Eureka, it weighed 21.25 carats

**1867**



**2016**

Mining Precinct opens its doors, aiming to boost the industry through R&D

OPEN



**1982**

National Union of Mineworkers (NUM) formed

**2014**

5-month platinum strike



Strike of 1987 – largest strike in the South African mining industry, with an estimated 340 000 people going on strike on the first day

**1987**

**2012**

Marikana tragedy on the platinum belt



George Harrison discovers the main gold reef on Langlaagte farm in 1886 – leading to the Witwatersrand gold rush, thousands of fortune seekers descend on Egoli, the ‘city of gold’

**1886**

Witwatersrand Chamber of Mines established

**1889**

**21 JAN  
1960**

Coalbrook Mine disaster – 435 lives lost in South Africa’s worst mining tragedy

**1921 –  
1922**

Rand Rebellion, an armed uprising of miners

Vaal Reefs mine disaster  
104 mineworkers died in worst shaft accident in South Africa

**10 MAY  
1995**

Association of Mineworkers and Construction Union (AMCU) formed

**2001**

**2004**

Mining Charter is launched

**2002**

MPRDA is promulgated into South Africa law

# Our metals and minerals

Mining has played a vital role in the economy of South Africa for over 100 years. In 2015 the mining industry contributed R286 billion towards South African Gross Domestic Product (GDP) representing 7.1% of overall GDP.

Mining directly contributed R89.4 billion to fixed investment in 2015, while R3.7 billion in royalties<sup>1</sup> and R12.5 billion in taxes<sup>2</sup> were paid to the South African government in 2015/2016. These funds form part of the government's budget, which is used to improve the infrastructure and lives of South Africans.

Mining is a significant contributor to employment in the nation, with 457 698 individuals directly employed by the sector in 2015. This represents just over 3% of all employed nationally. In total, these employees earned R116.7 billion, more than the nominal GDP of 52 countries in 2015<sup>3</sup>. In addition, through its employment, the industry adds R10 billion to the fiscus in terms of PAYE.

Based on the estimate that every employee supports between 5 and 10 dependants, the industry supports around 4.5 million people.

All these contributions to the South African economy occurred despite the overall aggregate loss of R38.5 billion incurred by the industry in 2015<sup>4</sup>.

<sup>1</sup> National Treasury Revenue Estimates, 2015/2016

<sup>2</sup> For the twelve month period ending June 2016

<sup>3</sup> World Bank GDP figures

<sup>4</sup> 2016 values

<sup>5</sup> Calculated off a significantly lower base as a result of the 2014 platinum strike



**R286 billion**  
contribution to  
2015 GDP



**R116.7 billion**  
employee earnings



**457 698**  
direct jobs created



# 3.2%<sup>5</sup>

Mining GDP growth rate

## MINING CONTRIBUTION SUMMARY:

### In 2015

Direct contribution of mining to GDP: R286 billion

Mining GDP growth rate: 3.2%

Mining contribution as % of total GDP: 7.1%

Direct contribution of mining to fixed investment:

R89.4 billion

Total primary mineral sales: R387 billion

### 2015/2016

Royalties paid: R3.7 billion<sup>1</sup>

Taxes paid: R12.5 billion<sup>2</sup>



Employees looking on at Kumba's iron ore operations

# Our metals and minerals

## Gold

The Witwatersrand (Wits) Basin is one of the world's largest gold deposits – an elliptical basin that stretches over an arc of 400 kilometres through the Free State, North West and Gauteng provinces.

After 120 years of operations, gold mining has reached depths of up to 4 000 metres, making these among the deepest mines in the world. At this depth, rock temperatures reach about 50°C and vertical rock pressures around 100MPa.

The 'discovery' of gold in South Africa in the late 19th century led to the development of the city of Johannesburg, Egoli (city of gold). For many years, South Africa was the world's primary gold producer with peak production of 1 000 tons in 1970.

Gold remains one of the world's most coveted metals, revered for its beauty, symbolism and held as a store of value. This versatile metal is malleable, conductive and does not tarnish, making it ideal for use in jewellery and many industrial applications.

## In 2016<sup>1</sup>

Direct employees

**115 822**  
people



Employee earnings

**R28.7bn**



Gold produced

**141.4t**



Royalties paid<sup>2</sup>

**R0.61bn**



## In 2015

Percentage of  
metals exported

**88%**

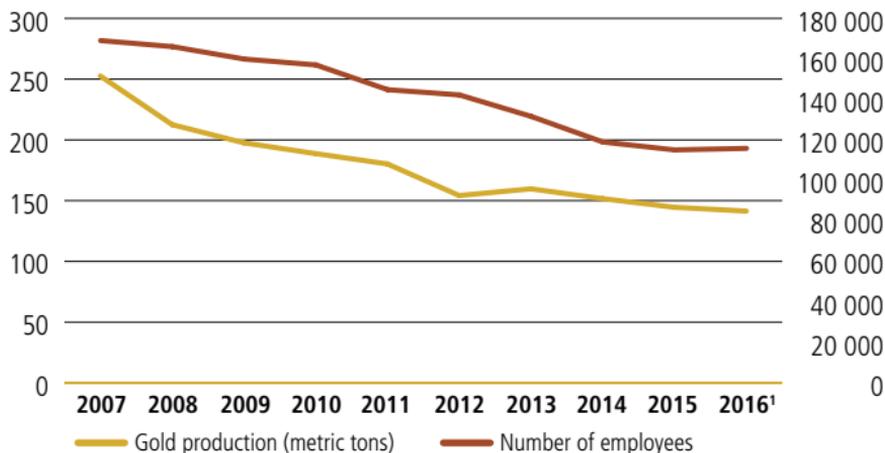


Total sales

**R62.7bn**



### Gold production and industry employment (2007 – 2016)



<sup>1</sup> Estimates based on latest statistics available

<sup>2</sup> National Treasury Revenue Estimates, 2015/2016

## Our metals and minerals

# Platinum

The Bushveld Igneous Complex, formed some 2 billion years ago, is the world's largest layered intrusion, created when vast quantities of molten rock from the earth's mantle was brought to the surface through long vertical cracks or intrusions.

In South Africa, the discovery of the first platinum nuggets dates back to 1924. Geologist Hans Merensky's follow-up work resulted in the discovery of the Bushveld Igneous Complex. This complex hosts more than half the world's platinum group metals (PGMs) and associated minerals, such as nickel, chromium, vanadium and refractory minerals. In fact, South Africa is host to around 80% of the world's known platinum reserves.

Six noble metals, all silvery-white in appearance, constitute PGMs – platinum, palladium, rhodium, ruthenium, osmium and iridium. Platinum, palladium and rhodium are the primary metals of significant economic value. They are used largely for jewellery and in the automotive industry for their excellent catalytic properties. Other uses include investment (coins and bars), fuel cells, and many other industrial purposes.

## In 2016<sup>1</sup>

Direct employees

**172 369**  
people



Employee earnings

**R43.6bn**



Royalties paid<sup>2</sup>

**R0.72bn**



## In 2015

Platinum produced

**275.5t**



Total sales

**R94.14bn**

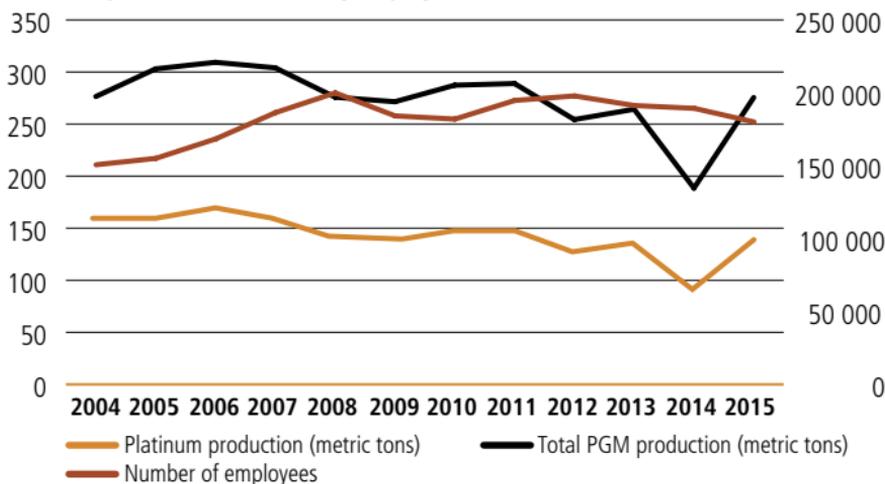


Percentage of metals exported

**88%**



### Platinum production and industry employment (2004 – 2015)



<sup>1</sup> Estimates based on latest statistics available

<sup>2</sup> National Treasury Revenue Estimates, 2015/2016

## Our metals and minerals

# Diamonds

Diamonds, arguably the ultimate luxury mineral, comprise an intricate lattice of carbon atoms, a crystalline structure that makes them harder than any other form in nature. This characteristic makes diamonds not only popular in jewellery, but also desirable in high-tech cutting, grinding and polishing tools.

Diamond mining has taken place in South Africa for over a century, and is largely responsible for putting the African sub-continent 'on the map' as a minerals-rich region.

Natural diamonds were formed some 3.3 billion years ago in conditions of intense heat and pressure 150 kilometres below the earth's surface. The primary sources of all of South Africa's diamonds are kimberlites in ancient, vertically dipping volcanic pipes, mostly in the vicinity of the city of Kimberley, and initially amenable to opencast mining. Early in the 20th century, the Premier mine's volcanic pipe was discovered near Pretoria with a number of further kimberlite pipes discovered in the Northern Cape and Limpopo since then. Alluvial diamonds and small diamondiferous fissures have been known and worked for many years along the southern banks of the Orange River, as well as along and offshore of South Africa's west coast.



## In 2016<sup>1</sup>

Direct employees

**17 885**  
people



Employee earnings

**R4.7bn**



Royalties paid<sup>2</sup>

**R0.61bn**



## In 2015

Diamonds produced

**8.2m**  
carats



Total sales

**R14.4bn**

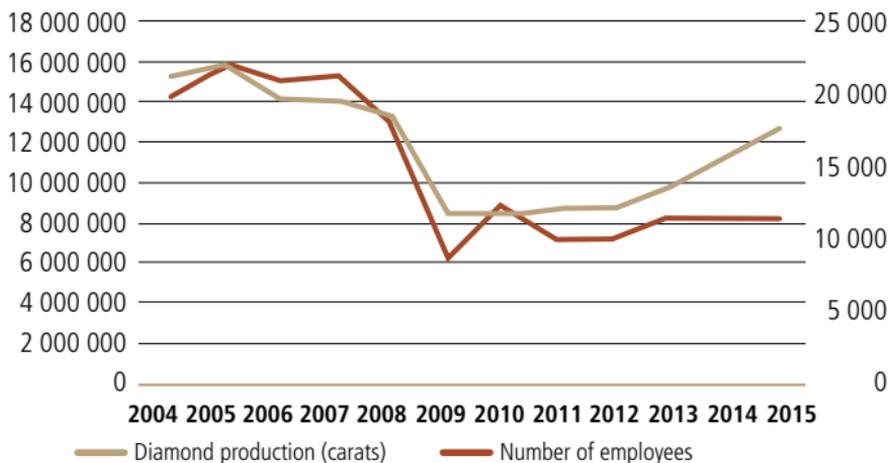


Percentage of minerals exported

**40.3%**



### Diamond production and industry employment (2004 – 2015)



<sup>1</sup> Estimates based on latest statistics available

<sup>2</sup> National Treasury Revenue Estimates, 2015/2016

# Our metals and minerals

## Coal

Coal is the largest component of mining by sales value, and is a critically important source of primary energy (electricity and liquid fuels) that drives the economy.

Coal mining in South Africa can be traced to the start of gold mining in the late 19th century, with the first coal in appreciable tonnages being extracted on the highveld coal field close to the Witwatersrand gold mines. Demand grew exponentially as the country entered a period of industrialisation during and following World War II. This included a major programme of building power stations, particularly on the coal fields of Emalahleni and Delmas. The development of the means to transform coal into fuel provided a further impetus for the coal sector.

South Africa's coal resources are contained in what is known as Ecca deposits, a stratum of the Karoo Supergroup, and date to between 280 and 250 million years ago. Generally, South Africa's coal deposits are shallow, largely unfaulted and lightly inclined, making their exploitation suitable for opencast and shallow underground mining, with a great degree of mechanisation.

Coal is a key role player in South Africa's energy production, with 81% of energy produced by Eskom being generated using coal.



## In 2016<sup>1</sup>

Direct employees

**77 226**  
people



Employee earnings

**R18.5bn**



Coal produced

**293.7t**  
252.1t saleable



Royalties paid<sup>2</sup>

**R0.70bn**



## In 2015

Percentage of metals  
exported of total sales

**45.2%**

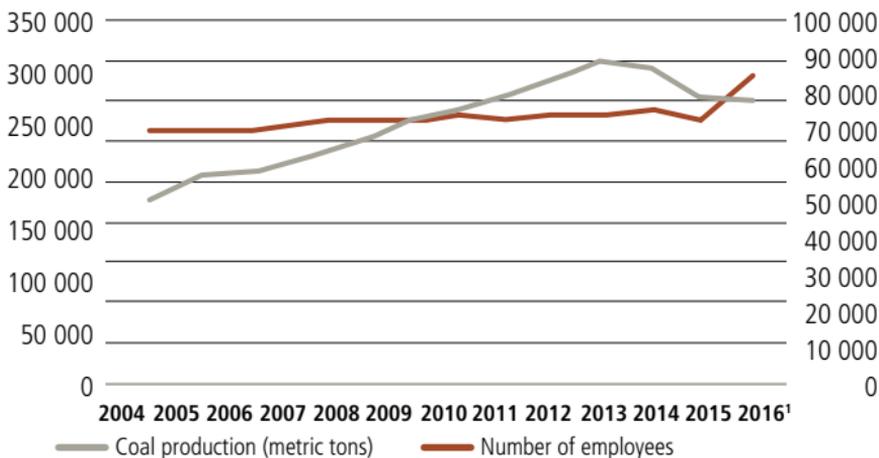


Total sales

**R119.6bn**



Coal production and industry employment (2004 – 2016)



<sup>1</sup> Estimates based on latest statistics available

<sup>2</sup> National Treasury Revenue Estimates, 2015/2016

# Our metals and minerals

## Chrome, iron ore and manganese



Chrome is known for its high corrosion resistance and hardness. It is essential in the production of stainless steel, which accounts for 85% of its commercial use.

Manganese has numerous industrial and metallurgical applications, batteries and chemicals.

Iron is the most common element on earth, comprising most of the planet's inner and outer core. Iron has been used by humans since the ancient times to make tools. Most iron is used to manufacture steel, which is in turn used to manufacture machines, buildings and tools.

Around 80% of the world's manganese resources and 70% of the world's chrome resources can be found in South Africa. South Africa is also the largest producer of both manganese and chrome globally.

## Base mineral employment highlights 2016<sup>1</sup>

<b>Cr</b> Chrome		<b>15 459</b> people	
<b>Fe</b> Iron ore		<b>17 081</b> people	
<b>Mn</b> Manganese		<b>7 200</b> people	

## Base mineral production highlights 2016<sup>1</sup>

<b>Cr</b> Chrome		<b>16.3m</b> metric tons	
<b>Fe</b> Iron ore		<b>73.2m</b> metric tons	
<b>Mn</b> Manganese		<b>15.0m</b> metric tons	

<sup>1</sup> Estimates based on latest statistics available

Mining in our lives

**If it's not  
grown,  
it's mined**



**Coal and Gold:**  
Jet fuel and aircraft engines

**Platinum:**  
making glass

**Coal:**  
energy generation

**Platinum:**  
solar panels

**Gold, Platinum and  
Diamonds:**  
jewellery

**Copper:**  
water pipes

**Copper:**  
door handle

**Platinum:**  
fuel cells



**Steel, Aluminium,  
Aggregate and Sand:**  
bridges



**Silver:**  
L.E.D.s



**Silver:**  
telescope



**Aluminium and  
Magnesium:**  
alloy wheels

**Platinum and Gold:**  
laptop and hard disc technology



**Copper:**  
air conditioner



**Platinum and Gold:**  
watches



**Chrome:**  
cans



**Chrome, Copper and Magnesium:**  
paint pigments



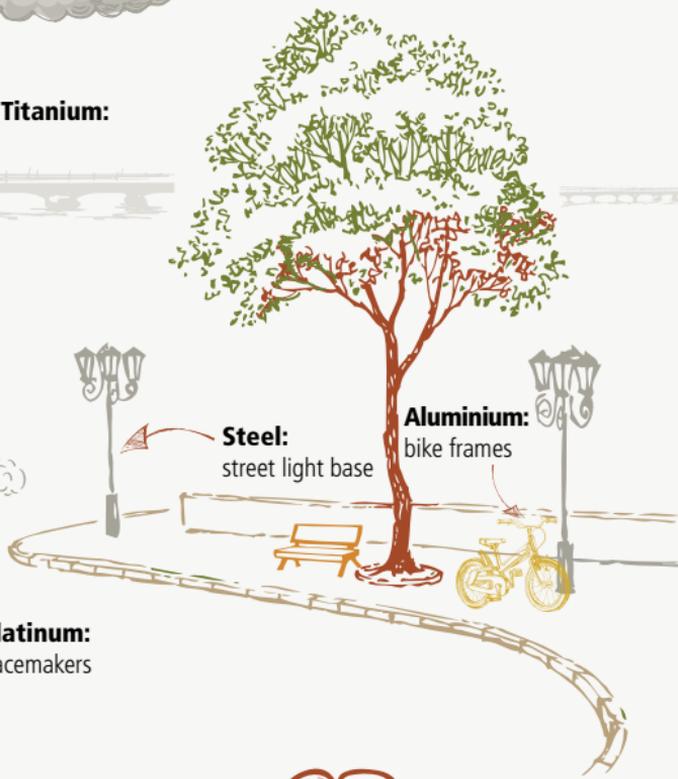
**Silver, Gold and Titanium:**  
space shuttle



**Platinum and Gold:**  
dentistry



**Platinum:**  
pacemakers



**Steel:**  
street light base

**Aluminium:**  
bike frames



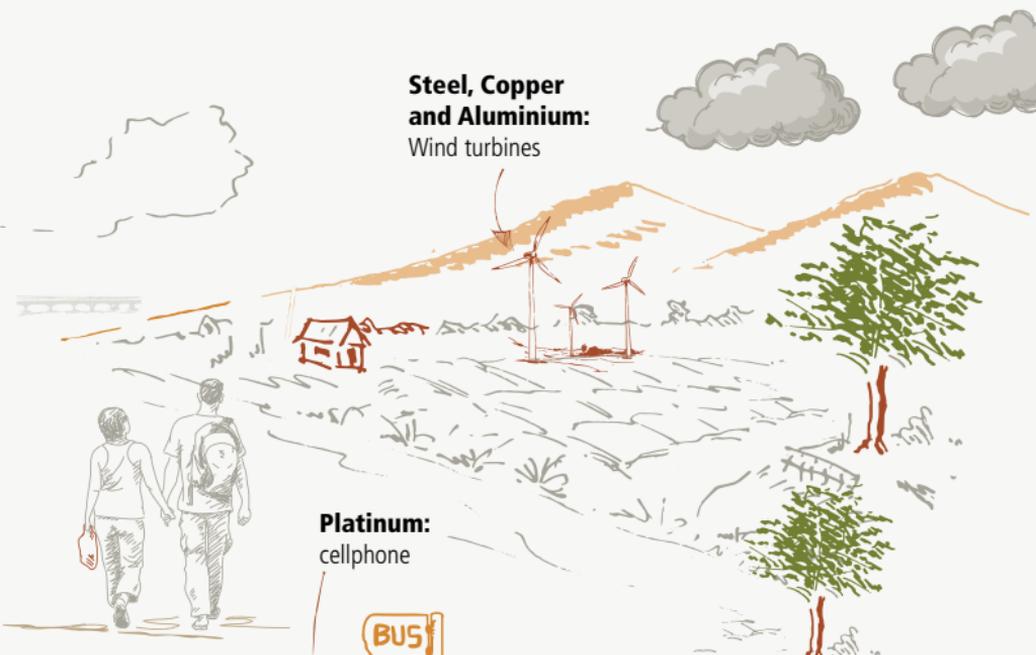
**Silver:**  
mirrors

**Steel:**  
vehicle body



**Steel and Titanium:**  
surgical implants

**Steel, Copper  
and Aluminium:**  
Wind turbines



**Platinum:**  
cellphone



**Coal and Gold:**  
pharmaceuticals

BUS

**Platinum:**  
airbags



**Platinum:**  
catalytic converters

**Steel and Aluminium:**  
metal furniture



**Aggregate and sand,  
chrome, coal, diamonds,  
ferrous metals, gold,  
iron, limestone and lime,  
manganese, non-ferrous  
metals, platinum group  
metals, precious metals  
and minerals**

# Safety and health



Working together, South African mining companies, unions, employees and the regulatory authorities have made significant strides in improving safety on South African mines.

Since 1993, the annual number of fatalities has reduced from 615 to 73 in 2016 – the direct result of the various safety initiatives adopted by the mining industry in collaboration with the Chamber of Mines and under the auspices of the Mine Health and Safety Council (MHSC).

Even though significant progress has been made, the industry recognises that much remains to be done, and that one fatality is one too many.

South Africa's Mine Health and Safety Act (MHSA), introduced in 2006, made provision for a tripartite approach to safety and health, requiring industry, the unions and government to act in concert in promoting a safe and healthy workplace. This approach underpins much of the successes achieved to date.

As required by the MHSA, individual companies and mines have agreements in place that regulate many aspects of safety and health in the workplaces, and that provide joint planning, decision-making, training and auditing.

To accelerate the journey to zero harm, the Chamber established the MOSH Learning Hub in 2008 to identify and promote adoption of leading practices through a people-centred contribution.





AngloGold Ashanti employees in safety gear

# KEY 2016

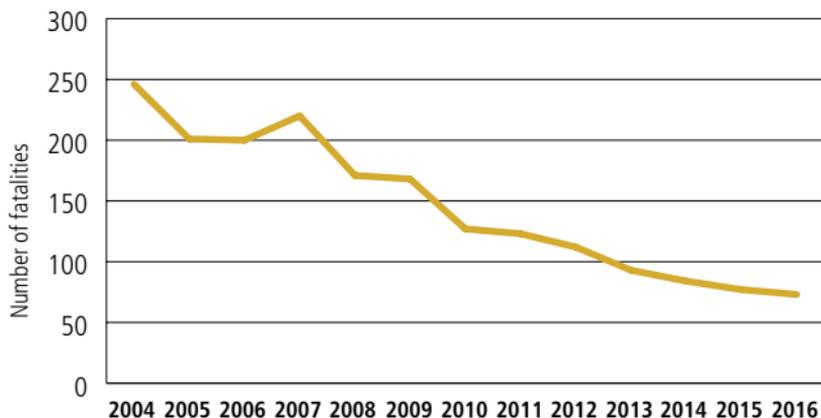
health and safety facts and figures:


**73** (2015: 77) fatalities

**2 662** injuries reported (2015: 3 138)


**5.6%** TB diagnoses decreased (2015: 4 461)

## INDUSTRY FATALITIES 2004 – 2016



# Mining people



Mining has continued to be a significant provider of employment in South Africa.



The mining industry employed 457 698 people in 2016. Although this is a decrease from 2015, the industry has done its best to minimise job losses.

- 10.3% increase in total wages in 2015, despite employee reductions



Mining contributes to various industries and has an extensive supply chain. Jobs in mining translate to employment in other industries.

- Indirect jobs created by industry 1.4 million



The industry not only provides jobs but believes it is important to encourage and facilitate the development of its employees to ensure the sustainability of the industry. South African mining companies invest in employee training and development in many forms that include learnerships, bursaries, apprenticeships, internships and adult education.

- R5 billion invested in training in 2015
- More than 18 000 tertiary education students funded between 2011-2015, by providing bursaries and workplace experience



Highest grant allocations for 2015 Rm

- Artisan development 220
- Bursaries and work experience 197
- Graduate training programmes 160
- Learnerships and skills development 69

Artisans are a mainstay of the mining industry

- On average 2 000 artisans qualify in the mining industry each year



# Women in mining



Since the promulgation of the MPRDA in 2002 and the Mining Charter in 2004, the number of women in the industry has significantly increased.

Most mines meet or exceed the 10% women in mining target and numerous industry initiatives are underway to make a career in mining more welcoming to female employees and job seekers.

- Representation of women in mining increased from around 11 400 in 2002 to around 53 000 women in 2015
- By 2015, representation of women in mining was 18%

## % of women in the workforce by commodity, 2015

Gold	11
PGMs	12
Diamond	19
Coal	17
Cement, lime aggregates and sand	19

## Training and development of women in mining

As the industry seeks to encourage the participation of women at all levels, special focus is placed on their training and development. The majority of women employed in the mining industry were skilled in 2015.



- 15% of top management were women



- 16% of senior management were women



- 22% of professionally qualified employees were women



- 18% of employees in the skilled and technical area were women

### IMAGE

Chamber members achieved the target of 10% for women in mining

# Mining transformation



The mining industry is committed to addressing legacies of the past and contributing meaningfully to policies, practices and outcomes that reflect the true demographics of the country, and to create an environment that will create a sustainable and prosperous mining industry.

Until the late 1980s, skilled jobs were denied to black miners. It took 10 years for the proportion of positions skilled by black miners to approach 20%. Since 2004, historically disadvantaged South Africans (HDSAs) in skilled and management positions have risen to between 40% and 75% depending on category.

## Since 2000, the value of empowerment transactions amounts to R205 billion in 2014 money terms

- All large mining companies achieved the 26% target of HDSA ownership and meaningful economic participation
- Meaningful economic participation inclusive of identifiable beneficiaries: Black Economic Empowerment (BEE) entrepreneurs (63%), communities (22%), Employee Share Ownership Plans (ESOPs) (15%)

### About these transactions:

- 7.1 million HDSAs participated
- R47 billion was paid in dividends
- R116 billion in initial transaction values
- R159 billion net value creation (after debt, including dividends)

### At the end of 2014:

Employment equity	Target (%)	Achieved (%)
Top management	40	50.4
Senior management	40	41.9
Middle management	40	50.9
Junior management	40	54.0
Core skills	40	75.5

# Mining communities



Mining companies recognise that they need to earn and maintain their social licence to operate.

Companies recognise their role not only as neighbours, but also the need to contribute to the socio-economic development and sustainability of mining communities and labour-sending areas.



Mining companies contribute to communities in many ways:

- Through both direct and indirect job creation, and particularly local recruitment.
- Through small business development and local procurement, including expenditure by employees.
- By providing training and development, bursaries, and learnerships.
- By improving access to healthcare and improving living conditions (water, sanitation, roads).
- Through their corporate social investment and local economic development programmes.
- Through the taxes and levies paid locally.

In 2016, mining companies spent approximately R2 billion in local and labour-sending communities, in line with their agreed Social and Labour Plans.



IMAGE

AngloGold Ashanti community members

# Modernisation



As mining depths increase and conditions become more challenging, there is an urgent need to modernise the industry. Mechanisation is one pillar of modernisation.

With conventional mining, the gold industry will see a sharp decline in production by 2019-20, with reserves exhausted by 2033. Through mechanisation and 24/7 operations, annual output could be sustained to at least 2025 and beyond.

Mechanisation would see 592 metric tons additional gold resources being mined –equivalent to 11 large gold mines – as well as an additional 360 metric tons of platinum – equivalent to eight large platinum mines.

Mining companies have spent over R500 million annually over the past couple of years on innovation. In 2016, government committed R150 million towards this cause.



## BY 2020

- The Chamber has identified the products, technologies, people and infrastructure required to mechanise the stoping and development cycle with remotely operated equipment.



## BY 2045

- Similar requirements have been developed for a 24/7 mechanised mining system that operates without explosives by 2045.

# WHAT DO WE MEAN BY MODERNISATION?



Modernisation is not simply mechanisation. It is a process of transition and transformation of the mining industry of yesteryear to that of tomorrow.

Modernisation will be driven by technological innovation, which in turn needs to be driven by research and development (R&D). To be successful, the approach to modernisation must be holistic, and in a systems and people-centric manner.

Modernisation could save around 200 000 jobs by 2030, affecting 2 million dependants.

**The Chamber has conducted extensive research into mine modernisation and has developed a strategic framework to guide the mining sector in achieving its objectives. 3 key enablers are:**



- **Research and development:** Massive investment is required, with initial focus on narrow-reef, hard-rock mining equipment and systems.



- **Mining manufacture:** Mining capital goods development programme is being developed to facilitate immediate manufacture of R&D equipment, industrialisation using local labour and reduced cost of ownership for mines and optimal mining production.



- **Sustainability:** A transition road map for modernisation will include sustainability impact assessments of future mining scenarios and accelerated skills development of employees in local communities.

# Illegal mining



Illegal mining is on the rise in South Africa and presents challenges that need to be addressed from a range of perspectives. Illegal miners in South Africa are colloquially known as 'zama zamas'.

- Many thousands of people are involved in illegal mining
- 70% of all illegal miners arrested are illegal immigrants
- R6 billion annual value of illegal mining
- Zama zamas travel as far as 4 kilometres underground where they live for several days at a time



An increase in unemployment, poverty and the entry of large numbers of illegal immigrants into the country has contributed to an increase in illegal mining



Illegal mining was initially based on the surge in the gold price during the bull market of the first decade of this century. Despite the fall in the US\$ gold price around 2011, the rand gold price has held sufficiently steady to keep illegal mining profitable.



There are limited resources at the disposal of law enforcement agencies to stem illegal mining, such as police, immigration, border controls and prosecuting authorities.

No single stakeholder can address the challenge of illegal mining on its own – collaboration is key.



# CHAMBER

## FACTS AND FIGURES



### Chamber member companies:

- represent more than 90% of South Africa's mineral production by value
- contribute around R11.3 billion in taxes per annum
- employ around 400 000 people directly

**The Chamber's vision is to reposition the mining industry as South Africa's foremost industrial sector**

### A BRIEF HISTORY

1889 – 1896



1897 – 1901



1902 – 1952



1953 – 1967



1968 – TODAY





**Telephone:** +27 11 498 7100

**Email:** [info@chamberofmines.org.za](mailto:info@chamberofmines.org.za)

5 Hollard Street, Johannesburg, 2001  
PO Box 61809, Marshalltown, 2107

 [www.chamberofmines.org.za](http://www.chamberofmines.org.za)

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