MINING IN SOUTH AFRICA: THE CHALLENGES AND THE OPPORTUNITIES

Roger Baxter, Chief Executive | 2 September 2016
This is the Mining Industry

“Long Cold winters and Short beautiful summers”
Everything that isn’t grown is mined.
Mining Matters for South Africa
Mining helps give us a cleaner future

Emissions from one car sold in 1960s

Emissions from 100 cars sold in 2015

PGMs, technology development and standards enabled this to happen

PGM vehicle emission catalysts including exhaust system catalysts, catalysed particulate filters and emission absorbers convert 99% of combustion engine pollutants (HC, CO, NOx, and particulates) enabling vehicle producers to meet EU standards.
Mining gives us energy for development

Platinum based fuel cell technology is unlocking the potential of the hydrogen economy

Chamber 100kW FUJI fuel cell
- First base-load 100kW platinum fuel cell installed in Africa
- In operation since 18/12/2014
- Uses natural gas (Egoli gas)
- Electro-chemical process, no moving parts
- 25 year design life, minimal servicing
- 50% energy efficient
- Further 30% energy to be captured for heating building
- Levelised energy cost cheaper than municipal supply
- Collaborative project, CoM, DTI, Mitochondria, Fuji, Egoli Gas, demonstration of platinum beneficiation

See www.platinumpowerfuelcell.co.za
Metals and minerals are the building blocks for smart technologies

- Copper (16 grams)¹
- Silver (0.35 grams)¹
- Gold (0.034 grams)¹
- Palladium (0.015 grams)¹
- Platinum (0.00034 grams)¹
- Ceramic magnetic switches containing rare earths²
- Indium²
- Titanium dioxide²
- Indium tin oxide²

² source – NRC critical minerals report
The world’s famous buildings would not have been possible without mining.
A wind turbine uses a significant amount of metals and minerals

- 335 tons of steel
- 4.7 tons of copper
- 13 tons of fiberglass
- 3 tons of aluminum
- 1,200 tons of reinforced concrete
Cosmetics are made from minerals

- Talc
- Mica
- Kaolin
- Calcite
- Titanium dioxide
- Zinc oxide
A bright smile comes from mining...

- Silica
- Limestone
- Aluminum
- Phosphate
- Fluoride
- Titanium
- Mica
- Petroleum
Metals and minerals are necessary for our well-being
What I am going to be talking about

SA mining has potential

SA mining today

How we can realise its potential

Overcoming our challenges
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Overcoming our challenges
Even though our market share of global commodity production and reserves has declined, potential is huge.

Source: SA Chamber of mines, SAIMM
We are reaching a precipice
Yet we hold some of the best mineral resources in the world

**Gold**
- Ultra deep 24/7 mechanisation: 106Mt
- Pillars and remnants: 20Mt
- Remote mechanisation: 8Mt
- Bulk mining: 24/7 mechanisation: 71Mt
- Portion to be converted to 24/7 mechanisation: 71Mt
- Non-convertible: will be mined out conventionally: 96Mt

**PGMs**
- Low-grade reefs mineable using 24/7 mechanisation: 71Mt
- Current conventional: can be converted to mechanisation: 284Mt
- Remains conventional: 303Mt (older shafts)
- Convert to mechanisation: 176Mt

**Mechanisation can preserve 360Mt of production** - without mechanisation, these resources are not economical. This is the equivalent to eight large mines.

**Total resources:** 592Mt - 496Mt can be mined using mechanisation. This is equivalent to 11 large gold mines, which would otherwise be sterilised.

Similar considerations apply to South Africa’s platinum mine although their resources are nowhere near exhaustion as those of the gold mines.
Industry has use potential;

If growth constraint can be removed and the industry makes significant progress on 'modernisation' and 'innovation',

- **Non-gold mining sector** can grow at 3-5% pa, resulting in more balanced country growth rate (double size of non-gold mining by 2028).
- If mining had grown at same pace as rest of economy between 1994 and 2013, country’s growth rate would have been 4% (not 3.2%)
- At a 5% growth rate, mining industry can double in size in 15 years
  - significantly increase exports and reduce the savings-investment constraint.
  - stabilise direct jobs and indirect jobs
  - significantly contribute to investment, transformation and development

- **The gold mining sector can:**
  - slow down the rate of decline and bring to account the country’s significant remaining gold reserves
  - help sustain and create significant economic linkages in the rest of the economy
More than half of NDP priorities can be tackled by mining

1. Economy and employment
2. Economy infrastructure – The foundation of social and economic development
3. Environmental sustainability – An equitable transition to a low-carbon economy
4. An integrated and inclusive rural economy
5. Positioning South Africa in the world
6. Transforming human settlements
7. Improving education, training and innovation
8. Promoting health
Mining really matters to South Africa

- In 2015, the South African mining industry contributed:
  - 7.7% to GDP
  - Around 15% to FDI
  - 20% of private investment
  - 1.4 million jobs
  - 25% of exports

**Sector contributions to mining minerals exports in SA (2014)**

- Gold, 17
- PGM, 26
- Other, 8
- Chrome, 2
- Manganese, 6
- Diamonds, 3
- Coal, 18
- Iron ore, 20

*Source: Chamber of Mines estimates; StatsSA*
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Chinese demand weakness structural
- Investment driven commodity demand growth from China at the end and shift is on to more consumer driven growth (rebalancing growth)
- Extent of oversupply of property significantly slowing commodity demand growth

Global commodity supply response has not matched demand slow down
- Significant “sunk” capital for growth in projects has slowed supply reduction response
- Commodity markets range from neutral to significantly oversupplied
- Significant overcapacity exists, depressing prices
- Commodity pricing outlook risks remains to the downside
The global mining industry: under significant financial pressure = adjustment

In 2015/16 for the top 40 mining companies:

- Commodity prices continued to fall (adjusting to a “new normal”) as demand slowed and oversupply emerged in some commodities.
- Revenues fell by 21% to $539bn (2014: $678bn).
- Operational costs fell to $419bn (2014: $502bn).
- Gearing increased to 46% (2014: 38%).
- Free cash flow down 15%.
- Miners have impaired 32% of capex 2010-15.
- Market capitalization fell to $494bn (end 2014: $791bn) – back to pre-GFC levels.
- Working capital improvements (reduction in capex and better efficiency)
- Mining companies are focused on cost cutting, productivity improvement, capital discipline and adjustment.

PWC Survey of top 40 mining companies
"The Gloves are Off" key indicators, 2015
The commodity price outlook remains weak (lower prices for longer - the 'new normal')

China:
• There is no “China” equivalent waiting in the wings to take over China’s mineral demand growth.

India:
• While India is expected to grow at a rapid pace, the mineral demand growth is nowhere near the scale of China.

Outlook:
• Mineral prices likely to remain lower for longer (the new normal)
• Gold the exception as a safe haven

Prices for selected minerals, and 5 year outlook (IMF)

- Coal, South African export price, US$/ton
- Copper, grade A LME spot price, CIF US$/ton
- Iron Ore, China import Fines 62% US$/ton
- Nickel, LME spot price, CIF US$/ton
- Zinc, HG 98%, US$/ton
SA mining industry has been hard hit

**Global commodity prices have fallen**
- Rand prices of key export commodities have fallen (except gold)

**Domestic cost pressures risen too quickly (for mining inputs)**
- Electricity prices have trebled in 7 years.
- Wages up >10% p.a. past 5 years.
- Stores and materials up >10% pa (steel up 12% pa past 5 years)

**Employment has declined**
- 59,407 jobs lost in mining between 2012 and 2015

**Productivity has fallen for a decade**
- Platinum output per worker has declined 49%, real labour costs/kg up 309% (1999-2014)
- Due to declining grade, aging mines, production disruptions (inappropriate s54s, strikes, community disruptions, illegal mining) and inability to increase productive shifts per annum

**A significant portions of the PGM sector is loss-making at current prices**

**The overall mining industry was loss-making in 2015**
- Aggregate net loss was R37 billion
The SA mining sector cost competitiveness

Illustrative SA commodity mining cost curve (2015)

Cash costs ($)  

First quartile  Second quartile  Third quartile  Fourth quartile

Global cumulative production, ranked based on costs

Source: Chamber of Mines member estimates, bank analyst estimates

Estimate % of sector loss-making (May 2015)

<table>
<thead>
<tr>
<th>Commodity</th>
<th>Estimate %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gold</td>
<td>31%</td>
</tr>
<tr>
<td>Diamonds</td>
<td>10%</td>
</tr>
<tr>
<td>PGM</td>
<td>45%</td>
</tr>
<tr>
<td>Iron ore</td>
<td>60%</td>
</tr>
<tr>
<td>Thermal Coal</td>
<td>40%</td>
</tr>
<tr>
<td>Manganese ore</td>
<td>70%</td>
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</table>
SA mining: key financials (sector is the only loss-making sector of the economy)

Source: STATSSA AFS
Challenges in SA mining sector

- Mineral prices in rand terms have stagnated or declined
- Viability challenges facing gold, platinum, coal sectors
- Instability in labour market and excessive wage demand pressures linked to social wage issues
- Policy, regulatory uncertainty despite efforts to address this
- Binding infrastructure constraints (electricity shortages since 2007)
- Declining productivity, rapidly escalating costs
- Inappropriate application of regulatory tools
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Mining has a set of characteristics that include:

- High risk industry, with long lead times from exploration through to mine development and ultimately through to closure
- Very capital intensive. Large portion of capital is spent in development of the mine
- Exposed to cyclical commodity markets
- Generally a 'price-taker' and cannot pass on cost increases to the final consumer
- Geographically captured
- Requires access to cost competitive and efficient infrastructure

In order to encourage investment into mining, policies need to recognise the characteristics of mining and help reduce the risks of investment in long term projects
Given long life cycle, mining needs predictable, stable and competitive policy and regulatory environment.

Mining asset lifecycle

- **Explore**
- **Develop**
- **Mine**
- **Closure**

Cash flow over life cycle

Price cycle
Examples of significant capital spend to bring new deep platinum resources to account

Impala Platinum (16 shaft):

- 1993 – The initial study started
- 2000 – The project (conceptual phase)
- 2004 – Complete the detailed feasibility with Control Budget
- 2004 – First construction started
- 2013 – Beneficial Hand Over – Cold Commissioning
- 2013-2018 – Ramp-up to full production (steady state production 2.7 million tonnes per annum ~ 185,000 oz of pt production)
- Capital spent to date R7 billion
- Further capital spend in 2014 R0,9 billion
- Jobs created 6,500 to 7,000
- Rule of thumb: 10 years from start of construction to cold commissioning, 4-5 years to build up production, ~7,000 jobs, 20-25 year mine life created
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Creating a successful mining sector

- More effective problem solving partnership between government, business and organised labour
- Regulatory and legislative environment that is stable, predictable and competitive
- Stable and constructive labour relations environment and better social license to operate
- Access to available, efficient and cost effective infrastructure (electricity, rail)
- Solutions to improve productivity (next generation mining) and reduce cost pressures
More effective problem solving partnership between government, business and labour

This is key to getting mining back on track
Regulatory and legislative environment that is stable, predictable and competitive

**MPRDA amendment bill**
- Needs to be finalised by Parliament- recent developments

**Davis Tax Commission – response to interim report**
- Retention of mining royalty model; rejection of the notion of a resource rents tax

**Section 54 safety stoppages**
- Speeding up development of implementation policy pertaining to Section 54 implementation

**Environmental licensing**
- New “One Environmental system” in place. Real progress made. Resolve challenges related to financial provision and treatment of mine residue as waste

**Carbon tax**
- Require significant offsets for carbon intensive trade exposed sectors
Stable and constructive labour relations environment and social licence to operate

Presidential framework agreement:
• Stabilise industrial relations environment
• Get the mining industry back on track from an investment and growth perspective

NEDLAC task team – minimum wage and strike action committee
• S18 representation and secret strike ballots on the agenda

Farlam report on Marikana Industry in process of implementing key learnings

Gold and Coal wage negotiations
• 3 year agreements for gold
• 2 year wage agreement in coal (after short strike)
• Platinum negotiations in 2016
Access to available, efficient and cost effective infrastructure (electricity, rail)

Electricity supply disruptions and costs – multiple initiatives
- Eskom expecting stability for 12 months
- 5 gigs renewables and 6 gigs gas/base-load contracted in by DOE
- Lid on big price increases necessary
- Concerns re policy uncertainty (where is IRP2016?)

Economic transport regulator
- Centralised ‘NERSA’ equivalent for transport, road, air and rail infrastructure
- Holistic cost impact assessment welcomed
- Pricing transparency and consistency key

Water & environment
- Water and Sanitation Economic Regulator-transparent and uniform pricing of water
- Concern re inclusion of legacies (AMD) in pricing strategy – is there a better solution
- Incentives for Water Conservation and Water Demand Management efforts by various users
# Solutions to improve productivity and reduce cost pressures

## Mining in South Africa: the challenges and the opportunities

### 2 September 2016

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<th>Gold</th>
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<td><strong>Mechanised mining system</strong></td>
<td>Research is required to integrate tested equipment into a working system and to provide real-time monitoring and control. Thereafter, technology transfer is imperative.</td>
</tr>
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<td>Application</td>
<td>Allows safer, healthier and more productive mining of current reefs, which otherwise become economically sterilised.</td>
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<td><strong>24/7 mechanised mining system</strong></td>
<td>Continuous mining machines that cost effectively cut the ore with reduced dilution have not been developed. Rock is extremely hard and the geology is complex. This requires globally leading R&amp;D.</td>
</tr>
<tr>
<td>Application</td>
<td>Allows the PGM industry to mine extensive, deeper orebodies in order to be more productive and thus help sustain the industry.</td>
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Solutions to improve productivity and reduce cost pressures (2)

STRATEGIC FRAMEWORK FOR MODERNISATION

Mining objectives:
- Zero harm for people and the environment
- Investment in more resources for longer
- Job retention

Shared value* in modernising the mining industry:
- Improved mining equipment and systems = improved health, safety and well-being
- Skills development = better pay and improved opportunities for growth and development
- Widespread industrialisation = more jobs associated with mining and beyond
- Sustainability through effective community development and protection of natural resources

National objectives:
- Higher growth, employment, exports and government revenue
- Better use of South Africa’s mineral wealth
- Improved talent pool of portable skills

Policy enablers:
- Research and development
- Narrow-reef, hard-rock mining equipment and systems
- Manufacturing
  - Globally competitive environment
  - Employment opportunities in factories and service industries
- Sustainability
  - Upskilling of employees and communities, job retention
- Legislative certainty for long-term investment

*Shared value = simultaneous advancement of social and economic goals
Modernisation possible future scenarios (20 yrs)

Where we are:

Stay as is: Conventional Mining

- Health and safety performance plateaus
- Rapidly depleting mineral wealth
- Lower production and higher costs
- Rapidly declining jobs
- 55% portable skilled labour in mining
- GDP growth opportunity lost
- Lack of Foreign Direct Investment

Low mechanisation

Early 1900s

Modernised: Continuous, Mechanised Mining with equipment

Zero Harm: Remove people from high-risk areas
SA’s Wealth: >50% increase in PGM tonne-years; >20% for gold tonne-years
Growth: >10% in GDP growth gained (losses prevented)
Employment: >10% increase in PGM job-years; >5% for gold job-years
Exports: >10% in exports gained (losses prevented)
Govt revenue: >5% in revenue gained (losses prevented)
Skills: 90% portable skilled labour in mining
Investment: Higher investment potential in optimal production at lower costs

Continuous, Mechanised Mining with Imported Machines

As above, but with:
- Higher cost of mining
- Lower economic growth
- Reduced employment
- Enhanced imports
- Less portable skills

Where we want to be

High local content

High mechanisation
Vision for a competitive, vibrant and transformed South African mining industry

**Government and trade unions** who are proud and fully supportive of mining industry and acknowledge industry as important for the country.

**Workforce**, that is transformed, productive, skilled, fulfilled, safe and healthy.

**CONSTRUCTIVE PARTNERSHIPS BUILT ON TRUST**

- Key exporter, earner of foreign exchange and taxpayer
- Creator of good jobs
- Developer of skills
- Significant contributor to economy
- Driver of transformation

**Management** not only focus on profits, but provide decent jobs, play positive role in mining communities and sensitive to environment.

**Investors** who regard industry as a good, long-term investment destination.

Mining in South Africa: the challenges and the opportunities  2 September 2016