

IPMI

International Precious Metals Institute



European Chapter Catalyst Seminar
Amsterdam, November 7&8, 2016

Primary PGM Production in Southern Africa:

A Dangerous Reef or an Economic Safe Harbour?

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Producing Nations



Pt Production by Country



	2015 Platinum Production (MT)	% of Global Production
South Africa	125	70.2
Russia	23	12.9
Zimbabwe	12.5	7.0
Canada	9	5.1
US	3.7	2.1
Southern Africa	137.5	77.2

Source: www.statista.com



Risk Free Investment Environment?

- Geography / Geology / Grade
- Power and water
- Political and legislative risk
- Capex / Opex
- Price fluctuation / extraction cost / FOREX
- Labour
- Product substitution
- Technology
- *ROI calculations need to model all these variables over the expected economic life span of the project*

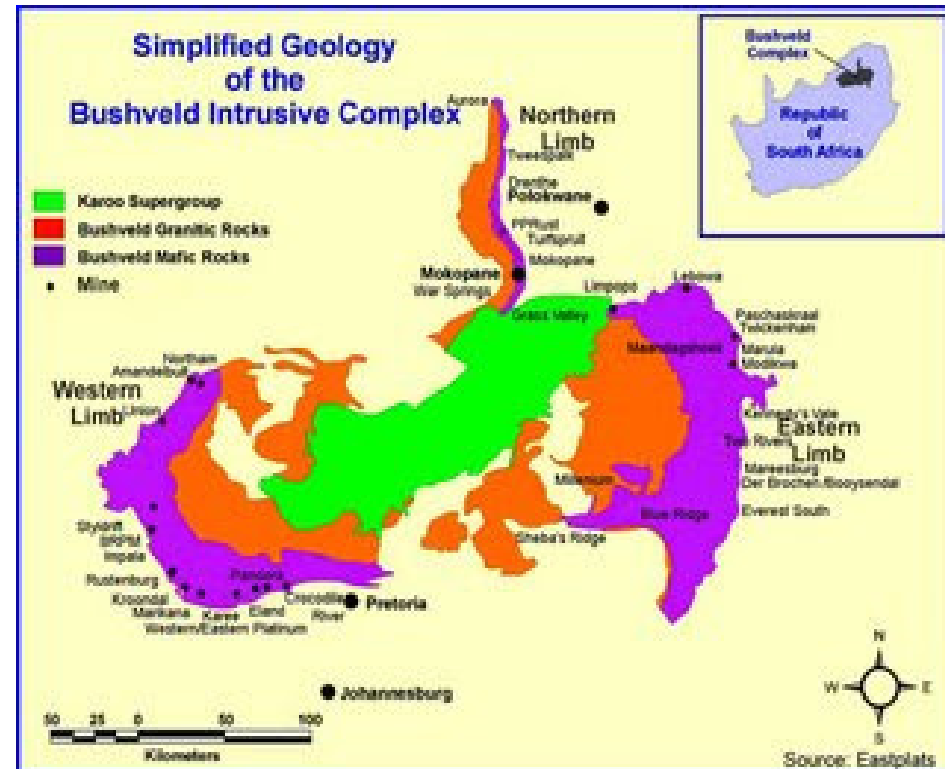


Political Risk

- Both South Africa and Zimbabwe face significant and on-going political risk
 - South Africa
 - Corruption charges and other legal actions against senior members of the ANC government
 - Rise of the Economic Freedom Fighters (EFF) lead by Julius Malema
 - AMCU & NUM conflict
 - BEE legislation
 - Zimbabwe
 - Situation post Robert Mugabe
 - Indigenisation and Economic Empowerment Act
 - Limited sanctions



Geography and Geology



The South African Mineral Codes (SAMCODEs)



- ***A mineral 'reserve' is an ore body for which adequate information exists to permit confident extraction.*** Briefly, it requires that all aspects including adequately spaced drilling, assaying, mineralogical and metallurgical studies, mine planning, beneficiation, environmental, social and legislative issues, and financial viability have been addressed. Mining companies would typically plan their exploration and evaluation strategies such that they had a minimum of ten years of ore in this category. (Two sub-categories exist: 'probable' and 'proven' reserves.)
- ***A mineral 'resource' is an ore body for which there are reasonable and realistic prospects for eventual extraction.*** Addressing of all the issues listed under 'reserve' would have been initiated, and all such results would be positive. Mining companies might aim to have a further ten years of ore in this category. (Three sub-categories exist: 'measured', 'indicated' and 'inferred', as a function of increasing risk.)

Bushveld Reserves and Resources (2010)



Company	Reserves, million oz	Resources ^b , million oz	Annual refined production ^c , million oz	
	3PGE ^d + Au	3PGE + Au	5PGE ^e	Pt
Anglo Platinum	171	632 ^f	4.8	2.5
Implats	26 ^g	133 ^g	2.6	1.2
Lonmin	45	178	1.2	0.7
Northam Platinum	8	129	0.4	0.2
Totals	250	1072	9.0	4.6

Source: Pt met reserves 2010. R. Grant Cawthorn

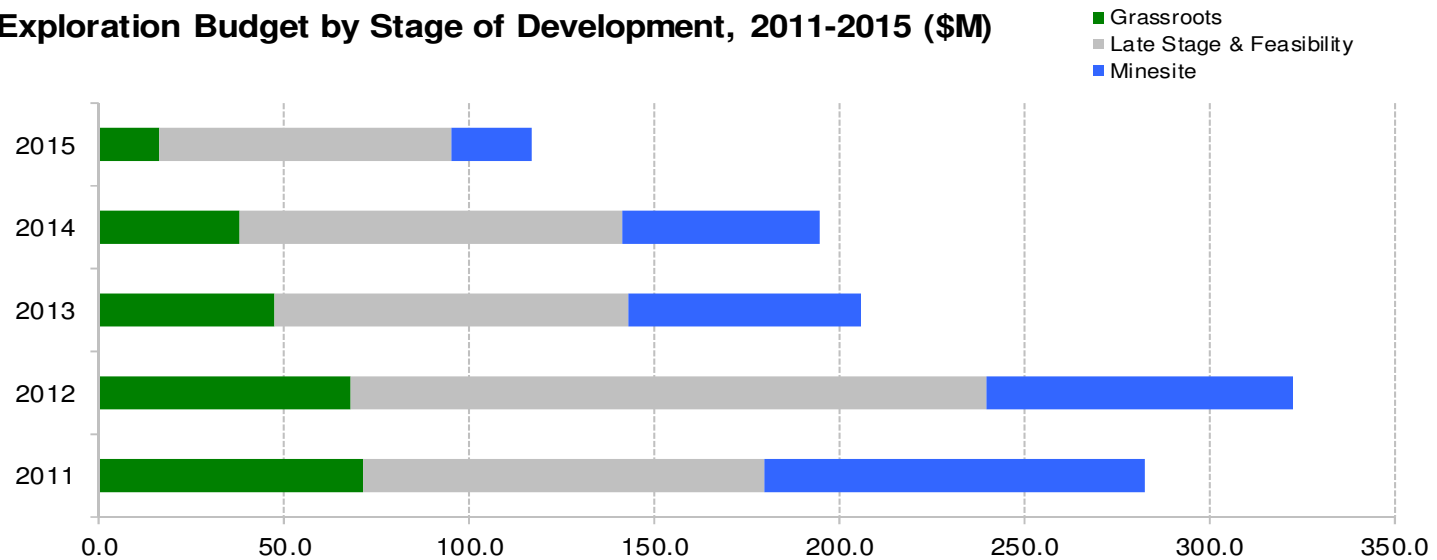
Exploration spend South Africa



Exploration Budget by Commodity, 2011-2015 (\$M)

Commodity	2011	2012	2013	2014	2015
Gold	61.7	59.7	28.1	22.0	15.8
PGM	132.1	147.0	72.3	91.9	56.3

Exploration Budget by Stage of Development, 2011-2015 (\$M)



Source: SNL MEG

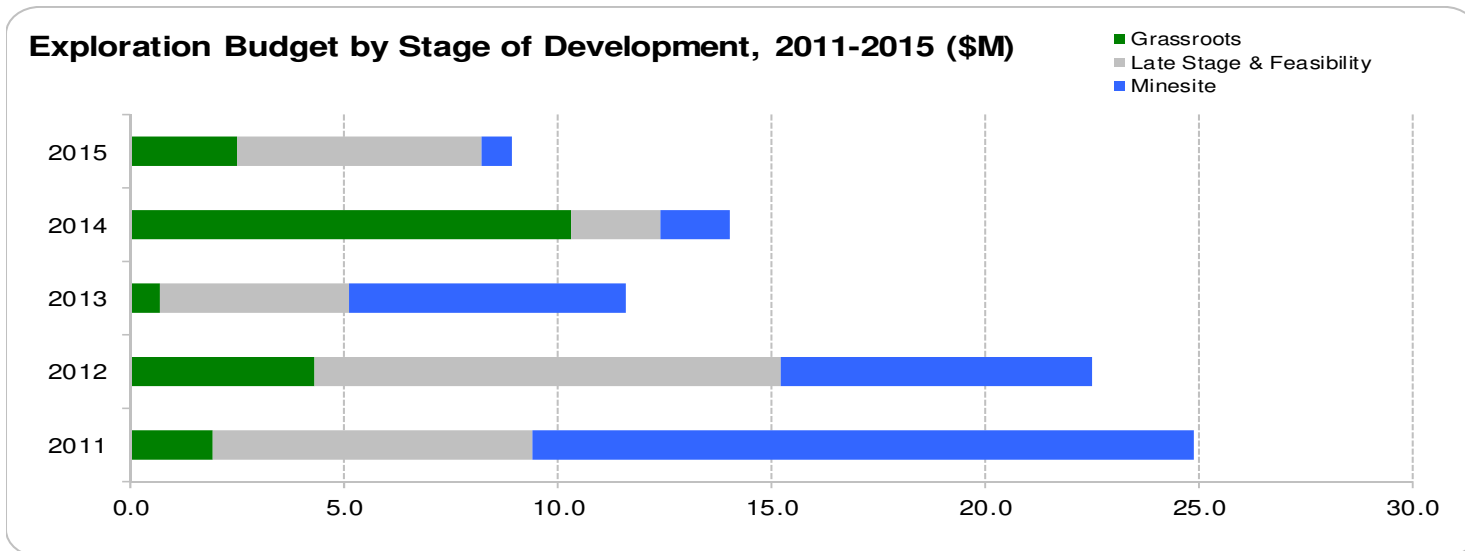
Exploration Spend Zimbabwe



Exploration Budget by Commodity, 2011-2015 (\$M)

Commodity	2011	2012	2013	2014	2015
Gold	11.4	9.8	9.3	0.7	0.5
PGM	13.4	12.2	2.0	7.5	6.1

Exploration Budget by Stage of Development, 2011-2015 (\$M)



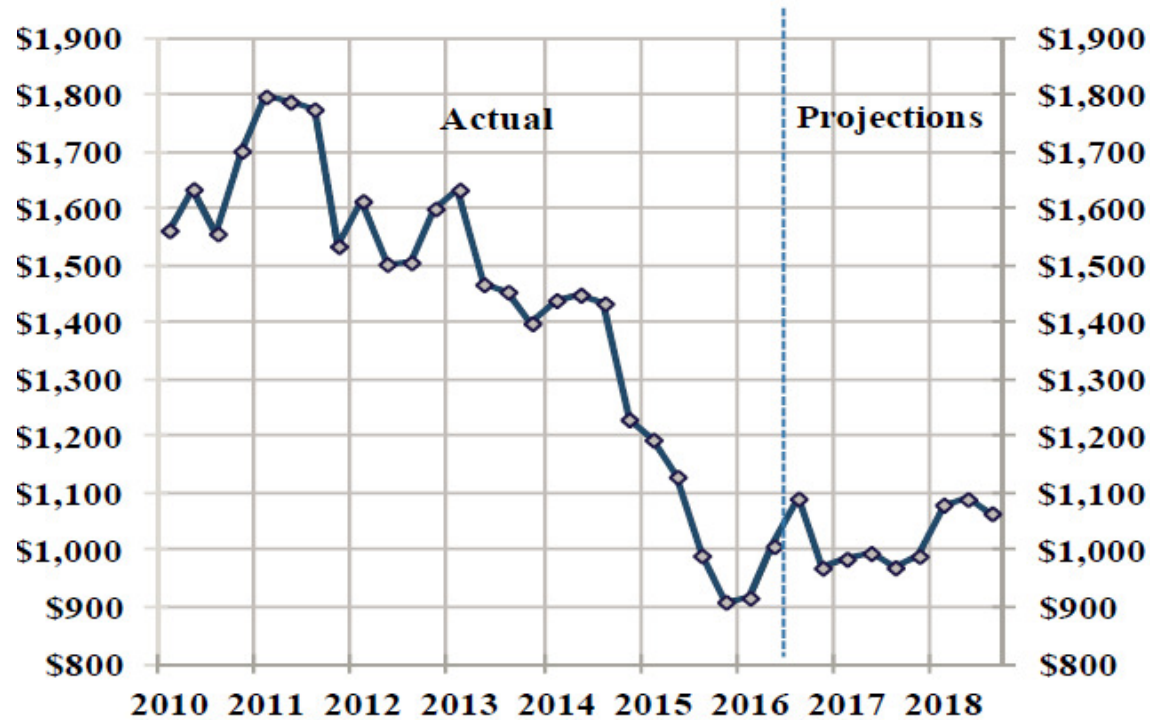
Source: SNL MEG

Price



Platinum Quarterly Average Price Projections to Q3 2018

\$ / Ounce

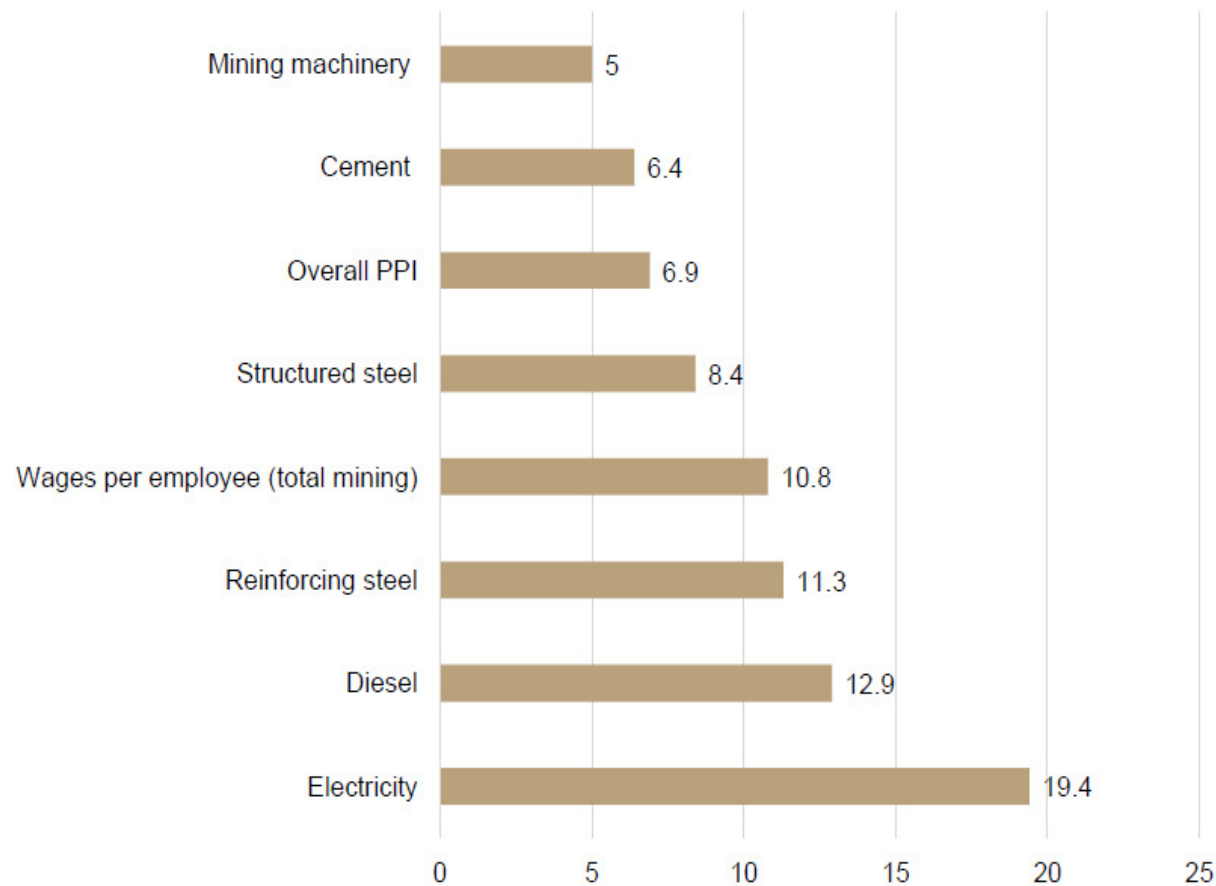


Source: CPM Group Nov 2016

Production Cost Inflation



Cost inflation affecting the mining sector (Annual average increase 2008 to 2014)

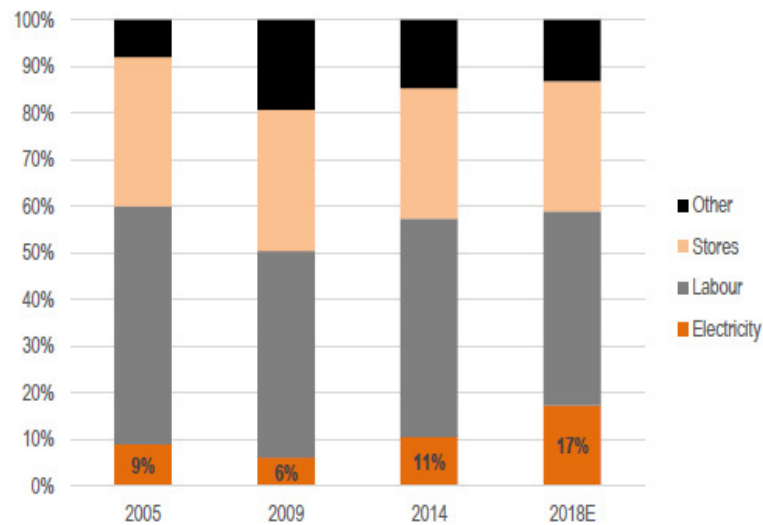


Source: Stats SA, CoM

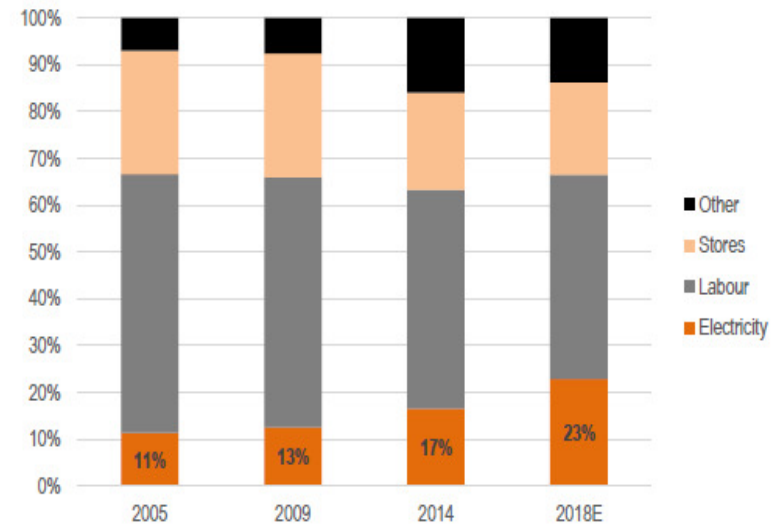
Electricity and Labour Costs



Cost components for the PGM sector



Cost components for the Gold sector



Source: Chamber of mines member estimates, *PGM sector proxy represented by 80% of production, ^Chamber members

Power and Labour Costs.

Some “light” at the end of the “tunnel”



- Anglo American Platinum, Impala Platinum and Lonmin have all just signed 3 year wage agreements with the AMCU
 - Agreed to an increase in basic pay ranging from 7% to 12.5% for each of the three years
 - The President of the AMCU, Joseph Mathunjwa, stated that he recognized the constraints of “a very deep economic crisis particularly in the platinum sector”
- In February 2016, The Chamber of Mines joined us in an objection to Eskom’s latest tariff increase. The National Electricity Regulator of South Africa (NERSA), based on industry objections, limited the tariff increase to an 8% rise

Mine Project Life-Cycle

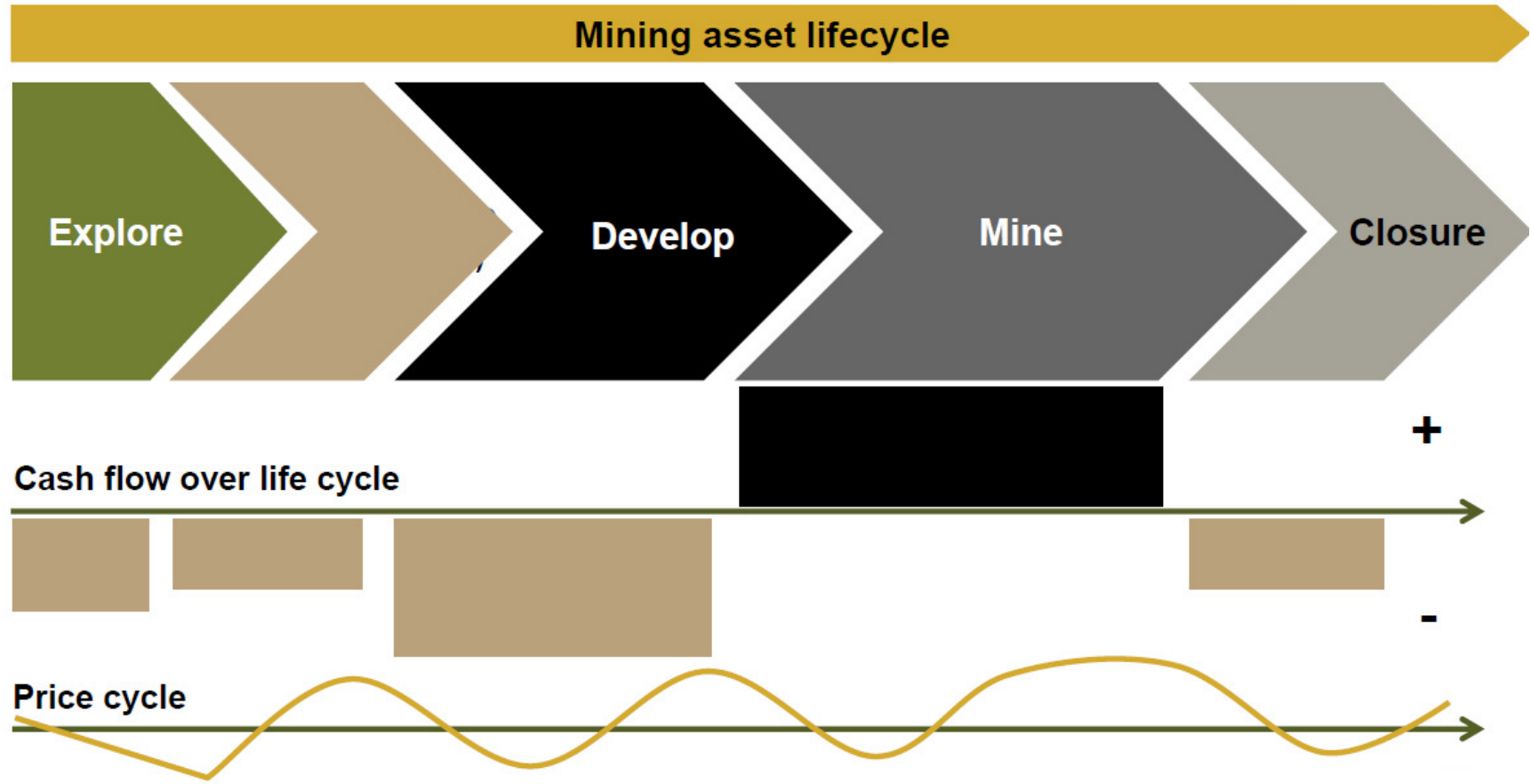


Impala Platinum (16 shaft):

25 years to production

- 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

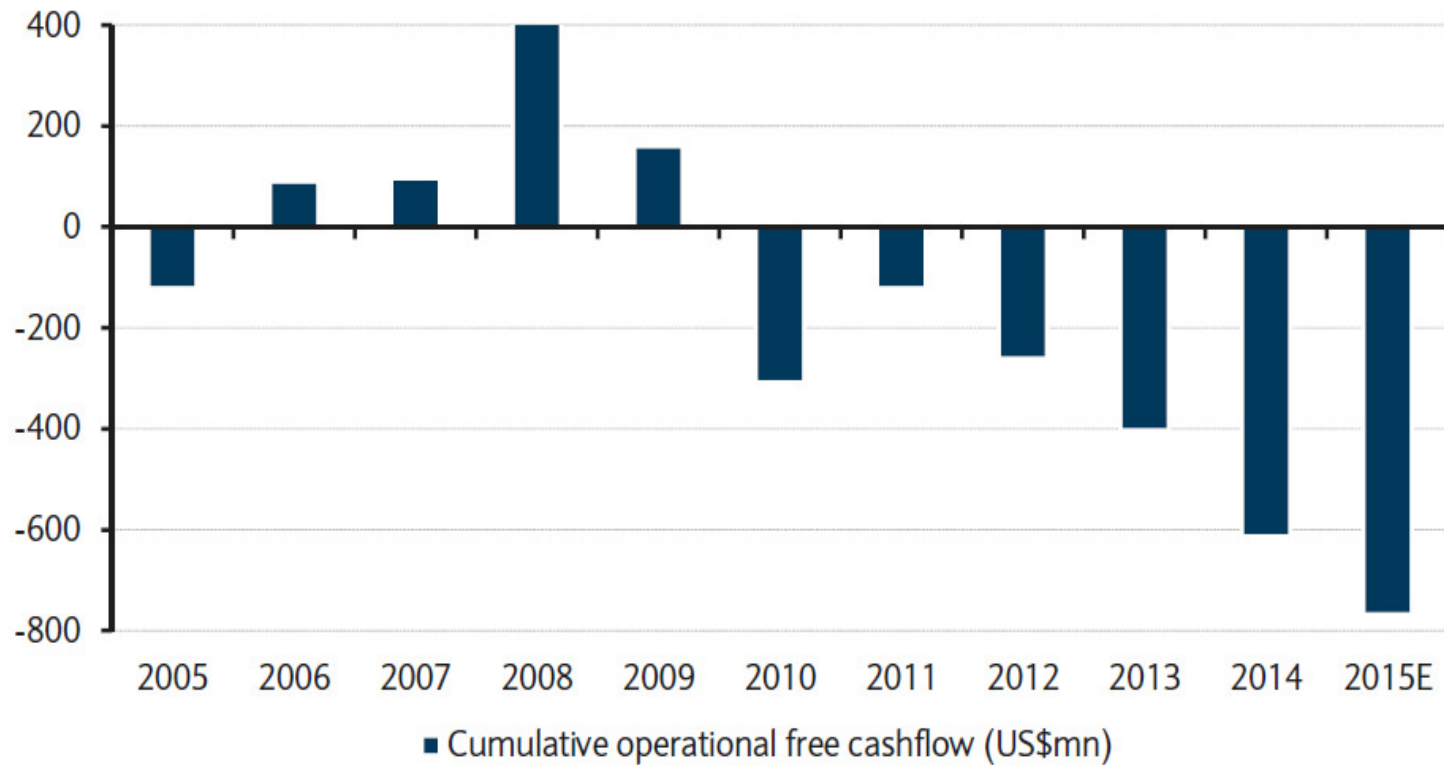
Cash Flow Cycle



A Sustainable Result for Investors?



Summary of Lonmin cumulative Free Cash Flow (US\$m)

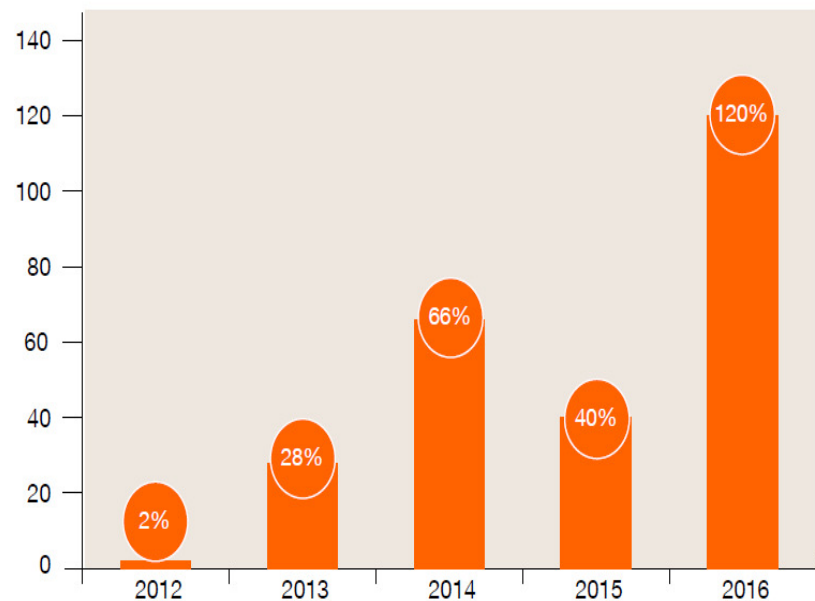


Source: Company data, Barclays Research



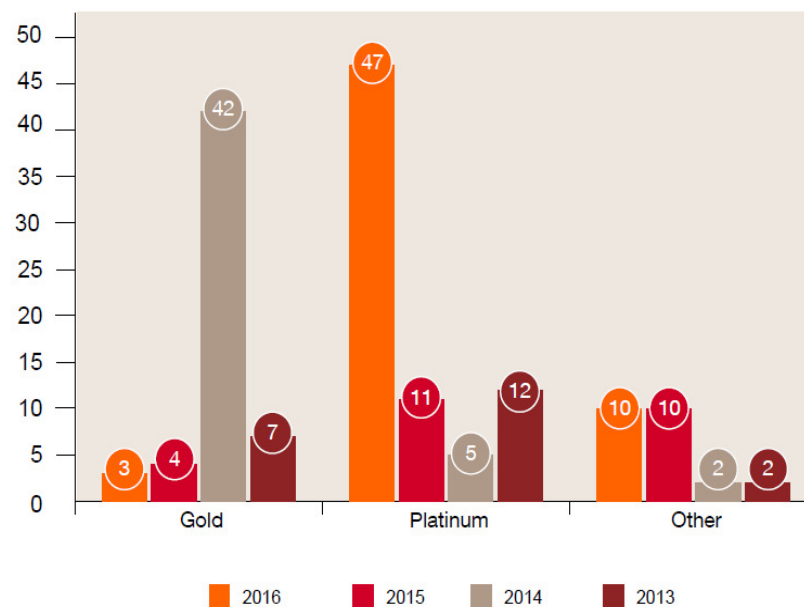
Capital Destruction

Figure 23: Impairment as a percentage of capital expenditure



Source: PwC analysis

Figure 24: Impairment per commodity (R 'billions)



Source: PwC analysis

Too Big To Fail?

A Commodities Case Study



- **Peabody Energy. Largest coal company on the NYSE**
- *April 2011 share price \$72.71 Market Cap \$1.4B*
- US EPA introduced stringent new regulations governing emissions from utility plants
- Fracking produces an abundant and cheap fuel source for utility plants
 - Thermal coal is largely substituted by natural gas as the fuel of choice for US utilities
- Collapse in Chinese import demand for thermal coal leads to a severe price decline which effectively closes export markets to US producers
- *April 2016 share price \$2.07 Market Cap \$38M*
- April 13, 2016. Company files for Chapter 11 protection for its US entities

So, do some Southern Africa Producers Sink or do they Reach Calmer Waters?



- ***Further shafts and operations in the higher cost quartiles will need to be closed***
 - *Will result in further job losses and possible labour unrest*
 - *Will result in further impairment charges for the mining companies*
- ***As miners are “takers” of market prices, forward demand is the key part of the cost equation***
 - *A early and significant switch to electric vehicles will reduce demand and therefore prices*
 - *Chinese demand for auto and jewellery has to stay strong*
- ***Assuming no increase in Political Risk and no major changes in the Legislative Agenda, the size and quality of the PGM reserves in Southern Africa will allow the stronger producers to survive***
- ***Although the number of miners employed in Southern Africa is a critical economic and social number for the respective governments, a way has to be found to bring automated mining technology into the Pt mines to optimize the mining operation and bring production costs down such that:***
 1. ***Employment numbers are maintained at the higher possible sustainable number***
 2. ***The industry can show a return on capital invested so justifying maintenance and greenfield capex***

Acknowledgements

- Assistance in sourcing data used in this presentation was given by:
 - SGS South Africa
 - Mr. Wouter Roos
- Data shown in this presentation came from a number of industry sources, including:
 - Chamber of Mines of South Africa
 - CPM Group
 - Johnson Matthey publications
 - PwC Mining reports
 - Barclays Research
 - SNL MEG Group