Minxcon Group

NEWSLETTER

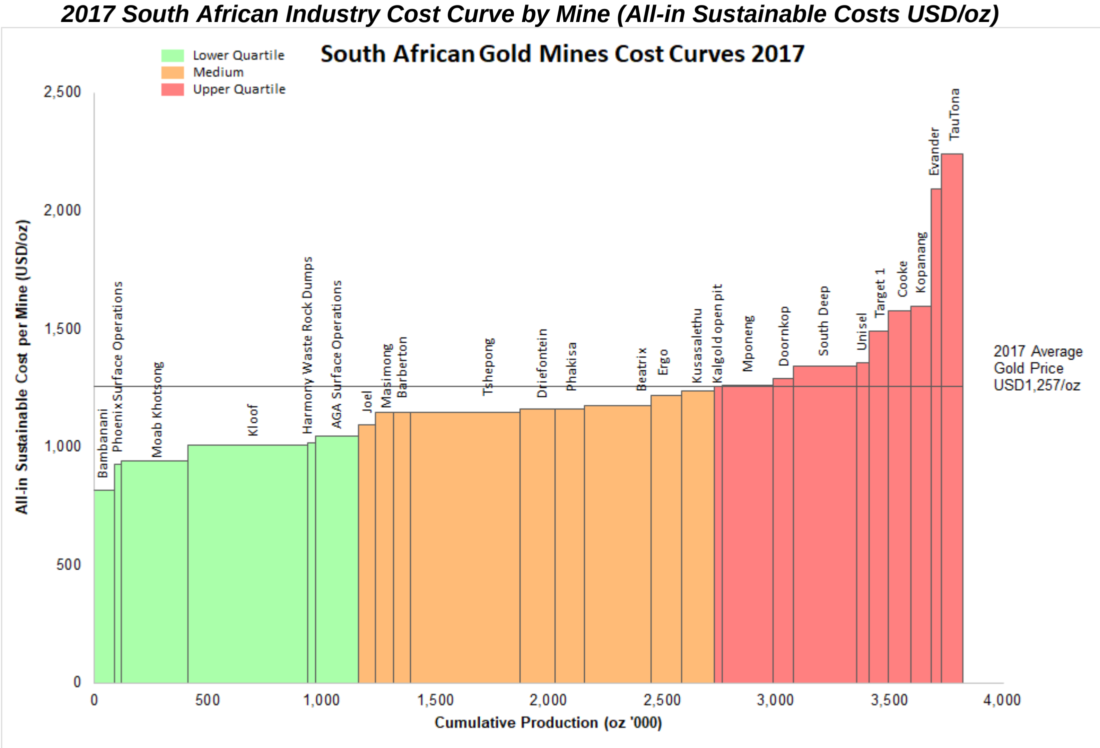
August 2018

EXPLORATION | CONSULTING | PROJECTS

Gold Cost Curves

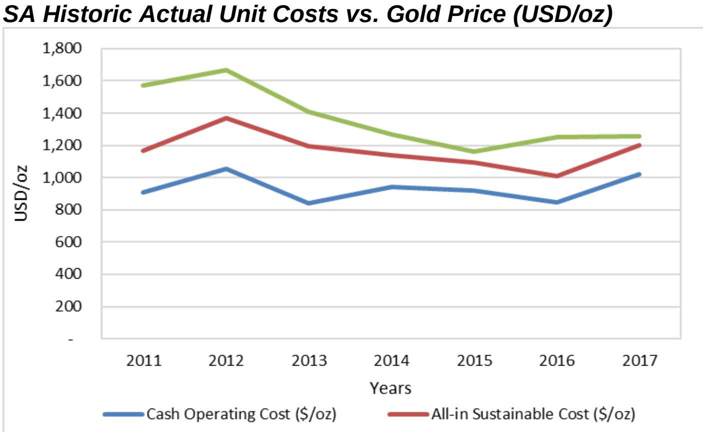
In 2017, the total Rand cash operating costs and all-in sustainable costs per ounce of gold produced from South African gold mines have risen by 9% and 8% year-on-year respectively, primarily as a result of increased labour and electricity costs as well as operational difficulties. The dollar-denominated total cash operating and all-in sustainable costs increased by a staggering 20% year-on-year, compounded by the strengthening of the Rand in 2017.

2017 South African Industry Cost Curve by Mine (All-in Sustainable Costs USD/oz)



Disclaimer: Information displayed in graph is based on public information collected from respectiveSouth African gold mining company's annual reports. There is no guarantee that the interpreted information is 100% accurate.

SA Historic Actual Unit Costs vs. Gold Price (USD/oz)

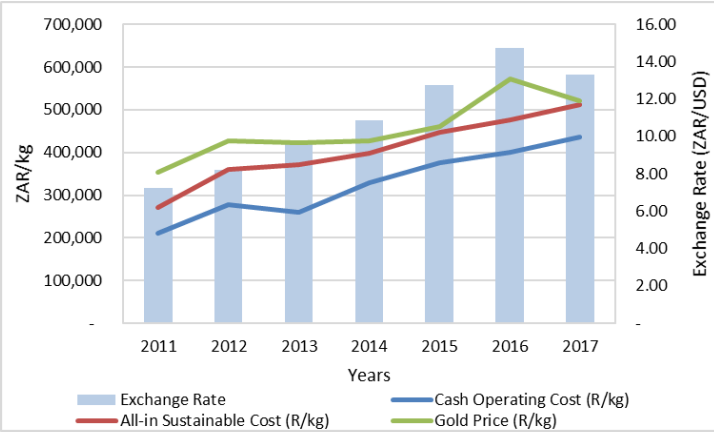


SA Historic Actual Unit Costs vs. Gold Price (ZAR/kg)

NEWSLETTER SPOTLIGHT

◊ **South African gold mines have some of the highest total cash operating costs (USD/oz) on a global scale and are operating at 52% above the average global total cash operating costs.**

◊ **36% of SA gold mines all-in**



sustainable costs are above the average 2017 gold price compared to 12% during 2016.

◊ Should gold retrace back to the USD1,200/oz level, 48% of SA mines will be above the price line on an all-in sustainable cost level basis.

Industry cost curves are valuable tools to benchmark the operational cost performance of an existing operation or new proposed mine project against industry. The industry cost curve indicates the ability of the existing mines to endure cyclical commodity prices and ensure continuous mining operations over time. This measure of a mine's cash margin per ounce can also be a useful tool for the following:-

- Use as a Comparison tool;
- Use as an Analytical tool:-
  - Shareholders, Management, Industry analysts;
- Use in Investment decisions:-
  - Investors, Banks, Equity brokers;
  - Identification of high- and low-cost producing regions, informs company decisions on where to invest;
- Provide a trend in costs as the mine mature; and
- Determine commodity price in times of market oversupply.

The cost curves are displayed here per ounce recovered and per milled tonne. Every company applies its own exchange rate when reporting costs over periods. The average exchange rate in 2017 was ZAR/USD 13.31 which strengthened from ZAR/USD 14.72 in 2016.

(*Note: Cash Operating Cost represents the cash cost incurred at each processing stage, from mining through to recoverable metal delivered to market inclusive of royalties and production taxes, less net by-product credits (if any). All-in Sustainable Cost is the sum of the cash operating cost, sustaining capital expenditure, corporate general and administrative costs, reclamation and remediation costs and sustaining exploration and study costs. Where gold producers report costs according to different definitions, Minxcon strives to adjust these costs to conform as close as possible to the above definitions.*)

The aim on any operation should be to remain within the lower 50th percentile of cost producers to ensure profitability even in market downturns. The principle of this logic is based on economic theory that states that the commodity price is a function of the supply-demand balance of the specific commodity. If demand decreases due to weak market conditions and commodity prices subsequently decline, it is likely that the highest cost producers will suspend production first, which reduces supply and ultimately supports higher commodity prices.

Cost curves can be constructed and analysed at a company or country level to facilitate comparison on a national, regional, or international level. South African gold mines have the highest total cash operating costs in the world and are operating at 52% above the average global total cash operating costs (USD672/oz for 2017). Some of the major reasons for the costs being higher are the age of the operations (thus increasing maintenance costs on the shafts and machinery), increasing electricity and labour costs, as well as the fact that the gold mines in South Africa are by far the deepest in the world.

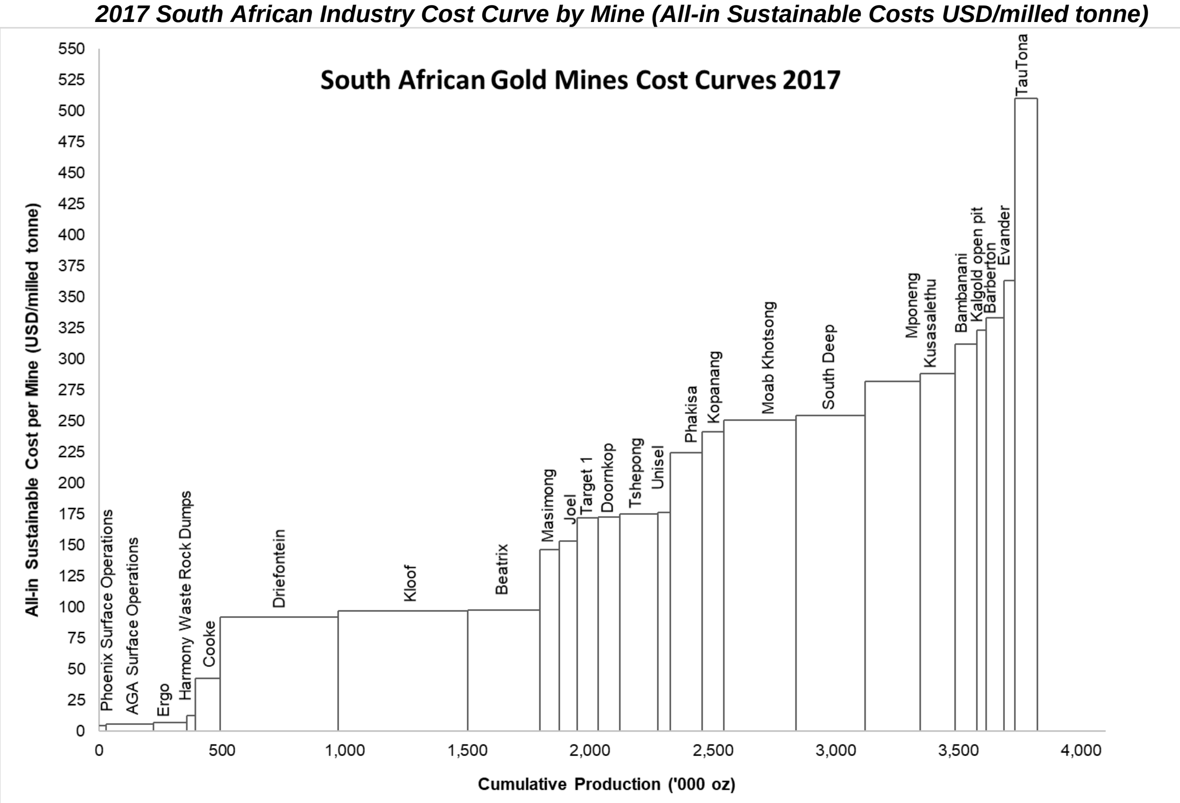
Minxcon used these cost curves to compare the cost curves of South African operating gold mines against the average gold price for the year. The figure on the first page shows the South African gold industry cost curve on an all-in sustainable cost per produced ounce basis for 2017 at a mine level, while the figure to follow illustrates the South African gold industry cost curve on an all-in sustainable cost per milled tonne basis. From the first figure, at the 2017 average gold price of USD1,257/oz, 36% of the gold mines in South Africa were not profitable with all-in sustainable costs above the gold price. These unprofitable mines accounted for 28% of South Africa's total ounces of approximately 3.8 million produced during 2017.

Should gold retrace back to the USD1,200/oz level, the costs of 48% of the South African gold mines will be above the price line on an all-in sustainable cost basis.

South African cash operating costs stands at USD1,022/oz for 2017 which is 15% below the USD1,200/oz level. Were the gold price to revert to USD1,200/oz, 79% of South African mines would be able to sustain operations for a limited period at current cash operating costs. However, there might be a contraction in exploration and expansion which could lead to upward pressure on the price sooner or later as most mines are geared sustaining operations but are not replacing resources. South Africa's influence in the global market has reduced significantly over the last decade from being the number one gold producer prior to 2007 producing 272.1 tonnes in 2006, to number eight producer in 2017 producing 139.9 tonnes. Significant production from new mines would realistically not take hold for approximately five to ten years because of the lead times on starting up operations.

In the case of existing South African operations with old infrastructure, constant replacement is required and older mines will come under immense pressure at lower price levels. Increasing labour costs and electricity tariffs are also applying pressure on South African operations, accounting for a significant portion of the increased cash operating costs in 2017.

2017 South African Industry Cost Curve by Mine (All-in Sustainable Costs USD/milled tonne)



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Minxcon Exploration

A project management company specialising in the management and optimisation of exploration projects within the mining industry.

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RESOURCE | RESERVE | VALUE

DESIGN | BUILD | OPTIMISE

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