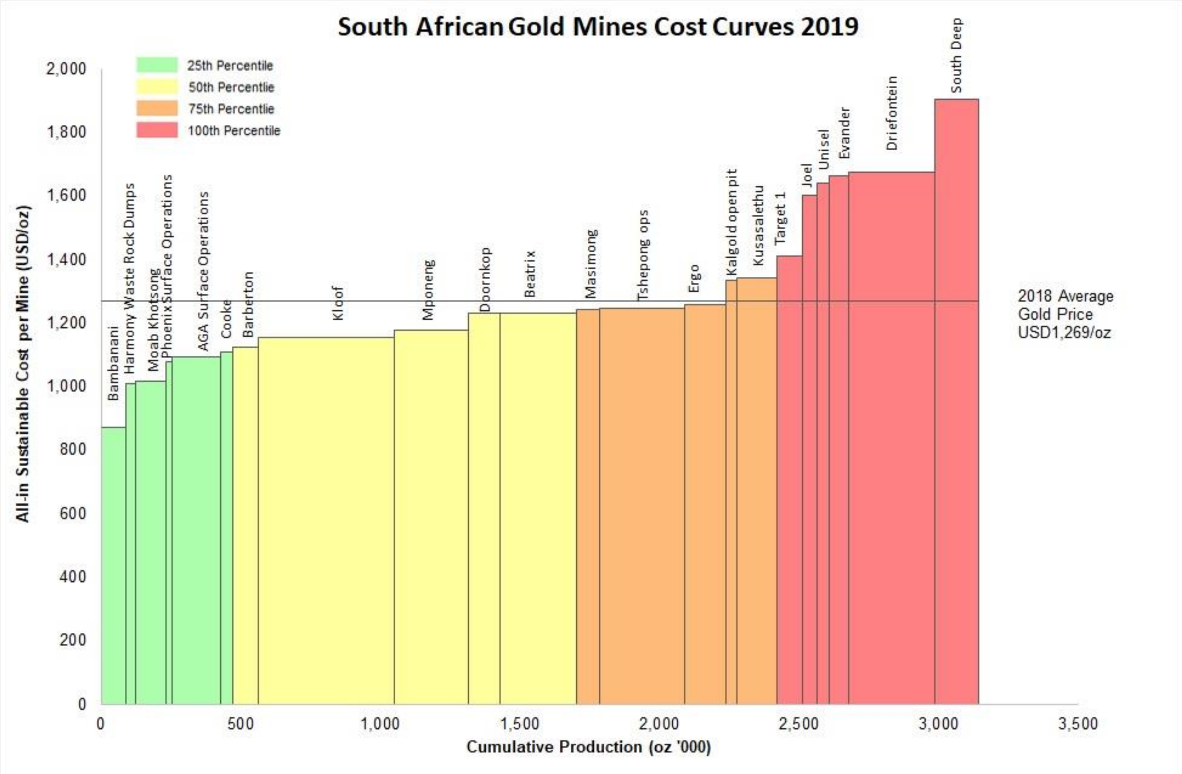
NEWSLETTER
December 2019

EXPLORATION | CONSULTING | PROJECTS

Gold Cost Curves

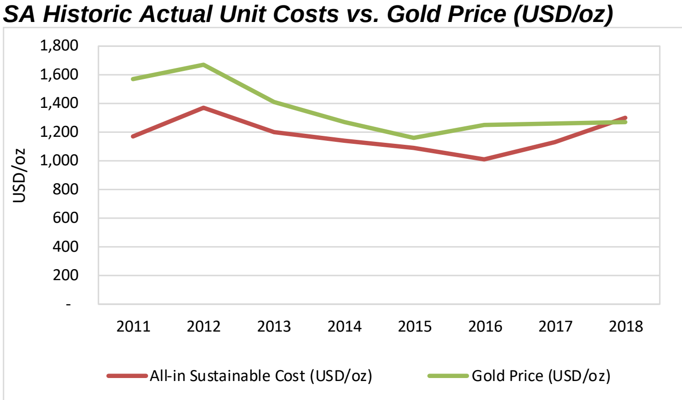
In 2018, the total Rand all-in sustainable costs per ounce of gold produced from South African gold mines have risen by 14% year-on-year respectively, primarily as a result of increased labour and electricity costs as well as operational difficulties and several fatalities. The dollar-denominated all-in sustainable costs also increased by 15% year-on-year, with the average exchange rate almost unchanged from 2017.

2019 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 respective South African gold mining companies' annual reports. There is no guarantee that the interpreted information is 100% accurate.

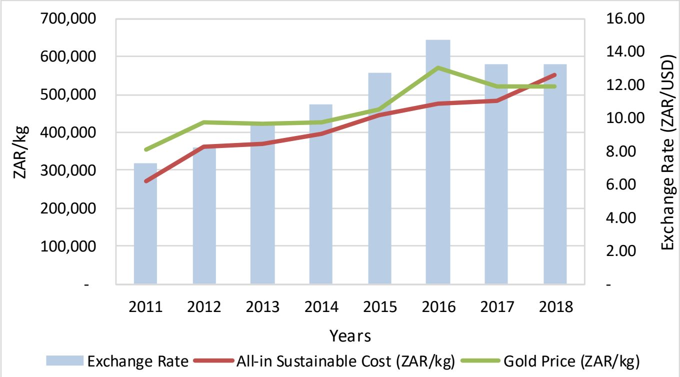
SA Historic Actual Unit Costs vs. Gold Price (USD/oz)



NEWSLETTER SPOTLIGHT

◊ South African gold mines have some of the highest operating costs (USD/oz) on a global scale and are operating at 44% above the average global total all-in sustainable costs.

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



◊ 36% of SA gold mines' all-in sustainable costs are above the average 2018 gold price compared to also 36% during 2017.

◊ Should gold retrace back to the USD1,200/oz level, 55% of SA mines will be above the price line on an all-in sustainable cost level basis.

***Note**: All-in Sustainable Cost ("AISC") includes cash cost incurred at each processing stage, from mining through to recoverable metal delivered to market inclusive of royalties and production taxes, sustaining and reserve development 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.*

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 produced and per milled tonne. Every company applies its own exchange rate when reporting costs over periods. The average exchange rate in 2018 was ZAR/USD 13.24 which is close to the average exchange rate of ZAR/USD 13.31 in 2017.

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 operating costs in the world and are operating at 44% above the average global all-in sustainable costs (USD1,294/oz for 2018). 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 with extremely difficult operating environments.

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 2018 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 2018 average gold price of USD1,269/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 29% of South Africa's total ounces of approximately 3.1 million produced during 2018 (listed companies).

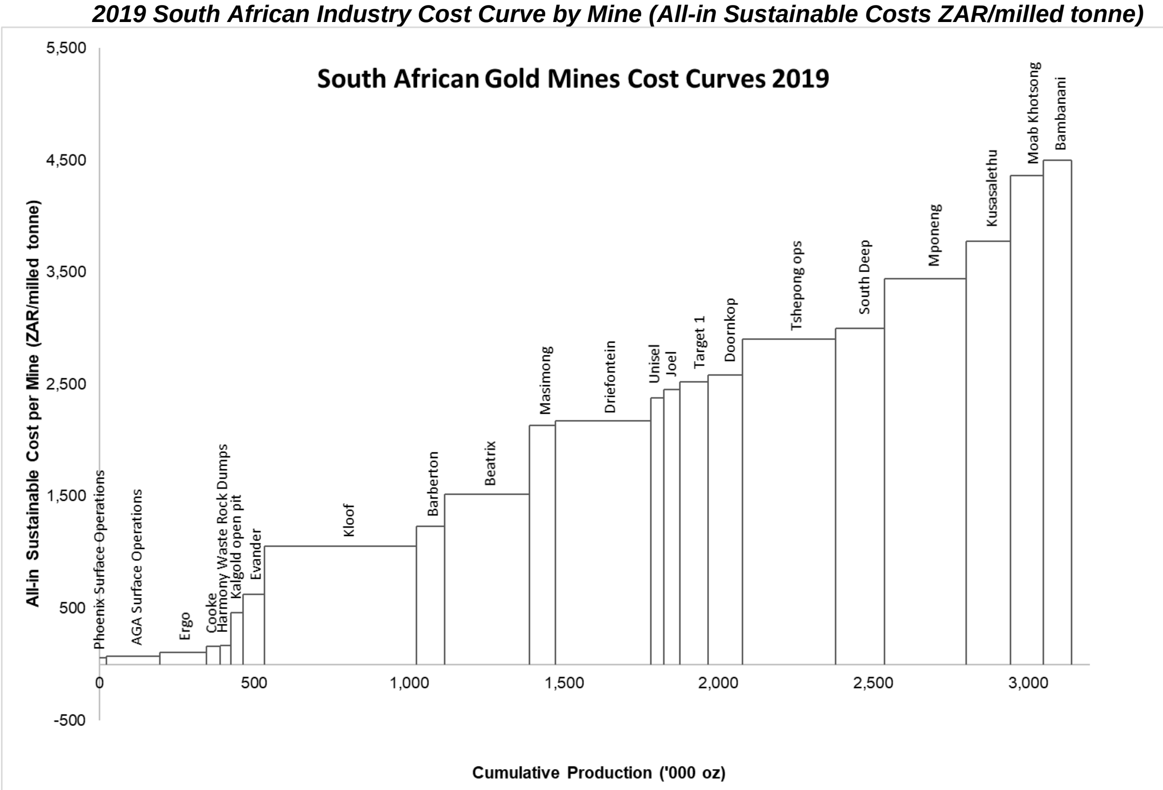
Should gold retrace back to the USD1,200/oz level, the costs of 59% of the South African gold mines will be above the price line on an all-in sustainable cost basis.

In such circumstances, in a global context, there may 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, however, 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 2018 producing 123.5 tonnes (139.7 tonnes in 2017). 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, steel costs and electricity tariffs are also applying pressure on South African operations. Electricity costs have trebled in the last seven years, while wages are also rising much faster than inflation and account for a significant portion of the increased costs in 2018.

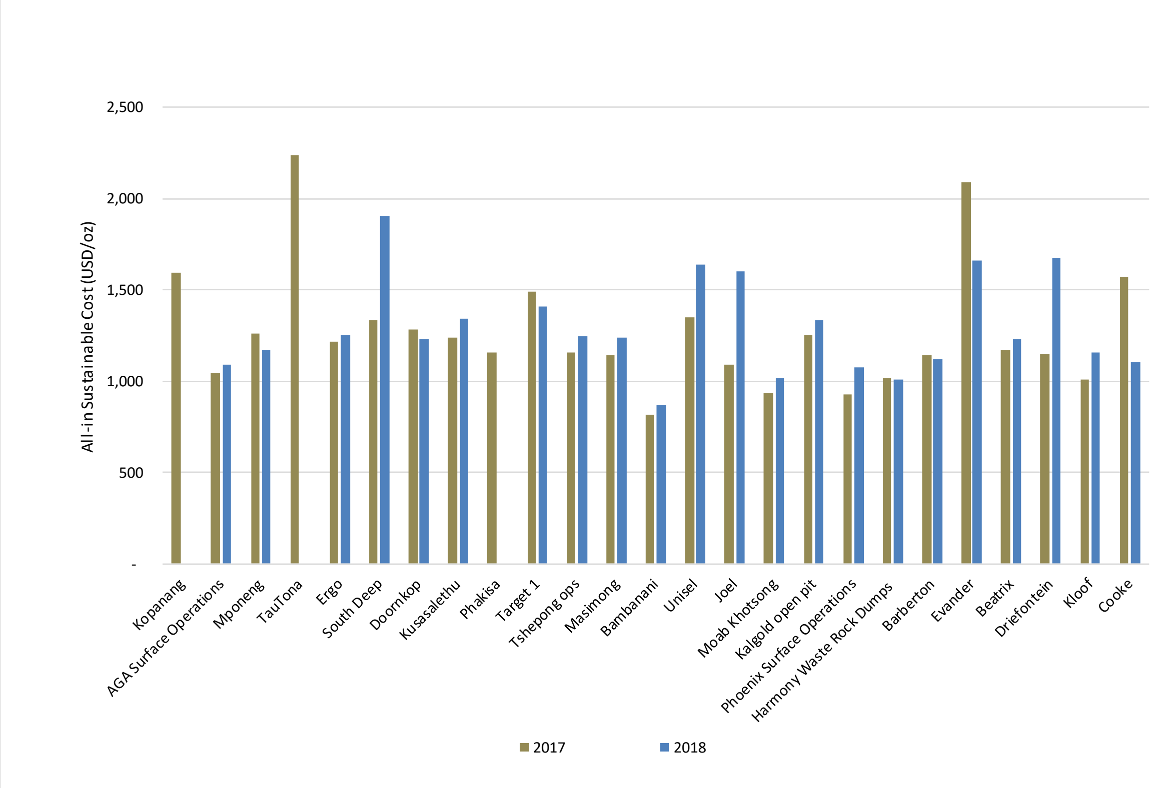
Fortunately for gold miners, the gold price has had a stellar 2019 thus far at time of writing, having breached the USD1,500/oz mark for the first time since 2013. This should bode well for all gold miners in the short-term.

2019 South African Industry Cost Curve by Mine (All-in Sustainable Costs ZAR/milled tonne)



The figure below illustrates a year-on-year comparison of the South African gold industry all-in sustainable cost per ounce at a mine level in dollar terms. Many mines have had increased costs over the year. Most notable is a sharp rise in Goldfields' South Deep and Sibanye's Driefontein costs, which are both large operations. Unit costs at South Deep increased due to production decreasing by 44% over 2018 as a result of industrial action, restructuring, and a fatality, exacerbated by poor ground conditions in the high-grade areas of the mine. Similarly, at Driefontein production decreased by 33% as a result of a significant seismic event resulting in seven fatalities and damage to shaft infrastructure, and strike action. With fixed costs accounting for approximately 80% of Sibanye's gold operations cost, unit costs are very sensitive to decreases in production. Tau Tona has been closed due to unprofitability, while Kopanang has been unbundled to a private company. These examples illustrate the difficult operating environment of South Africa's gold industry.

Year-on-Year Comparison of Cost by Mine (All-in Sustainable Costs USD/oz)



Note*:* *Information on Konanang no longer in the public space; Tau Tona has been closed due to unprofitability; Phakisa now reported with Tshepong Operations.*

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Minxcon Exploration

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