

EXPLORATION | CONSULTING | PROJECTS

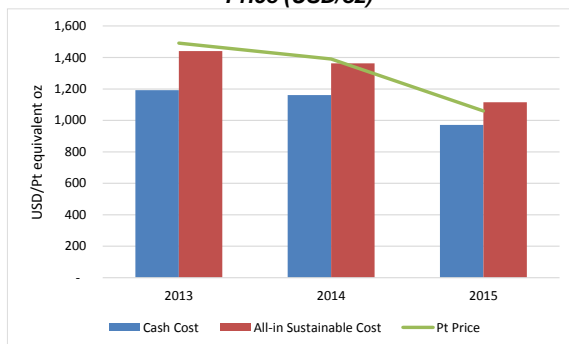
Platinum Cost Curves

In 2015 the total cash costs of South Africa's ("SA") platinum mines decreased slightly by 2% while the all-in sustaining costs decreased by 4% year-on-year in rand terms. The denominated total cash and all-in sustainable costs per dollar, however, decreased significantly, much of which is a consequence of the weakening rand.

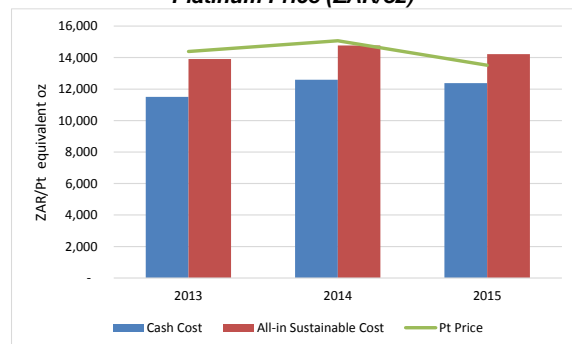
NEWSLETTER SPOTLIGHT

- ◇ South African platinum mines produced 71% of global platinum production during 2015.
- ◇ 57% of SA platinum mines all-in sustainable cost > average 2015 platinum price.
- ◇ Cash and all-in sustainable costs decreased by 16% and 18% respectively year-on-year.

SA Historic Actual Unit Costs (USD/Pt eq oz) vs Platinum Price (USD/oz)



SA Historic Actual Unit Costs (USD/Pt eq oz) vs Platinum Price (ZAR/oz)



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 to use as:-

- Comparison tool
- Analytical tool
 - Shareholders, Management, Industry analysts
- Investment decision tool
 - 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
- Determine commodity price in times of market oversupply

The aim should be to remain within the lower 50th percentile of cost producers to ensure profitability even in market down turns. 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.

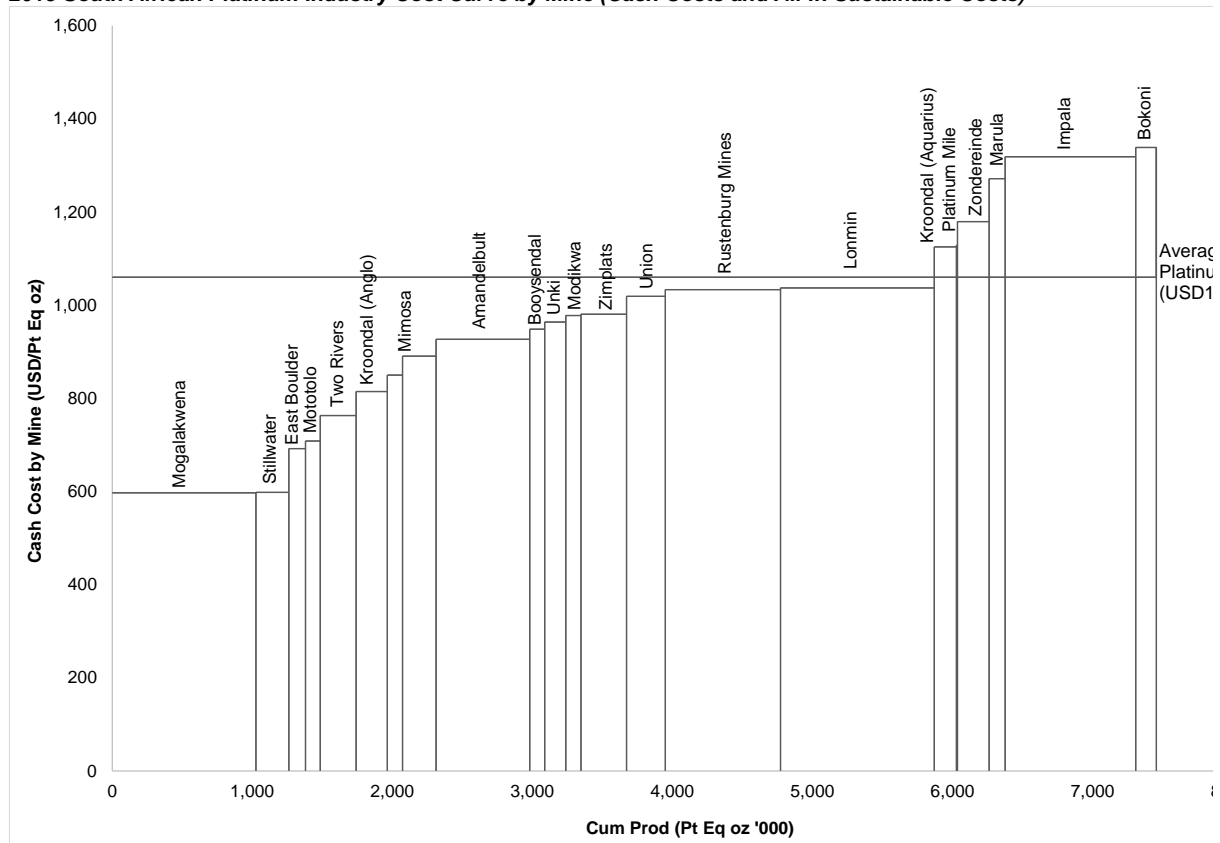
Cost curves can be constructed and analysed at a company or country level to facilitate comparison on a national, regional, or international level. SA produced 71% of global platinum during 2015 and is the main constituent of costed mine production. As a whole SA had a good year when looking at USD costs, with both cash and all-in sustaining cost falling by 16% and 18% respectively.

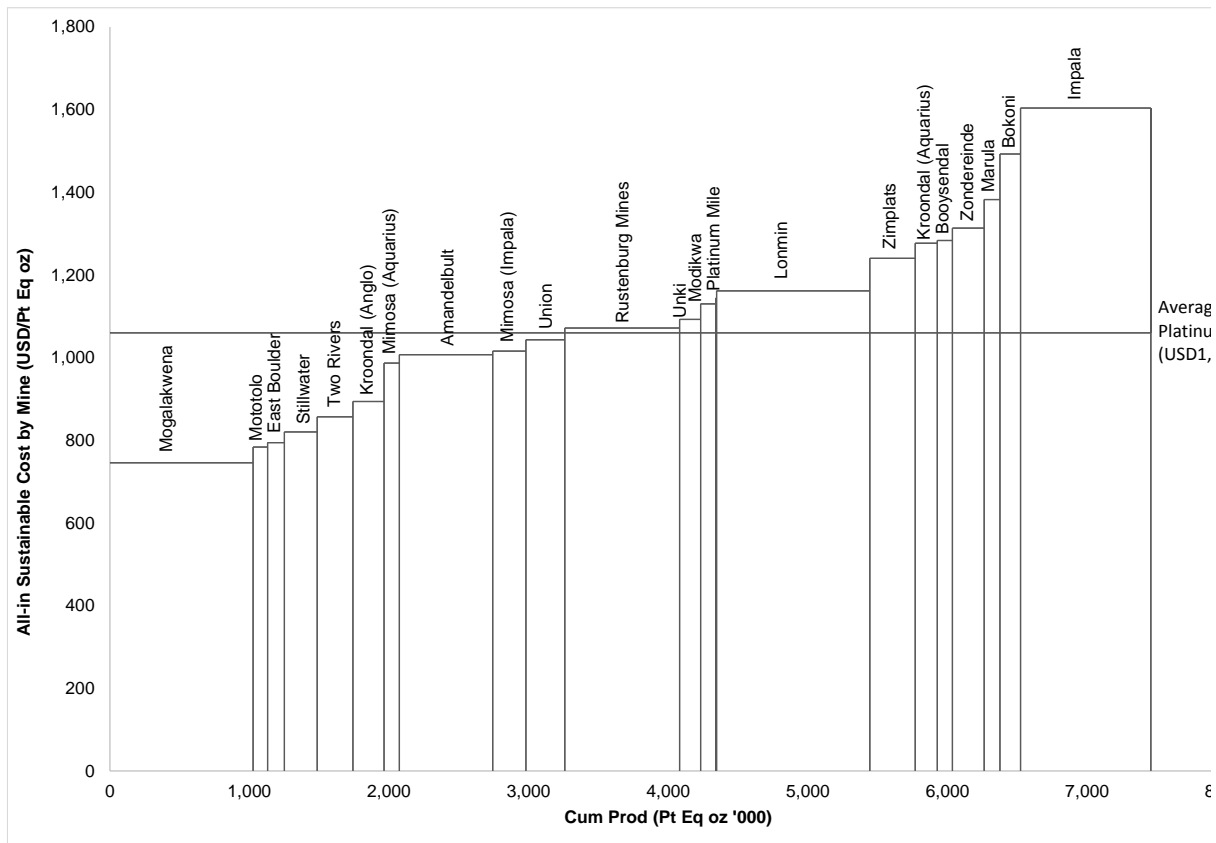
Even with the decrease in all-in sustainable costs during 2015, SA platinum mines still have the highest total all-in costs in the world and are operating at 14% above the average global all-in costs (USD980/oz.). Some of the major reasons for the higher costs include the fact that a large percentage of the mines have been operating for decades, thus increasing maintenance costs on the shafts and machinery, as well as the fact that the depth of some of the platinum mines in South Africa is the deepest in the world.

Minxcon used these cost curves to compare the South African operating platinum mine's cost curves to the average platinum price for the year. The Figure below shows the South African platinum industry all-in sustainable cost curve for 2015 at a mine level. From the figure it can be seen that at the average 2015 platinum price of USD1,060/oz., 57% of the platinum mines in South Africa were not profitable. These 57% mines accounted for 56% of SA's platinum equivalent ounces produced during 2015.

The average platinum price for 2016 thus far is USD999/oz. Should platinum consolidate below the USD1,000/oz. level, the costs of 43% of SA platinum mines will be above the price line on a cash cost basis and 70% will be above the price line on an all-in sustainable cost basis. With global cash costs at USD829/oz., 17% below USD1,000/oz., most mines will be able to sustain operations for a short while. However, there might be a contraction in exploration and expansion which could lead to upward pressure on the price in the future.

2015 South African Platinum Industry Cost Curve by Mine (Cash Costs and All-in Sustainable Costs)





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