JM ProcessWise webinar

PGM market overview

January 2021

Questions and answers

Please note that a number of similar and repeated questions have been combined.

Q1 Could higher prices lead to an increase in South African mine output?

A1 KEY MESSAGE:

- Rationalisations and shaft closures have affected pgm production capacity in recent years, and the remaining working life of some mines is limited. Significant investment will be required in order to maintain South African supplies at current levels.
- Very high prices during 2019-2020 have improved producers' cash position, despite the Covid crisis, and this may improve the prospects for on-going 'replacement' capex, to sustain output going forward.
- In the wake of Covid, weaker prospects for internal combustion engine car production could affect producers' decisions to invest in future expansion projects.

While the reserves and resources of platinum in South Africa are extensive and could support annual production well over 5 million ounces of platinum, a long period of weak pgm prices has resulted in many shaft closures and a lack of capital spending to replace older shafts as they deplete. This historical underinvestment is expected to keep supplies constrained for the foreseeable future, although continuing strong prices should help to support on-going replacement capex spending.

While some producers have positioned themselves to take advantage of supply shortfalls, and are currently ramping up new projects, this may not be enough to compensate for rationalization and depletion at older mines. Rhodium, iridium and ruthenium supplies in particular are likely to remain constrained due to past cuts in UG2 production.

While producers' cash flow has benefited significantly from "windfall" prices in 2019 and 2020, their appetite for expansion capital spending is hard to predict. Concerns over the long-term outlook for palladium and rhodium demand in ICE vehicles may make it hard to justify investing in new mining capacity, especially deeper projects which typically require at least 5-7 years before any production is achieved. Other geopolitical and economic factors are also likely to act as a constraint on investment,

for example the electricity crisis in South Africa and on-going political and economic turmoil in Zimbabwe.

Q2. What's happening with Pt substitution in gasoline and how much will it impact Pt and Pd demand?

A2. KEY MESSAGE:

- Some OEMs are expressing intent to substitute and are focusing more effort in this area in order to make cost savings (for some also from a security of supply standpoint).
- We are seeing some substitution in both underfloor and close coupled catalysts in the near term, but does not equate to significant additional platinum demand at the moment.
- The automotive industry is in a period of huge disruptive change and the situation remains fluid. In the current pgm price environment, in order to save costs, some automakers have prioritised thrifting activities over substitution programmes.
- Considering the different approaches of the OEMs, testing, certification and implementation timelines we still believe it'll be several years before we see significant adoption of Pt in gasoline catalysts.

It is possible in theory to replace some or all of the Pd in gasoline catalysts with Pt, but it is not technically straightforward to replace a large quantity of Pd with Pt without compromising the emissions performance of the system. The key issues for Pt-containing TWCs are

- inferior CO light-off
- inferior NOx light-off
- poorer high-speed NOx conversion
- lower thermal durability (Pt less stable than Pd in gasoline exhaust)

Much of the early substitution has happened on the cooler underfloor catalysts, where the lower thermal durability of Pt is less of a limiting factor. Since these catalysts typically have a much lower loading than close coupled catalysts this limits the overall downside impact on Pd demand.

In early March 2020 BASF announced that it had launched a new trimetal catalyst, developed in collaboration with, and sponsored by, Sibanye-Stillwater and Impala Platinum. From technical papers we know that the BASF technology uses strong metal-support interaction (SMSI) to keep higher Pt dispersion after ageing and possibly also an advanced support material. JM has similar technology.

In addition to technical aspects, an important factor determining the speed of platinum adoption in gasoline catalysts is the approach of the individual OEMs to substitution vs other cost saving activities on the exhaust aftertreatment. Before Covid-19, the automotive industry was already in a period of huge disruptive change with the transition to electrified vehicle powertrains, and these trends have accelerated as momentum on action for climate change has been building and demand for these vehicles types has increased. This means competing demand for resources in an already stressed environment. There is evidence that the current high Pd and Rh prices are driving efforts to thrift pgm, and in some cases this activity is being prioritised over substitution.

On a global basis, factoring in the approach of different OEMs, vehicle model lifetimes, and that substitution is likely to be adopted sequentially on selected vehicle platforms, platinum use in gasoline will remain quite small for the next year at least, but we expect it to steadily increase after that.

Q3. What's been driving the Rh price recently, and how much higher could it go?

A3. The rhodium price has been rising strongly since early 2019. Prices peaked at a new all-time high of $21,900 on 20th Jan 2021, an increase of 140% in a year and 780% over two years.

The price trajectory in recent years partly reflects strong fundamentals, as the market has been in deficit for two consecutive years, including a record shortfall last year, when strong demand from the auto catalyst sector combined with severely disrupted primary supplies. The market has been particularly stressed in Q420/Q121 as a result of the closure in Nov/Dec 2020 of Anglo's ACP facility, which has resulted in a build-up of pipeline stocks at the end of 2020. Though the Converter Plant has been operational since December, the relatively long lead time for processing Rh has ensured tight liquidity into Q121.

In addition, we understand that some of the trades that have contributed to the escalation in price to recent highs has occurred on very limited volumes, reflecting how relatively small and illiquid the market for Rh is in comparison to Pt and Pd; consequently, the market is prone to outsized price moves on relatively little market activity.

While we don't predict prices, it is fair to say that the fundamentals of the Rh market remain strong, with forecast growth in auto/industrial demand combined with limited prospects for supply growth.

Q4. What has caused the huge increase in Ir price at the end of 2020/early 2021?

- The iridium price has increased from just under $1,700/oz on 1st December 2020 to $4,000 on 1st February 2021.
- The first thing to note about the Ir market is that it is very small and illiquid. The usual global supply is around 250 koz per year, compared to around 10 million oz per year for Pd.
- Supplies are geographically concentrated in South Africa and in particular reliant on Anglo's output. This has been badly impacted by the ACP outages in 2020, with delays processing minor metals even greater than for Pt and Pd.
- Industrial demand is strong and we have seen particularly robust purchasing from Asia (China in particular). This appears to be a combination of existing demand for crucibles (5G), spark plugs (recovery in auto production in H2 2020) and for electrode coatings.
- Market sentiment is particularly strong. At the same time as the market was tightening due to constrained supply and robust industrial purchasing there has also been significant speculation (news) about iridium's future use in electrolysis demand. This appears to have panicked buyers, with some users becoming increasingly concerned about securing supply, potentially adding to the market tightness.

Q5. How much Pt is used in fuel cells? How much of this is automotive?

A5. KEY MESSAGE:

- Globally, fuel cells in all applications accounted for around 60,000 oz in 2020, of which around 40% was for road vehicles.

- Platinum consumption in fuel cells saw only a minor impact from the pandemic in 2020, generally remaining robust and growing vs 2019. Although intensified cost pressure saw some OEMs stepping back from releasing fuel cell passenger vehicles for the moment, others such as Hyundai and Toyota have not altered their plans for small-series production and are on course to meet or even beat their production targets. In contrast to fuel cell passenger vehicles, we are seeing enhanced industry commitment to developing fuel cell commercial vehicles, not least being the formation of the JV between Volvo Group and Daimler Truck AG to collaborate on large-scale fuel cell production for heavy vehicles. In China, uncertainty around government support for fuel cell vehicles was ended with the announcement in September of the new Rewards Scheme for fuel cell vehicles, which is expected to lead to significant strides towards commercialization in the market there over the next few years.