

PRECIOUS APPRAISAL

No. 31
26th September 2022



- 01 MARKET SPOTLIGHT
- 02 GOLD
- 03 SILVER
- 04 PLATINUM
- 05 PALLADIUM
- 06 RHODIUM, RUTHENIUM, IRIDIUM
- 07 TRENDS AND INVESTMENTS
- 08 ABOUT HERAEUS

MARKET SPOTLIGHT

Load-shedding: six stages of grief for South African PGM supply

Palladium supply expectations are downgraded for 2022. The delay to Anglo American Platinum’s Polokwane smelter rebuild is estimated to lead to up to 210 koz of palladium and 215 koz of platinum being carried over into the new year as work-in-progress stock, thus reducing refined metal output this year. The smelter’s feed is primarily palladium-rich ores from Mogalakwena and also ore from mines on the Bushveld’s Eastern Limb. At Mogalakwena, the average metal content is weighted towards palladium (46%), therefore there is a proportionally larger impact on the palladium market.

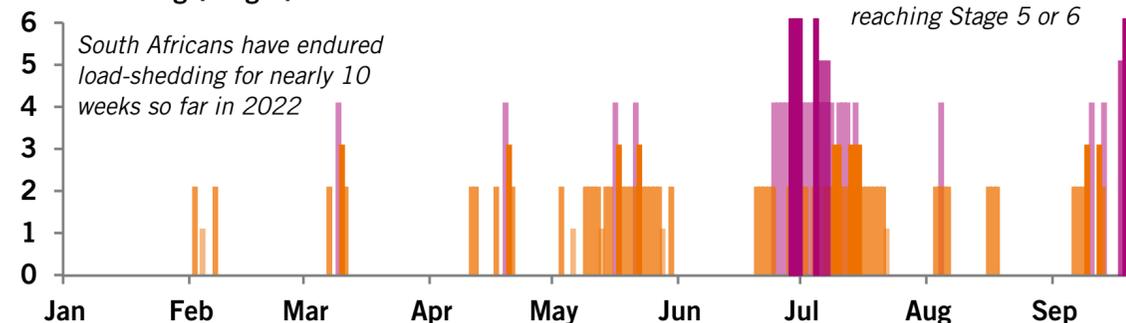
For the second time this year, South Africa’s sole electricity utility, Eskom, announced Stage 6 load-shedding. A combination of planned maintenance outages and the breakdown of numerous power stations resulted in the need for a cut of 6,000 MW from the grid demand last Sunday and into Monday. During Stage 6, mines are required to cut electricity demand by up to 50%. Stage 5 was implemented from Tuesday to Saturday owing to some generation units coming back online while others stayed offline.

Higher-level load-shedding has impacted PGM output in the past and may do so again this year. In 2019, the first time that Stage 6 was implemented, around 90 koz of work-in-progress PGMs was impacted by the idling of smelting facilities during Stage 6. Downside risk to refined PGM production increases with the level of load-shedding. Anglo American Platinum reported a minor impact to refined production in H1’22 of 30 koz (2E) as a result of load-shedding that reached only Stage 4 severity. Impala Platinum has also implied it resorted to much reduced furnace usage as a response to this most recent curtailment. The higher level of electricity supply reduction could have a greater impact in H2’22.

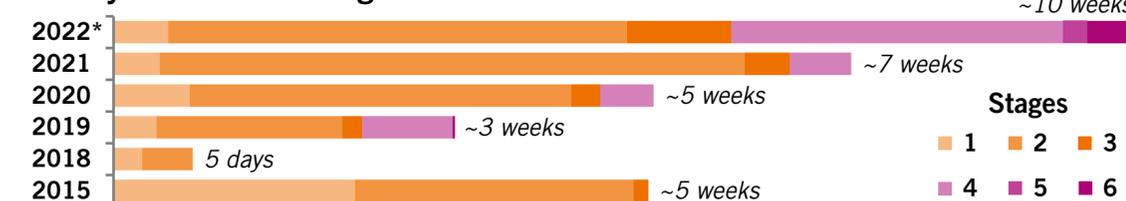
The impact on PGM supply is concentrated in the processing facilities. The energy-intensive concentrating and smelting processes at mine sites may be curtailed during periods of higher load-shedding. The underground operations of PGM mines usually remain operational, but deeper sections of some mines may need to reduce production if groundwater pumping and ore material hauling is paused to reduce energy consumption. If electricity supply problems hamper the smelting and refining of metal or other operations, further PGM output may be affected.

The result could be a market deficit for palladium and upward price pressure. Despite numerous downgrades to automotive production, the palladium market is now forecast to be in a deficit for 2022. Flooding at Stillwater mine, the Polokwane rebuild and now more severe power issues have reduced global palladium supply by more than lost demand. This could result in increased upward price pressure in the short term, and has kept the palladium price above \$2,000/oz recently. Next year, however, the unprocessed stock from H2’22 will be refined and add to new production, likely pushing the price down.

2022 the worst ever year for load-shedding
GW deloading (Stages)



History of load-shedding

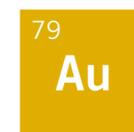


Source: SFA (Oxford), EskomSePush. *year-to-date

- 01 MARKET SPOTLIGHT
- 02 GOLD
- 03 SILVER
- 04 PLATINUM
- 05 PALLADIUM
- 06 RHODIUM, RUTHENIUM, IRIDIUM
- 07 TRENDS AND INVESTMENTS
- 08 ABOUT HERAEUS

PRECIOUS METALS REVIEW

Gold



| | CLOSE | WEEKLY CHANGE | HIGH | DATE | LOW | DATE |
|-------|-------|---------------|-------|------------|-------|------------|
| \$/oz | 1,646 | -1.65% | 1,688 | 21/09/2022 | 1,641 | 23/09/2022 |
| €/oz | 1,694 | 1.33% | 1,708 | 23/09/2022 | 1,662 | 19/09/2022 |

Dollar strength is weighing on the gold price. A third 75 bp rate hike was announced in as many FOMC meetings but the inflation issue for the US economy is far from resolved. The US dollar index hit new 20-year highs following the announcement. The gold price fluctuated in the wake of the Fed’s statement, and initially held its ground, possibly because of the increased tensions surrounding the Russia-Ukraine conflict. Russian president Vladimir Putin announced that the country will be calling up around 300,000 reservists to join forces in the east of Ukraine. This came after the semi-annexed Ukrainian territories declared that referendums would help to decide secession to Russia. However, dollar strength finally told and the gold price slipped to a new low for the year on Friday.

The Fed is just a hike, skip and a jump away from a recession. More (large) rate hikes are on the horizon for the US, as Chairman Powell said that “[the Fed] will keep at it” in reference to tackling inflation that came in unexpectedly hot in August. This action is looking increasingly likely to be pushing the US economy into a recession as borrowing costs rise, making mortgages and other loan repayments more expensive. As the global safe-haven currency, the dollar may continue to see strength during a recession. The momentum that built in the dollar this year could wane however, possibly pushing up the gold price as the US economy begins to contract and the Fed pauses or starts to cut rates.

Gold demand in China appears to be picking up. Local premiums on gold at the Shanghai Gold Exchange jumped to a three-year high of \$43.60/oz over the London spot price in the third week of September. The premium almost doubled overnight, suggesting a spike in demand from Chinese buyers.

PRECIOUS APPRAISAL

26th September 2022

- 01 MARKET SPOTLIGHT
- 02 GOLD
- 03 SILVER
- 04 PLATINUM
- 05 PALLADIUM
- 06 RHODIUM, RUTHENIUM, IRIDIUM
- 07 TRENDS AND INVESTMENTS
- 08 ABOUT HERAEUS

PRECIOUS METALS REVIEW

Silver



| | CLOSE | WEEKLY CHANGE | HIGH | DATE | LOW | DATE |
|-------|-------|---------------|-------|------------|-------|------------|
| \$/oz | 18.82 | -2.78% | 19.92 | 21/09/2022 | 18.78 | 23/09/2022 |
| €/oz | 19.37 | 0.19% | 20.13 | 21/09/2022 | 19.12 | 20/09/2022 |

Germany's green push requires more silver. In a bid to improve the uptake of small-scale solar arrays in the country and boost future domestic electricity production, the German government has approved various advantageous changes to tax measures. For households with existing solar installations, income tax will not need to be paid on the electricity yield from 2023. More importantly, for new installations there will be no value-added tax (VAT) burden on the purchase, importation and installation of both photovoltaic and energy storage systems with output up to 30 kW. In 2021, Germany had 58.5 GW of solar capacity installed, a 9% rise year-on-year. This installed capacity produced approximately 50 TWh of power (30% of European solar output), making it the fifth-largest solar energy producer globally. Solar installation on home roofs accounts for ~40% of Germany's installed capacity, and before this latest tax cut, industry surveys suggested that demand from this segment will rise sharply this year. Photovoltaic silver demand is forecast to total 127 moz this year with a growth rate of >10%. Demand is likely to be pushed higher in 2023 thanks to tax incentives such as those implemented by Germany from January, and an internal drive from the EU to become more energy self-sufficient. The silver price has held up better than the gold price, but if the dollar continues to climb then, near term, that could keep the downward pressure on the silver price.

PRECIOUS APPRAISAL

26th September 2022

- 01 MARKET SPOTLIGHT
- 02 GOLD
- 03 SILVER
- 04 **PLATINUM**
- 05 PALLADIUM
- 06 RHODIUM, RUTHENIUM, IRIDIUM
- 07 TRENDS AND INVESTMENTS
- 08 ABOUT HERAEUS

PRECIOUS METALS REVIEW

Platinum

| ⁷⁸ Pt | CLOSE | WEEKLY CHANGE | HIGH | DATE | LOW | DATE |
|---------------------|-------|---------------|------|------------|-----|------------|
| \$/oz | 863 | -4.73% | 940 | 21/09/2022 | 859 | 23/09/2022 |
| €/oz | 888 | -1.95% | 948 | 21/09/2022 | 885 | 23/09/2022 |

(L)eagle tender is outperforming platinum funds. This year, investors have bought the most Platinum American Eagle coins since 1998, despite average prices falling 19% since March. Although coin sales figures are strong, overall platinum investment is subdued year-to-date. ETF holdings fell by 266 koz in H1'22, with a further 174 koz reduction in global holdings by last week, leaving total holdings at 3.1 moz.

Crocodile River restart adds little to South Africa's platinum output.

The current owner of the Crocodile River Mine has received funding to restart underground mining operations on the Bushveld's Western Limb. Underground mining of UG2 ore began in 1987 and has been stop-start since then, last closing in 2013. Since the end of 2013, the UG2 4E (platinum, palladium, rhodium, gold) basket price has increased four-fold in rand terms, meaning mining could again be profitable. Initial mining at Crocodile River would yield approximately 15 koz platinum in the first year, 30 koz in the second and third year, finally ramping up to 60 koz per year at steady state. This would account for a marginal increase in South African platinum production and is therefore unlikely to influence the price of the metal. With a possible European recession in 2023, light-vehicle (LV) production may be in jeopardy. If LV production begins to fall, it is likely that PGM demand and prices will also slide lower. Much lower PGM prices would put the restart in doubt.

PRECIOUS APPRAISAL

26th September 2022

- 01 MARKET SPOTLIGHT
- 02 GOLD
- 03 SILVER
- 04 PLATINUM
- 05 PALLADIUM**
- 06 RHODIUM, RUTHENIUM, IRIDIUM
- 07 TRENDS AND INVESTMENTS
- 08 ABOUT HERAEUS

PRECIOUS METALS REVIEW

Palladium

| ⁴⁶ Pd | CLOSE | WEEKLY CHANGE | HIGH | DATE | LOW | DATE |
|---------------------|-------|---------------|-------|------------|-------|------------|
| \$/oz | 2,091 | -0.58% | 2,239 | 19/09/2022 | 2,069 | 23/09/2022 |
| €/oz | 2,151 | 2.51% | 2,232 | 19/09/2022 | 2,099 | 19/09/2022 |

The East Asian automotive market is a tale of two countries. The latest light-vehicle (LV) sales figures suggest that a recovery may be brewing in automotive demand. LMC Automotive reports that the global LV selling rate improved for the fourth consecutive month in July, while in August, China, the world's largest LV market, saw sales spike 46% year-on-year. This improvement was mainly a result of tax cuts to passenger vehicle purchases plus improving domestic vehicle supply. Across the East China Sea, the Japanese automotive market improved 18% month-on-month in terms of sales for August, but this is a year-on-year decline of 8.7%. Japanese LV production accounts for 9% of global palladium automotive demand, and is still hampered by semiconductor chip supply issues and component backlogs stemming from the Shanghai Covid lockdown. Toyota's domestic production was down 25% in July (latest figures), and its global production was down 7% to 835,000 vehicles. Toyota will now join Honda in cutting LV production in Japan in Q4'22. Honda is reducing production by between 30% and 40% at its two main assembly plants in early October, which combined produce approximately 65,000 units each month. These downgrades add to large production cuts that will continue into next year, reducing forecast 2023 palladium automotive demand by an estimated 460 koz compared to initial projections. This means that the palladium market is likely to be in a surplus for 2023, depressing the price.

PRECIOUS APPRAISAL

26th September 2022

01 MARKET SPOTLIGHT

02 GOLD

03 SILVER

04 PLATINUM

05 PALLADIUM

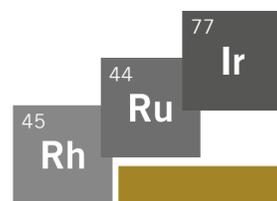
06 **RHODIUM, RUTHENIUM, IRIDIUM**

07 TRENDS AND INVESTMENTS

08 ABOUT HERAEUS

PRECIOUS METALS REVIEW

Rhodium, Ruthenium, Iridium



| | RHODIUM | RUTHENIUM | IRIDIUM |
|----------------|-------------|-----------|------------|
| Reporting Week | \$14,950/oz | \$515/oz | \$4,250/oz |
| Previous Week | \$15,200/oz | \$515/oz | \$4,250/oz |

Mind the gap: lithium supply shortages may open space for fuel cell vehicle adoption. As the battery value chain expands, total lithium demand is forecast to reach 2.4 million tonnes of lithium carbonate equivalent by 2030, an increase of 260% on current demand (source: BNEF). Current lithium supply forecasts predict that mine supply will be significantly below this level. Consequently, targets for BEV market share set by governments may not be achievable. As a result, a gap may open up for fuel cell powertrains in the LV market, as zero emission vehicles. Fuel cells use ruthenium and platinum in the membrane catalyst, but currently account for only a small portion of demand for either metal. Fuel cell electric vehicle (FCEV) development and production are weighted towards the heavy-duty sector, with very few LVs currently available to consumers. Boosting the market share of FCEVs could provide some upside to automotive PGM demand as autocatalyst demand declines. This will, however, require investment in fuel cell technology and time to develop new products.

The rhodium price declined again this week, closing at \$14,950/oz. Both iridium and ruthenium remained stable for another week.

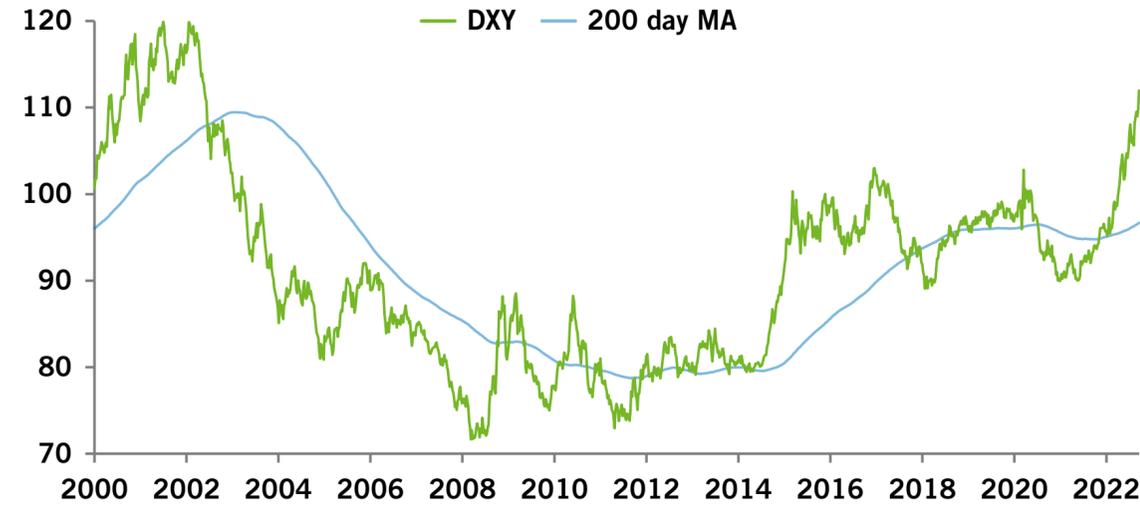
PRECIOUS APPRAISAL

26th September 2022

- 01 MARKET SPOTLIGHT
- 02 GOLD
- 03 SILVER
- 04 PLATINUM
- 05 PALLADIUM
- 06 RHODIUM, RUTHENIUM, IRIIDIUM
- 07 TRENDS AND INVESTMENTS**
- 08 ABOUT HERAEUS

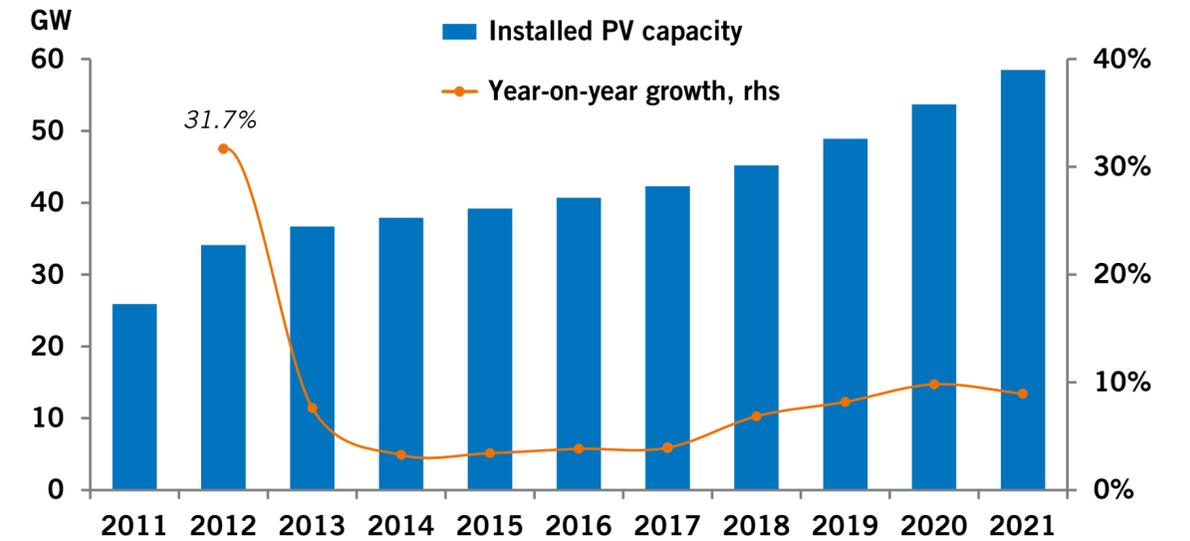
TRENDS AND INVESTMENTS

Dollar index



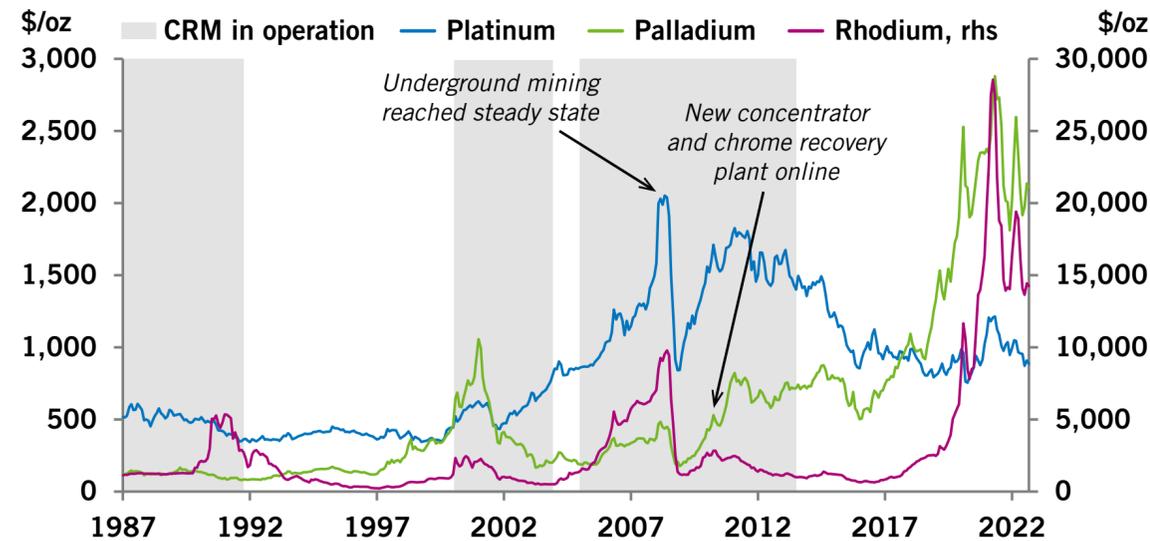
Source: SFA (Oxford), Bloomberg

Germany installed solar capacity



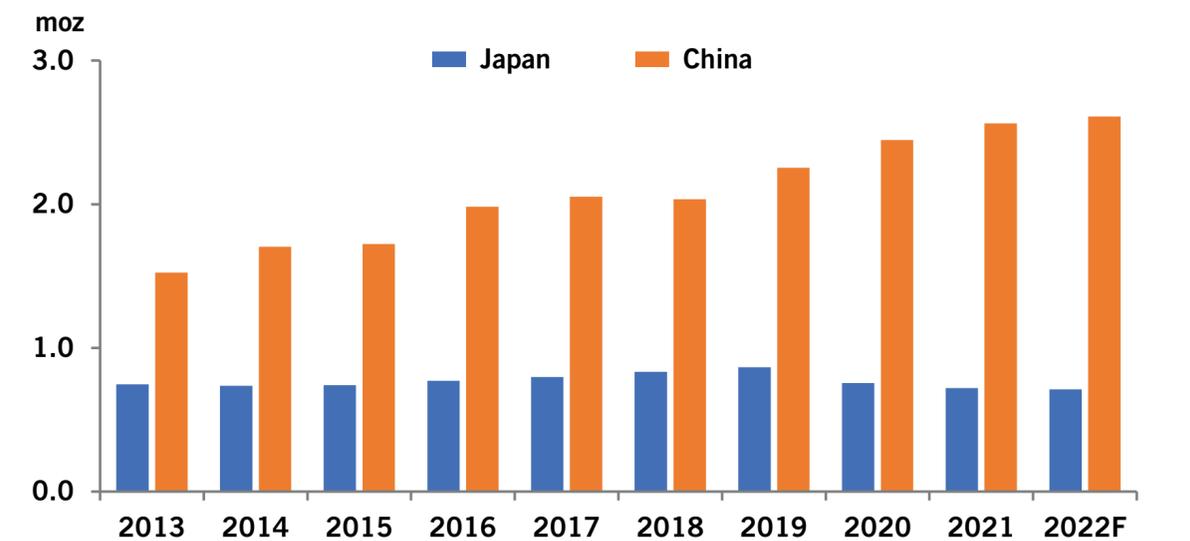
Source: SFA (Oxford), BP

PGM prices vs. Crocodile River Mine operation



Source: SFA (Oxford), Bloomberg, JM

Japan and China palladium autocatalyst demand



Source: SFA (Oxford)

PRECIOUS APPRAISAL

26th September 2022

- 01 MARKET SPOTLIGHT
- 02 GOLD
- 03 SILVER
- 04 PLATINUM
- 05 PALLADIUM
- 06 RHODIUM, RUTHENIUM, IRIIDIUM
- 07 TRENDS AND INVESTMENTS
- 08 **ABOUT HERAEUS**

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