

FOREWORD

This edition of *Platinum Quarterly* presents platinum supply and demand developments for the third quarter of 2023, an updated outlook for 2023 and a first forecast for 2024. It also provides WPIC's views on relevant issues and trends for investors considering exposure to platinum as an investment asset, plus an update on how our product partnerships continue to meet investors' needs. The *Platinum Quarterly* data and commentary (starting on page 7) are prepared independently for WPIC by Metals Focus.

Continuing on from a record platinum market deficit of 1,071 koz in 2023, the market is expected to record a second consecutive deficit in 2024. Many of the themes witnessed during this year are expected to continue into 2024, leading to a 353 koz deficit. Notably, automotive demand is forecast to grow, albeit modestly, and while industrial demand is expected to ease from the record level of demand seen in 2023, it should remain 14% higher than its average demand since 2013, benefitting from a diversity of end uses. The ongoing erosion of jewellery demand is expected to slow, suggesting a floor has been reached. Platinum investment demand is forecast to be negatively impacted by a -170 koz swing in ETF flows, due to persistently high interest rates weighing on demand for non-yielding assets. Total platinum demand is forecast to decline 6% in 2024 which reflects some resilience against a challenging economic environment. Platinum supply from mining and recycling will remain constrained. Total platinum supply of 7,310 koz in 2024 (+3% year-on-year) is 9% lower than average annual supply in the five-years prior to the COVID pandemic. Whilst platinum supply is expected to increase, downside risks remain elevated as electricity shortages in South Africa are ongoing, miners are increasingly discussing the need to restructure unprofitable production following the significant decline in the PGM basket price and recycling is constrained because of the reduced availability of end-of-life vehicles.

2023 forecast deficit increases to 1,071 koz, equivalent to 13% of projected annual demand

- Updating the outlook for 2023, the platinum deficit is increased by 66 koz to total 1,071 koz, 6% higher than the deficit presented in the last *Platinum Quarterly*. The updated deficit equates to a supply shortfall of 13% of projected full-year demand in 2023.
- Supply is now forecast to total 7,079 koz (-3% year-on-year) and remain highly challenged. Total supply is expected to be 9% below the average level since 2013. Secondary supply has been downgraded by a further 9% since the September PQ, on the weaker than expected availability of autocatalysts from end-of-life vehicles.
- In contrast, demand in 2023 is expected to total 8,150 koz (+26% year-on-year), with automotive demand up 395 koz, industrial demand up 317 koz, and investment demand improving significantly from -640 koz to +385 koz. The jewellery outlook remains muted with demand expected to decline 48 koz year-on-year.

2024 forecast suggests another material platinum market deficit

- The platinum market is expected to record a deficit of 353 koz in 2024. Notwithstanding lower platinum demand, which stems from softer investment demand, lower, but historically elevated, industrial demand, and rising total platinum supply, the deficit is still represents 5% of 2024 platinum demand.
- Platinum supply is expected to increase by 3% to 7,310 koz in 2024, although remaining constrained. Mining supply growth of 2% is forecast but remains challenged as electricity shortages remain a risk. Furthermore, miners are publicly discussing the need to restructure or even close economically unsustainable operations following the rapid and significant decline in the PGM basket price. Recycling supply should increase by 7% as availability of end-of-life vehicles increases.
- Automotive demand is forecast to record further, albeit modest, growth in 2024, reaching 3,312 koz, as platinum for palladium substitution is forecast to reach 700 koz up from 620 koz in 2023. Industrial demand is forecast to decrease by 11% from record levels in 2023, to 2,367 koz, although demand remains 14% higher than its average since 2013. A modest 3% jewellery demand recovery is expected as the cost-of-living crisis abates.
- Investment demand is forecast to be 82 koz, led by disinvestment in ETFs and sellbacks from Japanese bar & coin investors.

Platinum supply and demand – Q3 results and the read-throughs for the updated outlook for 2023

Q3 2023 deficit of 40 koz on increasing automotive, industrial and investment demand

The third quarter of 2023 saw a consolidation of several demand themes across the platinum market, with supply remaining constrained, and demand robust, with the exception of some weakness in the investment markets.

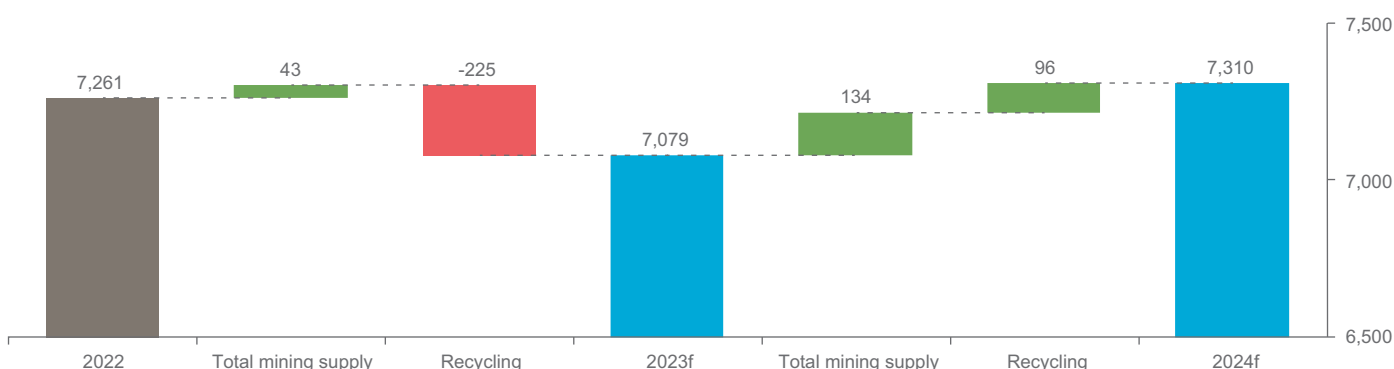
Mining supply increased by 2% year-on-year to 1,418 koz in Q3'23, underpinned by Southern Africa. South African production increased by 19 koz to 996 koz and Zimbabwean output increased by 13 koz in the third quarter. South African production represented the first quarterly of year-on-year growth since Q4'21 and was led by better management of load curtailment and less downstream processing capacity downtime. Elsewhere, producers decreased inventories during Q3'23 leading to an 18 koz net increase in platinum supply. Russian production decreased year-on-year but, was ahead of expectations as downstream maintenance has been deferred to 2024.

Recycling supply has not appeared to benefit from increasing new vehicle sales through 2023. Lower end-of-life vehicle availability appears attributable to the longer running of vehicles as mileage decreased during the COVID pandemic. Furthermore, reports of scrapyards holding out for higher metals prices may be restricting spent autocatalyst availability. Total supply in Q3'23 of 1,770 koz was down 2% year-on-year and 3% quarter-on-quarter.

Total demand for Q3'23 was robust at 1,810 koz, up 24% year-on-year. Demand benefitted from a 14% year-on-year increase in automotive platinum demand and reduced selling of platinum investment products (11 koz versus 260 koz in Q3'22). Automotive demand growth was underpinned by platinum for palladium substitution, growing vehicle numbers and higher platinum group metal loadings due to tighter emissions legislation. Platinum demand was negligibly impacted by labour disputes amongst North American automakers. Industrial demand rose by 6% year-on-year highlighting the ongoing strength in demand from multiple end use segments. Jewellery demand fell 5% year-on-year mainly due to ongoing weakness in China, albeit there are tentative signs that Chinese platinum jewellery demand has been stabilising over the past four quarters.

The net impact was a quarterly deficit of 40 koz in Q3'23, which represents a third consecutive quarterly deficit.

Annual total supply and changes 2022 to 2024f (koz)



Source: Metals Focus

Updated 2023 outlook – platinum market deficit of 1,071 koz on stronger demand and weaker supply

The forecast deficit for 2023 has increased by 66 koz to 1,071 koz since the Q2'23 *Platinum Quarterly* in September 2023, and reflects a 3% decline in total supply and a 26% increase in demand versus 2022.

The full year 2023 mine supply outlook is largely unchanged (+4 koz) compared to the last *Platinum Quarterly*. South African and North American supply were revised lower, Russian supply was revised higher on deferred maintenance. Furthermore, producers selling finished inventory will support supply. Against this backdrop, mine supply is expected to increase by 1% year-on-year, remaining depressed versus historical levels, as miners have faced electricity supply challenges in South Africa and processing constraints (planned and unplanned). Recycling supply was revised down by 149 koz since our last *Platinum Quarterly*, primarily due to lower availability of spent autocatalysts, resulting in recycling supply being down 13% year-on-year. Total supply is expected to fall by 3% from 2022 to 7,079 koz.

Total platinum demand for 2023 has been revised down 79 koz to 8,150 koz, yet is still up 26% year-on-year. Automotive demand is expected to total 3,262 koz, up 14% on 2022. Automotive demand growth reflects ongoing themes of higher-than-expected vehicle sales alongside substitution of platinum for palladium in gasoline vehicles and higher overall loadings, particularly in the heavy-duty and off-road vehicle categories. However, automotive demand is revised 21 koz lower than the previous estimates due to drivetrain mix and the impact of labour disputes across North America’s automotive manufacturers. Jewellery demand is expected to decline 3% year-on-year to 1,852 koz as growth in Japan and India is offset by weaker North American and Chinese demand. Total industrial demand is forecast at 2,652 koz, up 14% year-on-year, reiterating previous calls for 2023 to be the strongest year for industrial demand on record. Glass capacity additions and, to a lesser extent, chemical capacity additions are the big drivers of the year-on-year growth of total industrial demand, offsetting weaker petroleum and electrical segments during 2023.

Investment demand is forecast to be 385 koz in 2023, a substantial improvement from negative demand of -640koz in 2022. The challenging start to 2023 that bar and coin demand witnessed has persisted for most of the year but looks to be improving into Q4. ETF demand is expected to total 50 koz for 2023, but with risks to the downside. Stocks held by exchanges are expected to see 30 koz of net inflows for 2023.

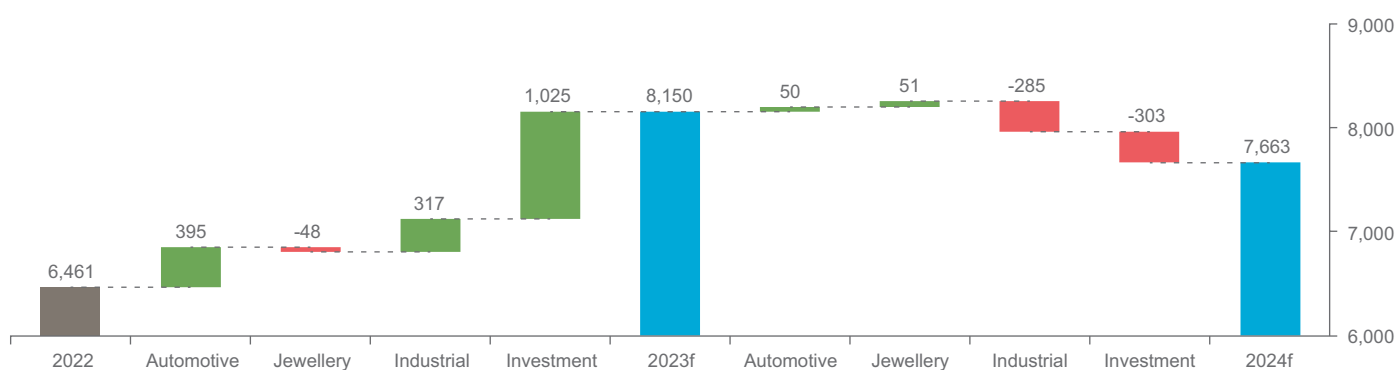
The net impact is for total demand of 8,150 koz in 2023, up 26% year-on-year.

Combining the weaker supply outlook and strong demand projections results in the forecast deficit for 2023, increasing from 1,005 koz (per the previous *Platinum Quarterly*) to 1,071 koz, the deepest deficit in our time-series back to 2013.

Initial 2024 forecasts – platinum markets to remain in deficit, further depleting above ground stocks

Some themes that have characterised the past couple of years are expected to continue into 2024. Supply is expected to remain subdued in 2024, albeit higher than in 2023. Automotive demand is expected to continue increasing, as platinum for palladium substitution growth offsets a decline in production of vehicles containing an autocatalyst. A reduction of industrial demand from record levels and an anticipated challenging investment demand outlook lead to a lower forecast total platinum demand versus 2023. Combining higher supply with weaker demand reduces the market deficit from 1,071 koz in 2023 to 353 koz in 2024, or 5% of demand. However, there are downside risks to supply and upside potential to investment demand which are not captured in our 2024 forecasts.

Annual total demand and changes 2022 to 2024f (koz)



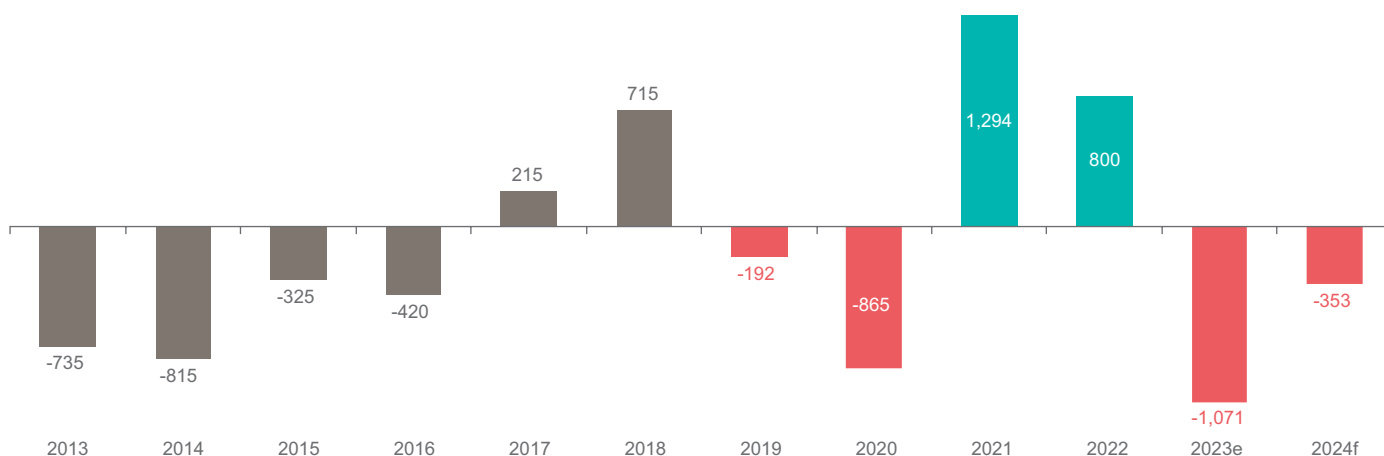
Source: Metals Focus

During 2024, mined platinum supply is expected to increase across all regions except Russia (-50 koz), where smelter maintenance planned for 2023 has been deferred to 2024. South African production is forecast to be 5% (+194 koz) higher than in 2023 as producers face less smelter maintenance downtime and electricity shortages are expected to reduce with the recommissioning of generating capacity at the Kusile Power Station. North America (+35 koz) is the second largest contributor to higher mined supply, as operational challenges ease. Total 2024 mined platinum supply is forecast to increase by 2% year-on-year to 5,743 koz. Recycling supply is forecast to increase by 7% year-on-year in 2024, on a recovery in end-of-life scrap vehicle availability, but still remaining constrained versus historical recycling rates. Total platinum supply of 7,310 koz is 9% lower than the average supply of the five years prior to COVID-19, with downside risks to both mined supply and recycling supply from the challenging operating environment in South Africa, as well as a potential for a more prolonged shortage of end-of-life vehicles.

Platinum demand is forecast to decrease by 6% year-on-year in 2024. Growth in demand from the automotive and jewellery markets is expected to be offset by lower industrial and investment demand, albeit industrial demand is still expected to remain at historically strong levels. In the light-duty automotive market, ICE vehicle production is expected to fall from 78 to 77 million units, reflecting the continued growth of the battery electric vehicle (BEV) market share. Despite this, automotive demand for platinum is expected to grow by 2% (+50 koz) year-on-year, on ongoing platinum for palladium substitution. The jewellery market will benefit from demand growth in India and Japan and a modest recovery in China. While industrial platinum demand is forecast to decrease 285 koz versus 2023, demand is coming off record levels in 2023, and the 2024 forecast of 2,367 koz still represents annualised demand growth of 3.7% CAGR since 2013. Investment demand of 82 koz in 2024 is negatively impacted by a 170 koz swing in ETF demand to negative 120 koz in 2024, as well as a weaker outlook for bar and coin, partially offset by inflows of 30 koz into exchange stocks.

The global platinum market will record a second year of deficits at 353 koz representing a continuation of tight fundamentals.

Annual platinum supply/demand balances



Source: SFA (Oxford) 2013-2018, Metals Focus 2019-2024f

The platinum investment case – supply challenges and resilient demand reiterate risk of metal shortages

The global economic outlook remains complex. Central banks appear to be at or near peak interest rate levels yet slow economic responses to the increases strongly suggest rates are likely to be held higher for longer. The IMF is forecasting global GDP growth to slow into 2024. While we still expect rate easing to commence in 2024, the timing is uncertain. The breakout of the Israel/Hamas conflict has implications for global energy markets which may offset recent trends of moderating inflationary pressures, which in turn increases the likelihood of prolonged high rates. Against this backdrop, US economic activity has remained resilient through 2023, while Chinese sentiment has declined, mainly due to its property and construction sector. In Europe, slowing growth, as illustrated by depressed German export data, suggests the economy is cooling in parallel with rate hikes. The overall economic outlook would suggest lower demand for commodities in general, including platinum.

However, whilst platinum demand was revised lower for 2023 and demand is forecast to decline modestly in 2024, we see platinum as being well protected against significant downside risks, despite the economic outlook described above. Platinum automotive demand is still growing as automakers continue to increase vehicle production to meet pent-up demand that resulted from production shortfalls through the semi-conductor crisis. The increase is, however, biased to BEV vehicles, with a modest decline expected for ICE vehicles. Despite this, higher PGM loadings to meet current emissions limits and the rising volume of platinum substitution for palladium are expected to offset reduced ICE vehicle production volumes in 2024, as well as any erosion of consumer purchasing power stemming from higher interest rates. Industrial demand is multifaceted, and whilst there are segments at risk from an economic slow-down (e.g. electronics), most of the other segments appear well protected (e.g. glass). The demand areas at most risk are the jewellery and investment segments. Current projections are for a small increase in jewellery demand in 2024, with support coming mostly from China and India. Chinese demand may benefit from government efforts to ease property market risks, while the discount to gold and greater product premiums seem set to keep Indian jewellers working to grow the platinum market there. In terms of investment, weaker retail demand and some disruption to supply of platinum bullion coins in the North American market are reflected in lower demand, with net

disinvestment in Japan still a risk with the weak or even weaker yen. Whilst higher-for-longer interest rates would suggest non-yielding ETF disposals, interest rate reductions even late in 2024 may alleviate selling or stimulate buying. Furthermore, ETF holdings have held up well through 2023, despite it being a period of notable and rapid interest rate increases.

Central to the outlook for platinum is the role that government stimulus packages are likely to have around the world. As growth slows and inflation is brought under control, we expect governments to deploy targeted stimulus packages to boost economic growth. We think these are likely to be oriented towards energy transition efforts, thereby aiming to maintain momentum in decarbonisation and stimulate economic activity. If this occurs, platinum stands to be a significant beneficiary with demand from growth in renewable energy generation and hydrogen production and use. Indeed, existing government incentives for green hydrogen projects have grown from US\$50 billion in 2021, to almost US\$300 billion two years later. The quest for energy independence in combination with decarbonisation, particularly in Europe suggests an even higher focus on green hydrogen.

The incentives available for green hydrogen production increase our confidence in related platinum demand and its associated medium- to longer-term growth. Although it is typical for a new industry growing rapidly from a small base to be susceptible to small changes in project delivery, the production of green hydrogen does not only rely on its use in transport and fuel cell electric vehicles. The existing large grey hydrogen market means almost all early green hydrogen production can be used to displace grey hydrogen, instantly providing existing businesses with lower carbon emissions.

At the same time, focussing only on the outlook for green hydrogen overlooks the economic importance platinum is already playing today in terms of reducing energy consumption and harmful emissions. In industrial applications, platinum-based catalysts are key to facilitating chemical reactions, reducing energy requirements and increasing yield, thereby also reducing emissions. Glass fibre produced using platinum alloy bushings is critical for the wind turbine industry, displacing fossil fuel power generation (global installed wind capacity is projected to double between now and 2030), as well as for vehicle lightweighting. Within the automotive industry, platinum is essential for the reduction in harmful emissions from internal combustion engines and will be increasingly critical in the deployment of fuel cell electric vehicles.

The essence of the investment case for platinum is becoming increasingly appealing to institutional and retail investors. Simply put, investing in platinum now is investing in the platinum market deficit, the result of strong demand growth protected from weak economic growth and constrained mine supply, whilst looking to gain from platinum's key role in the hydrogen enhanced energy transition.

Although this case is compelling, investors remain frustrated that the platinum price does not yet reflect the sizeable market deficit of over 1 million ounces forecast for 2023. This has been compounded by the rangebound price level over the past two years, the longevity of which has introduced self-fulfilling algorithmic trading – expecting range-bound performance and effectively acting in such a way as to keep platinum within that range. In addition, demand from China has been highly price sensitive, with purchasing volumes picking up at or below US\$900/oz and falling away at prices above US\$1,000/oz. Moreover, the pandemic and associated global semiconductor shortage resulted in over 30 million fewer vehicles being produced between 2020 and 2022. As many automakers buy PGMs on an annual contract basis, this at times resulted in larger volumes of the metals being bought than used. In turn, this resulted in automakers being able to soften regular buying and ease market tightness during 2023. During the recovery of the global vehicle market up until now, this excess PGM inventory has helped meet demand, which to an extent has helped meet market shortfalls. Our supply demand data are based upon consumption rather than purchasing timing. As these inventories diminish with continued growth in vehicle production and sales, we foresee a return to more typical automaker platinum buying patterns, which could further tighten the market and place upward pressure on the platinum price.

WPIC initiatives highlights

We continue to grow the number and geographic coverage of our product partnerships which, in addition to increasing choices for investors, provides us with the ability to identify market developments and appropriate strategies to increase investment in platinum.

Whilst retail bar and coin demand is below the exceptional levels seen over the past three years as demand for precious metals followed global economic turmoil, current demand is still above historical pre-COVID levels. Elevated interest rates remain a headwind to bar and coin demand in Western markets, but our initiatives in China continue to grow the investor audience considering platinum, as well as support the growth in momentum in product sales there, albeit still off a small base.

In Europe and North America we increased our efforts to initiate new and support ongoing partner programmes to maintain and increase platinum demand to good effect, and demand has exceeded our initial expectations. This included more creative promotion campaigns, in-person partner salesforce training and increased institutional engagement.

In China, our accelerated progress since COVID restrictions ended has continued and several of our partners significantly increased their efforts to manufacture and sell platinum investment bars, spurred on by the exposure that resulted from Shanghai Platinum Week. During Q3 we commenced our partnership with the Zhao Jin Group, a leading gold fabricator and retailer, now producing platinum bars for retail sales and planning distribution to its 500 outlets across China. We also worked with Bai de Jin, our Shenzhen based fabricator partner, to penetrate the online retail market and are pleased with initial results. In August, WPIC opened a physical liaison office with a showroom in Shenzhen to enhance the visibility of platinum investment products and to shore up relationships with the increasing number of platinum bar fabricators and wholesalers there.

In Japan, the efforts of our partners remain supportive of the turnaround from net negative investment seen in 2022 to net positive in 2023. We continue to expand our partnership portfolio in Japan and to support our partner efforts to attract new investors, including the effective collaboration with the Japan Bullion Market Association (JBMA), and in Q3 their annual precious metals event. We have also made good progress in South Korea and Singapore, signing an inaugural Korean partnership and making progress on agreeing our first partnership in Singapore.

Trevor Raymond, CEO

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PLATINUM QUARTERLY Q3 2023

Table 1: Supply, demand and above ground stock summary

| | 2020 | 2021 | 2022 | 2023e | 2024f | 2023e/2022 Growth % | 2024f/2023e Growth % | Q2 2023 | Q3 2023 |
|--------------------------------------------------------|----------------|--------------|--------------|---------------|--------------|------------------------|-------------------------|--------------|--------------|
| Platinum Supply-demand Balance (koz) | | | | | | | | | |
| SUPPLY | | | | | | | | | |
| Refined Production | 4,989 | 6,297 | 5,522 | 5,551 | 5,743 | 1% | 3% | 1,469 | 1,402 |
| South Africa | 3,298 | 4,678 | 3,915 | 3,905 | 4,099 | 0% | 5% | 1,033 | 996 |
| Zimbabwe | 448 | 485 | 480 | 502 | 506 | 5% | 1% | 126 | 129 |
| North America | 337 | 273 | 263 | 268 | 302 | 2% | 13% | 73 | 61 |
| Russia | 704 | 652 | 663 | 684 | 634 | 3% | -7% | 190 | 168 |
| Other | 202 | 208 | 201 | 193 | 201 | -4% | 4% | 47 | 49 |
| Increase (-)/Decrease (+) in Producer Inventory | -84 | -93 | +43 | +57 | +0 | 33% | -100% | +8 | +16 |
| Total Mining Supply | 4,906 | 6,204 | 5,565 | 5,608 | 5,743 | 1% | 2% | 1,477 | 1,418 |
| Recycling | 1,997 | 2,078 | 1,696 | 1,471 | 1,567 | -13% | 7% | 345 | 352 |
| Autocatalyst | 1,509 | 1,589 | 1,255 | 1,048 | 1,132 | -16% | 8% | 244 | 249 |
| Jewellery | 422 | 422 | 372 | 353 | 362 | -5% | 3% | 84 | 85 |
| Industrial | 66 | 67 | 68 | 70 | 73 | 2% | 4% | 17 | 17 |
| Total Supply | 6,902 | 8,282 | 7,261 | 7,079 | 7,310 | -3% | 3% | 1,822 | 1,770 |
| DEMAND | | | | | | | | | |
| Automotive | 2,326 | 2,555 | 2,867 | 3,262 | 3,312 | 14% | 2% | 838 | 793 |
| Autocatalyst | 2,326 | 2,555 | 2,867 | 3,262 | 3,312 | 14% | 2% | 838 | 793 |
| Non-road | † | † | † | † | † | N/A | N/A | † | † |
| Jewellery | 1,830 | 1,953 | 1,899 | 1,852 | 1,903 | -3% | 3% | 480 | 455 |
| Industrial | 2,075 | 2,536 | 2,335 | 2,652 | 2,367 | 14% | -11% | 690 | 574 |
| Chemical | 608 | 668 | 685 | 753 | 585 | 10% | -22% | 229 | 135 |
| Petroleum | 109 | 169 | 193 | 170 | 156 | -12% | -8% | 43 | 41 |
| Electrical | 130 | 135 | 106 | 92 | 90 | -13% | -3% | 24 | 22 |
| Glass | 473 | 753 | 505 | 756 | 623 | 50% | -18% | 170 | 158 |
| Medical and Biomedical | 254 | 265 | 273 | 283 | 292 | 4% | 3% | 70 | 70 |
| Other | 501 | 546 | 573 | 598 | 620 | 4% | 4% | 154 | 148 |
| Investment | 1,536 | -56 | -640 | 385 | 82 | N/A | -79% | 154 | -11 |
| Change in Bars, Coins | 571 | 324 | 225 | 305 | 172 | 36% | -44% | 26 | 59 |
| Change in ETF Holdings | 507 | -241 | -558 | 50 | -120 | N/A | N/A | 155 | -99 |
| Change in Stocks Held by Exchanges | 458 | -139 | -307 | 30 | 30 | N/A | 0% | -27 | 28 |
| Total Demand | 7,768 | 6,988 | 6,461 | 8,150 | 7,663 | 26% | -6% | 2,162 | 1,810 |
| Balance | -865 | 1,294 | 800 | -1,071 | -353 | N/A | N/A | -340 | -40 |
| Above Ground Stocks | 2,592** | 3,886 | 4,687 | 3,615 | 3,262 | -23% | -10% | | |

Source: Metals Focus 2019 - 2024f.

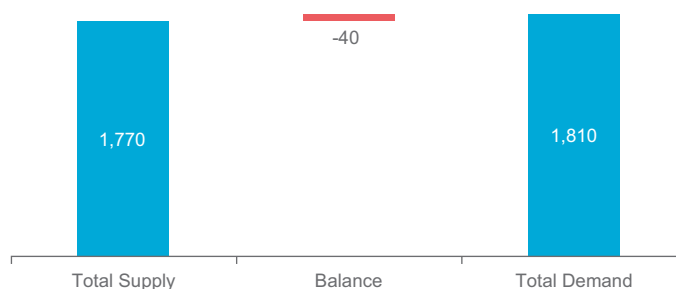
Notes:

- **Above Ground Stocks 3,650 koz as of 31 December 2018 (Metals Focus).
- † Non-road automotive demand is included in autocatalyst demand.
- All estimates are based on the latest available information, but they are subject to revision in subsequent quarterly reports.
- The WPIC did not publish quarterly estimates for 2013 or the first two quarters of 2014. However, quarterly estimates from Q3 2014, to Q4 2017 are contained in previously published PQs which are freely available on the WPIC website.
- Quarterly estimates from Q2 2018 and half-yearly estimates from H1 2018 are included in Tables 3 and 4 respectively, on pages 23 and 24 (supply, demand and above ground stocks). Details of regional recycling supply in Table 6 on page 26 are only published from 2019.

2023 THIRD QUARTER PLATINUM MARKET REVIEW

The platinum market shifted to a more balanced state in Q3'23, posting a 40 koz deficit. While the global economy is still growing in absolute terms, the rate is slowing. The IMF describes growth as limping rather than sprinting. Despite the tepid economic performance, higher vehicle production, more stringent emissions regulations, and increased platinum loadings in gasoline cars saw demand for platinum in the automotive sector increase by 14% (+96 koz). We saw virtually neutral net investment (versus disinvestment in Q3'22), lower changeout activity in the petroleum sector and only modest gains in the glass sector in this quarter compared to Q2'23. After experiencing record-high industrial demand in Q2'23, this is forecast to be 116 koz lower than in Q2'23, but still 6% higher than Q3'22. Jewellery demand contracted by 5% year-on-year (-26 koz) as the growth in North America stalled, and Chinese consumers continue to prefer gold over platinum. Investment overall was close to balance (showing disinvestment of a mere 11 koz to be precise), as ETF liquidations of -99 koz more than offset the 59 koz year-on-year increase in bar and coin investment and a rise in exchange stocks.

Chart 1: Supply-demand balance, koz, Q3 2023



Source: Metals Focus

Supply

Refined platinum supply edged 1% (+12 koz) higher year-on-year to 1,402 koz in Q3'23. This was primarily due to higher output from South Africa and Zimbabwe, which offset declines in Russia and North America.

Output from Anglo American Platinum was impacted by a five-day disruption to water supply curtailing output by approximately 25 koz, while other producers reported year-on-year increases. Implats' production recovered from last year's smelter maintenance. Meanwhile, Sibanye-Stillwater's Marikana operation reported fewer disruptions due to copper cable theft, and additional volumes from the ramp-up of the K4 project.

South African producers experienced fewer energy supply interruptions in the quarter. The combination of fewer breakdowns at Eskom and a reduction in national energy demand led to an easing of the energy crisis for the second consecutive quarter. Despite some impact from load curtailment, the effect on production was less than in prior quarters, leading to a 2% (+19 koz) year-on-year increase in South African output.

Zimbabwe's quarterly output is estimated to have increased 11% year-on-year (+13 koz) reaching 129 koz, an all-time high. The growth came from Zimplats which realised additional milled volumes from the third concentrator plant, in addition to the impact of scheduled furnace maintenance last year. Output from other producers, Unki and Mimosa, remained virtually unchanged year-on-year.

Output from North America declined 9% year-on-year (-6 koz) to 61 koz as the recovery at Sibanye-Stillwater's US operations from last year's flood was offset by lower output from Canadian by-product nickel mining due to a protracted recovery from the strike at Glencore's operation and maintenance at Vale's facilities.

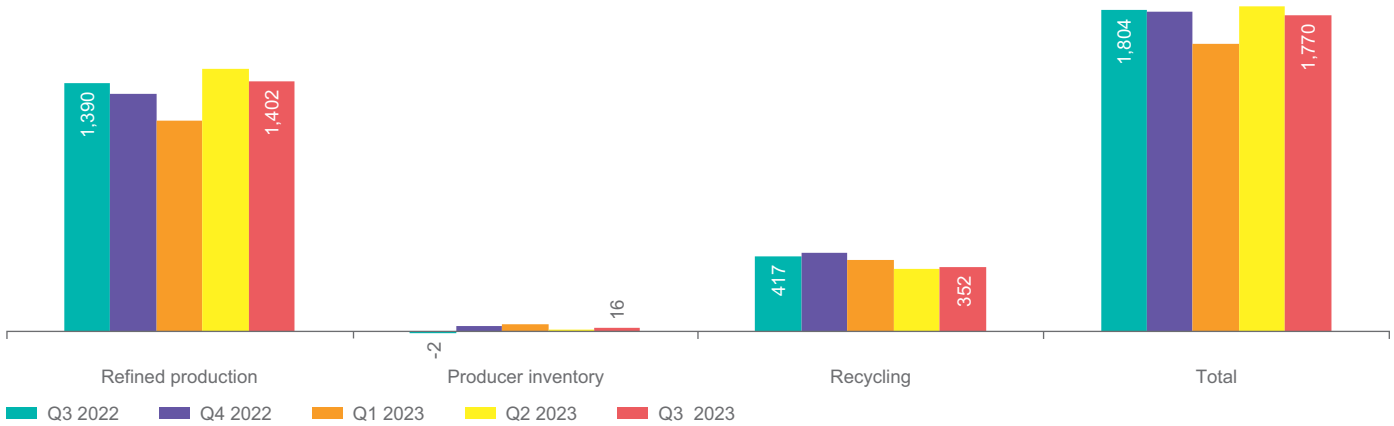
A drawdown of refined stock by Anglo American Platinum contributed to a net 16 koz release of producer finished inventory, boosting sales.

Recycling

Global recycling of platinum declined 15% year-on-year (-65 koz) to 352 koz in Q3'23. This was driven by far weaker autocatalyst recycling, which faces challenges in sourcing materials due to three main factors. First, there has been a shift in car-ownership trends as people have held onto older vehicles for longer partly as they were not used as intensively during the pandemic and partly due to affordability constraints, the result of both high new vehicle prices and the cost-of-living crisis. Second, the closure of smaller scrap yards and collectors have diminished the sourcing network, exacerbating the supply shortage. Finally, sharp declines in palladium and rhodium prices have hindered the supply chain, as some market participants have chosen to hold onto their spent autocatalyst inventory hoping for a price recovery, rather than realising losses from inventory acquired in the recent past, often when PGM prices were higher. In China, autocatalyst supply was also impaired by the introduction of temporary local restrictions.

Chinese platinum jewellery scrap continued to weaken, dropping by 5%, mainly driven by lacklustre current and recent jewellery demand. Meanwhile, retail destocking slowed as inventory levels were already low.

Chart 2: Platinum supply, koz

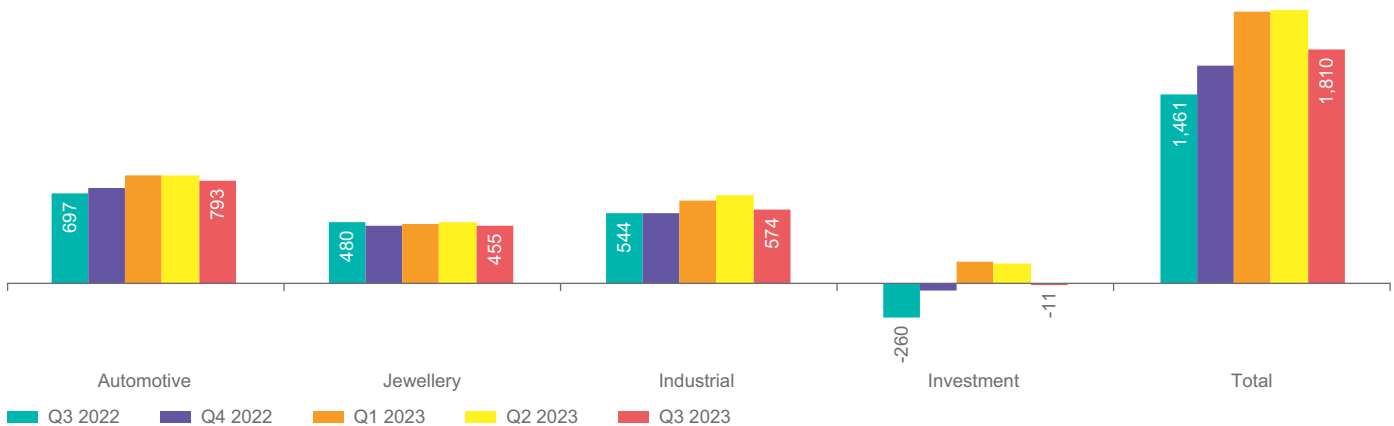


Source: Metals Focus

Demand

Global demand of 1,810 koz in Q3'23 was 24% (+349 koz) higher year-on-year on the back of fewer ETF liquidations and lower outflows from exchange stocks compared to Q3'22, as well as healthy automotive demand (up 14%) to 793 koz and modest increases in industrial demand, which rose to 574 koz, up 6% on Q3'22.

Chart 3: Platinum demand, koz



Source: Metals Focus

Automotive demand

In Q3'23, autocatalyst demand witnessed a 14% year-on-year (+96 koz) increase, reaching 793 koz on the back of higher vehicle production, aided by improved supply chains. Light vehicle production grew by 4% year-on-year, reaching a total of 22.3M units, while heavy-duty vehicle production increased by 9% to 770k units.

In North America, platinum demand rose by 8%, primarily driven by a 7% increase in light-duty vehicle production which was largely unaffected by the United Auto Workers strike which started on the 15th of September. The significant growth in hybrid vehicle production, along with higher platinum loadings resulting from the substitution of palladium in gasoline aftertreatment systems, contributed to this overall increase.

Meanwhile European production improved by 9% compared to Q3'22, supporting a 9% increase in platinum demand. Although the diesel share of production decreased by 2% year-on-year in the region, the resulting reduction in platinum demand was offset by higher heavy-duty vehicle production (up 18% year-on-year) and robust growth in hybrid vehicle production (up 36%). There was a fivefold increase in fuel cell vehicle (FCEV) production, however the total for the period was still a mere 300 vehicles. FCEV passenger cars currently contain between three to five times more platinum loadings than the average European diesel car.

Turning our attention to East Asia, production from China's heavy-duty vehicle sector, while slower compared to Q2'23, remained 43% higher than Q3'22. Several factors contributed to the overall 40% improvement in platinum demand during the quarter. Firstly, the increase in heavy-duty vehicle output and stable production of light-duty vehicles. Secondly, the vehicle mix favoured higher platinum demand, with a 20% increase in diesel light-duty vehicle production and a 34% rise in hybrid vehicles with higher PGM loadings. The third factor was the increased share of heavy-duty vehicles fitted with PGM-containing aftertreatment systems due to the full implementation of China VI/6b. Finally, some substitution of palladium in gasoline vehicles further supported the increase.

In Japan, car production percentage increases were flattered by the previous year's weak production figures. While light-duty vehicle output improved by 7%, the SUV and pick-up sectors grew at a higher rate, resulting in a 20% year-on-year increase in platinum demand. Similar to Europe, FCEV production also improved markedly, with production increasing almost fivefold compared to Q3'22, while we caution that these levels still represent very low quantities.

In the "Rest of the World", where supply chain constraints were less severe than during the previous year, light vehicle production increased by 4% year-on-year, leading to a 5% uptick in platinum demand.

Jewellery demand

Global jewellery demand slipped further, contracting by 5% year-on-year (-26 koz) to reach 455 koz.

European demand eased by 1% in Q3'23 as double-digit losses for bridal jewellery continued (mainly the result of fewer weddings), while the high-end brands continued to see robust gains. Contacts were certain that demand from the latter was much stronger than public data (such as hallmarking or corporate results).

Although the price differential to gold widened, North American offtake dipped 3% year-on-year in Q3'23, chiefly due to the normalisation of wedding numbers. Demand at the trade level was also hit by the newly important factor of the rise of lab-grown diamonds making retailers cautious about stocking the 'wrong' stone.

In China, despite the month-on-month recovery towards the latter part of Q3'23, platinum jewellery demand fell by another 20% from last year's low base. In addition to impaired consumer sentiment, fierce competition from gold jewellery continued to weigh on local platinum jewellery demand. Feedback from the supply chain suggests that the over 50% year-on-year slump in the platinum gem-set market explains the scale of the decline in platinum jewellery fabrication. In contrast, demand for menswear plain platinum chains lent some support to Chinese demand. We also continued to see small platinum plants switch to producing 5G gold (hard-pure gold products that contain less than 0.1% other metal alloys).

Japanese demand was flat year-on-year, an arguably disappointing result, when compared to continued gains in gold jewellery fabrication we saw over the period. While other segments of the market are still enjoying a healthy recovery, the weakness of the bridal sector continues to be a drag on demand.

Indian platinum jewellery fabrication rose by 15% year-on-year to 39 koz but declined by 6% quarter-on-quarter. Fabrication averaged 70% higher than the pre-pandemic (2018–2019) average of 28 koz. This owes much to an aggressive expansion of organised chain stores, which in turn has enabled further penetration of platinum jewellery in India as these retailers expand into smaller cities and towns. Moreover, with India's economy still growing at a healthy pace, and in particular the urban economy doing very well, platinum jewellery purchases have remained buoyant. During the quarter, fabrication was also supported by retailers building inventory ahead of the wedding and festive season. Apart from store expansions, many branded retailers have started to actively promote platinum jewellery to help improve their margins.

Industrial demand

Industrial platinum demand totalled 574 koz in Q3'23, representing a 6% (+30 koz) increase on Q3'22. The healthy 23% growth in chemical demand was offset by slower expansion in the petroleum sector and weakness in the electronics sector where hard-disk drive demand continues to soften.

Chemical

Platinum chemical offtake decreased by 41% quarter-on-quarter to 135 koz, but it was up by 23% year-on-year. The quarter-on-quarter decline was almost entirely led by the petrochemical sector, as the completion of new paraxylene (PX) and propane dehydrogenation (PDH) plants was concentrated in the first half of 2023. With significantly lower capacity additions in Q3'23, platinum use in the petrochemical sector was entirely related to top-up replacement during catalyst change-outs. Following a modest decline in H1'23, demand for platinum in the silicone industry remained soft, due to slowing economic growth affecting the use of silicone in key segments, ranging from construction to consumer products. By contrast, nitric acid offtake maintained growth, due to strong demand during the quarter for aniline, which is used in the rubber and automotive industries.

Petroleum

Platinum demand fell by 5% quarter-on-quarter (-2 koz) to 41 koz in Q3'23. While global refining capacity is on track to rise this year, Q3'23 witnessed a slower rate of expansion in China, which contributed to these weaker volumes. On a year-on-year basis, the decline was higher at 16% (-8 koz). As was the case in H1'23, this reflects gas-to-liquid catalyst changeouts in 2022 that have so far not been repeated this year.

Medical

Platinum medical demand rose 3% year-on-year (+2 koz) in Q3'23, to 70 koz. While this was in part attributable to a post-COVID recovery, particularly in emerging markets, secular industry growth and a greater focus on healthcare have also been key drivers.

Glass

The completion of a fibreglass production line in North Africa early in the year has kept the growth of platinum demand from the glass industry up by 5% year-on-year to 158 koz in Q3'23. This would have been higher had it not been partially offset by LCD-related closures in Asia in an effort to lower costs.

Electrical

Demand from the electrical segment in Q3'23 declined by 13% (-3 koz) year-on-year to 22 koz as hard-disk drive (HDD) shipments maintained their downward trend, while semiconductor utilisation rates have not yet fully recovered. Shipments of mass-capacity HDDs were still affected by conservative orders due to cautious enterprise IT spending amid an uncertain economic climate, with no clear factors to indicate a recovery in the short term. That said, the recent upgrading of cloud storage and computing, due to the surge of AI, has partially helped this segment, but it cannot make up for the losses caused by delays in data centre construction and solid state drives' (SSD) erosion of its market share. As for semiconductors, benefiting from the launch of new consumer electronics products, the need to rebuild stocks across the supply chain, as well as the boom in emerging applications of AI, factory capacity utilisation rates rebounded slightly from the previous quarter.

Other

Global other industrial demand grew by 5% (+7 koz) to 148 koz in Q3'23. In the automotive field, spark plugs and oxygen sensors benefited from healthy supplies of key components (now that the chip shortage has ended), stable vehicle production, and a healthy aftermarket business. Demand from the aerospace sector was also strong, driven by higher defence spending, new innovative applications, enabled by the deployment of 5G, and increased commercial space activities. Finally, the greater deployment of Proton Exchange Membrane (PEM) electrolyzers further supported growth.

Investment demand

Global bar and coin investment in Q3'23 fell by a noteworthy 35% (-32 koz) year-on-year to 59 koz, led by a sharp drop in North American demand which, along with further weakness in Europe, offset a modest recovery in Japan.

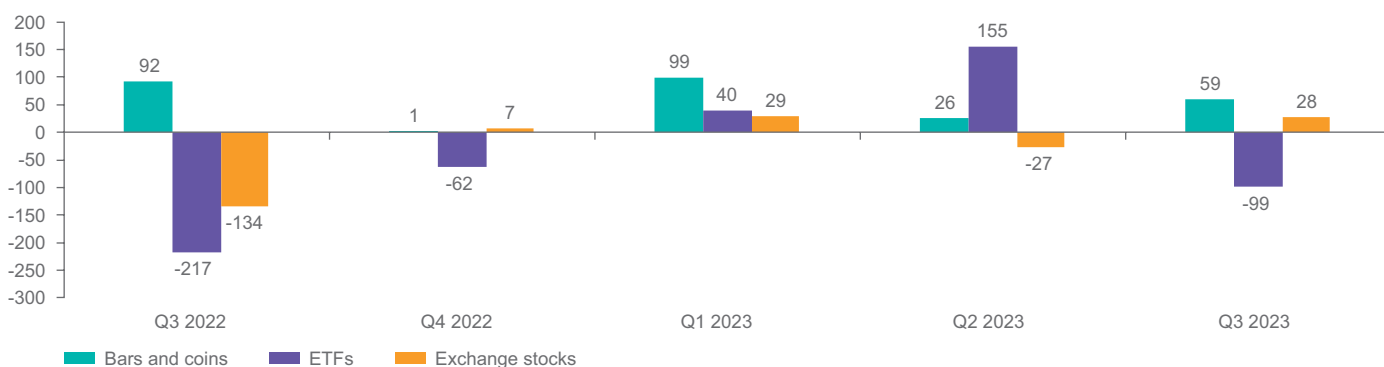
Looking first at North America, the weakness in Q3'23 followed a 63% collapse in the region during H1'23. Although there has been some appetite for platinum coins and bars, this has been comfortably offset by a slump in sales of US Eagle bullion coins. Taking a step back, the wider market for precious metals (including gold and silver) also struggled during much of Q3 in North America, only bursting into life towards end-quarter as a correction in the gold price benefited the wider precious metals market (a trend that has continued, to some extent, into Q4).

In Europe, with cash deposits offering multi-year high returns, interest in precious metals has eased across bullion products among retail investors. The ongoing cost-of-living crisis and dimmed economic outlook also made the public cautious about acquiring new investment products.

Japanese net investment demand swung back to positive territory after the previous quarter's disinvestment. At 15 koz, the Q3'23 figure was also 15% higher year-on-year, albeit from a low base. While yen-denominated prices remained elevated, they were lower on average than during the previous quarter and there were a few periods of downtrends that discouraged liquidations. Volumes on both sides of the market were low historically.

In contrast to the first two quarters of this year, Q3'23 platinum exchange-traded fund (ETF) holdings fell. The 3% (-99 koz) quarter-on-quarter decline was driven by a fall in South African holdings (-81 koz), which slowed somewhat this quarter following substantial inflows in the first half of the year as investors, concerned about Eskom's impact on PGM miners, rotated out of mining equities and into PGMs. European funds saw their eighth consecutive quarterly outflow, and US-listed funds also saw modest declines, both driven by rising interest rates lifting the opportunity cost for holding non-yielding assets. Conversely, combined NYMEX and TOCOM stocks rose by 28 koz in Q3'23. This followed 50 koz of platinum delivered into NYMEX warehouses at the end of September, incentivised by ongoing, positive platinum exchange of futures for physical (EFP) spreads.

Chart 4: Platinum Investment, koz

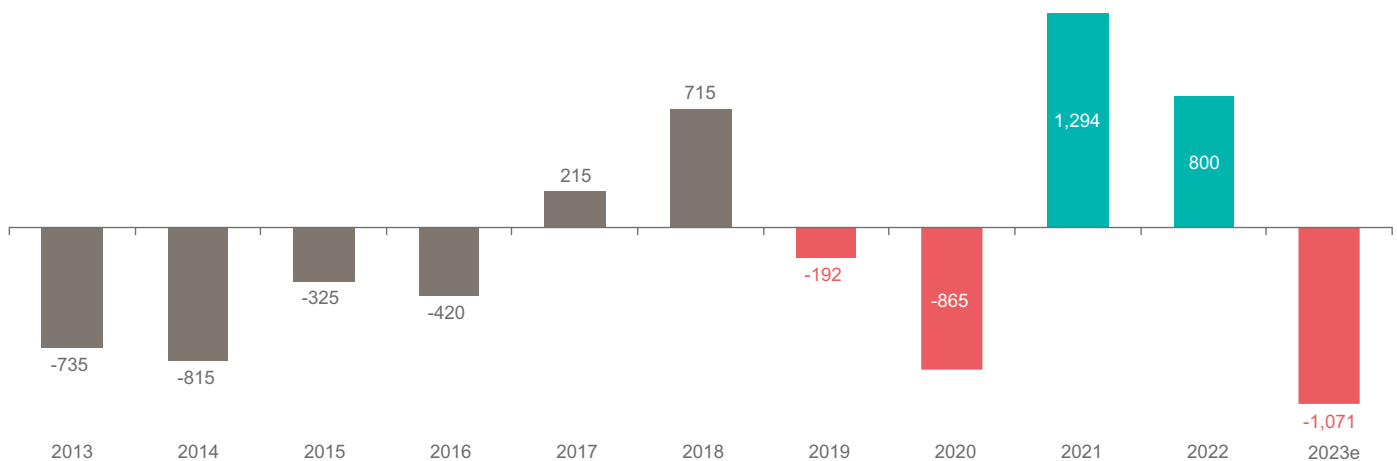


Source: Metals Focus

2023 OUTLOOK

Full-year global economic growth is expected to slow to 3% from a previous estimated 3.5%, with advanced economies growing at a slower rate than emerging markets. Headline inflation is falling but remains high and is expected to persist. Despite the weak economic data, we maintain our view of a deficit in the platinum market. We expect total supply to contract marginally to 7,079 koz as supply from secondary sources continues to underperform expectations. In contrast, demand is estimated to reach 8,150 koz, up 26% (+1,690 koz) year-on-year, as all demand segments perform better than in the previous year. As a result, we expect the market to record a 1,071 koz deficit, representing an overall swing of 1,871 koz from the surplus we saw in 2022.

Chart 5: Supply-demand balance, koz, 2013-2023e



Source: SFA (Oxford) 2014 - 2018, Metals Focus 2019 - 2023

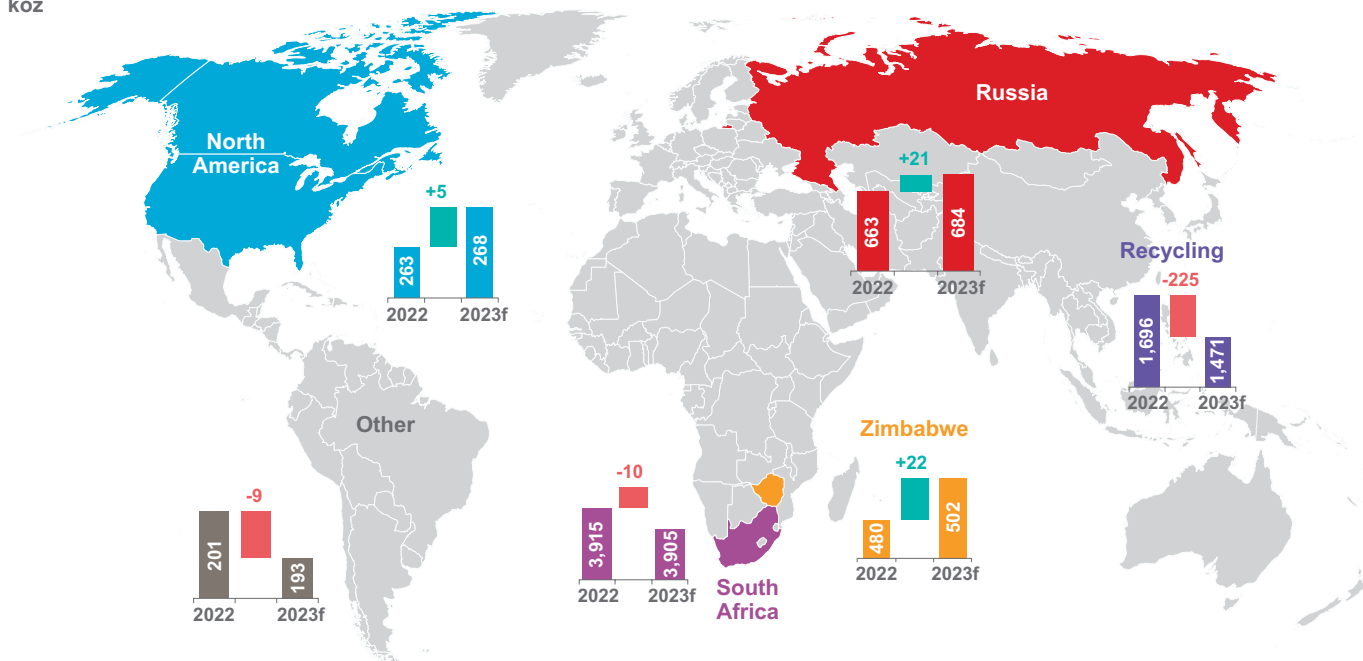
Supply

After three years of significant deviations from planned output, the global platinum mine supply in 2023 has largely followed projected production levels. In 2022, unexpected issues such as the severity of Eskom load shedding, delays in smelter maintenance, and security and safety challenges led to South African producers revising their production target downward or failing to meet guidance. In contrast, producers anticipated many of the challenges in 2023 and have often succeeded in mitigating them, resulting in output that closely matches planned levels. However, platinum production remains significantly below pre-COVID levels.

Despite a worsening power generation deficit from Eskom in 2023, South African platinum miners have largely controlled the impact on their operations. The return of smelters from maintenance has provided increased flexibility in managing power curtailment while minimising lost production. At the time of writing, thus far in Q4, there has been a decrease in power generation breakdowns, resulting in significantly improved energy security in South Africa, with only a minimal impact on production expected for the final quarter. The sharp decrease in the PGM basket price has affected profitability, leading to announcements by some producers that they are reassessing their production plans and restructuring operations. However, it is anticipated that any substantial changes to mine plans will not impact production until 2024 or later. As a result, South African mine supply for 2023 is forecast to remain virtually flat, slipping 10 koz year-on-year to 3,905 koz.

Zimbabwe's production is on track to reach an all-time high of 502 koz as a result of the commissioning of the third concentrator at Zimplats in 2022. Furthermore, a new power agreement for the operation should continue to deliver improved power stability. North American output is projected to remain stable at 268 koz, with the continued impact of last year's strike at Glencore's mine and damage to shaft infrastructure at Sibanye-Stillwater's US operations impeding a recovery from last year's disruption. Maintenance at Nor Nickel's Nadezhda smelter was expected to weigh on Russian output. However, due to a rescheduling of timelines, the impact is now expected to be deferred until 2024. As a result, Russian mine supply is expected to grow 3% (+21 koz) year-on-year to 684 koz. Consequently, global platinum mine supply for 2023 is expected to be virtually unchanged from the previous year, at 5,551 koz.

Chart 6: Changes in supply, 2022 vs. 2023f
koz



Source: Metals Focus

Recycling

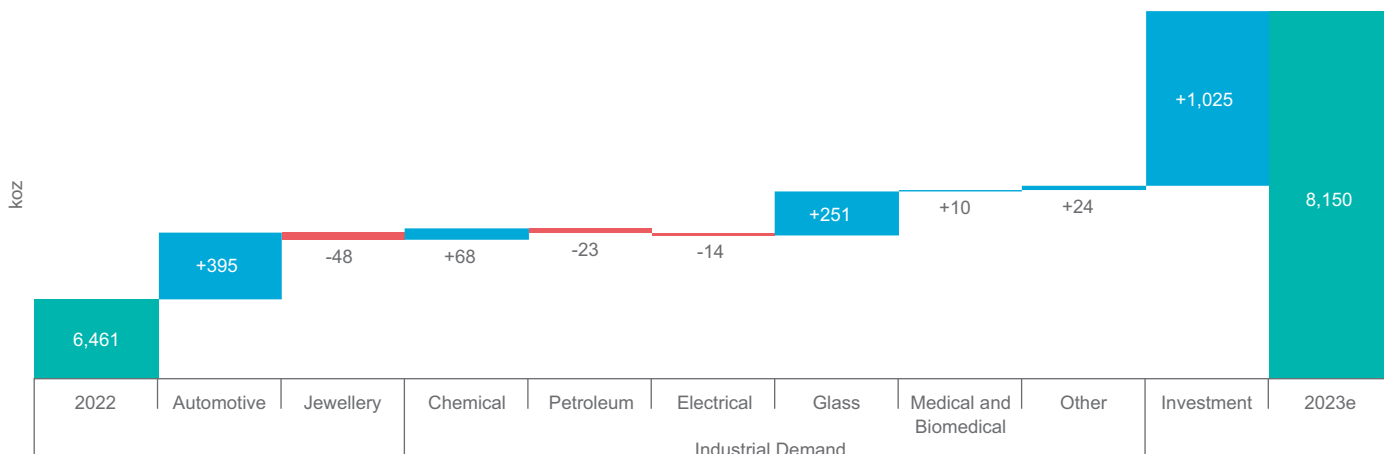
After a dismal recycling year in 2022, and given the improvement in vehicle sales this year, the global recycling market was expected to improve in 2023. However, headwinds persist and we have lowered our outlook for the full year. Global recycling is expected to fall to 1,471 koz, 13% lower than an already depressed 2022. The conventional wisdom that an increase in new vehicle sales should stimulate the spent autocatalyst market is not materialising as expected. Furthermore, with steel scrap prices on average 29% higher than pre-pandemic 2019 prices and used car parts remaining in high demand, scrap yards may be in the financial position to hold back on autocatalyst inventory hoping for higher prices, as high PGM inventories are expected to unwind and vehicle production improves. Newly entrenched consumer behavioural trends, such as remote working and online shopping, are contributing to a reduction in vehicle usage. This shift in behaviour is extending the lifespan of vehicles and, consequently, impacting the availability of end-of-life vehicles for recycling. Finally, the increased regulatory measures in North America and China, while acknowledged as an aid to address autocatalyst theft, are hampering the flow of material in these regions.

We have revised our estimate for Chinese jewellery scrap in 2023 from 1% growth to a 4% decline to reflect worse-than-expected Q3'23 activity and platinum's expected side-ways price movements in Q4'23.

Demand

Platinum demand is expected to grow by 26% (+1,690 koz) year-on-year to 8,150 koz in 2023. Bar and coin demand is expected to be 36% up on 2022 while we forecast a modest 50 koz inflow in ETF holdings. Improved automotive production, tighter emissions legislation, and substitution will raise automotive demand by 14% (+395 koz) to 3,262 koz, 16% higher than in 2019 when car production was at similar levels. Platinum demand in the industrial sector benefits from paraxylene and glass capacity expansions lifting demand by 14% (+395 koz).

Chart 7: Changes in demand by category, 2022 vs. 2023e



Source: Metals Focus

Automotive demand

In the current year, global production of light-duty vehicles (LDVs) is projected to reach 89M units, marking an 8% increase compared to the previous year. Approximately 78M (+5% compared to 2022) of these LDVs will require a PGM-based aftertreatment system. Furthermore, a meaningful upswing of 10% to 3.3M units is expected in the HDV segment. It is worth noting that the majority of this incremental HDV production (70%) will be fuelled by diesel, which favours platinum demand. Against this backdrop global automotive demand is expected to increase by 14% year-on-year in 2023 to 3,262 koz (+395 koz).

Higher platinum demand is underpinned by vehicle production growth and more stringent emissions standards, particularly in China. These regulations mandate the use of compliant aftertreatment systems in all HDVs, effective from 1st July 2023. Additionally due to China IV, the emissions regulation applicable to non-road vehicles (NRVs), which mandates the installation of particulate filter systems for all engines exceeding 37 kW, more than half of NRVs produced this year will have aftertreatment systems.

Shifting focus to North America, despite a protracted six-week strike by the United Auto Workers (UAW), LDV production is poised to increase by 7%. The decline in the diesel market, as consumer preferences for diesel-fuelled vehicles remains low, is more than offset by gasoline vehicle production which is set to expand by 5%, and increased hybridisation, up 38% year on year. Moreover, field research indicates an unexpectedly robust adoption of tri-metal catalysts, which features higher platinum content at the expense of palladium.

In Europe, platinum demand in the automotive sector is projected to increase by 11%, primarily due to healthy growth in vehicle production. LDV output is estimated to grow by 12%, encompassing a 3% increase in diesel vehicle production, an 11% rise in gasoline-fuelled cars, and a near-sixfold increase for FCEVs.

Japanese platinum demand is expected to improve by 20%, flattered by a weak 2022. Within the gasoline segment, further PGM demand is supported by a notable 15% increase in SUV production. In “Other Regions”, the growth in vehicle production, as well as tighter emissions legislation, will see platinum demand increase by 7%.

In combination with reports of substitution in other regions, we estimate that around 620 koz of palladium will be substituted by platinum this year.

Jewellery demand

Global jewellery demand is expected to contract by 3% (-48 koz) in 2023 to reach 1,852 koz.

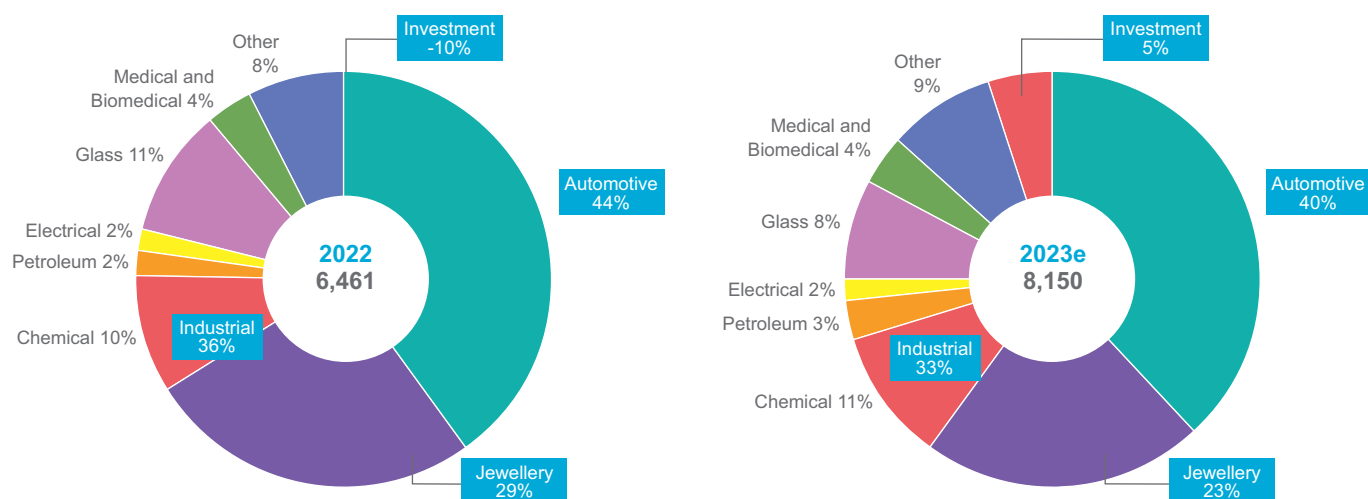
We have trimmed our European forecast growth for 2023 from the last Platinum Quarterly, from +4% to now show +2%, due to weaker-than-expected results for mass market / bridal jewellery, in part due to caution over stock build. Growth, therefore, is ever more dependent on the still strong luxury jewellery and watch brands.

Demand in North America remains forecast to dip slightly due to a normalisation in the number of weddings post COVID, consumer expenditure shifts and caution over stocks. The drop has been kept small due to wider price differentials to gold, which means platinum's market share within bridal is felt to have grown notably.

As seen in the quarter Japanese demand for platinum jewellery disappointed compared to gold. Improvements in other segments failed to offset a weak bridal market. We have lowered our forecast for China in 2023, from a 7% to a 13% decline, to 420 koz to reflect a worse-than-expected Q3'23 performance and growing consumer preferences for quasi-investment and value-preservation gold product collections.

In India, we estimate 2023 fabrication to be around 184 koz, up 8% year-on-year. Aside from ongoing store expansions, retailers have started to actively promote platinum jewellery in order to help improve their profits by offering high-margin products. They are also focusing on the younger generation by offering innovative, light-weight everyday wear, and bi-metal (gold & platinum) jewellery options.

Chart 8 & 9: Demand end-use shares, 2022 vs. 2023e



Source: Metals Focus

Industrial demand

Industrial demand in 2023 is forecast to improve by 14% year-on-year (+317 koz) to 2,652 koz. Capacity expansions in the glass and chemical industry will offset lower offtake from the electrical and petroleum markets.

Petroleum

Platinum offtake is forecast to remain steady in Q4'23. This will bring the annual total to 170 koz in 2023, down by 12% (-23 koz) year-on-year. As explained above, this decline was led by fewer planned catalyst changeout at gas-to-liquid plants in the Rest of the World. Part of these losses will be offset by higher demand from reforming and isomerisation plants, as new capacity has lifted platinum offtake.

Chemical

Platinum demand is forecast to rise by 10% (+68 koz) year-on-year in 2023 to a four-year high of 753 koz. The petrochemical industry will contribute the largest share of gains this year. This in turn reflects faster capacity expansion in both the paraxylene and propane dehydrogenation markets. In contrast to previous years, when growth was almost exclusively led by China, 2023-to-date has also seen two new plants in other countries. Nitric acid offtake is expected to improve, as the fertiliser industry recovers from major supply disruptions caused by the Ukraine-Russia war. This leaves the use of platinum in silicone products the only major area to post losses in 2023. This owes much to a slowing global economy, which has affected demand for silicone in areas such as construction, consumer care and electronics products.

Glass

We have kept our 2023 forecast for platinum demand in the glass industry at 756 koz, rising by 50% (+251 koz). There are no new notable updates in the identified capacities in LCD and fibreglass that changes our projections at this point. This would make 2023 the strongest year on record for this market. Most growth year-on-year will come from the ramp-up of single feeder tanks in Japan to replace decommissioned multi-feeder tanks, combined with capacity expansions and new investment anticipated in China. Platinum demand from the installation of LCD tanks in China is expected to almost double in 2023. This aligns with past industry growth cycles, where capacity expansions tend to be concentrated to take advantage of economies of scale. Additionally, the construction of new fibreglass plants from China's project pipeline will continue. The shift to a higher platinum ratio in platinum-rhodium alloys used in bushings, will also continue to benefit platinum demand.

Medical

Platinum medical demand is expected to grow 4% (+10 koz) year-on-year to 283 koz. As well as improvements from the aftermath of COVID in 2022, usual growth drivers continue to lift demand: emerging market development, greater spend on healthcare (particularly following the pandemic), an ageing and growing global population, and improving access to healthcare.

Electrical

Although inventories across supply chains in the consumer electronics industry have returned to relatively healthy levels, sluggish consumer confidence may weigh on forecasts of year-end sales performances being lower than expected. Furthermore, while leading HDD manufacturers are accelerating the introduction of higher-capacity HDDs (to benefit from the unit cost advantage), it is difficult to stop SSDs from further eroding HDDs' share in each sector. As a result, we forecast platinum offtake to decline, falling by 13% (-14 koz) to 92 koz.

Other

Platinum demand from other industrial applications is forecast to grow by 4% year-on-year (+24 koz) to 598 koz in 2023. Several spark plug and sensor manufacturers have reported a strong recovery in demand this year, with some launching new products containing both platinum and iridium. In the marine industry, the International Maritime Organization (IMO) introduced the Energy Efficiency Existing Ship Index (EEXI), which became effective from 1st January 2023. This regulation requires ships to monitor and report Carbon Intensity (CI), which has led to a marked rise in sensor demand from this sector. In the aerospace sector, commercial aviation is returning to pre-pandemic levels, and several key aircraft producers have increased their production targets this year. Global defence spending is expected to reach \$2.1 trillion in 2023 according to the Stockholm International Peace Research Institute (SIPRI), underpinning platinum demand from this industry. Finally, the deployment of stationary and hydrogen storage facilities will see platinum demand increase by 22% this year, while PEM electrolyser demand will increase 250% but still remain a very small quantity at this early stages of adoption.

Investment demand

This year, we expect global retail bar and coin investment to rise by 36% (+80 koz) to 305 koz, although this will represent just a two-year high. This will entirely be due to a return to positive net investment in Japan, for the first time in three years. By contrast, North American purchases are set to drop to a four-year low.

Bar and coin investment in North America is forecast to weaken by 32% (-82 koz) to just 177 koz in 2023, its lowest level since 2019. A subdued retail market has been punctuated by just two periods of strong sales, which occurred during the US regional banking crisis (from late Q1 through to early Q2) and then from late September when prices fell sharply before the Israel-Hamas crisis emerged and the subsequent jump in prices this generated. This aside, the region has faced subdued retail interest, across all precious metals. In Europe, many of the unfavourable factors that have weighed on precious metals investment so far this year are likely to persist for some time to come. Platinum retail investment is therefore expected to remain subdued in Q4'23, with the full year total on track to fall by 20% year-on-year to a six-year low. In contrast, Japanese investment is expected to swing to a positive figure, after two years of disinvestment. While prices remain elevated in local currency terms, their rallies have been more limited than in previous years. Meanwhile there seems to be some fresh buying by a new class of younger investors being interested in precious metals, although this is admittedly more pronounced for gold.

Over the first nine months of this year, platinum exchange-traded fund (ETF) holdings were up 97 koz, an increase of 3%. This followed substantial inflows from South African funds in the first five months, as concerns around South African power supply and its impact on the PGM miners lead to greater investment in PGM ETFs instead of mining equities. However, since their peak in May, investors have been unwinding these positions. As these funds normalise, and as Western-held funds continue to trend lower, we expect to see an outflow in the final quarter, generating an increase of 50 koz for full-year 2023 holdings.

Imports into China and Hong Kong have been largely quasi-speculative over the last two years, leading to significant levels of imports in excess of identified demand. So far this year, these imports have been exceptionally variable, ranging from 364 koz in June to their first ever monthly outflow in May of -75 koz. This variability is reflected in the standard deviation of monthly imports in 2023, which shows the greatest range on record, eclipsing near-record import years, 2021 and 2022. Coupled with the knowledge of Chinese stockpiling over the last few years, this is suggestive that their appetite for physical metal might be saturated, although there may still be opportunistic buying at low prices.

ABOVE-GROUND STOCKS

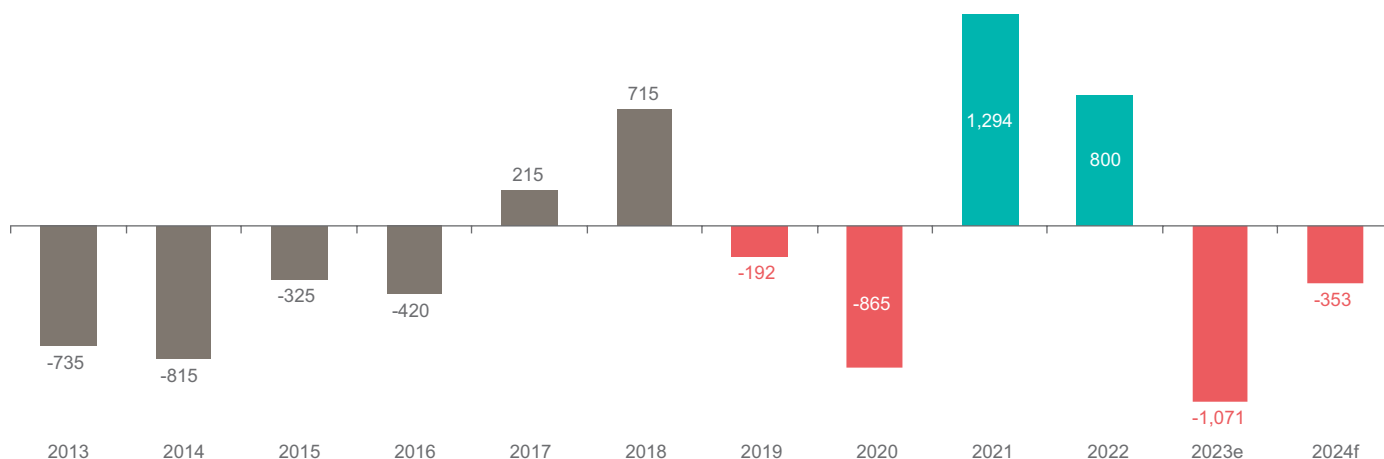
Due to a projected deficit of 1,071 koz in 2023, above-ground stocks are expected to decline to a three-year low of 3,615 koz by year-end, representing demand cover of just over five months.

The WPIC definition of above-ground stocks is the year-end estimate of the cumulative platinum holdings not associated with exchange-traded funds, metal held by exchanges or working inventories of mining producers, refiners, fabricators, or end-users.

2024 OUTLOOK

In 2024, despite global economic growth that is expected to be slower than 2023, at 3% based on the most recent IMF forecast, we expect the platinum market to remain in a deficit of 353 koz. The contraction of 718 koz compared to 2023 will result from higher supply, from both mine and secondary sources, as well as lower investment and industrial demand. Overall demand will contract 6% (-487 koz) to 7,663 koz due to fewer chemical and glass plant expansion anticipated. In addition, we forecast some ETF liquidations as high interest rates continue to place pressure on non-yielding assets. Meanwhile, supply is expected to improve by 3% (+231 koz) as both South African mine supply and global autocatalyst scrap supply improve.

Chart 10: Supply-demand balance, koz, 2013-2024f



Source: SFA (Oxford) 2013-2018, Metals Focus 2019-2024f

Supply

In 2024, we anticipate a 3% increase in global supply, driven by improvements in both mining and recycling.

Over the past three years, the historically high constituent prices of the PGM basket price have enabled South African PGM miners to recapitalise their operations, some of which had struggled for investment due to the low-price environment before 2019. Unlike previous cycles, where high prices led to increased production and substantial investment in new mines, the recent high prices spurred investment in existing operations to mitigate future production risks and reduce costs. Consequently, despite the decline in PGM prices in 2023, which has squeezed margins and led some companies to announce cost-cutting measures and restructure operations, overall PGM production should remain resilient. The completion of smelter maintenance is expected to bolster South African platinum output. However, the scheduled rebuild of Implats' Number 5 furnace in early-2024 is likely to have some impact.

The South African operating environment continues to present challenges. Although Eskom's performance has improved in the latter half of 2023, significant risks persist. Any major power generation failures could necessitate a return to load curtailment, which would affect the global platinum mine supply.

In Russia, the maintenance schedule for the Nadezhda Smelter is still uncertain, but it is currently expected to affect platinum production in 2024, with the extent of the impact depending on the duration of the downtime. North America faces ongoing regional skilled labour shortages that may continue to constrain output. Nonetheless, there is an expectation of growth as Sibanye-Stillwater's US operations rebound from shaft damage and Glencore's operations stabilise following the 2022 strike. Platinum mine supply in 2024 is forecast to grow by 3% (+191 koz) year-on-year to 5,743 koz.

Turning to global recycling, even though the persistent weakness this year has tempered our growth expectations, we do anticipate a modest improvement in autocatalyst recycling in 2024. With secondary supply from spent autocatalysts growing by 8% (+84 koz) to 1,132 koz, global recycling supply is expected to rise by 7% (+96 koz). The slight 3% increase we forecast for jewellery scrap in 2024 is mainly driven by our higher price expectations and the positive impact of the recovery in jewellery demand, while the 4% increase in electronic scrap is expected as recycling rates of electronic waste improve, offsetting thriftiness in loadings which has been a prevailing longer-term trend.

Demand

Following three consecutive years of double-digit growth in automotive platinum demand, we forecast a more modest 2% rise (+50 koz), bringing the total platinum demand to 3,312 koz. This growth is driven by a slight uptick in both the LDV and HDV production, with projections of 2% and 3% gains, respectively. While vehicle production is expected to increase by 2M units, PGM containing vehicle production is set to decline from 78M units to 77M, due to rising BEV penetration. From a production perspective, the biggest hit that the internal combustion engine will take is in China where 1M fewer gasoline cars will be built. This will, however, partially be offset by increased HDV production. For 2024, due to a combination of tighter emissions legislation and platinum substitution, estimated to increase to around 700 koz, most regions, with the exception of Europe, will still see growth in platinum demand.

In the jewellery sector, we expect to see a modest 3% (+51 koz) lift in demand next year to 1,903 koz. Europe in 2024 is forecast as flat year-on-year. The slight rise in the platinum price, fewer engagements and a possibly weak start for its economies will curb mass market / bridal demand. In contrast, the high-end is forecast to grow modestly, but this could again surprise to the upside. Platinum sales in North America are expected to dip next year due to unfavourable price moves (in the context of the jewellery industry) and fewer engagements. However, the fall will be limited by gains within bridal and possible benefits from the spread of lab-grown diamonds as their lower price liberates budget for ring mounts. Fabrication should also outperform sales as retailers build inventory. In China, we expect platinum jewellery fabrication to post modest growth in 2024, driven by somewhat firmer economic growth and improving consumer spending on non-essential items. Consumer demand in India is expected to remain strong as platinum gains wider acceptance across the country, particularly in smaller cities and towns. That being said, India's recent momentum could slow in percentage terms as the base becomes larger and as the growth in organised chain stores plateaus.

Platinum demand in the glass industry is forecast to decrease by 18% year-on-year to 623 koz in 2024 following the strongest year on record for the market. Both the LCD and fibreglass industries will drive this trend as fewer new installations are in the pipeline in China and in other territories. Decommissioning of LCD tanks in Japan will continue due to the existing issue of higher costs. However, platinum demand from the manufacture of LCDs will still manage to slightly rise year-on-year from the top-up of platinum during the change-out of existing tanks. We also anticipate the preference of higher platinum ratio in platinum-rhodium alloys, particularly in fibreglass bushings, to continue in 2024.

We forecast platinum medical demand will continue to grow in 2024, climbing 3% (+9 koz) to 292 koz, its highest level since 2011 in the Metals Focus data series when platinum dental platinum demand was substantially higher. We expect to see a continued rise in platinum-using medical devices and cancer treatments, driving higher demand. This growth will be led by emerging markets, despite their smaller base, as the populations age, incomes rise and access to healthcare improves.

In the chemical sector, demand is forecast to decline by 22% (-168 koz) year-on-year to 585 koz in 2024. Almost all the losses are premised on a projected slowdown in paraxylene (PX) and, to a lesser extent, propane dehydrogenation (PDH) capacity expansions in China. Following five consecutive years of double-digit gains, a slowdown in PX capacity additions is hardly surprising which leads to a decrease in platinum bearing catalysts from new plants. To illustrate, 1.4 million tonnes of new PX capacity is expected to be added in 2024 in China, compared to over 6 million tonnes in 2023.

Platinum offtake from the petroleum industry is forecast to decrease by 8% (-13 koz) to a four-year low of 156 koz. This in turn reflects slower capacity additions in reforming and isomerisation units. Interestingly, even with a challenging economic outlook, global oil demand is on track to hit all-time highs in 2023, with further gains expected for 2024. However, the pace of oil refining capacity additions has failed to keep up with this growth as a result of underinvestment by the industry in the last few years.

For 2024, retail investment is forecast to slump by 44% (-133 koz) to a decade low of just 172 koz. While North American demand is expected to drop by 11%, most important, in terms of its impact on the global total, is the expected return to net disinvestment in Japan.

The 11% decline forecast for North America will see the market return to levels last since in 2019. This partly reflects the negative impact that a broadly stable platinum price (this being forecast by Metals Focus) will have on investors that tend to respond more positively to more volatile prices. Put another way, even though investor liquidations should remain modest, price stability will discourage outright purchases. Higher prices are expected to drive a return to net selling in Japan, particularly as we expect they reach multi-year highs in yen terms.

Looking ahead to 2024, we expect to see a slight outflow of platinum ETFs, totalling 120 koz. European and North American funds remain under pressure from elevated interest rates. Equally, we do not expect to see a repeat of the exceptional inflows in South African-held funds that occurred in the first five months of 2023. Meanwhile, Japanese and other regions' ETFs only make up 3% of global holdings, meaning their fluctuations have a lesser impact on the global total.

ABOVE GROUND STOCKS

Due to a projected deficit of 353 koz in 2024, above-ground stocks are expected to decline to 3,262 koz by year-end, a four-year low.

The WPIC definition of above-ground stocks is the year-end estimate of the cumulative platinum holdings not associated with exchange-traded funds, metal held by exchanges or working inventories of mining producers, refiners, fabricators, or end-users.

PLATINUM QUARTERLY Q3 2023

Table 2: Supply, demand and above ground stock summary – annual comparison

| | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023e | 2024f | 2023e/2022 Growth % | 2024f/2023e Growth % |
|--------------------------------------------------------|---------------|--------------|--------------|--------------|--------------|--------------|----------------|--------------|--------------|---------------|--------------|------------------------|-------------------------|
| Platinum Supply-demand Balance (koz) | | | | | | | | | | | | | |
| SUPPLY | | | | | | | | | | | | | |
| Refined Production | 4,875 | 6,160 | 6,045 | 6,130 | 6,125 | 6,075 | 4,989 | 6,297 | 5,522 | 5,551 | 5,743 | 1% | 3% |
| South Africa | 3,135 | 4,480 | 4,265 | 4,385 | 4,470 | 4,374 | 3,298 | 4,678 | 3,915 | 3,905 | 4,099 | 0% | 5% |
| Zimbabwe | 405 | 405 | 490 | 480 | 465 | 458 | 448 | 485 | 480 | 502 | 506 | 5% | 1% |
| North America | 395 | 365 | 390 | 360 | 345 | 356 | 337 | 273 | 263 | 268 | 302 | 2% | 13% |
| Russia | 740 | 710 | 715 | 720 | 665 | 716 | 704 | 652 | 663 | 684 | 634 | 3% | -7% |
| Other | 200 | 200 | 185 | 185 | 180 | 170 | 202 | 208 | 201 | 193 | 201 | -4% | 4% |
| Increase (-)/Decrease (+) in Producer Inventory | +350 | +30 | +30 | +30 | +10 | +2 | -84 | -93 | +43 | +57 | +0 | 33% | -100% |
| Total Mining Supply | 5,225 | 6,190 | 6,075 | 6,160 | 6,135 | 6,077 | 4,906 | 6,204 | 5,565 | 5,608 | 5,743 | 1% | 2% |
| Recycling | 2,055 | 1,720 | 1,860 | 1,915 | 1,955 | 2,112 | 1,997 | 2,078 | 1,696 | 1,471 | 1,567 | -13% | 7% |
| Autocatalyst | 1,255 | 1,185 | 1,210 | 1,325 | 1,420 | 1,567 | 1,509 | 1,589 | 1,255 | 1,048 | 1,132 | -16% | 8% |
| Jewellery | 775 | 515 | 625 | 560 | 505 | 476 | 422 | 422 | 372 | 353 | 362 | -5% | 3% |
| Industrial | 25 | 20 | 25 | 30 | 30 | 69 | 66 | 67 | 68 | 70 | 73 | 2% | 4% |
| Total Supply | 7,280 | 7,910 | 7,935 | 8,075 | 8,090 | 8,189 | 6,902 | 8,282 | 7,261 | 7,079 | 7,310 | -3% | 3% |
| DEMAND | | | | | | | | | | | | | |
| Automotive | 3,245 | 3,245 | 3,360 | 3,300 | 3,100 | 2,811 | 2,326 | 2,555 | 2,867 | 3,262 | 3,312 | 14% | 2% |
| Autocatalyst | 3,095 | 3,105 | 3,225 | 3,160 | 2,955 | 2,811 | 2,326 | 2,555 | 2,867 | 3,262 | 3,312 | 14% | 2% |
| Non-road | 150 | 140 | 135 | 140 | 145 | † | † | † | † | † | † | N/A | N/A |
| Jewellery | 3,000 | 2,840 | 2,505 | 2,460 | 2,245 | 2,106 | 1,830 | 1,953 | 1,899 | 1,852 | 1,903 | -3% | 3% |
| Industrial | 1,700 | 1,845 | 1,955 | 1,825 | 2,015 | 2,231 | 2,075 | 2,536 | 2,335 | 2,652 | 2,367 | 14% | -11% |
| Chemical | 540 | 515 | 560 | 570 | 565 | 778 | 608 | 668 | 685 | 753 | 585 | 10% | -22% |
| Petroleum | 60 | 205 | 220 | 100 | 235 | 219 | 109 | 169 | 193 | 170 | 156 | -12% | -8% |
| Electrical | 215 | 205 | 195 | 210 | 205 | 144 | 130 | 135 | 106 | 92 | 90 | -13% | -3% |
| Glass | 205 | 235 | 255 | 205 | 250 | 228 | 473 | 753 | 505 | 756 | 623 | 50% | -18% |
| Medical and Biomedical | 225 | 240 | 235 | 235 | 235 | 277 | 254 | 265 | 273 | 283 | 292 | 4% | 3% |
| Other | 455 | 445 | 490 | 505 | 525 | 585 | 501 | 546 | 573 | 598 | 620 | 4% | 4% |
| Investment | 150 | 305 | 535 | 275 | 15 | 1,233 | 1,536 | -56 | -640 | 385 | 82 | N/A | -79% |
| Change in Bars, Coins | 50 | 525 | 460 | 215 | 280 | 263 | 571 | 324 | 225 | 305 | 172 | 36% | -44% |
| Change in ETF Holdings | 215 | -240 | -10 | 105 | -245 | 991 | 507 | -241 | -558 | 50 | -120 | N/A | N/A |
| Change in Stocks Held by Exchanges | -115 | 20 | 85 | -45 | -20 | -20 | 458 | -139 | -307 | 30 | 30 | N/A | 0% |
| Total Demand | 8,095 | 8,235 | 8,355 | 7,860 | 7,375 | 8,381 | 7,768 | 6,988 | 6,461 | 8,150 | 7,663 | 26% | -6% |
| Balance | -815 | -325 | -420 | 215 | 715 | -192 | -865 | 1,294 | 800 | -1,071 | -353 | N/A | N/A |
| Above Ground Stocks | 2,590* | 2,265 | 1,845 | 2,060 | 2,775 | 3,458 | 2,592** | 3,886 | 4,687 | 3,615 | 3,262 | -23% | -10% |

Source: Metals Focus 2019 - 2024f, SFA (Oxford) 2014 - 2018.

Notes:

1. Above Ground Stocks: *4,140 koz as of 31st December 2012 (SFA (Oxford)). **3,650 koz as of 31 December 2018 (Metals Focus).
2. † Non-road automotive demand is included in autocatalyst demand.
3. Data from Metals Focus and SFA (Oxford) may not have been prepared on the same or directly comparable basis.
4. Prior to 2019 SFA data is independently rounded to the nearest 5 koz.

PLATINUM QUARTERLY Q3 2023

Table 3: Supply and demand summary – quarterly comparison

| | Q3 2021 | Q4 2021 | Q1 2022 | Q2 2022 | Q3 2022 | Q4 2022 | Q1 2023 | Q2 2023 | Q3 2023 | Q3'23/Q3'22 Growth % | Q3'23/Q2'23 Growth % |
|--------------------------------------------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|-------------------------|-------------------------|
| Platinum Supply-demand Balance (koz) | | | | | | | | | | | |
| SUPPLY | | | | | | | | | | | |
| Refined Production | 1,571 | 1,695 | 1,273 | 1,530 | 1,390 | 1,329 | 1,175 | 1,469 | 1,402 | 1% | -5% |
| South Africa | 1,201 | 1,274 | 878 | 1,129 | 977 | 931 | 760 | 1,033 | 996 | 2% | -4% |
| Zimbabwe | 116 | 127 | 117 | 124 | 116 | 123 | 116 | 126 | 129 | 11% | 2% |
| North America | 51 | 64 | 66 | 64 | 67 | 65 | 71 | 73 | 61 | -9% | -18% |
| Russia | 153 | 178 | 163 | 161 | 179 | 160 | 180 | 190 | 168 | -6% | -12% |
| Other | 51 | 52 | 49 | 52 | 52 | 49 | 48 | 47 | 49 | -5% | 4% |
| Increase (-)/Decrease (+) in Producer Inventory | -43 | -39 | +24 | -2 | -2 | +23 | +33 | +8 | +16 | N/A | 109% |
| Total Mining Supply | 1,529 | 1,656 | 1,298 | 1,528 | 1,388 | 1,352 | 1,208 | 1,477 | 1,418 | 2% | -4% |
| Recycling | 534 | 544 | 449 | 391 | 417 | 440 | 397 | 345 | 352 | -15% | 2% |
| Autocatalyst | 413 | 425 | 333 | 281 | 310 | 331 | 284 | 244 | 249 | -20% | 2% |
| Jewellery | 104 | 102 | 98 | 92 | 90 | 92 | 95 | 84 | 85 | -5% | 2% |
| Industrial | 17 | 17 | 17 | 17 | 17 | 17 | 17 | 17 | 17 | 1% | 0% |
| Total Supply | 2,063 | 2,200 | 1,746 | 1,918 | 1,804 | 1,792 | 1,605 | 1,822 | 1,770 | -2% | -3% |
| DEMAND | | | | | | | | | | | |
| Automotive | 558 | 658 | 727 | 696 | 697 | 747 | 834 | 838 | 793 | 14% | -5% |
| Autocatalyst | 558 | 658 | 727 | 696 | 697 | 747 | 834 | 838 | 793 | 14% | -5% |
| Non-road | † | † | † | † | † | † | † | † | † | N/A | N/A |
| Jewellery | 485 | 511 | 472 | 489 | 480 | 457 | 462 | 480 | 455 | -5% | -5% |
| Industrial | 724 | 542 | 602 | 647 | 544 | 543 | 641 | 690 | 574 | 6% | -17% |
| Chemical | 315 | 103 | 163 | 153 | 110 | 260 | 265 | 229 | 135 | 23% | -41% |
| Petroleum | 38 | 56 | 44 | 48 | 49 | 52 | 44 | 43 | 41 | -16% | -5% |
| Electrical | 35 | 32 | 30 | 27 | 26 | 24 | 23 | 24 | 22 | -13% | -7% |
| Glass | 138 | 140 | 150 | 202 | 151 | 2 | 89 | 170 | 158 | 5% | -7% |
| Medical and Biomedical | 68 | 66 | 70 | 67 | 68 | 68 | 74 | 70 | 70 | 3% | 1% |
| Other | 130 | 145 | 145 | 149 | 141 | 138 | 147 | 154 | 148 | 5% | -4% |
| Investment | -278 | -118 | -165 | -162 | -260 | -54 | 168 | 154 | -11 | N/A | N/A |
| Change in Bars, Coins | 109 | 92 | 59 | 72 | 92 | 1 | 99 | 26 | 59 | -35% | 132% |
| Change in ETF Holdings | -213 | -162 | -166 | -112 | -217 | -62 | 40 | 155 | -99 | N/A | N/A |
| Change in Stocks Held by Exchanges | -173 | -48 | -58 | -123 | -134 | 7 | 29 | -27 | 28 | N/A | N/A |
| Total Demand | 1,489 | 1,592 | 1,636 | 1,670 | 1,461 | 1,693 | 2,106 | 2,162 | 1,810 | 24% | -16% |
| Balance | 574 | 608 | 110 | 248 | 343 | 99 | -501 | -340 | -40 | N/A | N/A |

Source: Metals Focus 2021 - 2023.

Notes:

1. † Non-road automotive demand is included in autocatalyst demand.

PLATINUM QUARTERLY Q3 2023

Table 4: Supply and demand summary – half-yearly comparison

| | H1 2021 | H2 2021 | H1 2022 | H2 2022 | H1 2023 | H1'23/H1'22 Growth % | H1'23/H2'22 Growth % |
|--------------------------------------------------------|--------------|--------------|--------------|--------------|--------------|-------------------------|-------------------------|
| Platinum Supply-demand Balance (koz) | | | | | | | |
| SUPPLY | | | | | | | |
| Refined Production | 3,030 | 3,266 | 2,803 | 2,719 | 2,644 | -6% | -3% |
| South Africa | 2,203 | 2,475 | 2,007 | 1,908 | 1,793 | -11% | -6% |
| Zimbabwe | 243 | 242 | 241 | 239 | 242 | 0% | 1% |
| North America | 159 | 115 | 131 | 132 | 144 | 10% | 9% |
| Russia | 321 | 331 | 324 | 339 | 370 | 14% | 9% |
| Other | 105 | 103 | 101 | 101 | 95 | -6% | -5% |
| Increase (-)/Decrease (+) in Producer Inventory | -11 | -82 | 22 | 21 | 41 | 84% | 99% |
| Total Mining Supply | 3,019 | 3,184 | 2,825 | 2,740 | 2,685 | -5% | -2% |
| Recycling | 999 | 1,079 | 839 | 857 | 742 | -12% | -13% |
| Autocatalyst | 751 | 838 | 614 | 641 | 528 | -14% | -18% |
| Jewellery | 215 | 206 | 191 | 181 | 179 | -6% | -1% |
| Industrial | 33 | 34 | 34 | 34 | 34 | 1% | 0% |
| Total Supply | 4,018 | 4,263 | 3,665 | 3,596 | 3,427 | -6% | -5% |
| DEMAND | | | | | | | |
| Automotive | 1,339 | 1,216 | 1,423 | 1,443 | 1,672 | 17% | 16% |
| Autocatalyst | 1,339 | 1,216 | 1,423 | 1,443 | 1,672 | 17% | 16% |
| Non-road | † | † | † | † | † | N/A | N/A |
| Jewellery | 957 | 995 | 962 | 937 | 942 | -2% | 0% |
| Industrial | 1,270 | 1,266 | 1,249 | 1,087 | 1,331 | 7% | 23% |
| Chemical | 250 | 418 | 315 | 370 | 494 | 57% | 34% |
| Petroleum | 74 | 95 | 92 | 101 | 87 | -5% | -13% |
| Electrical | 68 | 67 | 57 | 49 | 47 | -17% | -5% |
| Glass | 475 | 278 | 353 | 153 | 259 | -26% | 70% |
| Medical and Biomedical | 131 | 134 | 138 | 136 | 143 | 4% | 6% |
| Other | 271 | 275 | 294 | 279 | 301 | 2% | 8% |
| Investment | 340 | -396 | -327 | -313 | 322 | N/A | N/A |
| Change in Bars, Coins | 123 | 201 | 132 | 93 | 125 | -5% | 34% |
| Change in ETF Holdings | 134 | -375 | -278 | -280 | 196 | N/A | N/A |
| Change in Stocks Held by Exchanges | 82 | -221 | -181 | -127 | 2 | N/A | N/A |
| Total Demand | 3,906 | 3,081 | 3,306 | 3,154 | 4,267 | 29% | 35% |
| Balance | 112 | 1,182 | 358 | 442 | -841 | N/A | N/A |

Source: Metals Focus 2019 - 2023.

Notes:

1. † Non-road automotive demand is included in autocatalyst demand.

PLATINUM QUARTERLY Q3 2023

Table 5: Regional demand – annual and quarterly comparison

| | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023e | 2024f | 2023e/2022 | 2024f/2023e | Q3 2022 | Q4 2022 | Q1 2023 | Q2 2023 | Q3 2023 | |
|------------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------------|-------------|----------|---------|---------|---------|---------|--|
| | | | | | | | | | | | | | Growth % | Growth % | | | | | |
| Platinum gross demand (koz) | | | | | | | | | | | | | | | | | | | |
| Automotive | 3,240 | 3,250 | 3,350 | 3,290 | 3,090 | 2,811 | 2,326 | 2,555 | 2,867 | 3,262 | 3,312 | 14% | 2% | 697 | 747 | 834 | 838 | 793 | |
| North America | 465 | 480 | 410 | 390 | 390 | 329 | 282 | 361 | 435 | | | | | | | | | | |
| Western Europe | 1,395 | 1,450 | 1,630 | 1,545 | 1,325 | 1,430 | 1,060 | 962 | 999 | | | | | | | | | | |
| Japan | 585 | 510 | 450 | 435 | 425 | 295 | 232 | 258 | 256 | | | | | | | | | | |
| China | 125 | 145 | 195 | 230 | 220 | 183 | 280 | 378 | 459 | | | | | | | | | | |
| India | 170 | 180 | 170 | 175 | 195 | †† | †† | †† | †† | | | | | | | | | | |
| Rest of the World | 500 | 485 | 495 | 515 | 535 | 576 | 471 | 595 | 717 | | | | | | | | | | |
| Jewellery | 3,000 | 2,840 | 2,505 | 2,460 | 2,245 | 2,106 | 1,830 | 1,953 | 1,899 | 1,852 | 1,903 | -3% | 3% | 480 | 457 | 462 | 480 | 455 | |
| North America | 230 | 250 | 265 | 280 | 280 | 341 | 277 | 409 | 448 | | | | | | | | | | |
| Western Europe | 220 | 235 | 240 | 250 | 255 | 237 | 196 | 260 | 301 | | | | | | | | | | |
| Japan | 335 | 340 | 335 | 340 | 345 | 372 | 316 | 298 | 333 | | | | | | | | | | |
| China | 1,975 | 1,765 | 1,450 | 1,340 | 1,095 | 871 | 832 | 703 | 484 | | | | | | | | | | |
| India | 175 | 180 | 145 | 175 | 195 | 109 | 59 | 123 | 171 | | | | | | | | | | |
| Rest of the World | 65 | 70 | 70 | 75 | 75 | 176 | 151 | 159 | 163 | | | | | | | | | | |
| Chemical | 540 | 515 | 560 | 570 | 565 | 778 | 608 | 668 | 685 | 753 | 585 | 10% | -22% | 110 | 260 | 265 | 229 | 135 | |
| North America | 55 | 55 | 50 | 50 | 50 | 79 | 102 | 110 | 112 | | | | | | | | | | |
| Western Europe | 105 | 75 | 110 | 115 | 105 | 120 | 111 | 118 | 113 | | | | | | | | | | |
| Japan | 10 | 10 | 15 | 15 | 15 | 66 | 62 | 65 | 66 | | | | | | | | | | |
| China | 215 | 230 | 225 | 220 | 215 | 310 | 214 | 222 | 215 | | | | | | | | | | |
| Rest of the World | 155 | 145 | 160 | 170 | 180 | 204 | 118 | 153 | 180 | | | | | | | | | | |
| Petroleum | 60 | 205 | 220 | 100 | 235 | 219 | 109 | 169 | 193 | 170 | 156 | -12% | -8% | 49 | 52 | 44 | 43 | 41 | |
| North America | 25 | -25 | 90 | 55 | 55 | 30 | 5 | 32 | 44 | | | | | | | | | | |
| Western Europe | -20 | 70 | 10 | 5 | 20 | 14 | 11 | 18 | 30 | | | | | | | | | | |
| Japan | -35 | 5 | 0 | -40 | 5 | 7 | 6 | 12 | 7 | | | | | | | | | | |
| China | -5 | 45 | 80 | 45 | 10 | 66 | 35 | 39 | 26 | | | | | | | | | | |
| Rest of the World | 95 | 110 | 40 | 35 | 145 | 103 | 52 | 67 | 86 | | | | | | | | | | |
| Electrical | 215 | 205 | 195 | 210 | 205 | 144 | 130 | 135 | 106 | 92 | 90 | -13% | -3% | 26 | 24 | 23 | 24 | 22 | |
| North America | 15 | 15 | 10 | 15 | 15 | 38 | 35 | 35 | 28 | | | | | | | | | | |
| Western Europe | 10 | 10 | 10 | 10 | 10 | 27 | 23 | 25 | 20 | | | | | | | | | | |
| Japan | 15 | 15 | 15 | 15 | 15 | 20 | 16 | 17 | 14 | | | | | | | | | | |
| China | 70 | 70 | 80 | 90 | 85 | 28 | 31 | 31 | 23 | | | | | | | | | | |
| Rest of the World | 105 | 95 | 80 | 80 | 80 | 31 | 25 | 26 | 22 | | | | | | | | | | |
| Glass | 205 | 235 | 255 | 205 | 250 | 228 | 473 | 753 | 505 | 756 | 623 | 50% | -18% | 151 | 2 | 89 | 170 | 158 | |
| North America | 10 | 0 | 20 | 5 | 5 | -81 | -24 | 17 | 27 | | | | | | | | | | |
| Western Europe | 15 | 10 | 5 | 5 | 35 | 65 | 36 | 6 | 22 | | | | | | | | | | |
| Japan | -25 | -5 | -10 | -10 | 0 | -38 | -63 | 7 | -151 | | | | | | | | | | |
| China | 115 | 130 | 150 | 110 | 80 | 176 | 385 | 758 | 524 | | | | | | | | | | |
| Rest of the World | 90 | 100 | 90 | 95 | 130 | 107 | 139 | -36 | 82 | | | | | | | | | | |
| Medical | 225 | 240 | 235 | 235 | 235 | 277 | 254 | 265 | 273 | 283 | 292 | 4% | 3% | 68 | 68 | 74 | 70 | 70 | |
| Other industrial | 455 | 445 | 490 | 505 | 525 | 585 | 501 | 546 | 573 | 598 | 620 | 4% | 4% | 141 | 138 | 147 | 154 | 148 | |
| Bar & Coin Investment | 50 | 525 | 460 | 215 | 280 | 263 | 571 | 324 | 225 | 305 | 172 | 36% | -44% | 92 | 1 | 99 | 26 | 59 | |
| North America | | | | | | 155 | 234 | 256 | 258 | | | | | | | | | | |
| Western Europe | | | | | | 52 | 75 | 61 | 44 | | | | | | | | | | |
| Japan | | | | | | 46 | 240 | -26 | -114 | | | | | | | | | | |
| Rest of the World | | | | | | 9 | 21 | 33 | 36 | | | | | | | | | | |
| ETF Investment | 215 | -240 | -10 | 105 | -245 | 991 | 507 | -241 | -558 | 50 | -120 | N/A | N/A | -217 | -62 | 40 | 155 | -99 | |
| North America | | | | | | 125 | 524 | -6 | -102 | | | | | | | | | | |
| Western Europe | | | | | | 508 | 237 | 56 | -313 | | | | | | | | | | |
| Japan | | | | | | -13 | 58 | -23 | -28 | | | | | | | | | | |
| Rest of the World | | | | | | 370 | -312 | -268 | -116 | | | | | | | | | | |
| Change in Stocks Held by | | | | | | | | | | | | | | | | | | | |
| Exchanges | -115 | 20 | 85 | -45 | -20 | -20 | 458 | -139 | -307 | 30 | 30 | N/A | 0% | -134 | 7 | 29 | -27 | 28 | |
| Investment | 150 | 305 | 535 | 275 | 15 | 1,233 | 1,536 | -56 | -640 | 385 | 82 | N/A | -79% | -260 | -54 | 168 | 154 | -11 | |
| Total Demand | 8,090 | 8,240 | 8,345 | 7,850 | 7,365 | 8,381 | 7,768 | 6,988 | 6,461 | 8,150 | 7,663 | 26% | -6% | 1,461 | 1,693 | 2,106 | 2,162 | 1,810 | |

Source: Metals Focus 2019 - 2024f, SFA (Oxford) 2013 - 2018.

Notes:

- † Non-road automotive demand is included in autocatalyst demand.
- †† India automotive demand is included in Rest of the World.
- Data from Metals Focus and SFA (Oxford) may not have been prepared on the same or directly comparable basis.
- Prior to 2019 SFA data is independently rounded to the nearest 5 koz.

PLATINUM QUARTERLY Q3 2023

Table 6: Regional recycling – annual and quarterly comparison

| | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023e | Q3'23/Q3'22 Growth % | Q3'23/Q2'23 Growth % | Q3 2022 | Q4 2022 | Q1 2023 | Q2 2023 | Q3 2023 | |
|----------------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------------------------|-------------------------|------------|------------|------------|------------|------------|--|
| Platinum recycling supply (koz) | | | | | | | | | | | | | | | | | | |
| Automotive | 1,255 | 1,185 | 1,210 | 1,325 | 1,420 | 1,567 | 1,509 | 1,589 | 1,255 | 1,048 | -16% | 8% | 310 | 331 | 284 | 244 | 249 | |
| North America | | | | | | 520 | 458 | 504 | 368 | | | | | | | | | |
| Western Europe | | | | | | 785 | 815 | 835 | 662 | | | | | | | | | |
| Japan | | | | | | 116 | 110 | 117 | 110 | | | | | | | | | |
| China | | | | | | 36 | 36 | 41 | 34 | | | | | | | | | |
| Rest of the World | | | | | | 110 | 90 | 92 | 81 | | | | | | | | | |
| Jewellery | 775 | 515 | 625 | 560 | 505 | 476 | 422 | 422 | 372 | 353 | -5% | 3% | 90 | 92 | 95 | 84 | 85 | |
| North America | | | | | | 3 | 3 | 3 | 3 | | | | | | | | | |
| Western Europe | | | | | | 4 | 4 | 3 | 4 | | | | | | | | | |
| Japan | | | | | | 187 | 162 | 160 | 165 | | | | | | | | | |
| China | | | | | | 276 | 248 | 250 | 195 | | | | | | | | | |
| Rest of the World | | | | | | 5 | 5 | 5 | 6 | | | | | | | | | |
| Industrial | 25 | 20 | 25 | 30 | 30 | 69 | 66 | 67 | 68 | 70 | 2% | 4% | 17 | 17 | 17 | 17 | 17 | |
| North America | | | | | | 15 | 12 | 12 | 13 | | | | | | | | | |
| Western Europe | | | | | | 11 | 10 | 11 | 11 | | | | | | | | | |
| Japan | | | | | | 34 | 34 | 34 | 34 | | | | | | | | | |
| China | | | | | | 7 | 7 | 8 | 9 | | | | | | | | | |
| Rest of the World | | | | | | 2 | 2 | 2 | 2 | | | | | | | | | |

Source: Metals Focus 2019 - 2023e, SFA (Oxford) 2014 - 2018.

GLOSSARY OF TERMS

Above ground stocks

The year-end estimate of the cumulative platinum holdings not associated with exchange-traded funds; metal held by exchanges or working inventories of mining producers, refiners, fabricators, or end-users. Typically, unpublished vaulted metal holdings from which a supply-demand shortfall can be readily supplied or to which a supply-demand surplus can readily flow.

ADH

Alkane dehydrogenation: catalytic conversion of alkanes to alkenes. Broad term encompassing BDH and PDH.

BDH

Butane dehydrogenation; catalytic conversion of isobutane to isobutylene.

Bharat

The Government of India introduced Bharat emission standards (BSES) to reduce and regulate the output of air pollutants from internal combustion and spark-ignition engine equipment, including motor vehicles.

Bharat Stage V/VI standards (BS-V, BS-VI)

Early in 2016 the Indian government announced the intention to 'leapfrog' Bharat Stage V and move directly to Bharat Stage VI, equivalent to Euro 6, in 2020. This intention, despite lockdown, has not been altered.

China Vehicle Emission Standards

China's vehicle emission standards are set nationally by the Ministry of Environmental Protection and are regionally and locally enforced by Environmental Protection Bureaus.

A number of cities and provinces in China continue the historic practice of early introduction of new standards.

China 6

As of December 2016, China adopted China 6 standards that apply nationwide to light-duty passenger vehicles from July 2020 (China 6a) and July 2023 (China 6b). These standards incorporate elements of Euro 6 and U.S. Tier 2 regulations for tailpipe and evaporative emissions. China 6b includes mandatory on-road emissions testing modelled after the EU RDE regulation (also known as Euro 6d TEMP) with a few enhancements and modifications. A number of cities and provinces adopted China 6b in July 2019 and many automakers have proceeded to adopt China 6b early for all their production.

China VI

In June 2018, China finalized China VI standards that will apply to new heavy-duty diesel vehicles nationwide in two stages.

The first stage, China VI-a, originally targeted to have become applicable by July 2020 for new models but has been delayed by 6 months to January 2021, and all new HDVs targeted for compliance in July 2021. The second stage, China VI-b will apply to gas engines nationwide starting in January 2021 and all new HDVs in July 2023.

Compounds (Platinum based)

Platinum combines with other elements to form chemical mixtures that are used as catalysts in chemical processes as well as in plating, metal deposition and other industrial processes.

Diesel oxidation catalyst (DOC)

A DOC oxidises harmful carbon monoxide and unburnt hydrocarbons, produced by incomplete combustion of diesel fuel, to non-toxic carbon dioxide and water.

Diesel particulate filter (DPF) and catalysed diesel particulate filter (CDPF)

A DPF physically filters particulates (soot) from diesel exhaust. A CDPF adds a PGM catalyst coating to facilitate oxidation and removal of the soot. The terms are often used interchangeably.

Electrolysis of water

Water electrolyzers are electrochemical devices used to split water molecules into hydrogen and oxygen. An electrical current is applied to the electrolyser cell, and water is split into oxygen and hydrogen. The electrolysis system comprises of the system, the stack, and the cell.

Emissions Legislation

Regulations that necessitate the fitment of autocatalyst systems dealing with the treatment of vehicle tailpipe emissions such as carbon monoxide (CO), particulate matter, hydrocarbons, and oxides of nitrogen (NO_x). There are a range of standards specific to various regions and countries with varying minimum emissions targets and deadlines for compliance.

EPA

Environmental Protection Agency regulating the US vehicle and engine emission standards for pollutants.

ETF

Exchange-traded fund. A security that tracks an index, commodity, or basket of assets. Platinum ETFs included in demand are backed by physical metal (LPPM good delivery bars stored in a secure vault approved by the listing exchange).

Euro V/VI emission standards

EU emission standards for heavy-duty vehicles. Euro V legislation was introduced in 2008-09 and Euro VI in 2013/2014; similar standards have later been adopted in some other countries.

Euro 5/6 emission standards

EU emission standards for light-duty vehicles. Euro 5 legislation was introduced in 2009-11 and Euro 6 in 2014/2015. The limits set in Euro 6 have remained unchanged, but the measuring methods have become more stringent progressively including Euro 6 a, b, c, d, and Euro 6d-Temp, now in place. For CO₂, the laboratory based WLTP and for NO_x RDE.

FCM

Fuel Consumption Monitoring describes the recording of actual consumption during the life of the vehicle. Applicable under Euro 6d to all new vehicles from 1/01/2020 and all new registrations from 1/01/2021.

Forward prices

The price of a commodity at a future point in time. Typically comprises of the spot price as well as the risk-free interest rate and cost of carry.

GTL

Gas-to-liquids is a process that converts natural gas to liquid hydrocarbons such as gasoline or diesel fuel.

HAMR

Heat-Assisted Magnetic Recording. A magnetic recording technology which involves spot-heating the drive platters with laser beam.

HDD

Hard disk drive. Data storage device that stores digital data by magnetic platters.

HDV

Heavy-duty vehicle.

Hydrogen Production Methods

In recent years, colours have been used to refer to different hydrogen production routes. There is no international agreement on the use of these terms as yet, nor have their meanings in this context been clearly defined but the following colour key provides a guideline of most widely used reference to the various production methods

white – naturally occurring or produced as industrial by-product

black or brown – coal gasification

grey – steam methane reforming

turquoise – methane pyrolysis

blue – steam methane reforming plus carbon capture

green – water electrolysis with renewable energy sources

pink – nuclear power

yellow – solar power or mix of multiple sources.

ICE

Internal combustion engine.

IoT

Internet of Things. Networking system that allows data to be sent to and received from objects and devices through internet.

ISC

In Service Conformity which requires vehicles to not only conform with exhaust emission standards when they are new but also while in use.

Jewellery alloys

The purity of platinum jewellery is invariably expressed in parts per 1,000. For example, the most common variant, pt950, is 95% fine platinum, with the rest of the jewellery alloy made up of other metals such as cobalt or copper. Different markets would typically prescribe the purity levels for qualification and hallmarking of the jewellery as platinum jewellery.

Jewellery demand

Captures the first transformation of unwrought platinum into a semi-finished or finished jewellery product.

Koz

Thousand ounces.

LCD

Liquid-crystal display used for video display.

LCV

Light commercial vehicle.

Lean NO_x traps (LNT)

Platinum/rhodium-based, catalyses the chemical reduction of NO_x in diesel engine exhaust to harmless nitrogen.

Lease rates

The lease rate is defined as the rate at which the owner of the commodity lends or sells it and buys it back from the borrower in the market. LPPM.

The London Platinum and Palladium Market (LPPM)

It is a trade association representing the interests of the platinum and palladium market. It provides guidance and benchmarks on the form and governance of platinum and palladium delivered to the market and publishes a list of the companies that comply with the guidelines and purity. This list is known as the Good Delivery List. As at May 2020 the Good Delivery Lists consists of 31 platinum refiners, 28 palladium refiners, 15 full members, 41 associate members, 45 affiliate members and 2 affiliated exchange members.

MAMR

Microwave-Assisted Magnetic Recording. A magnetic recording technology by writing in the drive platters with a microwave field.

Metal-in-concentrate

PGMs contained in the concentrate produced after the crushing, milling and froth flotation processes in the concentrator. It is a measure of a mine's output before the smelting and refining stages.

MLCC

Multi-layer ceramic capacitors. A number of individual thin film capacitors stacked as a whole.

Moz

Million ounces.

NAND flash Memory

NAND flash memory is a type of non-volatile storage technology that does not require power in order to retain data. It uses floating-gate transistors that are connected in a way that the resulting connection resembles a NAND gate, where several transistors are series connected and a bit line is pulled low only when all word lines are at a high state.

NEDC

New European Driving Cycle vehicle emissions test set out in United Nations Vehicle Regulation 101 maintained by the United Nations Economic Commission for Europe and updated and reviewed from time to time. The WLTP is aimed to significantly enhance and replace this regulation.

Net demand

A measure of the requirement for new metal, i.e., net of recycling.

Non-road engines

Non-road engines are diesel engines used, for example, in construction, agricultural and mining equipment, often using engine and emissions technology similar to on-road heavy-duty diesel vehicles.

Ounce conversion

One metric tonne = 1,000 kilogrammes (kg) or 32,151 troy ounces.

oz

A unit of weight commonly used for precious metals. 1 troy oz = 31.103 grams.

PDH

Propane dehydrogenation, where propane is converted to propylene.

PEM Electrolyser Technology

One of four key water electrolyser technologies. The electrode on oxygen side (anode) contains iridium oxide while the electrode on hydrogen side (cathode) typically contains platinum. Transport layers are platinum-coated sintered porous titanium, and the bipolar plates would typically have platinum on with other metals.

PGMs

Platinum group metals.

PMR

Precious metals refinery.

Pricing benchmarks

A price for a commodity that is traded on a liquid market that is used as a reference for buyers and sellers. In the case of platinum, the most commonly referenced benchmark is the LBMA Platinum Price, which is administered and distributed by the London Metals Exchange. The LBMA Platinum Price is discovered through an auction process.

Producer inventory

As used in the supply-demand balance, the change in producer inventory is the difference between reported refined production and metal sales.

PX

Paraxylene is a chemical produced from petroleum naphtha extracted from crude oil using a platinum catalyst. This is used in the production of terephthalic acid which is used to manufacture polyester.

Refined production

Processed platinum output from refineries typically of a minimum 99.95% purity in the form of ingot, sponge, or grain.

RDE

The Real Driving Emissions (RDE) test measures the pollutants such as NO_x, emitted by cars while driven on the road. It is in addition to laboratory tests. RDE testing was implemented in September 2017 for new types of cars and has applied to all registrations from September 2019.

Secondary supply

Covers the recovery of platinum from fabricated products, including unused trade stocks. Excludes scrap generated during manufacturing (known as production or process scrap). Autocatalyst and jewellery recycling are shown in the country where the scrap is generated, which may differ from where it is refined.

Selective catalytic reduction (SCR)

Selective Catalytic Reduction (SCR) is an emissions control technology system that injects a liquid-reductant agent (urea) into the outlet stream of a diesel engine. The automotive-grade urea, known by the trade name AdBlue. The system typically requires a platinum bearing DOC ahead of the SCR unit.

SGE

Shanghai Gold Exchange.

SSD

Solid-state drive. Data storage device that uses memory chips to store data, typically using flash memory.

Stage 4 regulations

Non-road mobile machinery (NRMM) is regulated by increasingly stringent regulations set out in tiers from Stage 1 to 5. This was last reviewed in May 2018 with deadlines set for 2020 and 2021. A submission by industry bodies requesting a delay in implementation as yet to be ruled on.

Three-way catalyst

Used in gasoline cars to remove hydrocarbons, carbon monoxide and NO_x. Largely palladium-based now, they also include some rhodium.

US Vehicle Emission Standards

US vehicle and engine emission standards for pollutants, are established by the US Environmental Protection Agency (EPA) based on the Clean Air Act (CAA). The State of California has the right to introduce its own emission regulations. Engine and vehicle emission regulations are adopted by the California Air Resources Board (CARB), a regulatory body within the California EPA. Vehicles can in every year be certified in different emission classes, called "bins." The fleet average emissions over all "bins" are then regulated and reduced from year to year. To achieve the required fleet average, every year more vehicles have to be registered in the lower bins.

Tier 3

Emission regulation issued by EPA. The regulation defines common targets until 2025 in the USA.

Tier 4 stage

Non-road mobile machinery (NRMM) is regulated by increasingly stringent regulations set out in tiers from Stage 1 to 5. This was last reviewed in May 2018 with deadlines set for 2020 and 2021. A submission by industry bodies requesting a delay in implementation yet to be ruled on.

Washcoat

The layer that contains the active catalytic materials, such as PGMs, that is applied on the inactive, often ceramic, substrate within an autocatalyst block or component.

WIP

Work in progress.

WLTP

Worldwide Harmonised Light Vehicle Test Procedure is a laboratory test to measure pollutant emissions and fuel consumption. WLTP replaces the New European Driving Cycle (NEDC). It became applicable to new car types from September 2017 and new registrations from September 2018.

WPIC

The World Platinum Investment Council.

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