PLATINUM ESSENTIALS

Updating WPIC's two- to five-year supply/demand outlook: Supply side risks raise our conviction on deficits

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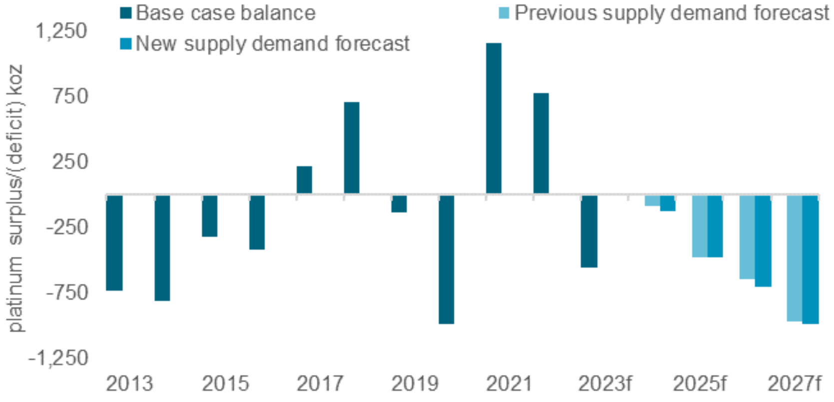
Our most recent Platinum Quarterly presented data for Q4 2022 and an updated outlook for 2023. This report contains revised estimates for platinum supply/demand balances in the years 2024-2027. Total demand is broadly unchanged versus previous estimates, while mine supply forecasts are lower, after including revised guidance. The net result is slightly deeper deficits. With published mine supply guidance updated after the latest financial reporting, we continue to base our supply forecasts on the mid-point of guidance ranges. However, management commentary generally cautioned that supply risks are biased to the downside.

The theme of elevated downside supply risks stems principally from electricity curtailments in South Africa and sanctions in Russia. We are using the mid-point of published company production guidance, which assumes no worsening of the power supply situation in South Africa and gives no consideration of the impact of sanctions on longer-term production stability in Russia. However, the South African miners have cautioned that a worsening of electricity availability from current levels could negatively impact output by between -5% and -15% in 2023 alone. Whilst Nornickel has not provided a definitive indication of the potential impact of sanctions on future output, we believe a similar downside risk of -5% and -15% is appropriate. Including mine supply risks at the midpoint of the downside risk range (-10%), our projected annual deficits would be compounded by about -500 koz.

Notwithstanding the risk of additional supply disruptions, the net impact is for the supply/demand balances to be in a deeper deficit of -129 koz in 2024 increasing considerably in 2025 and continuing to grow towards almost a million ounces by 2027.

*A*ll estimates in this report are based upon publicly available information and WPIC in-house analysis*. Our demand forecasts accommodate a similarly subdued economic outlook as presented in December 2022. *This report complements, but is entirely separate from, the one year forward outlook we publish in our Platinum Quarterly (PQ), which is prepared independently for us by Metals Focus.*

Figure 1. WPIC projects platinum deficits from 2023



Source: SFA (Oxford) from 2013 to 2018, Metals Focus from 2019 to 2023f, Company guidance, WPIC Research from 2024

**WPIC in-house supply research is based solely on published supply data, including forward looking guidance, with any adjustments noted. It does not represent the views of any WPIC members or those of Metals Focus which independently prepare our Platinum Quarterly reports. Demand data is based on public data but includes WPIC in-house analysis.*

Figure 2. Supply/demand summary table

	PUBLISHED PLATINUM QUARTERLY ESTIMATES†				WPIC ESTIMATES‡			
	2020	2021	2022	2023f	2024f	2025f	2026f	2027f
PLATINUM SUPPLY								
Refined mine production					Production at mid-point of aggregate guidance ranges			
- South Africa	3,298	4,678	3,975	3,920	4,698	4,623	4,576	4,541
- Zimbabwe	448	485	480	502	502	603	603	603
- North America	337	273	260	302	311	321	331	336
- Russia	704	652	663	644	624	624	624	624
- Other	202	208	201	205	193	194	196	196
- Producer inventory movement	-84	-93	-35	0	0	0	0	0
Total mining supply	**4,906**	**6,204**	**5,545**	**5,573**	**6,328**	**6,365**	**6,330**	**6,300**
Total recycling	**1,970**	**2,032**	**1,682**	**1,856**	**1,878**	**1,846**	**1,878**	**1,872**
Total supply	**6,876**	**8,235**	**7,227**	**7,428**	**8,205**	**8,211**	**8,208**	**8,172**
PLATINUM DEMAND								
Automotive	**2,403**	**2,647**	**2,957**	**3,246**	**3,615**	**3,780**	**4,024**	**4,187**
Jewellery	**1,830**	**1,953**	**1,894**	**1,936**	**1,905**	**1,905**	**1,920**	**1,935**
Industrial	**2,096**	**2,530**	**2,243**	**2,505**	**2,254**	**2,443**	**2,409**	**2,474**
Total investment	**1,536**	**-53**	**-643**	**298**	**560**	**560**	**560**	**560**
- Bar and coin	571	324	225	450	310	310	310	310
- ETF	507	-238	-560	-132	250	250	250	250
- Stocks held by exchanges	458	-139	-307	-20	0	0	0	0
Total demand	**7,866**	**7,077**	**6,451**	**7,985**	**8,334**	**8,689**	**8,914**	**9,157**
Supply/demand balance	**-990**	**1,158**	**776**	**-556**	**-129**	**-478**	**-706**	**-985**

†The Platinum Quarterly report and data are prepared independently for the WPIC by Metals Focus

‡WPIC estimates and analysis are based upon publically available information

Source: Metals Focus from 2019 to 2023f, Company guidance, WPIC Research from 2024f

Introduction

The WPIC's two to five-year platinum supply and demand projections are intended to complement the estimates and forecasts published in our *Platinum Quarterly*, but they look further into the future and allow for longer-term scenario analysis. The *Platinum Quarterly* report and data are prepared independently for the WPIC by Metals Focus, with Metals Focus's estimates provided on a one year forward basis (i.e. 2023). For the avoidance of doubt, all estimates for 2024 to 2027 included in this report are WPIC forecasts, with the exception of mine supply which is based upon publicly published company guidance. Specifically, WPIC has made no use of any data or views included in Metals Focus's separate five-year forecast available to its customers, that provides an outlook for all PGMs.

WPIC's base case published supply/demand projections for 2024 to 2027 provide the ability to run scenario analysis on different parts of the supply/demand landscape.

The WPIC has not attempted to develop further in-country and in-industry relationships to obtain fresh/incremental data and the information and sources used to develop our supply/demand model are all in the public domain.

Please see the appendix for a complete description of the methodologies we have used to develop each model and section of this report as well as a risk analysis for our forecasts.

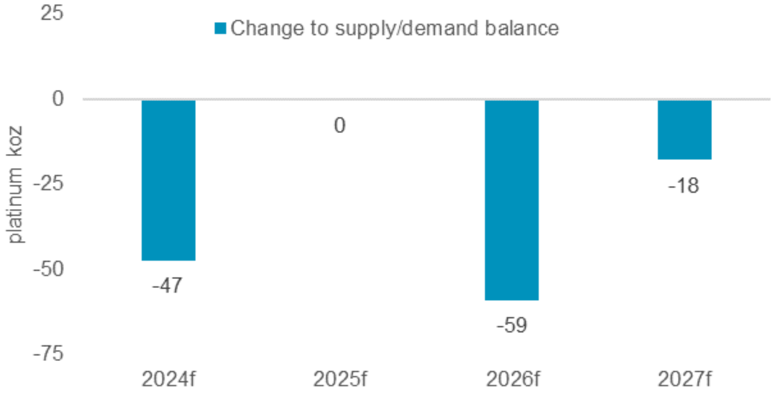
Key projections

Our revised outlook is compared to the supply/demand *Platinum Essentials* published in December 2022. Since then, we have seen the macroeconomic overlay remain volatile for the world as a whole. Europe remains at risk of slowing industrial production, although softening energy prices are easing risks to a degree. China's relaxing of COVID restrictions, has yet to meaningfully stimulate accelerated economic growth as the country unlocks. In the United States, market expectations have continued to vacillate regarding the potential tapering (or not) of rate increases as the Fed fights inflation and a robust labour market, which may not be helped by the sudden collapse of Silicon Valley Bank (SVB). We have accommodated the additional economic considerations in our revised two-to-five-year outlook.

Our key projections for the period 2024-2027 are as follows:

- **Total mining supply** is marginally lower (-0.8% on average), with reduced guidance from Russia as Nornickel cites prospective challenges from sanctions. The mine supply outlook remains at the mid-point of published company guidance.
- **Recycling supply** is increased by an average of 1.2% (22 koz) on an increase in scrap autocatalyst recovery rates.
- **Automotive demand** for platinum is down by an average of 0.6% within the forecast period (21 koz), attributable to production mix revisions in the United States and loadings revisions within Chinese HD markets.
- **Jewellery demand** is up by an average of 3.7% (68 koz) primarily due to robust demand from the United States requiring upward revisions.
- **Industrial demand** for platinum is down by 1.8% (44 koz) on a slight decrease to capacity addition expectations.
- **Investment demand** for platinum is unchanged since our previous outlook.

Figure 3. Near-term reductions in platinum supply forecasts coupled with a stable demand outlook result in deeper platinum supply deficits between 2024 to 2027 vs. previous published estimates



Source: WPIC Research

Conclusion – Year-on-year deficits

As shown below, although the deficits have deepened from our previous estimates, in the greater scheme of the scale of the deficits, the net impact of the changes to our forecasts are minimal for 2024-2027. We continue to project a 2027 deficit approaching 1 Moz.

With the deficits being broadly unchanged two quarters in succession, and after all of the year-end corporate updates, our confidence in the outlook of consistent and deepening deficits is reinforced.

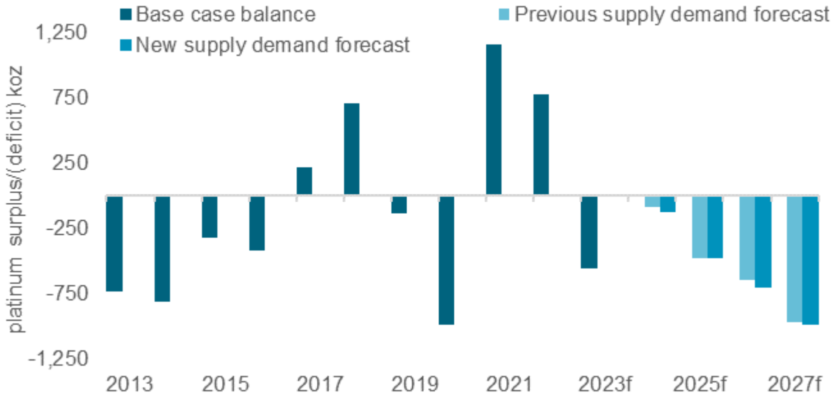
Risks biased to the downside

Whilst we are confident in the outlook for sustained deficits, there is the potential that the deficits could be deeper than projected. We are continuing to use the mid-point of aggregated published mining company production guidance, which results in a >700 koz bump in mine supply from 2023 (estimated by Metals Focus) and 2024 (mid-point of aggregate published company guidance). We note that this 14% year-on-year increase in mine supply comes despite the threats of power shortages in South Africa and the impact of sanctions on production from Russia.

Quantifying the risks of worsening power shortages and sanctions on Russian output: The South African miners have cautioned that a worsening of power availability from current levels could negatively impact output by between 5% to 15% in 2023 alone. Equally, whilst Nornickel has provided no definitive indication of the potential impact of sanctions on future output, a 5-15% downside risk feels intuitively about right.

Factoring in the mine supply risks at the midpoint of the range (10% downside), the projected deficits would be about 500 koz p.a greater than presented.

Figure 4. The platinum deficit is expected narrow in 2024 on increasing supply before returning to deeper and increasing deficits from 2025 and beyond



Source: SFA (Oxford) from 2013 to 2018, Metals Focus from 2019 to 2023, Company guidance, WPIC Research from 2024-2027

Platinum demand outlook relatively resilient in the near-term despite a soft economic outlook

Significant macro uncertainties remain.

With persistent geopolitical tensions and macroeconomic uncertainties, the global economic outlook has continued to be depressed. In terms of the outlook period, current projections are for 2023 to be the year that is most significantly challenged economically, with the outlook improving in 2024, although still remaining subdued.

The platinum outlook for 2023, as published in the last *Platinum Quarterly*, incorporates recessionary risks, whilst the demand outlook for 2024 and beyond presented in this report, include the economic overlay in the table below. Note that we expect deteriorating real consumer purchasing power as determined by taking consensus GDP less consensus CPI estimates.

Figure 5. Estimated changes to real consumer purchasing power versus the end of 2021

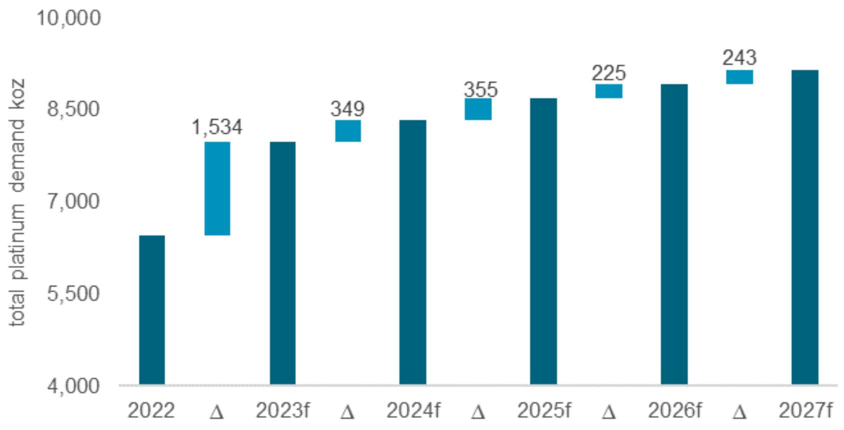
	2023	2024
North America	-3.4%	-1.4%
Western Europe	-5.4%	-1.2%
Japan	-0.9%	-0.1%
China	3.0%	2.7%
Rest of the World	-2.9%	-0.7%

Source: Bloomberg, WPIC Research

Platinum demand is expected to be resilient against an uncertain economic backdrop.

We note that platinum demand growth is the primary driver which transitions supply demand balances from a surplus in 2022 to sustained deficits from 2023 and beyond. Whilst the economic outlook appears somewhat shaky, the platinum market is, perhaps, surprisingly well insulated from the challenges ahead, at least in the near term. Accordingly, significant downside risks to demand appear relatively unlikely. Moreover, as we discuss from page 7, supply side risks (to the downside) appear more acute, which could in turn exacerbate already deepening supply deficits. The main driver of demand growth is increasing substitution of platinum for palladium in gasoline vehicles, as well as the growth of the hydrogen economy and improving investment demand. In aggregate, these offset weaker outlooks for industrial and jewellery demand.

Figure 6. Platinum demand is forecast to increase through the 2024-2027 period, underpinned by increasing automotive demand



Source: Metals Focus 2022-2023f, WPIC Research 2024-2027

Automotive demand

Starting with automotive demand, an erosion of spending power will impact the ability for some consumers to purchase new vehicles. However, we estimate that recessionary levels of consumer demand are, at worst, in line with the production levels that the automakers are expecting to be able to deliver. Additionally, after three years of significant automotive production shortfalls, we believe that there remains an element of pent-up demand for replacement vehicles, partially offset by the lower mileages driven during COVID allowing for some vehicles to be run for longer.

Recessionary levels of automotive demand are above automakers currently constrained supply capabilities.

We expect these challenges to have largely washed through by 2024 with production of light vehicles to grow by 3% to 89M units. However, ongoing growth in substitution and higher loadings on heavy duty vehicles (principally in China) result in automotive demand for platinum growing by 11% year-on-year to 3,615 koz. This growth continues through the period to 2027, albeit at a slower rate, result in automotive demand peaking in 2027 at 4,187 koz (including demand for FCEVs).

Industrial demand

Industrial demand is relatively well protected from near term recessionary headwinds. Industrial demand for platinum is influenced more by multi-year capacity addition decisions rather than short-term demand fluctuations. With capacity additions for 2023 mostly committed to financially and in terms of construction progress, downside risks are biased towards 2024 and beyond should capacity additions be deferred on the grounds of uncertain economics and end-product demand.

Reflecting the economic overlay, as well as an approximation of the impact of the timing of capacity additions, industrial demand in 2024 is expected to decline by 10% year-on-year to 2,254 koz. It is then expected to grow modestly to average 2,443 koz over the rest of the period.

Jewellery demand

Jewellery demand is the demand segment that is most at risk, as a worsening of consumer purchasing power beyond current forecasts would almost certainly flow through to reduced jewellery purchasing. Notwithstanding heightened demand risks, platinum jewellery demand has been upgraded by 3.7% on average between 2024 to 2027 since our last report. Demand from North America has steadily increased over the past decade from 200 koz in 2013 to 445 koz in 2022 (Fig. 7), which supports an upward revision in the medium-term demand outlook. This compensates, in part, for the continued erosion of jewellery demand in China.

North American platinum jewellery demand has increased by 9% CAGR between 2013 to 2022

On average, we expect the continued strength in demand from the rest of the world to offset ongoing declines in China, resulting in jewellery demand remaining broadly flat at a little over 1,900 koz, versus the 1,936 koz forecast for 2023.

Figure 7. North American platinum jewellery demand has trended higher over the past decade

Source: SFA (Oxford 2013-2018), Metals Focus 2019-2023f, WPIC Research 2024-2027

Investment demand

Investment demand is another area of uncertainty. Whilst bar and coin demand tends to be resilient, or even grows, during recessions or periods of heightened uncertainty (e.g. during COVID's peak years), the outlook for ETF investments and exchange stocks are harder to call. Recent ETF disinvestment has been a function of macro asset allocation in a rising interest environment, assisted by asset class agnostic investors rotating into the futures or forward markets, which have been in backwardation. Exchange stock outflows have been the result of high lease rates encouraging holders to move stocks off-exchange to lease out. With the pace of rate increases expected to slow, lease rates normalising and backwardation easing, we expect both exchange stock outflows and ETF disinvestment to slow and then cease. Notably exchange stocks are already back at pre-COVID normalised levels.

Furthermore, with the market expected to enter a period of sustained deficits, it seems likely that investor interest in exposure to this outlook through the ETFs is only likely to increase.

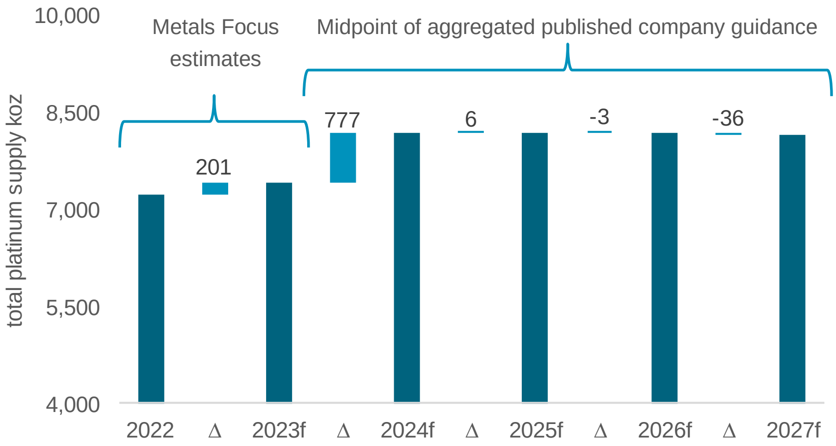
We continue to use long-run average demand flows as the basis for our two-to-five-year supply/demand outlook. This results in a flat investment demand outlook of 560 koz p.a.

Mining – risks biased to the downside

Mining supply represents a significant risk to the outlook. Inflationary and recessionary risks may weigh on investment decisions for large capital projects; for platinum, these are mostly replacement. For new projects rising interest rates also compress expected returns unless there is a corresponding increase in commodity prices, which have not yet manifested. Accordingly, meaningful upward supply revisions are unlikely between 2024 to 2027. Using the mid-point of published guidance suggests that primary supply plateaus from 2024f. However, recent trends suggest downside risks are more prevalent to platinum supply.

Primary platinum supply could stagnate beyond 2024.

Figure 8. Without incremental investments, current project growth is offset by aging assets leading to a plateauing of platinum supply from 2024

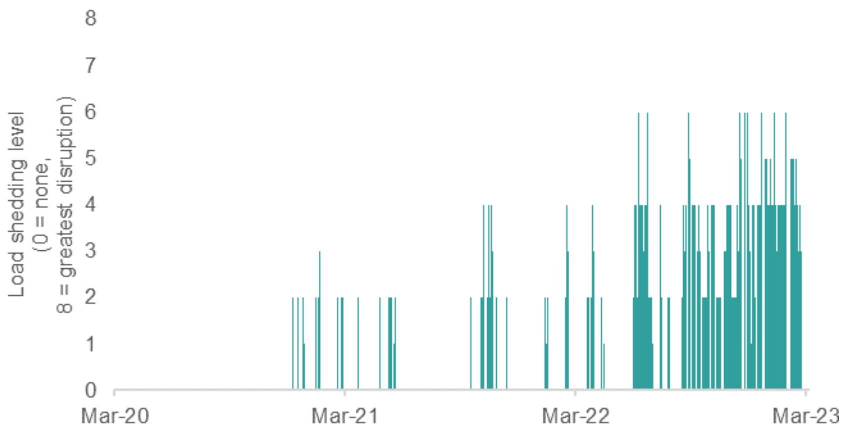


Source: Metals Focus 2021-2023f, Published company guidance, WPIC Research 2024-2027

Risks to mine production

Significant headwinds impeded supply plans for 2022. An unplanned extension to smelter maintenance weighed on domestic output in South Africa, while more broadly, ESKOM, the South African state energy supplier has been struggling with a number of well publicised problems. As discussed in a *recent note*, ESKOM's operational challenges have resulted in rolling load shedding (blackouts) around the country, with a particular impact on the optimal running of smelters. South Africa's platinum production in 2022 was 511 koz or 10% below production expectations at the start of the year.

Figure 9. The increasing frequency and severity of load shedding increases downside risks to primary platinum supply from South Africa



Source: EskomSePush, WPIC Research

ESKOM represents an ongoing risk to South African PGM supply.

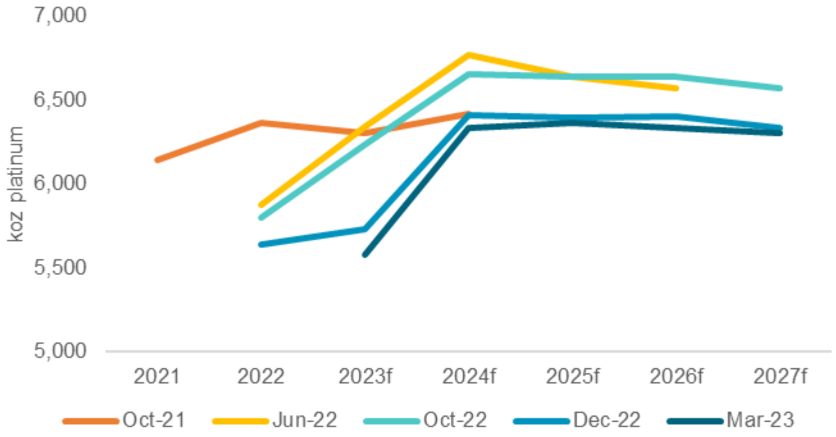
Nornickel has flagged an impact from sanctions underpinning risks to Russian production.

Production from Russia was pretty consistent in 2022 despite the onset of the Ukraine war. However, Nornickel has warned that sanctions are impacting its ability to procure mining equipment and spares, which may be a problem in terms of sustaining production in the medium to longer term. Nornickel is also undertaking a smelter rebuild in 2023, which it would normally have contracted out to the OEM but is now undertaking itself, something that presents a risk to completing and recommissioning without encountering any serious challenges. The mid-point of Nornickel's platinum production guidance for 2023 is 624 koz which is a 4.1% implied reduction in output relative 2022.

Forward looking production guidance does not factor in a deterioration of load shedding of the impact of sanctions on the mine operating environment in Russia.

Although operating challenges became more stark during 2022, Nornickel and the South African producers have not meaningfully changed medium to longer term guidance over the past three months, rather opting to speak to downside risks to their base case production assumptions.

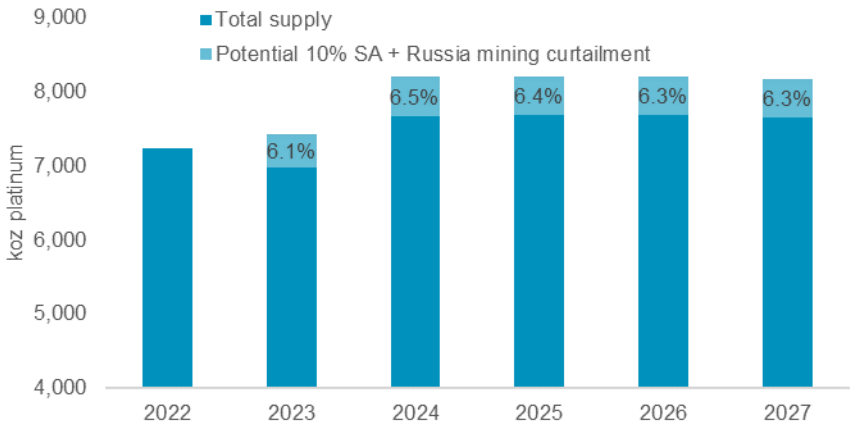
Figure 10. The mid-point of mine supply guidance has been trimmed over time, albeit less materially over the past three months – Note that each date represents when forward looking guidance was aggregated



Source: Published company guidance, WPIC Research

South African producer commentary from recent financial reporting suggests a worsening of loadshedding would incrementally negatively impact production for which the impacts of which are not factored into medium-term guidance forecasts. Management commentary indicates production downside risks from worsening loadshedding could curtail between 5% to 15% of South Africa's refined platinum output in 2023 alone. Using a mid-point 10% reduction to South African refined supply equates to a 5.6% average reduction in total platinum supply between 2024 to 2027. This could continue the recent downward trend in company guidance over the past 18-months.

Figure 11. Worsening South African loadshedding could curtail an incremental 5% to 15% of domestic refined production. Adding in 10% downside in Russia would reduce total supply by >500 koz.



Source: Metals Focus 2022-2023f, Published company guidance, WPIC Research

Whilst Nornickel has provided no definitive indication of the potential impact of sanctions on future output, a 5-15% downside risk feels intuitively about right (similar to for the South African producers).

Including the downside risks to supply would increase the deficits by over 500 koz p.a.

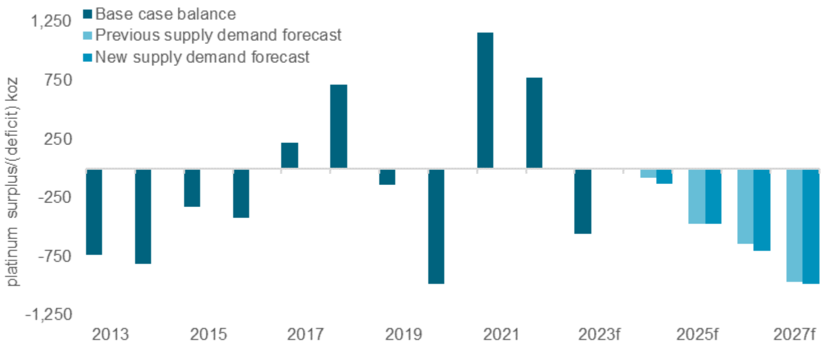
Aggregating the mid-point (10%) downside risks to production from South Africa and Russia would result in the projected deficits being about 500 koz p.a greater than presented.

Notwithstanding downside risks, we deliberately do not take a view on production levels, and so stick to the mid-point of published company guidance, particularly with updates provided alongside recent financial reporting. However, if guidance is stale relative to current events we may move to the upper or lower end of guidance ranges as appropriate, and collectively across all producers. Nornickel has pulled medium- and longer-term guidance, and we have rolled 2023 production guidance forward to 2024 and beyond.

Supply/demand balances for 2024-2027

As the production outlook is broadly unchanged versus our last two- to five-year supply/demand outlook, the supply/demand balances are more or less unchanged. As noted, platinum supply deficits are expected to get progressively deeper between 2024 to 2027.

Figure 12. Supply/demand balances at the mid and lower points of aggregate guidance.



Source: Metals Focus 2019-2023f, SFA Oxford 2013-2018, Published company guidance, WPIC Research

WPIC aims to increase investment in platinum

World Platinum Investment Council (WPIC) was established by the leading South African PGM miners in 2014 to increase investment ownership in platinum. This is done through both actionable insights and targeted development. We provide investors with the information to support informed decisions e.g. the *Platinum Quarterly* and monthly *Platinum Perspectives* and *Platinum Essentials*. We also analyse the platinum investment value chain by investor, product, channel and geography and work with partners to enhance market efficiency and increase the range of cost-effective products available to investors of all types.

Appendix I – Risks to forecasts

- Small changes can have significant impacts on supply/demand balances. For example a 5% change in total mine supply moves the supply/demand balance by an average of 316 koz p.a. over the years 2024-2027.
- The most significant risks to our outlook derive from macroeconomic factors which would similarly impact the demand for all commodities. Principally the risks that the combination of slowing economic growth and inflation bring to bear on consumer demand for goods that either contain platinum or for which the manufacturing process uses platinum.
- We think automotive production levels remains constrained below the level of consumer recessionary demand, but a worsening of the outlook could prove our estimates to be optimistic. Potentially balancing this risk, we have taken a conservative view on the levels of platinum for palladium substitution in gasoline vehicles.
- The impact of a recessionary environment on industrial and jewellery demand could be more severe than we have allowed for.
- Investment demand is potentially where the greatest risks lie. We are most confident in our projections for bar and coin demand and exchange stocks, but the risk of a continuation of the momentum behind ETF disinvestment is potentially significant. However, a clear shift in supply/demand balances into deficits should act to discourage further selling.

Appendix II – WPIC outlook methodologies

Preamble

The WPIC's platinum supply and demand model is intended to complement the one year out forecast published in our *Platinum Quarterly*, but to look further into the future to provide the basis for longer-term scenario analysis of particular aspects of supply and demand. The *Platinum Quarterly* report and data are prepared independently for the WPIC by Metals Focus.

The WPIC has not attempted to develop in-country and in-industry relationships to obtain data and the information and sources used to develop the underpinnings of WPIC's supply/demand model are all in the public domain.

Despite us having granular views of each demand segment, we have chosen, to use a simplified and conservative approach to forecasting. This provides us with our best current base case to allow scenario analysis while we increase modelling detail and publish more granular results in future reports.

Different methodologies in different segments

The WPIC's platinum supply/demand methodology is built up as follows for the years 2024-2027:

Refined mining supply: The WPIC was established by several PGM mining companies, and consequently we do not attempt to forecast future mined supply of platinum. To be able to present a supply/demand forecast to assist investors in making more informed investment decisions our refined mining supply outlook is strictly based on each company's public guidance for future production. This applies for WPIC members and non-members alike.

The production outlook for 2022 was characterised by continual downgrades to the annual production guidance as producers were caught off-guard by production challenges over and above the levels anticipated when setting guidance at the beginning of the year. Specific to South Africa, these were accentuated by power shortages related to ESKOM's well publicised difficulties, whereas in Russia, Nornickel cautioned that sanctions were restricting its access to mining equipment spares and reagents. Companies typically only change longer-term guidance once a year, usually around year end, so although a number of guidance adjustments were made for 2022 the longer-term guidance ranges were not revised until annual investor updates (mainly in the first two weeks of December), which resulted in us using the bottom end of guidance ranges for the first two two-five-year outlooks. Now that longer term guidance ranges have now been updated, for the most part, we have moved to using the mid-point of production guidance ranges, which feed into our overall supply/demand forecasts.

The guidance published by the PGM mining companies is typically provided for the combination of PGMs contained in the ore bodies mined by the respective companies, and expressed on a six-, four-, or two-element basis (6E, 4E or 2E respectively) including either: platinum, palladium, rhodium, ruthenium, iridium and gold; platinum, palladium, rhodium and gold; or platinum and palladium. Where guidance excludes specific reference to platinum, we have calculated refined platinum guidance by using the historical production ratios of these metals as published by the specific company. Where individual PGM mining companies do not provide refined mine supply guidance or where such guidance does not cover the period to 2026, we forecast that platinum mining supply remains at the level of the final year for which guidance, or production, is available. We have remained impartial to: the extent of mineral reserves and resources, the ability to extend mine lives, any potential smelter, precious or base metal refinery capacity constraints, the technical hurdles or timelines to complete capital projects, and the impact a change in PGM prices might have on mined supply.

Recycling supply: Automotive recycling can be determined by purchasing consecutive annual global vehicle registration data and determining detailed regional scrappage rates to apply to average vehicle platinum loadings, when manufactured, per region. We have not attempted to fund this high-cost exercise and have used a simplified approach using the published average vehicle life across all regions and determining the portion of annual platinum demand in the year of manufacture that reflects as recycled supply at the end of that average life. We use the average of this ratio over the past 20 years to calculate our forecast. Jewellery and industrial recycling rates are projections based upon historical ten-year trends.

Automotive demand: Automotive demand projections are a function of the WPIC's drivetrain outlook in combination with estimated autocatalyst platinum loadings and engine sizes for different vehicle categories in different geographies. Automotive production and the drivetrain estimates are based upon historical production numbers and trends as well as announced future regulations and WPIC's view of the pace of electrification and the phasing out of internal combustion engines. Future platinum loadings in autocatalysts are based upon historical loadings that are available in the public domain or can be calculated from published data, adjusted for WPIC's estimates of the impact of regulatory changes in different geographies, such as tightening emissions standards, as well as the rate of substitution of platinum for palladium in gasoline engines. FCEV demand for platinum has been added to the automotive demand outlook as a separate demand component.

Jewellery demand: The outlook for jewellery is predicated on recent historical trends by geography, projected into the future, with some allowance for a slowing of the trend away from platinum jewellery in China, and a return to modest growth in India.

Industrial demand: Industrial demand projections are based upon historical trends within each sub-category. This results in relatively steady trend projections, whereas in practice industrial demand is more volatile, depending upon the timing of capacity additions. Nonetheless, while industrial demand can be volatile, the multi-year trends have been very consistent and do provide a good guide to the future, added to which, in practice the annual volatility seen within each industrial sub-category tends to even each other out when totalled up. Platinum industrial demand is the demand segment most closely correlated to global economic growth over the long term. Despite the compound annual growth of platinum industrial demand over the past 30 years significantly exceeding global growth, our forecast, based on more recent historical trends, is closer to forecast global growth. Projected stationary fuel cell and electrolyser demand have been included in the other industrial category.

Investment demand: While we have granular insight into investment demand due to the views of our many product partners around the world and our regular interaction with investors, we have chosen to use a ten-year historic average of investment demand as the basis for our forecasts. This is to reduce the dramatic positive impact of extremely strong global ETF demand in 2019 and 2020 and similarly strong bar and coin demand in 2020 and 2021. Furthermore, we have not included the likely impact on investment demand of any material changes in price. For example, if the market is seen with successive, and increasing deficits as we are projecting, then it is likely that investors might expect the platinum price to move higher to reflect the shortage of metal available to the market and consequently increase their exposure by purchasing platinum metal or ETFs. This would in turn accentuate future deficits. We do not attempt to capture this iterative process and rather choose to maintain future investment demand at a level based on a ten-year historic average. Consequently, we include bar and coin investment demand of 310 koz p.a., and ETF demand of 250 koz p.a. We have assumed a net change in stocks held by exchanges of zero each year over the forecast period as those flows are typically short-term in nature to address atypical developments in the physical market and furthermore, primarily reflect the movement of metal between visible and non-visible inventories.

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