

FOREWORD

This edition of *Platinum Quarterly* presents platinum supply and demand developments for the second quarter of 2021 and gives an updated forecast for 2021. It also provides the WPIC's views on issues and trends relevant to 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 the WPIC by Metals Focus.

Platinum demand in the second quarter of 2021 continued the very positive year-on-year growth trends of the preceding two quarters, rising by 23%. The pace of economic recovery during the second quarter accelerated in comparison to the first quarter, as largely successful vaccination programs and widespread fiscal support increased economic activity. Automotive, industrial and jewellery platinum demand were up significantly year-on-year but weaker than in the first quarter while investment demand was well below the record level in Q2 2020. Mining supply benefitted from strong operational improvement compared to the severe COVID-19 restrictions in 2020 as well as the faster than anticipated processing of material built up during processing outages in 2020, helping to lift total supply by 55% year-on-year. This moved the market to a surplus of 161 koz, after four consecutive quarterly deficits.

Platinum supply and demand – updating 2021 forecasts

For 2021 total platinum supply is now forecast to rise 17% year-on-year to 7,943 koz, but still remain below pre-pandemic 2019 levels. Total platinum demand is now expected to rise by 1% year-on-year to 7,753 koz. As a result, the platinum market is forecast to be in a modest surplus in 2021 of 190 koz from our previous projection of a -158 koz deficit.

Total platinum supply in 2021 reflects an expected 21% (+1,058 koz) recovery in refined production and a 2% (+31 koz) increase in recycling supply.

Total platinum demand in 2021 is expected to be 1% (+59 koz) up on 2020 levels, as higher demand in the automotive (+529 koz), jewellery (+69 koz), and industrial (+493 koz) segments exceeds much lower investment demand (-1,033 koz).

Q2 2021 surplus of 161 koz on strong mining recovery from the COVID pandemic and faster ACP backlog processing

Supply in the second quarter of 2021 was 65% higher than in the second quarter of 2020. This recovery was primarily due to South African mines being able to operate at 97% of planned capacity, as operating protocols prevented widespread COVID-related disruption, but with quarterly output boosted as the Anglo American Platinum converter plant (ACP) ran at a higher rate than previously expected, processing more of the semi-finished material built up during the ACP outages in 2020. Producers also supplemented sales by reducing refined working inventory by 34 koz to meet strong demand for their platinum.

Russian production was 22% lower year-on-year due to mine flooding and concentrator repairs, while North American output was 13% lower as a result of a strike and safety related stoppages. Second quarter recycling supply was 30% higher year-on-year, driven largely by strong recovery in autocatalyst recycling from the COVID-affected logistical constraints in 2020.

Demand in the second quarter rose 23% (+352 koz) year-on-year to 1,907 koz on a continued recovery in demand across key end-use sectors. Automotive demand, up 75%, industrial demand, up 46%, and jewellery demand, up 19%, benefitted from the continued easing of COVID-related lockdown measures in most regions, enabled by the acceleration of mass vaccination programs, combined with continued government stimulus packages. Platinum automotive demand would have been some 50 koz higher if semiconductor shortages had not limited vehicle production in the second quarter. Investment demand was down 50% to 191 koz. Bar and coin demand remained high compared to historical levels, while ETF demand softened and the unprecedented increase in exchange stocks in 2020 was not repeated.

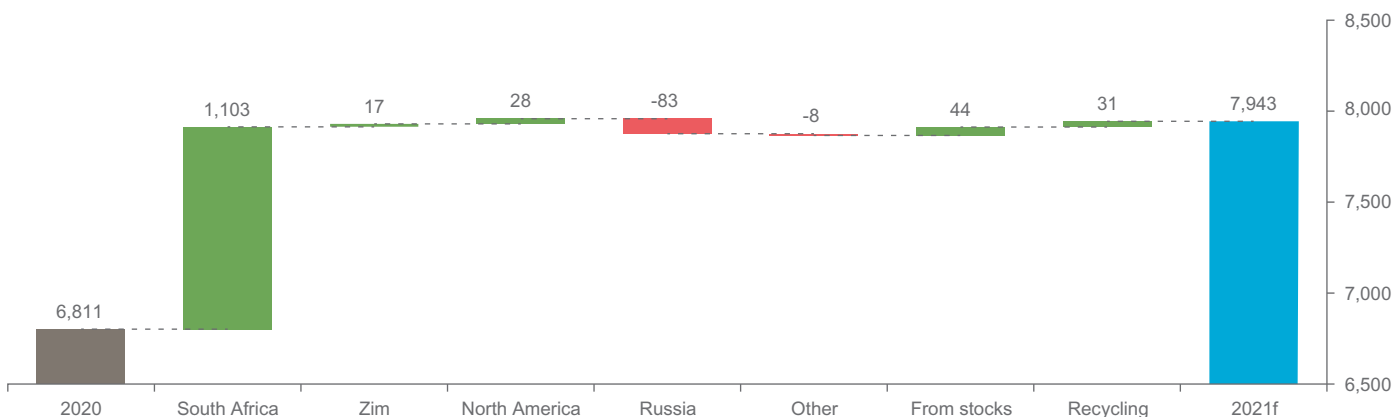
2021 Supply – higher mine supply on COVID-related recovery and outperformance of ACP

For 2021, total platinum supply is now forecast to rise by 17% year-on-year to 7,943 koz following the significant reductions experienced during 2020, with refined production rising by 21% to 6,047 koz and recycling supply by 2% to 1,936 koz.

Since the recommissioning of the Anglo Platinum ACP Phase A unit in December 2020, the plant has operated above expectations, enabling more semi-finished material that built up during the ACP outages in 2020 to be processed this year. This higher ACP operating rate, combined with South African miners' ongoing success in avoiding further operational challenges from COVID infections, is driving the increase in mine supply in 2021. In contrast, Russian supply is expected to fall by 12% (-83 koz) due

to delays in fully recommissioning operations following February’s concentrator shutdown and the impact of mine flooding and resulting remediation work. Recycling supply is expected to show limited growth during 2021, with volumes forecast to rise by only 2% (+31 koz) versus 2020 levels, muted due to limited processing capacity and the year-to-date adverse platinum price movement.

Annual total supply and changes 2020 to 2021f (koz)



2021 Demand – strong automotive and industrial demand plus jewellery recovery counters lower investment demand

Demand in 2021 is now forecast to grow by a modest 1% (+59 koz), as notably strong growth from automotive and industrial end-use sectors and the recovery in jewellery offsets lower investor demand.

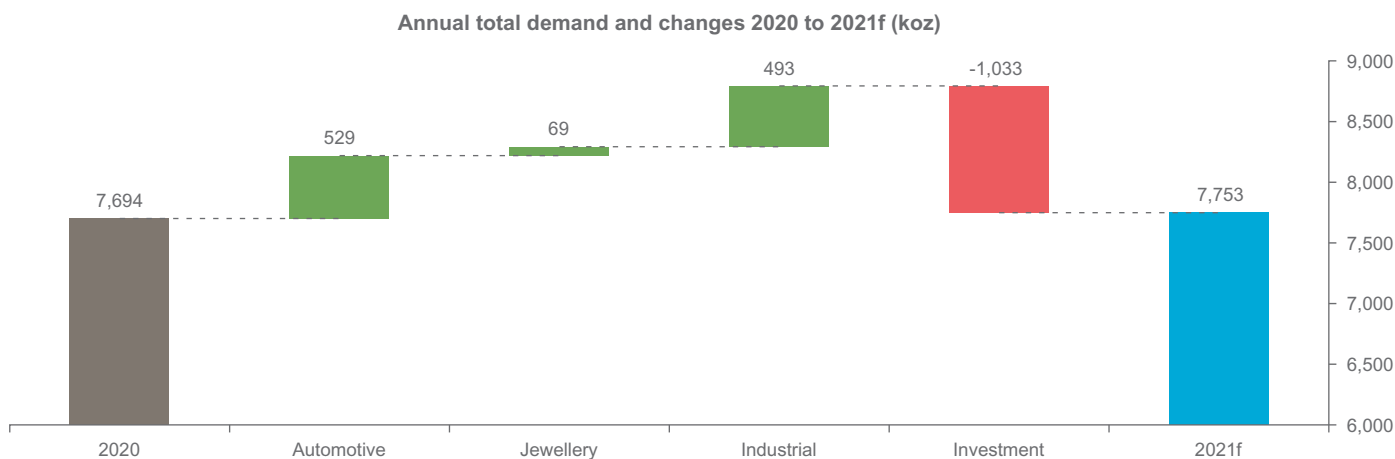
Automotive demand in 2021 is expected to recover by 22% (+529 koz) above the 2020 levels, and importantly also 2% (+58 koz) above 2019 levels, despite concerns over the ongoing impact of the global microchip shortages on vehicle production. Key to this growth is the impact on both light-duty and heavy-duty vehicle platinum loadings of tighter emissions standards applicable in a number of major auto markets this year. In addition, platinum demand is being boosted by platinum for palladium substitution in major European, North American and Chinese markets.

Platinum demand in industrial applications is expected to increase 25% (+493 koz) above 2020 levels, as the impact of continued economic recovery and planned manufacturing capacity expansions boost demand to record high levels. Glass demand is expected to increase by 69% (+268 koz) driven by capacity additions in China’s LCD substrate and glass fibre sector, the latter to meet the country’s burgeoning composites demand. In the chemical and petroleum sectors, capacity additions are also expected to significantly boost platinum demand this year, growing by 14% (+80 koz) and 65% (+71 koz) respectively.

In 2021, platinum jewellery demand is expected to grow by 4% (+69 koz) over 2020 levels. Sustained strong year-on-year growth in North America is expected to take the region’s demand to record levels while growth in Europe and India is expected to more than counter further softening of demand in China.

Compared to record high annual volumes in 2020, investment demand is expected to reduce significantly, at 521 koz versus 1,554 koz. This is primarily on lower ETF demand in South Africa due to rotation from ETFs to platinum mining equities offering healthy dividend yields and that the unprecedented increase in exchange stocks in 2020 was not repeated.

The platinum market surplus in 2021, after two consecutive deficits and despite very strong automotive and industrial demand growth, is mainly due to lower forecast investment demand, and stronger than previously projected supply growth. The latter is being driven by a faster rate of processing of the platinum contained in semi-processed material built up during process outages in 2020.



The platinum investment case – post Q2 platinum price weakness, transitory mine supply surge, global semiconductor shortage and no official substitution data, weakens short-term investment demand outlook

Platinum prices were well supported through much of the second quarter, averaging \$1,183/oz, up 49% year-on-year, and the highest quarterly average since Q1 2015, benefitting from a notably strong recovery in automotive and industrial demand during the first half of the year. However, since the end of Q2 2021 the platinum price has weakened, trading below \$975/oz on negative investor sentiment towards industrial metals. This was driven by concerns of slower global growth during the second half of the year than previously anticipated, in part due to increased COVID delta variant infections globally, and expectations of a ‘sooner rather than later’ move by the US Federal Reserve to taper asset purchases. For platinum, this macro-driven negative sentiment has been exacerbated by platinum miners’ mid-year results indicating a surge in platinum production during the second quarter, plus news flow regarding the global semiconductor chip shortage constraining the recovery in automotive production. Indeed, this negative sentiment is illustrated by moves in NYMEX net money manager positioning, which by mid-August was at its shortest level since July 2019 of over -440 koz. The platinum market surplus in Q2 2021 of +161 koz and the forecast surplus for 2021 of +190 koz may well contribute further to the negative sentiment of some investors.

However, current platinum supply/demand balances and news flow supportive of negative price sentiment may not fully reflect several key dynamics at play during 2021. These include: 1) the transitory nature of higher mine supply in 2021 and 2022; 2) platinum automotive demand growth despite chip shortages; 3) significantly higher platinum and lower palladium imports into China – both still unexplained; and 4) platinum being far less available than widely thought.

1. The pick-up in mine supply this year is partly due to operating largely without the COVID-related mining shutdowns or ACP converter plant outages suffered in 2020. Output from mining in 2021 should all be processed into refined metal and be available for sale but with additional refined production arising from processing of the built-up (post-smelter, pre-ACP) material accumulated in 2020. Of the c.500 koz of platinum contained in this material, we originally expected 200 koz would be processed in 2020 and 300 koz in 2022. Increased processing in H1 2021 has revised our expectations to 300 koz being added to mine output in 2021 and 200 koz added in 2022. What is not immediately apparent is that supply growth in 2021, contributing to both the Q2 surplus and the annual surplus, is transitory in nature and falls away at the end of 2022. It also highlights that output from mining operations in 2021 is below the level of output in 2019 and 2018 and at the level expected to be in place at the end of 2022.
2. Automotive demand surged in the first half of the year by 36% year-on-year, as production and sales rebounded from the COVID impacted lows in the first half of 2020. Indeed, despite the constraining impact of the global semiconductor-chip shortage on the rate of recovery in auto manufacturing, auto sector platinum demand is expected recover to above pre-pandemic levels this year, with H2 2021 levels now expected to be the highest second half result since 2017. Rather than vehicle production volume growth alone, it is the impact of higher platinum loadings to meet tighter emissions legislation together with platinum for palladium substitution in key European, North American and Chinese markets that is expected to elevate automotive platinum demand above 2019 volumes. Indeed, the mid-year application of China VI regulations for all heavy-duty vehicles, following from the early 2021 introduction of China 6a measures for light vehicles and Euro 6d/temp measures in the EU, plus the continued phased implementation of Tier 3 regulations in the US, will drive automotive platinum growth in 2021 and beyond.

3. The unanticipated surge in Chinese platinum imports in 2021 is not yet fully accounted for in demand forecasts. Over the first seven months of the year, China imported a record 1.92 moz of platinum, with the monthly rate rising as H1 2021 progressed. Imports in Q2 2021 are the highest quarterly volume on record, driven, we believe, by surging industrial and automotive demand. While details of platinum substitution for palladium in autocatalysts remains unpublished, it is noteworthy that over the same period China's palladium imports have softened considerably, down by 46% compared to 2020. These opposing trends do not, in isolation, provide evidence of substitution in China, but they do not contradict a situation where the speed and volume of palladium being replaced by platinum is far greater than current forecasts suggest.
4. The weak platinum price trends since the end of the second quarter, appear contrary to a lack of availability of platinum as suggested by the spike and sustained elevation in platinum lease rates. The platinum lease rate, the annual cost of borrowing metal from the market and based on a 1-month lease, rose to over 2.5% in mid-July, compared to average levels in the 4 years preceding COVID of 0.1%. We believe this recent lease rate spike was driven by unavailability of platinum to meet stronger than expected demand. Put more simply, parties contractually committed to supply platinum, that planned (as usual) to buy it, either could not find a supplier with stock and had to lease the platinum, or with balance sheets stretched due to the high price and inventory cost of palladium and rhodium chose to lease. However, the spike in lease rates occurred at the same time as holders of NYMEX futures chose to take physical delivery of over 160 koz, suggesting a genuine shortage of platinum was the main driver.

Demand growth potential – rapidly rising vehicle loadings, sustained substitution pressure, industrial capacity additions, and growing interest in the hydrogen economy, support upside for platinum investment demand

Platinum's short-term demand growth potential appears poised to be able to quickly erase this year's expected surplus. Crucially, we believe it can reverse the recent decline in investment demand as either more information becomes available or more investors consider the dynamics presented above.

Demand growth appears likely due to: 1) higher loadings and rising production of heavy-duty vehicles; 2) increasing platinum substitution for palladium; 3) Industrial demand growth; and 4) interest in the burgeoning hydrogen economy.

1. The trimming of light vehicle (LV) forecasts in 2021 raised investor concerns over platinum automotive demand, yet heavy-duty (HD) vehicle production appears to have been relatively unaffected by chip shortages. The HD vehicle sector globally saw production volumes grow by 5% to c.4.36 million vehicles in 2020 according to the International Organization of Motor Vehicle Manufacturers (OICA). This unexpected growth contrasted with the COVID-driven LV weakness and was principally driven by the 31% surge in Chinese HD diesel production. Over the first half of 2021, Chinese HD diesel production has risen by 20% to c.1 million units, while North American and European markets have experience growth of 33% and 34% respectively, as infrastructure and construction focussed stimulus policies have spurred continued HD sector growth. Positive HD production trends, plus the impact of tightening HD emissions regulations, are a key driver of automotive platinum demand growth.

China VI emission standards, which are significantly more stringent than China V, apply nationally for all HD vehicles from July 2021. Johnson Matthey (JM) expects platinum group metal loadings to treble to meet the tighter standard. Chinese HD vehicle production and sales are typically strongly correlated with investment in construction and infrastructure. It is expected that in H2 2021 such investment will increase due to concerns regarding the potential for economic underperformance in China. This suggests upside potential for forecast Chinese HD diesel production. Platinum demand upside could be higher when platinum loadings per HD vehicle are considered. China now has the strictest emissions regulations globally, yet HD platinum loadings for China VI vehicles based on Johnson Matthey forecasts appear to be c.50% of HD vehicle loadings in North America.

Current concerns regarding semiconductor chip shortages appear overly negative and vehicle production forecasts remain volatile. However, we believe that the LV sector remains at risk of upside revisions as chip production recovers in the second half of the year, with pent up automotive demand (from COVID restrictions and chip related constraints in H1 2021) then potentially driving higher auto production rates through the remainder of this year and into 2022.

2. Despite the palladium premium to platinum rising from an average of \$150/oz in 2018, to over \$1,600/oz in the second quarter of 2021, some market assessments claim that the ounce impact of substitution on platinum demand will only be material in two to three years' time, rising to well over 1.5 moz per annum. However, published platinum automotive demand is accelerating at a faster rate than vehicle production growth and, while clearly confirming rising loadings, this also implies rising volumes of substitution.

3. Industrial demand for platinum is a key long-term demand driver, strongly correlated with global economic growth. With the exception of COVID-impacted 2020, industrial demand for platinum has grown consistently since the WPIC demand data from 2013 was first published. Platinum industrial demand arises from three categories: products made from platinum (e.g. thermocouples and stents), small top-up needs as industrial catalysts and manufacturing equipment wear out, and lastly the significantly larger volumes of metal required when new process plant capacity is built, with capacity-driven demand typically being less vulnerable to short-term economic headwinds. This year, industrial demand is expected to reach a record annual volume of 2.45 moz, 22% up on COVID-impacted 2020 levels, and 15% up on pre-pandemic volumes, driven by capacity additions in glass manufacturing, chemical production and petroleum refining sectors.

In China, it is significant capacity additions in chemical, glass and petroleum production, that have dramatically increased the country's platinum industrial demand in recent years. For example, Chinese petroleum refining capacity has almost tripled over the last 20 years to keep pace with the rapid growth in domestic energy demand, while paraxylene capacity has grown by 120% since 2019. We believe that such industrial capacity additions are a key driver behind China's platinum demand growth in 2021 and beyond.

4. Global hydrogen policy directives and investment commitments continue to expand providing an increasingly positive longer-term demand picture for platinum. The China Hydrogen Alliance, a state sponsored hydrogen industry group, is currently predicting that given current investment trends, the value of the country's low carbon and green hydrogen energy industry in terms of production, will reach 1 trillion yuan (\$152.6 billion) by 2025, and by 2030 that China's annual demand for hydrogen will reach 35 million tons, accounting for at least 5% of China's energy needs. Indeed, we believe that surging investment in the Chinese hydrogen economy could be a factor supporting higher platinum imports this year. Globally, the Hydrogen Council estimates that 228 large-scale green hydrogen projects are now under development. Increased scale is key to bringing the cost of green hydrogen to levels competitive with other energy sources. IHS Markit estimates that green hydrogen production costs have fallen by 50% since 2015, and will fall another 30% by 2025 as investment in green hydrogen and renewable energy generation capacity accelerates, with costs becoming competitive with other fuel sources by 2030. Competitive green hydrogen costs are key to achieving current global targets of c.4% fuel cell electric vehicle (FCEV) market penetration by 2030.

Platinum's demand growth potential remains compelling but increased information flow appears necessary to see total investment demand growth re-instated. It appears likely that this information flow will occur over the next several months due to the significant level of activity underway in, for example, loadings growth, substitution for palladium and investor interest in the application of platinum-based hydrogen technologies.

WPIC initiatives highlights

As the global economy continues to recover from the severe impact of the COVID-19 pandemic last year, less severe yet ongoing negative impacts occurring this year, and large-scale government stimulus funding continues, more investors are considering an increased need for alternative hard assets like commodities, including platinum. This attraction to platinum is enhanced as more investors become aware of platinum's key role in the increasingly certain hydrogen economy. Platinum's constrained supply and significant demand growth potential increases the likelihood of new and existing investors increasing their holdings. We believe these factors will not only support continued investor interest in platinum, but also drive increased investor demand through the remainder of 2021 and beyond.

We continue to focus on increasing the number and impact of our product partnerships in our four key target markets, China, Japan, North America and Europe.

In Europe and North America, we continued to work closely with our partners to strengthen their focus on platinum and increase investor awareness of platinum as economic growth returns yet global risk levels remain elevated. Investor appetite for platinum bar and coin products, despite being lower than in the first quarter, remains at historically high levels. The release of an additional 40,000 Platinum 2021 American Eagle bullion coins helped meet strong investor demand for platinum in Q2 2021 and contributed to a notably strong performance in the first half of 2021. We are now seeing a slowdown in market demand reflected by the increased availability of products, as well as the easing of product premiums. However, we continue to work closely with our partners to support marketing activities to promote platinum investment and enhance awareness of platinum's strategic role in applications core to establishing the hydrogen economy and in global decarbonisation.

In China, WPIC initiated and jointly hosted the inaugural Shanghai Platinum Week in June with support from global leaders in the platinum industry. The week-long event significantly strengthened awareness of platinum and the platinum investment case and expanded our market-development footprint. During this week, Shanghai Gold Coins Investment Company confirmed its plan to add platinum to celebrate its 40th anniversary of Panda coins, an initiative to diversify its offering and to meet the growing demand for platinum investment. The recent growth in platinum coins produced by international mints and WPIC's increasing efforts in China also enhance its enthusiasm for platinum. Furthermore, a series of policies were recently implemented by China to support its hydrogen and FCEV industries, which increased investor interest in platinum. The significant increase in China platinum imports in the first six months included, we believe, investors and fabricators increasing ownership and taking advantage of the range-bound price.

WPIC continues with its expansion in Japan after signing a partnership with Rakuten Securities in the first quarter. We enhanced our investor development program by partnering with Japan Bullion Market Association (JBMA) which continues to attract interest from domestic investors and the media. We observed a flow of investment in Q2 2021, which contributed to partly offset the earlier net selling. WPIC communication on FCEVs in the Tokyo Olympics Games helped attract investor attention to platinum for its growing role in Japan's commitment to the hydrogen economy.

We also deepened our long-established partnership with the Singapore Bullion Market Association (SBMA) in the second quarter and started distributing market insights to local investors through the SBMA.

We believe that our efforts to increase platinum investment product availability and attractiveness to more investors around the world is well positioned to support future investment demand growth.

Paul Wilson, CEO

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PLATINUM QUARTERLY Q2 2021

Table 1: Supply, demand and above ground stocks summary

	2018	2019	2020	2021f	2020/2019 Growth %	2021f/2020 Growth %	Q1 2021	Q2 2021
Platinum Supply-demand Balance (koz)								
SUPPLY								
Refined Production	6,125	6,100	4,989	6,047	-18%	21%	1,468	1,557
South Africa	4,470	4,399	3,298	4,402	-25%	33%	1,036	1,165
Zimbabwe	465	458	448	465	-2%	4%	114	128
North America	345	356	337	365	-5%	8%	83	75
Russia	665	716	704	621	-2%	-12%	184	136
Other	180	170	202	194	19%	-4%	51	52
Increase (-)/Decrease (+) in Producer Inventory	+10	+2	-84	-40	N/A	N/A	-26	+34
Total Mining Supply	6,135	6,102	4,906	6,007	-20%	22%	1,442	1,591
Recycling	1,935	2,118	1,905	1,936	-10%	2%	493	477
Autocatalyst	1,420	1,584	1,427	1,454	-10%	2%	361	365
Jewellery	505	476	422	424	-11%	1%	118	98
Industrial	10	57	56	58	-2%	3%	14	14
Total Supply	8,070	8,220	6,811	7,943	-17%	17%	1,935	2,068
DEMAND								
Automotive	3,075	2,838	2,366	2,895	-17%	22%	715	664
Autocatalyst	2,930	2,838	2,366	2,895	-17%	22%	715	664
Non-road	145	†	†	†	†	†	†	†
Jewellery	2,245	2,099	1,820	1,889	-13%	4%	477	461
Industrial	1,935	2,129	1,955	2,448	-8%	25%	679	591
Chemical	570	694	585	665	-16%	14%	119	204
Petroleum	235	219	109	179	-50%	65%	35	40
Electrical	205	144	130	134	-10%	3%	33	35
Glass	250	236	391	658	65%	69%	286	112
Medical and Biomedical	240	249	238	246	-4%	3%	62	59
Other	435	587	502	565	-14%	13%	143	141
Investment	15	1,253	1,554	521	24%	-66%	157	191
Change in Bars, Coins	280	283	586	361	107%	-38%	18	111
Change in ETF Holdings	-245	991	509	110	-49%	-78%	106	31
Change in Stocks Held by Exchanges	-20	-20	458	50	N/A	-89%	33	49
Total Demand	7,270	8,319	7,694	7,753	-8%	1%	2,028	1,907
Balance	800	-99	-883	190	N/A	N/A	-93	161
Above Ground Stocks	3,270	3,551**	2,667	2,857	-25%	7%		

Source: Metals Focus 2019 - 2021, SFA (Oxford) 2018.

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 20 and 21 (supply, demand and above ground stocks). Details of regional recycling supply in Table 6 on page 23 are only published from 2019.
- 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.

2021 SECOND QUARTER PLATINUM MARKET REVIEW

During Q2'21, global platinum demand was up sharply against a pandemic-affected Q2'20, but eased back a fraction quarter-on-quarter. The growth experienced in Q1'21 continued, albeit unevenly across different regions. Industrialised countries which were bolstered by significant fiscal support and accelerated vaccination rates saw economic activity rapidly returning to more normal conditions. However, some sectors remained hampered by the consequences of the pandemic which exposed vulnerabilities in certain supply chains, most notably semi-conductor chips. Despite the ongoing challenges, Q2'21 platinum demand increased by 23% (+352 koz) year-on-year to 1,907 koz. However, this improvement was outstripped by total supply rising by 55% (+733 koz) to 2,068 koz. Overall, this resulted in a surplus of 161 koz, compared with a deficit of -93 koz in the previous quarter. The Q2'21 surplus was also the highest since Q1'20 (+167 koz).

Chart 1: Supply-demand balance, koz, Q2 2021



Source: Metals Focus

Supply

Global mine supply jumped 65% (+615 koz) year-on-year to 1,557 koz, the highest quarter for two years, as the major producer South Africa recovered from the extreme disruption of Q2'20, supporting refined output with a drawdown of semi-finished inventory.

South African output jumped 124% (+644 koz) year-on-year due to a return to full operations at the Anglo American Platinum Converter Plant (ACP) following the shutdown in Q2'20. As part of the ongoing process of recovery from the ACP shutdown around 140 koz of semi-finished stock, that had been built up as a result of last year's outages, was refined. Separately, Q2'20 was heavily impacted by COVID-19 restrictions resulting in a loss of around 45% of mined output. The third wave of COVID-19 created operational challenges, particularly towards the end of the quarter, with some deteriorating safety performances and increased rates of absenteeism. However, protocols continued to successfully mitigate against widespread disruption, with mines operating at an estimated 97% of planned capacity.

Zimbabwean production increased by 17% (+18 koz) year-on-year as a backlog of matte from the Unki smelter was processed through the ACP and refined. Russian output was curtailed by the ongoing remediation of flooding at two mines and constrained concentrator capacity due to a building structural failure. The result was a 22% fall to 136 koz (-39 koz), a new low for the data series. Artisanal volumes, which are highly price sensitive, remained weak as planned expansions are yet to occur. North American volumes fell by 13% (-12 koz) primarily due to a strike at a Canadian mine and a safety related work stoppage at a mine in Montana.

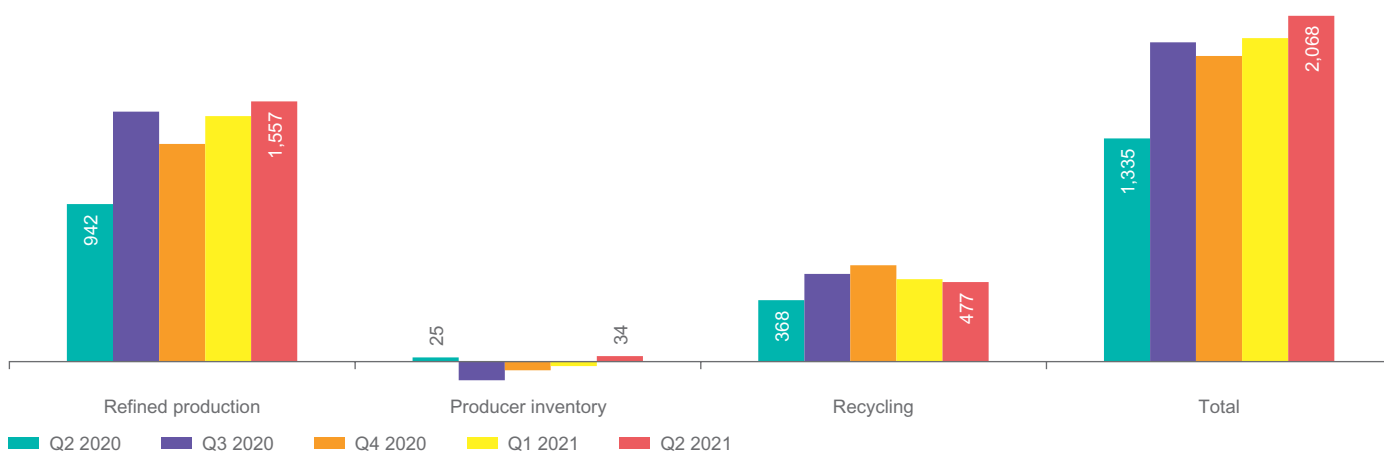
Metal released to the market exceeded refined volumes as producers supplemented sales drawing down an estimated 34 koz of finished metal working inventory, citing strong demand.

Recycling

Global recycling rose by 30% (+109 koz) year-on-year during Q2'21 to 477 koz, mostly as result of strong autocatalyst recoveries, which surged by 42% year-on-year (+108 koz) to 365 koz. The dramatic growth rate owed much to the impact of lockdown restrictions on recycling last year, especially in Western Europe. However, since that time and over the past 6-9 months supply has remained historically high. As a result, much of the recycling industry continues to operate at close to full capacity, with extended processing lead times. Interestingly, elevated palladium and rhodium prices have encouraged some smelters and refiners to focus on lots which

are rich in these two metals. As a result, there is some evidence of silicone carbide spent converters (which are principally diesel particulate filters (DPFs) that tend to be platinum-rich) being stockpiled. Jewellery recycling inched up by 1% year-on-year (+1 koz) in Q2'21 to 98 koz due to strong gains in Japan (as collection activities began normalising) being countered by marked losses in China (resulting from low old-for-new exchange and heavy inventory melt during the February price spike). Price-driven losses in China also largely explain the global 17% quarter-on-quarter fall.

Chart 2: Platinum supply, koz

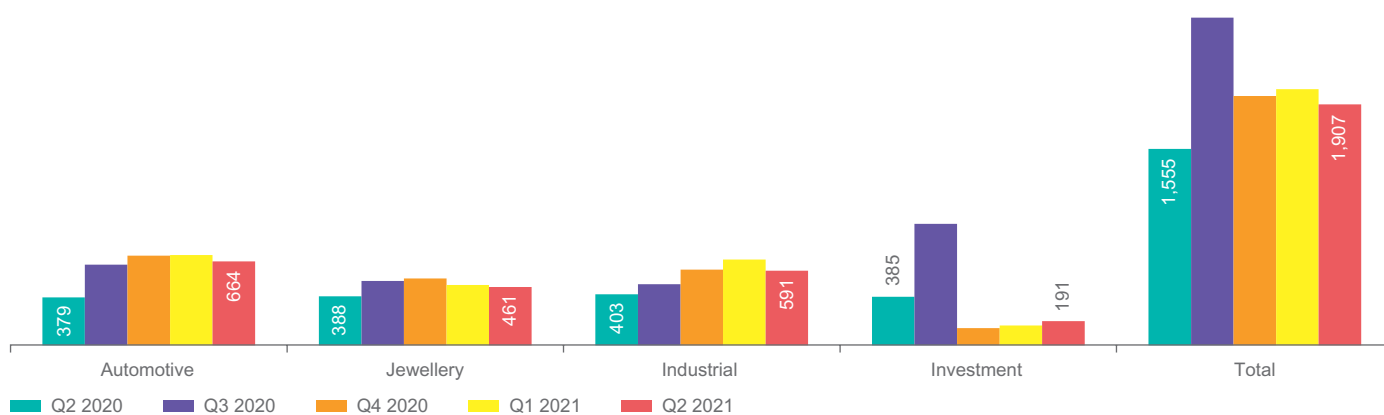


Source: Metals Focus

Demand

Overall platinum demand rose by 23% (+352 koz) year-on-year in Q2'21 even though investment demand halved. Autocatalyst and industrial demand stood out, with most sub-sectors achieving a strong recovery against the COVID-impacted Q2'20. Autocatalyst demand grew 75% (+285 koz), while industrial demand rose 46% (+188 koz), consisting of: chemical demand up 83% (+93 koz), petroleum up 121% (+22 koz) and glass up 39% (+31 koz). Jewellery fabrication rose by a more modest 19% (+73 koz), with Chinese weakness countering much of the strong growth elsewhere. Meanwhile, investor demand halved compared to the previous year. This reflected easing in both exchange warehouse inflows and sharply lower inflows into ETFs. Finally, strong bar and coin demand in North America was offset by heavy liquidations in Japan leading to a 10% (-12 koz) decline in bar and coin against Q2'20.

Chart 3: Platinum demand, koz



Source: Metals Focus

Automotive demand

Automotive demand jumped 75% (+285 koz) year-on-year in Q2'21 to 664 koz as global light vehicle production recovered compared to a pandemic-hit quarter in 2020, although it remained 10% below Q2'19 levels. Global light vehicle production for the quarter was up 51% and heavy-duty vehicle production grew by 12%. Had it not been for stoppages across the world as the semiconductor shortage persisted (and in many instances, worsened), demand for platinum would have been higher. During Q2'21, chip-related production losses were estimated at around 1.9M light-duty units and so platinum demand was almost 50 koz lower than previously anticipated.

Automotive demand for platinum in Europe surged 82% (+127 koz) as year-on-year production increased in all powertrain segments. Platinum loadings per vehicle were higher, due to a combination of the implementation of Euro 6d with a stricter conformity factor and some substitution gains this year. However, the number of diesel internal combustion engines produced in the quarter was 35% lower than that of Q2'19 levels. Western European diesel's share of new car sales fell to 23% for the quarter.

In North America, despite the impact of severe weather in Q1'21 and persistent chip shortages, vehicle production improved dramatically when compared to a pandemic impacted Q2'20. As a result, platinum demand in North America saw a marked increase year-on-year of 130% (+51 koz). In this region, stronger platinum demand reflected rising vehicle numbers, and specifically a higher number of diesel vehicles produced and a modest level of substitution of palladium with platinum.

In China, pre-buying of heavy-duty vehicles ahead of the implementation of China VI boosted platinum demand, especially since preference was given to diesel trucks ahead of gas powered vehicles. However, the country did not escape the global chip shortage and light-duty production declined by 5% in the quarter. However, with light duty loadings increasing between 30-50% from China 5 to China 6a and b and heavy-duty loadings more than doubling due to China VI, this helped lift platinum demand by 7% (+5 koz).

In the 'Rest of the World', though economic activity was hampered by the resurgence of lockdown measures in some countries, vehicle production improved significantly, rising by 111% on Q2'20 resulting in platinum automotive demand more than doubling.

Jewellery demand

During Q2'21, global platinum jewellery demand jumped by 19% (+73 koz) year-on-year to 461 koz. However, the performance was flattered by a lockdown affected Q2'20, with the Q2'21 total comfortably the second lowest second quarter in our quarterly series. The year-on-year gain would have been far stronger were it not for a sharp drop in China where jewellery demand fell to a historic low. European fabrication also rebounded, up 125% (+36 koz) in Q2'21 and up 1% on Q2'19. Much was due to a sea change in consumer sentiment and the re-start of weddings. Further strong, export-centred gains for the high-end jewellery and watch brands also helped.

North American jewellery fabrication in Q2'21 surged by 141% (+65 koz) and by 29% versus Q2'19. This stunning result was largely down to improving consumer sentiment, a rebounding economy, still constrained expenditure on services (especially travel) and the re-start of weddings. Retailers' growing enthusiasm to stock the metal (in part due to still helpful price differentials versus gold) also contributed.

In contrast, Chinese platinum jewellery fabrication in Q2'21 fell 25% (-54 koz) due to fierce competition from gold jewellery and COVID-related disruption across Guangdong Province (which recorded decent sales in Q2'20) over most of May and June. Almost all manufacturers and showrooms suffered double-digit declines. Despite some support from festive demand in May around Labour Day Holiday, ("I love you day", 20th May), and Mother's Day sales were comparatively weak on the previous quarter and lagged gold purchases, which saw a 64% increase. Lacklustre sales of heavier platinum plain designs, which last year had benefited from consumer bargain-hunting (on the back of the metal's sharp price correction and retail price promotions) also contrasted with gold this quarter, which showed healthy buying of larger gold jewellery pieces.

Japanese jewellery demand was up by nearly a third year-on-year, reflecting the low base in 2020. However, demand in the country remained historically low. For example, it was more than 20% lower than it had been in the same period of 2019. The ongoing COVID-19 crisis in the country, higher platinum prices, a preference for value-added products as well as gems and pearls and continued weakness of exports are all factors that have been weighing on Japanese demand.

In India, jewellery fabrication rose by 156% to 9 koz in Q2'21, flattered by a very low base in Q2'20. However, fabrication more than halved compared to Q1'21 as the second wave of COVID infections heavily impacted the market. Jewellery manufacturing was also impacted by the cautious approach adopted by retailers.

Industrial demand

Industrial demand in Q2'21 was +46% (+188 koz) higher than in Q2'20 and up 10% (+54 koz) on Q2'19. Despite some resurgence of COVID-19 and a slow vaccination roll-out in some regions, consumer demand underpinned much of the industrial recovery for most consuming segments.

Petroleum

Platinum demand posted a sharp year-on-year rise in Q2'21, with volumes more than doubling (+22 koz) to 40 koz. To a large extent, this steep rebound reflects the very low base in 2020 when the global oil industry was hit hard by the pandemic. That said, on a quarter-on-quarter basis, volumes were also higher in Q2, albeit by a more modest 5 koz. Importantly, demand has now recovered to be close to the long-run quarterly average. An ongoing ramp-up in oil refining runs was the driving force behind this improvement. According to the latest IEA report, after stagnating in May, global refining throughput increased by 1.6 million barrels per day in June, the largest monthly increase since July 2020.

Chemical

Platinum chemical demand rose both on a year-on-year (+93 koz) and quarter-on-quarter (+85 koz) basis to 204 koz in Q2'21. While most areas witnessed gains, most important was the strong performance in the Chinese petrochemical sector. This came as a result of new capacity additions, after Zhejiang Petrochemical confirmed in June that the company started test runs of its Phase II's paraxylene (PX) line (with commercial operations expected in H2). Platinum use in the silicone market continued to strengthen, as the ongoing economic recovery boosted its use in a wide range of applications, including consumer products and construction. Turning to the nitric acid market, platinum offtake remained broadly steady compared to the previous quarter, though notably higher than last year.

Medical

Despite the positive quarterly results released by several large medical device companies and evidence of a recovery in procedures, gains in platinum demand from medical applications have been capped. North America appears to be ahead of Europe and emerging markets. Although demand has improved for active pharmaceutical ingredients (APIs), containing platinum, which are used in chemotherapy treatments that include either carboplatin, oxaliplatin and cisplatin, the impact of resurging virus cases curtailed the recovery in the quarter. Overall, therefore, platinum use in the medical sector declined by 2% (-1 koz) on a pandemic affected Q2'20 and remained marginally below 2019 levels.

Glass

New fibreglass and LCD tank capacity installations resulted in a 39% increase in platinum demand year-on-year to 112 koz in Q2'21. Similar to other segments, the extent of the gains was partly a reflection of pandemic-related challenges having affected investments in Q2 last year. Having said this, there is no doubt that demand is healthy even in absolute terms, helped by strong demand for related end-products. Most new investments continue to be made in China and were notably plants whose start-ups were delayed due to last year's crisis.

Electrical

Demand from the electrical segment rose by 19% (+6 koz) year-on-year, due to the rebound of HDD shipments and gains in semiconductor applications, aided by the lower base last year. Solid demand from the active nearline market, increases in data centre projects, coupled with the extra momentum of high-capacity HDDs (partly fuelled by growing demand for storage-based cryptocurrency), contributed to higher metal loadings per disk which in turn helped platinum usage.

Other

Demand from the Other Industrial segment in Q2'21 increased by 36% (+37 koz), chiefly reflecting last year's lower total. Despite the recovery in new vehicle sales and aftermarket business, the growth in spark plugs and sensor demand was somewhat curtailed due to vehicle output constraints owing to the global auto-chip shortage.

Investment demand

Overall investment demand in the quarter fell 50% (-194 koz) as the pace of ETF buying and exchange warehouse stock inflows slowed.

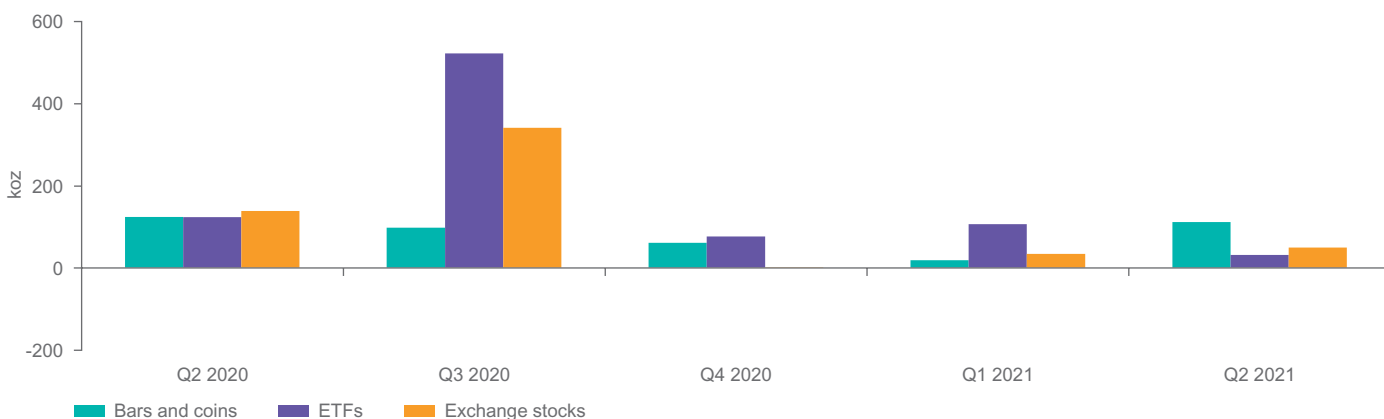
Bar and coin demand fell by 10% year-on-year to 111 koz. However, it still remained historically high. Performances varied markedly by region, with North America achieving another strong total, while Japanese investment returned to positive territory, but only modestly.

Despite falling 16% (-15 koz) on Q1'21, North America was the star performer in volume terms during Q2'21, with coin and bar demand of 79 koz. This compared with just 20 koz during Q2'20, although the total that quarter was hit by lockdown restrictions and many refineries focussing on delivering Comex-approved gold bars into New York at the expense of many other products. By contrast, demand this year has been notably strong, reflecting the health of the wider North American precious metals market. Although premiums have eased, largely reflecting greater product availability, selling back remains insignificant.

Although Japanese retail investment returned to positive territory in Q2'21, at 13 koz, the total for the period was historically low. Elevated local platinum prices in April and May continued to encourage some selling back and while the June correction did fuel a spike in demand, this was short-lived. Turnover has also been under pressure due to the ongoing COVID-19 pandemic discouraging many investors from visiting dealers.

ETF holdings grew modestly in Q2'21 by 31 koz as investor interest prevailed especially in Europe and to a lesser extent in North America. This was lower than the 123 koz growth seen in Q2'20 when platinum traded at a 49% discount to Q2'21 price levels. Exchange inventory increased a further 49 koz to end the quarter at 739 koz, a record high. The inflow reflected several factors, including risk mitigation requirements by financial institutions, following last year's dramatic events, as well as the continued exchange-for-physical (EFP) premium (though this was markedly smaller than during much of last year).

Chart 4: Platinum Investment, koz

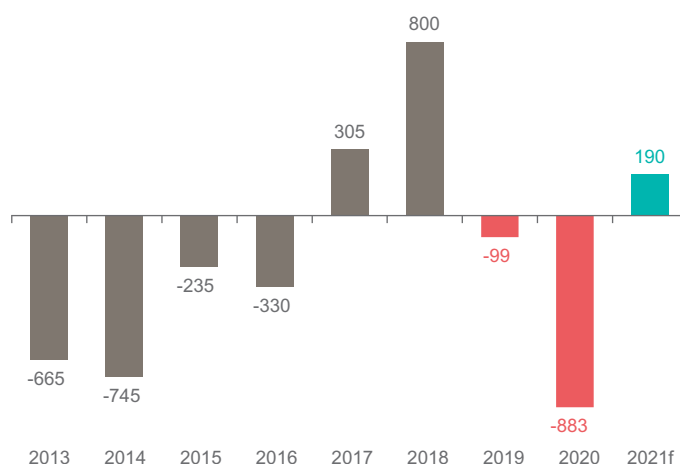


Source: Metals Focus

2021 OUTLOOK

The World Bank’s global growth expectations have been revised up from the 4% expected at the start of this year to 5.6% on the back of stronger than expected recoveries in major economies, such as China and the United States. While many countries still contend with a resurging pandemic, brought about by new virus variants, the economic outlook has nonetheless been revised up for most. Both platinum demand and supply have benefited from the economic recovery in the first half and we expect this to broadly continue for the rest of the year. Industrial activity, while likely to be uneven as the pandemic hits some industries harder than others, will surge ahead of 2020 driving demand for platinum in most sectors. As the future prospects for platinum demand continue to strengthen, we expect investment demand to remain positive, albeit at a lower rate than previously anticipated. We forecast 2021 demand in total to increase by 1% (+59 koz) to 7,753 koz. A strong recovery in mine production and modest growth in recycling will see total supply rise by 17% (+1,132 koz) to 7,943 koz. As a result, 2021 is forecast to generate a surplus of +190 koz compared to the deficit of -883 koz in 2020, as the latter was driven by investment inflows of 1.6 moz which contrasts with the forecast investment total of 521 koz for this year.

Chart 5: Supply-demand balance, koz, 2013-2021f



Source: Metals Focus 2019-2021, SFA (Oxford) 2013-2018

Supply

Global refined supply is expected to rebound to near 2019 levels in 2021, rising by 21% (+1,058 koz) to 6,047 koz on the back of the South African recovery following the extreme disruptions of 2020. South Africa is anticipated to add 1,103 koz year-on-year, a 33% increase to 4,402 koz. The country’s output continues to exceed earlier production guidance, with the ACP operating ahead of expectations and the largely successful navigation of COVID-19 pandemic challenges. The outperformance of the ACP is enabling a faster drawdown of the in-process inventory than originally guided. 300 koz of semi-finished inventory is now expected to be released over the year, a 100 koz increase over our previous expectations. The drawdown of the excess inventory will continue into 2022, however the accelerated depletion reduces volumes available for refining next year by a reciprocal quantity. Thus, the release of a remaining 200 koz is now estimated in 2022. COVID-19 continues to present some risk to the rest of this year, with some deteriorating safety performances and impact on project development with the delay of a mill commissioning. On a positive note, mining companies’ vaccine roll-out initiatives have meant workforce rates exceed the national average, with the latest data indicating 22% of mine workers have received a first vaccine dose. In addition, record industry margins have permitted an easing of cost restraints, with some miners mitigating absenteeism by increasing contracted labour and raising capital spend to facilitate operational flexibility in order to meet planned output.

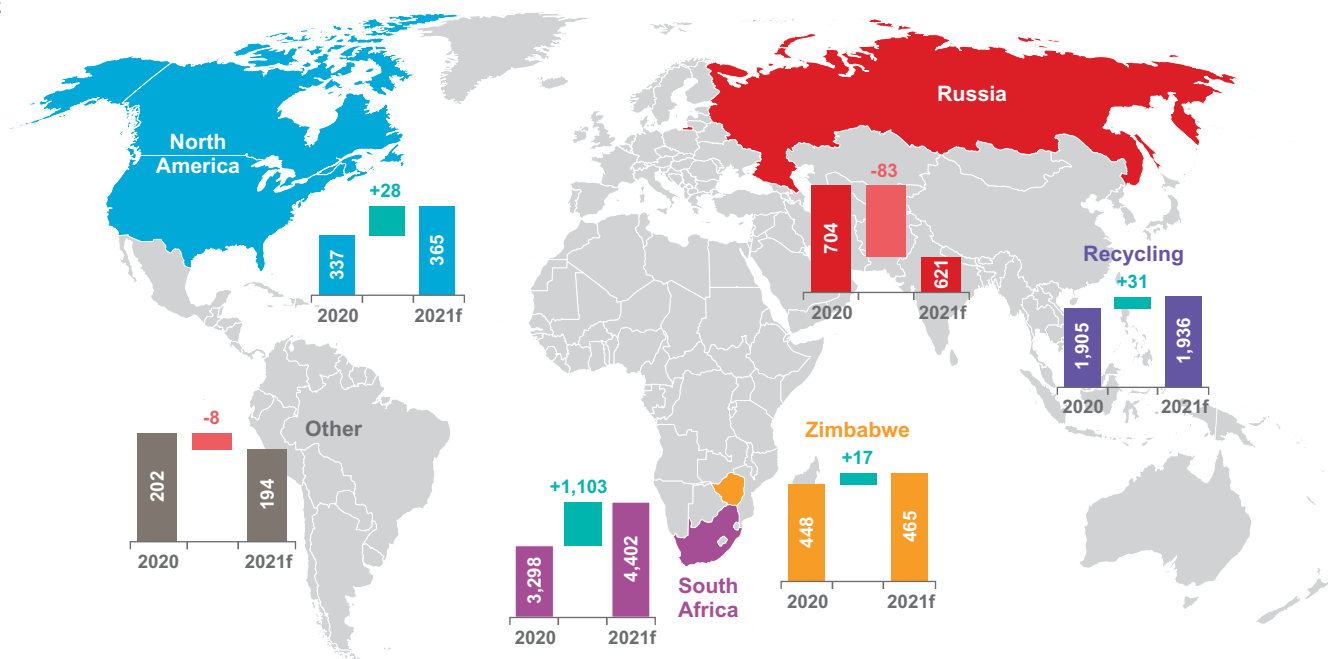
Russian output is projected to decline by 12% this year (-83 koz) due to disruptions resulting from mine flooding and ongoing remediation. A return to full operations is planned for November (a 5-month delay on previous expectations of a 4-month timeframe), as additional underground mine support work is required. Construction defects at a concentrator, identified following the building collapse in February, have now been rectified. The concentrator is operating at 85% capacity with a return to full capacity expected in October. The total impact from these events is anticipated to be -69 koz less refined output.

North American volumes are forecast to grow by 8% (+28 koz) as a project in Montana ramps-up, while Zimbabwe is expected to add 17 koz, up 4%, as the backlog of semi-finished inventory is refined in South Africa.

As disruption eases and record PGM pricing supports robust industry balance sheets we expect a build of producer refined inventory to more normal levels with a net 40 koz increase.

Chart 6: Changes in supply, 2020 vs. 2021f

koz



Source: Metals Focus

Recycling

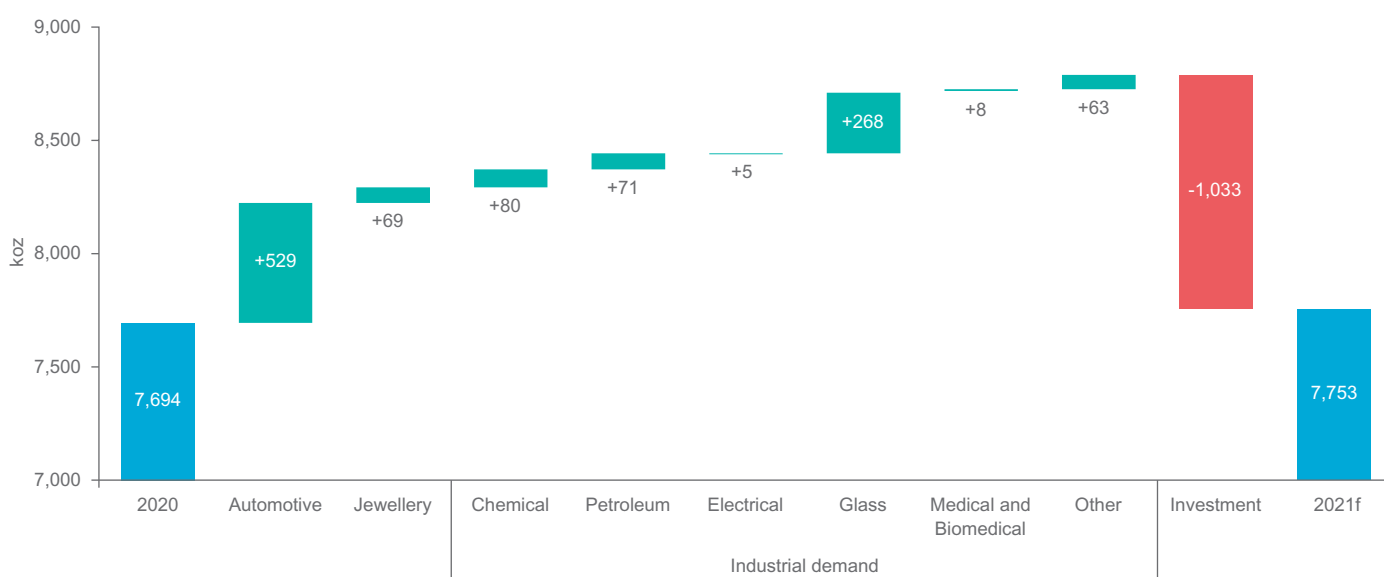
Total recycling of platinum is forecast to rise by 2% (+31 koz) in 2021 to 1,936 koz. Global autocatalyst recycling is forecast to rise by just 2% (+26 koz) to 1,454 koz. In spite of the modest growth rate, the total will remain close to 2019's record high total of 1,584 koz. This largely reflects the historical fitment of platinum-bearing autocatalysts during the late 2000s, especially in Europe and North America. We are also aware of some material, including those containing platinum-rich silicon carbide, being stockpiled because of a lack of processing capacity. Looking ahead, the point at which some of this material is sold will be partly determined by available processing capacity as well as how the platinum price performs in the coming months.

Jewellery recycling in 2021 is now expected to be broadly stable, with the global total up just 1% year-on-year (+2 koz), chiefly as a modest rise in China is largely balanced by a slight dip in Japan. This represents a sizeable change from the last report when +8% was forecast. Our estimates for China and Japan have been lowered notably due to the cut to our 2021 price forecast and a surprisingly sluggish Q2 in both countries.

Demand

Total demand in 2021 is expected to grow by 1% (+59 koz) to 7,753 koz. A bumper recovery in car sales and production drives autocatalyst demand (+529 koz), while a recovery in the luxury goods market sees a modest growth in jewellery (+69 koz). In addition, the ongoing economic recovery spurs healthy growth in all industrial sectors (+493 koz). We forecast growth of 110 koz in ETF holdings, down 78% (-399 koz) from the substantial rise seen last year. Coin and bar demand is also forecast to decline from the previous year record high in this series, down 38% (-225 koz) to 361 koz.

Chart 7: Changes in demand by category, 2020 vs. 2021f



Source: Metals Focus

Automotive demand

Autocatalyst demand for platinum is expected to rebound strongly this year, up 22% (+529 koz) on 2020 and even higher than 2019 (+2%, +58 koz), notwithstanding a further downward revision in vehicle production numbers, due to the ongoing semiconductor shortage. Despite growing numbers of battery electric vehicles, LMC Automotive global engine vehicle report at time of writing indicated that total light-duty vehicle production will rise by 13% to 84m, of which 95% will have a PGM-bearing aftertreatment system. While the recovery in platinum requirements is mostly driven by the substantial increase in units compared to last year, tighter emissions legislations covering an increasing number of vehicles globally will also benefit platinum demand. The growth of heavy-duty vehicle production is forecast to be a more modest 5% this year. Nevertheless, platinum demand within that segment is expected to grow by an impressive 57%, as more than half of the units produced worldwide are now expected to be fitted with Euro VI equivalent aftertreatment systems.

In Europe, full year demand is expected to grow ahead of 2020 despite the headwinds experienced due to the chip shortage and preferential incentives offered for the purchase of battery electric and hybrid vehicles (most of which have gasoline engines). Western Europe's diesel market share is forecast to decline to 23%, a 2% downward revision since Q1'21. In spite of these headwinds, stricter emissions compliance requirements and lower conformity factors (meaning a lower allowance for real driving condition tests to vary from the legislated limit) support growing demand for platinum. In addition, persistently higher palladium prices will continue to support rising platinum loadings as current palladium loadings are substituted by platinum, to help improve economics while ensuring legislative compliance.

In North America, healthy platinum demand can be ascribed to a stronger recovery in larger passenger vehicle sales ahead of conventional size cars. SUV and pick-up truck production is set to increase by 20% this year, while conventional passenger vehicle production is expected to decline moderately. In keeping with other regions, due to the economic benefit of substituting some palladium with platinum, a number of gasoline vehicles will contain platinum and at higher loading levels.

Similarly, despite overtaking Europe as the world's number one BEV market, China's healthy platinum demand reflects higher light-duty vehicle production, tighter emissions legislation for both light and heavy-duty vehicles and a shift towards higher platinum ratios to achieve compliance and due to substitution. Unlike North America, smaller conventional cars are still favoured, the production of which is set to grow ahead of SUV and pick-up models.

In the Rest of the World, platinum autocatalyst use is expected to grow by 151 koz as India leapfrogs to Bharat VI and countries such as Mexico see increasing production of Euro VI heavy-duty vehicles.

Jewellery demand

This year global jewellery consumption is forecast to rise by 4% (+69 koz) to 1,889 koz. Even so, this will be the second year that the total has failed to reach 2,000 koz. This reflects weakness in China, which will almost offset healthy gains in every other key market.

Jewellery fabrication in North America is expected to close the year with a healthy 35% year-on-year increase (and, more meaningfully, a 10% rise on a pre-pandemic 2019). That said, second half gains should slow notably from the first, as more travel resumes, stimulus cheques end, the rush to buy bridal jewellery eases, inventory replacement normalises and, finally, the spread of the Delta-variant casts a shadow. However, a still improving economy, high levels of savings and price differentials with gold will sustain consumption, and our full year forecast has been raised by 30 koz since the last *Platinum Quarterly*.

Full year 2021 fabrication in Europe looks set to enjoy a marked 20% rebound as COVID damage fades, with strong gains seen for both local, bridal-dominated sales and for the export-oriented high-end jewellery and watch brands. The latter's offtake might just surpass 2019 levels, but the mass market's slower recovery in Q1'21 means the full year may well fall short of pre-pandemic levels.

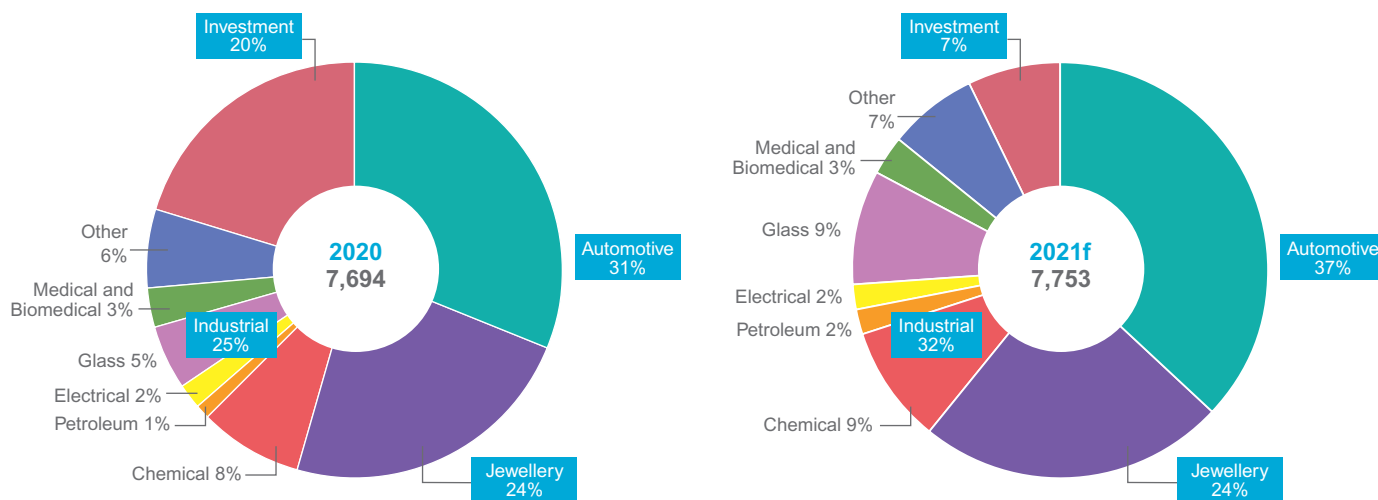
In response to the worse-than-expected demand in Q2'21 we have revised the expected decline for China's platinum jewellery fabrication in 2021 from 2% to 14% (now -116 koz). This revision reflects growing competition from the gold market and evidence of more cautious inventory replenishment of platinum across the jewellery supply chain.

For India, we have maintained our bullish outlook and expect fabrication and consumption to post double-digit growth; fabrication up 35% (+17 koz) and consumption up 29%. The strong second half recovery will be driven by the onset of the wedding season and an economic recovery as some level of normalcy returns.

Industrial demand

The use of platinum in industrial applications is expected to increase by 25% (+493 koz). Chemical demand is forecast to rise by 14% (+80 koz) and petroleum will rebound by 65% (+71 koz). Glass demand sees growth of 69% (+268 koz) due to expansions previously planned for 2020. Other Industrial Demand, which includes fuel cell applications, automotive sensors and spark plugs, will grow by 13% (+63 koz), while medical platinum demand is expected to rise by 3% (+8 koz).

Chart 8: Demand end-use shares, 2020 vs. 2021f



Source: Metals Focus

Petroleum

While rising Delta variant cases have weighed somewhat on near-term economic prospects, a further recovery in global oil refining output is expected in H2'21. Notably higher oil prices, an ongoing economic recovery and crude inventory drawdown, all point to a gradual pick-up in refining capacity utilisation rates. Meanwhile we do not expect a repeat of last year's plant decommissioning. Moreover, leaving aside ongoing capacity expansion capacity in China, platinum demand will also benefit from the start-up of new units elsewhere later this year, after construction was severely affected last year by the COVID crisis. Among these, Uzbekistan is expected to launch its first gas-to-liquids plant in Q4'21. All of these factors should bode well for a recovery in platinum demand in the petroleum industry, with volumes expected to rise by 65% (+71 koz) to 179 koz in 2021.

Chemical

Demand is projected to rise by 14% (+80 koz) to 665 koz in 2021, with gains expected in all key applications. For the silicone industry, much of this growth reflects a rebound from the COVID-19 driven low base, as the global economy gradually improves. With regards to nitric acid, platinum demand will benefit from a small pick-up in capacity additions, the result of sharp gains in fertilizer prices and tighter supplies so far this year. Turning to the petrochemical industry, demand is on track to record a small increase from an already elevated base in 2020, after capacity additions in China came on stream as scheduled. Meanwhile, Saudi Aramco is expected to start a new PX unit in Saudi Arabia later this year.

Glass

Following an exceptional first and healthy second quarters, we are firmly on track to meet our expectations of global glass demand enjoying strong gains in 2021. We have in fact upgraded our projections since the Q1'21 report, and now forecast a global total of 658 koz, up by 69% year-on-year. In addition to all the planned capacity additions that we had identified before still looking likely to go ahead, we have identified some extra glass-fibre plants likely to come on stream. Overall, a substantial increase in fibreglass capacity in China is expected in 2021 in response to growing demand for composites in the country. Some of the largest additions are from Xingtai Jinniu's two new production lines, Jushi's Tongxiang plant's third production line and Changhai's new production line.

Medical

Platinum use in pharmaceutical and biomedical devices is forecast to recover in 2021, growing by 3% year-on-year (+8 koz) to 246 koz. Even though many companies servicing the medical sector are broadly optimistic for H2, there is growing concern that the recovery remains vulnerable to further virus-related disruptions as can be seen in countries such as India, Japan and Australia.

Electrical

The electrical sector is expected to grow by 3% (+5 koz) to 134 koz as business activities heavily reliant on cloud storage and growing enterprise procurement capabilities continue to expand in the second half. However, the HDD market is likely to remain in a long-term secular decline due to growing adoption of SSDs in both consumer-grade applications (such as PC/laptop, nearline and game consoles) and enterprise storage solutions. Moreover, uncertainty that the spread of new COVID-19 variants pose, along with possible a deceleration in crypto-mining, may weigh on HDDs shipments and, by extension, platinum offtake.

Other

The adverse effect on the automotive sector, brought about by the chip shortage, is unlikely to be fully resolved until next year, but it is expected to ease gradually in the second half of 2021. As such, the delayed production is forecast to weigh on platinum demand in spark plugs and sensors in the coming months. As a result, while Other Industrial platinum demand is expected to grow 13% (+63 koz) this year, reaching 565 koz, the chip supply disruption will curb upside potential, meaning that the global total will fall short of 2019 levels.

Investment demand

Bar and coin investment is set to weaken sharply this year, by 38% (-225 koz) to 361 koz. The weakness reflects the impact of heavy liquidations in Japan at the start of the year, which contrasts sharply with another strong performance in North America.

This year, North America is forecast to post comfortably the highest regional total. There has been some bargain hunting on price dips, but ultimately investors have been keen to buy all the major precious metals. Looking ahead, we expect net buying to continue over the remainder of this year, but not at the same intensity compared with the first half.

ETF holdings grew by 137 koz in the first half of the year breaching 4 moz in the quarter for the first time on record. Some liquidations then emerged, taking the total back down to 3.9 moz as some investors took profit while others rotated in favour of mining equities (to benefit from healthy dividend yields). Overall, we expect global ETF holdings to rise by 110 koz this year, the smallest gain in three years following bumper inflows in 2019 and 2020 totalling 1.5 moz. Although the anticipated increase in 2021 is modest, this will nonetheless see ETF holdings very close to 4m by year-end.

At the end of June exchange stock stood at 740 koz up 82 koz from Q4'20 as the EFP premium continued to incentivise inflows and as market-makers' risk departments maintained directives for higher levels of accessible warehouse stocks against futures positions. However, in July sizeable outflows emerged of 160 koz. This drawdown was driven by a combination of the EFP trading at a discount, leading to outflows, and an increase in demand for physical platinum in plate or bar form. For the rest of the year, we expect the market to shift back to a contango, with a positive EFP attracting inflows once again. In addition, the overhang of the pandemic will see risk departments retain current measures further supporting inflows. Overall, we forecast a net increase of 50 koz for the full year.

ABOVE GROUND STOCKS

We expect platinum to record a surplus of 190 koz in 2021 as supply recovers strongly, while demand edges just a fraction higher. We expect to see a 1.04 moz reversal from last year's deficit position of -883 koz. Overall, this will result in above-ground stocks rising to 2,857 koz covering 4 months' worth of demand.

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 Q2 2021

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

	2013	2014	2015	2016	2017	2018	2019	2020	2021f	2020/2019 Growth %	2021f/2020 Growth %
Platinum Supply-demand Balance (koz)											
SUPPLY											
Refined Production	6,070	4,875	6,160	6,045	6,130	6,125	6,100	4,989	6,047	-18%	21%
South Africa	4,355	3,135	4,480	4,265	4,385	4,470	4,399	3,298	4,402	-25%	33%
Zimbabwe	405	405	405	490	480	465	458	448	465	-2%	4%
North America	355	395	365	390	360	345	356	337	365	-5%	8%
Russia	740	740	710	715	720	665	716	704	621	-2%	-12%
Other	215	200	200	185	185	180	170	202	194	19%	-4%
Increase (-)/Decrease (+) in Producer Inventory	-215	+350	+30	+30	+30	+10	+2	-84	-40	N/A	N/A
Total Mining Supply	5,855	5,225	6,190	6,075	6,160	6,135	6,102	4,906	6,007	-20%	22%
Recycling	1,980	2,035	1,705	1,840	1,895	1,935	2,118	1,905	1,936	-10%	2%
Autocatalyst	1,120	1,255	1,185	1,210	1,325	1,420	1,584	1,427	1,454	-10%	2%
Jewellery	855	775	515	625	560	505	476	422	424	-11%	1%
Industrial	5	5	5	5	10	10	57	56	58	-2%	3%
Total Supply	7,835	7,260	7,895	7,915	8,055	8,070	8,220	6,811	7,943	-17%	17%
DEMAND											
Automotive	3,130	3,245	3,245	3,350	3,290	3,075	2,838	2,366	2,895	-17%	22%
Autocatalyst	2,990	3,095	3,105	3,215	3,150	2,930	2,838	2,366	2,895	-17%	22%
Non-road	140	150	140	135	140	145	†	†	†	†	†
Jewellery	2,945	3,000	2,840	2,505	2,460	2,245	2,099	1,820	1,889	-13%	4%
Industrial	1,490	1,610	1,740	1,855	1,725	1,935	2,129	1,955	2,448	-8%	25%
Chemical	535	540	510	560	565	570	694	585	665	-16%	14%
Petroleum	50	60	205	215	100	235	219	109	179	-50%	65%
Electrical	195	215	205	195	210	205	144	130	134	-10%	3%
Glass	145	205	235	255	205	250	236	391	658	65%	69%
Medical and Biomedical	220	220	225	230	235	240	249	238	246	-4%	3%
Other	345	370	360	400	410	435	587	502	565	-14%	13%
Investment	935	150	305	535	275	15	1,253	1,554	521	24%	-66%
Change in Bars, Coins	-5	50	525	460	215	280	283	586	361	107%	-38%
Change in ETF Holdings	905	215	-240	-10	105	-245	991	509	110	-49%	-78%
Change in Stocks Held by Exchanges	35	-115	20	85	-45	-20	-20	458	50	N/A	-89%
Total Demand	8,500	8,005	8,130	8,245	7,750	7,270	8,319	7,694	7,753	-8%	1%
Balance	-665	-745	-235	-330	305	800	-99	-883	190	N/A	N/A
Above Ground Stocks	3,475*	2,730	2,495	2,165	2,470	3,270	3,551**	2,667	2,857	-25%	7%

Source: Metals Focus 2019 - 2021, SFA (Oxford) 2013 - 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 Q2 2021

Table 3: Supply and demand summary – quarterly comparison

	Q2 2019	Q3 2019	Q4 2019	Q1 2020	Q2 2020	Q3 2020	Q4 2020	Q1 2021	Q2 2021	Q2'21/Q2'20 Growth %	Q2'21/Q1'21 Growth %
Platinum Supply-demand Balance (koz)											
SUPPLY											
Refined Production	1,666	1,532	1,581	1,248	942	1,496	1,303	1,468	1,557	65%	6%
South Africa	1,219	1,119	1,186	843	521	1,062	873	1,036	1,165	124%	13%
Zimbabwe	119	119	108	108	110	115	115	114	128	17%	12%
North America	99	79	94	98	87	71	82	83	75	-13%	-10%
Russia	189	174	149	150	175	196	182	184	136	-22%	-26%
Other	41	41	42	50	49	52	51	51	52	6%	3%
Increase (-)/Decrease (+) in Producer Inventory	-26	-29	+45	+54	+25	-112	-51	-26	+34	37%	N/A
Total Mining Supply	1,640	1,503	1,626	1,302	967	1,384	1,252	1,442	1,591	65%	10%
Recycling	548	516	522	436	368	525	577	493	477	30%	-3%
Autocatalyst	415	386	387	353	257	389	428	361	365	42%	1%
Jewellery	119	116	121	70	97	121	134	118	98	1%	-17%
Industrial	14	14	15	13	13	14	15	14	14	9%	3%
Total Supply	2,188	2,019	2,149	1,738	1,335	1,909	1,829	1,935	2,068	55%	7%
DEMAND											
Automotive	736	668	681	638	379	639	710	715	664	75%	-7%
Autocatalyst	736	668	681	638	379	639	710	715	664	75%	-7%
Non-road	†	†	†	†	†	†	†	†	†	N/A	N/A
Jewellery	535	529	496	393	388	510	529	477	461	19%	-3%
Industrial	537	533	502	469	403	484	599	679	591	46%	-13%
Chemical	205	162	190	176	112	124	174	119	204	83%	71%
Petroleum	55	55	55	33	18	21	36	35	40	121%	16%
Electrical	36	37	36	32	29	33	36	33	35	19%	6%
Glass	32	71	12	50	80	109	151	286	112	39%	-61%
Medical and Biomedical	62	62	62	60	60	60	60	62	59	-2%	-5%
Other	147	146	147	118	104	137	143	143	141	36%	-2%
Investment	126	251	82	71	385	962	136	157	191	-50%	22%
Change in Bars, Coins	89	54	29	305	123	97	60	18	111	-10%	>±300%
Change in ETF Holdings	50	207	47	-213	123	523	76	106	31	-75%	-71%
Change in Stocks Held by Exchanges	-13	-10	6	-20	138	342	-1	33	49	-65%	47%
Total Demand	1,934	1,981	1,761	1,571	1,555	2,595	1,974	2,028	1,907	23%	-6%
Balance	254	37	388	167	-221	-685	-145	-93	161	N/A	N/A

Source: Metals Focus 2019 - 2021, SFA (Oxford) 2018.

Notes:

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

PLATINUM QUARTERLY Q2 2021

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

	H2 2018	H1 2019	H2 2019	H1 2020	H2 2020	H1 2021	H1'21/H1'20 Growth %	H1'21/H2'20 Growth %
Platinum Supply-demand Balance (koz)								
SUPPLY								
Refined Production	3,230	2,988	3,113	2,191	2,799	3,025	38%	8%
South Africa	2,400	2,094	2,305	1,364	1,934	2,201	61%	14%
Zimbabwe	240	230	228	218	230	243	12%	5%
North America	180	184	173	185	153	158	-14%	4%
Russia	325	393	324	325	379	320	-2%	-15%
Other	85	87	83	99	103	103	4%	0%
Increase (-)/Decrease (+) in Producer Inventory	-40	-14	+16	+79	-162	+8	-89%	N/A
Total Mining Supply	3,190	2,973	3,129	2,269	2,637	3,033	34%	15%
Recycling	985	1,079	1,038	804	1,102	970	21%	-12%
Autocatalyst	745	811	773	610	817	726	19%	-11%
Jewellery	240	239	237	167	255	216	29%	-15%
Industrial	0	29	29	27	29	29	7%	-3%
Total Supply	4,175	4,053	4,167	3,073	3,738	4,004	30%	7%
DEMAND								
Automotive	1,480	1,488	1,349	1,017	1,349	1,379	36%	2%
Autocatalyst	1,405	1,488	1,349	1,017	1,349	1,379	36%	2%
Non-road	75	†	†	†	†	†	N/A	N/A
Jewellery	1,110	1,074	1,025	780	1,039	939	20%	-10%
Industrial	970	1,094	1,035	872	1,083	1,270	46%	17%
Chemical	290	343	351	287	298	324	13%	9%
Petroleum	110	109	109	51	57	75	46%	31%
Electrical	105	71	73	62	68	68	11%	0%
Glass	135	152	84	130	260	398	205%	53%
Medical and Biomedical	115	124	124	119	119	120	1%	1%
Other	215	294	293	222	280	285	28%	2%
Investment	0	921	333	456	1,098	348	-24%	-68%
Change in Bars, Coins	120	200	82	428	158	129	-70%	-18%
Change in ETF Holdings	-110	737	254	-90	599	137	N/A	-77%
Change in Stocks Held by Exchanges	-10	-17	-4	118	341	82	-30%	-76%
Total Demand	3,560	4,577	3,742	3,126	4,569	3,936	26%	-14%
Balance	615	-524	425	-53	-830	68	N/A	N/A

Source: Metals Focus 2019 - 2021, SFA (Oxford) 2018.

Notes:

- † Non-road automotive demand is included in autocatalyst demand.
- 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 Q2 2021

Table 5: Regional demand – annual and quarterly comparison

	2013	2014	2015	2016	2017	2018	2019	2020	2021f	2020/2019 Growth %	2021f/2020 Growth %	Q2 2020	Q3 2020	Q4 2020	Q1 2021	Q2 2021
Platinum gross demand (koz)																
Automotive	3,135	3,240	3,250	3,345	3,280	3,065	2,838	2,366	2,895	-17%	22%	379	639	710	715	664
North America	425	465	480	410	375	355	340	297								
Western Europe	1,350	1,395	1,450	1,635	1,550	1,330	1,444	1,079								
Japan	585	585	510	450	435	430	303	242								
China	130	125	145	195	230	220	185	280								
India	165	170	180	170	175	195	††	††								
Rest of the World	480	500	485	485	515	535	566	467								
Jewellery	2,945	3,000	2,840	2,505	2,460	2,245	2,099	1,820	1,889	-13%	4%	388	510	529	477	461
North America	200	230	250	265	280	280	341	277								
Western Europe	220	220	235	240	250	255	237	196								
Japan	335	335	340	335	340	345	372	316								
China	1,990	1,975	1,765	1,450	1,340	1,095	871	832								
India	140	175	180	145	175	195	102	48								
Rest of the World	60	65	70	70	75	75	176	151								
Chemical	535	540	510	560	565	570	694	585	665	-16%	14%	112	124	174	119	204
North America	55	55	50	50	50	50	77	90								
Western Europe	110	105	75	110	115	110	125	113								
Japan	10	10	10	15	15	15	66	62								
China	195	215	230	225	215	215	236	180								
Rest of the World	165	155	145	160	170	180	190	141								
Petroleum	50	60	205	215	100	235	219	109	179	-50%	65%	18	21	36	35	40
North America	40	25	-25	90	55	55	30	5								
Western Europe	-45	-20	70	10	5	20	14	11								
Japan	10	-35	5	0	-40	5	7	6								
China	80	-5	45	80	45	10	66	35								
Rest of the World	-35	95	110	35	35	145	103	52								
Electrical	195	215	205	195	210	205	144	130	134	-10%	3%	29	33	36	33	35
North America	10	15	15	10	15	15	38	35								
Western Europe	5	10	10	10	10	10	27	23								
Japan	15	15	15	15	15	15	20	16								
China	75	70	70	80	90	85	28	31								
Rest of the World	90	105	95	80	80	80	31	25								
Glass	145	205	235	255	205	250	236	391	658	65%	69%	80	109	151	286	112
North America	5	10	0	20	5	5	7	-20								
Western Europe	-10	15	10	5	5	35	59	25								
Japan	0	-25	-5	-10	-10	0	-40	-88								
China	90	115	130	150	110	80	180	365								
Rest of the World	60	90	100	90	95	130	30	108								
Medical	220	220	225	230	235	240	249	238	246	-4%	3%	60	60	60	62	59
Other industrial	345	370	360	400	410	435	587	502	565	-14%	13%	104	137	143	143	141
Bar & Coin Investment	-5	50	525	460	215	280	283	586	361	107%	-38%	123	97	60	18	111
North America							159	242								
Western Europe							52	75								
Japan							46	240								
Rest of the World							25	29								
ETF Investment	905	215	-240	-10	105	-245	991	509	110	-49%	-78%	123	523	76	106	31
North America							125	526								
Western Europe							509	237								
Japan							-13	58								
Rest of the World							370	-312								
Change in Stocks Held by Exchanges	35	-115	20	85	-45	-20	-20	458	50	N/A	-89%	138	342	-1	33	49
Investment	935	150	305	535	275	15	1,253	1,554	521	24%	-66%	385	962	136	157	191
Total Demand	8,505	8,000	8,135	8,240	7,740	7,260	8,319	7,694	7,753	-8%	1%	1,555	2,595	1,974	2,028	1,907

Source: Metals Focus 2019 - 2021, SFA (Oxford) 2013 - 2018.

Notes:

1. †† India automotive demand is included in Rest of the World.
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 Q2 2021

Table 6: Regional recycling – annual and quarterly comparison

	2013	2014	2015	2016	2017	2018	2019	2020	2021f	2020/2019 Growth %	2021f/2020 Growth %	Q2 2020	Q3 2020	Q4 2020	Q1 2021	Q2 2021
Platinum recycling supply (koz)																
Automotive	1,120	1,255	1,185	1,210	1,325	1,420	1,584	1,427	1,454	-10%	2%	257	389	428	361	365
North America							520	458								
Western Europe							802	738								
Japan							116	103								
China							36	32								
Rest of the World							111	96								
Jewellery	855	775	515	625	560	505	476	422	424	-11%	1%	97	121	134	118	98
North America							3	3								
Western Europe							4	4								
Japan							187	162								
China							276	248								
Rest of the World							5	5								
Industrial	5	5	5	5	10	10	57	56	58	-2%	3%	13	14	15	14	14
North America							3	3								
Western Europe							11	10								
Japan							34	34								
China							7	7								
Rest of the World							2	2								

Source: Metals Focus 2019 - 2021, SFA (Oxford) 2013 - 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.

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) 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.

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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