
PLATINUM QUARTERLY

Q2 2018

6th September 2018

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FOREWORD

I am truly passionate about platinum, the benefits it brings to the world and the increasing number of ways it is used by us all on a daily basis, and in fact will be used into the future.

However, I am convinced that many components of published platinum demand data sometimes underestimate the extent of this usage. In the data we publish today we include a revision increasing the past and expected use of platinum in hard disk drives following new insights into a highly technical application of platinum. I believe that current trends in automotive applications of platinum may also not tell the full story. This could be masking significant platinum demand growth potential on diesel cars and in replacing palladium in gasoline cars. The low price of platinum, since 2011 tracking the depressed gold price, and demand trends that are not yet reflected in published data, are barriers to investment in platinum, particularly for investors considering platinum for the first time.

I am also passionate about the promotion of platinum to new audiences, which is why I have been so encouraged by the responses to our new partnership with Shenzhen Hengfu Yingjia to sell platinum bars in China, as well as our sponsorship of the recent Athletics World Cup. More on these later.

Accurately estimating platinum usage

The uses of platinum continue to expand. Hopefully you have seen our new publication, **60 seconds in Platinum**, which recently highlighted a groundbreaking advance in one of platinum's many long-standing medical uses; in aneurysm management.

But it is important that investors, many of whom share my passion, better understand existing sources of demand too. Today, some platinum investors appear to be waiting on the sidelines, concerned about the sustained decline in the platinum price. They are, perhaps, waiting for concrete evidence of a trend rather than considering current and projected supply/demand indicators. This appears to be more of a barrier to investment in platinum than in other commodities.

The WPIC is exploring new ways to provide investors with evidence to increase their confidence in taking value-based investment decisions in platinum.

Disclosure in many proprietary applications of platinum is naturally limited and confidential. This is why we look for other useful indicators, which are sometimes at odds with published data. Even so, both can still fail to adequately illustrate a developing trend that will meaningfully change demand in two or three years from now. The change in platinum use in computer storage (while not material to the annual market balance) is presented below, and helps illustrate why further insight into changes in platinum use in diesel and gasoline autocatalysis could be highly beneficial to investor decision making.

Platinum's use in computer and cloud data storage

The increasing use of solid state storage in personal computers reduces platinum use but this has largely been offset by platinum demand growth in cloud-based storage. Recent further scrutiny of platinum use in these applications has led to an upward revision of the estimates and the forecast we publish today, showing that c150 koz more platinum was used in the manufacturing of hard disk drives between 2013 and 2017 and forecast for 2018, than previously estimated.

Platinum usage in automotive applications, both in diesel and gasoline cars

Despite an increasing number of automakers making statements that diesel cars are essential for their fleets, to meet EU CO₂ levels and avoid fines, few have been specific on their low NO_x strategies and none have yet made public to what extent platinum forms part of those strategies. Similarly, they have not explained how they will convince customers that their cars are clean enough to avoid

exclusion from certain cities. Consequently, as today's numbers show, diesel sales continue to fall, being replaced with higher-CO₂ emitting gasoline cars.

If automakers have decided that lower NO_x emissions (necessary to win back the trust of customers and city regulators to keep 'on-road' clean diesel cars in their fleets), are preferable to paying heavy CO₂ fines, they have probably already increased their platinum loadings.

Autocatalyst fabricators are not able to disclose proprietary loadings and automakers will not want their increased platinum requirements known, for fear of higher demand increasing their input costs. Consequently, we believe that published platinum automotive demand data may exclude the impact of any higher loadings already in place to address excessive NO_x emissions.

The Fiat Chrysler Group is known for high on-road NO_x emissions from their diesels. Surprisingly, they have become one of the first firms to recently communicate on the showroom floor that "driver refilling of Adblue (urea solution to reduce NO_x emissions in SCR systems) has allowed increased dosing rates that reduce NO_x emissions to well below EU requirements". Increased urea dosing reduces on-road NO_x emissions but to achieve the massive reductions required for many models, higher platinum loadings are needed to increase the conversion of 'engine out' NO to NO₂ which ensures the SCR system efficiency necessary. The costly alternative of a complete engine re-design is unlikely and unnecessary in most cases.

On the gasoline side of the equation, automakers who have taken a strategic risk mitigation approach to the potential for palladium being unavailable to manufacture catalysts for gasoline cars, may have commenced substituting platinum for palladium. They will also not want this known by metal markets and therefore since this information is not yet officially visible, even reasonable estimates of such substitution are being ignored by most investors.

We have engaged automakers and implored them to share the role platinum is playing in being able to achieve extremely low NO_x-emitting diesel cars within their fleets. We will keep you updated on their responses and insights.

Gold and platinum

With respect to the impact of changes in the gold price on the platinum price, 2018 has seen some painful consequences for platinum. The graphs below highlight that when gold dipped below \$1,300/oz in June it took platinum below \$900/oz. Similarly, in August when gold fell below \$1,200/oz platinum dropped below \$800/oz.



The almost instantaneous tracking of the price of platinum to moves in the price of gold (in the absence of any meaningful news flow about platinum), highlights a further factor keeping platinum investors at bay. Our team at the WPIC continues to engage investor audiences explaining why the gold-platinum link is inappropriate and why investor confidence in constrained platinum supply and positive demand growth drivers continues to build and should justify a stand-alone evaluation.

Product partnerships: China and the World

As those of you familiar with our organisation will know, developing meaningful product partnerships sits alongside our work to improve information flow and understanding of the platinum market.

The quarter since we last published *Platinum Quarterly* has been a busy one. China is at the heart of our product development activities; it continues to be an area where we see tremendous opportunity and I am really pleased to say our efforts are gaining real traction.

In July, we announced our partnership with **Shenzhen Hengfu Yingjia**, a mining, production, industrial and investment conglomerate, to launch the first platinum bar products in China. The launch was part of a new strategic partnership between the WPIC and Hengfu to develop the physical platinum investment market in South China.

We believe the launch addresses a clear gap for physical platinum investment products in China, and more broadly supports platinum's growth potential as a retail investment medium.

July also saw the launch of the inaugural **Athletics World Cup**, at which many of the world's best athletes battled it out for The Platinum Trophy. The event was a tremendous success with the team from the USA lifting the trophy. The event also fired the starting gun on a wider programme of global outreach and promotion of platinum to the retail market by our team. More of this will be reported on in the remainder of 2018 and into 2019.

Paul Wilson, CEO

PLATINUM QUARTERLY Q2 2018

Table 1: Supply, demand and above ground stocks summary

	2016	2017	2018f	2017/2016 Growth %	2018f/2017 Growth %	Q1 2018	Q2 2018
Platinum Supply-demand Balance (koz)							
SUPPLY							
Refined Production	6,035	6,140	6,025	2%	-2%	1,305	1,575
South Africa	4,255	4,385	4,335	3%	-1%	905	1,125
Zimbabwe	490	480	460	-2%	-4%	115	110
North America	395	365	365	-8%	0%	90	85
Russia	715	720	680	1%	-6%	145	205
Other	180	190	185	6%	-3%	50	50
Increase (-)/Decrease (+) in Producer Inventory	+30	+30	-10	0%	N/M	-10	+65
Total Mining Supply	6,065	6,170	6,015	2%	-3%	1,295	1,640
Recycling	1,840	1,890	1,895	3%	0%	455	480
Autocatalyst	1,210	1,325	1,385	10%	5%	330	345
Jewellery	625	560	505	-10%	-10%	125	135
Industrial	5	5	5	0%	0%	0	0
Total Supply	7,905	8,060	7,910	2%	-2%	1,750	2,120
DEMAND							
Automotive	3,460	3,340	3,130	-3%	-6%	805	800
Autocatalyst	3,325	3,195	2,980	-4%	-7%	765	770
Non-road	135	140	145	4%	4%	35	40
Jewellery	2,505	2,460	2,445	-2%	-1%	605	590
Industrial	1,785	1,700	1,790	-5%	5%	465	445
Chemical	565	590	575	4%	-3%	145	140
Petroleum	215	100	160	-53%	60%	40	40
Electrical	185	195	190	5%	-3%	55	45
Glass	205	185	200	-10%	8%	70	45
Medical and Biomedical	230	235	240	2%	2%	55	70
Other	385	395	425	3%	8%	100	105
Investment	535	265	250	-50%	-6%	50	-55
Change in Bars, Coins	460	205				75	70
Change in ETF Holdings	-10	105				-15	-125
Change in Stocks Held by Exchanges	85	-45				-10	0
Total Demand	8,285	7,765	7,615	-6%	-2%	1,925	1,780
Balance	-380	295	295	N/M	0%	-175	340
Above Ground Stocks	4,140*	1,905	2,200	15%	13%		

Source: SFA (Oxford). *As of 31st December 2012. NB: Numbers have been independently rounded.

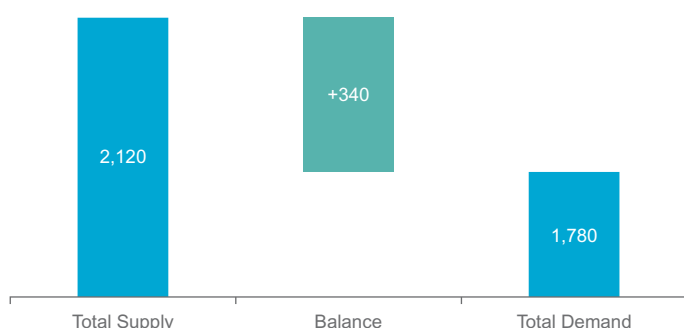
Notes:

- All estimates are based on the latest available information. They are subject to revision in our subsequent quarterly reports in the event that additional information is identified.
- The WPIC did not publish quarterly estimates for 2013 or the first two quarters of 2014. However, quarterly estimates from Q3 2014, to Q2 2016 are contained in previously published PQs which are freely available on the WPIC website. Quarterly estimates from Q3 2016 and half-yearly estimates from H2 2016 are included in Tables 3 and 4 respectively, on pages 14-15 (supply, demand and above ground stocks).
- The 2017 and 2018 forecasts are based on historical data and trends as well as modelling, with varying degrees of accuracy depending upon the supply or demand category. Investment demand is expected to be the least predictable segment. Some historical views are based on data and modelling that pre-date WPIC publication of PQ.

2018 SECOND QUARTER PLATINUM MARKET REVIEW

Global platinum demand contracted by 8% year-on-year to 1,780 koz in the second quarter this year. The largest decline was seen in investment demand which swung from positive in Q2'17 (+100 koz) to negative in Q2'18 (-55 koz), as outflows from ETFs more than outweighed solid bar and coin demand. Automotive demand fell year-on-year (-40 koz), while jewellery demand was unchanged and industrial demand improved (+30 koz). Total platinum supply increased marginally to 2,120 koz, as total mining supply grew by 1% (+10 koz) and platinum recycling was flat year-on-year. With demand weakening and supply little changed, the market had a surplus of 340 koz (Chart 1).

Chart 1: Supply-demand balance, koz, Q2 2018

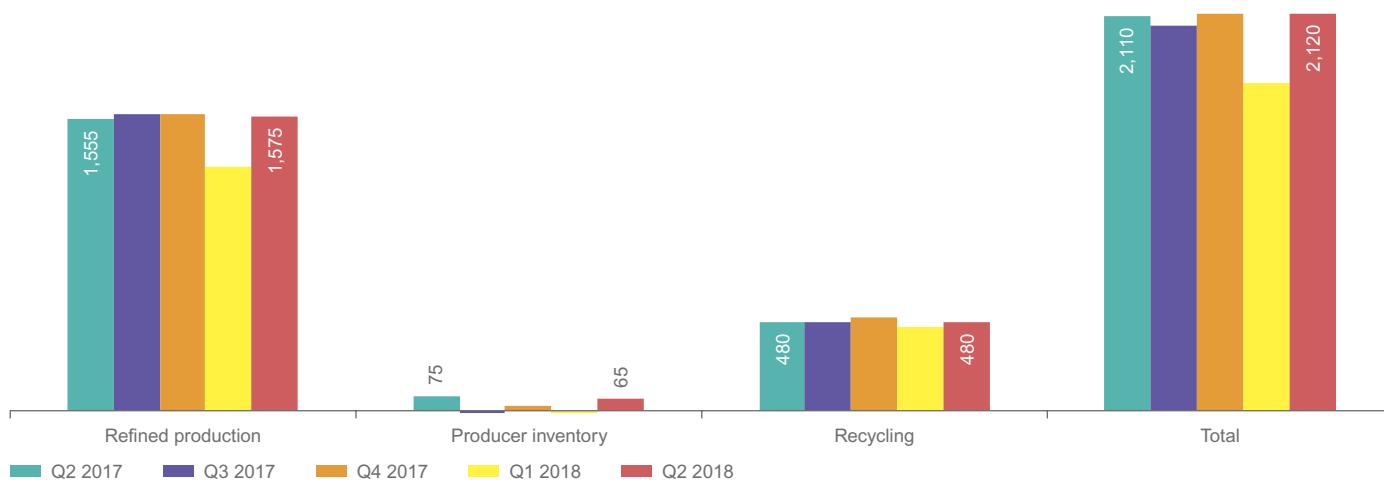


Source: SFA (Oxford)

Supply

Refined production increased by 1% (+20 koz) year-on-year to 1,575 koz in the second quarter of 2018. South African supply grew by 3% year-on-year to 1,125 koz, partly owing to reduced capacity in the prior year period for shaft repair work, but also increased volumes from a shaft in ramp-up phase, mining of a high-grade area at a major operation, and improved concentrator throughput and recoveries during the quarter. Growth in refined production was 25 koz lower in Q2'18 due to lower mining capacity as a result of shaft closures in 2017.

Chart 2: Platinum supply, koz



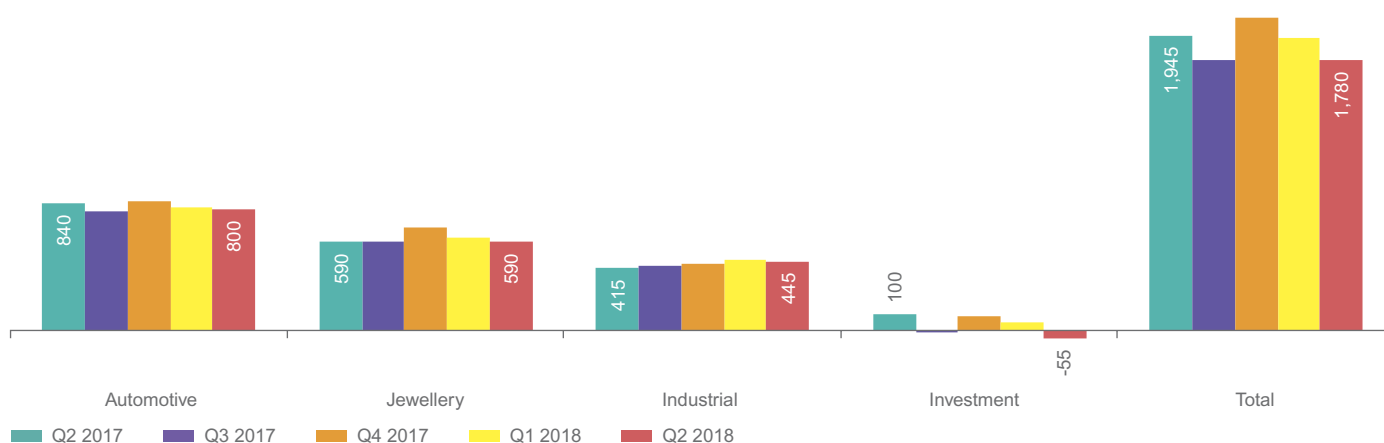
Source: SFA (Oxford)

Production from Zimbabwe decreased by 12% year-on-year to 110 koz as a result of built-up pipeline material processed in Q2'17. Combined output from North America, Russia and other regions remained stable year-on-year at 340 koz. There was a net 65 koz reduction in producer inventory during the quarter, which lifted total mining supply to 1,640 koz (+1% year-on-year).

Platinum recycling recovered 480 koz of metal in Q2'18, unchanged from the same quarter last year, but an increase from the first quarter of 2018. Autocatalyst recycling rose 5% (+15 koz) year-on-year to 345 koz as throughput volume grew. The Q2'18 average price of scrap steel was the highest since 2014 and resulted in a good flow of autocatalysts as scrapyards increased their vehicle throughput. Recycling of platinum jewellery fell 15 koz from Q2'17, exactly offsetting the growth in autocatalyst recycling. The local price of platinum dropped in China and Japan in Q2'18 which resulted in lower returns of jewellery metal.

Demand

Chart 3: Platinum demand, koz



Source: SFA (Oxford)

Automotive demand

Platinum demand for autocatalysis decreased by 5% (-40 koz) year-on-year to 800 koz in the second quarter of 2018, as the declining diesel share in Western Europe continued to weaken demand in platinum's largest automotive market. Consumption declined slightly in Japan and China, although growth in India and the RoW did partially offset lost demand in the other regions.

Western Europe's platinum requirements fell by 11% (-45 koz) to 355 koz, despite strong sales growth in the EU for both passenger cars and commercial vehicles in Q2'18. New car registrations increased by 5% year-on-year, according to data from ACEA, improving in each of the main markets, with the exception of Italy, where new car registrations fell 1.6%. However, whilst passenger car registrations grew in the key markets of Germany, France, Spain and the UK during Q2'18, diesel car sales slumped by double-digit percentages in each of those countries and by a single-digit percentage in Italy. As a result, Q2'18 diesel shares fell to 40% in France (48% in 2017), 36% in Spain (vs. 49%), just 32% in both Germany (from 40%) and the UK (from 44%) and 52% in Italy (from 57%).

India's automotive demand growth was primarily supported by increased sales in the heavy commercial vehicle (HCV) sector, which accounted for more than half of the increase in platinum consumption in Q2'18, as well as rising light vehicle production. Q2'17 was a relatively weak quarter for India, as domestic automakers were focused on minimising dealer stock levels ahead of the implementation of the Goods and Services Tax (GST) in July 2017, with uncertainties relating to the GST also weakening sales volumes for most manufacturers. Sales in Q2'17 were also negatively affected by the transition to Bharat Stage IV (BS-IV) regulations owing to a limited supply of BS-IV-compliant vehicles.

Jewellery demand

Platinum demand from jewellery fabricators was 590 koz in the second quarter of 2018, flat year-on-year as a decline in demand from China was offset by modest growth spread between all other regions.

Platinum jewellery continues to lose out to yellow and white gold in China as consumers' tastes change. The jewellery market remains challenging as total jewellery retail sales in mainland China dropped 10% year-on-year in Q2'18, but rose 23% in Hong Kong. A weak Hong Kong dollar relative to the Chinese yuan resulted in favourable prices which attracted a high volume of price-conscious tourists from the mainland in a typically weak period for travel. Indian jewellery demand saw relatively small growth compared to other quarters as Adhik Maas occurred in Q2'18, an inauspicious period which reduced wedding-related sales, and Q2'17 provided a high base due to purchasing ahead of the introduction of the Goods and Services Tax. US demand was strong, aided by the lower platinum price, and imports of solid platinum metal were at the highest level in H1'18 since before 2010, up 4% year-on-year. While European sales have not seen the same level of growth as those in the US, hallmarking figures are showing that platinum is expanding its market share as the platinum price fell further than the gold price, increasing platinum's discount to gold.

Industrial demand

Industrial demand for platinum increased by 7% year-on-year (+30 koz) to 445 koz in Q2'18, boosted by growth in net use in petroleum refining and other end-uses. Refining capacity expansion in Asia (RoW) raised new metal requirements in the petroleum sector during the second quarter of 2018, while more stable capacity (no cuts) also lifted net demand in Japan. Net petroleum demand was particularly weak in Japan during Q2'17 following substantial refining capacity reductions returning platinum to market, meaning that comparatively stable capacity in H1'18 raised net requirements in the country year-on-year. Meanwhile, rising demand for fuel cells (Japan) and automotive sensors (China and the RoW) increased platinum consumption in other end-uses last quarter.

Investment demand

Investment demand was -55 koz in the second quarter, as outflows from ETFs outweighed another solid quarter for bar and coin demand, while exchange stock holdings were unchanged.

Global ETF holdings dropped by 125 koz in Q2'18 as all regions saw net sales. The decline was largest in the US where ETF holdings fell by 59 koz, followed by South Africa with net sales of 30 koz. In the UK, ETF holdings slipped by 20 koz and Swiss investors reduced their ETF holdings by 14 koz.

Bar and coin demand was 70 koz in Q2'18. During the quarter the price of platinum fell further which encouraged Japanese investors to purchase more platinum bars than in Q1'18. However, there was evidently some reluctance to keep buying at the same pace as in previous years since, although the price was also lower year-on-year, purchases declined year-on-year. The US Mint released an additional 10,000 one ounce platinum American Eagle bullion coins in Q2'18 which also helped to contribute to the positive quarter.

Chart 4: Platinum investment



Source: SFA (Oxford)

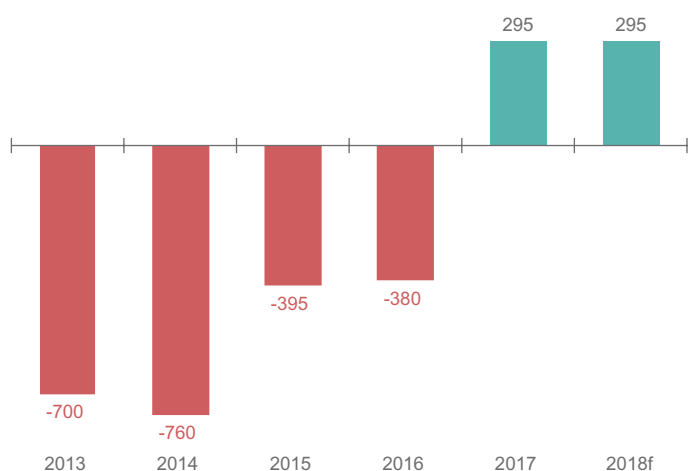
2018 FORECAST

Global platinum supply is forecast to slip by 2% year-on-year (-150 koz) to 7,910 koz this year as total mining output falls by 3% (-155 koz) to 6,015 koz, while recycling is marginally higher (+5 koz) at 1,895 koz. Most mining regions are expected to have lower refined production in 2018 with declines being seen in South Africa (-50 koz), Zimbabwe (-20 koz), Russia (-40 koz) and Other regions (-5 koz), while North American output remains flat. Autocatalyst recycling is projected to increase by 5% (+60 koz) to 1,385 koz. This gain just outweighs a 10% decline in jewellery recycling (-55 koz) to 505 koz.

Global platinum demand is forecast to fall by 2% in 2018 to 7,615 koz, as lower automotive (-210 koz), jewellery (-15 koz) and investment (-15 koz) demand outweighs an increase (+90 koz) in industrial usage. The main driver of the 5% increase in industrial demand to 1,790 koz is a rebound in petroleum demand after refinery closures in 2017 reduced net consumption. Glass, medical and other industrial end-uses see modest gains in demand, while chemical and electrical requirements are expected to be slightly lower this year. Jewellery demand is anticipated to decrease by 1% to 2,445 koz as the decline in Chinese requirements is expected to continue, and that more than offsets gains in all the other regions. Automotive demand is projected to fall by 6% to 3,130 koz, as the erosion of diesel market share in passenger cars in Western Europe continues and swamps gains from stronger commercial vehicle sales. Investment demand is forecast to be slightly lower this year at 250 koz as ETFs are not expected to see as large an increase as in 2017.

With both supply and demand dipping by 2% this year, the market is projected to have a surplus of 295 koz (Chart 5).

Chart 5: Supply-demand balance, koz, 2013-2018f



Source: SFA (Oxford)

Mine supply

Global refined production is forecast to fall by 2% to 6,025 koz in 2018. South African supply could decrease by 1% to 4,335 koz, with closure of loss-making production areas during 2017 resulting in a 105 koz reduction this year. However, four production areas are in ramp-up – contributing an additional 75 koz year-on-year – and ore stockpiled during tailings dam rehabilitation on the Eastern Bushveld in H2'17 will be processed this year, limiting South Africa to a 50 koz reduction in output for 2018 overall.

Supply from Zimbabwe is estimated to decrease by 4% year-on-year (-20 koz) with mine production stable at 460 koz and no major pipeline stock movements expected. Supply from North America should remain stable at 365 koz, while output from Russia is projected to fall by 6% year-on-year to 680 koz as a small pipeline lock-up is anticipated. A minor (+10 koz) net increase in producer inventory is forecast for 2018. There was a net reduction in the first half of 2018 that boosted refined supply by 55 koz, and it is likely that producers will restock to typical levels in the remainder of the year as built-up concentrate stocks are processed. This gives total mining supply of 6,015 koz for the year (-2% on 2017).

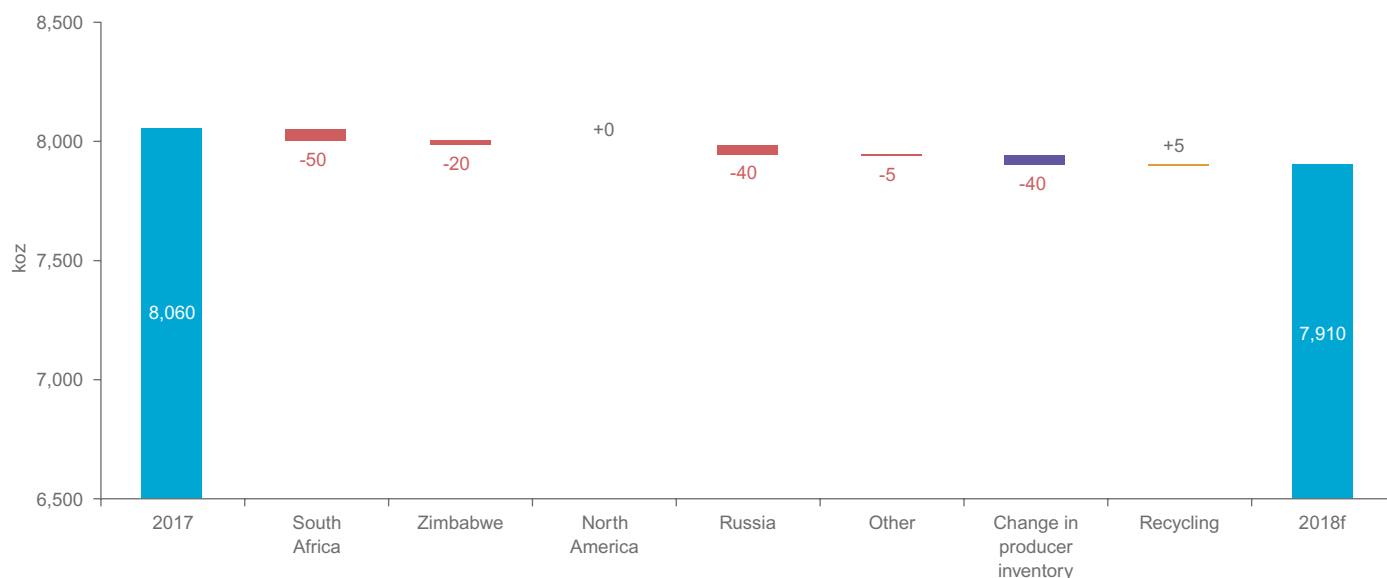
Recycling

Platinum supply from recycling is forecast to increase marginally by 5 koz to 1,895 koz in 2018.

Autocatalyst recycling is predicted to see continued growth this year, up by 5% to 1,385 koz. The volume of recycling in the first half of the year has been good, with vehicle scrappage volumes being driven up by a high scrap steel price. As the consensus scrap steel price forecast is for sustained high prices in H2'18, the second half is expected to continue the trend. A small revision (-20 koz) to the 2018 forecast has been made due to a change in estimates of second-hand vehicle trade flows in Europe.

Jewellery recycling is expected to decline by 10% in 2018 to 505 koz. The low platinum price is anticipated to continue to disincentivise recycling in H2'18 and, as a result, the forecast for platinum supply from recycled jewellery in 2018 has been reduced by 45 koz.

Chart 6: Changes in total supply, 2018f vs. 2017



Source: SFA (Oxford)

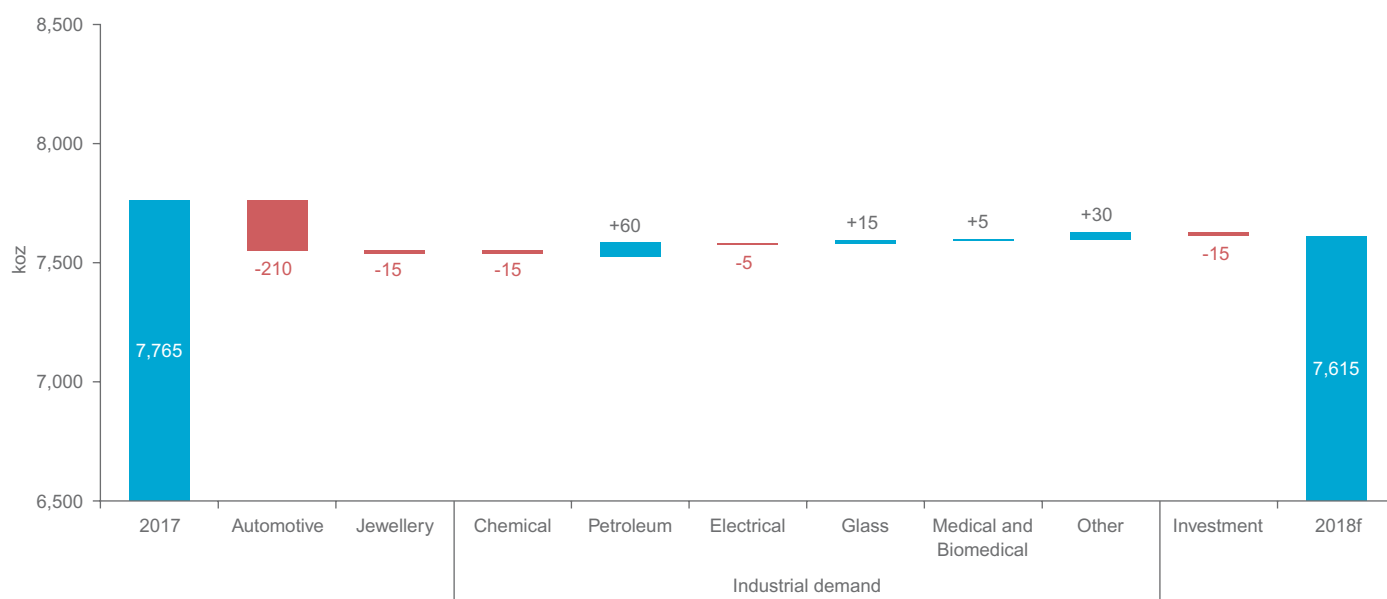
Automotive demand

Lower diesel vehicle production in Western Europe is likely to reduce global automotive platinum demand by 6% (-210 koz) year-on-year to 3,130 koz in 2018, with Western Europe's consumption declining at a double-digit rate. Elsewhere, demand is expected to increase slightly, with growth in India, North America and the RoW outweighing losses in Japan and China.

Despite gradual growth in overall passenger car production, Western Europe's diesel car output is forecast to shrink by 19% in 2018, equivalent to more than 1 million vehicles, lowering the region's diesel share to just 35% (versus 43% last year). This would represent a more rapid rate of decline of Western Europe's diesel market compared to 2017, as more automakers and consumers move away from pure diesel vehicles, resulting in a greater fall in platinum requirements year-on-year. A further minor contribution to the decline in platinum demand is the lower average platinum content of new diesel cars in the region, as manufacturers increasingly favour selective catalytic reduction (SCR) technology over lean NO_x traps (LNTs) for NO_x emissions control. Germany is set to account for the largest reduction of the region's demand this year, alone dwarfing growth outside of Western Europe, followed by Spain, the UK and France.

Platinum demand growth in India, the main automotive demand growth market, is predicted to increase in each of the main segments, passenger cars, light commercial vehicles (LCVs) and HCVs, this year, supported by rising production and stable diesel shares in each of these segments. In North America, expansion of the HCV market in the US is expected to comprise the vast majority (~80%) of regional consumption growth, while greater production of commercial vehicles in Mexico, Thailand and Brazil, as well as passenger cars in Russia, should boost platinum usage in the RoW. However, a dip in passenger car output in Japan and a reduction in HCV volumes in China are likely to lower requirements in these countries, following strong demand in China last year as a result of a spike in production and the implementation of more stringent emissions standards (China VI).

Chart 7: Changes in demand by category, 2018f vs. 2017



Source: SFA (Oxford)

Jewellery demand

Jewellery demand for platinum is forecast to fall by 1% (-15 koz) in 2018 to 2,445 koz. Chinese platinum jewellery consumption was revised down after a weaker than expected first half, as retailers have not fully adapted to changing consumer purchasing habits and platinum failed to benefit from the upturn in gold jewellery purchases. A shift towards more style- and design-focused jewellery pieces has benefitted gold as its widespread familiarity to jewellers has meant that gold jewellery has been able to adapt more rapidly than platinum. PGI's focus in China is on bridal jewellery, a core constituent of platinum jewellery demand, and sales have been stable despite the adverse demographic trend of a declining number of people of marriageable age. Currently, concerns stemming from the exchanges between the USA and China over trade do not appear to be impacting the jewellery market.

Japanese and North American requirements were revised up slightly based on the lower platinum price and a strong performance from the American economy, partly due to tax cuts. India is set to contribute the highest number of ounces to global growth and to be the fastest growing market in 2018. Platinum's market share is expanding from a very low base as retail chains in the country are increasingly stocking platinum jewellery. Platinum jewellery demand growth in 2018 is now expected in all regions except China.

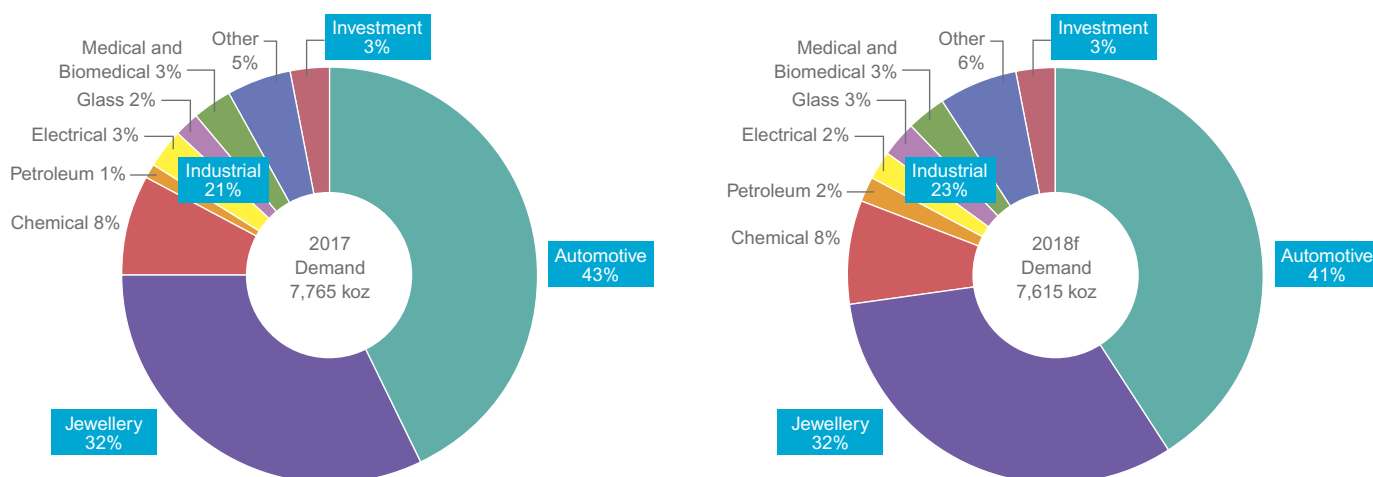
Industrial demand

Industrial platinum demand is forecast to recover to 1,790 koz this year, rising by 5% (+90 koz) to surpass 2016 demand levels following a rebound in net petroleum requirements (+60 koz) and greater usage in glass fabrication (+15 koz), medical devices (+5 koz) and other end-uses (+30 koz). However, demand is predicted to decline in the chemical (-15 koz) and electrical (-5 koz) sectors, partially offsetting growth elsewhere.

Chemical

Platinum requirements for chemical catalysis are expected to decrease by 3% year-on-year to 575 koz in 2018, largely owing to lower demand for use in nitric acid production. Global capacity for the production of ammonium nitrate, nitric acid's primary end-use, is projected to contract this year, reducing nitric acid consumption and thus platinum requirements in Western Europe and the RoW. Conversely, platinum consumption in silicones is anticipated to increase this year, especially in China and the RoW, somewhat offsetting lost demand in the nitric acid industry, although usage in dehydrogenation and paraxylene catalysts is set to remain relatively flat.

Chart 8: Demand end-use shares, 2018f vs. 2017



Source: SFA (Oxford)

Petroleum

Petroleum refining demand is predicted to recover in Japan (+45 koz), helping global platinum requirements rebound to 160 koz this year and returning domestic demand to net positive levels following capacity curtailments (metal returned to market) in 2017. Growth is also anticipated in the RoW, driven by refining capacity expansion in India, Russia, Southeast Asia and the Middle East, although the rate of capacity expansion in China is set to ease, lowering new metal demand in the country and partly negating growth elsewhere.

Electrical

Electrical usage is expected to fall by 3% year-on-year to 190 koz in 2018, predominantly owing to lower requirements for hard disk drives (HDDs) and other electrical components in China, the sector's main market. HDD demand is set to decline as shipments drop by 10% to an estimated 363 million units this year, with PC HDD deliveries decreasing by 17% following further loss of market share to solid-state drives (SSDs), particularly in laptops (notebooks). In the first six months of the year, HDD shipments declined by 6% to an estimated 184 million units. The total volume of platters (disks) shipped in HDDs is also predicted to decrease in 2018, by 1%, despite an increase in the average number of platters per HDD, reducing total platinum requirements slightly.

However, since the previous *Platinum Quarterly* report, demand estimates for electrical end-uses have been revised upwards by an average of 25 koz per annum for 2013-2018 following further research into the HDD market. This research identified additional information about historical and forecast platter shipments, leading to improved estimates for the average number of platters, and therefore platinum content, per HDD, and resulting in a higher re-basing of platinum demand for HDDs.

Glass

Platinum requirements for glass fabrication are projected to rise by 8% to 200 koz this year, following growth in all regions except China, where a relative lack of new capacity is likely to lower new metal demand compared to 2017, hindering global demand growth. New glass fibre facilities and expansions in France, the Netherlands, the US and Turkey are anticipated to lift platinum demand in Western Europe, North America and the RoW in 2018, whilst a more stable market (fewer plant closures, less metal returned to market) should shift demand back to net positive levels in Japan.

Other

Platinum consumption in other industrial end-uses is forecast to increase by 8% to 425 koz in 2018, driven by greater demand for fuel cells and automotive sensors. Growing adoption of fuel cell technology in stationary applications is expected to support demand growth in the US, while growing usage of fuel cells in transportation should boost platinum requirements in Japan and South Korea, both key manufacturing regions. Expanding gasoline vehicle production is likely to lift automotive sensor consumption in China and the RoW, as well as in Western Europe, where declining diesel shares are set to benefit the gasoline market and sensor demand this year.

Investment demand

Platinum investment is forecast to be 250 koz in 2018. While ETF holdings were sold off in the first half of 2018, there has been a sharp rebound so far in Q3'18 and the year as a whole is predicted to see a modest increase in holdings. Bar and coin demand is estimated to have another solid year. The platinum price has continued to edge lower in yen terms and Japanese investors are expected to purchase bars at a similar pace to last year; global coin sales are also anticipated to be similar to those in 2017.

ABOVE GROUND STOCKS

The market is projected to have a surplus of 295 koz this year, which will result in above ground stocks ending the year at 2,495 koz.

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 2018

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

	2013	2014	2015	2016	2017	2018f	2017/2016 Growth %	2018f/2017 Growth %
Platinum Supply-demand Balance (koz)								
SUPPLY								
Refined Production	6,070	4,880	6,150	6,035	6,140	6,025	2%	-2%
South Africa	4,355	3,115	4,465	4,255	4,385	4,335	3%	-1%
Zimbabwe	405	405	405	490	480	460	-2%	-4%
North America	355	400	385	395	365	365	-8%	0%
Russia	740	740	715	715	720	680	1%	-6%
Other	215	220	180	180	190	185	6%	-3%
Increase (-)/Decrease (+) in Producer Inventory	-215	+350	+45	+30	+30	-10	0%	N/M
Total Mining Supply	5,855	5,230	6,195	6,065	6,170	6,015	2%	-3%
Recycling	1,980	2,035	1,705	1,840	1,890	1,895	3%	0%
Autocatalyst	1,120	1,255	1,185	1,210	1,325	1,385	10%	5%
Jewellery	855	775	515	625	560	505	-10%	-10%
Industrial	5	5	5	5	5	5	0%	0%
Total Supply	7,835	7,265	7,900	7,905	8,060	7,910	2%	-2%
DEMAND								
Automotive	3,170	3,310	3,380	3,460	3,340	3,130	-3%	-6%
Autocatalyst	3,030	3,165	3,245	3,325	3,195	2,980	-4%	-7%
Non-road	140	150	140	135	140	145	4%	4%
Jewellery	2,945	3,000	2,840	2,505	2,460	2,445	-2%	-1%
Industrial	1,485	1,565	1,770	1,785	1,700	1,790	-5%	5%
Chemical	535	540	605	565	590	575	4%	-3%
Petroleum	50	65	205	215	100	160	-53%	60%
Electrical	195	205	190	185	195	190	5%	-3%
Glass	145	175	200	205	185	200	-10%	8%
Medical and Biomedical	220	220	225	230	235	240	2%	2%
Other	340	360	345	385	395	425	3%	8%
Investment	935	150	305	535	265	250	-50%	-6%
Change in Bars, Coins	-5	50	525	460	205			
Change in ETF Holdings	905	215	-240	-10	105			
Change in Stocks Held by Exchanges	35	-115	20	85	-45			
Total Demand	8,535	8,025	8,295	8,285	7,765	7,615	-6%	-2%
Balance	-700	-760	-395	-380	295	295	N/M	0%
Above Ground Stocks	4,140*	3,440	2,680	1,905	2,200	2,495	15%	13%

Source: SFA (Oxford). *As of 31st December 2012. NB: Numbers have been independently rounded.

PLATINUM QUARTERLY Q2 2018

Table 3: Supply and demand summary – quarterly comparison

	Q3 2016	Q4 2016	Q1 2017	Q2 2017	Q3 2017	Q4 2017	Q1 2018	Q2 2018	Q2'18/Q2'17 Growth %	Q2'18/Q1'18 Growth %
Platinum Supply-demand Balance (koz)										
SUPPLY										
Refined Production	1,620	1,490	1,415	1,555	1,585	1,590	1,305	1,575	1%	21%
South Africa	1,180	1,065	1,020	1,090	1,155	1,120	905	1,125	3%	24%
Zimbabwe	120	120	115	125	100	140	115	110	-12%	-4%
North America	100	85	95	85	95	95	90	85	0%	-6%
Russia	175	170	140	205	185	190	145	205	0%	41%
Other	45	50	45	50	50	45	50	50	0%	0%
Increase (-)/Decrease (+) in Producer Inventory	-105	-75	-60	+75	-10	+25	-10	+65	N/M	N/M
Total Mining Supply	1,515	1,415	1,355	1,630	1,575	1,615	1,295	1,640	1%	27%
Recycling	510	460	420	480	480	505	455	480	0%	5%
Autocatalyst	315	280	300	330	330	365	330	345	5%	5%
Jewellery	195	180	120	150	150	140	125	135	-10%	8%
Industrial	0	0	0	0	0	0	0	0	N/M	N/M
Total Supply	2,025	1,875	1,775	2,110	2,055	2,120	1,750	2,120	0%	21%
DEMAND										
Automotive	795	880	860	840	785	855	805	800	-5%	-1%
Autocatalyst	765	845	825	805	755	815	765	770	-4%	1%
Non-road	30	35	35	35	35	35	35	40	14%	14%
Jewellery	630	700	610	590	580	680	605	590	0%	-2%
Industrial	470	425	435	415	425	435	465	445	7%	-4%
Chemical	165	130	150	140	165	135	145	140	0%	-3%
Petroleum	55	55	35	15	25	25	40	40	167%	0%
Electrical	50	50	55	45	50	60	55	45	0%	-18%
Glass	60	5	40	50	45	40	70	45	-10%	-36%
Medical and Biomedical	45	75	55	70	45	70	55	70	0%	27%
Other	95	110	100	95	95	105	100	105	11%	5%
Investment	50	225	80	100	-10	95	50	-55	N/M	N/M
Change in Bars, Coins	80	115	30	70	45	60	75	70	0%	-7%
Change in ETF Holdings	-85	115	60	30	-40	55	-15	-125	N/M	N/M
Change in Stocks Held by Exchanges	55	-5	-10	0	-15	-20	-10	0	N/M	N/M
Total Demand	1,945	2,230	1,985	1,945	1,780	2,065	1,925	1,780	-8%	-8%
Balance	80	-355	-210	165	275	55	-175	340		

Source: SFA (Oxford). NB: Numbers have been independently rounded. N/M means not meaningful.

PLATINUM QUARTERLY Q2 2018

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

	H2 2016	H1 2017	H2 2017	H1 2018	H1'18/H1'17 Growth %	H1'18/H2'17 Growth %
Platinum Supply-demand Balance (koz)						
SUPPLY						
Refined Production	3,110	2,970	3,175	2,880	-3%	-9%
South Africa	2,245	2,110	2,275	2,030	-4%	-11%
Zimbabwe	240	240	240	225	-6%	-6%
North America	185	180	190	175	-3%	-8%
Russia	345	345	375	350	1%	-7%
Other	95	95	95	100	5%	5%
Increase (-)/Decrease (+) in Producer Inventory	-180	+15	+15	+55	N/M	N/M
Total Mining Supply	2,930	2,985	3,190	2,935	-2%	-8%
Recycling	970	900	985	935	4%	-5%
Autocatalyst	595	630	695	675	7%	-3%
Jewellery	375	270	290	260	-4%	-10%
Industrial	0	0	0	0	N/M	N/M
Total Supply	3,900	3,885	4,175	3,870	0%	-7%
DEMAND						
Automotive	1,675	1,700	1,640	1,605	-6%	-2%
Autocatalyst	1,610	1,630	1,570	1,535	-6%	-2%
Non-road	65	70	70	75	7%	7%
Jewellery	1,330	1,200	1,260	1,195	0%	-5%
Industrial	895	850	860	910	7%	6%
Chemical	295	290	300	285	-2%	-5%
Petroleum	110	50	50	80	60%	60%
Electrical	100	100	110	100	0%	-9%
Glass	65	90	85	115	28%	35%
Medical and Biomedical	120	125	115	125	0%	9%
Other	205	195	200	205	5%	3%
Investment	275	180	85	-5	N/M	N/M
Change in Bars, Coins	195	100	105	145	45%	38%
Change in ETF Holdings	30	90	15	-140	N/M	N/M
Change in Stocks Held by Exchanges	50	-10	-35	-10	0%	-71%
Total Demand	4,175	3,930	3,845	3,705	-6%	-4%
Balance	-275	-45	330	165		

Source: SFA (Oxford). NB: Numbers have been independently rounded. N/M means not meaningful.

PLATINUM QUARTERLY Q2 2018

Table 5: Regional demand – annual and quarterly comparison

	2013	2014	2015	2016	2017e	2018f	2017e/2016 Growth %	2018f/2017e Growth %	Q2 2017	Q3 2017	Q4 2017	Q1 2018	Q2 2018
Platinum gross demand (koz)													
Automotive	3,170	3,310	3,380	3,460	3,340	3,130	-3%	-6%	840	785	855	805	800
North America	425	465	490	445	415								
Western Europe	1,350	1,440	1,550	1,705	1,560								
Japan	580	590	510	455	450								
China	130	120	125	165	200								
India	160	160	175	165	165								
Rest of the World	525	535	530	525	550								
Jewellery	2,945	3,000	2,840	2,505	2,460	2,445	-2%	-1%	590	580	680	605	590
North America	200	230	250	265	280								
Western Europe	220	220	235	240	250								
Japan	335	335	340	335	340								
China	1,990	1,975	1,765	1,450	1,340								
India	140	175	180	145	175								
Rest of the World	60	65	70	70	75								
Chemical	535	540	605	565	590	575	4%	-3%	140	165	135	145	140
North America	55	55	65	50	55								
Western Europe	110	105	100	110	120								
Japan	10	10	10	15	15								
China	195	215	255	225	225								
Rest of the World	165	155	175	165	175								
Petroleum	50	65	205	215	100	160	-53%	60%	15	25	25	40	40
North America	40	25	-25	90	55								
Western Europe	-45	-15	70	10	5								
Japan	10	-35	5	0	-40								
China	80	-5	45	80	45								
Rest of the World	-35	95	110	35	35								
Electrical	195	205	190	185	195	190	5%	-3%	45	50	60	55	45
North America	10	15	15	10	15								
Western Europe	5	10	10	10	10								
Japan	15	15	15	15	15								
China	75	70	65	75	80								
Rest of the World	90	95	85	75	75								
Glass	145	175	200	205	185	200	-10%	8%	50	45	40	70	45
North America	5	10	0	20	5								
Western Europe	-10	15	10	5	10								
Japan	0	-25	-5	-10	-10								
China	90	85	95	100	85								
Rest of the World	60	90	100	90	95								
Medical and Biomedical	220	220	225	230	235	240	2%	2%	70	45	70	55	70
North America	90	90	90	90	95								
Western Europe	75	75	75	80	80								
Japan	20	20	20	20	20								
China	15	15	20	20	20								
Rest of the World	20	20	20	20	20								
Other industrial	340	360	345	385	395	425	3%	8%	95	95	105	100	105
Investment	935	150	305	535	270	250	-50%	-7%	100	-10	95	50	-55
Total Demand	8,535	8,025	8,295	8,285	7,770	7,615	-6%	-2%	1,945	1,780	2,065	1,925	1,780

Source: SFA (Oxford). NB: Numbers have been independently rounded.

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.

BDH

Butane dehydrogenation; catalytic conversion of isobutane to isobutylene.

Bharat Stage III/IV standards (BS-III, BS-IV)

Bharat Stage III is equivalent to Euro 3 emissions legislation. Introduced in 2005 in 12 major cities across India and enforced nationwide from April 2010. Bharat Stage IV is equivalent to Euro 4 emissions legislation. Introduced in 2010 in 14 major cities across India and set to be enforced nationwide from April 2017.

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.

Conformity factor (CF)

The EU is to allow automakers to exceed current Euro 6 NO_x limits, giving time to adapt to new real-world driving emissions rules. From September 2017 for new models and from September 2019 for new vehicles, a CF of up to 2.1 (110%) will be allowed over the 80 mg/km NO_x limit. This CF will be phased out at the latest in 2021, then from January 2020 (new models) and January 2021 (new vehicles) a lower CF of 1.5 will be allowed, reflecting statistical and technical uncertainty of the tests.

Diesel oxidation catalyst (DOC)

A DOC oxidises harmful carbon monoxide and unburnt hydrocarbons, produced by incomplete combustion of diesel fuel, to harmless 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.

Emissions legislation

Tailpipe regulations covering emissions of particulate matter, hydrocarbons and oxides of nitrogen.

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.

Euro V/VI emission standards

EU emission standards for heavy-duty vehicles. Euro V legislation was introduced in 2009 and Euro VI in 2013/2014; will be widely adopted later in other regions.

Euro 5/6 emission standards

EU emission standards for light-duty vehicles. Euro 5 legislation was introduced in 2009 and Euro 6 in 2014/2015; will be widely adopted later in other regions.

Form factor

The size of a hard disk drive (e.g. 2.5-inch or 3.5-inch) which varies depending on the device the drive is used in.

GTL

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

HDD

Hard disk drive.

HDV

Heavy-duty vehicle.

koz

Thousand ounces.

LCD

Liquid-crystal display used for video display.

LCV

Light commercial vehicle.

Lean NO_x traps (LNT)

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

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.

moz

Million ounces.

Net demand

A measure of the theoretical 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, using engine and emissions technology similar to on-road heavy-duty diesel vehicles.

NO_x storage catalyst (NSC)

Used in light duty diesel aftertreatment to convert harmful oxides of nitrogen to harmless nitrogen and carbon dioxide. The PGM content is mainly platinum, with some rhodium. NSCs may be used in conjunction with SCR technology to minimise NO_x emissions.

OECD

Organisation for Economic Co-operation and Development, consisting of 34 developed countries.

oz

A unit of weight commonly used for precious metals.
1 troy ounce = 1.1 ounces.

Paraxylene

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.

PDH

Propane dehydrogenation, where propane is converted to propylene.

PGMs

Platinum-group metals.

Producer inventory

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

RDE

Real Driving Emissions - the term used by the EU to define the testing protocol that will measure pollutants emitted from cars, including NO_x, while driven on the road. It is in addition to laboratory tests. RDE testing will be implemented in

September 2017 for new types of cars and will apply to all registrations from September 2019.

Refined production

Processed platinum output from refineries.

Secondary supply

Recycling output.

Selective catalytic reduction (SCR)

PGM-free, converts harmful NO_x in diesel exhaust to harmless nitrogen, via a tank of urea solution. Used in heavy-duty diesel vehicles, increasingly competes with LNT in light-duty diesel vehicles. Contained within an aftertreatment system which normally requires a platinum-containing oxidation catalyst ahead of the SCR unit.

SGE

Shanghai Gold Exchange.

SSD

Solid-state drive.

Stage 4 regulations

European emission standards implemented in 2014 for non-road diesel engines.

Three-way catalyst

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

Tier 4 stage

Emissions standards phased in between 2008 and 2015 in the US for non-road vehicles.

WLTP

Worldwide Harmonized Light Vehicles Test Procedure is a laboratory test to measure pollutant emissions and fuel consumption. WLTP replaces the New European Drive Cycle (NEDC).

WPIC

The World Platinum Investment Council.

Ounce conversion

1 million ounces = 31.1 tonnes.

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