

# PLATINUM QUARTERLY

## Q4 2016

9th March 2017

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### FOREWORD

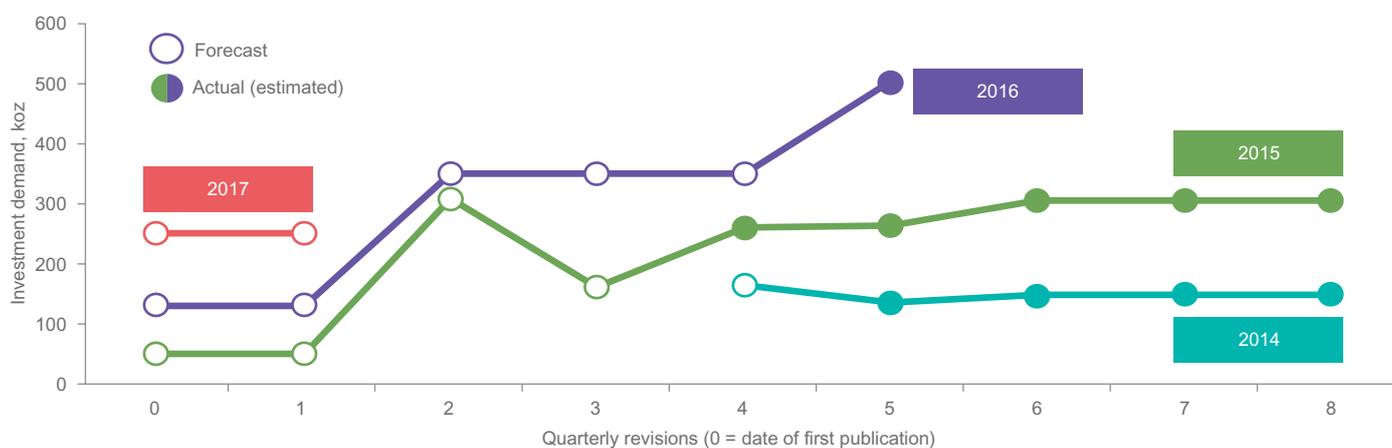
2016 was a year of mixed fortunes for the global platinum market. As today's *Platinum Quarterly*, the tenth report published by the World Platinum Investment Council, highlights, global supply was once again constrained – and is predicted to remain so in 2017 – while overall demand for the metal remained constant.

This resulted in the platinum market being in fundamental deficit for the fifth year in a row.

Nevertheless, the price of platinum remained weak, although it has encouragingly shown signs of reflecting tight fundamentals at the start of 2017.

Ahead of the modest price recovery recently observed, *Platinum Quarterly* shows that there was a considerable upturn in investment demand for platinum in the final quarter of 2016, powered by growing interest in Exchange Traded Funds (ETFs). It is also interesting to note the geographic pattern of ETF buying in 2016, with investors in Japan, the US and the UK increasing their purchases over the year, reversing the declines observed in those markets in 2015.

As the keen-eyed amongst you have no doubt already observed, the *Platinum Quarterly* investment demand forecast appears conservative. As the graph below shows, the investment demand forecast for the whole of 2017 is 250 koz, half that of 2016.



But if investment demand follows the path of previous years, the forecast will likely be revised upwards, as the graph shows it was in 2015 and 2016. Investment demand is often uneven, which is why we think it is wholly appropriate for the forecast to be prudent and conservative at the start of the year. As pieces are added to the investment jigsaw puzzle at quarterly intervals during the remainder of 2017, this should yield a more complete picture. I think this sensible approach truly shows the value of quarterly analysis as an aid to understanding this often complex market.

2016 was a year when headline jewellery demand in China fell. Our analysis indicates that while manufacturer demand undoubtedly fell, stock and inventory movements in China exaggerated the more moderate decline at the consumer level.

In contrast to jewellery, automotive demand for platinum increased, counter to many of the gloom-filled forecasts I have read.

Industrial demand, supported by resurgent expansion in petroleum refining capacity, also increased.

The barrage of often inaccurate coverage focused on diesel cars, and the suggested negative impact on platinum, continues. Those detractors would do well to read today's report which shows demand for platinum use in vehicles is far from collapsing – it grew in 2016 and in the largest diesel market, Western Europe, it was up again for the fourth consecutive year. Our quarterly data reveals that automotive demand grew, year-on-year, for 4 of the past 5 quarters. Although we do not publish quarterly data for Western Europe, our report confirms that automotive demand there grew year-on-year in every quarter since the third quarter of 2015, when the VW scandal started to unfold.

Consumers clearly enjoy diesel cars and want to continue buying them. They also continue to be an attractive option for reducing CO<sub>2</sub> emissions from the car fleet. Recent evidence shows that automakers can already produce extremely low emission diesel cars that meet NO<sub>x</sub> standards currently being considered for 2022. Those who are calling for an outright ban on diesel cars mistakenly assume that non-diesel cars are a cost-effective solution to both NO<sub>x</sub> and CO<sub>2</sub>. This simplistic approach should be avoided as it will compromise the optimal European and global powertrain mix. In the coming months, the WPIC will seek to add objective data to the debate.

Making it simpler for investors to invest in platinum through the investment product of their choice sits at the heart of the WPIC's activities. 2016 saw WPIC announce a raft of new partnerships. I'm delighted to say that we have already hit the ground running in 2017. Just last week we announced a new association with India's Muthoot Exim, the precious metals division of the 130-year old conglomerate Muthoot Pappachan Group, to launch India's first platinum deity products.

Demand for platinum products in India is undeniably on the up and we look forward to supporting further demand growth in the country in 2017. Meanwhile, we look forward to updating you on our exciting plans to support the launch of a number of ETF and coin-related products later in the year. We have observed the transformative market effect of ETF launches in the past and we certainly think there is a tremendous opportunity to further grow the market in years to come.

I would like to close the foreword of this quarter's *Platinum Quarterly* with some thoughts about the price of platinum.

There is confusion and there are differences of opinion as to how one should value platinum: is it a precious metal with an industrial premium or is it an industrial metal with a precious underpin?

These are questions that many investors we contact are grappling with. They are keen to better understand the opportunity presented by platinum's investment characteristics. They are evaluating platinum as part of their wider search for assets with upside to compensate for the declining long term yields that challenge asset managers worldwide.

Our conversations and engagement with family offices, private wealth managers and their advisors, who typically have a 2–3 year investment horizon, have been particularly enlightening on this matter. These investors are excited by the prospect that within their timeframe, the price of platinum will again reflect its industrial premium and the current discount provides a low risk entry point to this 'new' asset class.

Finally, I want to address the value of platinum in the context of the gold price. At present, the undeniable relationship between the two continues, with platinum still strongly tracking the movements of gold. In the short-term continued global macroeconomic and political instability means that platinum is likely to benefit from positive movements in the gold price, as the metal's safe haven status is sought. But do not be misled into thinking this relationship will continue to dominate, ignoring platinum's industrial premium, in the longer-term.

We believe that platinum is poised to re-gain the portion of its value related to its industrial applications and its strong supply/demand fundamentals. Platinum has been at a discount to gold on just four occasions during the past 40 years and the current period, its longest ever, seems increasingly unjustified due to misleading rhetoric and consecutive deficits. We believe many investors who have not previously considered investing in platinum find the unfolding data compelling.

**Paul Wilson, CEO**

# PLATINUM QUARTERLY Q4 2016

**Table 1: Supply, demand and above ground stocks summary**

	2015	2016	2017f	2016/2015 Growth %	2017f/2016 Growth %	Q3 2016	Q4 2016
<b>Platinum Supply-demand Balance (koz)</b>							
<b>SUPPLY</b>							
<b>Refined Production</b>	<b>6,150</b>	<b>6,030</b>	<b>5,920</b>	<b>-2%</b>	<b>-2%</b>	<b>1,610</b>	<b>1,495</b>
South Africa	4,465	4,240	4,185	-5%	-1%	1,170	1,065
Zimbabwe	405	480	445	19%	-7%	120	110
North America	385	410	400	6%	-2%	100	100
Russia	715	715	710	0%	-1%	175	170
Other	180	185	180	3%	-3%	45	50
<b>Increase (-)/Decrease (+) in Producer Inventory</b>	<b>+45</b>	<b>+70</b>	<b>-20</b>	<b>56%</b>	<b>-129%</b>	<b>-105</b>	<b>-35</b>
<b>Total Mining Supply</b>	<b>6,195</b>	<b>6,100</b>	<b>5,900</b>	<b>-2%</b>	<b>-3%</b>	<b>1,505</b>	<b>1,460</b>
<b>Recycling</b>	<b>1,710</b>	<b>1,865</b>	<b>1,760</b>	<b>9%</b>	<b>-6%</b>	<b>510</b>	<b>480</b>
Autocatalyst	1,190	1,235	1,255	4%	2%	315	300
Jewellery	515	625	500	21%	-20%	195	180
Industrial	5	5	5	0%	0%	0	0
<b>Total Supply</b>	<b>7,905</b>	<b>7,965</b>	<b>7,660</b>	<b>1%</b>	<b>-4%</b>	<b>2,015</b>	<b>1,940</b>
<b>DEMAND</b>							
<b>Automotive</b>	<b>3,385</b>	<b>3,405</b>	<b>3,390</b>	<b>1%</b>	<b>0%</b>	<b>790</b>	<b>855</b>
Autocatalyst	3,235	3,265	3,245	1%	-1%	755	815
Non-road	145	145	145	0%	0%	35	35
<b>Jewellery</b>	<b>2,880</b>	<b>2,565</b>	<b>2,530</b>	<b>-11%</b>	<b>-1%</b>	<b>665</b>	<b>680</b>
<b>Industrial</b>	<b>1,670</b>	<b>1,760</b>	<b>1,610</b>	<b>5%</b>	<b>-9%</b>	<b>440</b>	<b>405</b>
Chemical	605	590	590	-2%	0%	165	135
Petroleum	140	220	100	57%	-55%	55	55
Electrical	165	160	150	-3%	-6%	40	40
Glass	200	195	175	-3%	-10%	50	10
Medical and Biomedical	230	235	235	2%	0%	45	65
Other	330	360	360	9%	0%	85	100
<b>Investment</b>	<b>305</b>	<b>505</b>	<b>250</b>	<b>66%</b>	<b>-50%</b>	<b>40</b>	<b>220</b>
Change in Bars, Coins	525	430				70	110
Change in ETF Holdings	-240	-10				-85	115
Change in Stocks Held by Exchanges	20	85				55	-5
<b>Total Demand</b>	<b>8,240</b>	<b>8,235</b>	<b>7,780</b>	<b>0%</b>	<b>-6%</b>	<b>1,935</b>	<b>2,160</b>
<b>Balance</b>	<b>-335</b>	<b>-270</b>	<b>-120</b>	<b>-19%</b>	<b>-56%</b>	<b>80</b>	<b>-220</b>
<b>Above Ground Stocks</b>	<b>4,140*</b>	<b>2,340</b>	<b>1,950</b>	<b>-12%</b>	<b>-6%</b>		

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 and Q4 2014 are contained in previously published PQs which are freely available on the WPIC website. Quarterly estimates from Q1 2015 and half-yearly estimates from H1 2015 are included in Tables 3 and 4 respectively, on pages 19-20 (supply, demand and above ground stocks).
- The 2017 forecast is 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.

## 2016 FULL YEAR REVIEW

Total platinum supply increased by 1% to 7,965 koz in 2016, with greater secondary supply from jewellery and autocatalysts outweighing a fall in primary supply, primarily in South Africa.

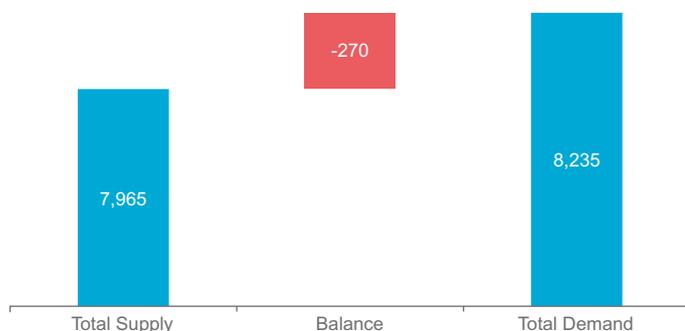
Refined production declined by 2% to 6,030 koz, whilst total mining supply fell to 6,100 koz, also 2% below 2015 output. Various issues at mines in South Africa, including stoppages and restructuring, led to the drop in refined production, despite higher output from Zimbabwe and North America.

Secondary supply grew by 9% to 1,865 koz last year, with increased recycling of both jewellery and autocatalysts. Global jewellery recycling rose by 21% to 625 koz, as Chinese manufacturers reduced stock levels, whilst platinum recovered from spent autocatalysts increased by 4% to 1,235 koz, driven by improved scrap steel prices.

Global demand decreased marginally to 8,235 koz, despite greater investment and stronger industrial and autocatalyst demand. Automotive demand climbed 1% year-on-year to 3,405 koz, owing to higher vehicle sales in Western Europe and China, whilst industrial demand grew by 5% to 1,760 koz, boosted by capacity expansion in the petroleum sector. Investment demand increased by 66% to 505 koz. Bar and coin purchases were a robust 430 koz, down from an exceptionally high 525 koz in 2015, and ETF holdings contracted for a second successive year but by only 10 koz. However, jewellery demand dropped by 11% to 2,565 koz, more than offsetting improvements elsewhere, as stock movements and a sluggish retail market led to a 20% fall in China's fabrication demand.

With global demand essentially flat and total supply growing, the market balance narrowed to a deficit of 270 koz in 2016 (Chart 1).

**Chart 1: Supply-demand balance, koz, 2016**



Source: SFA (Oxford)

## Mine supply

Global refined production decreased by 2% to 6,030 koz in 2016. Supply from South Africa fell by 5% to 4,240 koz owing to a higher number of safety-related stoppages, price-induced restructuring on the Western Limb and more general operational challenges which resulted in lower underground ore volumes being hoisted at other Western Limb mines. However, supply from Zimbabwe and North America increased.

In Zimbabwe, greater production from two areas and steady-state production at a new mine were achieved. Processing of built-up concentrate (21 koz) following a smelter outage in 2015 also contributed to a 19% increase in refined production to 480 koz for the year. In North America, improved productivity at one mine, and a normalisation of supply following plant maintenance work in the Sudbury region in 2015 resulted in a 6% rise in refined production to 410 koz. Despite restructuring of processing operations and an expected pipeline lock-up of 50–60 koz, output from Russia remained stable at 715 koz.

There was a net reduction in refined stock in 2016 owing to smelter (run-out) and refinery (safety) disruptions. Total mining supply amounted to 6,100 koz for the year (-2%), with the sales of platinum from producer inventory contributing 70 koz.

## Recycling

Platinum supply from recycling increased by 9% year-on-year (+155 koz) to 1,865 koz in 2016, lifted by greater volumes recovered from jewellery (+110 koz) and autocatalysts (+45 koz). Global jewellery recycling was up 21% year-on-year to 625 koz, primarily due to an increased volume in China, where recycled volumes were notably higher than 2015 levels, as stock was returned to manufacturers owing to a sluggish retail market. Autocatalyst recycling rose by 4% to 1,235 koz last year, primarily driven by higher scrap steel prices stimulating an increase in scrappage rates and thus catalytic converter volumes.

## Automotive demand

Platinum demand in all automotive applications increased by 1% year-on-year (+20 koz), to 3,405 koz.

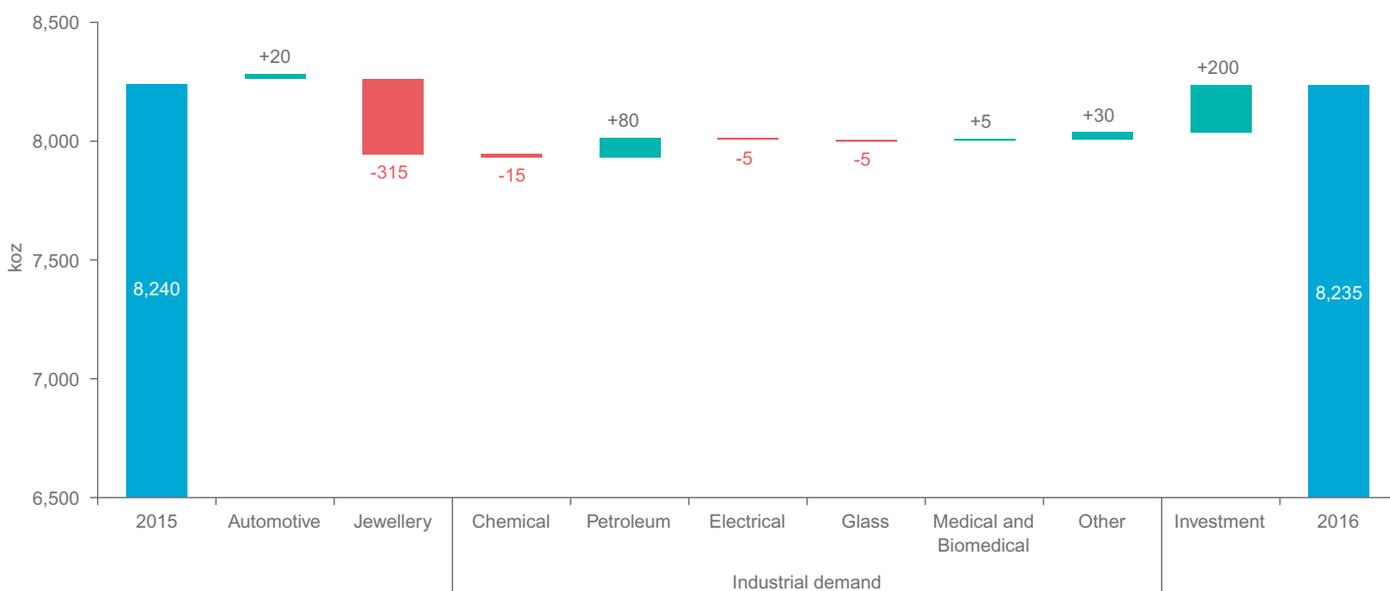
Car sales in the European Union rose to the highest volume in nine years, the third consecutive year of expansion. The five largest markets – Germany, UK, France, Italy and Spain – all saw growth, led by the southern countries.

The diesel share of new car sales was 49.6% in 2016, 2.5 percentage points lower year-on-year. Loss of share was highest in the Netherlands and Norway where electrified powertrains gained ground, owing to significant government incentives for purchasing electric vehicles. The diesel share in Europe has been trending lower for a few years while platinum demand has trended higher as autocatalyst loadings increased to meet tighter Euro 6 legislation. However, the additional cost of aftertreatment to ensure compliance with stricter emissions legislation has started to affect the diesel share across the size spectrum of light vehicles, with smaller cars being more impacted than larger cars. For smaller, lower-priced cars, diesel's share is falling faster and from already lower levels than among larger, higher-priced cars. In larger vehicles, not only is the added cost of aftertreatment more readily absorbed, but also the fuel economy and carbon dioxide emission advantages of diesel over alternatives continue to make sense for private and fleet owners.

Sales of diesel cars in the largest markets – Germany, France and the UK – reflect this size effect. In Germany, the largest market, with sales skewed to larger models, diesel's share was down just 2.2 percentage points year-on-year to 45.9% (Source: LMC Automotive). In France, the third-largest market, with sales skewed to smaller models, diesel's share fell 5.7 percentage points year-on-year as the market for previously popular small diesel cars was eroded. In the UK, which moved from third-largest market in 2015 to second-largest in 2016, diesel lost just 0.7 percentage points of market share year-on-year to 47.8%, but on slightly higher volumes.

Changes in end-use demand from 2015 to 2016 are shown in Chart 2.

**Chart 2: Changes in demand by category, 2016 vs. 2015**



Source: SFA (Oxford)

### Jewellery demand

Global platinum jewellery demand declined by 11% year-on-year (-315 koz) to 2,565 koz last year, largely owing to a substantial drop in China, where manufacturer usage fell by 20% (-355 koz) to 1,410 koz. Demand changes elsewhere were net positive overall, with growth of 11% year-on-year (+25 koz) in India, for example, but were relatively insignificant compared to China's losses.

Chinese fabricator requirements were 20% lower in 2016 than in 2015 owing to stock building in 2015 on low platinum prices and in anticipation of an improvement in retail demand. However, a sluggish retail market led to the reduction of platinum inventory throughout the manufacturing chain, curtailing the demand for new metal. Platinum jewellery demand in the non-bridal market was impacted by greater competition from low-priced alternatives, such as K-gold and silver jewellery, whilst there was also stronger competition for consumers' luxury spending in general. Jewellery retail sales declined by only 2% year-on-year in 2016 but jewellery's market share, including gold, of total retail sales was down by 11% compared to 2015. Conversely, the bridal market in China was relatively strong last year, despite marriage registrations falling by 7% year-on-year.

Demand in India recovered strongly in the second half of 2016, as anticipated, posting solid full-year growth of 11% despite the strike by jewellery retailers in H1'16. However, the strike did still hinder overall growth, with India's demand increasing at a significantly slower rate last year than in 2015 (+26%). Platinum benefitted from the promotion of men's jewellery during 2016, with the metal becoming an increasingly popular choice for men in the country. In North America, demand also improved, up 6% year-on-year, helped by the more affordable platinum price and robust retail sales growth (+5–7%) in the US.

### Industrial demand

Platinum demand for industrial applications increased by 5% year-on-year (+90 koz) to 1,760 koz in 2016, largely driven by substantial expansion of petroleum refining capacity (+80 koz) and greater requirements for other industrial end-uses (+30 koz). Despite weaker petroleum requirements in Western Europe, overall demand increased, boosted by significant growth in refining capacity in North America and China, whilst other industrial consumption growth was predominantly driven by the fuel cell industry, particularly in Japan and the US. Lower usage in the chemical (-15 koz), electrical (-5 koz) and glass (-5 koz) sectors only slightly hindered overall demand growth.

### Chemical

Chemical sector demand decreased by 2% year-on-year to 590 koz last year, weakened by lower requirements for new propane dehydrogenation (PDH) capacity following robust expansion in China, the US and the RoW during 2015. Greater production of silicones in China and nitric acid in Western Europe lifted demand in these sectors, partially offsetting the decline in PDH demand, whilst catalyst requirements for paraxylene production remained flat year-on-year. The fall in PDH demand in China last year was primarily due to delays in new capacity coming on-stream, with some of the plants scheduled for a 2016 start-up now anticipated to begin operations in 2017, resulting in a reduction in overall platinum demand for 2016 compared to previous estimates.

### Petroleum

Platinum requirements for petroleum refining grew to 220 koz (+57%) last year, bolstered by substantial refining capacity expansion in North America and China. However, overall growth was partly hindered by weaker demand in Western Europe, following a strong 2015, as capacity curtailments reduced the region's net requirements. Capacity expansion was higher than previously anticipated in China last year, resulting in upward revisions to overall petroleum demand for 2016, despite weaker than expected growth in the RoW.

### **Electrical**

Lower hard disk drive (HDD) demand reduced electrical sector platinum consumption to 160 koz (-3%) in 2016, as HDD shipments fell by 9.5% year-on-year to an estimated 425 million units, the lowest level since 2005 and the second successive year of significant decline. As a result of persistently low demand in recent years, major HDD manufacturers cut capacity last year in order to reduce costs, although these shutdowns are potentially only temporary. The PC HDD market accounted for the majority of the fall in HDD sales, declining by 24% from 2015, as sales of computers themselves decreased and HDDs lost more market share to solid-state drives (SSDs). Platinum requirements for other electrical components remained flat.

### **Glass**

The construction of fewer new fabrication facilities in the RoW reduced platinum requirements to 195 koz (-3%) last year, with net demand also hindered by the closure of glass plants in Japan and Western Europe, returning metal to market in 2016. However, lower usage in these regions was largely offset by greater demand for new fabrication capacity in North America, particularly the US, and China. Some of the closed capacity in Japan was liquid-crystal display (LCD) plants, continuing the declining LCD production trend seen in Japan in recent years. Concurrently however, China's LCD production capacity has been expanding, with new LCD facilities commencing production in the country last year, offsetting the decline in Japan.

### **Other**

Platinum usage in other industrial applications increased by 9% year-on-year to 360 koz in 2016, largely driven by robust growth in fuel cell demand, particularly in Japan and the US. Platinum requirements for fuel cells rose in both the stationary and transport sectors, as fuel cell systems continued to gradually gain market share over traditional technology. Greater demand for automotive sensors, primarily in China, also lifted platinum consumption last year, supported by higher vehicle production and the implementation of stricter emissions legislation (e.g. China 5).

## Investment demand

Total investment demand was 505 koz in 2016. Although at 430 koz bar and coin demand was not as strong as in 2015, the decline of ETF holdings was much reduced, which, along with a rise in exchange stocks of 85 koz, led to an increase in investment demand of 200 koz from 2015.

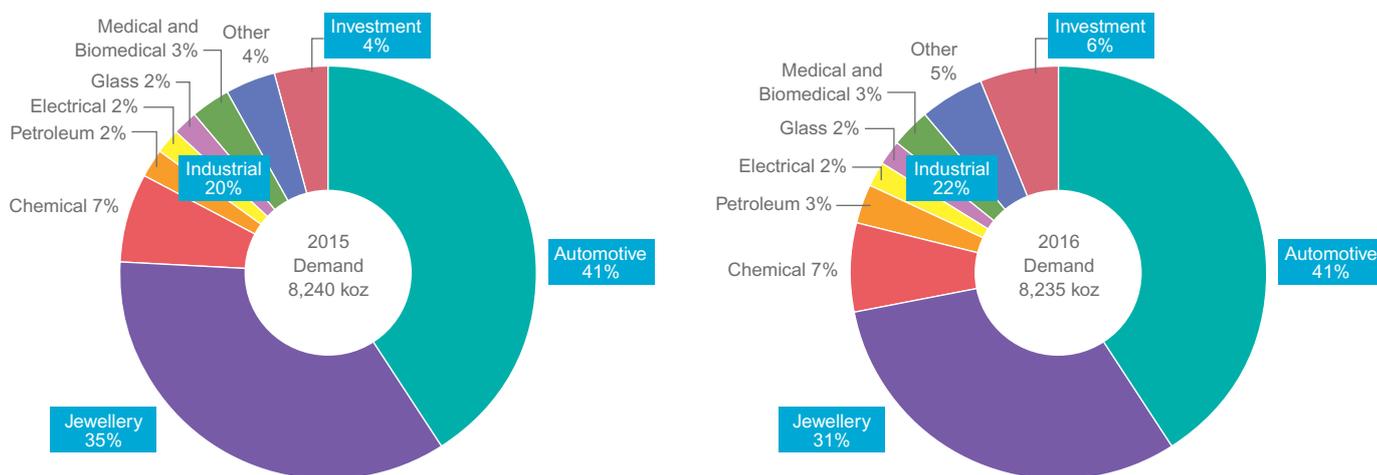
Overall ETF holdings fell by 10 koz in 2016, but this apparently small contraction masks divergent trends in different regions' ETFs. South African investors reduced their ETF holdings by a total of 155 koz, for a second consecutive annual decline, with the bulk of the decrease occurring in the first half of the year, whereas UK, US and Swiss investors, after reducing their holdings in 2015, became net purchasers in 2016. Japanese investors lifted their ETF holdings by 20 koz. US investors increased their ETF holdings by 59 koz, more than reversing the decline seen in 2015, but Swiss ETFs gained 15 koz.

UK investors returned to being net purchasers of ETFs to the tune of 52 koz in 2016. However, there were some significant swings from one quarter to the next, with net purchases of 54 koz in Q2'16, net sales of 81 koz in Q3'16 and back to net buying again in Q4'16. The drop in sterling following the referendum result in late June and the strong run that the platinum price had in the first half of the year may have triggered some profit-taking in the third quarter.

Global bar and coin investment totalled 430 koz in 2016, 95 koz lower than in 2015. Bar demand had risen in the second half of 2015, driven by a surge in Japanese investors' purchases as the platinum price fell below ¥4,000/g, and although the price held below ¥4,000/g and bar buying remained robust during 2016, it was 18% below 2015's exceptionally high level. The Austrian Mint introduced its first Vienna Philharmonic one ounce platinum coin in 2016, with no maximum mintage, while the US Mint reintroduced the bullion version of the American Eagle one ounce coin and increased its mintage of the proof version to 10,000 units, giving investors and collectors more options and helping to support coin demand.

In summary, demand shares by end-use are shown in Chart 3.

**Chart 3: Demand end use shares, 2016 vs. 2015**



Source: SFA (Oxford)

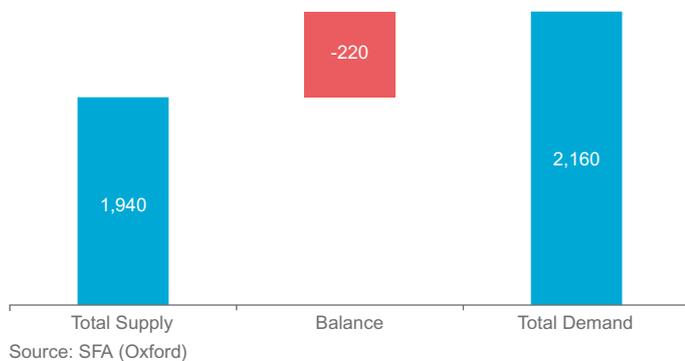
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## 2016 FOURTH QUARTER PLATINUM MARKET REVIEW

Overall demand was up by 12% quarter-on-quarter to 2,160 koz in Q4'16, despite a minor drop in industrial requirements, as automotive (+65 koz) and jewellery (+15 koz) demand both increased from the previous quarter. Investment demand had a strong fourth quarter of 2016, rising by 180 koz from Q3'16, as net sales of bars and coins and ETF holdings increased. Total supply fell by 75 koz from Q3'16 to 1,940 koz, owing to a reduction in refined production from South Africa and lower volumes recovered from autocatalyst and jewellery recycling.

With strong demand growth and a fall in total supply quarter-on-quarter, the market balance shifted from a surplus of 80 koz in Q3'16 to a deficit of 220 koz in Q4'16 (Chart 4).

**Chart 4: Supply-demand balance, koz, Q4 2016**

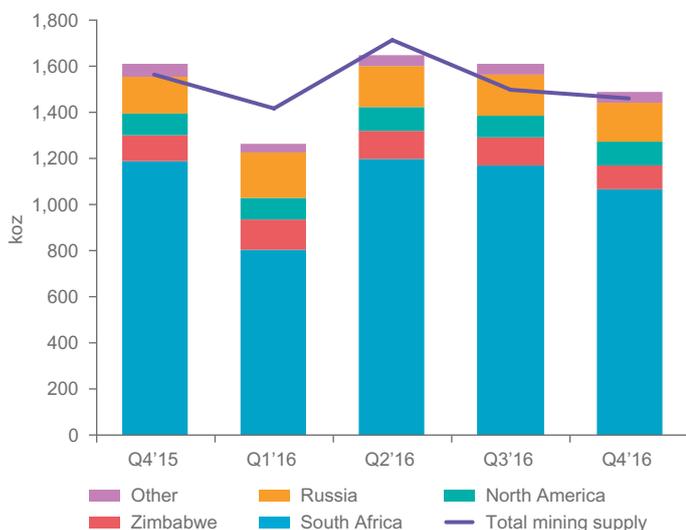


## Supply

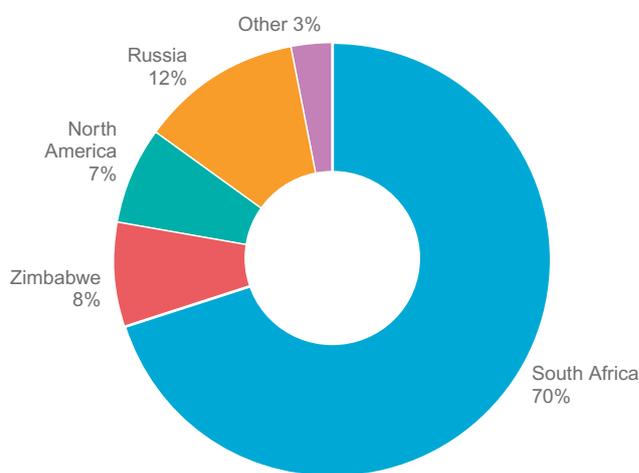
Refined production dipped below 1,500 koz in Q4'16 (-7% year-on-year) owing to a smelter outage in South Africa (Chart 5). South African supply decreased by 11% year-on-year to 1,065 koz, accounting for 70% of global supply (Chart 6), and fell by 9% compared to Q3'16. Supply from all other regions remained fairly stable compared to Q4'15 (+2% owing to a 10 koz increase in Russia) and Q3'16 (-2% attributable to a 10 koz reduction in Zimbabwe).

A producer inventory increase of 35 koz is estimated for Q4'16, slightly less than in the prior year quarter (+40 koz). Total mine supply is estimated at 1,460 koz for Q4'16, a drop of 7% compared to Q4'15, and a reduction of 3% on Q3'16.

**Chart 5: Global refined production**



**Chart 6: Global refined production, 2016**



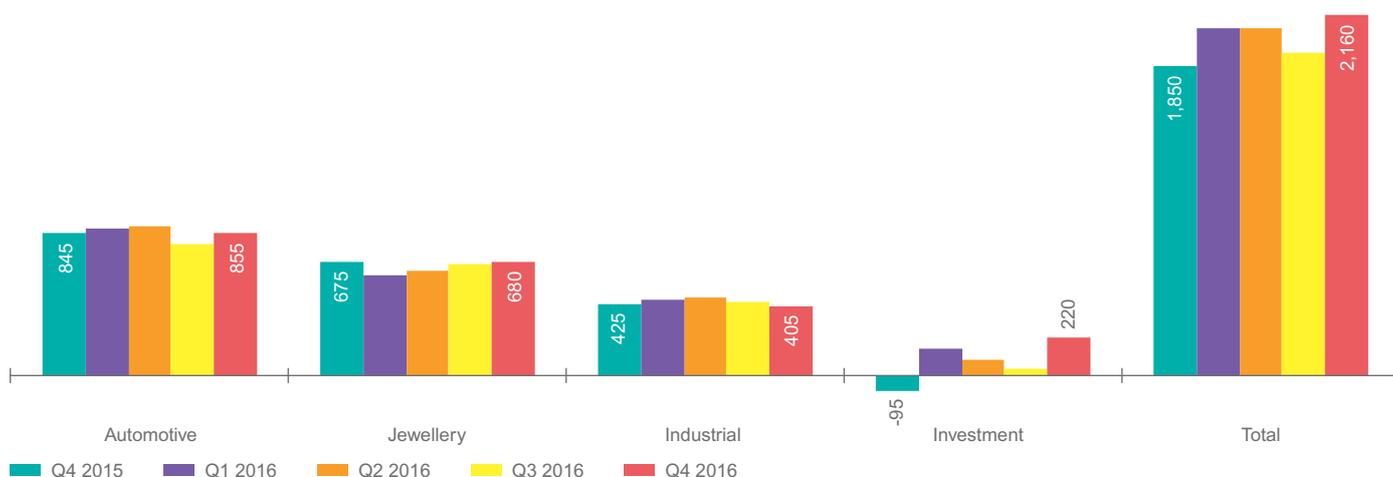
Source: SFA (Oxford)

Platinum recovered from recycling grew by 28% (+105 koz) from a particularly weak Q4'15 to 480 koz in the fourth quarter of 2016, supported by growth in jewellery (+75 koz) and autocatalyst (+30 koz) recycling. Jewellery recycling rose by 71% year-on-year to 180 koz in Q4'16, as China and Japan both experienced significantly higher levels of jewellery recycling than in Q4'15, which was particularly weak owing to soft retail sales in China and the low platinum price in Japan. Platinum recycled from scrapped autocatalysts increased by 11% year-on-year to 300 koz, driven by higher scrap steel prices compared to the last quarter of 2015 and greater volumes in North America and Western Europe.

## Demand

Fourth quarter demand grew by 17% year-on-year (+310 koz) to 2,160 koz in Q4'16 (Chart 7), primarily as a result of greater investment in bar and coin purchases and ETF holdings. Growth in investment demand (+315 koz) dwarfed lower requirements for industrial applications (-20 koz), whilst autocatalyst and jewellery demand both improved slightly.

Chart 7: Platinum demand, koz



Source: SFA (Oxford)

## Automotive demand

Fourth quarter total automotive demand saw a return to growth, up 8% (+65 koz) quarter-on-quarter and up 1% (+10 koz) year-on-year.

Diesel's share in its heartland Western European market has continued its overall downward trend this quarter. December's diesel sales fell to 48.3% of the car market, down 4.2 percentage points year-on-year. However, platinum demand in Western Europe continued its upward trend gaining 5% year-on-year, its fifth consecutive increase.

India, the second most important market for diesel cars, has seen active debate about the place of the fuel in the country's transport economy. Diesel ended the year well placed though, with over 50% of passenger vehicle sales, but with significant variation by vehicle size. Only the B-segment small hatchback has seen consumers move away from diesel, down to 34% from 46% in 2015, but this segment accounts for 65% of passenger car sales. Higher end SUVs and MPVs are predominantly diesel, as the improved performance is valued. Platinum demand in India in the fourth quarter was flat year-on-year and quarter-on-quarter.

## Jewellery demand

Platinum jewellery consumption rose by 1% year-on-year and 2% quarter-on-quarter to 680 koz in Q4'16, whilst H2'16 demand was 10% higher than H1'16 at 1,345 koz, although this was still some way below H2'15 levels of 1,470 koz.

China's jewellery demand declined by 6% year-on-year (-25 koz) in Q4'16, as platinum purchased by jewellery end-users through the Shanghai Gold Exchange (SGE) decreased by 9% year-on-year, whilst non-SGE platinum imports fell by 50% from Q4'15, despite 4% growth in China's total jewellery retail sales over the same period. China's largest jewellery retailer, Chow Tai Fook, reported a 9% fall in Q4'16 sales in mainland China, Hong Kong and Macau compared to the corresponding period in 2015, partly due to a 4% year-on-year decline in Chinese tourist spending in Hong Kong and Macau. In the bridal market, marriage registrations dropped by 14% year-on-year, although they were 17% higher than in Q3'16.

However, lower consumption in China was offset by growth in India, where demand increased by 45% year-on-year (+25 koz) and 33% quarter-on-quarter in Q4'16, owing to the growing popularity of men's platinum jewellery and the beginning of the festival and wedding season in October. As a result of this, as well as the strike in the first half of the year, H2'16 demand was 33% higher than in H1'16. Japan's platinum jewellery consumption also grew in Q4'16, up 5% year-on-year (+5 koz) and 50% higher than in Q3'16. This was largely down to strong bridal demand and consumer preferences shifting toward high-carat Pt950 jewellery.

### Industrial demand

Fourth quarter industrial demand decreased by 5% year-on-year (-20 koz) and by 8% quarter-on-quarter (-35 koz) to 405 koz, making Q4'16 the weakest quarter of the year. This was primarily due to slower expansion of glass fabrication capacity in China and the RoW compared to Q4'15, continuing the trend which also softened platinum usage in the third quarter. However, the decline in glass demand was partially offset by greater requirements for new petroleum refining capacity in North America during the quarter, plus growth in other industrial end-uses.

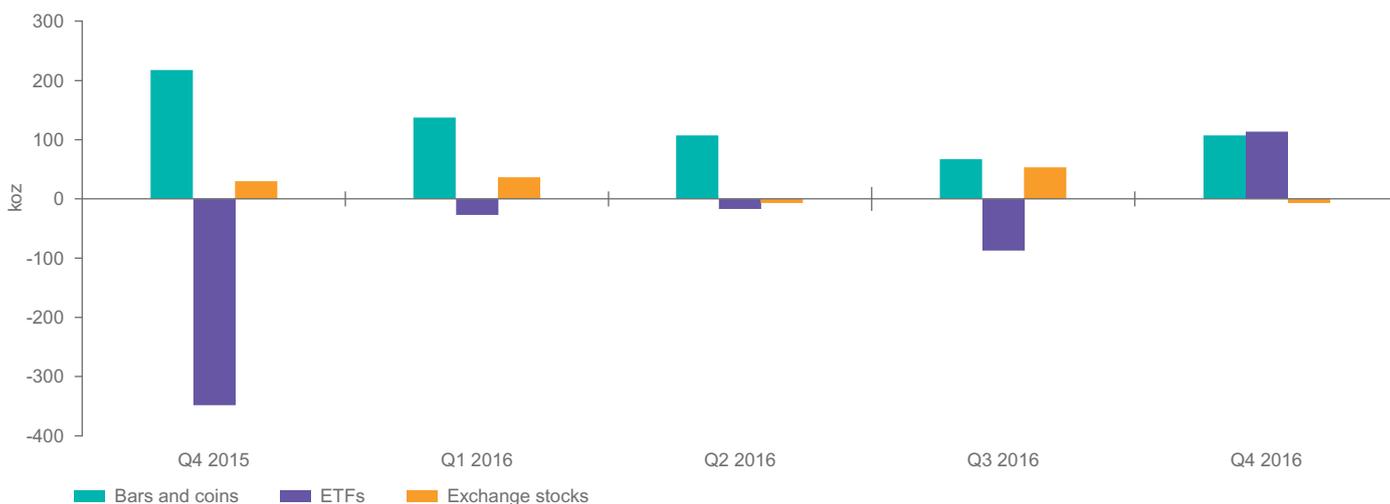
### Investment demand

Global investment demand totalled 220 koz in the fourth quarter (Chart 8) as bar and coin purchases were 110 koz and ETF holdings grew by 115 koz for the first gain in five quarters, while stocks held by exchanges declined slightly.

Japanese investors had been gradually reducing their purchasing of bars through the first three quarters of 2016, but renewed weakness in the price of platinum led to a jump in Japanese bar purchases in Q4'16, which, along with modest coin demand, resulted in 110 koz of bar and coin investment.

Global ETF holdings increased 115 koz in the final quarter, which reversed the trend of modest declines in the first three quarters of the year. The majority of the stronger interest came from UK investors who added 76 koz to their holdings, while US ETF holdings gained 29 koz. Swiss ETF and South African holdings were little changed.

**Chart 8: Platinum investment**



Source: SFA (Oxford)

### 2017 FORECAST

Total platinum supply is forecast to fall by 4% to 7,660 koz in 2017 (Chart 10), with both refined production and secondary supply projected to decline.

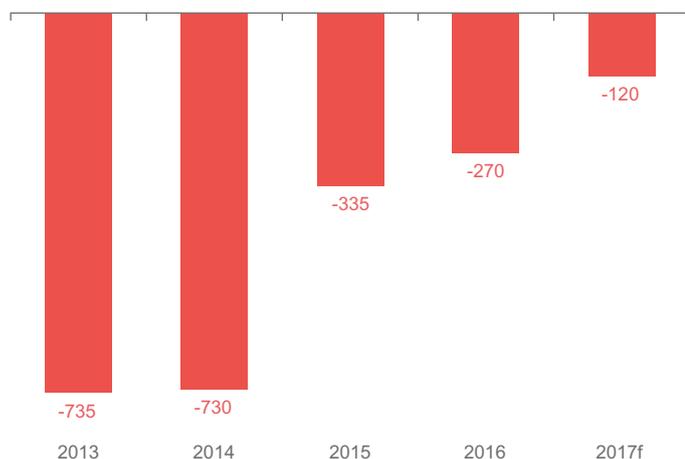
Refined production is expected to decrease by 2% to 5,920 koz, whilst total mining supply is set to drop by 3% to 5,900 koz. All regions are forecast to see reductions in refined output, with the largest falls likely in South Africa and Zimbabwe. Supply in South Africa is expected to be 1% lower year-on-year owing to the closure of loss-making production and depletion at various operations.

Secondary supply is predicted to decline by 6% to 1,760 koz, largely owing to the anticipated 20% drop in jewellery recycling to 500 koz (-125 koz), which should outweigh the anticipated 2% growth in platinum recovered from autocatalysts (+20 koz). Jewellery recycling in China was unusually high in 2016 as excess stock was recycled, which is not expected to be repeated in 2017, returning recycled volumes to more typical levels.

Global demand is projected to decrease by 6% to 7,780 koz this year (Chart 11), primarily owing to lower forecast investment demand (-255 koz), and lower net requirements for the petroleum sector (-120 koz). Automotive demand is forecast to fall marginally to 3,390 koz (-15 koz), whilst jewellery demand is predicted to decline by 1% (-35 koz) to 2,530 koz, as forecast growth in India and other regions almost offsets the expected decline in China. Lower net requirements in the petroleum sector are the main contributor to the expected reduction in overall industrial use of 9% to 1,610 koz, with consumption little changed in all the other industrial sectors. Investment demand is forecast to be 50% lower at 250 koz this year owing to higher prices reducing Japanese bar purchases and limited projected increases in ETF holdings.

With global demand anticipated to contract by a larger amount than total supply, the market deficit is projected to narrow to 120 koz in 2017 (Chart 9).

**Chart 9: Supply-demand balance, koz, 2013-2017f**



Source: SFA (Oxford)

## Mine supply

Global refined supply is forecast to fall by 2% to 5,920 koz in 2017. South African supply is estimated to decrease by 1% to 4,185 koz; this is attributable to the closure of loss-making production and depletion at a handful of small-scale UG2 operations on both the Western and Eastern limbs. The ramp-up of new shafts on the Western Limb may contribute an additional 120 koz this year, and around 65 koz of previously built-up concentrate stocks should be processed.

Production from Zimbabwe is estimated to drop by 7% to 445 koz as output normalises at one of the operations. North American supply decreases by 2% to 400 koz. Depletion in the Sudbury region may result in a small reduction in output year-on-year (-10 koz), but production should remain stable at other mines. Supply from Russia is also expected to remain at similar levels to last year at 710 koz.

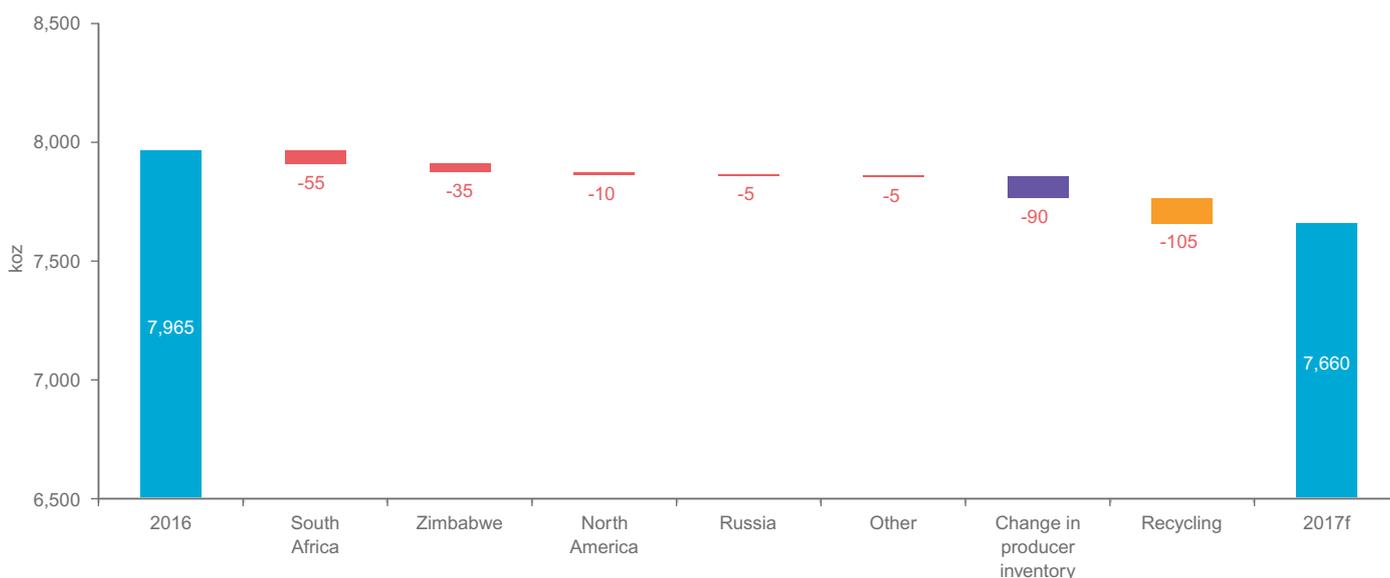
Following two years of net sales from stock, a slight build-up of producer inventories (+20 koz) is forecast for 2017. Total mining supply is estimated at 5,900 koz for the year, which is a reduction of 3% compared to 2016.

## Recycling

Platinum recovered via recycling is forecast to fall by 6% year-on-year (-105 koz) to 1,760 koz in 2017, primarily owing to a substantial drop in jewellery recycling (-125 koz). Secondary supply from jewellery recycling is projected to decline by 20% year-on-year to 500 koz owing to a significant reduction in recovered platinum from China, as the return of excess fabricator stocks seen in 2016 is not likely to be repeated, whilst other markets remain stable. Lower jewellery demand is also expected to reduce recycled volumes from customers trading in old jewellery pieces in China, returning recycled volumes to more typical levels this year.

Platinum retrieved from spent autocatalysts is expected to increase by 2% year-on-year (+20 koz) to 1,255 koz this year, as higher scrap steel prices should increase volumes of recycled catalytic converters above those seen in 2016.

**Chart 10: Changes in total supply, 2017f vs. 2016**



Source: SFA (Oxford)

### Automotive demand

Platinum demand in all automotive applications is forecast to remain essentially stable at 3,390 koz (-15 koz) in 2017.

Car sales growth in Europe is expected to slow in 2017, overshadowed by significant regional political uncertainty. The UK market is forecast to soften as the country moves towards Brexit, with slower economic expansion and price rises likely to curb car purchases, while elections in France, Germany and the Netherlands add to the political and economic risks, forecast to reduce fleet as well as private purchases. Several new model launches in key segments should help to boost consumers' interest in buying new cars.

This year will see further emissions legislation rollouts, set to restore consumer confidence after a turbulent period, particularly for diesels. The Worldwide Harmonized Light Vehicles Test Procedure (WLTP) introduces an updated laboratory test for measuring pollutant and carbon dioxide emissions, while the real driving emissions (RDE) test begins to measure pollutant emissions under real driving conditions.

In September 2017, RDE standards will begin to be introduced, mainly affecting how automotive manufacturers achieve the more stringent NO<sub>x</sub> emission limits from diesel cars. European light-duty diesels are likely to move away from LNT to SCR technology for NO<sub>x</sub> treatment, so losing some platinum content but still with a platinum-containing DOC and DPF.

Diesel vehicle volumes are forecast to fall in 2017 as the declining diesel share in Western Europe, estimated at 47.7% for 2017 (Source: LMC Automotive), is not expected to be offset by growth in overall sales. The decline in diesel share is likely to be greater in the small/medium segments where loadings are lower, with diesel expected to retain its share in the larger car segments.

### Jewellery demand

Platinum jewellery consumption is projected to decrease by 1% year-on-year (-35 koz) to 2,530 koz this year, mainly owing to weaker demand in China, which is anticipated to outweigh growth in India, North America and Europe.

This year's jewellery forecast has been revised downwards by 95 koz since the last *Platinum Quarterly*, with China accounting for the majority of this adjustment. Non-bridal platinum jewellery is suffering from a number of headwinds and broadly jewellery sales are expected to struggle. Chinese retailers continue to expand by opening new stores, but they are increasingly looking to develop their online sales channels while focusing on more affordable alternatives to platinum. Although platinum is heavily promoted on the bridal market in China, the number of marriage registrations in the country has fallen by an average of 5% per annum since 2013 and is expected to decline again in 2017.

Japan's demand is also estimated to decrease modestly this year, owing to consumer uncertainty over the economic outlook and the exchange rate.

Jewellery demand in India, however, is predicted to grow faster than in 2016 when it was impacted by a number of adverse events, although the effect of demonetisation could continue into 2017. However, favourable demographics (greater number of weddings) and the on-going Evara campaign should continue to lift sales. From the start of April, the 1% TCS (tax collected at source) threshold for cash purchases of jewellery is set to reduce from Rs500,000 (\$7,325) currently to Rs200,000 (\$2,930), which could impede sales of diamond jewellery or heavy products such as men's chains. However, the Indian government is also expected to announce further steps to promote growth in the industry this year, such as lower import duties and greater incentives to set up jewellery parks.

### **Industrial demand**

Industrial platinum demand is forecast to decline by 9% year-on-year (-150 koz) to 1,610 koz this year, primarily owing to a significant fall in requirements for the petroleum sector (-120 koz), where refining capacity reductions in Japan and Western Europe are expected to weaken demand. Platinum usage is also likely to decrease in glass fabrication (-20 koz) and electrical components (-10 koz), owing to slower glass capacity expansion and declining HDD sales respectively, whilst demand elsewhere is set to stay relatively flat from 2016.

### **Chemical**

Platinum requirements for chemical catalysis are anticipated to remain stable at 590 koz in 2017, despite further growth in the silicone market and an increase in demand for new PDH capacity in China, where a number of new plants are planned to start up this year, including some of those delayed from 2016. Expansion in these sectors, however, is set to be negated by lower use in nitric acid production due to slower global demand growth for nitric acid and its key derivatives.

### **Petroleum**

Refining capacity closures and cuts in Japan and Western Europe are likely to erode net petroleum requirements to 100 koz (-55%) this year following strong demand in 2016. Both regions are anticipated to have net negative demand as a result of the capacity curtailments returning metal to the market, with many of the reductions in Japan deferred from last year owing to delays to industry consolidation within the country. Platinum demand in North America and China is also set to fall in 2017, returning to more typical levels following robust growth last year. Conversely, significant expansion is predicted to raise requirements in the RoW, partially offsetting declining demand elsewhere, as new capacity is built in the Middle East, India and Southeast Asia.

### **Electrical**

Platinum usage in electrical devices is forecast to fall by 6% (-10 koz) to 150 koz in 2017, as HDD shipments are projected to contract by 8% to less than 400 million drives for the first time since 2005. This is supported by the closure of HDD production capacity by major manufacturers, suggesting they are not anticipating a significant upturn in demand in the near term. A weaker PC market is again predicted to be responsible for softer HDD demand, with platinum requirements likely to fall in the HDD manufacturing hubs of China and Southeast Asia (RoW).

### **Glass**

Glass demand is projected to drop by 10% (-20 koz) to 175 koz this year, mainly owing to slower expansion of glass capacity in China and the US following a relatively robust 2016. However, reduced requirements in these regions should be partly offset by higher demand in the RoW, where a greater number of new plants and expansions are expected to be completed throughout 2017 than during last year. Many of these identified projects in the RoW are located in emerging markets in Asia and Africa. Elsewhere, closures are likely to continue in Western Europe and Japan, with demand in Japan set to remain net negative again next year.

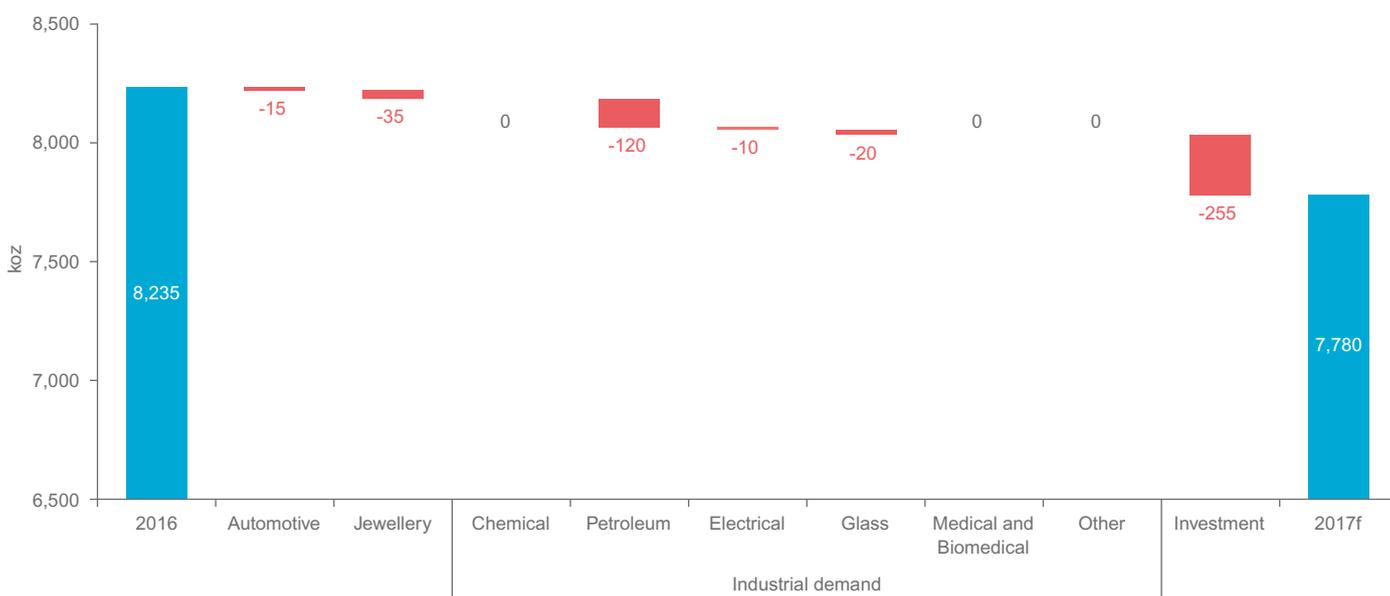
### **Other**

Platinum consumption in other industrial end-uses is expected to be stable at 360 koz in 2017, where, for example, usage in automotive sensors and plugs is also set to remain relatively flat this year. Global vehicle production growth is forecast to slow in 2017 compared to last year, hindering other automotive demand, particularly in more mature markets.

## Investment demand

Investment demand is predicted to moderate to 250 koz in 2017. The platinum price is expected to be somewhat higher in 2017 than 2016 and ETF holdings are estimated to increase modestly. However, bar and coin demand is projected to be lower than last year, mainly from reduced bar purchases in Japan. While the platinum price is expected to remain below ¥4,000/g, with a modestly stronger platinum price and a weaker yen forecast, bar purchases by Japanese investors are likely to slow from the elevated levels seen in 2016.

**Chart 11: Changes in demand by category, 2017f vs. 2016**



Source: SFA (Oxford)

## ABOVE GROUND STOCKS

During 2016, above ground stocks again provided supply to meet the market balance shortfall of 270 koz and consequently declined to 2,070 koz by the end of the year.

In 2017, the market is forecast to have a deficit of 120 koz, which is smaller than the deficits in recent years (Chart 9), and consequently, above ground stocks are expected to end the year at 1,950 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 Q4 2016

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

	2013	2014	2015	2016	2017f	2016/2015 Growth %	2017f/2016 Growth %
<b>Platinum Supply-demand Balance (koz)</b>							
<b>SUPPLY</b>							
<b>Refined Production</b>	<b>6,070</b>	<b>4,880</b>	<b>6,150</b>	<b>6,030</b>	<b>5,920</b>	<b>-2%</b>	<b>-2%</b>
South Africa	4,355	3,115	4,465	4,240	4,185	-5%	-1%
Zimbabwe	405	405	405	480	445	19%	-7%
North America	355	400	385	410	400	6%	-2%
Russia	740	740	715	715	710	0%	-1%
Other	215	220	180	185	180	3%	-3%
<b>Increase (-)/Decrease (+) in Producer Inventory</b>	<b>-215</b>	<b>+350</b>	<b>+45</b>	<b>+70</b>	<b>-20</b>	<b>56%</b>	<b>-129%</b>
<b>Total Mining Supply</b>	<b>5,855</b>	<b>5,230</b>	<b>6,195</b>	<b>6,100</b>	<b>5,900</b>	<b>-2%</b>	<b>-3%</b>
<b>Recycling</b>	<b>1,980</b>	<b>2,035</b>	<b>1,710</b>	<b>1,865</b>	<b>1,760</b>	<b>9%</b>	<b>-6%</b>
Autocatalyst	1,120	1,255	1,190	1,235	1,255	4%	2%
Jewellery	855	775	515	625	500	21%	-20%
Industrial	5	5	5	5	5	0%	0%
<b>Total Supply</b>	<b>7,835</b>	<b>7,265</b>	<b>7,905</b>	<b>7,965</b>	<b>7,660</b>	<b>1%</b>	<b>-4%</b>
<b>DEMAND</b>							
<b>Automotive</b>	<b>3,160</b>	<b>3,295</b>	<b>3,385</b>	<b>3,405</b>	<b>3,390</b>	<b>1%</b>	<b>0%</b>
Autocatalyst	3,015	3,140	3,235	3,265	3,245	1%	-1%
Non-road	140	150	145	145	145	0%	0%
<b>Jewellery</b>	<b>2,945</b>	<b>3,000</b>	<b>2,880</b>	<b>2,565</b>	<b>2,530</b>	<b>-11%</b>	<b>-1%</b>
<b>Industrial</b>	<b>1,530</b>	<b>1,550</b>	<b>1,670</b>	<b>1,760</b>	<b>1,610</b>	<b>5%</b>	<b>-9%</b>
Chemical	545	560	605	590	590	-2%	0%
Petroleum	115	65	140	220	100	57%	-55%
Electrical	185	190	165	160	150	-3%	-6%
Glass	145	175	200	195	175	-3%	-10%
Medical and Biomedical	220	220	230	235	235	2%	0%
Other	320	340	330	360	360	9%	0%
<b>Investment</b>	<b>935</b>	<b>150</b>	<b>305</b>	<b>505</b>	<b>250</b>	<b>66%</b>	<b>-50%</b>
Change in Bars, Coins	-5	50	525	430			
Change in ETF Holdings	905	215	-240	-10			
Change in Stocks Held by Exchanges	35	-115	20	85			
<b>Total Demand</b>	<b>8,570</b>	<b>7,995</b>	<b>8,240</b>	<b>8,235</b>	<b>7,780</b>	<b>0%</b>	<b>-6%</b>
<b>Balance</b>	<b>-735</b>	<b>-730</b>	<b>-335</b>	<b>-270</b>	<b>-120</b>	<b>-19%</b>	<b>-56%</b>
<b>Above Ground Stocks</b>	<b>4,140*</b>	<b>3,405</b>	<b>2,340</b>	<b>2,070</b>	<b>1,950</b>	<b>-12%</b>	<b>-6%</b>

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

# PLATINUM QUARTERLY Q4 2016

**Table 3: Supply, demand and above ground stocks summary – quarterly comparison**

	Q1 2015	Q2 2015	Q3 2015	Q4 2015	Q1 2016	Q2 2016	Q3 2016	Q4 2016	Q4'16/Q4'15 Growth %	Q4'16/Q3'16 Growth %
<b>Platinum Supply-demand Balance (koz)</b>										
<b>SUPPLY</b>										
<b>Refined Production</b>	<b>1,355</b>	<b>1,540</b>	<b>1,650</b>	<b>1,610</b>	<b>1,270</b>	<b>1,650</b>	<b>1,610</b>	<b>1,495</b>	<b>-7%</b>	<b>-7%</b>
South Africa	935	1,125	1,210	1,190	805	1,200	1,170	1,065	-11%	-9%
Zimbabwe	95	80	115	110	130	120	120	110	0%	-8%
North America	100	100	90	100	100	105	100	100	0%	0%
Russia	180	190	190	160	190	180	175	170	6%	-3%
Other	45	45	45	50	45	45	45	50	0%	11%
<b>Increase (-)/Decrease (+) in Producer Inventory</b>	<b>+60</b>	<b>-5</b>	<b>+30</b>	<b>-40</b>	<b>+150</b>	<b>+60</b>	<b>-105</b>	<b>-35</b>	<b>-13%</b>	<b>-67%</b>
<b>Total Mining Supply</b>	<b>1,415</b>	<b>1,535</b>	<b>1,680</b>	<b>1,570</b>	<b>1,420</b>	<b>1,710</b>	<b>1,505</b>	<b>1,460</b>	<b>-7%</b>	<b>-3%</b>
<b>Recycling</b>	<b>435</b>	<b>475</b>	<b>415</b>	<b>375</b>	<b>395</b>	<b>480</b>	<b>510</b>	<b>480</b>	<b>28%</b>	<b>6%</b>
Autocatalyst	315	310	295	270	280	340	315	300	11%	-5%
Jewellery	120	165	120	105	115	140	195	180	71%	-8%
Industrial	0	0	0	0	0	0	0	0	N/M	N/M
<b>Total Supply</b>	<b>1,850</b>	<b>2,010</b>	<b>2,095</b>	<b>1,945</b>	<b>1,815</b>	<b>2,190</b>	<b>2,015</b>	<b>1,940</b>	<b>0%</b>	<b>-4%</b>
<b>DEMAND</b>										
<b>Automotive</b>	<b>855</b>	<b>865</b>	<b>810</b>	<b>845</b>	<b>875</b>	<b>895</b>	<b>790</b>	<b>855</b>	<b>1%</b>	<b>8%</b>
Autocatalyst	820	825	780	810	835	855	755	815	1%	8%
Non-road	35	35	35	35	35	35	35	35	0%	0%
<b>Jewellery</b>	<b>745</b>	<b>670</b>	<b>795</b>	<b>675</b>	<b>600</b>	<b>620</b>	<b>665</b>	<b>680</b>	<b>1%</b>	<b>2%</b>
<b>Industrial</b>	<b>405</b>	<b>410</b>	<b>430</b>	<b>425</b>	<b>445</b>	<b>465</b>	<b>440</b>	<b>405</b>	<b>-5%</b>	<b>-8%</b>
Chemical	165	145	160	130	150	135	165	135	4%	-18%
Petroleum	35	35	35	35	55	60	55	55	57%	0%
Electrical	45	40	40	40	40	40	40	40	0%	0%
Glass	30	45	70	65	60	80	50	10	-85%	-80%
Medical and Biomedical	50	65	45	65	55	65	45	65	0%	44%
Other	80	80	80	90	85	85	85	100	11%	18%
<b>Investment</b>	<b>-10</b>	<b>115</b>	<b>285</b>	<b>-95</b>	<b>155</b>	<b>90</b>	<b>40</b>	<b>220</b>	<b>N/M</b>	<b>N/M</b>
Change in Bars, Coins	45	75	180	220	140	110	70	110	-50%	57%
Change in ETF Holdings	-50	45	110	-345	-25	-15	-85	115	N/M	N/M
Change in Stocks Held by Exchanges	-5	-5	-5	30	40	-5	55	-5	N/M	N/M
<b>Total Demand</b>	<b>1,995</b>	<b>2,060</b>	<b>2,320</b>	<b>1,850</b>	<b>2,075</b>	<b>2,070</b>	<b>1,935</b>	<b>2,160</b>	<b>17%</b>	<b>12%</b>
<b>Balance</b>	<b>-145</b>	<b>-50</b>	<b>-225</b>	<b>95</b>	<b>-260</b>	<b>120</b>	<b>80</b>	<b>-220</b>		

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

# PLATINUM QUARTERLY Q4 2016

**Table 4: Supply, demand and above ground stocks summary – half-yearly comparison**

	H1 2015	H2 2015	H1 2016	H2 2016	H2'16/H2'15 Growth %	H2'16/H1'16 Growth %
<b>Platinum Supply-demand Balance (koz)</b>						
<b>SUPPLY</b>						
<b>Refined Production</b>	<b>2,895</b>	<b>3,260</b>	<b>2,920</b>	<b>3,105</b>	<b>-5%</b>	<b>6%</b>
South Africa	2,060	2,400	2,005	2,235	-7%	11%
Zimbabwe	175	225	250	230	2%	-8%
North America	200	190	205	200	5%	-2%
Russia	370	350	370	345	-1%	-7%
Other	90	95	90	95	0%	6%
<b>Increase (-)/Decrease (+) in Producer Inventory</b>	<b>+55</b>	<b>-10</b>	<b>+210</b>	<b>-140</b>	<b>N/M</b>	<b>N/M</b>
<b>Total Mining Supply</b>	<b>2,950</b>	<b>3,215</b>	<b>3,130</b>	<b>2,965</b>	<b>-8%</b>	<b>-5%</b>
<b>Recycling</b>	<b>910</b>	<b>790</b>	<b>875</b>	<b>990</b>	<b>25%</b>	<b>13%</b>
Autocatalyst	625	565	620	615	9%	-1%
Jewellery	285	225	255	375	67%	47%
Industrial	0	0	0	0	N/M	N/M
<b>Total Supply</b>	<b>3,860</b>	<b>4,040</b>	<b>4,005</b>	<b>3,955</b>	<b>-2%</b>	<b>-1%</b>
<b>DEMAND</b>						
<b>Automotive</b>	<b>1,720</b>	<b>1,655</b>	<b>1,770</b>	<b>1,645</b>	<b>-1%</b>	<b>-7%</b>
Autocatalyst	1,645	1,590	1,690	1,570	-1%	-7%
Non-road	70	70	70	70	0%	0%
<b>Jewellery</b>	<b>1,415</b>	<b>1,470</b>	<b>1,220</b>	<b>1,345</b>	<b>-9%</b>	<b>10%</b>
<b>Industrial</b>	<b>815</b>	<b>855</b>	<b>910</b>	<b>845</b>	<b>-1%</b>	<b>-7%</b>
Chemical	310	290	285	300	3%	5%
Petroleum	70	70	115	110	57%	-4%
Electrical	85	80	80	80	0%	0%
Glass	75	135	140	60	-56%	-57%
Medical and Biomedical	115	110	120	110	0%	-8%
Other	160	170	170	185	9%	9%
<b>Investment</b>	<b>105</b>	<b>190</b>	<b>245</b>	<b>260</b>	<b>37%</b>	<b>6%</b>
Change in Bars, Coins	120	400	250	180	-55%	-28%
Change in ETF Holdings	-5	-235	-40	30	N/M	N/M
Change in Stocks Held by Exchanges	-10	25	35	50	100%	43%
<b>Total Demand</b>	<b>4,055</b>	<b>4,170</b>	<b>4,145</b>	<b>4,095</b>	<b>-2%</b>	<b>-1%</b>
<b>Balance</b>	<b>-195</b>	<b>-130</b>	<b>-140</b>	<b>-140</b>		

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

# PLATINUM QUARTERLY Q4 2016

**Table 5: Regional demand – annual and quarterly comparison**

	2013	2014	2015	2016	2017f	2016/2015 Growth %	2017f/2016 Growth %	Q1 2016	Q2 2016	Q3 2016	Q4 2016
<b>Platinum gross demand (koz)</b>											
<b>Automotive</b>	<b>3,160</b>	<b>3,295</b>	<b>3,385</b>	<b>3,405</b>	<b>3,390</b>	<b>1%</b>	<b>0%</b>	<b>875</b>	<b>895</b>	<b>790</b>	<b>855</b>
North America	425	465	475	425							
Western Europe	1,360	1,450	1,560	1,650							
Japan	580	590	525	475							
China	130	125	130	160							
India	160	160	175	165							
Rest of the World	505	505	520	530							
<b>Jewellery</b>	<b>2,945</b>	<b>3,000</b>	<b>2,880</b>	<b>2,565</b>	<b>2,530</b>	<b>-11%</b>	<b>-1%</b>	<b>600</b>	<b>620</b>	<b>665</b>	<b>680</b>
North America	200	230	250	265							
Western Europe	220	220	235	240							
Japan	335	335	340	335							
China	1,990	1,975	1,765	1,410							
India	140	175	220	245							
Rest of the World	60	65	70	70							
<b>Chemical</b>	<b>545</b>	<b>560</b>	<b>605</b>	<b>590</b>	<b>590</b>	<b>-2%</b>	<b>0%</b>	<b>150</b>	<b>135</b>	<b>165</b>	<b>135</b>
North America	55	55	65	55							
Western Europe	110	105	105	120							
Japan	15	15	10	15							
China	200	220	260	240							
Rest of the World	165	165	165	160							
<b>Petroleum</b>	<b>115</b>	<b>65</b>	<b>140</b>	<b>220</b>	<b>100</b>	<b>57%</b>	<b>-55%</b>	<b>55</b>	<b>60</b>	<b>55</b>	<b>55</b>
North America	40	25	-25	90							
Western Europe	-45	-15	70	10							
Japan	10	-35	5	0							
China	80	-5	45	80							
Rest of the World	30	95	45	40							
<b>Electrical</b>	<b>185</b>	<b>190</b>	<b>165</b>	<b>160</b>	<b>150</b>	<b>-3%</b>	<b>-6%</b>	<b>40</b>	<b>40</b>	<b>40</b>	<b>40</b>
North America	10	15	10	10							
Western Europe	5	10	10	10							
Japan	10	15	15	15							
China	75	70	60	60							
Rest of the World	85	80	70	65							
<b>Glass</b>	<b>145</b>	<b>175</b>	<b>200</b>	<b>195</b>	<b>175</b>	<b>-3%</b>	<b>-10%</b>	<b>60</b>	<b>80</b>	<b>50</b>	<b>10</b>
North America	5	10	0	20							
Western Europe	-10	15	10	5							
Japan	0	-25	-5	-10							
China	90	85	95	100							
Rest of the World	60	90	100	180							
<b>Medical and Biomedical</b>	<b>220</b>	<b>220</b>	<b>230</b>	<b>235</b>	<b>235</b>	<b>2%</b>	<b>0%</b>	<b>55</b>	<b>65</b>	<b>45</b>	<b>65</b>
North America	90	90	90	90							
Western Europe	75	75	75	80							
Japan	20	20	20	20							
China	15	15	20	20							
Rest of the World	20	20	25	25							
<b>Other industrial</b>	<b>320</b>	<b>340</b>	<b>330</b>	<b>360</b>	<b>360</b>	<b>9%</b>	<b>0%</b>	<b>85</b>	<b>85</b>	<b>85</b>	<b>10</b>
<b>Investment</b>	<b>935</b>	<b>150</b>	<b>305</b>	<b>505</b>	<b>250</b>	<b>66%</b>	<b>-50%</b>	<b>155</b>	<b>90</b>	<b>40</b>	<b>220</b>
<b>Total Demand</b>	<b>8,570</b>	<b>7,995</b>	<b>8,240</b>	<b>8,235</b>	<b>7,780</b>	<b>0%</b>	<b>-6%</b>	<b>2,075</b>	<b>2,070</b>	<b>1,935</b>	<b>2,160</b>

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<sub>x</sub> 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<sub>x</sub> 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

Gas-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<sub>x</sub> traps (LNT)

Rhodium-based, catalyses the chemical reduction of NO<sub>x</sub> 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.

### 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<sub>x</sub>, 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<sub>x</sub> 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.

### 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<sub>x</sub>. 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

World harmonized light vehicles testing protocols/procedures are laboratory tests to measure pollutant emissions and fuel consumption. WLTP replaces the New European Drive Cycle.

### WPIC

The World Platinum Investment Council.

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### Ounce conversion

1 million ounces = 31.1 tonnes.

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