

See page 3 for contents

## FOREWORD

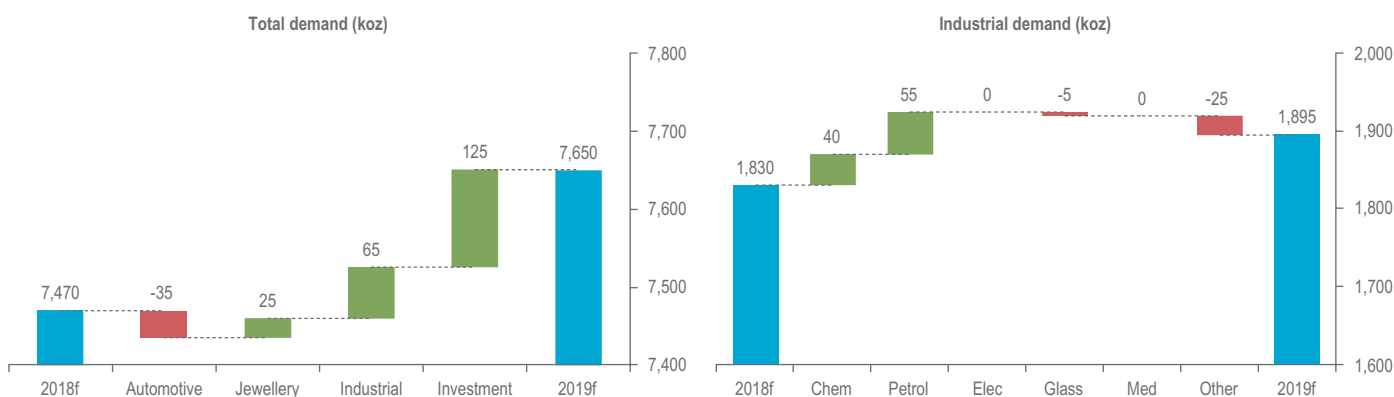
We launched the *Platinum Quarterly* four years ago this month. We highlight below the key current supply and demand issues, presenting data and developments from 2018 that inform the forecast presented for 2019. The *Platinum Quarterly* data and report (from page 4) are, as always, prepared independently for us by SFA (Oxford).

### Platinum supply and demand – updating 2018 and introducing 2019

Today's update raises the 2018 supply demand surplus from 295 koz to 505 koz, primarily on weaker jewellery demand. The 2019 forecast is introduced with a market surplus of 455 koz, reflecting increases of 2% in both supply and demand.

2018 demand bright spots are growth in the industrial segments of petroleum and glass, with strong bar and coin investment growth. Offsetting these positives are continued decline in European autocatalyst consumption and weaker Chinese jewellery demand.

Looking into 2019, the 35 koz decline in automotive demand is more than offset by growth of 215 koz in other demand segments, as jewellery returns to annual growth, the first since 2014, and industrial demand remains strong. A turnaround in ETF investment is expected; aided in part, in our view, by value investors considering platinum in light of its widening price discount to palladium and rhodium.



### Platinum supply – moderate increases

Total mining supply in 2018 is still expected to fall by 1% from 2017. Weakness in Russia and elsewhere will offset the 15 koz production increase in South Africa, which is largely due to fewer operational disruptions in 2018 than in 2017.

A similarly low level of mining disruptions is anticipated for 2019 in South Africa. This, combined with the ramp up of a new project in North America, drive the 2% mine supply growth forecast for 2019.

Recycling should benefit from additional autocatalyst supply, more than offsetting weaker jewellery recycling, to maintain recycling platinum supply growth of 1% year-on-year again in 2019. Stronger autocatalyst recycling is due to improved availability of scrapped vehicles; in part from reasonably healthy scrap steel demand and elevated prices for palladium and rhodium.

### Platinum demand – weaker 2018 but some positives and growth in 2019

2018 demand is 4% weaker year-on-year though with certain bright spots:

- Strengths:
  - Industrial demand up 8%.
  - Petroleum sees a +85% year-on-year recovery. The expected rebound comes after a weak 2017, on the back of refinery capacity shutdowns in Japan that have now passed.
  - Glass is up 19% driven by new plants coming online this year in China and RoW.

- Challenges:

- European diesel appetite continues to decline on negative emissions sentiment and uncertainty regarding diesel car restrictions in some cities.
- Jewellery is expected to be down 2% year-on-year on reduced consumer spending and competition from low carat gold jewellery in China. Double-digit Indian jewellery growth partially offsets some of this weakness.

2019 demand growth of 2% will be mainly from investment and industrial, with small changes in automotive and jewellery:

- Strengths:

- Investment demand is forecast to double from its 2018 trough as strong bar and coin sales are joined by an expected ETF demand rebound.
- The industrial segment has shown annual growth of more than 4%, on average, over the last 5 years versus global GDP growth of 3.5%; this long-term trend should continue. The forecast 4% year-on-year uplift is mainly from chemicals (silicones) and petroleum.

- Challenges:

- Automotive demand, on lower diesel car sales, is assumed to remain on its downward trajectory, but at a slower rate.
- The automotive forecast assumes, somewhat conservatively in our view, no significant substitution by platinum for palladium in gasoline auto-catalysts (despite palladium's price premium exceeding \$300/oz).

### The platinum investment case

The estimated 2019 platinum surplus declines 10% from 2018 and excludes material influence from several emerging medium-term demand drivers. Beyond the 2019 forecast, we see Platinum Group Metal (PGM) substitution in platinum's favour and platinum investment growth as key drivers.

### Platinum substitution for palladium – potential new demand driver

Palladium's price premium to platinum emerged in late 2017 and became meaningful in Q2'18. Palladium has seen a decade of dominance over platinum in gasoline autocatalysts and this is unlikely to be reversed in a short period. Nevertheless, economic and supply concerns argue strongly for automakers to consider a partial switch from palladium to platinum. Technological development and certification may pose switching costs, but these are probably more than overcome by the current palladium price premium over platinum.

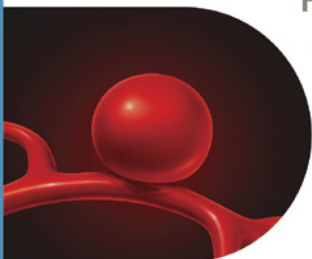
In addition, the introduction of China 6 emissions limits, which are more stringent than emissions regulations in both the US and the EU, should deliver continued growth in Chinese platinum and PGM demand.

### Platinum investment demand – WPIC initiatives

Demand for bars and coins has shown a strong trend, at 210 koz year-to-date, +45% year-on-year and we believe our efforts have aided this trend. These new products and services have been made possible through our strong partnerships with: The Royal Mint, Tanaka (TKK), Valcambi, GraniteShares and BullionVault plus, most recently from our Shanghai office, Hengfu and Taiyuan (CNOOC).

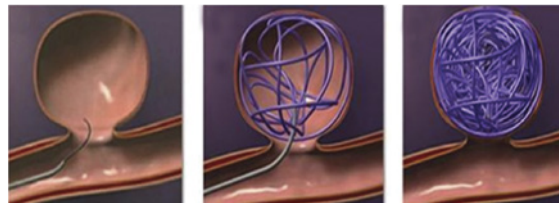
We see significant potential for platinum ownership by retail investors and have increased our focus on this segment, particularly in North America and China. Few people are currently aware of the full range of platinum's interesting and beneficial applications. We have introduced **60 Seconds in Platinum** to address this. These short pieces, published up to four times a month, are freely available and can be accessed and subscribed to via our website: [www.platinuminvestment.com](http://www.platinuminvestment.com)

60 SECONDS IN PLATINUM



## PLATINUM IS A LIFE-SAVING TREATMENT FOR ANEURYSMS

Platinum's applications continue to grow and evolve. After 30 years of use in treating aneurysms, a new more flexible application of the precious metal now updates this technology, further improving outcomes for sufferers



How platinum coils treat an aneurysm: displacing blood and forming a permanent seal. Image: Johnson Matthey

 World Platinum Investment Council

We are also excited about the potential for growth in fuel cell electric vehicles and see this topic increasingly on the agenda for investors. Recent newsworthy examples feature: Japan using the 2020 Tokyo Olympic Games to showcase its vision for a hydrogen society, Germany launching the world's first hydrogen-powered trains and Switzerland implementing on-road trialling of 1,000 hydrogen-powered heavy-duty fuel cell trucks.

**Paul Wilson, CEO**

### Contents

Foreword	<b>P1</b>	2019 Outlook	<b>P14</b>
Summary Table	<b>P4</b>	Expanded Tables	<b>P16</b>
2018 Third Quarter Review	<b>P5</b>	Glossary of Terms	<b>P20</b>
2018 Forecast	<b>P9</b>	Copyright and Disclaimer	<b>P22</b>

# PLATINUM QUARTERLY Q3 2018

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

	2017	2018f	2019f	2018/2017 Growth %	2019f/2018f Growth %	Q2 2018	Q3 2018
<b>Platinum Supply-demand Balance (koz)</b>							
<b>SUPPLY</b>							
<b>Refined Production</b>	<b>6,125</b>	<b>6,080</b>	<b>6,170</b>	<b>-1%</b>	<b>1%</b>	<b>1,600</b>	<b>1,650</b>
South Africa	4,380	4,395	4,450	0%	1%	1,150	1,210
Zimbabwe	480	465	465	-3%	0%	115	120
North America	365	365	410	0%	12%	85	90
Russia	720	685	665	-5%	-3%	205	185
Other	180	170	180	-6%	6%	45	45
<b>Increase (-)/Decrease (+) in Producer Inventory</b>	<b>+30</b>	<b>-15</b>	<b>+0</b>	<b>N/M</b>	<b>N/M</b>	<b>+55</b>	<b>-20</b>
<b>Total Mining Supply</b>	<b>6,155</b>	<b>6,065</b>	<b>6,170</b>	<b>-1%</b>	<b>2%</b>	<b>1,655</b>	<b>1,630</b>
<b>Recycling</b>	<b>1,890</b>	<b>1,910</b>	<b>1,935</b>	<b>1%</b>	<b>1%</b>	<b>480</b>	<b>485</b>
Autocatalyst	1,325	1,405	1,450	6%	3%	345	365
Jewellery	560	500	480	-11%	-4%	135	120
Industrial	5	5	5	0%	0%	0	0
<b>Total Supply</b>	<b>8,045</b>	<b>7,975</b>	<b>8,105</b>	<b>-1%</b>	<b>2%</b>	<b>2,135</b>	<b>2,115</b>
<b>DEMAND</b>							
<b>Automotive</b>	<b>3,335</b>	<b>3,110</b>	<b>3,075</b>	<b>-7%</b>	<b>-1%</b>	<b>805</b>	<b>720</b>
Autocatalyst	3,195	2,965	2,925	-7%	-1%	770	685
Non-road	140	145	150	4%	3%	40	35
<b>Jewellery</b>	<b>2,460</b>	<b>2,405</b>	<b>2,430</b>	<b>-2%</b>	<b>1%</b>	<b>590</b>	<b>580</b>
<b>Industrial</b>	<b>1,700</b>	<b>1,830</b>	<b>1,895</b>	<b>8%</b>	<b>4%</b>	<b>470</b>	<b>450</b>
Chemical	590	575	615	-3%	7%	140	160
Petroleum	100	185	240	85%	30%	45	45
Electrical	195	190	190	-3%	0%	45	50
Glass	185	220	215	19%	-2%	65	50
Medical and Biomedical	235	240	240	2%	0%	70	45
Other	395	420	395	6%	-6%	105	100
<b>Investment</b>	<b>265</b>	<b>125</b>	<b>250</b>	<b>-53%</b>	<b>100%</b>	<b>-55</b>	<b>60</b>
Change in Bars, Coins	205					70	65
Change in ETF Holdings	105					-125	5
Change in Stocks Held by Exchanges	-45					0	-10
<b>Total Demand</b>	<b>7,760</b>	<b>7,470</b>	<b>7,650</b>	<b>-4%</b>	<b>2%</b>	<b>1,810</b>	<b>1,810</b>
<b>Balance</b>	<b>285</b>	<b>505</b>	<b>455</b>	<b>77%</b>	<b>-10%</b>	<b>325</b>	<b>305</b>
<b>Above Ground Stocks</b>	<b>4,140*</b>	<b>2,160</b>	<b>2,665</b>	<b>23%</b>	<b>17%</b>		

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

Notes:

1. 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.

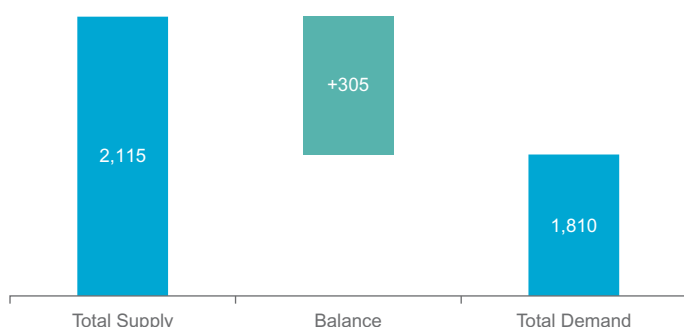
2. The WPIC did not publish quarterly estimates for 2013 or the first two quarters of 2014. However, quarterly estimates from Q3 2014, to Q3 2016 are contained in previously published PQs which are freely available on the WPIC website. Quarterly estimates from Q4 2016 and half-yearly estimates from H2 2016 are included in Tables 3 and 4 respectively, on pages 17-18 (supply, demand and above ground stocks).

3. 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 THIRD QUARTER PLATINUM MARKET REVIEW

Global platinum supply was 2,115 koz in the third quarter, a 3% year-on-year increase. Total mining supply rose 4% year-on-year to 1,630 koz and recycling edged up 1% to 485 koz. Overall platinum demand was 1,810 koz, a 2% improvement year-on-year, helped by a positive quarter for investment demand. Automotive demand was 8% lower year-on-year (-65 koz), while jewellery consumption was unchanged and industrial usage was 6% higher (+25 koz). With demand growing more slowly than supply during the quarter, the market had a surplus of 305 koz (Chart 1).

**Chart 1: Supply-demand balance, koz, Q3 2018**

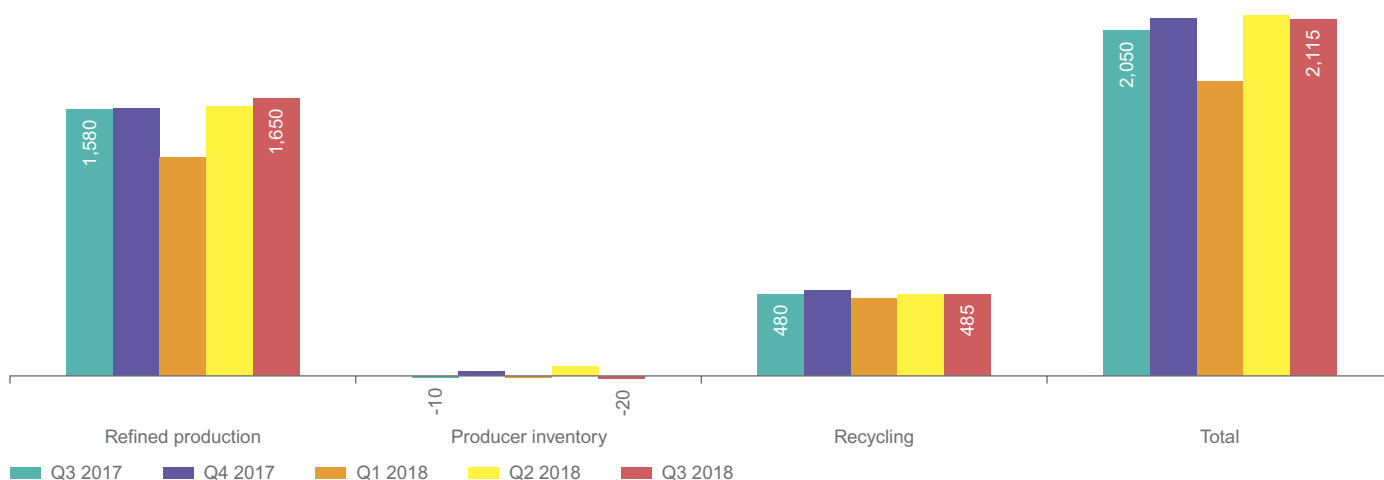


Source: SFA (Oxford)

### Supply

Refined production was up by 4% (+70 koz) year-on-year to 1,650 koz in the third quarter of 2018 due to increased supply from South Africa and Zimbabwe. Operational improvements on the Western Bushveld, combined with the ramp-up of output from development-phase shafts and the restart of a concentrator on the Eastern Bushveld, lifted production from South Africa by 5% year-on-year to 1,210 koz (+55 koz). Production rose by 20% (+20 koz) to 120 koz in Zimbabwe following furnace maintenance in the prior year period. Output from all other regions remained stable at 320 koz overall. There was a net 20 koz increase in producer inventory during the quarter, and total mining supply therefore grew by 4% year-on-year to 1,630 koz.

**Chart 2: Platinum supply, koz**

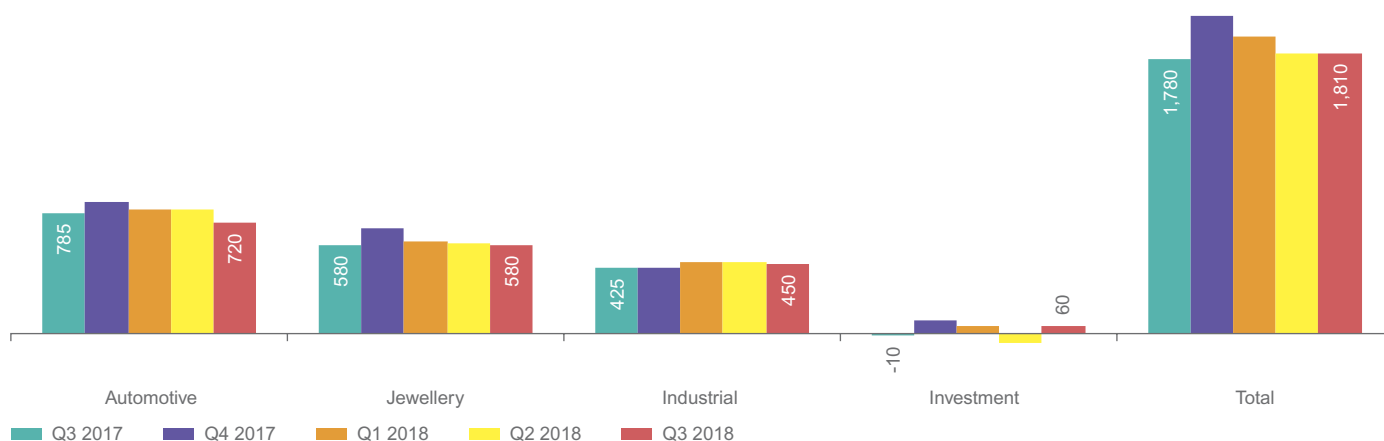


Source: SFA (Oxford)

Platinum recycling in Q3'18 contributed 485 koz of platinum to the market. Autocatalyst recycling improved 11% (+35 koz) compared to Q3'17 as the availability of autocatalysts has increased across passenger cars and commercial vehicles. This gain has mostly been seen in Western Europe and North America, the major regions for platinum autocatalyst recycling. Platinum jewellery recycling dropped to 120 koz (-30 koz) in Q3'18, the Chinese price fell to within 1% of its 15-year low and the price in Japanese yen reached the lowest level since 2008. Price-conscious consumers in those regions were aware of these low prices, which reduced the incentive to return jewellery.

## Demand

Chart 3: Platinum demand, koz



Source: SFA (Oxford)

## Automotive demand

Platinum demand for autocatalysis decreased by 8% (-65 koz) year-on-year to 720 koz in the third quarter of 2018. Declining diesel shares in Western Europe continued to weaken demand in platinum's largest automotive market. Consumption fell slightly in Japan and China, although growth in India and North America partially offset lost demand in the other regions.

Western European vehicle sales in the second half of 2018 are being disrupted by the change in tailpipe emissions testing and certification from NEDC (New European Driving Cycle) to WLTP (Worldwide Harmonised Light Vehicles Test Procedure) real-world driving emissions (RDE) to more realistically assess fuel consumption, and CO<sub>2</sub> and pollutant emissions. Sales were brought forward in July and August, rising by 9% and 28% respectively. The implementation of WLTP emissions testing in September caused delays in the testing of models, distorting sales further. Sales declined by double-digits in all main Western European markets in September, offsetting the gains seen in July and August. In aggregate, passenger car sales in Q3'18 grew in Spain (+16%), France (+12%) and Germany (+1%), but declined in Italy (-7%) and the UK (-10%), with the overall Western European market up by only 0.2% to 3.15 million units (source: ACEA).

Diesel passenger cars, which account for just over half of automotive platinum demand in Western Europe, saw market shares fall further in Q3'18 to 36.8% (down -0.9 percentage points from Q2'18, and down by -8.5 percentage points year-on-year). Western European diesel passenger cars are estimated to represent around 22% of total automotive platinum demand in 2018. Sales of diesel cars fell by 17% year-on-year to 1.17 million units in Western Europe in Q3'18. Among the biggest Western European car markets, the UK registered the largest year-on-year drop during the quarter (-34%), followed by Spain (-13%), Italy (-12%), Germany (-11%) and France (-9%). By the end of Q3'18, diesel shares fell to 40% in France (from 48% in Q3'17), 37% in Spain (from 50%), just 32% in both Germany (from 40%) and the UK (from 43%), and 53% in Italy (from 57%) (source: LMC Automotive).

### Jewellery demand

Jewellery demand for platinum in Q3'18 was 580 koz, down 10 koz from the previous quarter and flat year-on-year. A surprisingly weak quarter for China offset the year-on-year growth in other regions, which mainly came from the US and India. Demand from Chinese jewellery manufacturers declined 9% year-on-year for the quarter. Purchasing of platinum on the Shanghai Gold Exchange by jewellery end-users fell at a double digit rate year-on-year in Q3'18 and this was an even sharper drop than that seen in H1'18. However, high platinum imports to China and Hong Kong suggest additional purchasing through other channels. This is in contrast to the overall Chinese jewellery market: major players Chow Tai Fook reported 6% and 23% same store sales growth for mainland China and Hong Kong & Macau, respectively, while Luk Fook reported 4% and 17% for the same metrics. Official statistics for jewellery retail sales growth indicated a change of 11% and 13% year-on-year for the mainland and Hong Kong, respectively, in Q3'18. Chinese jewellers also continued to highlight the shift of consumers to fashion jewellery which is less commonly priced by weight, although in this category the focus is currently on lower carat coloured gold jewellery.

In Japan, the local market for platinum has been lifted by the low platinum price which consumers there view as a buying opportunity, although this has not been fully reflected in manufacturer demand in Japan as production for export has declined due to lower Chinese platinum jewellery demand. The overall Indian jewellery market has been soft in Q3'18 owing to the weak rupee but platinum demand continues on its upward trend. Strong economic conditions in the US, and the combination of lower platinum prices with a steady \$400/oz discount to gold in Q2'18 and Q3'18, have contributed to strong platinum jewellery demand growth, while growth in Europe has been more muted.

### Industrial demand

Industrial demand for platinum increased by 6% year-on-year (+25 koz) to 450 koz in Q3'18, strengthened mainly by greater requirements in the petroleum sector, as well as minor growth in glass fabrication and other end-uses. Similarly to the second quarter, net petroleum demand improved in Japan versus a weak Q3'17, as there have been no refining capacity curtailments in the country this year, compared to sizeable cuts in 2017 (metal returned to market). Elsewhere in the petroleum industry, expansion of refining capacity in Russia and East and West Asia lifted new catalyst requirements in the RoW. Growth in glass fabrication capacity in Western Europe and the RoW plus development in the fuel cell industry (other end-uses) also boosted platinum demand slightly in the third quarter.

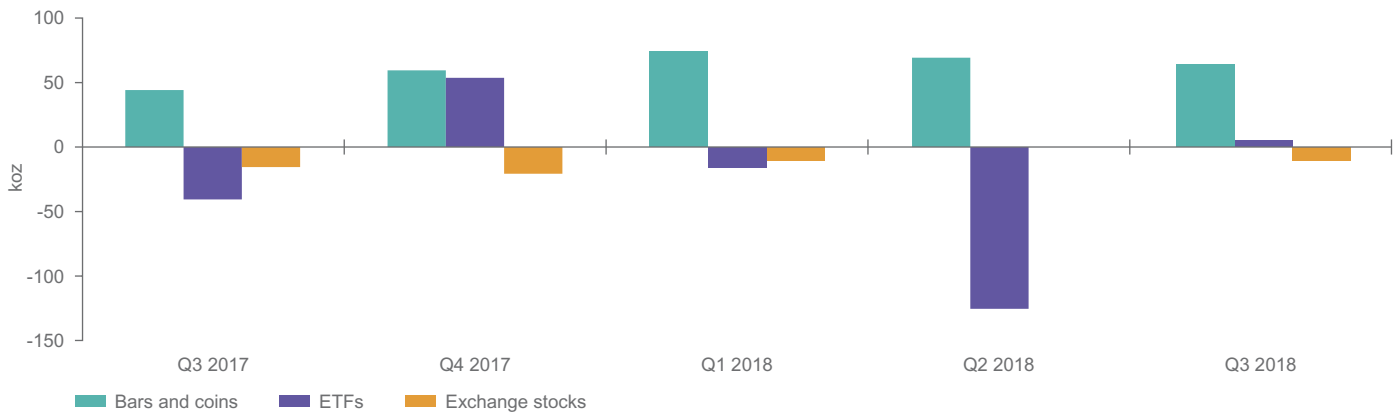
### Investment demand

The third quarter saw total investment in platinum grow by 60 koz as investment in bars and coins and ETFs increased, while exchange stocks declined. Q3'18 was another solid quarter for bar and coin investment with investors purchasing 65 koz. The summer can be a quiet period for investment demand in Japan, but with the platinum price falling to ¥2,815/g on 16 August, the lowest level since January 2009, investors took the opportunity to buy while the price was low.

Global ETF holdings ended the quarter 5 koz higher, for the first quarterly gain since Q4'17. Increases in July and August were almost cancelled out by a drop in holdings in September. On the positive side, US ETFs gained 98 koz and Japanese investors also made net purchases of 7 koz. However, offsetting most of these gains were contractions in ETF holdings of 64 koz in the UK, most of which came in September, 32 koz in South Africa and 3 koz in Switzerland.

There was no consistent pattern of increases or decreases in regional ETF holdings during the quarter. South African investors made net sales of 63 koz in July but then made net purchases of 31 koz over the course of August and September, whereas in the UK investors added 18 koz to their ETF holdings in July but then reversed course and reduced them in August and September by 22 koz and 59 koz respectively. Meanwhile, in the US the growth in ETF holdings came in July and August but was then followed by a small decline in September.

**Chart 4: Platinum investment**



Source: SFA (Oxford)



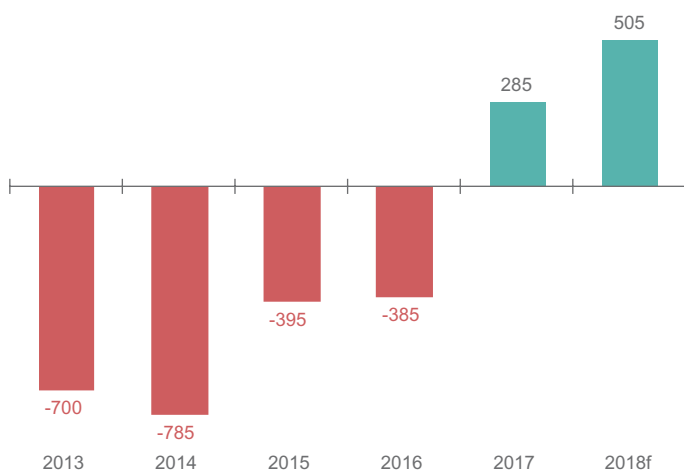
## 2018 FORECAST

Total platinum supply is forecast to dip by 1% year-on-year (-70 koz) to 7,975 koz in 2018 as total mining supply drops by 1% (-90 koz) to 6,065 koz, while recycling grows marginally (+20 koz) to 1,910 koz. South African refined production is expected to increase slightly (+15 koz) while North American output is flat, but declines are likely in Zimbabwe (-15 koz), Russia (-35 koz) and other regions (-10 koz). In addition, a 15 koz build in producer inventory is anticipated. Secondary platinum supply is forecast to climb by 1% (+20 koz) as continued growth in autocatalyst recycling (+80 koz) is mostly offset by a decline in recycled jewellery (-60 koz).

Global platinum demand is projected to drop by 4% to 7,470 koz this year as reductions in automotive (-225 koz), jewellery (-55 koz) and investment (-140 koz) demand are only partially offset by an increase in industrial usage (+130 koz). The amount of platinum used in the automotive market is expected to fall by 7% to 3,110 koz. Automotive demand continues to suffer from the decline in the diesel share of passenger cars in the Western European market, which significantly outweighs gains from the heavy-duty diesel market. Jewellery consumption is growing in most regions, but the ongoing decline in China, which is the largest market, is expected to result in a 2% drop in global jewellery demand to 2,405 koz. Industrial requirements are expected to increase by 8% this year to 1,830 koz with gains in most segments, notably petroleum (+85 koz) as demand rebounds following refinery closures in 2017. Investment demand is projected to be 125 koz this year as solid bar and coin demand is somewhat offset by a contraction in global ETF holdings.

With demand declining more than supply, the market is projected to have a surplus of 505 koz (Chart 5).

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



Source: SFA (Oxford)

## Mine supply

Global refined production is forecast to fall by 1% year-on-year to 6,080 koz in 2018. South African supply is predicted to increase marginally (+15 koz), with ramp-up of new production areas and recovery of output from a mine impacted by a tailings dam failure last year offsetting production lost from shaft closures. Supply from Russia is projected to fall by 5% (-35 koz) to 685 koz owing to a small pipeline lockup. Output from Zimbabwe could drop by 3% (-15 koz) to 465 koz because of a pipeline boost to yield in 2017, but mine production from the region should remain stable overall. North American production is forecast to remain unchanged at 365 koz for the year, while a minor reduction (-10 koz) is anticipated from the rest of the world. There was a net 25 koz reduction in producer inventories for the first nine months of 2018, and a restock of around 40 koz is estimated for the final quarter. This gives total mining supply of 6,065 koz for 2018, down 1% (-90 koz) on 2017 levels.

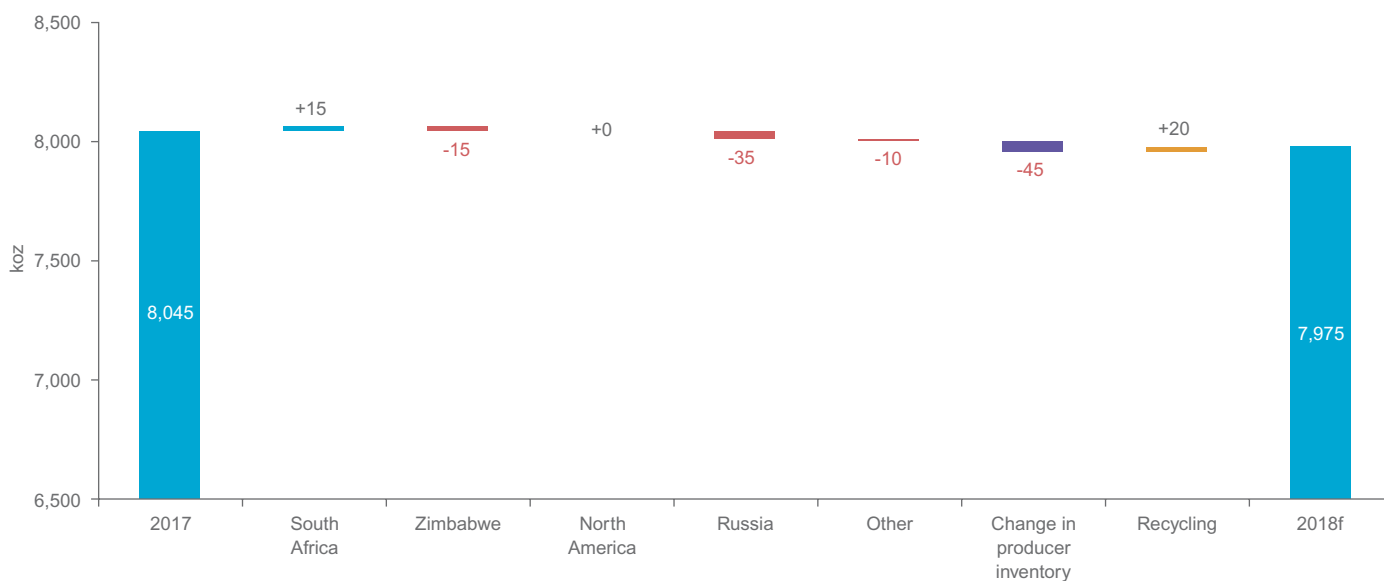
## Recycling

Platinum recycling is expected to increase by 20 koz (+1%) to 1,910 koz in 2018 as autocatalyst and jewellery recycling move in opposite directions.

Autocatalyst recycling is estimated to grow to 1,405 koz this year, up 6% (+80 koz) from 2017. The high palladium and rhodium prices have driven up the availability of all autocatalysts and this has benefitted platinum recycling. In addition to the platinum-rich diesel autocatalysts, gasoline catalysts from 10-15 years ago which are now being recycled also contain some platinum metal, providing a boost as processed volumes increase, especially from the large US gasoline auto market. The continued strong performance of the autocatalyst recycling industry in Q3'18, which has been able to maintain high volume throughput, and the recovery of the palladium price in September have increased forecast autocatalyst recycling supply in 2018 by 15 koz.

Jewellery recycling is set to be 500 koz in 2018, a fall of 11% (-60 koz). The slowing Chinese platinum jewellery market and low platinum prices in both China and Japan have been the main forces behind this decline. The weakness of recycling in Q3'18 and the lower forecast for Chinese jewellery demand have led to a downward revision (-5 koz) in the annual forecast.

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



Source: SFA (Oxford)

## Automotive demand

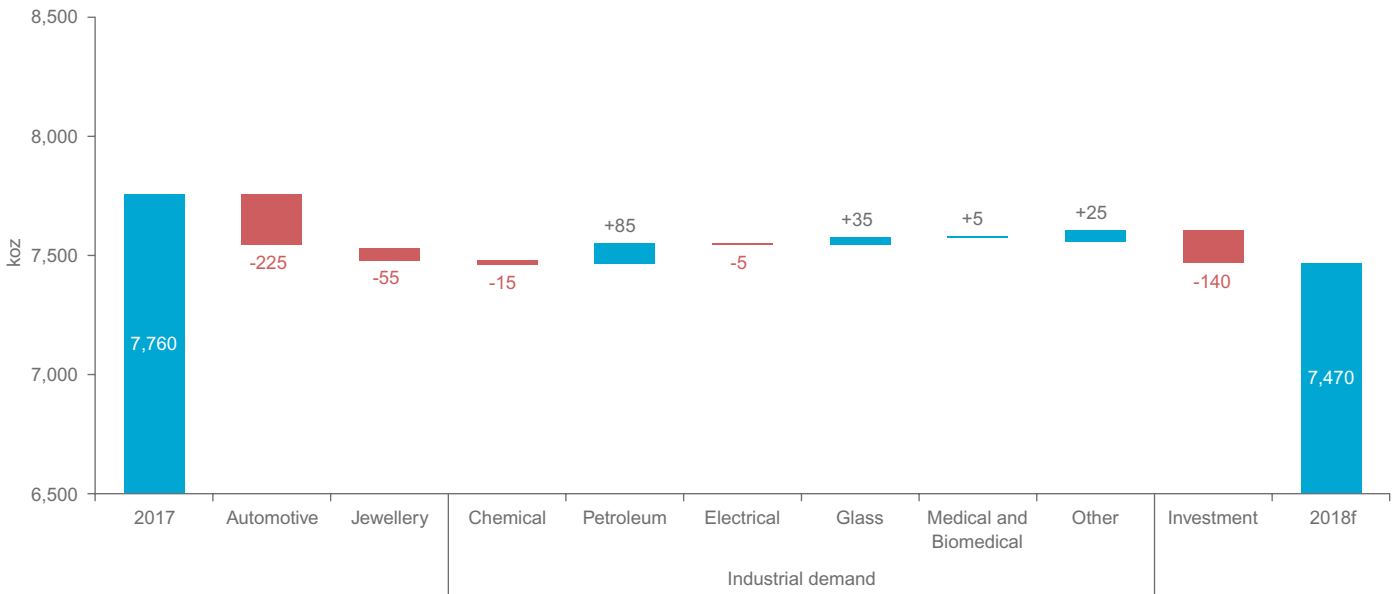
Global automotive demand is expected to decline by 7% (-225 koz) to 3,110 koz in 2018, with the biggest drop coming from Western Europe. Diesel market share in passenger car sales is expected to shrink by 8.1 percentage points to 36.3% in 2018 (down from 44.4% in 2017), resulting in lower diesel car sales of around 1.1 million units (-17% year-on-year). Demand is expected to grow in the North America, India and RoW markets due to higher vehicle output and stable diesel shares.

## Jewellery demand

Platinum jewellery demand is predicted to drop 2% (-55 koz) in 2018 to 2,405 koz. The decline in Chinese jewellery demand in Q3'18 has led to forecast annual demand for the region being lowered and it no longer seems likely that platinum jewellery demand will start to level off. Additionally, the risk to the total jewellery industry is of a slowdown: jewellery retail sales growth in mainland China slowed to 5% in October from 11% in September and total retail sales growth dropped to the second lowest level in 15 years. Consumers are being cautious due to ongoing trade tensions with the US and a slowdown in the economy, as indicated by the four consecutive months of year-on-year decline in passenger car sales (as of October), and this could expand to luxury goods in Q4'18.

India and North America are expected to contribute the most growth to platinum jewellery demand in 2018, the latter being revised up marginally due to a good economic environment which resulted in strong Q3'18 platinum jewellery demand and improved expectations for the final quarter of the year. The Indian rupee continues to weaken and could be a headwind going into Q4'18 but is more likely to affect gold jewellery demand. Western Europe and Japan are both predicted to see low single-digit growth as the year-on-year fall in the platinum price induces some demand growth in what would otherwise be relatively flat markets.

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

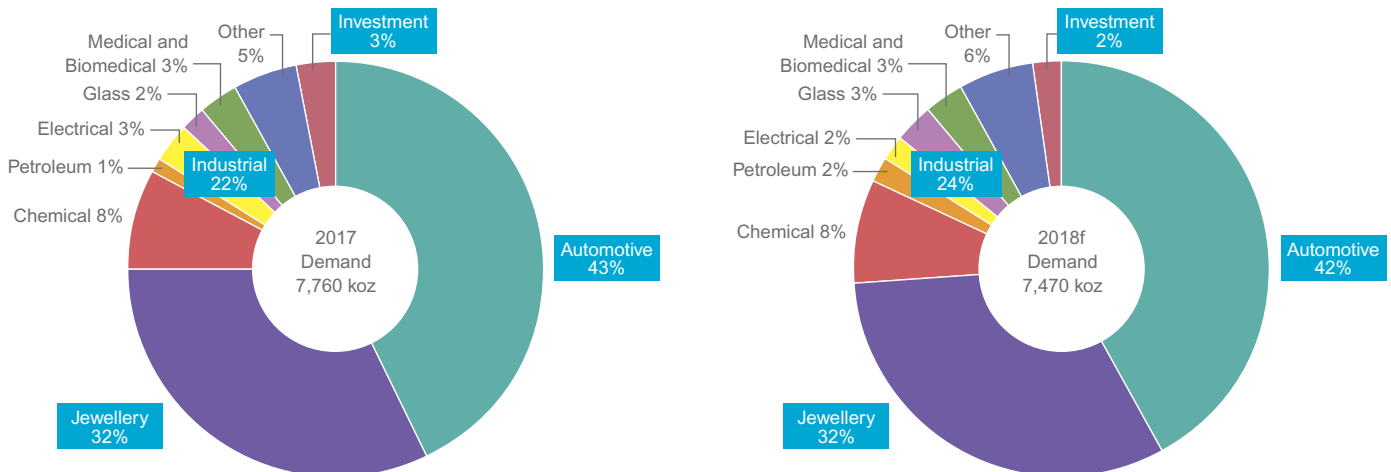


Source: SFA (Oxford)

Industrial demand

Industrial platinum demand is set to rebound to 1,830 koz in 2018, an increase of 8% (+130 koz) year-on-year, as net petroleum requirements recover (+85 koz) from the slump in 2017 and demand grows in the glass sector (+35 koz) and other end-uses (+25 koz). Greater usage in these segments, plus medical applications (+5 koz), should dwarf declines in chemical catalysis (-15 koz) and electrical components (-5 koz).

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



Source: SFA (Oxford)

### **Chemical**

Chemical demand is forecast to drop by 3% to 575 koz this year, owing to lower usage in China, Western Europe and North America, which together should outweigh growth in the RoW. Platinum required for nitric acid production is likely to fall in most regions as global ammonium nitrate capacity contracts, weakening chemical demand in Western Europe and North America especially, while a lack of new alkane dehydrogenation (ADH) plants during 2018 is also expected to help reduce requirements in China. However, elsewhere ADH capacity is set to increase following the completion of a new propane dehydrogenation (PDH) unit in West Asia, boosting new metal demand in the RoW, while growing silicone production is likely to lift platinum usage throughout the RoW region as well.

### **Petroleum**

Net platinum requirements for the petroleum industry are predicted to rebound to 185 koz in 2018, following a recovery in Japan plus growth in the RoW. Widespread cuts to refining capacity significantly weakened petroleum demand in Japan last year, reducing domestic requirements to net negative levels as recovered catalysts were recycled and metal returned to market. However, as there have been no capacity curtailments in the country this year, platinum usage is set to recover back to positive territory. A similar trend is expected in Western Europe, although with a smaller rebound in platinum demand, as the region's refining capacity should also remain stable in 2018. In the RoW, refining capacity expansion in Russia and across Asia is anticipated to boost new metal requirements this year which, along with improvements in Japan and Western Europe, should easily exceed a decline in China, where capacity growth is not as great as in 2017.

Compared to the previous *Platinum Quarterly* report, net petroleum demand estimates for this year have been revised upwards by 25 koz, as a result of higher demand forecasts for the RoW (greater rate of refining capacity expansion) and Western Europe (healthy refinery margins – no capacity cuts).

### **Electrical**

Electrical usage is expected to decrease by 3% to 190 koz this year, mainly owing to weaker demand in China, while requirements in other regions remain relatively flat. Platinum consumed in hard disk drives (HDDs) is forecast to fall slightly in 2018 as HDD unit and platter (disk) shipments decline by 10% and 1% respectively, with the increase in the average number of platters per drive failing to offset the large drop in unit shipments. The PC sector is set to account for most of the decline in HDD deliveries, while non-PC sales are also anticipated to contract, despite growth in the enterprise market. Meanwhile, platinum purchases by other Chinese electrical component manufacturers are likely to fall as well, following a small spike in demand last year.

### **Glass**

Glass demand is predicted to rise to 220 koz in 2018, with greater platinum usage in Western Europe, Japan and the RoW set to comfortably outweigh a drop in China's requirements. Expansion of glass fabrication capacity in several Western European countries is expected to increase platinum demand in the region this year, including at glass fibre facilities in France and the Netherlands, while capacity growth in Latin America and Asia should also lift requirements in the RoW, especially for new glass fibre capacity in West Asia and solar glass plant expansions in Southeast Asia. Demand in Japan is likely to recover from a period in net negative territory, during which closures of liquid-crystal display (LCD) substrate capacity returned metal from recycled equipment to market. However, China's usage is projected to fall following expansion of LCD glass substrate capacity last year, with a comparative lack of new fabrication facilities resulting in lower new metal requirements in 2018.

Since the previous *Platinum Quarterly* report, glass demand estimates for the year have been revised upwards by 20 koz, as a result of higher demand forecasts for China and the RoW. Following recent announcements, glass capacity growth in these regions is expected to be higher than previously forecast.

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### *Other*

Platinum consumption in other industrial end-uses is set to increase by 6% to 420 koz this year, driven by growth in Japan, North America and the RoW. The fuel cell sector is predicted to account for the majority of growth in this segment, as rising production and adoption of fuel cells for transportation and stationary applications are likely to boost platinum requirements in Japan, the US and South Korea (RoW). Stronger demand for automotive sensors is also expected to lift consumption in the RoW marginally, as the region's vehicle production increases by 5% in 2018, particularly in India, Russia, Latin America and Southeast Asia.

### *Investment demand*

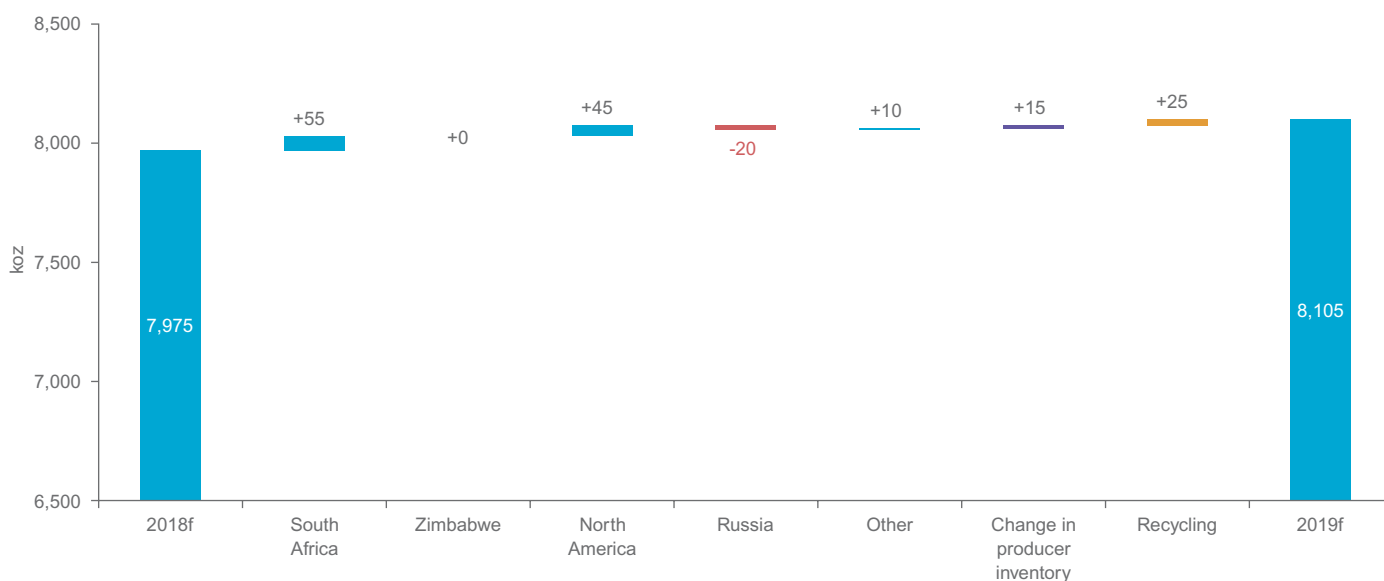
Global investment in platinum is estimated to be 125 koz in 2018. The low platinum price has maintained Japanese investors' buying interest in platinum bars, and with the US Mint raising the mintage of platinum American Eagle bullion coins, bar and coin demand is expected to improve somewhat from 2017. However, with a small drop in exchange stocks likely and with ETF holdings now looking set to fall this year, the forecast for global platinum investment has been revised down to 125 koz.

## 2019 OUTLOOK

Global refined production is forecast to grow by 1% (+90 koz) to 6,170 koz in 2019. This growth is attributable to shafts ramping up in South Africa and the US. South African production is forecast to increase by 1% (+55 koz) year-on-year to 4,450 koz, while North American production is expected to grow by 12% (+45 koz) to 410 koz. Output from Russia is forecast to decrease by 3% (-20 koz) to 665 koz owing to depletion of alluvial sources, while supply from the rest of the world should remain broadly stable.

Platinum recycling is forecast to expand by another 1% (+25 koz) in 2019 to 1,935 koz. Autocatalyst recycling is expected to increase for a fourth consecutive year, adding an additional 45 koz to reach 1,450 koz of annual platinum supply. The mix of powertrains in scrapped vehicles in Western Europe is predicted to shift further in favour of platinum-rich diesels. There is a slight risk around North American volumes as the slowing sales of new autos in the US could lead to marginally lower numbers of vehicles being scrapped. However, the collection rate of autocatalysts from scrapped vehicles should continue to remain high while the palladium, rhodium and steel prices remain elevated. Jewellery recycling is forecast to decline by 20 koz to 480 koz in 2019 owing to a low platinum price and a further contraction in the Chinese platinum jewellery market.

**Chart 9: Changes in total supply, 2019f vs. 2018f**



Source: SFA (Oxford)

Lower diesel vehicle production in Western Europe combined with ongoing thrifting of platinum in light-duty gasoline autocatalysts in Japan and cooling of the Chinese vehicle market, is expected to slightly reduce global automotive platinum demand by 1% (-35 koz) year-on-year to 3,075 koz in 2019.

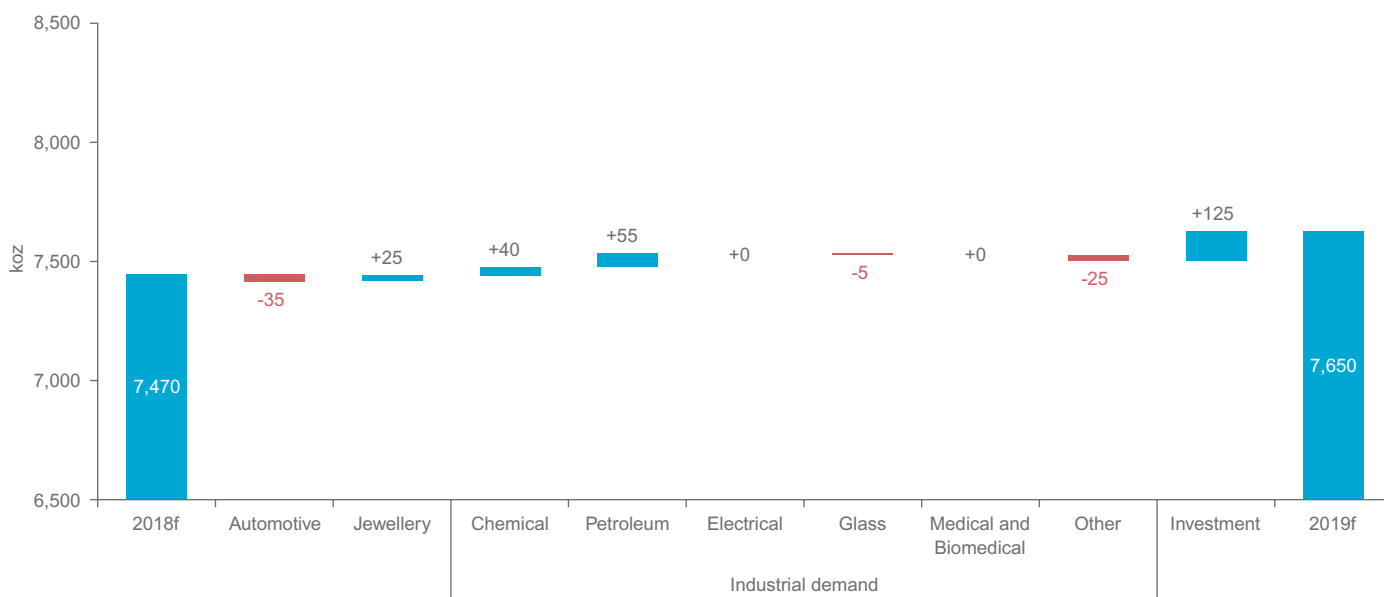
Western Europe's diesel car sales are expected to decline further next year (-4% year-on-year to 5.0 million units), lowering the overall diesel share to below 35%, with further risks to the downside. Demand is forecast to increase in North America owing to a higher diesel share in the light-duty segment, while requirements in India and the RoW are also expected to rise, driven by higher vehicle output and stricter emissions legislation.

In light of the widening price differential between platinum and palladium (~\$240/oz at the end of October 2018), thrifting of platinum in light-duty gasoline autocatalysts in Japan might be reversed. Globally, the use of some platinum at the expense of palladium in gasoline catalysts will become increasingly likely, but it is unlikely to impact demand in 2019 as new catalyst formulations take time to certify and reach the production line.

Platinum jewellery demand is estimated to grow 1% (+25 koz) to 2,430 koz in 2019, which would make it the first year of growth since 2014. Chinese demand is expected to continue its decline, albeit at a slower rate, as platinum struggles to find its place in a changing market where the trend towards jewellery pieces for daily wear and purchases by younger consumers are becoming increasingly important. This fashion trend is likely to involve a move away from weight-based pricing to design-led pieces, which are priced by piece, leading to less metal demand for the same level of retail spending. Furthermore, the downward trend in the platinum price means that consumers are aware that their purchases of platinum jewellery may not hold their value. However, the slower rate of decline in China and the anticipated growth in all other regions, which are largely expected to continue their trends from 2018, lifts global demand, resulting in a positive year-on-year change.

Industrial platinum demand is projected to rise by 4% (+65 koz) year-on-year to 1,895 koz in 2019, strengthened by greater requirements for petroleum processes (+55 koz) and chemical catalysis (+40 koz). The rate of refining capacity expansion is expected to accelerate in China, North America and the RoW next year, boosting petroleum demand in these regions, while new ADH units in China and the US should lift new metal purchases by the chemical sector, along with growing paraxylene capacity (also in China) and silicone production. However, decreasing demand for use in glass fabrication (-5 koz) and other end-uses (-25 koz) is set to hinder overall demand growth somewhat, as thrifting is likely to temporarily reduce requirements for fuel cells, despite further growth in unit volumes. Electrical and medical usage is forecast to remain stable.

**Chart 10: Changes in demand by category, 2019f vs. 2018f**



Source: SFA (Oxford)

Next year, platinum investment is forecast to be 250 koz. Japanese investors have become somewhat inured to the low platinum price, so, while the price is expected to remain subdued in yen terms as the yen is forecast to strengthen slightly, an easing in overall bar demand is anticipated. Coin demand is likely to be similar to the level seen in 2018 and global ETF holdings are projected to experience a modest increase.

## ABOVE GROUND STOCKS

The market is projected to have a surplus of 505 koz this year and 455 koz in 2019, which will result in above ground stocks reaching 3,120 koz at the end of 2019.

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

# PLATINUM QUARTERLY Q3 2018

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

	2013	2014	2015	2016	2017	2018f	2019f	2018f/2017 Growth %	2019f/2018f Growth %
<b>Platinum Supply-demand Balance (koz)</b>									
<b>SUPPLY</b>									
<b>Refined Production</b>	<b>6,070</b>	<b>4,885</b>	<b>6,160</b>	<b>6,035</b>	<b>6,125</b>	<b>6,080</b>	<b>6,170</b>	<b>-1%</b>	<b>1%</b>
South Africa	4,355	3,115	4,480	4,255	4,380	4,395	4,450	0%	1%
Zimbabwe	405	405	405	490	480	465	465	-3%	0%
North America	355	400	385	395	365	365	410	0%	12%
Russia	740	740	710	715	720	685	665	-5%	-3%
Other	215	195	180	180	180	170	180	-6%	6%
<b>Increase (-)/Decrease (+) in Producer Inventory</b>	<b>-215</b>	<b>+350</b>	<b>+30</b>	<b>+30</b>	<b>+30</b>	<b>-15</b>	<b>+0</b>	<b>N/M</b>	<b>N/M</b>
<b>Total Mining Supply</b>	<b>5,855</b>	<b>5,205</b>	<b>6,190</b>	<b>6,065</b>	<b>6,155</b>	<b>6,065</b>	<b>6,170</b>	<b>-1%</b>	<b>2%</b>
<b>Recycling</b>	<b>1,980</b>	<b>2,035</b>	<b>1,705</b>	<b>1,840</b>	<b>1,890</b>	<b>1,910</b>	<b>1,935</b>	<b>1%</b>	<b>1%</b>
Autocatalyst	1,120	1,255	1,185	1,210	1,325	1,405	1,450	6%	3%
Jewellery	855	775	515	625	560	500	480	-11%	-4%
Industrial	5	5	5	5	5	5	5	0%	0%
<b>Total Supply</b>	<b>7,835</b>	<b>7,240</b>	<b>7,895</b>	<b>7,905</b>	<b>8,045</b>	<b>7,975</b>	<b>8,105</b>	<b>-1%</b>	<b>2%</b>
<b>DEMAND</b>									
<b>Automotive</b>	<b>3,170</b>	<b>3,310</b>	<b>3,385</b>	<b>3,470</b>	<b>3,335</b>	<b>3,110</b>	<b>3,075</b>	<b>-7%</b>	<b>-1%</b>
Autocatalyst	3,030	3,165	3,250	3,330	3,195	2,965	2,925	-7%	-1%
Non-road	140	150	140	135	140	145	150	4%	3%
<b>Jewellery</b>	<b>2,945</b>	<b>3,000</b>	<b>2,840</b>	<b>2,505</b>	<b>2,460</b>	<b>2,405</b>	<b>2,430</b>	<b>-2%</b>	<b>1%</b>
<b>Industrial</b>	<b>1,485</b>	<b>1,565</b>	<b>1,760</b>	<b>1,780</b>	<b>1,700</b>	<b>1,830</b>	<b>1,895</b>	<b>8%</b>	<b>4%</b>
Chemical	535	540	595	560	590	575	615	-3%	7%
Petroleum	50	65	205	215	100	185	240	85%	30%
Electrical	195	205	190	185	195	190	190	-3%	0%
Glass	145	175	200	205	185	220	215	19%	-2%
Medical and Biomedical	220	220	225	230	235	240	240	2%	0%
Other	340	360	345	385	395	420	395	6%	-6%
<b>Investment</b>	<b>935</b>	<b>150</b>	<b>305</b>	<b>535</b>	<b>265</b>	<b>125</b>	<b>250</b>	<b>-53%</b>	<b>100%</b>
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				
<b>Total Demand</b>	<b>8,535</b>	<b>8,025</b>	<b>8,290</b>	<b>8,290</b>	<b>7,760</b>	<b>7,470</b>	<b>7,650</b>	<b>-4%</b>	<b>2%</b>
<b>Balance</b>	<b>-700</b>	<b>-785</b>	<b>-395</b>	<b>-385</b>	<b>285</b>	<b>505</b>	<b>455</b>	<b>77%</b>	<b>-10%</b>
<b>Above Ground Stocks</b>	<b>4,140*</b>	<b>3,440</b>	<b>2,655</b>	<b>2,260</b>	<b>1,875</b>	<b>2,160</b>	<b>3,120</b>	<b>23%</b>	<b>17%</b>

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



# PLATINUM QUARTERLY Q3 2018

**Table 3: Supply and demand summary – quarterly comparison**

	Q4 2016	Q1 2017	Q2 2017	Q3 2017	Q4 2017	Q1 2018	Q2 2018	Q3 2018	Q3'18/Q3'17 Growth %	Q3'18/Q2'18 Growth %
<b>Platinum Supply-demand Balance (koz)</b>										
<b>SUPPLY</b>										
<b>Refined Production</b>	<b>1,490</b>	<b>1,415</b>	<b>1,550</b>	<b>1,580</b>	<b>1,590</b>	<b>1,300</b>	<b>1,600</b>	<b>1,650</b>	<b>4%</b>	<b>3%</b>
South Africa	1,065	1,020	1,090	1,155	1,120	910	1,150	1,210	5%	5%
Zimbabwe	120	115	125	100	140	115	115	120	20%	4%
North America	85	95	85	95	95	90	85	90	-5%	6%
Russia	170	140	205	185	190	145	205	185	0%	-10%
Other	50	45	45	45	45	40	45	45	0%	0%
<b>Increase (-)/Decrease (+) in Producer Inventory</b>	<b>-75</b>	<b>-60</b>	<b>+75</b>	<b>-10</b>	<b>+25</b>	<b>-10</b>	<b>+55</b>	<b>-20</b>	<b>N/M</b>	<b>N/M</b>
<b>Total Mining Supply</b>	<b>1,415</b>	<b>1,355</b>	<b>1,625</b>	<b>1,570</b>	<b>1,615</b>	<b>1,290</b>	<b>1,655</b>	<b>1,630</b>	<b>4%</b>	<b>-2%</b>
<b>Recycling</b>	<b>460</b>	<b>420</b>	<b>480</b>	<b>480</b>	<b>505</b>	<b>455</b>	<b>480</b>	<b>485</b>	<b>1%</b>	<b>1%</b>
Autocatalyst	280	300	330	330	365	330	345	365	11%	6%
Jewellery	180	120	150	150	140	125	135	120	-20%	-11%
Industrial	0	0	0	0	0	0	0	0	N/M	N/M
<b>Total Supply</b>	<b>1,875</b>	<b>1,775</b>	<b>2,105</b>	<b>2,055</b>	<b>2,120</b>	<b>1,745</b>	<b>2,135</b>	<b>2,115</b>	<b>3%</b>	<b>-1%</b>
<b>DEMAND</b>										
<b>Automotive</b>	<b>880</b>	<b>865</b>	<b>840</b>	<b>785</b>	<b>850</b>	<b>805</b>	<b>805</b>	<b>720</b>	<b>-8%</b>	<b>-11%</b>
Autocatalyst	845	825	805	750	815	770	770	685	-9%	-11%
Non-road	35	35	35	35	35	35	40	35	0%	-13%
<b>Jewellery</b>	<b>700</b>	<b>610</b>	<b>590</b>	<b>580</b>	<b>680</b>	<b>605</b>	<b>590</b>	<b>580</b>	<b>0%</b>	<b>-2%</b>
<b>Industrial</b>	<b>425</b>	<b>435</b>	<b>415</b>	<b>425</b>	<b>435</b>	<b>465</b>	<b>470</b>	<b>450</b>	<b>6%</b>	<b>-4%</b>
Chemical	130	150	140	165	135	145	140	160	-3%	14%
Petroleum	55	35	15	25	25	45	45	45	80%	0%
Electrical	50	55	45	50	60	55	45	50	0%	11%
Glass	5	40	50	45	40	60	65	50	11%	-23%
Medical and Biomedical	75	55	70	45	70	55	70	45	0%	-36%
Other	110	100	95	95	105	105	105	100	5%	-5%
<b>Investment</b>	<b>225</b>	<b>80</b>	<b>100</b>	<b>-10</b>	<b>95</b>	<b>50</b>	<b>-55</b>	<b>60</b>	<b>N/M</b>	<b>N/M</b>
Change in Bars, Coins	115	30	70	45	60	75	70	65	44%	-7%
Change in ETF Holdings	115	60	30	-40	55	-15	-125	5	N/M	N/M
Change in Stocks Held by Exchanges	-5	-10	0	-15	-20	-10	0	-10	-33%	N/M
<b>Total Demand</b>	<b>2,230</b>	<b>1,990</b>	<b>1,945</b>	<b>1,780</b>	<b>2,060</b>	<b>1,925</b>	<b>1,810</b>	<b>1,810</b>	<b>2%</b>	<b>0%</b>
<b>Balance</b>	<b>-355</b>	<b>-215</b>	<b>160</b>	<b>270</b>	<b>60</b>	<b>-180</b>	<b>325</b>	<b>305</b>		

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

# PLATINUM QUARTERLY Q3 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 %
<b>Platinum Supply-demand Balance (koz)</b>						
<b>SUPPLY</b>						
<b>Refined Production</b>	<b>3,110</b>	<b>2,965</b>	<b>3,170</b>	<b>2,900</b>	<b>-2%</b>	<b>-9%</b>
South Africa	2,245	2,110	2,275	2,060	-2%	-9%
Zimbabwe	240	240	240	230	-4%	-4%
North America	185	180	190	175	-3%	-8%
Russia	345	345	375	350	1%	-7%
Other	95	90	90	85	-6%	-6%
<b>Increase (-)/Decrease (+) in Producer Inventory</b>	<b>-180</b>	<b>+15</b>	<b>+15</b>	<b>+45</b>	<b>N/M</b>	<b>N/M</b>
<b>Total Mining Supply</b>	<b>2,930</b>	<b>2,980</b>	<b>3,185</b>	<b>2,945</b>	<b>-1%</b>	<b>-8%</b>
<b>Recycling</b>	<b>970</b>	<b>900</b>	<b>985</b>	<b>935</b>	<b>4%</b>	<b>-5%</b>
Autocatalyst	595	630	695	675	7%	-3%
Jewellery	375	270	290	260	-4%	-10%
Industrial	0	0	0	0	N/M	N/M
<b>Total Supply</b>	<b>3,900</b>	<b>3,880</b>	<b>4,170</b>	<b>3,880</b>	<b>0%</b>	<b>-7%</b>
<b>DEMAND</b>						
<b>Automotive</b>	<b>1,675</b>	<b>1,705</b>	<b>1,635</b>	<b>1,610</b>	<b>-6%</b>	<b>-2%</b>
Autocatalyst	1,610	1,630	1,565	1,540	-6%	-2%
Non-road	65	70	70	75	7%	7%
<b>Jewellery</b>	<b>1,330</b>	<b>1,200</b>	<b>1,260</b>	<b>1,195</b>	<b>0%</b>	<b>-5%</b>
<b>Industrial</b>	<b>895</b>	<b>850</b>	<b>860</b>	<b>935</b>	<b>10%</b>	<b>9%</b>
Chemical	295	290	300	285	-2%	-5%
Petroleum	110	50	50	90	80%	80%
Electrical	100	100	110	100	0%	-9%
Glass	65	90	85	125	39%	47%
Medical and Biomedical	120	125	115	125	0%	9%
Other	205	195	200	210	8%	5%
<b>Investment</b>	<b>275</b>	<b>180</b>	<b>85</b>	<b>-5</b>	<b>N/M</b>	<b>N/M</b>
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%
<b>Total Demand</b>	<b>4,175</b>	<b>3,935</b>	<b>3,840</b>	<b>3,735</b>	<b>-5%</b>	<b>-3%</b>
<b>Balance</b>	<b>-275</b>	<b>-55</b>	<b>330</b>	<b>145</b>		

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

# PLATINUM QUARTERLY Q3 2018

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

	2013	2014	2015	2016	2017	2018f	2019f	2018f/2017 Growth %	2019f/2018f Growth %	Q3 2017	Q4 2017	Q1 2018	Q2 2018	Q3 2018
<b>Platinum gross demand (koz)</b>														
<b>Automotive</b>	<b>3,170</b>	<b>3,310</b>	<b>3,385</b>	<b>3,470</b>	<b>3,335</b>	<b>3,110</b>	<b>3,075</b>	<b>-7%</b>	<b>-1%</b>	<b>785</b>	<b>850</b>	<b>805</b>	<b>805</b>	<b>720</b>
North America	425	465	490	450	415									
Western Europe	1,350	1,440	1,550	1,705	1,560									
Japan	580	590	510	455	445									
China	130	120	125	165	200									
India	160	160	175	165	165									
Rest of the World	525	535	535	530	550									
<b>Jewellery</b>	<b>2,945</b>	<b>3,000</b>	<b>2,840</b>	<b>2,505</b>	<b>2,460</b>	<b>2,405</b>	<b>2,430</b>	<b>-2%</b>	<b>1%</b>	<b>580</b>	<b>680</b>	<b>605</b>	<b>590</b>	<b>580</b>
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									
<b>Chemical</b>	<b>535</b>	<b>540</b>	<b>595</b>	<b>560</b>	<b>590</b>	<b>575</b>	<b>615</b>	<b>-3%</b>	<b>7%</b>	<b>165</b>	<b>135</b>	<b>145</b>	<b>140</b>	<b>160</b>
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	165	160	175									
<b>Petroleum</b>	<b>50</b>	<b>65</b>	<b>205</b>	<b>215</b>	<b>100</b>	<b>185</b>	<b>240</b>	<b>85%</b>	<b>30%</b>	<b>25</b>	<b>25</b>	<b>45</b>	<b>45</b>	<b>45</b>
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									
<b>Electrical</b>	<b>195</b>	<b>205</b>	<b>190</b>	<b>185</b>	<b>195</b>	<b>190</b>	<b>190</b>	<b>-3%</b>	<b>0%</b>	<b>50</b>	<b>60</b>	<b>55</b>	<b>45</b>	<b>50</b>
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									
<b>Glass</b>	<b>145</b>	<b>175</b>	<b>200</b>	<b>205</b>	<b>185</b>	<b>220</b>	<b>215</b>	<b>19%</b>	<b>-2%</b>	<b>45</b>	<b>40</b>	<b>60</b>	<b>65</b>	<b>50</b>
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									
<b>Medical and Biomedical</b>	<b>220</b>	<b>220</b>	<b>225</b>	<b>230</b>	<b>235</b>	<b>240</b>	<b>240</b>	<b>2%</b>	<b>0%</b>	<b>45</b>	<b>70</b>	<b>55</b>	<b>70</b>	<b>45</b>
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									
<b>Other industrial</b>	<b>340</b>	<b>360</b>	<b>345</b>	<b>385</b>	<b>395</b>	<b>420</b>	<b>395</b>	<b>6%</b>	<b>-6%</b>	<b>95</b>	<b>105</b>	<b>105</b>	<b>105</b>	<b>100</b>
<b>Investment</b>	<b>935</b>	<b>150</b>	<b>305</b>	<b>535</b>	<b>265</b>	<b>125</b>	<b>250</b>	<b>-53%</b>	<b>100%</b>	<b>-10</b>	<b>95</b>	<b>50</b>	<b>-55</b>	<b>60</b>
<b>Total Demand</b>	<b>8,535</b>	<b>8,025</b>	<b>8,290</b>	<b>8,290</b>	<b>7,760</b>	<b>7,470</b>	<b>7,650</b>	<b>-4%</b>	<b>2%</b>	<b>1,780</b>	<b>2,060</b>	<b>1,925</b>	<b>1,810</b>	<b>1,810</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.

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

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.

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### Ounce conversion

1 million ounces = 31.1 tonnes.

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