

---

# PLATINUM QUARTERLY

## Q1 2018

---

14th May 2018

---

### Contents

Foreword	P1	Expanded Tables	P12
Summary Table	P3	Glossary of Terms	P16
First Quarter 2018 Review	P4	Copyright and Disclaimer	P18
2018 Forecast	P7		

---

### FOREWORD

One of the primary aims of the World Platinum Investment Council (WPIC) is to make the platinum market easier for investors to understand and navigate. The complexities of this market are many and varied.

Many experts and institutional investors who understand and work in this market are currently visiting London. I look forward to meeting many of them during what I'm sure will be a very busy and thought-provoking London Platinum Week.

However, if the WPIC is to succeed in its mission to expand the size of the investment market for platinum, then we have also to successfully reach and support retail investors.

We have made great strides in retail during the last few years, entering into partnerships with BullionVault, Valcambi, the UK's Royal Mint, Tanaka and Mitsubishi in Japan, GraniteShares in the US, among others; but we can do more.

China, particularly the Chinese retail market, is a priority target for our global team. We are increasing awareness of platinum as an investment asset in China, and we have advanced plans to launch a number of new investment products including, for example, platinum accumulation plans, which have previously proved to be a springboard for growth in Japan.

I recently posted a couple of [articles](#) looking at the development of platinum investment in both Western and Asian markets.

As part of our wider retail engagement and promotion of platinum as the best precious metal and as an investment asset, last month we announced our new partnership with the Athletics World Cup, which takes place in London in July. The winner of this prestigious team event, which will involve the eight highest ranked teams over selected track and field events (US, UK, Germany, South Africa, France, China, Poland and Jamaica) will scoop the Platinum Trophy which we are providing to this inaugural event.

Celebrating the finest athletics team in the world and linking them with the world's best precious metal, fires the starting gun on a campaign to heighten public awareness of platinum as an investment worthy of consideration. This is already proving particularly helpful to our efforts in China.

Somewhat ironically, the historically low price of platinum, and its continued discount to gold, is supporting our efforts to gain interest from value investors in China. However, this clearly doesn't help our wider efforts elsewhere in the world.

The platinum price is weak. PGM producers are struggling to remain profitable against the backdrop of low US dollar prices and a stronger South African rand.

Platinum's robust fundamentals, which are scrutinised in today's *Platinum Quarterly*, appear unable to shake-off the negative sentiment driving the short-term price.

Platinum demand in 2018 will be up, despite falling diesel sales. But this is only the headline, which masks the complex underlying activity in the sector.

While diesel car sales are down in the European Union, heavy duty diesel sales are strong in the rest of the world. US heavy-duty truck orders have responded to rising freight demand in a confident economy. US sales of Daimler Trucks, for instance, are up 21%. In China, increased sales were bolstered by higher platinum loadings to meet tightening emissions legislation. Environmentally driven fleet renewal in India is now also underway.

Against this backdrop, it's interesting to observe how automakers are communicating their respective strategies to the wider market. There has been a significant increase in the number of announcements by automakers on the need for diesel cars to meet CO<sub>2</sub> targets. It seems many have evaluated the risk of high CO<sub>2</sub> fines when compared to the cost of addressing diesel emissions. We believe many have already decided that low NO<sub>x</sub> solutions are preferable to accepting fines and are now producing very clean diesels.

For those without a diesel solution, deafening silence tells its own story.

This month's *Platinum Quarterly* shows that the expected rebound in industrial demand in 2018 is supported by strong demand growth in the first quarter, up 4% year-on-year and 6% quarter-on-quarter.

The turnaround in Chinese jewellery demand continues with same-store sales at the world's largest listed jewellery retailer, Chow Tai Fook, up 7% in the first quarter, building on a 5% increase at the end of 2017.

On the supply side, the data we publish today requires a greater amount of explanation than we would normally consider in this foreword.

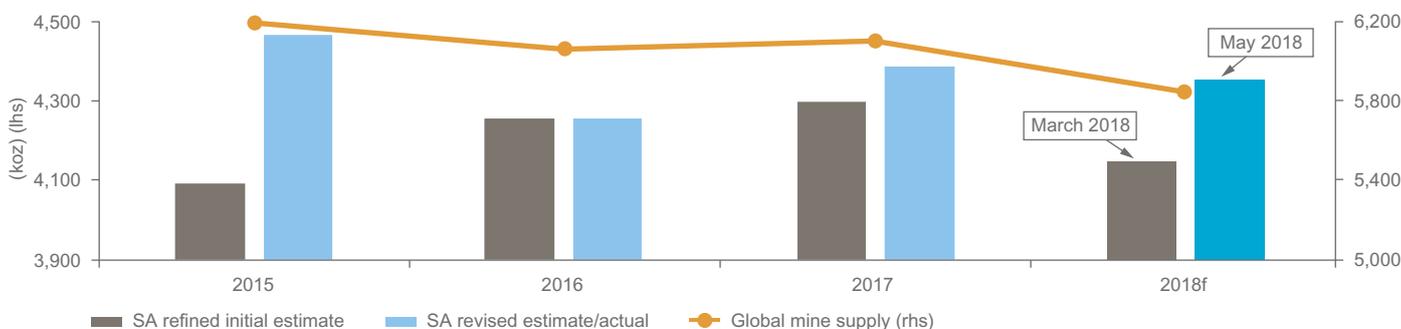
We have revised our forecast for 2018 upwards because, despite a weak first quarter, we believe mined supply in South Africa will be higher for the full year than we previously thought. There are three reasons for the revision.

Firstly, a fire at a producer furnace reduced refined output in the first quarter but this locked-up material will be processed during 2018.

Secondly, the improved operating conditions in 2017 are expected to continue into 2018 as higher mining efficiency from improved safety and an improved process for the suspension of operations to investigate safety incidents (Section 54 notices) are expected to be maintained in 2018.

Finally, the completion of mine closure programmes in 2017 has increased the focus and efficiency on the remaining, more consolidated, operations and start-up production.

Although first quarter supply at 985 koz was the lowest for eight quarters, the forecast 2018 mine supply from South Africa has been revised up from 4,175 koz to 4,355 koz. This has been the dominant reason for the increase in the forecast global platinum supply demand balance for 2018 from 25koz to 180 koz. However, as shown in the graph below this still results in mined supply from South Africa being lower in 2018 than 2017, with both lower than in 2015.



Source: SFA (Oxford), WPIC Research

Ultimately, we believe platinum supply remains constrained. Producers are contending with reducing their costs to offset increased labour costs driven up by more than inflation. Moreover, utilities and consumables, coupled with a low platinum price and the strong rand, continue to put severe pressure on margins and capital expenditure.

Despite the upward revision of South African mine supply in our 2018 forecast, the surplus in 2018 is smaller than the surplus in 2017. We also believe that any surplus is likely to shrink rather than grow beyond 2018.

Finally, I wanted to end by touching upon the issue of switching, which we have highlighted in previous *Platinum Quarterly* editions.

Palladium has provided producers with some respite from low margins, increasing in price by over \$350/oz in 2017. But concerns about palladium availability have accelerated recently.

The palladium market is tight, lease rates are high and global trade tensions add to concerns on supply. Substitution of palladium by platinum in gasoline cars appears more likely and will not happen slowly, due to price, as suggested by fabricators, but is already underway (and unannounced) to reduce supply risk.

**Paul Wilson, CEO**

# PLATINUM QUARTERLY Q1 2018

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

	2016	2017	2018f	2017/2016 Growth %	2018f/2017 Growth %	Q4 2017	Q1 2018
<b>Platinum Supply-demand Balance (koz)</b>							
<b>SUPPLY</b>							
<b>Refined Production</b>	<b>6,035</b>	<b>6,145</b>	<b>6,035</b>	<b>2%</b>	<b>-2%</b>	<b>1,595</b>	<b>1,405</b>
South Africa	4,255	4,385	4,355	3%	-1%	1,120	985
Zimbabwe	490	480	455	-2%	-5%	140	115
North America	395	365	375	-8%	3%	95	90
Russia	715	725	660	1%	-9%	195	165
Other	180	190	185	6%	-3%	45	45
<b>Increase (-)/Decrease (+) in Producer Inventory</b>	<b>+30</b>	<b>+30</b>	<b>-20</b>	<b>0%</b>	<b>N/M</b>	<b>+25</b>	
<b>Total Mining Supply</b>	<b>6,065</b>	<b>6,175</b>	<b>6,015</b>	<b>2%</b>	<b>-3%</b>	<b>1,620</b>	<b>1,400</b>
<b>Recycling</b>	<b>1,855</b>	<b>1,905</b>	<b>1,960</b>	<b>3%</b>	<b>3%</b>	<b>520</b>	<b>450</b>
Autocatalyst	1,225	1,340	1,405	9%	5%	380	320
Jewellery	625	560	550	-10%	-2%	140	130
Industrial	5	5	5	0%	0%	0	0
<b>Total Supply</b>	<b>7,920</b>	<b>8,080</b>	<b>7,975</b>	<b>2%</b>	<b>-1%</b>	<b>2,140</b>	<b>1,850</b>
<b>DEMAND</b>							
<b>Automotive</b>	<b>3,490</b>	<b>3,390</b>	<b>3,285</b>	<b>-3%</b>	<b>-3%</b>	<b>865</b>	<b>840</b>
Autocatalyst	3,350	3,245	3,140	-3%	-3%	825	805
Non-road	135	140	145	4%	4%	35	35
<b>Jewellery</b>	<b>2,505</b>	<b>2,460</b>	<b>2,510</b>	<b>-2%</b>	<b>2%</b>	<b>680</b>	<b>640</b>
<b>Industrial</b>	<b>1,790</b>	<b>1,655</b>	<b>1,750</b>	<b>-8%</b>	<b>6%</b>	<b>410</b>	<b>435</b>
Chemical	595	585	590	-2%	1%	135	155
Petroleum	215	100	160	-53%	60%	25	40
Electrical	160	160	150	0%	-6%	45	40
Glass	205	180	195	-12%	8%	25	45
Medical and Biomedical	235	240	240	2%	0%	75	55
Other	380	390	415	3%	6%	105	100
<b>Investment</b>	<b>535</b>	<b>260</b>	<b>250</b>	<b>-51%</b>	<b>-4%</b>	<b>95</b>	<b>60</b>
Change in Bars, Coins	460	210				65	80
Change in ETF Holdings	-10	95				50	-10
Change in Stocks Held by Exchanges	85	-45				-20	-10
<b>Total Demand</b>	<b>8,320</b>	<b>7,765</b>	<b>7,795</b>	<b>-7%</b>	<b>0%</b>	<b>2,050</b>	<b>1,975</b>
<b>Balance</b>	<b>-400</b>	<b>315</b>	<b>180</b>	<b>N/M</b>	<b>-43%</b>	<b>90</b>	<b>-125</b>
<b>Above Ground Stocks</b>	<b>4,140*</b>	<b>1,905</b>	<b>2,220</b>	<b>17%</b>	<b>8%</b>		

Source: SFA (Oxford). \*As of 31st December 2012. NB: Numbers have been independently rounded. N/M means not meaningful.

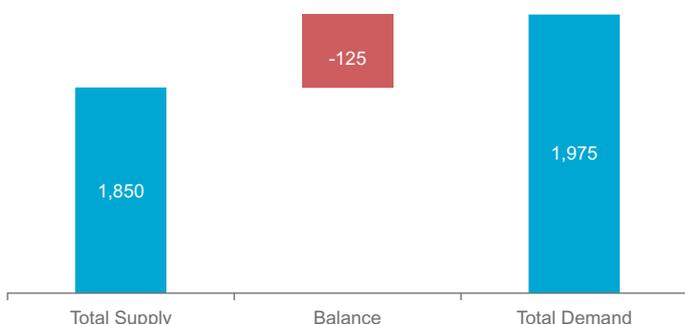
Notes:

- All estimates are based on the latest available information. They are subject to revision in our subsequent quarterly reports in the event that additional information is identified.
- The WPIC did not publish quarterly estimates for 2013 or the first two quarters of 2014. However, quarterly estimates from Q3 2014, to Q4 2015 are contained in previously published PQs which are freely available on the WPIC website. Quarterly estimates from Q1 2016 and half-yearly estimates from H1 2016 are included in Tables 3 and 4 respectively, on pages 13-14 (supply, demand and above ground stocks).
- The 2017 and 2018 forecasts are based on historical data and trends as well as modelling, with varying degrees of accuracy depending upon the supply or demand category. Investment demand is expected to be the least predictable segment. Some historical views are based on data and modelling that pre-date WPIC publication of PQ.

## 2018 FIRST QUARTER PLATINUM MARKET REVIEW

Global demand was 1,975 koz in the first quarter of the year, down marginally (-10 koz) year-on-year as gains in jewellery (+30 koz) and industrial (+15 koz) demand were outweighed by declines in automotive (-35 koz) and investment demand (-20 koz). Total supply rose 4% (+75 koz) year-on-year to 1,850 koz as both primary and secondary supply increased. The first quarter typically sees weak output from South Africa, but an improvement in output from Russia resulted in global refined production falling 10 koz and, unlike Q1'17, there was not a significant build in producer inventory, so overall total mining supply increased by 3% to 1,400 koz. The resulting market balance was a deficit of 125 koz (Chart 1).

**Chart 1: Supply-demand balance, koz, Q1 2018**

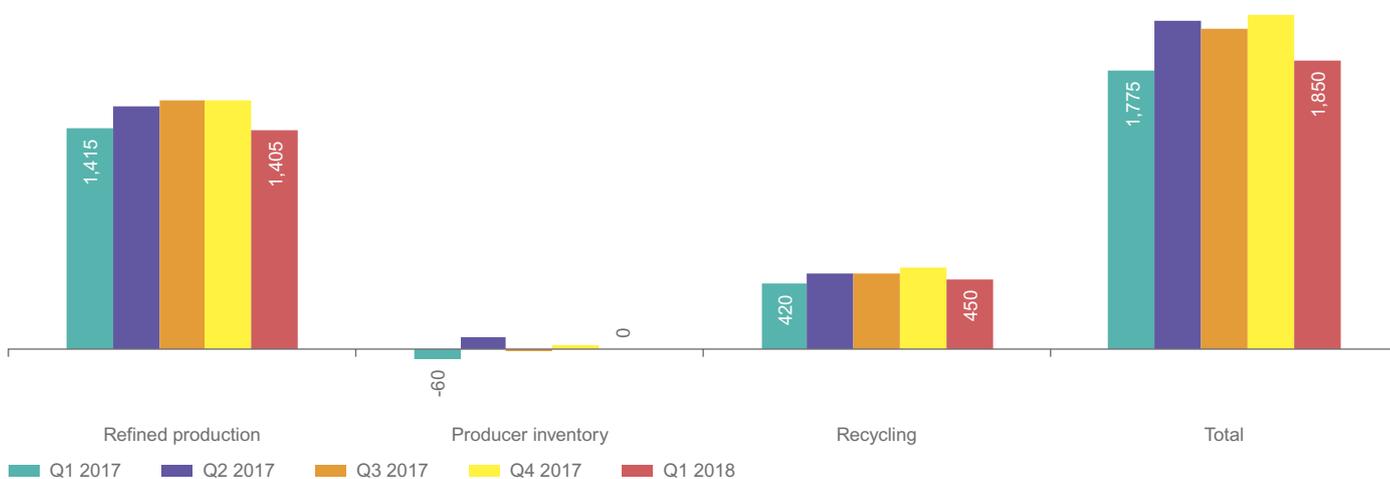


Source: SFA (Oxford)

### Supply

Refined production fell by 0.7% (-10 koz) year-on-year to 1,405 koz in the first quarter of 2018. A fire at a South African producer's furnace in February this year resulted in a build-up of concentrate (around 75-80 koz), reducing refined production in the quarter, but this was partly offset by ongoing operational improvements across the mines on South Africa's Western-limb – including the extraction of higher-grade ore, higher concentrator recoveries and improved stoping efficiencies. South African supply decreased by 3% year-on-year (-35 koz) to 985 koz overall.

**Chart 2: Platinum supply, koz**



Source: SFA (Oxford)

Supply from Russia increased by 18% year-on-year (+25 koz) to 165 koz in Q1'18 owing to the reconfiguration of downstream processing facilities that had negatively impacted on production volumes in the prior year period. Output from North America fell by 5% year-on-year (-5 koz) to 90 koz following the closure of a mine in Sudbury last year which had reached the end of its life.

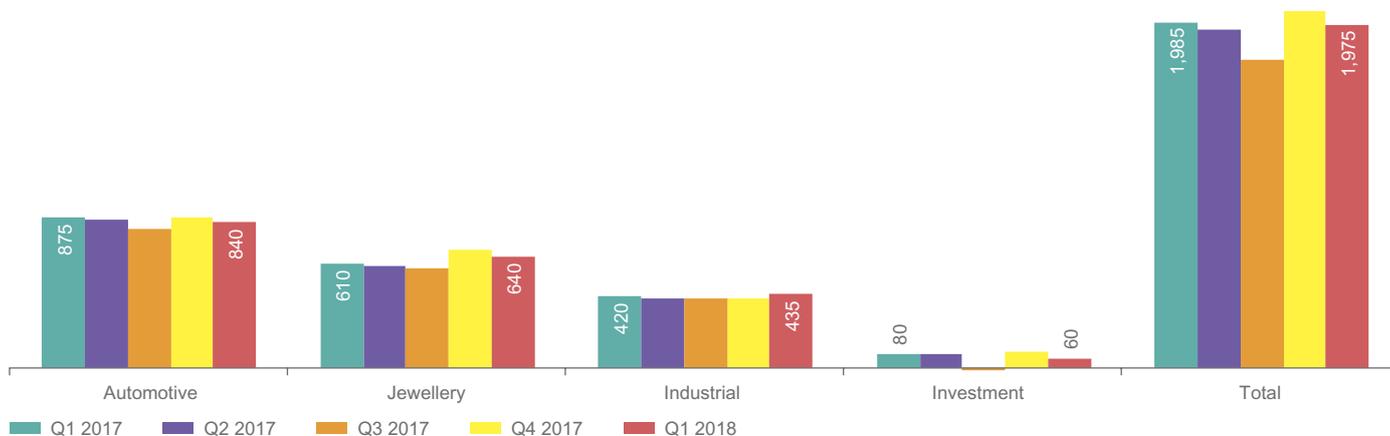
Production from all other regions remained stable. There was a minor increase in producer inventory (2 koz), to give total mining supply of 1,400 koz for the quarter – up 3% (+45 koz) on Q1'17 when there was a larger (60 koz) rise in producer stocks.

Secondary supply reached 450 koz in Q1'18, an increase of 7% year-on-year, but a decline of 13% from a very strong fourth quarter. Autocatalyst recycling in the quarter saw a return to more typical levels, falling to 320 koz, following elevated catalyst collection volumes in the US and Europe in Q4'17, but grew 7% year-on-year from 300 koz. Jewellery recycling also rose compared to the same period last year, gaining 8% to 130 koz, as stronger retail performance in China led to more jewellery being traded in to purchase new items.

## Demand

The first quarter of 2018 saw platinum demand slip 1% year-on-year (-10 koz) to 1,975 koz (Chart 3) owing to lower automotive (-35 koz) and investment (-20 koz) demand which was not completely offset by gains in jewellery (+30 koz) and industrial (+15 koz) demand.

**Chart 3: Platinum demand, koz**



Source: SFA (Oxford)

## Automotive demand

Automotive requirements for platinum decreased by 4% (-35 koz) year-on-year, from 875 koz in Q1'17 to 840 koz in Q1'18. Western Europe, the largest market, suffered the greatest reductions in demand, while small growth was seen in North America, RoW and China, and there was a small decrease in Japan with India stable. Gains in truck sales are offsetting the decline in passenger cars to some degree.

The UK continues to be a drag on sales, with overall car registrations down 16% year-on-year in March 2018, but diesel sales underperformed the market, down 37% year-on-year. Diesel's share of the UK car market fell from 43.5% in March 2017 to 32.4% in March 2018 (source: SMMT). Similar reductions in diesel share have been seen in the other major European diesel markets. The platinum content of diesel cars is declining somewhat too, as SCR technology displaces LNT for NO<sub>x</sub> control. Automakers are urgently seeking clarity from city and national authorities over possible bans and additional taxes on diesel cars, as uncertainty means consumers are delaying or avoiding diesel car purchases.

Heavy-duty truck orders in the US reached a 12-year high in Q1'18, as fleets rushed to add capacity to meet rising freight demand in a confident economy. Daimler Trucks increased first-quarter sales in North America by 21% year-on-year, while the company's sales in Europe were flat. Volvo Trucks and PACCAR also saw double-digit sales growth in Q1'18 in North America. The China Association of Automobile Manufacturers reported that Q1'18 truck sales were up 4.3% year-on-year.

## Jewellery demand

First-quarter global jewellery demand is estimated at 640 koz, a rise of 3% year-on-year, with all regions seeing demand at a similar or slightly higher level than in the first quarter of last year. All the major platinum jewellery markets (China, Japan, North America and Western Europe) have maintained high levels of consumer confidence over the first three months of 2018, despite some wobbles in the stock markets.

Retail sales growth for all jewellery continued in a strong manner in Asia, as mainland China saw a 7.9% increase in Q1'18 compared to the same period in 2017, while sales in Hong Kong and Macau were up by 3.8% year-on-year in January and then accelerated in February (up 31% year-on-year), although platinum has not benefitted as much from this tailwind as gold. Platinum trade on the Shanghai Gold Exchange has risen by 2% year-on-year in Q1'18, returning to growth after a 39% decline in Q1'17. The Indian jewellery market has mostly readjusted following the introduction of the Goods and Services Tax last year as jewellers are no longer reporting significant problems or difficulties, and the slight increase in tax does not appear to have had a significant negative impact.

## Industrial demand

Industrial demand for platinum increased by 4% year-on-year (+15 koz) to 435 koz in the first quarter of 2018, following growth in chemical catalysis, petroleum refining and other end-uses. New propane dehydrogenation (PDH) capacity in China lifted platinum purchases by the chemical industry in Q1'18, while greater production of fuel cells in Japan for the transport sector raised other industrial end-use requirements. Expansion of oil refining capacity also elevated net petroleum platinum demand in the RoW last quarter, outweighing a decline in this application in China, where capacity growth slowed.

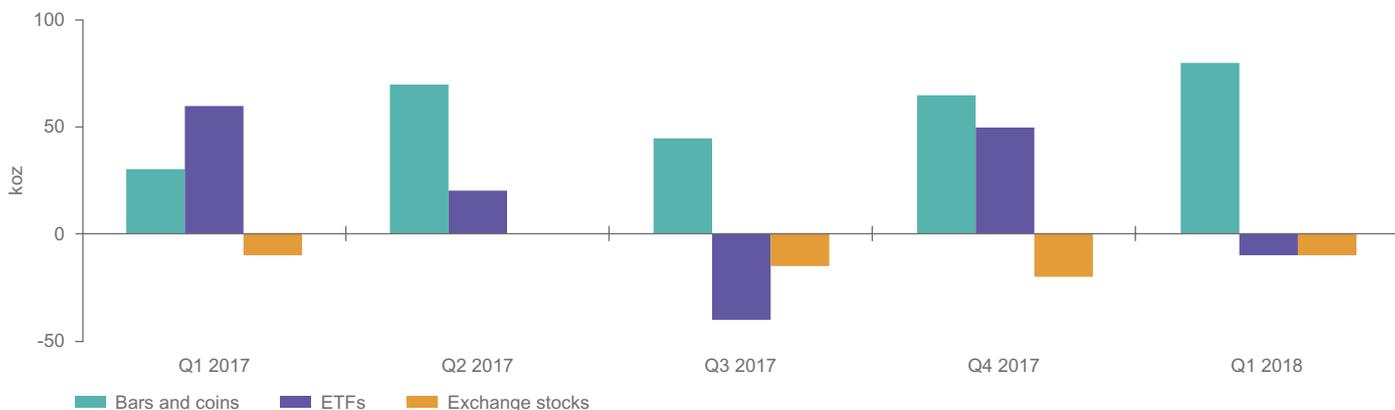
## Investment demand

In the first quarter of 2018 total investment demand was 60 koz (Chart 4), as robust bar and coin sales were offset by small declines in ETF holdings (-10 koz) and stocks held by exchanges (-10 koz).

Bar and coin demand was 80 koz in Q1'18. Coin sales were aided by the US Mint making both bullion and proof platinum American Eagle coins available during the first quarter. As in 2017, the Mint limited the mintage of bullion coins to 20,000 and they sold out, but doubled the mintage of proof coins to 20,000 with just under half being purchased in the first quarter. Platinum bar purchases in Japan were muted at the start of the year, but as the platinum price dropped in March investor purchases picked up.

While ETF holdings fell 10 koz, this masks divergent fortunes in different regions. US and Swiss ETFs saw net sales of 39 koz and 13 koz respectively, whereas investors in the UK and South Africa added 18 koz and 25 koz to their holdings, respectively.

**Chart 4: Platinum investment**



Source: SFA (Oxford)

## 2018 FORECAST

Global platinum supply is forecast to dip 1% (-105 koz) year-on-year to 7,975 koz this year as total mining supply falls 3% (-160 koz) to 6,015 koz, while recycling expands by 3% (+55 koz) to 1,960 koz. Most regions are expected to have lower refined production in 2018 with declines in South Africa (-30 koz), Zimbabwe (-25 koz), Russia (-65 koz) and Other regions (-5 koz) outweighing a projected gain of 10 koz in North America. Autocatalyst recycling continues to trend higher, although growth is expected to slow to 5% from 9% in 2017, reaching 1,405 koz, and this outweighs a 2% dip in jewellery recycling (-10 koz) to 550 koz.

Global platinum demand is projected to be marginally higher in 2018 than last year at 7,795 koz, as gains in industrial (+95 koz) and jewellery (+50 koz) demand offset declines in automotive (-105 koz) and investment (-10 koz) demand. Industrial demand is anticipated to recover by 6% year-on-year to 1,750 koz, as refinery closures which held back net petroleum demand in 2017 are not repeated and chemical, glass and other end-uses also see gains. Jewellery demand is forecast to increase 2% to 2,510 koz this year as continued growth is expected in North America, Europe and India, and Chinese demand is projected to stabilise. Automotive demand continues to slip, falling 3% to 3,285 koz, as growth in commercial vehicles is insufficient to offset lower demand from passenger cars.

Even with a slight dip in supply this year, the marginal growth in demand means that the market is projected to have a surplus of 180 koz in 2018 (Chart 5).

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



Source: SFA (Oxford)

## Mine supply

Global supply is forecast to fall by -1.8% year-on-year (-110 koz) to 6,035 koz in 2018. South African production is estimated to drop by -1% (-30 koz) to 4,355 koz. Shafts in ramp-up phase are scheduled to add around 105 koz this year, but last year's mine closures and pipeline lock-up from a furnace outage mean refined production will be lower overall compared to 2017. Compared to last quarter, projected South African output in 2018 has been revised up to take account of a more stable production environment and producers' efforts to maximise mining and processing efficiencies in response to low platinum prices.

Supply from Zimbabwe is estimated to decrease by 5% year-on-year (-25 koz), with mine production stable at 455 koz and no major pipeline stock movements expected. A potential lock-up in the pipeline owing to ongoing processing reconfiguration work could see Russian supply fall by 9% (-65 koz) to 660 koz in 2018. However, ramp-up of output from new production areas at existing operations in North America should see yield in this region increase by 3% year-on-year (+10 koz) to 375 koz. Other supply is stable at 185 koz. An increase in producer inventory of 20 koz is forecast, bringing total mining supply to 6,015 koz (-3% year-on-year).

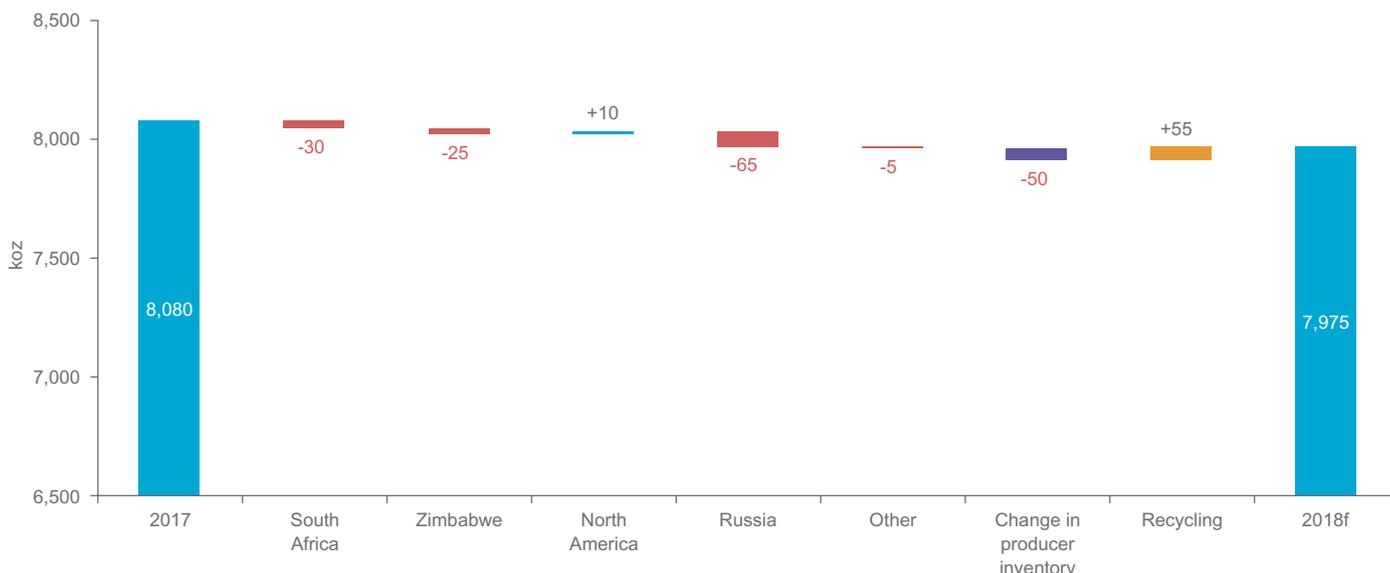
## Recycling

Total platinum recycling from all sources is expected to supply 1,960 koz of metal to the market in 2018, a 3% increase over 2017 recycling.

Autocatalyst recycling is forecast to gain 5% year-on-year to 1,405 koz. Robust scrap steel and palladium prices should promote additional recycling of end-of-life vehicles and collection of autocatalysts, which has a positive knock-on effect for platinum recycling. The two main regions for recycling, North America and Western Europe, are both expected to continue the trend of increasing secondary platinum supply that was witnessed in 2017, although at a lower rate.

Secondary supply from jewellery is estimated to decline marginally by 2% in 2018 to 550 koz, as Japanese recycling is set to retrace the growth it saw last year. Platinum jewellery recycling from China is likely to stay flat year-on-year, in line with the trends that it is seeing in jewellery demand.

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



Source: SFA (Oxford)

## Automotive demand

Continued weakness in light-duty diesel sales is expected to drag automotive platinum demand down by 3% (-105 koz), from 3,390 koz in 2017 to 3,285 koz in 2018.

Western Europe, though still around 40% of the market and more than twice the size of any other regional market, is predicted to see the greatest reduction in demand for the year, while North America, India and RoW are likely to see modest growth and Japan and China are set to see small reductions.

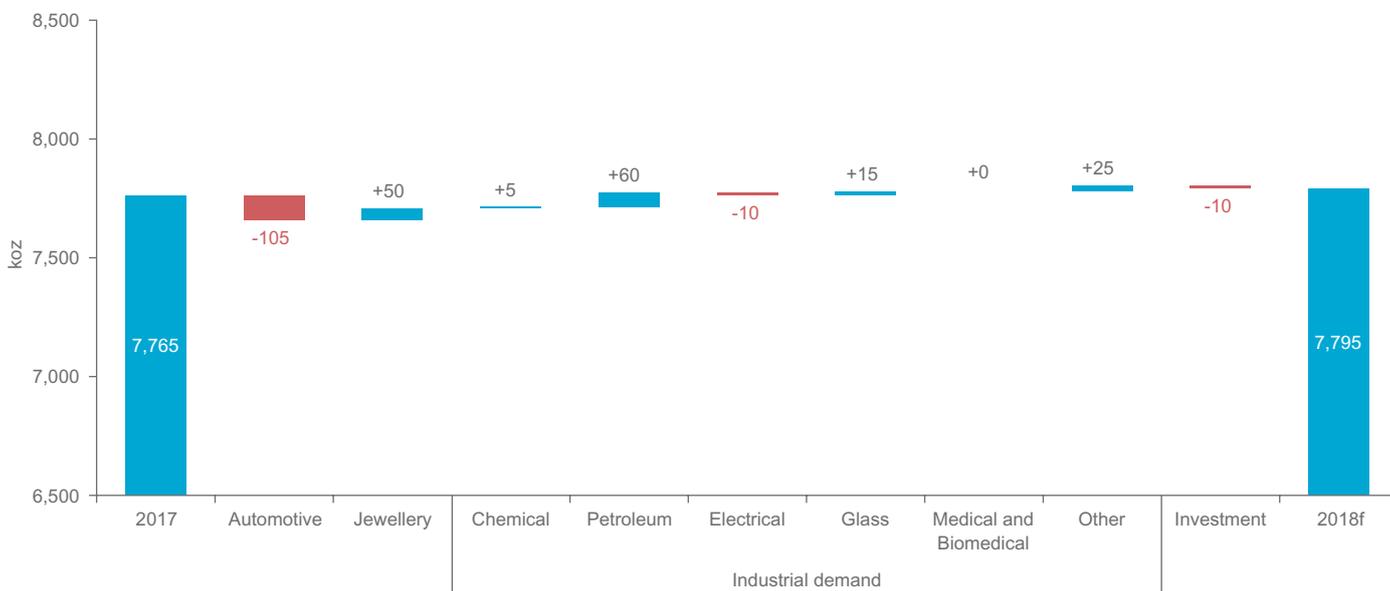
Public uncertainty over the risk and timing of possible diesel bans in some cities continues to dent sales of diesel cars in Europe. Diesel car sales in the US, by contrast, are expected to be strong, and while vehicle numbers are much smaller than the European market, the impact on platinum demand from autocatalysts is higher as US diesel cars tend to be much larger than their European counterparts.

Automakers are increasingly recognising that with a declining diesel share in their light vehicle portfolios, they may struggle to meet the 95 g/km by 2020 CO<sub>2</sub> targets and face hefty fines. The European Environment Agency recently released data for 2017, showing that average CO<sub>2</sub> emissions from new cars increased by 0.4% year-on-year to 118.5 g/km. The European Automobile Manufacturers' Association showed that diesel's share of car sales fell from 49.9% to 44.8% in 2017. While parallel increases in vehicle mass may complicate the analysis, many in the industry are connecting rising CO<sub>2</sub> emissions with falling diesel share.

Heavy-duty truck demand in most regions is estimated to be positive for platinum demand, both as vehicle numbers rise and as the platinum content of each vehicle grows, particularly with the greater use of DOCs on Chinese trucks required to comply with emissions legislation. In India, considerable fleet renewal is already being seen, and is likely to continue over the next two years, as environmentally conscious corporate clients in some sectors increasingly expect their goods to be transported in vehicles no more than five years old and there is far greater focus on hourly efficiency of haulage operations.

In the US, heavy-duty truck sales are expected to outpace the medium-duty segment in 2018. Increasing activity in the oil industry, construction and consumer products is contributing to the need for additional freight capacity in the US, while growing activity in mining and agriculture in some parts of Asia is driving demand for further commercial vehicles in these markets.

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



Source: SFA (Oxford)

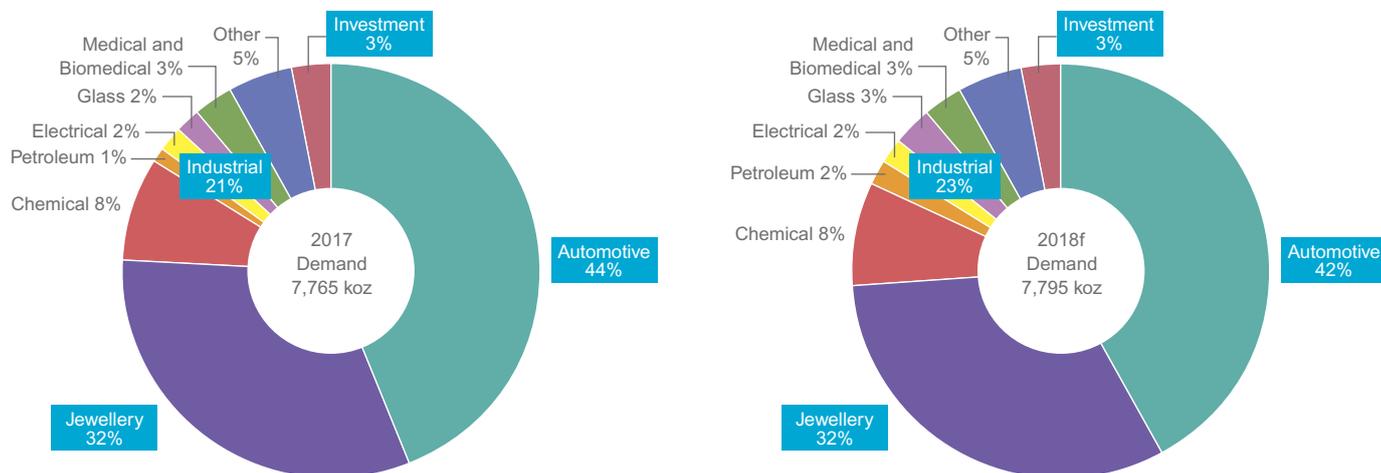
## Jewellery demand

The 2018 forecast for annual platinum jewellery demand is 2,510 koz, a 2% (+50 koz) increase on 2017, as growth is expected in all regions except Japan. Chinese demand is predicted to climb slightly over the course of 2018 as improvements in consumer sentiment feed into jewellery retail sales, although most of the sales growth is being seen coming from sales of gold jewellery and consequently the expectations of growth in platinum demand in the region are still small. Expansion in third and fourth tier cities and campaigns aimed at boosting the engagement of millennials in the jewellery market should offset potential declines in the bridal sector. Reasonable economic growth forecasts in the US and Europe are supporting the expansion in these markets, strengthened by the currently high platinum price discount to gold. The Indian market saw good growth in sales during the Akshaya Tritiya festival, viewed as an auspicious day for jewellery purchases. Indian demand is expected to continue its strong performance from the first few months of the year as larger retailers with multiple stores gain market share from the independent sector. Jewellery demand from Japan is anticipated to be little changed this year, as the low rate of economic growth is not likely to be sufficient to bolster the market.

## Industrial demand

A rebound in net petroleum requirements (+60 koz) is expected to help increase industrial platinum demand by 6% (+95 koz) to 1,750 koz this year, as usage in petroleum refining recovers in Japan and rises in the RoW. Growth in glass fabrication (+15 koz), chemical catalysis (+5 koz) and other end-uses (+25 koz) is also anticipated to lift platinum requirements in 2018, far exceeding a drop in electrical demand (-10 koz), whilst medical usage remains flat.

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



Source: SFA (Oxford)

## Chemical

Chemical requirements are forecast to climb by 1% year-on-year to 590 koz in 2018, predominantly supported by growth in China, which should outweigh a decline in the RoW. Rising production of platinum-cured silicone products and greater expansion of PDH capacity are set to lift China's platinum usage this year. However, despite higher silicone production, slower expansion of both paraxylene and nitric acid capacity is expected to lower platinum demand throughout the RoW in 2018, partially offsetting growth in China.

## Petroleum

Net petroleum demand is predicted to recover by 60 koz to 160 koz this year, boosted by a rebound in Japan plus growth in the RoW. Japan's platinum requirements are expected to recover back to net positive levels in 2018, as fewer refining capacity cuts are anticipated in the country compared to last year. Expansion of petroleum refining capacity in several emerging economies is set to increase new metal demand across the RoW, although the rate of capacity growth is estimated to ease in China and North America, lowering requirements in these regions and hindering overall demand growth this year.

## Electrical

Declining hard disk drive (HDD) demand is set to reduce platinum usage in electrical applications by 6% to 150 koz in 2018, with global HDD shipments forecast to fall by 10% year-on-year to 364 million units. The PC market is predicted to account for the majority (80%) of the decrease in HDD deliveries this year, shrinking by 17%, owing to weak PC sales and further substitution to solid-state drives (SSDs). Lower HDD demand is likely to reduce platinum requirements, primarily in China where usage in other electrical components is also anticipated to ease, following a strong 2017.

## Glass

Platinum requirements for glass fabrication are projected to rise by 8% to 195 koz this year, despite a decline in China, where government restrictions combating domestic overcapacity may inhibit capacity growth. However, demand is forecast to increase in all other regions, particularly Western Europe, where the upcoming expansion of glass fibre facilities is likely to boost platinum purchases this year. In Japan, a lack of closures in 2017/18 should lift domestic demand with ongoing production requirements exceeding recycle supply from closures, while new plants and expansions in Latin America and Asia are also expected to raise requirements in the RoW.

---

### **Other**

Rising demand for fuel cells is forecast to boost platinum consumption in other industrial end-uses by 6% to 415 koz in 2018, while requirements for automotive sensors, mainly in China and the RoW, are also anticipated to increase as vehicle production expands in these regions. Growing fuel cell adoption in various transport and stationary applications is set to raise platinum consumption in key markets, including Japan and the US, as fuel cells are increasingly used in trains, buses and non-road vehicles such as forklift trucks.

### **Investment demand**

This year platinum investment is forecast to be 250 koz, with ETFs predicted to have another positive year. As the local platinum price is projected to rise somewhat this year and the yen is forecast to weaken, Japanese investors' bar purchases are estimated to be lower than last year, while global coin sales are anticipated to be similar to those in 2017.

### **ABOVE GROUND STOCKS**

With the market forecast to have a surplus of 180 koz, above ground stocks are projected to end the year at 2,400 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 Q1 2018

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

	2013	2014	2015	2016	2017	2018f	2017/2016 Growth %	2018f/2017 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>6,035</b>	<b>6,145</b>	<b>6,035</b>	<b>2%</b>	<b>-2%</b>
South Africa	4,355	3,115	4,465	4,255	4,385	4,355	3%	-1%
Zimbabwe	405	405	405	490	480	455	-2%	-5%
North America	355	400	385	395	365	375	-8%	3%
Russia	740	740	715	715	725	660	1%	-9%
Other	215	220	180	180	190	185	6%	-3%
<b>Increase (-)/Decrease (+) in Producer Inventory</b>	<b>-215</b>	<b>+350</b>	<b>+45</b>	<b>+30</b>	<b>+30</b>	<b>-20</b>	<b>0%</b>	<b>N/M</b>
<b>Total Mining Supply</b>	<b>5,855</b>	<b>5,230</b>	<b>6,195</b>	<b>6,065</b>	<b>6,175</b>	<b>6,015</b>	<b>2%</b>	<b>-3%</b>
<b>Recycling</b>	<b>1,980</b>	<b>2,035</b>	<b>1,710</b>	<b>1,855</b>	<b>1,905</b>	<b>1,960</b>	<b>3%</b>	<b>3%</b>
Autocatalyst	1,120	1,255	1,190	1,225	1,340	1,405	9%	5%
Jewellery	855	775	515	625	560	550	-10%	-2%
Industrial	5	5	5	5	5	5	0%	0%
<b>Total Supply</b>	<b>7,835</b>	<b>7,265</b>	<b>7,905</b>	<b>7,920</b>	<b>8,080</b>	<b>7,975</b>	<b>2%</b>	<b>-1%</b>
<b>DEMAND</b>								
<b>Automotive</b>	<b>3,170</b>	<b>3,310</b>	<b>3,395</b>	<b>3,490</b>	<b>3,390</b>	<b>3,285</b>	<b>-3%</b>	<b>-3%</b>
Autocatalyst	3,030	3,165	3,255	3,350	3,245	3,140	-3%	-3%
Non-road	140	150	140	135	140	145	4%	4%
<b>Jewellery</b>	<b>2,945</b>	<b>3,000</b>	<b>2,840</b>	<b>2,505</b>	<b>2,460</b>	<b>2,510</b>	<b>-2%</b>	<b>2%</b>
<b>Industrial</b>	<b>1,475</b>	<b>1,565</b>	<b>1,750</b>	<b>1,790</b>	<b>1,655</b>	<b>1,750</b>	<b>-8%</b>	<b>6%</b>
Chemical	535	555	605	595	585	590	-2%	1%
Petroleum	50	65	205	215	100	160	-53%	60%
Electrical	185	190	165	160	160	150	0%	-6%
Glass	145	175	200	205	180	195	-12%	8%
Medical and Biomedical	220	220	230	235	240	240	2%	0%
Other	340	360	345	380	390	415	3%	6%
<b>Investment</b>	<b>935</b>	<b>150</b>	<b>305</b>	<b>535</b>	<b>260</b>	<b>250</b>	<b>-51%</b>	<b>-4%</b>
Change in Bars, Coins	-5	50	525	460	210			
Change in ETF Holdings	905	215	-240	-10	95			
Change in Stocks Held by Exchanges	35	-115	20	85	-45			
<b>Total Demand</b>	<b>8,525</b>	<b>8,025</b>	<b>8,290</b>	<b>8,320</b>	<b>7,765</b>	<b>7,795</b>	<b>-7%</b>	<b>0%</b>
<b>Balance</b>	<b>-690</b>	<b>-760</b>	<b>-385</b>	<b>-400</b>	<b>315</b>	<b>180</b>	<b>N/M</b>	<b>-43%</b>
<b>Above Ground Stocks</b>	<b>4,140*</b>	<b>3,450</b>	<b>2,305</b>	<b>1,905</b>	<b>2,220</b>	<b>2,400</b>	<b>17%</b>	<b>8%</b>

Source: SFA (Oxford). \*As of 31st December 2012. NB: Numbers have been independently rounded. N/M means not meaningful.

# PLATINUM QUARTERLY Q1 2018

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

	Q2 2016	Q3 2016	Q4 2016	Q1 2017	Q2 2017	Q3 2017	Q4 2017	Q1 2018	Q1'18/Q1'17 Growth %	Q1'18/Q4'17 Growth %
<b>Platinum Supply-demand Balance (koz)</b>										
<b>SUPPLY</b>										
<b>Refined Production</b>	<b>1,650</b>	<b>1,620</b>	<b>1,490</b>	<b>1,415</b>	<b>1,550</b>	<b>1,585</b>	<b>1,595</b>	<b>1,405</b>	<b>-1%</b>	<b>-12%</b>
South Africa	1,200	1,180	1,065	1,020	1,090	1,155	1,120	985	-3%	-12%
Zimbabwe	120	120	120	115	125	100	140	115	0%	-18%
North America	105	100	85	95	85	95	95	90	-5%	-5%
Russia	180	175	170	140	205	185	195	165	18%	-15%
Other	45	45	50	45	50	50	45	45	0%	0%
<b>Increase (-)/Decrease (+) in Producer Inventory</b>	<b>+60</b>	<b>-105</b>	<b>-75</b>	<b>-60</b>	<b>+75</b>	<b>-10</b>	<b>+25</b>		<b>N/M</b>	<b>N/M</b>
<b>Total Mining Supply</b>	<b>1,710</b>	<b>1,515</b>	<b>1,415</b>	<b>1,355</b>	<b>1,625</b>	<b>1,575</b>	<b>1,620</b>	<b>1,400</b>	<b>3%</b>	<b>-14%</b>
<b>Recycling</b>	<b>480</b>	<b>510</b>	<b>470</b>	<b>420</b>	<b>480</b>	<b>480</b>	<b>520</b>	<b>450</b>	<b>7%</b>	<b>-13%</b>
Autocatalyst	340	315	290	300	330	330	380	320	7%	-16%
Jewellery	140	195	180	120	150	150	140	130	8%	-7%
Industrial	0	0	0	0	0	0	0	0	N/M	N/M
<b>Total Supply</b>	<b>2,190</b>	<b>2,025</b>	<b>1,885</b>	<b>1,775</b>	<b>2,105</b>	<b>2,055</b>	<b>2,140</b>	<b>1,850</b>	<b>4%</b>	<b>-14%</b>
<b>DEMAND</b>										
<b>Automotive</b>	<b>910</b>	<b>800</b>	<b>885</b>	<b>875</b>	<b>855</b>	<b>800</b>	<b>865</b>	<b>840</b>	<b>-4%</b>	<b>-3%</b>
Autocatalyst	875	770	850	835	815	765	825	805	-4%	-2%
Non-road	35	30	35	35	35	35	35	35	0%	0%
<b>Jewellery</b>	<b>600</b>	<b>630</b>	<b>700</b>	<b>610</b>	<b>590</b>	<b>580</b>	<b>680</b>	<b>640</b>	<b>5%</b>	<b>-6%</b>
<b>Industrial</b>	<b>480</b>	<b>465</b>	<b>410</b>	<b>420</b>	<b>410</b>	<b>410</b>	<b>410</b>	<b>435</b>	<b>4%</b>	<b>6%</b>
Chemical	140	170	130	150	135	160	135	155	3%	15%
Petroleum	60	55	55	35	15	25	25	40	14%	60%
Electrical	40	40	40	40	40	40	45	40	0%	-11%
Glass	80	60	5	45	55	50	25	45	0%	80%
Medical and Biomedical	70	45	75	55	70	45	75	55	0%	-27%
Other	90	95	105	95	95	90	105	100	5%	-5%
<b>Investment</b>	<b>95</b>	<b>50</b>	<b>225</b>	<b>80</b>	<b>90</b>	<b>-10</b>	<b>95</b>	<b>60</b>	<b>-25%</b>	<b>-37%</b>
Change in Bars, Coins	115	80	115	30	70	45	65	80	167%	23%
Change in ETF Holdings	-15	-85	115	60	20	-40	50	-10	N/M	N/M
Change in Stocks Held by Exchanges	-5	55	-5	-10	0	-15	-20	-10	0%	-50%
<b>Total Demand</b>	<b>2,085</b>	<b>1,945</b>	<b>2,220</b>	<b>1,985</b>	<b>1,945</b>	<b>1,780</b>	<b>2,050</b>	<b>1,975</b>	<b>-1%</b>	<b>-4%</b>
<b>Balance</b>	<b>105</b>	<b>80</b>	<b>-335</b>	<b>-210</b>	<b>160</b>	<b>275</b>	<b>90</b>	<b>-125</b>		

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

# PLATINUM QUARTERLY Q1 2018

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

	H1 2016	H2 2016	H1 2017	H2 2017	H2'17/H2'16 Growth %	H2'17/H1'17 Growth %
<b>Platinum Supply-demand Balance (koz)</b>						
<b>SUPPLY</b>						
<b>Refined Production</b>	<b>2,925</b>	<b>3,110</b>	<b>2,965</b>	<b>3,180</b>	<b>2%</b>	<b>7%</b>
South Africa	2,010	2,245	2,110	2,275	1%	8%
Zimbabwe	250	240	240	240	0%	0%
North America	205	185	180	190	3%	6%
Russia	370	345	345	380	10%	10%
Other	90	95	95	95	0%	0%
<b>Increase (-)/Decrease (+) in Producer Inventory</b>	<b>+210</b>	<b>-180</b>	<b>+15</b>	<b>+15</b>	<b>N/M</b>	<b>0%</b>
<b>Total Mining Supply</b>	<b>3,135</b>	<b>2,930</b>	<b>2,980</b>	<b>3,195</b>	<b>9%</b>	<b>7%</b>
<b>Recycling</b>	<b>875</b>	<b>980</b>	<b>900</b>	<b>1,000</b>	<b>2%</b>	<b>11%</b>
Autocatalyst	620	605	630	710	17%	13%
Jewellery	255	375	270	290	-23%	7%
Industrial	0	0	0	0	N/M	N/M
<b>Total Supply</b>	<b>4,010</b>	<b>3,910</b>	<b>3,880</b>	<b>4,195</b>	<b>7%</b>	<b>8%</b>
<b>DEMAND</b>						
<b>Automotive</b>	<b>1,800</b>	<b>1,685</b>	<b>1,730</b>	<b>1,665</b>	<b>-1%</b>	<b>-4%</b>
Autocatalyst	1,730	1,620	1,650	1,590	-2%	-4%
Non-road	70	65	70	70	8%	0%
<b>Jewellery</b>	<b>1,180</b>	<b>1,330</b>	<b>1,200</b>	<b>1,260</b>	<b>-5%</b>	<b>5%</b>
<b>Industrial</b>	<b>925</b>	<b>875</b>	<b>830</b>	<b>820</b>	<b>-6%</b>	<b>-1%</b>
Chemical	290	300	285	295	-2%	4%
Petroleum	115	110	50	50	-55%	0%
Electrical	80	80	80	85	6%	6%
Glass	140	65	100	75	15%	-25%
Medical and Biomedical	120	120	125	120	0%	-4%
Other	180	200	190	195	-3%	3%
<b>Investment</b>	<b>260</b>	<b>275</b>	<b>170</b>	<b>85</b>	<b>-69%</b>	<b>-50%</b>
Change in Bars, Coins	265	195	100	110	-44%	10%
Change in ETF Holdings	-40	30	80	10	-67%	-88%
Change in Stocks Held by Exchanges	35	50	-10	-35	N/M	N/M
<b>Total Demand</b>	<b>4,165</b>	<b>4,165</b>	<b>3,930</b>	<b>3,830</b>	<b>-8%</b>	<b>-3%</b>
<b>Balance</b>	<b>-155</b>	<b>-255</b>	<b>-50</b>	<b>365</b>		

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

# PLATINUM QUARTERLY Q1 2018

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

	2013	2014	2015	2016	2017e	2018f	2017e/2016 Growth %	2018f/2017e Growth %	Q1 2017	Q2 2017	Q3 2017	Q4 2017	Q1 2018
<b>Platinum gross demand (koz)</b>													
<b>Automotive</b>	<b>3,170</b>	<b>3,310</b>	<b>3,395</b>	<b>3,490</b>	<b>3,390</b>	<b>3,285</b>	<b>-3%</b>	<b>-3%</b>	<b>875</b>	<b>855</b>	<b>800</b>	<b>865</b>	<b>840</b>
North America	425	465	470	425	430								
Western Europe	1,350	1,440	1,550	1,700	1,555								
Japan	580	590	530	490	480								
China	130	120	125	170	200								
India	160	160	175	165	165								
Rest of the World	525	535	545	540	560								
<b>Jewellery</b>	<b>2,945</b>	<b>3,000</b>	<b>2,840</b>	<b>2,505</b>	<b>2,460</b>	<b>2,510</b>	<b>-2%</b>	<b>2%</b>	<b>610</b>	<b>590</b>	<b>580</b>	<b>680</b>	<b>640</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>555</b>	<b>605</b>	<b>595</b>	<b>585</b>	<b>590</b>	<b>-2%</b>	<b>1%</b>	<b>150</b>	<b>135</b>	<b>160</b>	<b>135</b>	<b>155</b>
North America	55	55	65	55	55								
Western Europe	110	105	105	120	115								
Japan	15	15	10	15	15								
China	195	215	255	240	235								
Rest of the World	160	165	170	165	165								
<b>Petroleum</b>	<b>50</b>	<b>65</b>	<b>205</b>	<b>215</b>	<b>100</b>	<b>160</b>	<b>-53%</b>	<b>60%</b>	<b>35</b>	<b>15</b>	<b>25</b>	<b>25</b>	<b>40</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>185</b>	<b>190</b>	<b>165</b>	<b>160</b>	<b>160</b>	<b>150</b>	<b>0%</b>	<b>-6%</b>	<b>40</b>	<b>40</b>	<b>40</b>	<b>45</b>	<b>40</b>
North America	10	15	10	10	10								
Western Europe	5	10	10	10	10								
Japan	10	15	15	15	15								
China	75	70	60	60	65								
Rest of the World	85	80	70	65	60								
<b>Glass</b>	<b>145</b>	<b>175</b>	<b>200</b>	<b>205</b>	<b>180</b>	<b>195</b>	<b>-12%</b>	<b>8%</b>	<b>45</b>	<b>55</b>	<b>50</b>	<b>25</b>	<b>45</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	80								
Rest of the World	60	90	100	90	95								
<b>Medical and Biomedical</b>	<b>220</b>	<b>220</b>	<b>230</b>	<b>235</b>	<b>240</b>	<b>240</b>	<b>2%</b>	<b>0%</b>	<b>55</b>	<b>70</b>	<b>45</b>	<b>75</b>	<b>55</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	25	25	25								
<b>Other industrial</b>	<b>340</b>	<b>360</b>	<b>345</b>	<b>380</b>	<b>390</b>	<b>415</b>	<b>3%</b>	<b>6%</b>	<b>95</b>	<b>95</b>	<b>90</b>	<b>105</b>	<b>100</b>
<b>Investment</b>	<b>935</b>	<b>150</b>	<b>305</b>	<b>535</b>	<b>260</b>	<b>250</b>	<b>-51%</b>	<b>-4%</b>	<b>80</b>	<b>90</b>	<b>-10</b>	<b>95</b>	<b>60</b>
<b>Total Demand</b>	<b>8,525</b>	<b>8,025</b>	<b>8,290</b>	<b>8,320</b>	<b>7,765</b>	<b>7,795</b>	<b>-7%</b>	<b>0%</b>	<b>1,985</b>	<b>1,945</b>	<b>1,780</b>	<b>2,050</b>	<b>1,975</b>

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

## 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.

### NO<sub>x</sub> 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.

---

### Ounce conversion

1 million ounces = 31.1 tonnes.

**IMPORTANT NOTICE AND DISCLAIMER:** This publication is general and solely for educational purposes. The publisher, The World Platinum Investment Council, has been formed by the world's leading platinum producers to develop the market for platinum investment demand. Its mission is to stimulate investor demand for physical platinum through both actionable insights and targeted development, providing investors with the information to support informed decisions regarding platinum and working with financial institutions and market participants to develop products and channels that investors need. No part of this report may be reproduced or distributed in any manner without attribution to the authors. The research and commentary attributed to SFA in the publication is © SFA Copyright reserved. All copyright and other intellectual property rights in the data and commentary contained in this report remain the property of SFA, one of our third party content providers, and no person other than SFA shall be entitled to register any intellectual property rights in the information, or data herein. The analysis, data and other information attributed to SFA reflect SFA's judgment as of the date of the document and are subject to change without notice. No part of the data or commentary shall be used for the specific purpose of accessing capital markets (fundraising) without the written permission of SFA.

This publication is not, and should not be construed to be, an offer to sell or a solicitation of an offer to buy any security. With this publication, neither the publisher nor SFA intend to transmit any order for, arrange for, advise on, act as agent in relation to, or otherwise facilitate any transaction involving securities or commodities regardless of whether such are otherwise referenced in it. This publication is not intended to provide tax, legal, or investment advice and nothing in it should be construed as a recommendation to buy, sell, or hold any investment or security or to engage in any investment strategy or transaction. Neither the publisher nor SFA is, or purports to be, a broker-dealer, a registered investment advisor, or otherwise registered under the laws of the United States or the United Kingdom, including under the Financial Services and Markets Act 2000 or Senior Managers and Certifications Regime or by the Financial Conduct Authority.

This publication is not, and should not be construed to be, personalized investment advice directed to or appropriate for any particular investor. Any investment should be made only after consulting a professional investment advisor. You are solely responsible for determining whether any investment, investment strategy, security or related transaction is appropriate for you based on your investment objectives, financial circumstances and risk tolerance. You should consult your business, legal, tax or accounting advisors regarding your specific business, legal or tax situation or circumstances.

The information on which this publication is based is believed to be reliable. Nevertheless, neither the publisher nor SFA can guarantee the accuracy or completeness of the information. This publication contains forward-looking statements, including statements regarding expected continual growth of the industry. The publisher and SFA note that statements contained in the publication that look forward in time, which include everything other than historical information, involve risks and uncertainties that may affect actual results and neither the publisher nor SFA accepts any liability whatsoever for any loss or damage suffered by any person in reliance on the information in the publication.

The logos, services marks and trademarks of the World Platinum Investment Council are owned exclusively by it. All other trademarks used in this publication are the property of their respective trademark holders. The publisher is not affiliated, connected, or associated with, and is not sponsored, approved, or originated by, the trademark holders unless otherwise stated. No claim is made by the publisher to any rights in any third-party trademarks.

### **WPIC Research MiFID II Status**

The World Platinum Investment Council (WPIC) has undertaken an internal and external review of its content and services for MiFID II. As a result WPIC highlights the following to the recipients of its research services, and their Compliance/Legal departments:

WPIC research content falls clearly within the Minor Non-Monetary Benefit Category, and can continue to be consumed by all asset managers free of charge. WPIC research can be freely shared across investment organisations.

WPIC does not conduct any financial instrument execution business. WPIC does not have any market making, sales trading, trading or share dealing activity. (No possible inducement).

WPIC content is disseminated widely and made available to all interested parties through a range of different channels, therefore qualifying as a "Minor Non-Monetary Benefit" under MiFID II (ESMA/FCA/AMF). WPIC research is made freely available through the WPIC website. WPIC does not have any permissioning requirements on research aggregation platforms.

WPIC does not, and will not seek, any payment from consumers of our research services. WPIC makes it clear to institutional investors that it does not seek payment from them for our freely available content.

More detailed information is available on the WPIC website: <http://www.platinuminvestment.com/investment-research/mifid-ii>