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# PLATINUM QUARTERLY

## Q2 2016

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8th September 2016

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### FOREWORD

We are experiencing a more positive platinum price environment which has been attracting media and investor attention. This is being driven by better information, attractive market fundamentals and four years of deficits. We are in a tightening market and our latest *Platinum Quarterly* is released in this context.

During the first six months of 2016, investors saw the US Dollar price of platinum increase by 15% – yet platinum is trading at its highest ever discount to gold. Over the past 40 years platinum has exhibited, on average, a premium to gold reflecting its rarity and wider industrial application. Since 2014, this relationship has been heavily discounted. This is only the fourth period in those forty years where platinum is at a sustained discount to gold. Investors are increasingly telling us that they view this divergence from historical norms as significant and temporary. As they make sense of better and more detailed information on platinum, their confidence in the underlying market is growing. We expect the re-rating to continue.

Our *Platinum Quarterly*, now comprising two years' of quarterly data, continues to amass a growing following by providing the most granular, independent view of the drivers of platinum supply and demand. It has won praise for providing the supply/demand context for investors to consider the investment case for platinum. Quarterly balances, the increased frequency of annual balance updates and a published level of above ground stocks have been warmly received by investors.

SFA Oxford's data shows that the platinum market is forecast to have a full year 2016 deficit of 520 koz. We are confident that the fundamentals behind platinum remain strong, will be so for the foreseeable future and will continue to present a compelling case for investors.

While a surplus was recorded in the second quarter, this was largely attributable to the South African refinery outage in Q1 and the associated processing of backlogged concentrate when refining resumed in Q2.

We continue to see little evidence to support rising output over the medium term. Platinum production from South Africa, the largest producer, has failed to reach the levels observed in 2013 and 2015. Real cost increases due to labour costs – which account for over 50% of overall mining costs - continue and, together with low metal prices, they have driven the fall in capital investment across this industry. Sustaining current output is harder as a result.

We are often asked why platinum mining supply is not more responsive to US Dollar price progression or Rand weakness. Quite simply, increasing platinum production from new or existing operations or to restart halted production, requires commitment to a multi-year capital investment. These investment decisions have become increasingly hard to justify with price and sentiment disconnected from fundamentals. Conversely, specifically because most production is from underground labour-intensive mining, similar decisions are frequently required to maintain current output. Capital investment in platinum mining in South Africa continues to reduce each year, continuing the dramatic fall from almost \$4 bn per annum to under \$1bn per annum in the past seven years.

The predicted strong growth in platinum supply from recycled autocatalysts, argued by some as potentially weakening platinum's solid fundamentals, has not materialised. While growth in recycling supply is still likely, it remains muted due to the ongoing low scrap steel price and reduced rates of car scrapping. Data flow over the next few quarters will ensure we better understand the relative impact of the dynamics at work in this area.

Overall, we firmly believe that platinum supply will remain constrained for the foreseeable future.

It is in this context that we see demand growth for platinum over the medium term. In the second quarter *Platinum Quarterly* shows resilient demand from automotive, industrial and investment segments. Despite the small increase in jewellery demand in Q2 it remains, as it was in Q1, below recent quarterly average levels. The expected increase in jewellery demand in China in the second half of 2016 is dependent on platinum jewellery sales outperforming other jewellery sales, as it has in the past, and manufacturers increasing their stock ahead of typically strong seasonal demand. The growth in platinum jewellery demand expected in India and the US in 2016 should offset the weakness in China and see overall 2016 demand little changed from 2015.

Conversely, our perspective on automotive demand is much clearer. We are convinced that in the near to medium term we will see growth from this segment. Consumers and investors do not have easy access to a balanced perspective on vehicle emissions. It is now more important than ever to get the real facts about diesel across to both groups. The confusing aftermath of the VW crisis has led some consumers to question their decision to purchase a diesel vehicle. We believe this underlying concern and the headline-grabbing calls for the banning of diesel cars in some major cities as a means to solve urban NO<sub>x</sub> issues has, in turn, prompted some extremely conservative forecasts for the global diesel car share. As part of our role to provide better information to investors we have sought to counter poorly supported assertions in public. We firmly believe that the urban NO<sub>x</sub> issue can and should be solved without a blanket ban on diesel cars. Many diesel cars already comply with future 'on-the-road' limits and are fully capable of being part of the urban NO<sub>x</sub> solution, while retaining their significant CO<sub>2</sub> benefits over gasoline cars.

Industrial platinum demand remains the segment most closely aligned with long term global economic growth. However, Q2 highlights the volatility of shorter term industrial demand associated with the high platinum content of new plant construction or old plant decommissioning versus the smaller yet more stable consumption and replenishment components of industrial applications. In Q2, for example, platinum for glass manufacture increased 11% while platinum used in electrical applications fell 22%.

Physical investment demand remains strong while ETF outflows have tapered. We believe that the 16 physically backed platinum ETFs in issue are under-owned and under-promoted globally. We have established several new partnerships during the course of 2016 with a range of best-in-class organisations to raise awareness of existing products, fill geographic and product gaps, remove obstacles to ownership and ensure buying physical platinum is made easier. Examples of these partnerships include increasing awareness and ownership of the Japan-listed Mitsubishi Fruits of Platinum ETF, working with Swiss refiner Valcambi to increase bar and coin availability in the US and elsewhere and our agreement with Rand Merchant Bank in South Africa for the bullion coin certificate product which targets investors around the world who prefer direct ownership of a numbered, bullion coin. Our collaboration with Bullion Vault, the on-line precious metals platform, is aimed at unlocking retail access to platinum around the world.

This has been a busy quarter for WPIC. We have made progress on many fronts and we have successfully engaged with a large number of investors and potential investors. We are working with a growing number of partners around the world, helping them to consider and execute on new platinum products to improve investor access and grow the market. The patchy performance of other asset classes, risk diversification requirements and relative valuation compared to the wider commodities complex, are leading an increasing number of investors to appraise, or reappraise, the case for platinum, with more investors, both professional and private, wanting to hear from us.

Thanks again for your support.

**Paul Wilson, CEO**

# PLATINUM QUARTERLY Q2 2016

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

	2013	2014	2015	2016f	2016f/2015 Growth %	Q1 2016	Q2 2016
<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>5,925</b>	<b>-4%</b>	<b>1,240</b>	<b>1,615</b>
South Africa	4,355	3,115	4,465	4,190	-6%	770	1,175
Zimbabwe	405	405	405	465	15%	135	105
North America	355	400	385	400	4%	100	105
Russia	740	740	715	680	-5%	190	180
Other	215	220	180	190	6%	45	50
<b>Increase (-)/Decrease (+) in Producer Inventory</b>	<b>-215</b>	<b>+350</b>	<b>+45</b>	<b>+60</b>	<b>33%</b>	<b>+150</b>	<b>+80</b>
<b>Total Mining Supply</b>	<b>5,855</b>	<b>5,230</b>	<b>6,195</b>	<b>5,985</b>	<b>-3%</b>	<b>1,390</b>	<b>1,695</b>
<b>Recycling</b>	<b>1,980</b>	<b>2,035</b>	<b>1,710</b>	<b>1,745</b>	<b>2%</b>	<b>395</b>	<b>480</b>
Autocatalyst	1,120	1,255	1,190	1,240	4%	280	340
Jewellery	855	775	515	500	-3%	115	140
Industrial	5	5	5	5	0%	0	0
<b>Total Supply</b>	<b>7,835</b>	<b>7,265</b>	<b>7,905</b>	<b>7,730</b>	<b>-2%</b>	<b>1,785</b>	<b>2,175</b>
<b>DEMAND</b>							
<b>Automotive</b>	<b>3,165</b>	<b>3,300</b>	<b>3,405</b>	<b>3,390</b>	<b>0%</b>	<b>870</b>	<b>865</b>
Autocatalyst	3,015	3,140	3,260	3,240	-1%	835	830
Non-road	145	155	145	145	0%	35	40
<b>Jewellery</b>	<b>2,945</b>	<b>3,000</b>	<b>2,880</b>	<b>2,885</b>	<b>0%</b>	<b>600</b>	<b>620</b>
<b>Industrial</b>	<b>1,480</b>	<b>1,535</b>	<b>1,650</b>	<b>1,625</b>	<b>-2%</b>	<b>400</b>	<b>410</b>
Chemical	530	575	595	600	1%	145	145
Petroleum	115	65	160	145	-9%	35	35
Electrical	185	190	170	160	-6%	45	35
Glass	145	180	200	170	-15%	45	50
Medical	220	220	230	230	0%	55	65
Other	285	305	295	320	8%	75	80
<b>Investment</b>	<b>935</b>	<b>150</b>	<b>305</b>	<b>350</b>	<b>15%</b>	<b>155</b>	<b>90</b>
Change in Bars, Coins	-5	50	525			140	110
Change in ETF Holdings	905	215	-240			-25	-15
Change in Stocks Held by Exchanges	35	-115	20			40	-5
<b>Total Demand</b>	<b>8,525</b>	<b>7,985</b>	<b>8,240</b>	<b>8,250</b>	<b>0%</b>	<b>2,025</b>	<b>1,985</b>
<b>Balance</b>	<b>-690</b>	<b>-720</b>	<b>-335</b>	<b>-520</b>	<b>55%</b>	<b>-240</b>	<b>190</b>
<b>Above Ground Stocks</b>	<b>4,140*</b>	<b>3,450</b>	<b>2,730</b>	<b>1,875</b>	<b>-22%</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 Q4 2015 are contained in previously published PQs which are freely available on the WPIC website. The current estimates for H1 2016 are included in Table 4 on page 15 (supply, demand and above ground stocks).

3. The 2016 forecast is based on historical data and trends as well as modelling, with varying degrees of accuracy depending upon the supply or demand category. Investment demand is expected to be the least predictable segment. Some historical views are based on data and modelling that pre-date WPIC publication of PQ.

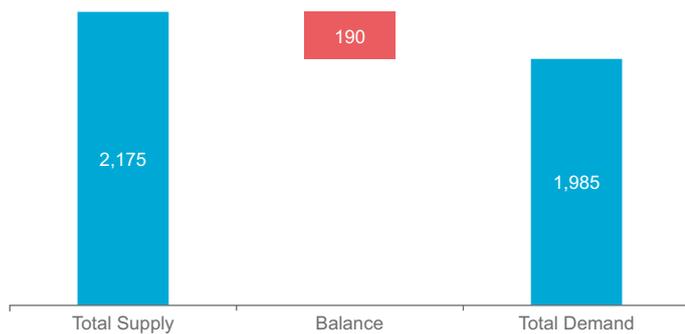
## 2016 SECOND QUARTER PLATINUM MARKET REVIEW

The second quarter of 2016 saw a 390 koz (+22%) increase quarter-on-quarter in total platinum supply to 2,175 koz as refined production in South Africa returned to more normal levels, sales from producer inventory continued and supply from recycled autocatalysts increased. A temporary refinery closure in Q1'16 that reduced output for over a month led to a reduction in refined output from South Africa and prompted sales from producer inventory. Most of the material that built up during the outage was processed in Q2'16 and, together with an additional 80 koz of sales from producer inventory, increased total mining supply 22% quarter-on-quarter to 1,695 koz. Coincidentally, recycling also grew 22% to 480 koz as the rise in the platinum price encouraged collectors to process some autocatalysts held back during particularly low prices in 2015 and Q1'16. The increase in price also prompted higher jewellery recycling.

Total global consumption fell 2% (-35 koz) quarter-on-quarter to 1,990 koz. Gains in jewellery (+20 koz) and industrial (+15 koz) demand were outweighed by lower investment demand (-65 koz) and a slight reduction in autocatalyst usage (-5 koz).

The small decline in demand and strong recovery in supply compared to the first quarter resulted in a market surplus of 190 koz in Q2'16 (Chart 1).

**Chart 1: Supply-demand balance, koz, Q1 2016**



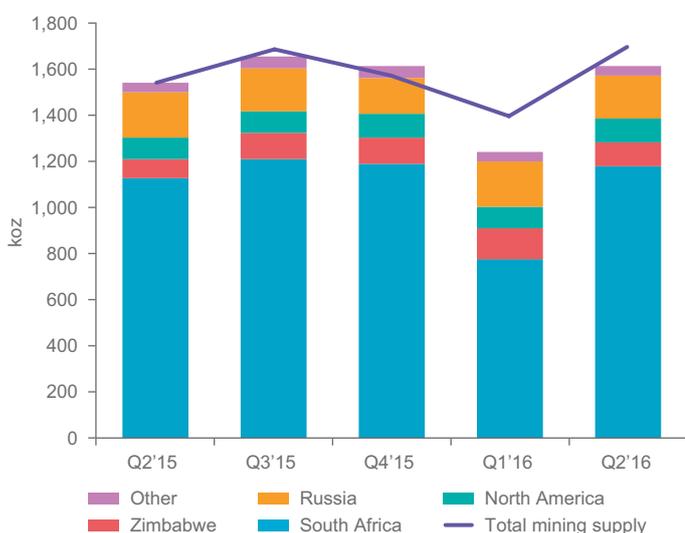
Source: SFA (Oxford)

## Supply

Total mining supply in Q2'16 increased by 22% quarter-on-quarter to 1,695 koz (Chart 2). Refined production rose by 30% to 1,615 koz, while inventory sales are estimated at 80 koz for the quarter, compared to 150 koz in Q1'16. South African refined production was 53% higher in Q2'16 at 1,175 koz (Chart 3), as most of the backlogged material was processed after the removal of a Section 54 stoppage at a refinery in Q1'16.

Production from Zimbabwe is estimated to be 22% lower than Q1'16 at 105 koz, signifying a return to normal output levels. There was a release of stockpiled concentrate in Q1'16 following a furnace outage in Q4'15. Supply from all other regions remained stable at 335 koz in Q2'16.

**Chart 2: Global refined production**



Source: SFA (Oxford)

**Chart 3: South African refined production**



Source: SFA (Oxford)

Total mining supply was up 10% year-on-year for Q2'16, with refined production 5% higher. For the six months to June, refined production fell by 1% year-on-year overall, and was 6% lower in South Africa owing to safety related stoppages at operations and a refinery. The unfortunate increase in fatalities in South African platinum mines in H1'16 compared to H1'15, occurred primarily (over 80%) at Western Limb operations, which account for 75% of South African supply. The associated safety stoppages in H1'16 reduced production from the Western Limb by 4% (-55 koz) year-on-year to 1,470 koz. The Q1'16 refinery stoppage also impacted other South African supply, which decreased by 6% (-32 koz) year-on-year to 505 koz in H1'16.

Production from Zimbabwe has increased by 37% year-on-year in H1'16 to 240 koz, partly from the release of concentrates in Q1'16, but also through efforts to offset lost volumes resulting from an unplanned shaft closure in July 2014. Output from Russia and North America in H1'16 remained stable year-on-year at 370 koz and 205 koz respectively.

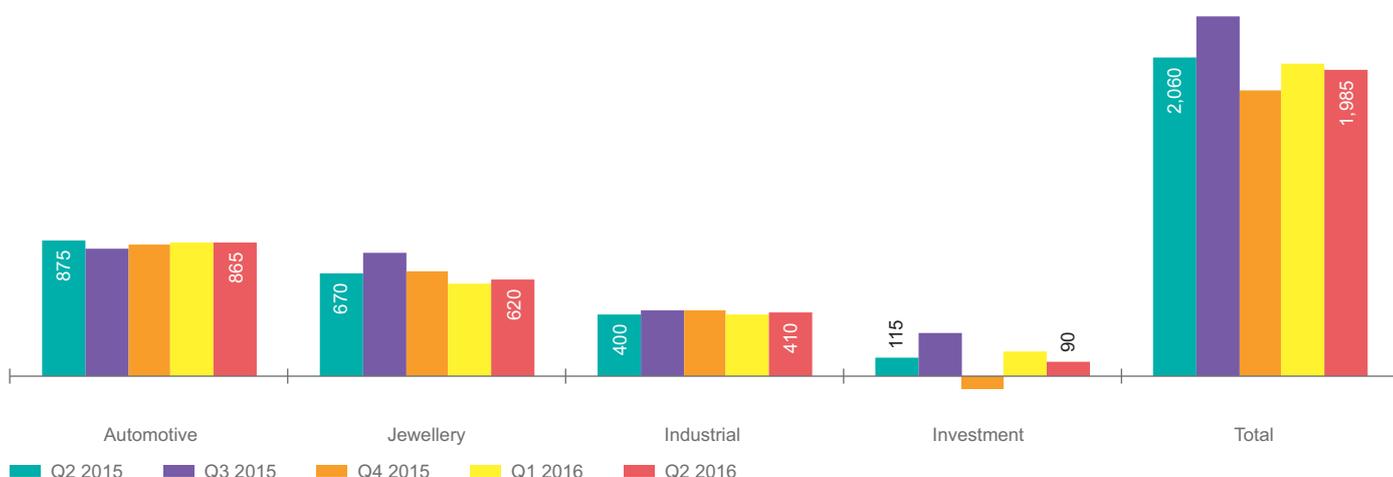
Platinum recovered from spent autocatalysts was 340 koz in the second quarter, up by 10% year-on-year and by 21% quarter-on-quarter. Scrap steel prices rebounded sharply by 45% quarter-on-quarter in Q2'16, which resulted in an improvement in the level of vehicle scrappage. The average platinum price also improved in Q2'16 (+6% quarter-on-quarter), and, while still down 11% year-on-year, some destocking of hoarded catalysts resulted from the increase in PGM prices.

Jewellery recycling rose to 140 koz in the second quarter, 25 koz higher (+22%) than in Q1'16, but 15% lower than Q2'15. China and Japan both experienced a higher level of recycling than in the previous quarter owing to the recovery of the platinum price. However, in Q2'16 the platinum price in Japanese yen was still down 21% year-on-year and was 6% year-on-year lower in Chinese yuan.

## Demand

In the second quarter of 2016 total global platinum demand was 1,985 koz (Chart 4), a decline of 4% year-on-year and 2% quarter-on-quarter. Modest gains in jewellery (+20 koz) and industrial (+10 koz) demand compared to the first quarter were offset by weaker investment demand (-65 koz), as bar and coin demand eased and ETF holdings and exchange stocks fell slightly, along with almost flat autocatalyst demand (-5 koz).

Chart 4: Platinum demand, koz



Source: SFA (Oxford)

## Automotive demand

Despite significant uncertainty through the past year in the automotive market over diesel shares and vehicle emissions, platinum autocatalyst demand has been essentially stable over the past four quarters. Total automotive demand in Q2'16 was virtually unchanged quarter-on-quarter and year-on-year at 865 koz.

Diesels' share of Western European light vehicle sales continued to decline gradually in 2016. At the end of June 2016, diesel made up 49.7% of the market, a decline of 2.1 percentage points from June 2015. However, Germany, Italy and the UK are among the largest markets and show stable diesel shares. Increasing light vehicle sales, especially in Italy, have mostly offset the lower diesel share, with Western Europe 2016 year-to-date diesel car sales up by some 150,000 units (source: LMC Automotive).

## Jewellery demand

Platinum jewellery demand in Q2'16 was 620 koz, up 3% from the previous quarter. The main driver of this growth was fabricator demand in China and Western Europe, while the strength of the Japanese currency led to retail sales declining as tourist numbers dropped and, as a consequence, jewellery purchasing dipped.

Trading volume on the Shanghai Gold Exchange decreased 12% quarter-on-quarter in Q2'16, but the volume in Q1'16 was the second-highest for the first quarter in the last nine years. Chinese fabricator demand increased 10% quarter-on-quarter in Q2'16, but was down 16% year-on-year. The retail jewellery environment was still soft, with Chinese jewellery sales (all metals) shrinking by 4% year-on-year and 8.5% quarter-on-quarter (source: National Bureau of Statistics), although platinum jewellery purchasing has generally held up better than other jewellery. Chinese marriage registrations also dropped 0.5% year-on-year in the second quarter.

In India, platinum jewellery retail sales were impacted by the one-month strike in Q1'16 caused by the imposition of a 1% rise in excise duty on non-silver jewellery imports. However, retail sales have regained their pre-strike momentum and jewellery demand rose 25% year-on-year in Q2'16.

## Industrial demand

Second-quarter industrial demand grew moderately year-on-year to 410 koz, primarily lifted by the construction of new LCD glass substrate facilities in China and glass capacity expansions in developing RoW regions. Platinum requirements for silicone and fuel cell manufacture were also higher than in Q2'15, but growth in these sectors was offset by weaker net demand for use in HDDs (lower production) and petroleum refining (refinery closures) during Q2'16. Despite the inherent volatility of industrial demand, quarterly platinum usage has grown gradually since Q3'14, by an average of 1% per quarter, as installed capacity, and thus base-level top-up requirements, has increased in many industrial sectors.

## Investment demand

In the second quarter of 2016 bar and coin purchases stood at 110 koz, but this was slightly offset by minor reductions in ETF holdings (-15 koz) and exchange stocks (-5 koz), leaving investment demand at 90 koz (Chart 5).

ETF holdings have now contracted for three quarters in a row, but the decline eased with net sales of just 15 koz in Q2'16. The reduction in ETF holdings during the quarter was driven by net sales from South African ETFs, where holdings fell by a combined 84 koz. After being net sellers in the first two months of the year, South African investors increased their ETF holdings in March and again in April, but reduced their holdings through May and June.

In Europe, UK funds added 54 koz in Q2'16, which was an improvement over the 3 koz gain in Q1'16, while Swiss funds added 2 koz, down from a similarly modest 4 koz in the first quarter. Investors in the US expanded their ETF holdings by 11 koz.

Bar and coin buying eased to 110 koz in Q2'16 from 140 koz in the previous quarter. While bar purchases in Japan again dominated bar and coin demand, Japanese investors' purchasing slowed down somewhat after three very strong quarters. However, coin purchases picked up as the US Mint made 10,000 American Eagle platinum proof coins available in June and they sold out in under an hour. Only 4,000 proof coins had been made available in 2015, so collector interest was very high.

Chart 5: Platinum investment



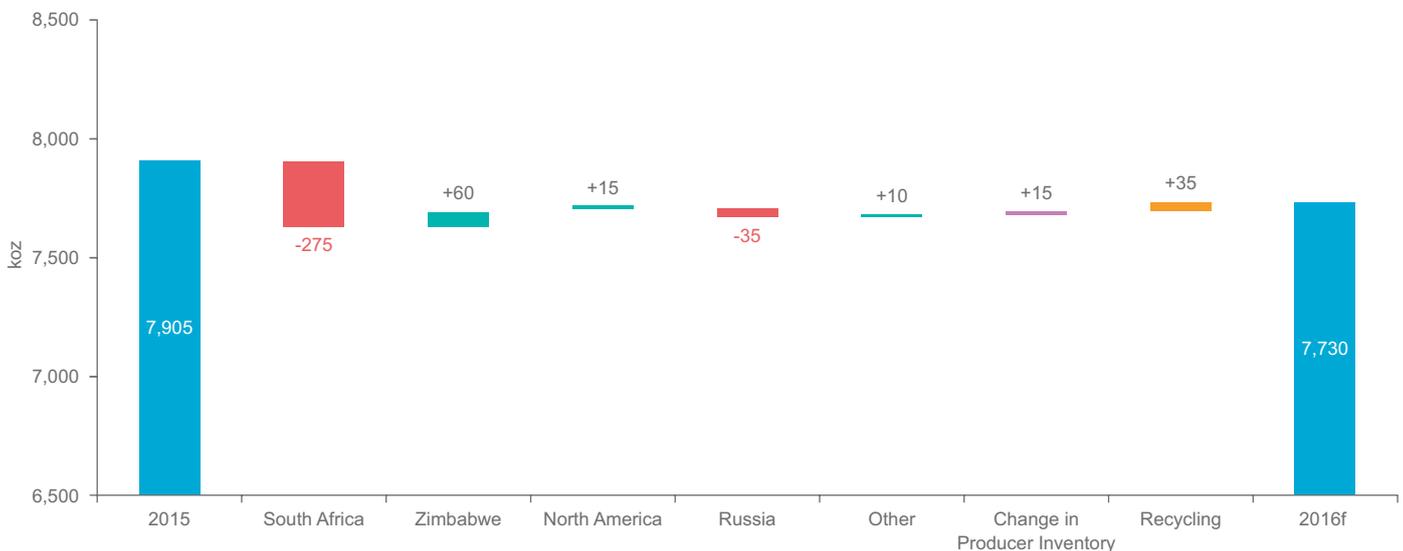
Source: SFA (Oxford)

## 2016 FORECAST

Global platinum demand is forecast to be 8,250 koz in 2016, essentially flat year-on-year. Automotive demand is projected to be 3,390 koz, slightly lower than in 2015 as a declining diesel share more than offsets growing vehicle sales. Jewellery demand is little changed at 2,885 koz, with an anticipated decline in Chinese jewellery consumption being offset by growth in other regions. Industrial demand is expected to dip by 2% year-on-year to 1,625 koz owing to lower requirements in the electrical, petroleum and glass sectors, while investment demand is projected to expand by 45 koz to 350 koz, as although bar and coin demand is expected to fall back from the exceptional level seen in 2015, the reduction in ETF holdings is also expected to be lower than last year.

Total supply is forecast to decrease by 2% to 7,730 koz this year as lower refined production from South Africa and Russia outweighs gains in other regions and from recycling (Chart 6).

**Chart 6: Changes in total supply, 2016f vs. 2015**



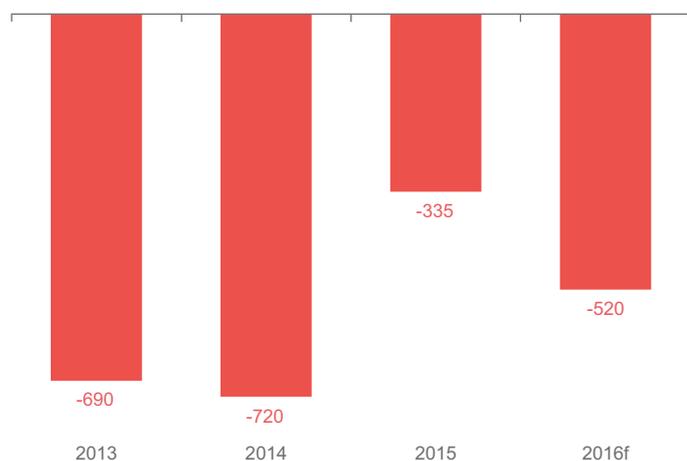
Source: SFA (Oxford)

Refined supply is projected to be 5,925 koz this year, with total mining supply of 5,985 koz as some sales from producer inventory are anticipated. South African output is forecast to be 4,190 koz, down 6% from 4,465 koz in 2015 owing to the impact of shaft closures. Russian supply is estimated to be 5% lower this year at 680 koz, as some material will be locked up in the production pipeline when processing facilities are reconfigured. Following significant sales from producer inventory in the first half of the year, South African producers are expected to rebuild their inventories during the second half of the year. Producers hold a certain inventory level to allow them to meet supply agreements when unforeseen problems reduce their refined output, as occurred in the first half.

Platinum recovered via recycling has been revised down to an increase of 35 koz (+2%) to 1,745 koz as overall scrappage rates are expected to be lower than previously estimated. Secondary supply from autocatalysts is now forecast to grow to 1,240 koz (+4%) this year as the impact of low scrap steel prices, that reduced vehicle scrappage rates in 2015, continued in H1'16. The scrap steel price picked up sharply in Q2'16, which improved the catalytic converter collection rate in scrapyards, and the third quarter is likely to see an increase in platinum volume as higher PGM prices encourage an increase in ceramic substrates sent to refineries. However, as scrap steel prices look unlikely to recover to 2014 levels, the expected rate of vehicle scrappage has been revised down accordingly. Jewellery recycling is predicted to dip 15 koz to 500 koz in 2016, still being held back by relatively low platinum prices.

While global demand is little changed this year, mining supply is expected to be 3% lower and weak metal prices have reduced the growth in recycling, so the platinum market is projected to have a 520 koz deficit in 2016 (Chart 7).

**Chart 7: Supply-demand balance, koz, 2013-2016f**



Source: SFA (Oxford)

### Mine supply

Global refined supply is forecast to decrease by 4% to 5,925 koz in 2016. South African production is estimated to be 6% lower (-275 koz) at 4,190 koz owing to shaft closures in 2015, and production from Russia is forecast to decline by 5% (-35 koz) following a refinery closure. Increasing production rates in Zimbabwe should see a 15% (+60 koz) rise year-on-year to 465 koz. The estimate for total mine supply falls short of 2015 levels by 210 koz (5,985 koz), and this includes anticipated sales from producer inventory of 60 koz.

### Recycling

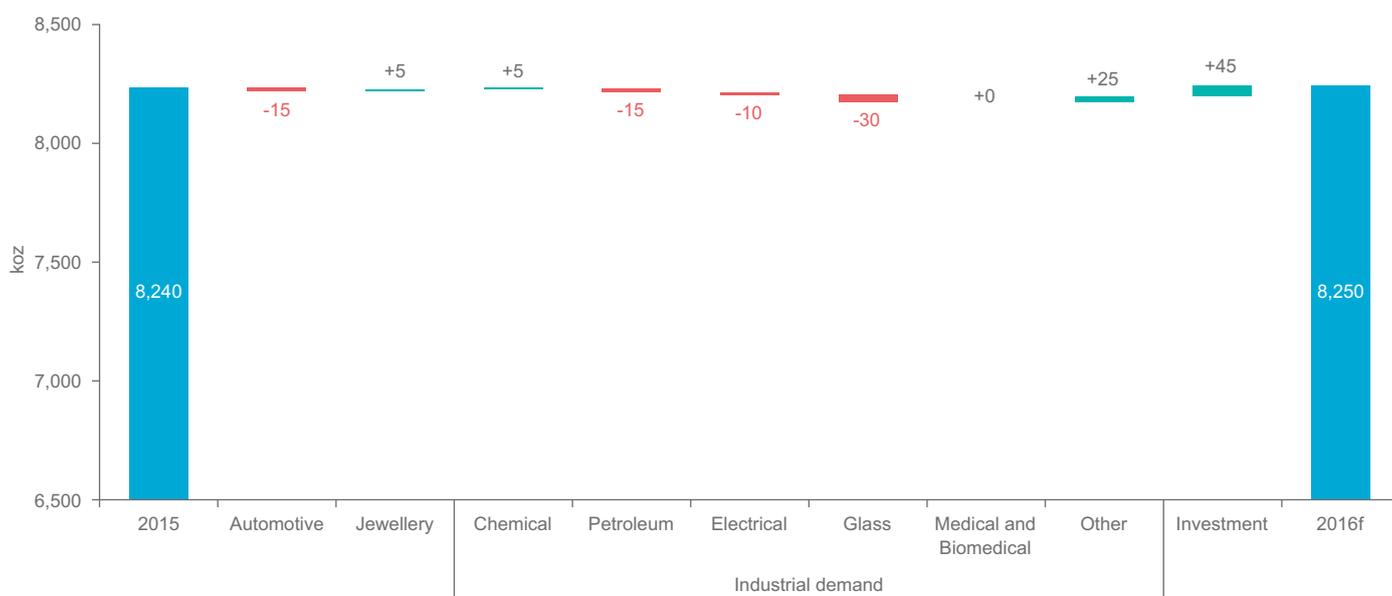
Recycled platinum from autocatalysts has been revised down to 1,240 koz in 2016, 4% (+50 koz) higher than in 2015.

The recovery in the platinum price in H1'16 increased material flow to recyclers, and H1'16 recycled volume was up 55 koz from H2'15 and in line with H1'15. Recycling volume is now expected to be flat in the last two quarters of 2016 as the scrap steel price is unlikely to recover to the level of H2'14. While the volume of recycled catalytic converters is expected to be lower year-on-year in 2016 this should be more than offset by an increase in the average platinum loading as a higher proportion of diesel catalysts are recycled reflecting the increase in diesel share in Europe in the 2000s.

Jewellery recycling is projected to be down 3% (-15 koz) at 500 koz this year owing to the low price discouraging recycling in Japan and sluggish demand in China.

Changes in end-use demand from 2015 to 2016 are shown in Chart 8.

**Chart 8: Changes in demand by category, 2016f vs. 2015**



Source: SFA (Oxford)

## Automotive demand

Autocatalyst demand for platinum is estimated to be 3,390 koz in 2016, essentially flat compared to 2015.

Total passenger car sales for Western Europe are still expected to show growth for the full year of 2016, and are forecast to rise by 5.2% from 13.18 million units in 2015 to 13.87 million units in 2016. Growth in overall vehicle sales is expected to slow and become insufficient to offset the declining diesel share. Diesel car sales are projected to reach 6.84 million units, down slightly on the 6.85 million units sold in 2015 (source: LMC Automotive). Diesel is likely to remain a significant part of the powertrain mix as the engine and aftertreatment technology already exists to meet on-the-road Euro 6 NO<sub>x</sub> and particulate emissions criteria, enabling automakers to meet ever-tighter CO<sub>2</sub> emissions targets.

Reduced confidence following the UK's Brexit vote is expected to lower vehicle sales in H2'16 in the UK, but with limited impact on platinum demand this year.

## Jewellery demand

Jewellery demand is anticipated to be 2,885 koz in 2016, little changed from 2015. India, the US and Western Europe will offset the decline in demand in China and Japan this year. The price differential to gold continues to support demand in the US and Europe. In India, the impact of the one-month strike by jewellery retailers led to flat demand in H1'16, but it is anticipated that sales will significantly recover in H2'16 which sees the start of the wedding season. The on-going Evara campaign should continue to help drive sales, and platinum jewellery has also been promoted for the Raksha Bandhan festival in August as a symbol of the eternal bond between brothers and sisters. Chinese fabricator demand was down 24% year-on-year in H1'16, owing to fewer purchases by manufacturers following a reduction in higher than normal stock levels in H2'15. Marriage registrations decreased 2.6% year-on-year in H1'16 and the competitive market conditions negatively impacted the performance of major retailers, as independent retailers gained market share. Chinese demand is expected to improve in H2'16, as increasing fabricator demand is anticipated ahead of the National Day holiday, but is still likely to fall by 4% in 2016.

### **Industrial demand**

Weaker demand for use in glass fabrication, petroleum processes and electrical components is expected to reduce net platinum requirements for industrial end-uses to 1,625 koz (-2%) in 2016, despite greater consumption in other end-uses. Glass and petroleum demand is set to decrease in Japan and Western Europe, owing to fabrication facility and refinery closures, whilst platinum consumption by the electrical sector in China is also anticipated to fall. Platinum requirements are projected to decline in all regions this year, except North America, where usage should be boosted by the petroleum industry.

### **Chemical**

Platinum requirements for the chemical industry are forecast to rise slightly (+1%) to 600 koz this year, as greater usage by silicone manufacturers and nitric acid producers is projected to outweigh lower demand for propane dehydrogenation (PDH) capacity expansion. Higher production of silicones is set to lift demand in China and the RoW, whilst greater nitric acid output should boost platinum usage in Western Europe during 2016. However, new metal requirements for on-purpose propylene producers are estimated to fall this year, partially offsetting demand growth elsewhere, as fewer new PDH plants are scheduled for completion in North America and the RoW compared to 2015.

### **Petroleum**

Oil-refining capacity cuts in Japan and Western Europe and slower capacity growth in China are expected to soften net platinum demand in the petroleum industry to 145 koz (-9%) in 2016, despite robust expansion in North America and the RoW. In Japan, some closures and refinery integration are already in progress, although capacity reductions (and platinum returned to market) are predicted to be lower than previously forecast for the year, as delays to company consolidation agreements are likely to push some of the anticipated capacity curtailments into 2017. Planned capacity reductions are also underway in Western Europe and are set to return the region back to net negative demand following a strong 2015.

### **Electrical**

The continuing slump in hard disk drive (HDD) production is projected to weaken platinum consumption in the electrical sector to 160 koz (-6%) this year, outweighing demand growth for use in other electrical components. HDD deliveries were down by 16% year-on-year in H1'16 and the full-year outlook remains considerably below 2015 volumes, with platinum requirements in China predicted to be the hardest hit by this decline.

### **Glass**

Despite on-going capacity growth in China and the RoW, the timing of major projects, combined with closures in Japan and Western Europe, is likely to reduce net platinum purchases by the glass sector to 170 koz (-15%) in 2016. Further closures of liquid-crystal display (LCD) substrate plants in Japan should return platinum to market throughout the year, whilst the scheduling of some of this year's major new glass facilities and capacity expansion projects in the RoW resulted in the additional platinum requirements for these plants being purchased last year, rather than in 2016. China's demand estimate is higher than previously forecast, as new glass projects have been identified, including new LCD facilities, some of which are scheduled to commence operation late this year or in early 2017.

### **Other**

Greater requirements for automotive sensor and fuel cell manufacture are forecast to boost platinum consumption in other industrial end-uses to 320 koz (+8%) this year, driven by growing vehicle production, particularly in China and North America, and increased adoption of fuel cell technology (both transport and stationary). Japan is expected to account for the majority of the additional fuel cell demand, followed by North America.

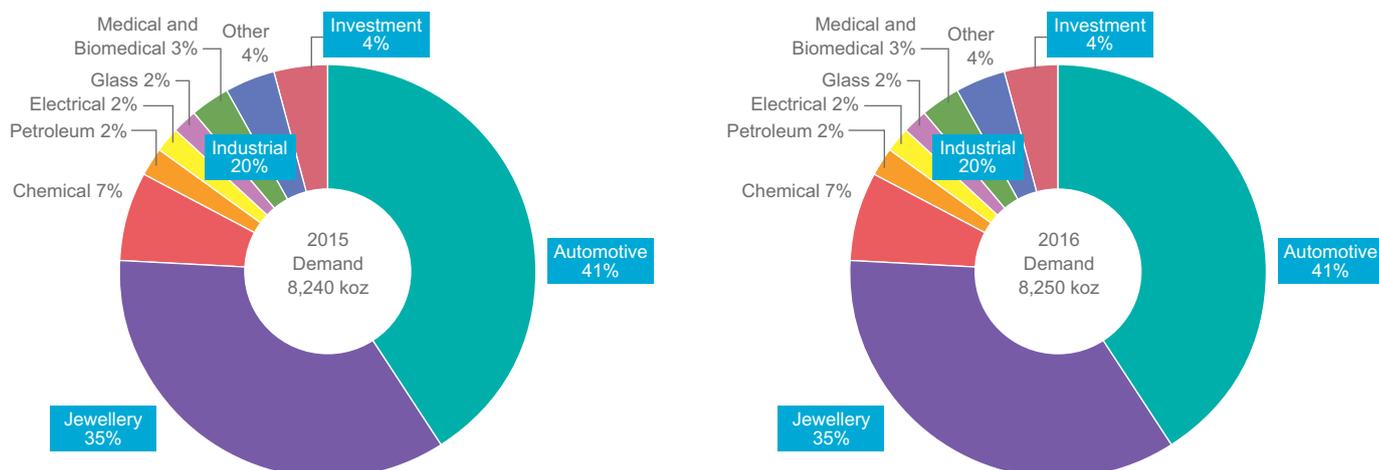
**Investment demand**

Total investment demand is forecast to be 350 koz in 2016. Total bar and coin demand is anticipated to be somewhat lower than in 2015. The strong level of bar buying in Japan has eased through the first half of the year and is expected to continue to moderate in the second half as the yen is predicted to weaken against the US dollar, raising the platinum price in yen terms. Unlike last year when only a limited number of proof coins were minted, the US Mint has made both proof and bullion versions of the American Eagle platinum coin available, and the Austrian Mint has produced a platinum version of its Philharmonic coin for the first time, so coin demand is expected to be robust.

ETF investors further reduced their holdings in Q2'16 despite the platinum price continuing to rally, and so even if interest increases in the remainder of the year, global ETF holdings look set to decline for a second consecutive year.

Demand shares by end-use are shown in Chart 9.

**Chart 9: Demand end use shares, 2016f vs. 2015**



Source: SFA (Oxford)

**ABOVE GROUND STOCKS**

With the platinum market forecast to have a deficit of 520 koz this year, above ground stocks are estimated to end the year at 1,875 koz.

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

# PLATINUM QUARTERLY Q2 2016

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

	2013	2014	2015	2016f	2015/2014 Growth %	2016f/2015 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>5,925</b>	<b>26%</b>	<b>-4%</b>
South Africa	4,355	3,115	4,465	4,190	43%	-6%
Zimbabwe	405	405	405	465	0%	15%
North America	355	400	385	400	-4%	4%
Russia	740	740	715	680	-3%	-5%
Other	215	220	180	190	-18%	6%
<b>Increase (-)/Decrease (+) in Producer Inventory</b>	<b>-215</b>	<b>+350</b>	<b>+45</b>	<b>+60</b>	<b>-87%</b>	<b>33%</b>
<b>Total Mining Supply</b>	<b>5,855</b>	<b>5,230</b>	<b>6,195</b>	<b>5,985</b>	<b>18%</b>	<b>-3%</b>
<b>Recycling</b>	<b>1,980</b>	<b>2,035</b>	<b>1,710</b>	<b>1,745</b>	<b>-16%</b>	<b>2%</b>
Autocatalyst	1,120	1,255	1,190	1,240	-5%	4%
Jewellery	855	775	515	500	-34%	-3%
Industrial	5	5	5	5	0%	0%
<b>Total Supply</b>	<b>7,835</b>	<b>7,265</b>	<b>7,905</b>	<b>7,730</b>	<b>9%</b>	<b>-2%</b>
<b>DEMAND</b>						
<b>Automotive</b>	<b>3,165</b>	<b>3,300</b>	<b>3,405</b>	<b>3,390</b>	<b>3%</b>	<b>0%</b>
Autocatalyst	3,015	3,140	3,260	3,240	4%	-1%
Non-road	145	155	145	145	-6%	0%
<b>Jewellery</b>	<b>2,945</b>	<b>3,000</b>	<b>2,880</b>	<b>2,885</b>	<b>-4%</b>	<b>0%</b>
<b>Industrial</b>	<b>1,480</b>	<b>1,535</b>	<b>1,650</b>	<b>1,625</b>	<b>7%</b>	<b>-2%</b>
Chemical	530	575	595	600	3%	1%
Petroleum	115	65	160	145	146%	-9%
Electrical	185	190	170	160	-11%	-6%
Glass	145	180	200	170	11%	-15%
Medical	220	220	230	230	5%	0%
Other	285	305	295	320	-3%	8%
<b>Investment</b>	<b>935</b>	<b>150</b>	<b>305</b>	<b>350</b>	<b>103%</b>	<b>15%</b>
Change in Bars, Coins	-5	50	525			
Change in ETF Holdings	905	215	-240			
Change in Stocks Held by Exchanges	35	-115	20			
<b>Total Demand</b>	<b>8,525</b>	<b>7,985</b>	<b>8,240</b>	<b>8,250</b>	<b>3%</b>	<b>0%</b>
<b>Balance</b>	<b>-690</b>	<b>-720</b>	<b>-335</b>	<b>-520</b>	<b>-53%</b>	<b>55%</b>
<b>Above Ground Stocks</b>	<b>4,140*</b>	<b>3,450</b>	<b>2,730</b>	<b>1,875</b>	<b>-12%</b>	<b>-22%</b>

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

# PLATINUM QUARTERLY Q2 2016

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

	Q1 2015	Q2 2015	Q3 2015	Q4 2015	Q1 2016	Q2 2016	Q2'16/Q2'15 Growth %	Q2'16/Q1'16 Growth %
<b>Platinum Supply-demand Balance (koz)</b>								
<b>SUPPLY</b>								
<b>Refined Production</b>	<b>1,355</b>	<b>1,540</b>	<b>1,650</b>	<b>1,610</b>	<b>1,240</b>	<b>1,615</b>	<b>5%</b>	<b>30%</b>
South Africa	935	1,125	1,210	1,190	770	1,175	4%	53%
Zimbabwe	95	80	115	110	135	105	31%	-22%
North America	100	100	90	100	100	105	5%	5%
Russia	180	190	190	160	190	180	-5%	-5%
Other	45	45	45	50	45	50	11%	11%
<b>Increase (-)/Decrease (+) in Producer Inventory</b>	<b>+60</b>	<b>-5</b>	<b>+30</b>	<b>-40</b>	<b>+150</b>	<b>+80</b>	<b>N/M</b>	<b>-47%</b>
<b>Total Mining Supply</b>	<b>1,415</b>	<b>1,535</b>	<b>1,680</b>	<b>1,570</b>	<b>1,390</b>	<b>1,695</b>	<b>10%</b>	<b>22%</b>
<b>Recycling</b>	<b>435</b>	<b>475</b>	<b>415</b>	<b>375</b>	<b>395</b>	<b>480</b>	<b>1%</b>	<b>22%</b>
Autocatalyst	315	310	295	270	280	340	10%	21%
Jewellery	120	165	120	105	115	140	-15%	22%
Industrial	0	0	0	0	0	0	0%	0%
<b>Total Supply</b>	<b>1,850</b>	<b>2,010</b>	<b>2,095</b>	<b>1,945</b>	<b>1,785</b>	<b>2,175</b>	<b>8%</b>	<b>22%</b>
<b>DEMAND</b>								
<b>Automotive</b>	<b>865</b>	<b>875</b>	<b>820</b>	<b>850</b>	<b>870</b>	<b>865</b>	<b>-1%</b>	<b>-1%</b>
Autocatalyst	825	835	785	815	835	830	-1%	-1%
Non-road	35	40	35	40	35	40	0%	14%
<b>Jewellery</b>	<b>750</b>	<b>670</b>	<b>795</b>	<b>675</b>	<b>600</b>	<b>620</b>	<b>-7%</b>	<b>3%</b>
<b>Industrial</b>	<b>395</b>	<b>400</b>	<b>430</b>	<b>420</b>	<b>400</b>	<b>410</b>	<b>3%</b>	<b>3%</b>
Chemical	160	140	160	125	145	145	4%	0%
Petroleum	40	40	40	40	35	35	-13%	0%
Electrical	45	40	45	45	45	35	-13%	-22%
Glass	30	40	70	65	45	50	25%	11%
Medical and Biomedical	50	65	45	65	55	65	0%	18%
Other	70	75	70	80	75	80	7%	7%
<b>Investment</b>	<b>-10</b>	<b>115</b>	<b>285</b>	<b>-95</b>	<b>155</b>	<b>90</b>	<b>-22%</b>	<b>-42%</b>
Change in Bars, Coins	45	75	180	220	140	110	47%	-21%
Change in ETF Holdings	-50	45	110	-345	-25	-15	N/M	-40%
Change in Stocks Held by Exchanges	-5	-5	-5	30	40	-5	0%	N/M
<b>Total Demand</b>	<b>2,000</b>	<b>2,060</b>	<b>2,330</b>	<b>1,850</b>	<b>2,025</b>	<b>1,985</b>	<b>-4%</b>	<b>-2%</b>
<b>Balance</b>	<b>-150</b>	<b>-50</b>	<b>-235</b>	<b>95</b>	<b>-240</b>	<b>190</b>		

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

# PLATINUM QUARTERLY Q2 2016

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

	H1 2015	H2 2015	H1 2016	H1'16/H1'15 Growth %	H1'16/H2'15 Growth %
<b>Platinum Supply-demand Balance (koz)</b>					
<b>SUPPLY</b>					
<b>Refined Production</b>	<b>2,895</b>	<b>3,260</b>	<b>2,855</b>	<b>-1%</b>	<b>-12%</b>
South Africa	2,060	2,400	1,945	-6%	-19%
Zimbabwe	175	225	240	37%	7%
North America	200	190	205	3%	8%
Russia	370	350	370	0%	6%
Other	90	95	95	6%	0%
<b>Increase (-)/Decrease (+) in Producer Inventory</b>	<b>+55</b>	<b>-10</b>	<b>+230</b>	<b>N/M</b>	<b>N/M</b>
<b>Total Mining Supply</b>	<b>2,950</b>	<b>3,215</b>	<b>3,085</b>	<b>5%</b>	<b>-4%</b>
<b>Recycling</b>	<b>910</b>	<b>790</b>	<b>875</b>	<b>-4%</b>	<b>11%</b>
Autocatalyst	625	565	620	-1%	10%
Jewellery	285	225	255	-11%	13%
Industrial	0	0	0	0%	0%
<b>Total Supply</b>	<b>3,860</b>	<b>4,040</b>	<b>3,960</b>	<b>3%</b>	<b>-2%</b>
<b>DEMAND</b>					
<b>Automotive</b>	<b>1,740</b>	<b>1,670</b>	<b>1,735</b>	<b>0%</b>	<b>4%</b>
Autocatalyst	1,660	1,600	1,665	0%	4%
Non-road	75	75	75	0%	0%
<b>Jewellery</b>	<b>1,420</b>	<b>1,470</b>	<b>1,220</b>	<b>-14%</b>	<b>-17%</b>
<b>Industrial</b>	<b>795</b>	<b>850</b>	<b>810</b>	<b>2%</b>	<b>-5%</b>
Chemical	300	285	290	-3%	2%
Petroleum	80	80	70	-13%	-13%
Electrical	85	90	80	-6%	-11%
Glass	70	135	95	36%	-30%
Medical and Biomedical	115	110	120	4%	9%
Other	145	150	155	7%	3%
<b>Investment</b>	<b>105</b>	<b>190</b>	<b>245</b>	<b>133%</b>	<b>29%</b>
Change in Bars, Coins	120	400	250	108%	-38%
Change in ETF Holdings	-5	-235	-40	N/M	-83%
Change in Stocks Held by Exchanges	-10	25	35	N/M	40%
<b>Total Demand</b>	<b>4,060</b>	<b>4,180</b>	<b>4,010</b>	<b>-1%</b>	<b>-4%</b>
<b>Balance</b>	<b>-200</b>	<b>-140</b>	<b>-50</b>		

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

# PLATINUM QUARTERLY Q2 2016

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

	2013	2014	2015	2016f	2016f/2015 Growth %	Q1 2015	Q2 2015	Q3 2015	Q4 2015	Q1 2016	Q2 2016
<b>Platinum gross demand (koz)</b>											
<b>Automotive</b>	<b>3,165</b>	<b>3,300</b>	<b>3,405</b>	<b>3,390</b>	<b>0%</b>	<b>865</b>	<b>875</b>	<b>820</b>	<b>850</b>	<b>870</b>	<b>865</b>
North America	430	465	475								
Western Europe	1,360	1,455	1,560								
Japan	580	590	565								
China	130	125	115								
India	160	160	170								
Rest of the World	505	505	520								
<b>Jewellery</b>	<b>2,945</b>	<b>3,000</b>	<b>2,880</b>	<b>2,885</b>	<b>0%</b>	<b>750</b>	<b>670</b>	<b>795</b>	<b>675</b>	<b>600</b>	<b>620</b>
North America	200	230	250								
Western Europe	220	220	235								
Japan	335	335	340								
China	1,990	1,975	1,765								
India	140	175	220								
Rest of the World	60	65	70								
<b>Chemical</b>	<b>530</b>	<b>575</b>	<b>595</b>	<b>600</b>	<b>1%</b>	<b>160</b>	<b>140</b>	<b>160</b>	<b>125</b>	<b>145</b>	<b>145</b>
North America	55	60	65								
Western Europe	105	110	105								
Japan	15	15	10								
China	195	220	240								
Rest of the World	160	170	175								
<b>Petroleum</b>	<b>115</b>	<b>65</b>	<b>160</b>	<b>145</b>	<b>-9%</b>	<b>40</b>	<b>40</b>	<b>40</b>	<b>40</b>	<b>35</b>	<b>35</b>
North America	40	25	-25								
Western Europe	-45	-15	70								
Japan	10	-35	5								
China	80	-5	45								
Rest of the World	30	95	65								
<b>Electrical</b>	<b>185</b>	<b>190</b>	<b>170</b>	<b>160</b>	<b>-6%</b>	<b>45</b>	<b>40</b>	<b>45</b>	<b>45</b>	<b>45</b>	<b>35</b>
North America	10	15	10								
Western Europe	5	10	10								
Japan	10	15	15								
China	75	70	60								
Rest of the World	85	80	75								
<b>Glass</b>	<b>145</b>	<b>180</b>	<b>200</b>	<b>170</b>	<b>-15%</b>	<b>30</b>	<b>40</b>	<b>70</b>	<b>65</b>	<b>45</b>	<b>50</b>
North America	5	10	0								
Western Europe	-10	15	10								
Japan	0	-20	-5								
China	90	85	95								
Rest of the World	60	90	100								
<b>Medical and Biomedical</b>	<b>220</b>	<b>220</b>	<b>230</b>	<b>230</b>	<b>0%</b>	<b>50</b>	<b>65</b>	<b>45</b>	<b>65</b>	<b>55</b>	<b>65</b>
North America	90	90	90								
Western Europe	75	75	75								
Japan	20	20	20								
China	15	15	20								
Rest of the World	20	20	25								
<b>Other industrial</b>	<b>285</b>	<b>305</b>	<b>295</b>	<b>320</b>	<b>8%</b>	<b>70</b>	<b>75</b>	<b>70</b>	<b>80</b>	<b>75</b>	<b>80</b>
<b>Investment</b>	<b>935</b>	<b>150</b>	<b>305</b>	<b>350</b>	<b>15%</b>	<b>-10</b>	<b>115</b>	<b>285</b>	<b>-95</b>	<b>155</b>	<b>90</b>
<b>Total Demand</b>	<b>8,525</b>	<b>7,985</b>	<b>8,240</b>	<b>8,250</b>	<b>0%</b>	<b>2,000</b>	<b>2,060</b>	<b>2,330</b>	<b>1,850</b>	<b>2,025</b>	<b>1,985</b>

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

## GLOSSARY OF TERMS

### Above ground stocks

The year-end estimate of the cumulative platinum holdings not associated with: exchange-traded funds, metal held by exchanges or working inventories of: mining producers, refiners, fabricators or end-users. Typically, unpublished vaulted metal holdings from which a supply-demand shortfall can be readily supplied or to which a supply-demand surplus can readily flow.

### BDH

Butane dehydrogenation; catalytic conversion of isobutane to isobutylene.

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

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

### Bharat Stage V/VI standards (BS-V, BS-VI)

Early in 2016 the Indian government announced the intention to 'leapfrog' Bharat Stage V and move directly to Bharat Stage VI, equivalent to Euro 6, in 2020.

### Conformity factor (CF)

The EU is to allow automakers to exceed current Euro 6 NO<sub>x</sub> limits, giving time to adapt to new real-world driving emissions rules. From September 2017 for new models and from September 2019 for new vehicles, a CF of up to 2.1 (110%) will be allowed over the 80 mg/km NO<sub>x</sub> limit. This CF will be phased out at the latest in 2021, then from January 2020 (new models) and January 2021 (new vehicles) a lower CF of 1.5 will be allowed, reflecting statistical and technical uncertainty of the tests.

### Diesel oxidation catalyst (DOC)

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

### Diesel particulate filter (DPF) and catalysed diesel particulate filter (CDPF)

A DPF physically filters particulates (soot) from diesel exhaust. A CDPF adds a PGM catalyst coating to facilitate oxidation and removal of the soot. The terms are often used interchangeably.

### Emissions legislation

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

### ETF

Exchange-traded fund. A security that tracks an index, commodity or basket of assets. Platinum ETFs included in demand are backed by physical metal.

### Euro V/VI emission standards

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

### Euro 5/6 emission standards

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

### Form factor

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

### GTL

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

### HDD

Hard disk drive.

### HDV

Heavy-duty vehicle.

### koz

Thousand ounces.

### LCD

Liquid-crystal display used for video display.

### LCV

Light commercial vehicle.

### Lean NO<sub>x</sub> traps (LNT)

Rhodium-based, catalyses the chemical reduction of NO<sub>x</sub> in diesel engine exhaust to harmless nitrogen.

### Metal-in-concentrate

PGMs contained in the concentrate produced after the crushing, milling and froth flotation processes in the concentrator. It is a measure of a mine's output before the smelting and refining stages.

### **moz**

Million ounces.

### **Net demand**

A measure of the theoretical requirement for new metal, i.e. net of recycling.

### **Non-road engines**

Non-road engines are diesel engines used, for example, in construction, agricultural and mining equipment, using engine and emissions technology similar to on-road heavy-duty diesel vehicles.

### **OECD**

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

### **oz**

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

### **Paraxylene**

A chemical produced from petroleum naphtha extracted from crude oil using a platinum catalyst. This is used in the production of terephthalic acid which is used to manufacture polyester.

### **PDH**

Propane dehydrogenation, where propane is converted to propylene.

### **PGMs**

Platinum-group metals.

### **Producer inventory**

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

### **Refined production**

Processed platinum output from refineries.

### **Secondary supply**

Recycling output.

### **Selective catalytic reduction (SCR)**

PGM-free, converts harmful NO<sub>x</sub> in diesel exhaust to harmless nitrogen, via a tank of urea solution. Used in heavy-duty diesel vehicles, increasingly competes with LNT in light-duty diesel vehicles.

### **SGE**

Shanghai Gold Exchange.

### **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.

### **WPIC**

The World Platinum Investment Council.

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### **Ounce conversion**

1 million ounces = 31.1 tonnes.

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