

Summary of Platinum SUPPLY & DEMAND IN 2014

SUMMARY: PLATINUM

- The deficit in the platinum market widened to a record 1.11 million oz in 2014, due to a five-month strike at major South African mines.
- Over 1.3 million oz of platinum production were lost, but South African supplies were supported by destocking by producers.
- Primary supplies fell by 12% to 5.13 million oz, while secondary recoveries grew more slowly than previously expected, rising 2% to 2.07 million oz.
- Auto demand rose by 7% to 3.35 million oz, its highest level since 2008, due to higher car output and tighter emissions limits in Europe.
- ETF purchasing fell sharply, while jewellery demand retreated from 2013's record level, but industrial consumption was strong.

The platinum market recorded its largest ever deficit in 2014, following a five-month strike at major South African mines that resulted in the loss of over 1.3 million oz of platinum production. Investment and jewellery demand fell from the previous year's exceptional levels, but sales of platinum to industrial and automotive consumers were buoyant. The largest gain came from the European diesel catalyst sector, on the back of a 5% increase in diesel vehicle output and the implementation of Euro 6 and Euro VI legislation on light and heavy duty vehicles respectively. Meanwhile, growth in the recovery of platinum from scrapped autocatalysts was relatively muted, leaving total secondary supplies little changed.

Primary supplies of platinum fell by 12% to 5.13 million oz in 2014, following prolonged industrial action at the western Bushveld operations of Anglo Platinum, Impala Platinum and Lonmin, which together account for around 40% of global platinum production capability. Ultimately, we estimate that over 1.3 million oz of platinum output was foregone during the five-month stoppage and the immediate post-strike period. However, producers were able to mitigate the impact on the market by selling metal from pre-existing stocks of refined metal, and by running down in-process inventories. Over the year as a whole, net destocking contributed around 430,000 oz to South African platinum supplies.

The affected mines resumed production in July, and were running at close to planned levels by the final quarter. In total, these operations produced just 1.2 million oz of platinum in 2014, less than half the previous year's total.

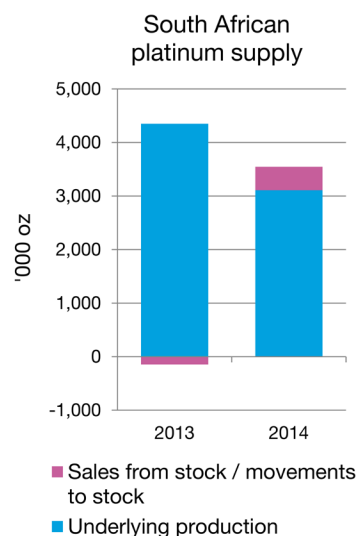
This decline was not entirely attributable to the strike. In the second half of 2013, Anglo Platinum rationalised its Rustenburg assets as well as closing some small shafts at its Union Mine, removing over 100,000 oz of annual production. During the last decade, there has been a steady erosion of capacity at the large western Bushveld mines owned and operated by the three major producers, mainly as a result of the depletion of shallower, higher grade ore reserves, and delays in the commissioning of replacement projects. At its peak, in 2005–2006, combined platinum output from these operations approached 4 million oz per annum; their productive capability is currently around 2.5 million oz.

Platinum Supply and Demand '000 oz			
Supply	2013	2014	2015
South Africa	4,205	3,546	4,237
Russia	725	715	696
Others	871	864	874
Total Supply	5,801	5,125	5,807
Gross Demand			
Autocatalyst	3,147	3,354	3,695
Jewellery	3,028	2,900	2,862
Industrial	1,652	1,784	1,836
Investment	871	272	-88
Total Gross Demand	8,698	8,310	8,305
Recycling	-2,029	-2,073	-2,213
Total Net Demand	6,669	6,237	6,092
Movements in Stocks	-868	-1,112	-285

Elsewhere in the industry, most mines reported positive operational results, and several matched or exceeded previous records. Anglo Platinum's Mogalakwena open pit had its best year ever, producing 365,000 oz of platinum; the Kroondal joint venture rivalled its 2010 peak of 250,000 oz; the Two Rivers mine extended a long series of year-on-year increases; and Northam's Booysendal project continued its successful ramp-up. There was also some additional pgm extraction from chrome ores, at Sylvania's Dump Operations and the Tharisa chrome mine. Overall, production from mines not directly affected by the strike rose by 4%, or just over 70,000 oz.



“ South African producers were able to mitigate the impact of the strike by selling around 430,000 oz of platinum from refined and in-process inventories. ”



“ Secondary supplies expanded only modestly, due to a decline in jewellery recycling volumes, and slower-than-expected growth in recoveries of platinum from scrapped vehicles. ”

The Zimbabwean platinum industry has a long history of steady increases in output, often in the face of difficult political, social and economic circumstances. Last year should have witnessed further gains, as Zimplats completed its latest expansion, intended to increase its platinum production capacity to around 270,000 oz annually. However, in July 2014, the company reported a deterioration of ground conditions at one of its four portals, known as the Bimha mine. Subsequent geological and technical evaluations suggested that the problem was more serious than initially thought, and all production at the mine was halted, removing around 90,000 oz of annual platinum output. However, the company was able to mitigate the impact of the shaft closure by reallocating mining teams to other areas, limiting the fall in production in 2014 to just 15,000 oz. This loss was partly offset by a small gain at the Mimosa joint venture, with the result that overall shipments from Zimbabwe fell by 9,000 oz, to 401,000 oz.

Supplies of platinum from North American mines rose by 6% to an estimated 336,000 oz, due to higher output from Stillwater, while shipments from Russian producers fell 2% to 715,000 oz. Although Norilsk saw some gains at its Russian operations, there was a decline in outturns from alluvial mining in the Far East of Russia. These placer deposits have been operated continuously since the mid-1980s, and in recent years there has been a sharp decline in grade, largely offset by an increase in the quantity of sands treated. However, in 2014 it appears that producers were unable to process sufficient volumes in order to maintain platinum output.

We have slightly reduced our estimates of Russian and Canadian supplies of platinum over the 2012 to 2014 period, to better account for flows of pgm-containing materials between different producers, refiners and regions. It should be noted that we count production in the region in which it is mined, not where it is refined.

Despite a 12% drop in primary platinum supplies, and the resulting price firmness during the first eight months of the year, secondary supplies expanded only modestly, up 2% to 2.07 million oz. This is significantly lower than our previous estimate, due to a decline in volumes of jewellery scrap, combined with slower-than-anticipated growth in the recycling of platinum from end-of-life vehicles.

In our previous report, we forecast that recycling of platinum from spent autocatalyst would increase by 17% in 2014, reflecting historic trends in automotive pgm demand between 2000 and 2005. During this period, platinum usage on European vehicles more than trebled, in line with significant growth in diesel's share of the passenger car market at a time when loadings were climbing steeply. In the event, the expected increase did not materialise: European and North American platinum recoveries rose at a lower rate than predicted, while the platinum content of Japanese scrap declined.

Analysis of pgm recoveries during 2014 suggests that spent catalyst refined last year contained less platinum, but more palladium, than we had previously expected. In addition, Japanese scrap volumes were affected by an increase in exports of end-of-life vehicles, primarily due to a weaker yen which made second-hand Japanese vehicles more affordable for overseas buyers. This particularly affected larger, older vehicles which are more likely to have highly-loaded platinum catalysts.

While autocatalyst recovery can exhibit short-term, price-driven fluctuations, we do not believe that lower prices in the final quarter of 2014 led to significant industry-wide stockpiling

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Platinum Demand: Autocatalyst '000 oz									
	Gross			Recycling			Net		
	2013	2014	2015	2013	2014	2015	2013	2014	2015
Europe	1,321	1,525	1,705	-457	-523	-664	864	1,002	1,041
Japan	558	543	530	-83	-62	-80	475	481	450
North America	345	369	412	-563	-571	-580	-218	-202	-168
China	130	137	181	-19	-25	-30	111	112	151
Rest of World	793	780	867	-93	-105	-111	700	675	756
Total	3,147	3,354	3,695	-1,215	-1,286	-1,465	1,932	2,068	2,230

of catalyst scrap, although it appears that some Japanese collectors have built modest inventories.

On the demand front, trends in automotive and industrial markets were broadly positive. Industrial consumption forged ahead by 8% to 1.78 million oz, on the back of record purchasing by chemical companies

and a recovery in the glass sector, while sales to automakers rose by just under 7% to 3.35 million oz, in response to growth in diesel vehicle production and tightening legislation.

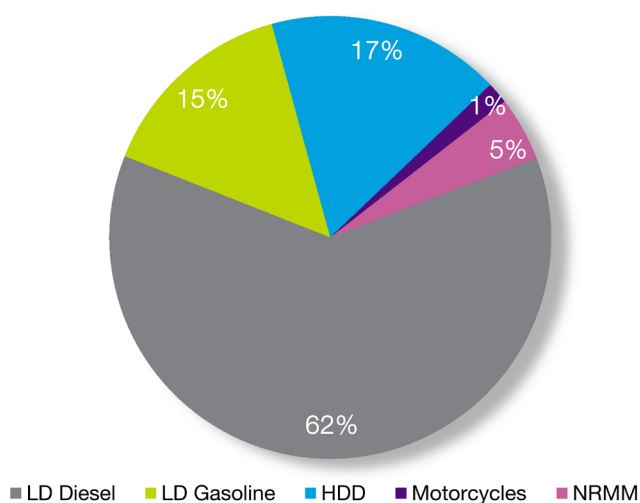
Indeed, automotive platinum demand was at its highest level since 2008, despite significant substitution of platinum with palladium on both diesel and gasoline vehicles over the intervening period. The use of platinum on diesel catalysts rose by 8%, with gains concentrated in Europe, where tighter legislation has driven up loadings on both cars and heavy duty trucks.

“The roll-out of new European emissions legislation resulted in higher platinum loadings on both diesel cars and heavy duty trucks.”

The roll-out of Euro 6 emissions legislation for diesel passenger cars began in September 2014, initially applying only to new models (it will be extended to all vehicles from September this year). Euro 6 diesels require NOx aftertreatment in order to meet the stricter limits: most smaller cars are fitted with a platinum-rich NOx trap, in addition to a diesel particulate filter (DPF), while larger vehicles typically use non-pgm selective catalytic reduction (SCR) technology downstream of a pgm-containing oxidation catalyst and DPF.

Although the new legislation applied to a minority of vehicles manufactured in 2014, there was an appreciable impact on average catalyst loadings. In addition, stricter NOx limits have triggered a modest reversal of recent trends towards an increased proportion of palladium in the diesel catalyst mix: in order to optimise NOx aftertreatment, it is necessary to control the NO to NO₂ ratio in the gas stream, and this favours the use of platinum.

Platinum demand by auto sector 2014



The impact of higher loadings was amplified by a recovery in vehicle sales. Despite a lacklustre economic performance across much of Europe, new car registrations began to rebound from the low point reached in 2012–2013, rising by 4% last year. Light duty production followed suit, up by 4.5%, with diesel vehicles taking the largest share of the gains. At 8.85 million units, European light duty diesel output was at its highest level since the start of the financial crisis in 2008.

In the heavy duty sector, Euro VI regulations have applied to all vehicles sold in Europe since January 2014. As a result, the majority of trucks manufactured in this region last year were fitted with platinum-rich catalysts, and average loadings almost doubled. Although fewer heavy duty vehicles were produced – a consequence of the pre-buying that occurred in 2013 ahead of the new legislation – platinum demand from the European truck sector rose by over 80%.



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“ The use of platinum to control emissions from non-road mobile machinery rose by over a third in 2014, due to stricter emissions limits in Europe, Japan and North America. ”

The North American light duty diesel sector was also buoyant in 2014, with production up 28% to 0.77 million units, accounting for a record 5.6% of light duty vehicle output. In the US, diesel-powered light duty trucks are often used for commercial purposes and are typically bigger than their European counterparts; since pgm demand is related to engine size, this means that catalyst loadings are relatively high. However, North American automakers have begun to offer a wider range of lighter diesel models, with the result that fleet average loadings declined in 2014 and platinum consumption increased at a slower rate than vehicle output.

In other regions, platinum demand for diesel catalysts was broadly flat: a fall in diesel car production in the large Indian and Thai markets was offset by modest growth in the heavy duty sector in Japan and Mexico, where the majority of trucks are fitted with platinum-containing catalysts.

In contrast, the use of platinum on gasoline cars fell by 6%, despite a 3% rise in global light duty production. Japanese automakers are the largest users of platinum in gasoline emissions control, but their domestic market has been affected by a shift towards smaller vehicles as well as greater adoption of palladium, with the result that platinum loadings fell last year.

The one bright spot in the gasoline segment was Europe, where the use of platinum on gasoline catalysts has seen a modest renaissance in the last three years. This is due to the fitment of heavily-loaded NOx traps to a small number of large gasoline direct injection (GDI) vehicles. The introduction of lean-burn gasoline vehicles in Europe is primarily a response to tightening limits on fleet average CO₂ emissions, which are especially challenging for manufacturers who sell larger vehicles or who have a lower proportion of diesel in their engine mix.

The use of platinum to control emissions from non-road diesel mobile machinery rose by over a third in 2014, as smaller engines begin to fall within the remit of European, Japanese and North American legislation. While thrifting is becoming more evident in this sector, to date it has been more than offset by increases in the number of engines requiring catalyst fitment. We include non-road demand in our autocatalyst numbers.

“ Industrial demand for platinum rose 8% to 1.78 million oz, with purchases by the chemicals sector at an all-time high. ”

In the industrial sector, demand for platinum has generally been positive, with total usage in the chemical, glass, electrical, petroleum and other applications rising by 8% to 1.78 million oz in 2014. However, this is a little lower than we anticipated in our previous report, mainly because we have adjusted our petroleum refining number downwards in order to account for sales of metal from refinery closures.

Purchases of platinum by chemical companies recorded another all-time high in 2014, reflecting continued investment in propane dehydrogenation (PDH) facilities. In recent years, the economics of this process have become attractive due to an abundant supply of propane, a natural gas liquid extracted from shale gas wells. However, the US market is now at risk of short-term propylene oversupply and, in view of the high cost of constructing new PDH facilities, some North American manufacturers have chosen to delay any further investment.

Consumption of platinum in electrical applications is dominated by the hard disk sector. World demand for data storage capacity is estimated to be expanding at 40% annually, but

“ Shipments of hard disk drives have been supported by growth in cloud computing, lifting demand for platinum from the electrical sector. ”

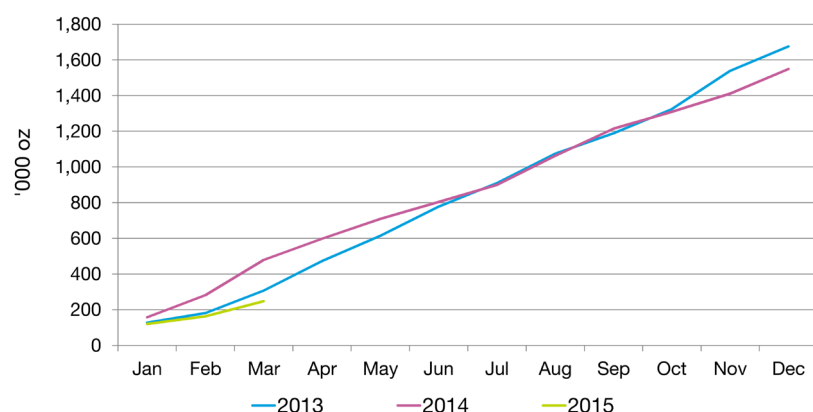
in recent years, hard disk drives (HDDs) have lost market share to tablets and phones fitted with solid state memory chips, which do not contain platinum. Nevertheless, shipments of HDDs have been supported by growth in the ‘enterprise’ sector, which comprises servers for business users and for cloud computing. These enterprise products typically contain more disks per drive than those used in personal computing, supporting a modest increase in both disk volumes and platinum usage.

Last year saw a recovery in net sales to glass makers, despite the sale of excess metal stocks back to the market following rationalisation in the display glass segment. Faced with high domestic energy costs and lower LCD prices on world markets, Japanese display glass producers have reduced capacity and transferred some of their production offshore. Nevertheless, despite excess capacity across the industry, Chinese manufacturers continue to build new display glass facilities, with the intention of capturing local market share. Chinese companies also played a key role in the fibreglass sector, continuing to invest in new capacity, both in their domestic market and in other Rest of World countries.

Demand for platinum in petroleum refining catalysts was stable in 2014. In the last few years, weak margins have triggered the closure of several refineries in Europe and North America: refineries located in OECD countries face competition from newer facilities in Asia and the Middle East, and European refiners in particular have been challenged by weak local gasoline demand due to the prolonged recession, growing use of diesel and biofuels, and improvements in fuel economy. Metal from these closures has been returned to the market, partly offsetting new sales of platinum for refinery expansions in China and the Rest of World.

Medical demand for platinum was flat in 2014, as modest underlying growth in procedures was offset by some substitution of platinum in dental alloys and to a much smaller extent in other medical products. The use of platinum in dental alloys has been eroded over the last several years by the wider adoption of ceramics, and some switching away from platinum-containing products in favour of base metal and palladium-rich alloys. There has also been some limited substitution of platinum with palladium in medical devices such as guidewires and catheters.

Estimated cumulative annual purchasing by the platinum jewellery industry in China (net)



The use of platinum in other applications expanded moderately in 2014. Much of the growth was generated by the continued expansion of the Chinese auto market, which has stimulated demand for pgm-containing components such as oxygen (lambda) sensors, which are fitted to all catalyst-equipped vehicles.

Global sales of platinum to jewellery manufacturers fell below 3 million oz, reflecting a larger than previously expected contraction in Chinese demand, from 2.10 million oz in 2013 to 1.94 million oz last year. It should be noted that 2013 was an unusually strong year for the Chinese jewellery industry generally: a correction in the gold

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Platinum Demand: Jewellery '000 oz									
	Gross			Recycling			Net		
	2013	2014	2015	2013	2014	2015	2013	2014	2015
Europe	219	211	215	-5	-5	-5	214	206	210
Japan	309	313	309	-282	-275	-270	27	38	39
North America	213	217	222	0	-21	0	213	196	222
China	2,100	1,935	1,840	-500	-455	-440	1,600	1,480	1,400
Rest of World	187	224	276	-3	-4	-4	184	220	272
Total	3,028	2,900	2,862	-790	-760	-719	2,238	2,140	2,143

price generated an increased retail footfall from opportunistic consumers seeking to acquire gold jewellery at lower prices, and this had a knock-on effect on platinum jewellery sales. In comparison, the gold jewellery market was comparatively subdued last year, reducing opportunities for retailers to 'upsell' platinum items.

“ Sales to jewellery makers fell below 3 million oz, as retail expansion in China slowed more sharply than expected in the second half of 2014. ”

We had previously anticipated that, in 2014, lower retail footfall would be offset by continuing growth in the number of retail outlets. However, it is now clear that retail expansion in China slowed more sharply than expected during the second half of 2014. Investment in new jewellery stores is primarily driven by the large gold market, which has been negatively affected by a slowdown in economic growth and by government anti-corruption measures which have hit sales of old bars and ornaments. Gold jewellery accounts for the bulk of inventory in most jewellery stores, but a new outlet might typically stock 2–6kg of platinum jewellery, depending on the size of the store and its location. Thus, a reduced rate of retail expansion was negative for platinum demand.

Our previous forecast also assumed that low prices during the final quarter of last year would have a positive impact on sales to Chinese jewellery makers: in the past, manufacturers have proven adept at buying into price dips in order to replenish stocks of metal that they can draw upon when prices move higher. However, while this strategy makes sense in a generally rising market, it is less attractive in a situation of prolonged price weakness, especially during a period of slower retail expansion. Thus, weakness in the platinum price during the final quarter of 2014 did not produce the expected uptick in purchasing, and overall, our research suggests that most manufacturers did not increase their platinum inventories in 2014.

Elsewhere, the developed jewellery markets of Japan, North America and Europe were broadly flat. However, purchases of platinum by Indian jewellery makers rose by 25%, with men's jewellery continuing to perform particularly well. Chain is a popular purchase for male jewellery buyers, and while unit volumes are relatively small, a chain typically contains significantly more platinum than a ring.

As forecast in our previous reports, physical investment played a much reduced role in determining market balance in 2014, with net inflows falling by 600,000 oz compared with the previous year, despite a modest return to positive territory for the Japanese large bar sector, which had been hit by dishoarding the previous year.

Net ETF purchases fell to 224,000 oz, down from an all-time high of 893,000 oz in 2013, when Absa introduced the first physically-backed South African fund. A second rand-denominated product was launched by Standard Bank in April 2014. Together, these funds saw steady accumulation of platinum, at a rate of over 50,000 oz a month, through the first half of 2014. Between July and December, total holdings in these two funds remained stable, even as dollar prices retreated.

“ The South African funds saw steady accumulation of platinum, but there was some disinvestment by ETF investors in other regions. ”



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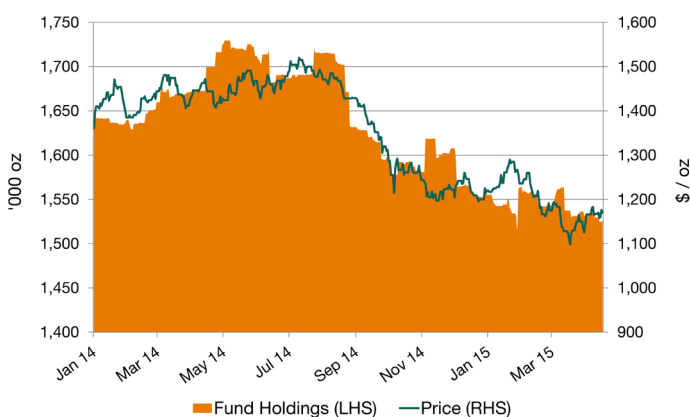
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“ The platinum market deficit reached 1.11 million oz, but market stocks were sufficient to meet this shortfall without any major impact on price. ”

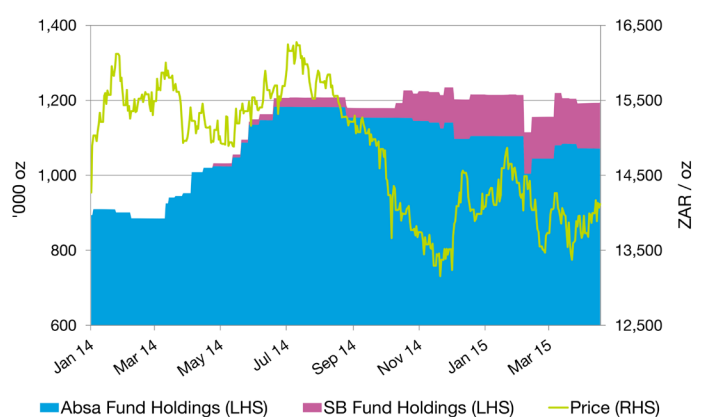
However, the behaviour of investors in the longer-established ETF funds, primarily in North America and Europe, was distinctly different. These investors added about 35,000 oz to net holdings during the first half of 2014, in the expectation that supply disruptions would lead to substantial price appreciation. When these gains failed to materialise, holdings were liquidated. This selling occurred both immediately ahead of, and during, the price reversal that took place in late August; steady but moderate disinvestment continued until the year end. In total, funds outside South Africa shed 132,000 oz during the second half of 2014, and a net 97,500 oz for the year as a whole. This relatively subdued reaction supports our view that investors in European and North American funds remain reluctant to liquidate their holdings while they are ‘out of the money’.

We now believe that the overall deficit in the platinum market reached 1.11 million oz in 2014, up from 868,000 oz the previous year. Market stocks were sufficient to meet this shortfall without any major impact on price. However, the prolonged disruption in South African production resulted in significant tightening in availability of platinum sponge, the form of metal produced by the South African mines and required by most automotive and industrial customers, and we believe that by the end of 2014 remaining market stocks were primarily in the form of ingot.

ETF holdings in non South African funds - platinum



ETF holdings in South African funds - platinum



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Forecast of Platinum SUPPLY & DEMAND IN 2015

FORECAST: PLATINUM

- Assuming no recurrence of prolonged labour disruption, South African supplies will recover strongly and could match or even exceed 2013 levels.
- Recoveries of platinum from end-of-life vehicles will rise strongly, due to increasing availability of highly-loaded diesel catalyst scrap.
- Gross demand for platinum will be flat, with significant growth in auto demand forecast to be offset by liquidation by ETF investors.
- Jewellery demand is predicted to fall marginally, as reduced purchasing by Chinese jewellers is offset by strong growth in the Indian platinum sector.

Assuming there is no recurrence of prolonged labour disruption, South African supplies will recover strongly in 2015. Production at the strike-affected mines returned to near-normal conditions more quickly than many observers had expected, and output in 2015 could match or even exceed that of two years ago, despite some shaft closures in the intervening period. Our forecast incorporates an allowance for modest levels of disruption due to labour, safety and technical factors, but assumes that there will be no widespread, concerted industrial action. On balance, we expect producers to ship 20% more platinum in 2015 than last year, representing nearly 700,000 oz of additional sales.

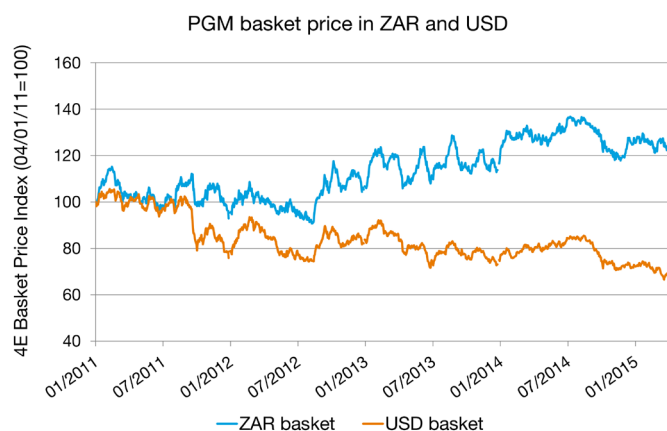
There are a number of uncertainties surrounding this outlook. Stock sales represent an important sensitivity: South African producers sold over 430,000 oz of metal from refined and in-process stocks in 2014, and any decision to replenish depleted inventories would reduce the amount of metal available for sale this year. The risk of electricity shortages appears to be higher now than at any time since 2008, and could result in platinum producers being required to reduce power to their smelters, or even to halt underground production if continuous electricity supply cannot be guaranteed. However, this is unlikely to have a large effect on production (the 2008 electricity crisis resulted in the loss of only around 60,000 oz of platinum output).

New owners are being sought for a number of mines. Anglo Platinum intends to sell its Union and Rustenburg mines, or to spin them off into a separate company, and at the time of writing was reviewing offers. In February 2015, Impala Platinum announced the results of its strategic review, including the proposed sale of its Marula mine on the eastern limb of the Bushveld complex. Aquarius Platinum's mothballed Blue Ridge mine is still for sale after a deal with a Chinese consortium fell through in October 2014, while it is widely rumoured that Glencore intends to exit its platinum business, which includes the Eland mine and a

50% stake in the Mototolo joint venture. Glencore has already announced its intention to divest its 24% stake in Lonmin by distributing its shareholding to its own shareholders.

Given the difficulty of making adequate returns at current platinum prices, it may prove difficult to find buyers for all these operations. Despite a short-lived, strike-induced excursion above \$1,500 in mid 2014, the dollar price of platinum retreated by 13% during the course of last year, falling to just over \$1,200 at the year end. The descent continued during the first quarter of 2015, with platinum ending March below \$1,130.

However, rand depreciation over the same period has provided some protection for the beleaguered South African industry,



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“ In Europe, recoveries of platinum from scrapped diesel vehicles are expected to rise strongly, but the potential for further growth in US platinum recycling is now limited. ”

while palladium price strength has also been helpful. The rand value of a typical pgm basket averaged R12,700 per oz in 2014, 10% higher than the previous year, compared with a 2% decline in the average dollar basket. Price weakness in the first quarter of 2015 has largely been balanced by rand depreciation, allowing the basket to remain around R12,500. Nevertheless, many operations continue to experience double-digit inflation in their mining costs, and in many cases, margins are not sufficient to support the investment required to maintain production in future.

Supplies from other regions will be broadly stable in 2015. In order to compensate for the loss of production due to the Bimha mine closure, Zimplats has reallocated mining assets to other shafts, and also intends to recommence open cast mining this year. Output from Russian alluvial operations is forecast to fall, but this should be offset by a modest increase in production from North American mines.

Recoveries of platinum from end-of-life vehicles are expected to rise strongly in 2015, primarily due to increasing availability of highly-loaded catalysts removed from scrapped European diesel vehicles. We also expect a rebound in Japanese scrap volumes, as rouble weakness hits exports of used Japanese cars to Russia.

Elsewhere, automotive recycling is predicted to grow at a more modest pace. Starting in the late 1990s, platinum's share of the US autocatalyst market began to falter as car makers adopted palladium catalysts, and this process intensified after 2007. For a period during the early 2000s, there were some notable year-to-year fluctuations in pgm ratios in autocatalyst, making it difficult to predict the precise year in which US platinum recoveries will peak. However, we believe that the potential for further growth is now limited.

Overall, we expect recycling of platinum from autocatalyst, jewellery and electrical scrap to rise by around 7%. This means that total availability of platinum, from combined primary and secondary sources, should exceed 8 million oz this year, up from 7.2 million oz in 2014.

In our November 2014 report we said that, in 2015, “regardless of growth in primary and secondary shipments, it is likely that the market will be in deficit once again”. It remains true that purchases of metal by industrial, automotive and jewellery consumers are on course to exceed combined supplies from miners and recyclers. However, it is now less certain that the market will remain in a significant deficit after taking investment flows into account.

“ Investment demand is a function of price, sentiment and the attractiveness of alternative products; all three factors are likely to favour disinvestment in platinum ETFs this year. ”

Investment demand is a function of price, investor sentiment, and the attractiveness of alternative investment products. All three factors are likely to favour disinvestment in platinum ETFs this year, but the extent of any selling is difficult to predict.

During the 2007–2014 period, ETF purchasing generally showed a positive correlation with rising price, while lower prices led to only muted selling; this behaviour led to the accumulation of platinum holdings totalling 2.77 million oz at the end of 2014. We continue to believe that large-scale selling of this metal is unlikely, primarily because at current prices a large proportion of ETF investment is ‘out of the money’. Nevertheless, there is a risk that should prices remain persistently low, some investors will seek to cut their losses and move their funds into alternative products. This risk has been exacerbated by the expectation that US interest rates will begin to rise this year, and by a deterioration of investor sentiment, caused by a combination of uncertainty over the outlook for the diesel vehicle and Chinese jewellery markets, and an orderly return to full production in South Africa.

“ Euro 6 emissions limits already apply to all new light duty models sold in Europe, and will be extended to all new registrations starting in September 2014. ”

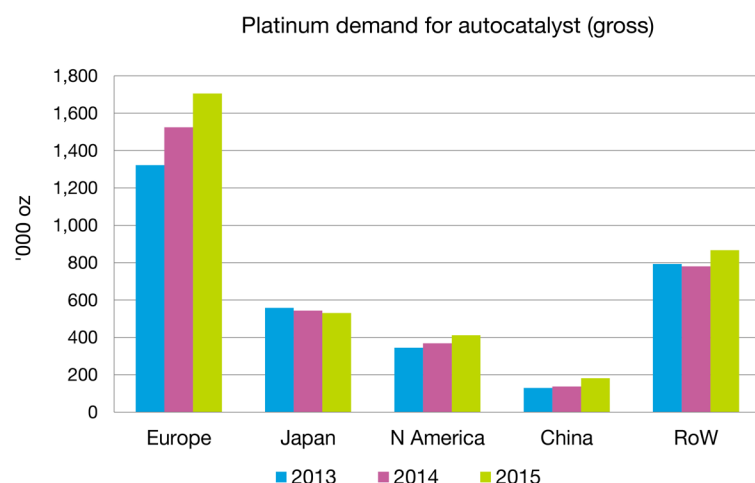
The first quarter of 2015 saw net disinvestment of over 45,000 oz, with selling by South African, European and US investors. Based on January to March data, we allow for net ETF disinvestment of a little over 100,000 oz during this calendar year, partly offset by modest demand for platinum in coins, and small net sales of large bars to Japanese investors.

Taking into account our expectations for ETFs, we now expect gross platinum demand to be flat in 2015. Disinvestment in ETFs will be offset by further increases in autocatalyst consumption, mainly due to stricter legislation in Europe, and gains in some industrial applications. Jewellery sales are forecast to be marginally down on last year, leaving total world demand for platinum unchanged at 8.31 million oz.

This year, European auto demand will receive a further boost from the phased introduction of Euro 6 legislation, although the full benefit will not be felt until 2016. The new limits currently apply to all new light duty diesel models sold in Europe, and will be extended to all new registrations starting in September. As a direct consequence of the new emissions limits, average platinum loadings on European diesel cars will rise by over 10% this year, and we expect further growth in 2016. These gains should be amplified by modest increases in light duty diesel production: output is expected to rise by 1.6% to 9 million units this year. Overall, we expect gross sales of platinum to the European auto sector to rise by 12% to 1.71 million oz, the highest level since 2008.

In recent months, there has been considerable speculation about the longer-term outlook for the European diesel market, following proposals to ban some diesel vehicles from the centre of Paris and to introduce an ultra-low emissions zone in London in order to reduce pollution from particulates and NOx in these cities. These restrictions will primarily affect older vehicles, sold under previous iterations of European emissions legislation when standards for diesel cars were less strict than those applied to gasoline vehicles. Current legislation is significantly tighter, and the limits imposed on diesel and gasoline engines are now almost identical.

Vehicle manufacturers also have to meet CO₂ limits, in the form of fleet average targets, and they face significant financial penalties for non-compliance. These standards are already challenging, and will become progressively more stringent over the next decade; fuel-efficient diesel cars play an essential role in automakers' strategies for meeting greenhouse gas limits. We therefore believe that diesel will remain an essential part of the vehicle mix in Europe.



With the exception of Japan, where light duty diesel output is forecast to decline by 9%, all other regions will see growth in autocatalyst platinum demand in 2015. Outside Europe, the largest gains will occur in China and the Rest of World. The Chinese government has responded to concerns about air quality by bringing forward the application of China 4 emissions limits for light duty diesels, and in consequence the majority of light diesel vehicles manufactured in China in 2015 will be fitted with platinum catalysts with higher loadings. This will result in appreciable demand from this sector for the first time. Meanwhile, demand in the Rest of World region will benefit

“ China now has surplus oil refining capacity and the government temporarily halted new project approvals, causing a drop in expected platinum demand from the petroleum sector.”

from a recovery in the Indian and Thai diesel car sectors, while output in Mexico is expected to grow strongly to meet buoyant demand for diesel vehicles in the North American market.

Industry forecasts suggest that last year's surge in consumer demand for light duty diesels in the USA will be repeated. North American output is slated to rise 15% to nearly 900,000 units, but loadings will be reduced by a combination of thrifting and changes in the fleet mix, thereby limiting the gains in platinum demand. As US automakers expand their range of smaller diesel vehicles, pgm loadings are gradually falling into line with those seen on European cars.

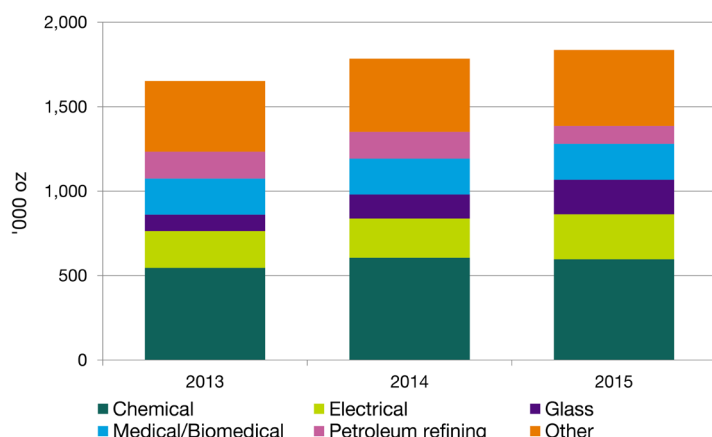
The outlook for industrial demand is for modest growth. We anticipate a further recovery in net consumption by the glass industry, following sales of surplus platinum back to the market in 2013–2014. In the electrical sector, purchases by hard disk manufacturers should grow steadily, while fuel cell demand is forecast to nearly double this year, albeit off a small base. These gains should offset a decline in sales to petroleum refiners. China now has surplus refining capacity and the Chinese government imposed a temporary suspension of new project approvals, causing a drop in expected demand in 2015. There will also be some further sales of metal from mothballed facilities in Europe and Australia.

Fuel cell demand has been stable in the 10–15,000 oz per annum range in recent years primarily due to demand from the large stationary power generation and residential CHP (combined heat and power) sectors. This year should see a notable increase in demand in most fuel cell applications, with the greatest gains occurring in the large stationary, uninterruptible power supply (UPS) and road transport applications.

Toyota launched its Mirai fuel cell car in late 2014, while Hyundai also offers a fuel cell SUV, and Honda and Daimler plan to launch their fuel cell vehicles in the 2016–2017 timeframe. While sales and demand remain small in absolute terms – Toyota expects to produce around 700 units this year and 2,000 in 2016 – this is the first time that commercial fuel cell models have been available for purchase by ordinary consumers.

The impact on platinum demand of the recent collapse in the oil price is not yet clear. Most major platinum-consuming nations are net oil importers, and a decline in the oil price should be broadly positive for economic growth in these countries. This will tend to support platinum demand, both in industrial applications and in jewellery.

Gross industrial demand for platinum



However, platinum usage in some industrial processes is sensitive to changes in raw material availability and costs. For example, if shale gas production were to decrease due to competition with cheap oil, this would reduce the supply of co-products such as propane, and could affect demand for platinum in propane dehydrogenation (PDH). Indeed, there are already some signs that North American PDH projects are being delayed, although this is primarily a reaction to forecasts of propylene oversupply, and the high risk and costs involved in plant construction. At present, the fall in the oil price does not appear to have had any direct impact on investment in new petrochemical facilities, but projects are likely to come under greater scrutiny and this could result in new plants being delayed or even shelved.

“In the Chinese jewellery sector, the buying behaviour of jewellery manufacturers has changed and we no longer expect to see significant purchasing into price weakness this year.”

In our previous report we observed that the prerequisites for underlying growth in Chinese jewellery demand remain in place, and this continues to be the case: platinum is sought-after by younger consumers with increasing disposable incomes, retail availability continues to improve, and both manufacturing and retail margins are higher for platinum than for gold. However, as we discussed on page 6, slower rates of retail expansion combined with a weak price environment have combined to alter the buying behaviour of jewellery manufacturers, and we no longer expect to see significant purchasing into price weakness this year.

In addition, platinum appears to have lost market share in non-bridal gem-set jewellery, where white gold has made inroads due to its fabrication characteristics, which make intricate designs possible, and its lower cost (white gold alloys typically contain 75% gold, versus a purity of at least 95% for platinum). However, this will have only a minor impact as this segment accounts for less than 10% of the overall market. More concerning is the possibility that a period of low platinum prices will affect retail purchasing patterns, since Chinese consumers are attracted to products that appreciate steadily in value. However, fears that the government anti-corruption drive would affect platinum demand appear to have been misplaced: unlike gold, platinum is not viewed primarily as an investment product or a store of value. Overall, we believe that Chinese jewellery demand may fall by around 5% this year.

In contrast, the Indian platinum jewellery sector is predicted to grow by nearly 30% in 2015, and is on course to become the third largest market behind China and Japan. A new industry marketing campaign focusing on the bridal sector was launched towards the end of last year, centred around the concept of parents giving their blessings to the couple in the form of a platinum jewellery set. This promotion does not aim to position platinum as a direct competitor with gold in the traditional wedding jewellery market, but to create additional demand.

Initial results were promising, with evidence of increased retail stocking in late 2014. The full impact of the new initiative will be felt this year and should provide a significant boost to demand: a jewellery set contains a combination of items such as necklace, bangles and earrings for the bride, and bracelet and chain for the groom, and typically weighs 25–60 grams, compared with an average weight of 5 grams for a bridal ring. Nevertheless, gains in India are unlikely to fully offset the decline in sales to Chinese jewellers, and gross world demand for jewellery is forecast to fall marginally.

Assuming that our expectations of lower jewellery sales and negative investment demand prove correct, we expect the market to move closer to balance in 2015, with the deficit falling to 285,000 oz. We believe that market stocks are adequate to meet this shortfall.



Summary of Palladium

SUPPLY & DEMAND IN 2014

SUMMARY: PALLADIUM

- Primary supplies of palladium fell by 4% to 6.1 million oz in 2014, due to lower shipments from strike-hit South African producers and the cessation of Russian stock sales.
- Recoveries of palladium from scrapped autocatalysts increased by 15%, offsetting lower returns of old palladium jewellery by Chinese consumers.
- Investment demand was revitalised by the launch in early 2014 of two South African ETFs, and reached a record 932,000 oz.
- Gross sales of palladium to automakers were at an all-time high, on the back of higher vehicle sales in Europe and China, and tightening standards in North America.

In contrast with platinum, the strike in South Africa had only a modest impact on global shipments of palladium, which fell 4% in 2014 (versus a 12% decline for platinum). This is primarily because much of the world's palladium is sourced from outside South Africa; the latter typically accounts for less than 40% of world palladium supplies compared with over 70% for platinum.

In addition, the impact of the stoppage on palladium was moderated by a strong performance from eastern and northern limb mines that were relatively unaffected by industrial action. These mines tend to exploit ores that contain higher palladium but lower platinum values. The Platreef is particularly rich in palladium, and Anglo's Mogalakwena mine – the only operation currently exploiting this orebody – enjoyed a record year. Overall, we estimate that underlying mine output of palladium in South Africa fell by 23%, compared with a 29% drop for platinum. Palladium shipments were further supported by the sale of approximately 200,000 oz of metal sourced from in-process and refined inventories.

Shipments of palladium from Norilsk Nickel's Russian operations rose by around 5% in 2014, slightly exceeding previous expectations. This gain was primarily due to the processing of work-in-progress materials during the second and third quarters. We do not believe that any sales of palladium from Russian state stocks occurred last year.

Last year also saw higher shipments by North America's two primary palladium producers. Stillwater reported a 6% increase in sales, to 421,000 oz, reflecting a strong performance from the East Boulder mine and some sales from stocks. At North American Palladium, output rose by nearly 30%, in line with the ramp-up of its new underground operation. Overall, North American supplies were up 8% at just under 900,000 oz.

This figure is lower than we predicted in our previous report. As we noted on page 2, we have reviewed our estimates of pgm production from Russian, Canadian and Rest of World nickel ores, in order to better account for flows of pgm-containing materials between different producers, refiners and regions. Our policy is to count production in the region in which it is mined, not where it is refined, in order to eliminate potential double-counting.

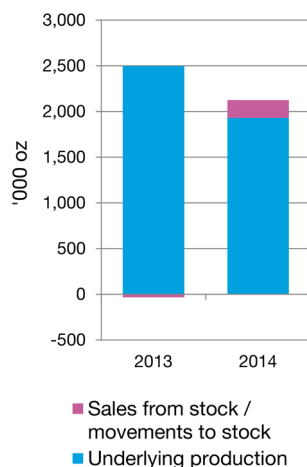
Palladium Supply and Demand '000 oz			
Supply	2013	2014	2015
South Africa	2,464	2,125	2,480
Russia	2,610	2,628	2,600
Others	1,300	1,351	1,323
Total Supply	6,374	6,104	6,403
Gross Demand			
Autocatalyst	6,958	7,351	7,457
Jewellery	355	279	245
Industrial	2,192	2,125	2,074
Investment	-8	932	-400
Total Gross Demand	9,497	10,687	9,376
Recycling	-2,525	-2,750	-2,873
Total Net demand	6,972	7,937	6,503
Movements in Stocks	-598	-1,833	-100

Shipments of palladium from Zimbabwe were little changed at 328,000 oz, despite the closure of Zimplats' Bimha mine. However, there was a decline in output in other regions, primarily due to lower output from the Tati Nickel mine in Botswana. It was announced in October 2014 that Norilsk Nickel had sold its African operations, comprising an 85% share in the Tati mine and 50% of the Nkomati Nickel operation in South Africa, to Botswana copper producer BCL Limited.

Global primary supplies of palladium totalled 6.1 million oz, while a further 2.75 million oz were recovered from automotive, jewellery and electronic



South African palladium supply



“ Average gasoline catalyst loadings in the USA are rising in response to consumer demand for cleaner vehicles, and an imminent tightening of emissions legislation. ”

scrap. Most of the expansion in secondary supplies came from the collection of increased quantities of palladium-rich catalyst scrap: automotive recoveries were up 15%. In contrast, returns of old palladium jewellery by Chinese consumers fell sharply.

The rise in autocatalyst recovery relates to changes in catalyst fitment strategies and the pgm mix that occurred between the mid-1990s and mid-2000s. This period saw an extraordinary expansion in the use of palladium, first on US and then on European gasoline vehicles, as platinum catalysts were replaced by more heavily-loaded palladium equivalents. Palladium catalyst technology was less advanced than it is today, so palladium loadings tended to be much higher than on modern cars, even though emissions limits were less stringent than now.

This dramatic shift to palladium did not occur in a steady fashion; dramatic price gains precipitated a temporary dip in palladium usage in the early 2000s. These year-to-year fluctuations make it challenging to predict pgm ratios in scrap from this period, and it appears that spent autocatalyst collected in 2014 contained more palladium (and less platinum) than we had previously anticipated. We now estimate that the recycling of end-of-life vehicles contributed nearly 2.2 million oz of palladium last year, up from 1.91 million oz in 2013.

The gain in secondary recoveries almost exactly offset the contraction in primary supplies, with the result that combined primary and secondary shipments were little changed at 8.85 million oz. This was significantly below the level of new demand, which surged by over 1 million oz to a new record of 10.7 million oz.

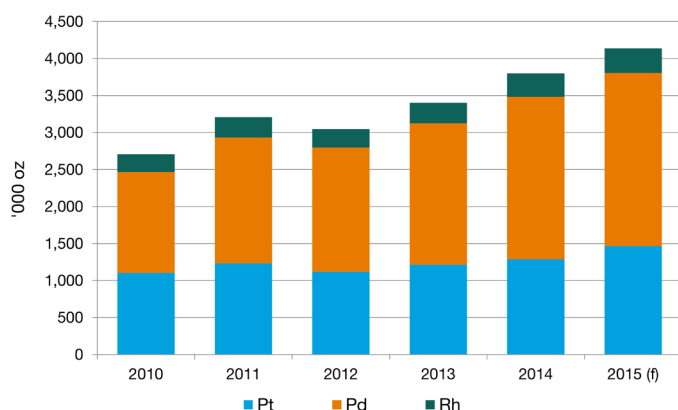
The gains in demand were overwhelmingly concentrated in two applications, autocatalyst and investment; palladium usage in other sectors was flat or down. Demand for palladium ETFs was revitalised by the launch of two new rand-denominated products by Absa and Standard Bank in March 2014. These new funds accumulated metal rapidly in the second quarter of 2014, with the total under management reaching 854,000 oz by the end of June; thereafter, investors added steadily to their holdings, which totalled nearly 1.23 million oz by the year end.

However, this activity was partly offset by some profit-taking in other regions, as investors took advantage of gains in the palladium price which, despite the retracement that began in August 2014, remained in positive territory for the year as a whole. In total, the established

ETF funds in North America and Europe shed over 280,000 oz last year, about three times the volume of platinum disinvestment: this reflects the greater potential for profit-taking in palladium. Overall, net palladium investment in 2014 totalled 932,000 oz, a very significant swing from the moderate net disinvestment of the previous year.

Sales of palladium to automakers rose by nearly 400,000 oz in 2014, reaching a new all-time peak of 7.35 million oz. Most of this gain was in the light duty gasoline sector, although the use of palladium on heavy duty diesel catalysts also saw growth, due to stricter emissions legislation on European trucks. In contrast, there was a marginal decline in palladium usage on light duty diesels, with Euro 6 legislation tending to favour a higher proportion of platinum in the catalyst mix.

Autocatalyst recovery by metal



PGM MARKET REPORT MAY 2015

Palladium Demand: Autocatalyst '000 oz									
	Gross			Recycling			Net		
	2013	2014	2015	2013	2014	2015	2013	2014	2015
Europe	1,490	1,580	1,552	-410	-471	-525	1,080	1,109	1,027
Japan	755	743	710	-129	-119	-126	626	624	584
North America	1,787	1,959	2,022	-1,149	-1,335	-1,360	638	624	662
China	1,499	1,639	1,722	-57	-82	-115	1,442	1,557	1,607
Rest of World	1,427	1,430	1,451	-165	-188	-214	1,262	1,242	1,237
Total	6,958	7,351	7,457	-1,910	-2,195	-2,340	5,048	5,156	5,117

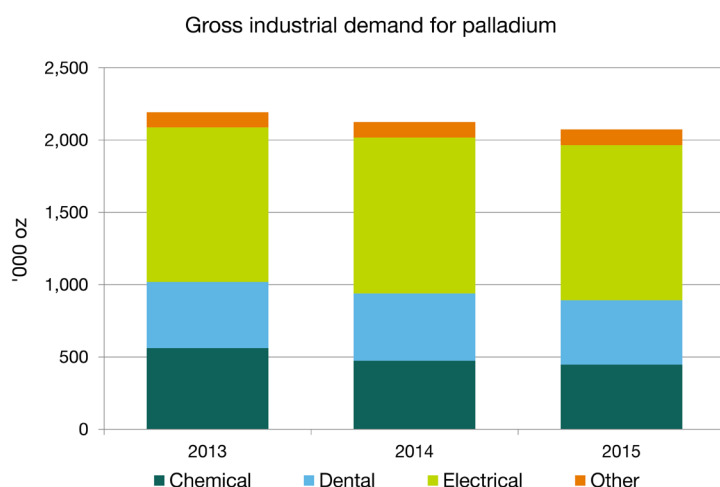
All three of the world's largest auto markets saw substantial growth in the sale of palladium to automakers. China added 140,000 oz of palladium demand, on the back of a 10% rise in gasoline vehicle output. In Europe, light duty gasoline production was up 4%, with the result that palladium usage rose by 90,000 oz.

“Exceptional levels of auto and investment demand pushed the palladium market to a record deficit of 1.83 million oz in 2014.”

However, the most important contributor to 2014's gains has been the North American market. While gasoline vehicle production in this region rose by less than 3%, average catalyst loadings are rising in response to consumer demand for cleaner vehicles, and an imminent tightening of emissions legislation. Californian LEV III emission standards (also adopted by other 'Green States') will be phased in from the 2015 model year, but some manufacturers have chosen to certify vehicles to LEV III standards ahead of this schedule. In 2014, US automakers increased their output of vehicles meeting ULEV (Ultra Low Emission Vehicle) standards, contributing to higher palladium loadings.

Stricter Corporate Average Fuel Economy (CAFE) requirements have also had a positive impact on palladium demand. Car companies are making increased use of turbo-charging, in order to permit engine-downsizing and improved fuel economy without sacrificing performance. While engine-downsizing is often negative for pgm demand, in this instance the overall effect has been positive. Emissions from turbo-charged engines can be more difficult to control, while the location of the catalyst is typically further downstream from the engine, meaning that the temperature of the gases entering the catalyst is lower. Both these factors can favour higher palladium loadings.

Palladium demand in other applications was comparatively subdued in 2014. Gross sales to jewellery makers fell again, as demand in China ebbed away to insignificant levels; however, lower recycling resulted in net jewellery demand being flat. Outside China, much palladium jewellery demand is generated by its use in white metal alloys: palladium is added to most platinum alloys in Japan, and is used as an alloying component of white gold alloys in most regions. The use of palladium as an alloying element was marginally down in 2014.



The chemical industry bought less palladium than in 2013, as continued strong sales of process catalysts to chemical companies in China and the Far East were partly offset by plant closures in Europe. However, palladium usage in dental and electrical applications stabilised; thrifting and substitution had a much smaller impact on these sectors than in recent years. Overall, demand for palladium in industrial applications declined by 3% to 2.13 million oz.

Despite modestly lower industrial usage, exceptional levels of auto and investment demand pushed the palladium market to a record deficit of 1.83 million oz in 2014. The consequence was a further drawdown of market stocks, the bulk of which date from the



Johnson Matthey
Precious Metals Management



PGM MARKET REPORT MAY 2015

1995 to 2010 period, when Russia exported much of its strategic stockpile and the market was consequently in persistent surplus. These stocks are almost exclusively in the form of ingot, whereas most automakers and industrial customers require sponge for their processes.

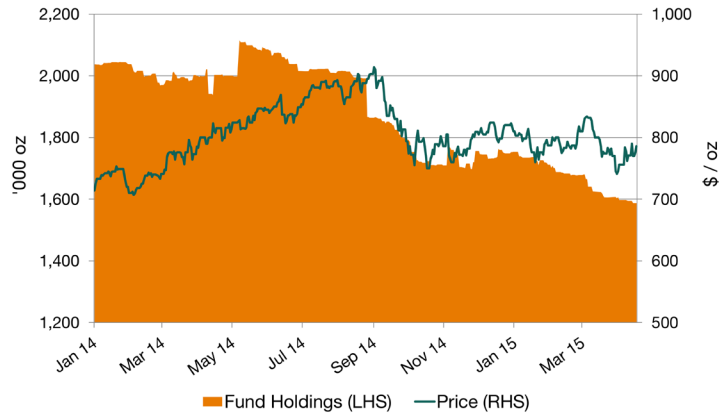
With shipments from South Africa severely disrupted due to industrial action, strong demand for sponge caused a serious imbalance in the market during 2014, and resulted in a sharp increase in the premium over ingot. In order to meet demand from their auto and industrial customers, fabricators and refiners converted several hundred thousand ounces of palladium ingot into sponge. This provides material evidence of the continuing transfer of market stocks into the hands of industrial consumers.



PGM MARKET REPORT MAY 2015

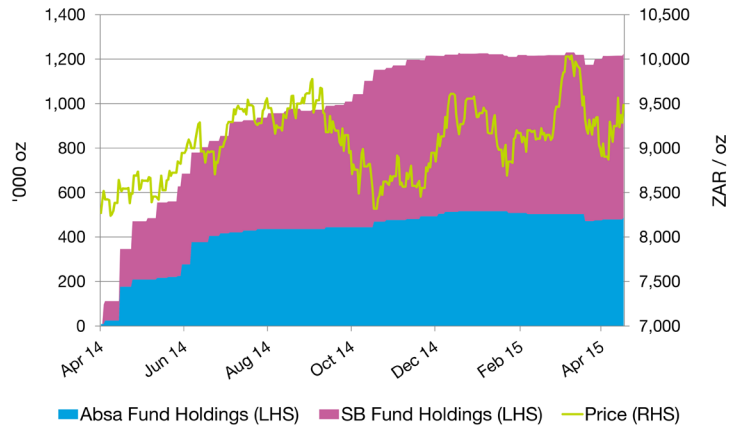
- Profit-taking in Europe and North America began just ahead of the price correction in August 2014, and was subsequently exacerbated by further sharp declines in the palladium price.

ETF holdings in non South African funds - palladium



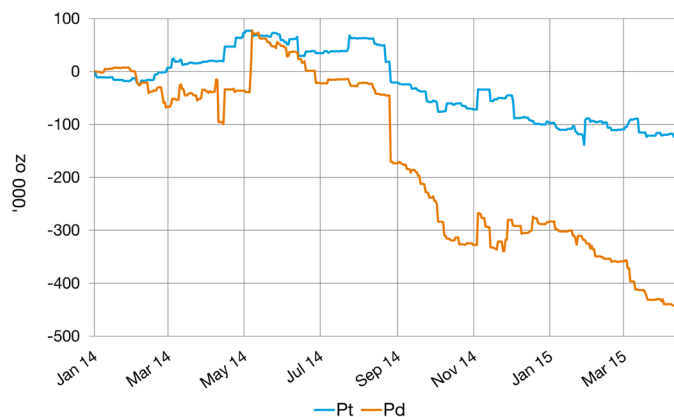
- Two new rand-denominated ETFs were launched by Absa and Standard Bank in early 2014 and by year end these funds held nearly 1.23 million oz of palladium. There was some disinvestment in the first quarter of 2015, but this was quickly reversed.

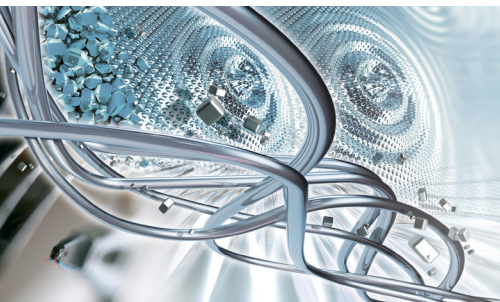
ETF holdings in South African funds - palladium



- The longer-established palladium ETFs in North America and Europe shed 280,000 oz in 2014, nearly three times the volume of platinum disinvestment in these regions, reflecting the greater potential for profit-taking in palladium. Further liquidation occurred in the first quarter of this year.

Net investment in non South African ETFs





PGM MARKET REPORT MAY 2015

Forecast of Palladium SUPPLY & DEMAND IN 2015

FORECAST: **PALLADIUM**

- Palladium shipments from South Africa should rebound strongly in 2015, but in the absence of Russian stock sales, total world supplies will remain below pre-2013 levels.
- Total demand is expected to fall significantly, as investment turns negative, reducing the market deficit to 100,000 oz.
- Growth in autocatalyst usage will slow this year, on the back of more moderate growth in China, and engine-downsizing in other gasoline markets.

Palladium production in South Africa is expected to rebound strongly in 2015; in the absence of major labour disruption, shipments should match or exceed those seen two years ago. However, total world supplies are likely to remain below the levels seen in the 1995–2012 period, when sales from Russian stocks supplemented primary output. We do not at present expect any further sales of palladium from government inventories.

In March 2015, Norilsk Nickel announced that Russia's Central Bank (which holds significant quantities of palladium acquired out of past surpluses) had agreed in principle to sell part of its stockpile to the company. Norilsk has stated that it and partner companies could invest up to \$2 billion in such a deal, which would involve up to 2.5 million oz. If such a transaction were to be concluded, this would simply represent a movement in above-ground stocks, and would not affect our assessment of the market balance.

The processing of jewellery, autocatalyst and electrical scrap will generate additional quantities of metal this year, although the rate of increase will be significantly lower than in 2014. Returns of old Chinese palladium jewellery are expected to fall sharply, while growth in the volume of electronics recycling will be largely offset by a gradual decline in the palladium content of scrapped devices. However, there will be further growth in the refining of highly-loaded gasoline catalyst scrap collected primarily from European and North American gasoline vehicles.

As we noted on page 14, the profile of autocatalyst palladium demand over the last 20 years makes it difficult to anticipate the pgm mix in scrap in any individual year. Since 2007, palladium demand has by and large followed the trajectory of gasoline vehicle sales, but in the preceding decade, average loadings showed significant variations between individual years. In 2014, palladium values in spent catalyst were higher, and platinum values lower, than we had predicted; in contrast, processors report that in the first quarter of 2015, pgm ratios in the material collected have been largely unchanged compared to last year. Our forecast therefore allows for palladium recoveries to grow less strongly this year than in 2014.

Lower pgm prices do appear to have motivated some collectors to withhold scrap during the early part of the year, but we do not take this into account in arriving at our annual forecast, because stock movements in the scrap industry tend to be a short-term phenomenon.

Demand is now almost certain to fall significantly this year. The first quarter of 2015 saw the liquidation of around 177,000 oz of ETF holdings; we believe perceptions of poorer prospects for palladium demand in China, where economic growth is slowing, have led some investors to reduce their exposure to palladium. This selling was concentrated in the more mature funds in Europe and North America, but there was some limited disinvestment in South Africa too; however, this was reversed in April.



Johnson Matthey
Precious Metals Management

“ Many European and US ETF investors who acquired metal before 2014 are still in a position to take profits; in these regions, further liquidation is likely this year. ”

European and US funds have existed since 2007 and 2010, respectively, and many investors who acquired metal before 2014 are still in a position to take profits; in these regions, further liquidation is likely to occur this year, and selling could intensify if US interest rates were to rise, or global economic growth prospects were to weaken. Despite recent declines in the dollar palladium price the majority of South African investors remain ‘in the money’ as a result of the sharp depreciation in the rand. We believe there is still scope for South African investors to add modestly to their holdings this year due to the relatively young nature of the funds.

For the year as a whole, we forecast that net disinvestment will total 400,000 oz: this implies a swing of over 1.3 million oz in investment demand between 2014 and 2015. It will bring the market much closer to balance, and indeed – should dishoarding ultimately be larger than we have forecast – could even push it into surplus.

Annual swings in investment demand in recent years have been so large that they have tended to obscure underlying market trends in consumption and availability. During the 2012–2014 period, palladium usage in the ‘consuming applications’ – automotive, industrial and jewellery – consistently exceeded the level of supplies from primary and secondary sources by at least half a million ounces per annum. This fundamental imbalance will remain unchanged in 2015.

“ Sales of palladium to automakers will reach a new all-time high of 7.46 million oz, but growth will be more modest than the rates enjoyed in recent years. ”

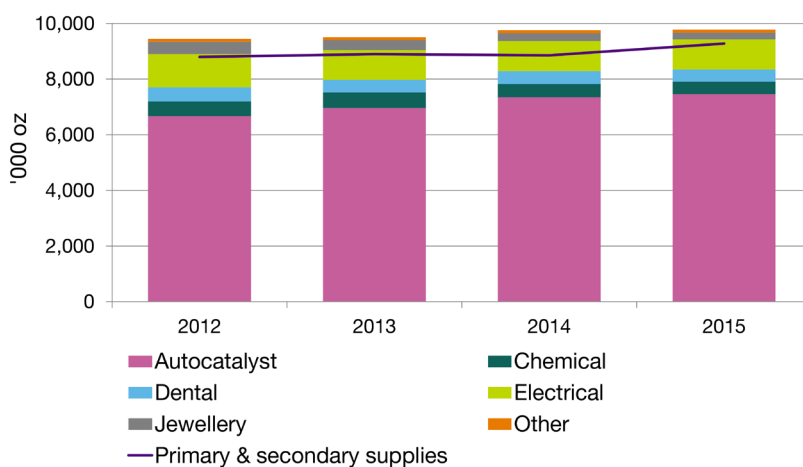
Excluding investment, palladium demand has expanded modestly but continuously over the period since 2012, with growth in automotive consumption offsetting moderate levels of substitution and thrifting in electronic and dental applications. Similar trends will be seen this year.

Sales of palladium to automakers will rise by over 100,000 oz, to a new all-time high of 7.46 million oz. However, growth will be rather more modest than the rates enjoyed in recent years. In the past decade, palladium’s share of total pgm demand in autocatalyst has expanded substantially, increasing steadily year-on-year from around 45% in 2005 to a peak of over 63% in 2013 and 2014. This was the result of a combination of factors: the

substitution of platinum with palladium on gasoline and, more recently, diesel catalysts; the spread of emissions legislation to rest of world countries which are primarily gasoline markets; and, since 2009, explosive growth in car output in China, where the great majority of vehicles are equipped with palladium-based catalysts.

However, in 2015, this share is expected to dip slightly, to 62%. This reflects slower growth in major gasoline markets, especially China, a slight trend to smaller engine sizes in some gasoline markets, and the introduction of Euro 6 emissions limits which tend to favour an increased platinum share in diesel catalysts. As a result, this year’s increase in demand will slightly lag the rate of growth in global light duty gasoline vehicle production.

**Palladium demand in consuming applications
(excluding investment)**



“ In the USA, Californian LEV III emissions standards are being phased in starting with the 2015 model year, and auto makers are increasing their output of ultra-low emission vehicles. ”

This will be especially true in Europe and Japan. While the European gasoline car sector should see steady growth in the 2–3% range, gains in palladium demand will be limited by a trend towards smaller average engine sizes. In addition, there will be a noticeable decrease in palladium usage on diesel cars this year. In Japan, the domestic market is struggling to recover from a hike in the consumption tax in April 2014, and this year we expect to see a decline in light duty gasoline output combined with a distinct shift in consumer preferences towards smaller vehicles.

In contrast, Chinese demand should increase in line with the predicted 5% growth in car output, while North American palladium demand will rise ahead of production. US output of light duty gasoline vehicles is expected to rise only marginally, but we expect a further increase in average palladium loadings as a result of tightening emissions standards. As discussed on page 15, Californian LEV III emissions standards are being phased in starting with the 2015 model year, and automakers are increasing their output of vehicles meeting ULEV standards.

Growth in autocatalyst demand will be partly offset by a modest retreat in industrial and jewellery applications. In total, we expect demand in ‘consuming applications’ – excluding investment – to total 9.78 million oz in 2015, a small gain compared with last year’s total of 9.76 million oz.



Summary of Rhodium

SUPPLY & DEMAND IN 2014

SUMMARY: RHODIUM

- Global mine supplies of rhodium fell by 11% to 617,000 oz, but this drop was partly offset by a 14% increase in recoveries from autocatalyst scrap.
- Gross demand for rhodium rose marginally to just over 1 million oz in 2014, exceeding total supplies by 70,000 oz.
- Purchases by automakers rose by over 6%, due to higher vehicle output in China and tightening emissions standards in the USA.
- Demand in non-autocatalyst applications fell sharply, due to much reduced sales of rhodium to ETF investors.

The rhodium market moved further into deficit in 2014, with supply falling short of demand by 70,000 oz. The loss of over five months of production from major western Bushveld mines resulted in an 11% drop in mine supplies of rhodium in 2014, but this was partly offset by growth in recoveries from automotive scrap; combined primary and secondary shipments fell by only 4%. New demand was unchanged at 1 million oz, as higher sales to automakers were balanced by lower investment purchasing.

Rhodium demand is dominated by its use in three-way catalysts fitted to light duty gasoline cars and motorcycles. The use of rhodium in this sector grew by 4% in 2014, slightly ahead of global growth in light duty production: in North America, the implementation of LEV III legislation and stricter corporate average fuel economy requirements has resulted in higher pgm loadings on some gasoline vehicles (see page 15 for further details). China, now the largest single market for rhodium in autocatalysts, saw demand rise by 10%, in line with gasoline car output.

Sales of rhodium to European automakers were up 20%, with the diesel sector generating measurable demand for rhodium for the first time. The implementation of Euro 6 emissions legislation began in September 2014; compared with stage 5 legislation, this imposes a further 55% reduction in NOx emissions from diesel cars. On smaller vehicles, this is generally achieved by the addition of a rhodium-containing lean NOx trap to the catalyst system.

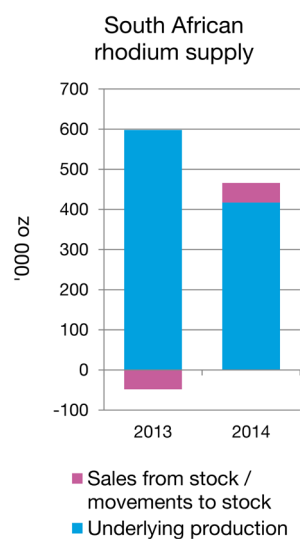
Combined demand for rhodium in non-autocatalyst applications contracted by 21% in 2014. While consumption in the metal's main industrial applications was broadly stable, net investment in Deutsche Bank's rhodium ETF shrank to just 5,000 oz, compared with 51,000 oz in 2013. This fund was launched in May 2011 and, after a spate of buying during 2012–2013, had accumulated 104,400 oz by the beginning of last year. There was further steady purchasing during the first eight months of 2014, and holdings peaked at over 130,000 oz in August. However, disinvestment in November and December brought the total under management down to just over 109,000 oz at the year end.

Global mine supplies of rhodium fell by 76,000 oz to 617,000 oz in 2014. Shipments from South Africa were hit by industrial action at major western Bushveld mines, but sales by Norilsk Nickel were up 9%, due to the processing of above-ground materials rich in rhodium.

The strike-affected mines produce mainly from the UG2 orebody, which has a higher rhodium content than other South African pgm ores. As a result, underlying mine output of rhodium fell by over 30% in 2014, versus declines of 29% for platinum and 23% for palladium. However, producers were able to supplement their shipments with rhodium sourced from in-process

Rhodium Supply and Demand '000 oz			
Supply	2013	2014	2015
South Africa	551	466	584
Russia	80	87	80
Others	62	64	62
Total Supply	693	617	726
Gross Demand			
Autocatalyst	786	837	851
Other	213	168	146
Total Gross Demand	999	1,005	997
Recycling	-278	-316	-333
Total Net Demand	721	689	664
Movements in Stocks	-28	-72	62





inventories and pre-existing stockpiles of refined metal, limiting the decline in South African supplies to 15%.

The fall in primary shipments was partly offset by growth in autocatalyst recycling, which rose by 14% to 316,000 oz. Overall, combined primary and secondary supplies fell short of demand by 70,000 oz. However, the impact on price was comparatively muted, with the rhodium price rising from \$1,000 at the start of 2014 to a peak of \$1,475 in August, before easing to \$1,245 at the year end. The market was in persistent surplus between 2008 and 2012, and we believe that considerable quantities of rhodium remain in the hands of speculators.



PGM MARKET REPORT MAY 2015

Forecast of Rhodium SUPPLY & DEMAND IN 2015

FORECAST: RHODIUM

- Sales of rhodium to automakers will be flat in 2015, with modest growth in global light duty gasoline output offset by a slight decline in rhodium loadings on catalysts.
- Investment demand is forecast to be zero: we assume that disinvestment will be balanced by new purchases.
- With supplies expected to rebound to 2013 levels, we forecast that the rhodium market will return to surplus this year.

Last year's deficit in the rhodium market was a direct result of a decline of 76,000 oz in primary supplies due to the South African strike. In our November 2014 report, we forecast that, assuming a return to normal output in South Africa, the rhodium market would move back into balance. However, the outlook for investment and automotive demand has deteriorated somewhat since the end of last year. We assume that net investment will be zero this year, while our forecast for auto demand has been adjusted to account for recent industry forecasts which show more moderate growth in gasoline vehicle output in China and the Rest of World this year. We now expect the rhodium market to return to surplus in 2015.

Global production of light duty gasoline vehicles is forecast to rise by 2% in 2015. However, we expect rhodium demand in this application to be flat, due to some minor thrifting in North America and to a lesser extent in other regions. In contrast, rhodium usage in the diesel sector will benefit from an increase in the number of vehicles fitted with NOx traps in order to meet Euro 6 emissions standards; this will result in a doubling of rhodium consumption on European diesel cars, albeit from a low base. Overall, auto demand is expected to rise by 2% to 851,000 oz.

Since 2012, growth in the consumption of rhodium in autocatalysts has been almost exactly matched by increases in recoveries from end-of-life vehicles. This will remain the case in 2015: we expect the processing of spent autocatalyst to generate 333,000 oz, up 5% on last year. Recoveries of palladium and rhodium increased strongly in 2014, reflecting increased collection of highly-loaded palladium-based catalysts from the early 2000s. However, processors report that the pgm mix in scrap collected so far this year has been broadly stable.

Combined demand in other applications is predicted to decline by 13% this year, following a 21% fall in 2014. We believe that the glass industry is well stocked with rhodium from recent plant closures, and that metal requirements for LCD glass manufacture will be partly satisfied from inventories this year. In the fibreglass sector, a period of alloy switching in favour of alloys with a higher rhodium content now appears to be over.

In the final two months of 2014, investors in the Deutsche Bank ETF sold over 20,000 oz of rhodium. Holdings have been stable during the first three months of 2015, and we assume that for the year as a whole, any disinvestment will be balanced by new purchases. Most of the metal held in the ETF was accumulated between mid-2012 and late 2013, a period during which prices were below current levels; it is therefore likely that the majority of investors are 'in the money'. However, so far this year prices have drifted lower and this may have reduced the incentive for investors to make further sales.

On the supply side, we now expect South African production to match 2013 levels, despite some rationalisation over the last eighteen months which has mostly affected UG2 shafts.



“ Since 2012, growth in the use of rhodium in autocatalysts has been almost exactly matched by increases in recoveries from end-of-life vehicles. ”

The negative impact of these shaft closures should be offset by a recovery in production at Anglo Platinum's Amandelbult Section (a large producer of UG2 ore), some additional production from newer shafts at Lonmin, a ramp-up at Northam's Booysendal mine, and growth in the recovery of minor pgm from chrome tailings.

In 2013, supplies of rhodium from South Africa were below the level of production: recognising the risk of impending industrial action, producers chose to build pgm inventories. These stocks were duly utilised in 2014, in order to minimise disruption to the market during the strike. We assume that inventory movements will be neutral this year and, if this is the case, we expect rhodium shipments to reach 584,000 oz – some 118,000 oz above last year, and 33,000 oz higher than in 2013. However, this figure could be reduced if producers choose to rebuild inventories depleted during the strike, or if disruption due to labour, technical and safety factors exceeds the allowance we have incorporated into our forecast.



PGM MARKET REPORT MAY 2015

PLATINUM '000 oz - Supply and Demand							
							Forecast
		2010	2011	2012	2013	2014	2015
Supply ¹	South Africa	4,635	4,860	4,110	4,205	3,546	4,237
	Russia ²	825	835	801	725	715	696
	North America	200	350	306	318	336	357
	Zimbabwe ³	280	340	337	410	401	397
	Others ³	110	100	126	143	127	120
Total Supply		6,050	6,485	5,680	5,801	5,125	5,807
Demand ⁴	Autocatalyst ⁴	3,075	3,185	3,158	3,147	3,354	3,695
	Chemical	440	470	452	546	606	597
	Electrical ⁴	230	230	176	218	232	266
	Glass	385	515	153	97	142	204
	Investment	655	460	450	871	272	-88
	Jewellery ⁴	2,420	2,475	2,783	3,028	2,900	2,862
	Medical and Biomedical ⁵	230	230	223	214	212	213
	Petroleum	170	210	112	159	159	106
	Other	300	320	395	418	433	450
Total Gross Demand		7,905	8,095	7,902	8,698	8,310	8,305
Recycling ⁶	Autocatalyst	-1,085	-1,240	-1,120	-1,215	-1,286	-1,465
	Electrical	-10	-10	-22	-24	-27	-29
	Jewellery	-735	-810	-895	-790	-760	-719
Total Recycling		-1,830	-2,060	-2,037	-2,029	-2,073	-2,213
Total Net Demand ⁷		6,075	6,035	5,865	6,669	6,237	6,092
Movement in Stocks ⁸		-25	450	-185	-868	-1,112	-285



PGM MARKET REPORT MAY 2015

PLATINUM '000 oz - Gross Demand by Region

							Forecast
		2010	2011	2012	2013	2014	2015
Europe	Autocatalyst	1,495	1,505	1,323	1,321	1,525	1,705
	Chemical	110	120	110	98	102	102
	Electrical	15	20	17	15	16	18
	Glass	10	30	2	6	10	10
	Investment	140	155	135	-40	-77	-75
	Jewellery	175	175	179	219	211	215
	Medical and Biomedical	90	90	78	72	70	69
	Petroleum	20	35	-3	-12	8	-7
	Other	100	95	115	117	117	118
Total		2,155	2,225	1,956	1,796	1,982	2,155
Japan	Autocatalyst	550	500	591	558	543	530
	Chemical	50	35	35	42	42	41
	Electrical	30	25	21	27	28	33
	Glass	90	130	-3	-20	-95	9
	Investment	45	250	98	-40	20	10
	Jewellery	325	310	312	309	313	309
	Medical and Biomedical	20	20	20	19	19	19
	Petroleum	5	5	3	-1	3	3
	Other	40	40	63	64	64	64
Total		1,155	1,315	1,140	958	937	1,018
N. America	Autocatalyst	405	370	395	345	369	412
	Chemical	100	95	106	102	114	120
	Electrical	25	25	21	19	19	23
	Glass	10	-5	7	7	12	12
	Investment	465	10	187	57	5	-35
	Jewellery	175	185	187	213	217	222
	Medical and Biomedical	90	90	89	85	84	85
	Petroleum	25	50	46	23	24	26
	Other	105	110	118	124	127	127
Total		1,400	930	1,156	975	971	992
China	Autocatalyst	100	105	93	130	137	181
	Chemical	80	100	89	146	123	131
	Electrical	30	30	31	36	38	41
	Glass	130	10	53	99	162	126
	Investment	0	0	0	0	0	0
	Jewellery	1,650	1,680	1,950	2,100	1,935	1,840
	Medical and Biomedical	10	10	15	17	17	17
	Petroleum	15	15	21	56	28	16
	Other	25	30	40	49	56	64
Total		2,040	1,980	2,292	2,633	2,496	2,416
RoW	Autocatalyst	525	705	756	793	780	867
	Chemical	100	120	112	158	225	203
	Electrical	130	130	86	121	131	151
	Glass	145	350	94	5	53	47
	Investment	5	45	30	894	324	12
	Jewellery	95	125	155	187	224	276
	Medical and Biomedical	20	20	21	21	22	23
	Petroleum	105	105	45	93	96	68
	Other	30	45	59	64	69	77
Total		1,155	1,645	1,358	2,336	1,924	1,724
Grand total		7,905	8,095	7,902	8,698	8,310	8,305



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PGM MARKET REPORT MAY 2015

PLATINUM Tonnes - Supply and Demand							
							Forecast
		2010	2011	2012	2013	2014	2015
Supply ¹	South Africa	144.2	151.2	127.8	130.8	110.3	131.8
	Russia ²	25.7	26.0	24.9	22.5	22.2	21.7
	North America	6.2	10.9	9.5	9.9	10.4	11.1
	Zimbabwe ³	8.7	10.6	10.5	12.8	12.5	12.3
	Others ³	3.4	3.1	3.9	4.4	4.0	3.7
Total Supply		188.2	201.7	176.6	180.4	159.4	180.6
Demand ⁴	Autocatalyst ⁴	95.6	99.1	98.2	97.9	104.4	114.9
	Chemical	13.7	14.6	14.1	16.9	18.8	18.6
	Electrical ⁴	7.2	7.2	5.5	6.8	7.3	8.3
	Glass	12.0	16.0	4.7	3.1	4.3	6.4
	Investment	20.4	14.3	13.9	27.2	8.5	-2.7
	Jewellery ⁴	75.3	77.0	86.6	94.1	90.2	89.0
	Medical and Biomedical ⁵	7.2	7.2	7.0	6.6	6.6	6.5
	Petroleum	5.3	6.5	3.5	4.9	4.9	3.3
	Other	9.3	10.0	12.3	13.0	13.5	14.1
Total Gross Demand		245.9	251.8	245.8	270.5	258.5	258.4
Recycling ⁶	Autocatalyst	-33.7	-38.6	-34.9	-37.8	-40.1	-45.6
	Electrical	-0.3	-0.3	-0.7	-0.7	-0.8	-0.9
	Jewellery	-22.9	-25.2	-27.9	-24.7	-23.6	-22.4
Total Recycling		-56.9	-64.1	-63.5	-63.2	-64.5	-68.9
Total Net Demand⁷		189.0	187.7	182.3	207.3	194.0	189.5
Movement in Stocks⁸		-0.8	14.0	-5.7	-26.9	-34.6	-8.9

PGM MARKET REPORT MAY 2015

PLATINUM Tonnes - Gross Demand by Region

							Forecast
		2010	2011	2012	2013	2014	2015
Europe	Autocatalyst	46.5	46.8	41.1	41.1	47.4	53.0
	Chemical	3.4	3.7	3.4	3.0	3.2	3.2
	Electrical	0.5	0.6	0.5	0.5	0.5	0.6
	Glass	0.3	0.9	0.1	0.2	0.3	0.3
	Investment	4.4	4.8	4.2	-1.2	-2.4	-2.3
	Jewellery	5.4	5.4	5.6	6.8	6.6	6.7
	Medical and Biomedical	2.8	2.8	2.4	2.2	2.2	2.1
	Petroleum	0.6	1.1	-0.1	-0.4	0.2	-0.2
	Other	3.1	3.0	3.6	3.6	3.6	3.7
Total		67.0	69.2	60.8	55.8	61.6	67.1
Japan	Autocatalyst	17.1	15.6	18.4	17.4	16.9	16.5
	Chemical	1.6	1.1	1.1	1.3	1.3	1.3
	Electrical	0.9	0.8	0.6	0.8	0.9	1.0
	Glass	2.8	4.0	-0.1	-0.6	-3.0	0.3
	Investment	1.4	7.8	3.0	-1.2	0.6	0.3
	Jewellery	10.1	9.6	9.7	9.6	9.7	9.6
	Medical and Biomedical	0.6	0.6	0.6	0.6	0.6	0.6
	Petroleum	0.2	0.2	0.1	0.0	0.1	0.1
	Other	1.2	1.2	2.0	2.0	2.0	2.0
Total		35.9	40.9	35.4	29.9	29.1	31.7
N. America	Autocatalyst	12.6	11.5	12.3	10.7	11.5	12.8
	Chemical	3.1	3.0	3.3	3.2	3.5	3.7
	Electrical	0.8	0.8	0.7	0.6	0.6	0.7
	Glass	0.3	-0.2	0.2	0.2	0.4	0.4
	Investment	14.5	0.3	5.8	1.8	0.2	-1.1
	Jewellery	5.4	5.8	5.8	6.6	6.7	6.9
	Medical and Biomedical	2.8	2.8	2.8	2.6	2.6	2.6
	Petroleum	0.8	1.6	1.4	0.7	0.7	0.8
	Other	3.3	3.4	3.7	3.9	4.0	4.0
Total		43.5	28.9	36.0	30.3	30.2	30.8
China	Autocatalyst	3.1	3.3	2.9	4.0	4.3	5.6
	Chemical	2.5	3.1	2.8	4.5	3.8	4.1
	Electrical	0.9	0.9	1.0	1.1	1.2	1.3
	Glass	4.0	0.3	1.6	3.1	5.0	3.9
	Investment	0.0	0.0	0.0	0.0	0.0	0.0
	Jewellery	51.3	52.3	60.7	65.3	60.2	57.2
	Medical and Biomedical	0.3	0.3	0.5	0.5	0.5	0.5
	Petroleum	0.5	0.5	0.7	1.7	0.9	0.5
	Other	0.8	0.9	1.2	1.5	1.7	2.0
Total		63.5	61.6	71.4	81.7	77.6	75.1
RoW	Autocatalyst	16.3	21.9	23.5	24.7	24.3	27.0
	Chemical	3.1	3.7	3.5	4.9	7.0	6.3
	Electrical	4.0	4.0	2.7	3.8	4.1	4.7
	Glass	4.5	10.9	2.9	0.2	1.6	1.5
	Investment	0.2	1.4	0.9	27.8	10.1	0.4
	Jewellery	3.0	3.9	4.8	5.8	7.0	8.6
	Medical and Biomedical	0.6	0.6	0.7	0.7	0.7	0.7
	Petroleum	3.3	3.3	1.4	2.9	3.0	2.1
	Other	0.9	1.4	1.8	2.0	2.2	2.4
Total		35.9	51.2	42.2	72.8	60.0	53.7
Grand total		245.9	251.8	245.8	270.5	258.5	258.4



PGM MARKET REPORT MAY 2015

PALLADIUM '000 oz - Supply and Demand							
							Forecast
		2010	2011	2012	2013	2014	2015
Supply ¹	South Africa	2,640	2,560	2,359	2,464	2,125	2,480
	Russia: Primary ²	2,720	2,705	2,627	2,510	2,628	2,600
	Russia: Stock Sales ²	1,000	775	260	100	0	0
	North America	590	900	811	829	898	900
	Zimbabwe ³	220	265	266	323	328	316
	Others ³	185	155	162	148	125	107
	Total Supply	7,355	7,360	6,485	6,374	6,104	6,403
Demand ⁴	Autocatalyst ⁴	5,580	6,155	6,673	6,958	7,351	7,457
	Chemical	370	440	524	561	474	448
	Dental	595	540	510	457	466	445
	Electrical ⁴	1,410	1,375	1,190	1,070	1,078	1,072
	Investment	1,095	-565	467	-8	932	-400
	Jewellery ⁴	595	505	442	355	279	245
	Other	90	110	104	104	107	109
Total Gross Demand		9,735	8,560	9,910	9,497	10,687	9,376
Recycling ⁶	Autocatalyst	-1,310	-1,695	-1,675	-1,910	-2,195	-2,340
	Electrical	-440	-480	-443	-458	-466	-472
	Jewellery	-100	-210	-194	-157	-89	-61
Total Recycling		-1,850	-2,385	-2,312	-2,525	-2,750	-2,873
Total Net Demand⁷		7,885	6,175	7,598	6,972	7,937	6,503
Movement in Stocks⁸		-530	1,185	-1,113	-598	-1,833	-100



PGM MARKET REPORT MAY 2015

PALLADIUM '000 oz - Gross Demand by Region

							Forecast
		2010	2011	2012	2013	2014	2015
Europe	Autocatalyst	1,330	1,485	1,427	1,490	1,580	1,552
	Chemical	105	80	79	76	-15	83
	Dental	80	80	81	80	77	68
	Electrical	195	190	151	119	113	111
	Investment	-5	-35	163	-14	-76	-270
	Jewellery	65	60	64	61	66	67
	Other	30	25	24	24	25	25
	Total	1,800	1,885	1,989	1,836	1,770	1,636
Japan	Autocatalyst	820	680	799	755	743	710
	Chemical	20	20	17	18	18	17
	Dental	250	220	220	184	203	199
	Electrical	295	300	320	245	243	241
	Investment	10	5	0	-4	-2	0
	Jewellery	75	70	70	70	67	65
	Other	10	10	9	9	9	9
	Total	1,480	1,305	1,435	1,277	1,281	1,241
N. America	Autocatalyst	1,355	1,545	1,803	1,787	1,959	2,022
	Chemical	65	80	87	70	74	83
	Dental	250	225	190	168	160	152
	Electrical	160	145	163	159	157	155
	Investment	1,090	-535	304	10	-214	-160
	Jewellery	65	45	44	44	44	44
	Other	25	45	39	38	39	40
	Total	3,010	1,550	2,630	2,276	2,219	2,336
China	Autocatalyst	1,005	1,155	1,325	1,499	1,639	1,722
	Chemical	65	145	213	262	261	149
	Dental	0	0	3	8	8	8
	Electrical	360	270	176	168	188	190
	Investment	0	0	0	0	0	0
	Jewellery	360	305	238	155	78	46
	Other	10	10	14	15	16	17
	Total	1,800	1,885	1,969	2,107	2,190	2,132
RoW	Autocatalyst	1,070	1,290	1,319	1,427	1,430	1,451
	Chemical	115	115	128	135	136	116
	Dental	15	15	16	17	18	18
	Electrical	400	470	380	379	377	375
	Investment	0	0	0	0	1,224	30
	Jewellery	30	25	26	25	24	23
	Other	15	20	18	18	18	18
	Total	1,645	1,935	1,887	2,001	3,227	2,031
Grand total		9,735	8,560	9,910	9,497	10,687	9,376



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PGM MARKET REPORT MAY 2015

PALLADIUM Tonnes - Supply and Demand							
							Forecast
		2010	2011	2012	2013	2014	2015
Supply ¹	South Africa	82.1	79.6	73.4	76.6	66.1	77.1
	Russia: Primary ²	84.6	84.1	81.7	78.1	81.7	80.9
	Russia: Stock Sales ²	31.1	24.1	8.1	3.1	0.0	0.0
	North America	18.4	28.0	25.2	25.8	27.9	28.0
	Zimbabwe ³	6.8	8.2	8.3	10.0	10.2	9.8
	Others ³	5.8	4.8	5.0	4.6	3.9	3.3
Total Supply		228.8	228.9	201.7	198.2	189.8	199.1
Demand ⁴	Autocatalyst ⁴	173.6	191.4	207.5	216.4	228.6	232.0
	Chemical	11.5	13.7	16.3	17.5	14.7	13.9
	Dental	18.5	16.8	15.8	14.1	14.5	13.8
	Electrical ⁴	43.9	42.8	37.1	33.2	33.5	33.4
	Investment	34.1	-17.6	14.6	-0.2	28.9	-12.5
	Jewellery ⁴	18.5	15.7	13.8	11.1	8.7	7.6
	Other	2.8	3.4	3.2	3.3	3.4	3.4
Total Gross Demand		302.8	266.2	308.3	295.4	332.3	291.6
Recycling ⁶	Autocatalyst	-40.7	-52.7	-52.2	-59.4	-68.3	-72.8
	Electrical	-13.7	-14.9	-13.7	-14.3	-14.4	-14.7
	Jewellery	-3.1	-6.5	-6.0	-4.9	-2.8	-1.9
Total Recycling		-57.5	-74.2	-71.9	-78.6	-85.5	-89.4
Total Net Demand⁷		245.3	192.1	236.4	216.8	246.8	202.2
Movement in Stocks⁸		-16.5	36.9	-34.7	-18.6	-57.0	-3.1



PGM MARKET REPORT MAY 2015

PALLADIUM Tonnes - Gross Demand by Region

							Forecast
		2010	2011	2012	2013	2014	2015
Europe	Autocatalyst	41.4	46.2	44.4	46.3	49.1	48.3
	Chemical	3.3	2.5	2.5	2.4	-0.5	2.6
	Dental	2.5	2.5	2.5	2.5	2.4	2.1
	Electrical	6.1	5.9	4.7	3.7	3.5	3.5
	Investment	-0.2	-1.1	5.1	-0.4	-2.4	-8.4
	Jewellery	2.0	1.9	2.0	1.9	2.1	2.1
	Other	0.9	0.8	0.7	0.7	0.8	0.8
	Total	56.0	58.6	61.9	57.1	55.0	51.0
Japan	Autocatalyst	25.5	21.2	24.8	23.5	23.1	22.1
	Chemical	0.6	0.6	0.5	0.6	0.6	0.5
	Dental	7.8	6.8	6.8	5.7	6.3	6.2
	Electrical	9.2	9.3	10.0	7.6	7.6	7.5
	Investment	0.3	0.2	0.0	-0.1	-0.1	0.0
	Jewellery	2.3	2.2	2.2	2.2	2.1	2.0
	Other	0.3	0.3	0.3	0.3	0.3	0.3
	Total	46.0	40.6	44.6	39.8	39.9	38.6
N. America	Autocatalyst	42.1	48.1	56.1	55.6	60.9	62.9
	Chemical	2.0	2.5	2.7	2.2	2.3	2.6
	Dental	7.8	7.0	5.9	5.2	5.0	4.7
	Electrical	5.0	4.5	5.1	4.9	4.9	4.8
	Investment	33.9	-16.6	9.5	0.3	-6.7	-5.0
	Jewellery	2.0	1.4	1.4	1.4	1.4	1.4
	Other	0.8	1.4	1.2	1.2	1.2	1.2
	Total	93.6	48.2	81.9	70.8	69.0	72.6
China	Autocatalyst	31.3	35.9	41.2	46.6	51.0	53.6
	Chemical	2.0	4.5	6.6	8.1	8.1	4.6
	Dental	0.0	0.0	0.1	0.2	0.2	0.2
	Electrical	11.2	8.4	5.5	5.2	5.8	5.9
	Investment	0.0	0.0	0.0	0.0	0.0	0.0
	Jewellery	11.2	9.5	7.4	4.8	2.4	1.4
	Other	0.3	0.3	0.4	0.5	0.5	0.5
	Total	56.0	58.6	61.2	65.4	68.0	66.2
RoW	Autocatalyst	33.3	40.1	41.0	44.4	44.5	45.1
	Chemical	3.6	3.6	4.0	4.2	4.2	3.6
	Dental	0.5	0.5	0.5	0.5	0.6	0.6
	Electrical	12.4	14.6	11.8	11.8	11.7	11.7
	Investment	0.0	0.0	0.0	0.0	38.1	0.9
	Jewellery	0.9	0.8	0.8	0.8	0.7	0.7
	Other	0.5	0.6	0.6	0.6	0.6	0.6
	Total	51.2	60.2	58.7	62.3	100.4	63.2
Grand total		302.8	266.2	308.3	295.4	332.3	291.6



PGM MARKET REPORT MAY 2015

RHODIUM '000 oz - Supply and Demand							
							Forecast
		2010	2011	2012	2013	2014	2015
Supply ¹	South Africa	632	641	577	551	466	584
	Russia ²	70	70	90	80	87	80
	North America	10	23	22	23	24	25
	Zimbabwe ³	19	29	28	36	36	34
	Others ³	3	2	3	3	4	3
	Total Supply	734	765	720	693	617	726
Demand ⁴	Autocatalyst ⁴	727	715	775	786	837	851
	Chemical	67	72	80	83	82	79
	Electrical	4	6	6	5	5	5
	Glass	68	77	35	47	47	38
	Other	21	38	63	78	34	24
	Total Gross Demand	887	908	959	999	1,005	997
Recycling ⁶	Autocatalyst	-241	-277	-252	-278	-316	-333
	Total Recycling	-241	-277	-252	-278	-316	-333
	Total Net Demand⁷	646	631	707	721	689	664
	Movement in Stocks⁸	88	134	13	-28	-72	62



PGM MARKET REPORT MAY 2015

RHODIUM Tonnes - Supply and Demand							
							Forecast
		2010	2011	2012	2013	2014	2015
Supply¹	South Africa	20.6	19.7	17.9	17.1	14.5	18.2
	Russia ²	2.2	2.2	2.8	2.5	2.7	2.5
	North America	0.5	0.3	0.7	0.7	0.7	0.8
	Zimbabwe ³	0.6	0.6	0.9	1.1	1.1	1.1
	Others ³	0.1	0.1	0.1	0.1	0.1	0.1
	Total Supply	23.9	22.8	22.4	21.5	19.1	22.7
Demand⁴	Autocatalyst ⁴	19.3	22.6	24.1	24.4	26.0	26.5
	Chemical	1.7	2.1	2.5	2.6	2.6	2.5
	Electrical	0.1	0.1	0.2	0.1	0.1	0.1
	Glass	0.6	2.1	1.0	1.5	1.5	1.2
	Other	0.7	0.7	2.0	2.5	1.0	0.7
	Total Gross Demand	22.3	27.6	29.8	31.1	31.2	31.0
Recycling⁶	Autocatalyst	-5.8	-7.5	-7.8	-8.7	-9.8	-10.3
	Total Recycling	-5.8	-7.5	-7.8	-8.7	-9.8	-10.3
	Total Net Demand⁷	16.5	20.1	22.0	22.4	21.4	20.7
	Movement in Stocks⁸	7.5	2.7	0.4	-0.9	-2.3	2.0



PGM MARKET REPORT MAY 2015

IRIDIUM '000 oz - Demand							
							Forecast
		2010	2011	2012	2013	2014	2015
Demand	Chemical	18	19	19	20	20	20
	Electrical	201	195	28	35	41	86
	Electrochemical	79	76	73	50	50	53
	Other	40	42	75	81	85	90
Total Demand		338	332	195	186	196	249

IRIDIUM Tonnes - Demand							
							Forecast
		2010	2011	2012	2013	2014	2015
Demand	Chemical	0.6	0.6	0.6	0.6	0.6	0.6
	Electrical	6.3	6.1	0.9	1.1	1.3	2.7
	Electrochemical	2.5	2.4	2.3	1.6	1.6	1.6
	Other	1.2	1.3	2.3	2.5	2.6	2.8
Total Demand		10.6	10.4	6.1	5.8	6.1	7.7



PGM MARKET REPORT MAY 2015

RUTHENIUM '000 oz - Demand							
							Forecast
Demand		2010	2011	2012	2013	2014	2015
	Chemical	100	273	134	305	240	205
	Electrical	679	536	247	337	370	506
	Electrochemical	124	130	172	146	139	151
	Other	42	58	79	111	113	119
Total Demand		945	997	632	899	862	981

RUTHENIUM Tonnes - Demand							
							Forecast
Demand		2010	2011	2012	2013	2014	2015
	Chemical	3.1	8.5	4.2	9.5	7.5	6.4
	Electrical	21.1	16.7	7.7	10.5	11.5	15.7
	Electrochemical	3.9	4.0	5.3	4.5	4.3	4.7
	Other	1.3	1.8	2.5	3.5	3.5	3.7
Total Demand		29.4	31.0	19.7	28.0	26.8	30.5



NOTES TO TABLES

¹**Supply** figures represent estimates of sales by the mines of primary pgm and are allocated to where the initial mining took place rather than the location of refining. Additionally, we continue to report sales of metal which we believe has not previously been priced, principally sales of Russian state stocks, as supplies.

²Our **Russian supply** figures represent the total pgm sold in all regions, including Russia and the ex-CIS. Demand in Russia and the ex-CIS states is included in the Rest of the World region. Russian supply figures for palladium have been split into sales from primary mining and sales of stocks.

³Supplies from **Zimbabwe** have been split from Others' supplies. Platinum group metals mined in Zimbabwe are currently refined in South Africa, and our supply figures represent shipments of pgm in concentrate or matte, adjusted for typical refining recoveries.

⁴**Gross demand** figures for any given application represent the sum of manufacturer demand for metal in that application and any changes in unrefined metal stocks in that sector. Increases in unrefined stocks lead to additional demand, reductions in stock lead to a lower demand figure.

⁵Our **Medical and Biomedical** category represents combined metal demand in the medical, biomedical and dental sectors.

⁶**Recycling** figures represent estimates of the quantity of metal recovered from open loop recycling (i.e. where the original purchaser does not retain control of the metal throughout). For instance, autocatalyst recycling represents the weight of metal recovered from end of life vehicles and aftermarket scrap in an individual region, allocated to where the car is scrapped rather than where the metal is finally recovered. These figures do not include warranty or production scrap. Where no recycling figures are given, open loop recycling is negligible.

⁷**Net demand** figures are equivalent to the sum of gross demand in an application less any metal recovery from open loop scrap in that application, whether the recycled metal is reused in that industry or sold into another application. Where no recycling figure is given for an application, gross and net demand are identical.

⁸**Movements in stocks** in any given year reflect changes in stocks held by fabricators, dealers, banks and depositories but excluding stocks held by primary refiners and final consumers. A positive figure (sometimes referred to as a 'surplus') reflects an increase in market stocks. A negative value (or 'deficit') indicates a decrease in market stocks.

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