PLATINUM 2010

JM
Johnson Matthey

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Iron milling balls such as these are used to break ore down into smaller pieces as a first step in platinum group metal processing.

PLATINUM 2010

by **David Jollie**

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Johnson Matthey

EXECUTIVE SUMMARY

The platinum market was in surplus by 285,000 oz in 2009. Gross demand fell by 11.9 per cent to 7.04 million ounces. Platinum recovery from scrapped autocatalysts, electronics and jewellery decreased by 23.2 per cent to 1.41 million ounces. Net demand for platinum fell by 8.5 per cent to 5.64 million ounces. Supplies of platinum from current mining operations fell by 0.3 per cent to 5.92 million ounces.

Supplies of platinum fell by 20,000 oz to 5.92 million ounces in 2009. South African supplies climbed marginally to 4.53 million ounces as increased output from several newer mines and the sale of additional refined metal offset the closure of some uneconomic production. North American supplies of platinum fell to 260,000 oz. Russian supplies of platinum fell to 785,000 oz but Zimbabwean output increased.

Gross automotive sector demand for platinum fell by 39.0 per cent to 2.23 million ounces in 2009. Global vehicle production fell heavily last year in most countries and platinum demand

fell in every region. Gross European demand dropped by over half to 970,000 oz due to a sharp, short term decline in the market share of the diesel engine.

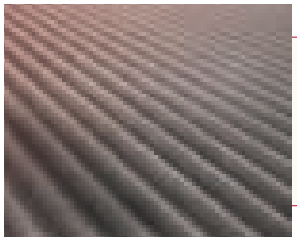
Gross purchases of platinum by the jewellery industry climbed by 46.1 per cent to 3.01 million ounces in 2009. Weak economic conditions limited demand within Europe, Japan and North America but a booming domestic economy and a fall in the price of platinum boosted Chinese demand to a record 2.08 million ounces. Net global demand rose by 79.1 per cent to 2.45 million ounces.

Industrial demand for platinum softened by 33.7 per cent to 1.14 million ounces in 2009. The economic downturn hit demand for many industrial products and inventory reductions were widespread. Demand for new metal fell from industries as diverse as the electronics, glass and petroleum refining sectors.

Identifiable physical investment demand for platinum climbed by 18.9 per cent to 660,000 oz in 2009. Demand fell within Japan where purchasing of large bars was weaker

than in 2008, but total holdings of metal within the European Exchange Traded Funds (ETFs) climbed substantially following their decline in the second half of the previous year.

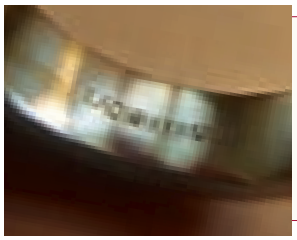
Rhodium was in oversupply by 241,000 oz in 2009. Weak global vehicle output and widespread destocking sent gross automotive demand 149,000 oz lower to 619,000 oz. Industrial demand for rhodium dropped from 129,000 oz to 97,000 oz. The weight of rhodium recovered from scrapped autocatalysts declined by 40,000 oz to 187,000 oz. Supplies of rhodium climbed by 75,000 oz to 770,000 oz due to greater South African sales of metal.



The palladium market was in surplus by 760,000 oz in 2009. Gross demand decreased by 6.3 per cent to 7.77 million ounces. Palladium recovery from scrapped autocatalysts, electronics and jewellery fell by 11.5 per cent to 1.43 million ounces. Net demand declined by 5.0 per cent to 6.34 million ounces. Supplies of palladium, including sales of metal from Russian state stocks, fell by 2.9 per cent to 7.10 million ounces.

Palladium supplies decreased by 210,000 oz to 7.10 million ounces in 2009. Production from current Russian mining slipped marginally lower to 2.68 million ounces. We estimate that sales of material from Russian state stocks contributed another 960,000 oz of palladium to supplies. South African supplies dropped by 60,000 oz to 2.37 million ounces. North American production decreased due to strike action in the nickel industry but Zimbabwean supplies increased.

Gross purchases of palladium for use in autocatalysts decreased by 9.3 per cent to 4.05 million ounces in 2009, largely due to the fall in vehicle output which occurred in most regions. European demand was almost flat as scrappage schemes supported the sales of gasoline-fuelled vehicles and palladium continued to gain ground in the diesel sector. Chinese demand for palladium grew strongly to 685,000 oz, in line with car production.



In the jewellery sector, gross global demand for palladium decreased by 17.3 per cent to 815,000 oz in 2009. Gross Chinese demand slipped from 740,000 oz to 560,000 oz as manufacturers chose to devote resources to platinum jewellery manufacturing instead of palladium production. North American demand was flat but European demand was driven marginally higher by the introduction of a jewellery hallmark in the UK. Net global demand fell by 12.9 per cent to 745,000 oz.

Gross industrial demand for palladium (including dental demand of 615,000 oz) decreased by 5.8 per cent to 2.28 million ounces in 2009. Gross electrical demand declined by 100,000 oz to 1.27 million ounces due to lower output of automotive electronics and heavy destocking in early 2009. Net electrical demand fell by 14.6 per cent to 875,000 oz. Chemical sector demand fell from 350,000 oz to 325,000 oz.

Identifiable physical investment demand for palladium climbed by 48.8 per cent to 625,000 oz in 2009. Once again, there was strong buying interest in palladium through the European Exchange Traded Funds, encouraged by the rising metal price. Demand for coins and small bars also increased.

NOTE: Johnson Matthey now reports gross demand and recycling figures for the autocatalyst, electrical and jewellery sectors. Previously, electrical and jewellery demand figures were net. Demand figures have been restated throughout to ensure consistency within this report. To see both new and old presentations of this data, please visit **www.platinum.matthey.com/publications/market-data-tables**.

SUMMARY

PLATINUM

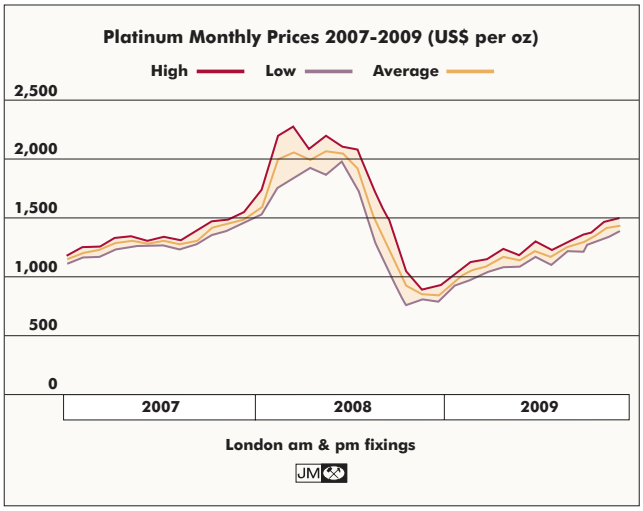
- **The platinum market was in surplus by 285,000 oz in 2009. Gross demand fell by 11.9% to 7.04 million oz. Supplies fell by 0.3% to 5.92 million oz. Platinum recovery from recycling dropped 23.2% to 1.41 million oz.**
- **Gross autocatalyst demand for platinum decreased by 39.0% to a nine-year low of 2.23 million oz in 2009 with European demand particularly weak.**
- **Gross demand for platinum from the jewellery sector climbed by 950,000 oz to a total of 3.01 million oz in 2009 due to strong growth in the Chinese market.**
- **Industrial demand for platinum weakened by 33.7% to a total of 1.14 million oz in 2009.**
- **Identifiable physical investment demand rose by 18.9% to 660,000 oz in 2009 due to strong ETF investment.**

Difficult economic conditions negatively affected demand for platinum in many sectors during 2009, driving gross demand 11.9 per cent lower to 7.04 million ounces. Supplies fell by only 20,000 oz to 5.92 million ounces despite the closure of some uneconomic mine production in South Africa. Although the weight of platinum recovered from open loop recycling also fell, to 1.41 million ounces, the platinum market was in oversupply by 285,000 oz during 2009.

Gross automotive demand for platinum decreased by 1.43 million ounces during 2009 to 2.23 million ounces. Global light duty vehicle output sank by 12.2 per cent as sales tumbled and auto makers cut their inventories of unsold vehicles. They also reduced their stocks of catalysts and metal. Gross demand for platinum fell in Japan, North America and the Rest of the World region, dropping from a combined 1.54 million ounces in 2008 to 1.13 million ounces. Manufacturers continued to switch to palladium-based technology on any gasoline vehicles where platinum-based catalysts were still in use. Even in China, where car production climbed strongly, this substitution of platinum by palladium in gasoline vehicles meant that platinum demand decreased.

The largest fall in automotive demand came in Europe. Vehicle sales and production fell as in most other regions but the effect on platinum offtake was accentuated by a temporary decline in the market share of the diesel engine. Various national vehicle scrappage schemes supported sales of smaller, gasoline-fuelled vehicles rather than larger, diesel-powered ones which use platinum in their catalytic aftertreatment. The auto makers also continued to introduce palladium into diesel oxidation catalysts and particulate filters at the expense of some of the platinum previously used. As a result, gross European automotive demand for platinum decreased by one million ounces to 970,000 oz, its lowest level since 2000.

Much of the weakness in the global automotive markets was offset by a strong performance in the jewellery sector, where gross platinum demand increased by 46.1 per cent to 3.01 million ounces. In Europe and North America, the economic downturn reduced consumer spending and, with jewellery and watch retailers keen to minimise stocks costs due to a tightening of credit availability, gross demand fell in both regions to a combined 320,000 oz. The Japanese market performed fairly well in the first half of the year before weakening as the price rose: gross demand here was almost static at 535,000 oz.



The price of platinum recovered strongly in 2009, having collapsed by over fifty per cent in the second half of 2008.

In China, though, a booming economy and the lower price of platinum reignited the jewellery market. Consumer purchasing rose and retailers rapidly expanded the amount of jewellery on offer. Manufacturers also took the opportunity to rebuild stock levels, adding further to demand. Increasing profit margins attracted a number of new participants at the manufacturing and retail levels, helping to drive Chinese gross demand to a record 2.08 million ounces. For more details, see our Special Feature on pages 34-35.

Gross industrial demand suffered in 2009 due to the weak global economy, falling by a third to 1.14 million ounces. Most industries were affected, with weak sales exacerbated by poor availability of credit to manufacturers, retailers and consumers.

In many sectors – just as in the automotive industry – this led to extended destocking throughout the supply chain, driving production levels far below even the poor rate of sales in the first half of 2009. In the electrical sector, gross demand for platinum fell from 230,000 oz to 190,000 oz as a result of this destocking despite some recovery in output in the second half of the year. In the chemical and petroleum refining industries, demand fell to 295,000 oz and 205,000 oz respectively as fewer new plants were built and requirements for top-up metal fell due to low plant utilisation rates.

Glass sector demand was particularly weak. The fragile economy affected sales of products such as flat screen televisions, and less new manufacturing capacity was installed than in 2008. As importantly, though, the success of LCD technology in capturing market share from traditional cathode ray tube (CRT) sets led to the closure of a number of CRT glass factories and the consequent release of a large amount of metal back to the market. Overall, glass sector demand for platinum slumped from 315,000 oz to only 10,000 oz.

Identifiable physical investment demand surged by 18.9 per cent to 660,000 oz last year. Japanese investors purchased 160,000 oz of platinum, a lower total than in 2008 despite a strong first quarter, as worries over the stability of the financial system dissipated. However, European Exchange Traded Fund (ETF) demand was particularly strong. ETF holdings increased throughout the year, leading to net demand of 385,000 oz in Europe and 5,000 oz in Australia. Although the launch of a US-based ETF was announced in late 2009, the launch itself did not take place until 2010 and it therefore did not contribute to demand last year.

The weight of platinum recovered from open loop recycling of autocatalysts, electronics and jewellery fell from 1.83 million ounces in 2008 to 1.41 million ounces in 2009. Weak sales of new automobiles resulted in lower recycling of end-of-life vehicles despite scrappage schemes such as the US "Cash for Clunkers" plan, driving recycling of platinum from this source down to 830,000 oz – 300,000 oz lower than one year earlier. The recycling of jewellery decreased by 130,000 oz to 565,000 oz as a lower platinum price reduced the economic incentive for Japanese consumers to recycle old jewellery.

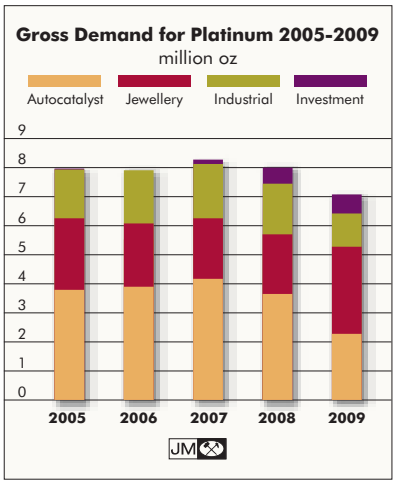
Platinum supplies from current mining fell marginally to 5.92 million ounces in 2009. In South Africa, three new mines started production but this was balanced by the closure of some existing production in response to the strength of the rand and the weakness of precious metals prices. Supplies from Lonmin declined due to the closure of some of its production at Marikana and the decision to place its Limpopo mine on care and maintenance. Impala's output fell due to industrial action and safety stoppages at its lease area. At Anglo Platinum, underlying production was flat but some metal was sold from stock and supplies rose. Total South African supplies of platinum increased by 15,000 oz to 4.53 million ounces.

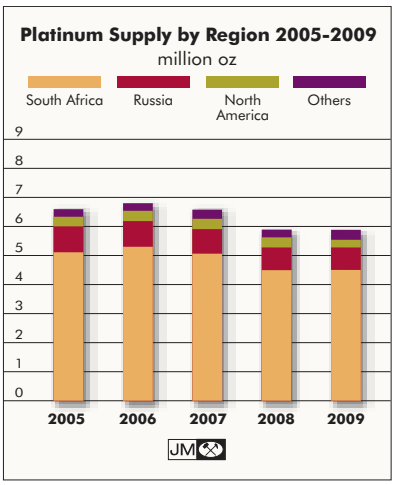
Russian supplies of platinum fell by 20,000 oz to 785,000 oz as lower production at the alluvial mines more than offset a slight rise in output at Norilsk Nickel. Supplies from North America dropped to 260,000 oz largely due to lengthy industrial action at Vale Inco's Sudbury nickel operations. Only in Zimbabwe did output improve significantly: platinum supplies grew from 180,000 oz to 230,000 oz as both Mimosa and Ngezi continued to expand.

The price of platinum rose strongly throughout 2009 following its decline in late 2008. It began the year at $934 and ended the year 57.0 per cent higher at $1,466. Although industrial and automotive demand remained weak, strong Chinese jewellery demand provided good support for the price. As importantly, the US Dollar weakened against the Euro for much of the year, bolstering all commodity prices. The gold price climbed to record levels and investment flows into the commodity sector resumed, driving ETF holdings and net long speculative futures positions higher and boosting the price of platinum.

Platinum Supply and Demand
'000 oz

Supply	2007	2008	2009
South Africa	5,070	4,515	4,530
Russia	915	805	785
Others	615	620	605
Total Supply	**6,600**	**5,940**	**5,920**
Gross Demand			
Autocatalyst	4,145	3,655	2,230
Jewellery	2,110	2,060	3,010
Investment	170	555	660
Others	1,845	1,720	1,140
Total Gross Demand	**8,270**	**7,990**	**7,040**
Recycling	**(1,590)**	**(1,830)**	**(1,405)**
Total Net Demand	**6,680**	**6,160**	**5,635**
Movements in Stocks	**(80)**	**(220)**	**285**





PALLADIUM

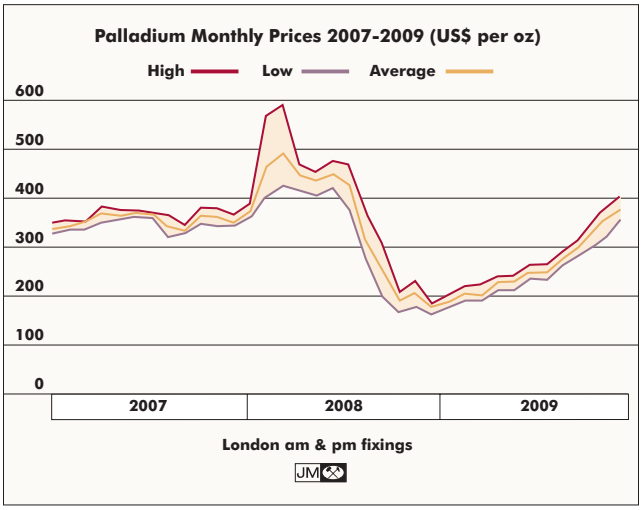
- **Palladium was in surplus by 760,000 oz during 2009. Gross demand fell by 6.3% to 7.77 million oz. Supplies of palladium dropped by 2.9% to 7.10 million oz. Palladium recovery from recycling fell by 11.5% to 1.43 million oz.**
- **Gross automotive sector demand for palladium fell by 9.3% to 4.05 million oz in 2009 with demand growing in China but falling elsewhere.**
- **Gross palladium jewellery demand fell by 17.3% to 815,000 oz in 2009 due to weaker Chinese output.**
- **Gross industrial demand for palladium (including dental demand) decreased by 5.8% to 2.28 million oz in 2009.**
- **Net annual identifiable physical investment demand for palladium increased by 48.8% to 625,000 oz last year.**

Palladium demand suffered due to the weak state of the world's economy. Gross automotive demand fell by 9.3 per cent and gross electrical sector demand decreased by 7.3 per cent as companies and individuals restrained their spending in the first half of 2009 in particular. Although the economic picture started to improve later in the year, total gross demand fell to 7.77 million ounces. Supplies of palladium fell to 7.10 million ounces – including the sale of 960,000 oz from Russian state stocks – with mine output decreasing in North America, Russia and South Africa but rising in Zimbabwe. The weight of metal recovered from scrapped autocatalysts, electronics and jewellery declined to 1.43 million ounces. The palladium market was therefore in oversupply during 2009 by 760,000 oz, a slightly larger surplus than in the previous year.

Gross automotive sector demand for palladium fell by 415,000 oz to 4.05 million ounces in 2009, although this was a much shallower percentage decline than was the case for either platinum or rhodium. Light duty vehicle production fell in almost every country during 2009 as a direct effect of the widespread economic turmoil and global output slipped by 8.3 million units.

However, at various points in the year, a number of countries introduced schemes designed – one way or another – to subsidise the purchase of new vehicles. For instance, the "Cash for Clunkers" scheme provided some support for vehicle sales in the middle of 2009 in the USA. The health of the US economy also improved gradually throughout the year. However, light duty vehicle output there still fell substantially and palladium demand in North America slipped 20.9 per cent lower to only 1.02 million ounces. Vehicle manufacturing also contracted in Japan, despite the introduction of a scrappage scheme there, and in the Rest of the World region and palladium demand fell in each of these locations.

European demand was much more stable, falling only by 10,000 oz to 995,000 oz. Vehicle output was supported by a number of scrappage schemes including those in France, Germany and the UK but the majority of purchasers opted for smaller, gasoline-fuelled vehicles at the expense of diesel cars. Production of gasoline vehicles was almost flat compared with the previous year and palladium demand in this sub-segment actually grew. In the diesel sector, palladium benefited from its growing use in diesel catalysts alongside platinum. However, this was offset by the weakness of the diesel vehicle market itself and total palladium usage on diesel vehicles fell marginally.



The palladium price more than doubled during 2009, supported by strong investment inflows, record gold prices and a weak US Dollar.

By far the most positive area for automotive palladium usage was the Chinese market where rapid growth in vehicle sales and production meant that gross palladium demand soared from 390,000 oz to 685,000 oz.

In the jewellery sector, gross purchases of palladium declined by 17.3 per cent to 815,000 oz. Demand rose in Europe and was stable in North America where palladium has now established a niche in men's wedding bands. In China, however, gross palladium demand fell from 740,000 oz to 560,000 oz. The success of platinum in the domestic jewellery market raised the profits available to manufacturers working in that metal. Many therefore moved some of their production to platinum, cutting the capacity available for palladium production. Although other companies filled some of this gap, retail interest within China

remained mixed and palladium jewellery demand fell.

Close examination of trade statistics indicates that more metal was imported into China in 2009 than can readily be explained in terms of automotive, industrial and jewellery demand. We believe much of this was purchased for speculative investment as the price rose. This view has been supported by the return of a significant quantity of this material to the market during the first part of 2010.

Gross electronics demand decreased by 100,000 oz to 1.27 million ounces. As in many other industrial sectors, destocking hurt demand for palladium in this industry in the first part of 2009. With purchasing of consumer electronics also poor, demand was particularly weak in the first half of the year. However, sales improved throughout the year as the economic outlook brightened and the overall fall in demand was relatively modest.

Dental demand fell by 10,000 oz to 615,000 oz as a result of weakness in the North American market where precious metal treatments continued to lose ground to other treatments such as all-ceramic crowns. Japanese demand was flat at 275,000 oz.

Net identifiable physical investment demand climbed strongly during 2009 – rising by 205,000 oz to 625,000 oz – mainly due to the behaviour of ETF investors whose total holdings climbed by 530,000 oz. A buoyant palladium price, an improving outlook for the automotive sector and a rising gold price all created a bullish environment which attracted more investors into this metal through the European ETFs. Investment through coins and small bars also performed strongly, with demand almost doubling to 95,000 oz.

Palladium supplies declined from 7.31 million ounces in 2008 to 7.10 million ounces in 2009 with production dropping in every region except Zimbabwe. Sales of palladium from Russian mining dipped marginally to 2.68 million ounces but outperformed expectations as Norilsk Nickel improved metal recoveries in its platinum group metal processing. We estimate that a further 960,000 oz of palladium was sold from Russian state stocks during the year, adding to supplies. Although there was little evidence of shipments of metal from this source during 2009, it is our firm opinion that the metal shipped in late 2007 and the second half of 2008 is being sold over a three-year period and we have therefore included 960,000 oz in our 2009 supplies total.

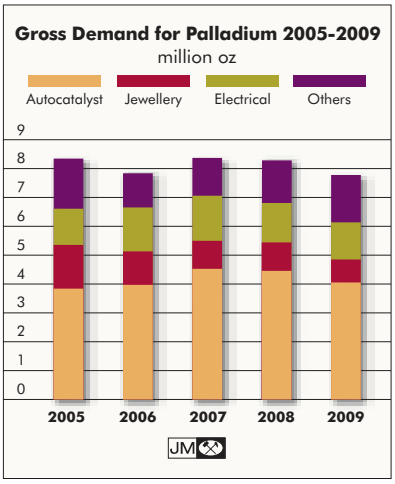
South African supplies fell by 60,000 oz to 2.37 million ounces. A number of marginal shafts and open pits were closed in response to weak metal prices. Industrial action, safety stoppages and smelter shutdowns also hurt output. North American supplies of palladium fell by 155,000 oz to 755,000 oz due to the temporary closure of the Lac des Iles mine in late 2008 and industrial action in the nickel mining industry during 2009.

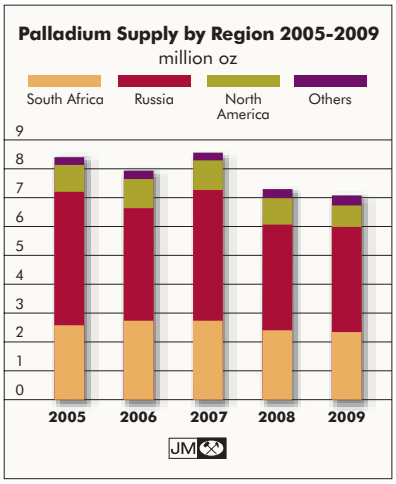
The weight of metal recovered from open loop sources of recycling – autocatalysts, electronics and jewellery – fell by 11.5 per cent to 1.43 million ounces. Less metal was recovered from the automotive sector, where fewer vehicles were scrapped than in 2008, and from the jewellery sector where fewer Pd950 alloy pieces were recycled in China. The weight of palladium recovered from end-of-life electronics rose to 395,000 oz.

The palladium market thus remained in oversupply in 2009: the surplus climbed from 635,000 oz to 760,000 oz. Excluding the sale of Russian state stocks, current mine supply fell short of demand. However, the palladium price performed strongly throughout the year. As with platinum, it was boosted by the very positive performance of the rest of the precious metal sector and by a prolonged spell of weakness in the US Dollar. Investment flows were also substantial, as ETF positions climbed rapidly and net long speculative futures positions approached record levels. Having started the year at $185, the palladium price more than doubled, to end 2009 at $402.

Palladium Supply and Demand
'000 oz

Supply	2007	2008	2009
South Africa	2,765	2,430	2,370
Russia	4,540	3,660	3,635
Others	1,275	1,220	1,095
Total Supply	**8,580**	**7,310**	**7,100**
Gross Demand			
Autocatalyst	4,545	4,465	4,050
Jewellery	950	985	815
Investment	260	420	625
Others	2,640	2,420	2,280
Total Gross Demand	**8,395**	**8,290**	**7,770**
Recycling	**(1,565)**	**(1,615)**	**(1,430)**
Total Net Demand	**6,830**	**6,675**	**6,340**
Movements in Stocks	**1,750**	**635**	**760**





OTHER PGM

- **Rhodium was in oversupply by 241,000 oz in 2009, compared to a surplus of 25,000 oz in 2008.**
- **Gross rhodium demand fell by 20.2% to 716,000 oz due to weak automotive purchasing.**
- **Recovery of rhodium from spent autocatalysts decreased by 17.6% to 187,000 oz in 2009.**
- **Supplies of rhodium increased by 10.8% in 2009 to an annual total of 770,000 oz.**
- **Ruthenium demand declined for the third successive year, falling by 17.9% to 574,000 oz in 2009.**
- **Iridium demand also fell for the third successive year in 2009, decreasing by 10.8% to 91,000 oz.**

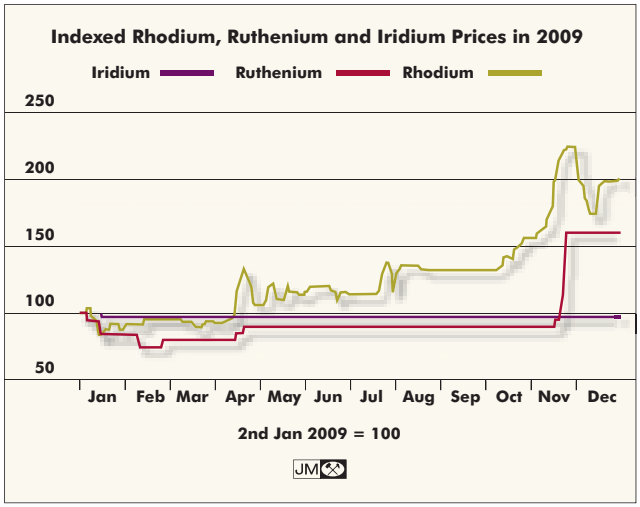
Rhodium

The rhodium market moved from a surplus of 25,000 oz in 2008 into a much larger surplus of 241,000 oz in 2009. Supplies rose from 695,000 oz to 770,000 oz. Demand was hit by a poor performance by its largest sector – the automotive market – where gross demand fell 19.4 per cent lower to 619,000 oz, the lowest figure since 2004. Demand fell in most other applications too, although some of this weakness was offset by lower rhodium recovery from scrapped autocatalysts.

Supplies of rhodium climbed by 75,000 oz to 770,000 oz, primarily due to higher sales of metal from South Africa. Underlying output of rhodium was flat as the closure of some South African production balanced increasing output of rhodium-rich UG2 ore from several newer mines. More importantly, an accumulation of rhodium in the processing pipeline restricted the amount of metal available for sale during 2008. A decrease in pipeline stocks in 2009 meant that more refined rhodium was released for sale: South African supplies therefore climbed to 663,000 oz. Supplies of rhodium from elsewhere fell from 121,000 oz to 107,000 oz.

Demand for rhodium was weak during 2009. The automotive sector accounts for the majority of rhodium demand and the slowdown in global vehicle production had a powerful negative impact. Most gasoline vehicles are fitted with palladium:rhodium catalysts and lower vehicle sales therefore hit gross rhodium usage. The impact was greater than sales figures alone would suggest, though. Inventories of unsold cars were high at the start of 2009 and as the industry tried to reduce these, vehicle production fell below the level of sales. Working stocks of catalyst and raw metal fell too, further depressing rhodium demand.

In a number of markets, consumers' response to the financial crisis was to delay or cancel the purchase of new vehicles. However, even where purchases did take place, there was a general shift towards buying smaller vehicles, reducing average catalyst size and typical rhodium content. Additionally, the auto makers have intensified their efforts to reduce the rhodium loadings in their three-way catalysts over recent years in response to high prevailing rhodium prices. Although rhodium remains an essential catalytic component of these devices, these thrifting programmes have had some success, further hurting rhodium demand. Overall, gross automotive demand for rhodium fell from 768,000 oz in 2008 to 619,000 oz last year. Only in China, where government action drove booming vehicle production, did rhodium demand increase.



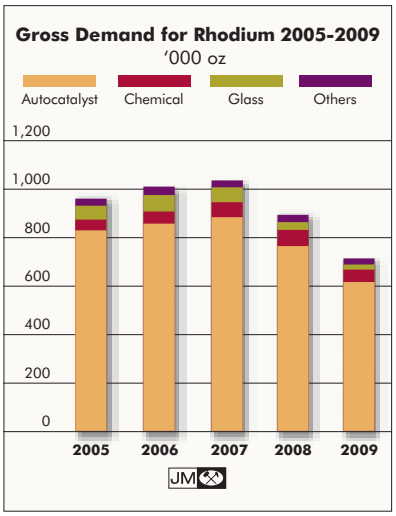
The rhodium price rebounded during 2009 after falling from record levels of over $10,000 per ounce in mid-2008. The ruthenium price recovered some ground too.

Rhodium demand was weak in most other sectors too. Although some glass manufacturers increased the rhodium content of their alloys, construction of fewer new factories and the closure of some cathode ray tube glass facilities meant that rhodium demand in this sector fell to 19,000 oz. Chemical industry demand also fell – to 54,000 oz – due to delays in the installation of new capacity for the LP oxo-alcohol process.

The dip in sales of new vehicles was clearly reflected in the performance of the automotive recycling sector where the amount of metal recovered from spent catalysts slumped from 227,000 oz a year earlier to 187,000 oz last year. With fewer

new cars bought, relatively few vehicles were scrapped in most developed countries and rhodium recovery suffered. A number of scrappage schemes were introduced around the world throughout the year, however, providing some support for this sector and ensuring that the weight of metal recovered did not fall too far below the levels of 2007.

Although the rhodium market moved into a large surplus, the price performed strongly throughout 2009. Automotive purchasing was weak at the start of 2009 but gradually strengthened as the year progressed, although it remained softer than in recent years. However, this weakness was balanced by some speculative rhodium purchasing in Asia and North America in particular, causing the price to double from $1,250 at the start of 2009 to its closing Johnson Matthey Base Price of $2,500.



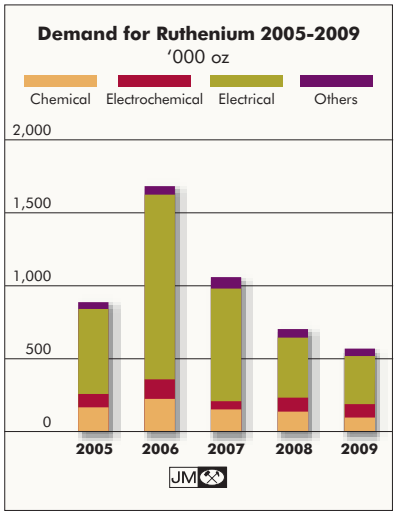
Ruthenium

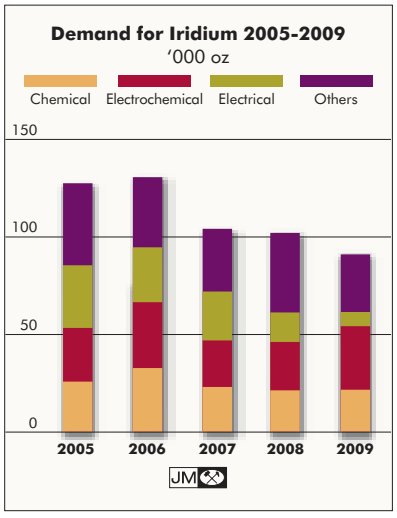
Ruthenium demand decreased from 699,000 oz to 574,000 oz in 2009, continuing its slide from the elevated levels of 2006. Demand in the electrical sector fell once again, to 336,000 oz, and chemical industry demand softened too. Ruthenium use in the electrochemical sector and in a number of other small applications was steady compared to previous year levels. Supplies were adequate to meet demand.

In most of the electronics industry, demand was hit by the same negative factors as in many other sectors: a weak global economy depressed sales of consumer electronics, while demand for components such as chip resistors was further damaged by destocking throughout the supply chain. The amount of metal purchased by the hard disk sector for use in perpendicular magnetic recording (PMR) disks also decreased in 2009, despite a rise in the market share of this technology, which is now almost entirely dominant. In fact, this increase in market share, when coupled with only a marginal decline in hard disk production, meant that ruthenium use on disks increased. However, the industry was able to source most of its metal requirements from stocks it had previously built up. Demand decreased last year as a result but should return to growth in 2010.

Chemical sector demand dipped as less new plant capacity was installed in Asia than in recent years. Electrochemical demand, however, was supported at 95,000 oz by a decision by the Chinese authorities to upgrade the country's chlor-alkali capacity to newer, more environmentally-friendly, ruthenium-containing membrane technology. The use of ruthenium in a number of other minor applications slipped only marginally to 54,000 oz.

As in the rhodium market, there were indications of a degree of speculative short term investment in ruthenium within Asia in the second half of the year. As demand improved steadily, the price eventually responded, rising to end the year at $160.





Iridium

Iridium demand dropped in 2009, slipping from 102,000 oz to 91,000 oz. In the electrochemical sector, demand rose from 25,000 oz to 33,000 oz, reflecting the move to upgrade the Chinese chlor-alkali industry to membrane technology. Chemical demand remained flat at 21,000 oz. Temporary falls in demand for iridium crucibles and for new vehicles drove demand in the electrical sector and other applications – principally spark plugs – lower to 7,000 oz and 30,000 oz respectively. Supplies of iridium – mainly from South Africa – remained sufficient to meet demand and the price moved little throughout the year, remaining at $425 for most of 2009.

OUTLOOK

- **Platinum expected to be closer to balance in 2010.**
- **Gross platinum demand to strengthen in the automotive sector but weaken in China's jewellery market.**
- **Supplies of platinum to increase in 2010 although constraining factors continue to exist in South African production.**
- **Platinum expected to trade between $1,600 and $2,000 during the next six months.**
- **Palladium forecast to be in smaller surplus during 2010.**
- **Gross demand for palladium set to rise due to stronger physical investment and some recovery in the automotive sector.**
- **Palladium production from current mining likely to rise. Further Russian state stock sales expected.**
- **Palladium expected to trade between $475 and $700 during the next six months.**

PLATINUM

The short term outlook for South African platinum production is quietly positive. The three newest mines – Blue Ridge, Pilanesberg and Smokey Hills – should continue to ramp up to full production. Other mines such as Two Rivers should produce more platinum in the near term. Continuing progress in developing new shafts at Lonmin should boost underlying production marginally this year although refined sales will be dependent on smelter availability. Production at Impala is set to remain relatively flat but there is some scope for additional sales of refined metal. At Anglo Platinum, the company has acknowledged that it may elect to increase production by up to 200,000 oz of platinum above its planned guidance for this year if the market demands it, suggesting that underlying production should rise above 2009 levels.

Over the medium term, the picture becomes more complex. Production at Impala and Lonmin should return closer to previous peak levels and Aquarius should resume mining at its Everest site (this is currently scheduled for 2010 but significant amounts of refined metal are unlikely before 2011). However, constraints still exist within the industry: the recession has reduced power consumption and temporarily eased power availability problems for the mines. However, as the South African economy begins to recover, electricity usage will start to increase. Although Eskom is installing new capacity, the spare generating margin is limited in the short to medium term. While the pgm producers are now better-positioned to cope with such problems, electricity availability may once again become a constraint on supplies.

Other issues may dog the mining industry in South Africa. The mines controlled costs remarkably well during 2009 but cost pressures still exist and have been accentuated by the strong rand making some production uneconomic and capital investment less certain. The adequate availability of skilled labour is likely to continue to be problematic too.

There is some scope for further growth in Zimbabwean platinum output. In the short term, output will rise as the current expansion programmes at Mimosa and Ngezi come to fruition. Anglo Platinum's Unki mine is also expected to come onstream. However, further investment to develop these mines into larger operations might not be forthcoming, depending on political developments within Zimbabwe.

The state of the global economy remains the issue of key importance on the demand side of the equation for platinum. While growth remains weak in most countries, market confidence is steadily returning and industrial output is improving. The tightening of domestic monetary policy has raised some concerns over the Chinese economy and could pose some threat to the global recovery but it seems likely that with destocking completed in most sectors and consumer sales rising, global industrial demand should grow in 2010.

In the chemical sector, demand should rise. Higher production of commodity chemicals such as nitric acid will increase plant utilisation and drive increased requirements for top-up catalyst charges. In the glass industry, demand will bounce sharply higher: 2009 saw the closure of several cathode ray tube television glass plants, returning platinum to the market and driving demand to very low levels. With this unlikely to recur this year and a return to growth in the LCD and fibre glass sectors expected, glass sector demand for platinum should rise substantially.

Global automotive output is also expected to show some growth this year and again in 2011. In Europe, light duty vehicle sales are likely to fall following the end of a number of national scrappage schemes. However, vehicle production is set to rise as destocking is essentially complete in this industry. Demand should be further boosted as working stocks of catalysts and metal start to increase once more. The removal

of the distortions in the market caused by the various national incentive programmes should also see a return to more normal buying patterns: the market share of the diesel car is expected to rise and platinum demand will rise with it.

Outside Europe, higher light duty gasoline vehicle production should lead to a modest increase in platinum demand: palladium remains the main beneficiary in the light duty vehicle sector. An increase in heavy duty diesel usage of platinum can also be expected, though: sales of these trucks were depressed during 2008 and 2009 as fleet owners delayed their purchases. With the global economy recovering, some of these deferred purchases should take place this year, with demand for both new heavy duty diesel vehicles and platinum likely to rise from last year's weak levels.

The health of the global jewellery sector also remains of great relevance to the platinum market. An improving North American economy could boost jewellery demand in that region. European jewellery demand could also rise marginally as consumer spending starts to recover. However, in Japan, gross platinum demand is likely to fall as the higher metal price negatively affects the affordability of platinum jewellery.

In China, gross jewellery demand is likely to fall in 2010. Last year saw the industry build its stocks by at least 300,000 oz. This restocking is unlikely to recur this year. At the time of writing, there have been some early indications of manufacturers reducing metal inventories in response to the recent rise in the platinum price. However, the health of the industry is better indicated by underlying manufacturing and retail demand. The rising platinum price has started to affect the affordability of platinum jewellery in China and manufacturing rates have fallen from the heights of 2009, although, if the bullion price were to fall, consumer demand can be expected to recover closer to last year's levels.

The direction of the platinum price is therefore of key importance to this sector and the trajectory of underlying Chinese demand remains uncertain, although sales of metal on the Shanghai Gold Exchange have been weaker so far this year than in 2009. One point of note, however, is the growing possibility that the Chinese Government will allow its currency to appreciate against the US Dollar: this would have the effect of reducing the local metal price which would accordingly support demand.

Physical investment demand had a significant effect on the platinum market during 2009 and is expected to do so once again in 2010. The launch of Exchange Traded Funds (ETFs) has opened investment in platinum to a wider group of potential investors than ever before. The launch of a physically-backed US ETF in January of this year has already proved significant in terms of demand. After three months of trading, the inflows of metal had slowed but US holdings had reached some 320,000 oz of platinum. We believe that the initial pace of investment was driven partly by the release of pent-up investor interest and that the more recent, lower running rates are more representative of ongoing demand. However, metal flows appear to be related to price performance and overall annual demand is hard to forecast with any degree of confidence.

In the recycling sector, we expect to see a return to more typical patterns of car scrappage and platinum recovery from spent autocatalysts should rise. Platinum recycling from the jewellery industry in China and Japan is also likely to be boosted by high current metal prices.

Overall, it seems likely that the platinum market will return closer to balance during 2010 as rising demand outweighs steady growth in supplies. On a fundamental basis, this recovery in demand might be expected to lead to a bullish price environment. However, concerns remain over the global economy: recovery is painfully slow in many countries and worries over the sustainability of Chinese economic growth have surfaced. National credit issues also continue to weigh on the Euro, applying some downward pressure to the platinum price. If these concerns dominate the market, platinum could trade as low as $1,600 during the next six months, although we would expect to find strong physical support from Chinese jewellery purchasing at these levels.

Investment activity has become a major influence on the platinum price. Net long speculative futures positions currently stand at very high levels and, although ETF demand has slowed since early 2010, total holdings are very substantial. If interest rates remain low and the gold price stays at its current elevated levels, net investment inflows into platinum are likely to continue, and the platinum price could trade as high as $2,000 within the next six months.

PALLADIUM

Supplies of palladium are forecast to rise in 2010. Supplies of palladium from current Russian mining are expected to increase marginally, in line with higher nickel output from Norilsk Nickel's Polar and Kola operations. We also expect sales of the remainder of the palladium originally shipped from Russian state stocks in 2007 and 2008, equating to roughly one million ounces. Little if any clarity exists in the longer term about the size and likely fate of remaining palladium stocks. However, over ten tonnes of palladium

was shipped into Switzerland in early 2010, apparently also from Russian state stocks. We do not currently expect this material to be sold this year although such sales remain possible and, if they were to occur, would boost supplies further.

South African production should increase with output expected to grow steadily at the three largest producers. Supplies from some of the smaller producers are also likely to rise, reflecting the ramp-up in production at the three new mines – now owned by Aquarius, Platinum Australia and Platmin – and at a number of other operations including ARM and Norilsk Nickel's Nkomati site. Should Anglo Platinum decide to increase its production and sales in order to meet demand in the platinum market, its palladium supplies should climb by at least another 100,000 oz.

In the medium term, as with platinum, constraints remain on South African production but output is nonetheless likely to grow. Zimbabwean supplies should also increase in 2010 as Unki comes onstream and both Mimosa and Ngezi continue to expand. Further growth after this date is likely to be dependent on the local political situation and operating environment. North American supplies may fall in 2010 due to continued industrial unrest in the nickel industry but should return to growth thereafter as North American Palladium increases production at its Lac des Iles mine and nickel production returns to normal levels.

Palladium demand should increase during 2010. Of greatest importance, global automotive output should recover some of the ground lost last year. A gradual recovery in the world's economic situation has reassured consumers and made them more willing to buy new vehicles after delaying purchases over the previous eighteen months. Additionally, the destocking of vehicles, parts and metal that so harmed demand during 2009 has now been completed. Rebounding vehicle output will therefore drive demand higher in Japan, North America and the Rest of the World region in 2010 and 2011. In China, the new Euro 3 and Euro 4 equivalent emissions regulations will be in place for the whole of 2010 having only been introduced in mid-2009, boosting average catalyst loadings. With Chinese vehicle production expected to remain strong, the weight of palladium used in this country should increase significantly.

In Europe, light duty vehicle production is forecast to rise but with the diesel vehicle set to recapture some of the market share it lost last year, the use of palladium on gasoline vehicles is set to decline. However, the continuing introduction of platinum:palladium catalyst formulations on diesel vehicles to replace platinum-only technology is expected to drive total European autocatalyst demand for palladium higher.

Industrial demand for palladium is also set to grow in the short to medium term. The healthier economic landscape should lead to higher demand for consumer electronics and this should increase demand for palladium from electrical applications such as its use in plating and multi-layer ceramic capacitors. However, the increase in demand is expected to be relatively slow. In the chemical sector, demand should also rise as more new capacity is installed this year. Requirements for top-up metal for process catalysts and nitric acid catchment gauzes will rebound as plant utilisation rates increase to more normal levels. Dental sector demand for palladium can again be expected to decrease marginally, as it continues its slow decline by losing share to non-precious metal treatments.

The outlook for the palladium jewellery market is less positive. There are good reasons to anticipate rising demand in Europe and in North America where palladium has gained some market acceptance as a jewellery metal.

In China, however, the manufacturing of palladium jewellery has become concentrated in the hands of a relatively small number of companies due to the higher profits available in platinum. The availability of palladium jewellery at a retail level within China remains highly uneven, suggesting that any upside in demand growth is likely to be limited even with gold and platinum prices currently at high levels. In fact, we believe that the pricing challenges of palladium, its limited brand presence and poor exchange or buy-back value – despite its rising price – make it more likely that Chinese palladium jewellery demand will decrease this year. Without a sustained, coordinated marketing effort, it seems unlikely that gross palladium demand for jewellery will return to anywhere near the peak levels of 2005.

In the investment sector, demand seems certain to increase this year. The January 2010 launch of a US-based Exchange Traded Fund has changed the outlook for this sector dramatically. Investors purchased a total of 430,000 oz of metal within the first month of this fund's existence and, although investment flows have since slowed, demand through this fund alone had already reached 550,000 oz by the end of March. In Europe, however, investment flows appear effectively to have stalled, suggesting either that some investors are now happy to realise profits they have generated or that some of the European investment activity has been displaced into the North American market.

Finally, we expect recycling of palladium from open loop sources to increase this year. While palladium recovery from jewellery recycling is likely to fall to very low levels – since

there is now little redundant Pd950 jewellery stock at retailers in China and exchange of old jewellery remains limited – the recovery of metal both from spent autocatalysts and end-of-life electronics should rise as scrap rates approach normal levels.

We therefore expect the palladium market to be in oversupply in 2010, although the surplus is likely to be smaller than in 2009. If no sales of metal from Russian state stocks take place, it is highly likely that the palladium market will be in a fundamental deficit.

Price movements over recent months indicate that many investors see potential long term profits in this metal, perhaps driven by speculation that Russian state stocks are now effectively almost exhausted. Interestingly, the abnormally large shipments of metal into Switzerland of early 2010 did little to dent the investment community's bullishness. If investors continue to build on their large futures and ETF positions, as they have in recent months, recovering industrial and automotive demand could help drive palladium as high as $700 during the next six months.

Much of the positive sentiment around palladium derives from the prospects of economic recovery. If Chinese growth were to slow or industrial and automotive output were to falter, the palladium price could soften. Any spell of dollar strength or weakness in the gold price could see investment outflows from futures, ETF and physical positions, which could drive the price to trade as low as $475 within the same six months.

OTHER PGM

We expect rhodium to be in another large fundamental surplus in 2010. Supplies of rhodium are unlikely to change significantly from 2009. Production of refined rhodium was hit by a build-up in pipeline stocks in 2008 and some of this metal was refined and sold in 2009, boosting supplies strongly. With the pipeline now less full, sales of rhodium should revert to closer to the level of mine output. So, although increasing production from rhodium-rich UG2 ore on the Bushveld Complex should boost underlying output, supplies will rise by less this year. Rhodium supplies from other producing nations should remain flat.

Demand for rhodium remains heavily dependent on the automotive sector. This industry is slowly recovering and vehicle output is expected to rise in most regions in 2010 although it is unlikely to reach pre-crisis levels in most countries in the short term. As sales of automobiles improve, the car industry can also be expected to restock with the numbers of unsold finished vehicles rising and an increase in working stocks of metal and catalytic converters. Rhodium demand will thus increase this year and should climb again in 2011, with a minor boost coming from the introduction of new emissions legislation in a number of countries. However, the auto makers will continue to introduce lower rhodium-loaded technology where this is available, restraining growth in rhodium demand to some degree.

Rhodium demand should recover in the glass industry. At the current price differential between platinum and rhodium, it remains attractive for many glass producers to increase the rhodium content of their alloys in order to extend the working lifetime of their manufacturing equipment and this should support demand this year. More importantly, the fibre glass and LCD television glass markets have started to return to growth in 2010. Glass makers will therefore install more capacity, leading to higher demand than in 2009.

During 2009, rhodium attracted a reasonable amount of speculative over-the-counter interest, which helps to explain much of the disconnect between a substantial fundamental surplus in this metal and its strong price performance. Due to the nature of these investment flows, it is hard to forecast at the time of writing whether they will persist during 2010.

Ruthenium demand should return to growth in 2010, largely due to increased demand from the hard disk industry. Perpendicular magnetic recording (PMR) is now the dominant hard disk technology and this market should start to grow rapidly once more as computer sales recover, driving ruthenium usage higher. As importantly, the hard disk makers have reduced their working stocks of ruthenium and are no longer able to source the majority of their requirements from material they had previously bought. Purchases of ruthenium by the industry – equivalent to demand – are therefore rising strongly.

Electrochemical demand for ruthenium should be supported by continued investment for chlor-alkali production and process catalyst demand should start to recover, as in the platinum and palladium markets.

Iridium demand is also forecast to perform well this year. Increasing car production will boost iridium demand for use in high-specification spark plugs. Demand for iridium crucibles for growing high-quality metal oxide single crystals is also set to rebound. Electrochemical demand should strengthen again, reflecting the continuing conversion of mercury cell chlor-alkali technology to more environmentally-friendly membrane cells in Asia and in other regions.

SUPPLIES, MINING & EXPLORATION

- **Global supplies of platinum fell by 20,000 oz to 5.92 million oz in 2009. Supplies of palladium dropped by 210,000 oz to 7.10 million oz. Rhodium supplies climbed by 75,000 oz to 770,000 oz.**
- **South African supplies of platinum rose by 0.3% to 4.53 million oz last year. Palladium supplies from South Africa decreased by 2.5% to 2.37 million oz but supplies of rhodium increased to 663,000 oz.**
- **Supplies of palladium from current Russian mining in 2009 decreased by 0.9% to 2.68 million oz. Sales of palladium from state stocks were flat at 960,000 oz. Platinum supplies fell by 2.5% to 785,000 oz.**
- **North American palladium supplies fell by 17.0% to 755,000 oz. Platinum supplies fell by 20.0% to 260,000 oz.**
- **Zimbabwean supplies climbed by a quarter to 230,000 oz of platinum and 180,000 oz of palladium last year.**

SOUTH AFRICA

Supplies of platinum from South Africa rose marginally to 4.53 million ounces in 2009, despite a 3 per cent decline in refined production levels. Shipments by Anglo Platinum were supplemented by the sale early in the year of some metal produced in late 2008. This helped to offset lower supplies from Impala and Lonmin. The operational climate remained extremely difficult, with the industry hit by safety stoppages, strike action, smelter outages and geological issues, while production was also affected by the closure of a number of uneconomic shafts and pits. Palladium supplies decreased to 2.37 million ounces while supplies of rhodium climbed to 663,000 oz.

Anglo Platinum

Anglo Platinum sold 2.58 million ounces of refined platinum in 2009, an increase of 16 per cent, or over 350,000 oz. Underlying mine production was almost unchanged, but refinery performance improved, while supplies were augmented by the shipment in early 2009 of some 164,000 oz of platinum which had been produced (but not sold) at the tail end of 2008.

Refined production of palladium rose by 3 per cent to 1.36 million ounces, boosted by expansion at the palladium-rich Mogalakwena mine, while rhodium output (which had been depressed by an increase in unrefined pipeline stocks the previous year) climbed by 17 per cent to 350,000 oz.

PGM Supplies: South Africa
'000 oz

Supply	2007	2008	2009
Platinum	5,070	4,515	4,530
Palladium	2,765	2,430	2,370
Rhodium	696	574	663

Overall "equivalent refined" production of platinum (an indication of production obtained by multiplying the weight of metal recovered from each mine in ore form by standard Anglo Platinum smelting and refining recoveries) was stable at 2.46 million ounces. Shaft closures resulted in a fall in output at the Khuseleka and Siphumelele mines (formerly part of Rustenburg section), but this was offset by higher production from Mogalakwena – where platinum output rose by 26 per cent to 237,000 oz – following the commissioning of the Mogalakwena North expansion project during 2008.

The amount of platinum processed on behalf of joint venture and pool-and-share operations also grew. Output from the Mototolo mine – a 50:50 joint venture between Anglo Platinum and Xstrata – climbed by 25 per cent to 109,000 oz of equivalent refined platinum production as the operation reached its rated capacity of 200,000 tonnes per month of ore milled. Production also increased at Kroondal and Marikana.

At the BRPM joint venture operation, a rise in headgrade and improved recoveries in metal processing were offset by poor ground conditions and equivalent refined production fell by 1 per cent to 173,000 oz. At Modikwa – a joint venture with African Rainbow Minerals – platinum output also fell marginally, to 134,000 oz of equivalent refined production, due to power supply problems and shortages of skilled labour.

There was a decline in purchases of platinum from third parties, due to lower output at Xstrata's Eland Platinum mine (platinum group metals from this operation are refined by Anglo under a concentrate offtake agreement).

During 2009, Anglo Platinum responded to depressed metal prices by restructuring its large Rustenburg and Amandelbult mines into seven separate units, closing three Rustenburg shafts, and delaying expenditure on a number of capital projects. These include the Amandelbult No 4 shaft (where development will restart in 2012, with first production

Production of pgm in concentrate at Northam's Zondereinde mine was stable at 310,000 oz during 2009.

scheduled for 2016), the Styldrift Merensky project (due to come onstream in 2017), and the Twickenham Platinum Mine (due in 2018).

In January 2010, Anglo Platinum's BRPM joint venture with Royal Bafokeng Resources (RBR) was restructured to give majority ownership and operational control to RBR. Majority ownership of Bokoni (previously known as Lebowa) will also move from Anglo Platinum to a Historically Disadvantaged South African managed and controlled producer which will be 51 per cent owned by Anooraq Resources.

Anglo Platinum's stated production target for 2010 is 2.5 million ounces of platinum. However, the company has since revealed that production could rise by up to 200,000 oz above this level if the market demands it.

Impala Platinum

Output at Impala weakened during 2009, with operations at the Rustenburg lease area disrupted by a two-week strike and a major fall of ground in a mechanised section at 14 shaft. The company estimates that industrial action cost it some 50,000 oz of platinum production, while safety stoppages at 14 shaft and elsewhere resulted in the loss of a further 25,000 oz. Output was also affected by Impala's decision to alter the mining layout at its mechanised sections, cutting bord widths (the distance between pillars) in order to reduce the risk of further falls of ground.

As a result, platinum production from the Impala lease area fell by 12 per cent to 867,000 oz in 2009, the lowest level for a number of years, while sales were down by 18 per cent at 816,000 oz. Impala intends to grow platinum output from the lease area to 1 million ounces annually within 5 years, but the outlook for the immediate future is flat, with the company forecasting production of around 860,000 oz in the financial year to June 2010. However, with refined platinum stocks starting the year above normal levels, there may be some flexibility to increase sales modestly in 2010.

Impala Refining Services (IRS) refines platinum group metals (pgm) on behalf of other mines, including the Zimplats and Mimosa operations in Zimbabwe (of which Impala holds 87 per cent and 50 per cent respectively), the Marula mine on the Eastern Bushveld (of which Impala owns 73 per cent), and the Two Rivers joint venture with African Rainbow Minerals (of which Impala owns 45 per cent).

Additionally, IRS purchases and refines pgm-bearing concentrate from a number of third party operations, as well as processing autocatalyst scrap. Excluding secondary scrap materials (which we do not include in our primary supplies numbers), refined platinum output from IRS rose by 8 per cent to 627,000 oz in 2009. It should be noted that much of this increase relates to expansion in Zimbabwe: although this metal is refined in South Africa, it is reported as Zimbabwean supply (see pages 21 and 22).

Output at Marula continued to ramp up gradually, reaching 76,000 oz of platinum in concentrate in 2009. The mine is undertaking a switch from mechanised to conventional mining methods, but progress has been slower than previously anticipated and platinum output has grown slowly.

At Two Rivers, the ramp-up to full production is now almost complete. Following optimisation of the concentrator plant, mill throughput rose by 7 per cent to 2.8 million tonnes in 2009, while recoveries also improved; output climbed by more than a quarter, to 132,000 oz of platinum in concentrate. Once at steady state, production should climb to a rated annual capacity of 150,000 oz of platinum in concentrate.

Lonmin

Production of platinum in concentrate from Lonmin's operations fell by 9 per cent to 652,000 oz in 2009, reflecting the decision to place the Limpopo mine on care and maintenance, the closure of one uneconomic mine shaft and several half-levels at Marikana, and the cessation of open pit operations across the company's Western Bushveld operations. Supplies of platinum from Lonmin were down by 6 per cent at 666,000 oz, as the company sold small amounts from its stocks of refined metal.

After consistently declining since 2005, underlying performance at the company's main Marikana operation showed signs of stabilising, with production from the new vertical shafts, Hossy and Saffy, beginning to ramp up, offsetting the effects of safety stoppages at the two largest shafts, K3 and Rowland. Recoveries also improved as a result of a better ore mix and a completed concentrator optimisation programme. A third new vertical shaft, K4, is under development and will begin to contribute to refined output in 2011.

At the Pandora joint venture, plant throughput dropped by 26 per cent to 650,000 tonnes last year, following the decision to terminate open pit mining. However, ore continues to be extracted from underground via shaft infrastructure located on the adjacent Marikana mine: output of platinum totalled 40,000 oz in 2009.

Lonmin expects to see an improvement of around 5 per cent in underlying production of pgm in concentrate in 2010, in line

with improved productivity and the ramp-up in production from the next generation Marikana shafts. However, the outlook for refined production and sales is less certain, following another leak at the company's No 1 furnace at the end of March 2010. The plant was scheduled to be closed for repairs for at least one month. Despite the availability of some back-up smelting capacity, using three old Pyromet furnaces, there will be a temporary build-up in stocks of unrefined concentrate. This may affect the amount of pgm available for sale this year.

Northam

At Northam's Zondereinde mine, the quantity of newly-mined ore processed through the mills declined by 7 per cent in 2009, to 2.02 million tonnes. However, production of pgm in concentrate was stable at 310,000 oz, with lower ore production rates offset by improved grades, and the processing of other pgm-bearing materials (such as smelter reverts) which added some 15,000 oz to pgm output during the second half.

For the first time, concentrate purchase contracts made a significant contribution to Northam's business. The company has an offtake agreement with Platmin's Pilanesberg mine, which came onstream in early 2009, and also processes small quantities of concentrate from other sources. In total, Northam purchased just under 50,000 oz of pgm in concentrate last year, and this augmented the company's pgm sales: platinum shipments rose by 35 per cent to 235,000 oz.

In February 2010, Northam confirmed that development of its Booysendal project on the Eastern limb of the Bushveld complex will proceed this year. The board has approved initial capital expenditure of R340 million, which will be used to build basic infrastructure such as roads and pipelines, in advance of the start of mine construction in mid-2010. The project is to be developed in a modular fashion, with the first phase costing some R3 billion and due to come onstream in mid-2013. It is planned to extract 150,000 tonnes of ore per month, yielding 130,000 oz of pgm annually including around 75,000 oz of platinum, with further expansion in later phases.

Aquarius Platinum

Aquarius Platinum operates four mines and two tailings retreatment operations in South Africa. At the Kroondal mine, production of platinum in concentrate rose marginally to 241,000 oz in 2009, while the Marikana mine saw a 7 per cent increase in output, to 89,000 oz. These gains were made in spite of an unofficial strike in August which resulted in the dismissal

Platinum supplies from Crocodile River climbed in 2009 due to the processing of a greater tonnage of ore and improvements in recoveries and headgrades.

of the contractor workforce and the loss of around 15,000-20,000 oz of pgm production. Both these mines are operated under pool-and-share agreements with Anglo Platinum, which purchases all concentrate from Kroondal; output from Marikana is refined by both Anglo and IRS. The mine life of both operations was extended by the acquisition of First Platinum and Salene Mining in early 2010; these companies own mineral rights in the vicinity of the Kroondal and Marikana mines.

Aquarius Platinum's Everest Mine was closed in December 2008, due to subsidence in mined-out levels of the mine around the decline shaft following a period of exceptionally heavy rainfall. A decision to redevelop the mine was taken in mid-2009, involving the construction of two new decline shafts to access the mining areas (which were unaffected by the subsidence). This will cost some R259 million, and will put the company in a position to resume milling ore in late 2010. However, pgm production from Everest this year – if any – will be relatively small.

In July 2009, Aquarius acquired the UK company Ridge Mining, owner of a 50 per cent stake in the Blue Ridge mine, and a 39 per cent stake in a large pgm/nickel project, Sheba's Ridge, which is undergoing feasibility studies. Blue Ridge came onstream during the first half of 2009, and between July and December it produced just under 20,000 oz of platinum. The mine is ramping up towards full production, and platinum output should exceed 50,000 oz this year. Metal from both Blue Ridge and Everest is refined and marketed by IRS.

Aquarius also has 50 per cent stakes in the Mimosa mine in Zimbabwe (see page 21), and in two tailings retreatment operations in South Africa: the Chromite Tailings Retreatment Plant (CTRP), based at the Kroondal mine, and Platinum Mile,

An expansion programme is currently underway at ARM and Norilsk Nickel's Nkomati mine to lift annual pgm output to 100,000 oz.

located on Anglo Platinum's Rustenburg lease area. These process tailings from adjacent chrome and platinum mining operations. Together, the two operations produced just under 17,000 oz of platinum in 2009.

ARM Platinum

African Rainbow Minerals (ARM) is involved in three pgm-producing mining ventures in South Africa. It has a 55 per cent stake in the Two Rivers mine (with the remaining 45 per cent held by Impala), which started up in late 2006. This mine has enjoyed a relatively rapid ramp-up to full production, with platinum output of over 130,000 oz achieved in 2009.

ARM also participates in a 50:50 joint venture with Anglo Platinum, the Modikwa Platinum Mine: this operation has now reached steady state production and recorded stable output of 134,000 oz of platinum last year. Further capital investment is expected to maintain output at this level.

Finally, ARM and its joint venture partner Norilsk Nickel produced just under 30,000 oz of pgm as a by-product of nickel mining at the Nkomati Nickel mine; an expansion programme is currently being undertaken at this operation which will lift platinum group metal output to close to 100,000 oz annually.

Eastern Platinum

At Eastern Platinum's Crocodile River mine, the tonnage of freshly-mined ore processed through the concentrator rose by 4 per cent, while recoveries and grades also improved. Platinum group metal output climbed from 118,000 oz in 2008 to 130,000 oz in 2009, with sales of platinum in concentrate also rising by over ten per cent to 65,000 oz.

In January 2010, the company announced the reactivation of development work at Crocette, a small section adjacent to the existing Crocodile River operations which had been on care and maintenance since November 2008. At full production, Crocette will contribute some 50,000 oz of pgm annually. The company has yet to confirm its plans for the Spitzkop project on the Eastern Bushveld, the development of which was also put on hold in late 2008 due to low pgm prices.

Other

Platinum Australia's Smokey Hills mine joined the ranks of pgm producers in early 2009. In its first year of operation, the plant milled 487,000 tonnes of ore, shipping around 27,000 oz of pgm in concentrate to IRS.

Much of the ore processed at Smokey Hills last year came from an open pit, the life of which was extended from September to December 2009 due to the slower than expected ramp-up of underground production. Geological issues which hampered underground mining last year will continue to affect production in early 2010, but should be offset by higher plant recoveries. The Smokey Hills concentrator is designed to treat 720,000 tonnes of UG2 ore annually, which at full production should yield some 95,000 oz of pgm annually over a mine life of seven years.

Another first-time contributor to pgm production was Platmin's Pilanesberg open pit operation. Mining began in December 2008, and concentrator commissioning commenced three months later, with the first delivery of pgm concentrate to Northam taking place in April 2009. However, the mine's ramp-up was delayed by industrial action, while production was also affected by difficulties in processing weathered, oxidised ore from shallower sections of the pit. For the year as a whole, the company shipped some 28,000 oz of pgm in concentrate; it expects output to rise to 160,000 oz in 2010, with full production (250,000 oz of pgm annually) being achieved during the following year.

Sylvania Resources is developing a series of chrome tailings retreatment plants, known collectively as the Sylvania Dump Operations (SDO). Two further plants were commissioned during 2009, bringing the total to four, with a fifth due to be brought onstream in May 2010. Last year, SDO processed some 690,000 tonnes of tailings, yielding 21,000 oz of pgm.

The Blue Ridge mine also started production during 2009 but was purchased by Aquarius Platinum and is therefore reported under Aquarius above.

Palladium output from Norilsk Nickel's Russian operations fell marginally in 2009 but platinum production rose slightly.

RUSSIA

Supplies of palladium from current Russian mining operations fell by 25,000 oz to 2.68 million ounces in 2009, a higher total than previously forecast. We estimate that sales of metal from Russian state stocks contributed another 960,000 oz of palladium to supplies. Sales of platinum – all from current production – fell by 20,000 oz to 785,000 oz. Supplies of rhodium decreased from 85,000 oz in 2008 to a more sustainable level of 70,000 oz in 2009.

Total production of platinum group metals from Norilsk Nickel's Russian operations fell slightly from 2008 levels but outperformed earlier expectations. Palladium output decreased from 2.70 million ounces to 2.68 million ounces. Platinum output rose marginally from 632,000 oz in 2008 to 636,000 oz. Nickel production within Russia remained flat as Norilsk Nickel maintained domestic production but copper output fell, suggesting that the mix of ore being mined and processed at these Siberian operations has changed.

Although there was no repeat of the issues which affected production in the first quarter of 2008, platinum group metal output – and base metal production – declined in the first quarter of 2009. This was partly due to lower-than-expected processing rates of disseminated ore. However, the volumes of metal produced increased throughout the year, as a number of technical changes improved platinum group metal recoveries at the company's smelting and metallurgical facilities.

Nickel production is forecast to rise marginally in 2010 while copper output is expected to fall, suggesting a decrease in the amount of cuprous ore which will be mined. Current plans anticipate a 1 per cent rise in palladium output from Norilsk Nickel's Russian operations to 2.72 million ounces in 2010 and a 3 per cent rise in platinum production to 655,000 oz.

Supplies of platinum from other mining in Russia – mainly from alluvial mining operations in the far East of the country – decreased from 175,000 oz in 2008 to 150,000 oz last year. The largest of these, the Amur mine, on the Kondjor deposit in the Khabarovsk region, produced marginally less platinum than in the previous year due to poor weather conditions. Platinum sales from the Korjak mine fell to roughly 25,000 oz. No metal was supplied from the Inagli placer deposit which had produced almost 5,000 oz in 2008. Production from the Urals placer deposits fell slightly lower to close to 10,000 oz. Palladium output from these operations remains negligible.

We estimate that 960,000 oz of palladium was sold from Russian state stocks during 2009. This is metal mined at Norilsk in previous decades but never supplied to the market. There were large shipments of palladium from Russia to Switzerland in late 2007 and again in the second half of 2008, amounting to roughly 3 million ounces in total. We believe that around a third of this metal was priced and sold in 2008 and again in 2009 and that the remainder is scheduled for sale in 2010. Additionally, more than ten tonnes of palladium was shipped into Switzerland in early 2010, apparently from Russian state stocks. We do not currently expect this recently-shipped metal to be sold into the market this year.

PGM Supplies: Russia
'000 oz

Supply	2007	2008	2009
Platinum	915	805	785
Palladium			
Primary Production	3,050	2,700	2,675
State Sales	1,490	960	960
Rhodium	90	85	70

NORTH AMERICA

Supplies of palladium from North America declined from 910,000 oz in 2008 to 755,000 oz last year due to the temporary closure of North American Palladium's Lac des Iles mine and prolonged strike action at Vale Inco's Sudbury nickel operations. Supplies from Stillwater Mining's two Montana mines were almost unchanged despite a reduced workforce at the East Boulder property. Platinum supplies dropped from 325,000 oz to 260,000 oz. Rhodium sales decreased from 18,000 oz to 15,000 oz.

Platinum group metal production at Stillwater Mining increased in 2009 despite a reduction in the workforce at its East Boulder site.

Canada

North American Palladium, the only primary producer of platinum group metals in Canada, temporarily closed its Lac des Iles mine in Ontario in late October 2008 in response to low prevailing precious metals prices. Having produced some 212,000 oz of palladium in 2008, no ore was mined or processed during 2009. Our estimates of supplies do however include the sale of a small amount of metal processed in late 2008 but not sold until the first six months of 2009.

In December 2009, North American Palladium responded to the strength of the palladium price by announcing that it would restart part of the Lac des Iles mine in the second quarter of 2010. Mining is planned to take place at the Roby underground section and could produce 140,000 oz of palladium per year over a two-year period. However, full production will not be reached until late 2010 and sales of refined metal are expected to remain at relatively low levels this year.

Vale Inco produced less platinum and palladium from its Canadian nickel operations in 2009 than in the previous year. Platinum output fell from 166,000 oz to 103,000 oz while palladium production dropped from 231,000 oz to 152,000 oz despite increased pgm recoveries.

Most of this metal comes as a by-product from nickel mining at Vale Inco's Sudbury, Ontario mines. Its Copper Cliff South mine was closed in late 2008 in response to low base metal prices. The remaining Sudbury operations were temporarily closed by the company in June. However, in July, much of the workforce decided to strike, preventing these operations from restarting. Nickel output dropped by roughly half and pgm output fell heavily too. At the time of writing (April 2010) industrial action was continuing although smelting had restarted at 50 per cent of maximum throughput. Platinum group metal production from these mines will therefore remain constrained this year.

In contrast, at Xstrata, the second major producer of nickel in Canada, nickel output was much more stable in 2009. Although the company closed two of its mines, it ramped up production from its low cost Nickel Rim South Mine to 500,000 tonnes of ore. According to the company, this mine is on schedule to reach its full capacity of 1.25 million tonnes of ore in 2011. While the weight of ore milled from all of its Sudbury operations fell by 42.6 per cent to 1.1 million tonnes, headgrades improved dramatically, limiting the fall in base metal and pgm production.

Both output and headgrades improved at Xstrata's Raglan nickel operations with, we believe, a positive impact on pgm production there too. Although Xstrata releases little data on its North American pgm production, we estimate that its overall output of both palladium and platinum from its operations in North America increased last year.

USA

Stillwater Mining, the only US primary producer of platinum group metals, performed well during 2009, producing a combined 530,000 oz of palladium and platinum compared to 499,000 oz in the previous year. Palladium production rose from 384,000 oz to 407,000 oz while platinum output increased from 115,000 oz to 123,000 oz. Combined sales of both metals to the market – our definition of supplies – from this primary production were 2,000 oz above 2008 levels at 516,000 oz.

In the second half of 2008, Stillwater responded to the low prevailing precious metals prices by refocusing its efforts on activity at its Stillwater property at the expense of the smaller, higher-cost East Boulder operation.

Although the workforce at the East Boulder site was reduced by almost 50 per cent in late 2008, the weight of ore milled dropped by only 3.0 per cent to 359,000 tonnes during 2009 due to an enhanced focus on the most economically-attractive

PGM Supplies: North America
'000 oz

Supply	2007	2008	2009
Platinum	325	325	260
Palladium	990	910	755
Rhodium	20	18	15

sectors of this mine. Annual palladium production at this site fell from 116,000 oz to 105,000 oz while platinum production dropped by a similar 8.8 per cent to 31,000 oz.

At the Stillwater Mine, the relocation of a number of miners from East Boulder boosted the workforce. The weight of ore milled climbed by 5.4 per cent to 727,000 tonnes as a result. The headgrade at the mill rose too and annual palladium output increased by 12.7 per cent to 302,000 oz. Platinum production increased to 92,000 oz during the same period.

Costs were reduced at both mines and the company intends to continue to focus on reducing costs and improving mining efficiencies to balance the negative financial impact of the expiry of its remaining guaranteed pricing deal with the automotive sector. Current guidance suggests that production should be marginally lower in 2010 than in 2009 at a combined 515,000 oz of platinum and palladium.

ZIMBABWE

Supplies of metal from Zimbabwe climbed in 2009. Platinum supplies rose from 180,000 oz to 230,000 oz while supplies of palladium climbed too, rising from 140,000 oz to 180,000 oz, as expansion programmes continued at both operating mines on the Great Dyke.

Output of platinum group metals (4E) at Mimosa – a joint venture between Aquarius Platinum and Impala – climbed from 160,000 oz to 194,000 oz during 2009. Concentrator recoveries improved gradually throughout the first three-quarters of the year, offsetting a slight decline in ore headgrade.

More importantly, the Wedza 5.5 expansion was completed in May 2009, increasing mill capacity to 185,000 tonnes and platinum group metal production capacity to nearly 200,000 oz per annum. Mill throughput rose by 21 per cent to 2.24 million tonnes and production of platinum in concentrate increased by 22.2 per cent to 99,000 oz. Annual palladium and rhodium production at Mimosa rose by similar percentages to 75,000 oz and 8,000 oz respectively.

PGM Supplies: Zimbabwe
'000 oz

Supply	2007	2008	2009
Platinum	170	180	230
Palladium	135	140	180
Rhodium	14	15	19

Supplies of metal from Zimplats increased in 2009 too with platinum production in matte rising to 131,000 oz. Palladium output rose to 104,000 oz and rhodium production reached 12,000 oz. The Phase 1 expansion project continued during the year and Portal 1 reached its full production capacity of some 100,000 tonnes of ore per month in June 2009. Development of Portal 4 continues and should be complete by mid-2011 and additional tonnage from these two portals – including up to 80,000 tonnes per month from Portal 4 in December – more than balanced the effects of the early closure of the open pit in late 2008. In fact, mill throughput rose by almost 50 per cent from one year earlier. The Ngezi concentrator was commissioned in July 2009 and reached full capacity in September.

At Anglo Platinum's Unki mine, also on the Great Dyke, development continued in 2009 and the first ore has now been stockpiled for processing once the concentrator is commissioned in the final quarter of 2010.

The expansion at Ngezi raised mill capacity and lifted platinum group metal output from Zimplats in 2009.

OTHER PRODUCING COUNTRIES

Small amounts of platinum group metals are produced as by-products of mining in a number of other countries including China and Colombia. Supplies from these minor producers were relatively flat in 2009 at roughly 115,000 oz of platinum and 160,000 oz of palladium.

PGM Supplies: Other Producing Countries
'000 oz

Supply	2007	2008	2009
Platinum	120	115	115
Palladium	150	170	160
Rhodium	4	3	3

THE ZIMBABWEAN MINING INDUSTRY

Recent expansion in the mining of platinum group metals in Zimbabwe has finally started to make this country a significant producer.

Platinum was discovered on Zimbabwe's Great Dyke in the early 20th century, at around the same time that the metal was found in the Bushveld Complex. However, comparatively little development has occurred in Zimbabwe in the platinum mining sector since that date.

Interest in mining this 550 km long, 12 km wide geological structure has, though, increased in recent years. The four major platinum deposits on the Great Dyke (Hartley, Musengezi, Ngezi and Selukwe) are located in a 3-4 m thick mineralised seam which lies at shallow depths, typically of 250 m or less. The reef is platinum-rich but also has high base metal content, leading to high by-product credits and making mining potentially very economically attractive.

The Hartley mine which opened in the mid-1990s was the first serious attempt at platinum mining in Zimbabwe. Although this no longer produces any ore, active mines at Mimosa and Ngezi have since begun operations. A new mine is also under development at Unki. After several years of inactivity, exploration has restarted at a small number of other properties too.

Investment in Zimbabwean platinum mining has been gradual to date, inhibited by an uncertain political climate. The establishment in 2009 of a cross-party inclusive government in Zimbabwe has given grounds for cautious optimism over the operating environment for the mining industry, but the political situation remains somewhat fragile. In April 2010, confusion emerged over whether the new indigenisation law (equivalent to South Africa's Black Economic Empowerment rules) which required 51 per cent local ownership of large businesses would be enacted or not.

Recent expansions at Mimosa and Ngezi have increased production at both sites. Outline plans have also been developed for Phase 2 expansion at Ngezi – adding 2 million tonnes of ore to output, roughly equivalent to 200,000 oz per annum of pgm – and for Wedza Phase 6 at Mimosa. If these occur, together with production from Unki, this would make Zimbabwe the world's third largest producer of platinum as it finally starts to fulfil its potential.

HARTLEY

Hartley was developed in the mid-1990s by Delta Gold and BHP. Mining began in 1997 but was suspended in June 1999 due to geological problems and low productivity. Peak production was close to 150,000 oz of pgm per year. Hartley is now owned by Zimplats (which is majority owned by Impala) and, although no mining is carried out, concentrate from Ngezi is processed into matte at the Selous Metallurgical Complex at Hartley before being sold to Impala Refining Services (IRS) for further processing in South Africa.

NGEZI

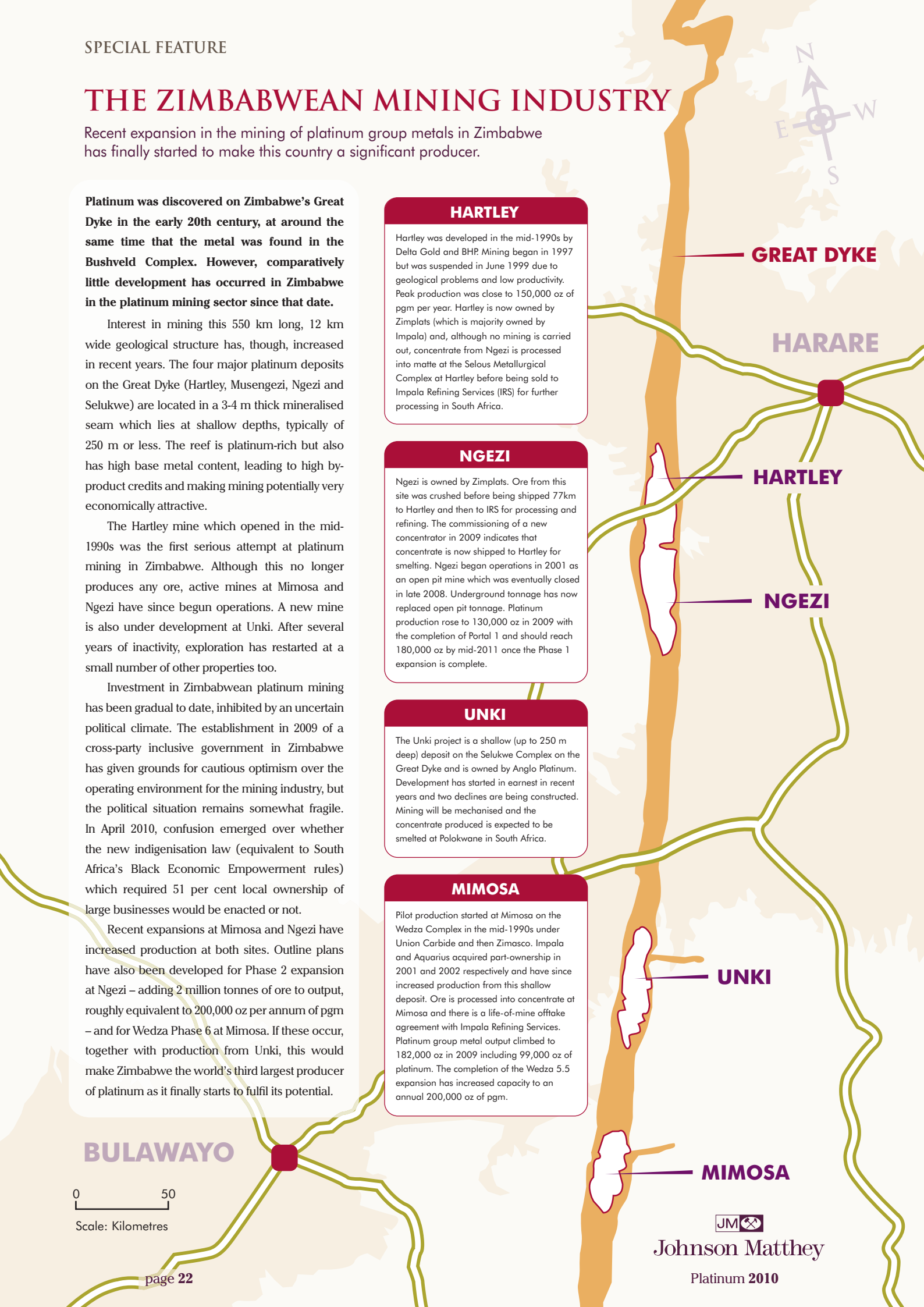
Ngezi is owned by Zimplats. Ore from this site was crushed before being shipped 77km to Hartley and then to IRS for processing and refining. The commissioning of a new concentrator in 2009 indicates that concentrate is now shipped to Hartley for smelting. Ngezi began operations in 2001 as an open pit mine which was eventually closed in late 2008. Underground tonnage has now replaced open pit tonnage. Platinum production rose to 130,000 oz in 2009 with the completion of Portal 1 and should reach 180,000 oz by mid-2011 once the Phase 1 expansion is complete.

UNKI

The Unki project is a shallow (up to 250 m deep) deposit on the Selukwe Complex on the Great Dyke and is owned by Anglo Platinum. Development has started in earnest in recent years and two declines are being constructed. Mining will be mechanised and the concentrate produced is expected to be smelted at Polokwane in South Africa.

MIMOSA

Pilot production started at Mimosa on the Wedza Complex in the mid-1990s under Union Carbide and then Zimasco. Impala and Aquarius acquired part-ownership in 2001 and 2002 respectively and have since increased production from this shallow deposit. Ore is processed into concentrate at Mimosa and there is a life-of-mine offtake agreement with Impala Refining Services. Platinum group metal output climbed to 182,000 oz in 2009 including 99,000 oz of platinum. The completion of the Wedza 5.5 expansion has increased capacity to an annual 200,000 oz of pgm.



RECYCLING

- **Recycling of scrapped automotive catalysts fell in 2009. Recovery of platinum dropped by 26.5% to 830,000 oz; recycling of palladium fell by 15.4% to 965,000 oz; and rhodium recovery slipped 17.6% lower to 187,000 oz.**
- **Recycling of end-of-life electronics climbed in 2009. Recovery of platinum increased to 10,000 oz while recovery of palladium rose by 14.5% to 395,000 oz. Little ruthenium was reclaimed from this source.**
- **Recycling of jewellery decreased in 2009. Platinum recovery decreased by 18.7% to 565,000 oz worldwide. The weight of palladium reclaimed from this source declined by 46.2% to 70,000 oz.**

In most of the industrial applications of the platinum group metals, the precious metal is contained within a closed loop process where it can be readily reclaimed and recycled by the same organisation which initially purchased it. For instance, in the nitric acid industry, used platinum and palladium gauzes are frequently refined after use with the remaining metal typically re-used in a new gauze. Likewise, in the glass industry, bushings used in the manufacture of fibre glass are melted and reprocessed into new bushings. There is little purpose in reporting recycling in such applications, since control and ownership of the metal never change hands, and we continue to report net and gross demand figures which are identical.

However, in three major applications – autocatalysts, electronics and jewellery – the platinum group metal is contained in a product which is sold to an end consumer and control and ownership of the metal therefore change hands. The market dynamics for consumers returning metal can differ greatly from the factors underlying initial demand. In each of these sectors, there is generally sufficient metal present for recycling to be economically attractive. Because the amount of metal returning from these sectors has grown, we have decided to report gross demand and open loop recycling figures (i.e. not including scrap from the production process itself) for these three applications, with the metal recovered allocated to the region where the scrapped material had been in use rather than where it was reprocessed. For a precise definition of recycling, see the note on page 60.

AUTOCATALYST RECOVERY

Weak sales of new vehicles in most markets during 2009 led to significantly lower numbers of used vehicles being scrapped than in the previous year. This drove the number of end-of-life catalysts available for recycling sharply lower for the first part of the year in almost every region.

Additionally, the catalyst recycling industry had raised recycling rates strongly – by processing stocks of spent catalysts previously collected – during the corresponding period of 2008 in response to high metal prices. The significant decline in the value of palladium, platinum and rhodium since then and the exhaustion of these stocks led to a very sharp decline in recycling volumes, with some processors reporting running rates for the first six months of 2009 over fifty per cent below those occurring in the first half of 2008.

However, the introduction of a number of national scrappage schemes supported the new car market in the second half of the year. Notably, the US scheme subsidised the purchase of almost 700,000 vehicles in one month with anecdotal evidence suggesting that many of these would not have occurred without the "Cash for Clunkers" scheme.

Importantly, in order to qualify for these incentives, consumers in many countries had to provide documentary evidence that they had scrapped a vehicle. This both raised the number of end-of-life vehicles being traded-in from the previous anaemic levels and forced the percentage of these which were actually scrapped and reprocessed sharply higher, leading to the recovery of more catalytic converters and a greater weight of platinum group metals in the second half of 2009 than in the first half of the year. North American recovery was boosted by the scrapping of vehicles which were not then replaced.

These subsidy schemes also introduced some other distortions into the market. Consumers were incentivised to scrap vehicles rather than sell them to second-hand dealers even if the vehicle was still driveable. As a result, the average age of an end-of-life vehicle fell, resulting in higher-loaded, palladium-rich parts being recovered. However, the average size of a scrapped vehicle decreased in most regions, leading to the recovery of smaller end-of-life catalysts and offsetting much of the effect of this higher metal loading.

Overall, recycling volumes in 2009 were significantly lower than in the previous year: the weight of platinum recovered fell by 26.5 per cent to 830,000 oz; the weight of palladium recovered decreased by 15.4 per cent to 965,000 oz; and the weight of rhodium recovered dropped by 17.6 per cent to 187,000 oz.

ELECTRICAL RECOVERY

The recovery of platinum group metals from open loop recycling of electronic and electrical goods increased strongly during 2009. Legislation exists in many jurisdictions to ensure the recycling of larger consumer electronics goods and this has helped to drive recovery rates of metal from these devices higher over recent years. For smaller devices, recycling rates remain relatively low since these items are often retained or simply disposed of as waste at the end of their useful lives.

Electronics recyclers typically recover the most economically-significant elements – often gold or copper – from end-of-life equipment first. The strong performance of the gold price during 2009 therefore encouraged higher recycling of electronic devices and components, in contrast to the autocatalyst recycling sector where the prices of the platinum group metals were more important.

With sales of personal computers and other consumer electronics devices surprisingly resilient during 2009, the weight of metal recovered from scrapped items increased. Palladium recovery rose by 14.5 per cent to 395,000 oz. Recovery of platinum is much lower, with far less of this metal used in the electronics industry, but the amount of metal recovered rose from 5,000 oz to 10,000 oz. Recovery of ruthenium and other platinum group metals remained minimal.

JEWELLERY RECOVERY

Recovery of platinum from the global jewellery sector fell by 18.7 per cent in 2009 to 565,000 oz. Only 70,000 oz of palladium were recovered during the same period, a fall of 46.2 per cent from 2008. Relatively little metal is returned by consumers for recycling in Europe, North America or the Rest of the World region (although some material is recycled due to bankruptcies within the industry). However, the situation is different in China and Japan, with considerable volumes of metal recovered from jewellery consumers and reprocessed. Open loop recycling figures also include unsold retail and wholesale stocks which were remanufactured but do not include production scrap.

In Japan, an extensive recycling infrastructure has been developed over recent years, leading to substantial growth in the amount of platinum jewellery returned for recycling. This reached a peak in 2008 as the platinum price approached its historical highs in Yen terms and consumers returned old, inherited or broken pieces of platinum jewellery in large volumes. The decrease in the platinum price which occurred in late 2008 has since reduced this flow of second-hand jewellery. The weight of platinum recovered within Japan – whether re-used in jewellery or sold into other sectors – decreased by 51.6 per cent to 230,000 oz in 2009. The weight of palladium recovered – from platinum and white gold alloys rather than from palladium jewellery, little of which is sold in Japan – also decreased, falling to 20,000 oz.

In China, there are two routes for second-hand jewellery to return from consumers for recycling. Individuals can part-exchange broken or old pieces for newer platinum or gold jewellery at many shops. Anecdotal evidence suggests that this occurs in some ten per cent of purchases. The huge rise in consumer sales of platinum jewellery therefore drove a substantial increase in the recycling of platinum from this source. However, the lower metal price – compared to 2008 – reduced the amount of jewellery sold back for cash rather than in part-exchange.

With consumer purchasing running at high levels, fewer unsold pieces were returned for recycling by retailers. Overall, though, the amount of platinum recovered from the Chinese jewellery sector rose from 210,000 oz in 2008 to 330,000 oz in 2009. Most of this metal was re-used within the industry.

Recovery of palladium from the Chinese jewellery sector decreased, falling from 90,000 oz in 2008 to 50,000 oz in 2009. Large amounts of Pd950 (95 per cent purity) jewellery were made in 2004 and 2005 and purchased by retailers. These same stores have since recycled much of this stock for remanufacture into the more popular Pd990 (99 per cent purity) alloy. With decreasing amounts of this Pd950 stock available, and consumer exchange of second-hand pieces relatively rare, recycling rates have continued to dwindle.

Relatively small amounts of palladium jewellery have been sold to date in North America and Europe and only small amounts of metal are reclaimed from this source. In fact, despite a recent increase in jewellery recycling – driven by the high price of gold – recycling rates remain fairly low in both regions, leading to little recovery of palladium from platinum or white gold alloys. Recovery of other platinum group metals from the jewellery sector was also negligible.

Recycling
'000 oz

	Platinum		Palladium		Rhodium	
	2008	2009	2008	2009	2008	2009
Autocatalyst	(1,130)	(830)	(1,140)	(965)	(227)	(187)
Electrical	(5)	(10)	(345)	(395)	0	0
Jewellery	(695)	(565)	(130)	(70)	0	0
Total	**(1,830)**	**(1,405)**	**(1,615)**	**(1,430)**	**(227)**	**(187)**

PLATINUM

- **Gross demand for platinum decreased by 11.9% to 7.04 million oz in 2009. Net platinum demand fell by 8.5% to 5.64 million oz.**
- **Open loop recycling returned 1.41 million oz of platinum to the market from scrapped autocatalysts, electronics and jewellery, a decrease of 23.2% from 2008.**
- **Gross platinum demand from the automotive sector fell by 39.0% to 2.23 million oz in 2009.**
- **Gross industrial demand for platinum declined by 33.7% to 1.14 million oz last year.**
- **Gross platinum jewellery demand rose strongly in 2009, climbing by 46.1%, to 3.01 million oz.**
- **Net identifiable physical investment demand for platinum climbed by 18.9% to 660,000 oz in 2009.**

AUTOCATALYST

Due to the weakness in the global economy, gross global automotive sector demand for platinum fell by 39.0 per cent during 2009, to 2.23 million ounces, the lowest level since 2000. European demand was worst hit, falling by just over half to only 970,000 oz. North American, Japanese and Rest of the World demand for platinum also fell, declining by 26.6 per cent to a combined 1.13 million ounces. Despite strong growth in vehicle production in China, demand decreased by 10.3 per cent to 130,000 oz due to replacement of platinum catalysts by palladium ones.

Europe

Light duty vehicle production in Europe fell from 19.3 million units in 2008 to only 16.0 million units last year due to the effects of the global recession. In the first half of the year in particular, consumers delayed purchasing vehicles because of worries over their personal financial situation. The auto makers worked hard to reduce their stocks of unsold vehicles too, leading to production rates falling some way below even the weak sales rates seen during this period.

Gross demand for platinum from the European autocatalyst industry declined by more than half, falling to 970,000 oz compared to 1.97 million ounces one year earlier, as lower vehicle output and a temporary decrease in the market share of the diesel engine took effect. Additionally, the move to destock metal, catalysts and vehicles which took place at the start of the year was not reversed to any significant extent during 2009 and platinum demand was therefore lower than the level of vehicle sales would normally suggest.

However, a number of European governments launched incentive schemes – mostly in the form of subsidies on purchases of new cars provided on scrappage of an older model – from early 2009. This generated some significant consumer interest and boosted both vehicle sales and production, although this had little positive impact on platinum demand.

The subsidies available to consumers proved to be particularly attractive to purchasers of smaller vehicles. With these small cars generally being powered by gasoline engines, the market share of the diesel engine was driven lower. Fleet sales to commercial organisations – again typically of diesel passenger cars and trucks – were also weak due to poor economic conditions and a lack of available credit, adding to the downturn in the diesel engine's market share and dragging platinum demand lower. The market share of the diesel engine decreased from 52.7 per cent of all new cars sold in Western Europe in 2008 to 45.9 per cent in 2009 (following a slight revival in diesel sales in the final quarter). Production and sales of heavy duty diesel trucks were poor too, as fleet operators delayed replacement purchases, again with a negative effect on platinum demand.

The continued price difference between platinum and palladium led to increased use of palladium alongside platinum in diesel aftertreatment formulations, further trimming European automotive platinum demand in favour of palladium (although platinum remains the dominant metal in diesel catalysts). Around one fifth of the metal used in light duty

Platinum Demand: Autocatalyst
'000 oz

	Gross		Recycling		Net	
	2008	2009	2008	2009	2008	2009
Europe	1,970	970	(385)	(290)	1,585	680
Japan	610	395	(60)	(50)	550	345
North America	505	370	(625)	(425)	(120)	(55)
China	145	130	(15)	(20)	130	110
Rest of the World	425	365	(45)	(45)	380	320
Total	**3,655**	**2,230**	**(1,130)**	**(830)**	**2,525**	**1,400**

diesel aftertreatment was palladium compared to roughly one eighth of total light duty diesel pgm demand a year earlier.

One of the few positive developments for platinum demand in this region was the introduction of European light duty Euro 5 emissions rules during 2009. These effectively mandated the fitment of diesel particulate filters (DPFs) to new diesel models from the final quarter of the year. The proportion of vehicles fitted with such filters in addition to diesel oxidation catalysts increased strongly, adding some additional platinum demand.

Japan

Gross platinum demand for use in autocatalysts fitted to vehicles manufactured in Japan declined by 215,000 oz to 395,000 oz in 2009, roughly in line with production of passenger cars which fell by 30.9 per cent to only 6.86 million units.

Following a healthy performance in 2008, the Japanese market was certainly not immune to the effects of the global economic crisis last year. With domestic sales struggling and economic conditions weak in many of Japan's major export markets, output fell sharply at the Japanese car makers, forcing cuts even in domestic manufacturing. Sales and output of the largest vehicles were disproportionately affected by the economic crisis and platinum demand – principally for catalysts fitted to vehicles destined for export – therefore fell by a marginally greater proportion than did vehicle production.

North America

After a difficult year in 2008, last year proved to be even more challenging for the North American automotive sector and platinum demand in the region (comprising the USA and Canada) fell by a further 26.7 per cent to 370,000 oz.

The US economy was especially weak in the early parts of 2009 with consumers worrying about debt repayments and job security. Purchases of "big ticket" items such as automobiles were particularly affected, with a lack of availability of new credit also hitting consumers' ability to purchase or lease new vehicles. With the stocks of unsold vehicles at dealers increasing, the auto makers were forced to slash production to extremely low levels.

The launch of the one-month long "Cash for Clunkers" scrappage incentive scheme finally provided some support for the automotive sector in mid-July by incentivising the sale of almost 700,000 vehicles. A gradual improvement in the economy lifted vehicle sales and manufacturing in the final quarter of the year but light duty vehicle production still fell by 32.7 per cent to 7.1 million units in the region.

The decline in platinum demand was less steep than this. Consumers started to purchase smaller vehicles than before, reducing average catalyst sizes. However, tightening emissions rules raised typical catalyst platinum loadings. The poor short term prospects for the regional economy also hit the heavy duty diesel sector with many fleet operators opting to delay purchases of new trucks. This cut a further 50,000 oz from demand in 2009 and deferred this to future years.

China

Automotive sector demand for platinum in China fell last year, decreasing by 10.3 per cent to 130,000 oz as the auto makers continued to substitute platinum with palladium in three-way (gasoline) catalysts. Additionally, we have downgraded our figure for platinum demand in this market for both 2008 and 2009 due to new information on the use of catalyst aftertreatment in the heavy duty diesel sector.

The Chinese domestic economy performed well throughout 2009, with growth continuing at a high rate. The national government made a number of moves to enhance domestic consumption in an effort to offset the weakness in many of China's industrial export markets. The reduction in sales taxes on smaller vehicles (with engine displacement below 2.0 litres) and the introduction of subsidies for rural purchasers of cars strengthened the market considerably, sending production of passenger cars a sharp 47.6 per cent higher to 8.4 million units, making China the world's biggest producer in 2009.

However, most of the vehicles manufactured and sold in China are gasoline-fuelled and are therefore fitted with palladium-based three-way catalysts rather than with platinum technology. The introduction of Euro 3 and Euro 4 equivalent emissions rules part-way through the year provided local and foreign-owned manufacturers alike with an economically-attractive opportunity to change any platinum-based catalysts fitted to their vehicles to use cheaper palladium-based technology. This eroded usage of platinum in the gasoline sector, depressing platinum demand in this country.

Rest of the World

Automotive platinum demand in the Rest of the World region weakened by 14.1 per cent in 2009, falling to 365,000 oz, although the picture varied from country to country.

In Russia and Mexico, for instance, car output fell substantially and platinum demand, although relatively small

Gross electrical sector demand for platinum fell by nearly a fifth in 2009 due to widespread destocking, despite improving output in the second half of the year.

in both countries, declined as a result. In South Korea, although vehicle production decreased relatively little from 2008, the number of diesel vehicles produced for export to Europe – the source of much of the local demand for platinum – fell further, dragging platinum demand lower.

However, in India the effects of the weak global economy were limited and passenger car production – including diesel vehicles for the domestic market – rose to 2.3 million units, boosting platinum demand, aided by some prefitment in advance of the Bharat stage 4 emissions legislation.

JEWELLERY

Gross platinum jewellery demand (equal to the sum of manufacturing demand and any increases in stocks of unprocessed metal) grew by 46.1 per cent in 2009, rising from 2.06 million ounces to 3.01 million ounces, driven by very strong Chinese purchasing. Gross Japanese demand edged 5,000 oz higher to 535,000 oz. Outside China and Japan, the weak global economy restricted consumer purchasing of platinum, forcing gross demand lower in most regions. Changes in jewellery recycling are discussed in our recycling chapter on page 24.

Europe

The European jewellery sector purchased a gross 185,000 oz of platinum during 2009, a fall of 9.8 per cent from the previous year. Unsurprisingly, the weak state of the regional economy depressed manufacturing demand for platinum jewellery and watches in most European countries.

Within the UK, the sharp fall in consumer spending in the early part of the year hurt demand for jewellery in general. However, the fall in the price of platinum from its mid-2008 peak improved the affordability of platinum jewellery, with the number of pieces hallmarked rising from the levels of the previous year. The market for bridal jewellery remained firm in markets including the UK, Germany and Italy, meaning that demand for platinum rings proved to be remarkably resilient.

Elsewhere in Europe, much jewellery platinum demand is from the luxury sector. Within most of Europe, sales of luxury goods were relatively poor and, although platinum maintained its share of the market, demand slipped lower. The manufacturing of high-end jewellery in Europe for export to Chinese markets did, however, offset some of this weakness. A decline in the production of Swiss platinum watches – almost the archetypal luxury product – led to a fall of 20,000 oz in platinum demand as manufacturers and distributors minimised stock levels in response to the recession and consumers were unable or unwilling to purchase these items in the difficult economic climate.

Japan

Gross demand for platinum from the Japanese jewellery market climbed by 5,000 oz to 535,000 oz in 2009.

Although Japan's economy remained weak during 2009, the strength of the Yen against most other currencies meant that the platinum price remained significantly lower than it had been during much of the previous year. Those stores which reduced retail prices earliest were thus rewarded by increased sales of platinum as it captured some share of the bridal market from white gold. However, as the platinum price rose, white gold began to recapture some of its lost market share, leaving consumer demand only marginally higher than in 2008.

Japanese demand did benefit from healthy sales of Kihei "investment" chain and from very strong exports of rings and lighter weight chain to China, a relatively recent trend. Demand within Japan was also supported by purchases made by Chinese visitors to Japan: anecdotal evidence indicates that ten per cent of sales in Tokyo's Ginza area may be to tourists.

Although there have been some reports of lower-purity alloy pieces on sale in Japan, these remain sporadic.

As we have previously reported, the volume of metal recovered by recycling old jewellery from the Japanese market dropped last year, forcing net jewellery platinum purchases higher. For more details on this, please see page 24.

Within China, plain platinum and gold jewellery is typically priced per gram, with the price displayed on boards such as this.

North America

2009 was a challenging year for the North American jewellery market and gross demand for platinum fell by 32.5 per cent – the sixth successive annual decline – to 135,000 oz.

The North American economy was particularly weak in 2009 and consumers responded to worries over their personal economic situation by reducing their discretionary spending. As expected, this impacted heavily upon the jewellery market, with sales of all types of jewellery falling in response. The poor economic conditions also encouraged manufacturers and retailers to reduce their working stocks of platinum.

Although the bridal sector performed better than most other market segments, even here, price pressures were evident. While the platinum price was lower than it had been for much of 2008, marrying couples still reduced their overall spend on wedding jewellery. This allowed palladium and base metals to gain some market share in men's wedding bands and also led to a slight decrease in the average weight of pieces sold, further hurting demand. However, sales of platinum jewellery by online retailers showed some growth.

China

Gross purchases of platinum by the Chinese jewellery industry (equivalent to the sum of manufacturing demand plus any increases in unmanufactured metal stocks throughout the supply chain) were extremely strong during 2009, almost doubling to an all-time high of 2.08 million ounces.

With the Chinese economy still in robust health, consumer purchasing of all types of jewellery strengthened. Despite the gains in the platinum metal price throughout the year, the retail price of platinum jewellery remained below the high levels of early 2008 for the whole of 2009, improving the affordability of platinum jewellery in almost every city. Additionally, the rising price of gold narrowed the gap in the relative cost of jewellery made from these two metals, allowing platinum to recapture market share from white gold, gem-set jewellery. Consumer purchases of platinum jewellery therefore strengthened considerably.

Retailers and wholesalers also took advantage of the lower platinum price at the end of 2008 and the start of 2009 in order to rebuild stock levels which they had previously run down. With sales of all jewellery so strong, retailers added additional space to their existing stores and expanded the number of stores they operated too. This generated some additional consumer purchasing but, as importantly, led to extra demand in order to build inventories. Wholesalers too were driven to increase their working stocks of platinum jewellery.

At the manufacturer level, high demand for platinum jewellery boosted profit margins, encouraging many companies to devote more resources to the manufacturing of platinum jewellery instead of palladium and white gold production. These enhanced potential profits also attracted a number of other organisations to move into this space to start jewellery manufacturing, adding further to the industry's growing metal inventory.

Overall, we believe that at least 300,000 oz of demand for platinum in 2009 was due to the combined stock-build which took place at the manufacturing, wholesaling and retailing levels. A degree of stock rationalisation did occur in the final months of the year at some manufacturers but the rising price seems to have also encouraged stock-building at others and the net impact of the price on metal demand was limited during this period.

For information on the recycling of platinum from jewellery within China, please see page 24.

Platinum Demand: Jewellery
'000 oz

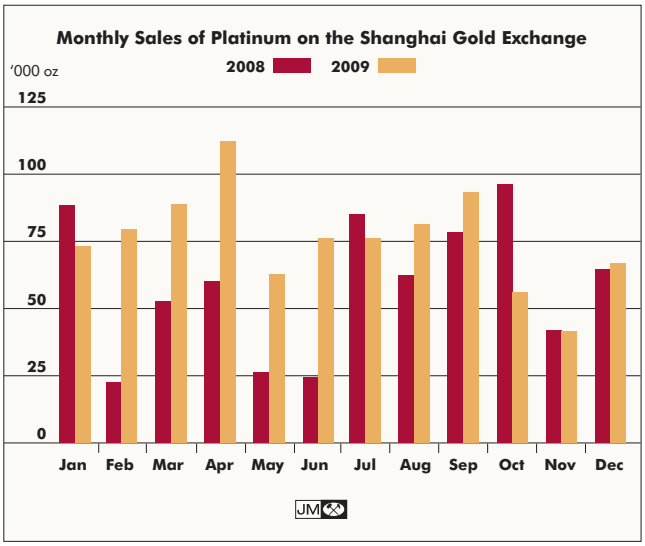
	Gross[1]		Recycling[2]		Net[3]	
	2008	2009	2008	2009	2008	2009
Europe	205	185	(5)	(5)	200	180
Japan	530	535	(475)	(230)	55	305
North America	200	135	(5)	0	195	135
China	1,060	2,080	(210)	(330)	850	1,750
Rest of the World	65	75	0	0	65	75
Total	**2,060**	**3,010**	**(695)**	**(565)**	**1,365**	**2,445**

NOTES TO TABLE

[1] Gross demand is equivalent to the sum of platinum jewellery manufacturing volumes and any increases in unfabricated metal stocks within the industry.

[2] Recycling represents the amount of old stock and old jewellery recycled whether the metal is re-used within the jewellery industry or sold back to the market.

[3] Net demand is the sum of these figures and therefore represents the industry's net requirement for new metal.



The weight of platinum purchased on the Shanghai Gold Exchange – much of which is used in the jewellery industry – climbed to record levels in 2009.

Strong purchasing of platinum in the form of coins, bars and Exchange Traded Fund positions drove physical investment demand higher in 2009.

Rest of the World

Gross purchases of platinum by the jewellery industry in our Rest of the World region rose by 10,000 oz to 75,000 oz.

Platinum jewellery is produced in a number of countries for export to the USA and the poor state of the North American retail market negatively affected demand from this sector. However, a recent decision to increase the investment in marketing platinum jewellery within India has boosted confidence in this market and generated some additional domestic demand, more than offsetting weak exports to the US market.

INVESTMENT

Identifiable physical investment demand strengthened during 2009, climbing by 18.9 per cent from 2008 levels to 660,000 oz. Purchasing of coins and small bars was stronger than in 2008 and generated demand of some 105,000 oz. Purchases of large bars in all forms decreased to 165,000 oz. However, most importantly, Exchange Traded Fund (ETF) holdings increased by some 390,000 oz.

In the coin sector, the US Mint did not release any of its platinum American Eagle coins for sale until the end of the year due to a focus on meeting high demand for gold bullion. Nonetheless, the underlying consumer appetite for coins remained healthy, leading to the proof coins eventually minted selling their annual production in a very short period after their release. Sales of coins from other mints including the Royal Canadian Mint and the Perth Mint in Australia were also strong as they benefited from unsatisfied investment interest in precious metal coins. This strengthening of precious metal investing interest by the general public also led to increased demand from the sale of small bars in North America.

Demand for platinum from Japanese retail investors decreased from 385,000 oz in 2008 to 160,000 oz last year. The explosion of the global economic crisis in the final months of 2008 significantly increased the risk aversion of a typical investor, leading to large flows of money into so-called "safe haven" investments such as precious metals. Net purchasing of platinum bars – primarily as over-the-counter investment – soared to historically high levels in the final quarter of 2008 and continued to be strong in the first quarter of 2009. However, as the prospects of a total collapse of the world's financial system receded, purchasing returned to a more typical pattern for the final three-quarters of the year: net sales by the general public of large bars in over-the-counter transactions and a low level of net buying interest through accumulation plans.

Identifiable physical investment demand within Europe climbed to 385,000 oz in 2009 from 105,000 oz one year earlier, with almost all of this demand attributable to the flows of metal into Exchange Traded Funds based in London and Zurich.

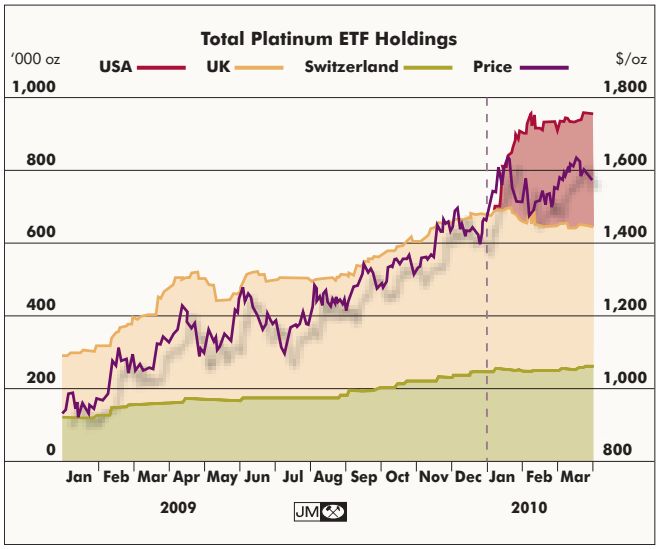
Investors had redeemed large amounts of platinum from ETF positions in the second half of 2008 as the metal price fell, but reversed this behaviour at the start of 2009 once the price had shown initial signs of recovery. Very large amounts of metal were transferred into ETF holdings in the first half of the year in response to the weak US Dollar and rising prices across the precious metals complex. When the gold price started to rise towards record levels in the final quarter of the year and global economic prospects finally began to improve, investment flows into the platinum ETFs returned. With relatively few large redemptions (sales of metal by investors), demand increased dramatically from 2008 levels.

Buying through the Australian ETF generated 5,000 oz of platinum demand. Although the seed metal (10,000 oz) for the launch of the US-based ETF was purchased during 2009, we do not include this in our demand figures for last year.

Platinum Demand: Investment
'000 oz

	2007	2008	2009
Europe	195	105	385
Japan	(60)	385	160
North America	30	60	105
China	0	0	0
Rest of the World	5	5	10
Total	**170**	**555**	**660**

Purchasing of platinum through the European Exchange Traded Funds was strong throughout the whole of 2009.



CHEMICAL

The chemical industry purchased 295,000 oz of platinum in 2009, some 105,000 oz less than it bought in the previous year. The economic slowdown had relatively little impact on the amount of new capacity constructed but less metal was required to top-up current operations than had been the case in 2008.

The construction of a new chemicals facility is often a multi-year process and, where companies had commenced installing new capacity before the economic downturn, most continued this construction last year. One exception, though, was where the expectation of slower medium term growth in global requirements for para-xylene resulted in a delay in the completion of new facilities within Asia. We have therefore downgraded our figure for 2009 demand by some 60,000 oz, although we now expect this expansion to take place in 2010.

However, after several years of strong growth, the chemical sector had, in any case, entered a cyclical slowdown with less new capacity scheduled to be installed than had occurred a few years earlier. Purchases of new metal for plants therefore shrank somewhat from the 2008 figure despite some growth in process catalyst demand in Asia.

As importantly, the financial crisis depressed demand for a number of commodity chemicals and many plants were operated at significantly below their rated capacity. With throughputs limited, catalyst lifetimes were extended and less metal was required to replace in-process losses than was purchased in 2008. This effect was seen in the nitric acid industry where companies worked to minimise their stocks of fertilisers in the first half of the year, severely depressing plant

Platinum Demand: Chemical
'000 oz

	2007	2008	2009
Europe	110	105	70
Japan	55	55	45
North America	95	95	65
China	70	60	40
Rest of the World	90	85	75
Total	**420**	**400**	**295**

throughput. Once this destocking had been completed, nitric acid production improved and platinum demand returned to closer to normal levels for the remainder of the year.

In the silicones sector, where the platinum catalyst is trapped in the final product, a small decrease in demand for silicones for pressure release applications translated into lower platinum requirements. Catalyst manufacturers also continued to thrift the platinum content of their products, further depressing demand. However, a challenging economic environment and a lower platinum price meant that few manufacturers were willing to make the capital investment to upgrade their production lines, limiting the scope of thrifting in the industry and the fall in platinum demand.

PETROLEUM REFINING

Widespread weakness in the global economy in 2009 was reflected in low consumer demand for refined oil products. With destocking occurring in the first half of the year too, net platinum demand from the petroleum refining industry decreased by 14.6 per cent to 205,000 oz last year.

Lower demand for gasoline and most petrochemicals caused many oil refineries to run at significantly below their rated capacity for most of 2009. Although capacity utilisation did improve throughout the year, this low throughput led to extended catalyst lifetimes and reduced the industry's need to purchase platinum to top-up catalyst losses.

Platinum Demand: Petroleum Refining
'000 oz

	2007	2008	2009
Europe	25	30	25
Japan	5	10	10
North America	30	25	15
China	10	10	10
Rest of the World	135	165	145
Total	**205**	**240**	**205**

Uncertainty over the pace of economic recovery also had a negative impact upon platinum demand by delaying expansions of refining capacity in North America and elsewhere. While we expect most of these projects to be completed eventually, many will now generate additional platinum demand one or two years later than had originally been planned.

ELECTRICAL

Gross electrical sector demand for platinum (equivalent to the sum of manufacturer demand and any stock changes) fell by 17.4 per cent to 190,000 oz last year. Over half of total demand was for use in the hard disk sector.

2009 was a better year for the electronics industry than had initially been expected. Although purchases of electronic goods were very weak at the start of the year, they gradually improved as the year progressed with factory utilisation rates rising to more normal levels. For the year as a whole, sales of consumer electronics including personal computers were little different from one year earlier although business investment in IT infrastructure remained muted.

Platinum Demand: Electrical
'000 oz

	Gross		Recycling		Net	
	2008	2009	2008	2009	2008	2009
Europe	20	20	(5)	(5)	15	15
Japan	35	30	0	0	35	30
North America	30	25	0	0	30	25
China	30	20	0	0	30	20
Rest of the World	115	95	0	(5)	115	90
Total	**230**	**190**	**(5)**	**(10)**	**225**	**180**

Other recent trends occurring in this sector continued into 2009. Further miniaturisation of PCs – as shown by growth in the sales of notebook computers – led to decreases in average hard disk size and a fall in platinum content per disk. However, increases in data-processing requirements boosted the average number of hard disks per device slightly, maintaining platinum demand.

However, the industry did carry out a large amount of destocking in the early months of 2009. With consumer demand weak and credit increasingly challenging to obtain, the industry reduced its inventories at every level (whether of finished goods, hard drives, sputtering targets or raw metal) during this period. Production of hard disks therefore underperformed headline sales, leading to a fall of some 30,000 oz in platinum demand from the hard disk sector.

Platinum Demand: Glass
'000 oz

	2007	2008	2009
Europe	15	(25)	5
Japan	85	65	40
North America	25	(5)	(35)
China	180	85	(90)
Rest of the World	165	195	90
Total	**470**	**315**	**10**

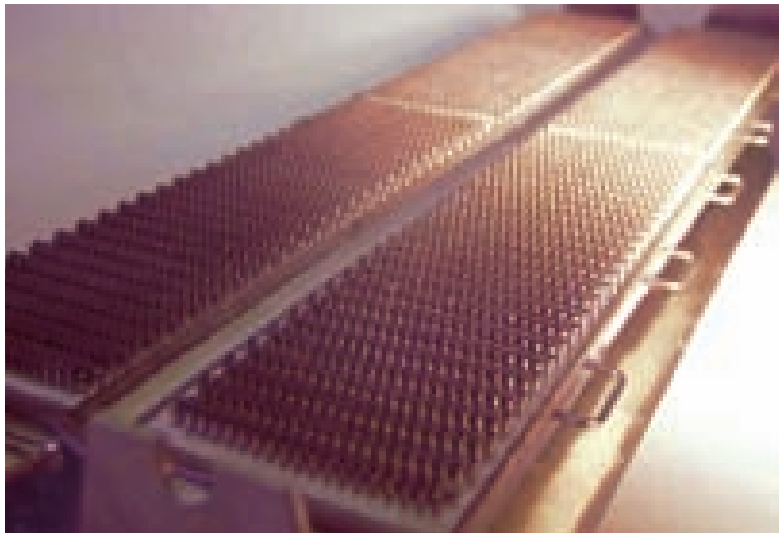
The amount of platinum used in the fuel cell sector rose with the launch of limited edition products such as Toshiba's fuel cell mobile phone charger providing a boost to demand, although demand remains small. The usage of platinum in other electronic applications, including plating, fell due to destocking and low output in areas such as automotive electronics.

For details on recovery of platinum from end-of-life electronics, please see page 24.

GLASS

Net glass sector demand for platinum fell very heavily, from 315,000 oz in 2008, to 10,000 oz in 2009. The fibre glass industry purchased less platinum than in the previous year and the closure of a number of cathode ray tube (CRT) television glass factories returned some platinum to the market. The LCD glass industry also experienced a reduction in platinum demand.

The long term trend of relocating fibreglass production from Europe and North America to Asia continued last year. Although the Chinese economy grew strongly during 2009,



Demand for platinum from the glass sector decreased sharply in 2009 due to slower industry expansion and the closure of some CRT glass plants.

domestic fibreglass production – representing the majority of world output – did not keep pace. Key export markets such as the North American construction industry were weak, limiting demand for Chinese fibreglass. The pace of installation of new capacity thus slowed considerably, with the construction of some plants delayed. The fall in platinum demand in this sector was further exacerbated by a move towards the use of more durable, higher-rhodium, lower-platinum alloys at many manufacturers, particularly in Europe and North America, driven by the low rhodium price.

Flat screen television sets – principally LCD technology – continue to capture market share from conventional cathode ray tube sets. As a result, CRT glass factories continue to close at a rapid rate, particularly within China where most of this manufacturing is situated. The metal previously utilised at these plants is refined and sold back into the market. In previous years, this has been counterbalanced by demand derived from healthy expansion in LCD glass production capacity. Demand for LCD glass weakened substantially in the first half of 2009, leading to delays in plant construction and hence to much lower platinum demand. However, sales of flat screen sets improved to a degree in the second half of the year. The glass manufacturers responded by moving back into expansion mode, installing new capacity and supporting platinum demand to a limited extent.

MEDICAL & BIOMEDICAL

Net demand for platinum from the medical and biomedical sector (including demand from the dental sector) was little affected by economic conditions and increased from 245,000 oz in 2008 to 250,000 in 2009.

Platinum is used in a range of biomedical applications, including stents and pacemaker electrodes, due to its biocompatibility and mechanical and electrical properties. Output of these devices continues to grow but platinum demand fell marginally in 2009 as device manufacturers minimised metal inventories. Consumption of platinum in anti-cancer drugs has increased during recent years as global standards of healthcare have improved and demand for platinum in this application increased once more in 2009.

Platinum demand in the dental sector is highly dependent on the European market. Here, ceramic technology is steadily taking market share from precious metal treatments and platinum demand is slowly decreasing.

Platinum Demand: Medical & Biomedical
'000 oz

	2007	2008	2009
Europe	110	115	115
Japan	15	20	20
North America	80	85	90
China	10	10	10
Rest of the World	15	15	15
Total	**230**	**245**	**250**

Demand for platinum for use in automotive spark plugs decreased in 2009 due to lower global light duty vehicle output.

OTHER

Demand for platinum from all other applications fell by 100,000 oz to 190,000 oz last year. (Platinum demand for the biomedical, dental and medical sectors is now included in a separate medical and biomedical demand sector rather than in the other demand category for all years.)

The use of platinum in spark plugs and automotive sensors suffered badly due to lower global vehicle production. The weak world economy meant that aircraft utilisation declined, depressing the number of engines refurbished during the year. The number of new engines manufactured fell too and demand for platinum for use in coating turbine blades decreased.

Platinum Demand: Other
'000 oz

	2007	2008	2009
Europe	75	85	55
Japan	30	25	15
North America	135	150	90
China	5	10	10
Rest of the World	20	20	20
Total	**265**	**290**	**190**

THE CHINESE PLATINUM JEWELLERY MARKET

Strong consumer demand, healthy manufacturing output and stock-building of raw materials and finished pieces all contributed to a record performance by the Chinese platinum jewellery market in 2009.

INTRODUCTION

2009 was an exceptional year for platinum jewellery in China with gross demand rising from 1.06 million ounces to a record 2.08 million ounces. In the most general terms, this was due to the twin stimuli of a lower platinum price and a booming domestic economy. The real picture is rather more complex, with the motivations of consumers, manufacturers, retailers and wholesalers all playing their part.

DEFINING GROSS DEMAND IN THE JEWELLERY SECTOR

In previous years, Johnson Matthey has only reported net demand for platinum group metals in the jewellery sector. While recycling remained at low levels, this made sense and the numbers reported reflected the state of the market well. In recent years, though, in markets such as China and Japan, recycling has increased in volume and obscured the underlying trends in consumer and manufacturer purchases.

We have now therefore chosen to report demand as a gross figure, representing the total weight of metal bought by manufacturers from any sources and made into jewellery, plus any increases in stocks of unfabricated metal throughout the industry. Recycling figures – the amount of metal recovered from second-hand jewellery and from any wholesale and retail stock returned for reprocessing – are now reported separately.

To explain the underlying health of the market thus requires a focus on understanding manufacturing output and examining why stock changes take place in this industry.

CONSUMER PULL – PRICE

Consumer purchasing of platinum jewellery strengthened considerably during 2009. Growth in the Chinese economy maintained the positive mindset amongst domestic consumers. The Shanghai Stock Exchange performed particularly well during the first two-thirds of 2009, augmenting people's perceptions of their own personal wealth. Rising real estate prices also enhanced this "feel-good factor", encouraging higher discretionary spending.

Platinum demand increased by more than this effect alone would suggest, though. Plain platinum jewellery (i.e. pieces which do not contain precious or semi-precious stones) is typically priced by weight in Yuan per gram in China. In a normal year, this retail price – which is prominently displayed in most jewellery stores – would typically move in line with changes in the bullion price. In the first half of 2008, for example, the rising platinum price pushed the retail price of platinum jewellery to ever-higher levels, hurting consumer demand as it became less affordable.

Many retailers were slow to reduce prices in the early part of 2009 as they averaged down metal costs on existing stock. Thus, although the bullion price had fallen, consumer prices were relatively slow to follow. In some cities, retail prices were therefore still falling even as the platinum price rose in the second half of 2009. These lower retail prices improved the affordability of platinum compared to the previous year, releasing a surge of pent-up demand and sending consumer purchasing sharply higher. Imports of fine, lightweight platinum chain from Japan also benefited, helping to increase Japanese platinum jewellery manufacturing demand.

CONSUMER PULL – PLATINUM AND GOLD

The narrowing price differential between gold and platinum also aided platinum demand last year. With the gold price stronger than in 2008 and the platinum price weaker, the differential in price between the two metals shrank. Although the gold jewellery market remains very much larger than the platinum market, this made platinum relatively more attractive to some consumers, with demand for platinum improving accordingly.

This could readily be seen in the range of gem-set jewellery on display in retail stores. During 2007 and 2008, an increasing amount of white gold could be seen as retailers tried to maintain sales in the face of rising prices for platinum and for diamonds. However, white gold has a lower brand acceptance than does platinum within China. Thus, when the platinum price fell, retailers gladly returned to stocking more platinum at the expense of white gold. Consumers happily bought platinum at these more affordable prices instead of being forced to trade down to the cheaper white gold.

CONSUMER PULL – RISING AND FALLING PRICES

While lower platinum prices have clearly benefited affordability and platinum demand, the longer term impact of price changes and price volatility on consumer perception of platinum is more complex.

Precious metal jewellery in China is both an adornment and an investment. Although a rising price hurts affordability, it may make a material more attractive as an investment. To some extent, a rising metal price reinforces perceptions of the "store-of-value" status of precious metal jewellery as well as actually increasing its value.

For some consumers, the rising price of platinum in 2009 was therefore a positive factor, encouraging purchasing. For others, the precipitous fall in the price of platinum of late 2008 may have damaged confidence in its future value. The balance between these two opposing trends is hard to ascertain but this tension does demonstrate the complexity of consumer thinking in this market.

CONSUMER PULL – CALENDAR EFFECTS

The effects of the Chinese calendar also drove consumer purchasing in 2009. The year of the ox started in January and contained

two Springs (this number can vary due to discrepancies between when the Chinese New Year starts and when Spring begins) and was an auspicious year for marriages. (It is worth noting, however, that some of these marriages took place in the Chinese year of the ox but in calendar year 2010 and therefore will contribute to demand in 2010 rather than in 2009). The 9th of September 2009 also saw large numbers of weddings as the number nine is generally viewed as lucky: 09/09/09 was therefore an especially good day to marry.

Allied to this, the influence of dates in the Western calendar is increasing in China. Valentine's Day has become an increasingly important occasion and now forms one of the key buying seasons in China along with Chinese New Year, Christmas and the May and October National Day holidays. In 2009, Valentine's Day fell on a Saturday and retailers reported hugely positive sales, adding extra strength to an already good retail performance for the year.

MANUFACTURER PUSH

With consumer demand at very healthy levels and retailers and wholesalers increasing stock levels too, manufacturing demand strengthened considerably in 2009.

At various points during the year, latent demand – the amount of jewellery that manufacturers could have sold – was higher than their production capacity. Some companies refocused their production, manufacturing platinum jewellery instead of white gold and palladium. Almost every manufacturer increased capacity, recruiting more staff and investing in larger premises in several cases.

Weakness in manufacturing in the South of China of other goods for export – due to the global recession – contrasted with the rising profits available from platinum jewellery, both in total but also in margin per piece. This stimulated more investment into this sector and brought new companies into jewellery manufacturing. The increasing competition led to improvements in the design and quality of some of their pieces while many manufactures started to produce quantities of Pt999 (99.9 per cent purity alloy) jewellery in an attempt to further boost their profits.

CHANGES IN STOCK LEVELS OF FINISHED JEWELLERY

Manufacturing demand in 2009 was further augmented by significant increases in retail and wholesale stocks of finished platinum jewellery in China, driving gross demand upwards at a faster rate than the rise in consumer purchasing.

The consumer preference for platinum over white gold stimulated an increase in the amount of counter space devoted to gem-set platinum jewellery at retailers at the expense of white gold, leading to some of the stock-build which occurred at the retail level. Increases in plain platinum jewellery stock were also seen throughout the industry. Wholesalers expanded their stocks of finished jewellery in order to capture strong interest from the retailers.

In department stores, which account for a large proportion of jewellery sales in China, the store charges a percentage of turnover as commission from the individual concession-holders. A high gold price and good levels of sales of jewellery in general convinced these larger stores to devote more floor space to jewellery. It is questionable how much impact this had on sales of platinum but it did contribute to the increased levels of stock being held throughout the industry.

The ready availability of credit to businesses also encouraged independent retailers to add new outlets alongside their current operations in the larger cities or to expand into smaller, less affluent cities. Even a small store could require 50 oz or more of platinum in the form of initial stock with larger shops needing much more metal to stock their display cases.

Although the Chinese market is not yet saturated in terms of the number of jewellery stores per head of population, expansion of the number of retail outlets has slowed since late 2009. We also see little evidence of increasing stock-build due to platinum replacing other precious metals in retailer display cases and there have instead been some indications of stock reductions in response to recent rises in the platinum price.

CHANGES IN STOCK LEVELS OF UNPROCESSED METAL

Just as retailers and wholesalers had done, manufacturers had reacted to the rising platinum price of recent years by minimising the amount of metal they owned in raw or finished form or in their in-process inventories. By the time metal prices had reached their peak in the middle of 2008, these stocks had probably fallen close to a practical minimum. As the price fell, therefore, manufacturers bought heavily to rebuild stock levels in late 2008 and early 2009.

In order to increase their output of finished pieces, more metal was required in the form of working stocks at manufacturers. Many manufacturers try to keep their stocks at a flat value in Yuan terms and it can therefore be seen that the fifty per cent fall in the platinum price had a major impact on the amount of physical inventory held. The new manufacturers starting operations in China last year also each required a significant quantity of platinum to begin production.

The stock-build at the retailer , wholesaler and manufacturer levels added several hundred thousand ounces to platinum demand during 2009.

THE OUTLOOK FOR DEMAND IN 2010

Although the underlying health of the Chinese platinum jewellery sector remains fairly good, it is unrealistic to expect another year of such strong demand in 2010. The factors leading to the heavy stock-building of 2009 are unlikely to be repeated. Recent higher bullion prices have started to impact upon the affordability of platinum jewellery and there have been some early signs of inventory reductions in the first part of 2010, suggesting that while demand may be strong by historical standards, it is unlikely to reach the heights of 2009 this year.

PALLADIUM

- **Gross demand for palladium decreased by 6.3% to 7.77 million oz in 2009. Net palladium demand (taking into account recycling) fell by 5.0% to 6.34 million oz.**
- **Open loop recycling returned 1.43 million oz of palladium to the market from scrapped autocatalysts, electronics and jewellery, a decrease of 11.5% from 2008.**
- **Gross autocatalyst sector demand for palladium decreased by 9.3% to 4.05 million oz in 2009.**
- **Gross industrial demand for palladium, mostly from its use in the electrical and dental sectors, fell by 5.8% to 2.28 million oz last year.**
- **Gross palladium demand from the jewellery industry fell by 17.3% to a global total of 815,000 oz.**
- **Net identifiable physical investment demand for palladium climbed by 48.8% to 625,000 oz in 2009, with higher ETF demand largely responsible.**

AUTOCATALYST

Gross global demand for palladium from the automotive sector fell by 9.3 per cent to 4.05 million ounces in 2009. Difficult economic conditions hit vehicle sales and manufacturing volumes in Japan, North America and the Rest of the World region, with metal demand falling substantially in each location. European automotive palladium demand was remarkably robust: the gasoline engine gained market share, supporting palladium demand which fell only by 1.0 per cent to 995,000 oz. Chinese demand for palladium from the autocatalyst sector rose by 75.6 per cent to 685,000 oz, driven mainly by strong growth in light duty vehicle output.

Europe

In Europe, automotive sector purchases of palladium were surprisingly strong in 2009, falling only by 1.0 per cent – 10,000 oz – to 995,000 oz, despite a decrease in light duty vehicle production from 19.3 million units to 16.0 million units.

The opening months of 2009 were extremely difficult for the European automotive industry with the effects of low consumer confidence exacerbated by the limited availability of credit. Production was depressed below the headline rate of sales due to the existence of excessively large inventories of unsold vehicles which made manufacturers unwilling to produce cars which they could not quickly sell. A degree of destocking of catalysts also occurred in the early months of the year, further restricting new metal demand. Little of the catalyst restocking which we had previously forecast occurred in late 2009.

However, midway through the year, a number of European governments introduced incentive schemes to encourage consumers to buy new vehicles, typically in the form of scrappage schemes. The UK scheme was launched in May 2009 and had subsidised 290,000 new vehicle sales by the end of the year, while the hugely successful German scrappage scheme part-financed almost two million vehicle purchases.

The subsidies available proved particularly attractive to purchasers of smaller vehicles, where a greater proportion of the vehicle's cost was subsidised. Most smaller cars are gasoline-fuelled and, despite the 7.2 per cent fall in the sale of new vehicles for the year as a whole in Europe to only 16.8 million units, the gasoline engine gained substantially in terms of market share during 2009. The number of gasoline vehicles manufactured changed comparatively little as a result, and gross palladium demand for the gasoline sector actually increased by some 20,000 oz to 750,000 oz.

Gross palladium demand from the diesel sector decreased slightly. The auto makers continued to increase the proportion of diesel catalysts and filters which used platinum:palladium formulations at the expense of platinum-only technology. The introduction of the first stages of the new Euro 5 emissions rules in late 2009 drove the fitment of diesel particulate filters to an increasing proportion of new vehicles too. Overall, therefore, there was a healthy increase in the average amount of palladium in a diesel aftertreatment system during the year.

This was, though, outweighed by the impact of the temporary fall in the market share of the diesel engine. Palladium use in the diesel sector decreased to roughly 245,000 oz, although demand is expected to return to growth during 2010 as this market segment starts to recover. Overall, palladium represented roughly twenty per cent of the platinum group metals used in the European diesel sector during 2009.

Japan

Japanese auto makers purchased a gross 590,000 oz of palladium for use on domestically-produced automobiles during 2009, one third less than in the previous year.

Extremely strong growth in car production in China proved to be one of the few bright points for automotive palladium demand in 2009.

The economic downturn had little impact on Japanese automotive output during 2008 with exports remaining strong until the end of that year. The sharp downturn in sales was therefore reflected more strongly in reduced manufacturing volumes in 2009 than was the case in other regions where the slowdown was felt earlier. Japanese passenger car production fell by 30.9 per cent, from 9.9 million units to a weak 6.9 million units. The manufacturing of vehicles for export and for the domestic market were both affected. Vehicle output should recover to some extent in 2010 although it will not rise back to the levels reached in 2008 this year.

The introduction of the Post New Long Term light duty and JP09 heavy duty emissions regulations occurred in the Japanese market in 2009. However, manufacturers continue to voluntarily meet tighter emissions standards similar to those in place in the USA. This means that catalyst loadings are regularly increased to meet new limits, offsetting the effects of continuing work on thrifting (reducing the metal loading without negatively affecting catalyst performance).

In almost all of Japan's export markets, tighter emissions rules are continually being introduced. This forces the fitment of increasingly heavily-loaded catalysts in order to reduce regulated emissions, supporting metal demand. Palladium demand was further boosted by the continued steady replacement of platinum-based catalyst formulations on gasoline vehicles by palladium-based technology, made possible by better quality fuel in these export markets.

North America

Gross demand for palladium from the North American automotive sector fell by 20.9 per cent to 1.02 million ounces in 2009, the lowest figure since 2002.

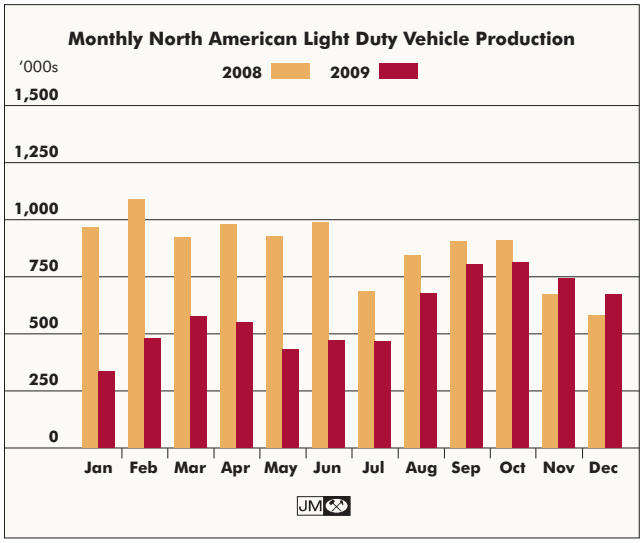
Vehicle sales were weak throughout 2009, running at levels substantially below those seen in recent years. At the start of the year, confidence in the US economy slumped to extremely low levels. The financial problems being experienced by some of the largest auto makers made consumers wary of purchasing new vehicles and a lack of available credit depressed leasing too, driving sales sharply lower. Palladium demand was further hurt by consumers' desire to downsize their vehicles: the average engine displacement of a new car or truck fell again last year, dragging the size of a typical catalyst lower and further trimming palladium demand.

With large stockpiles of unsold vehicles in existence at the start of 2009, production rates underperformed even the weak level of sales as the industry attempted to cut inventories. Light duty vehicle output fell by 32.7 per cent to 7.1 million units.

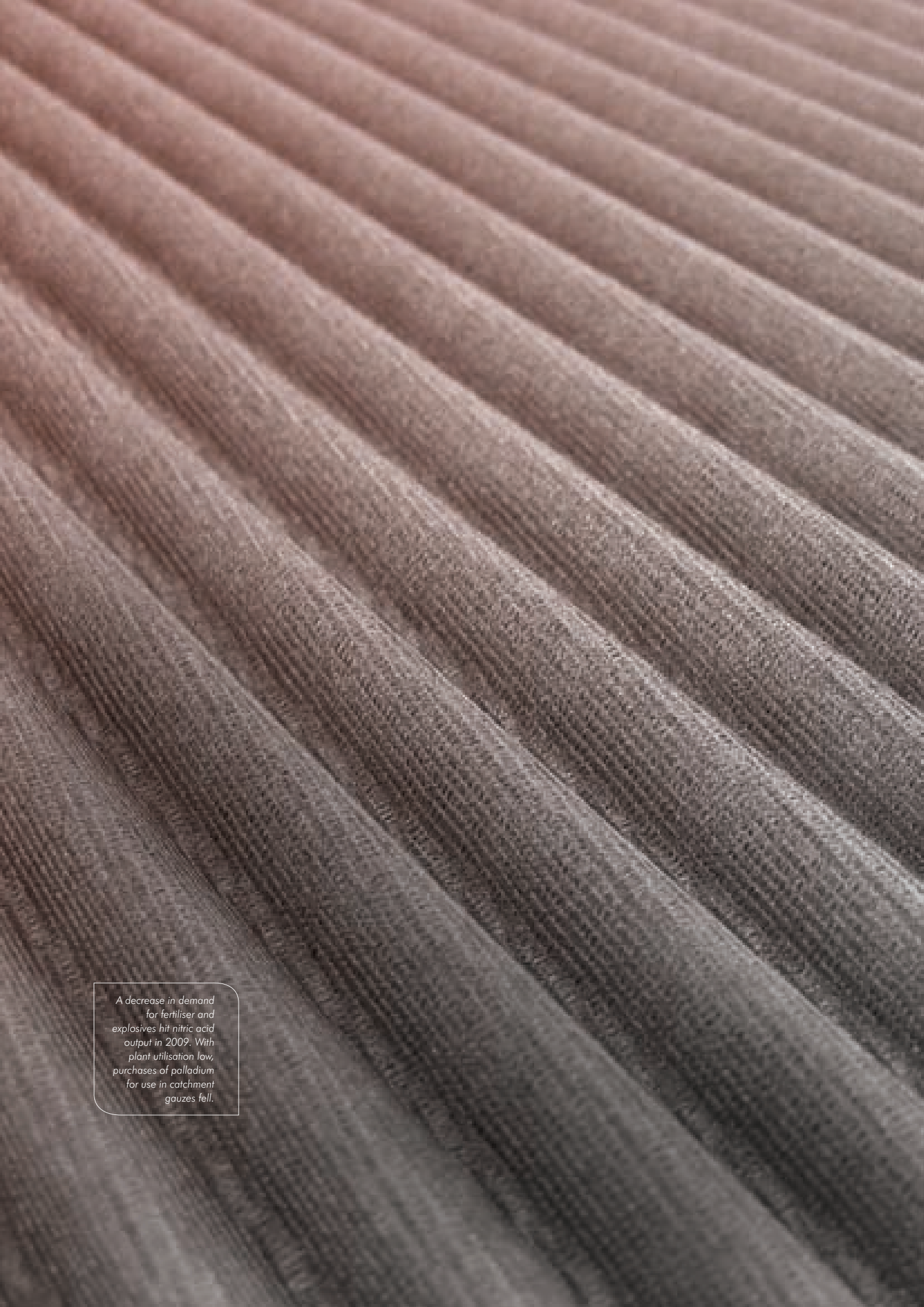
Sales and production only started to rise once the "Cash for Clunkers" scrappage scheme was introduced in the middle of the year in the USA. A gradual improvement in the prospects for

Palladium Demand: Autocatalyst
'000 oz

	Gross		Recycling		Net	
	2008	2009	2008	2009	2008	2009
Europe	1,005	995	(310)	(280)	695	715
Japan	885	590	(70)	(50)	815	540
North America	1,290	1,020	(670)	(540)	620	480
China	390	685	(30)	(35)	360	650
Rest of the World	895	760	(60)	(60)	835	700
Total	**4,465**	**4,050**	**(1,140)**	**(965)**	**3,325**	**3,085**



North American light duty vehicle production was weaker in 2009 than in 2008 although output gradually improved during the year.



A decrease in demand for fertiliser and explosives hit nitric acid output in 2009. With plant utilisation low, purchases of palladium for use in catchment gauzes fell.

the economy encouraged consumers to return to more normal levels of buying interest in the final months of the year after this scheme ended. This drove additional increases in working stocks of catalysts, supporting palladium demand.

China

The continuing rapid growth of the Chinese economy encouraged high levels of discretionary spending throughout most of 2009. An expansion in the availability of corporate and consumer credit helped drive record passenger car production of 8.4 million units, some 47.6 per cent higher than one year before, with most of these vehicles sold within China. Demand for palladium soared 75.6 per cent from 390,000 oz in 2008 to 685,000 oz in 2009.

Most of the vehicles manufactured and sold within China are gasoline-fuelled and the majority of platinum group metal demand is therefore for palladium. Euro 3 equivalent rules were introduced across most of China in mid-2009 (with Euro 4 rules being introduced in Beijing, Guangzhou and Shanghai) and manufacturers responded by fitting higher-loaded catalysts – increasing the average precious metal loading of a new vehicle – and replacing platinum-based catalysts with palladium-based formulations in many cases. This was, however, offset to some extent by the Chinese Government's reduction in purchase taxes on smaller vehicles (with engines of below 2.0 litres) and a range of other incentives which drove slight decreases in both average engine size and average catalyst size.

Rest of the World

Gross demand for palladium from the autocatalyst sector in the Rest of the World region dropped by 15.1 per cent to 760,000 oz last year as vehicle production tumbled.

In Russia, the weakness in the global economy was exacerbated by the fall in oil and natural gas prices. With the economy struggling, sales of new vehicles slumped by over half. There has been relatively little recovery in this market to date although the introduction of a scrappage scheme in 2010 could provide some boost to sales. Mexican vehicle production also slumped due to the marked weakness in the economy of the USA, its key export market. Palladium demand dropped sharply in both countries.

There were, however, a few bright spots such as Brazil where early government action, in the form of cutting purchase taxes on new cars, supported the market for the entire year, with production increasing as a result.

JEWELLERY

Gross global demand for palladium from the jewellery sector fell by 17.3 per cent to 815,000 oz in 2009. (Due to a decline in the recycling of old jewellery, net demand was down by only 12.9 per cent to 745,000 oz.) Gross demand due to Chinese manufacturing of palladium jewellery fell by 24.3 per cent from the previous year's levels to 560,000 oz, as manufacturers increased their output of platinum jewellery at the expense of palladium. Combined gross demand from jewellers in Europe and North America increased to a total of 110,000 oz.

China

Gross demand for palladium from the Chinese jewellery sector slipped from 740,000 oz in 2008 to 560,000 oz in 2009.

Demand for platinum was exceptionally strong last year and profit margins for platinum jewellery increased at the manufacturer level. As a result, many manufacturers who had previously produced palladium jewellery alongside platinum concentrated their resources on the more profitable market sector – platinum jewellery – reducing the capacity available for palladium jewellery production. Some manufacturers stopped making palladium jewellery entirely and reduced their stocks of raw materials, driving demand lower still.

The retail picture for palladium jewellery is still mixed within China. Palladium retains a strong position in some provinces, particularly in the West and North-East of the country but is rarely seen on sale in the more affluent Eastern provinces.

At this level, the geographical distribution of palladium

The introduction of the new palladium hallmark boosted demand for palladium from the UK jewellery industry last year.

See notes to table on page 29.

Palladium Demand: Jewellery
'000 oz

	Gross[1]		Recycling[2]		Net[3]	
	2008	2009	2008	2009	2008	2009
Europe	45	50	0	0	45	50
Japan	115	120	(40)	(20)	75	100
North America	60	60	0	0	60	60
China	740	560	(90)	(50)	650	510
Rest of the World	25	25	0	0	25	25
Total	**985**	**815**	**(130)**	**(70)**	**855**	**745**

jewellery appears to be driven by interest from individual wholesalers and retail chains and by the amount of disposable income in the area, rather than by latent customer demand.

Palladium availability is therefore not uniform even within a province: although it is sold in second and third tier cities, it is seldom present in the central shopping areas of the major cities. Growing affluence means that an increasing number of rural consumers are travelling into these areas to purchase jewellery, limiting the potential sales of palladium.

The stocks of the Pd950 (95 per cent purity) jewellery which were originally manufactured in China in 2004 and 2005 are now almost exhausted. From 2006 to 2008, significant quantities of this stock returned to manufacturers for refining and remaking into higher-purity Pd990 pieces. With less of this remanufacturing occurring last year, gross demand fell by a greater percentage than did net demand.

We have previously commented on the purchase of palladium in China for short term speculative uses rather than for manufacturing into jewellery. We believe that at least 150,000 oz of metal entered China for this purpose during 2008 and that further speculative investment took place at the start of 2009 as prices remained low. The high palladium price of early 2010 appears to have brought some of this metal back to the market, supporting our decision not to include it in our demand figures initially. Indications of the scale of this returning metal flow – which was larger than originally expected – have led us to downgrade our figure for palladium jewellery demand within China for last year.

Other Regions

In Europe, palladium made some progress in the jewellery sector during 2009 and gross European jewellery sector demand rose by 11.1 per cent to 50,000 oz. In the UK, a hallmark was granted in the second half of the year, encouraging manufacturers to add palladium to their product ranges and affirming its status as a bona fide precious metal.

In a number of European countries, the introduction of palladium men's wedding bands allowed palladium to capture some market share from other white metals, augmenting demand. In Germany, for example, most manufacturers now include palladium bands in their wedding collections. Most European sales continue to be for men's rings but there are reports of the sale of a small number of palladium engagement rings, reflecting the establishment of palladium as a jewellery metal to a limited extent. In Switzerland, however, production of luxury watches – including those made from palladium – weakened as demand for these high-end items slowed.

Gross North American jewellery demand for palladium was unchanged at 60,000 oz last year. Manufacturers have now been developing expertise and product ranges in palladium jewellery for several years. This has improved the availability of palladium products but progress remains slow at the retail level. Consumers were greatly affected by the economic malaise of 2009 and marrying couples found their budgets squeezed. The more attractive price of palladium allowed it to capture a small additional share of the men's wedding band market. However, palladium faced competition from other materials including base metals and demand was almost static.

Gross palladium consumption in the Japanese jewellery market in 2009 increased by 5,000 oz from 2008 levels to 120,000 oz. Very little palladium jewellery is produced or sold within Japan. Instead, demand derives from its use as a minor alloying element in platinum and white gold jewellery. The Japanese platinum market performed relatively well last year with manufacturing volumes marginally higher than in the previous year.

CHEMICAL

In the chemical industry, palladium is used in the production of four major bulk chemicals: hydrogen peroxide, nitric acid, purified terephthalic acid (PTA) and vinyl acetate monomer (VAM). The weakness in the global economy, and the expected cyclical slowdown in the construction of new production capacity for these chemicals, hit chemical sector demand which fell from 350,000 oz in 2008 to 325,000 oz last year.

Purchases of palladium for use in nitric acid catchment gauze – to capture the platinum lost from the main burner gauzes in low to medium pressure reactors – decreased in 2009. Global production of nitric acid fell at the start of the year and many facilities were run at very low throughput, with

some even being mothballed, causing a decline in the number of replacement catchment gauzes required. A slow recovery in demand for nitrogen-based fertilisers and explosives should lead to enhanced nitric acid production in 2010 and higher palladium requirements for this application.

Although global demand for PTA and VAM for the manufacture of products ranging from plastic bottles to paints fell during 2009, this decline did not occur in every region. The Chinese market performed relatively strongly and further plant capacity was installed in 2009, leading to additional palladium demand for process catalysts. After several years of rapid expansion, demand in the Rest of the World region, largely from plant construction in Asia and the Middle East, fell as fewer new facilities were built.

Palladium is also used in the production of hydrogen peroxide by the hydrogenation of alkylated anthraquinones. This process is cleaner than many other routes to produce this industrial bleach and environmental drivers encouraged the addition of further capacity, supporting palladium demand.

Palladium Demand: Chemical
'000 oz

	2007	2008	2009
Europe	95	100	85
Japan	25	20	20
North America	75	55	50
China	80	55	75
Rest of the World	100	120	95
Total	**375**	**350**	**325**

DENTAL

Net usage of palladium in the dental sector continued to decline slowly in 2009, falling from 625,000 oz a year earlier to 615,000 oz. Demand for palladium from the Japanese dental industry remained flat at 275,000 oz, while North American palladium demand decreased by 10,000 oz to 260,000 oz. Demand in other regions remains low.

The long term trend in palladium demand within Japan remains one of gradual decline as its population falls, dental health improves and as other technologies such as all-ceramic treatments capture some market share. A number of dental suppliers also moved to just-in-time delivery, reducing industry stocks of palladium. However, less metal was recovered from scrap alloy than in 2008 and net demand remained steady.

Kinpala alloy (a mixture of gold, silver and palladium) continues to attract a subsidy from the Japanese Government

Palladium alloys such as Kinpala are used in a range of dental treatments within Japan.

encouraging its use in dental treatments such as crowns and bridgework. Surprisingly, though, the subsidy was lowered slightly in October at its twice-yearly review, despite the increase in the raw material prices, suggesting that demand may weaken this year as dentists and patients increasingly opt for other, non-precious metal treatments.

In North America, palladium is primarily used as a component of low gold content alloys used in dental treatment. These compete in the same applications – bridgework and restorations – as higher gold content alloys. The rising gold price was therefore more influential than any changes in the palladium price: with gold trading above $1,000 an ounce for much of the year, there was a clear financial incentive for dentists and those receiving dental treatment to switch to higher-palladium, lower-gold content alloys, where this had not previously happened.

However, as in other areas of the dental market, precious metal alloys are slowly losing market share to other treatments such as all-ceramic crowns. The switching that did occur into palladium-rich alloys therefore merely limited the decrease in North American dental demand to 10,000 oz.

Palladium Demand: Dental
'000 oz

	2007	2008	2009
Europe	70	65	65
Japan	275	275	275
North America	265	270	260
China	5	0	0
Rest of the World	15	15	15
Total	**630**	**625**	**615**

ELECTRICAL

The electrical sector purchased a gross 1.27 million ounces of palladium during 2009, 7.3 per cent less than in the previous year, as the global economy hit consumer purchasing and drove widespread inventory reductions at all levels of the industry.

As in many other sectors, output from the electronics industry was severely depressed in the earlier parts of 2009 before recovering to much healthier levels later in the year. Looking at the whole of 2009, purchasing of consumer electronics was at relatively similar levels to the previous year. However, overall electronics output was driven lower by weak business investment and by low demand for automotive electronics, causing palladium demand to fall.

Demand for palladium was also reduced due to widespread destocking of materials, components and finished goods throughout the electronics industry. This process took place during the first half of 2009 and, although some restocking began later in the year, the net impact was a further reduction in palladium demand.

In the multi-layer ceramic capacitor (MLCC) sector, palladium was again used in some 10-15 per cent of all MLCC produced. The longer term trends of recent years continued, though: miniaturisation of electronic devices once again drove down the average size of a MLCC as more of the smallest 0201 and 01005 case size capacitors were produced – these now account for more than ten per cent of the MLCC market.

However, the increasing complexity of electronic devices has also led to the use of significantly higher numbers of passive components such as MLCC, balancing the effects of miniaturisation and maintaining the typical palladium content of a device. Overall, annual demand for palladium from this specific application slipped to just below 600,000 oz.

Palladium demand for use in silver-palladium alloys employed in the conductive tracks in hybrid integrated circuits (HICs) fell last year due to the weakness in the automotive market where many of these HICs are used.

In many of its other electronic applications – particularly plating – palladium competes with gold. The gold price was extremely buoyant during 2009, rising to record levels. Thus, although the palladium price rose strongly throughout the year, the economic incentive to replace gold with palladium persisted. However, this price differential has existed for a number of years now and relatively little further switching took place in 2009. Palladium demand from this application fell by some ten per cent due to destocking and soft consumer sales.

Palladium Demand: Electrical
'000 oz

	Gross		Recycling		Net	
	2008	2009	2008	2009	2008	2009
Europe	190	175	(140)	(160)	50	15
Japan	320	305	(60)	(55)	260	250
North America	170	155	(55)	(70)	115	85
China	255	235	(20)	(25)	235	210
Rest of the World	435	400	(70)	(85)	365	315
Total	**1,370**	**1,270**	**(345)**	**(395)**	**1,025**	**875**

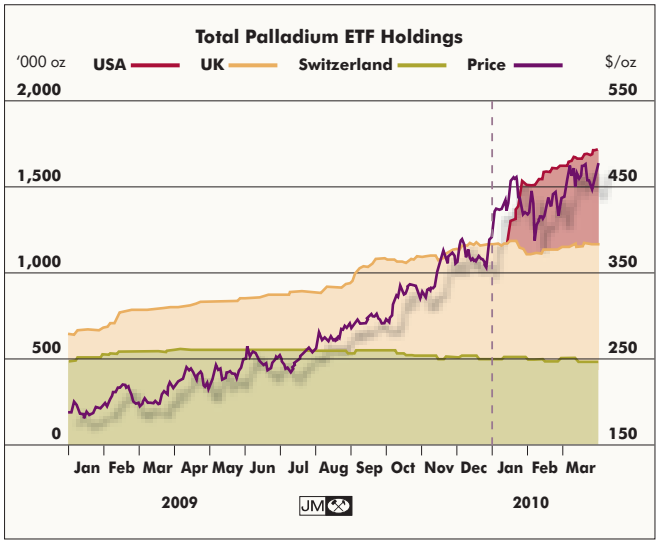
The weight of palladium recovered from end-of-life electronics increased substantially in 2009. Environmental legislation and the high prices of gold and copper stimulated higher recycling of used electronic devices. As a result, net electronics demand fell by a greater percentage than gross demand, decreasing by 14.6 per cent to 875,000 oz. For more information on the recycling of end-of-life electronics, please see page 24.

INVESTMENT

Identifiable physical investment demand for palladium climbed by 48.8 per cent to a record annual total of 625,000 oz in 2009. The purchase of coins and small bars generated 95,000 oz of demand in North America,

The sale of products like this Canadian Maple Leaf coin helped drive demand for coins and small bars up to 95,000 oz last year.

Investors once again increased their holdings of palladium in the European Exchange Traded Funds last year, leading to record investment demand.



significantly more than the previous year's figure. Exchange Traded Fund (ETF) investors also showed a greater appetite for palladium, with demand rising by 160,000 oz to a substantial 530,000 oz.

The Royal Canadian Mint restarted production of its one ounce palladium Maple Leaf coins in mid-2009 having not minted any of these coins during 2008. A rising gold price prompted strong individual investor interest in precious metal products including palladium. With relatively few previously-minted palladium Maple Leafs in circulation, demand for these items was particularly healthy, helping to boost demand for coins and small bars in total to some 95,000 oz.

ETF demand also climbed, rising from 370,000 oz in 2008 to 530,000 oz in 2009. Almost all of this demand reflected flows into the European ETFs with only 5,000 oz entering the Australian ETF which was launched in January 2009.

Combined Exchange Traded Fund positions rose from 645,000 oz of palladium at the start of 2009 to a record level of 1.17 million ounces at the end of the year, as European investors demonstrated their confidence that the palladium price would continue to rise.

In 2008, the Swiss fund accounted for most of the ETF purchasing which took place. In 2009, although the Swiss fund saw reasonable levels of buying at the start of the year, taking its holdings from an initial 490,000 oz to 550,000 oz, redemptions in the final quarter meant that net metal inflows into this fund for the year were close to zero. Total holdings continued to decline during the first quarter of 2010, suggesting that some investors have chosen to realise profits with the palladium price above the $400 level.

In sharp contrast, investors continued to add to their positions in the London fund throughout 2009, taking holdings from 155,000 oz to 670,000 oz at the end of the year, following their weighty redemptions of metal in the second half of 2008. Anecdotal evidence suggests that these investors have a wide range of different investment timescales. Some investment inflows may have been encouraged by the rapid rise in the palladium price throughout much of the year. However, the slow recovery in the automotive market and speculation over the size and future fate of Russian state stocks of palladium provided enough incentive to attract investors with bullish longer term views, adding to demand.

The launch of the US-based palladium ETF in January 2010 came too late to affect metal uptake for 2009 but should raise demand substantially once again this year: by March 2010, total positions in this fund stood at 540,000 oz, although purchasing has since slowed.

OTHER

Palladium demand from all other applications fell from 75,000 oz in 2008 to 70,000 oz in 2009. Small but rising amounts of metal were used in pollution control from off-road sources and from small engines. More palladium was also used in hydrogen purification equipment than in the previous year. Demand for palladium for control of emissions from stationary sources increased but the use of palladium in brazing alloys fell.

Palladium Demand: Investment
'000 oz

	2007	2008	2009
Europe	280	370	525
Japan	0	0	0
North America	(20)	50	95
China	0	0	0
Rest of the World	0	0	5
Total	**260**	**420**	**625**

Palladium Demand: Other
'000 oz

	2007	2008	2009
Europe	20	20	20
Japan	10	10	10
North America	30	20	15
China	10	10	10
Rest of the World	15	15	15
Total	**85**	**75**	**70**

OTHER PLATINUM GROUP METALS

- **Gross rhodium demand fell 20.2% in 2009 to 716,000 oz. Net rhodium demand slipped by 21.0% to 529,000 oz.**
- **187,000 oz of rhodium were recovered from spent autocatalysts in 2009, 17.6% less than in 2008.**
- **Rhodium supplies rose by 10.8% to 770,000 oz in 2009.**
- **Net demand for ruthenium fell from 699,000 oz in 2008 to 574,000 oz last year.**
- **Iridium demand fell from 102,000 oz to 91,000 oz in 2009.**
- **Supplies of ruthenium and iridium rose and were able to meet demand.**

RHODIUM

The rhodium market was oversupplied by 241,000 oz in 2009. Gross demand fell to 716,000 oz due to weak automotive output. Recovery from spent autocatalysts fell to 187,000 oz. Rhodium supplies climbed to 770,000 oz.

Autocatalyst Demand

Gross demand for rhodium from the autocatalyst sector declined from 768,000 oz in 2008 to 619,000 oz last year, the second successive fall after six consecutive years of growth.

Global light duty vehicle production fell heavily during 2009, dropping 12.2 per cent to 59.9 million units, hitting the use of rhodium in this sector. Consumers responded to concerns about their personal economic situation by restricting their spending, with the most expensive items worst hit. The availability of corporate credit worsened too, hitting business purchases of new vehicles. Having started the year with large stockpiles of unsold cars, the auto makers cut back sharply on vehicle output in Europe, Japan and North America.

Scrappage schemes in each of these regions started to generate reasonable levels of sales from mid-year. With the economic outlook slowly improving too, sales in the second half of 2009 were stronger in these regions than in the first six months, although they still declined for the year as a whole.

Rhodium demand was also negatively affected by the results of thrifting programmes which had been initiated at higher metal prices in recent years, although this was less important than the decline in vehicle production.

Gross North American rhodium demand fell to 126,000 oz and Japanese demand dropped by more than a third to 152,000 oz. European demand was supported by growth in the market share of the gasoline engine (no rhodium is used in a typical diesel catalyst) and rhodium usage decreased only by 12.4 per cent to 113,000 oz. Rest of the World region demand fell to 111,000 oz. Chinese automotive rhodium purchases, however, climbed by almost half to 117,000 oz as domestic car production soared by 47.6 per cent to 8.4 million units.

The weight of rhodium recovered from spent autocatalysts fell by 40,000 oz to 187,000 oz in 2009. For more information on the recovery of rhodium from this sector, please see page 23.

Other Demand

Rhodium demand from the glass sector fell from 34,000 oz to 19,000 oz in 2009. The economic slowdown weakened demand for fibre glass and LCD glass. Manufacturers therefore installed less new capacity than they had in preceding years. The closure of a number of cathode ray tube glass plants in China also returned some metal to the market.

However, the fall in the price of rhodium encouraged many manufacturers to change the platinum alloys used in their factories. Higher rhodium content alloys withstand the corrosive molten glass environment better than lower rhodium content alloys. The lower rhodium price encouraged glass producers to switch from cheaper, less durable alloys to higher-rhodium content alloys at the expense of platinum.

In the chemical sector, rhodium demand decreased by 14,000 oz to 54,000 oz during 2009. A number of new oxo-alcohol manufacturing plants were constructed in China and elsewhere in Asia but some delays in these projects have led us to downgrade demand from our previous estimates.

Demand for rhodium from electrical and other applications fell from 27,000 oz to 24,000 oz last year. Although there are some indications of a small number of investors purchasing

Rhodium Demand by Application
'000 oz

	2007	2008	2009
Autocatalyst	887	768	619
Chemical	63	68	54
Electrical	3	3	3
Glass	59	34	19
Other	24	24	21
Total Gross Demand	**1,036**	**897**	**716**
Autocatalyst Recycling	**(192)**	**(227)**	**(187)**
Total Net Demand	**844**	**670**	**529**

rhodium last year, we believe this was speculative in nature and so have excluded it from our estimates of demand.

Supplies

Supplies of rhodium climbed by 75,000 oz to 770,000 oz in 2009. The majority of this metal – 663,000 oz – came from South Africa where underlying mine output was almost flat. Supplies – defined as sales of rhodium – rose due to changes in refined metal and pipeline stocks. Mine production from elsewhere remained steady.

RUTHENIUM & IRIDIUM

Ruthenium demand fell from 699,000 oz to 574,000 oz in 2009. Purchases by the chemical and electrical sectors fell but electrochemical demand was flat. Iridium demand decreased from 102,000 oz to 91,000 oz last year. Purchases by the electrochemical industry increased but less metal was used in spark plugs and electronics.

Demand

Total ruthenium demand declined by 125,000 oz to 574,000 oz in 2009. Electrical sector demand fell by 18.0 per cent to 336,000 oz due to the economic slowdown. Metal use in chip resistor production shrank as output declined and the industry cut its stocks. Miniaturisation of these components also reduced their average ruthenium content. Ruthenium use in flat screen plasma display panels decreased as these devices lost market share to LCD televisions.

Net hard disk demand for ruthenium fell from 99,000 oz to 53,000 oz. At the start of 2009, 85 per cent of disks used ruthenium-containing perpendicular magnetic recording (PMR). PMR's market share increased through the year and is now almost 100 per cent. Production of hard disks changed little from 2008 and ruthenium use on disks rose slightly.

The pattern of ruthenium purchasing, though, changed during 2009. In the first quarter, manufacturers had low throughput and were able to meet most of their requirements through the use of stocks of metal they already owned. Only later, once production ramped up, were target manufacturers forced to purchase ruthenium at more normal levels. Overall, metal demand fell by some 46.5 per cent.

Demand for ruthenium from the chemical sector decreased by 50,000 oz to 89,000 oz. Less new capacity was installed than in recent years and low plant utilisation at many existing facilities also led to lower requirements for top-up catalyst.

Ruthenium Demand by Application
'000 oz

	2007	2008	2009
Chemical	151	139	89
Electrical	776	410	336
Electrochemical	62	95	95
Other	69	55	54
Total Demand	**1,058**	**699**	**574**

Electrochemical demand for ruthenium remained steady at 95,000 oz last year. A decision to upgrade much of the Chinese chlor-alkali industry to membrane cell technology generated a small amount of additional metal demand.

Other demand for ruthenium slipped to 54,000 oz in 2009. Anecdotal evidence also indicated reasonable levels of speculative investment in ruthenium from Asia and from North America. However, we believe this is short term in nature and therefore do not include it in our demand figures.

Iridium demand fell from 102,000 oz in 2008 to 91,000 oz in 2009. Demand from the electrochemical industry climbed by 8,000 oz to 33,000 oz. Although little new chlor-alkali capacity was added last year, the Chinese authorities have embarked upon a programme to replace older mercury-based technology with more environmentally-friendly iridium and ruthenium-containing membrane cells, adding to demand for iridium. In the chemical sector, demand remained flat at 21,000 oz.

Demand for iridium from the electrical sector fell to below 10,000 oz as fewer iridium crucibles were manufactured. Spark plug and ignitor demand dropped from 26,000 oz to 17,000 oz in 2009 due to falling vehicle and aeroengine production. Other demand fell by 2,000 oz to 13,000 oz.

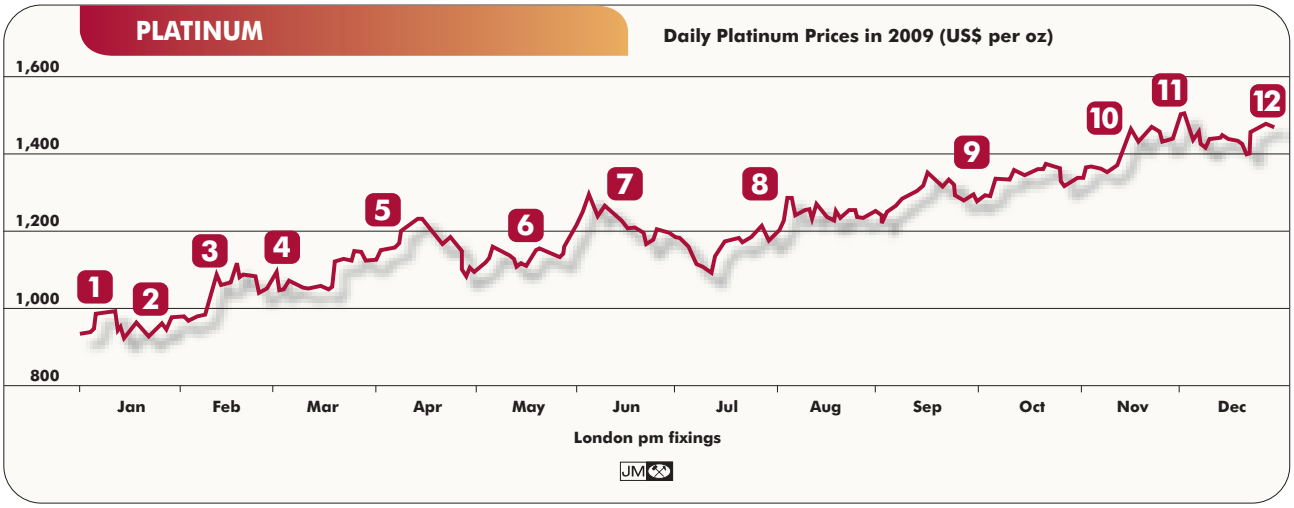
Supplies

Underlying production of ruthenium and iridium climbed slightly during 2009. With demand for both metals weak, each market remained adequately supplied during 2009.

Iridium Demand by Application
'000 oz

	2007	2008	2009
Chemical	23	21	21
Electrical	25	15	7
Electrochemical	24	25	33
Other	32	41	30
Total Demand	**104**	**102**	**91**

PRICES



After falling heavily in the second half of 2008, the platinum price performed strongly during 2009, rising 57.0 per cent from an opening fix of $934 to end the year at $1,466. It was driven higher throughout much of the year by a weakening US Dollar, a buoyant gold price, a healthy Chinese jewellery market and the steady return of investment interest. The price peaked at $1,500 in early December to cap a remarkable recovery from the previous year but at no point did platinum reach the average price achieved during 2008.

1 Platinum started the year quite strongly at $934 after bouncing back from its late October 2008 low of $756. Strong buying on the Shanghai Gold Exchange (SGE) and a Chinese government decision to cut purchase taxes on smaller new vehicles added some energy and drove the price to $1,000 for the first time in 2009 on the 7th of **January**.

2 Investors continued to worry over the state of the global economy, though, and moved increasingly into "safe haven" investments. The US Dollar in particular benefited, driving the prices of many commodities lower. Platinum fell to $931 on the 13th of January but bounced back to $960 one day later as the temporary closure of three mine shafts in South Africa reminded the market of the supply pressures which still existed. However, the dollar rose again and worries of possible deflation depressed the precious metals, sending platinum to its low point for the entire year of $915 on the 15th.

Average PGM Prices
in $ per oz

	2008	2009	Change
Platinum	1,576	1,205	(23.5%)
Palladium	352	264	(25.0%)
Rhodium	6,564	1,592	(75.7%)
Ruthenium	323	95	(70.6%)
Iridium	450	425	(5.6%)

Platinum and palladium prices are averages of London am and pm fixings. Other pgm prices are averages of Johnson Matthey European Base Prices.

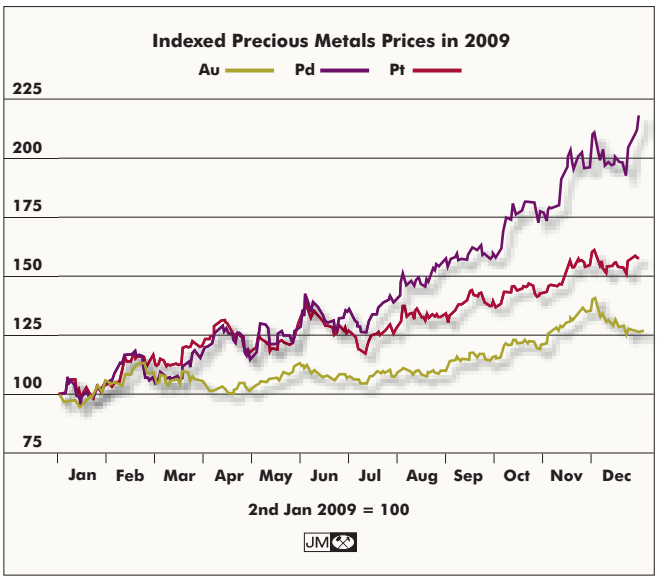
At these reduced prices, purchasing by jewellery manufacturers on SGE strengthened ahead of the key Chinese New Year selling season at the end of January. Assisted by investor purchasing through the European Exchange Traded Funds (ETFs) and on the futures exchanges, the price finally broke back through the $1,000 barrier on the 10th of **February**, fixing at $1,008 that morning.

3 Having overcome the resistance at the psychologically-important $1,000 level, platinum moved rapidly higher as investors started to focus once again on the commodity sector. Rumours of a lack of availability of platinum ingot in Asia overpowered widespread worries over weak global automotive production and injected some further momentum. Warnings of a possible strike by South African miners further tightened the market. Continuing investor interest propelled the price higher still, to $1,113 on the 18th of February, before profit-taking appeared.

4 The price showed little movement in the first half of **March**, remaining close to $1,050, as weak European and North American automotive and industrial purchasing of platinum offset the very strong buying occurring in China.

On the 18th of March, the US Government put forward a proposal to inject huge amounts of liquidity into its domestic

Returning investment interest and a strong gold price boosted the prices of platinum and palladium throughout much of 2009.



financial system (known as "quantitative easing"). This dramatically boosted the prospects of economic recovery and firmed the platinum price which surged over $1,100 on the 20th, driven by investor buying. More importantly in the longer term, this action raised fears of substantial future inflation, sending the dollar on a nine-month slide against the Euro and boosting precious metal prices throughout this period.

5 Platinum came under some pressure at the end of March when the US Government rejected proposed recovery plans at two of the major US automotive manufacturers. The dollar, though, continued to weaken as investors gradually began to look for more risk in their investments. Short covering in gold encouraged platinum to $1,140 on the 2nd of **April** despite a heavy year-on-year fall in North American vehicle production.

The following day, news was reported that ETF Securities, who already operated the London-based platinum ETF, had applied for regulatory approval to launch a similar product in the USA. This drove ETF purchasing in London and Zurich. TOCOM investors responded too and the price received further boosts from nervousness over the forthcoming South African elections and from the booming Chinese car market. Platinum fixed at a monthly high of $1,229 on the 14th of April but climbed as high as an offer of $1,250 in the spot market later that day.

6 News that the International Monetary Fund (IMF) was planning to sell some of its gold reserves prompted sales of precious metals in mid-April, with platinum drifting back below $1,200 on the 20th. Chinese buying weakened slightly and concerns over the North American automotive sector weighed on platinum which slid further to a low of $1,076 on the 1st of **May** as Chrysler entered Chapter 11 insolvency, forcing sales of counterparty metal.

Later in May, unsubstantiated rumours of Chinese state purchasing of platinum for national stockpiles encouraged further inflows of money from investors, firming the price above $1,100. Strong Chinese economic data provided good support for a number of commodities, benefiting platinum. However, the most important stimuli came from discussions within the US and Japanese governments about launching subsidised car purchase and scrappage schemes. This improved the prospects for platinum demand, allowing the price to build support between $1,100 and $1,150 in late May.

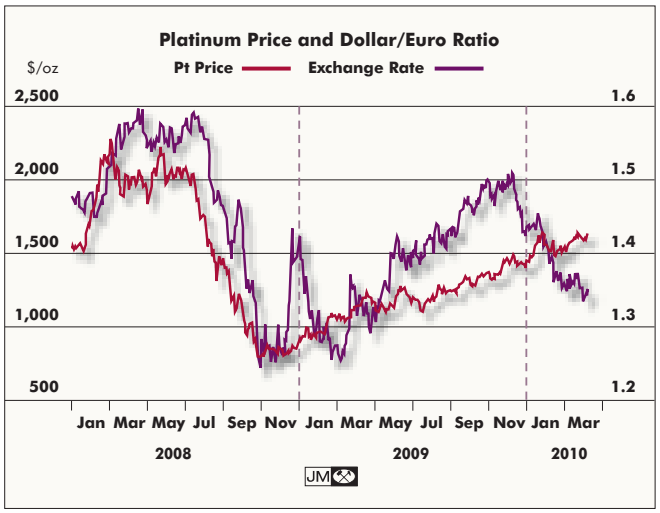
7 Concerns over the scale of US sovereign bond issuing – and the possible impact of this on future inflation – hit the dollar at the end of May. As that currency softened against the Euro, investors switched their attentions to gold, and the other precious metals to a lesser extent, as a safe haven. The rising gold price pulled platinum higher and it moved rapidly from $1,126 on the 28th of May to $1,293 on the 5th of **June**.

At this point, net long speculative futures positions in gold and platinum started to decline, dragging the prices of both metals lower. On the 8th of June, the US Federal Reserve made comments which were seen as being vigilant to the threat of future inflation and the dollar firmed in response.

With physical demand remaining weak, platinum slipped to flirt with the $1,200 level around the middle of the month. In early **July**, though, the dollar flickered back into life as investors started to fret about the state of the world's economy once again. This strengthened the dollar and dumped platinum back below $1,200. Worries then emerged that the US Commodities Futures Trading Commission (CFTC) might impose position limits for a range of commodities. This prompted liquidation of long positions on NYMEX, sending platinum down to a low of $1,092 on the 13th of July.

8 Late on the 13th of July, comments from the US Treasury that it expected domestic economic growth to restart during 2009 weakened the dollar as investors became less concerned about risk and sent platinum back over $1,100. Chinese physical purchasing decreased in response to this rising price but some reasonably positive news started to emerge from the automotive sector to offset this and maintain the momentum. Fund buying, on TOCOM and elsewhere, kept platinum moving higher and was reinforced by the closure of several shafts at mines in South Africa in response to low prevailing

A weak dollar boosted the price of platinum during most of 2009. However, the dollar's new-found strength was unable to prevent platinum gaining further ground in early 2010.



metal prices. The launch of the US "Cash for Clunkers" vehicle scrappage subsidy scheme on the 24th of July then generated enough positive sentiment to drive platinum up to a monthly high for July of $1,213 on the 28th.

The tone of economic news emerging from around the world started to become more positive and investors unwound their safe dollar positions, weakening the currency and boosting metal prices. Concerns over a possible strike at Eskom, the South African power utility, and its potential impact upon platinum supply further firmed the price which climbed to a high of $1,286 on the 5th of **August** before settling back towards $1,250 for the remainder of the month.

9 Investor activity resumed in earnest in early **September**. Investors added to their long physical and futures positions in gold, driving that metal over $1,000 on the 8th. This positive mood overflowed into the platinum market, providing considerable momentum there. Net long speculative positions on NYMEX started to increase rapidly and physical holdings in the European ETFs also grew. In response to this flow of investor funds, platinum burst through $1,300 on the 14th and climbed to a monthly high of $1,343 on the 17th of September – its highest point for more than a year.

Late in the month, concerns that the world's central banks were to scale down their injections of liquidity into the global financial system reawakened fears of risk and drove a flight to the dollar. Gold fell back and platinum retraced its steps to a low of $1,269 on the 2nd of **October**.

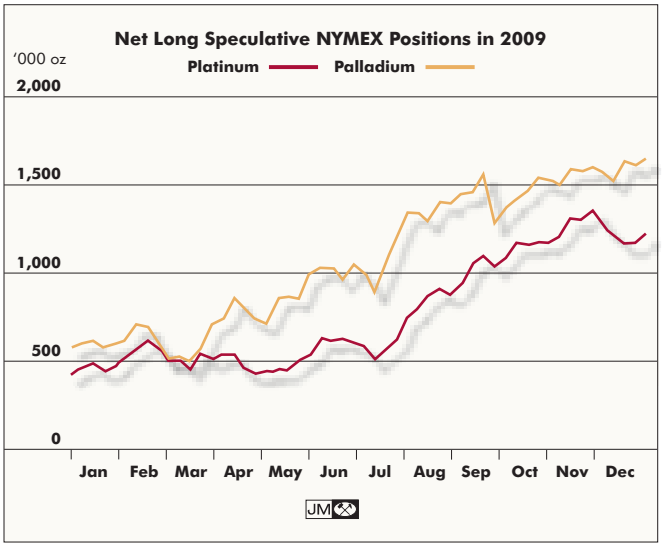
On the 5th, noises emanating from the G7 heads of state meeting suggested that the major economies were comfortable with a weak US Dollar. The markets took the hint and drove the dollar further down: the platinum price responded by rising back above $1,300 immediately. Market worries over possible future inflation strengthened gold and supported platinum over the following days even though industrial buying remained weak (despite the evidence of a narrowing differential between sponge and ingot prices).

Rumours of producer dehedging in the gold market firmed all of the precious metals on the 12th, impelling platinum to $1,340 that day. As the dollar spiralled lower, the resubmission of proposals to launch a platinum ETF in the USA generated a little more buying and platinum moved up to a peak for the year-to-date of $1,372 on the 23rd of October, before profit-taking appeared again to drive the price lower.

10 Platinum fell back to $1,313 on the 28th of October following short covering of the dollar in the currency markets. However, this dollar strength rapidly receded under pressure from better-than-expected US and Japanese economic data, providing a firm floor for the price above $1,300.

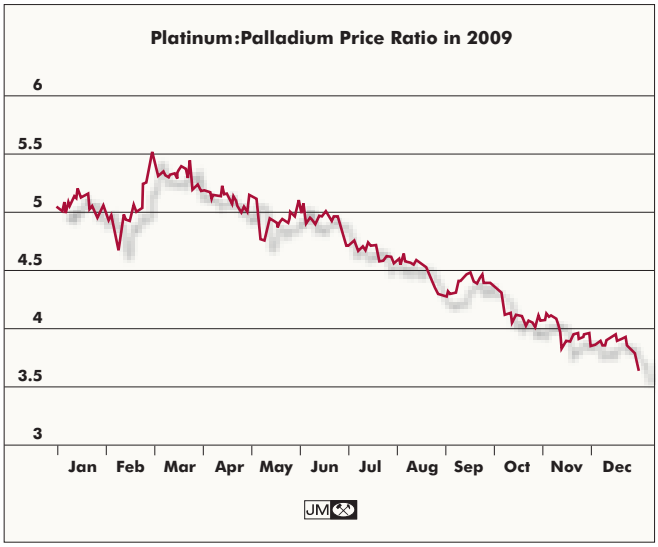
The dollar continued its decline throughout **November** as investors gradually became more willing to accept risk in their positions. Investment flows propelled gold towards $1,200 as Barrick Gold unwound some of its hedge positions and the International Monetary Fund revealed the sale of 200 tonnes of gold to the Reserve Bank of India. With all these positive stimuli present in the precious metal sector, the platinum price followed gold and raced to a peak of $1,469 on the 23rd of November.

11 The platinum price retreated marginally on the 24th of November before rumours of more buying interest from the Reserve Bank of India drove the gold price still closer to the $1,200 level. Platinum peaked at $1,469 again on the 25th of



Net long speculative positions on NYMEX for both platinum and palladium rose strongly during 2009, supporting the price of each.

The recovery in the palladium price was even more dramatic than was the case for platinum in 2009.



November before the news of financial problems at Dubai World (the state-owned development body in Dubai) drove investors back into the dollar as a safe haven. Platinum lurched down to $1,426 on the 27th in thin trading conditions. The panic, though, subsided rapidly and platinum calmly started to climb higher once more.

The focus moved back onto platinum itself as Eskom, the South African electricity utility, revealed that it planned to seek a 35 per cent annual increase in its tariffs over a three-year period, demonstrating the continuing cost pressures that existed on the supply side of the market. The dollar relaxed further as tension over Dubai World dissipated and gold traders took the opportunity to push the price of that metal above $1,200 on the 2nd of **December**. Platinum was further aided by the release of some positive European automotive sales statistics for November, encouraging the optimists in the market to drive the white metal to a peak for 2009 of $1,500 at the first fix on the 3rd of December.

12 As soon as platinum gained the $1,500 level, a degree of profit-taking unsurprisingly occurred. The announcement of the agreement of a two-year wage deal between the South African National Union of Mineworkers and Lonmin provided a further negative stimulus and the price slid rapidly lower. On the 8th of December, news that the credit rating of Greece's sovereign debt had been downgraded drove investors from the Euro into the US Dollar, putting pressure on commodity prices for the remainder of the month. Platinum slipped to a low of $1,413 on the 10th, demonstrating the high levels of volatility being experienced in the marketplace.

However, amidst slow end-of-year trading almost everywhere, reasonable purchasing interest emerged on the Shanghai Gold Exchange to provide some support for the platinum price which, as a result, dipped only to a monthly low of $1,397 on the 23rd, although even this was more than a hundred dollars below December's earlier monthly peak.

With trading conditions quiet in advance of Christmas, the US Securities Exchange Commision revealed that it had given approval to the launch of a US-registered, physically-backed platinum Exchange Traded Fund. This news – coupled with the uncertainty over how much demand this might lead to – proved explosive, with platinum rallying to $1,456 on the following day and moving on to end the year at $1,466, a rise of 57 per cent from its starting point.

Platinum Prices in 2009
London am and pm fixings, $ per oz

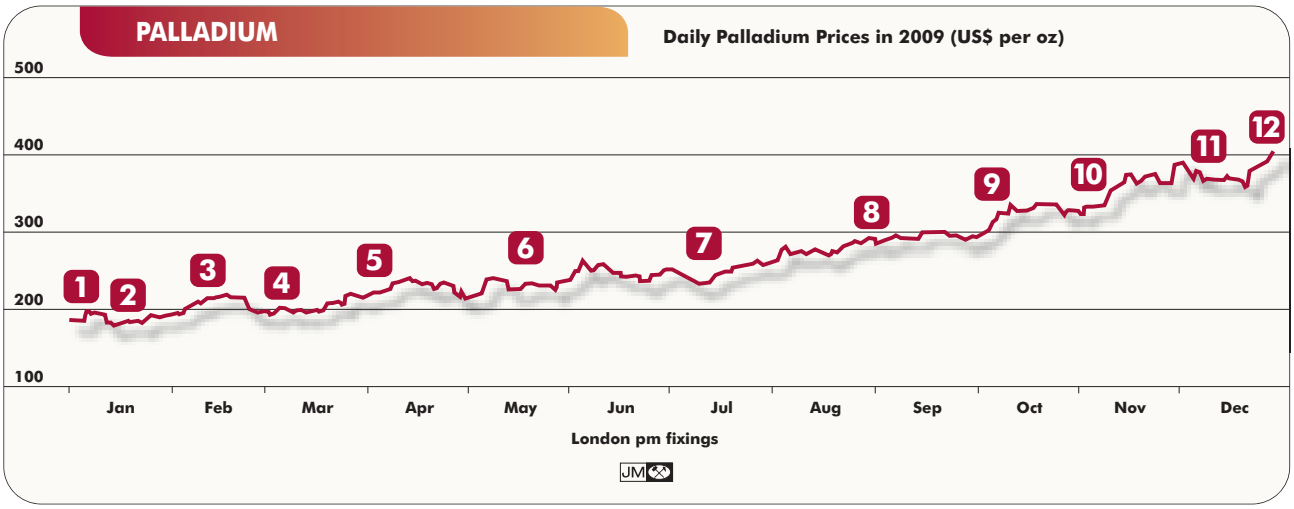
	High	Low	Average
January	1,000.00	915.00	951.35
February	1,113.00	962.00	1,036.90
March	1,152.00	1,039.00	1,081.75
April	1,229.00	1,078.00	1,163.80
May	1,175.00	1,076.00	1,132.05
June	1,293.00	1,165.00	1,219.45
July	1,213.00	1,092.00	1,161.75
August	1,286.00	1,210.00	1,244.65
September	1,343.00	1,210.00	1,289.20
October	1,372.00	1,269.00	1,333.05
November	1,469.00	1,325.00	1,401.40
December	1,500.00	1,397.00	1,445.35
Annual	**1,500.00**	**915.00**	**1,205.40**

Palladium Prices in 2009
London am and pm fixings, $ per oz

	High	Low	Average
January	202.50	177.00	188.00
February	219.00	190.50	206.70
March	222.00	191.00	202.60
April	239.00	213.00	227.05
May	242.00	212.00	229.85
June	264.00	234.00	245.85
July	263.00	232.00	248.45
August	289.00	262.00	275.50
September	304.00	283.00	293.15
October	339.00	291.00	321.80
November	375.00	318.00	351.75
December	402.00	355.00	373.15
Annual	**402.00**	**177.00**	**263.70**

Rhodium Prices in 2009
Johnson Matthey Base Prices, $ per oz

	High	Low	Average
January	1,300.00	1,050.00	1,152.15
February	1,200.00	1,150.00	1.178.75
March	1,200.00	1,125.00	1,169.80
April	1,675.00	1,160.00	1,343.45
May	1,525.00	1,325.00	1,419.90
June	1,500.00	1,375.00	1,465.45
July	1,725.00	1,430.00	1,488.65
August	1,700.00	1,625.00	1,671.60
September	1,650.00	1,650.00	1,650.00
October	1,950.00	1,650.00	1,776.20
November	2,800.00	1,950.00	2,361.05
December	2,800.00	2,175.00	2,422.20
Annual	**2,800.00**	**1,050.00**	**1,591.60**



Palladium traded at an average price of $263.72 in 2009, some 25 per cent below the average for the previous year. However, it performed strongly during 2009, aided by substantial investment inflows, the surge in the gold price to record levels and by dollar weakness throughout much of the year. A slow but steady return of optimism to the automotive sector eventually provided some upwards momentum too and the palladium price more than doubled, climbing from an initial $185 to a final fix for the year of $402.

1 Palladium's first fix of 2009 was at $185 and, despite the gloom surrounding the automotive sector, the initial price movement was upwards. Much of this negative news seemed already to be included in the metal's price and a weak US Dollar and steady flows of money into the European Exchange Traded Funds forced the price higher. News that the Chinese Government was to cut purchase taxes on some new vehicles in order to stimulate the market provided another fillip and, as Chinese purchasers impelled platinum to $1,000 on the 7th of **January**, palladium rose above the $200 level, reaching its monthly high of $202.50 at the second fix of the day.

2 Fund sales of palladium on the 8th of January drove the price back below $200 but other investors continued to try to push palladium higher over the following days. However, concerns over the health of the world's economy, and the prospects of another cut in European interest rates, strengthened the dollar, preventing palladium from rising back over this level. Weak European car production data and further investor sales of metal softened the price which slipped to its low for the month – and the whole of the year – of $177 at the morning fix in London on the 15th of January.

The following day, the US Government came to the rescue as it announced a $825 billion economic support plan. This reassured the financial markets and helped palladium back up to $185 at the second fix on the 16th, before it settled to trade in a range from $180-$190.

3 Continuing economic uncertainty dogged the equity markets during **February**, encouraging investors into gold and the other precious metals as a relative safe haven. Once the palladium price had broken out of the top of its previous narrow trading range, investors started to purchase significant amounts of metal through the European Exchange Traded Funds, pushing it closer to the substantial resistance near to the $200 mark.

Net long speculative positions on the futures exchanges increased by over 100,000 oz in the first two weeks of the month. The rising gold price provided the final touch and forced palladium back over $200 on the 5th of February. A general sense of bullishness now began to infect the precious metal market and palladium tracked platinum and gold higher to reach its monthly high of $219 on the 18th of February.

4 However, on the 19th of February, a request from General Motors for $30 billion of aid from the US Government reinjected some realism over the scale of the challenges facing the automotive sector, weakening the palladium price which settled ever closer to $200 before finally falling below that level on the 25th.

Investment flows into the precious metals slowed and with industrial purchasing of palladium weak and the gold price flat, the palladium price remained becalmed just below $200. Investors did manage to force the price over this level briefly

on the 6th of **March** but palladium found little buying support here and fell back to trade between $190 and $200 until the 18th of March.

5 The US Government's proposal to undertake a huge quantitative easing programme to keep its domestic financial system functioning sent the dollar plunging in after-hours trading on the 18th of March. Almost every commodity benefited, particularly gold which gained favour as a hedge against future inflation. The other precious metals firmed too, with palladium climbing to $203 on the 19th: it did not fall back below this level again in 2009. Investors regained their appetite – net long speculative positions on NYMEX started to rise once more – and drove palladium to a high of $222 on the 26th.

Palladium came under some pressure at the end of the month as the US Government rejected General Motors' and Chrysler's turnaround plans but shrugged it off, aided by a weak US Dollar. Investors continued to move into the gold market, supporting the whole precious metal complex.

On the 2nd of **April**, ETF Securities revealed that it had filed for regulatory approval for a US palladium Exchange Traded Fund, driving the price to $225 on the 7th. The Russian Government then announced plans to abolish Almazjuvelierexport's monopoly on platinum group metal exports from Russia. This caused speculation about possible supply disruption, propelling palladium to a monthly peak of $239 on the 14th of April.

6 Net long speculative futures positions on NYMEX began to shrink in the second half of April due to worries over the possible impact of bankruptcies at some of the major US automotive manufacturers on demand for palladium. The palladium price began to retreat too, tracking back to a low of $212 on the 1st of **May** when significant amounts of metal were sold as Chrysler entered Chapter 11 insolvency.

The mood of the investment community changed abruptly though, with negative news from the automotive sector ignored. NYMEX positions started to grow amidst signs of strong commodity demand in China. A weak dollar and heavy Asian physical purchasing of palladium impelled the price to a monthly peak of $242 on the 8th of May before the momentum dissipated. Palladium did soften as far as $223.50 on the 14th of May amidst widespread commodity liquidation but a general sense of bullishness persisted.

This view was proven correct at the end of the month as worries over the creditworthiness of the US economy drove investors from the dollar into gold and other commodities as a safe haven. The markets also responded positively as General Motors moved into Chapter 11 at the start of **June**, reducing the uncertainty over its prospects. Rumours of South African platinum group metal production problems and speculation that a US vehicle scrappage scheme might be launched drove palladium to a monthly high of $264 on the 5th of June.

7 Weak industrial and automotive purchasing finally took its toll from mid-June to mid-**July**, dragging the palladium price back below $250 for most of this period. Currency movements prompted much of the day-to-day volatility as investors' risk appetite fluctuated. However, a range of supply side issues eventually generated some momentum, sending palladium upwards from a low of $232 on the 13th of July.

The launch of the US "Cash for Clunkers" scrappage scheme spurred palladium to a monthly high of $263 on the 28th of July. Norilsk Nickel revealed a fall in its palladium output and threats of a strike at Eskom reminded the market of palladium's potential supply constraints. The US raised the funding available to its scrappage scheme and strong German car sales provided further vigour from the demand side, sending palladium to a short-lived peak of $280 on the 5th of **August** before slipping back closer to $270 by the middle of the month.

8 Palladium broke out from its range on the 24th of August, climbing as the Euro strengthened against the US Dollar. This was accompanied by growing industrial unrest in the South African mining industry – illustrated by a stoppage at Impala on the 25th – and palladium climbed to $289 on the 28th of August, its highest point of the year-to-date.

The gold price, though, kept on rising, driven by fears over the prospects of higher future inflation due to the widespread use of quantitative easing around the world. As gold climbed back over $1,000, investor interest returned to palladium, with funds increasingly targeting the $300 mark. As a signal of the market's intentions, 25,000 oz of palladium entered the London ETF that day and a slow trickle of positive news from the world's automotive markets helped palladium chip away at the resistance. Net long speculative positions on NYMEX rose above the 1.5 million ounce level. The dollar lurched lower on the 16th of **September** as inflation fears surfaced again and palladium finally burst through $300 in spot trading in New York on the 17th. It fixed at $304 on the 18th, the first time it had been above $300 since the 1st of September 2008.

9 Profit-taking inevitably occurred, with net long speculative NYMEX positions shrinking rapidly, but the US Dollar remained weak, supporting the palladium price at its low of $291 on the

2nd of **October**. Commentators started to focus once more on market fundamentals and a slow but steady improvement of the prospects for the global automotive industry provided some firmness to the palladium price.

Investors too demonstrated their continuing commitment to palladium by once again increasing their long positions on the futures exchanges. The gold price raced ahead due to speculation that the US Dollar could lose its status as the world's de facto reserve currency. Dehedging in the gold market drove that metal to an all-time record price on the 13th of October and palladium followed gold higher, climbing to fix at $335 that morning, a rise of more than ten per cent in just two weeks. Profit-taking followed but public comments from Norilsk Nickel that it did not expect to see shipments of Russian state stocks of palladium during 2009 firmed the price further, sending it up to $339 on the 20th.

10 Worries about the possible impact of early tightening of global monetary policy on the world's economic growth weighed on most commodities in early **November**, sending palladium to a low of $318 on the 3rd. However, with each successive low of the palladium price higher than the previous minimum, the underlying level of investor interest was clear. Later on the 3rd, news that the Reserve Bank of India had bought 200 tonnes of gold provided the catalyst to drive all of the precious metals upwards. Gold leapt and continued to climb; the US Dollar weakened further against the Euro; and positive European car sales data propelled palladium sharply higher to a peak of $375 on the 18th of November.

11 Towards the end of November, doubts surfaced over the ability of Dubai World (the state-owned development body) to repay its debts and investors fled from riskier assets into dollars. Palladium briefly faltered and the price dipped as low as $358 on the 27th before the panic subsided. Investors started to abandon the dollar again and, with gold seemingly headed to $1,200 and platinum to $1,500, palladium investors started to target $400 as the next significant milestone. Gold reached its target and palladium climbed to a new high for 2009 of $389 on the 3rd of **December**.

However, unexpectedly positive American employment data suggested to investors that US interest rates might eventually start to rise and the dollar strengthened, forcing palladium back lower on the 7th. On the following day, the credit rating of Greece's sovereign debt was downgraded, leading to fears over the health of the Euro. The US Dollar abruptly reversed its long term slide against the Euro, firming instead. Metal prices softened in response and, although ETF holdings and net long speculative futures positions continued to grow, the price drifted back down to only $355 on the 23rd.

12 After the afternoon fix on the 23rd of December, the approval of a US-registered physically-backed palladium Exchange Traded Fund surprised the market. With pre-Christmas trading volumes light, nervous buying drove the palladium price immediately back to $377 on the 24th. With energy returning to the market, palladium soared higher, moving closer to $400. It seemed inevitable that this level would be breached and palladium finally exceeded it when it reached $402 – its highest point of the year – at the very final fix of 2009.

OTHER PGM

Although rhodium traded at a fraction of its average 2008 price, it performed strongly during 2009, rising from an initial Johnson Matthey Base Price of $1,250 to a final price of $2,500 – and peaked at $2,800 en route – as many investors showed their belief that it was undervalued despite weak automotive demand.

Rhodium started 2009 at $1,250 and modest buying initially pushed it up to $1,300 on the 7th of **January**. However, continuing turmoil throughout the world's economy weakened the price and rhodium slipped back to its low for 2009 of $1,050 on the 14th of January.

Automotive demand remained weak (as it would for most of the year) but some light purchasing and a dearth of metal being recovered from spent autocatalysts rescued the price, sending it back to $1,200 in the second half of **February**. The price fell once more but rumours of significant investor purchasing and some stock-building by the automotive industry then supported the price which quickly shot higher, moving from $1,225 on the 15th of **April** to $1,675 on the 22nd. The number of bids decreased rapidly and rhodium crashed back to $1,325 at the start of **May**. Residual Asian buying interest took rhodium back to a monthly peak for May of $1,525 before disappearing, causing the price to drift lower again.

This heady mixture of physical and speculative interest re-emerged in **July**, and the price sped from $1,430 on the 22nd to a high of $1,725 on the 28th before purchasing eased again. The price had retreated to $1,650 by the end of **August** when it received support from worries over disruption to South African supplies. Rhodium remained at this level until the 9th of **October** when Asian purchasing forced the price

higher despite little evidence of renewed automotive sector interest. With the price of almost every other precious metal rising, "relative value" investors were attracted to rhodium and steady bidding propelled the price to $1,950 by the end of the month. Two-way trading returned and, as investors digested increasingly positive news emerging from the car market, rhodium climbed to its peak for more than a year of $2,800 at the end of **November**.

Normal behaviour now returned to the rhodium market: bids disappeared and the price spiralled rapidly downwards to $2,175 on the 11th of **December**. Investor interest returned at this level, though, and bids soon outnumbered offers, sending rhodium bouncing quickly upwards to end the year at $2,500.

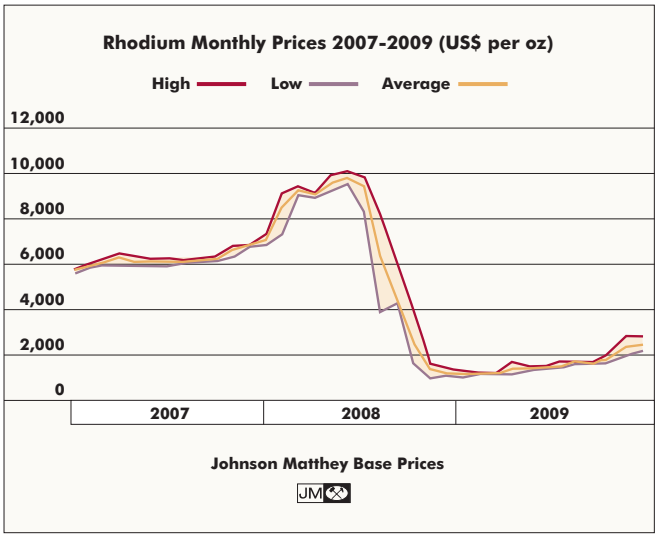
The ruthenium price also strengthened during 2009 – it climbed from an initial $100 to end the year at $160 an ounce – although it remained a long way below the elevated levels of late 2007 and early 2008.

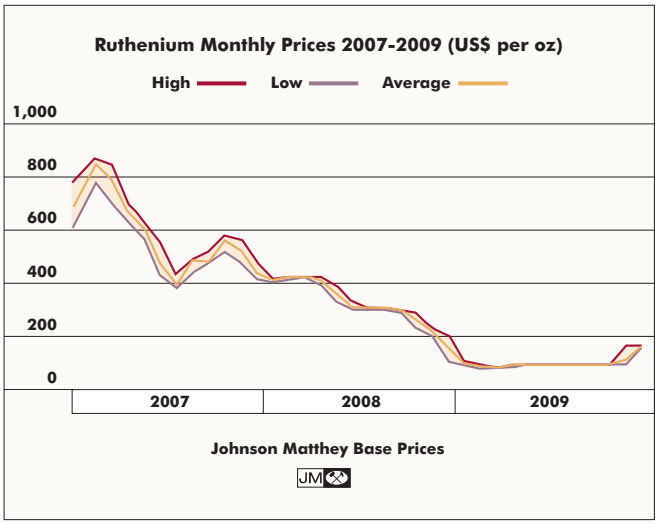
Ruthenium started the year weakly at a Johnson Matthey Base Price of $100. Demand was soft, as had been the case throughout much of 2008, with hard disk and sputtering target manufacturers able to meet most of their metal requirements through the use of ruthenium recycled from their production processes. The price softened to $85 by the middle of **January** and retreated further to its yearly low of $75 in early **February**. This generated a small amount of additional physical buying interest and the price crept back up to $90 by the end of **April**, still a long way below its 2007 highs.

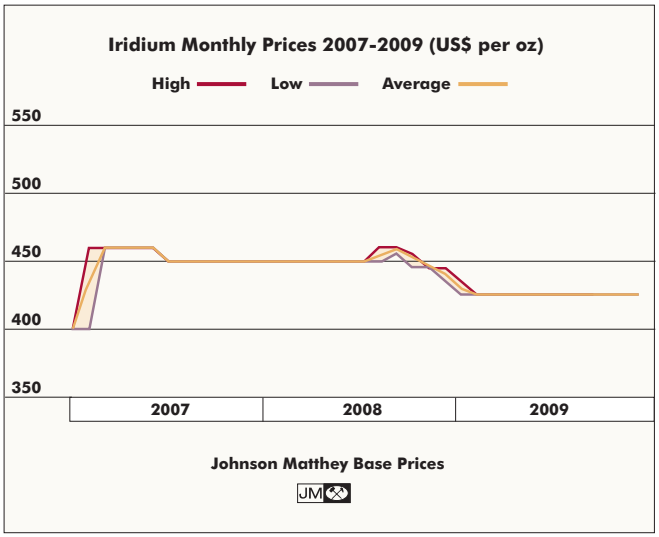
Ruthenium remained at $90 for the entire Northern hemisphere summer but eventually started to show signs of life in **November**, following a gradual return of industrial purchasing. With the prices of the other platinum group metals rising, investors finally turned their attention to ruthenium. Speculative buying occurred in China and in North America, driving the price up to $95 on the 18th. Once it had started to move, the momentum built and the price sped to $100 on the 23rd before running out of energy at $160 on the 25th of November. This was the highest ruthenium price for more than a year and it remained at this level for the remainder of 2009.

Once again, iridium was the quietest of the platinum group metals during 2009, trading at an average of just over $425 compared to $450 one year earlier.

Iridium began the year at a Johnson Matthey Base Price of $435 but moved lower to $425 on the 16th of **January** amidst thin industrial purchasing. End user interest remained weak for much of the remainder of the year but the price did not respond, trading at $425 for the following eleven months to end 2009 at that level.





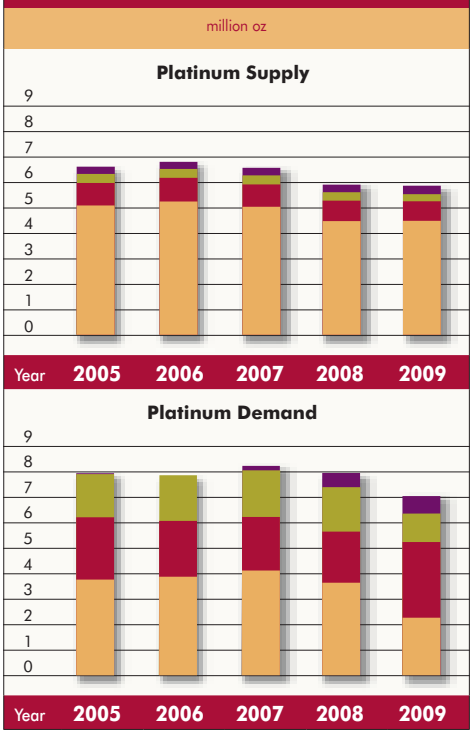


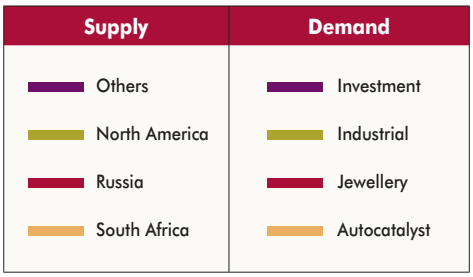
SUPPLY AND DEMAND TABLES

Platinum Supply and Demand

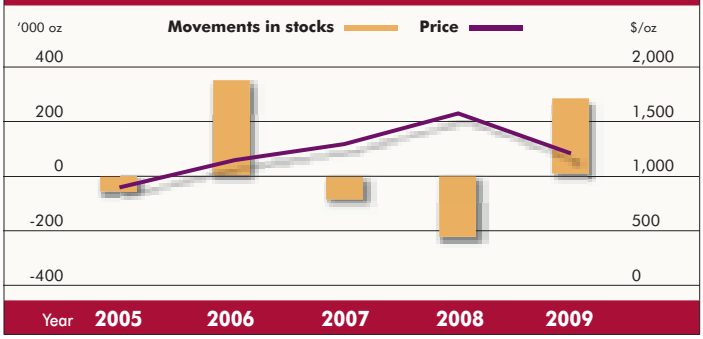
	'000 oz	2005	2006	2007	2008	2009
Supply[1]	South Africa	5,115	5,295	5,070	4,515	4,530
	Russia[3]	890	920	915	805	785
	North America	365	345	325	325	260
	Zimbabwe[2]	155	165	170	180	230
	Others[2]	115	105	120	115	115
	Total Supply	**6,640**	**6,830**	**6,600**	**5,940**	**5,920**
Gross Demand by Application[4]	Autocatalyst[4]	3,795	3,905	4,145	3,655	2,230
	Chemical	325	395	420	400	295
	Electrical[4]	360	360	255	230	190
	Glass	360	405	470	315	10
	Investment	15	(40)	170	555	660
	Jewellery[4]	2,465	2,195	2,110	2,060	3,010
	Medical & Biomedical[5]	250	250	230	245	250
	Petroleum	170	180	205	240	205
	Other[5]	225	240	265	290	190
	Total Gross Demand	**7,965**	**7,890**	**8,270**	**7,990**	**7,040**
Recycling[6]	Autocatalyst	(770)	(860)	(935)	(1,130)	(830)
	Electrical	0	0	0	(5)	(10)
	Jewellery	(500)	(555)	(655)	(695)	(565)
	Total Recycling	**(1,270)**	**(1,415)**	**(1,590)**	**(1,830)**	**(1,405)**
	Total Net Demand[7]	**6,695**	**6,475**	**6,680**	**6,160**	**5,635**
	Movements in Stocks[8]	**(55)**	**355**	**(80)**	**(220)**	**285**

At a glance





Prices and Movements in Stocks



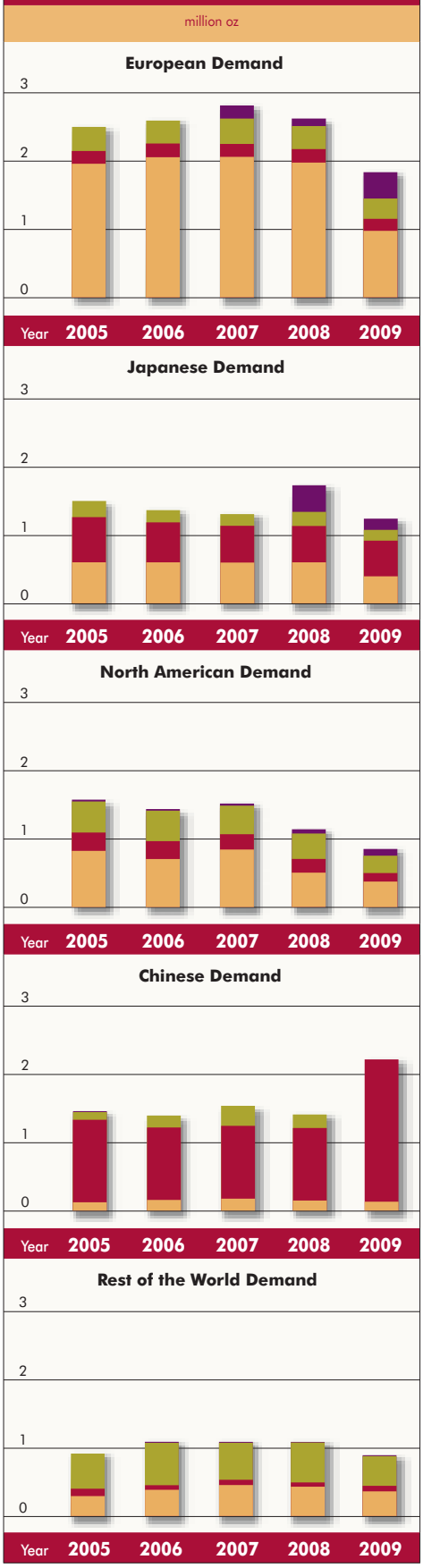
Average Price (US$ per oz)[9]

2005	2006	2007	2008	2009
897	1,143	1,304	1,576	1,205

Gross Platinum Demand by Region

	'000 oz	2005	2006	2007	2008	2009
Europe	Autocatalyst	1,960	2,060	2,055	1,970	970
	Chemical	100	100	110	105	70
	Electrical	40	25	15	20	20
	Glass	10	10	15	(25)	5
	Investment	0	0	195	105	385
	Jewellery	195	200	200	205	185
	Medical & Biomedical	110	110	110	115	115
	Petroleum	15	20	25	30	25
	Other	65	65	75	85	55
	Total	**2,495**	**2,590**	**2,800**	**2,610**	**1,830**
Japan	Autocatalyst	600	605	610	610	395
	Chemical	50	50	55	55	45
	Electrical	65	55	35	35	30
	Glass	95	100	85	65	40
	Investment	(15)	(65)	(60)	385	160
	Jewellery	670	585	540	530	535
	Medical & Biomedical	20	20	15	20	20
	Petroleum	5	5	5	10	10
	Other	25	20	30	25	15
	Total	**1,515**	**1,375**	**1,315**	**1,735**	**1,250**
North America	Autocatalyst	820	705	850	505	370
	Chemical	100	100	95	95	65
	Electrical	95	75	55	30	25
	Glass	5	10	25	(5)	(35)
	Investment	25	20	30	60	105
	Jewellery	285	270	225	200	135
	Medical & Biomedical	110	105	80	85	90
	Petroleum	35	35	30	25	15
	Other	110	120	135	150	90
	Total	**1,585**	**1,440**	**1,525**	**1,145**	**860**
China	Autocatalyst	120	155	175	145	130
	Chemical	10	65	70	60	40
	Electrical	25	45	20	30	20
	Glass	70	50	180	85	(90)
	Investment	5	0	0	0	0
	Jewellery	1,205	1,060	1,070	1,060	2,080
	Medical & Biomedical	0	0	10	10	10
	Petroleum	5	10	10	10	10
	Other	10	10	5	10	10
	Total	**1,450**	**1,395**	**1,540**	**1,410**	**2,210**
Rest of the World	Autocatalyst	295	380	455	425	365
	Chemical	65	80	90	85	75
	Electrical	135	160	130	115	95
	Glass	180	235	165	195	90
	Investment	0	5	5	5	10
	Jewellery	110	80	75	65	75
	Medical & Biomedical	10	15	15	15	15
	Petroleum	110	110	135	165	145
	Other	15	25	20	20	20
	Total	**920**	**1,090**	**1,090**	**1,090**	**890**
	Total Gross Demand	**7,965**	**7,890**	**8,270**	**7,990**	**7,040**

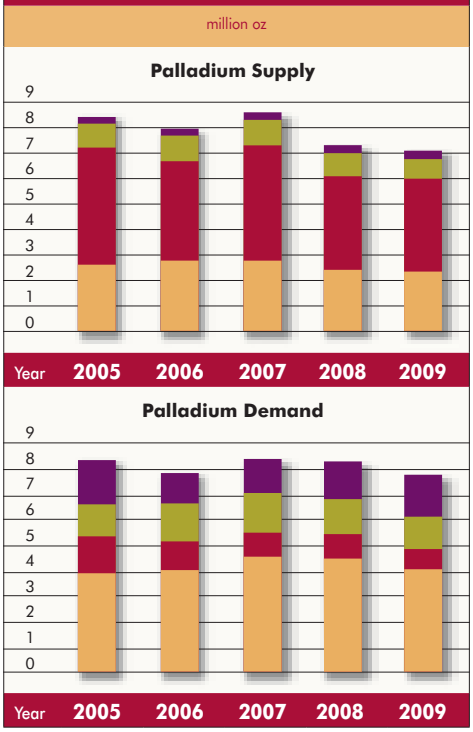
At a glance



Palladium Supply and Demand

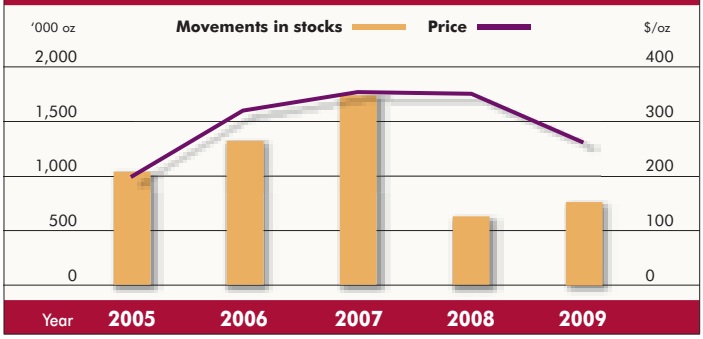
	'000 oz	2005	2006	2007	2008	2009
Supply[1]	South Africa	2,605	2,775	2,765	2,430	2,370
	Russia[3]					
	Primary	3,135	3,220	3,050	2,700	2,675
	Stock Sales	1,485	700	1,490	960	960
	North America	910	985	990	910	755
	Zimbabwe[2]	125	135	135	140	180
	Others[2]	145	135	150	170	160
	Total Supply	**8,405**	**7,950**	**8,580**	**7,310**	**7,100**
Gross Demand by Application[4]	Autocatalyst[4]	3,865	4,015	4,545	4,465	4,050
	Chemical	415	440	375	350	325
	Dental	815	620	630	625	615
	Electrical[4]	1,275	1,495	1,550	1,370	1,270
	Investment	220	50	260	420	625
	Jewellery[4]	1,490	1,140	950	985	815
	Other	265	85	85	75	70
	Total Gross Demand	**8,345**	**7,845**	**8,395**	**8,290**	**7,770**
Recycling[6]	Autocatalyst	(625)	(805)	(1,015)	(1,140)	(965)
	Electrical	(305)	(290)	(315)	(345)	(395)
	Jewellery	(60)	(135)	(235)	(130)	(70)
	Total Recycling	**(990)**	**(1,230)**	**(1,565)**	**(1,615)**	**(1,430)**
	Total Net Demand[7]	**7,355**	**6,615**	**6,830**	**6,675**	**6,340**
	Movements in Stocks[8]	**1,050**	**1,335**	**1,750**	**635**	**760**

At a glance



Supply	Demand
Others	Others
North America	Electrical
Russia	Jewellery
South Africa	Autocatalyst

Prices and Movements in Stocks



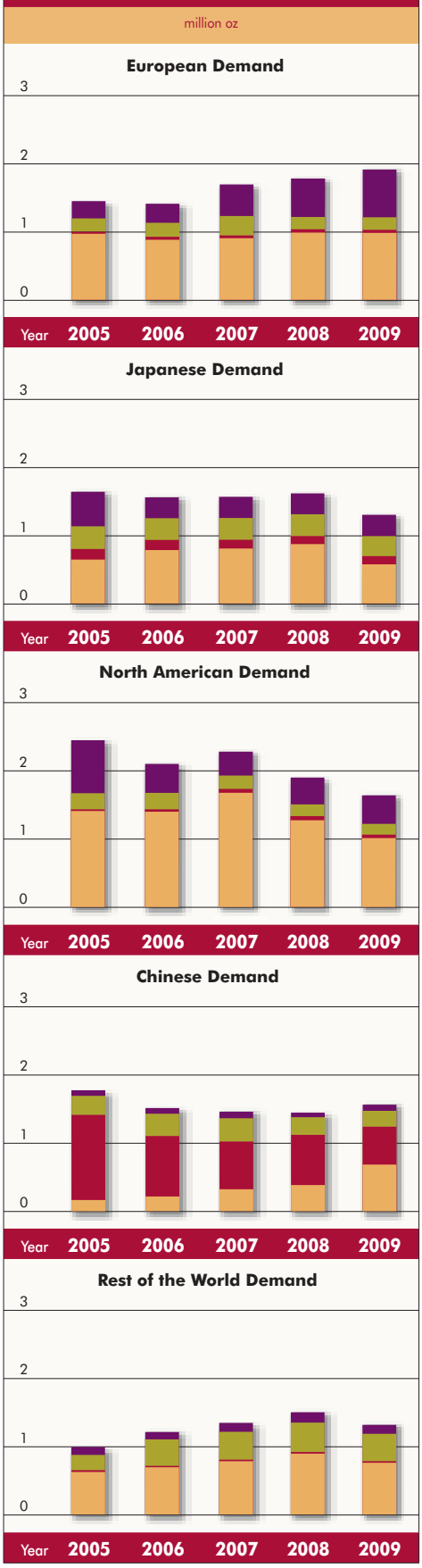
Average Price (US$ per oz)[9]

2005	2006	2007	2008	2009
201	320	355	352	264

Gross Palladium Demand by Region

	'000 oz	2005	2006	2007	2008	2009
Europe	Autocatalyst	975	890	920	1,005	995
	Chemical	155	175	95	100	85
	Dental	75	75	70	65	65
	Electrical	195	210	280	190	175
	Investment	0	0	280	370	525
	Jewellery	35	40	40	45	50
	Other	20	25	20	20	20
	Total	**1,455**	**1,415**	**1,705**	**1,795**	**1,915**
Japan	Autocatalyst	660	795	820	885	590
	Chemical	25	25	25	20	20
	Dental	475	270	275	275	275
	Electrical	325	330	325	320	305
	Investment	0	0	0	0	0
	Jewellery	155	145	125	115	120
	Other	10	10	10	10	10
	Total	**1,650**	**1,575**	**1,580**	**1,625**	**1,320**
North America	Autocatalyst	1,430	1,415	1,695	1,290	1,020
	Chemical	85	80	75	55	50
	Dental	250	260	265	270	260
	Electrical	245	240	195	170	155
	Investment	220	50	(20)	50	95
	Jewellery	20	40	55	60	60
	Other	215	30	30	20	15
	Total	**2,465**	**2,115**	**2,295**	**1,915**	**1,655**
China	Autocatalyst	170	220	325	390	685
	Chemical	55	65	80	55	75
	Dental	5	5	5	0	0
	Electrical	285	330	340	255	235
	Investment	0	0	0	0	0
	Jewellery	1,250	890	705	740	560
	Other	5	10	10	10	10
	Total	**1,770**	**1,520**	**1,465**	**1,450**	**1,565**
Rest of the World	Autocatalyst	630	695	785	895	760
	Chemical	95	95	100	120	95
	Dental	10	10	15	15	15
	Electrical	225	385	410	435	400
	Investment	0	0	0	0	5
	Jewellery	30	25	25	25	25
	Other	15	10	15	15	15
	Total	**1,005**	**1,220**	**1,350**	**1,505**	**1,315**
	Total Gross Demand	**8,345**	**7,845**	**8,395**	**8,290**	**7,770**

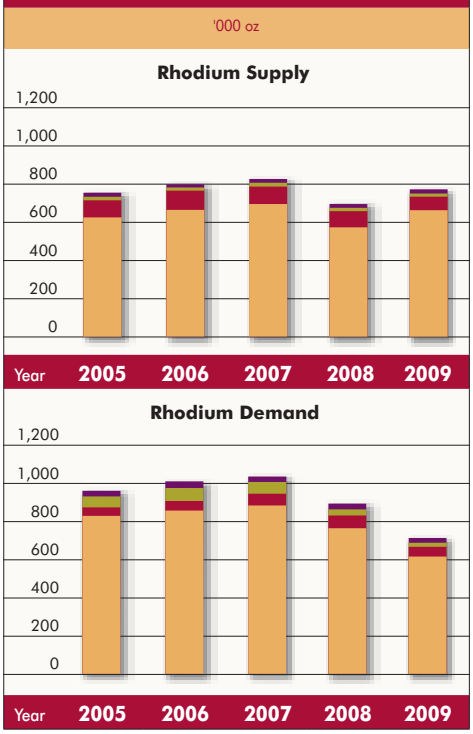
At a glance



Rhodium Supply and Demand

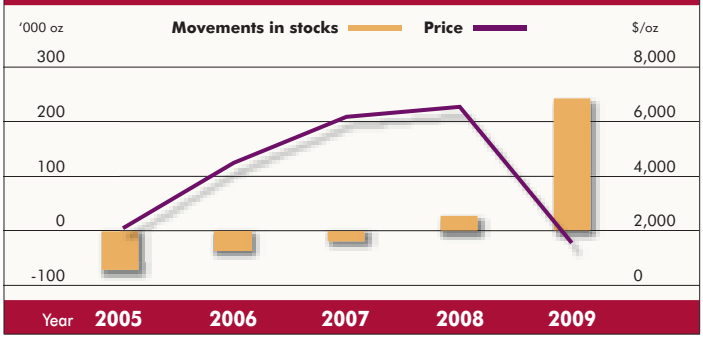
	'000 oz	2005	2006	2007	2008	2009
Supply[1]	South Africa	627	666	696	574	663
	Russia[3]	90	100	90	85	70
	North America	20	17	20	18	15
	Zimbabwe[2]	13	14	14	15	19
	Others[2]	4	5	4	3	3
	Total Supply	**754**	**802**	**824**	**695**	**770**
Gross Demand by Application[4]	Autocatalyst[4]	829	863	887	768	619
	Chemical	48	49	63	68	54
	Electrical[4]	10	9	3	3	3
	Glass	57	65	59	34	19
	Other	20	23	24	24	21
	Total Gross Demand	**964**	**1,009**	**1,036**	**897**	**716**
Recycling[6]	Autocatalyst	(137)	(171)	(192)	(227)	(187)
	Total Recycling	**(137)**	**(171)**	**(192)**	**(227)**	**(187)**
	Total Net Demand[7]	**827**	**838**	**844**	**670**	**529**
	Movements in Stocks[8]	**(73)**	**(36)**	**(20)**	**25**	**241**

At a glance



Supply	Demand
Others	Others
North America	Glass
Russia	Chemical
South Africa	Autocatalyst

Prices and Movements in Stocks



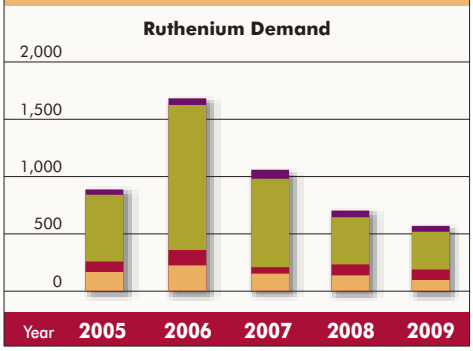
Average Price (US$ per oz)[9]

2005	2006	2007	2008	2009
2,056	4,552	6,191	6,564	1,592

Ruthenium Demand

	'000 oz	2005	2006	2007	2008	2009
Gross Demand by Application	Chemical	164	223	151	139	89
	Electrical	582	1,272	776	410	336
	Electrochemical	96	137	62	95	95
	Other	49	54	69	55	54
	Total Gross Demand	**891**	**1,686**	**1,058**	**699**	**574**

At a glance



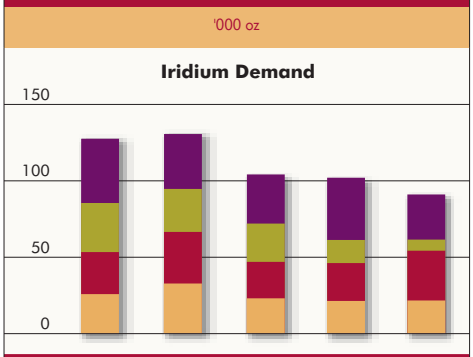
Average Price (US$ per oz)[9]

2005	2006	2007	2008	2009
75	192	580	323	95

Iridium Demand

	'000 oz	2005	2006	2007	2008	2009
Gross Demand by Application	Chemical	26	33	23	21	21
	Electrical	32	28	25	15	7
	Electrochemical	28	34	24	25	33
	Other	42	36	32	41	30
	Total Gross Demand	**128**	**131**	**104**	**102**	**91**

At a glance



Average Price (US$ per oz)[9]

2005	2006	2007	2008	2009
169	350	447	450	425

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 do not believe has previously been priced - principally sales of Russian state stocks - as supplies.

[2]Supplies from **Zimbabwe** have been split from **Other supplies** throughout the 2005-2009 period. Platinum group metals mined in Zimbabwe are currently refined in South Africa, and our supplies figures represent shipments of pgm in concentrate or matte, adjusted for typical refining recoveries.

[3]From 2006 onwards, **Russian supply** figures are net of Russian and ex-CIS states' demand and 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 from 2006 onwards. **Russian supply** figures for palladium have been split into sales from primary mining and sales of stocks. In 2005, these figures included the sale of 439,000 oz of metal used in the Stillwater transaction. Other than this metal, all other stock sales are movements of Russian state stocks which had not previously been priced.

[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.

[5]Demand for our new category, **Medical and Biomedical** has now been separated from our **Other demand** category for platinum. This 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, warranty scrap 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 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 re-used 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.

[9]**Average price** figures for platinum and palladium are the mean of all daily fixing values in a given year. Average price figures for rhodium, ruthenium and iridium are based on Johnson Matthey European Base Prices.

GLOSSARY

BEE	*Black Economic Empowerment*
CIS	*Commonwealth of Independent States*
CO	*Carbon Monoxide*
CSF	*Catalysed Soot Filter*
DMFC	*Direct Methanol Fuel Cell*
DOC	*Diesel Oxidation Catalyst*
DPF	*Diesel Particulate Filter*
ETF	*Exchange Traded Fund*
g	*Gram*
HC	*HydroCarbons*
HDD	*Heavy Duty Diesel*
HIC	*Hybrid Integrated Circuit*
jv	*Joint Venture*
kg	*Kilograms*
LCD	*Liquid Crystal Display*
Merensky	*A platiniferous ore body in South Africa*
MLCC	*Multi-Layer Ceramic Capacitor*
NOx	*Oxides of nitrogen*
NYMEX	*New York Mercantile Exchange*
OBD	*On-Board Diagnostics*
oz	*Ounces troy*
PDP	*Plasma Display Panels*
PEMFC	*Proton Exchange Membrane Fuel Cell*
PET	*PolyEthylene Terephthalate*
pgm	*Platinum Group Metal(s)*
Platreef	*A platiniferous ore body in South Africa*
PM	*Particulate Matter*
PMR	*Perpendicular Magnetic Recording*
ppm	*Parts Per Million*
ppt	*Parts Per Thousand*
PTA	*Purified Terephthalic Acid*
SCR	*Selective Catalytic Reduction*
SUV	*Sports Utility Vehicle*
TOCOM	*Tokyo Commodity Exchange*
ton	*Short ton (2,000 pounds or 907 kg)*
tonne	*1,000 kg*
TWC	*Three-Way Catalyst*
UG2	*A platiniferous ore body in South Africa*
ULEV	*Ultra Low Emissions Vehicle*
VAM	*Vinyl Acetate Monomer*

NOTE ON PRICES

All prices are quoted per oz unless otherwise stated.

R	*South African Rand*
£	*UK Pound*
$	*US Dollar*
¥	*Japanese Yen*
€	*Euro*
RMB	*Chinese Renminbi*

PICTURE CREDITS

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