

PALLADIUM

Net palladium demand is forecast to decrease by 255,000 oz in 2009 to 6.52 million ounces. Gross autocatalyst palladium demand will decline by 565,000 oz to 3.90 million ounces. Demand for new metal from the jewellery sector is forecast to rise by 65,000 oz to 920,000 oz, while industrial and dental demand is expected to fall by 6.3 per cent to a combined 2.02 million ounces.

AUTOCATALYST

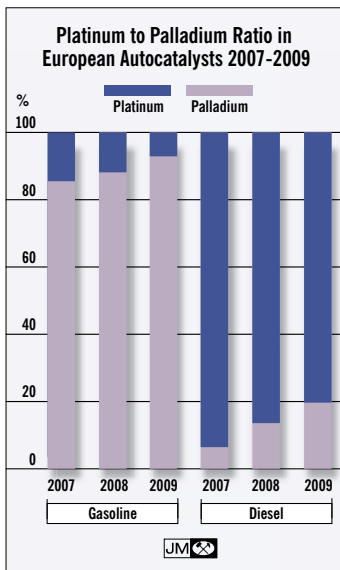
Gross demand for palladium from the auto makers is expected to fall by 12.7 per cent to 3.90 million ounces in 2009, the lowest figure since 2005. The onset of the global economic crisis hit output in 2008 and the downturn continued into this year with global light duty vehicle production forecast to fall by 16.1 per cent to 57.2 million units.

Europe

Although European light duty automotive output is expected to fall to 15.8 million units, production of gasoline cars is expected to rise in 2009. As a result, gross palladium demand in this region is forecast to fall by only 20,000 oz from 2008 levels to 985,000 oz.

With almost all gasoline catalysts already palladium-based, there can be little further switching to palladium in this sector. Although the first stage of Euro 5 emissions rules was introduced in the second half of

Increasing use of palladium in diesel oxidation catalysts and particulate filters will help to support automotive palladium demand in Europe this year.



2009, driving average catalyst precious metal loadings higher, there has been a simultaneous decrease in average engine size. This has reduced the size of a typical three-way catalyst, outweighing the effect of marginally higher loadings. National scrappage schemes have, though, been successful in supporting sales of gasoline vehicles and palladium demand will be remarkably steady.

In the diesel market, the introduction of palladium into platinum-based catalyst formulations is continuing

at a rapid pace. Over half of all diesel catalysts manufactured for the European market now contain palladium in addition to platinum. The typical palladium content of such a catalyst is also rising and palladium now accounts for some twenty per cent on average of the precious metal content of a diesel exhaust aftertreatment system. Despite a fall in the number of diesel vehicles produced, palladium demand in the diesel sector will thus decline only marginally.

Japan

Demand for palladium for use in autocatalysts fitted to cars manufactured in Japan is set to decline by 23.2 per cent to 680,000 oz this year, largely due to a similar percentage fall in domestic light duty vehicle production to a likely 8.0 million units.

The downturn in global sales only started to affect Japanese domestic production in the final quarter of last year and auto makers have since slashed production from 2008 levels in an attempt to maintain profitability. While the major Japanese manufacturers would normally cut output in their overseas factories, the depth of the downturn has forced them to suspend operations at many of their domestic factories too, hitting demand for palladium in this region.

North America

The North American automotive sector has had an extremely challenging year with light duty vehicle sales forecast to fall from an already weak 14.9 million units in 2008 to only 11.8 million. As a result, the auto makers have cut production and gross palladium demand will fall by 27.5 per cent to an estimated 935,000 oz.

The weakness in the regional economy has resulted in a sharp decline in consumer confidence and spending, with car sales plummeting in response. A lack of available credit for consumers also made leasing of new vehicles much more difficult, further hurting vehicle demand. Where consumers have chosen to purchase new automobiles, they have also tended to buy smaller

Gross Palladium Demand: Autocatalyst '000 oz		
	2008	2009
Europe	1,005	985
Japan	885	680
North America	1,290	935
China	385	520
Rest of the World	895	775
Total	4,460	3,895

models with the sales of sports utility vehicles (SUVs) and light and medium duty trucks suffering. This has cut the size of a typical catalytic converter and further hurt palladium demand.

Although the market remains weak, the “Cash for Clunkers” scheme introduced by the US government in July did encourage sales of 690,000 vehicles. Credit availability has begun to improve and production levels have stabilised suggesting that the second half of 2009 could see some improvement in palladium demand.

China

The Chinese automotive sector performed well during the first half of 2009. This strong performance seems set to continue for the rest of the year and domestic sales of light duty vehicles are forecast to rise from 8.6 million units last year to 11.0 million units in 2009, driving gross palladium demand 35.1 per cent higher to 520,000 oz for the year.

The huge economic stimulus provided by the Chinese government has had a significant effect on the appetite of domestic consumers. The increased provision of consumer credit and rebates for rural purchasers have brought car ownership within the reach of a larger fraction of the population, boosting sales, particularly of smaller domestically-produced models. The governmental decision to decrease purchase taxes for cars with engines of 1.6 litres or below has also aided sales of such vehicles, partly at the expense of luxury models and SUVs, reducing the average size of a catalyst in this market too. However, with Euro 3 and Euro 4 emissions rules having been imposed in different areas of China in mid-2008, catalyst metal loadings have risen, causing palladium demand to grow more quickly than vehicle output.

Rest of the World

Gross autocatalyst palladium demand in the Rest of the World region is forecast to fall by 120,000 oz to 775,000 oz this year due to lower vehicle production in many countries. In Russia, the economic crisis has hit particularly hard with plunging vehicle sales dragging palladium demand lower despite the introduction of a scrappage scheme in the middle of the year. Of further note, Euro 4 emissions rules were to be introduced on

all new vehicles sold in Russia during 2010 but this has been postponed until 2012. Mexican production has also suffered, largely due to weakness in vehicle sales in the USA, its principal export market, and palladium demand will fall here too.

There are, though, some locations such as Brazil where the automotive market remains healthy. The Brazilian government cut sales taxes on smaller vehicles at the end of 2008, with sales rising to record levels for the first seven months of this year.

Autocatalyst Recycling

950,000 oz of palladium are forecast to be recovered from end-of-life automotive catalysts during 2009, a fall of 14.8 per cent from the previous year. However, the longer term trend remains one of an increase in palladium recovery.

The recycling industry has suffered from weak new vehicle sales in many regions which have meant that fewer drivers have scrapped old cars. High metal prices in the first half of last year also encouraged recyclers to collect and process any stockpiles of catalytic converters that existed at that time. The volume of end-of-life autocatalysts available for reprocessing has therefore fallen, with the amount of palladium recovered falling likewise. Scrappage schemes have since boosted new vehicle sales and scrappage rates of used gasoline vehicles, supporting palladium recovery at this level. The German scheme has also driven the scrapping of newer vehicles than normal and palladium recoveries will rise in Europe.

Palladium Demand: Autocatalyst Recovery '000 oz		
	2008	2009
Europe	(300)	(335)
Japan	(70)	(50)
North America	(655)	(470)
China	(30)	(35)
Rest of the World	(60)	(60)
Total	(1,115)	(950)

DENTAL

Net demand for palladium from the dental sector is forecast to fall by 3.2 per cent to 605,000 oz this year despite some support from a high gold price and lower recycling rates in this industry.

In Japan, we expect net palladium usage in the dental

Palladium Demand: Dental '000 oz		
	2008	2009
Europe	65	65
Japan	275	270
North America	270	255
China	0	0
Rest of the World	15	15
Total	625	605

sector to slip by 5,000 oz to 270,000 oz. There is a long term trend towards lower levels of dental treatment, reflecting improvements in dental healthcare, which has again hit gross palladium usage. The dental industry has also started to reduce its stocks of the palladium-containing Kinpala alloy by moving to a just-in-time delivery system. However, all these negative trends for palladium demand will be partially offset by a fall in the recycling of unused material.

North American dental demand for palladium is also forecast to fall this year, to 255,000 oz. A weak economy has encouraged patients to delay dental treatment where possible. Despite this, palladium has benefited from the high price of gold. This has driven a move towards the use of medium-gold content alloys from more expensive, gold-rich materials. These lower-gold content alloys are often palladium-based and their increased use has supported demand.

Palladium Demand: Electronics '000 oz		
	2008	2009
Europe	95	75
Japan	275	265
North America	125	110
China	240	215
Rest of the World	365	335
Total	1,100	1,000

ELECTRONICS

The electronics industry is expected to purchase a net one million ounces of palladium in 2009, a 100,000 oz fall from the previous year as the slowdown in the world's economy hits consumer sales and industry stock levels.

The main use of palladium in the electronics sector is in the production of multi-layer ceramic capacitors (MLCC) which are used in consumer electronics. Although sales of electronic devices have recovered well from very low levels at the start of 2009, they will show little if any growth year-on-year. Demand for palladium from MLCC producers has been further depressed due to the widespread destocking of materials, components and finished goods across the market. Although this process is now complete, demand will still fall substantially this year.

Palladium demand for use in lead frames will also suffer due to lower production volumes and a loss of market share to base metal alternatives due to the price volatility of palladium during 2008. However, in some other electronics applications, such as plating, palladium often competes with gold. The sustained high price differential between these two metals

has allowed palladium to gain some market share, providing a minor positive note for demand. Net demand has been further supported by lower recovery of palladium from end-of-life electronic scrap due to the low metal prices of 2009.

JEWELLERY

Net palladium demand from the jewellery industry is forecast to climb by 65,000 oz to 920,000 oz this year with more metal purchased in every region.

China

At the manufacturing level, 2009 has seen significant changes in market share in the palladium jewellery sector in China. Margins on platinum jewellery have increased this year and some manufacturers have abandoned palladium production in order to focus all of their capacity on platinum. However, other companies have captured this market share, expanding their production. Overall production of palladium jewellery is therefore expected to be almost flat compared to 2008 levels.

At a retail level, the picture remains mixed. The availability of palladium jewellery varies between provinces and even between cities within one province, suggesting that retailers and wholesalers are not universally convinced of the potential of this material. Where it is readily available, however, consumer demand appears to be firm, suggesting that the market may now have reached a level of maturity in these locations.

Finally, the amount of palladium recovered from old jewellery is likely to drop, by 40,000 oz, to 50,000 oz this

Palladium Demand: Jewellery '000 oz						
	Gross		Recycling		Net	
	2008	2009	2008	2009	2008	2009
Europe	45	50	0	0	45	50
Japan	120	115	(40)	(20)	80	95
North America	60	70	0	0	60	70
China	740	730	(90)	(50)	650	680
Rest of the World	20	25	0	0	20	25
Total	985	990	(130)	(70)	855	920

See notes to table on page 17.

year. Large amounts of palladium stock were fabricated between 2004 and 2007 using Pd950 alloys (which contain 95 per cent palladium by weight). This material did not sell well and much has been reprocessed and converted into Pd990 (a 99 per cent purity alloy). Little of this Pd950 stock now remains and, with the rate of exchange of old jewellery by consumers still slow, recycling volumes have decreased and are expected to remain low in the short to medium term.

Overall, therefore, net demand is expected to increase from the 650,000 oz of palladium purchased in 2008 to a total of 680,000 oz in 2009.

Other Regions

Palladium demand from the jewellery industry will increase in each of Europe, North America and Japan to a combined 215,000 oz.

European palladium demand should rise to an estimated 50,000 oz this year. A growing number of manufacturers now have expertise in working with this material and it can be seen at an increasing number of retail stores across Europe. As importantly, though, the introduction of a hallmark for palladium jewellery in the UK in mid-2009 is expected to add legitimacy to this material, boosting consumer interest.

In North America, jewellers will purchase 70,000 oz of palladium, an increase of 10,000 oz from last year. The economic crunch has boosted palladium sales in some sectors such as men's wedding bands where couples have focused their available budget on the woman's engagement and wedding rings and moved to cheaper materials for the man's ring.

In Japan, little palladium jewellery is manufactured or sold. However, palladium is used in most platinum and some white gold jewellery alloys. With the recycling of old jewellery falling this year, less palladium will be recovered and net demand will rise to 95,000 oz.

CHEMICAL

The chemical sector is expected to purchase a net 345,000 oz of palladium this year, little different to the 355,000 oz bought during 2008.

A fall in demand for explosives and fertiliser has driven some nitric acid producers to cut production of this feedstock chemical. With catalyst utilisation below

last year's levels, the catchment gauzes in these facilities catch less platinum and are replaced less often and palladium demand for this application will therefore decline slightly.

The net weight of palladium purchased by the process catalyst industry – principally for the production of hydrogen peroxide, purified terephthalic acid (PTA) and vinyl acetate monomer (VAM) – is set to fall marginally too. Most of this metal is for installation in new production plants. While any plants already under construction will be completed despite the current unfavourable market conditions, a lack of availability of project finance will mean fewer new plants will be built this year and palladium requirements will decrease.

INVESTMENT

Net physical investment demand is forecast to rise by 215,000 oz in 2009 to a total of 635,000 oz.

Investment demand for palladium in the form of coins and small bars is set to almost double to 95,000 oz this year. The Royal Canadian Mint restarted production of its palladium Maple Leaf coins in the middle of 2009 and demand has been supported by the rising price of all of the precious metals.

Net investment through Exchange Traded Funds (ETFs) will also increase strongly this year. 2009 has seen heavy buying of palladium (and few redemptions) through the European ETFs at numerous points in the year, driven by the low price of palladium relative to its previous highs. By the end of September, total positions had reached 1.08 million ounces, equivalent to net demand of 430,000 oz in the first three quarters of 2009. Although there is significant uncertainty in investors' behaviour over the rest of the year, we forecast net demand through ETFs to reach 540,000 oz this year, considerably more than the 370,000 oz purchased in 2008.

Palladium Demand: Chemical '000 oz		
	2008	2009
Europe	100	85
Japan	20	20
North America	55	50
China	60	75
Rest of the World	120	115
Total	355	345

Palladium Demand: Investment '000 oz		
	2008	2009
Europe	370	540
Japan	0	0
North America	50	95
China	0	0
Rest of the World	0	0
Total	420	635