

OTHER PLATINUM GROUP METALS

- Gross demand for rhodium grew by 6% to 966,000 oz in 2012, largely the result of strong demand for rhodium in autocatalysts, especially in North America and Japan.
- Primary supplies of rhodium declined by 43,000 oz to 722,000 oz. Weaker South African production was partly offset by a rise in output from Russia. Recovery of rhodium from autocatalyst scrap fell to 259,000 oz.
- Ruthenium demand in 2012 fell by 32% to 679,000 oz due to sharply reduced buying of ruthenium for the production of hard disks and for use in chemical catalysts.
- Adequate stocks of iridium crucibles for growing single crystal sapphire meant a sharp drop in buying from the electrical industry, causing global iridium demand to fall by 46% to 178,000 oz in 2012.

RHODIUM

The market for rhodium was very close to balance in 2012 after the large surplus of the previous year. Supplies from South Africa were significantly reduced due to loss of production through mining strikes and other stoppages; however, some extra shipments were made from Russia in the form of metal recovered from stored mine concentrates at Norilsk. Industrial demand for rhodium was mixed, with growth in purchasing by the chemical industry outweighed by a fall in demand from the glass sector after two very strong years. Autocatalyst demand was boosted by a recovery in vehicle production in Japan from the disruption caused by the 2011 tsunami, plus a buoyant market for cars in North America. In total, gross demand for rhodium rose to 966,000 oz.

Autocatalyst Demand

Demand for rhodium by the automotive industry worldwide rose by 9% in 2012 to 782,000 oz, the highest for five years, with almost all the growth coming from Japan and North America. A 22% increase in light duty gasoline vehicle output in Japan reflected the industry returning to normal after production was seriously interrupted by the 2011 earthquake and tsunami. Japanese auto manufacturers are the heaviest users of rhodium in the autocatalyst sector, and in 2012 a quarter of all rhodium in light duty gasoline vehicles worldwide was used in cars and light trucks produced in Japan.

Japanese automotive factories outside Japan are also relatively high consumers of rhodium. In North America, there was an increase in light duty vehicle output of nearly 19% in response to vibrant demand for cars and trucks from consumers and industrial companies. This led to higher purchases of rhodium for autocatalysts, especially by Japanese auto companies operating in the USA as their share of light vehicle production increased in 2012.

Other Demand

Purchasing of rhodium by the chemical industry remained robust in 2012, with an increase of 13% to 81,000 oz. Demand for rhodium catalysts for the production of acetic acid and oxo-alcohols is being driven by growth in Asian manufacturing capacity. Acetic acid is used to make vinyl acetate monomer, purified terephthalic acid and ethyl acetate. Demand for these chemicals is increasing from downstream paint, solvent and polymer industries. Growth in oxo-alcohol capacity in China is being stimulated by the automotive and construction sectors, which use oxo-alcohols as plasticisers.

Demand for rhodium for platinum–rhodium alloys in the glass industry fell from 77,000 oz in 2011 to 31,000 oz in 2012 as excess capacity for LCD glass production resulted in a delay in new capacity additions by flat glass manufacturers. In addition, glassmakers have been focusing on increasing output from glass melting tanks already installed. Despite the global over-capacity, new tanks were added in China to meet the goal of domestic panel manufacturers to acquire glass from domestic sources. However, of the seven new tanks installed in China in 2012, three were funded with rhodium purchased in 2011.

Excess capacity in the glass fibre manufacturing sector resulted in at least one large project being delayed until 2013. In addition, rhodium coming back from the closure of

Rhodium Demand by Application '000 oz			
	2010	2011	2012
Autocatalyst	727	715	782
Chemical	67	72	81
Electrical	4	6	6
Glass	68	77	31
Other	21	38	66
Total Gross Demand	887	908	966
Autocatalyst Recycling	(241)	(277)	(259)
Total Net Demand	646	631	707

less-efficient glass fibre manufacturing plants and old CRT plants in China dampened demand in the glass industry.

Other demand for rhodium grew by 74% in 2012 to 66,000 oz. Most of the increase was due to investment in the Deutsche Bank rhodium ETF, launched in 2011. Steady incremental buying resulted in the fund's holdings growing by 36,400 oz in 2012. Minting of rhodium bars in Europe added a further 6,000 oz to rhodium investment demand.

Supplies

In 2012, shipments of rhodium by primary producers fell by 5.6% to 722,000 oz, reflecting lower output from South Africa. However, the decline in rhodium supplies was significantly smaller than that in platinum and palladium shipments. South African sales were supported by releases from the refining pipeline, especially at Lonmin, which shipped more rhodium in 2012 than it had the previous year. We also allow for an increase in supplies from Russia, where we believe the treatment of large quantities of stored pyrrhotite concentrate has added to rhodium output at Norilsk Nickel.

RUTHENIUM & IRIIDIUM

Demand for the minor pgm has been volatile in recent years and 2012 was no exception. Ruthenium demand fell by nearly a third and iridium demand by almost a half after two years of strong demand for both metals.

Demand

Ruthenium demand in the chemical sector returned to a more normal level of 101,000 oz in 2012, a sharp decrease of 172,000 oz year-on-year. There had been an exceptional amount of purchasing in 2011, when replacement and back-up charges of ruthenium catalyst were bought for several plants producing ammonia from natural gas.

Demand for ruthenium for sputtering targets, used in the coating of computer hard disks, fell by just over 9% to 137,000 oz in 2012. Lower consumer sales, combined with a technology shift towards tablets and smart phones rather than the more traditional PC and laptop computers, negatively affected hard disk media manufacturing. A reduction of inventories and the increasing ability of hard disk media producers to get more product out of each ruthenium target compounded the effect of poor hard drive sales.

The use of ruthenium as the resistive element in thick-film

Ruthenium Demand by Application '000 oz			
	2010	2011	2012
Chemical	100	273	101
Electrical	679	536	377
Electrochemical	124	130	127
Other	42	58	74
Total Demand	945	997	679

hybrid integrated circuits and chip products fell by 5,000 oz last year, with growth in the number of chips produced being countered by progressive downsizing of components. Purchases of iridium by the electronics industry fell in 2012 by 153,000 oz to a total of 42,000 oz, signalling an abrupt end to the expansion in the use of iridium crucibles to manufacture single crystal sapphire. As demand in this application stabilised, the majority of metal bought in 2012 was to replace losses from existing operations rather than for new crucible installations.

Ruthenium and iridium are used in the electrolysis of sodium chloride solution (brine) to chlorine and sodium hydroxide. China is coming towards the end of a massive project to expand and upgrade its chloralkali industry, moving from the older mercury and diaphragm technologies to more efficient, environmentally acceptable membrane cells.

Overall, electrochemical demand for ruthenium fell by 2%, with growth in North America and the Rest of the World region going some way to offset a 28% drop in China. Iridium demand in the electrochemical sector was similarly hurt by reduced Chinese demand, decreasing by 8% in 2012.

Supplies

Mine production of ruthenium and iridium fell in 2012 in line with lower platinum output at strike-hit South African mines. However, with industrial purchasing down on the previous year, there was no shortage of primary metal. We believe that some additions were made to above-ground stockpiles, indicating that both metals were in fundamental surplus.

Iridium Demand by Application '000 oz			
	2010	2011	2012
Chemical	18	19	19
Electrical	201	195	42
Electrochemical	79	76	70
Other	40	42	47
Total Demand	338	332	178