

# OTHER PLATINUM GROUP METALS

**Net rhodium demand decreased to 689,000 oz in 2008. Rhodium supplies also fell, to 695,000 oz. Ruthenium demand slipped to 669,000 oz as net purchases by the electronics industry contracted. Demand for iridium fell to 102,000 oz. Supplies of both iridium and ruthenium decreased too.**

## RHODIUM

**Net global rhodium demand fell by 18.4 per cent to 689,000 oz in 2008, largely due to the slowdown in the automotive industry and reduced demand for rhodium from glass producers. More metal was recovered from spent autocatalysts. Supplies of rhodium decreased by 15.7 per cent as South African producers failed to maintain output. Overall, the rhodium market was in a small surplus of 6,000 oz during 2008.**

### Autocatalyst Demand

Gross automotive demand for rhodium in 2008 was 14.3 per cent lower than in 2007, at 760,000 oz, the first decrease in rhodium demand since 2001.

Gross rhodium usage fell heavily – to 194,000 oz – in North America last year. The effects of falling vehicle

production were exacerbated by a decrease in the average size of new vehicles sold and a trend towards lower rhodium catalyst loadings. Although the rhodium price reached its peak in mid-2008, it had already been at elevated levels for some time. This had driven considerable research and development efforts into rhodium thrifting (the reduction of rhodium content without worsening catalyst performance) which have now taken effect.

In Europe and Japan, gross rhodium demand also decreased. European vehicle production fell (although by a lower percentage than the fall in North American output) but the

forthcoming introduction of Euro 5 emissions rules for light duty vehicles supported rhodium use to an extent. Vehicle manufacturing volumes in Japan changed little from 2007 levels but some thrifting took place, cutting Japanese rhodium demand by 14,000 oz.

In the Rest of the World region, gross rhodium demand fell to 144,000 oz. Production increased in many countries including Brazil, India and Russia. However, as in other regions, auto makers were able to thrift the rhodium from some catalyst formulations, driving gross rhodium usage lower. Rhodium use increased to 77,000 oz in China where rising production and new emissions legislation supported demand.

205,000 oz of rhodium were recovered from end-of-life catalysts in 2008, more than in 2007. The sharp rise in the rhodium price in early 2008 encouraged recyclers to process as many catalysts as possible, leading to higher recycling volumes in all regions.

### Other Demand

Glass industry demand for rhodium fell by 21,000 oz to 38,000 oz in 2008. While the economic slowdown weakened flat panel glass demand in late 2008, extra production capacity was installed in Asia during the year. However, the high rhodium price drove widespread dealloying throughout the glass industry. Reducing the rhodium content of the alloys used in this industry shortens their working life but the costs of more frequent replacement of parts were outweighed by the decrease in total metal costs. Glass sector demand was driven lower still by the release of rhodium from a number of cathode ray tube glass factories that closed in China in 2008.

In the chemical sector, rhodium demand rose slightly to 68,000 oz, due to the installation of new oxo-alcohol manufacturing capacity (for alcohols used as plasticisers or solvents) in China and the Rest of the World region. Rhodium use in electrical and other applications was stable at 28,000 oz.

### Supplies

Supplies of rhodium fell heavily – by 15.7 per cent – to 695,000 oz during 2008. Over 80 per cent of supplies come from South Africa and lower production at many mines drove metal sales sharply lower to 574,000 oz.

Rhodium Supply and Demand '000 oz		
	2007	2008
<b>Supply</b>		
South Africa	696	574
Russia	90	85
North America	20	18
Others	18	18
<b>Total Supply</b>	<b>824</b>	<b>695</b>
<b>Demand</b>		
Autocatalyst: gross	887	760
recovery	(192)	(205)
Chemical	63	68
Electrical	3	3
Glass	59	38
Other	24	25
<b>Total Demand</b>	<b>844</b>	<b>689</b>
<b>Movements in Stocks</b>	<b>(20)</b>	<b>6</b>



This was despite the addition of capacity from newer mines producing rhodium-rich UG2 ore. Russian rhodium sales also fell, by 5,000 oz, to 85,000 oz.

## RUTHENIUM & IRIIDIUM

**Net ruthenium demand in 2008 fell by 36.8 per cent to 669,000 oz, driven lower by reduced new metal purchases by the electronics industry and the chemical sector. Iridium demand declined marginally to 102,000 oz. Supplies of both metals fell but remained adequate to meet demand.**

### Demand

Net ruthenium demand fell for the second successive year, decreasing by 389,000 oz to 669,000 oz in 2008. While production of perpendicular magnetic recording (PMR) hard disks increased, more metal was recovered from the hard disk manufacturing process and net demand fell heavily. The use of ruthenium both in plasma display panels and in chip resistors fell.

Net demand for ruthenium from the hard disk sector fell to below 200,000 oz in 2008. The market share of PMR hard disks rose rapidly throughout 2008 and by the end of the year almost all disks manufactured used this technology. Despite this increase in the number of PMR disks, thriftiness of their average ruthenium content restrained growth in the amount of metal consumed.

However, the major change in hard disk demand was related to movements in industry working stocks. In 2007, sputtering target and hard disk manufacturers purchased large quantities of ruthenium for working

stocks. Since then, however, the average recycling time for spent targets has shrunk greatly, returning substantial amounts of ruthenium to the market and driving net demand lower.

Ruthenium is used in photo-imageable thick film pastes used in the manufacture of plasma display panels (PDP). Production

of flat screen televisions using PDP technology rose by 26 per cent in 2008 despite a slowdown in sales in late 2008. More importantly, though, the increasing use of lower ruthenium or even ruthenium-free pastes cut

metal demand from this application substantially.

Ruthenium use in thick film chip resistors also fell. The number of these components manufactured climbed during 2008 but an ongoing trend towards miniaturisation drove the average ruthenium content of each resistor marginally lower.

Ruthenium demand from the chemical and electrochemical sectors fell by 14,000 oz to a combined 199,000 oz. Use in the chlor-alkali process was flat but purchases for process catalysis dropped by 12,000 oz. Ruthenium demand from other applications decreased by 18.8 per cent to 56,000 oz.

Iridium demand dipped from 104,000 oz in 2007 to 102,000 oz in 2008. We have restated demand for both years to reflect higher recycling rates of iridium crucibles than we had previously accounted for.

Fewer iridium crucibles were manufactured for crystal-growing in 2008 than in the previous year. These crystals are used in telecommunications and medical imaging, and the slowdown in the North American economy cut demand both for these crystals and the crucibles in which they are grown.

Demand for iridium for use in spark plugs and aero engine ignitors was flat in 2008 at 25,000 oz. Iridium plugs continue to increase their share of the higher end of the automotive market but demand was restrained by a fall in vehicle output in the main producing regions.

Chemical and electrochemical demand for iridium fell to 45,000 oz. Environmental legislation and efforts to improve energy efficiency are driving a transition from mercury technology to membrane cells in the chlor-alkali process, thereby increasing iridium demand. However, chemical sector demand fell in 2008.

	2007	2008
Chemical	23	21
Electrochemical	24	24
Electrical	25	15
Other	32	42
<b>Total Demand</b>	<b>104</b>	<b>102</b>



	2007	2008
Chemical	151	139
Electrochemical	62	60
Electrical	776	414
Other	69	56
<b>Total Demand</b>	<b>1,058</b>	<b>669</b>



### Supplies

Supplies of ruthenium and iridium fell in 2008. Most mine production of both metals is from South Africa and electricity supply problems, smelter outages and a range of other issues forced supplies sharply lower. Even so, we believe that supplies were comfortably able to meet demand.