

OTHER PLATINUM GROUP METALS

- Gross rhodium demand is forecast to rise by 18,000 oz to 905,000 oz in 2011. Strong purchasing in the glass sector and new physical investment demand is set to more than offset a decline in demand in autocatalysts.
- Supplies of rhodium are predicted to rise by 5% to 768,000 oz while recycling is set to increase by 8%.
- Demand for ruthenium is forecast to soften by 14% to 811,000 oz due to lower levels of purchasing by the electrical sector this year.
- Iridium demand is set to remain robust at 342,000 oz in 2011 with continued strong purchasing of crucibles in the electrical sector.

RHODIUM

The rhodium market is forecast to remain in surplus this year by 123,000 oz as growth in supplies and recycling offsets a rise in gross demand. Due to thrifting and the disruption to Japanese vehicle production caused by the March disaster, automotive demand for rhodium is set to soften. This is expected to be more than made up for by an increase in demand from the glass industry, plus some additional demand from a new rhodium ETF.

Autocatalyst

Gross demand for rhodium in the autocatalyst sector is set to decline by 22,000 oz to 705,000 oz in 2011. A long-term trend towards thrifting rhodium from palladium-rhodium gasoline autocatalyst formulations in response to previously high prices will lead to flat or reduced demand in most regions this year.

Japan is expected to remain the largest market for rhodium in autocatalysts but demand is forecast to fall in the light duty gasoline sector, the principal area of rhodium use, by almost 27,000 oz this year to 171,000 oz. This is mainly due to lower vehicle output in the aftermath of the earthquake, tsunami and ongoing power restrictions that are expected to affect the car industry this year. Continued thrifting by manufacturers should also play a part in lowering demand in Japan.

In Europe, demand is forecast to decline due to thrifting as well as a fall in the number of gasoline vehicles produced as diesel output picks up. In North America and the Rest of the World region, rhodium demand will remain flat.

Other Demand

Demand for rhodium in the glass sector is forecast to increase by 25% this year to 85,000 oz. Rhodium is used in platinum-rhodium alloys to increase the strength and durability of melting tanks and components in the manufacture of LCD glass and glass fibre. In LCD glass manufacturing, strong

consumer demand for TVs and computer displays is expected to drive purchases of rhodium for new and expanded glass substrate manufacturing facilities in China, Japan, South Korea and Taiwan. Falling rhodium prices and rising platinum prices recently have encouraged glass fibre manufacturers to switch alloys from 10% rhodium-platinum to 20% rhodium-platinum with the extended lifetime of the latter justifying the higher capital investment. Therefore, though the glass fibre manufacturing sector currently has overcapacity and platinum demand is subdued, some additional demand for rhodium is anticipated to come from alloy switching this year.

Consumption of rhodium in the chemical sector is set to rise by 5,000 oz to 72,000 oz this year mainly due to expansion of capacity for oxo-alcohol and acetic acid production, particularly in China.

With the launch of a rhodium ETF by Deutsche Bank in May this year, a new demand area for rhodium is identifiable physically-backed investment. Perhaps due to rhodium's subdued price performance in 2011, as well as rhodium being largely an industrial metal, additions to the new ETF were modest in the first few months of its operation, with only around 14,000 oz of net inflows in the period to late September. Although the physically-backed rhodium investment market is likely to remain a relatively small part of the overall rhodium market, purchases of rhodium for the ETF account for most of the growth in our 'Other' category this year.

Rhodium Demand by Application '000 oz			
	2009	2010	2011
Autocatalyst	619	727	705
Chemical	54	67	72
Electrical	3	4	6
Glass	19	68	85
Other	21	21	37
Total Gross Demand	716	887	905
Autocatalyst Recycling	(187)	(241)	(260)
Total Net Demand	529	646	645

Supplies

Rhodium supplies are forecast to increase by 34,000 oz in 2011 to 768,000 oz as refined output by South African producers recovers following pipeline build-ups in 2010. We anticipate a continued ramp-up to full production by North American miners following strikes and shutdowns in 2009 to 2010. Additional supplies will come from Zimbabwe in line with rhodium beginning to be produced from Unki. Overall, the rhodium market is forecast to remain oversupplied this year as higher refined output, as well as increased recycling, overshadows the increase in industrial demand.

RUTHENIUM & IRIDIUM

Due to a contraction of purchasing by the electrical sector, ruthenium demand is forecast to soften to 811,000 oz this year, a reduction of 14%. In the iridium market, demand is set to remain robust at 342,000 oz, a rise of 4,000 oz compared with 2010.

Demand

Total demand for ruthenium is anticipated to fall this year, mainly due to a reduction in purchasing by the hard disk sector. Following the filling of manufacturing pipelines in early 2010 to support growth in demand for hard disk drives with higher storage capacity, purchasing of ruthenium sputtering targets is expected to return to more normal levels this year. However, despite lower purchasing of ruthenium by manufacturers, demand for hard disks for computers and digital recording devices is set to remain strong from the consumer electronics industry. Not all of the new demand can be satisfied from manufacturer inventories and net demand for ruthenium in this segment is forecast to be 250,000 oz. In addition, increased sales of electronic goods should drive manufacturer purchases of ruthenium pastes for use in components such as chip resistors.

Demand for ruthenium from the chemical industry is again forecast to increase with higher levels of purchasing of ruthenium catalysts for production of ammonia and acetic acid. In the electrochemical sector, a continuing move towards more environmentally friendly membrane cell technology to replace older mercury and diaphragm technology in the chlor-alkali industry is expected to account for some demand, though at a lower level than in previous years. Ruthenium demand is set to increase for salt water chlorination of swimming pools. This process uses ruthenium-coated electrodes in the electrolysis

Ruthenium Demand by Application

	'000 oz		
	2009	2010	2011
Chemical	89	100	109
Electrical	336	679	514
Electrochemical	95	124	131
Other	54	42	57
Total Demand	574	945	811

of salt water to generate sanitising agents to clean the water.

Iridium demand is expected to rise slightly this year to 342,000 oz in line with higher consumption in the electrical sector. The use of iridium in phosphorescent emitter materials in organic light emitting diode (OLED) displays is a new and interesting area of demand. OLED displays are increasingly used in mobile devices such as smart phones and tablet computers where they offer improved image quality over LCD technology and are more energy efficient.

The exceptional levels of purchases of iridium crucibles by the electrical sector last year are unlikely to be repeated in 2011, but demand should remain high by historical standards. The rapid rise in demand for iridium crucibles, particularly in Japan, came as manufacturers built capacity to produce single crystal sapphire, used as a substrate in the manufacture of LEDs. Driven by strong consumer purchasing of LED backlight televisions, further expansion of sapphire production is expected this year in Asia, although as higher iridium prices encourage a shift to alternative technology for crystal growing, overall demand will be lower.

Supplies

Underlying mine production of ruthenium and iridium is forecast to fall this year in line with lower production of platinum. However, ruthenium output is expected to be above the level of demand this year. In the iridium market, sales from producer stocks were required in the first half of 2011 in order to balance the market.

Iridium Demand by Application

	'000 oz		
	2009	2010	2011
Chemical	11	18	19
Electrical	7	201	204
Electrochemical	33	79	74
Other	30	40	45
Total Demand	81	338	342