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**