RECYCLING

- **Recycling of platinum, palladium and rhodium in 2012 came to 4.57 million ounces, a year-on-year decline of 150,000 oz.**
- **Recovery of platinum in 2012 was marginally down compared to 2011, with a fall in autocatalyst scrap refining in Europe and North America partly offset by greater recycling of jewellery scrap in China.**
- **Palladium recycling fell by 105,000 oz to 2.28 million ounces in 2012, the bulk of the decline coming from the electrical sector.**
- **As with platinum and palladium, refining of rhodium from scrap autocatalysts in 2012 was affected by weak pgm prices and lower collection rates, total recoveries falling by 6% to 259,000 oz.**

AUTOCATALYST

Recovery of pgm from end-of-life vehicle catalysts in 2012 was 3.05 million ounces, lower than in 2011 by 160,000 oz. Low pgm prices, which prompted collectors to hoard scrap, and continued weakness in the European car market were the main causes of the decline. A recovery in prices in the second half of the year and the liquidation of old autocatalyst inventories held by one collector in North America in particular gave a late boost to scrap volumes.

PGM recovered from end-of-life European autocatalysts declined by 21% in 2012 to 720,000 oz. The continued weakness in car sales in the region had a knock-on impact on vehicle scrap rates as motorists held on to their vehicles for longer periods. The average age of cars on the road in Europe has steadily increased since 2009. PGM recoveries were also impacted by falling prices for steel during 2012, which further reduced the throughput of scrap, and by lower average pgm prices in the first half of the year which led to the hoarding of catalysts at many of the smaller scrap yards and collectors. Recoveries picked up in line with pgm prices in August and September and were steady in the final quarter, but ended the year well below 2011 levels. Platinum recoveries fell by a lesser amount than palladium as a result of the year-on-year growth in collection of diesel catalysts stemming from the rapid growth in diesel vehicle registrations during the early part of the last decade.

PGM autocatalyst recovery in Japan in 2012 increased by 5% year-on-year to 205,000 oz. A higher turnover of scrapped vehicles was the result of much improved new and second-hand vehicle sales compared with 2011, when the Japanese auto market was depressed by the disastrous earthquake and tsunami. Used vehicle sales in 2012 rose for the first time in 12 years. Also helping to boost autocatalyst recoveries was the re-introduction of a Government subsidy for fuel efficient vehicles, which encouraged greater movement down the second-hand market chain, and contributed to the increase in the availability of scrap material. However, some of this was lost to the Japanese collection network as de-registered vehicles for export passed the million-unit mark for the first time since 2008.

In North America, pent-up demand for light and heavy vehicles after the long recession helped to propel sales of new vehicles in 2012, which in turn augmented the number of older vehicles scrapped. At the same time, falling pgm prices in the first half of the year encouraged collectors to hold on to material. The higher average prices in the second half drove collectors to release catalysts to refiners. In addition to catalysts collected from end-of-life vehicles, one of the largest collectors in the USA, known to hold large stocks of spent catalytic converters, began processing its inventory in the second half of the year. Consequently, recovery of pgm in North America in 2012 substantially exceeded earlier expectations to reach 1.81 million ounces, only marginally below the 2011 level.

The autocatalyst recycling infrastructure in North America is one of the oldest and most developed: recycling rates have been optimised over the last three decades and are therefore not expected to improve. Future recoveries will depend on the amount of pgm used in catalysts over time and the number of vehicles scrapped each year, as well as short-term holding and release of inventory by collectors.

Recycling of catalytic converters in China and other countries expanded at double digit rates in 2012, although total quantities remain low compared with Europe, Japan and North America. Recycling volumes will continue to increase as

Recycling
'000 oz

	Platinum		Palladium		Rhodium	
	2011	2012	2011	2012	2011	2012
Autocatalyst	(1,240)	(1,130)	(1,695)	(1,660)	(277)	(259)
Electrical	(10)	(10)	(480)	(430)	0	0
Jewellery	(810)	(890)	(210)	(190)	0	0
Total	**(2,060)**	**(2,030)**	**(2,385)**	**(2,280)**	**(277)**	**(259)**

a greater proportion of vehicles originally fitted with catalytic converters are scrapped and as the collection infrastructure improves. In addition to these ongoing trends, from May 2013, new standards will take effect in China requiring most vehicles to be scrapped after being operated for 600,000 kilometres. Small taxis, mid-size taxis and buses will need to be removed from service and dismantled eight, ten and twelve years after their production dates respectively.

ELECTRICAL

Globally, the amount of palladium recovered from electronic waste fell by 10% to 430,000 oz in 2012, despite a rise in the absolute quantity of waste captured for recycling. The concentration of palladium per tonne of waste continues to decline due to the historical trends of miniaturisation of electronic components, thrifting of palladium and substitution of palladium by base metals within the electronics industry.

Recovery rates for electronic scrap remain strongest in Europe, driven by the Waste Electronic Equipment (WEE) directive. 2012 saw a recast of the directive, which tightened legislation and will increase collection rates substantially in the future by setting much more ambitious targets, as well as giving EU member states greater power to clamp down on illegal shipments of waste disguised as used equipment.

Recycling of platinum from electrical goods is far lower than palladium, due to the only significant potential source being hard disks, in which the minute quantities of platinum make recovery and refining uneconomical. Recycling rates will increase gradually as higher legislation and greater awareness prevail, but only from a low base of 10,000 oz a year at present.

JEWELLERY

Recycling of platinum jewellery in China rose by nearly one-third to 600,000 oz in 2012. The vast majority of this was old consumer jewellery traded in at retail stores in exchange for new, often heavier platinum pieces. The greater level of recycling reflected a generally vibrant end-market – specifically, rising consumer affluence, the relatively high exchange value of platinum jewellery and consumers' desire to own the latest designs. Healthy consumer demand also ensured that relatively little unsold retail stock had to be returned for refining.

Unlike in China, the Japanese market tends to be one based on cash exchange and is therefore more sensitive to the price in local currency terms. As such, an average price in 2012 that was 10% lower in yen terms provided less economic incentive to recycle old jewellery than the previous year, resulting in platinum jewellery recycling dropping to 285,000 oz, almost one-fifth less than in 2011. Lower recycling of gold jewellery also contributed to less precious metal jewellery being returned across the board.

Recovery of palladium from the Chinese jewellery sector contracted by 15,000 oz to 175,000 oz in 2012, though this amount represents an increase to over 70% of gross demand, signalling an ever-diminishing desire to own or retain palladium jewellery. A theoretically large pool of palladium jewellery still exists in China and while the retail exchange value is relatively low compared with gold and platinum, the fact that the majority of Chinese palladium jewellery was purchased at prices significantly lower than seen in the recent past ensures the economic incentive remains for consumers to cash in old palladium items.