

## PLATINUM-GROUP METALS

(Platinum, palladium, rhodium, ruthenium, iridium, osmium)  
(Data in kilograms unless otherwise noted)

**Domestic Production and Use:** The Stillwater and East Boulder Mines in south-central Montana were the only platinum-group metals (PGMs) mines in the United States and were owned by one company. Small quantities of PGMs were also recovered as byproducts of copper refining. The leading demand sector for PGMs continued to be catalysts to decrease harmful emissions in both light- and heavy-duty vehicles. PGMs are also used in the chemical sector as catalysts for manufacturing bulk chemicals; in the petroleum refining sector; and in laboratory equipment, including crucibles for growing high-purity single crystals for use in the electronics sector. Also in the electronics sector, PGMs are used in computer hard disks to increase storage capacity, in multilayer ceramic capacitors, and in hybridized integrated circuits. PGMs are used by the glass manufacturing sector in the production of fiberglass, liquid crystal displays, and flat-panel displays. Platinum alloys are commonly used for jewelry. Platinum, palladium, and a variety of complex gold-silver-copper alloys are used as dental restorative materials. Platinum, palladium, and rhodium are used as investment tools in the form of exchange-traded notes and exchange-traded funds.

<b>Salient Statistics—United States:</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013<sup>e</sup></b>
Mine production: <sup>1</sup>					
Platinum	3,830	3,450	3,700	3,670	3,700
Palladium	12,700	11,600	12,400	12,300	12,500
Imports for consumption:					
Platinum	183,000	152,000	129,000	172,000	83,000
Palladium	69,700	70,700	98,900	80,100	87,000
Rhodium	11,200	12,800	13,100	12,800	11,000
Ruthenium	21,200	14,100	13,300	10,200	13,000
Iridium	1,520	3,530	2,790	1,230	1,500
Osmium	68	76	48	130	130
Exports:					
Platinum	15,600	16,900	11,300	8,630	11,000
Palladium	30,300	38,100	32,000	32,200	29,000
Rhodium	1,220	2,320	1,370	1,040	1,500
Other PGMs	4,020	3,720	1,150	1,640	1,100
Price, <sup>2</sup> dollars per troy ounce:					
Platinum	1,207.55	1,615.56	1,724.51	1,555.39	1,511.00
Palladium	265.65	530.61	738.51	649.27	736.00
Rhodium	1,591.32	2,459.07	2,204.35	1,274.98	1,095.00
Ruthenium	97.28	198.45	165.85	112.26	81.00
Iridium	420.40	642.15	1,035.87	1,066.23	921.00
Employment, mine, <sup>3</sup> number <sup>1</sup>	1,270	1,350	1,570	1,660	1,700
Net import reliance <sup>3</sup> as a percentage of apparent consumption <sup>e</sup>					
Platinum	95	91	89	90	79
Palladium	62	49	64	57	60

**Recycling:** An estimated 155,000 kilograms of PGMs was recovered globally from new and old scrap in 2013, including about 56,000 kilograms of PGMs in North America.

**Import Sources (2009–12):** Platinum: Germany, 18%; South Africa, 18%; United Kingdom, 9%; Canada, 8%; and other, 47%. Palladium: Russia, 33%; South Africa, 28%; United Kingdom, 25%; Norway, 6%; and other, 8%.

**Tariff:** All unwrought and semimanufactured forms of PGMs can be imported duty free.

**Depletion Allowance:** 22% (Domestic), 14% (Foreign).

**Government Stockpile:** Sales of iridium and platinum from the National Defense Stockpile remained suspended through FY 2013.

### Stockpile Status—9–30–13<sup>4</sup>

Material	Uncommitted inventory	Authorized for disposal	Disposal plan FY 2013	Disposals FY 2013
Platinum	261	261	<sup>5</sup> 778	—
Iridium	18	18	<sup>5</sup> 186	—

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**Events, Trends, and Issues:** Owing to continued global economic concerns, the average annual prices for iridium, platinum, rhodium, and ruthenium decreased for the second consecutive year. The palladium average yearly price was higher in 2013 than that in 2012, likely owing to increased consumption in the automobile sector. Prices for platinum and rhodium increased early in the year but then generally decreased; iridium prices were stable until midyear and then decreased markedly toward yearend, reportedly owing to lack of buying interest. Platinum prices remained higher than those for rhodium for the second consecutive year, and remained below those for gold during the first quarter of 2013 before increasing above gold prices.

Three expansion projects continued on schedule, adjacent to the only U.S. PGM mining company's existing mines. The projects were expected to begin producing in 2014 and 2016. A detailed engineering and feasibility study on the company's Canadian PGM project was expected to be completed by the end of 2013.

Unrest continued in the platinum mining sector in South Africa, the world's leading supplier of PGMs. Although workers' strikes at several mining companies resulted in production losses, production at other mines more than made up for the losses. Disputes at various mining companies were fueled by rivalry between two workers' unions. Owing to increased costs and lower metal prices, several mines were placed on care-and-maintenance status. In an effort to return to profitability, a leading PGM producer planned to restructure its operations by consolidating mines, closing an unprofitable mine, and abolishing thousands of workers' positions.

The Government of Zimbabwe announced plans to seize nearly 28,000 hectares of land from a South African mining company, Zimbabwe's leading PGMs miner, and sell the land to new investors. The Government also planned to require that a PGM refinery be built in Zimbabwe within the next 2 years so that PGMs mined in Zimbabwe would be refined locally to derive greater value.

A new platinum exchange-traded fund (ETF) was launched in Johannesburg, South Africa, at the end of April. By late August, the fund contained 18,000 kilograms of platinum, making it the leading global platinum ETF. Investment interest in platinum was supported by supply concerns caused by the unrest in the South African PGM mining sector.

### **World Mine Production and Reserves:**

	Mine production				PGMs Reserves <sup>6</sup>
	Platinum		Palladium		
	2012	2013 <sup>e</sup>	2012	2013 <sup>e</sup>	
United States	3,670	3,700	12,300	12,500	900,000
Canada	7,000	7,000	12,200	13,000	310,000
Russia	24,600	25,000	82,000	82,000	1,100,000
South Africa	133,000	140,000	74,000	82,000	63,000,000
Zimbabwe	11,000	12,000	9,000	9,000	( <sup>7</sup> )
Other countries	3,480	4,000	11,500	12,000	800,000
World total (rounded)	183,000	192,000	201,000	211,000	66,000,000

**World Resources:** World resources of PGMs in mineral concentrations that can be mined economically are estimated to total more than 100 million kilograms. The largest reserves are in the Bushveld Complex in South Africa.

**Substitutes:** Most motor vehicle manufacturers have substituted palladium for the more expensive platinum in gasoline-engine catalytic converters. As much as 25% palladium can routinely be substituted for platinum in diesel catalytic converters; new technologies have increased that proportion to as much as 50% in some applications. For other end uses, some PGMs can be substituted for other PGMs, with some losses in efficiency.

<sup>e</sup>Estimated. — Zero.

<sup>1</sup>Estimates from published sources.

<sup>2</sup>Engelhard Corporation unfabricated metal.

<sup>3</sup>Defined as imports – exports + adjustments for Government and industry stock changes.

<sup>4</sup>[See Appendix B for definitions.](#)

<sup>5</sup>Actual quantity limited to remaining inventory.

<sup>6</sup>[See Appendix C for resource/reserve definitions and information concerning data sources.](#)

<sup>7</sup>Included with "Other countries."