

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 primary 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 by companies in Texas and Utah. The leading demand sector for PGMs continued to be catalysts for air-pollution abatement in both light- and heavy-duty vehicles. PGMs are also used in the chemical sector as catalysts for manufacturing bulk chemicals such as nitric acid; in the petroleum refining sector; and in the fabrication of laboratory equipment. In the electronics sector, PGMs are used in computer hard disks, multilayer ceramic capacitors, and 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, in cast or wrought form, are commonly used for jewelry. Platinum, palladium, and a variety of complex gold-silver-copper alloys are used as dental restorative materials. Platinum and palladium can be used as investment tools in the form of exchange traded notes and exchange traded funds.

Salient Statistics—United States:	2005	2006	2007	2008	2009^e
Mine production: ¹					
Platinum	3,920	4,290	3,860	3,580	3,800
Palladium	13,300	14,400	12,800	11,900	12,500
Imports for consumption:					
Platinum	106,000	114,000	181,000	150,000	112,000
Palladium	139,000	119,000	113,000	120,000	50,000
Rhodium	13,600	15,900	16,600	12,600	10,200
Ruthenium	23,200	36,000	48,700	49,800	21,600
Iridium	3,010	2,800	3,410	2,550	1,300
Osmium	39	56	23	11	80
Exports:					
Platinum	20,700	45,500	28,900	15,600	20,000
Palladium	27,000	53,100	41,800	26,400	31,000
Rhodium	615	1,600	2,210	1,980	950
Other PGMs	1,080	3,390	8,190	6,450	1,800
Price, ² dollars per troy ounce:					
Platinum	899.51	1,144.42	1,308.44	1,578.26	1,187.00
Palladium	203.54	322.93	357.34	355.12	254.00
Rhodium	2,059.73	4,561.06	6,203.09	6,533.57	1,468.00
Ruthenium	74.41	193.09	573.74	324.60	91.00
Iridium	169.51	349.45	444.43	448.34	420.40
Employment, mine, number ¹	1,620	1,720	1,630	1,360	1,000
Net import reliance as a percentage of apparent consumption ^e					
Platinum	93	90	91	89	89
Palladium	84	75	73	79	47

Recycling: An estimated 17,000 kilograms of PGMs was recovered from new and old scrap in 2009.

Import Sources (2005-08): Platinum: South Africa, 27%; Germany, 17%; United Kingdom, 12%; Canada, 5%; and other, 39%. Palladium: Russia, 46%; South Africa, 21%; United Kingdom, 17%; Belgium, 4%; and other, 12%.

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 2009.

Stockpile Status—9-30-09³

Material	Uncommitted inventory	Authorized for disposal	Disposal plan FY 2009	Disposals FY 2009
Platinum	261	261	⁴ 778	—
Iridium	18	18	⁴ 186	—

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Events, Trends, and Issues. Prices of platinum, palladium, and rhodium trended higher during the year, whereas prices of iridium and ruthenium remained relatively flat. Prices of platinum and rhodium nearly reached parity in March, for the first time in almost 5 years.

The global economic deterioration had several adverse effects on the PGM industry. The poor economy resulted in lower demand and production of automobiles, in which catalytic converters are the major use of PGMs. Some mining companies placed mines on care and maintenance and others cut back on production in response to lower metal prices in 2009 compared with the high prices in 2008. One of the leading U.S. auto manufacturers filed for Chapter 11 bankruptcy protection and cancelled its contract with the U.S. PGMs producer to purchase palladium and rhodium. The U.S. Government instituted a “cash for clunkers” auto scrap plan to encourage consumers to scrap old vehicles and purchase new, more fuel-efficient vehicles. The effect may be an increase in supply of recycled PGMs from scrapped vehicles because older models contain higher quantities of PGMs in their catalytic converters than newer models. Demand for platinum jewelry increased in India and China as a result of lower prices in 2009 compared with prices of 2008. A decrease in car sales in Europe and North America can be expected to result in a decrease in use of platinum and palladium in these regions in 2010 and beyond. The tightening of emissions standards in China, Europe, Japan, and other parts of the world is expected to lead to higher average platinum loadings on catalysts, especially in light-duty diesel vehicles, as particulate matter emissions become more closely controlled. In the United States, thriftiness is continuing at most manufacturers and is likely to lead to a reduction in the use of platinum in autocatalysts. The large price differential between platinum and palladium has led to the assumption that automobile manufacturers will continue to change PGMs ratios in gasoline-engine vehicles in favor of palladium, as well as continue efforts to increase the proportion of palladium used in diesel vehicles. Research is likely to continue on fuel cells for automobiles, with some progress having been made in the use of palladium rather than more expensive platinum, in the catalysts. The sales of platinum jewelry are expected to increase in some regions, in response to lower prices than in the recent past. Investor interest in exchange-traded notes and funds is expected to continue to rise.

World Mine Production and Reserves:

	Mine production				PGMs Reserves ⁵
	Platinum		Palladium		
	2008	2009 ^e	2008	2009 ^e	
United States	3,580	3,800	11,900	12,500	900,000
Canada	7,000	5,000	15,000	9,000	310,000
Colombia	1,500	1,200	NA	NA	(⁶)
Russia	23,000	20,000	87,700	80,000	6,200,000
South Africa	146,000	140,000	75,500	79,000	63,000,000
Zimbabwe	5,640	6,000	4,390	4,800	(⁶)
Other countries	2,140	2,000	9,500	9,800	800,000
World total (rounded)	189,000	178,000	204,000	195,000	71,000,000

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: Some motor vehicle manufacturers have substituted palladium for the more expensive platinum in catalytic converters. Until recently, only platinum could be used in diesel catalytic converters; however, new technologies allow as much as 25% palladium to be used. For most other end uses, PGMs can be substituted for other PGMs, with some losses in efficiency. In addition, electronic parts manufacturers are reducing the average palladium content of the conductive pastes used to form the electrodes of multilayer ceramic capacitors by substituting base metals or silver-palladium pastes that contain significantly less palladium.

^eEstimated. NA Not available. — Zero.

¹Estimates from published sources.

²Engelhard Corporation unfabricated metal.

³See Appendix B for definitions.

⁴Actual quantity limited to remaining inventory.

⁵See Appendix C for definitions. Reserve base estimates were discontinued in 2009; see Introduction.

⁶Included with “Other countries.”