

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 are 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 (ETNs).

Salient Statistics—United States:	2004	2005	2006	2007	2008^e
Mine production: ¹					
Platinum	4,040	3,920	4,290	3,860	3,700
Palladium	13,700	13,300	14,400	12,800	12,400
Imports for consumption:					
Platinum	86,400	106,000	114,000	181,000	195,000
Palladium	127,000	139,000	119,000	113,000	107,000
Rhodium	13,200	13,600	15,900	16,600	16,000
Ruthenium	18,800	23,200	36,000	48,700	57,000
Iridium	3,230	3,010	2,800	3,400	2,800
Osmium	75	39	56	23	24
Exports:					
Platinum	20,000	20,700	45,500	28,900	27,000
Palladium	31,500	27,000	53,100	41,800	40,000
Rhodium	311	615	1,600	2,200	3,500
Other PGMs	1,086	1,080	3,390	8,190	6,700
Price, ² dollars per troy ounce:					
Platinum	848.76	899.51	1,144.42	1,308.44	1,680.00
Palladium	232.93	203.54	322.93	357.34	370.00
Rhodium	983.24	2,059.73	4,561.06	6,203.09	7,260.00
Ruthenium	64.22	74.41	193.09	573.74	340.00
Iridium	185.33	169.51	349.45	444.43	450.00
Employment, mine, number ¹	1,580	1,620	1,720	1,630	1,700
Net import reliance as a percentage of apparent consumption ^e					
Platinum	92	93	90	91	91
Palladium	83	84	75	73	72

Recycling: An estimated 26,000 kilograms of PGMs was recovered from new and old scrap in 2008.

Import Sources (2004-07): Platinum: South Africa, 35%; Germany, 17%; United Kingdom, 11%; Canada, 5%; and other, 32%. Palladium: Russia, 41%; South Africa, 22%; United Kingdom, 18%; Belgium, 5%; and other, 14%.

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

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

Government Stockpile:

Stockpile Status—9-30-08³

Material	Uncommitted inventory	Authorized for disposal	Disposal plan FY 2008	Disposals FY 2008
Platinum	261	261	778	—
Palladium	—	—	3,110	—
Iridium	18	18	186	—

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Events, Trends, and Issues: A power crisis in South Africa, the world's leading supplier of PGM, resulted in the shutdown of all platinum mines for 5 days in January, which caused production loss, supply fears, and record-high prices in the first half of 2008. Prices of platinum and rhodium reached alltime highs of \$2,275 per troy ounce and \$10,100 per troy ounce, respectively, and the palladium price reached a 7-year high of \$585 per troy ounce. The global economic downturn resulted in lower automobile demand, which in turn resulted in falling consumption and prices of PGM in the second half of the year. The desire for an alternative fuel, both for automobiles and to power homes, has led to a large global public and private effort to develop fuel cell technology. Platinum is the catalyst used in fuel cells to convert hydrogen and oxygen to electricity. A decrease in car sales in Europe and North America can be expected to cause a decrease in use of platinum and palladium in the regions in 2008 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, thrifting 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. The sales of platinum jewelry are expected to drop worldwide, as the price continues to be high and white gold and palladium are substituted for platinum. In May, new investment vehicles for PGMs, ETNs, were launched for platinum and palladium and are the first such PGM-trading product available to U.S. investors. Unlike exchange-traded funds, ETNs are based on futures contracts, and physical metal is not held.

World Mine Production, Reserves, and Reserve Base:

	Mine production				PGMs	
	Platinum		Palladium		Reserves ⁴	Reserve base ⁴
	2007	2008 ^e	2007	2008 ^e		
United States	3,860	3,700	12,800	12,400	900,000	2,000,000
Canada	6,200	7,200	10,500	12,500	310,000	390,000
Colombia	1,400	1,700	NA	NA	(⁵)	(⁵)
Russia	27,000	25,000	96,800	88,000	6,200,000	6,600,000
South Africa	166,000	153,000	86,500	80,000	63,000,000	70,000,000
Zimbabwe	5,300	5,600	4,200	4,400	(⁵)	(⁵)
Other countries	3,490	3,500	8,120	8,300	800,000	850,000
World total (rounded)	213,000	200,000	219,000	206,000	71,000,000	80,000,000

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.

⁴See Appendix C for definitions.

⁵Included with "Other countries."