

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. 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 such as nitric acid and in the production of specialty silicones; 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, 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, palladium, and rhodium are used as investment tools in the form of exchange-traded notes and exchange-traded funds.

Salient Statistics—United States:	2007	2008	2009	2010	2011^e
Mine production: ¹					
Platinum	3,860	3,580	3,830	3,450	3,700
Palladium	12,800	11,900	12,700	11,600	12,500
Imports for consumption:					
Platinum	181,000	150,000	183,000	152,000	130,000
Palladium	113,000	120,000	69,700	70,700	80,000
Rhodium	16,600	12,600	11,200	12,800	12,000
Ruthenium	48,700	49,800	21,200	14,100	15,000
Iridium	3,410	2,550	1,520	3,530	2,800
Osmium	23	11	68	76	80
Exports:					
Platinum	28,900	15,600	15,600	16,900	10,000
Palladium	41,800	26,400	30,300	38,100	33,000
Rhodium	2,210	1,980	1,220	2,320	1,900
Other PGMs	8,190	6,450	4,020	3,720	1,000
Price, ² dollars per troy ounce:					
Platinum	1,308.44	1,578.26	1,207.55	1,615.56	1,720.00
Palladium	357.34	355.12	265.65	530.61	730.00
Rhodium	6,203.09	6,533.57	1,591.32	2,459.07	2,030.00
Ruthenium	573.74	324.60	97.28	198.45	170.00
Iridium	444.43	448.34	420.40	642.15	1,030.00
Employment, mine, number ¹	1,630	1,360	1,270	1,350	1,360
Net import reliance as a percentage of apparent consumption ^e					
Platinum	91	89	95	91	88
Palladium	73	79	62	49	56

Recycling: An estimated 36,000 kilograms of PGMs was recovered from new and old scrap in 2011.

Import Sources (2007–10): Platinum: Germany, 17%; South Africa, 17%; United Kingdom, 9%; Canada, 5%; and other, 52%. Palladium: Russia, 42%; South Africa, 24%; United Kingdom, 15%; Norway, 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: Sales of iridium and platinum from the National Defense Stockpile remained suspended through FY 2011.

Stockpile Status—9-30-11³

Material	Uncommitted inventory	Authorized for disposal	Disposal plan FY 2011	Disposals FY 2011
Platinum	261	261	⁴ 778	—
Iridium	18	18	⁴ 186	—

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Events, Trends, and Issues: The global economy continued to be unstable; fears of a recession affected prices of the PGMs. Platinum and palladium prices held relatively steady for the first 8 months of 2011; platinum reached a multiyear high briefly in August, boosted in part by record gold prices. Prices plunged in September because concerns about the world economy led to a sell-off of investments. Toward midyear, platinum prices were less than those for gold for the first time since late 2008, and platinum prices were higher than those for rhodium for several days for the first time since 2004. Rhodium prices trended downward throughout the year; ruthenium prices were steady in the first 8 months and then decreased because of lower demand. In contrast, iridium prices trended upward during the year owing to steady demand from the electronics sector. A new exchange-traded fund was launched for rhodium. The fund was backed by physical rhodium sponge and was designed to track the U.S. dollar spot price less fees. The rhodium price increased briefly after the exchange-traded fund was introduced, but interest proved to be short-lived, and the price dropped.

Mine production of PGMs decreased in South Africa in 2011 compared with that of 2010 owing to safety-related stoppages, workers strikes, and rising production costs, which caused one mine to be placed on care-and-maintenance status and other companies to postpone mine expansions. Mine production in Canada was substantially higher in 2011 because a workers strike ended.

A massive earthquake and tsunami in Japan in March disrupted automobile production and thereby temporarily lowered demand for PGMs. Globally, however, production of and demand for automobiles was higher in 2011 than in 2010, particularly in developing nations such as China and India. This led to increased PGM demand in some regions because catalytic converters are the major end use of PGMs. Global automobile production and demand are expected to continue to increase. Compared with that in 2010, consumption of PGMs for industrial uses in the chemical, glassmaking, and petroleum-refining sectors increased. In contrast, consumption in the jewelry sector was lower in 2011 as a result of higher prices than those in 2010. Consumption in the jewelry sector can be expected to follow price trends for platinum.

The Zimbabwe Government moved forward with plans to require foreign-owned companies worth more than \$1 to sell 51% stakes in the company to indigenous personnel. Mining companies were required to draw up plans regarding how they will transfer ownership, and the process was to be completed by September 2011, although negotiations continued beyond that date for some PGM mining companies.

World Mine Production and Reserves:

	Mine production				PGMs Reserves ⁵
	Platinum		Palladium		
	<u>2010</u>	<u>2011^e</u>	<u>2010</u>	<u>2011^e</u>	
United States	3,450	3,700	11,600	12,500	900,000
Canada	3,900	10,000	6,700	18,000	310,000
Colombia	998	1,000	NA	NA	(⁶)
Russia	25,100	26,000	84,700	85,000	1,100,000
South Africa	148,000	139,000	82,200	78,000	63,000,000
Zimbabwe	8,800	9,400	7,000	7,400	(⁶)
Other countries	<u>2,300</u>	<u>2,500</u>	<u>9,540</u>	<u>6,100</u>	<u>800,000</u>
World total (rounded)	192,000	192,000	202,000	207,000	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: Many 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 and laboratory experiments have increased that proportion to around 50% in some applications. For other end uses, some PGMs can be substituted for other PGMs, with some losses in efficiency.

^eEstimated. NA Not available. — Zero.

¹Estimates from published sources.

²Engelhard Corporation unfabricated metal.

³[See Appendix B for definitions.](#)

⁴Actual quantity limited to remaining inventory.

⁵[See Appendix C for resource/reserve definitions and information concerning data sources.](#)

⁶Included with "Other countries."