

## PLATINUM-GROUP METALS

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

**Domestic Production and Use:** In 2015, one domestic mining company produced platinum-group metals (PGMs) with an estimated value of nearly \$532 million from its two mines in south-central Montana. Small quantities of PGMs were also recovered as byproducts of copper refining. The leading use for PGMs continued to be in catalytic converters to decrease harmful emissions from automobiles. PGMs are also used in catalysts for bulk-chemical production and petroleum refining; in electronic applications, such as in computer hard disks to increase storage capacity, in multilayer ceramic capacitors, and in hybridized integrated circuits; in glass manufacturing; jewelry; and in laboratory equipment. Platinum is used in the medical sector; platinum and palladium, along with gold-silver-copper-zinc alloys, are used as dental restorative materials. Platinum, palladium, and rhodium are used as investments in the form of exchange-traded products, as well as through the individual holding of physical bars and coins.

<b>Salient Statistics—United States:</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015<sup>e</sup></b>
Mine production: <sup>1</sup>					
Platinum	3,700	3,670	3,720	3,660	3,700
Palladium	12,400	12,300	12,600	12,400	12,500
Imports for consumption:					
Platinum	129,000	172,000	116,000	141,000	139,000
Palladium	98,900	80,100	83,100	92,400	89,000
Rhodium	13,100	12,800	11,100	11,100	11,000
Ruthenium	13,300	10,200	15,300	11,100	9,000
Iridium	2,790	1,230	1,720	1,990	730
Osmium	48	130	77	322	40
Exports:					
Platinum	11,300	8,630	11,200	14,800	11,000
Palladium	32,000	32,200	25,900	22,500	27,000
Rhodium	1,370	1,040	1,220	428	600
Other PGMs	1,150	1,640	1,320	901	800
Price, <sup>2</sup> dollars per troy ounce:					
Platinum	1,724.51	1,555.39	1,489.57	1,387.89	1,080.00
Palladium	738.51	649.27	729.58	809.98	690.00
Rhodium	2,204.35	1,274.98	1,069.10	1,174.23	970.00
Ruthenium	165.85	112.26	75.63	65.13	48.00
Iridium	1,035.87	1,066.23	826.45	556.19	530.00
Employment, mine, <sup>3</sup> number <sup>1</sup>	1,570	1,670	1,780	1,620	1,600
Net import reliance <sup>3</sup> as a percentage of apparent consumption:					
Platinum	89	90	84	89	90
Palladium	64	57	60	65	58

**Recycling:** An estimated 125,000 kilograms of platinum, palladium, and rhodium was recovered globally from new and old scrap in 2015, including about 55,000 kilograms recovered from automobile catalytic converters in the United States.

**Import Sources (2011–14):** Platinum: South Africa, 18%; Germany, 16%; United Kingdom, 13%; Canada, 11%; and other, 42%. Palladium: Russia, 24%; South Africa, 24%; United Kingdom, 21%; Switzerland, 6%; and other, 25%.

**Tariff:** All unwrought and semimanufactured forms of PGMs are 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 2015.

### Stockpile Status—9–30–15<sup>4</sup>

Material	Inventory	Disposal Plan FY 2015	Disposals FY 2015
Platinum	261	—	—
Iridium	15	—	—

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**Events, Trends, and Issues:** Platinum mining companies in South Africa continued to recover from the effects of the 5-month-long workers' strike that took place in 2014. Although rampup in production was completed during 2015 by the three major mining companies affected by the strike, total South African production was lower than prestrike levels. Low metal prices continued to adversely affect the mining industry. Some companies placed mines on care-and-maintenance status, one mining company sold unprofitable mines, and some mining companies implemented work force reductions. The mining sector in South Africa also continued to be affected by insufficient electric power generation capacity and increased power costs, labor unrest, and safety-related stoppages.

Production by the sole U.S. PGM-mining company increased slightly. However, owing to low metal prices, the company adjusted its mine plan to focus on the most profitable areas of one of its mines, planned to continue to maximize production at its other mine, and planned a reorganization that included reducing the number of workers.

Global economic conditions, including slower growth of China's economy and reduced PGM demand, resulted in lower PGM prices. Monthly average prices of platinum and rhodium generally decreased from January through August; palladium monthly average prices remained unchanged through May and then decreased through August. The average monthly prices for platinum, palladium, and rhodium in August were at their lowest levels in 6 years, 3 years, and 11 years, respectively. Daily platinum prices, which generally track the trend of gold prices, were below those of gold from February through September. The monthly average prices for iridium and ruthenium fell from June through August owing to weak industrial demand.

Introduction in some countries of more stringent emission standards for automobiles was expected to result in increased demand for palladium, platinum, and rhodium for use in catalytic converters. Automobile production levels were expected to increase, particularly in developing countries, and this was also expected to increase demand for platinum-group metals in 2015 and beyond.

### World Mine Production and Reserves:

	Mine production				PGMs Reserves <sup>5</sup>
	Platinum		Palladium		
	<u>2014</u>	<u>2015<sup>e</sup></u>	<u>2014</u>	<u>2015<sup>e</sup></u>	
United States	3,660	3,700	12,400	12,500	900,000
Canada	8,500	9,000	20,000	24,000	310,000
Russia	23,000	23,000	83,000	80,000	1,100,000
South Africa	94,000	125,000	58,400	73,000	63,000,000
Zimbabwe	12,500	12,500	10,100	10,000	( <sup>6</sup> )
Other countries	<u>5,800</u>	<u>4,800</u>	<u>9,000</u>	<u>8,000</u>	<u>800,000</u>
World total (rounded)	147,000	178,000	193,000	208,000	66,000,000

**World Resources:** World resources of PGMs are estimated to total more than 100 million kilograms. The largest reserves are in the Bushveld Complex in South Africa.

**Substitutes:** Less-expensive palladium has been substituted for platinum in most gasoline-engine catalytic converters. About 25% palladium can routinely be substituted for platinum in diesel catalytic converters; the proportion can be as much as 50% in some applications. For some industrial end uses, one PGM can substitute for another, but with losses in efficiency.

<sup>e</sup>Estimated. — Zero.

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

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

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

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

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

<sup>6</sup>Included with "Other countries."