

PLATINUM-GROUP METALS

(Palladium, platinum, iridium, osmium, rhodium, and ruthenium)
(Data in kilograms of platinum-group-metal content unless otherwise noted)

Domestic Production and Use: One company in Montana produced about 18,100 kilograms of platinum-group metals (PGMs) with an estimated value of about \$570 million. Small quantities of primary PGMs also were recovered as byproducts of copper-nickel mining in Minnesota; however, this material was sold to foreign companies for refining. The leading domestic use for PGMs was in catalytic converters to decrease harmful emissions from automobiles. Platinum-group metals are also used in catalysts for bulk-chemical production and petroleum refining; dental and medical devices; electronic applications, such as in computer hard disks, hybridized integrated circuits, and multilayer ceramic capacitors; glass manufacturing; investment; jewelry; and laboratory equipment.

Salient Statistics—United States:	2014	2015	2016	2017	2018^e
Mine production: ¹					
Palladium	12,400	12,500	13,100	13,600	14,000
Platinum	3,660	3,670	3,890	3,980	4,100
Imports for consumption: ²					
Palladium	92,900	85,300	80,400	86,000	89,000
Platinum	45,400	42,700	42,300	53,200	59,000
PGM waste and scrap	112,000	123,000	159,000	363,000	43,000
Iridium	1,960	1,010	1,300	1,420	940
Osmium	322	8	27	856	38
Rhodium	11,100	10,600	10,700	11,600	14,000
Ruthenium	11,000	8,230	8,410	14,500	17,000
Exports: ³					
Palladium	22,100	23,000	17,500	52,300	61,000
Platinum	14,800	14,400	14,000	16,700	18,000
PGM waste and scrap	254,000	246,000	273,000	195,000	34,000
Rhodium	433	759	794	844	4,000
Other PGMs	887	781	736	939	2,500
Price, dollars per troy ounce: ⁴					
Palladium	809.89	694.99	617.39	874.30	990.00
Platinum	1,387.89	1,056.09	989.52	951.23	900.00
Iridium	556.19	544.19	586.90	908.35	1,200.00
Rhodium	1,174.23	954.90	696.84	1,112.59	2,100.00
Ruthenium	65.13	47.63	42.00	76.86	240.00
Employment, mine, number ¹	1,622	1,439	1,432	1,513	1,500
Net import reliance ^{5, 6} as a percentage of apparent consumption:					
Palladium	57	53	53	38	33
Platinum	69	66	66	71	73

Recycling: About 120,000 kilograms of palladium and platinum was recovered globally from new and old scrap in 2018, including about 51,000 kilograms recovered from automobile catalytic converters in the United States.

Import Sources (2014–17):⁶ Palladium: South Africa, 31%; Russia, 28%; Italy, 12%; United Kingdom, 6%; and other, 23%. Platinum: South Africa, 44%; Germany, 15%; United Kingdom, 10%; Italy, 7%; and other, 24%.

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

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

Government Stockpile:⁷

Material	Inventory As of 9–30–18	FY 2018		FY 2019	
		Potential Acquisitions	Potential Disposals ⁸	Potential Acquisitions	Potential Disposals ⁸
Iridium	15	—	15	—	15
Platinum	261	—	261	—	261

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Events, Trends, and Issues: Progress continued on the domestic company's mine expansion project; full production was expected by the end of 2021. Production of PGMs in South Africa, the world's leading supplier of mined material, decreased compared with 2017 owing to job cuts and mine-shaft closures. Production was expected to continue decreasing as the world's third-leading PGM-mining company, by production volume, announced plans to cut 13,000 jobs over the next 2 years at some of its mines in South Africa.

In May 2018, the U.S. Department of the Interior, in coordination with other executive branch agencies, published a list of 35 critical minerals (83 FR 23295), including platinum-group metals. This list was developed to serve as an initial focus, pursuant to Executive Order 13817, "A Federal Strategy to Ensure Secure and Reliable Supplies of Critical Minerals" (82 FR 60835).

Annual average prices of iridium, palladium, rhodium, and ruthenium increased by 32%, 13%, 89%, and 212%, respectively, compared with those of 2017. The average annual price of platinum was 5% lower than that of 2017. Since October 2017, the average price of palladium has been higher than that of platinum, which had not been the case previously since 2001.

World Mine Production and Reserves:

	Mine production				PGMs Reserves ⁹
	Palladium		Platinum		
	2017	2018 ^e	2017	2018 ^e	
United States	13,600	14,000	3,980	4,100	900,000
Canada	17,000	17,000	9,500	9,500	310,000
Russia	85,200	85,000	21,800	21,000	3,900,000
South Africa	86,800	68,000	143,000	110,000	63,000,000
Zimbabwe	12,000	12,000	14,000	14,000	1,200,000
Other countries	10,800	11,000	6,510	6,100	NA
World total (rounded)	225,000	210,000	199,000	160,000	69,000,000

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: Palladium has been substituted for platinum in most gasoline-engine catalytic converters because of the historically lower price for palladium relative to that of platinum. About 25% of 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.

^eEstimated. NA Not available. — Zero.

¹Estimates from published sources.

²Includes data for the following Harmonized Tariff Schedule of the United States codes: 7110.11.0010, 7110.11.0020, 7110.11.0050, 7110.19.0000, 7110.21.0000, 7110.29.0000, 7110.31.0000, 7110.39.0000, 7110.41.0010, 7110.41.0020, 7110.41.0030, 7110.49.0010, 7112.92.0000, and 7118.90.0020.

³Includes data for the following Schedule B codes: 7110.11.0000, 7110.19.0000, 7110.21.0000, 7110.29.0000, 7110.31.0000, 7110.39.0000, 7110.41.0000, 7110.49.0000, and 7112.92.0000.

⁴Engelhard Corp. unfabricated metal.

⁵Defined as imports – exports + adjustments for industry stock changes.

⁶Excludes imports and (or) exports of waste and scrap.

⁷See Appendix B for definitions.

⁸Disposals are defined as any barter, rotation, sale, or upgrade of National Defense Stockpile stock.

⁹See Appendix C for resource and reserve definitions and information concerning data sources.