

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 over 15,000 kilograms of platinum-group metals (PGMs) with an estimated value of about \$680 million. Small quantities of primary PGMs also were recovered as byproducts of copper-nickel mining in Michigan; 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:	2015	2016	2017	2018	2019^e
Mine production: ¹					
Palladium	12,500	13,100	13,600	14,300	12,000
Platinum	3,670	3,890	3,980	4,160	3,600
Imports for consumption: ²					
Palladium	85,300	80,400	86,000	92,900	76,000
Platinum	42,700	42,300	53,200	58,500	38,000
PGM waste and scrap	123,000	154,000	354,000	40,700	38,000
Iridium	1,010	1,300	1,420	1,020	910
Osmium	8	27	856	25	—
Rhodium	10,600	10,700	11,600	14,500	14,000
Ruthenium	8,230	8,410	14,600	17,900	9,900
Exports: ³					
Palladium	23,000	17,500	52,300	53,300	50,000
Platinum	14,400	14,000	16,700	18,900	17,000
PGM waste and scrap	246,000	48,100	55,500	31,800	19,000
Rhodium	759	794	844	2,010	1,600
Other PGMs	781	736	939	2,600	1,300
Consumption, apparent ^{4, 5}					
Palladium	117,000	118,000	89,300	95,900	80,000
Platinum	40,800	43,200	51,500	53,800	33,000
Price, dollars per troy ounce: ⁶					
Palladium	694.99	617.39	874.30	1,036.43	1,500.00
Platinum	1,056.09	989.52	951.23	882.66	850.00
Iridium	544.19	586.90	908.35	1,293.27	1,500.00
Rhodium	954.90	696.84	1,112.59	2,225.30	3,300.00
Ruthenium	47.63	42.00	76.86	244.41	270.00
Employment, mine, number ¹	1,439	1,432	1,432	1,628	1,400
Net import reliance ^{5, 7} as a percentage of apparent consumption:					
Palladium	53	53	38	41	32
Platinum	66	66	71	74	64

Recycling: About 116,000 kilograms of palladium and platinum was recovered globally from new and old scrap in 2018, including about 49,000 kilograms recovered from automobile catalytic converters in the United States.

Import Sources (2015–18): Palladium: South Africa, 33%; Russia, 33%; Germany, 7%; Italy, 7%; and other, 20%. Platinum: South Africa, 46%; Germany, 16%; Italy, 7%; Russia, 6%; and other, 25%.

Tariff: All unwrought and semimanufactured forms of PGMs are imported duty free. See footnotes for specific Harmonized Tariff Schedule of the United States codes.

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

PLATINUM-GROUP METALS

Government Stockpile:⁸

Material	Inventory As of 9–30–19	FY 2019		FY 2020	
		Potential Acquisitions	Potential Disposals	Potential Acquisitions	Potential Disposals
Iridium	15	—	15	—	15
Platinum	261	—	261	—	261

Events, Trends, and Issues: Progress continued at a domestic mine expansion project; full production from the project was expected by late 2021. Based on platinum content, imports of PGM waste and scrap decreased by 89% in 2018 compared with imports in 2017 and remained at similarly low levels in 2019; however, imports of PGM waste and scrap based on gross weight only decreased by 12% during the same time period. This indicates that imported PGM waste and scrap has increased in content of PGMs other than platinum.

Production of PGMs in South Africa, the world's leading supplier of mined material, decreased by 4% compared with that of 2018 owing to increased labor costs, increased costs for electricity, an unreliable supply of electricity, and challenges related to deep-level mining.

The estimated annual average prices of iridium, palladium, rhodium, and ruthenium increased by 15%, 41%, 50%, and 8%, respectively, compared with those of 2018. The estimated average annual price of platinum was 3% lower than that of 2018, continuing a 5-year trend of declining prices. The price of palladium remained higher than that of platinum in 2019, with palladium prices exceeding a previous high of \$1,036.82 in January 2013 and platinum prices decreasing to their lowest level in a decade.

World Mine Production and Reserves:

	Mine production				PGM Reserves ⁹
	Palladium		Platinum		
	2018	2019 ^e	2018	2019 ^e	
United States	14,300	12,000	4,160	3,600	900,000
Canada	20,000	20,000	7,400	7,400	310,000
Russia	90,000	86,000	22,000	22,000	3,900,000
South Africa	80,600	80,000	137,000	130,000	63,000,000
Zimbabwe	12,000	12,000	15,000	15,000	1,200,000
Other countries	2,920	3,000	4,470	4,300	NA
World total (rounded)	220,000	210,000	190,000	180,000	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.

⁴Defined as primary production + secondary production + imports – exports.

⁵Excludes imports and (or) exports of waste and scrap.

⁶Engelhard Corp. unfabricated metal.

⁷Defined as imports – exports.

⁸See Appendix B for definitions.

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