

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 approximately 18,000 kilograms of platinum-group metals (PGMs) with an estimated value of about \$1.1 billion. 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. PGMs 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:	2016	2017	2018	2019	2020^e
Mine production: ¹					
Palladium	13,100	14,000	14,300	14,300	14,000
Platinum	3,890	4,000	4,160	4,150	4,000
Imports for consumption: ²					
Palladium	80,400	86,000	92,900	84,300	78,000
Platinum	42,300	53,200	58,500	42,300	60,000
PGM waste and scrap	154,000	354,000	40,700	54,300	130,000
Iridium	1,300	1,420	1,020	875	1,300
Osmium	27	856	25	(3)	—
Rhodium	10,700	11,600	14,500	15,000	20,000
Ruthenium	8,410	14,600	17,900	11,200	11,000
Exports: ⁴					
Palladium	17,500	52,300	52,900	55,500	36,000
Platinum	14,000	16,700	18,900	17,400	18,000
PGM waste and scrap	48,100	37,200	31,700	20,800	29,000
Rhodium	794	844	2,010	1,210	1,300
Other PGMs	736	939	2,500	1,330	1,400
Consumption, apparent: ^{5, 6}					
Palladium	118,000	89,700	96,200	96,100	110,000
Platinum	43,200	51,600	53,700	37,100	53,000
Price, dollars per troy ounce: ⁷					
Palladium	617.39	874.30	1,036.43	1,544.31	2,100.00
Platinum	989.52	951.23	882.66	866.94	850.00
Iridium	586.90	908.35	1,293.27	1,485.80	1,600.00
Rhodium	696.84	1,112.59	2,225.30	3,918.78	9,200.00
Ruthenium	42.00	76.86	244.41	262.59	260.00
Employment, mine, number ¹	1,432	1,513	1,628	1,789	1,600
Net import reliance ^{6, 8} as a percentage of apparent consumption:					
Palladium	53	38	42	30	40
Platinum	66	71	74	67	79

Recycling: About 102,000 kilograms of palladium and platinum was recovered globally from new and old scrap in 2020, including about 57,000 kilograms recovered from automobile catalytic converters in the United States.

Import Sources (2016–19): Palladium: Russia, 38%; South Africa, 33%; Germany, 8%; United Kingdom, 5%; and other, 16%. Platinum: South Africa, 43%; Germany, 21%; Italy, 7%; Switzerland, 6%; and other, 23%.

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).

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Government Stockpile:⁹

Material	Inventory as of 9–30–20	FY 2020		FY 2021	
		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. Production of PGMs in South Africa, the world's leading supplier of mined material, decreased by 11% compared with that of 2019 owing to temporary lockdowns related to the COVID-19 pandemic as well as 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 5%, 38%, 136%, and slightly, respectively, compared with those of 2019. The estimated average annual price of platinum decreased slightly compared with that of 2019, continuing a 5-year trend of declining prices. The price of palladium remained higher than that of platinum in 2020, with palladium prices exceeding a previous high of \$1,977.00 in December 2019.

World Mine Production and Reserves:

	Mine production				PGM reserves ¹⁰
	Palladium		Platinum		
	<u>2019</u>	<u>2020^e</u>	<u>2019</u>	<u>2020^e</u>	
United States	14,300	14,000	4,150	4,000	900,000
Canada	20,000	20,000	7,800	7,800	310,000
Russia	98,000	91,000	24,000	21,000	3,900,000
South Africa	80,700	70,000	133,000	120,000	63,000,000
Zimbabwe	11,400	12,000	13,500	14,000	1,200,000
Other countries	<u>2,420</u>	<u>2,600</u>	<u>3,730</u>	<u>3,800</u>	NA
World total (rounded)	227,000	210,000	186,000	170,000	69,000,000

World Resources:¹⁰ 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.

¹Estimated 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.

³Less than ½ unit.

⁴Includes 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.

⁵Defined as primary production + secondary production + imports – exports.

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

⁷Engelhard Corp. unfabricated metal.

⁸Defined as imports – exports.

⁹See Appendix B for definitions.

¹⁰See Appendix C for resource and reserve definitions and information concerning data sources.