

TUNGSTEN

(Data in metric tons of tungsten content unless otherwise noted)

Domestic Production and Use: There has been no known domestic commercial production of tungsten concentrates since 2016. Approximately six companies in the United States processed tungsten concentrates, ammonium paratungstate, tungsten oxide, and (or) scrap to make tungsten metal powder, tungsten carbide powder, and (or) tungsten chemicals. Nearly 60% of the tungsten used in the United States was used in cemented carbide parts for cutting and wear-resistant applications, primarily in the construction, metalworking, mining, and oil and gas drilling industries. The remaining tungsten was used to make various alloys and specialty steels; electrodes, filaments, wires, and other components for electrical, electronic, heating, lighting, and welding applications; and chemicals for various applications. The estimated value of apparent consumption in 2018 was approximately \$900 million.

Salient Statistics—United States:	2014	2015	2016	2017	2018^e
Production:					
Mine	NA	NA	—	—	—
Secondary	W	W	W	W	W
Imports for consumption:					
Concentrate	4,080	3,970	3,580	3,930	4,000
Other forms	8,820	6,270	6,300	9,790	10,000
Exports:					
Concentrate	1,230	398	183	532	370
Other forms	5,490	3,360	3,200	3,010	3,100
Shipments from Government stockpile:					
Concentrate	282	—	—	1,460	1,200
Other forms	(1)	—	—	—	—
Consumption:					
Reported, concentrate	W	W	W	W	W
Apparent, all forms ²	W	W	W	W	W
Price, concentrate, dollars per mtu WO ₃ , ³ average, U.S. spot market, Platts Metals Week	348	302	148	245	330
Stocks, industry, year-end, concentrate and other forms	W	W	W	W	W
Net import reliance ⁴ as a percentage of apparent consumption	>25	>25	>25	>50	>50

Recycling: The estimated quantity of tungsten consumed from secondary sources by processors and end users in 2018 was withheld to avoid disclosing company proprietary data.

Import Sources (2014–17): Tungsten contained in ores and concentrates, intermediate and primary products, wrought and unwrought tungsten, and waste and scrap: China, 32%; Bolivia, 9%; Germany, 9%; Canada, 8%; and other, 42%.

Tariff: Item	Number	Normal Trade Relations 12–31–18
Ores	2611.00.3000	Free.
Concentrates	2611.00.6000	37.5¢/kg tungsten content.
Tungsten oxides	2825.90.3000	5.5% ad val.
Ammonium tungstates	2841.80.0010	5.5% ad val.
Tungsten carbides	2849.90.3000	5.5% ad val.
Ferrotungsten	7202.80.0000	5.6% ad val.
Tungsten powders	8101.10.0000	7.0% ad val.
Tungsten waste and scrap	8101.97.0000	2.8% ad val.

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

Government Stockpile:⁵

Material	Inventory As of 9–30–18	FY 2018		FY 2019	
		Potential Acquisitions	Potential Disposals⁶	Potential Acquisitions	Potential Disposals⁶
Metal powder	125	—	125	—	125
Ores and concentrates	9,170	—	1,360	—	1,360
Tungsten alloys, gross weight ⁷	6	5	—	5	—

TUNGSTEN

Events, Trends, and Issues: 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 tungsten. 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).

World tungsten supply was dominated by production in China and exports from China. China’s Government regulated its tungsten industry by limiting the number of mining and export licenses, imposing quotas on concentrate production, and placing constraints on mining and processing. From 2016 through 2018, environmental and safety inspections at Chinese mines and downstream ammonium paratungstate plants resulted in intermittent periods of reduced supply. Production of tungsten concentrate outside China in 2018 was expected to be less than that of 2017, owing to lower ore grades being mined in Vietnam and the closure of the sole tungsten mine in the United Kingdom after the owner entered voluntary administration in October 2018. Near-term new concentrate production was anticipated in the Republic of Korea and Spain. Scrap continued to be an important source of raw material for the tungsten industry worldwide.

China was the world’s leading tungsten consumer. Beginning in 2017, economic conditions improved in China and elsewhere, resulting in increased tungsten consumption. In early to mid-2018, prices of tungsten concentrate and downstream tungsten materials trended upward and then stabilized or decreased during the remainder of the year.

World Mine Production and Reserves: Reserves for China and Russia were revised based on company or Government reports.

	Mine production		Reserves ⁸
	<u>2017</u>	<u>2018^e</u>	
United States	—	—	NA
Austria	975	980	10,000
Bolivia	994	1,000	NA
China	67,000	67,000	1,900,000
Portugal	724	770	3,100
Russia	2,090	2,100	240,000
Rwanda	720	830	NA
Spain	564	750	54,000
United Kingdom	1,090	900	43,000
Vietnam	6,600	6,000	95,000
Other countries	<u>1,300</u>	<u>1,400</u>	<u>1,000,000</u>
World total (rounded)	82,100	82,000	3,300,000

World Resources: World tungsten resources are geographically widespread. China ranks first in the world in terms of tungsten resources and reserves and has some of the largest deposits. Canada, Kazakhstan, Russia, and the United States also have significant tungsten resources.

Substitutes: Potential substitutes for cemented tungsten carbides include cemented carbides based on molybdenum carbide, niobium carbide, or titanium carbide; ceramics; ceramic-metallic composites (cermets); and tool steels. Most of these options reduce, rather than replace, the amount of tungsten used. Potential substitutes for other applications are as follows: molybdenum for certain tungsten mill products; molybdenum steels for tungsten steels, although most molybdenum steels still contain tungsten; lighting based on carbon nanotube filaments, induction technology, and light-emitting diodes for lighting based on tungsten electrodes or filaments; depleted uranium or lead for tungsten or tungsten alloys in applications requiring high-density or the ability to shield radiation; and depleted uranium alloys or hardened steel for cemented tungsten carbides or tungsten alloys in armor-piercing projectiles. In some applications, substitution would result in increased cost or a loss in product performance.

^eEstimated. NA Not available. W Withheld to avoid disclosing company proprietary data. — Zero.

¹Less than ½ unit.

²Defined as mine production + secondary production + imports – exports + adjustments for Government and industry stock changes.

³A metric ton unit (mtu) of tungsten trioxide (WO₃) contains 7.93 kilograms of tungsten.

⁴Defined as imports – exports + adjustments for Government and industry stock changes.

⁵See Appendix B for definitions.

⁶Disposals are defined as any barter, rotation, sale, or upgrade of National Defense Stockpile stock.

⁷Inventory includes tungsten alloys and tungsten rhenium metal; acquisitions are tungsten rhenium metal only.

⁸See Appendix C for resource and reserve definitions and information concerning data sources.