

TUNGSTEN

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

Domestic Production and Use: No domestic production of commercial tungsten concentrates has been reported since 2015. Approximately six U.S. companies had the capability to convert tungsten concentrates, ammonium paratungstate (APT), tungsten oxide, and (or) scrap to tungsten metal powder, tungsten carbide powder, and (or) tungsten chemicals. Nearly 60% of the tungsten consumed 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 remainder 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 2021 was approximately \$600 million.

<u>Salient Statistics—United States:</u>	<u>2017</u>	<u>2018</u>	<u>2019</u>	<u>2020</u>	<u>2021^e</u>
Production:					
Mine	—	—	—	—	—
Secondary	W	W	W	W	W
Imports for consumption:					
Concentrate	3,920	4,050	2,760	2,020	1,400
Other forms ¹	9,780	10,400	11,100	8,650	10,000
Exports:					
Concentrate	531	284	583	480	390
Other forms ²	3,010	3,210	2,780	2,460	2,500
Shipments from Government stockpile:					
Concentrate	1,460	1,180	663	728	800
Other forms	—	—	—	34	93
Consumption:					
Reported, concentrate	W	W	W	W	W
Apparent, ³ all forms	W	W	W	W	W
Price, ⁴ concentrate, average U.S. spot market, dollars per metric ton unit of tungsten trioxide ⁵	245	326	270	270	270
Stocks, industry, concentrate and other forms, yearend	W	W	W	W	W
Net import reliance ⁶ as a percentage of apparent consumption	>50	>50	>50	>50	>50

Recycling: The estimated quantity of secondary tungsten produced and the amount consumed from secondary sources by processors and end users in 2021 were withheld to avoid disclosing company proprietary data.

Import Sources (2017–20): 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, 5%; and other, 45%.

<u>Tariff:</u>	<u>Item</u>	<u>Number</u>	<u>Normal Trade Relations</u> <u>12–31–21</u>
	Ores	2611.00.3000	Free.
	Concentrates	2611.00.6000	37.5¢/kg tungsten content.
	Tungsten oxides	2825.90.3000	5.5% ad valorem.
	Ammonium tungstates	2841.80.0010	5.5% ad valorem.
	Tungsten carbides	2849.90.3000	5.5% ad valorem.
	Ferrotungsten	7202.80.0000	5.6% ad valorem.
	Tungsten powders	8101.10.0000	7.0% ad valorem.
	Tungsten waste and scrap	8101.97.0000	2.8% ad valorem.

Depletion Allowance: 22% (domestic), 14% (foreign).

Government Stockpile:⁷

<u>Material</u>	<u>FY 2021</u>			<u>FY 2022</u>	
	<u>Inventory</u> <u>as of 9–30–21</u>	<u>Potential</u> <u>acquisitions</u>	<u>Potential</u> <u>disposals</u>	<u>Potential</u> <u>acquisitions</u>	<u>Potential</u> <u>disposals</u>
Metal powder	—	—	125	—	125
Ores and concentrates	6,850	—	1,360	—	1,360
Tungsten alloys, gross weight ⁸	5	5	—	—	—

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Events, Trends, and Issues: 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. In 2021, reduced production during or after environmental and safety inspections at Chinese mining operations contributed to periods when supplies of tungsten concentrates were constrained in China. Production of tungsten concentrate outside China was expected to increase in 2021 but to remain at less than 20% of world production. Scrap continued to be an important source of raw material for the tungsten industry worldwide. Beginning in 2020 and into 2021, the tungsten scrap supply was constrained because less scrap is generated during periods of low industrial activity.

China was the world's leading tungsten consumer. Analysts forecast global tungsten consumption in 2021 will be higher than that in 2020 as the global economy and industrial production continued to improve following declines in 2020 resulting from the global COVID-19 pandemic. In 2021, most prices of tungsten concentrates, scrap, and downstream tungsten materials trended upward in response to strong demand, constrained spot supplies of ammonium paratungstate and concentrates, reduced scrap availability, and low inventory levels. Transportation delays and increased freight costs contributed to supply constraints and price increases.

World Mine Production and Reserves: Reserves for Portugal, Spain, Vietnam, and "Other countries" were revised based on updated company data and (or) information from the Governments of those countries.

	Mine production		Reserves ⁹
	2020	2021 ^e	
United States	—	—	NA
Austria	890	900	10,000
Bolivia	1,350	1,400	NA
China	66,000	66,000	1,900,000
Korea, North	410	400	29,000
Portugal	550	620	5,100
Russia	2,400	2,400	400,000
Rwanda	860	950	NA
Spain	500	900	52,000
Vietnam	4,500	4,500	100,000
Other countries	960	1,200	1,200,000
World total (rounded)	78,400	79,000	3,700,000

World Resources:⁹ 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 tungsten electrodes or 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.

¹Includes ammonium and other tungstates; ferrotungsten; tungsten carbides; tungsten metal powders; tungsten oxides, chlorides, and other tungsten compounds; unwrought tungsten; wrought tungsten forms; and tungsten waste and scrap.

²Includes ammonium and other tungstates, ferrotungsten, tungsten carbides, tungsten metal powders, unwrought tungsten, wrought tungsten forms, and tungsten waste and scrap.

³Defined as mine production + secondary production + imports – exports + adjustments for Government and industry stock changes.

⁴Source: Platts Metals Week.

⁵A metric ton unit of tungsten trioxide contains 7.93 kilograms of tungsten.

⁶Defined as imports – exports + adjustments for Government and industry stock changes.

⁷See Appendix B for definitions.

⁸Tungsten-rhenium metal.

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