

INDIUM

(Data in metric tons unless otherwise noted)

Domestic Production and Use: Indium was not recovered from ores in the United States in 2022. Several companies produced indium products—including alloys, compounds, high-purity metal, and solders—from imported indium metal. Production of indium tin oxide (ITO) continued to account for most global indium consumption. ITO thin-film coatings were primarily used for electrically conductive purposes in a variety of flat-panel displays—most commonly liquid crystal displays (LCDs). Other indium end uses included alloys and solders, compounds, electrical components and semiconductors, and research. Estimated domestic consumption of refined indium was 160 tons in 2022 and was based on the annual estimated import quantity. There were no readily available recycling or end-use data available for indium. The estimated value of refined indium consumed domestically in 2022, based on the average U.S. warehouse price, was about \$40 million.

Salient Statistics—United States:	2018	2019	2020	2021	2022^e
Production, refinery	—	—	—	—	—
Imports for consumption	125	95	115	158	160
Exports	NA	NA	NA	NA	NA
Consumption, estimated ¹	125	95	115	158	160
Price, annual average, dollars per kilogram:					
New York dealer ²	375	390	395	NA	NA
U.S. warehouse, free on board ³	285	182	161	223	250
Rotterdam, duties unpaid ⁴	281	177	158	217	250
Net import reliance ⁵ as a percentage of estimated consumption	100	100	100	100	100

Recycling: Indium is most commonly recovered from ITO scrap in Japan and the Republic of Korea. Indium-containing scrap was recycled domestically; however, data on the quantity of indium recovered from scrap were not available.

Import Sources (2018–21): Republic of Korea, 32%; Canada, 22%; China,⁶ 18%; France, 9%; and other, 19%.

Tariff:	Item	Number	Normal Trade Relations 12–31–22
	Unwrought indium, including powders	8112.92.3000	Free.

Depletion Allowance: 14% (domestic and foreign).

Government Stockpile: None.

Events, Trends, and Issues: In 2022, the estimated annual average U.S. warehouse price (free on board) was \$250 per kilogram, 12% greater than the reported average price 2021. The U.S. price, as reported by Argus Media group, Argus Metals International, began the year at \$275 per kilogram and generally trended downward for most of the year to \$240 per kilogram at the end of September.

A leading manufacturer of indium products in the United States invested \$10 million to expand operations at its facility in Rome, NY. According to the company, the plant produced solder fabrications that were primarily used in advanced electronics, and the expansion would increase the number of manufacturing processes at the plant to 25.

The Utah Geological Survey received a Federal grant to research the genesis and geology of the zinc-copper-indium West Desert deposit in Juab County, UT. The funding was awarded under the U.S. Geological Survey's Earth Mapping Resource Initiative (Earth MRI) program. The research would focus on the spatial and mineralogical distribution of indium throughout the deposit and exploration indicators to help identify similar deposits.

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An indium-producing zinc smelter in Aubry, France, was placed on care-and-maintenance status in January owing to high power prices. The smelter resumed production at a reduced rate in March. Annual indium production at the smelter was last reported in 2018 at 43 tons.

China, the leading producer and exporter of indium globally, exported 421 tons of indium in the first 8 months of 2022, a 13% increase compared with exports in the same period in 2021. Exports were primarily sent to the Republic of Korea, 55%; Singapore, 14%; and Hong Kong, 12%. Some zinc smelters in Sichuan and Yunnan Provinces temporarily cut production during the year in response to power supply issues, according to news sources; however, the extent of the cuts and their effect on related byproduct metal production, including indium, could not be quantified.

World Refinery Production and Reserves:

	Refinery production ^{e, 7}		Reserves ⁸
	2021	2022	
United States	—	—	Quantitative estimates of reserves were not available.
Belgium	20	20	
Canada	60	55	
China	540	530	
France	38	20	
Japan	66	66	
Korea, Republic of	190	200	
Peru	12	—	
Russia	5	5	
Uzbekistan	1	1	
World total (rounded)	932	900	

World Resources:⁸ Indium is most commonly recovered from the zinc-sulfide ore mineral sphalerite. The indium content of zinc deposits from which it is recovered ranges from less than 1 part per million to 100 parts per million. Although the geochemical properties of indium are such that it occurs in trace amounts in other base-metal sulfides—particularly chalcopyrite and stannite—indium recovery from most deposits of these minerals was not economic.

Substitutes: Antimony tin oxide coatings have been developed as an alternative to ITO coatings in LCDs and have been successfully annealed to LCD glass; carbon nanotube coatings have been developed as an alternative to ITO coatings in flexible displays, solar cells, and touch screens; poly (3,4-ethylene dioxythiophene) (PEDOT) has also been developed as a substitute for ITO in flexible displays and organic light-emitting diodes; and copper or silver nanowires have been explored as a substitute for ITO in touch screens. Graphene has been developed to replace ITO electrodes in solar cells and also has been explored as a replacement for ITO in flexible touch screens. Researchers have developed a more adhesive zinc oxide nanopowder to replace ITO in LCDs. Hafnium can replace indium in nuclear reactor control rod alloys.

^eEstimated. NA Not available. — Zero.

¹Estimated to equal imports.

²Price is based on 99.99%-minimum-purity indium, delivered duty paid by U.S. buyers, in minimum lots of 50 kilograms. Source: S&P Global Platts Metals Week; price was discontinued as of September 11, 2020.

³Price is based on 99.99%-minimum-purity indium, free on board U.S. warehouse. Source: Argus Media group, Argus Metals International.

⁴Price is based on 99.99%-minimum-purity indium, duties unpaid in warehouse (Rotterdam). Source: Argus Media group, Argus Metals International.

⁵Defined as imports – exports.

⁶Includes Hong Kong.

⁷Refinery production data for indium were limited or unavailable for most countries. Estimates were derived from trade data, production capacity, and (or) changes in related lead and zinc smelter production.

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