

INDIUM

(Data in metric tons unless otherwise noted)

Domestic Production and Use: Indium was not recovered from ores in the United States in 2021. 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 170 tons in 2021. The estimated value of refined indium consumed domestically in 2021, based on the average free on board U.S. warehouse price, was about \$37 million.

<u>Salient Statistics—United States:</u>	<u>2017</u>	<u>2018</u>	<u>2019</u>	<u>2020</u>	<u>2021^e</u>
Production, refinery	—	—	—	—	—
Imports for consumption	127	125	95	115	170
Exports	NA	NA	NA	NA	NA
Consumption, estimated ¹	127	125	95	115	170
Price, annual average, dollars per kilogram:					
New York dealer ²	363	375	390	395	NA
Free on board U.S. warehouse ³	206	285	182	161	220
Duties unpaid in warehouse, Rotterdam ⁴	205	281	177	158	210
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. A significant quantity of scrap was recycled domestically; however, data on the quantity of secondary indium recovered from scrap were not available.

Import Sources (2017–20): China,⁶ 31%; Canada, 23%; Republic of Korea, 20%; France, 9%; and other, 17%.

<u>Tariff:</u>	<u>Item</u>	<u>Number</u>	<u>Normal Trade Relations</u> <u>12–31–21</u>
	Unwrought indium, including powders, waste, and scrap	8112.92.3000	Free.

Depletion Allowance: 14% (domestic and foreign).

Government Stockpile: None.

Events, Trends, and Issues: The New York dealer price of indium from the listed source was discontinued in 2021. In 2021, the average annual free on board U.S. warehouse price was an estimated \$220 per kilogram, 37% greater than in 2020. The average monthly price was \$187 per kilogram in January and increased throughout most of the year to a weekly average price of \$270 per kilogram at the beginning of October. The 2021 estimated annual average Rotterdam price of indium (duties unpaid in the warehouse) was \$210 per kilogram, 33% greater than that in 2020. The average monthly Rotterdam price of indium (duties unpaid in the warehouse) price began the year at \$184 per kilogram in January then generally increased throughout the remainder of the year to a daily average of \$235 per kilogram at the beginning of October.

INDIUM

Demand for indium in Europe has been reduced during the global COVID-19 pandemic restrictions, but demand began to increase in May, when China's exports of indium to Europe increased sharply. Several European buyers started to build up indium stocks to ensure they had enough supply, owing to the prevalence of shipping delays in 2021.

The leading producer of tin in China announced that it produced 34.88 tons of indium in the first 6 months of 2021, with a reported capacity of 60 tons per year of indium. Other producers in China also announced the resumption of production of indium, accounting for an additional 50 to 60 tons per year of capacity, after shutting down to perform maintenance in the beginning of July.

World Refinery Production and Reserves:

	Refinery production ^e		Reserves ⁷
	<u>2020</u>	<u>2021</u>	
United States	—	—	Quantitative estimates of reserves are not available.
Belgium	20	20	
Canada	66	60	
China	540	530	
France	38	35	
Japan	66	60	
Korea, Republic of	210	200	
Peru	12	10	
Russia	<u>5</u>	<u>5</u>	
World total (rounded)	960	920	

World Resources:⁷ 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—most deposits of these minerals are subeconomic for indium recovery.

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 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.

⁷See Appendix C for resource and reserve definitions and information concerning data sources.