

INDIUM

(Data in metric tons unless otherwise noted)

Domestic Production and Use: Indium was not recovered from ores in the United States in 2014. 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 of global indium consumption. ITO thin-film coatings were primarily used for electrical 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. Based on recent annual import levels, estimated domestic consumption ranges between 100 and 150 tons. The estimated value of primary indium metal consumed domestically in 2014, based on the average New York dealer price, was between \$69.5 million and \$104 million.

Salient Statistics—United States:	2010	2011	2012	2013	2014^e
Production, refinery	—	—	—	—	—
Imports for consumption	117	146	109	97	120
Exports	NA	NA	NA	NA	NA
Price, annual average, dollars per kilogram:					
U.S. producer ¹	565	720	650	615	735
New York dealer ²	552	685	540	570	695
99.99% c.i.f. Japan ³	546	680	510	575	700
Net import reliance ⁴ as a percentage of estimated consumption	100	100	100	100	100

Recycling: Data on the quantity of secondary indium recovered from scrap were not available. Indium is most commonly recovered from ITO scrap in Japan and the Republic of Korea.

Import Sources (2010–13): China, 21%; Canada, 21%; Belgium, 14%; Japan, 11%; and other, 33%.

Tariff: Item	Number	Normal Trade Relations
Unwrought indium, including powders	8112.92.3000	<u>12–31–14</u> Free.

Depletion Allowance: 14% (Domestic and foreign).

Government Stockpile: None.

Events, Trends, and Issues: The estimated annual average New York dealer price of indium was \$695 per kilogram, 22% more than that of 2013. The New York dealer price range for indium began the year at \$670 to \$700 per kilogram and increased through the first half of the year, reaching \$710 to \$750 per kilogram in mid-July. Prices then trended downward, falling to \$645 per kilogram to \$685 per kilogram in early October. The U.S. producer price for indium began the year at \$680 per kilogram and increased to \$745 per kilogram in February, where it remained through October.

According to market reports, global indium consumption increased slightly in 2014 from that of 2013 to about 1,500 tons. Japan and the Republic of Korea were thought to have accounted for most of global consumption for the production of ITO. Increased indium consumption was reportedly driven by increased demand for LCD televisions in developing countries and for smartphones and tablets, which use small LCD panels, in developed countries.

A Japanese company was in the process of constructing its fourth copper-indium-gallium-selenide (CIGS) solar cell production plant in the Tohoku region of Japan. The plant was expected to begin production in 2015. The company was reportedly the only mass producer of CIGS solar cells and consumed about 20 tons per year of indium at its three other CIGS solar cell production plants in Miyazaki (Kyushu region).

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In China, two large-scale ITO projects were under development and expected to begin production in late 2014 or 2015. Once onstream, they would increase China's indium consumption, which was reported to be about 70 tons in 2013. One of the plants, located in Quingyuan, would have an ITO production capacity of 200 tons per year. The other plant did not release capacity information.

Reported inventories of indium held in China's Fanya Nonferrous Metals Exchange approved warehouses increased by 1,240 tons in the first 9 months of 2014 to 3,240 tons. Some market participants questioned the magnitude of the reported increase, considering that the amount was about triple China's annual indium production in 2013 and that imports of indium in 2014 were relatively low. During the first 8 months of 2014, China imported 27 tons of unwrought indium, 72% less than the amount imported during the corresponding period of 2013.

World Refinery Production and Reserves:

	Refinery production		Reserves⁵
	2013	2014^e	
United States	—	—	Quantitative estimates of reserves are not available.
Belgium	30	30	
Canada	65	65	
China	415	420	
France	33	48	
Germany	10	10	
Japan	72	72	
Korea, Republic of	150	150	
Peru	11	11	
Russia	13	13	
World total (rounded)	799	820	

World Resources: 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 metals are subeconomic for indium.

Substitutes: Indium's price volatility and various supply concerns associated with the metal have spurred the development of ITO 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; and poly(3,4-ethylene dioxythiophene) (PEDOT) has also been developed as a substitute for ITO in flexible displays and organic light-emitting diodes. Graphene has been developed to replace ITO electrodes in solar cells and also have been explored as a replacement for ITO in flexible touchscreens. Researchers have developed a more adhesive zinc oxide nanopowder to replace ITO in LCDs. Gallium arsenide can substitute for indium phosphide in solar cells and in many semiconductor applications. Hafnium can replace indium in nuclear reactor control rod alloys.

^eEstimated. NA Not available. — Zero.

¹Indium Corp.'s price for 99.97%-purity metal, free on board. Source: Platts Metals Week, Metal Bulletin.

²Price is based on 99.99%-minimum-purity indium at warehouse (Rotterdam); cost, insurance, and freight (in minimum lots of 50 kilograms). Source: Platts Metals Week.

³Price is based on 99.99%-purity indium, primary or secondary, shipped to Japan. Source: Platts Metals Week.

⁴Defined as imports – exports.

⁵See [Appendix C](#) for resource/reserve definitions and information concerning data sources.