INDIUM

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

Domestic Production and Use: Indium was not recovered from ores in the United States in 2016. 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 an average of recent annual import levels, estimated domestic consumption of refined indium was 128 tons in 2016. The estimated value of refined indium consumed domestically in 2016, based on the average New York dealer price, was about $44 million.

Salient Statistics—United States:	**2012**	**2013**	**2014**	**2015**	**2016[e]**
Production, refinery	—	—	—	—	—
Imports for consumption	109	97	123	140	170
Exports	NA	NA	NA	NA	NA
Price, annual average, dollars per kilogram:					
New York dealer[1]	540	570	705	520	340
Free market[2]	NA	NA	NA	410	240
Net import reliance[3] 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 (2012–15): Canada, 25%; China, 14%; France, 13%; Belgium, 12%; and other, 36%.

Tariff: Item	**Number**	**Normal Trade Relations 12–31–16**
Unwrought indium, including powders	8112.92.3000	Free.

Depletion Allowance: 14% (Domestic and foreign).

Government Stockpile: None.

Events, Trends, and Issues: The 2016 estimated average free market price of indium was $240 per kilogram. The average monthly price began the year at $255 per kilogram in January and increased slightly during the first 4 months of the year reaching $262 per kilogram in April, after which the price decreased through September, falling to $218 per kilogram. News sources attributed low prices to an oversupply of indium and depressed demand after the collapse of the Fanya Metal Exchange Co. Ltd. in 2015. As of August 2016, Fanya's warehouses reportedly held 3,600 metric tons of indium, and no information was available as to when the inventory would be released into the market. Recent cuts in zinc mine production were not thought to have led to similar decreases in indium production because most of the zinc mines that have closed within the past 1 to 2 years were reported to have produced clean concentrates, or concentrates with relatively low levels of minor metals.

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INDIUM

According to market reports, indium production in China continued to decrease in the first half of 2016 after falling by about 30% in 2015, owing to a continued decrease in production by small-scale indium producers. Indium production at large lead and zinc smelters was reported to have remained level. Although production continued to decline, China's net exports of indium (including unwrought, scrap, and powder) increased by 30% to 49 metric tons from January to July 2016 from that of the same period of 2015. The Government of China was expected to increase policy support during the next 5 years (2016 to 2020) for the development of its minor metals industry and related downstream, value-added products, potentially leading to a notable increase in indium consumption. During this time, China also planned to reform its national stockpiling strategy, although details, including which metals would be affected by the reform, have not been confirmed.

No indium was produced in France in 2016, owing to a fire that damaged the indium production plant at the Auby zinc smelter in November 2015. Production was projected to resume in the first quarter of 2017.

World Refinery Production and Reserves:

	Refinery production[e]		Reserves[4]
	2015	2016	
United States	—	—	Quantitative estimates of reserves are not available.
Belgium	20	25	
Canada	70	65	
China	350	290	
France	41	—	
Japan	70	70	
Korea, Republic of	195	195	
Peru	9	5	
Russia	4	5	
World total (rounded)	759	655	

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: 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; PEDOT [poly(3,4-ethylene dioxythiophene)] has also been developed as a substitute for ITO in flexible displays and organic light-emitting diodes; and 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. 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.

[e]Estimated. NA Not available. — Zero.

[1]Price is based on 99.99%-minimum-purity indium; delivered duty paid U.S. buyers; in minimum lots of 50 kilograms. Source: Platts Metals Week.

[2]Price is based on 99.99%-minimum-purity indium at warehouse (Rotterdam). Source: Metal Bulletin.

[3]Defined as imports – exports.

[4]See Appendix C for resource and reserve definitions and information concerning data sources.