INDIUM[1]

(Data in metric tons, unless otherwise noted)

Domestic Production and Use: Indium was not recovered from ores in the United States in 2002. Domestically produced standard grade indium was derived by upgrading lower grade imported indium metal. Two companies, one each in New York and Rhode Island, were the major producers of indium metal and indium products in 2002. Several additional firms produced high-purity indium shapes, alloys, and compounds from imported indium. Thin-film coatings, which are used in applications such as liquid crystal displays (LCDs) and electroluminescent lamps, continued to be the largest end use. Indium semiconductor compounds were used in infrared detectors, high-speed transistors, and high-efficiency photovoltaic devices. The estimated distribution of uses in 2002 indicated a moderate increase in semiconductors and stable consumption in other sectors: Coatings, 45%; solders and alloys, 30%; electrical components and semiconductors, 15%; and research and other, 10%. The estimated value of primary indium metal consumed in 2002, based upon the annual average price, was about $9.5 million.

Salient Statistics—United States:	1998	1999	2000	2001	2002[e]
Production, refinery	—	—	—	—	—
Imports for consumption	75	77	69	79	90
Exports	NA	NA	NA	[e]10	NA
Consumption[e]	50	52	55	65	75
Price, annual average, dollars per kilogram (99.97% indium)	296	303	188	120	130
Stocks, producer, yearend	NA	NA	NA	NA	NA
Employment, number	NA	NA	NA	NA	NA
Net import reliance[2] as a percentage of estimated consumption	100	100	100	100	100

Recycling: Only small amounts of indium are recycled because there is an adequate supply of primary indium as a byproduct of zinc smelting. Compared with previous years, however—when recycling occurred only if the price of indium was very high and/or increasing rapidly—recycling of both new and old scrap is becoming more noteworthy. Most of indium is recycled by countries that have inadequate zinc resources and are dependent on imported zinc, decreasing the possibility of primary indium production. For example, about 42% of Japanese indium consumption is derived from secondary sources, mostly of domestic origin. Recycling of new scrap, the scrap from fabrication of indium products, is only now gaining acceptance in the United States.

Import Sources (1998-2001): China, 40%; Canada, 30%; France, 10%; Russia, 9%; and other, 11%.

Tariff: Item	Number	Normal Trade Relations 12/31/02
Unwrought indium	8112.92.3000	Free.

Depletion Allowance: 14% (Domestic and foreign).

Government Stockpile: None.

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INDIUM

Events, Trends, and Issues: Estimated domestic indium consumption increased by about 15% to 75 metric tons in 2002. After 3 years of relative stability, the annual average price of indium dropped considerably in 2000 and 2001 and then increased slightly in 2002. Expanding LCD manufacture kept demand strong for indium-tin oxide, and the use of indium phosphide for semiconductors could increase worldwide demand for indium. The ready availability of low-priced indium from China—with increases in capacity, production, and purity—kept world prices down. The long range outlook for the indium market remains promising despite possible near term market fluctuations caused by economic uncertainties.

World Refinery Production, Reserves, and Reserve Base:

	Refinery production[e]		Reserves[3]	Reserve base[3]
	2001	2002		
United States	—	—	300	600
Belgium	40	40	([4])	([4])
Canada	45	45	700	2,000
China	100	85	280	1,300
France	65	65	([4])	([4])
Japan	55	60	100	150
Peru	5	5	100	150
Russia	15	15	200	300
Other countries	20	20	800	1,500
World total (may be rounded)	345	335	2,500	6,000

World Resources: Indium occurs predominantly in solid solution in sphalerite, a zinc-sulfide ore mineral. Large quantities of indium also are contained in ores of copper, lead, and tin, but there is not enough information to formulate reliable estimates of indium resources, and most of these deposits are subeconomic for indium. Indium is recovered almost exclusively as a byproduct of zinc. Estimates of the average indium content of the Earth's crust range from 50 to 200 parts per billion. The average indium content of zinc deposits ranges from less than 1 part per million to 100 parts per million. The highest known concentrations of indium occur in vein or replacement sulfide deposits, usually associated with tin-bearing minerals. However, this type of deposit is usually difficult to process economically.

Substitutes: Gallium arsenide can substitute for indium phosphide in solar cells and semiconductor applications. Silver-zinc oxide or tin oxide are lower cost substitutes for indium-tin oxide in transparent conductive coatings for glass. Hafnium can replace indium alloys for use in nuclear reactor control rods.

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

[1]Prepared by Jozef Plachy.

[2]Defined as imports - exports + adjustments for Government and industry stock changes; exports were assumed to be no greater than the difference between imports and consumption.

[3]Estimate based on the indium content of zinc ores. See Appendix C for definitions.

[4]Reserves and reserve base for this country and other European nations are included with "Other countries."