

CADMIUM

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

Domestic Production and Use: Two companies in the United States produced the majority of refined cadmium in 2012. One company, operating in Tennessee, recovered primary cadmium as a byproduct of zinc leaching from roasted sulfide concentrates. The other company, operating in Pennsylvania, thermally recovered secondary cadmium metal from spent nickel-cadmium (NiCd) batteries and other cadmium-bearing scrap. Cadmium metal and compounds are mainly consumed for alloys, coatings, nickel-cadmium batteries, pigments, and plastic stabilizers.

Salient Statistics—United States:	2008	2009	2010	2011	2012^e
Production, refinery ¹	777	633	637	W	W
Imports for consumption:					
Metal only	153	117	216	201	270
Metal, alloys, scrap	197	122	221	211	260
Exports:					
Metal only	295	276	40	63	260
Metal, alloys, scrap	421	661	306	271	730
Consumption of metal, apparent	528	199	477	W	W
Price, metal, annual average, ² dollars per kilogram	5.92	2.87	3.90	2.76	1.98
Stocks, yearend, producer and distributor	132	27	102	W	W
Net import reliance ³ as a percentage of apparent consumption	E	E	E	E	E

Recycling: Cadmium is mainly recovered from spent consumer and industrial NiCd batteries. Other waste and scrap from which cadmium can be recovered includes copper-cadmium alloy scrap, some complex nonferrous alloy scrap, and cadmium-containing dust from electric arc furnaces (EAF). The amount of cadmium recycled was not disclosed.

Import Sources (2008–11): Metal:⁴ Australia, 24%; Mexico, 19%; Canada, 17%; Germany, 12%; and other, 28%.

Tariff: Item	Number	Normal Trade Relations⁵
Cadmium oxide	2825.90.7500	<u>12–31–12</u> Free.
Cadmium sulfide	2830.90.2000	3.1% ad val.
Pigments and preparations based on cadmium compounds	3206.49.6010	3.1% ad val.
Unwrought cadmium and powders	8107.20.0000	Free.
Cadmium waste and scrap	8107.30.0000	Free.
Wrought cadmium and other articles	8107.90.0000	4.4% ad val.

Depletion Allowance: 22% (Domestic), 14% (Foreign).

Government Stockpile: None.

Events, Trends, and Issues: Global production in 2012 increased compared with that of 2011 owing to a recovery in production in Japan following the Tohoku earthquake and tsunami, which caused several cadmium-producing refineries to temporarily close in 2011. Approximately 70% of the world's primary cadmium metal was produced in Asia. Leading producers were China, the Republic of Korea, and Japan.

Cadmium consumption remained flat in 2012 when compared with that of 2011 creating a surplus of metal in the market. According to data published by the World Bureau of Metal Statistics, cadmium was primarily consumed in China (33%), Belgium (32%), and Japan (12%). Cadmium for NiCd batteries accounted for the majority of global consumption. The remainder was distributed as follows, in order of descending consumption: pigments, coatings and plating, stabilizers for plastics, nonferrous alloys, and other specialized uses (including photovoltaic devices). The percentage of cadmium consumed globally for NiCd battery production has been increasing, while the percentages for the other traditional end uses of cadmium—specifically coatings, pigments, and stabilizers—have gradually decreased owing to environmental and health concerns.

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A significant use for cadmium coatings is in the aerospace industry. Fasteners in landing gear and parachutes are commonly coated with cadmium for corrosion resistance. A U.S.-based company recently developed an ultrahigh-strength stainless steel for landing gear components that would eliminate the need for cadmium plating. The company is currently undertaking the multiyear process of qualifying the steel alloy for commercial use.

In China, the Ministry of Industry and Information Technology announced that the production, sale, and use of lead-acid batteries with a cadmium content of more than 0.002% would be prohibited by 2014. Lead-acid batteries used to power electric bicycles sold in China were reported to contain some cadmium.

World Refinery Production and Reserves: Reserve data were revised, excluding those for China, Germany, and Poland, based on new company information and country reports.

	Refinery production		Reserves ⁶
	<u>2011</u>	<u>2012^e</u>	
United States	W	W	32,000
Australia	390	390	NA
Canada	1,770	1,780	23,000
China	7,000	7,000	92,000
Germany	300	300	—
India	630	620	35,000
Japan	1,760	2,130	—
Kazakhstan	1,400	1,400	30,000
Korea, Republic of	4,000	4,100	—
Mexico	1,480	1,610	47,000
Netherlands	570	540	—
Peru	572	690	55,000
Poland	450	450	16,000
Russia	700	700	44,000
Other countries	<u>1,190</u>	<u>1,200</u>	<u>130,000</u>
World total (rounded)	22,200	23,000	500,000

World Resources: Cadmium is generally recovered as a byproduct from zinc concentrates. Zinc-to-cadmium ratios in typical zinc ores range from 200:1 to 400:1. Sphalerite (ZnS), the most economically significant zinc mineral, commonly contains minor amounts of other elements; cadmium, which shares certain similar chemical properties with zinc, will often substitute for zinc in the sphalerite crystal lattice. The cadmium mineral greenockite (CdS) is frequently associated with weathered sphalerite and wurtzite. Zinc-bearing coals of the Central United States and Carboniferous age coals of other countries also contain large subeconomic resources of cadmium.

Substitutes: Lithium-ion and nickel-metal hydride batteries are replacing NiCd batteries in some applications. However, the higher cost of these substitutes restricts their use in less-expensive products. Except where the surface characteristics of a coating are critical (for example, fasteners for aircraft), coatings of zinc or vapor-deposited aluminum can be substituted for cadmium in many plating applications. Cerium sulfide is used as a replacement for cadmium pigments, mostly in plastics. Barium/zinc or calcium/zinc stabilizers can replace barium/cadmium stabilizers in flexible polyvinylchloride applications.

^eEstimated. E Net exporter. NA Not available. W Withheld to avoid disclosing company proprietary data. — Zero.

¹Cadmium metal produced as a byproduct of lead-zinc refining plus metal from recycling.

²Average New York dealer price for 99.95% purity in 5-short-ton lots. Source: Platts Metals Week.

³Defined as imports – exports + adjustments for Government and industry stock changes.

⁴Imports for consumption of unwrought metal and metal powders (Tariff no. 8107.20.0000).

⁵No tariff for Australia, Canada, Mexico, and Peru for items shown.

⁶[See Appendix C for resource/reserve definitions and information concerning data sources.](#)