CADMIUM

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

Domestic Production and Use: Two companies in the United States produced refined cadmium in 2015. One company, operating in Tennessee, recovered primary refined cadmium as a byproduct of zinc leaching from roasted sulfide concentrates. The other company, operating in Ohio, recovered secondary cadmium metal from spent nickel-cadmium (NiCd) batteries and other cadmium-bearing scrap. Domestic production and consumption of cadmium from 2011 to 2016 were withheld to avoid disclosing company proprietary data. Cadmium metal and compounds are mainly consumed for alloys, coatings, NiCd batteries, pigments, and plastic stabilizers.

Salient Statistics—United States:	2012	2013	2014	2015	2016[e]
Production, refined[1]	W	W	W	W	W
Imports for consumption:					
Unwrought cadmium and powders	170	284	133	237	260
Wrought cadmium and other articles (gross weight)	21	104	6	18	(2)
Cadmium waste and scrap (gross weight)	1	(2)	—	71	20
Exports:					
Unwrought cadmium and powders	253	131	198	350	210
Wrought cadmium and other articles (gross weight)	378	266	72	246	410
Cadmium waste and scrap (gross weight)	—	20	—	(2)	12
Consumption of metal	W	W	W	W	W
Price, metal, annual average,[3] dollars per kilogram	2.03	1.92	1.94	1.47	1.30
Stocks, yearend, producer and distributor	W	W	W	W	W
Net import reliance[4] as a percentage of apparent consumption	E	<25	E	E	<25

Recycling: Secondary 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.

Import Sources (2012–15):[5] Canada, 47%; China, 18%; Australia, 14%; Mexico, 7%; and other, 14%.

Tariff: Item	Number	Normal Trade Relations 12–31–16
Cadmium oxide	2825.90.7500	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: Most of the world's primary cadmium metal was produced in Asia, and leading global producers were China, the Republic of Korea, and Japan. A smaller amount of secondary cadmium metal was recovered from recycling NiCd batteries. Although detailed data on the global consumption of primary cadmium were not available, NiCd battery production was thought to have continued to account for the majority of global cadmium consumption. Other end uses for cadmium and cadmium compounds included alloys, anticorrosive coatings, pigments, polyvinyl chloride (PVC) stabilizers, and semiconductors for solar cells.

The average monthly cadmium price began 2016 at $0.94 per kilogram in January and trended upward to $1.61 per kilogram in May. Prices then decreased during the next 4 months to an average of $1.12 per kilogram in September. News sources attributed the price rise in the earlier part of the year to increased demand in India, and the price decrease in the latter half of the year was speculated to have been as a result of consumers operating off of high stock levels.

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CADMIUM

In October 2013, the European Parliament amended the European Union (EU) Battery Directive (2006/66/EC) to prohibit the inclusion of NiCd batteries in cordless power tools beginning December 31, 2016, after which nickel-cadmium batteries could only be used in emergency systems and medical equipment in the EU. In May 2015, the European Parliament voted against extending an exemption for cadmium-containing quantum dots under the Restriction of Hazardous Substances directive. Cadmium-containing quantum dots are used in light-emitting diode displays. In February 2016, the European Parliament amended its restrictions on the use cadmium in certain paints by limiting the content of cadmium in those paints to no more than 0.01% by weight and prohibiting the placement of such paints on the market. Despite these restrictions, cadmium-containing residues will continue to be generated as a byproduct during the zinc smelting process. If the applications and markets for cadmium continue to decline, excess cadmium-containing waste may need to be permanently stockpiled and managed.

World Refinery Production and Reserves:

	Refinery production		Reserves[6]
	2015	2016[e]	
United States[1]	W	W	Quantitative estimates of reserves are not available. The cadmium content of typical zinc ores averages about 0.03%. See the Zinc chapter for zinc reserves.
Australia	380	380	
Bulgaria	360	300	
Canada	1,160	1,140	
China	7,600	7,400	
Japan	1,960	1,900	
Kazakhstan	1,500	1,500	
Korea, Republic of	4,200	4,500	
Mexico	1,300	1,250	
Netherlands	640	640	
Peru	760	760	
Poland	630	500	
Russia	1,300	1,350	
Other countries	1,410	1,380	
World total (rounded)	[7]23,200	[7]23,000	

World Resources: Cadmium is generally recovered from zinc ores and concentrates. Sphalerite, the most economically significant zinc mineral, commonly contains minor amounts of cadmium, which shares certain similar chemical properties with zinc and often substitutes for zinc in the sphalerite crystal lattice. The cadmium mineral greenockite 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 can replace NiCd batteries in many applications. 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 PVC applications.

[e]Estimated. E Net exporter. W Withheld to avoid disclosing company proprietary data. — Zero.
[1]Cadmium metal produced as a byproduct of zinc refining plus metal from recycling.
[2]Less than ½ unit.
[3]Average New York dealer price for 99.95% purity in 5-short-ton lots. Source: Platts Metals Week (2012–2015), Metal Bulletin (2016).
[4]Defined as imports of unwrought metal and metal powders – exports of unwrought metal and metal powders + adjustments for industry stock changes.
[5]Imports for consumption of unwrought metal and metal powders (HTS number 8107.20.0000).
[6]See Appendix C for resource and reserve definitions and information concerning data sources.
[7]Excludes U.S. production.