CADMIUM

(Data in metric tons unless otherwise specified)

Domestic Production and Use: Cadmium is present in small amounts in most zinc ores and at zinc smelters is either recovered or treated as part of a waste stream. Although most domestically mined zinc ore is exported for smelting, one company produced an estimated 200 tons of cadmium metal as a byproduct from its zinc smelter in Tennessee, which processed both domestic and imported zinc concentrates. Cadmium metal and compounds are mainly consumed for nickel cadmium (NiCd) batteries, but also for alloys, coatings, and pigments. In recent years, cadmium has increasingly been used in semiconductors such as in cadmium-telluride (CdTe) thin-film solar panels, in cadmium-zinc-telluride (CdZnTe) substrates for radiation detectors and imaging applications, and cadmium selenide (CdSe) optoelectronic applications. In the consumer battery market, there has been a shift from NiCd batteries towards lithium-based batteries, which have higher energy densities, but the reliability and longevity of NiCd industrial batteries make them ideal for many applications. One company in Ohio recovered cadmium metal from the recycling of both consumer and industrial NiCd batteries.

Salient Statistics—United States:	**2021**	**2022**	**2023**	**2024**	**2025[e]**
Production:					
Primary, refined[1]	241	212	375	180	200
Secondary	W	W	W	W	W
Imports for consumption:					
Unwrought cadmium and powders	155	99	72	6	10
Wrought cadmium and other articles	2	1	1	2	1
Cadmium waste and scrap	85	40	([2])	40	30
Cadmium oxide	14	33	37	13	40
Cadmium sulfide	—	([2])	—	41	—
Cadmium pigments and preparations based on cadmium compounds	101	146	147	126	170
Exports:					
Unwrought cadmium and powders	51	68	100	24	1
Wrought cadmium and other articles	217	60	21	33	30
Cadmium waste and scrap	—	2	15	—	—
Cadmium pigments and preparations based on cadmium compounds	550	747	947	471	760
Consumption of metal, apparent[3]	W	W	W	W	W
Price, metal, annual average,[4] dollars per kilogram	2.56	3.42	4.06	4.12	3.90
Net import reliance[5] as a percentage of apparent consumption	<50	<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 recycled includes copper-cadmium alloy scrap, some complex nonferrous alloy scrap, cadmium-containing dust from electric-arc furnaces, and CdTe solar panels.

Import Sources (2021–24):[6] China,[7] 50%; Germany, 33%; Australia, 6%; Peru, 6%; and other, 5%.

Tariff: Item	**Number**	**Normal Trade Relations 12–31–25**
Cadmium oxide	2825.90.7500	Free.
Cadmium sulfide	2830.90.2000	3.1% ad valorem.
Pigments and preparations based on cadmium compounds	3206.49.6010	3.1% ad valorem.
Cadmium waste and scrap	8112.61.0000	Free.
Selenides and tellurides	2842.90.9010	3.3% ad valorem.
Unwrought cadmium and powders	8112.69.1000	Free.
Wrought cadmium and other articles	8112.69.9000	4.4% ad valorem.

Depletion Allowance: 22% (domestic), 14% (foreign).

Government Stockpile:[8] The fiscal year (FY) 2026 potential acquisitions were not available; FY 2025 potential acquisitions included 2,800 square centimeters of CdZnTe substrates.

Prepared by **Robert M. Callaghan [(703) 648–7709, rcallaghan@usgs.gov]**

CADMIUM

Events, Trends, and Issues: The importance of semiconductor materials was highlighted by the mid-2025 addition of a subcategory for “selenides and tellurides” to the U.S. Harmonized Tariff Schedule. Although not all materials in this group contain cadmium, two important members are CdTe, increasingly used in the solar industry, and CdSe, used in optoelectronics. Quantum dots, nanocrystals that can be made from CdSe and have unique optical and electronic properties, were used in displays and medical imaging equipment and were being investigated for use in improving the performance of batteries and supercapacitors. Under the 3-year Cadmium Telluride Accelerator Consortium administered by the U.S. Department of Energy, research on improving CdTe cell efficiency continued. The leading domestic CdTe solar panel manufacturer began production in mid-2025 at a fifth facility, which was expected to increase domestic manufacturing capacity to about 14 gigawatts per year once fully ramped up in 2026.

World Refinery Production and Reserves: Significant revisions were made to the 2024 production for Australia, Bulgaria, Canada, China, the Netherlands, Poland, and Russia based on company and Government reports.

	Refinery production		Reserves[9]
	2024	2025[e]	
United States[1]	180	200	Quantitative estimates of reserves were not available. The cadmium content of typical zinc ores averages about 0.03%. See the Zinc chapter for zinc reserves.
Australia	601	600	
Bulgaria	379	380	
Canada[e]	1,300	1,300	
China[e]	8,900	9,500	
Germany[e]	130	220	
Japan[e]	1,580	1,300	
Kazakhstan[e]	1,100	1,100	
Korea, Republic of[e]	4,300	4,300	
Mexico	1,190	1,000	
Netherlands	592	600	
Norway[e]	350	430	
Peru	664	600	
Poland	382	400	
Russia[e]	1,000	1,000	
Uzbekistan[e]	170	230	
World total (rounded)	22,800	23,000	

World Resources:[9] Cadmium is generally recovered from zinc ores and concentrates. Sphalerite, the most economically significant zinc ore 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.

Substitutes: Batteries with other chemistries, particularly lithium-ion, can replace NiCd batteries in many applications. Except where the surface characteristics of a coating are critical (for example, fasteners for aircraft), coatings such as zinc-nickel can be substituted for cadmium in many plating applications. Cerium sulfide is used as a replacement for cadmium pigments, mostly in plastics. Barium stabilizers can replace barium-cadmium stabilizers in flexible polyvinyl chloride (PVC) applications. CdTe solar panels compete with crystalline silicon solar panels.

[e]Estimated. E Net exporter. W Withheld to avoid disclosing company proprietary data. — Zero.

[1]Cadmium metal produced as a byproduct of zinc refining.

[2]Less than ½ unit.

[3]Defined as primary production + secondary production + imports of unwrought cadmium and powders – exports of unwrought cadmium and powders.

[4]Average free market price for 99.95% purity in 10-ton lots; cost, insurance, and freight; global ports. Source: Fastmarkets MB.

[5]Defined as imports of unwrought cadmium and powders – exports of unwrought cadmium and powders.

[6]Unwrought cadmium and powders; Harmonized Tariff Schedule of the United States code 8107.20.0000 for 2021 and 8112.69.1000 beginning in 2022.

[7]Includes Hong Kong.

[8]See Appendix B for definitions. For fiscal year 2026, the Annual Materials Plan was not released.

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