

COBALT

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

Domestic Production and Use: Significant U.S. cobalt mine production has not been reported since 1971, and production of refined cobalt from imported nickel-copper-cobalt matte ceased in 1985. U.S. supply comprised imports, stock releases, and secondary (scrap) materials. The sole U.S. producer of extra-fine cobalt powder, in Pennsylvania, used cemented carbide scrap as feed. Seven companies were known to produce cobalt compounds. About 51% of the cobalt consumed in the United States was used in superalloys, mainly in aircraft gas turbine engines; 8% in cemented carbides for cutting and wear-resistant applications; 16% in various other metallic applications; and 25% in a variety of chemical applications. The total estimated value of cobalt consumed in 2012 was \$275 million.

Salient Statistics—United States:	2008	2009	2010	2011	2012^e
Production:					
Mine	—	—	—	—	—
Secondary	1,930	1,790	2,000	2,210	2,100
Imports for consumption	10,700	7,680	11,100	10,600	11,000
Exports	2,850	2,440	2,640	3,390	3,700
Shipments from Government stockpile excesses ¹	203	180	-8	—	—
Consumption:					
Reported (includes secondary)	8,820	7,470	8,030	9,100	8,400
Apparent ² (includes secondary)	10,100	7,580	10,300	9,230	9,400
Price, average, dollars per pound:					
Spot, cathode ³	39.01	17.86	20.85	17.99	14.00
London Metal Exchange (LME), cash	XX	XX	XX	16.01	13.50
Stocks, yearend:					
Industry	1,160	780	880	1,040	990
LME, U.S. warehouse	XX	XX	23	43	50
Net import reliance ⁴ as a percentage of apparent consumption	81	76	81	76	78

Recycling: In 2012, cobalt contained in purchased scrap represented an estimated 25% of cobalt reported consumption.

Import Sources (2008–11): Cobalt contained in metal, oxide, and salts: China, 20%; Norway, 14%; Russia, 12%; Finland, 10%; and other, 44%.

Tariff: Item	Number	Normal Trade Relations⁵ 12–31–12
Cobalt ores and concentrates	2605.00.0000	Free.
Chemical compounds:		
Cobalt oxides and hydroxides	2822.00.0000	0.1% ad val.
Cobalt chlorides	2827.39.6000	4.2% ad val.
Cobalt sulfates	2833.29.1000	1.4% ad val.
Cobalt carbonates	2836.99.1000	4.2% ad val.
Cobalt acetates	2915.29.3000	4.2% ad val.
Unwrought cobalt, alloys	8105.20.3000	4.4% ad val.
Unwrought cobalt, other	8105.20.6000	Free.
Cobalt mattes and other intermediate products; cobalt powders	8105.20.9000	Free.
Cobalt waste and scrap	8105.30.0000	Free.
Wrought cobalt and cobalt articles	8105.90.0000	3.7% ad val.

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

Government Stockpile:

Material	Stockpile Status—9–30–12⁶			
	Uncommitted inventory	Authorized for disposal	Disposal plan FY 2012	Disposals FY 2012
Cobalt	301	301	301	—

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Events, Trends, and Issues: In recent years, global cobalt production has been higher than consumption, resulting in a market surplus and downward pressure on prices. This trend is expected to continue in the near-term as production from new projects and expansions to existing operations adds to supply. China was the world's leading producer of refined cobalt, and much of its production was from cobalt-rich ore and partially refined cobalt imported from Congo (Kinshasa). In recent years, significant stocks of cobalt feed have accumulated in China. China is a leading supplier of cobalt imports to the United States.

During the first 6 months of 2012, world availability of refined cobalt (as measured by production and U.S. Government shipments) was 8% lower than that of the same period in 2011. China showed the largest decrease in production, which was attributed to a reduction in global demand for cobalt.

Worldwide cobalt inventories in London Metal Exchange (LME) warehouses increased to approximately 430 tons in early November 2012 from 304 tons at yearend 2011.

World Mine Production and Reserves: Reserves for Australia and Brazil were revised based on information from Government reports. Reserves for Canada and "Other countries" were revised based on company reports.

	Mine production		Reserves ⁷
	2011	2012 ^e	
United States	—	—	33,000
Australia	3,900	4,500	⁸ 1,200,000
Brazil	3,500	3,700	89,000
Canada	7,100	6,700	140,000
China	6,800	7,000	80,000
Congo (Kinshasa)	60,000	60,000	3,400,000
Cuba	4,000	3,700	500,000
Morocco	2,200	1,800	20,000
New Caledonia ⁹	3,200	3,500	370,000
Russia	6,300	6,200	250,000
Zambia	5,400	3,000	270,000
Other countries	<u>6,700</u>	<u>9,000</u>	<u>1,100,000</u>
World total (rounded)	109,000	110,000	7,500,000

World Resources: Identified cobalt resources of the United States are estimated to be about 1 million tons. Most of these resources are in Minnesota, but other important occurrences are in Alaska, California, Idaho, Missouri, Montana, and Oregon. With the exception of resources in Idaho and Missouri, any future cobalt production from these deposits would be as a byproduct of another metal. Identified world cobalt resources are about 15 million tons. The vast majority of these resources are in nickel-bearing laterite deposits, with most of the rest occurring in nickel-copper sulfide deposits hosted in mafic and ultramafic rocks in Australia, Canada, and Russia, and in the sedimentary copper deposits of Congo (Kinshasa) and Zambia. In addition, as much as 1 billion tons of hypothetical and speculative cobalt resources may exist in manganese nodules and crusts on the ocean floor.

Substitutes: In some applications, substitution for cobalt would result in a loss in product performance. Potential substitutes include barium or strontium ferrites, neodymium-iron-boron, or nickel-iron alloys in magnets; cerium, iron, lead, manganese, or vanadium in paints; cobalt-iron-copper or iron-copper in diamond tools; copper-iron-manganese for curing unsaturated polyester resins; iron-cobalt-nickel, nickel, cermets, or ceramics in cutting and wear-resistant materials; iron-phosphorous, manganese, nickel-cobalt-aluminum, or nickel-cobalt-manganese in lithium-ion batteries; nickel-based alloys or ceramics in jet engines; nickel in petroleum catalysts; and rhodium in hydroformylation catalysts.

^eEstimated. XX Not applicable. — Zero.

¹Negative numbers are the result of inventory adjustments.

²The sum of U.S. net import reliance and secondary production, as estimated from consumption of purchased scrap.

³As reported by Platts Metals Week.

⁴Defined as imports – exports + adjustments for Government and industry stock changes.

⁵Tariffs for certain countries and items may be eliminated under special trade agreements.

⁶See Appendix B for definitions.

⁷See Appendix C for resource/reserve definitions and information concerning data sources.

⁸For Australia, Joint Ore Reserves Committee (JORC)-compliant reserves were about 420,000 tons.

⁹Overseas territory of France.