

NICKEL

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

Domestic Production and Use: The United States did not have any active nickel mines in 2007. Limited amounts of byproduct nickel were recovered from copper and palladium-platinum ores mined in the Western United States. On a monthly or annual basis, 111 facilities reported nickel consumption. The principal consuming State was Pennsylvania, followed by Kentucky, West Virginia, and North Carolina. Approximately 52% of the primary nickel consumed went into stainless and alloy steel production, 34% into nonferrous alloys and superalloys, 10% into electroplating, and 4% into other uses. End uses were as follows: transportation, 30%; chemical industry, 15%; electrical equipment, 10%; construction, 9%; fabricated metal products, 8%; household appliances, 8%; petroleum industry, 7%; machinery, 6%; and other, 7%. Estimated value of apparent primary consumption was \$4.19 billion.

Salient Statistics—United States:	2003	2004	2005	2006	2007^e
	W	W	W	W	W
Production, refinery byproduct					
Shipments of purchased scrap ¹	137,000	133,000	141,000	147,000	207,000
Imports: Primary	125,000	136,000	143,000	153,000	125,000
Secondary	11,500	18,800	15,500	20,300	15,100
Exports: Primary	6,330	8,000	7,630	8,050	13,000
Secondary	47,300	48,300	55,600	59,300	103,000
Consumption: Reported, primary ²	90,400	102,000	100,000	124,000	113,000
Reported, secondary ²	101,000	103,000	101,000	108,000	119,000
Apparent, primary	117,000	128,000	135,000	144,000	112,000
Total ³	218,000	232,000	236,000	252,000	231,000
Price, average annual, London Metal Exchange:					
Cash, dollars per metric ton	9,629	13,823	14,738	24,244	37,744
Cash, dollars per pound	4.368	6.270	6.685	10.997	17.121
Stocks: Consumer, yearend	11,700	11,900	13,500	14,100	14,100
Producer, yearend ⁴	8,040	6,580	5,940	6,450	6,500
Net import reliance ⁵ as a percentage of apparent consumption	45	49	48	49	17

Recycling: About 119,000 tons of nickel was recovered from purchased scrap in 2007. This represented about 52% of reported secondary plus apparent primary consumption for the year.

Import Sources (2003-06): Canada, 41%; Russia, 16%; Norway, 11%; Australia, 8%; and other, 24%.

Tariff: Item	Number	Normal Trade Relations
		12-31-07
Nickel oxide, chemical grade	2825.40.0000	Free.
Ferronickel	7202.60.0000	Free.
Nickel oxide, metallurgical grade	7501.20.0000	Free.
Unwrought nickel, not alloyed	7502.10.0000	Free.

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

Government Stockpile: The U.S. Government sold the last of the nickel in the National Defense Stockpile in 1999. The U.S. Department of Energy is holding 8,800 tons of nickel ingot contaminated by low-level radioactivity plus 5,100 tons of contaminated shredded nickel scrap. Planned decommissioning activities at former nuclear defense sites are expected to generate an additional 20,000 tons of nickel in shredded scrap.

Events, Trends, and Issues: World nickel mine production was at an alltime high in 2007, just meeting demand. Stainless steel accounted for two-thirds of global primary nickel use. U.S. production of austenitic (nickel-bearing) stainless steel reached a record high of 1.71 million tons in 2006, 21% more than the 1.41 million tons in 2005. Since 1993, global stainless steel production has been growing at an average rate of 5.6% per year. Consumption of stainless steel in China has been particularly robust since 2003 and exceeded the combined output of Japan and the United States in 2007. Chinese and Australian companies have joined to explore for nickel across China. China imported nickel feedstocks from six countries to help supply its growing stainless steel-producing industry. Brazil was expected to become a significant global supplier of nickel by 2012. Nickel prices climbed to unprecedented levels in the first half of 2007, but weakened during the summer. In October 2007, the London Metal Exchange cash mean for 99.8%-pure nickel averaged \$31,045 per metric ton (\$14.08 per pound).

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Acquisitions and mergers have completely changed the structure of the global nickel industry since 2004. In 2006, the two leading nickel producers in Canada were taken over by even larger foreign mining companies. In 2007, the leading nickel producer in the world—a Russian company—created an entire overseas production operation by acquiring and then integrating existing facilities in Australia, Botswana, and Finland. The larger of the two Canadian takeover targets was preparing to commission a laterite mining complex at Goro, New Caledonia. The New Caledonian nickel was to be recovered onsite using advanced pressure acid leach technology. Australia's leading nickel producer was developing a laterite deposit near Ravensthorpe, Western Australia. Nickel and cobalt were to be leached from the ore and converted onsite to an intermediate hydroxide, which would be refined at Yabulu, Queensland. Several other companies were considering employing some form of acid leach technology to recover nickel at greenfield sites in Brazil, Cuba, Guatemala, Indonesia, Kazakhstan, Madagascar, and the Philippines. A new type of heap-leaching process was being used to recover nickel in Turkey. Work was underway on a more traditional, ferronickel plant in Goias, Brazil. Some nickel consumers were concerned that global consumption of the metal would outstrip supply before new mining projects could be completed. Continued high prices for gasoline and other petroleum products have spurred development and production of novel hydrogen storage and battery materials, such as lanthanum-nickel-cobalt alloys. Nickel-metal hydride (NiMH) batteries continue to be widely used in hybrid motor vehicles, despite inroads made by lithium-ion batteries. Sales in the United States of hybrid electric passenger vehicles have risen steadily to 247,000 in 2006 from 9,370 in 2000. Major air carriers began ordering planes again, after a 5-year lull in the wake of the 2001 terrorist attacks, thus increasing demand for superalloys.

World Mine Production, Reserves, and Reserve Base: Estimates of reserves for Canada and New Caledonia and the reserve base for the United States were revised based on new mining industry information.

	Mine production		Reserves ⁶	Reserve base ⁶
	2006	2007 ^e		
United States	—	—	—	150,000
Australia	185,000	180,000	24,000,000	27,000,000
Botswana	38,000	35,000	490,000	920,000
Brazil	82,500	75,300	4,500,000	8,300,000
Canada	233,000	258,000	4,900,000	15,000,000
China	82,100	80,000	1,100,000	7,600,000
Colombia	94,100	99,500	830,000	1,100,000
Cuba	75,000	77,000	5,600,000	23,000,000
Dominican Republic	46,500	47,000	720,000	1,000,000
Greece	21,700	20,100	490,000	900,000
Indonesia	140,000	145,000	3,200,000	13,000,000
New Caledonia ⁷	103,000	119,000	7,100,000	15,000,000
Philippines	58,900	88,400	940,000	5,200,000
Russia	320,000	322,000	6,600,000	9,200,000
South Africa	41,600	42,000	3,700,000	12,000,000
Venezuela	20,000	20,000	560,000	630,000
Zimbabwe	8,820	9,000	15,000	260,000
Other countries	34,300	41,000	2,100,000	5,900,000
World total (rounded)	1,580,000	1,660,000	67,000,000	150,000,000

World Resources: Identified land-based resources averaging 1% nickel or greater contain at least 130 million tons of nickel. About 60% is in laterites and 40% in sulfide deposits. In addition, extensive deep-sea resources of nickel are in manganese crusts and nodules covering large areas of the ocean floor, particularly in the Pacific Ocean.

Substitutes: To offset high nickel prices, engineers have begun substituting low-nickel, duplex, or ultrahigh-chromium stainless steels for austenitic grades in a few construction applications. Nickel-free specialty steels are sometimes used in place of stainless steel within the power generating and petrochemical industries. Titanium alloys or specialty plastics can substitute for nickel metal or nickel-base alloys in highly corrosive chemical environments. Cost savings in manufacturing lithium ion batteries allow them to compete against NiMH in certain applications.

^eEstimated. W Withheld to avoid disclosing company proprietary data. — Zero.

¹Scrap receipts – shipments by consumers + exports – imports + adjustments for consumer stock changes.

²Changes in this section are due to revisions of 2003-05 ferrous scrap data, resulting from new information and improved software.

³Apparent primary consumption + reported secondary consumption.

⁴Stocks of producers, agents, and dealers held only in the United States.

⁵Defined as imports – exports + adjustments for Government and industry stock changes.

⁶See Appendix C for definitions.

⁷Overseas territory of France.