

NICKEL

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

Domestic Production and Use: The United States had only one active nickel mine in 2013—a greenfield, underground operation in Michigan. Contractors completed the main decline tunnel of the new chalcopyrite-pentlandite mine in May 2013. The mine was scheduled to be in full production by late 2014. Two mining projects were also in varying stages of development in northeastern Minnesota. On an annual basis, 121 facilities reported nickel consumption. The principal consuming State was Pennsylvania, followed by Kentucky, North Carolina, New York, and Illinois. Approximately 48% of the primary nickel consumed went into stainless and alloy steel production, 41% into nonferrous alloys and superalloys, 7% into electroplating, and 4% into other uses. End uses were as follows: transportation, 31%; fabricated metal products, 13%; electrical equipment, 12%; petroleum industry, 10%; chemical industry, construction, household appliances, and industrial machinery, 8% each; and other, 2%. The estimated value of apparent primary consumption was \$1.79 billion.

Salient Statistics—United States:	2009	2010	2011	2012	2013^e
	W	W	W	W	W
Production, refinery byproduct					
Shipments of purchased scrap ¹	152,000	139,000	130,000	127,000	130,000
Imports:					
Primary	99,900	129,000	138,000	133,000	130,000
Secondary	17,700	23,800	21,300	22,300	21,800
Exports:					
Primary	7,030	12,600	12,400	9,100	9,900
Secondary	90,000	80,300	64,800	59,800	65,000
Consumption:					
Reported, primary	83,100	98,700	107,000	110,000	97,600
Reported, secondary	79,800	81,900	86,600	89,900	82,200
Apparent, primary	93,500	114,000	124,000	126,000	119,000
Total ²	173,000	196,000	211,000	216,000	202,000
Price, average annual, London Metal Exchange:					
Cash, dollars per metric ton	14,649	21,804	22,890	17,533	15,018
Cash, dollars per pound	6.645	9.890	10.383	7.953	6.812
Stocks:					
Consumer, yearend	14,700	17,100	18,300	16,700	17,000
Producer, yearend ³	5,490	6,240	6,650	5,980	6,080
Net import reliance ⁴ as a percentage of apparent consumption	22	41	48	50	48

Recycling: About 82,200 tons of nickel was recovered from purchased scrap in 2013. This represented about 41% of reported secondary plus apparent primary consumption for the year.

Import Sources (2009–12): Canada, 34%; Russia, 16%; Australia, 11%; Norway, 10%; and other, 29%.

Tariff: Item	Number	Normal Trade Relations 12–31–13
Nickel oxides, chemical grade	2825.40.0000	Free.
Ferronickel	7202.60.0000	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 at Paducah, KY, plus 5,080 tons of contaminated shredded nickel scrap at Oak Ridge, TN. Ongoing decommissioning activities at former nuclear defense sites are expected to generate an additional 20,000 tons of nickel in scrap.

Events, Trends, and Issues: The U.S. economy continued to recover from the global recession of 2008–09, but the recovery was slow. The U.S. steel industry produced 1.54 million tons of austenitic (nickel-bearing) stainless steel in 2013—up by 8% from 2012 and 31% greater than the reduced output of 1.16 million tons in 2009. Stainless steel has traditionally accounted for two-thirds of primary nickel use worldwide, with more than one-half of the steel going into the construction, food processing, and transportation sectors. China, the world's leading producer, cast a record-high 14.3 million tons of austenitic stainless steel in 2013.

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Nickel prices deteriorated further in 2013 even though the global economy was slowly recovering. In February 2013, the London Metal Exchange (LME) cash mean for 99.8%-pure nickel peaked briefly at \$17,729 per metric ton after partially recovering from an 11-month decline. However, the cash price started contracting again as increased production of nickel pig iron in China weakened demand for imported ferronickel. Manufacturing cutbacks in Europe and related economic problems also helped to depress prices. By November, the cash price had fallen to \$13,725 per ton; the price drop was accompanied by the gradual buildup of stocks in LME warehouses to record-high levels.

Mining companies continue to bring on new nickel projects in anticipation of a turnaround in the global economy, despite current weak prices and an oversupply of the metal. For at least 20 years, the nickel price cycle has been shorter than the time period required to develop and commission many greenfield mining projects. Global long-term demand for austenitic stainless steel has been projected to grow despite the current depressed economic climate. Demand for superalloys is expected to be especially strong in the aerospace and power-generation sectors. The Koniambo mining and smelting complex in New Caledonia began producing ferronickel in April 2013. The Government of Indonesia took steps to limit the export of direct shipping ores in an effort to encourage the construction of additional ferronickel and nickel pig iron production facilities in the archipelago. In 2009, Danish geologists identified a 3-billion-year-old meteorite impact site near Maniitsoq, Greenland. Subsequent exploration drilling revealed significant nickel-copper sulfide mineralization. The Greenland discovery, coupled with new projects in Canada and Russia, could help offset the depletion of nickel sulfide reserves elsewhere in the world.

World Mine Production and Reserves: Reserves for Australia, Brazil, and the United States were revised based on new information from company or Government reports.

	Mine production		Reserves ⁵
	2012	2013 ^e	
United States	—	—	160,000
Australia	246,000	240,000	⁶ 18,000,000
Brazil	139,000	149,000	8,400,000
Canada	205,000	225,000	3,300,000
China	93,300	95,000	3,000,000
Colombia	84,000	75,000	1,100,000
Cuba	68,200	66,000	5,500,000
Dominican Republic	15,200	12,500	970,000
Indonesia	228,000	440,000	3,900,000
Madagascar	8,250	26,000	1,600,000
New Caledonia ⁷	132,000	145,000	12,000,000
Philippines	424,000	440,000	1,100,000
Russia	255,000	250,000	6,100,000
South Africa	45,900	48,000	3,700,000
Other countries	<u>273,000</u>	<u>274,000</u>	<u>5,100,000</u>
World total (rounded)	2,220,000	2,490,000	74,000,000

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% is in sulfide deposits. Extensive resources of nickel are also found in manganese crusts and nodules covering large areas of the ocean floor. The long-term decline in discovery of new sulfide deposits in traditional mining districts has forced exploration teams to shift to more challenging locations like east-central Africa and the Subarctic. Development of awaruite deposits in Canada may help alleviate projected shortages of nickel concentrate. Awaruite, a natural iron-nickel alloy, is easier to concentrate than pentlandite.

Substitutes: Low-nickel, duplex, or ultrahigh-chromium stainless steels are being substituted for austenitic grades in construction. Nickel-free specialty steels are sometimes used in place of stainless steel in the power-generating and petrochemical industries. Titanium alloys can substitute for nickel metal or nickel-based alloys in corrosive chemical environments. Lithium-ion batteries instead of nickel-metal hydride may be used 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.

²Apparent primary consumption + reported secondary consumption.

³Stocks of producers, agents, and dealers held only in the United States.

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

⁵[See Appendix C for resource/reserve definitions and information concerning data sources.](#)

⁶For Australia, Joint Ore Reserves Committee (JORC)-compliant reserves were about 7.5 million tons.

⁷Overseas territory of France.