

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 2010. Limited amounts of byproduct nickel were recovered from copper and palladium-platinum ores mined in the Western United States. An inclined tunnel was being driven to access a sulfide orebody in Michigan, and four other projects were in varying stages of development in Minnesota. On a monthly or annual basis, 110 facilities reported nickel consumption. The principal consuming State was Pennsylvania, followed by Kentucky, North Carolina, and Indiana. Approximately 46% of the primary nickel consumed went into stainless and alloy steel production, 34% into nonferrous alloys and superalloys, 14% into electroplating, and 6% into other uses. End uses were as follows: transportation, 30%; fabricated metal products, 14%; 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 \$2.93 billion.

Salient Statistics—United States:	2007	2008	2009	2010	2011^e
	W	W	W	W	W
Production, refinery byproduct					
Shipments of purchased scrap ¹	186,000	160,000	152,000	161,000	141,000
Imports:					
Primary	125,000	129,000	99,900	129,000	139,000
Secondary	16,200	20,100	17,700	23,800	22,500
Exports:					
Primary	13,100	11,600	7,030	12,600	13,000
Secondary	103,000	94,600	90,000	80,300	65,000
Consumption:					
Reported, primary	101,000	102,000	83,600	108,000	116,000
Reported, secondary	99,100	85,400	79,800	105,000	98,900
Apparent, primary	112,000	115,000	93,200	112,000	129,000
Total ²	212,000	201,000	173,000	217,000	228,000
Price, average annual, London Metal Exchange:					
Cash, dollars per metric ton	37,216	21,104	14,649	21,804	22,800
Cash, dollars per pound	16.881	9.572	6.645	9.890	10.300
Stocks:					
Consumer, yearend	19,200	19,200	17,700	22,600	19,900
Producer, yearend ³	5,690	5,860	6,150	7,950	7,050
Net import reliance ⁴ as a percentage of apparent consumption	17	33	21	34	47

Recycling: About 99,000 tons of nickel was recovered from purchased scrap in 2011. This represented about 43% of reported secondary plus apparent primary consumption for the year.

Import Sources (2007–10): Canada, 38%; Russia, 17%; Australia, 10%; Norway, 10%; and other, 25%.

Tariff: Item	Number	Normal Trade Relations 12-31-11
Nickel oxide, 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 plus 5,080 tons of contaminated shredded nickel scrap. Ongoing 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: The U.S. economy continued to recover from the global recession of 2008–09, but the recovery remained weak. In 2011, U.S. production of austenitic (nickel-bearing) stainless steel increased to 1.57 million tons—slightly more than production in 2010 but 35% 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 9.69 million tons of austenitic stainless steel in 2011.

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Nickel prices have been volatile in the aftermath of the global economic recession. In February 2011, the London Metal Exchange (LME) cash mean for 99.8%-pure nickel peaked at \$28,249 per metric ton after an 8-month recovery. The cash price, however, began to deteriorate at that point as the European debt situation worsened and the adverse economic effect of the March earthquake in Japan became apparent. By September, the cash price had fallen to \$20,388 per metric ton despite a gradual drawdown of stocks in LME warehouses. The average monthly LME cash price for November 2011 was \$17,879 per ton. Canadian mine production rebounded after a 12-month labor dispute was settled in July 2010. Companies mining lateritic ore in the Philippines have been ramping up production to meet increased demand from Chinese producers of nickel pig iron. The \$5.5 billion Ambatovy mining and processing project in east-central Madagascar was scheduled to begin producing nickel metal in early 2012. The lateritic ore was being slurried and piped to the venture's pressure leach plant and refinery near Toamasina. The Toamasina refinery was designed to produce 60,000 tons per year of nickel metal. New mines also were being developed at several locations in Brazil, Southeast Asia, and the Pacific. The Barro Alto and Onca Puma laterite projects in Brazil have been producing ferronickel since early 2011. The \$4.5 billion Goro hydrometallurgical complex in New Caledonia began producing a nickel-cobalt intermediate for export and was scheduled to reach full production in 2013.

World Mine Production and Reserves: Estimates of reserves for Canada, Colombia, Dominican Republic, Madagascar, and New Caledonia were revised based on new mining industry information from published sources.

	Mine production		Reserves ⁵
	2010	2011 ^e	
United States	—	—	—
Australia	170,000	180,000	⁶ 24,000,000
Botswana	28,000	32,000	490,000
Brazil	59,100	83,000	8,700,000
Canada	158,000	200,000	3,300,000
China	79,000	80,000	3,000,000
Colombia	72,000	72,000	720,000
Cuba	70,000	74,000	5,500,000
Dominican Republic	—	14,000	1,000,000
Indonesia	232,000	230,000	3,900,000
Madagascar	15,000	25,000	1,600,000
New Caledonia ⁷	130,000	140,000	12,000,000
Philippines	173,000	230,000	1,100,000
Russia	269,000	280,000	6,000,000
South Africa	40,000	42,000	3,700,000
Other countries	99,000	100,000	4,600,000
World total (rounded)	1,590,000	1,800,000	80,000,000

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. 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. The long-term decline in discovery of new sulfide deposits in traditional mining districts has forced companies to shift exploration efforts to more challenging locations like east-central Africa and the Subarctic. In 2007, a promising high-grade sulfide resource was discovered in the James Bay Lowlands of northwestern Ontario. The development of awaruite deposits in other parts of Canada may help alleviate any prolonged shortage of nickel concentrate. Awaruite, a natural iron-nickel alloy, is much easier to concentrate than pentlandite, the principal sulfide of nickel.

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

⁵See Appendix C for resource/reserve definitions and information concerning data sources.

⁶For Australia, Joint Ore Reserves Committee (JORC) compliant reserves were only 5.5 million tons.

⁷Overseas territory of France.