

# NICKEL

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

**Domestic Production and Use:** In 2020, the underground Eagle Mine in Michigan produced approximately 16,000 tons of nickel in concentrate, which was exported to smelters in Canada and overseas. A company in Missouri recovered metals, including nickel, from mine tailings as part of the Superfund Redevelopment Initiative. Nickel in crystalline sulfate was produced as a byproduct of smelting and refining platinum-group-metal ores mined in Montana.

In the United States, the leading uses for primary nickel are stainless and alloy steels, nonferrous alloys and superalloys, electroplating, and other uses including catalysts and chemicals. Stainless and alloy steel and nickel-containing alloys typically account for more than 85% of domestic consumption.

<b>Salient Statistics—United States:</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>	<b>2019</b>	<b>2020<sup>e</sup></b>
Production:					
Mine	24,100	22,100	17,600	13,500	16,000
Refinery, byproduct	W	W	W	W	W
Imports:					
Ores and concentrates	( <sup>1</sup> )	64	3	4	120
Primary	111,000	150,000	144,000	119,000	110,000
Secondary	32,300	38,100	45,100	37,700	32,000
Exports:					
Ores and concentrates	22,400	20,000	18,000	14,700	13,000
Primary	10,300	11,000	9,780	12,800	11,000
Secondary	63,700	51,500	59,400	51,100	34,000
Consumption:					
Reported, primary metal	97,800	105,000	107,000	105,000	85,000
Reported, secondary, purchased scrap	131,000	133,000	123,000	111,000	100,000
Apparent, primary metal <sup>2</sup>	104,000	140,000	136,000	106,000	99,000
Apparent, total <sup>3</sup>	235,000	273,000	259,000	217,000	200,000
Price, average annual, London Metal Exchange (LME):					
Cash, dollars per metric ton	9,594	10,403	13,114	13,903	14,000
Cash, dollars per pound	4.352	4.719	5.948	6.306	6.40
Stocks, yearend:					
Consumer	15,100	14,600	16,300	13,400	13,000
LME U.S. warehouses	5,232	3,780	2,268	1,974	2,000
Net import reliance <sup>4</sup> as a percentage of total apparent consumption	44	51	52	49	50

**Recycling:** Nickel in alloyed form was recovered from the processing of nickel-containing waste, including flue dust, grinding swarf, mill scale, and shot blast generated during the manufacturing of stainless steel; filter cakes, plating solutions, spent catalysts, spent pickle liquor, sludges, and all types of spent nickel-containing batteries. Nickel-containing alloys and stainless-steel scrap were also melted and used to produce new alloys and stainless steel. The U.S. Department of Energy's ReCell Center continued to investigate methods to more effectively recover raw materials, including nickel, from recycled batteries. In 2020, recycled nickel in all forms accounted for approximately 50% of apparent consumption.

**Import Sources (2016–19):** Nickel contained in ferronickel, metal, oxides, and salt: Canada, 42%; Norway, 10%; Finland, 9%; Russia, 8%; and other, 31%. Nickel-containing scrap, including nickel content of stainless-steel scrap: Canada, 38%; Mexico, 27%; United Kingdom, 9%; and other, 26%.

<b>Tariff:</b>	<b>Item</b>	<b>Number</b>	<b>Normal Trade Relations 12–31–20</b>
	Nickel ores and concentrates, nickel content	2604.00.0040	Free.
	Ferronickel	7202.60.0000	Free.
	Unwrought nickel, not alloyed	7502.10.0000	Free.
	Nickel waste and scrap	7503.00.0000	Free.
	Nickel powders	7504.00.0010	Free.
	Nickel flakes	7504.00.0050	Free.

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

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**Government Stockpile:**<sup>5</sup> The U.S. Department of Energy is holding nickel ingot contaminated by low-level radioactivity at Paducah, KY, and shredded nickel scrap at Oak Ridge, TN. Ongoing decommissioning activities at former nuclear defense sites were expected to generate additional nickel in scrap. See the Lithium chapter for statistics on lithium-nickel-cobalt-aluminum oxide.

Material	Inventory as of 9–30–20	FY 2020		FY 2021	
		Potential acquisitions	Potential disposals	Potential acquisitions	Potential disposals
Nickel alloys, gross weight	609	—	272	—	—

**Events, Trends, and Issues:** Domestic reported consumption of primary nickel decreased by an estimated 20% in 2020, owing primarily to reduced demand related to the global COVID-19 pandemic. Approximately 70% of the decrease was attributed to reduced consumption of nickel alloys, primarily those used in the aviation and oil and gas sectors. Domestic production of stainless steel and related nickel consumption decreased substantially in the first half of 2020, but most of the leading domestic stainless-steel producers reported relatively robust recovery in the third quarter. Total domestic production of stainless steel in 2020 was estimated to have decreased by approximately 10%.

Globally, nickel mine production was estimated to have decreased by 5%. Although stainless-steel production in most leading producing countries and (or) localities decreased, these were mostly offset by a rapid recovery in China's production of nickel-bearing stainless-steel grades after the first quarter, and the continued rampup of nickel pig iron and stainless-steel projects in Indonesia.

**World Mine Production and Reserves:** Reserves for Brazil, Canada, and the United States were revised based on new information from company and (or) Government reports

	Mine production		Reserves <sup>6</sup>
	2019	2020 <sup>e</sup>	
United States	13,500	16,000	100,000
Australia	159,000	170,000	720,000,000
Brazil	60,600	73,000	16,000,000
Canada	181,000	150,000	2,800,000
China	120,000	120,000	2,800,000
Cuba	49,200	49,000	5,500,000
Dominican Republic	56,900	47,000	NA
Indonesia	853,000	760,000	21,000,000
New Caledonia <sup>8</sup>	208,000	200,000	NA
Philippines	323,000	320,000	4,800,000
Russia	279,000	280,000	6,900,000
Other countries	310,000	290,000	14,000,000
World total (rounded)	2,610,000	2,500,000	94,000,000

**World Resources:**<sup>6</sup> Identified land-based resources averaging approximately 0.5% nickel or greater contain at least 300 million tons of nickel, with about 60% in laterites and 40% in sulfide deposits. Extensive nickel resources also are found in manganese crusts and nodules on the ocean floor.

**Substitutes:** Low-nickel, duplex, or ultrahigh-chromium stainless steels have been 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-base alloys in corrosive chemical environments. Lithium-ion batteries may be used instead of nickel metal hydride batteries in certain applications.

<sup>e</sup>Estimated. NA Not available. W Withheld to avoid disclosing company proprietary data. — Zero.

<sup>1</sup>Less than ½ unit.

<sup>2</sup>Defined as primary imports – primary exports + adjustments for industry stock changes, excluding secondary consumer stocks.

<sup>3</sup>Defined as apparent primary metal consumption + reported secondary consumption.

<sup>4</sup>Defined as imports – exports + adjustments for consumer stock changes.

<sup>5</sup>See Appendix B for definitions.

<sup>6</sup>See Appendix C for resource and reserve definitions and information concerning data sources.

<sup>7</sup>For Australia, Joint Ore Reserves Committee-compliant reserves were 6.2 million tons.

<sup>8</sup>Overseas Territory of France.