

GRAPHITE (NATURAL)

(Data in thousand metric tons unless otherwise noted)

Domestic Production and Use: Although natural graphite was not produced in the United States in 2011, approximately 90 U.S. firms, primarily in the Northeastern and Great Lakes regions, used it for a wide variety of applications. The major uses of natural graphite in 2011 were estimated to be refractory applications and crucibles combined, 33%; foundry operations and steelmaking combined, 26%; brake linings, 7%; batteries and lubricants combined, 5%; and other applications, 29%.

Salient Statistics—United States:	2007	2008	2009	2010	2011^e
Production, mine	—	—	—	—	—
Imports for consumption	59	58	33	65	70
Exports	16	8	11	6	7
Consumption, apparent ¹	43	50	22	60	63
Price, imports (average dollars per ton at foreign ports):					
Flake	499	753	694	720	1,170
Lump and chip (Sri Lankan)	2,219	2,550	1,410	1,700	2,070
Amorphous	150	203	249	257	299
Net import reliance ² as a percentage of apparent consumption	100	100	100	100	100

Recycling: Refractory brick and linings, alumina-graphite refractories for continuous metal castings, magnesia-graphite refractory brick for basic oxygen and electric arc furnaces, and insulation brick led the way in recycling of graphite products. The market for recycled refractory graphite material is growing, with material being recycled into products such as brake linings and thermal insulation.

Recovering high-quality flake graphite from steelmaking kish is technically feasible, but not practiced at the present time. The abundance of graphite in the world market inhibits increased recycling efforts. Information on the quantity and value of recycled graphite is not available.

Import Sources (2007–10): China, 51%; Mexico, 20%; Canada, 19%; Brazil, 6%; and other, 4%.

Tariff:	Item	Number	Normal Trade Relations
			12-31-11
	Crystalline flake (not including flake dust)	2504.10.1000	Free.
	Powder	2504.10.5000	Free.
	Other	2504.90.0000	Free.

Depletion Allowance: 22% (Domestic lump and amorphous), 14% (Domestic flake), and 14% (Foreign).

Government Stockpile: None.

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Events, Trends, and Issues: Worldwide demand for graphite slowly began to increase during the last half of 2009 and continued increasing steadily throughout 2010 and into 2011. This increase resulted from the improvement of global economic conditions and its impact on industries that use graphite. Principal import sources of natural graphite were, in descending order of tonnage, China, Mexico, Canada, Brazil, and Madagascar, which combined accounted for 99% of the tonnage and 92% of the value of total imports. Mexico provided all the amorphous graphite, and Sri Lanka provided all the lump and chippy dust variety. China, Canada, and Brazil were, in descending order of tonnage, the major suppliers of crystalline flake and flake dust graphite.

During 2011, China produced the majority of the world's graphite, and China's graphite production is expected to continue to increase.

Advances in thermal technology and acid-leaching techniques that enable the production of higher purity graphite powders are likely to lead to development of new applications for graphite in high-technology fields. Such innovative refining techniques have enabled the use of improved graphite in carbon-graphite composites, electronics, foils, friction materials, and special lubricant applications. Flexible graphite product lines, such as graphoil (a thin graphite cloth), are likely to be the fastest growing market. Large-scale fuel-cell applications are being developed that could consume as much graphite as all other uses combined.

World Mine Production and Reserves: The reserve data for India were revised based on information reported by the Government of India.

	Mine production		Reserves ³
	2010	2011 ^e	
United States	—	—	—
Brazil	76	76	360
Canada	25	25	(⁴)
China	600	600	55,000
India	140	140	11,000
Korea, North	30	30	(⁴)
Madagascar	5	5	940
Mexico	7	7	3,100
Norway	2	2	(⁴)
Romania	20	20	(⁴)
Sri Lanka	8	8	(⁴)
Ukraine	6	6	(⁴)
Other countries	6	6	6,400
World total (rounded)	925	925	77,000

World Resources: Domestic resources of graphite are relatively small, but the rest of the world's inferred resources exceed 800 million tons of recoverable graphite.

Substitutes: Manufactured graphite powder, scrap from discarded machined shapes, and calcined petroleum coke compete for use in iron and steel production. Finely ground coke with olivine is a potential competitor in foundry facing applications. Molybdenum disulfide competes as a dry lubricant but is more sensitive to oxidizing conditions.

^eEstimated.— Zero.

¹Defined as imports – exports.

²Defined as imports – exports.

³See Appendix C for resource/reserve definitions and information concerning data sources.

⁴Included with "Other countries."