IRON AND STEEL SLAG

(Data in million metric tons unless otherwise noted)

Domestic Production and Use: Ferrous slags are valuable coproducts of ironmaking and steelmaking. In 2005, about 21 million tons of domestic iron and steel slag, valued at about $326 million[1] (f.o.b.), was consumed. Iron or blast furnace slag accounted for about 60% of the tonnage sold and was worth about $290 million; about 85% of this value was granulated slag. Steel slag, produced from basic oxygen and electric arc furnaces[2] accounted for the remainder. There were 29 slag-processing companies servicing iron and/or steel companies or reprocessing old slag piles at about 130 locations: iron slag at about 40 sites in 14 States and steel slag at about 90 sites in 32 States. Included in these data are a dozen facilities that grind and sell ground granulated blast furnace slag (GGBFS) based on imported unground feed.

The prices listed in the table below are the weighted average for a variety of ferrous slags. Actual prices per ton range from about $0.25 for steel slags in areas where natural aggregates are abundant to about $72 for some GGBFS. The major uses of air-cooled iron slag and for steel slag were as aggregates for asphaltic paving, fill, and road bases, and as a feed for cement kilns. Air-cooled slag also is used as an aggregate for concrete. In contrast, GGBFS is mainly used as a partial substitute for portland cement in concrete mixes and in blended cements. Owing to their low unit values, most slag types are shipped by truck over short distances only (rail and waterborne transportation can be longer). Because it has a much higher unit value, GGBFS can be shipped economically over longer distances.

Salient Statistics—United States:	2001	2002[3]	2003[3]	2004[3]	2005[e, 3]
Production, marketed[1, 4]	16.9	19.1	19.7	21.2	21.0
Imports for consumption	2.6	1.1	1.1	1.0	1.7
Exports	([5])	0.1	0.1	0.1	([5])
Consumption, apparent[6]	19.5	19.1	19.7	21.1	21.0
Price average value, dollars per ton, f.o.b. plant	8.05	[7]15.50	[7]15.00	[7]15.50	[7]15.50
Stocks, yearend	NA	NA	NA	NA	NA
Employment, number[e]	2,700	2,700	2,700	2,700	2,600
Net import reliance[8] as a percentage of apparent consumption	8	5	5	4	8

Recycling: Apart from the large outside markets for slag in the construction sector, some iron and steel slags are returned to the furnaces as ferrous and flux feed. Entrained metal, particularly in steel slag, is routinely recovered during slag processing for return to the furnaces. However, data for such furnace-feed uses are unavailable.

Import Sources (2001-04): Year-to-year import data for ferrous slags show variations in both tonnage and unit value; many past data contain discrepancies. Most of the imported material is unground granulated blast furnace slag. Principal suppliers in recent years have been Brazil, Canada, France, Italy, Japan, South Africa, and Spain. Principal sources, for 2002-04 only, were Canada, 39%; France, 27%; Italy, 23%; Japan, 5%; and other, 6%.

Tariff: Item	Number	Normal Trade Relations 12-31-05
Granulated slag	2618.00.0000	Free.
Basic slag	3103.20.0000	Free.
Slag, dross, scale, from manufacture of iron and steel	2619.00.3000	Free.

Depletion Allowance: Not applicable.

Government Stockpile: None.

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Events, Trends, and Issues: Air-cooled blast furnace slag is in declining domestic supply owing to depletion of old slag piles and the closure of many blast furnaces over the years for economic and/or environmental reasons. No new blast furnaces are under construction or are planned. Steel slag from integrated works is likewise in decline, but slag from electric arc furnaces (largely fed with steel scrap) remains abundant. Both of these slag types compete with natural aggregates. Demand is growing for GGBFS in concrete; spurred by this demand and the much higher unit sales price for GGBFS, two new granulators have been added in recent years to existing blast furnaces, and a number of grinding facilities at independent sites or at cement plants have been constructed to process imported granulated slag. However, one blast furnace, long equipped with a granulator, was idled—perhaps permanently—at midyear 2005, and one import-based grinding plant for GGBFS was made temporarily inoperable in late August 2005 by a hurricane. Pelletized slag, used mainly as a lightweight aggregate, remains in limited supply. Overall, most of the demand for slag is in large-scale (mostly public-sector) construction projects and fluctuates with levels of construction spending.

World Mine Production, Reserves, and Reserve Base: Slag is not a mined material. Production data for the world are unavailable, but it is estimated that annual world iron and steel slag output is on the order of 220 to 420 million tons, based on typical ratios of slag to crude iron and steel output.

World Resources: Not applicable.

Substitutes: Crushed stone and sand and gravel are common aggregate substitutes in the construction sector. Certain rock types, as well as silica fume and, especially, fly ash, are alternative cementitious additives in blended cements and concrete. As a cement kiln feed, slags (especially steel slag) compete with some of the traditional limestone and other natural (rock) raw materials.

[e]Estimated. NA Not available.

[1]The data (obtained from an annual survey of slag processors) pertain to the quantities of processed slag sold rather than that processed or produced during the year. The data exclude any entrained metal that may be recovered during slag processing and returned to iron and, especially, steel furnaces. Data for such recovered metal were unavailable.

[2]There were very minor sales of open hearth furnace steel slag from stockpiles but no domestic production of this slag type in 2005.

[3]Owing to inclusion of more complete information (especially for granulated slag), data in 2002-05 are not strictly comparable to those of recent previous years.

[4]The data include (2001-05) sales of imported granulated blast furnace slag, either after domestic grinding or still unground, and exclude (2003-05) sales of pelletized slag (proprietary but very small). Overall, blast furnace slag production may be estimated as equivalent to 25% to 30% of crude (pig) iron production and steel furnace slag at about 10% to 15% of crude steel output.

[5]Less than ½ unit.

[6]Defined, for 2001, as production (sales) + imports – exports and, for 2002-05, as total sales of slag (includes that from imported feed) – exports. Calculation is based on unrounded original data.

[7]The higher price in 2002-05 represents more complete data on sales of ground granulated blast furnace slag, which sold for almost $60 per ton, as opposed to air-cooled blast furnace and steel slags, which sold, on average, in the range of about $4 to $7 per ton.

[8]Defined as imports – exports for 2001 and, for 2002-05, as total sales of imported slag – exports of slag. Data are not available to allow adjustments for changes in stocks.