

BAUXITE AND ALUMINA¹

(Data in thousand metric dry tons unless otherwise noted)

Domestic Production and Use: In 2014, bauxite consumption was estimated to be 9.6 million tons, nearly all of which was imported, worth an estimated 269 million dollars. More than 95% of the bauxite was converted to alumina, and the remaining 5% went to nonmetallurgical products, such as abrasives, chemicals, proppants, and refractories. There were four domestic Bayer process refineries with a combined alumina production capacity of 5.6 million tons per year. Three of the refineries operated throughout the year. One, which was shut down during the fourth quarter of 2013, was restarted by the beginning of 2014 and ramped up to full production during the first half of the year. About 90% of the alumina produced went to primary aluminum smelters and the remaining 10% went to nonmetallurgical products, such as abrasives, ceramics, chemicals, and refractories.

Salient Statistics—United States:	2010	2011	2012	2013	2014^e
Production, bauxite, mine	NA	NA	NA	NA	NA
Production, alumina, refinery	3,470	3,790	4,370	4,390	4,200
Imports of bauxite for consumption ²	9,310	10,200	11,100	10,800	9,600
Imports of alumina ³	1,720	2,160	1,790	2,050	1,700
Exports of bauxite ²	54	76	42	21	18
Exports of alumina ³	1,520	1,660	1,720	2,300	2,200
Consumption, apparent, bauxite and alumina (in aluminum equivalents) ⁴	2,580	2,250	2,870	2,380	2,300
Price, bauxite, average value U.S. imports (f.a.s.) dollars per ton	27	30	28	27	28
Price, alumina, average value U.S. imports (f.a.s.) dollars per ton	365	413	372	368	370
Stocks, bauxite, industry, yearend ²	95	272	440	540	600
Net import reliance, ⁵ bauxite, as a percentage of apparent consumption	100	100	100	100	100
Net import reliance, ⁵ alumina, as a percentage of apparent consumption	2	E	13	E	5

Recycling: None.

Import Sources (2010–13):⁶ Bauxite: Jamaica, 45%; Guinea, 24%; Brazil, 22%; Guyana, 4%; and other, 5%. Alumina: Suriname, 34%; Australia, 33%; Brazil, 12%; Jamaica, 10%; and other, 11%. Total: Jamaica, 29%; Brazil, 18%; Guinea, 18%; Australia, 11%; and other, 24%.

Tariff:	Item	Number	Normal Trade Relations 12–31–14
	Bauxite, calcined (refractory grade)	2606.00.0030	Free.
	Bauxite, calcined (other)	2606.00.0060	Free.
	Bauxite, crude dry (metallurgical grade)	2606.00.0090	Free.
	Alumina	2818.20.0000	Free.
	Aluminum hydroxide	2818.30.0000	Free.

Depletion Allowance: 22% (Domestic), 14% (Foreign).

Government Stockpile: None

Events, Trends, and Issues: In February 2013, the owner of the 540,000-ton-per-year Burnside, LA, alumina refinery filed for chapter 11 bankruptcy protection, citing high power prices, low aluminum prices, high debt levels, and legacy costs. In August 2013, the company shut down 360,000 tons per year of capacity at the refinery and the remaining capacity was shut down in October. In December 2013, the refinery was sold to a new owner and reopened. The refinery was modified to produce chemical-grade alumina with a capacity of 500,000 tons per year. In October 2014, a labor dispute at a 1,600,000-ton-per-year alumina refinery in Corpus Christi, TX, resulted in an employee lockout. Production continued using management employees and temporary workers.

The estimated annual average price (free alongside ship) for U.S. imports for consumption of metallurgical-grade alumina was \$369 per ton. During the first 9 months of the year, the price ranged between \$350 per ton and \$510 per ton. According to production data from the International Aluminium Institute, world alumina production through September 2013 increased slightly compared with that of the same period in 2013.

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Bauxite prices are generally negotiated through long-term contracts, and a significant portion of bauxite consumed at alumina refineries in the United States was produced at mines owned by the refinery owners. The estimated annual average price (free alongside ship) for U.S. imports for consumption of crude-dry bauxite was \$28 per ton.

Global bauxite production decreased by 17% from that of 2013, principally owing to lower production in Indonesia. In response to a Government ban on exporting bauxite and other unprocessed mineral ores that took effect on January 12, 2014, bauxite mines throughout Indonesia shut down and production decreased from 55.7 million tons in 2013 to an estimated 500,000 tons in 2014. The ban was part of a mining law that was instituted in 2009 to increase development of downstream processing facilities in Indonesia. In response, several companies were planning to build alumina refineries in Indonesia, including companies based in China, where the Government was encouraging investment in power-intensive industries in other countries. In anticipation of the export ban, many refineries in China stockpiled imported bauxite in 2013 and bauxite production in China increased in 2014. Stockpiling by alumina refineries in China was attributed for bauxite production in Indonesia increasing to 55.7 million tons in 2013 from 31.4 million tons in 2012. Total imports of bauxite to China from January 2014 through August 2014 were 46% lower than in the same period in 2013, but alumina production through August was 5% higher than in the same period of 2013.

World Bauxite Mine Production and Reserves:

	Mine production		Reserves ⁷
	<u>2013</u>	<u>2014^e</u>	
United States	NA	NA	20,000
Australia	81,100	81,000	6,500,000
Brazil	32,500	32,500	2,600,000
China	46,000	47,000	830,000
Greece	2,100	2,100	600,000
Guinea	18,800	19,300	7,400,000
Guyana	1,710	1,800	850,000
India	15,400	19,000	540,000
Indonesia	55,700	500	1,000,000
Jamaica	9,440	9,800	2,000,000
Kazakhstan	5,400	5,500	160,000
Russia	5,320	5,300	200,000
Suriname	2,700	2,700	580,000
Venezuela	2,160	2,200	320,000
Vietnam	250	1,000	2,100,000
Other countries	<u>4,570</u>	<u>4,760</u>	<u>2,400,000</u>
World total (rounded)	283,000	234,000	28,000,000

World Resources: Bauxite resources are estimated to be 55 to 75 billion tons, in Africa (32%), Oceania (23%), South America and the Caribbean (21%), Asia (18%), and elsewhere (6%). Domestic resources of bauxite are inadequate to meet long-term U.S. demand, but the United States and most other major aluminum-producing countries have essentially inexhaustible subeconomic resources of aluminum in materials other than bauxite.

Substitutes: Bauxite is the only raw material used in the production of alumina on a commercial scale in the United States. However, the vast U.S. and global resources of clay are technically feasible sources of alumina. Other domestic raw materials, such as alunite, anorthosite, coal wastes, and oil shales, offer additional potential alumina sources. Although it would require new plants using different technology, these nonbauxitic materials could satisfy the demand for alumina. Some refineries in China recover alumina from coal ash. Processes for recovering alumina from clay were being tested in Australia and Canada to determine if they would be economically competitive with the processes now used for recovering alumina from bauxite. Processes for using other aluminum-bearing resources have not yet been proven to be economically competitive with those now used for bauxite. Synthetic mullite, produced from kyanite and sillimanite, substitutes for bauxite-based refractories. Although more costly, silicon carbide and alumina-zirconia can substitute for bauxite-based abrasives.

^eEstimated. E Net exporter. NA Not available.

¹See also Aluminum. As a general rule, 4 tons of dried bauxite is required to produce 2 tons of alumina, which, in turn, produces 1 ton of aluminum.

²Includes all forms of bauxite, expressed as dry equivalent weights.

³Calcined equivalent weights.

⁴The sum of U.S. bauxite production and net import reliance.

⁵Defined as imports – exports + adjustments for Government and industry stock changes (all in aluminum equivalents).

⁶Based on aluminum equivalents.

⁷See [Appendix C](#) for resource/reserve definitions and information concerning data sources.