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2021 Minerals Yearbook

BAUXITE AND ALUMINA [ADVANCE RELEASE]

U.S. Department of the Interior
U.S. Geological Survey

April 2025

U.S. Geological Survey, Reston, Virginia: 2025

Bauxite and Alumina

By Adam M. Merrill

Domestic survey data and tables were prepared by Susan M. Weaver, statistical assistant.

In 2021, nearly all of the 2.79 million metric tons (Mt) of bauxite consumed in the United States was imported. World production of bauxite was approximately 384 Mt (tables 1, 11); the leading producing countries were, in descending order of production, Australia, China, Guinea, Brazil, Indonesia, and India, which accounted for 91% of world bauxite production.

U.S. production and shipments of alumina (calcined equivalent) were an estimated 1.0 Mt and 1.1 Mt, respectively (table 2). Alumina production and shipments (calcined equivalent) decreased by 30% and 27%, respectively, compared with those in 2020. An estimated 65% of alumina shipments from domestic refineries was to domestic primary aluminum smelters for metal production; 19% of shipments were for abrasives, chemicals, ceramics, and refractories; and 16% of shipments were exported. World production of alumina (calcined equivalent) was approximately 138 Mt (tables 2, 12); the leading producing countries were, in descending order of production, China, Australia, Brazil, and India, which accounted for 83% of world alumina production.

Production

Bauxite.—The United States was reliant on imports for 100% of the metallurgical-grade bauxite consumed. Mines in Alabama, Arkansas, and Georgia produced small amounts of bauxite and bauxitic clays for nonmetallurgical uses, such as abrasives, cement, chemicals, proppants, and refractories. Domestic mines supplied less than 5% of the U.S. requirement for bauxite, and all of the bauxite that the United States required for alumina production was imported.

Alumina.—U.S. production of alumina (calcined equivalent), which was derived exclusively from imported metallurgical-grade bauxite, decreased by 30% in 2021 from that in 2020 to an estimated 1.0 Mt (table 2). Domestic production and consumption data for alumina were obtained by the U.S. Geological Survey (USGS) from three separate voluntary surveys. The "Alumina Production" survey was sent to the two operating domestic alumina refineries, one of which responded. In order to avoid disclosing company proprietary data, alumina production was estimated based on bauxite imports.

In July, Concord Resources Holdings Ltd. became the majority shareholder of New Day Aluminum Holdings LLC, the parent company of alumina producer Noranda Alumina LLC (Lazzaro, 2021). In August, Noranda Alumina LLC temporarily shut down production at its 1.2-million-metric-ton-per-year (Mt/yr) alumina refinery in Gramercy, LA. The shutdown was a precaution ahead of Hurricane Ida, which made landfall on the coast of Louisiana on August 29. After inspection for damage, the refinery was restarted at the beginning of September, producing at a rate of about 80% of its capacity. By the end of October, the refinery was producing at its full capacity. In November, Noranda Alumina changed its name to the Atlantic Alumina Company (ATALCO) (Concord Resources Holdings Ltd., 2021; Ong, 2021g; Ong and Lim, 2021).

A 500,000-metric-ton-per-year (t/yr) alumina refinery in Burnside, LA, owned by LAlumina LLC, a subsidiary of Arthur Metals LLC, remained shuttered through yearend 2021 since being shut down in August 2020. It had been used to produce nonmetallurgical-grade alumina. Decreased consumption of specialty grade alumina with the economic downturn caused by the global coronavirus disease 2019 (COVID-19) pandemic was cited for the shutdown. Approximately 300 employees were laid off (Mosbrucker, 2020).

Consumption

Bauxite.—The USGS bauxite consumption survey was sent to 26 operations of which 16 responded. One refinery produced alumina in 2021, however bauxite consumption was estimated based on import data to avoid the release of confidential company information. Total domestic consumption of bauxite decreased by 17% in 2021 compared with the amount in 2020. In 2021, 93% of the bauxite consumed in the United States was refined to alumina; the remaining 7% was consumed in nonmetallurgical applications, such as abrasives, proppants, and refractories. An estimated 2.59 metric tons (t) of dried bauxite was required to produce 1 t of alumina (table 4).

Alumina.—Alumina consumption by domestic primary aluminum smelters was estimated from the responses to the USGS aluminum production survey, which was received from all three companies that operated seven primary aluminum smelters. An estimated 74% of the 2.4 Mt of alumina apparent consumption was for metal production at primary aluminum smelters (table 2). In 2021, seven domestic primary aluminum smelters consumed an estimated 1.78 Mt of alumina, 12% less than the amount of alumina consumed in 2020. Citing declining market conditions, Alcoa Corp. temporarily ceased production during the third quarter of 2020 at the 236,000-t/yr Intalco smelter in Ferndale, WA. The Intalco smelter remained shut down through yearend 2021 (Alcoa Corp., 2022, p. 6, 80). The remainder of U.S. consumption of various forms of alumina was by abrasives, chemicals, refractories, and other specialty industries.

Prices

Most metallurgical-grade bauxite was produced by companies that owned both bauxite mines and alumina refineries, or was purchased under long-term contracts, and contract terms normally were not made public. Spot prices for metallurgical-grade alumina and specialty forms of bauxite and alumina for nonmetallurgical applications, however, were published in trade journals.

The annual average delivered value of U.S. imports of metallurgical-grade bauxite was essentially unchanged in 2021

compared with the revised prices in 2020 (table 5). In 2021, the average unit value of U.S. imports of calcined alumina, reported as free alongside ship valuation, was 17% more than that in 2020 at $462 per metric ton (table 6). However, U.S. import values for alumina and bauxite often reflect prices established under long-term contracts or are for alumina and bauxite produced by the same company as the importing smelter or refinery, so they are not necessarily reflective of global prices. Yearend price ranges, as quoted by Industrial Minerals, for refractory-grade bauxite exported from China were higher than those at yearend 2020 (table 7) (Industrial Minerals, 2021).

Foreign Trade

Imports of crude dry bauxite decreased by 3% from the amount in 2020. Jamaica (84%) and Turkey (15%) were the leading sources of crude dry bauxite imports in 2021 (table 8). Imports and exports of alumina increased by 15% and 18%, respectively, compared with those in 2020. Brazil (68%), Jamaica (16%), and Australia and Canada (4% each) were the leading sources of alumina imports in 2021. Mexico (37%), Canada (14%), and China (7%) were the leading destinations for alumina exports in 2021 (table 10).

Environment

Efforts to find solutions for managing the estimated 4 billion metric tons of bauxite residue stored behind earthen dams around the world continued. The bauxite residue, also known as red mud, is a byproduct of the Bayer process which extracts alumina from bauxite. Researchers at the Sustainable Minerals Institute at the University of Queensland in Australia continued development of an in-situ eco-engineering process to convert bauxite residue into fertile soil which could be more cost effective and sustainable than existing disposal techniques. Rio Tinto and Queensland Alumina Ltd. (Australia) have funded the research to test the technology at two existing bauxite residue storage areas (Leotaud, 2021).

World Industry Structure

Bauxite.—In 2021, world production of bauxite was slightly less than the revised amount in 2020. Decreased production in China (by 2.7 Mt), India (2.59 Mt), and Jamaica (1.6 Mt) was partially offset by increased production in Kazakhstan (by 312,000 t), Vietnam (250,000 t), and Indonesia (200,000 t). Total mine production of 384 Mt was from 25 countries, not including production from the United States, for which data were withheld. The leading producers of bauxite were, in descending order of tonnage mined, Australia, China, Guinea, Brazil, Indonesia, and India. These countries accounted for 91% of total world production; Australia and China together accounted for 50% of the world's production (table 11).

Alumina.—World output of alumina increased 3% to 138 Mt in 2021 compared with the revised amount in 2020 (table 12). Increased production in China (2.07 Mt), Brazil (1.7 Mt), and India (437,000 t) was partially offset by decreased production in Australia (477,000 t), Jamaica (463,000 t), and Indonesia (162,000). Although there was production in 27 countries, the 4 leading producing countries, in descending order of quantity of alumina produced—China, Australia, Brazil, and India—accounted for 83% of world production; China and Australia accounted for 54% and 15%, respectively.

World Review

Australia.—Bauxite production of 103,056 Mt was essentially unchanged, and alumina production decreased slightly to 20,359 t compared with the revised amounts in 2020 (tables 11, 12). After a prolonged wet season, Metro Mining Ltd. commenced mining on April 14 at its Bauxite Hills Mine located within the Cape York Peninsula in the State of Queensland. A shutdown planned for the wet season commenced in September 2020. In 2021, the company extracted 3.0 Mt of bauxite (wet basis), of which 2.8 Mt was delivered primarily to China (Metro Mining Ltd., 2021; 2022, p. 7, 37, 75).

Alcoa of Australia Ltd., a subsidiary of Alcoa World Alumina and Chemicals (Australia), initiated a study to determine the feasibility of using renewable energy to recycle waste heat generated from alumina refining. The company would determine whether compressors, which convert waste vapor into steam through a process known as mechanical vapor recompression, could be powered with renewable energy. Alcoa of Australia secured an $8.8 million grant from the Australian Renewable Energy Agency (ARENA) to conduct the tests. The company predicted that the adaptation of renewable energy into the mechanical vapor recompression process could decrease its greenhouse gas emissions by 70% and reduce water usage through recapturing lost water vapor. Pending favorable results, the company planned to test the technology by installing a 3-megawatt renewable-energy-powered compressor at its Wagerup refinery in the State of Western Australia, Australia. Alcoa World Alumina and Chemicals was a joint venture between Alcoa (60%) and Alumina Ltd. (40%) (Alcoa Corp., 2021; Hotter, 2021).

Rio Tinto plc (United Kingdom) initiated a study to determine whether it can reduce greenhouse emissions at its Yarwun alumina refinery in Gladstone, Queensland, Australia, by replacing natural gas with hydrogen during the calcination process. The $1.2 million study was to be funded in part by a $580,000 grant from ARENA. The study would include preliminary engineering designs for a potential demonstration project and a simulation of the calcination process using a lab-scale reactor at Rio Tinto's Bundoora Technical Development Centre in Melbourne, Victoria, Australia (Mason, 2021; Rio Tinto plc, 2021).

Brazil.—Bauxite production in 2021 was 33 Mt, unchanged from the revised amount in 2020, and alumina production was estimated to be 12 Mt, 17% more than that in 2020 (tables 11, 12). In July, one of two ship unloaders essential for unloading bauxite was damaged at the Alumar alumina refinery in Sao Luis, resulting in a temporary one-third reduction in production capacity at the 3.5-Mt/yr capacity refinery. By October, production increased to 95% of full capacity, as cranes were used for unloading operations while repairs were made to the damaged equipment. The refinery, a joint venture among Alcoa (54%), South32 Ltd. (Australia) (36%), and Rio Tinto (10%), was restored to full operation by yearend (Alcoa Corp., 2022, p. 51; Ong, 2021b).

China.—Bauxite production was estimated to be 90 Mt, 3% less than that in 2020 (table 11). China imported 107.4 Mt of bauxite, 4% less than the 111.6 Mt imported in 2020. The leading sources of bauxite imports, in descending order, were Guinea (51%), Australia (32%), and Indonesia (17%). Imports from Australia, Indonesia, Montenegro, and the Solomon Islands decreased by 2.93 Mt (8%), 797,000 t (4%), 558,000 t (87%), and 842,000 t (100%), respectively, compared with those in 2020, accounting for the decrease in imports. These decreases were partially offset by increased imports from Guinea by 2.14 Mt, 4% more than imports in 2020 (China Metal Market—Alumina and Aluminum, 2021b, 2022b).

Alumina production in 2021 was 75.2 Mt, 3% more than that in 2020 (table 12). Alumina capacity at yearend 2021 was estimated to be 91.2 Mt/yr, slightly more than the 89.2 Mt/yr at yearend 2020. Approximately 75.4 Mt/yr of capacity was in use at yearend 2021. Alumina imports in 2021 were 3.33 Mt, 13% less than the 3.84 Mt imported in 2020. The leading sources of alumina imports, in descending order, were Australia (67%), Vietnam (13%), Kazakhstan (7%), and Indonesia (5%). China exported 120,000 t of alumina in 2021, 22% less than the 155,000 t of alumina exported in 2020 (China Metal Market—Alumina and Aluminum, 2021b, f, 2022b, c, 2023).

Chongqing Municipality.—Bosai Minerals Group Ltd. was constructing an alumina refinery at the Chongqing Jiulong Wanbo plant in Wanzhou district. Completion was expected with the first quarter of 2022. The refinery would have 3.6 Mt/yr of capacity and use bauxite imported from Australia and Guinea. The refinery would sell alumina to smelters in the southwest of China as the industry migrated to that region where hydropower resources are abundant (Ju, 2021a; Ling, 2020, p. 8–9).

Guangxi Zhuang Autonomous Region.—Guangxi Longzhou Xinxiang Aluminum Co. Ltd. began ramping up operations at its newly constructed 1-Mt/yr alumina refinery in Longzhou County. Construction commenced in 2017, but the 24-month expected completion was delayed by market conditions. Guangxi Tiangui Aluminum Co. Ltd. was increasing production capacity at its alumina refinery from 800,000 t/yr to 2.5 Mt/yr. Construction was expected to end by midyear 2022 (China Metal Market—Alumina and Aluminum, 2021c, d; 2022a).

Henan Province.—Kaiman Aluminum Co. shut down about one-half of the capacity of its 2.1-Mt/yr alumina refinery in Sanmenxia city, at the end of April. This shutdown was attributed to a shortfall of bauxite produced from nearby mines, which were affected by environmental protection actions. East Hope Aluminum Co. Ltd. completed maintenance at its 2.4-Mt/yr alumina refinery in Sanmenxia prefecture and resumed production at full capacity at the end of April (Tang, 2021).

Flooding in Henan Province interrupted production at several alumina refineries during the last 2 weeks of July. Notably, power outages caused by the flooding led to a temporary shutdown of Jiaozuo Wanfang Aluminum Manufacturing Co., Ltd.'s 420,000-Mt/yr primary aluminum smelter. Service on several railroads in the Province was disrupted, interfering with alumina shipments from the refineries and shipments of bauxite to the refineries. Several refineries stopped production including Aluminum Corp. of China Ltd.'s (Chinalco) 1-Mt/yr refinery at Luoyang city. Production at all refineries affected was expected to restart by mid-August (Li, 2021b, d; S&P Global Platts Metals Daily, 2021c).

Shandong Province.—Beginning in January, alumina shipments from Shandong Province were affected by freeway closures in Hebei, Shaanxi, and Shanxi Provinces, which were implemented to prevent the spread of the COVID-19 pandemic. Hebei Province is a transportation corridor for trucks carrying alumina from refiners in Shandong Province to primary aluminum smelters in Qinghai Province, Xinjiang Uygur Autonomous Region, and Inner Mongolia Autonomous Region. By February, the outbreak abated, and traffic conditions had improved as freeways were reopened (Ong, 2021; Tang and Ong, 2021).

Shanxi Province.—In April, Xinfa Group Ltd. restarted production of 1.4 Mt/yr at its alumina refinery in Jiaokou, Luliang city. The 2.8-Mt/yr refinery was ordered to shut down on May 19, 2019, after a spill from a red mud disposal area. In July, Chinalco temporarily shut down production of 500,000 Mt/yr at its 2.5-Mt/yr alumina refinery in Shanxi Province. The refinery had been producing at a rate of 1.7 Mt/yr since the start of 2021 because of bauxite shortages. Environmental and safety audits were cited for the decreased production of bauxite and alumina in July and August. Plans to restart capacity were not available, but a restart was not expected until after yearend (Li, 2021a, c; Lim and Ong, 2021a).

In October, heavy rainfall caused the closure of a bauxite mine which led the Xinfa Group to temporarily halt production at two alumina refineries located within Xiaoyi and Jiaokou cities. Together the two production facilities had a total alumina capacity of 2 Mt/yr. In November, air quality concerns led Luliang city to request that six alumina producers reduce operations from November 1, 2021, through March 31, 2022, while a seventh refiner was ordered to suspend operations (Ju, 2021b; S&P Global Platts Metals Daily, 2021b).

Since the beginning of the year, Shanxi Huaxing Aluminum Co., Ltd., a subsidiary of Chinalco, had reduced production at its 2-Mt/yr-alumina refinery because of insufficient bauxite supplies. In September, the operation resumed full production after receiving bauxite from the Chinalco-operated Boffa Mine located in Guinea (China Metal Market—Alumina and Aluminum, 2021a, e).

Guinea.—Bauxite production was estimated to be 86 Mt, unchanged from that in 2020, and alumina production decreased by 6% to 414,000 t. In June, bauxite producer and distributor Société Minière de Boké (SMB)-Winning Consortium finished construction of a 125-kilometer rail line, creating a shipping route between Santou II and Houda bauxite deposits and the Dapilon River terminal. With the completion of this project, bauxite export capacity from the terminal was expected to increase to 20 Mt/yr by 2024. The new rail line was part of a larger $3 billion investment into the region including a 1-Mt/yr alumina refinery. The SMB-Winning Consortium included three companies, Shandong Weiqiao Pioneering Group Co. Ltd. (China), United Mining Supply SA (Guinea), and Winning International Group Pte Ltd. (Singapore) (Kinch, 2021; Winning International Group Pte Ltd., undated).

In a coup on September 5, Guinea's military removed President Alpha Conde, suspended the constitution, and closed the country's borders. However, the production and trade of alumina and bauxite generally were unaffected. On September 20, a fatal crash took place between two freight trains carrying bauxite for United Company RUSAL Plc, which operated three bauxite mines and an alumina refinery within the country. RUSAL reported that its freight traffic had returned to normal by September 29 (CRU International Ltd., 2021a, b; Everiss, 2021; Ong, 2021a).

India.—Bauxite production was estimated to be 17.4 Mt, 13% less than the revised amount in 2020, and alumina production estimated to be 7 Mt, 7% more than that in 2020. In September, Hindalco Industries Ltd. commissioned its 500,000-t/yr expansion of the Utkal alumina refinery located within Rayagada, Odisha State. Full rampup was achieved by November, which increased total capacity to 2.1 Mt/yr (CRU International Ltd., 2021c; Hindalco Industries Ltd., 2021).

Vedanta Resources Ltd. (United Kingdom) was increasing capacity at its Lanjigarh alumina refinery to 5.0 Mt/yr from its current capacity of 2.0 Mt/yr. The refinery, located in Kalahandi district, Odisha State, provides alumina to the company's primary aluminum smelters in Jharsuguda district, Odisha State. Completion was expected by midyear 2023 (CRU Bauxite and Alumina Monitor, 2021b; Vedanta Resources Ltd., undated).

Indonesia.—Bauxite production was estimated to be 21 Mt in 2021, essentially unchanged from that in 2020. Alumina production was estimated to be 1 Mt in 2021, 14% less than the revised amount in 2020. On November 24, 2021, the Government of Indonesia announced that it would reinstate its ban of bauxite exports in 2022. Indonesia banned exportation of bauxite and other unprocessed mineral ores in 2014. Limited exports were permitted starting in 2017 by companies building alumina refineries in Indonesia so the companies could fund construction. The ban was intended to encourage investments in the domestic manufacturing of semifinished and finished products (Ong, 2021d).

PT Bintan Alumina Indonesia initiated operations at its 1-Mt/yr alumina refinery within the Galang Batang Special Economic Zone, Riau Islands Province. In July, PT Bintan shipped its first alumina cargo from the newly constructed port in the special economic zone. The cargo, totaling 18,000 t of alumina, was reportedly shipped to Malaysia. The refinery was expected to achieve full production capacity by February 2022. The Bintan refinery was a joint venture among Global Aluminum International Pte Ltd. (72%), Press Metal Aluminum Holdings Bhd (25%), and PT Mahkota Karya Utama (3%) (AL Circle, 2021; Lim and Ong, 2021b).

In the first half of 2021, Shandong Nanshan Aluminium Co. Ltd. (China) initiated trial production of the first phase of its alumina refinery located within the island of Bintan. By September, the company began partial production at the refinery at the rate of 85,500 t/yr of alumina. The refinery's first phase had an expected capacity of 1 Mt/yr of alumina. The company expected to start production at a second 1-Mt/yr alumina production line during the first half of 2022 (CRU Bauxite and Alumina Monitor, 2021a; Li, 2021e).

Well Harvest Winning Ltd. completed the third production line of its alumina refinery in West Kalimantan Province and started production on December 28, 2021. The capacity of the new production line was 500,000 t/yr, increasing total capacity of the refinery to 1.5 Mt/yr. Shipments of alumina from the new production line started in the first quarter of 2022. The first phase of the alumina refinery started production in June 2016. A fourth 500,000-t/yr production line was expected to start up in February 2022, increasing total refinery capacity to 2 Mt/yr. Well Harvest Winning was a joint venture among China Hongqiao Group (56%), PT Cita Mineral Investindo Tbk (30%), Winning Investment Holdings Co., Ltd. (9%), and Shandong Weiqiao Aluminum Electricity Co. (5%) (Ong, 2021e; S&P Global Platts Metals Daily, 2021a).

Jamaica.—Bauxite production decreased to 5.95 Mt, 21% less than that in 2020, and alumina production was 1.16 Mt, 29% less than that in 2020. On August 22, Jamalco Inc.'s alumina refinery in Clarendon was temporarily shut down after a fire caused major damage to the powerhouse. The refinery's operations were dependent on the steam and power produced by the powerhouse. The refinery was expected to restart approximately one-half of its 1.42-Mt/yr capacity after repairs were completed. Planned repair activities were scheduled to be completed by June 2022 and included environmental cleanup, structural engineering assessments, reconstruction of surviving buildings, and restart of the main steam turbine. Subsequent plans included transition to a two-phase digester operation and utilizing rented gas turbines within 9 months after the initial restart. Long-term plans involved constructing a new gas-fired powerhouse with heat recovery capabilities to replace the rented gas turbines. The refinery was a joint venture between Noble Group Ltd. (55%) and Clarendon Alumina Production Ltd. (45%) (Ong, 2021c, f).

Russia.—Bauxite production increased to 5.68 Mt, slightly more than that in 2020, and alumina production was 3.05 Mt, 6% more than that in 2020. RUSAL initiated bauxite production from a newly developed pit at the Vezhayu-Vorykvinskoye deposit, part of the Timan Mine situated in Komi Republic. RUSAL reported that the new pit area had more than 14 Mt of bauxite ore reserves. Concurrently, construction of another pit at the Verkhne-Shchugorskoye deposit continued, which was scheduled to start production in 2023. These new pits were expected to replace production from two other pits whose reserves were expected to be depleted by 2022. Although the mine produced 3.3 Mt of bauxite in 2020, the capacity of the new pit was not disclosed (Bouckley, 2021; United Company RUSAL Plc, 2021).

United Arab Emirates.—Alumina production was 2.3 Mt, 20% more than that in 2020 as Emirates Global Aluminium PJSC (EGA) exceeded the capacity of its Al Taweelah alumina refinery by nearly 15%. In April 2019, EGA started alumina production at the newly constructed 2-Mt/yr refinery, achieving production at full capacity by yearend 2020 (Emirates Global Aluminium PJSC, 2021, 2022).

Outlook

World consumption of bauxite and alumina in 2022 is expected to increase as economic activity continues to recover from the effects of the global COVID-19 pandemic. World demand for aluminum is expected to steadily increase within traditional sectors as the global economy recovers and as aluminum products become more accessible to consumers in developing economies. Demand for aluminum from growing sectors, such as transportation and renewable energy, is expected to accelerate during the next decade as compared with other sectors. These trends inevitably will lead to an increase in demand for alumina and bauxite. It is anticipated that producers of alumina will continue to adopt practices and develop technologies that reduce greenhouse gas emissions and energy consumption at alumina refineries as new carbon policies are enforced and as consumers increase their demand for environmentally friendly and sustainable products.

World consumption of alumina for nonmetallurgical uses is expected to increase slightly, attributable to continued growth in consumption of aluminum-hydroxide-based fire-retardant materials and other alumina-based chemicals. Demand is expected to continue to increase for high-purity alumina used in devices such as smartphones, laptops, and tablets, although the effect on total consumption of bauxite and alumina would be negligible because of the limited volume of this market relative to aluminum smelting. Also, new entrants to the high-purity alumina market are expected to consume high-alumina clay instead of bauxite as the raw material, as higher purity levels can be obtained using high-alumina clay.

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TABLE 1
SALIENT BAUXITE STATISTICS[1]

(Thousand metric tons)

	2017	2018	2019	2020	2021
United States:					
Production	W	W	W	W	W
Exports, as shipped:					
Crude and dried	5	4	3	3	2
Calcined	14	7	7	7	6
Total	19	11	10	10	8
Imports for consumption, as shipped:					
Crude and dried	3,530	3,330	3,880	3,180	3,090
Calcined	478	376	430	336 r	455
Total	4,010	3,710	4,310	3,510	3,550
Consumption, dry equivalent	4,330	4,460	3,680	3,330	2,790
World, production[2]	308,000 r	341,000 r	388,000 r	393,000 r	384,000

rRevised. W Withheld to avoid disclosing company proprietary data.
[1]Table includes data available through September 8, 2022. Data are rounded to no more than three significant digits; may not add to totals shown.
[2]May include estimated data.

TABLE 2
SALIENT ALUMINA STATISTICS[1]

(Thousand metric tons)

	2017	2018	2019	2020	2021
United States:					
Production:[e]					
Calcined alumina	1,400 r	1,600 r	1,400 r	1,300 r	1,000
Other alumina[2]	770	810	750	530 r	530
Total:					
As produced or shipped[3]	2,000 r	1,900 r	1,700 r	1,500 r	1,200
Calcined equivalent	1,400 r	1,600 r	1,400 r	1,300 r	1,000
Shipments:[e]					
Calcined alumina	1,200 r	1,100 r	930 r	1,000 r	710
Other alumina[2]	780 r	810	750	520 r	530
Total:					
As produced or shipped[3]	2,000	1,900 r	1,700 r	1,500 r	1,200
Calcined equivalent	1,450	1,600 r	1,400 r	1,400 r	1,100
Stocks, yearend[4, 5]	264	275	275	234	202
Imports for consumption[5]	1,330	1,530	1,930	1,340	1,550
Exports[5]	481	288	200	153	180
Consumption, apparent[5, 6]	2,340	2,830 r	3,130 r	2,530 r	2,400
World, production[5, 7]	128,000 r	130,000 r	132,000 r	135,000 r	138,000

eEstimated. rRevised.
[1]Table includes data available through September 8, 2022. Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Trihydrate, activated, tabular, and other aluminas. Excludes calcium and sodium aluminates.
[3]Includes only the end product if one type of alumina was produced and used to make another type of alumina.
[4]Excludes consumers stocks other than those at primary aluminum plants.
[5]Calcined equivalent.
[6]Defined as domestic production plus imports minus exports plus adjustments for industry stock changes.
[7]May include estimated data.

TABLE 3
CAPACITIES OF DOMESTIC ALUMINA PLANTS, DECEMBER 31[1]

(Thousand metric tons per year)

Company and plant	2020	2021
LAlumina LLC, Burnside, LA	500	500
Noranda Alumina LLC, Gramercy, LA	1,200	1,200
Total	1,700 r	1,700

[1]Table includes data available through September 8, 2022. Data are rounded to no more than three significant digits; may not add to totals shown. Capacity may vary depending on the bauxite used.

TABLE 4
U.S. CONSUMPTION OF BAUXITE, BY INDUSTRY[1]

(Thousand metric tons, dry equivalent)

Industry	2020	2021
Alumina[2]	3,120	2,590
Other[3]	212	202
Total	3,330	2,790

[1]Table includes data available through September 8, 2022. Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Includes abrasive use.
[3]Includes chemical and refractory uses.

TABLE 5
AVERAGE VALUE OF U.S. IMPORTS OF CRUDE AND DRIED BAUXITE[1]

(Dollars per metric ton)

	2020		2021	
Country or locality	Port of shipment f.a.s.[2]	Delivered to U.S. ports c.i.f.[3]	Port of shipment f.a.s.[2]	Delivered to U.S. ports c.i.f.[3]
Guinea	25.70	26.08	--	--
Jamaica[4]	29.68 r	29.82 r	29.64	29.66
Sierra Leone	33.50	34.03	--	--
Turkey	33.80 r	46.98 r	43.80	48.18
Weighted average[5]	30.10 r	30.53 r	30.63	30.96

rRevised. -- Zero.
[1]Table includes data available through September 8, 2022. Computed from quantity and value data reported to U.S. Customs and Border Protection and compiled by the U.S. Census Bureau. Not adjusted for moisture content of bauxite or differences in methods used by importers to determine value of individual shipments.
[2]Free alongside ship valuation.
[3]Cost, insurance, and freight valuation.
[4]Based on quantity reported by the Jamaica Bauxite Institute.
[5]Weighted average of major suppliers.

TABLE 6
AVERAGE VALUE OF U.S. IMPORTS OF ALUMINA[1, 2]

(Dollars per metric ton)

Month	2020[r]	2021
January	395	389
February	357	384
March	391	426
April	355	505
May	449	465
June	348	396
July	359	413
August	345	633
September	407	419
October	457	553
November	419	461
December	594	532
Weighted average	394	462

[1]Table includes data available through September 8, 2022. Metallurgical grade; free alongside ship valuation. Computed from quantity and value data reported to U.S. Customs and Border Protection and compiled by the U.S. Census Bureau.
[2]Beginning with the 2021 Minerals Yearbook (MYB), valuation is reported as free alongside ship, previous MYBs reported valuation as cost, insurance, and freight.

TABLE 7
REFRACTORY GRADE BAUXITE PRICES[1]

(Dollars per metric ton)

Material	2020	2021
China:		
Xingang, rotary kiln, lump 86% Al_2O_3	440–460	460–480
Xingang, round kiln, lump 87% Al_2O_3	460–480	480–500

[1]Table includes data available through September 8, 2022. Port of shipment, free-on-board ship valuation, yearend.

Source: Fastmarkets IM.

TABLE 8
U.S. EXPORTS AND IMPORTS FOR CONSUMPTION
OF BAUXITE, CRUDE AND DRIED, BY COUNTRY OR LOCALITY[1]

(Thousand metric tons)

Country or locality	2020	2021
Exports:		
Canada	2	2
Other	1	(2)
Total	3	2
Imports:		
Brazil	(2)	1
Guinea	104	--
Jamaica[3]	2,680	2,600
Sierra Leone	298	--
Turkey	96	457
Other	1	33
Total	3,180	3,090

-- Zero.
[1]Table includes data available through May 13, 2022. Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Less than ½ unit.
[3]Data from the Jamaica Bauxite Institute.

Note: Total U.S. imports of crude and dried bauxite as reported by the U.S. Census Bureau were as follows, in thousand metric tons: 2020—404,000 and 2021—230,000.

Source: U.S. Census Bureau.

TABLE 9
U.S. EXPORTS AND IMPORTS FOR CONSUMPTION OF CALCINED BAUXITE, BY COUNTRY OR LOCALITY[1]

(Thousand metric tons and thousand dollars)

	2020				2021			
	Refractory grade		Other grade		Refractory grade		Other grade	
Country or locality	Quantity	Value[2]	Quantity	Value[2]	Quantity	Value[2]	Quantity	Value[2]
Exports:								
Canada	3	1,100	--	--	(3)	90	--	--
China	2	946	(3)	3	1	670	--	--
Mexico	2	917	(3)	3	3	1,870	--	--
Other	1	362	(3)	13	1	261	(3)	221
Total	7	3,320	(3)	19	6	2,900	(3)	221
Imports:								
Australia	--	--	149	5,060	--	--	99	3,120
China	34	13,900	5	2,370 r	79	35,700	13	5,760
Guyana	30	8,170	115	16,300	57	15,300	142	21,200
Other	1	661	(3)	71	3	573	63	2,770
Total	66	22,800	270	23,800	139	51,600	316	32,800

[r]Revised. -- Zero.
[1]Table includes data available through May 13, 2022. Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Value at foreign port of shipment as reported to U.S. Customs Service.
[3]Less than ½ unit.

Source: U.S. Census Bureau; based on information received by third-parties, adjusted by the U.S. Geological Survey to accurately depict product grade by country.

TABLE 10
U.S. EXPORTS AND IMPORTS FOR CONSUMPTION OF ALUMINA,
BY COUNTRY OR LOCALITY[1]

(Thousand metric tons, calcined equivalent, and thousand dollars)

	2020		2021	
Country or locality	Quantity	Value[2]	Quantity	Value[2]
Exports:				
Canada	24	52,100 r	25	31,800
China	7	55,600	13	69,500
India	4	6,090 r	3	5,090
Mexico	60	46,500	66	59,300
Netherlands	4	20,700	6	11,400
United Arab Emirates	1	1,480	3	4,010
Other	53 r	203,000	64	225,000
Total	153	386,000	180	406,000
Imports:				
Australia	98	27,900	66	29,700
Brazil	899	269,000	1,050	400,000
Canada	60	34,500	68	43,800
China	31 r	37,500 r	47	43,200
France	22	34,000 r	19	29,400
Germany	18	54,600	24	79,500
India	8	7,140	7	6,530
Jamaica[3]	181	67,300	242	89,800
Other	26	59,200 r	30	63,800
Total	1,340	591,000 r	1,550	786,000

rRevised.
[1]Table includes data available through May 13, 2022. Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Value at foreign port of shipment as reported to U.S. Customs and Border Protection.
[3]Data from the Jamaica Bauxite Institute.

Source: U.S. Census Bureau.

TABLE 11
BAUXITE: WORLD PRODUCTION, BY COUNTRY OR LOCALITY[1]

(Thousand metric tons)

Country or locality	2017	2018	2019	2020	2021
Australia	89,421	95,948	105,544	103,627 r	103,056
Bosnia and Herzegovina	700	803	934	688 r	700 e
Brazil, dry basis[2]	38,072	32,377	31,938	32,898 r	33,000 e
China	68,390	77,170	105,000 e	92,700 e	90,000 e
Côte d'Ivoire	--	400 e	750 e	700 e	700 e
Fiji	60 e	60 e	--	--	--
Ghana	1,477	1,011	1,116 r	1,162 r	1,200 e
Greece[2]	1,927	1,559	1,492	1,400 r	1,400 e
Guinea, dry basis[2]	46,160	57,000 e	67,000 e	86,000 e	86,000 e
Guyana, dry basis[2]	1,482	1,926 r	1,920 r	595 r	619
Hungary	4	5	--	--	-- e
India	22,803	23,229	22,321	19,988 r	17,400 e
Indonesia	2,900 e	13,243	16,593	20,800 e	21,000 e
Iran, dry basis[2]	1,047	805	1,163 r	1,200 r, e	1,200 e
Jamaica, dry basis[2]	8,245	10,058	9,022	7,546	5,950
Kazakhstan	4,846	5,700	4,118	4,058 r	4,370
Malaysia	2,000 e	590	901	595 r	624
Montenegro	928	468	775	897 r	400 e
Mozambique	3	10	8	6 r	6 e
Pakistan	103	121	58 r	124 r, e	100 e
Russia	5,523	5,651	5,574	5,570	5,679
Saudi Arabia	3,990 r	4,731 r	5,031 r	4,946 r	4,781
Sierra Leone	1,788	1,938	1,884	1,342	1,397
Solomon Islands	1,503	1,609	1,161	842	-- e
Tanzania	12	11 r	--	26 r	30 e
Turkey	941	1,000 e	819	1,300 e	700 e
United States	W	W	W	W	W
Venezuela	550 e	--	--	250 e	250 e
Vietnam	2,800 e	3,500 e	3,350 e	3,580 r	3,830 e
Total	308,000 r	341,000 r	388,000 r	393,000 r	384,000

[e]Estimated. [r]Revised. W Withheld to avoid disclosing company propriety data. -- Zero.
[1]Table includes data available through August 30, 2022. All data are reported unless otherwise noted; totals may include estimated data. Totals and estimated data are rounded to no more than three significant digits; may not add to totals shown.
[2]Dry bauxite equivalent of crude ore.

TABLE 12
ALUMINA: WORLD PRODUCTION, BY COUNTRY OR LOCALITY[1, 2]

(Thousand metric tons)

Country or locality	2017	2018	2019	2020	2021
Australia	20,486	20,062	20,239	20,836 r	20,359
Bosnia and Herzegovina	238	262	214	122 r	100 e
Brazil	11,061	8,258	9,171	10,300	12,000 e
Canada	1,570	1,568	1,522	1,518	1,364
China	69,017	72,531	72,474	73,132	75,200
France[e]	300	300	300	300	300
Germany	1,000 r, e	1,000 r, e	889 r	919 r	900 e
Greece	821	827	820	827	871
Guinea	--	182	368	439	414
Hungary	273	266	265	228 r	200 e
India	6,055	6,430	6,690	6,563	7,000 e
Indonesia	917	843	1,148	1,162 r	1,000 e
Iran	240 e	235	235	240 e	240 e
Ireland	1,937	1,874	1,893	1,883	1,878
Jamaica	1,782	2,484	2,173	1,621	1,158
Japan[e]	20	20	20	40	30
Kazakhstan	1,509	1,481	1,393	1,393 r	1,400 e
Romania	473	572	461	426	499
Russia	2,822	2,763	2,755	2,873	3,054
Saudi Arabia	1,484	1,774	1,798 r	1,782 r	1,922
Spain	1,588	1,589	1,595	1,552	1,536
Turkey[e]	300	300	300	300	300
Ukraine	1,676	1,715	1,690	1,725	1,769
United Arab Emirates	--	--	1,100	1,920	2,300
United States[e]	1,400 r	1,600 r	1,400 r	1,300 r	1,000
Venezuela	240 e	--	--	110 e	80 e
Vietnam	1,062	1,329	1,365	1,422 r	1,456
Total	128,000 r	130,000 r	132,000 r	135,000 r	138,000

[e]Estimated. [r]Revised. -- Zero.

[1]Table includes data available through August 30, 2022. All data are reported unless otherwise noted; totals may include estimated data. Totals, U.S. data, and estimated data are rounded to no more than three significant digits; may not add to totals shown.

[2]Figures represent calcined alumina or the total of calcined alumina plus the calcined equivalent of hydrate when available; exceptions, if known, are noted.