USGS
science for a changing world

2022 Minerals Yearbook

BAUXITE AND ALUMINA [ADVANCE RELEASE]

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

August 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 2022, nearly all of the 2.17 million metric tons (Mt) of bauxite consumed in the United States, on a dry equivalent basis, was imported. World production of bauxite was approximately 400 Mt (tables 1, 11); the leading producing countries were, in descending order of production, Australia, Guinea, China, Brazil, India, and Indonesia, which accounted for 92% of world bauxite production. U.S. production and shipments of alumina (calcined equivalent) were an estimated 920,000 metric tons (t) and 930,000 t, respectively (table 2). Alumina production and shipments (calcined equivalent) decreased by 8% and 15%, respectively, from those in 2021. An estimated 68% of alumina shipments from domestic refineries were to domestic primary aluminum smelters for metal production, 19% of shipments were exported, and 14% of shipments were used for abrasives, chemicals, ceramics, and refractories. World production of alumina (calcined equivalent) was 140 Mt (tables 2, 12); the leading producing countries were, in descending order of production, China, Australia, Brazil, and India, which accounted for 85% 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, was an estimated 920,000 t in 2022, 8% less than that in 2021 (table 2). Domestic production and consumption data for alumina were obtained by the U.S. Geological Survey (USGS) from three separate voluntary surveys. To avoid disclosing company proprietary data, alumina production was estimated based on bauxite imports. Noranda Alumina LLC is the only operating alumina refinery in the United States. There has been no change in the status to the refinery in Burnside, LA, owned by LAlumina LLC, which was temporarily shut down in August 2020 (Mosbrucker, 2020).

First Bauxite LLC purchased US Ceramics LLC, a manufacturer and distributor of non-metallurgical bauxite products and ceramic proppants. US Ceramics owned two calcination and manufacturing facilities located in Andersonville and Wrens, GA. First Bauxite sources bauxite from its Bonasika Mine in Guyana. The company intended to use the newly acquired facility to expand its nonmetallurgical bauxite product line into new and existing markets including refractories, flame retardants, and chemicals (Howard, 2022; O'Driscoll, 2022).

Consumption

Bauxite.—The USGS bauxite consumption survey was sent to 20 operations, of which 13 responded. One refinery produced alumina in 2022; however, bauxite consumption was estimated based on import data to avoid disclosing company proprietary data. Total domestic consumption of bauxite decreased by 24% in 2022 from the amount in 2021. In 2022, 91% of the bauxite consumed in the United States was refined to alumina; the remaining 9% was consumed in nonmetallurgical applications, such as abrasives, proppants, and refractories. An estimated 2.13 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 were received from all three companies that operated seven primary aluminum smelters. In 2022, an estimated 66% of the 2.62 Mt of alumina apparent consumption was for metal production at primary aluminum smelters (table 2). Six domestic primary aluminum smelters consumed an estimated 1.72 Mt of alumina in 2022, 3% less than the amount of alumina consumed in 2021. Citing high energy costs, Century Aluminum Co. temporarily idled its 250,000-metric-ton-per-year (t/yr) primary aluminum smelter located in Hawesville, KY, during the third quarter of 2022. The smelter remained shut down through yearend 2022 (Century Aluminum Co., 2022; 2023, p. 2). Alcoa Corp.'s 279,000-t/yr aluminum smelter in Ferndale, WA, remained closed since its temporary shuttering in 2020 (Alcoa Corp., 2020). The rest of U.S. consumption was used in 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 longstanding contracts, whose 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 free alongside ship (f.a.s.) value of U.S. imports of metallurgical-grade bauxite in 2022 was 4% more than the revised value in 2021 (table 5). In 2022, the average unit value of U.S. imports of calcined alumina, reported as f.a.s. valuation, was $518 per metric ton, 12% more than that in 2021 (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 similar to those at yearend 2021 (table 7) (Fastmarkets-IM, 2022).

Foreign Trade

In 2022, imports of crude dry bauxite decreased by 9% from the amount in 2021 (table 8). Jamaica (84%) and Turkey (14%) were the leading sources of crude dry bauxite imports in 2022. In 2022, the United States exported only a negligible amount of crude dry bauxite. Imports of alumina increased by 21%, whereas exports decreased by 3% from those in 2021. Brazil (62%), Australia (13%), and Canada (4%) were the leading sources of alumina imports in 2022. Mexico (37%), Canada (13%), and China (8%) were the leading destinations for alumina exports in 2022 (table 10).

World Industry Structure

Bauxite.—In 2022, world production of bauxite was 400 Mt, 5% more than the revised amount in 2021. Increases in production in Guinea (by 18.0 Mt), China (4.0 Mt), and India (1.86 Mt) were partially offset by decreases production in Brazil (by 3.0 Mt), Jamaica (1.59 Mt), Australia (766,000 t), Iran (528,000 t), and Sierra Leone (487,000 t). Bauxite was produced in 28 countries, of which the leading producers were, in descending order of tonnage mined, Australia, Guinea, China, Brazil, India, and Indonesia. These countries accounted for 92% of total world production; Australia, China, and Guinea accounted for 73% of the world's production (table 11).

Alumina.—World output of alumina was 140 Mt in 2022, from 138 Mt in 2021 (tables 2, 12). Production increased in China (by 4.39 Mt) and India (866,000 t), whereas production decreased in Ukraine (by 1.47 Mt), Australia (858,000 t), and Jamaica (524,000 t). Alumina was produced in 27 countries. The four leading producing countries were, in descending order of quantity, China, Australia, Brazil, and India and accounted for 85% of world production; China and Australia accounted for 58% and 14%, respectively.

World Review

Australia.—Bauxite production in 2022 was 102 Mt, essentially unchanged from that in 2021, and alumina production was 19.5 Mt, 4% less than that in 2021 (tables 11, 12). In May, Australia banned the export of alumina, aluminum hydroxide, aluminum oxide, and bauxite to Russia to prevent their use in weapons production, an apparent response to Russia's conflict with Ukraine. Following the trade sanctions, Rio Tinto Group took full control of the alumina refinery operated by Queensland Alumina Ltd. (QAL), a joint venture between Rio Tinto (80%) and United Company RUSAL International PJSC (Russia) (20%). Located in Gladstone, Queensland, the QAL alumina refinery had a capacity of 3.95 million metric tons per year (Mt/yr). In June, RUSAL filed a lawsuit against Rio Tinto to restore its rights at QAL in the Federal Courts of Australia; a ruling had not been issued by yearend 2022 (Australia Government Department of Foreign Affairs and Trade, 2022; Biesheuvel, 2022; Menon, 2022; Rio Tinto Group, 2022, p. 39, 214, 330).

Alcoa of Australia Ltd., a subsidiary of Alcoa World Alumina and Chemicals (Australia), received $7.7 million from the Australian Government to research and test electric calcination powered by renewable energy. The funds were provided by the Australian Renewable Energy Agency and Western Australia's Clean Energy Future Fund. Calcination, the final stage of alumina production, typically consumes fossil fuels. Electric calcination powered by renewable energy may have the potential to reduce carbon emissions and water use. The study, engineering, and technology testing were scheduled to be completed by yearend 2023. Design, construction, and pilot testing would take place at the company's alumina refinery near Pinjarra, Western Australia, beginning in the first quarter of 2024 through mid-2026. Alcoa World Alumina and Chemicals was a joint venture between Alcoa (60%) and Alumina Ltd. (40%) (Alcoa Corp., 2022b; Australian Renewable Energy Agency, 2022).

Brazil.—Bauxite production in 2022 was estimated to be 30 Mt, 9% less than that in 2021 and alumina production was estimated to be 10 Mt, unchanged from the revised amount in 2021 (tables 11, 12). In May, South32 Ltd. completed the purchase of 18.2% of the Mineração Rio do Norte (MRN) bauxite mine in Para State from Alcoa. With the acquisition, South32's ownership of the MRN Mine increased to 33%. The mine capacity was 18 Mt/yr (South32 Ltd., 2022; Warwick, 2022).

In October, Norsk Hydro ASA (Norway) began construction on an access road and infrastructure to support operations at a new mining area at its Mineracao Paragominas Mine. Located in northeast Para state, the mine had a production capacity of 11.4 Mt/yr of bauxite. The Miltonia 5 project was expected to be completed by the first quarter of 2023 (Norsk Hydro ASA, 2022, undated).

China.—Bauxite production in 2022 was estimated to be 90 Mt, 5% less than the revised amount in 2021 (table 11). China imported 125 Mt of bauxite, 17% more than that in 2021. The leading sources of bauxite imports, in descending order, were Guinea (56%), Australia (27%), and Indonesia (15%). The import sources with the most significant volume increases compared with those in 2021 were Ghana (344,000 t), Guinea (15.5 Mt), Indonesia (1.16 Mt), and Montenegro (372,000 t) (Beijing Antaike Information Co., Ltd., 2022a, p. 12; 2023, p. 11).

Alumina production in 2022 was 81.9 Mt, 6% more than the revised amount in 2021 (table 12). Alumina capacity at yearend 2022 was 99.6 Mt/yr, 10% more than that at yearend 2021. Approximately 79.8 Mt/yr of capacity was in use at yearend 2022, 6% more than that at yearend 2021. Alumina imports in 2022 were 1.99 Mt, 40% less than that in 2021. The leading sources of alumina imports were Australia (57%), Indonesia (23%), and Vietnam (10%). China exported 1.01 Mt of alumina in 2022, more than seven times the amount in 2021, owing to increased shipments to Russia, which replaced supply losses from Australia and Ukraine caused by the Russia-Ukraine conflict (Beijing Antaike Information Co., Ltd., 2022a, p. 13–14; 2022b, p. 6; 2023, p. 8, 12; Hui, 2022; S&P Global Platts Metals Daily, 2022).

The Aluminum Corporation of China Ltd. Guangxi Branch opened a new bauxite mine near Pingguo City, Guangxi Zhuang Autonomous Region. Construction began in 2021 and took approximately 10 months to complete at a cost of $81.6 million.[1] The mine had a capacity of 2.0 Mt/yr of bauxite

[1]Where necessary, values have been converted from Chinese yuan renminbi (CNY) to U.S. dollars (US$) at the annual average exchange rate of CNY6.73=US$1.00 for 2022.

and reported reserves of 26 Mt (Beijing Antaike Information Co., Ltd., 2022f, p. 17).

Alumina refining capacity increased across China as new projects were commissioned during 2022. In the Guangxi Zhuang Autonomous Region, Jingxi Tiangui Aluminum Co., Ltd. commissioned the final phases of its 2.5-Mt/yr-capacity alumina refinery. Phases 2 and 3 were completed in March and June, respectively, increasing total capacity at the facility by 1.7 Mt/yr (Beijing Antaike Information Co., Ltd., 2022d, p. 17; Ong, 2022a).

Hebei Wenfeng New Material Co., Ltd. completed the first phase of the company's alumina refinery, located in Tangshan city, Hebei Province. The first phase included two alumina production lines, one finished in March and one in May. Each line had an alumina production capacity of 1.2 Mt/yr. Construction of the first phase began in 2020 (Beijing Antaike Information Co., Ltd., 2022c, p. 18; 2022e, p. 19–20).

Guinea.—Bauxite production in 2022 was estimated to be 100 Mt, 22% more than the revised amount in 2021, but alumina production decreased by 18% to 340,000 t (tables 11, 12). Employees at the Compagnie des Bauxites de Dian-Dian (COBAD) bauxite mine resumed work on June 2 after a weeklong strike. Workers negotiated salary increases, housing allowances, and guarantees for medical treatment. A subsidiary of RUSAL, the COBAD Mine produced 3.59 Mt of bauxite in 2021 (Christensen, 2022).

Indonesia.—Bauxite production was estimated to be 21 Mt in 2022, unchanged from that in 2021, and alumina production was estimated to be 1.2 Mt in 2022, 4% more than the revised amount in 2021 (tables 11, 12). Well Harvest Winning Ltd. completed the fourth production line of its alumina refinery in West Kalimantan Province and started production in January. The capacity of the new production line was 500,000 t/yr, increasing total capacity of the refinery to 2.0 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. Well Harvest Winning did not own or operate its own smelter and sold alumina produced at the refinery to other companies. 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%) (S&P Global Platts Metals Daily, 2021; Ong, 2022c).

PT Bintan Alumina Indonesia doubled production capacity at its alumina refinery located within the Galang Batang Special Economic Zone, Riau Islands Province. In September, the company commissioned the second phase of its alumina refinery, adding 1.0 Mt/yr of alumina production capacity increasing total production capacity at the facility to 2.0 Mt/yr. The Bintan refinery, a joint venture among Global Aluminum International Pte Ltd. (73%), Press Metal Aluminum Holdings Bhd (25%), and PT Mahkota Karya Utama (2%), was not vertically integrated with a primary aluminum smelter (Ong, 2022b).

On December 21, Indonesian President Joko Widodo announced that beginning in June 2023, the Government would ban bauxite exports. The measure was reportedly intended to replicate the 2020 nickel export ban, which the Government credited for the successful development of nickel processing within the country. Likewise, the impending bauxite ban was intended to increase domestic mineral processing and manufacturing within Indonesia (Carino, 2022; Nangoy and Christina, 2022).

Ireland.—Alumina production in 2022 was 1.63 Mt, 13% less than that in 2021 (table 12). In September, An Bord Pleanala, an independent, quasi-judicial appellate board for local planning decisions, approved extending the operational lifetime of Aughinish Alumina Ltd.'s existing bauxite residue (red mud) disposal facility until 2039. The facility was permitted to deposit 1 million cubic meters per year of red mud, cumulatively increasing the height of the deposited material by 12 meters. The facility is located along the Shannon Estuary adjacent to the company's 1.99-Mt/yr-capacity alumina refinery. Aughinish Alumina Ltd. was a subsidiary of RUSAL (Deegan, 2022; United Company RUSAL Plc, 2023, p. 26).

Jamaica.—Bauxite production in 2022 was 4.37 Mt, 27% less than that in 2021; alumina production was 634,000 t, 45% less than that in 2021 (tables 11, 12). In July, Jamalco Inc. resumed partial operations at its alumina refinery in Clarendon, although production at full capacity was not achieved by yearend. A fire at the facility in August 2021 caused a yearlong shutdown. The refinery's alumina production capacity was 1.42 Mt/yr. Jamalco was a joint venture between General Alumina Jamaica Ltd. (55%) and Clarendon Alumina Production Ltd. (45%), which was owned by the Government of Jamaica (CRU International Ltd., 2022; Jamaica Observer, 2022, 2023).

Romania.—Alumina production in 2022 was 108,000 t, 78% less than that in 2021 (table 12). In August, Alro S.A. temporarily shuttered its 600,000-t/yr alumina refinery in Tulcea. High energy prices were blamed for the shutdown. Alro was a subsidiary of Vimetco N.V., a Belgium-based aluminum producer (AL Circle, 2022; CRU Bauxite and Alumina Monitor, 2022, p. 8).

Spain.—Alumina production in 2022 was 1.34 Mt, 13% less than that in 2021 (table 12). In August, Alcoa began reducing production at its 1.6-Mt/yr-capacity San Ciprian alumina refinery, by up to 60%. By the third quarter of 2022, the company had reduced alumina production at the facility by one half. The company did not anticipate that the reduction would adversely affect its ability to fulfill shipments to its customers. Since early 2021, the cost of natural gas to produce alumina at the San Ciprian facility had more than quintupled owing to the Russia-Ukraine conflict (Alcoa Corp., 2022a, p. 3; Alumina Ltd., 2022).

Ukraine.—Alumina production in 2022 was 300,000 t, 83% less than that in 2021 (table 12). On February 24, Russia launched large-scale attacks on Ukraine on several fronts and, by September, Russia declared its annexation of the Ukrainian Provinces of Donetsk, Kherson, Luhansk, and Zaporizhzhia (U.S. Central Intelligence Agency, 2024). Later that month, RUSAL announced that it halted shipments from the Nikolaev alumina refinery located at Mykolaiv. Logistical issues related to the Russia-Ukraine conflict were cited by RUSAL for the stoppage of production and shipments from the refinery. The 1.75-Mt/yr refinery was operated by RUSAL; the bauxite feedstock was imported from its mines in Guinea and Guyana. Alumina produced at the refinery was exported to RUSAL's Bratsk, Krasnoyarsk, and Sayanogorsk aluminum smelters in Russia. In March, RUSAL rerouted shipments of bauxite from Guinea intended for the Nikolaev refinery to its Aughinish

refinery in Ireland (Bavier and others, 2022; Lazzaro, 2022; Mining.com, 2022).

In July, courts in Ukraine transferred corporate rights of the RUSAL-operated Nikolaev alumina refinery to Ukraine's Asset Recovery Management Agency. In September, the Kyiv Court of Appeals upheld this decision, which had been initiated by the Office of the Prosecutor General as part of pretrial criminal proceedings related to Russian acts of war in Ukraine (Kyivs′kiy apelyatsiyniy sud, 2022; Ofis Heneral'noho prokurora, 2022).

Outlook

World consumption of aluminum is expected to steadily increase within traditional sectors as aluminum products become more accessible to consumers in developing economies. Consumption of aluminum by growing sectors, such as transportation and renewable energy, is expected to accelerate and increase during the next decade. 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 low-carbon 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 nominal 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.

References Cited

AL Circle, 2022, The sole Romanian calcined alumina producer to halt operations from August 1 due to electricity & natural gas price surge: Rajarhat New Town, India, AL Circle, June 30. (Accessed August 8, 2024, at https://www.alcircle.com/news/the-sole-romanian-calcined-alumina-producer-to-halt-operations-from-august-1-due-to-electricity-natural-gas-price-surge-80855.)

Alcoa Corp., 2020, Alcoa Corporation reports first quarter 2020 results: Pittsburgh, PA, Alcoa Corp. press release, April 22, 14 p. (Accessed September 14, 2024, at https://s29.q4cdn.com/844074237/files/press_release_pdf/2020/q1-2020-pr.pdf.)

Alcoa Corp., 2022a, Alcoa Corporation reports third quarter 2022 results: Pittsburgh, PA, Alcoa Corp., October 19, 16 p. (Accessed August 1, 2024, at https://s29.q4cdn.com/844074237/files/doc_news/2022/10/3Q22-Alcoa-Financial-Results.pdf.)

Alcoa Corp., 2022b, Alcoa receives funding to pilot carbon-reduction technology for alumina refining, supporting refinery of the future initiative: Pittsburgh, PA, Alcoa Corp. press release, April 11. (Accessed August 19, 2024, at https://news.alcoa.com/press-releases/press-release-details/2022/Alcoa-Receives-Funding-to-Pilot-Carbon-Reduction-Technology-for-Alumina-Refining-Supporting-Refinery-of-the-Future-Initiative/default.aspx.)

Alumina Ltd., 2022, San Ciprian alumina refinery output reduction: London, United Kingdom, Alumina Ltd. press release, July 29, 2 p. (Accessed October 26, 2022, at https://www.aluminalimited.com/wp-content/uploads/2022/12/ASX_announcement_2022_26_-_San_Ciprian_reduction.pdf.)

Australia Government Department of Foreign Affairs and Trade, 2022, Russia—Australia prohibits the export of aluminium ores, alumina and related products to Russia: Canberra, Australian Capital Territory, Australia, Department of Foreign Affairs and Trade, Government of Australia press release, March 20. (Accessed August 9, 2024, at https://www.dfat.gov.au/news/news/russia-australia-prohibits-export-aluminium-ores-alumina-and-related-products-russia.)

Australian Renewable Energy Agency, 2022, World-first pilot to electrify calcination in alumina refining: Canberra, Australian Capital Territory, Australia, Australian Renewable Energy Agency press release, April 12. (Accessed August 19, 2024, at https://arena.gov.au/news/world-first-pilot-to-electrify-calcination-in-alumina-refining/.)

Bavier, Joe, Reid, Helen, and Denina, Clara, 2022, Russia's Rusal diverts ore to Ireland after Ukraine plant shuttered: Thomson Reuters, March 15. (Accessed August 3, 2024, at https://www.reuters.com/article/markets/russias-rusal-diverts-ore-to-ireland-after-ukraine-plant-shuttered-idUSL5N2VI0W9/.)

Beijing Antaike Information Co., Ltd., 2022a, Alumina and aluminum monthly: Beijing, China, Beijing Antaike Information Co., Ltd., no. 302, February, 27 p.

Beijing Antaike Information Co., Ltd., 2022b, Alumina and aluminum monthly: Beijing, China, Beijing Antaike Information Co., Ltd., no. 303, March, 20 p.

Beijing Antaike Information Co., Ltd., 2022c, Alumina and aluminum monthly: Beijing, China, Beijing Antaike Information Co., Ltd., no. 304, April, 22 p.

Beijing Antaike Information Co., Ltd., 2022d, Alumina and aluminum monthly: Beijing, China, Beijing Antaike Information Co., Ltd., no. 306, June, 23 p.

Beijing Antaike Information Co., Ltd., 2022e, Alumina and aluminum monthly: Beijing, China, Beijing Antaike Information Co., Ltd., no. 307, July, 25 p.

Beijing Antaike Information Co., Ltd., 2022f, Alumina and aluminum monthly: Beijing, China, Beijing Antaike Information Co., Ltd., no. 309, September, 24 p.

Beijing Antaike Information Co., Ltd., 2023, Alumina and aluminum monthly: Beijing, China, Beijing Antaike Information Co., Ltd., no. 314, February, 25 p.

Biesheuvel, Thomas, 2022, Rio takes full control of Rusal alumina partnership in Australia: Mining.com, The Northern Miner Group, April 7. (Accessed August 3, 2024, at https://www.mining.com/web/rio-takes-full-control-of-rusal-alumina-partnership-in-australia/.)

Carino, Dan, Jr., 2022, Indonesia to implement bauxite export ban in June 2023: New York, NY, S&P Capital IQ, December 21. (Accessed July 7, 2023, via https://www.capitaliq.spglobal.com/.)

Century Aluminum Co., 2022, Century Aluminum to temporarily idle its Hawesville smelter due to soaring energy prices; issues WARN notice to employees: Chicago, IL, Century Aluminum Co. press release, June 22. (Accessed December 6, 2022, at https://centuryaluminum.com/investors/press-releases/press-release-details/2022/Century-Aluminum-to-Temporarily-Idle-Its-Hawesville-Smelter-Due-to-Soaring-Energy-Prices-Issues-WARN-Notice-to-Employees/default.aspx.)

Century Aluminum Co., 2023, Form 10–K—2022: Washington, DC, U.S. Securities and Exchange Commission, 102 p. (Accessed June 6, 2024, via https://centuryaluminum.com/investors/filings-and-financials/annual-reports-and-proxy/default.aspx.)

Christensen, Sofia, 2022, Workers at Rusal's Guinea bauxite mine end strike, obtain salary rise: Thomson Reuters, June 6. (Accessed June 14, 2022, at https://www.reuters.com/article/rusal-guinea-idUSKBN2NN1K2.)

CRU Bauxite and Alumina Monitor, 2022, Atlantic alumina market approaches tipping point: CRU Bauxite and Alumina Monitor, August 11, 16 p. (Accessed June 14, 2024, via https://www.crugroup.com/.)

CRU International Ltd., 2022, Jamalco resumes alumina production: London, United Kingdom, CRU International Ltd., August 24. (Accessed November 17, 2022, via https://www.crugroup.com/.)

Deegan, Gordon, 2022, Aughinish Alumina gets green light to expand residue disposal area: The Irish Times [Dublin, Ireland], September 6. (Accessed August 1, 2024, at https://www.irishtimes.com/business/2022/09/06/aughinish-alumina-gets-green-light-to-expand-residue-disposal-area/.)

Fastmarkets-IM, 2022, Bauxite monthly prices: London, United Kingdom, Fastmarkets-IM, December 30. (Accessed July 5, 2023, via http://www.indmin.com/MonthlyPrices.html.)

Howard, Parish, 2022, New owner will help Wrens plant diversify its product line: The Augusta [GA] Chronicle, August 5. (Accessed June 14, 2024, at https://www.augustachronicle.com/story/news/local/the-news-and-farmer/2022/08/05/new-owner-help-wrens-plant-diversify-its-product-line/10175368002/.)

Hui, Mary, 2022, Russia's lost alumina supply from Ukraine is now coming from China: New York, NY, Quartz, G/O Media, May 5. (Accessed August 19, 2024, at https://qz.com/2162256/chinas-alumina-exports-to-russia-surge-after-ukraine-invasion.)
Jamaica Observer, 2022, Jamalco back to production: [Kingston] Jamaica Observer, September 6. (Accessed June 14, 2024, at https://www.jamaicaobserver.com/2022/09/06/jamalco-back-to-production/.)
Jamaica Observer, 2023, Economy recovering faster: [Kingston] Jamaica Observer, February 21. (Accessed June 14, 2024, at https://www.jamaicaobserver.com/2023/02/21/economy-recovering-faster/.)
Kyivs′kiy apelyatsiyniy sud [Kyiv Court of Appeals], 2022, Kyivs′kiy apelyatsiyniy sud zalishiv pid areshtom korporatyvni prava na sumu ponad 3,58 mlrd hryven′ rosiys′koho biznesmena Oleha Derypasky shodo yakoho SShA zaprovadyly sanktsiyi cherez viys′kovu ahresiyu rf proty Ukrayiny [The Kyiv Court of Appeals upheld the corporate rights worth more than UAH 3.58 billion of Russian businessman Oleg Deripaska, against whom the United States imposed sanctions due to the military aggression of the Russian Federation against Ukraine]: Kyiv, Ukraine, Kyiivs′kyj apelyatsiyniy sud September 28. (Accessed August 2, 2024, at https://www.kas.gov.ua/?p=30266.) [In Ukrainian.]
Lazzaro, Nick, 2022, Alcoa expects higher aluminum prices, shorter alumina supply on Russia sanctions—Exec: S&P Global Platts Metals Daily, v. 11, no. 41, February 28, p. 2–3.
Menon, Praveen, 2022, Russia's Rusal files suit against Rio Tinto over alumina refinery—Documents: Thomson Reuters, June 5. (Accessed June 10, 2022, at https://www.reuters.com/markets/commodities/russias-rusal-launches-legal-action-against-rio-tinto-over-alumina-refinery-2022-06-05/.)
Mining.com, 2022, Rusal halts alumina shipments from Ukraine: Mining.com, The Northern Miner Group, February 28. (Accessed August 3, 2024, at https://www.mining.com/rusal-halts-alumina-shipments-from-ukraine/.)
Mosbrucker, Kristen, 2020, A Louisiana plant expects to close, laying off hundreds despite 'paycheck protection' program: The Advocate [Baton Rouge, LA], July 7. (Accessed August 26, 2020, via https://www.theadvocate.com/.)
Nangoy, Fransiska, and Christina, Bernadette, 2022, Indonesia confirms bauxite export ban to proceed as scheduled: Thomson Reuters, December 21. (Accessed June 14, 2024, at https://www.reuters.com/markets/asia/indonesia-announce-ban-exports-commodity-without-saying-which-2022-12-21/.)
Norsk Hydro ASA, 2022, Hydro invests BRL 590 million in Paragominas: Oslo, Norway, Norsk Hydro ASA press release, October 12. (Accessed November 8, 2022, at https://www.hydro.com/en/global/media/news/2022/hydro-invests-brl-590-million-in-paragominas/.)
Norsk Hydro ASA, [undated], Paragominas' Mine: Oslo, Norway, Norsk Hydro ASA. (Accessed August 16, 2024, at https://www.hydro.com/en/global/about-hydro/hydro-worldwide/americas/brazil/paragominas/paragominas-mine/.)
O'Driscoll, Mike, 2022, First Bauxite acquires US calcination plants: Wallington, United Kingdom, Imformed Industrial Mineral Forums & Research Ltd., May 9. (Accessed June 14, 2024, at https://imformed.com/first-bauxite-acquires-us-calcination-plants/.)
Ofis Heneral'noho prokurora [Office of the Prosecutor General of Ukraine], 2022, Ofis Henprokurora peredav v ARMA aktyvy 19 ukrayins′kyh kompaniy, yaki pidkontrol′ni RF ta yiyi rezidentam [The Prosecutor General's Office transferred the assets of 19 Ukrainian companies controlled by the Russian Federation and its residents to ARMA]: Kyiv, Ukraine, Ofis Heneral'noho Prokurora, July 28. (Accessed August 1, 2024, at https://www.gp.gov.ua/ua/posts/ofis-genprokurora-peredav-v-arma-aktivi-19-ukrayinskix-kompanii-yaki-pidkontrolni-rf-ta-yiyi-rezidentam.) [In Ukrainian.]
Ong, Jenson, 2022a, Australian alumina steady; market turns to China and Atlantic developments: S&P Global Platts Metals Daily, v. 11, no. 123, June 23, p. 2–3.
Ong, Jenson, 2022b, Indonesia's Bintan Alumina commissions phase 2 of refinery: S&P Global Platts Metals Daily, v. 11, no. 184, September 16, p. 2.
Ong, Jenson, 2022c, Indonesia's Well Harvest Winning alumina refinery completes second-phase expansion: S&P Global Platts Metals Daily, v. 11, no. 20, January 28, p. 5–6.
Rio Tinto Group, 2022, Annual report—2022: London, United Kingdom, Rio Tinto Group, 352 p. (Accessed June 3, 2024, via https://www.riotinto.com/en/invest/reports/annual-report.)
S&P Global Platts Metals Daily, 2021, China Hongqiao's Indonesia unit starts third alumina product line: S&P Global Platts Metals Daily, v. 10, no. 255, December 29, p. 4.
S&P Global Platts Metals Daily, 2022, China records higher aluminum, alumina trade with Russia in 2022: S&P Global Platts Metals Daily, v. 12, no. 14, January 20, p. 3–4.
South32 Ltd., 2022, South32 completes acquisition of additional interest in Mineração Rio do Norte: Perth, Western Australia, Australia, South32 Ltd. press release, May 2, p. 2. (Accessed June 14, 2024, at https://www.south32.net/docs/default-source/media-releases/south32-completes-acquisition-of-additional-interest-in-mrn.pdf?sfvrsn= 7a5dfb6d_3.)
United Company RUSAL Plc, 2023, More than aluminum—Annual report 2022: Moscow, Russia, United Company RUSAL Plc, 282 p. (Accessed August 1, 2024, at https://rusal.ru/upload/iblock/2e9/7v4apk1vlhn5m3z6hfo85cg52e0rtz73.pdf.)
U.S. Central Intelligence Agency, 2024, Ukraine, *in* The world factbook: Langley, VA, U.S. Central Intelligence Agency. (Accessed January 3, 2024, at https://www.cia.gov/the-world-factbook/countries/ukraine/.)
Warwick, Filip, 2022, Australian miner South32 boosts stake in Brazil's MRN bauxite mine by 18%: S&P Global Platts Metals Daily, v. 11, no. 86, May 3, p. 4–5.

GENERAL SOURCES OF INFORMATION

U.S. Geological Survey Publications

Aluminum. Ch. in Mineral Commodity Summaries, annual.
Aluminum. Mineral Industry Surveys, monthly.
Aluminum (Al). Ch. in Metal Prices in the United States Through 2010, Scientific Investigations Report 2012–5188, 2013.
Aluminum and Bauxite. Ch. in United States Mineral Resources, Professional Paper 820, 1973.
Bauxite and Alumina. Ch. in Mineral Commodity Summaries, annual.
Bauxite and Alumina. Mineral Industry Surveys, quarterly.
Historical Statistics for Mineral and Material Commodities in the United States. Data Series 140.
World Bauxite Resources. Professional Paper 1076–B, 1986.
World Nonbauxite Aluminum Resources—Alunite. Professional Paper 1076–A, 1978.
World Nonbauxite Aluminum Resources Excluding Alunite. Professional Paper 1076–C, 1990.

Other

Alumina Monitor. CRU Group, monthly.
Aluminum. Ch. in Mineral Facts and Problems, U.S. Bureau of Mines Bulletin 675, 1985.
Fastmarkets-IM. Prices, annual, 2022.

TABLE 1
SALIENT BAUXITE STATISTICS[1]

(Thousand metric tons)

	2018	2019	2020	2021	2022
United States:					
Production	W	W	W	W	W
Exports, as shipped:					
Crude and dried	4	3	3	2	2
Calcined	7	7	7	6	4
Total	11	10	10	8	6
Imports for consumption, as shipped:					
Crude and dried	3,330	3,880	3,180	3,090	2,800
Calcined	376	430	336	455	479
Total	3,710	4,310	3,510	3,550	3,280
Consumption, dry equivalent	4,460	3,680	3,330	2,790	2,170
World, production[2]	341,000	358,000 r	364,000 r	383,000 r	400,000

rRevised. W Withheld to avoid disclosing company proprietary data.
[1]Table includes data available through July 6, 2023. 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)

	2018	2019	2020	2021	2022
United States:					
Production:[e]					
Calcined alumina	1,000	930	1,000	690	610
Other alumina[2]	810	750	530	530	470
Total:					
As produced or shipped[3]	1,900	1,700	1,500	1,200	1,100
Calcined equivalent	1,600	1,400	1,300	1,000	920
Shipments:[e]					
Calcined alumina	1,100	930	1,000	710	630
Other alumina[2]	810	750	520	530	470
Total:					
As produced or shipped[3]	1,900	1,700	1,500	1,200	1,100
Calcined equivalent	1,600	1,400	1,400	1,100	930
Stocks, yearend[4, 5]	275	275	234	202	213
Imports for consumption[5]	1,530	1,930	1,340	1,550	1,880
Exports[5]	288	200	153	180	174
Consumption, apparent[5, 6]	2,800 r	3,130	2,530	2,410 r	2,620
World, production[5, 7]	130,000	132,000	136,000 r	138,000	140,000

eEstimated. rRevised.
[1]Table includes data available through July 6, 2023. 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 location	2021	2022
LAlumina LLC, Burnside, LA	500	500
Noranda Alumina LLC, Gramercy, LA	1,200	1,200
Total	1,700	1,700

[1]Table includes data available through July 6, 2023. 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
ESTIMATED U.S. CONSUMPTION OF BAUXITE, BY INDUSTRY[1]

(Thousand metric tons, dry equivalent)

Industry	2021[r]	2022
Alumina[2]	2,600	2,000
Other[3]	200	200
Total	2,800	2,200

[r]Revised.
[1]Table includes data available through July 6, 2023. Data are rounded to no more than two 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)

	2021		2022	
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]
Jamaica[4]	29.64	29.66	29.60	29.61
Turkey	40.07 [r]	48.04 [r]	54.15	69.11
Weighted average[5]	31.10 [r]	33.57 [r]	32.30	33.95

[r]Revised.
[1]Table includes data available through July 6, 2023. 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]

(Dollars per metric ton)

Month	2021	2022
January	389	554
February	384	501
March	426	543
April	505	598
May	465	655
June	396	524
July	413	605
August	633	488
September	419	711
October	553	494
November	461	410
December	532	399
Weighted average	462	518

[1]Table includes data available through July 6, 2023. 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.

TABLE 7
REFRACTORY GRADE BAUXITE PRICES[1]

(Dollars per metric ton)

Material	2021	2022
China:		
Xingang, rotary kiln, lump 86% Al_2O_3	460–480	460–480
Xingang, round kiln, lump 87% Al_2O_3	480–500	475–510

[1]Table includes data available through July 6, 2023. 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	2021	2022
Exports:		
Canada	2	1
Other	(2)	1
Total	2	2
Imports:		
Brazil	1	1
Jamaica[3]	2,600	2,360
Turkey	457	403
Other	33	45
Total	3,090	2,800

[1]Table includes data available through May 15, 2023. 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: 2021—230,000 and 2022—242,000.

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)

	2021				2022			
	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)	90	--	--	1	317	--	--
China	1	670	--	--	(3)	23	(3)	54
Mexico	3	1,870	--	--	3	1,720	(3)	28
Other	1	261	(3)	221	(3)	315	(3)	66
Total	6	2,900	(3)	221	4	2,380	(3)	149
Imports:								
Australia	--	--	99	3,120	--	--	82	2,760
China	79	35,700	13	5,760	39	19,500	18	7,670
Guyana	57	15,300	142	21,200	68	16,100	137	26,700
Other	3	573	63	2,770	2	754	135	7,340
Total	139	51,600	316	32,800	108	36,300	371	44,500

-- Zero.
[1]Table includes data available through May 15, 2023. 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]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)

Country or locality	2021		2022	
	Quantity	Value[2]	Quantity	Value[2]
Exports:				
Canada	25	31,900 r	23	37,600
China	13	84,300 r	13	74,200
India	3	5,230 r	2	5,160
Mexico	66	59,300	64	60,100
Netherlands	6	11,300 r	4	16,000
United Arab Emirates	3	4,020 r	4	10,400
Other	64	222,000 r	63	222,000
Total	180	418,000 r	174	425,000
Imports:				
Australia	66	29,700	248	80,900
Brazil	1,050	400,000	1,170	536,000
Canada	68	43,800	81	57,600
China	47	43,200	54	66,700
France	19	29,100 r	18	38,800
Germany	24	79,300 r	26	88,100
India	7	6,530	10	13,700
Jamaica[3]	239 r	88,700 r	41	15,200
Other	29 r	63,800	230	165,000
Total	1,550	784,000 r	1,880	1,060,000

rRevised.
[1]Table includes data available through May 15, 2023. 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	2018	2019	2020	2021	2022
Australia	95,948	105,544	103,627	103,056	102,290
Bosnia and Herzegovina	803	934	688	725 r	700 e
Brazil, dry basis	32,377	31,938	32,898	33,000 e	30,000 e
China	77,170	73,320 r	62,800 r, e	86,000 r, e	90,000 e
Côte d'Ivoire[e]	400	750	700	700	700
Croatia	12	14	14	14	10 e
Dominican Republic	--	--	9	89	90 e
Fiji	60 e	--	--	--	-- e
Ghana	1,011	1,116	1,162	839 r	800 e
Greece[2]	1,559	1,379 r	1,429 r	1,227 r	1,200 e
Guinea, dry basis[e, 2]	57,000	67,000	86,000	82,000 r	100,000
Guyana, dry basis	1,926	1,920	595	619	706
Hungary	5	--	--	-- e	-- e
India	23,229	22,321	19,988	22,136 r	24,000 e
Indonesia	13,243	16,593	20,800 e	21,000 e	21,000 e
Iran[2]	805	1,163	1,200 e	1,100 r, e	572
Jamaica, dry basis	10,058	9,022	7,546	5,950	4,365
Kazakhstan	5,700	4,118	4,058	4,370	4,400
Malaysia	590	901	595	624 e	600 e
Montenegro	468	775	897	542 r	442
Mozambique	10	8	6	8 r	8 e
Pakistan	121	58	105 r	97 r	45 e
Russia	5,651	5,574	5,570	5,679	5,780
Saudi Arabia	4,731	5,031	4,946	4,781	4,800 e
Sierra Leone	1,938	1,884	1,342	1,397	910
Solomon Islands	1,609	1,161	842	-- e	-- e
Tanzania	11	--	26	38 r	40 e
Turkey	1,000 e	2,255 r	2,400 r	2,765 r	2,800 e
United States	W	W	W	W	W
Venezuela	--	--	250 e	250 e	250 e
Vietnam	3,500 e	3,350 e	3,580	3,670 r, e	3,860 e
Total	341,000	358,000 r	364,000 r	383,000 r	400,000

[e]Estimated. [r]Revised. W Withheld to avoid disclosing company propriety data. -- Zero.
[1]Table includes data available through June 21, 2023. 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	2018	2019	2020	2021	2022
Australia	20,062	20,239	20,836	20,359	19,501
Bosnia and Herzegovina	262	214	122	173 r	170 e
Brazil	8,258	9,171	10,300	10,000 r, e	10,000 e
Canada	1,568	1,522	1,518	1,364	1,364
China	72,531	72,474	73,786 r	77,475 r	81,862
France[e]	300	300	300	300	300
Germany	1,000 e	889	919	964 r	1,000 e
Greece	827	820	827	871	861
Guinea	182	368	439	414	340
Hungary	266	265	228	307 r	300 e
India	6,430	6,690	6,563	6,634 r	7,500 e
Indonesia	843	1,148	1,162	1,156 r	1,200 e
Iran	235 e	234 r, e	238 r, e	230 r, e	226
Ireland	1,874	1,893	1,883	1,878	1,629
Jamaica	2,484	2,173	1,621	1,158	634
Japan[e]	20	20	40	30	20
Kazakhstan	1,481	1,393	1,393	1,315 r	1,338
Romania	572	461	426	499	108
Russia	2,763	2,755	2,873	3,054	3,080
Saudi Arabia	1,774	1,798	1,782	1,922	1,900 e
Spain	1,589	1,595	1,552	1,536	1,343
Turkey[e]	300	300	300	300	300
Ukraine	1,715	1,690	1,725	1,769	300
United Arab Emirates	--	1,100	1,920	2,300	2,430
United States[e]	1,600	1,400	1,300	1,000	920
Venezuela	--	--	110 e	80 e	80
Vietnam	1,329	1,365	1,422	1,394 r	1,426
Total	130,000	132,000	136,000 r	138,000	140,000

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

[1]Table includes data available through June 21, 2023. 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]Numbers represent calcined alumina or the total of calcined alumina plus the calcined equivalent of hydrate when available; exceptions, if known, are noted.