



2019 Minerals Yearbook

BAUXITE AND ALUMINA [ADVANCE RELEASE]

BAUXITE AND ALUMINA

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In 2019, almost all of the 3.92 million metric tons (Mt) of bauxite (dry equivalent) consumed in the United States was imported. World production of bauxite was approximately 358 Mt (tables 1, 11); the leading producing countries, in descending order of production, were Australia, China, Guinea, Brazil, India, and Indonesia, which together accounted for 88% of world bauxite production. U.S. production and shipments of alumina (calcined equivalent) were estimated to be 1.41 Mt each. Alumina production and shipments (calcined equivalent) decreased by 10% and 12%, respectively, compared with those in 2018 (table 2). An estimated 70% of domestic alumina consumption was for metal production. World production of alumina (calcined equivalent) was approximately 133 Mt (tables 2, 12). The leading producing countries, in descending order of production, were China, Australia, Brazil, and India, which together accounted for 81% of world alumina production.

Legislation and Government Programs

The U.S. Department of the Treasury lifted sanctions on United Company RUSAL Plc on January 27, 2019. In April 2018, RUSAL and its principal owner, who also was its former chief executive officer, were sanctioned by the U.S. Department of the Treasury. The principal owner decreased his ownership to a level acceptable to the U.S. Department of the Treasury and the company agreed to audits of its operations and to reporting requirements. Companies with supply contracts with RUSAL were permitted to continue receiving shipments during the sanction period (Yang, 2018; U.S. Department of the Treasury, 2019).

Production

Bauxite.—The United States was reliant on imports for 100% of the metallurgical-grade bauxite consumed. Small amounts of bauxite and bauxitic clays were produced in Alabama, Arkansas, and Georgia for nonmetallurgical uses, such as abrasives, cement, chemicals, proppants, and refractories. Domestic mines operated by five companies supplied less than 5% of the U.S. requirement for bauxite and all 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 10% in 2019 from that in 2018 to 1.41 Mt (table 2). Domestic production and consumption data for bauxite and alumina were obtained by the U.S. Geological Survey from three separate voluntary surveys. The “Alumina Production” survey was sent to the two domestic alumina refineries operating, neither of which responded, so alumina production was estimated based on bauxite imports.

Noranda Alumina LLC (a subsidiary of New Day Aluminum LLC) produced alumina at its 1.2-million-metric-ton-per-year

(Mt/yr) refinery in Gramercy, LA. Approximately 800,000 metric tons per year (t/yr) of its capacity was used to produce chemical-grade alumina. In recent years, Noranda had shifted production in favor of chemical-grade alumina that generally had higher profit margins than metallurgical-grade alumina.

A 500,000-t/yr refinery in Burnside, LA, was used to produce alumina for nonmetallurgical uses. The Burnside refinery was sold by Almathis Inc. to Arthur Metals LLC in June (Hotter, 2019).

In December, Alcoa Corp. announced that the temporary shutdown of the Point Comfort, TX, alumina refinery would be permanent. Alcoa shut down the 2.3-Mt/yr alumina refinery in 2016 citing high production costs and low alumina prices. A review of assets determined that the refinery was not economically competitive with refineries elsewhere (Alcoa Corp., 2019).

Consumption

Bauxite.—The “Bauxite Consumption” survey was sent to 27 operations, 15 of which responded, representing approximately 10% of the bauxite consumed for uses other than cement listed in table 4. The two refineries producing alumina in 2019 did not respond and bauxite consumption was estimated based on import data.

Total domestic consumption of bauxite decreased by 12% in 2019 compared with the amount in 2018. In 2019, 89% of the bauxite consumed in the United States was refined to alumina; the remaining 11% was consumed in nonmetallurgical applications. An estimated 2.45 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 “Aluminum” survey, which was received from three companies that operated seven primary aluminum smelters. An estimated 70% of domestic alumina consumption (net alumina imports and domestic alumina production by U.S. alumina refineries) was for metal production at primary aluminum smelters. In 2019, seven domestic primary aluminum smelters consumed 2.19 Mt of alumina, 23% more than the amount of alumina consumed in 2018. Production at three smelters was ramped up by yearend 2018 and remained at those levels in 2019, accounting for much of the increased alumina consumption in 2019 compared with that in 2018. Alcoa completed ramping up 161,400 t/yr of capacity in mid-2018 at the 269,000-t/yr Warrick primary aluminum smelter in Evansville, IN, which was restarted in December 2017 (Alcoa Corp., 2018). Century Aluminum Co. completed ramping up 150,000 t/yr of capacity from three potlines at the 252,000-t/yr Hawesville, KY, smelter by August 2018 (Century Aluminum Co., 2018). In June 2018, Magnitude 7 Metals LLC restarted production of approximately 100,000 t/yr of capacity at the 263,000-t/yr primary aluminum smelter in New Madrid, MO (Matyi, 2018). 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 increased slightly in 2019 compared with the revised prices in 2018 (table 5). In 2019, the average value of U.S. imports of alumina, including cost, insurance, and freight at U.S. ports, was \$480 per metric ton, 22% less than in 2018 (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 in *Industrial Minerals* (2019, 2020), for refractory-grade bauxite exported from China were generally lower than those at yearend 2018 (table 7).

Foreign Trade

Imports of crude dried bauxite increased by 7% from the revised amount in 2018 (table 8). Imports of alumina increased by 26%, and exports of alumina decreased by 31% compared with those in 2018 (table 10). Jamaica and Brazil remained the leading sources of crude dried bauxite imports, accounting for 73% and 23%, respectively. Brazil, Australia, and Jamaica were the leading sources of alumina imports, accounting for 52%, 24%, and 11%, respectively. Mexico, Canada, Iceland, and Venezuela were the leading destinations for alumina exports in 2019, receiving 21%, 15%, 11%, and 11%, respectively.

World Industry Structure

Bauxite.—In 2019, world production of bauxite was 5% more than the revised amount in 2018, attributed mostly to significant increases of production in Guinea (10 Mt), Australia (9.2 Mt), Indonesia (6 Mt), and Brazil (2 Mt) that was partially offset by decreased production in China (9 Mt) and Jamaica (1 Mt). Total mine production of 358 Mt was estimated from 26 countries, not including production from the United States, which was withheld to avoid disclosing company proprietary data. The leading producers of bauxite, in decreasing order of tonnage mined, were Australia, China, Guinea, Brazil, India, Indonesia, and Jamaica. These countries accounted for 91% of total world production; Australia and China together accounted for 49% of the world's production (table 11).

Alumina.—World output of alumina increased slightly to 133 Mt in 2019 compared with the amount in 2018. Increased production in Australia, Brazil, Guinea, India, Indonesia, and the United Arab Emirates was partially offset by decreased production in Jamaica, Romania, and the United States. Although there was production in 26 countries, the 4 leading producing countries, China, Australia, Brazil, and India, in

descending order of quantity of alumina produced, accounted for 81% of world production; China and Australia accounted for 55% and 15%, respectively (table 12).

World Review

Australia.—Bauxite production increased by 10% (9.23 Mt) and alumina production increased slightly compared with the revised amounts in 2018 (tables 11, 12). Increased bauxite production was attributed mostly to the rampup of production at two new mines that were commissioned in 2018.

In March 2019, Rio Tinto plc completed commissioning of the Amrun Mine in Queensland. In December 2018, the first shipment of bauxite was made from the 22.8-Mt/yr mine. The project also included port facilities on the Cape York Peninsula (Lim, 2019c).

Metro Mining Ltd. completed ramping up production of the Bauxite Hills Mine in Queensland to a production rate of 3.5 Mt/yr in the first quarter of the year. Further expansion of capacity to 6 Mt/yr was being considered. In November, the Northern Australia Infrastructure Facility approved financing to construct a floating terminal on the Skardon River adjacent to the Bauxite Hills Mine. The terminal would facilitate increased bauxite capacity from the mine. The bauxite deposit reserves were about 110 Mt (Metro Mining Ltd., 2019a, b, 2020).

Australian Bauxite Ltd. was developing a mine to produce bauxite from the Binjour deposit in central Queensland. The deposit had 37 Mt of reserves of gibbsite bauxite with 44% to 45% alumina and 5% silica. The proposed mine capacity would be between 0.5 to 1.5 Mt/yr. A construction schedule was pending regulatory approval (Australian Bauxite Ltd., 2019).

Brazil.—Bauxite production increased by 6% (1.99 Mt) and alumina production increased by 5% (442,000 t) compared with the revised amounts in 2018 (tables 11, 12). Increased bauxite and alumina production was attributed to the restart of capacity at a bauxite mine and an alumina refinery. After a tailings dam failure on January 25 at an iron ore mine near Brumadinho, Minas Gerais State, in which approximately 300 people were killed, regulators increased scrutiny of mine waste disposal including red mud impoundments (CRU Bauxite and Alumina Weekly, 2019e).

In May 2019, production restarted at the Alunorte alumina refinery in Barcarena from capacity that was shut down in 2018. The refinery was ordered by environmental regulators to shut down one-half of its 6.3 Mt/yr of capacity after a suspected leak from its red mud impoundment in February 2018. On May 20, a court lifted the restrictions on production at the refinery. Production at the Alunorte alumina refinery reached 80% to 85% of its capacity in June. Bauxite production from the Paragominas Mine also increased to full capacity as the refinery ramped up. The mine shut down one-half of its 9.9-Mt/yr capacity in February 2018. The adjacent 460,000-t/yr Albras smelter, which shut down one-half of its capacity in April 2018, also restarted its idled capacity by yearend (Hydro ASA, 2019a, b, e; Mason, 2019b).

On December 18, damage to a power transmission tower at the Paragominas Mine was cited as the reason for a temporary shutdown of some production capacity at the Alunorte alumina refinery. Hydro decreased production at the 6.3-Mt/yr alumina refinery to between 50% and 70% of capacity after the power

failure at the mine. Power was restored at the mine and production was restarted from the affected mine and refinery capacity on December 28 (Hydro ASA, 2019c, d).

China.—Alumina production was essentially unchanged in 2019 at 72.5 Mt, compared with the amount in 2018 (table 12). Alumina capacity at yearend 2019 was estimated to be 86.2 Mt/yr, a 3% increase from 83.4 Mt/yr at yearend 2018. Approximately 70.1 Mt/yr of capacity was in use at yearend. Alumina imports were 1.65 Mt, 221% more than the 511,000 t imported in 2018. The leading sources of China's alumina imports, in descending order, were Australia (61%), Vietnam (10%), and Kazakhstan (9%). China exported 279,000 t of alumina in 2019 compared with 1.46 Mt in 2018. Bauxite production was estimated to have decreased by 11% (9 Mt) compared with that in 2018 (table 11). Decreased production was offset by consumption of stocks and increased imports. Bauxite imports were 100.7 Mt, 22% more than the 82.6 Mt imported in 2018. The leading sources of China's bauxite imports, in descending order, were Guinea (44%), Australia (36%), and Indonesia (14%). Imports from Australia, Guinea, and Indonesia increased by 6.28 Mt (21%), 6.25 Mt (16%), and 6.87 Mt (91%), respectively, compared with those in 2018, accounting for the increased imports. These increases were partially offset by decreased imports from Jamaica (by 543,000 t), Vietnam (by 467,000 t), and the Solomon Islands (by 448,000 t). Stricter enforcement of environmental and safety regulations and decreasing quality of domestic bauxite were cited as the reasons for decreased bauxite production from mines in China (China Metal Market—Alumina and Aluminum, 2019i, 2020c, e; CRU Bauxite and Alumina Monitor, 2019c).

The Government of China ordered alumina refineries and aluminum smelters in certain areas to shut down 30% of capacity from October 1, 2018, to March 31, 2019. The order to shut down capacity cited environmental concerns about pollution produced by refineries, smelters, and powerplants during the winter. Refineries and smelters in two cities and 26 regions, mainly in the central and eastern Provinces, were affected by the order. When the restrictions on production expired, some of the capacity affected by the policy was restarted. The order was a continuation of a policy first instituted in 2017. In September 2019, an updated policy was announced covering alumina refineries in the same areas that ordered shutdowns based on specific pollution emissions criteria. Industry sources reported that few alumina refineries were affected by the policy and that production had not dropped significantly (Hotter, 2017; Mok, 2017a; China Metal Market—Alumina and Aluminum, 2018c; CRU Bauxite and Alumina Monitor, 2019a).

A combination of high production costs, orders by environmental regulators, and a typhoon were reasons for shutdowns of capacity at several alumina refineries in China during July and August. Industry sources estimated that at least 1.5 Mt/yr of capacity was shut down temporarily at several alumina refineries. Most of the affected capacity was restarted by yearend, but some may have been shut down during the winter months (Li, 2019).

In June, the State Administrator of Worker Safety announced strict enforcement of mine safety regulations and would shut all

mines that did not comply with the standards by yearend. Mines that produced bauxite were specified in the announcement. It was uncertain how many bauxite mines were unable to comply with the safety standards. Increased safety enforcement at mines throughout China was announced after accidents in the first quarter of the year had killed 20 workers at a coal mine and 21 workers at a silver mine (Lee and Leung, 2019; Leung, 2019).

Chongqing Municipality.—In January, Bosai Minerals Group Ltd. restarted production at an 800,000-t/yr alumina refinery and an adjacent 1.65-Mt/yr bauxite mine in Shuijiang. The refinery and mine were owned by Aluminum Corp. of China (Chalco) but Chalco had entered an operation and development agreement with Bosai. Chalco had shut down the mine and refinery in July 2014, citing economic conditions (China Metal Market—Alumina and Aluminum, 2019b).

Guangxi Zhuang Autonomous Region.—Jingxi Tiangu Aluminum Co. Ltd. completed construction of an 800,000-t/yr alumina refinery in Jingxi and started production in July. Construction of the refinery had started in September 2017. Further expansion to 2.5 Mt/yr was planned. Guangxi Huasheng New Material Co. Ltd. continued construction of a 2-Mt/yr alumina refinery in Fangchenggang. Construction of the refinery had started in September 2018 and was scheduled to be completed by April 2020. Expansion of the alumina refinery to 4 Mt/yr would be completed in 2022 (China Metal Market—Alumina and Aluminum, 2018b, 2019c, d, 2020b).

Guizhou Province.—In March, China Power Investment Corp. started production from its expanded alumina refinery in Zunyi. The project increased capacity to 1 Mt/yr from 500,000 t/yr. The first phase of the refinery was commissioned in September 2018 and the refinery used bauxite from an adjacent mine. Guizhou Galuminium Aluminum Co. Ltd. was expanding capacity of its alumina refinery in Qingzhen to 1.5 Mt/yr from 800,000 t/yr. Completion of the project was expected early in 2020. The refinery used bauxite from mines in the Province (China Metal Market—Alumina and Aluminum, 2018a, 2019a, f).

Shandong Province.—In February, Shandong Qixing Group Ltd. restarted its 500,000-t/yr alumina refinery in Wudi. The refinery had been shut down in mid-2017 (CRU Bauxite and Alumina Weekly, 2019c).

Shanxi Province.—The government of Shanxi Province issued an order intended to control new alumina refining capacity in the Province. New projects to add capacity would not be permitted and expansion projects under construction should match smelting capacity in the Province. The policy also encouraged development of downstream aluminum rolling mills, extrusion plants, and recycling capacity (China Metal Market—Alumina and Aluminum, 2019e).

A red mud spill occurred on May 7 at Shanxi Jiaokou Aluminum Co. Ltd.'s alumina refinery in Jiaokou County. The 2.8-Mt/yr refinery was shut down after the spill. According to industry sources, the refinery restarted production by the end of July. Environmental regulators also ordered Shanxi Xiaoyi Huaqing Ltd. Co. to shut down its 450,000-t/yr alumina refinery for environmental inspections. A new red mud pipeline was being constructed to transport red mud from the refinery to the waste impound; the refinery previously transported red mud

to the impound by trucks. Environmental inspections were conducted at the 3-Mt/yr Shanxi Xiaoyi Xinfu Aluminum Co. Ltd. alumina refinery but production was reported to have continued (CRU Bauxite and Alumina Monitor, 2019d, f; Leung and Watanabe, 2019; Watanabe and Leung, 2019).

Shanxi Fenyang Ltd. Co. was constructing a 1.2-Mt/yr alumina refinery in Qiangjin. Construction started in August and was scheduled for completion in October 2020 (CRU Bauxite and Alumina Monitor, 2019d).

Côte d'Ivoire.—Lagune Exploitation Afrique Ltd. was expanding its bauxite mine near Benene. Mine capacity was being increased to 1.2 Mt/yr from 750,000 t/yr from a deposit with 35 Mt of reserves. Completion of the project was scheduled by February 2020. Further development to construct an alumina refinery was being considered (Mieu, 2018; China Metal Market—Alumina and Aluminum, 2020d).

Guinea.—Alumina production doubled as rampup continued at the 650,000-t/yr alumina refinery in Friguia, which was restarted in May 2018. Bauxite production increased by 18% (10 Mt) compared with that in 2018 and by more than 300% (50.7 Mt) compared with that in 2015 as new mines ramped up production. Bauxite production from the Dian-Dian Mine reached its capacity of 3 Mt/yr in the fourth quarter of the year. Further expansion of the mine, which had started production in 2018, to 9 Mt/yr was planned for completion in 2021 (Blamey, 2018; United Company RUSAL Plc, 2020).

In February, Alufer Mining Ltd. [Guernsey (United Kingdom)] completed ramping up the 5.5-Mt/yr Bel Air Mine which started production in June 2018. Further expansion of capacity to 10 Mt/yr was being considered (Alufer Mining Ltd., 2019a, b).

In August, Guinea Alumina Corp. [a subsidiary of Emirates Global Aluminium Ltd. (EGA)] started shipping bauxite from its 12-Mt/yr Boke Mine to the 2-Mt/yr Al Taweelah alumina refinery in the United Arab Emirates. In April, EGA started alumina production at the refinery using bauxite from other sources but the Boke Mine would be the principal bauxite supplier to the refinery, and surplus bauxite would be sold to other consumers (Emirates Global Aluminium PJSC, 2019a).

Chalco completed construction of a 12-Mt/yr bauxite mine in Boffa during the fourth quarter of the year. Bauxite production started before yearend and the first shipment to China was scheduled for January 2020. The Boffa deposit was reported to have about 740 Mt of reserves grading 39.1% alumina. Further expansion to 40 Mt/yr was planned and the mine life was expected to be at least 60 years (Leung, 2018; Aluminium Insider, 2020).

Henan International Mining Ltd. completed construction of the Neiyabokai Mine and started production in the second half of the year. The mine's capacity was about 8.9 Mt/yr and production by yearend was estimated to be 1.4 Mt (Everiss, 2020).

Guyana.—RUSAL temporarily shut down production at the Kurubuka Mine in February, citing a labor dispute. The mine produced refractory-grade bauxite. Production in the first quarter of the year decreased to 253,000 t compared to 345,000 t in the prior quarter, but after the dispute was resolved, production increased to 398,000 t in the second quarter of 2019 (CRU Bauxite and Alumina Weekly, 2019d; United Company RUSAL Plc, 2019a, b).

First Bauxite LLC was constructing the Bonasika Mine near Sand Hills throughout the year and started trial production of refractory-grade bauxite by yearend. Commercial production was scheduled for early 2020 with a capacity of 360,000 t/yr. A plant at the mine would wash bauxite but calcining would be done at other locations until a kiln is installed and a natural gas pipeline is built to the mine. The bauxite would mainly be used in refractory products but also to produce proppants used in the petroleum industry. Other markets for the high purity bauxite would include abrasives, chemicals, slag conditioning in steel making, and welding rods. The calcined bauxite would contain over 93% alumina with less than 3% silica and less than 1% iron oxide (First Bauxite LLC, 2019a, b; Papanah, 2020).

India.—Production of alumina increased by 4% but bauxite production decreased slightly compared with production in 2018. Increased alumina production was attributed to one refinery having increased production after completing an upgrade project in 2018 and an expansion project adding new capacity at another refinery but was offset partially by decreased production at another refinery after an accident forced a temporary shutdown. Vedanta Resources Ltd. (United Kingdom) increased alumina production at the Lanjigarh alumina refinery by about 20% compared with that in 2018. Completion of a streamlining project in 2018 that increased capacity to 2 Mt/yr from 1.25 Mt/yr was cited for increased production. Further expansion of capacity to 6 Mt/yr was being considered (Vedanta Resources Ltd., 2020, p. 25, 185).

In April, Hindalco Industries Ltd. shut down production from its alumina refinery in Muri, citing a spill from its red mud storage impound. The 450,000-t/yr alumina refinery restarted production in December. Decreased production from the Muri refinery partially was offset by increased production from the Utkal refinery, which was increasing capacity to 2 Mt/yr from 1.5 Mt/yr. Completion of the expansion project was expected in 2020 (Hindalco Industries Ltd., 2019a, p. 5, 17; 2019b, p. 6, 18, 27; 2020, p. 17, 25; Lim, 2019a).

National Aluminium Co. Ltd. of India (Nalco) continued expanding the capacity of its alumina refinery in Damanjodi to 3.28 Mt/yr from 2.28 Mt/yr. Preliminary site work started in December 2017 with completion expected in April 2021. Nalco continued planning a mine to develop the Pottangi bauxite deposit after being granted mining rights by the Odisha State government in 2016. Completion of the mine was expected in 2022 (National Aluminium Co. Ltd., 2018, p. 4; 2019; 2020).

Anrak Aluminium Ltd. continued to delay the start of its 1.5-Mt/yr alumina refinery in Rachapalle, Andhra Pradesh State that was completed in 2013. The refinery also had a captive 225-megawatt powerplant. The refinery was built to consume bauxite from Andhra Pradesh Mineral Development Corporation Ltd.'s (APMDC) Jerella deposit in Andhra Pradesh State, but APMDC had not received the necessary permit to start mining. In April 2017, the government of Andhra Pradesh State canceled the bauxite supply agreement between APMDC and Anrak. In June, the government of Andhra Pradesh State ended permission to mine in the tribal areas of Eastern Ghats. Bauxite reserves in Andhra Pradesh State were estimated to be 600 Mt and the Eastern Ghats region had some of the biggest deposits. Anrak was reported to be seeking bauxite supplies from mines

in other parts of India but concerns about the company's finances were preventing the refinery from being commissioned (Sukumar, 2017; Sarma, 2018; CRU Bauxite and Alumina Weekly, 2019a; Patnaik, 2019).

Indonesia.—Alumina production was estimated to be 1 Mt in 2019, 19% more than the revised amount in 2018, compared with 917,000 t in 2017, 600,000 t in 2016, and 70,000 t in 2015. Bauxite production was estimated to be 17 Mt in 2019, an increase of 55% compared with 11 Mt in 2018, 2.9 Mt in 2017, 1.4 Mt in 2016, 472,000 t in 2015, 2.56 Mt in 2014, and 57 Mt in 2013, as the Government permitted more bauxite exports. A ban on exporting bauxite and other unprocessed mineral ores took effect on January 12, 2014. The export ban was part of the 2009 Mining Law intended to increase economic development in the country through investment in mineral-processing facilities (Yee, 2014). Exports of bauxite resumed in July 2017 for the first time since the ban started in 2014. The Government issued export licenses to PT Aneka Tambang Tbk (Antam) and PT Bintan Alumina Indonesia Ltd. (Bintan) so that they could use proceeds of bauxite sales to finance construction of alumina refineries. The permit system was scheduled to end in January 2022 and permits previously issued to companies that did not make significant progress on alumina refineries were revoked (Ghilotti, 2017; Lim, 2017; Mok, 2017b; CRU Bauxite and Alumina Monitor, 2019c).

Bintan continued construction of a 1-Mt/yr alumina refinery in Galang Batang, Riau Islands Province. Construction started in December 2018 and completion was scheduled for early 2021. Bintan was a joint venture among Shandong Nanshan Aluminum Co. Ltd. (China) (94%), Redstone Alumina International Pte. (Australia) (5%), and PT Makhota Karya Utama (1%). The alumina produced at the refinery would be exported. The refinery would use bauxite from Kalimantan Province and Riau Islands Province. Further expansion to 2 Mt/yr was planned (China Metal Market—Alumina and Aluminum, 2019g; Wong, 2019; Panama, 2020).

In April, Antam started construction of a 1-Mt/yr alumina refinery in Mempawah, West Kalimantan Province, with PT Indonesia Asahan Aluminium Tbk (Inalum). Completion of the refinery was scheduled in 2022. Expansion to 2 Mt/yr would begin after production of the first phase was ramped up. The refinery would supply Inalum's aluminum smelter in Asahan, North Sumatra Province, which Inalum planned to expand to 500,000 t/yr from 250,000 t/yr by yearend 2020 (PT Aneka Tambang Tbk, 2019, p. 343; 2020, p. 20, 132, 295; PT Indonesia Asahan Aluminium Tbk, 2019).

Hongfa Winning Alumina Co. Ltd. was planning to expand capacity of its alumina refinery to 2 Mt/yr from 1 Mt/yr. A loan to finance construction of the project was obtained in November and construction was expected to be completed by yearend 2020. Hongfa Winning Alumina was a joint venture of Hongqiao Group (60%) and Harita Jayaraya (40%). The first stage of the alumina refinery was completed in 2016 (China Metal Market—Alumina and Aluminum, 2020a).

Jamaica.—Alumina production decreased by 13% (311,000 t) and bauxite production decreased by 10% (1.04 Mt) compared with that in 2018, attributed to disruptions at two refineries. A power outage on April 14 was cited for the temporary shutdown

of the Jamalco Ltd. alumina refinery in Halse Hall, Clarendon. Production resumed by early May. The Jamalco refinery, a joint venture between Noble Group Ltd. (55%) and Clarendon Alumina Production Ltd. (45%), had 1.425 Mt/yr of capacity (Jamalco Ltd., 2019; Lim and others, 2019).

In October, Jiuquan Iron and Steel Co. (JISCO) suspended production from the Alpart alumina refinery and the adjacent bauxite mine for a modernization project at the refinery after numerous operational issues at the refinery. The refinery's capacity was 1.65 Mt/yr and the capacity of the bauxite mine was 4.9 Mt/yr, but the refinery only produced 800,000 to 900,000 t in 2018. JISCO cited high production costs, difficulty obtaining spare parts for its aging equipment, low alumina prices, and safety issues as reasons for the project. The project was scheduled to be completed in 18 to 24 months and would increase the refinery capacity to 2 Mt/yr (Aluminium Insider, 2019; Lim, 2019b; Mason, 2019a; Mok, 2019).

Laos.—Sino Lao Aluminum Corp. Ltd. (Slaco) planned to develop a bauxite deposit in Attepeu and Sekong Provinces. Chalco was a partner in the project with Slaco. An alumina refinery with 550,000 t/yr of capacity was also planned as part of the project. Slaco signed an agreement with a Chalco subsidiary for construction of the refinery in September. Construction would take about 2 years but start of construction permits had not been issued by yearend (Leung, 2018; China Metal Market—Alumina and Aluminum, 2019h).

Malaysia.—Bauxite production increased to 901,000 t from the revised 590,000 t in 2018, 2 Mt in 2017, 3 Mt in 2016, and 35 Mt in 2015. The Government ended a ban on bauxite mining effective March 31 and regulations on mining and storage of bauxite were enacted. Bauxite exports were limited to 600,000 metric tons per month, buffer zones were established between mines and residential areas, and mining licenses would be required. Bauxite mining was banned in January 2016 by the Government, citing pollution from unpermitted mines and uncovered storage facilities at ports. After the Government of Indonesia banned the export of bauxite and other unprocessed mineral ores at the start of 2014, bauxite mines in Malaysia increased production to gain market share. Bauxite exports from Malaysia were nearly 3.5 million metric tons per month before the ban was imposed. After bauxite mining was banned, exports of bauxite stockpiled at uncovered storage areas were still permitted (Radford, 2016; CRU Bauxite and Alumina Weekly, 2019b; Decena, 2019).

Altech Chemicals Ltd. (Australia) started construction in January of a 4,500-t/yr refinery in Johor Bahru to produce high-purity (99.99%) alumina. Feedstock would be sourced from a high-alumina clay deposit in Western Australia, Australia. Altech planned to sell the high-purity alumina for use in electronics and other high-tech products. Completion of the refinery was scheduled by yearend 2020 (Altech Chemicals Ltd., 2019, p. 5–7; 2020, p. 2, 5).

Russia.—RUSAL completed development of the Cheremukhovskaya-Glubokaya Mine. A shaft 1.5 kilometers deep accessed the underground bauxite deposit. The mine is part of RUSAL's North Urals Mine Complex, which had a total capacity of 3.4 Mt/yr (CRU Bauxite and Alumina Monitor, 2019e).

United Arab Emirates.—In April, EGA started alumina production at the 2-Mt/yr Al Taweelah alumina refinery. In August, EGA started shipping bauxite from its 12-Mt/yr mine in Guinea to the United Arab Emirates. The mine in Guinea would be the principal bauxite supplier to the refinery and surplus bauxite would be sold to other consumers (CRU Bauxite and Alumina Monitor, 2019b; Emirates Global Aluminium PJSC, 2019a, b).

Outlook

Consumption of bauxite and alumina is expected to closely follow the trend of aluminum production. Consumption of aluminum for aircraft, automobiles, and construction is expected to decline with decreased economic activity resulting from the coronavirus disease 2019 (COVID-19) pandemic that emerged in China late in 2019. In the longer term, world demand for aluminum is expected to increase as the global economy recovers and aluminum products become more accessible to consumers in developing economies. 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 use high-alumina clay instead of bauxite as the raw material for their processes, as higher purity levels can be obtained using high-alumina clay.

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TABLE 1
SALIENT BAUXITE STATISTICS¹

(Thousand metric tons)

	2015	2016	2017	2018	2019
United States:					
Production	W	W	W	W	W
Exports, as shipped:					
Crude and dried	4	5	5	4 ^r	3
Calcined	10	20	14	7	7
Total	14	25	19	11 ^r	10
Imports for consumption, as shipped:					
Crude and dried	10,700	5,100	3,530	3,330 ^r	3,570
Calcined	485	548	478	376 ^r	430
Total	11,200	5,650	4,010	3,710 ^r	4,000
Consumption, dry equivalent	11,200	6,630	4,330	4,460	3,920
World, production	294,000 ^r	286,000 ^r	307,000 ^r	339,000 ^r	358,000 ^e

^eEstimated. ^rRevised. W Withheld to avoid disclosing company proprietary data.

¹Table includes data available through September 23, 2020. Data are rounded to no more than three significant digits; may not add to totals shown.

TABLE 2
SALIENT ALUMINA STATISTICS¹

(Thousand metric tons)

	2015	2016	2017	2018	2019
United States:					
Production:					
Calcined alumina	4,130	2,000	1,200	1,040	925
Other alumina ²	617 ^r	570 ^r	770	810	750
Total:					
As produced or shipped ³	4,750	2,570	1,970	1,850	1,680
Calcined equivalent	4,550	2,360	1,430	1,570	1,410 ^e
Shipments:					
Calcined alumina	4,100 ^r	2,050	1,220	1,090 ^r	925
Other alumina ²	627 ^r	577 ^r	781	810	750
Total:					
As produced or shipped ³	4,730 ^r	2,630 ^r	2,000	1,900 ^r	1,680
Calcined equivalent	4,520 ^r	2,410	1,450	1,610 ^r	1,410 ^e
Stocks, yearend ^{4,5}	274	320	264	275	275
Imports for consumption ⁵	1,570	1,140	1,330	1,530	1,930
Exports ⁵	2,210	1,330	481	288	200
Consumption, apparent ^{5,6}	3,920	2,130	2,340	2,800	3,140
World, production ⁵	119,000	121,000	129,000	131,000	133,000

^eEstimated. ^rRevised.

¹Table includes data available through September 23, 2020. Data are rounded to no more than three significant digits.

²Trihydrate, activated, tabular, and other aluminas. Excludes calcium and sodium aluminates.

³Includes only the end product if one type of alumina was produced and used to make another type of alumina.

⁴Excludes consumers stocks other than those at primary aluminum smelters.

⁵Calcined equivalent.

⁶Defined as domestic production plus imports minus exports plus adjustments for industry stock changes.

TABLE 3
CAPACITIES OF DOMESTIC ALUMINA PLANTS, DECEMBER 31¹

(Thousand metric tons per year)

Company and plant	2018	2019
Alcoa Corp., Point Comfort, TX ²	2,300	--
Noranda Alumina LLC, Gramercy, LA	1,200	1,200
Almatis Inc., Burnside, LA	500	500
Total	4,000	1,700

-- Zero.

¹Table includes data available through September 23, 2020. Data are rounded to no more than three significant digits; may not add to totals shown. Capacity may vary depending on the bauxite used.

²Permanently shut down in December 2019; had been temporarily shut down since March 2016.

TABLE 4
U.S. CONSUMPTION OF BAUXITE, BY INDUSTRY¹

(Thousand metric tons, dry equivalent)

Industry	2018	2019
Alumina	3,670	3,470
Other ²	796	450
Total	4,460	3,920

¹Table includes data available through September 23, 2020.

Data are rounded to no more than three significant digits; may not add to totals shown.

²Includes abrasive, chemical, and refractory uses.

TABLE 5
AVERAGE VALUE OF U.S. IMPORTS OF CRUDE AND DRIED BAUXITE¹

(Dollars per metric ton)

Country or locality	2018		2019	
	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
Brazil	57.56	57.66	54.95	55.05
Jamaica ⁴	25.00 ^r	30.24 ^r	25.05	30.64
Weighted average ⁵	31.48 ^r	35.70 ^r	32.11	36.40

^rRevised.

¹Table includes data available through September 23, 2020. 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.

²Free alongside ship valuation.

³Cost, insurance, and freight valuation.

⁴Based on quantity reported by the Jamaica Bauxite Institute.

⁵Weighted average of major suppliers.

TABLE 6
AVERAGE VALUE OF U.S. IMPORTS OF ALUMINA¹

(Dollars per metric ton)

	2018	2019
January	545	507
February	626	523
March	463	554
April	525	708
May	916	470
June	645	553
July	620	446
August	594	427
September	608	492
October	950	387
November	673	348
December	909	510
Weighted average ²	612	480

¹Table includes data available through September 23, 2020. Metallurgical grade; cost, insurance, and freight valuation. Computed from quantity and value data reported to U.S. Customs and Border Protection and compiled by the U.S. Census Bureau.

²Weighted average of major suppliers.

TABLE 7
REFRACTORY-GRADE BAUXITE PRICES¹

(Dollars per metric ton)

Material	2018	2019
China:		
Xingang, rotary kiln, lump 86% Al ₂ O ₃	430–450	390–410
Xingang, round kiln, lump 87% Al ₂ O ₃	450–490	420–430

¹Table includes data available through September 23, 2020. Port of shipment, free-on-board ship valuation, yearend.

Source: Industrial Minerals.

TABLE 8
U.S. EXPORTS AND IMPORTS FOR CONSUMPTION
OF BAUXITE, CRUDE AND DRIED, BY COUNTRY OR LOCALITY¹

(Thousand metric tons)

Country or locality	2018	2019
Exports:		
Canada	3	2
Other	2	1
Total	4 ^r	3
Imports:		
Brazil	637	806
Guinea	--	53
Jamaica ²	2,570	2,610
Turkey	84	91
Other	43 ^r	7
Total	3,330 ^r	3,570

^rRevised. -- Zero.

¹Table includes data available through April 13, 2020. Data are rounded to no more than three significant digits; may not add to totals shown.

²Data 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: 2018—0.76 million metric tons (Mt) and 2019—0.96 Mt.

Source: U.S. Census Bureau.

TABLE 9
U.S. EXPORTS AND IMPORTS FOR CONSUMPTION OF CALCINED BAUXITE, BY COUNTRY OR LOCALITY¹

(Thousand metric tons and thousand dollars)

Country or locality	2018				2019			
	Refractory grade		Other grade		Refractory grade		Other grade	
	Quantity	Value ²	Quantity	Value ²	Quantity	Value ²	Quantity	Value ²
Exports:								
Canada	5	1,780	--	--	4	1,810	--	--
Mexico	1	342	--	--	1	527	(3)	5
Other	1	658	(3)	42	2	923	(3)	14
Total	7	2,780	(3)	42	7	3,260	(3)	19
Imports:								
Australia	--	--	115	4,020	--	--	213	7,510
China	43	16,300	10	4,410	17	7,490	12	5,360
Guyana	58	22,800	146	13,000	52	16,200	133	14,000
India	1	340	1	400	(3)	48	--	--
Other	(3) ^r	194 ^r	1 ^r	333 ^r	1	401	4	386
Total	103 ^r	39,600	274 ^r	22,200	69	24,200	361	27,200

^rRevised. -- Zero.

¹Table includes data available through April 16, 2020. Data are rounded to no more than three significant digits; may not add to totals shown.

²Value at foreign port of shipment as reported to U.S. Customs and Border Protection.

³Less than ½ unit.

Source: U.S. Census Bureau; data adjusted by U.S. Geological Survey.

TABLE 10
U.S. EXPORTS AND IMPORTS FOR CONSUMPTION OF ALUMINA,
BY COUNTRY OR LOCALITY¹

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

Country or locality	2018		2019	
	Quantity	Value ²	Quantity	Value ²
Exports:				
Canada	34	41,600	30	37,000
China	26	46,700	5	43,400
Iceland	(3)	58	21	8,690
India	9	13,900	7	11,100
Mexico	59	58,100	42	42,400
Netherlands	29	30,200	15	23,000
Norway	26	15,300	(3)	273
Russia	(3)	1,120	1	2,680
United Arab Emirates	1	1,590	1	1,160
Venezuela	56	29,100	21	7,820
Other	47 ^r	155,000	58	214,000
Total	288	393,000	200	391,000
Imports:				
Australia	293	145,000	459	171,000
Brazil	858	421,000	1,010	399,000
Canada	89	61,100	79	59,700
China	40	52,200 ^r	48	61,100
France	21	40,700 ^r	19	33,500
Germany	48	108,000	27	87,000
India	10	8,040	12	10,700
Jamaica ⁴	141	52,500 ^r	217	80,500
Other	28	67,900	57	86,700
Total	1,530	956,000	1,930	989,000

^rRevised.

¹Table includes data available through April 17, 2020. Data are rounded to no more than three significant digits; may not add to totals shown.

²Value at foreign port of shipment as reported to U.S. Customs and Border Protection.

³Less than ½ unit.

⁴Data from the Jamaica Bauxite Institute.

Source: U.S. Census Bureau.

TABLE 11
BAUXITE: WORLD PRODUCTION, BY COUNTRY OR LOCALITY¹

(Thousand metric tons)

Country or locality	2015	2016	2017	2018	2019
Australia	80,909	83,517	89,421	95,948 ^r	105,176
Bosnia and Herzegovina	787	641	700	700 ^e	700 ^e
Brazil ²	37,057	39,244	38,072 ^r	32,007 ^r	34,000 ^e
China	60,790 ^r	68,620 ^r	68,390 ^r	79,000 ^e	70,000 ^e
Côte d'Ivoire	--	--	--	400 ^e	750 ^e
Dominican Republic	1,724	7	--	--	--
Fiji	121	117	60	60	--
Ghana	1,026	1,144	1,477	1,011 ^r	1,200 ^e
Greece ²	1,832	1,880	1,927	1,607 ^r	1,700 ^e
Guinea ²	16,303	31,500	46,160	57,000 ^e	67,000 ^e
Guyana ²	1,498	1,480	1,481	1,924 ^r	1,900 ^e
Hungary	8	17	4 ^r	5 ^r	5 ^e
India	27,757	23,886	22,803	23,229 ^r	23,000 ^e
Indonesia	472	1,400	2,900 ^e	11,000 ^e	17,000 ^e
Iran ²	862	766 ^e	735 ^e	700 ^e	800 ^e
Jamaica ²	9,629	8,540	8,245	10,058	9,022
Kazakhstan	4,683	4,801	4,846	5,700 ^r	5,800 ^e
Malaysia	35,000 ^e	3,000 ^e	2,000 ^e	590 ^r	901
Montenegro	50	667	928	468 ^r	775
Mozambique	5	1	3	10 ^r	5 ^e
Pakistan	31	90	103 ^r	121 ^r	125 ^e
Russia	5,900	5,431	5,523	5,651	5,574
Saudi Arabia	1,148	3,843	3,708	3,885	4,050 ^e
Sierra Leone	1,334	1,369	1,788	1,938 ^r	1,884
Solomon Islands	292	238	1,503	1,609	1,161
Suriname	1,600	--	--	--	--
Tanzania	50 ^{r,e}	73	12	7 ^r	10 ^e
Turkey	1,050	1,000	941	1,000 ^e	1,000 ^e
United States	W	W	W	W	W
Venezuela	992	909	550 ^e	--	--
Vietnam ^e	1,150	1,420	2,800 ^r	3,500 ^r	4,000
Total	294,000 ^r	286,000 ^r	307,000 ^r	339,000 ^r	358,000 ^e

^eEstimated. ^rRevised. W Withheld to avoid disclosing company propriety data. -- Zero.

¹Table includes data available through July 6, 2020. All data are reported unless otherwise noted. Totals and estimated data are rounded to no more than three significant digits; may not add to totals shown.

²Dry bauxite equivalent of crude ore.

TABLE 12
ALUMINA: WORLD PRODUCTION, BY COUNTRY OR LOCALITY^{1,2}

(Thousand metric tons)

Country or locality	2015	2016	2017	2018	2019
Australia	20,097	20,681	20,486	20,062 ^r	20,192
Bosnia and Herzegovina	251	188	238	262 ^r	250 ^e
Brazil	10,452	10,886	11,061 ^r	8,258 ^r	8,700 ^e
Canada	1,561	1,566	1,570	1,568	1,522
China	58,978	61,034 ^r	69,017	72,531	72,474
France ^e	300	300	300	300	300
Germany	1,910	1,900 ^e	1,900 ^e	1,900 ^e	1,900 ^e
Greece	807	821	821	827 ^r	830 ^e
Guinea	--	--	--	182	368
Hungary	255	274	273	265 ^r	270 ^e
India	5,512	6,028	6,055	6,430	6,690
Indonesia	70	600 ^e	917 ^r	843 ^r	1,000 ^e
Iran	241	250 ^e	240 ^e	240 ^e	250 ^e
Ireland	1,983	1,967	1,937	1,874	1,893
Jamaica	1,865	1,865	1,782	2,484	2,173
Japan ^e	15	18	20	20	20
Kazakhstan	1,448	1,500	1,509	1,481 ^r	1,500 ^e
Romania	405	467	473	572 ^r	461
Russia	2,593	2,682	2,822	2,763	2,755
Saudi Arabia	846	1,429	1,484 ^r	1,774 ^r	1,839
Spain	1,633	1,579	1,588	1,589	1,595
Suriname	748	--	--	--	--
Turkey	294	305	300 ^e	300 ^e	300 ^e
Ukraine	1,481	1,510	1,676	1,715	1,690
United Arab Emirates	--	--	--	--	1,100
United States	4,550	2,360	1,430	1,570	1,410 ^e
Venezuela	465	301	240 ^e	--	--
Vietnam	660	602	1,062 ^r	1,329 ^r	1,368
Total	119,000	121,000	129,000	131,000	133,000

^eEstimated. ^rRevised. -- Zero.

¹Table includes data available through June 25, 2020. All data are reported unless otherwise noted. Totals, U.S. data, and estimated data are rounded to no more than three significant digits; may not add to totals shown.

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