



2018 Minerals Yearbook

BAUXITE AND ALUMINA [ADVANCE RELEASE]

BAUXITE AND ALUMINA

By E. Lee Bray

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

In 2018, almost all of the 4.46 million metric tons (Mt) of bauxite consumed in the United States was imported. World production of bauxite was approximately 327 Mt (tables 1, 11); the leading producing countries were, in descending order of production, Australia, China, Guinea, Brazil, and India. U.S. production and shipments of alumina (calcined equivalent) were 1.57 Mt each and increased after declining the previous 2 years (table 2). Alumina production (calcined equivalent) increased by 10% compared with that in 2017. Alumina shipments (calcined equivalent) increased by 8% compared with those in 2017. An estimated 64% of domestic alumina consumption was for metal production. World production of alumina (calcined equivalent) was approximately 131 Mt (tables 2, 12). The leading producing countries were, in descending order of production, China, Australia, Brazil, and India.

Legislation and Government Programs

On April 6, 2018, the U.S. Department of the Treasury, in consultation with the U.S. Department of State, designated several Russian individuals and businesses for sanctions in response to activities of the Government of Russia. Among those designated were United Company RUSAL Plc, EN+ Group (which owns and controls RUSAL), and the chief executive officer of RUSAL. RUSAL owned all alumina refineries, bauxite mines, and primary aluminum smelters in Russia. All assets subject to U.S. jurisdiction of those sanctioned were frozen, and American citizens and companies were generally prohibited from doing business with sanctioned individuals or businesses. RUSAL petitioned the U.S. Department of the Treasury to remove the sanctions against its products. The U.S. Department of the Treasury authorized a winddown period until June 5, 2018, for contracts and deliveries, but payments were required to be deposited into frozen accounts in financial institutions in the United States. The winddown period was extended several times to January 21, 2019. In September 2018, the U.S. Department of the Treasury allowed companies that had imported from RUSAL in 2018 to import similar amounts in 2019 (Roh, 2018; U.S. Department of the Treasury, 2018a–c; Yang, 2018).

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 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, increased by 10% in 2018 from that in 2017 to 1.57 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 both domestic alumina refineries, neither of which responded, and alumina production was estimated based on bauxite imports.

Noranda Alumina LLC (a subsidiary of New Day Aluminum LLC) completed an upgrade project at its 1.2-million-metric-ton-per-year (Mt/yr) refinery in Gramercy, LA, to convert 200,000 metric tons per year (t/yr) of metallurgical-grade alumina capacity to produce 800,000 t/yr of chemical-grade alumina. The upgraded production capacity would be ramped up in early 2019. Installation of new red mud filtering technology would also be part of the modernization project and would significantly expand red mud storage capacity at the refinery (Aluminium Insider, 2018b; Maltais, 2018).

Almatis Inc. produced alumina for nonmetallurgical uses at its 500,000-t/yr refinery in Burnside, LA. Alcoa Corp.’s 2.3-Mt/yr alumina refinery in Point Comfort, TX, was temporarily shut down in March 2016.

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 2018 did not respond and bauxite consumption was estimated based on import data.

Total domestic consumption of bauxite increased by 3% compared with the amount in 2017 (table 1). In 2018, 82% of the bauxite consumed in the United States was refined to alumina; the remaining 18% was consumed in nonmetallurgical applications. An estimated 2.34 metric tons (t) of dried bauxite was required to produce 1 t of alumina (tables 2, 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 64% 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 2018, seven domestic primary aluminum smelters consumed 1.78 Mt of alumina, 20% more than the amount of alumina consumed in 2017. Restarts of smelting capacity at three smelters accounted for much of the increased alumina consumption compared to that of the prior year. Alcoa completed ramping up 161,400 t/yr of capacity at the 269,000-t/yr Warrick primary aluminum smelter in Evansville, IN, which was restarted in

December 2017 (Alcoa Corp., 2018a). Century Aluminum Co. restarted 150,000 t/yr of capacity from three potlines that had been shut down in 2015 at the 252,000-t/yr Hawesville, KY, smelter (Century Aluminum Co., 2018). In June, Magnitude 7 Metals LLC restarted 100,000 t/yr of capacity at the 263,000-t/yr primary aluminum smelter in New Madrid, MO (Matyi, 2018a). The remainder of U.S. consumption of various forms of alumina was for abrasives, chemicals, refractories, and other specialty industries.

Prices

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

The annual average delivered value of U.S. imports of metallurgical-grade bauxite was essentially unchanged in 2018 compared with that of 2017 (table 5). In 2018, the average value of U.S. imports of calcined alumina, including cost, insurance, and freight at U.S. ports, was 20% more than in 2017 at \$612 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 are not necessarily reflective of global prices. Yearend price ranges, as quoted in *Industrial Minerals* (2018, 2019), for refractory-grade bauxite exported from China were generally lower than those at yearend 2017 (table 7).

The sanctions against RUSAL and a shutdown at the Alunorte refinery in Brazil created concerns of possible alumina shortages at many smelters and were cited as reasons for the alumina price increasing by more than 10% in the spring according to some alumina traders and industry sources. On April 13, the price for Australian alumina was reported to have increased to \$550 per metric ton from \$485 per metric ton (Lim, 2018c).

Foreign Trade

Imports of crude dry bauxite increased slightly from those in 2017 after dropping for 3 consecutive years (table 8). Imports of alumina increased by 15% and exports of alumina decreased by 40% compared with those in 2017 (table 10) as domestic primary aluminum smelters increased production. Jamaica and Brazil remained the leading sources of crude dry bauxite imports, accounting for 71% and 18%, respectively. Brazil, Australia, and Jamaica were the leading sources of alumina imports, accounting for 56%, 19%, and 9%, respectively. Mexico, Venezuela, Canada, and the Netherlands were the leading destinations for alumina exports in 2018, receiving 20%, 19%, 12%, and 10%, respectively.

World Industry Structure

Bauxite.—In 2018, world production of bauxite was 9% more than the revised amount in 2017, attributed mostly to significant increases of production in China (17 Mt), Guinea (10.8 Mt),

Indonesia (8.1 Mt), and Jamaica (1.8 Mt) that were partially offset by decreased production in Brazil (9.1 Mt), Australia (3.0 Mt), and Malaysia (1.5 Mt) (table 11). Total mine production of 327 Mt was estimated from 26 countries. The leading producers of bauxite, in decreasing order of production, were Australia, China, Guinea, Brazil, and India. These countries accounted for 84% of total world production; Australia and China together accounted for 51% of the world's production.

Alumina.—World production of alumina increased slightly in 2018 compared with that of 2017 (table 12). Increased production in China, India, and Jamaica was partially offset by decreased production in Brazil and Venezuela. Although there was production in 25 countries, the 4 leading producing countries (China, Australia, Brazil, and India, in descending order of production) accounted for 82% of world production. China and Australia accounted for 55% and 16%, respectively, of world alumina production.

World Review

Australia.—Bauxite production decreased by 3% (3.02 Mt) and alumina production was essentially unchanged compared with that in 2017. Decreased bauxite production was attributed to a labor dispute which lasted about 8 weeks. On August 8, approximately 1,600 employees represented by the Australian Workers' Union at three alumina refineries and two bauxite mines in Western Australia went on strike. The capacities of the Kwinana, Pinjarra, and Wagerup refineries were 2.2 Mt/yr, 4.2 Mt/yr, and 2.6 Mt/yr, respectively. The Huntly Mine capacity was 26 Mt/yr and the Willowdale Mine capacity was 10 Mt/yr. The mines and refineries were operated by Alcoa (60%) as part of its joint venture with Alumina Ltd. (40%). Production continued by approximately 1,900 employees not participating in the strike. On September 7, the striking workers voted against a contract proposed by the management but on September 28, they ended the strike (Alcoa Corp., 2018b; Alumina Ltd., 2018b; Faye, 2018; Lim, 2018a; Mok, 2018d).

Rio Tinto plc continued construction of the Amrun Mine in Queensland and made the first shipment of bauxite from the mine in December. Completion of the 22.8-Mt/yr bauxite mine was scheduled for March 2019. The bauxite would be shipped through the Port of Cape York and upgraded port facilities would increase export capacity by about 10 Mt/yr. Production from the Amrun Mine would replace production from the East Weipa Mine about 40 kilometers (km) away which was nearing the end of its reserves (Joanna Lim, 2019).

Metro Mining Ltd. started production from the Bauxite Hills Mine in Queensland in April. By August, the mine was producing at a rate of 2.4 Mt/yr. The mine was scheduled to reach a production rate of 3.5 Mt/yr in 2019. Further capacity expansion to 6 Mt/yr was planned by yearend 2021. The bauxite deposit reserves were reported to be 109.5 Mt (Lee, 2018; Metro Mining Ltd., 2018, 2019).

Brazil.—Bauxite production decreased by 24% (9.12 Mt) and alumina production decreased by 26% (2.91 Mt) compared with the revised amounts in 2017. Decreased bauxite and alumina production was attributed to environmental regulators' order to Norsk Hydro ASA to temporarily shut down one-half of the 6.3-Mt/yr capacity of the Alunorte alumina refinery (Barcarena,

Para State) on February 27. Heavy rainfall on February 16 and 17 resulted in high water levels in one of the refinery's waste disposal impounds. Monitoring of the impounds did not detect any leakage or failure, but the water level in one impound reached a dangerous point, prompting the order to shut down some production. On February 28, regulators also ordered Norsk Hydro to stop using one of the two tailing impounds at the 9.9-Mt/yr mine located approximately 250 km west of the refinery because of high water levels after the heavy rainfall. On October 3, the mine and refinery shut down all capacity for a few weeks when the red mud impoundment reached its maximum capacity. However, production was restarted at one-half of the capacity at the end of October when permits to use a new impoundment and filter press were issued. At yearend, the mine and refinery were producing at one-half of capacity while the company waited for approval to restart the other one-half of capacity. Norsk Hydro also shut down 230,000 t/yr of capacity at the adjacent 460,000-t/yr Albras primary aluminum smelter in April citing a shortage of alumina resulting from the refinery shutdown (Lim, 2018b, d; Norsk Hydro ASA, 2018a–d).

An expansion project, started in 2016, was completed at the Juruti Mine, increasing capacity to 6.5 Mt/yr from 5.7 Mt/yr. The mine was a joint venture of Alcoa (60%) and Alumina Ltd. (40%) (Alumina Ltd., 2018a, p. 8, 26, 28; 2019, p. 19).

Canada.—Orbite Technologies Inc. was repairing equipment that failed during trial production from its high-purity alumina refinery in Cap-Chat, Quebec. Trial production from the 3-metric-ton-per-day plant was halted in March after 2 months owing to equipment issues. Inspection of the plant's calciner identified problems with the heating system. As a result of the shutdown and equipment issues, Orbite filed for protection under the Bankruptcy and Insolvency Act in April. In addition to high-purity alumina, Orbite's plant was designed to produce gallium, iron oxide, rare-earth elements, and high-purity silica from high-alumina clay (Orbite Technologies Inc., 2017, 2018).

China.—Alumina production increased by 5% (3.51 Mt) to 72.5 Mt, compared with that in 2017 (table 12). The increased production was attributed to production from new capacity and restarts of capacity at several refineries that had been temporarily shut down to comply with environmental regulations. Alumina capacity at yearend 2018 was estimated to be 83.4 Mt/yr, a 3% increase from 81 Mt/yr at yearend 2017. Approximately 73.5 Mt/yr of capacity was in use at yearend. Although new capacity was added, some startups were delayed until permits were issued and because of limited bauxite supplies at some refineries in the northern part of the country. Many of the new alumina refineries under construction or planned for construction were located in port cities rather than adjacent to inland bauxite deposits. Stricter enforcement of environmental regulations and decreasing quality of bauxite reserves discouraged new refineries in many inland cities while availability of abundant bauxite imports made port locations more attractive. China imported 511,000 t of alumina, 82% less than the 2.86 Mt imported in 2017. The leading sources of alumina imports, in descending order, were Australia (49%) and Indonesia (12%). China exported 1.46 Mt of alumina in 2018 compared with 56,000 t in 2017, as the alumina price in the world market increased in response to refinery shutdowns in

Australia and Brazil. China imported 82.6 Mt of bauxite, 20% more than the 68.6 Mt imported in 2017. The leading sources of bauxite imports, in descending order, were Guinea (46%), Australia (36%), and Indonesia (9%). Imports from Australia, Guinea, and Indonesia increased by 4.29 Mt (17%), 10.6 Mt (38%), and 6.25 Mt (483%), respectively, compared with those in 2017, accounting for the increased imports. These increases were partially offset by decreased imports from Brazil (by 1.71 Mt), India (by 1.47 Mt), and Malaysia (by 4.22 Mt) (China Metal Market—Alumina and Aluminum, 2018g, i, j, 2019c, d; Mok, 2018b).

The Government of China ordered alumina refineries and aluminum smelters in certain regions to shut down 30% of capacity from November 15, 2017, until March 15, 2018. The order to shut down capacity cited environmental concerns about pollution produced by refineries, smelters, and powerplants during the winter. Refineries and smelters in 31 cities, mainly in the central and eastern Provinces, were affected by the order. When the restrictions expired, some of the capacity affected by the policy was restarted. The Government instituted a similar shutdown from October 1, 2018, to March 31, 2019, to reduce pollution during the winter, requiring alumina refineries and aluminum smelters in 26 cities to close 30% of their capacity (Hotter, 2017; Mok, 2017a, 2018a; China Metal Market—Alumina and Aluminum, 2018a, h, k).

Guangxi Zhuang Autonomous Region.—The Nanning municipal government announced a ban on new bauxite mines with less than 300,000 t/yr of capacity. Environmental reasons were cited for the ban. Bauxite reserves in the area were estimated to be 147 Mt (Leung, 2018b).

Jingxi Tianguai Aluminum Co. Ltd. continued construction on an alumina refinery in Jingxi. The 800,000-t/yr refinery was expected to be completed by yearend and further expansion to 2.5 Mt/yr was planned. Construction of the refinery started in September 2017 (China Metal Market—Alumina and Aluminum, 2018f).

In September, Guangxi Huasheng New Material Co. Ltd. started construction of a 2-Mt/yr alumina refinery in Fangchenggang. The refinery was scheduled to be completed by April 2020. Expansion of the alumina refinery to 4 Mt/yr and an adjacent 1-Mt/yr aluminum smelter, rolling mill, and captive coal-fired powerplant were also planned and would be completed in 2022. Aluminum Corp. of China Ltd. (Chinalco) owned 51% of the joint venture with several other partners (China Metal Market—Alumina and Aluminum, 2017a, 2018f; Leung, 2018a).

Guizhou Province.—Guizhou Galuminium Aluminum Co. Ltd. was expanding the capacity of its alumina refinery in Qingzhen to 1.5 Mt/yr from 800,000 t/yr. The project was scheduled for completion by yearend 2019. Further expansion to 2.7 Mt/yr was planned but construction was not scheduled. China Power Investment Corp. (CPI) started production from the Wachangping Mine in May. The capacity of the underground bauxite mine was 1 Mt/yr, which would supply an alumina refinery in Zunyi that started production in September. Capacity of the alumina refinery was approximately 500,000 t/yr (China Metal Market—Alumina and Aluminum, 2018c, 2019a).

Henan Province.—In July, Henan Xiangjiang Wanji Co. Ltd. shut down 800,000 t/yr of capacity at its 2.4-Mt/yr alumina

refinery. A reason was not cited for the shutdown (China Metal Market—Alumina and Aluminum, 2018d).

Liaoning Province.—In March, Bosai Minerals Group Ltd. started construction of an alumina refinery in Gaizhou. The capacity of the refinery would be 2.5 Mt/yr and completion was expected by October 2019. The refinery would consume bauxite from a mine in Ghana owned by Bosai (China Metal Market—Alumina and Aluminum, 2018b; Mok, 2018a).

Jingoutou Development Co. Ltd., Jinzhou Port Co. Ltd., and CPI were building an alumina refinery in Jinzhou. Construction of the first phase started in October and was scheduled to be completed in June 2020. Full capacity was expected to be 10 Mt/yr when the project was completed. Capacity of the first phase was estimated to be 2.5 Mt/yr (China Metal Market—Alumina and Aluminum, 2018c).

Shandong Province.—Shandong Weiqiao Group Ltd. completed construction of a 1.2-Mt/yr expansion of its refinery during the year, but startup was delayed. A company spokesperson said that a startup date had not been set by yearend. Market sources said that permits for startup had not been issued before yearend (Mok, 2018b). East Hope Group Ltd. expanded its alumina refinery in Jinzhou, Lingshi County, to 2 Mt/yr from 1 Mt/yr. The new capacity was started in October (China Metal Market—Alumina and Aluminum, 2018c).

Shanxi Province.—Shandong Xina Group Ltd. was increasing capacity of its alumina refinery in Xiaoyi to 3 Mt/yr from 1.8 Mt/yr. Production from some of the new capacity started in September and further expansion to 4.2 Mt/yr was planned but a construction schedule was not available. In October, Shandong Chipping Xinfu shut down production from 1.4 Mt/yr of capacity at the 2.8-Mt/yr Jiaokou refinery, citing a shortage of bauxite. In September, East Hope started production from a new alumina refinery with approximately 1.2 Mt/yr of capacity in Jinzhong (China Metal Market—Alumina and Aluminum, 2018e, f; Mok, 2018b, c).

Côte d'Ivoire.—Lagune Exploitation Afrique Ltd. was developing a bauxite mine near Benene. The mine capacity was 750,000 t/yr from a deposit with 34.5 Mt of reserves. Further development to construct an alumina refinery was being considered (Mieu, 2018).

Guinea.—Bauxite production increased by 23% (10.8 Mt) compared with that in 2017 and by 250% (40.7 Mt) compared with that in 2015 (table 11). Increased bauxite production was attributed partially to the restart of the 2.1-Mt/yr bauxite mine adjacent to the 650,000-t/yr alumina refinery at Friguia which was restarted in May. RUSAL shut down the refinery in 2012 owing to low alumina prices. The refinery produced at one-half of its 650,000-t/yr capacity, and RUSAL reported producing 182,000 t of alumina by yearend. However, RUSAL planned to produce alumina at a rate of 550,000 to 600,000 t/yr once rampup was completed by midyear 2019. RUSAL also started shipments of bauxite from the Dian-Dian Mine. The capacity of the new mine was 3 Mt/yr and further expansion to 9 Mt/yr was planned for completion in 2021 (Blamey, 2018; Flaws, 2018; United Company RUSAL Plc, 2018, 2019).

Alufer Mining Ltd. [Guernsey (United Kingdom)] completed construction of the 5.5-Mt/yr Bel Air Mine and production started in June. The first shipment of bauxite was made in

August from a nearby port facility constructed as part of the project. Construction of the mine started in January 2017 (Alufer Mining Ltd., 2018).

Guinea Alumina Corp., a subsidiary of Emirates Global Aluminium PJSC (EGA) (United Arab Emirates), continued development of a 12-Mt/yr bauxite mine in the Boke region and at yearend construction was 75% complete. Trial production started with shipments to EGA's new alumina refinery in the United Arab Emirates, and commercial production was scheduled to start in the second half of 2019. Construction of support facilities at the port in Kamsar were completed in 2016 (Emirates Global Aluminium PJSC, 2018a; Radford, 2018).

In October, Aluminum Corp. of China (Chalco) started construction of a 12-Mt/yr bauxite mine in Boffa. In June, a joint-venture agreement was signed between Chalco (95%) and the Government of Guinea (5%) for the bauxite deposit which had resources of 1.75 billion metric tons grading 39.1% alumina. Further expansion to 40 Mt/yr was planned, and the mine life was expected to be at least 60 years. Production from the mine was expected to start in December 2019 (Leung, 2018a).

Alliance Minière Responsable SAS and SMB Winning Consortium (a joint venture among Hongqiao Group Ltd., Shandong Yantai Port Corp., United Mining Supply plc, and Winning International Group Ltd.) continued a feasibility study to develop a bauxite deposit in the Boke region. Initial mine capacity would be 5 Mt/yr and expansion to 10 Mt/yr was planned. A construction schedule was not available (China Metal Market—Alumina and Aluminum, 2017b; Alliance Minière Responsable SAS, undated).

India.—Production of alumina increased by 6%, and bauxite production increased slightly compared with production in 2017 (tables 11, 12). Vedanta Resources Ltd. (United Kingdom) increased alumina production at the 1.25-Mt/yr Lanjigarh alumina refinery by about 20% compared with that in 2017. Streamlined processes were cited as the reason for increased production (Vedanta Resources Ltd., 2018a, p. 10; 2018b, p. 9; 2019, p. 12).

National Aluminium Co. Ltd. (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 also started development of the Pottangi bauxite deposit after being granted mining rights from the Odisha State government in 2016. Completion of the mine was expected in April 2022 (National Aluminium Co. Ltd., 2018, p. 4).

Hindalco Industries Ltd. started construction of an expansion project on the Utkal alumina refinery. Capacity would increase to 2 Mt/yr from 1.5 Mt/yr. Completion was expected by yearend 2020 (Hindalco Industries Ltd., 2018).

Anrak Aluminium Ltd. continued to seek bauxite for its 1.5-Mt/yr alumina refinery in Rachapalle, Andhra Pradesh State, that was completed in 2013 but had never started production. 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. Anrak was

seeking bauxite supplies from mines in Gujarat and Odisha States as well as bauxite imported from Australia, Guinea, and Indonesia (Sukumar, 2017; Sarma, 2018).

Indonesia.—Bauxite production was 11 Mt in 2018 compared with 2.9 Mt in 2017, 1.4 Mt in 2016, 472,000 t in 2015, 2.56 Mt in 2014 (table 11), and 57 Mt in 2013. The overall increase in production was attributed to the rampup of production from mines that supplied two alumina refineries and some mines that were permitted to export bauxite. Alumina production was estimated to be 1 Mt in 2018, the same as the revised estimate in 2017, compared with 600,000 t in 2016, and 70,000 t in 2015 (table 12).

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 and was 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 of Indonesia 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 2023 (Ghilotti, 2017a; Lim, 2017a; Mok, 2017b).

Antam completed a bankable feasibility study for a 1-Mt/yr alumina refinery in Mempawah, West Kalimantan Province, with PT Indonesia Asahan Aluminium Ltd. (Inalum). Construction was scheduled to start in the first quarter of 2019. 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 2020 (PT Aneka Tambang Tbk, 2018, p. 289, 322; 2019, p. 343).

In December, Bintan started construction of a 1-Mt/yr alumina refinery in Galang Batang, Riau Islands Province. 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%). A construction schedule was not available (China Metal Market—Alumina and Aluminum, 2019b; Justin Lim, 2019; Wong, 2019).

Jamaica.—Alumina production increased by 39% (702,000 t), and bauxite production increased by 22% (1.81 Mt) compared with that in 2017 (tables 11, 12). Increased production was attributed to the restart of production at the Alumina Partners of Jamaica alumina refinery and the adjacent bauxite mine by Jiuquan Iron and Steel Group Ltd. (China) in October 2017. The 1.67-Mt/yr alumina refinery and 4.9-Mt/yr bauxite mine were shut down in 2009 by the previous owner, RUSAL (Lim, 2017b).

New Day, the parent company of Noranda, signed a 25-year mining lease with the Government of Jamaica to continue producing bauxite from the St. Anne Mine. The lease permitted up to 5.2 Mt/yr of bauxite to be mined and included an agreement to share profits from the bauxite mine and Noranda's alumina refinery in Gramercy, LA, with the Government. The lease could be renewed for an additional 25 years (Matyi, 2018b).

Laos.—Sino Lao Aluminum Corp. Ltd. (Slaco) was developing a bauxite deposit in Attepeu and Sekong Provinces. Chalco was a partner in the project with Slaco. An alumina refinery was also planned as part of the project. Construction

would be completed in about 2 years but start of construction was not scheduled and details about the refinery capacity were not available (Leung, 2018a).

Malaysia.—Bauxite production decreased to 500,000 t from 2 Mt in 2017, 3 Mt in 2016, and 35 Mt in 2015 (table 11). The Government of Malaysia continued a ban on bauxite mining throughout the year that was initially imposed in January 2016 in response to illegal mining and pollution at ports from bauxite stockpiles. Export of bauxite was still allowed in order to remove uncovered stockpiles at ports. Production in Malaysia increased in 2015 to supply alumina refineries in China after Indonesia implemented a ban on exporting bauxite and other mineral ores in 2014. When mines increased production in 2015, storage facilities and other infrastructure were inadequate for handling and storing bauxite, leading to water pollution (Radford, 2016; Ghilotti, 2017b; Lim, 2017c; Zou, 2017; Aluminium Insider, 2018a; Decena, 2019).

Altech Chemicals Ltd. (Australia) finalized plans to construct 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. Altech planned to sell the high-purity alumina for use in electronics and other high-tech products. Construction was expected to begin in early 2019 with completion by yearend 2020 (Altech Chemicals Ltd., 2018).

United Arab Emirates.—EGA continued construction of a 2-Mt/yr alumina refinery adjacent to its Al Taweelah aluminum smelter. The refinery, scheduled to start production in 2019, would use bauxite from EGA's mine in Guinea (Emirates Global Aluminium PJSC, 2018b; Radford, 2018).

Outlook

Consumption of bauxite and alumina is expected to closely follow the trend of aluminum production. World demand for aluminum is expected to increase as the global economy continues to expand 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 consume 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)

	2014	2015	2016	2017	2018
United States:					
Production	W	W	W	W	W
Exports, as shipped:					
Crude and dried	3	4	5	5	5
Calcined	7	10	20	14	7
Total	10	14	25	19	12
Imports for consumption, as shipped:					
Crude and dried	10,800	10,700 ^r	5,100 ^r	3,530 ^r	3,610
Calcined	549 ^r	485 ^r	548 ^r	478 ^r	375
Total	11,400	11,200 ^r	5,650 ^r	4,010	3,990
Consumption, dry equivalent	11,800 ^r	11,200 ^r	6,630 ^r	4,330 ^r	4,460
World, production	258,000	293,000 ^r	278,000 ^r	301,000 ^r	327,000

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

¹Table includes data available through April 28, 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)

	2014	2015	2016	2017	2018
United States:					
Production:					
Calcined alumina	4,200	4,130	2,000	1,200	1,040
Other alumina ²	635	615	568	770	810
Total:					
As produced or shipped ³	4,830	4,750	2,570	1,970	1,850
Calcined equivalent	4,460	4,550	2,360	1,430	1,570
Shipments:					
Calcined alumina	4,150	4,070	2,050	1,220	1,040
Other alumina ²	637	614	564	781	810
Total:					
As produced or shipped ³	4,790	4,690	2,610	2,000	1,850
Calcined equivalent	4,410	4,490	2,410	1,450	1,570
Stocks, yearend ^{4,5}	276	274	320	264	275
Imports for consumption ⁵	1,630	1,570	1,140	1,330	1,530
Exports ⁵	2,160 ^r	2,210	1,330	481 ^r	288
Consumption, apparent ^{5,6}	3,650 ^r	3,920	2,130	2,340 ^r	2,800
World, production ⁵	111,000	119,000	121,000	129,000	131,000

^rRevised.

¹Table includes data available through April 28, 2020. Data are rounded to no more than three significant digits; may not add to totals shown.

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 consumer stocks other than those at primary aluminum plants.

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	2017	2018
Alcoa Corp., Point Comfort, TX	2,300	2,300
Noranda Alumina LLC, Gramercy, LA	1,200	1,200
Almatis Inc., Burnside, LA	500	500
Total	4,000	4,000

¹Table includes data available through April 28, 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.

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

(Thousand metric tons, dry equivalent)

Industry	2017	2018
Alumina	3,340	3,670
Other ²	982 ^r	796
Total	4,330 ^r	4,460

^rRevised.

¹Table includes data available through April 28, 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	2017		2018	
	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	55.95	56.01 ^r	57.56	57.66
Jamaica ⁴	24.93	24.93	24.93	24.93
Weighted average ⁵	31.52 ^r	31.53 ^r	31.42	31.44

^rRevised.

¹Table includes data available through April 28, 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)

	2017	2018
January	448	545
February	558	626
March	485	463
April	451	525
May	602	916
June	540	645
July	471	620
August	412	594
September	468	608
October	590	950
November	561	673
December	674	909
Weighted average ²	508	612

¹Table includes data available through April 28, 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	2017	2018
China:		
Xingang, rotary kiln, lump 86% Al ₂ O ₃	470–480	430–450
Xingang, round kiln, lump 87% Al ₂ O ₃	490–500	450–490

¹Table includes data available through April 28, 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	2017	2018
Exports:		
Canada	3	3
Other	2	2
Total	5	5
Imports:		
Brazil	699	637
Jamaica ²	2,590	2,570
Other	238 ^r	411
Total	3,530 ^r	3,610

^rRevised.

¹Table includes data available through April 28, 2020. Data are rounded to no more than three significant digits; may not add to totals shown.

²Source: Jamaica Bauxite Institute.

Note: Total U.S. imports of crude and dried bauxite as reported by the U.S. Census Bureau were as follows: 2017—0.84 million metric tons (Mt) and 2018—0.76 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	2017				2018			
	Refractory grade		Other grade		Refractory grade		Other grade	
	Quantity	Value ²	Quantity	Value ²	Quantity	Value ²	Quantity	Value ²
Exports:								
Canada	4	1,490	--	--	5	1,780	--	--
Mexico	(3)	195	--	--	1	342	--	--
Other	10	4,270	(3)	41	1	658	(3)	42
Total	14	5,950	(3)	41	7	2,780	(3)	42
Imports:								
Australia	--	--	159	5,550	--	--	115	4,020
China	72	21,300	18	6,510	43	16,300	10	4,410
Guyana	55	19,900	145	10,500	58	22,800	146	13,000
Other	--	--	29	787	1	534	2	734
Total	127	41,200	351 ^r	23,400 ^r	102	39,600	273	22,200

^rRevised. -- Zero.

¹Table includes data available through April 28, 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	2017		2018	
	Quantity	Value ²	Quantity	Value ²
Exports:				
Canada	36	36,500 ^r	34	41,600
China	17	40,400	26	46,700
Iceland	63	20,500	(3)	58
India	33	15,200	9	13,900
Mexico	48	41,200	59	58,100
Netherlands	95	44,100	29	30,200
Norway	(3)	316	26	15,300
Russia	90	28,200	(3)	1,120
United Arab Emirates	33	11,500	1	1,590
Venezuela	21	7,150	56	29,100
Other	45 ^r	152,000 ^r	48	155,000
Total	481 ^r	397,000 ^r	288	393,000
Imports:				
Australia	392	136,000	293	145,000
Brazil	543	215,000	858	421,000
Canada	90	64,300	89	61,100
China	38	43,100	40	52,300
France	20	35,300	21	40,800
Germany	51	92,200	48	108,000
India	8	6,160	10	8,040
Jamaica ⁴	169	62,700	141	52,300
Other	22 ^r	66,100 ^r	28	67,900
Total	1,330	721,000 ^r	1,530	956,000

^rRevised.

¹Table includes data available through April 28, 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.

⁴Source: Jamaica Bauxite Institute.

Source: U.S. Census Bureau.

TABLE 11
BAUXITE: WORLD PRODUCTION, BY COUNTRY OR LOCALITY¹

(Thousand metric tons)

Country or locality	2014	2015	2016	2017	2018
Australia	78,631 ^r	80,909 ^r	83,517	89,421 ^r	86,400 ^e
Bosnia and Herzegovina	605	787	641	700 ^r	700 ^e
Brazil, dry basis	36,308	37,057	39,244	38,123 ^r	29,000 ^e
China	59,200	60,000 ^{r,e}	60,800 ^{r,e}	62,000 ^{r,e}	79,000 ^e
Dominican Republic	1,446	1,724	7	--	-- ^e
Fiji ^e	376	121 ^r	117 ^r	60 ^r	60
Ghana	906	1,026	1,144 ^r	1,477 ^r	1,500 ^e
Greece ²	1,873	1,832	1,880 ^r	1,927 ^r	2,100 ^e
Guinea, dry basis ²	17,258	16,303 ^r	31,500	46,160	57,000 ^e
Guyana, dry basis	1,602	1,498	1,480 ^r	1,481 ^r	1,500 ^e
Hungary	14	8	17	1 ^r	1 ^e
India	22,636	27,757	23,886	22,803 ^r	23,000 ^e
Indonesia	2,555	472	1,400	2,900 ^e	11,000 ^e
Iran ²	748	862	766 ^r	735 ^r	700 ^e
Jamaica, dry basis	9,677	9,629	8,540	8,245	10,058
Kazakhstan	4,516	4,683	4,801	4,846 ^r	4,800 ^e
Malaysia	3,665	35,000 ^e	3,000 ^e	2,000 ^e	500 ^e
Montenegro	155	50	667 ^r	928 ^r	900 ^e
Mozambique	3	5	1	3 ^r	5 ^e
Pakistan	30	31	90	104 ^r	100 ^e
Russia	6,293	5,900	5,431	5,523	5,651
Saudi Arabia	1,096	1,148	3,843	3,708 ^r	3,885
Sierra Leone	1,161	1,334	1,369	1,788	2,000 ^e
Solomon Islands	--	292	238	1,503	1,609
Suriname	2,708	1,600	--	--	--
Tanzania	26	26 ^e	73 ^r	12 ^r	25 ^e
Turkey	1,091	1,050	1,000 ^r	941 ^r	1,000 ^e
United States	W	W	W	W	W
Venezuela	2,346	992	909 ^r	550 ^{r,e}	-- ^e
Vietnam ^e	1,090	1,150	1,420 ^r	2,700 ^r	4,100
Total	258,000	293,000 ^r	278,000 ^r	301,000 ^r	327,000

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

¹Table includes data available through June 17, 2019. 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	2014	2015	2016	2017	2018
Australia	20,476 ^r	20,097	20,681	20,486	20,417
Bosnia and Herzegovina	171	251	188	238 ^r	250 ^e
Brazil	10,404	10,452	10,886	11,014 ^r	8,100 ^e
Canada	1,563	1,561	1,566 ^r	1,570	1,568
China	51,300	58,978	60,907	69,017	72,531
France ^e	300	300	300	300	300
Germany ^e	1,910	1,910	1,900	1,900	1,900
Greece	814	807	821	821 ^r	820 ^e
Guinea	--	--	--	--	182
Hungary	61	255 ^r	274 ^r	273 ^r	275 ^e
India	5,060	5,512	6,028	6,060 ^e	6,430
Indonesia	--	70	600 ^e	1,000 ^{r,e}	1,000 ^e
Iran	251	241	250 ^e	240 ^{r,e}	240 ^e
Ireland	1,951	1,983	1,967	1,937	1,874
Jamaica	1,851	1,865	1,865	1,782	2,484
Japan ^{e,3}	100	15	18	20	20
Kazakhstan	1,419	1,448	1,500 ^r	1,509 ^r	1,500 ^e
Romania	363	405	467	473	570 ^e
Russia	2,572	2,593	2,682	2,822	2,763
Saudi Arabia	23	846	1,429	1,478	1,765
Spain	1,520 ^e	1,630 ^e	1,579	1,588	1,589
Suriname	1,149	748	--	--	--
Turkey ^e	195	294	305	300	300
Ukraine	1,457	1,481	1,510	1,676	1,715
United States	4,460	4,550	2,360	1,430	1,570
Venezuela	660	465	301 ^r	240 ^{r,e}	-- ^e
Vietnam	485 ^e	660	602	1,027 ^r	1,310
Total	111,000	119,000	121,000	129,000	131,000

^eEstimated. ^rRevised. -- Zero.

¹Table includes data available through June 17, 2019. 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.

³Data presented are for alumina used principally for specialty applications. Information on aluminum hydrate for all uses is not adequate to make estimates of production levels.