



2017 Minerals Yearbook

BAUXITE AND ALUMINA [ADVANCE RELEASE]

BAUXITE AND ALUMINA

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In 2017, almost all of the 3.51 million metric tons (Mt) of bauxite consumed in the United States was imported. World production of bauxite was estimated to be 308 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 1.43 Mt and 1.45 Mt, respectively, and declined for the second year in a row. Alumina production (calcined equivalent) decreased by 40% and 69% compared with those in 2016 and 2015, respectively. Alumina shipments (calcined equivalent) decreased by 40% and 68% compared with those in 2016 and 2015, respectively. An estimated 81% of domestic shipments were used for metal production. World production of alumina (calcined equivalent) was estimated to be 129 Mt (tables 2, 12). The leading producing countries were, in descending order of production, China, Australia, Brazil, and India.

Production

Bauxite.—The United States is 100% net import reliant for metallurgical-grade bauxite. Small amounts of bauxite and bauxitic clays are 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, decreased by 40% in 2017 from that in 2016 to 1.43 Mt and was 69% less than the amount produced in 2015 (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 Holdings LLC) was upgrading 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 chemical-grade alumina. The project would be completed in the first half of 2018. The red mud disposal area was also being upgraded to increase its capacity (Noranda Alumina LLC, 2017; Matyi, 2018). Almatris 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, has been temporarily shut down since 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 2017 did not respond and bauxite consumption was estimated based on import data.

Total domestic consumption of bauxite decreased by 34% compared with the revised amount in 2016. In 2017, 95% of the bauxite consumed in the United States was refined to alumina; the remaining 5% 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 two companies that operated six 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 2017, six domestic primary aluminum smelters consumed 1.48 Mt of alumina, 9% less than the amount of alumina consumed in 2016. 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 purchased under long-term contracts, and contract terms normally were not made public, or was produced by companies that own both bauxite mines and alumina refineries. 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 decreased by 7% in 2017 compared with that of 2016 (table 5). In 2017, the average value of U.S. imports of calcined alumina, including cost, insurance, and freight at U.S. ports, was 32% more than in 2016 at \$508 per metric ton (table 6). However, U.S. import values for alumina and bauxite often reflect prices established under long-term contracts or are for alumina and bauxite produced by the same company as the importing smelter or refinery, so they are not necessarily reflective of global prices. Yearend price ranges, as quoted in Industrial Minerals (2017, 2018), for refractory-grade bauxite exported from China were significantly higher than those at yearend 2016 (table 7).

Foreign Trade

In 2017, as a result of shutdowns of alumina refineries and aluminum smelters in the United States in 2016, imports of bauxite and alumina, as well as exports of alumina, decreased compared with those in 2016. Imports of crude dry bauxite decreased by 31%. Imports of alumina increased by 17%, but exports of alumina decreased by 61% compared with exports in 2016 (tables 8, 10). Jamaica and Brazil remained the leading sources of crude dry bauxite imports, accounting for 76% and 20%, respectively. Brazil, Australia, and Jamaica were the leading sources of alumina imports, accounting for 41%, 29%, and 13%, respectively. The Netherlands, Russia, Iceland, and Mexico were the leading destinations for alumina exports in 2017, receiving 18%, 17%, 12%, and 9%, respectively.

World Industry Structure

Bauxite.—In 2017, world production of bauxite was 9% more than the revised amount in 2016, attributed mostly to a significant increase of production in Guinea (14.7 Mt), as well as increased production in Australia (4.38 Mt) and China (5 Mt) that was partially offset by decreased production in India (977,000 t) and Malaysia (1 Mt) (table 11). Total mine production of 308 Mt was reported from 26 countries. The leading producers of bauxite were, in decreasing order of tonnage mined, Australia, China, Guinea, Brazil, and India. These countries accounted for 86% of total world production; Australia and China together accounted for 51% of the world's production.

Alumina.—World output of alumina increased by 7% in 2017 compared with that of 2016 (table 12). Increased production in China and Indonesia was partially offset by decreased production in the United States. Although 24 countries reported production, the 4 leading producing countries, in descending order of quantity of alumina produced—China, Australia, Brazil, and India—accounted for 83% of world production; China and Australia accounted for 54% and 16%, respectively.

Mergers, Acquisitions, and Divestitures.—New Day Aluminum acquired ARC Fused Alumina from Mircal SA, a subsidiary of Imerys SA (France), in October. Imerys was required by the European Commission to divest the specialty alumina plant located in La Bathie, France, as part of the conditions of approval for its acquisition of Alteo Holding SAS in 2016. The plant produced white fused alumina and other products used in abrasives, ceramics, flooring material, and refractory products (New Day Aluminum Holdings LLC, 2017).

World Review

Australia.—Bauxite production increased by 5% (4.38 Mt) but alumina production decreased slightly (195,000 t) compared with that in 2016. Decreased alumina production was partially attributed to a 3% (113,000 t) decrease from Rio Tinto plc's (United Kingdom) 3.85-Mt/yr Queensland alumina refinery in Gladstone, Queensland, which had major maintenance work performed during the year. Production from Rio Tinto's 3.4-Mt/yr Yarwun refinery in Queensland increased slightly compared with that in 2016. South32 Ltd. decreased alumina production slightly at the Worsley refinery compared with that

of 2016, citing maintenance work on the calciner. Rio Tinto increased bauxite production of the Gove Mine in the Northern Territory by 23% (2.11 Mt) compared with production in 2016. The completion of a project to upgrade the conveyor system and export facilities in the fourth quarter of 2016 was cited for increased production at the Gove Mine. The project increased the mine capacity to approximately 13 Mt/yr from 8.2 Mt/yr. Bauxite production from the Weipa Mine increased by 5% (1.47 Mt) compared with that in 2016 (Rio Tinto plc, 2017c, p. 2; 2017d, p. 3, 18, 20; 2018, p. 3, 18, 20; South32 Ltd., 2018a, p. 3).

Rio Tinto continued construction of a 22.8-Mt/yr bauxite mine in Queensland. Bauxite produced at the Amrun Mine would be shipped through the Port of Cape York. Completion of the project was expected in the first half of 2019 (Rio Tinto plc, 2017a, p. 23, 35; 2017b).

Metro Mining Ltd. was developing the Bauxite Hills project in Queensland with construction of most infrastructure, including loading facilities at the nearby port, completed by yearend. Mining was scheduled to start in mid-2018. Metro completed the acquisition of Gulf Alumina Ltd. in early 2017. Gulf Alumina was developing the Skardon River project adjacent to the Bauxite Hills project, and Metro consolidated the projects into a single operation after completing the acquisition. The combined bauxite deposit reserves were reported to be 92.2 Mt (Metro Mining Ltd., 2017a, b, c, p. 1–5).

Brazil.—Bauxite production decreased slightly (744,000 t) but alumina production was essentially unchanged compared with the revised amounts in 2016. Decreased bauxite production was attributed to an 11% decrease (1.74 Mt) in production at the MRN Mine in Para State, which was negatively impacted by drought conditions in the Porto Trombetas region. Bauxite deliveries to export markets were affected by decreased output from the MRN Mine owing to lack of water for the tailings system, but bauxite deliveries to the Alunorte alumina refinery in Barcarena, Para State were not affected. Production from the Paragominas Mine in Para State increased slightly (300,000 t), partially offsetting the decreased production from the MRN Mine (Norsk Hydro ASA, 2017; 2018, p. 114; Rio Tinto plc, 2017c, p. 2; 2018, p. 3, 18, 20; South32 Ltd., 2018b, p. 4).

Production capacity at the Juruti Mine was being expanded to 6.5 Mt/yr from 5.7 Mt/yr. The expansion project that was started in 2016 would be completed in 2018. Production increased by 400,000 t compared with that in 2016. Production was negatively affected by heavy rainfall in the first half of the year. In the second half of the year, lack of water during drought conditions resulted in decreased quality of bauxite shipped to the Alumar refinery, but alumina production was not significantly affected (Alumina Ltd., 2018, p. 8, 26, 28).

Canada.—Orbite Technologies Inc. started trial production of high-purity alumina in January. Orbite used high-alumina clay as the raw material for its 3-metric-ton-per-day refinery at Cap-Chat, Quebec. However, trial production was stopped in March owing to equipment issues. Inspection of the plant's calciner identified issues with the heating system, which would require about 8 months to repair, pending the availability of financing. As a result of the shutdown and equipment issues, Orbite filed for protection under the Bankruptcy and Insolvency Act in April.

The supplier of the calcination equipment identified the cause of its failure and was working to correct the problem. Restart of the plant was not expected until the end of the first quarter of 2018, pending available financing. In addition to high-purity alumina, Orbite's plant was designed to produce gallium, iron oxide, rare-earth elements, and high-purity silica (Orbite Technologies Inc., 2017a–c).

China.—Alumina production increased by 13% (8.1 Mt) to 69 Mt, compared with the amount in 2016 (table 12). The increased production was attributed to restarts of capacity at several refineries that were shut down from the fourth quarter of 2015 until the first half of 2016 and production from new capacity. Alumina capacity at yearend 2017 was estimated to be 81 Mt/yr, a 9% increase from 74 Mt/yr at yearend 2016. Approximately 68.5 Mt/yr of capacity was in use at yearend. Alumina imports were 2.86 Mt, 6% less than the 3.03 Mt imported in 2016. The leading sources of alumina imports, in descending order, were Australia (43%), Indonesia (26%), Vietnam (19%), and India (8%). Alumina consumption was estimated to be 72.5 Mt in 2017, 12% more than the 64.7 Mt consumed in 2016, and 97% of which was consumed by aluminum smelters. Bauxite production was estimated to be 70 Mt, 8% more than that in 2016. Bauxite imports were 68.6 Mt, 32% more than the 51.8 Mt imported in 2016. The leading sources of bauxite imports, in descending order, were Guinea (40%), Australia (37%), Malaysia (7%), and Brazil (5%). Imports from Guinea, Australia, and the Solomon Islands increased by 15.7 Mt (132%), 4.17 Mt (20%), and 1.26 Mt (531%), respectively, compared with those in 2016, accounting for the increased imports. These increases were partially offset by decreased imports from Brazil (by 1.1 Mt), India (by 2.4 Mt), and Malaysia (by 2.67 Mt). Malaysia remained the third-ranked supplier in 2017 but imports from Malaysia decreased by 36% to 4.78 Mt from 7.45 Mt in 2016. Malaysia had been the leading supplier of bauxite imports to China in 2015, supplying 24 Mt (43%), until Malaysia's Government temporarily banned bauxite mining starting in January 2016, but continued to allow exports of stockpiled bauxite (China Metal Market—Alumina and Aluminum, 2016, 2017h, 2018a, b, c, d; Mok, 2016).

The Government of China ordered alumina refineries and aluminum smelters in certain areas 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 (Hotter, 2017; Mok, 2017a).

Guangxi Zhuang Autonomous Region.—Hangzhuang Jinjiang Group Ltd. started construction of an alumina refinery in Chongzuo. Construction of 1 Mt/yr of capacity was expected to be completed by yearend 2019. An additional 1-Mt/yr expansion was planned, but a construction schedule was not available (China Metal Market—Alumina and Aluminum, 2017g).

In June, Aluminum Corp. of China Ltd. (Chinalco) started construction of a 2-Mt/yr alumina refinery in Fangchenggang. Expansion to 4 Mt/yr was planned and an adjacent 1-Mt/yr aluminum smelter, rolling mill, and captive coal-fired

powerplant were also planned. The refinery would consume bauxite from Guinea. Completion was expected in 2019, and expansions of the alumina refinery to 4 Mt/yr and the aluminum smelter to 2 Mt/yr would be completed in 2022 (China Metal Market—Alumina and Aluminum, 2017c, d, e).

Henan Province.—Chinalco completed an upgrading project at the Henan alumina refinery, which included the construction of a new 1.6-Mt/yr refinery to replace an older refinery at the site, which was shut down in December 2015. Construction of the new capacity started in April 2016 and took less than a year to complete (China Metal Market—Alumina and Aluminum, 2017b).

Liaoning Province.—Bosai Minerals Group Ltd. was constructing an alumina refinery in Gai County. The capacity of the refinery would be 2.5 Mt/yr and expansion to 5 Mt/yr was planned. The refinery would consume bauxite from a mine in Ghana owned by Bosai. A construction schedule was not available (CRU Alumina Monitor, 2017b).

Shandong Province.—Chinalco and Qinxin Group planned to build a 3.2-Mt/yr alumina refinery in Qinyuan. A feasibility study for the project was completed at yearend 2016, but a construction schedule was not available (China Metal Market—Alumina and Aluminum, 2017a).

East Hope Group Ltd. was adding two more production lines to its alumina refinery in Jinzhou, Lingshi County. The expansion would increase capacity to 2 Mt/yr from 1 Mt/yr. The first phase of the refinery was completed in 2016 with production from the first line started in April and the second started in December. The first phase reached full capacity by mid-year 2017 (China Metal Market—Alumina and Aluminum, 2017c).

In August, East Hope signed an agreement with the Zuoquan County government to build a 2.4-Mt/yr alumina refinery in Jinzhong. One-half of the capacity would be built first, then the refinery would be expanded at a later time. The refinery would use bauxite from nearby deposits. A construction schedule was not available (CRU Alumina Monitor, 2017c).

In October, East Hope signed an agreement with the Fugu County government to build a 3.6-Mt/yr alumina refinery, which would also have capacity to produce 60 t/yr of gallium. The refinery would use bauxite from an adjacent deposit. A construction schedule was not available (China Metal Market—Alumina and Aluminum, 2017f).

Xiaoyi Xing'an Chemical Engineering Co. Ltd. planned to expand alumina production capacity at its refinery in Xiaoyi County to 2 Mt/yr from 1 Mt/yr by installing a calciner to convert aluminum hydroxide to alumina. The refinery had 2.8 Mt/yr of aluminum hydroxide capacity but only had enough calcining capacity for 1 Mt/yr of alumina. The new calciner would enable the refinery to produce alumina from all its production. The company cited higher profit margins on alumina than on aluminum hydroxide for the project. A construction schedule was not available (China Metal Market—Alumina and Aluminum, 2017f).

Yunnan Province.—Yunnan Aluminium Co. Ltd. completed expanding its alumina refinery in Wenshan to 1.6 Mt/yr from 600,000 t/yr. Production from the new capacity started in October. The project was started in June 2014 but low alumina

prices were cited for construction being delayed. The refinery consumed bauxite from an adjacent bauxite mine (Lee, 2015; China Metal Market—Alumina and Aluminum, 2017g).

Fiji.—Bauxite production was more than double that in 2016 but was 68% less than the revised production in 2014. Aurum Exploration Fiji Ltd. had difficulty selling its bauxite in 2016 in part because of concerns about the impurity levels in the bauxite. Exports to customers in China resumed in August 2016 after a washing plant was installed to remove impurities from the bauxite but the mine was still ramping up to the prior production rate (CRU Bauxite and Alumina Weekly, 2016).

Guinea.—Bauxite production increased by 47% (14.7 Mt) compared with that in 2016 and by 183% (29.9 Mt) compared with that in 2015. Increased production was partially attributed to the completion and rampup of a 5-Mt/yr mine in the Boke region owned by SMB Winning Consortium Ltd. (a joint venture among Hongqiao Group Ltd., Shandong Yantai Port Corp., United Mining Supply plc, and Winning International Group Ltd.), which began shipments in September 2015 (Leung, 2015).

Increased bauxite production was partially offset by a 4% (614,000 t) decrease in production from the Sangaredi Mine, attributed to maintenance issues in the first quarter of the year. Capacity of the mine, a joint venture among Alcoa (23%), Rio Tinto (23%), Dadco Group (5%), and the Government of Guinea (49%), was being expanded to 18.5 Mt/yr from 14.5 Mt/yr. The project would be completed by yearend 2018 (Rio Tinto plc, 2017c, p. 2; 2018, p. 3, 18, 20; Leung, 2018).

United Company RUSAL Plc (Russia) continued construction of the Dian-Dian Mine, which would have a capacity of 3 Mt/yr. Bauxite production was expected to begin in early 2018, and it would be shipped by rail to a port for export. Further expansion to 9 Mt/yr was planned for completion in 2021. RUSAL was also planning to restart production from the 650,000-t/yr Friguia alumina refinery and the adjacent 2.1-Mt/yr bauxite mine in April 2018. The refinery and mine were shut down in April 2012 owing to low alumina prices (United Company RUSAL Plc, 2016, 2018, p. 24; Lim, 2017b).

In January, Alufer Mining Ltd. [Guernsey (United Kingdom)] started construction of the 5.5-Mt/yr Bel Air Mine. Production was scheduled to start in the third quarter of 2018 (Alufer Mining Ltd., undated).

Guinea Alumina Corp., a subsidiary of Emirates Global Aluminum PJSC (United Arab Emirates), continued development of a 12-Mt/yr bauxite mine in the Boke region scheduled for completion in 2018. Construction of support facilities at the Port of Kamsar were completed in 2016. A railroad spur line was under construction to connect the mine to an existing railroad line to Kamsar (Emirates Global Aluminum PJSC, 2017a, b).

In June, Alliance Minière Responsable Ltd. and SMB Winning Consortium signed an agreement 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. The first phase of the mine would be completed and producing by January 2019 (China Metal Market—Alumina and Aluminum, 2017i).

India.—Production of alumina was essentially unchanged but bauxite production decreased by 4% compared with production in 2016. Decreased bauxite production was mainly attributed to

decreased exports, especially to China, which declined by 53% (2.4 Mt) compared with exports to China in 2016 (China Metal Market—Alumina and Aluminum, 2017h, 2018a).

National Aluminium Co. Ltd. of India (Nalco) was 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 but a completion date was not available. Nalco obtained all regulatory clearances from the Odisha State government to mine bauxite in the south block area of the Panchpatmali Mine, and production started in May. The expansion increased bauxite capacity to 7.25 Mt/yr from 6.83 Mt/yr. Nalco was also working to obtain a mining permit for the Pottangi deposit after being granted mining rights to it from the Odisha State government in 2016. A completion date was not available (National Aluminium Co. Ltd., 2017, p. 11, 34, 44; 2018, p. 7, 9–10).

Vedanta Resources plc (United Kingdom) increased alumina production at the 1.25-Mt/yr Lanjigarh alumina refinery by 6% compared with that in 2016. Production in the first quarter was 48% more than that in the same period of 2016 as capacity that had been shut down temporarily in 2015 owing to low alumina prices was restarted by midyear 2016. Alumina production in the second half of the year decreased by 10% compared with that in the same period of 2016 as transportation issues negatively affected bauxite deliveries from the Chattisgarh Mine (Vedanta Resources plc, 2017a, p. 8–9; 2017b, p. 8; 2018, p. 12).

Anrak Aluminium Ltd. continued to delay the startup of its 1.5-Mt/yr alumina refinery that was completed in 2013 in Rachapalle, Andhra Pradesh State. The refinery also had a captive 225-megawatt (MW) powerplant. The refinery was built to consume bauxite from Andhra Pradesh Mineral Development Corporation Ltd.'s (APMDC's) Jerella deposit in Andhra Pradesh State, but APMDC had not received the necessary permit to start mining. In April, the government of Andhra Pradesh State canceled the bauxite supply agreement between APMDC and Anrak. Anrak and its investors were appealing the decision and were seeking enforcement of the supply agreement (Sukumar, 2017).

Indonesia.—Bauxite production was 2.9 Mt in 2017 compared with 1.4 Mt in 2016, 472,000 t in 2015, 2.56 Mt in 2014, and 57 Mt in 2013, as mines that supplied two alumina refineries ramped up production and some mines were permitted to export bauxite. Alumina production was estimated to be 1.3 Mt in 2017, compared with 600,000 t in 2016, and 70,000 t in 2015. 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 for the first time since the ban started in 2014. The Government issued export licenses to companies building alumina refineries in Indonesia so that they could use proceeds of bauxite sales to finance construction. The permit system was scheduled to end in 2023 (Ghilotti, 2017a; Lim, 2017a; Mok, 2017b).

PT Aneka Tambang Tbk continued planning to build a 1-Mt/yr alumina refinery in Mempawah, West Kalimantan Province, with PT Indonesia Asahan Aluminium Ltd. (Inalum). A bankable feasibility study was started in December, but a

construction schedule was not available. 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).

Nanshan Aluminum Co. Ltd. (China) announced plans to build a 1-Mt/yr alumina refinery in Bintan. A construction schedule was not available (CRU Alumina Monitor, 2017a).

Jamaica.—Jiuquan Iron and Steel Group Ltd. (China) started commercial production at the Aluminum Partners of Jamaica (Alpart) alumina refinery in October with rampup to be completed in January 2018. The 1.67-Mt/yr alumina refinery and adjacent 4.9-Mt/yr bauxite mine were shut down in 2009 by the previous owner, RUSAL. Alumina from the Alpart refinery was expected to be exported to China for use in Jiuquan's 1.7-Mt/yr smelter (Lim, 2017c).

Noranda began shipments of bauxite to China and India from the 5.4-Mt/yr St. Ann Mine in April. Exports by large-capacity ships were enabled by the completion of the expansion of Port Rhoades in Discovery Bay in 2015 (CRU Alumina Monitor, 2015; Matyi, 2017).

Malaysia.—Bauxite production decreased to 2 Mt in 2017 from 3 Mt in 2016 and 35 Mt in 2015. The Government extended the temporary ban on bauxite mining for the entire year in response to illegal mining and pollution at ports from bauxite stockpiles. The ban was initially imposed in January 2016. Exportation of bauxite was still allowed in order to remove uncovered stockpiles at ports. When mines increased production in 2015, storage facilities and other infrastructure were inadequate for handling and storing bauxite, leading to water pollution. 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. Although mining bauxite was prohibited, illegal mining was reported after the ban was imposed. Government officials estimated that 3.6 Mt of bauxite was stockpiled at ports in April and industry observers stated that the stockpiles were not diminishing even though exports were reported, evidence that mining was continuing (Radford, 2016; Ghilotti, 2017b; Lim, 2017d; Zou, 2017).

Altech Chemicals Ltd. (Australia) continued to plan a 4,500-t/yr refinery to be built 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 2018 with completion in 2019 (Altech Chemicals Ltd., 2018, p. 3–5).

Russia.—In April, RUSAL completed an expansion project at the Ural alumina refinery and started production from the new capacity. The project took 2 years to complete and increased the capacity of the refinery to 900,000 t/yr from 770,000 t/yr. The rampup was completed by yearend and was largely responsible for Russia's total alumina production increasing by 5% compared with that in 2016 (United Company RUSAL Plc, 2017c; 2018, p. 56).

In May, RUSAL completed an expansion project that started in October 2015 at the Boksiogorsk alumina refinery

to increase capacity of nonmetallurgical alumina and synthetic corundum. Total capacity of nonmetallurgical alumina and corundum increased to 79,000 t/yr from 69,000 t/yr. The project added 6,000 t/yr of capacity for refractory-grade alumina and 4,000 t/yr corundum for abrasives (United Company RUSAL Plc, 2017d).

Suriname.—The shutdown of the Suralco alumina refinery in Paranam was made permanent in January. The 2.2-Mt/yr alumina refinery was temporarily shut down in November 2015. The shutdown was attributed to declining bauxite reserves, limited energy supplies, and low alumina prices. The refinery was a joint venture between Alcoa (60%) and Alumina Ltd. (40%). Alcoa was working with the Government to determine how to maintain the bauxite industry in Suriname (Alcoa Corp., 2017).

Ukraine.—RUSAL completed an expansion project of the Mykolayiv alumina refinery in Nikolaev to 1.7 Mt/yr from 1.6 Mt/yr. Rampup of new capacity was started in the fourth quarter of 2016 and by yearend 2017 all new capacity was ramped up. The expansion contributed to the country's 11% increase in production compared with that in 2016 (United Company RUSAL Plc, 2017a, p. 25; 2017b; 2018, p. 24).

United Arab Emirates.—Emirates Global Aluminum continued construction of a 2-Mt/yr alumina refinery adjacent to its Al Taweelah aluminum smelter. The refinery, to be completed in 2018, would use bauxite from Emirates Global Aluminum's mine in Guinea (Emirates Global Aluminum PJSC, 2017c).

Vietnam.—Bauxite and alumina production increased by 69% and 50%, respectively, as Vietnam National Coal and Mineral Industries Group (Vinacomin) continued to ramp up production at the 650,000-t/yr Nhan Co alumina refinery in Dak Nong Province that started production in December 2016. Production at full capacity was not expected until 2018 (Lim, 2017e).

In December, Vinacomin signed a 3-year alumina supply agreement with Emirates Global Aluminum. Up to 300,000 t/yr of alumina would be supplied to Emirates Global Aluminum to be consumed at its smelter in the United Arab Emirates (Emirates Global Aluminum PJSC, 2017d, 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 for high-purity alumina for devices such as smartphones, laptops, and tablets is expected to continue to increase, 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)

	2013	2014	2015	2016	2017
United States:					
Production	W	W	W	W	W
Exports, as shipped:					
Crude and dried	4	3	4	5	5
Calcined	10	7	10	20	14
Total	14	10	14	25	19
Imports for consumption, as shipped:					
Crude and dried	9,830	10,800	10,400 ^r	4,930 ^r	3,430
Calcined	582	601	526	574	579
Total	10,400	11,400	10,900 ^r	5,500 ^r	4,010
Consumption, dry equivalent	10,200	9,840	9,660	5,360 ^r	3,510
World, production	296,000 ^r	258,000	298,000 ^r	282,000 ^r	308,000

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

¹Table includes data available through March 13, 2019. Data are rounded to no more than three significant digits; may not add to totals shown.

TABLE 2
SALIENT ALUMINA STATISTICS¹

(Thousand metric tons)

	2013	2014	2015	2016	2017
United States:					
Production:					
Calcined alumina	4,250	4,200	4,130	2,000	1,200 ²
Other alumina ³	582	635	615	568	770 ²
Total:					
As produced or shipped ⁴	4,830	4,830	4,750	2,570	1,970 ²
Calcined equivalent	4,320	4,460	4,550	2,360	1,430 ²
Shipments:					
Calcined alumina	4,260	4,150	4,070	2,050	1,220 ²
Other alumina ³	580	637	614	564	781 ²
Total:					
As produced or shipped ⁴	4,840	4,790	4,690	2,610	2,000 ²
Calcined equivalent	4,330	4,410	4,490	2,410	1,450 ²
Stocks, yearend ^{5,6}	280	276	274	320 ^r	264
Imports for consumption ⁶	2,050 ^r	1,630 ^r	1,570 ^r	1,140 ^r	1,330
Exports ⁶	2,250	2,170 ^r	2,210 ^r	1,330 ^r	516
Consumption, apparent ^{6,7}	4,120	3,930 ^r	3,920 ^r	2,130 ^r	2,300
World, production ⁶	106,000	111,000	119,000	121,000	129,000

^rRevised.

¹Table includes data available through March 13, 2019. Data are rounded to no more than three significant digits; may not add to totals shown.

²Production and shipments estimated based on bauxite imports.

³Trihydrate, activated, tabular, and other aluminas. Excludes calcium and sodium aluminates.

⁴Includes only the end product if one type of alumina was produced and used to make another type of alumina.

⁵Excludes consumers stocks other than those at primary aluminum plants.

⁶Calcined equivalent.

⁷Defined 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	2016	2017
Alcoa Corp., Point Comfort, TX ²	2,300	2,300
Noranda Alumina LLC, Gramercy, LA	1,200	1,200
Almatis Inc., Burnside, LA	500	500
Sherwin Alumina Co., Corpus Christi, TX ³	--	--
Total	4,000	4,000

-- Zero.

¹Table includes data available through March 13, 2019. Data are rounded to no more than three significant digits; may not add to totals shown. Capacity may vary depending on the bauxite used.

²Temporarily shut down in March 2016.

³Owned by Glencore plc. Refinery was permanently shut down in September 2016.

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

(Thousand metric tons, dry equivalent)

Industry	2016	2017
Alumina	5,080 [†]	3,340 ²
Other ³	284	169
Total	5,360 [†]	3,510

[†]Revised.

¹Table includes data available through March 13, 2019.

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

²Estimated based on bauxite imports.

³Includes 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	2016		2017	
	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	41.74	45.98	55.95	57.12
Guinea	25.27	33.94	XX	XX
Jamaica ⁴	23.40	30.17	24.93	24.93
Weighted average ⁵	28.10	34.27	31.50	31.70

XX Not applicable.

¹Table includes data available through March 13, 2019. 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
METALLURGICAL-GRADE ALUMINA¹

(Dollars per metric ton)

	2016	2017
January	354	448
February	322 ^r	558
March	367 ^r	485
April	365 ^r	451
May	439 ^r	602
June	297 ^r	540
July	480 ^r	471
August	396 ^r	412
September	493 ^r	468
October	356 ^r	590
November	689 ^r	561
December	413 ^r	674
Weighted average ²	384	508

^rRevised.

¹Table includes data available through March 13, 2019. 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	2016	2017
China:		
Xingang, rotary kiln, lump 86% Al ₂ O ₃	280–300	470–480
Xingang, round kiln, lump 87% Al ₂ O ₃	300–325	490–500

¹Table includes data available through March 13, 2019. 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	2016	2017
Exports:		
Canada	4	3
Other	1	2
Total	5	5
Imports:		
Brazil	1,210 ^r	699
Guinea	101	--
Jamaica ²	3,460	2,590
Other	162 ^r	137
Total	4,930 ^r	3,430

^rRevised. -- Zero.

¹Table includes data available through March 13, 2019. 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: 2016—2.45 million metric tons (Mt) and 2017—0.84 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	2016				2017			
	Refractory grade		Other grade		Refractory grade		Other grade	
	Quantity	Value ²	Quantity	Value ²	Quantity	Value ²	Quantity	Value ²
Exports:								
Canada	3	574	--	--	4	1,490	--	--
Mexico	3	1,040	(3)	46	(3)	195	--	--
Other	14	4,510	(3)	57	10	4,270	(3)	41
Total	20	6,120	(3)	103	14	5,950	(3)	41
Imports:								
Australia	--	--	170	6,090	--	--	159	5,550
Brazil	1	41	--	--	--	--	--	--
China	53	14,000	13	4,230	72	21,300	18	6,510
Greece	--	--	--	--	--	--	--	--
Guyana	29	10,300	242	13,500	55	19,900	145	10,500
Turkey	--	--	25	694	--	--	101	3,880
Other	4	1,720 ^r	37	668	--	--	29	787
Total	87	26,000	487	25,200	127	41,200	452	27,200

^rRevised. -- Zero.

¹Table includes data available through March 13, 2019. 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 Service.

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	2016		2017	
	Quantity	Value ²	Quantity	Value ²
Exports:				
Bahrain	32	6,440	(3)	27
Canada	86	46,800 ^r	36	36,500
China	74	44,100	17	40,400
Egypt	60	16,300	(3)	88
Iceland	395	88,400 ^r	63	20,500
India	2	4,810	34	15,200
Mexico	77	47,100	48	41,200
Netherlands	120	56,600	95	44,100
Russia	63	16,300	90	28,200
United Arab Emirates	282	64,000	33	11,500
Other	141 ^r	184,000 ^r	100	175,000
Total	1,330 ^r	575,000 ^r	516	412,000
Imports:				
Australia	373	87,900	392	136,000
Brazil	400	128,000	543	215,000
Canada	67	45,300	90	64,300
China	33	36,800	38	43,100
France	18	36,400	20	35,300
Germany	26	71,200	51	92,200
Jamaica ⁴	164	34,200	169	62,700
Suriname	35	8,400	--	--
Other	25 ^r	40,800 ^r	30	55,900
Total	1,140	489,000 ^r	1,330	704,000

^rRevised. -- Zero.

¹Table includes data available through March 13, 2019. 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

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	2013	2014	2015	2016	2017
Australia	81,119	78,632	80,910	83,517 ^r	87,898
Bosnia and Herzegovina	657	605	787	641 ^r	600 ^e
Brazil	33,896	36,308	37,057	39,244 ^r	38,500 ^e
China	50,400	59,200	65,000	65,000 ^{r,e}	70,000 ^e
Dominican Republic	770	1,446	1,724	7 ^r	--
Fiji	343 ^r	376 ^r	172 ^r	58	119
Ghana	817 ^r	906 ^r	1,026 ^r	1,015 ^r	1,500 ^e
Greece ²	1,844	1,873	1,832	1,848 ^r	1,900 ^e
Guinea ²	16,900 ^{r,e}	17,258 ^r	16,300 ^{r,e}	31,500	46,160
Guyana ²	1,649	1,602	1,498 ^r	1,500 ^r	1,500 ^e
Hungary	94	14	8	17 ^r	20 ^e
India	20,664	22,636	27,757	23,886	22,909
Indonesia	57,024	2,555	472	1,400	2,900 ^e
Iran ²	789	748 ^r	862 ^r	800 ^{r,e}	800 ^e
Jamaica	9,435	9,677	9,629	8,540	8,245
Kazakhstan	5,192	4,516	4,683	4,801 ^r	5,000 ^e
Malaysia	209	3,665	35,000	3,000 ^{r,e}	2,000 ^e
Montenegro	61	155	50	400	800
Mozambique	7	3	5	1 ^r	2 ^e
Pakistan	27	30	31	90 ^r	100 ^e
Russia	6,028	6,293	5,900	5,431	5,523
Saudi Arabia	1,044 ^r	1,096 ^r	1,148 ^r	3,843	4,125
Sierra Leone	616	1,161	1,334	1,369	1,788
Solomon Islands	--	--	292 ^r	238	1,503
Suriname	2,706	2,708	1,600	--	--
Tanzania	34	26	26 ^e	25 ^e	25 ^e
Turkey	795 ^r	1,091 ^r	1,050 ^r	1,300 ^e	1,000 ^e
United States	W	W	W	W	W
Venezuela	2,341	2,346	992	900 ^{r,e}	750 ^e
Vietnam	482 ^e	1,090 ^e	1,150 ^e	1,419 ^r	2,400 ^e
Total	296,000 ^r	258,000	298,000 ^r	282,000 ^r	308,000

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

¹Table includes data available through July 17, 2018. All data are reported unless otherwise noted.

Totals and estimated data are rounded to 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	2013	2014	2015	2016	2017
Australia	21,528	20,474	20,097	20,681 ^r	20,486
Bosnia and Herzegovina	176	171	251	188 ^r	180 ^e
Brazil	9,942	10,404	10,452	10,886 ^r	10,900 ^e
Canada	1,555	1,563	1,561	1,567	1,570
China	47,000	51,300	58,978	60,907	69,017
France ^e	315	300	300	300	300
Germany	2,244	1,910 ^e	1,910 ^e	1,900 ^e	1,900 ^e
Greece	812	814	807	821	810 ^e
Hungary	81	61	--	--	--
India	4,040	5,060	5,512	6,028	6,060 ^e
Indonesia	--	--	70	600 ^e	1,300 ^e
Iran	249	251	241	250 ^e	250 ^e
Ireland	1,935	1,951	1,983	1,967	1,937
Jamaica	1,855	1,851	1,865	1,865	1,782
Japan ^{e,3}	250	100	15	18 ^r	20
Kazakhstan	1,590	1,419	1,448	1,510 ^r	1,500 ^e
Romania	391	363	405	467	473
Russia	2,659	2,572	2,593	2,682 ^r	2,822
Saudi Arabia	--	23	846	1,429	1,478
Spain	1,570 ^{r,e}	1,520 ^{r,e}	1,630 ^{r,e}	1,579	1,588
Suriname	1,149	1,149	748	--	--
Turkey ^e	206 ^r	195 ^r	294 ^r	305 ^r	300
Ukraine	1,494	1,457	1,481	1,510	1,676
United States	4,320	4,460	4,550	2,360	1,430
Venezuela	580	660	465	500 ^e	330
Vietnam	214 ^e	485 ^e	660 ^r	602 ^r	900 ^e
Total	106,000	111,000	119,000	121,000	129,000

^eEstimated. ^rRevised. -- Zero.

¹Table includes data available through July 17, 2018. All data are reported unless otherwise noted. Totals, U.S. data, and estimated data are rounded to 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 are for alumina used principally for specialty applications. Information on aluminum hydrate for all uses was not adequate to make estimates of production.