

**UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
WASHINGTON, D.C. 20549**

FORM 10-K

☒ ANNUAL REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934

For The Fiscal Year Ended December 31, 2018

OR

☐ TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934

Commission File Number 1-37816

ALCOA CORPORATION

(Exact Name of Registrant as Specified in Charter)

Delaware

(State or Other Jurisdiction
of Incorporation or Organization)

**201 Isabella Street, Suite 500,
Pittsburgh, Pennsylvania**
(Address of Principal Executive Offices)

81-1789115

(I.R.S. Employer
Identification No.)

15212-5858

(Zip Code)

412-315-2900

(Registrant's telephone number, including area code)

Securities registered pursuant to Section 12(b) of the Act:

Title of each class Common Stock, par value \$0.01 per share	Name of each exchange on which registered New York Stock Exchange
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Securities registered pursuant to Section 12(g) of the Act:

None

(Title of Class)

Indicate by check mark if the registrant is a well-known seasoned issuer, as defined in Rule 405 of the Securities Act.

Yes ☒ No ☐.

Indicate by check mark if the registrant is not required to file reports pursuant to Section 13 or Section 15(d) of the Exchange Act. Yes ☐ No ☒.

Indicate by check mark whether the registrant (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding 12 months, and (2) has been subject to such filing requirements for the past 90 days. Yes ☒ No ☐.

Indicate by check mark whether the registrant has submitted electronically every Interactive Data File required to be submitted pursuant to Rule 405 of Regulation S-T (§232.405 of this chapter) during the preceding 12 months (or for such shorter period that the registrant was required to submit such files). Yes ☒ No ☐.

Indicate by check mark if disclosure of delinquent filers pursuant to Item 405 of Regulation S-K (§229.405 of this chapter) is not contained herein, and will not be contained, to the best of registrant's knowledge, in definitive proxy or information statements incorporated by reference in Part III of this Form 10-K or any amendment to this Form 10-K. ☒

Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, a smaller reporting company, or an emerging growth company. See the definitions of "large accelerated filer," "accelerated filer," "smaller reporting company" and "emerging growth company" in Rule 12b-2 of the Exchange Act.

Large accelerated filer ☒ Accelerated filer ☐ Non-accelerated filer ☐ Smaller reporting company ☐

Emerging growth company ☐

If an emerging growth company, indicate by check mark if the registrant has elected not to use the extended transition period for complying with any new or revised financial accounting standards provided pursuant to Section 13(a) of the Exchange Act. ☐

Indicate by check mark whether the registrant is a shell company (as defined in Rule 12b-2 of the Exchange Act). Yes ☐ No ☒.

As of February 18, 2019, there were 185,498,424 shares of the registrant's common stock, par value \$0.01 per share, outstanding.

The aggregate market value of the Registrant's voting stock held by non-affiliates at June 29, 2018 was approximately \$8.7 billion, based on the closing price per share of Common Stock on June 29, 2018 of \$46.88 as reported on the New York Stock Exchange.

Documents incorporated by reference.

Part III of this Form 10-K incorporates by reference certain information from the registrant's Definitive Proxy Statement for its 2019 Annual Meeting of Stockholders to be filed pursuant to Regulation 14A.

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Note on Incorporation by Reference

In this Form 10-K, selected items of information and data are incorporated by reference to portions of Alcoa Corporation’s Definitive Proxy Statement for its 2019 Annual Meeting of Stockholders (“Proxy Statement”), which will be filed with the Securities and Exchange Commission within 120 days after the end of Alcoa Corporation’s fiscal year ended December 31, 2018. Unless otherwise provided herein, any reference in this Form 10-K to disclosures in the Proxy Statement shall constitute incorporation by reference of only that specific disclosure into this Form 10-K.

Forward-Looking Statements

This report contains statements that relate to future events and expectations and, as such, constitute forward-looking statements within the meaning of the Private Securities Litigation Reform Act of 1995. Forward-looking statements include those containing such words as “anticipates,” “believes,” “could,” “estimates,” “expects,” “forecasts,” “goal,” “intends,” “may,” “outlook,” “plans,” “projects,” “seeks,” “sees,” “should,” “targets,” “will,” “would,” or other words of similar meaning. All statements by Alcoa Corporation that reflect expectations, assumptions or projections about the future, other than statements of historical fact, are forward-looking statements. These statements reflect beliefs and assumptions that are based on Alcoa Corporation’s perception of historical trends, current conditions, and expected future developments, as well as other factors that management believes are appropriate in the circumstances. Forward-looking statements are not guarantees of future performance and are subject to known and unknown risks, uncertainties, and changes in circumstances that are difficult to predict. Although Alcoa Corporation believes that expectations reflected in any forward-looking statements are based on reasonable assumptions, it can give no assurance that these expectations will be attained and it is possible that actual results may differ materially from those indicated by these forward-looking statements due to a variety of risks and uncertainties.

For a discussion of some of the specific factors that may cause Alcoa’s actual results to differ materially from those projected in any forward-looking statements, see the following sections of this report: Part I, Item 1A. (Risk Factors), Part II, Item 7. (Management’s Discussion and Analysis of Financial Condition and Results of Operations), including the disclosures under Segment Information and Critical Accounting Policies and Estimates, and the Derivatives Section of Note O to the Consolidated Financial Statements in Part II, Item 8. (Financial Statements and Supplementary Data). Alcoa Corporation disclaims any obligation to update publicly any forward-looking statements, whether in response to new information, future events or otherwise, except as required by applicable law. Market projections are subject to the risks discussed above and other risks in the market.

PART I

Item 1. Business.

General

Alcoa Corporation, a Delaware corporation, became an independent, publicly traded company on November 1, 2016, following its separation from its former parent company, Alcoa Inc. (“ParentCo” or “Arconic”) (described below). “Regular-way” trading of Alcoa Corporation’s common stock began with the opening of the New York Stock Exchange (“NYSE”) on November 1, 2016 under the ticker symbol “AA.” Alcoa Corporation’s common stock has a par value of \$0.01 per share. Alcoa Corporation has its principal office in Pittsburgh, Pennsylvania. In this report, unless the context otherwise requires, the terms “Alcoa” or the “Company,” “we,” “us,” and “our” refer to Alcoa Corporation and all subsidiaries consolidated for the purposes of its financial statements.

Alcoa is a global industry leader in bauxite, alumina, and aluminum products. The Company is built on a foundation of strong values and operating excellence dating back 130 years to the world-changing discovery that made aluminum an affordable and vital part of modern life. Since developing the aluminum industry, and throughout our history, our talented Alcoans have followed on with breakthrough innovations and best practices that have led to efficiency, safety, sustainability, and stronger communities wherever we operate.

Alcoa is a global company with more than 40 operating locations across 10 countries. The Company’s operations consist of three reportable business segments: Bauxite, Alumina, and Aluminum. The Bauxite and Alumina segments primarily consist of a series of affiliated operating entities held in Alcoa World Alumina and Chemicals, a global, unincorporated joint venture between Alcoa and Alumina Limited (described below). The Aluminum segment consists of the Company’s aluminum smelting, casting, and rolling businesses, along with the majority of the energy business.

Aluminum, as an element, is abundant in the earth’s crust but a multi-step process is required to make aluminum metal. Aluminum metal is produced by refining alumina oxide from bauxite into alumina, which is then smelted into aluminum and can be cast and rolled into many shapes and forms. Aluminum is a commodity traded on the London Metal Exchange (“LME”) and priced daily. Alumina, an intermediary product, is subject to market pricing against the Alumina Price Index (“API”). As a result, the prices of both aluminum and alumina are subject to significant volatility and, therefore, influence the operating results of Alcoa.

The Company’s internet address is <http://www.alcoa.com>. Alcoa makes available free of charge on or through its website its annual report on Form 10-K, quarterly reports on Form 10-Q, current reports on Form 8-K, and amendments to those reports filed or furnished pursuant to Section 13(a) or 15(d) of the Securities Exchange Act of 1934, as amended (the “Exchange Act”) as soon as reasonably practicable after the Company electronically files such material with, or furnishes it to, the Securities and Exchange Commission (the “SEC”). The information on the Company’s internet site is not a part of, or incorporated by reference in, this annual report on Form 10-K. The SEC maintains an internet site that contains these reports at <http://www.sec.gov>.

Separation Transaction in 2016

On September 28, 2015, ParentCo announced its intention to separate ParentCo into two standalone, publicly traded companies (the “Separation Transaction”). Alcoa Upstream Corporation was formed in Delaware in March 2016 for the purpose of holding ParentCo’s Alcoa Corporation Business (as defined below) and was renamed Alcoa Corporation in connection with the Separation Transaction.

Alcoa Corporation was formed to hold ParentCo’s Bauxite, Alumina, Aluminum, Cast Products and Energy businesses, as well as ParentCo’s rolling mill operations in Warrick, Indiana, and ParentCo’s 25.1% interest in the Ma’aden Rolling Company in Saudi Arabia (collectively, the “Alcoa Corporation Business”). Following the Separation Transaction, Alcoa Corporation holds the assets and liabilities of ParentCo relating to those businesses and the direct and indirect subsidiary entities that operated the Alcoa Corporation Business, subject to certain exceptions. Upon completion of the Separation Transaction, ParentCo was renamed Arconic Inc. (“Arconic”) and now holds ParentCo’s Engineered Products and Solutions, Global Rolled Products (other than the rolling mill operations in Warrick, Indiana, and the 25.1% interest in the Ma’aden Rolling Company in Saudi Arabia) and Transportation and Construction Solutions businesses (the “Arconic Business”), including those assets and liabilities of ParentCo and its direct and indirect subsidiary entities that operated the Arconic Business, subject to certain exceptions.

In connection with the Separation Transaction, as of October 31, 2016, Alcoa Corporation entered into certain agreements with Arconic to implement the legal and structural separation between the two companies to govern the relationship between Alcoa Corporation and Arconic after the completion of the Separation Transaction and allocate between Alcoa Corporation and Arconic various assets, liabilities and obligations, including, among other things, employee benefits, environmental liabilities, intellectual property, and tax-related assets and liabilities. These agreements included a Separation and

Distribution Agreement, Tax Matters Agreement, Employee Matters Agreement, Transition Services Agreement, Stockholder and Registration Rights Agreement, and certain Patent, Know-How, Trade Secret License, and Trademark License Agreements.

Joint Ventures

AWAC

Alcoa World Alumina and Chemicals (“AWAC”) is an unincorporated global joint venture between Alcoa Corporation and Alumina Limited, a company incorporated under the laws of the Commonwealth of Australia and listed on the Australian Securities Exchange. AWAC consists of a number of affiliated entities that own, operate or have an interest in bauxite mines and alumina refineries, as well as certain aluminum smelters, in seven countries. Alcoa Corporation owns 60% and Alumina Limited owns 40% of these entities, directly or indirectly, with such entities being consolidated by Alcoa Corporation for financial reporting purposes.

The scope of AWAC generally includes:

- Bauxite and Alumina: The mining of bauxite and other aluminous ores as well as the refining and other processing of these ores into alumina and other ancillary operations;
- Non-Metallurgical Alumina: The production and sale of non-metallurgical alumina and other alumina-based chemicals; and
- Integrated Operations: Ownership and operation of certain primary aluminum smelting and other ancillary facilities.

Alcoa is the industrial leader of AWAC and provides the operating management for all of the operating entities forming AWAC. The operating management is subject to direction provided by the Strategic Council of AWAC, which is the principal forum for Alcoa and Alumina Limited to provide direction and counsel to the AWAC companies regarding strategic and policy matters. The Strategic Council consists of five members, three of whom are appointed by Alcoa (of which one is the Chairman of the Strategic Council), and two of whom are appointed by Alumina Limited (of which one is the Deputy Chairman of the Strategic Council).

All matters before the Strategic Council are decided by a majority vote of the members. Certain matters require approval by at least 80% of the members, including: changes to the scope of AWAC; changes in the dividend policy; equity calls in aggregate greater than \$1 billion in any year; sales of all or a majority of the AWAC assets; loans from AWAC companies to Alcoa or Alumina Limited; certain acquisitions, divestitures, expansions, curtailments or closures; certain related-party transactions; financial derivatives, hedges or swap transactions; a decision by AWAC companies to file for insolvency; and changes to pricing formula in certain offtake agreements which may be entered into between AWAC companies and Alcoa or Alumina Limited.

AWAC Operations

AWAC entities’ assets include the following interests:

- 100% of the bauxite mining, alumina refining, and aluminum smelting operations of Alcoa’s affiliate, Alcoa of Australia Limited (“AofA”);
- 100% of the Juruti bauxite deposit and mine in Brazil;
- 45% interest in Halco (Mining) Inc., a bauxite consortium that owns a 51% interest in Compagnie des Bauxites de Guinée, a bauxite mine in Guinea;
- 9.62% interest in the bauxite mining operations in Brazil of Mineração Rio Do Norte, an international mining consortium;
- 100% interest in various mining and refining assets and the hydro-electric facilities in Suriname;
- 25.1% interest in the mine and refinery in Ras Al Khair, Saudi Arabia;
- 100% of the refinery and alumina-based chemicals assets at San Ciprián, Spain;
- 100% of the refinery assets at Point Comfort, Texas, United States;

- 39% interest in the São Luis refinery in Brazil;
- 55% interest in the Portland, Australia smelter that AWAC manages on behalf of the joint venture partners; and
- 100% of Alcoa Steamship Company Inc., a company that procures ocean freight and commercial shipping services for the chartering of aluminum, alumina, bauxite, caustic liquor, carbon products, and support material which may be bought or sold by Alcoa in the ordinary course of business.

Exclusivity

Under the terms of their joint venture agreements, Alcoa and Alumina Limited have agreed that, subject to certain exceptions, AWAC is their exclusive vehicle for their investments, operations or participation in the bauxite and alumina business, and they will not compete with AWAC in those businesses. In the event of a change of control of either Alcoa or Alumina Limited, this exclusivity and non-compete restriction will terminate, and the partners will then have opportunities to unilaterally pursue bauxite or alumina projects outside of or within AWAC, subject to certain conditions provided in the Amended and Restated Charter of the Strategic Council.

Equity Calls

The cash flow of AWAC and borrowings are the preferred sources of funding for the needs of AWAC. An equity call can be made on 30 days' notice, subject to certain limitations, in the event the aggregate annual capital budget of AWAC requires an equity contribution from Alcoa and Alumina Limited.

Dividend Policy

AWAC will generally be required to distribute at least 50% of the prior calendar quarter's net income of each AWAC company, and certain AWAC companies will also be required to pay a distribution every three months equal to the amount of available cash above specified thresholds and subject to the forecast cash needs of the company. Alcoa will obtain a limited amount of debt funding for the AWAC companies to fund growth projects, subject to certain restrictions.

Leveraging Policy

Debt of AWAC is subject to a limit of 30% of total capital (defined as the sum of debt (net of cash) plus any minority interest plus shareholder equity). The AWAC joint venture has raised a limited amount of debt to fund growth projects as permitted under Alcoa's revolving credit line, in accordance with the joint venture partnership agreements.

Saudi Arabia Joint Venture

In December 2009, Alcoa entered into a joint venture with the Saudi Arabian Mining Company ("Ma'aden"), which was formed by the government of Saudi Arabia to develop its mineral resources and create a fully integrated aluminum complex in the Kingdom of Saudi Arabia. Ma'aden is listed on the Saudi Stock Exchange (Tadawul). This project is one of the most efficient integrated aluminum production complexes within the worldwide Alcoa system. The complex includes a bauxite mine with a capacity of 4 million bone dry metric tons per year; an alumina refinery with a capacity of 1.8 million metric tons per year ("mtpy"); an aluminum smelter with a capacity of ingot, slab and billet of 740,000 mtpy; and a rolling mill with a capacity of 380,000 mtpy.

The joint venture is comprised of three entities: the Ma'aden Bauxite and Alumina Company ("MBAC"), the Ma'aden Aluminum Company ("MAC"), and the Ma'aden Rolling Company ("MRC") (collectively, the "Ma'aden Joint Venture"). Ma'aden owns a 74.9% interest in the joint venture. Alcoa owns a 25.1% interest in MAC, which holds the smelter, and in MRC, which holds the rolling mill; AWAC holds a 25.1% interest in MBAC, which holds the mine and refinery. The refinery, smelter and rolling mill are located within the Ras Al Khair industrial zone on the east coast of the Kingdom of Saudi Arabia.

Other

The Company is party to several other joint ventures and consortia. See details within each business segment discussion under "Description of the Business" below.

The Aluminerie de Bécancour Inc. ("ABI") smelter is a joint venture between Alcoa and Rio Tinto Alcan Inc. ("Rio Tinto") located in Bécancour, Quebec. Alcoa is the operating partner and owns 74.95% of the joint venture.

Compagnie des Bauxites de Guinée ("CBG") is a joint venture between Boké Investment Company (51%) and the Government of Guinea (49%) for the operation of a bauxite mine in the Boké region of Guinea. Boké Investment Company is owned 100% by Halco (Mining) Inc.; AWA LLC holds a 45% interest in Halco.

Mineração Rio do Norte (“MRN”) is a joint venture between Alcoa Alumínio (8.58%), AWA Brasil (4.62%) and AWA LLC (5%), each a subsidiary of Alcoa, and affiliates of Rio Tinto (12%), Companhia Brasileira de Alumínio (10%), Vale S.A. (“Vale”) (40%), South32 (14.8%), and Norsk Hydro (5%) for the operation of a bauxite mine in Porto Trombetas in the state of Pará in Brazil.

Alumar is a joint venture for the operation of a refinery, smelter, and casthouse in Brazil. The refinery is owned by AWA Brasil (39%), Rio Tinto (10%), Alcoa Alumínio (15%), and South32 (36%). AWA Brasil is part of the AWAC group of companies and is ultimately owned 60% by Alcoa and 40% by Alumina Limited. With respect to Rio Tinto and South32, the named company or an affiliate thereof holds the interest. The smelter and casthouse are owned by Alcoa Alumínio (60%) and South32 (40%).

Elysis is a joint venture between the wholly-owned subsidiaries of Alcoa (48.235%) and Rio Tinto (48.235%), respectively, and Investissement Québec (3.53%), a company wholly-owned by the Government of Québec. The purpose of Elysis is to advance larger scale development and commercialization of the Company’s patent-protected technology that produces oxygen and eliminates all direct greenhouse gas emissions from the traditional aluminum smelting process.

Strathcona calciner is a joint venture between Alcoa and Rio Tinto. The calciner purchases green coke from the petroleum industry and converts it into calcined coke. The calcined coke is then used as a raw material in an aluminum smelter. Alcoa owns 39% of the joint venture.

Hydropower

Machadinho Hydro Power Plant (“HPP”) is a consortium between Alcoa Alumínio (25.8%), Votorantim Energia (33.1%), Tractebel (19.3%), Vale (8.3%) and other partners (CEEE, InterCement and DME Energetica) located in the Pelotas River, southern Brazil.

Barra Grande HPP is a joint venture between Alcoa Alumínio (42.2%), CPFL Energia (25%), Votorantim Energia (15%), InterCement (9%) and DME Energetica (8.8%) located in the Pelotas River, southern Brazil.

Estreito HPP is a consortium between Alcoa Alumínio (25.5%), Tractebel (40.1%), Vale (30%) and InterCement (4.4%) located in the Tocantins River, northern Brazil.

Serra do Facão HPP is a consortium between Alcoa Alumínio (34.9%), Furnas (49.4%), DME Energetica (10%) and Camargo Correa Energia (5.4%) located in the Sao Marcos River, central Brazil.

Manicouagan Power Limited Partnership (“Manicouagan”) is a joint venture between Alcoa Corporation and Hydro-Québec. Manicouagan owns and operates the 335 megawatt McCormick hydroelectric project, which is located on the Manicouagan River in the Province of Quebec. Manicouagan supplies approximately 27% of the electricity requirements of Alcoa’s Baie-Comeau, Quebec, smelter. Alcoa owns 40% of the joint venture.

Bauxite

This segment consists of the Company’s global bauxite mining operations. Bauxite is the principal raw material used to produce alumina and contains various aluminum hydroxide minerals, the most important of which are gibbsite and boehmite. Bauxite is refined using the Bayer process, the principal industrial chemical process for refining bauxite to produce alumina, a compound of aluminum and oxygen that is the raw material used by smelters to produce aluminum metal. Bauxite is Alcoa’s basic raw material input for its alumina refining process. The Company obtains bauxite from its own resources and from those belonging to AWAC, located in the countries listed in the table below, as well as pursuant to both long-term and short-term contracts and mining leases. Tons of bauxite are reported on a zero-moisture basis as dry metric tons (“dmt”) unless otherwise stated.

Alcoa processes most of the bauxite that it mines into alumina and sells the remainder to third parties. In 2018, Alcoa-operated mines produced 39.6 million dmt and mines operated by partnerships in which Alcoa and AWAC have equity interests produced 6.2 million dmt on a proportional equity basis, for a total Company bauxite production of 45.8 million dmt.

Based on the terms of its bauxite supply contracts, the amount of bauxite AWAC purchases from its minority-owned joint ventures Mineração Rio do Norte S.A. (“MRN”) and Compagnie des Bauxites de Guinée (“CBG”) differ from its proportional equity in those mines. Therefore, in 2018, AWAC had access to 46.9 million dmt of production from its portfolio of bauxite interests and sold 5.7 million dmt of bauxite to third parties; 41.2 million dmt of bauxite was delivered to Alcoa and AWAC refineries.

The Company is committed to growing its third-party bauxite sales business. In December 2016, the Government of Western Australia granted permission to Alcoa’s majority-owned subsidiary, Alcoa of Australia, (“AofA”), to export up to 2.5 million dmt per year of bauxite for five years to third-party customers. In addition, the Company is currently pursuing long-term

contracts with potential customers. Contracts for bauxite have generally been short-term contracts (two years or less in duration) with spot pricing and adjustments for quality and logistics. The primary customer base for third-party bauxite is located in Asia, particularly in China.

Bauxite Resource and Reserve Development Guidelines

The Company has access to large bauxite deposit areas with mining rights that extend in most cases more than 20 years from the date of this report. For purposes of evaluating the amount of bauxite that will be available to supply its refineries, the Company considers both estimates of bauxite resources as well as calculated bauxite reserves. “Bauxite resources” are deposits for which tonnage, densities, shape, physical characteristics, grade and mineral content can be estimated with a reasonable level of confidence (based on the amount of exploration sampling and testing information gathered through appropriate techniques from locations such as outcrops, trenches, pits, workings and drill holes), such that they are acceptable prospects for economic extraction. “Bauxite reserves” represent the part of resource deposits that can be economically mined to supply alumina refineries, and include diluting materials and allowances for losses, which may occur when the material is mined. Appropriate assessments and studies have been carried out to define the reserves, and include consideration of and modification by realistically assumed mining, metallurgical, economic, marketing, legal, environmental, social and governmental factors. Alcoa employs a conventional approach (including additional drilling with successive tightening of the drilling grid) with customized techniques to define and characterize its various bauxite deposit types allowing us to confidently establish the extent of its bauxite resources and their ultimate conversion to reserves.

Alcoa has adopted best practice guidelines for bauxite reserve and resource classification at its operating bauxite mines. The Alcoa Ore Reserves Committee (“AORC”) is an internal group comprised of geologists and engineers that issues and administers the AORC Guidelines, which are used by all Alcoa-managed mines to classify bauxite reserves and resources. Alcoa’s reserves are declared in accordance with the Joint Ore Reserves Committee (“JORC”) code guidelines. The reported ore reserves set forth in the table below are those that we estimated could be extracted economically with current technology and in current market conditions. We do not use a price for bauxite, alumina or aluminum to determine our bauxite reserves. The primary criteria for determining bauxite reserves are the feed specifications required by the receiving alumina refinery. More specifically, reserves are set based on the chemical composition of the bauxite in order to minimize bauxite processing cost and maximize refinery economics for each individual refinery. The primary specifications that are important to this analysis are the “available alumina” content of the bauxite, which is the amount of alumina extractable from bauxite using the Bayer process, and “reactive silica” content of the bauxite, which is the amount of silica that is reactive within the Bayer process. Each alumina refinery will have a target specification for these parameters, but may receive bauxite within a range that allows blending in stockpiles to achieve the receiving refinery’s target.

In addition to these chemical specifications, a number of other ore reserve design factors have been applied to differentiate bauxite reserves from other mineralized material. The contours of the bauxite reserves are designed using parameters such as available alumina content cutoff grade, reactive silica cutoff grade, ore density, overburden thickness, ore thickness and mine access considerations. These parameters are generally determined by using infill drilling or geological modeling. Further, our mining locations utilize annual in-fill drilling or geological modeling programs designed to progressively upgrade the reserve and resource classification of their bauxite based on the above-described factors.

The following table only includes the amount of proven and probable reserves controlled by the Company. While the level of reserves may appear low in relation to annual production levels, they are consistent with historical levels of reserves for the Company’s mining locations and consistent with the Company reserves strategy. Given the Company’s extensive bauxite resources, the abundant supply of bauxite globally, and the length of the Company’s rights to bauxite, it is not cost-effective to establish bauxite reserves that reflect the total size of the bauxite resources available to the Company. Rather, bauxite resources are upgraded annually to reserves as needed by the location. Detailed assessments are progressively undertaken within a proposed mining area and mine activity is then planned to achieve a uniform quality in the supply of blended feedstock to the relevant refinery. Alcoa believes its present sources of bauxite on a global basis are sufficient to meet the forecasted requirements of its alumina refining operations for the foreseeable future.

Bauxite Interests, Share of Reserves and Annual Production

Country	Project	Owners' Mining Rights (% Entitlement)	Expiration Date of Mining Rights	Probable Reserves ² (million dmt)	Proven Reserves ² (million dmt)	Available Alumina Content ¹² (%) A.Al ₂ O ₃	Reactive Silica Content ¹³ (%) R.SiO ₂	2018 Annual Production (million dmt)	Ore Reserve Design Factors
Australia	Darling Range Mines ML1SA	Alcoa of Australia Limited ("AofA") ³ (100%)	2024	55.6	101.1	32.7	1.0	33.5	• A.Al₂O₃ ≥ 27.5% • R.SiO₂ ≤ 3.5% • Minimum mineable thickness 2m • Minimum bench widths of 45m
Brazil	Poços de Caldas ⁵	Alcoa Alumínio S.A. ("Alcoa Alumínio") ⁴ (100%)	2028 ⁵	0.2	1.7	39.5	4.3	0.4	• A.Al₂O₃ ≥ 30% • R.SiO₂ ≤ 7%
	Juruti ⁵ RN101, RN102, RN103, RN104, #34	Alcoa World Alumina Brasil Ltda. ("AWA Brasil") ³ (100%)	2100 ⁵	19	3.5	46.7	4.4	5.7	• A.Al₂O₃ ≥ 35% • R.SiO₂ ≤ 10% • Wash Recovery: ≥ 30% • Overburden /Ore (m/m) = 10/1
Equity Interests :									
Brazil	Trombetas	Mineração Rio do Norte S.A. ("MRN") ⁶ (18.2%)	2046 ⁵	2.4	6.3	48.7	5.4	2.3	• A.Al₂O₃ ≥ 46% • R.SiO₂ ≤ 7% • Wash Recovery: ≥ 30%
Guinea	Boké	Compagnie des Bauxites de Guinée ("CBG") ⁷ (22.95%)	2038 ⁸	41.7	62.0	TAI ₂ O ₃ 47.3	TSiO ₂ 1.8	2.7	• A.Al₂O₃ ≥ 44% • R.SiO₂ ≤ 10% • Minimum mineable thickness 2m • Smallest Mining Unit size (SMU) 50m x 50m
Kingdom of Saudi Arabia	Al Ba'itha	Ma'aden Bauxite & Alumina Company (25.1%) ¹⁰	2037	30.9	17.3	TAA ₁ 48.2	TSiO ₂ 11 9.2	1.1	• A.Al₂O₃ ≥ 40% • Mining dilution modeled as a skin of 12.5cm around the ore • Mining recovery applied as a skin loss of 7.5 cm on each side of the mineralisation • Mineralisation less than 1m thick excluded

¹ This table shows only the AWAC and/or Alcoa share (proportion) of reserve and annual production tonnage.

² Reserves are in place for all mines other than Juruti and Trombetas, where the ore is beneficiated and a wash recovery factor is applied. "Probable reserves" are the portion of a bauxite reserve where the physical and chemical characteristics and limits are known with sufficient confidence for mining and to which various mining modifying factors have been applied. "Proven reserves" are the portion of a bauxite reserve where the physical and chemical characteristics and limits are known with high confidence and to which various mining modifying factors have been applied.

³ This entity is part of the AWAC group of companies and is ultimately owned 60% by Alcoa and 40% by Alumina Limited.

⁴ Alcoa Alumínio is ultimately owned 100% by Alcoa.

⁵ Brazilian mineral legislation does not limit the duration of mining concessions; rather, the concession remains in force until the deposit is exhausted. We estimate that (i) the Poços de Caldas concessions will last at least until 2028; (ii) the Trombetas concessions will last until 2046; and (iii) the Juruti concessions will last until 2100. These concessions may be extended later or expire earlier than estimated, based on the rate at which these deposits are exhausted and on obtaining any additional governmental approval, as necessary.

⁶ MRN interests are held by Alcoa Alumínio (8.58%), AWA Brasil (4.62%), and AWA LLC (5%). Remaining interest in MRN is held by affiliates of Rio Tinto (12%), Companhia Brasileira de Alumínio (10%), Vale (40%), South32 (14.8%), and Norsk Hydro (5%). Alumínio, AWA Brasil, and AWA LLC purchase bauxite from MRN under long-term supply contracts.

⁷ CBG is a joint venture between Boké Investment Company, a Delaware company (51%) and the Government of Guinea (49%) for the operation of a bauxite mine in Guinea. Boké Investment Company is owned 100% by Halco

- (Mining) Inc. (“Halco”); AWA LLC owns a 45% interest in Halco. CBG has the exclusive right through 2038 to develop and mine bauxite in certain areas within an approximately 2,939 square-kilometer concession in northwestern Guinea.
- 8 AWA LLC and Alúmina Española, S.A. have bauxite purchase contracts with CBG that expire in 2033 and are expected to negotiate extensions of these contracts in light of CBG’s exclusive concession through 2038. The CBG concession can be renewed beyond 2038 by agreement of the Government of Guinea and CBG in the event more time is required to commercialize the remaining economic bauxite within the concession.
- 9 Guinea—Boké: CBG prices bauxite and plans the mine based on the total amount of alumina contained in the bauxite (“TA₂O₃” or “total alumina content”), not all of which is extractable through the Bayer process, and total amount of silica (a compound of silicon and oxygen) contained in the bauxite (“TSiO₂” or “total silica”).
- 10 MBAC is owned by Ma’aden, the Saudi Arabian Mining Company (74.9%) and AWA Saudi Limited (25.1%). AWA Saudi Limited is part of the AWAC group of companies and is ultimately owned 60% by Alcoa Corporation and 40% by Alumina Limited.
- 11 Kingdom of Saudi Arabia—Al Ba’itha: Bauxite reserves and mine plans are based on the bauxite qualities of the total amount of alumina extractable from bauxite by the Bayer process (“TA₂O₃” or “available alumina content”), and total amount of silica contained in the bauxite (TSiO₂).
- 12 Available alumina content is the total amount of alumina extractable from bauxite using the Bayer process.
- 13 Reactive silica (“R.SiO₂”) is the amount of silica contained in bauxite that is reactive within the Bayer process.

Qualifying statements relating to the table above:

Australia—Darling Range Mines: Huntly and Willowdale are the two active AWAC mines in the Darling Range of Western Australia that supply bauxite to three local AWAC alumina refineries. They operate within ML1SA, the mineral lease issued by the State of Western Australia to Alcoa’s majority-owned subsidiary, AofA. The ML1SA lease encompasses a gross area of 712,881 hectares (including private land holdings, state forests, national parks and conservation areas) in the Darling Range and extends from east of Perth to east of Bunbury (“ML1SA Area”). The ML1SA lease provides AofA with various rights, including certain exclusivity rights to explore for and mine bauxite, rights to deny third party mining tenements in limited circumstances, rights to mining leases for other minerals in the ML1SA Area, and the right to prevent certain governmental actions from interfering with or prejudicially affecting the rights of AofA. The ML1SA lease term extends to 2024 and can be renewed for an additional 21-year period to 2045. The above-declared reserves are current as of December 31, 2018. The amount of reserves reflects the total AWAC share. Additional resources are routinely upgraded by additional exploration and development drilling to reserve status.

Brazil—Poços de Caldas: The above-declared reserves are current as of December 31, 2018. Tonnage is total Alcoa share. Additional resources are being upgraded to reserves as needed.

Brazil—Juruti RN101, RN102, RN103, RN104, #34: The above-declared reserves are current as of December 31, 2018. All reserves are on Capianga Plateau in mineral claim areas RN101, RN102, RN103, RN104, #34, within which Alcoa has operating licenses issued by the state. Declared reserves are total AWAC share. Declared reserve tonnages and the annual production tonnage are washed and unwashed product tonnages. The Juruti mine’s operating licenses are periodically renewed.

Brazil—Trombetas-MRN: The above-declared reserves are as of December 31, 2018. Declared and annual production tonnages reflect the total for Alumínio and AWAC shares (18.2%). Declared tonnages are washed product tonnages.

Guinea—Boké-CBG: The above-declared reserves are based on export quality bauxite reserves and are current as of December 31, 2018. Declared tonnages reflect only the AWAC share of CBG’s reserves. Annual production tonnage is reported based on AWAC’s 22.95% share. Declared reserves quality is reported based on total alumina content (“TA₂O₃”) and total silica (“TSiO₂”) because CBG export bauxite is sold on this basis. Additional resources are being routinely drilled and modeled to upgrade to reserves as needed.

Kingdom of Saudi Arabia—Al Ba’itha: The Al Ba’itha Mine began production during 2014 and production was increased in 2016. Declared reserves are as of November 30, 2018. The declared reserves are located in the South Zone of the Az Zabirah Bauxite Deposit. The reserve tonnage in this declaration is AWAC share only (25.1%).

The following table provides additional information regarding the Company's bauxite mines, all of which are open-cut mines. Excavation is done at the surface of open-cut mines to extract mineral ore (such as bauxite). Open-cut mines are not underground and the sky is viewable from the mine floor:

Mine & Location	Means of Access	Operator	Title, Lease or Options	History	Type of Mine Mineralization Style	Power Source	Facilities, Use & Condition
Australia—Darling Range; Huntly and Willowdale.	Mine locations accessed by roads. Ore is transported to refineries by long distance conveyor and rail.	Alcoa	Mining lease from the Western Australia Government. ML1SA. Expires in 2024, with option to renew.	Mining began in 1963.	Open-cut mines. Bauxite is derived from the weathering of Archean granites and gneisses and Precambrian dolerite.	Electrical energy from natural gas is supplied by the refinery.	Infrastructure includes buildings for administration and services; workshops; power distribution; water supply; crushers; long distance conveyors. Mines and facilities are operating.
Brazil—Poços de Caldas. Closest town is Poços de Caldas, MG, Brazil.	Mine locations are accessed by road. Ore transport to the refinery is by road.	Alcoa	Mining licenses from the Government of Brazil and Minas Gerais. Company claims and third-party leases. Expires in 2020.	Mining began in 1965.	Open-cut mines. Bauxite derived from the weathering of nepheline syenite and phonolite.	Commercial grid power.	Mining offices and services are located at the refinery. Numerous small deposits are mined by contract miners and the ore is trucked to either the refinery stockpile or intermediate stockpile area. Mines and facilities are operating. Mine production has been reduced to align with the reduced production of the Poços refinery which is now producing specialty alumina.
Brazil—Juruti. Closest town is Juruti located on the Amazon River.	The mine's port at Juruti is located on the Amazon River and accessed by ship. Ore is transported from the mine site to the port by company owned rail.	Alcoa	Mining licenses from the Government of Brazil and Pará. Mining rights do not have a legal expiration date. See footnote 5 to the table above. Operating licenses for the mine, washing plant and exploration are in the process of being renewed. Operating license for the port remains valid until the government agency formalizes the renewal.	The Juruti deposit was systematically evaluated by Reynolds Metals Company beginning in 1974. ParentCo merged Reynolds into the Company in 2000. ParentCo then executed a due diligence program and expanded the exploration area. Mining began in 2009.	Open-cut mines. Bauxite derived from weathering during the Tertiary of Cretaceous fine to medium grained feldspathic sandstones. The deposits are covered by the Belterra clays.	Electrical energy from fuel oil is generated at the mine site. Commercial grid power at the port.	At the mine site: Fixed plant facilities for crushing and washing the ore; mine services offices and workshops; power generation; water supply; stockpiles; rail sidings. At the port: Mine and rail administrative offices and services; port control facilities with stockpiles and ship loader. Mine and port facilities are operating.

Mine & Location	Means of Access	Operator	Title, Lease or Options	History	Type of Mine Mineralization Style	Power Source	Facilities, Use & Condition
Brazil—MRN Closest town is Trombetas in the State of Pará, Brazil.	The mine and port areas are connected by sealed road and company owned rail. Washed ore is transported to Porto Trombetas by rail. Trombetas is accessed by river and by air at the airport.	MRN	Mining rights and licenses from the Government of Brazil. Concession rights expire in 2046.	Mining began in 1979. Major expansion in 2003.	Open-cut mines. Bauxite derived from weathering during the Tertiary of Cretaceous fine to medium grained feldspathic sandstones. The deposits are covered by the Belterra clays.	MRN generates its own electricity from fuel oil.	Ore mined from several plateaus is crushed and transported to the washing plant by long-distance conveyors. The washing plant is located in the mining zone. Washed ore is transported to the port area by company-owned and operated rail. At Porto Trombetas the ore is loaded onto customer ships berthed in the Trombetas River. Some ore is dried and the drying facilities are located in the port area. Mine planning and services and mining equipment workshops are located in the mine zone. The main administrative, rail and port control offices and various workshops are located in the port area. MRN's main housing facilities are located near the port. The mines, port and all facilities are operating.
Guinea—CBG. Closest town to the mine is Sangaredi. Closest town to the port is Kamsar. The CBG Lease is located within the Boké, Telimele and Gaoual administrative regions.	The mine and port areas are connected by sealed road and company-operated rail. Ore is transported to the port at Kamsar by rail. There are air strips near both the mine and port. These are not operated by the company.	CBG	CBG Lease expires in 2038. The lease is renewable in 25-year increments. CBG's rights are specified within the Basic Agreement and Amendment 1 to the Basic Agreement with the Government of Guinea.	Construction began in 1969. First export ore shipment was in 1973.	Open-cut mines. The bauxite deposits within the CBG lease are of two general types. TYPE 1: In-situ laterization of Ordovician and Devonian plateau sediments locally intruded by dolerite dikes and sills. TYPE 2: Sangaredi type deposits are derived from clastic deposition of material eroded from the Type 1 laterite deposits and possibly some of the protholiths from the TYPE 1 plateaus deposits.	The company generates its own electricity from fuel oil at both Kamsar and Sangaredi.	Mine offices, workshops, power generation and water supply for the mine and company mine city are located at Sangaredi. The main administrative offices, port control, railroad control, workshops, power generation and water supply are located in Kamsar. Ore is crushed, dried and exported from Kamsar. CBG has company cities within both Kamsar and Sangaredi. The mines, railroad, driers, port and other facilities are operating.

Mine & Location	Means of Access	Operator	Title, Lease or Options	History	Type of Mine Mineralization Style	Power Source	Facilities, Use & Condition
Kingdom of Saudi Arabia —Al Ba'itha Mine. Qibah is the closest regional center to the mine, located in the Qassim province.	The mine and refinery are connected by road and rail. Ore is transported to the refinery at Ras Al Khair by rail and truck.	Ma'aden Bauxite & Alumina Company	The current mining lease will expire in 2037.	The initial discovery and delineation of bauxite resources was carried out between 1979 and 1984. The southern zone of the Az Zabirah deposit was granted to Ma'aden in 1999. Mine construction was completed in the second quarter of 2015, and the mining operations continued at planned levels.	Open-cut mine. Bauxite occurs as a paleolaterite profile developed at an angular unconformity between underlying late Triassic to early Cretaceous sediments (parent rock sequence Biyadh Formation) and the overlying late Cretaceous Wasia Formation (overburden sequence).	The company generates electricity at the mine site from fuel oil.	The mine includes fixed plants for crushing and train loading; workshops and ancillary services; power plant; and water supply. There is a company village with supporting facilities. Mining operations commenced in 2014. Mine construction was completed in the second quarter of 2015 and the mining operations continued at planned levels.

Kingdom of Saudi Arabia Joint Venture

MBAC includes a bauxite mine with an initial capacity of 4 million dmt per year. For additional information regarding the joint venture, see Joint Ventures under the “General” and the Equity Investments section of Note H to the Consolidated Financial Statements in Part II, Item 8. (Financial Statements and Supplementary Data). Financial results for the Saudi Arabian mine are discussed below in “Alumina”.

Alumina

This segment consists of the Company’s worldwide refining system, which processes bauxite into alumina. Alcoa’s largest customer for smelter grade alumina is its own aluminum smelters, which in 2018 accounted for approximately 29% of its total alumina sales. A portion of the alumina is sold to third-party customers who process it into industrial chemical products. Remaining sales are made to customers all over the world and are typically priced by reference to published spot market prices.

This segment also includes AWAC’s 25.1% share of MBAC.

In 2010, a number of key commodity information service providers began publishing daily and weekly alumina (spot) pricing assessments or indices rather than calculating alumina price as a percentage of the LME aluminum price, as had been done historically. Since that time, Alcoa has been systematically moving its third-party alumina sales contracts away from LME aluminum-based pricing to published alumina spot or index pricing, thus de-linking the price for alumina from the aluminum price to better reflect alumina’s distinct fundamentals. Contracts for smelter grade alumina are often multi-year, although contract structures have evolved from primarily long-term contracts with fixed or LME-based pricing to shorter-term contracts with more frequent pricing adjustment to reflect this change in pricing structure. In 2018, approximately 95% of Alcoa Corporation’s smelter grade alumina shipments to third parties were sold at published spot/index prices.

Alcoa's alumina refining facilities and its worldwide alumina capacity are shown in the following table:

Country	Facility ¹	Nameplate Capacity ² (000 MTPY)	Alcoa Corporation Consolidated Capacity ³ (000 MTPY)
Australia	Kwinana ⁴	2,190	2,190
	Pinjarra ⁴	4,234	4,234
	Wagerup ⁴	2,555	2,555
Brazil	Poços de Caldas	390 ⁵	390
	São Luís ("Alumar") ⁶	3,500	1,890
Spain	San Ciprián	1,500	1,500
United States	Point Comfort, TX ⁷	2,305 ⁸	2,305
TOTAL		16,674	15,064

Equity Interests:

Country	Facility ¹	Nameplate Capacity ² (000 MTPY)
Kingdom of Saudi Arabia	Ras Al Khair ⁹	1,800

¹ Each facility is 100% owned by Alcoa, unless otherwise noted.

² Nameplate Capacity is an estimate based on design capacity and normal operating efficiencies and does not necessarily represent maximum possible production.

³ The figures in this column reflect Alcoa's share of production from these facilities. For facilities wholly-owned by AWAC entities, Alcoa takes 100% of the production.

⁴ These facilities are wholly-owned by AofA, which is part of the AWAC group of companies and is ultimately owned 60% by Alcoa and 40% by Alumina Limited.

⁵ As a result of the decision to fully curtail the Poços de Caldas smelter, management initiated a reduction in alumina production at this refinery. The capacity that is operating at this refinery is producing at an approximately 45% output level.

⁶ The Alumar facility is owned by AWA Brasil (39%), Rio Tinto Alcan Inc. (10%), Alcoa Alumínio (15%), and South32 (36%). AWA Brasil is part of the AWAC group of companies and is ultimately owned 60% by Alcoa and 40% by Alumina Limited. With respect to Rio Tinto Alcan Inc. and South32, the named company or an affiliate thereof holds the interest.

⁷ The Point Comfort facility is 100% owned by AWA LLC. This entity is part of the AWAC group of companies and is ultimately owned 60% by Alcoa and 40% by Alumina Limited.

⁸ The Point Comfort alumina refinery has been fully curtailed.

⁹ The San Ciprián refinery is part of the AWAC group of companies.

¹⁰ The Ras Al Khair facility is 100% owned by MBAC, a joint venture company owned by Ma'aden (74.9%) and AWA Saudi Limited (25.1%). AWA Saudi Limited is part of the AWAC group of companies and is ultimately owned 60% by Alcoa and 40% by Alumina Limited.

As of December 31, 2018, Alcoa had approximately 2,305,000 mtpy of idle capacity relative to total Alcoa consolidated capacity of 15,064,000 mtpy. As noted above, Alcoa and Ma'aden developed an alumina refinery in the Kingdom of Saudi Arabia. Initial capacity of the refinery is 1,800,000 mtpy, and it produced approximately 1,774,000 metric tons (mt) in 2018. For additional information regarding the joint venture, see Note H to the Consolidated Financial Statements under the caption "Investments—Equity Investments."

In March 2015, ParentCo initiated a 12-month review of 2,800,000 mtpy in refining capacity for possible curtailment (partial or full), permanent closure or divestiture, as part of an effort to lower the position of the Company's refining operations on the global alumina cost curve. The review resulted in the curtailment of the remaining capacity at the Suralco refinery (1,330,000 mtpy) in 2015 and the commencement of the curtailment of the remaining capacity of the Point Comfort, TX refinery (2,010,000 mtpy), which curtailment was completed in the first half of 2016. In the fourth quarter of 2016, Alcoa determined to close the Suralco alumina refinery and bauxite mines in Suriname, which have been fully curtailed since November 2015. For additional information regarding the curtailments, see "Management's Discussion and Analysis of Financial Condition and Results of Operations—Segment Information—Alumina."

Aluminum

This segment consists of (i) the Company's worldwide smelting and casthouse system, (ii) a rolling mill in the United States, and (iii) a portfolio of energy assets in Brazil, Canada, and the United States. The smelting operations produce molten primary aluminum, which is then formed by the casting operations into either common alloy ingot (e.g., t-bar, sow, standard ingot) or into value-added ingot products (e.g., foundry, billet, rod, and slab). The rolling mill produces aluminum sheet primarily for the production of aluminum cans. The energy assets supply power to external customers in Brazil, and, to a lesser extent, in the United States, and internal customers within the Aluminum segment (Canadian smelters and Warrick (Indiana) smelter and rolling mill) and the Alumina segment (Brazilian refineries). This segment also includes Alcoa's 25.1% share of MAC and MRC, the smelting and rolling mill joint venture companies in Saudi Arabia.

Smelting and Casting Operations

Contracts for primary aluminum vary widely in duration, from multi-year supply contracts to monthly or weekly spot purchases. Pricing for primary aluminum products is typically comprised of three components: (i) the published LME aluminum price for commodity grade P1020 aluminum, (ii) the published regional premium applicable to the delivery locale and (iii) a negotiated product premium which accounts for factors such as shape and alloy. In recent years, the Company has experienced increasing trade flows of commodity and higher value-added products between regions, with surplus regions supplying missing volumes to deficit regions. The flow patterns consider shipping costs, import duties, and premiums in the importing regions.

Alcoa's primary aluminum facilities and its global smelting capacity are shown in the following table:

Country	Facility ¹	Nameplate Capacity ² (000 MTPY)	Alcoa Corporation Consolidated Capacity ³ (000 MTPY)
Australia	Portland ⁴	358	197 _{5,6}
Brazil	Poços de Caldas ⁷	N/A	N/A
	São Luís ("Alumar") ⁸	447	268 ₉
Canada	Baie Comeau, Québec	280	280
	Bécancour, Québec ¹⁰	413	310 ₁₁
	Deschambault, Québec	260	260
Iceland	Fjarðaál	344	344
Norway	Lista	94	94
	Mosjøen	188	188
Spain	Avilés	93 ₁₂	93
	La Coruña	87 ₁₂	87
	San Ciprián	228	228
United States	Massena West, NY	130	130
	Ferndale, WA ("Intalco")	279 ₁₃	279
	Wenatchee, WA	146 ₁₄	146
	Evansville, IN ("Warrick") ¹⁵	269 ₁₆	269
TOTAL		3,616	3,173

Equity Interests:

Country	Facility	Nameplate Capacity ² (000 MTPY)
Kingdom of Saudi Arabia	Ras Al Khair ¹⁷	740

¹ Each facility is comprised of a smelter and casthouse and is 100% owned by Alcoa, unless otherwise indicated.

² Nameplate Smelting Capacity is an estimate based on design capacity and normal operating efficiencies and does not necessarily represent maximum possible production.

³ The figures in this column reflect Alcoa's share of Nameplate Smelting Capacity based on its ownership interest in the respective smelter.

⁴ The Portland facility is owned by AofA (55%), CITIC (22.5%), and Marubeni (22.5%).

⁵ This figure includes Alumina Limited's noncontrolling interest in the Portland facility, which is owned by AofA, an AWAC company. From this facility, AWAC takes 100% of the production allocated to AofA.

- 6 The Portland smelter has approximately 30,000 mtpy of idle capacity.
- 7 The Poços de Caldas facility is a casthouse and does not include a smelter.
- 8 The Alumar facility is owned by Alcoa Alumínio (60%) and South32 (40%). Alcoa Alumínio is ultimately owned 100% by Alcoa.
- 9 The Alumar smelter and casthouse have been fully curtailed since April 2015.
- 10 The Bécancour facility is owned by Alcoa (74.95%) and Rio Tinto (“Rio Tinto”) (25.05%, owned through Rio Tinto’s interest in Pechiney Reynolds Québec, Inc., which is owned by Rio Tinto and Alcoa).
- 11 The Bécancour smelter has approximately 259,000 mtpy of idle capacity (see below).
- 12 The Avilés and La Coruña smelters have approximately 56,000 mtpy of idle capacity combined (see below).
- 13 The Intalco smelter has approximately 49,000 mtpy of idle capacity.
- 14 The Wenatchee smelter and casthouse have been fully curtailed since December 2015. In June 2018, one (approximately 38,000 mtpy) of the four potlines was permanently closed, as it had not operated since 2001, and the investments needed to restart that line are cost prohibitive. As a result, Wenatchee’s smelting capacity now stands at approximately 146,000 mtpy.
- 15 The Warrick facility is dedicated to supplying rolling slab to the Warrick rolling mill.
- 16 The Warrick smelter has approximately 108,000 mtpy of idle capacity (see below).
- 17 The Ras Al Khair facility is 100%-owned by the Ma’aden Joint Venture, a minority-owned joint venture between Ma’aden (74.9%) and Alcoa (25.1%).

As of December 31, 2018, the Company had approximately 916,000 mtpy of idle smelting capacity relative to total Alcoa consolidated capacity of 3,173,000 mtpy.

In July 2017, Alcoa announced plans to restart three (approximately 161,000 mtpy of capacity) of the five potlines (269,000 mtpy of capacity) at the Warrick smelter (previously permanently closed in March 2016 by ParentCo). The capacity identified for restart directly supplies the existing rolling mill at the Warrick location, improves efficiency of the integrated site and provides an additional source of metal to help meet production volumes. Alcoa completed the restart of two potlines (approximately 108,000 mtpy of capacity) in mid-2018 and a third potline in December 2018 (approximately 53,000 mtpy of capacity).

In January 2018, a lockout of the bargained hourly employees commenced at the Bécancour smelter (see Employees below). Accordingly, management initiated a curtailment of two (approximately 207,000 mtpy (Alcoa’s share) of capacity) of the three potlines at the smelter. Additionally, in December 2018, half (approximately 52,000 mtpy (Alcoa’s share) of capacity) of the one operating potline at the Bécancour smelter was curtailed. This additional curtailment was deemed necessary to ensure continued safety and maintenance due to recent retirements and departures among the salaried workforce.

In January 2019, Alcoa reached an agreement with workers’ representatives at the Avilés and La Coruña facilities as part of a collective dismissal process initiated in October 2018 (see Employees below). The plan calls for the curtailment of the remaining smelting capacity (approximately 124,000 mtpy combined) of the two smelters. The casthouse at each plant and the paste plant at La Coruña will remain in operation while the Company participates in a Spanish government-led process for the potential sale of the Avilés and La Coruña facilities. In accordance with the ratified agreement, the Company will maintain the smelters in the restart condition in the event an agreement to sell the plants can be reached by June 30, 2019.

For additional information regarding the curtailments and closures, see “Management’s Discussion and Analysis of Financial Condition and Results of Operations—Restructuring and Other Charges.”

Rolling Operations

The Aluminum segment’s rolled products business consists of the Company’s rolling mill in Warrick, Indiana, which produces aluminum sheet primarily sold directly to customers in the packaging end market for the production of aluminum cans (beverage and food) and Alcoa’s investment in a rolling mill in Saudi Arabia through the Ma’aden Rolling Company. For additional information about the Ma’aden Joint Venture, see Joint Ventures under “General” and the Equity Investments section of Note H to the Consolidated Financial Statements in Part II, Item 8. (Financial Statements and Supplementary Data).

Alcoa’s rolled products business has the capability of participating in several market segments, including beverage can sheet, food can sheet, lithographic sheet, and industrial products. The term “RCS” or Rigid Container Sheet is commonly used for both beverage and food can sheet. This includes the material used to produce the body of beverage containers (body stock), the lid of beverage containers (end stock and tab stock), the material to produce food can body and lids (food stock), and the material to produce aluminum bottles (bottle stock) and bottle closures (closure sheet). Alcoa suspended production of lithographic sheet in the second quarter of 2018.

In 2018, our Warrick facility produced and sold 334.4 kilo metric tons (kMT) of RCS, lithographic sheet, and industrial products, of which over 99% was sold to customers in North America. The majority of its sales were coated RCS products (food stock, beverage end and tab stock). Following the Separation Transaction, both Warrick and the Ma'aden Rolling Company supply body stock material, temporarily supplemented by Arconic's Tennessee Operations under a transition supply agreement that expired on December 31, 2018. Seasonal increases in can sheet sales are generally expected in the second and third quarters of the year.

Can sheet demand is a function of consumer demand for beverages in aluminum packaging. Aluminum cans have a number of functional advantages for beverage companies, including product shelf life, carbonation retention, and logistics/distribution efficiency. Demand is mostly affected by overall demand for carbonated soft drinks and beer, which comprise approximately 60% and 40%, respectively, of overall aluminum can demand. In 2018, the U.S./Canada aluminum can shipments reached 94.0 billion cans, an increase of 0.6% over 2017. Alcoholic can shipments reached 35.6 billion cans, declining 2.4% year over year, while non-alcoholic can shipments were 58.4 billion, growing 2.5% year over year.

Energy Facilities and Sources

Employing the Bayer process, Alcoa refines alumina from bauxite ore. The Company's smelters then produce aluminum from the alumina by an electrolytic process requiring substantial amounts of electric power. Energy accounts for approximately 20% of the Company's total alumina refining production costs. Electric power accounts for approximately 24% of the Company's primary aluminum production costs.

Electricity markets are regional. They are limited in size by physical and regulatory constraints, including the physical inability to transport electricity efficiently over long distances, the design of the electric grid, including interconnections, and by the regulatory structure imposed by various federal and state entities.

Electricity contracts may be short term (real-time or day ahead) or years in duration, and contracts can be executed for immediate delivery or years in advance. Pricing may be fixed, indexed to an underlying fuel source or other index such as LME, cost-based or based on regional market pricing. Pricing may be all inclusive on a per energy unit delivered basis (e.g., dollars per megawatt hour) or the components may be separated and include a demand or capacity charge, an energy charge, an ancillary services charge and a transmission charge to make the delivered energy conform to customer requirements. In 2018, Alcoa generated approximately 9% of the power used at its smelters worldwide and generally purchased the remainder under long-term arrangements.

The following table sets forth the electricity generation capacity and 2018 generation of facilities in which Alcoa Corporation has an ownership interest:

Country	Facility ¹	Alcoa Corporation Consolidated Capacity (MW) ²	2018 Generation (MWh) ³
Brazil	Barra Grande	156	1,331,520
	Estreito	157	1,431,304
	Machadinho	119	956,682
	Serra do Facão	60	185,813
Canada	Manicouagan	133	1,160,854
Suriname	Afobaka	189	1,004,475
United States	Warrick ⁴	657	3,446,084
TOTAL		1,471	9,516,732

¹ Each listed facility generates hydroelectric power except the Warrick facility, which generates substantially all of the power used at the Warrick facility using nearby coal reserves from the Alcoa-owned Liberty Mine. Liberty Mine, which is operated by Vigo Coal Company, Inc., has a production capacity of approximately 1.5 million tons per year. During 2018, approximately 28% of the capacity from the Warrick power plant was sold into the market under its current operating permits. In 2019, Alcoa will purchase coal from independently-owned mines. Alcoa Power Generating Inc. also owns certain Federal Energy Regulatory Commission ("FERC")-regulated transmission assets in Indiana, Tennessee, New York, and Washington.

² The consolidated capacity of the Brazilian energy facilities represented here in megawatts ("MW"), is the assured energy that is approximately 52% of hydropower plant nominal capacity.

³ The figures in this column are presented in megawatt hours ("MWh").

⁴ Alcoa Alumínio has approximately a 42.2% interest in Energética Barra Grande S.A. (BAESA), which built the Barra Grande hydroelectric power plant in southern Brazil.

- 5 Alcoa Alumínio participates in the Estreito hydropower project in northern Brazil, through Estreito Energia S.A. (an Alcoa Alumínio wholly-owned company) holding an approximately 25.5% stake in Consórcio Estreito Energia, the owner of the hydroelectric power plant.
- 6 Alcoa Alumínio owns approximately a 25.8% stake in Consórcio Machadinho, the owner of the Machadinho hydroelectric power plant located in southern Brazil.
- 7 Alcoa Alumínio has approximately a 34.9% share in Serra do Facão Energia S.A., which built the Serra do Facão hydroelectric power plant in southeastern Brazil.
- 8 Since May 2015 (after curtailment of the Poços de Caldas and São Luís smelters), the excess generation capacity from the Brazilian hydroelectric facilities described above has been sold into the market.
- 9 Power generated from Afobaka is sold to the Government of Suriname under a bilateral contract.

The sections below provide an overview of our external energy for our smelters and refineries.

n	External Energy Source	
	Electricity	Natural Gas
th America	<u>Québec</u> The Deschambault, Baie Comeau, and Bécancour smelters in Québec purchase all or a majority of their electricity under contracts with Hydro-Québec that expire on December 31, 2029. The smelter located in Baie Comeau purchases approximately 73% of its power needs under the Hydro-Québec contract, and the remainder from a 40% owned hydroelectric generating company, Manicouagan Power Limited Partnership. For the Baie Comeau smelter, the Hydro-Québec contract can be extended until February 23, 2036.	In order to supply its smelters in the U.S. and Canada generally procures natural gas on a competitive bid b variety of sources, including producers in the gas pro areas and independent gas marketers. Pipeline transp may be procured directly or via the local distribution Contract pricing for gas is typically based on a publi industry index such as the New York Mercantile Exc (“NYMEX”) price. The Company may choose to red exposure to NYMEX pricing by hedging a portion of natural gas consumption.
	<u>Wenatchee</u> In the State of Washington, Alcoa’s Wenatchee smelter is served by a contract with Chelan County Public Utility District No. 1 (“Chelan PUD”) under which Alcoa receives 26% of the hydropower output of Chelan PUD’s Rocky Reach and Rock Island dams. In June 2018, the Company announced its decision to permanently close one of four potlines at the Wenatchee smelter, which has a remaining capacity of approximately 146,000 mtpy that has been fully curtailed since 2015.	
	<u>Intalco</u> Starting on January 1, 2013, the Intalco smelter, in the state of Washington, began receiving physical power under a contract with the Bonneville Power Administration (“BPA”) at the Northwest Power Act mandated industrial firm power (“IP”) rate through September 30, 2022. Additional power is purchased from the market as needed. In May 2015, the contract was amended to reduce the amount of physical power received from BPA and allow for additional purchases of market power. In April 2016, the contract was amended again to reduce the contractual amount through February 2018, following which Intalco resumed receiving physical contracted quantities of power at the mandated IP rate. In August 2018, Alcoa issued a notice of termination to BPA that will become effective on August 31, 2019, after which the Intalco smelter will purchase power from the market.	
	<u>Massena West</u> The Massena West smelter in New York receives power from the New York Power Authority (“NYPA”) pursuant to a contract between Alcoa and NYPA that will expire in March 2019. The Company is currently negotiating a long-term contract with NYPA effective following the termination date.	

in	External Energy Source	
	Electricity	Natural Gas
Australia	<u>Portland</u> The Portland smelter purchased electricity from the State Electricity Commission of Victoria (“SECV”) under a contract with Alcoa Portland Aluminium Pty Ltd, a wholly-owned subsidiary of AofA, that extended to October 2016. Upon the expiration of this contract, the Portland smelter commenced to purchase power from the National Electricity Market (“NEM”) variable spot market. In March 2010, AofA and Eastern Aluminium (Portland) Pty Ltd separately entered into fixed for floating swap contracts with Loy Yang (now AGL Energy Ltd) in order to manage exposure to the variable energy rates from the NEM. The fixed for floating swap contract with AGL for the Portland smelter commenced operating from the date of expiration of the contract with the SECV and was terminated in accordance with its terms, effective July 31, 2017. A new fixed for floating swap contract for the Portland smelter was entered into with AGL in January 2017 that commenced on August 1, 2017 and will expire on July 31, 2021.	<u>Western Australia</u> AofA uses gas to co-generate steam and electricity for alumina refining processes at the Kwinana, Pinjarra and Wagerup refineries. More than 90% of AofA’s gas requirements for the remainder of the decade are secured under long-term contracts. In 2015, AofA secured a significant portion of its gas supplies to 2032. In 2018, AofA secured three new gas agreements which, combined, will supply approximately 80% of the Company’s gas requirement in Western Australia through 2020.
Europe	<u>Spain</u> Alcoa’s smelter at San Ciprián, Spain, purchases electricity under a bilateral spot power contract that expires December 31, 2020. Smelters at Avilés and La Coruña, Spain, purchase electricity under bilateral spot power contracts that expire December 31, 2019. As a large consumer of electricity, Alcoa participates in a demand response program in Spain, agreeing to reduce usage of electricity for a specific period of time, in return for compensation, which allows the utility or grid operator to divert electricity during times of peak demand. A competitive bidding mechanism to allocate these “interruptibility rights” in Spain was settled during 2014 to be applied starting from January 1, 2015 and with several auctions to allocate annual rights taking place since then. In May 2018, Alcoa secured 605MW of interruptibility rights for the period of June to December 2018. The last auction process to allocate rights took place in December 2018, where Alcoa secured 590MW of interruptibility rights for the period of January to June 2019 for the three Spanish smelters. <u>Norway</u> Alcoa owns two smelters in Norway, Lista and Mosjøen, which have historical long-term power purchase agreements in place that continue until the end of 2019. During 2017 and 2018, Alcoa entered into several power purchase agreements, securing approximately 45% of the necessary power for the Norwegian smelters for the period of 2020 to 2035. The Company continues to seek and negotiate additional power purchase contracts for years subsequent to 2019. In addition, for Alcoa’s smelters in Norway, the financial compensation of the indirect carbon emissions costs passed through in the electricity bill is received in accordance with EU Commission Guidelines and Norwegian compensation regime. <u>Iceland</u> Landsvirkjun, the Icelandic national power company, supplies competitively priced electricity to Alcoa’s Fjarðaál smelter in eastern Iceland under a 40-year power contract, which will expire in 2047.	<u>Spain</u> To facilitate the full conversion of the San Ciprián, S.A. alumina refinery from fuel oil to natural gas, in October 2015, Alúmina Española S.A. (“AE”) and Gas Natural Tráfico SDG SL (“GN”) signed a take-or-pay gas pipeline utilization agreement. Pursuant to that agreement, the ultimate shareholders of AE, Alcoa Corporation and Alumina Company, guaranteed the payment of AE’s contracted gas pipeline utilization over the four years of the commitment period. If AE fails to do so, each shareholder is responsible for its respective proportionate share (i.e., 60/40). Such agreement came into force six months after the gas pipeline was completed and put into operation by GN. The gas pipeline was completed in 2015 and the refinery has switched to natural gas consumption for 100% of its needs. In 2018, natural gas was supplied to the San Ciprián, alumina refinery pursuant to two supply contracts which expired in June and December 2018, respectively. Supply contracts with BP that expired in June 2018 and a supply contract with Axpo that expired in December 2018. Following the expiration of those contracts, the refinery’s natural gas requirements are supplied pursuant to supply contracts with: Endesa expiring in June 2019; Naturgas in December 2019; and BP expiring in June 2020.

Other

The Company has a calciner facility located in Lake Charles, Louisiana. This facility converts green coke into calcined coke, which is used as a raw material for the anode formation process at an aluminum smelter. The Lake Charles facility was curtailed in December 2015 due to an equipment failure and restarted again in July 2017.

The Company's Gum Springs, Arkansas facility processes spent potlining and other hazardous wastes.

Sources and Availability of Raw Materials

Generally, materials are purchased from third-party suppliers under competitively priced supply contracts or bidding arrangements. The Company believes that the raw materials necessary to its business are and will continue to be available.

For each metric ton of alumina produced, Alcoa consumes the following amounts of the identified raw material inputs (approximate range across relevant facilities):

Raw Material	Units	Consumption per MT of Alumina
Bauxite	mt	2.2 – 3.6
Caustic soda	kg	60 – 115
Electricity	kWh	200 to 260 total consumed (0 to 220 imported)
Fuel oil and natural gas	GJ	6.2 – 12.2
Lime (CaO)	kg	6 – 60

For each metric ton of aluminum produced, Alcoa consumes the following amounts of the identified raw material inputs (approximate range across relevant facilities):

Raw Material	Units	Consumption per MT of Primary Aluminum
Alumina	mt	1.92 ± 0.02
Aluminum fluoride	kg	17.1 ± 5.0
Calcined petroleum coke	mt	0.37 ± 0.05
Cathode blocks	mt	0.005 ± 0.002
Electricity	kWh	12900 – 17000
Liquid pitch	mt	0.10 ± 0.03
Natural gas	mcf	3.0 ± 1.0

Certain aluminum we produce includes alloying materials. Because of the number of different types of elements that can be used to produce our various alloys, providing a range of such elements would not be meaningful. With the exception of a very small number of internally used products, Alcoa produces its alloys in adherence to an Aluminum Association (of which Alcoa is an active member) standard, which uses a specific designation system to identify alloy types. In general, each alloy type has a major alloying element other than aluminum but will also have other constituents as well, but of lesser amounts.

Competition

Alcoa is subject to highly competitive conditions in all aspects of the aluminum supply chain in which it competes. Competitors include a variety of both U.S. and non-U.S. companies in all major markets. Brand name recognition and loyalty also play a role. Alcoa's competitive position depends, in part, on the Company's access to an economical power supply to sustain its operations in various countries.

In each of our business segments, we enjoy several competitive advantages. We are among the world's largest bauxite miners, with best practices in efficient mining operations and sustainability. We are the world's largest alumina producer outside of China and operate competitive, efficient assets across our refining, aluminum smelting, and casting portfolios. Our business segments operate in close proximity to our broad, worldwide customer base, enabling us to meet customer demand in key markets in North America, South America, Europe, the Middle East, Australia, and China. Competitive advantages specific to each business segment are detailed below.

Bauxite:

The third-party market for metallurgical grade bauxite is relatively new and growing quickly as global demand for bauxite increases—particularly in China. The majority of bauxite mined globally is converted to alumina for the production of aluminum. While Alcoa has historically mined bauxite for internal consumption in our alumina refineries, we are committed to expanding our third-party bauxite business to meet growing demand.

Our principal competitors in the third-party bauxite market include Rio Tinto, Norsk Hydro and multiple suppliers from Guinea, India and other countries. We compete largely based on bauxite quality, price and proximity to customers. In addition to the competitive advantages described above, Alcoa has a strong competitive position in this market due to its reliable, long-term bauxite resources in strategic bauxite mine locations, including Australia, Brazil, and Guinea, which is home to the world's largest reserves of high-quality metallurgical grade bauxite. Alcoa has a long history of stable operations in these countries and has access to large bauxite deposits with mining rights that extend in most cases more than 20 years from the date of this report.

Alumina:

The alumina market is global and highly competitive, with many active suppliers, producers, and commodity traders. Alcoa faces competition from a number of companies, including Aluminum Corporation of China Limited, China Hongqiao Group Limited, Hindalco Industries Ltd., Hangzhou Jinjiang Group, National Aluminium Company Limited ("NALCO"), Noranda Aluminum Holding Corporation, Norsk Hydro ASA, Rio Tinto, South32 Limited, State Power Investment Corporation, United Company RUSAL Plc, and Chipping Xinfu Alumina Product Co., Ltd. In recent years, there has been significant growth in alumina refining in China and India. The majority of our product is sold in the form of smelter grade alumina, with 5% to 10% of total global alumina production being produced for non-metallurgical applications.

Key factors influencing competition in the alumina market include: cost position, price, reliability of bauxite supply, quality and proximity to customers and end markets. While we face competition from many industry players, we had an average cost position in the first quartile of global alumina production in 2018, in part attributable to our experienced workforce and sophistication in refining technology and process automation. Also, our refineries are strategically located next to low cost bauxite mines, and our alumina refineries are tuned to maximize efficiency with the exact bauxite qualities from these internal mines. In addition to these refining efficiencies, vertical integration affords a stable and consistent long-term supply of bauxite to our refining portfolio.

Aluminum:

In our Aluminum segment, competition is dependent upon the type of product we are selling.

The market for primary aluminum is global, and demand for aluminum varies widely from region to region. We compete with commodity traders and aluminum producers such as Aluminum Corporation of China Limited, China Hongqiao Group Limited, East Hope Group Co. Ltd., Emirates Global Aluminum, Norsk Hydro, Rio Tinto, Shandong Xinfu Aluminum & Power Group, State Power Investment Co. ("SPIC"), and United Company RUSAL Plc, as well as with alternative materials such as steel, titanium, copper, carbon fiber, composites, plastic and glass, each of which may be substituted for aluminum in certain applications.

The aluminum industry itself is highly competitive; some of the most critical competitive factors in our industry are product quality, production costs (including source and cost of energy), price, proximity to raw materials, customers and end markets, timeliness of delivery, customer service (including technical support), product innovation, and breadth of offerings. Where aluminum products compete with other materials, the diverse characteristics of aluminum are also a significant factor, particularly its light weight, strength and recyclability.

In addition, in some end-use markets, competition is also affected by customer requirements that suppliers complete a qualification process to supply their plants. This process can be rigorous and may take many months to complete. However, the ability to obtain and maintain these qualifications can represent a competitive advantage.

The strength of our position in the primary aluminum market is largely attributable to the following factors:

- Low Cost Production: Alcoa leverages significant economies of scale to continuously reduce costs. As a result, Alcoa operates competitive, efficient assets across its aluminum smelting and casting portfolios. The Company's smelting cost position is supported by long-term energy arrangements at many locations; Alcoa has secured approximately 61% of its smelter power needs through 2023.
- Value-Added Product Portfolio: Alcoa's casthouses supply global customers with a diverse product portfolio, both in terms of shapes and alloys. We offer differentiated products that are cast into specific shapes to meet customer demand, with 67% of 2018 smelter shipments representing value-added products.
- Sustainability: As of December 31, 2018, approximately 70% of our aluminum smelting portfolio runs on renewable power sources, lessening our demand for fossil fuels.

Alcoa owns generation and transmission assets that produce and sell electric energy and ancillary services in the United States and Brazilian wholesale energy markets. Our competitors include integrated electric utilities that may be owned by

governments (either fully or partially), cooperatives or investors, independent power producers and energy brokers and traders.

Competition factors in open power markets include fuel supply, production costs, operational reliability, access to the power grid, and environmental attributes (e.g., green power and renewable energy credits). As electricity is difficult and cost prohibitive to store, there are no electricity inventories to cushion the impact of supply and demand factors and the resultant pricing in electricity markets may be volatile. Demand for power varies greatly both seasonally and by time of day. Supply may be impacted in the short term by unplanned generator outages or transmission congestion and longer term by planned generator outages, droughts, high precipitation levels and fuel pricing (coal and/or natural gas).

Alcoa's energy assets enjoy several competitive advantages, when compared to other power suppliers:

- **Reliability:** In the United States, we have operated our thermal energy assets for over 50 years with a high degree of reliability and expect to continue this level of performance. In Brazil, our ownership provides for assured energy from hydroelectric operations from 2032 through 2037.
- **Sustainable ("green") energy sources:** A majority of our generating assets use renewable (hydroelectric) sources of fuel for generation.

Our rolled products business has the capability of participating in various market segments, including beverage can sheet, food can sheet, lithographic sheet, aluminum bottle sheet, and industrial products and in the U.S. competes with other North American producers of RCS products, namely Novelis Corp, Tri-Arrows Aluminum, and Constellium NV. There is also import supply of RCS from China (Nanshan) and Western Europe (Hydro and Eval) mainly for the beverage market.

We also compete against package types made of other materials including polyethylene terephthalate ("PET") bottles, glass bottles, steel tin plate and other materials.

We compete on cost, quality, and service. The Company intends to continue to improve our cost position by increasing recycled aluminum content in our metal feedstock as well as continuing to focus on capacity utilization. We believe our team of technical and operational resources provides distinctive quality and customer service.

Patents, Trade Secrets and Trademarks

The Company believes that its domestic and international patent, trade secret and trademark assets provide it with a significant competitive advantage. The Company's rights under its intellectual property, as well as the products made and sold under them, are important to the Company as a whole and, to varying degrees, important to each business segment. Alcoa's business as a whole is not, however, materially dependent on any single patent, trade secret or trademark. As a result of product development and technological advancement, the Company continues to pursue patent protection in jurisdictions throughout the world. As of December 31, 2018, Alcoa's worldwide patent portfolio consisted of approximately 720 granted patents and 300 pending patent applications. The Company also has a number of domestic and international registered trademarks that have significant recognition within the markets that are served, including the name "Alcoa" and the Alcoa symbol.

As part of the Separation Transaction, Alcoa Corporation and Arconic entered into certain intellectual property license agreements between them. These agreements, as amended, provide for a license of certain patents, trademarks and know-how from Arconic or Alcoa Corporation, as applicable, to the other, on a perpetual, royalty-free, non-exclusive basis, subject to certain exceptions.

Environmental Matters

Alcoa is subject to extensive federal, state and local environmental laws and regulations, including those relating to the release or discharge of materials into the air, water and soil, waste management, pollution prevention measures, the generation, storage, handling, use, transportation and disposal of hazardous materials, the exposure of persons to hazardous materials, greenhouse gas emissions, and the health and safety of our employees. We participate in environmental assessments and cleanups at approximately 60 locations. These include owned or operating facilities and adjoining properties, previously owned or operating facilities and adjoining properties, and waste sites, including Superfund (Comprehensive Environmental Response, Compensation and Liability Act ("CERCLA")) sites. In 2018, capital expenditures for new or expanded facilities for environmental control were approximately \$145 million and approximately \$75 million is expected in 2019. Additional information relating to environmental matters is included in Note R to the Consolidated Financial Statements under the caption "Contingencies and Commitments—Environmental Matters."

Employees

At the end of 2018, Alcoa had approximately 14,000 employees in 15 countries. Approximately 10,700 of these employees are represented by labor unions. In the U.S., approximately 2,400 employees are represented by various labor unions. The largest collective bargaining agreement in the U.S. is the master collective bargaining agreement with the United Steelworkers (“USW”), which covers approximately 1,600 employees at five U.S. locations. There are three additional collective bargaining agreements at three U.S. locations with the USW, the International Association of Machinists and Aerospace Workers (IAM) and the International Brotherhood of Electric Workers (IBEW), with varying expiration dates. On a regional basis, collective bargaining agreements with varying expiration dates cover approximately 2,200 employees in Europe, 1,600 employees in Canada, 1,800 employees in Central and South America, and 2,700 employees in Australia.

The Company’s master agreement with the USW is set to expire on May 15, 2019, and Alcoa is currently negotiating a new collective bargaining agreement with the union.

The collective bargaining agreement with CSN (Confédération des Syndicats Nationaux) representing about 600 hourly employees at its Baie Comeau smelter in Canada expires on May 31, 2019. Alcoa is preparing to negotiate a new collective bargaining agreement.

On January 11, 2018, a lockout of the bargained hourly employees commenced at the Bécancour smelter in Québec, impacting approximately 1,000 employees at this facility. The Bécancour facility is owned by Alcoa (74.95%) and Rio Tinto (25.05%). For additional information, see footnote 10 to the table in “Smelting Operations” under the Aluminum segment above.

On August 8, 2018, the Company’s bauxite mines and alumina refineries in Australia experienced a nearly eight-week strike by the unionized labor force who are represented by the Australian Workers’ Union (AWU). These two mines continued to operate during the strike with minimal disruption. The labor force has returned to work while negotiations between the Company and the union continue.

On October 17, 2018, the Company announced its intention to begin a formal consultation process for collective dismissals that would affect all employees at its Avilés and La Coruña smelters in Spain. A total of almost 700 employees will be impacted. In January 2019, Alcoa reached an agreement with workers’ representatives at these facilities). Under this agreement, the remaining smelting capacity (approximately 124,000 mtpy combined) of the two smelters will be curtailed by the end of February 2019. The casthouse at each plant and the paste plant at La Coruña will remain in operation while the Company participates in a Spanish government-led process for the potential sale of the Avilés and La Coruña facilities. A social plan included in the agreement preserves a portion of the jobs at the two facilities and includes retirement packages and potential relocation to the Company’s San Ciprián facility. In accordance with the ratified agreement, the Company will maintain the smelters in the restart condition in the event an agreement to sell the plants can be reached by June 30, 2019.

Executive Officers of the Registrant

The names, ages, positions and areas of responsibility of the executive officers of the Company as of February 15, 2019 are listed below.

Roy C. Harvey, 45, is President and Chief Executive Officer of Alcoa Corporation. He became Chief Executive Officer in November 2016 and assumed the role of President in May 2017. Mr. Harvey served as Executive Vice President of ParentCo and President of ParentCo’s Global Primary Products (“GPP”) division from October 2015 to November 2016. From June 2014 to October 2015, he was Executive Vice President, Human Resources and Environment, Health, Safety and Sustainability at ParentCo. Prior to that time, Mr. Harvey was Chief Operating Officer for GPP at ParentCo from July 2013 to June 2014 and was Chief Financial Officer for GPP from December 2011 to July 2013. In addition to these roles, Mr. Harvey served as Director of Investor Relations at ParentCo from September 2010 through November 2011 and was Director of Corporate Treasury from January 2010 to September 2010. Mr. Harvey joined ParentCo in 2002 as a business analyst for GPP in Knoxville, Tennessee.

William F. Oplinger, 52, has served as Executive Vice President and Chief Financial Officer of Alcoa Corporation since November 2016. Mr. Oplinger served as Executive Vice President and Chief Financial Officer of ParentCo from April 1, 2013 to November 2016. Mr. Oplinger joined ParentCo in 2000, and through 2013 held key corporate positions in financial analysis and planning and also served as Director of Investor Relations. Mr. Oplinger also held principal positions in the ParentCo’s GPP division, including as Controller, Operational Excellence Director, Chief Financial Officer, and Chief Operating Officer.

Leigh Ann Fisher, 52, has served as Executive Vice President and Chief Administrative Officer since November 2016. She has responsibility for the Human Resources, Shared Services, Procurement and Information Technology functions of Alcoa Corporation. Ms. Fisher served as Chief Financial Officer of ParentCo’s GPP division from July 2013 to November 2016.

Ms. Fisher was Group Controller for GPP at ParentCo from 2011 to July 2013. From 2008 to 2011, Ms. Fisher was Group Controller for ParentCo's Engineered Products and Solutions division. Ms. Fisher joined ParentCo in 1989.

Jeffrey D. Heeter, 53, has served as Executive Vice President, General Counsel and Secretary of Alcoa Corporation since November 2016. Mr. Heeter served as Assistant General Counsel of ParentCo from 2014 to November 2016. Mr. Heeter was Group Counsel for GPP at ParentCo from 2010 to 2014. From 2008 to 2010, Mr. Heeter was General Counsel of Alcoa of Australia in Perth, Australia. Mr. Heeter joined ParentCo in 1998.

John D. Slaven, 57, has served as Executive Vice President and Chief Strategy Officer of Alcoa Corporation, responsible for the Strategy, Corporate and Business Development functions and Supply Chain group, since he joined Alcoa on February 4, 2019. From 2006 until 2019, Mr. Slaven was Partner and Managing Director at the Boston Consulting Group, where he most recently led the North American Metals and Mining; Infrastructure and Public Transport practices. Prior to this time, from 2002 through early 2006, Mr. Slaven worked for ParentCo, where he implemented its Asia growth strategy, revitalized the Latin America business, and led ParentCo's sales and marketing growth in Asia before returning to New York to lead the corporate strategy, financial planning, and analysis functions.

Garret J. Dixon, 60, has served as President of Alcoa Corporation's Bauxite business unit since November 2016 and is responsible for the Company's global bauxite operations. Mr. Dixon served as President Alcoa Bauxite of ParentCo from February 2013, when he joined ParentCo, to November 2016 and as President of ParentCo's Mining business from 2015 until November 2016. From July 2011 until February 2013, Mr. Dixon served as the Vice President Business Development at Aurizon (previously QR National Ltd), a publicly-listed rail freight company in Australia. Prior to this time, Mr. Dixon served as the Chief Executive Officer and Managing Director of Gindalbie Metals Ltd., an Australian resources company based in Perth.

Michael A. Parker, 47, has served as President of Alcoa Corporation's Alumina business unit since November 2016, responsible for the Company's global alumina portfolio. He also serves as the Chairman and Managing Director of Alcoa of Australia. Mr. Parker served as Vice President Commercial for ParentCo's global alumina refining business from September 2015 until November 2016. From January 2010 through August 2015, Mr. Parker was Director, Business Development and Marketing for Alcoa of Australia, responsible for sales, marketing, business development, and energy strategy for the Australian operations. Mr. Parker joined ParentCo in 1994.

Timothy D. Reyes, 52, has served as President of Alcoa Corporation's Aluminum business unit since March 2017. Mr. Reyes was President, Alcoa Cast Products from November 2016 until March 2017, when the aluminum smelting, cast products and rolled products businesses, along with the majority of the energy segment assets, were combined into a new Aluminum business unit. From January 2015 to November 2016, he served as President, Alcoa Cast Products of ParentCo. Prior to this time, Mr. Reyes was President of Alcoa Materials Management, a subsidiary of ParentCo, from September 2009 until December 2014, responsible for the commercial activities related to primary metals, alumina, and bauxite within ParentCo's GPP group, and commodity price risk management and global transportation services for ParentCo.

Item 1A. Risk Factors.

Alcoa's business, financial condition and results of operations may be impacted by a number of factors. In addition to the factors discussed elsewhere in this report, the following risks and uncertainties could materially harm its business, financial condition or results of operations, including causing Alcoa's actual results to differ materially from those projected in any forward-looking statements. The following list of significant risk factors is not all-inclusive or necessarily in order of importance. Additional risks and uncertainties not presently known to Alcoa or that Alcoa currently deems immaterial also may materially adversely affect us in future periods. See the discussion under "Forward-Looking Statements" in Item 7. Management's Discussion and Analysis of Financial Condition and Results of Operations, in this Annual Report on Form 10-K.

Risks Related to Our Company

Global Operational Risks

Our global operations expose us to risks that could adversely affect our business, financial condition, operating results or cash flows.

We have operations or activities in numerous countries and regions outside the United States, including Australia, Brazil, Canada, Europe, Guinea, Suriname, and the Kingdom of Saudi Arabia. The risks associated with the Company's global operations include:

- economic and commercial instability risks, including those caused by sovereign and private debt default, corruption, and changes in local government laws, regulations and policies, such as those related to tariffs and trade barriers, taxation, exchange controls, employment regulations and repatriation of earnings;

- geopolitical risks, such as political instability, civil unrest, expropriation, nationalization of properties by a government, imposition of sanctions, changes to import or export regulations and fees, renegotiation or nullification of existing agreements, mining leases and permits;
- war or terrorist activities;
- major public health issues, such as an outbreak of a pandemic or epidemic, which could cause disruptions in our operations or workforce;
- difficulties enforcing intellectual property and contractual rights in certain jurisdictions; and
- unexpected events, accidents, or environmental incidents, including natural disasters.

While the impact of any of the foregoing factors is difficult to predict, any one or more of them could adversely affect our business, financial condition, operating results or cash flows. Existing insurance arrangements may not provide protection for the costs that may arise from such events.

Our global operations expose us to risks related to economic and political conditions, including the impact of tariffs and sanctions, which may negatively impact our business.

We are subject to risks associated with doing business internationally, including the effects of foreign and domestic laws and regulations, foreign or domestic government fiscal and political crises, and political and economic disputes and sanctions. These factors, among others, bring uncertainty to the markets in which we compete, and may adversely affect our business, financial condition, operating results or cash flows. For example, in April 2018, the U.S. Department of the Treasury's Office of Foreign Assets Control ("OFAC") implemented sanctions against several Russian government officials and companies, including United Company RUSAL Plc ("Rusal"). The prospect of sanctions contributed to significant volatility in the market for aluminum and alumina, as companies, including Alcoa, take action in order to comply with the OFAC sanctions. While OFAC has since removed Rusal from the Specially Designated Nationals and Blocked Persons List (SDN), these external events created uncertainty and therefore, volatility in the markets in which we operate. Similarly, government enforcement in Brazil that resulted in disruptions in the alumina supply, as well as the impact of environmental and supply management regulatory reforms in China, could adversely impact our business and results of operations.

In the United States, the current administration has publicly supported, and in some instances has already proposed or taken action with respect to, significant changes to certain trade policies, including import tariffs and quotas, modifications to international trade policy, the withdrawal from or renegotiation of certain trade agreements, including the North American Free Trade Agreement, and other changes that may affect U.S. trade relations with other countries, any of which may require us to significantly modify our current business practices or may otherwise materially and adversely affect our business. Such changes could also result in retaliatory actions by United States' trade partners. For example, in 2018, the United States imposed tariffs and proposed quotas on aluminum imports to the United States. These actions and the possibility of trade conflicts stemming from these actions could negatively impact global trade and economic conditions in many of the regions where we do business. For example, certain foreign governments, including China, have proposed the imposition of additional tariffs on certain exports from the United States. This could further exacerbate aluminum and alumina price increases and overall market uncertainty.

Our global operations expose us to various legal and regulatory systems, and changes in conditions beyond our control in foreign countries.

In addition to the business risks inherent in operating outside the United States, legal and regulatory systems may be less developed and predictable and the possibility of various types of adverse governmental action more pronounced. Unexpected or uncontrollable events or circumstances in any of these foreign markets, including actions by foreign governments such as changes in fiscal regimes, termination of our agreements with such foreign governments, increased government regulation, or forced curtailment of operations could materially and adversely affect our business, financial condition, results of operations or cash flows.

Weakness in global economic conditions or in any of the industries or geographic regions in which we or our customers operate, or the cyclical nature of their businesses, could adversely impact our revenues and profitability by reducing demand and margins.

Our results of operations may be materially affected by the conditions in the global economy generally and in global capital markets. There has been extreme volatility in the capital markets and in the end markets and geographic regions in which we or our customers operate, which has negatively affected our revenues. Many of the markets in which our customers participate are also cyclical in nature and experience significant fluctuations in demand for our products based on economic conditions, consumer demand, raw material and energy costs, and government actions. Many of these factors are beyond our control.

A decline in consumer and business confidence and spending, severe reductions in the availability and cost of credit, and volatility in the capital and credit markets, could adversely affect the business and economic environment in which we operate and the profitability of our business. We are also exposed to risks associated with the creditworthiness of our suppliers and customers. If the availability of credit to fund or support the continuation and expansion of our customers' business operations is curtailed or if the cost of that credit is increased, the resulting inability of our customers or of their customers to either access credit or absorb the increased cost of that credit could adversely affect our business by reducing our sales or by increasing our exposure to losses from uncollectible customer accounts. These conditions and a disruption of the credit markets could also result in financial instability of some of our suppliers and customers. The consequences of such adverse effects could include the interruption of production at the facilities of our customers, the reduction, delay or cancellation of customer orders, delays or interruptions of the supply of raw materials we purchase, and bankruptcy of customers, suppliers or other creditors. Any of these events could adversely affect our profitability, cash flow and financial condition.

Unanticipated changes in tax laws or exposure to additional tax liabilities could affect our future profitability.

We are subject to income taxes in both the United States and various non-U.S. jurisdictions. Unanticipated changes in tax laws or regulations or exposure to additional tax liabilities could affect our future profitability. Our domestic and international tax liabilities are dependent upon the distribution of income among these different jurisdictions. Changes in applicable domestic or foreign tax laws and regulations, or their interpretation and application, including the possibility of retroactive effect, could affect the Company's tax expense and profitability. Our tax expense includes estimates of additional tax that may be incurred for tax exposures and reflects various estimates and assumptions. The assumptions include assessments of future earnings of the Company that could impact the valuation of our deferred tax assets. Our future results of operations could be adversely affected by changes in the effective tax rate as a result of a change in the mix of earnings in countries with differing statutory tax rates, changes in the overall profitability of the Company, changes in tax legislation and rates, changes in generally accepted accounting principles, changes in the valuation of deferred tax assets and liabilities, the results of tax audits and examinations of previously filed tax returns or related litigation and continuing assessments of our tax exposures. Significant changes to tax laws or regulations could have a substantial impact, positive or negative, on our effective tax rate, cash tax expenditures and deferred tax assets and liabilities. For example, the Tax Cuts and Jobs Act, which was enacted in the United States on December 22, 2017, reduces the U.S. corporate statutory tax rate, eliminates or limits tax deductions for several expenses that previously were deductible, imposes a mandatory deemed repatriation tax on undistributed historic earnings of foreign subsidiaries, requires a minimum tax on earnings generated by foreign subsidiaries and permits a tax-free repatriation of foreign earnings through a dividends received deduction. See "Management's Discussion and Analysis of Financial Conditions and Results of Operations" and the Company's financial statements for management's assessment of the overall impact of the Tax Cuts and Jobs Act on our effective tax rate and balance sheet.

We may be exposed to significant legal proceedings, investigations or changes in foreign and/or U.S. federal, state, or local laws, regulations or policies.

Our results of operations or liquidity in a particular period could be affected by new or increasingly stringent laws, regulatory requirements or interpretations, or outcomes of significant legal proceedings or investigations adverse to the Company. We may become subject to unexpected or rising costs associated with business operations or provision of health or welfare benefits to employees due to changes in laws, regulations or policies. We are also subject to a variety of legal compliance risks. These risks include, among other things, potential claims relating to health and safety, environmental matters, intellectual property rights, product liability, taxes and compliance with U.S. and foreign export laws, anti-bribery laws, competition laws and sales and trading practices. We could be subject to fines, penalties or damages (in certain cases, treble damages). In addition, if we violate the terms of our agreements with governmental authorities, we may face additional monetary sanctions and such other remedies as a court deems appropriate.

While we believe we have adopted appropriate risk management and compliance programs to address and reduce these risks, the global and diverse nature of our operations means that these risks will continue to exist, and additional legal proceedings and contingencies may arise from time to time. In addition, various factors or developments can lead the Company to change current estimates of liabilities or make such estimates for matters previously not susceptible of reasonable estimates, such as a significant judicial ruling or judgment, a significant settlement, significant regulatory developments or changes in applicable law. A future adverse ruling or settlement or unfavorable changes in laws, regulations or policies, or other contingencies that the company cannot predict with certainty could have a material adverse effect on our results of operations or cash flows in a particular period. See "Item 3, Legal Proceedings" and Note R under the caption "Contingencies and Commitments—Contingencies—Litigation" to the Consolidated Financial Statements.

We are exposed to fluctuations in foreign currency exchange rates and interest rates, as well as inflation, and other economic factors in the countries in which we operate.

Economic factors, including inflation and fluctuations in foreign currency exchange rates and interest rates, competitive factors in the countries in which we operate, and continued volatility or deterioration in the global economic and financial

environment could affect our revenues, expenses and results of operations. Changes in the valuation of the U.S. dollar against other currencies, particularly the Australian dollar, Brazilian real, Canadian dollar, Euro, and Norwegian kroner, may affect our profitability as some important inputs are purchased in other currencies, while our products are generally sold in U.S. dollars. In addition, although a strong U.S. dollar generally has a positive impact on our near-term profitability, over a longer term, a strong U.S. dollar may have an unfavorable impact on our position on the global aluminum cost curve due to the company's U.S. smelting portfolio. As the U.S. dollar strengthens, the cost curve shifts down for smelters outside the United States but costs for our U.S. smelting portfolio may not decline.

We are subject to a broad range of health, safety and environmental laws, regulations and other requirements in the jurisdictions in which we operate that expose us to substantial costs and liabilities.

Our operations worldwide are subject to numerous complex and increasingly stringent federal, state, local and foreign laws, regulations, policies, and other requirements, including those related to health, safety, environmental, and waste management and disposal matters, and may expose us to substantial costs and liabilities associated with such laws, regulations, policies, and other requirements. These laws, regulations, policies, and other requirements could change or be applied or interpreted in ways that could (i) require us to enjoin, curtail, close or otherwise modify our operations, including the implementation of corrective measures, the installation of additional equipment, or the undertaking of other remedial actions, or (ii) subject us to enforcement risk or impose on or require us to incur additional capital expenditures, compliance or other costs, fines, or penalties, any of which could adversely affect our results of operations, cash flows and financial condition, and the trading price of our common stock.

The costs of complying with such laws, regulations, policies and other requirements, including participation in assessments, remediation activities, and cleanups of sites, as well as internal voluntary programs, are significant and will continue to be so for the foreseeable future. Environmental laws may impose cleanup liability on owners and occupiers of contaminated property, including past or divested properties, regardless of whether the owners and occupiers caused the contamination or whether the activity that caused the contamination was lawful at the time it was conducted. Environmental matters for which we may be liable may arise in the future at our present sites, where no problem is currently known, at previously owned sites, at sites previously operated by the Company, at sites owned by our predecessors or at sites that we may acquire in the future.

In addition, because environmental laws, regulations, policies and other requirements are constantly evolving, we will continue to incur costs to maintain compliance and such costs could increase materially. Evolving standards and expectations can result in increased litigation and/or increased costs, all of which can have a material and adverse effect on our earnings and cash flows. Future compliance with environmental, health and safety legislation and other regulatory requirements may prove to be more limiting and costly than we anticipate, and may disrupt our business operations and require significant expenditures. Our results of operations or liquidity in a particular period could be materially affected by certain health, safety or environmental matters, including remediation costs and damages related to certain sites.

Our operations may impact the environment or cause exposure to hazardous substances, and our properties may have environmental contamination or other damage, which could result in material liabilities to us.

We could be subject to claims for environmental contamination and associated liability, including fines and penalties under federal and state statutes and/or common law toxic tort doctrines and other damages, such as natural resource damages and the costs associated with the investigation and cleanup of soil, surface water, groundwater, and other media under laws such as the U.S. Comprehensive Environmental Response, Compensation and Liabilities Act ("CERCLA", commonly known as "Superfund") or similar foreign regulations. Such claims may arise, for example, out of current or former conditions at sites that we own or operate currently, as well as at sites that we and companies we acquired owned or operated in the past, and at contaminated sites that have always been owned or operated by third parties. Liability may be without regard to fault and may be joint and several, so that we may be held responsible for more than our share of the contamination or other damages, or even for the entire share.

In addition, our operations generate hazardous waste. Some of the hazardous waste and other byproducts from our operations we contain in tailing facilities, residue storage areas, and other structural impoundments that are subject to extensive regulation. Overtopping of storage areas caused by extreme weather events or unanticipated structural failure of impoundments could result in damage to the environment, natural resources, or property, or personal injury. These and other similar impacts that our operations may have on the environment, as well as exposures to hazardous substances or wastes associated with our operations, could result in civil or criminal fines or penalties and enforcement actions issued by regulatory or judicial authorities enjoining, curtailing or closing operations or requiring corrective measures, any of which could materially and adversely affect us.

Climate change, climate change legislation or regulations, extreme weather conditions, and greenhouse effects may adversely impact our operations and markets.

Energy is a significant input in a number of our operations. There is growing recognition that consumption of energy derived from fossil fuels is a contributor to global warming.

A number of governments or governmental bodies in areas of the world where we operate have introduced or are contemplating legislative and regulatory change in response to the potential impacts of climate change. We will likely see changes in the margins of greenhouse gas-intensive assets and energy-intensive assets as a result of regulatory impacts in the countries in which we operate. These regulatory mechanisms may be either voluntary or legislated and may impact our operations directly or indirectly through customers or our supply chain. Inconsistency of regulations may also change the attractiveness of the locations of some of the Company's assets. Assessments of the potential impact of future climate change legislation, regulation and international treaties and accords are uncertain, given the wide scope of potential regulatory change in countries in which we operate. We may realize increased capital expenditures resulting from required compliance with revised or new legislation or regulations, costs to purchase or profits from sales of, allowances or credits under a "cap and trade" system, increased insurance premiums and deductibles as new actuarial tables are developed to reshape coverage, a change in competitive position relative to industry peers and changes to profit or loss arising from increased or decreased demand for goods produced by the Company and, indirectly, from changes in costs of goods sold.

The potential physical impacts of climate change or extreme weather conditions on the Company's operations are highly uncertain, and will be particular to the geographic circumstances. These may include changes in rainfall patterns, shortages of water or other natural resources, changing sea levels, changing storm patterns, increased frequency and intensities of storms, and changing temperature levels. For example, in 2017, our Trombetas mine experienced disruption to its normal operations due to separate weather events that impacted the tailing ponds (bauxite waste storage areas) and the washing plant in the first half (heavy rain) and the second half (drought conditions) of the year, respectively. Effects such as these may adversely impact the cost, production and financial performance of our operations.

Available Capital and Credit-Related Risks

Our business and growth prospects may be negatively impacted by limits in our ability to fund capital expenditures.

We require substantial capital to invest in growth opportunities and to maintain and prolong the life and capacity of our existing facilities. Insufficient cash generation or capital project overruns may negatively impact our ability to fund as planned our sustaining and return-seeking capital projects, and such postponement in funding capital expenditures or inadequate funding to complete projects could result in operational issues. We may also need to address commercial and political issues in relation to reductions in capital expenditures in certain of the jurisdictions in which we operate. If our interest in our joint ventures is diluted or we lose key concessions, our growth could be constrained. Any of the foregoing could have a material adverse effect on our business, results of operations, financial condition and prospects.

Our capital resources may not be adequate to provide for all of our cash requirements, and we are exposed to risks associated with financial, credit, capital, and banking markets.

In the ordinary course of business, we seek to access competitive financial, credit, capital and/or banking markets. Currently, we believe we have adequate access to these markets to meet our reasonably anticipated business needs based on our historic financial performance and strong financial position. To the extent our access to competitive financial, credit, capital and/or banking markets was to be impaired, our operations, financial results and cash flows could be adversely impacted.

Deterioration in our credit profile or increases in interest rates could increase our costs of borrowing money and limit our access to the capital markets and commercial credit.

The major credit rating agencies evaluate our creditworthiness and give us specified credit ratings. These ratings are based on a number of factors, including our financial strength and financial policies as well as our strategies, operations and execution. These credit ratings are limited in scope, and do not address all material risks related to investment in us, but rather reflect only the view of each rating agency at the time the rating is issued. Nonetheless, the credit ratings we receive impact our borrowing costs as well as our access to sources of capital on terms that will be advantageous to our business. Failure to obtain sufficiently high credit ratings could adversely affect the interest rate in future financings, our liquidity or our competitive position and could also restrict our access to capital markets. In addition, our credit ratings could be lowered or withdrawn entirely by a rating agency if, in its judgment, the circumstances warrant. If a rating agency were to downgrade our rating, our borrowing costs would increase, and our funding sources could decrease. As a result of these factors, a downgrade of our credit ratings could have a materially adverse impact on our future operations and financial position.

In addition, our variable rate indebtedness may use London Interbank Offering Rate ("LIBOR") as a benchmark for establishing the rate. LIBOR is the subject of recent national, international and other regulatory guidance and proposals for

reform. These reforms and other pressures may cause LIBOR to disappear entirely or to perform differently than in the past. The consequences of these developments cannot be entirely predicted, but could include an increase in the cost of our variable rate indebtedness.

Our indebtedness restricts our current and future operations, which could adversely affect our ability to respond to changes in our business and manage our operations.

Alcoa and Alcoa Nederland Holding B.V. (“ANHBV”), a wholly-owned subsidiary of Alcoa, are party to a revolving credit agreement with a syndicate of lenders and issuers named therein (as subsequently amended, the “Revolving Credit Agreement”). The terms of the Revolving Credit Agreement and the indentures governing our notes contain covenants that impose significant operating and financial restrictions on us, including on our ability to, among other things:

- make investments, loans, advances, and acquisitions;
- amend certain material documents;
- dispose of assets;
- incur or guarantee additional debt and issue certain disqualified equity interests and preferred stock;
- make certain restricted payments, including by limiting the amount of dividends on equity securities and payments to redeem, repurchase or retire equity securities or other indebtedness;
- engage in transactions with affiliates;
- materially alter the business we conduct;
- enter into certain restrictive agreements;
- create liens on assets to secure debt;
- consolidate, merge, sell or otherwise dispose of all or substantially all of Alcoa’s, ANHBV’s or a subsidiary guarantor’s assets; and
- take any actions that would reduce our ownership of AWAC entities below an agreed level.

The Revolving Credit Agreement requires us to comply with financial covenants. We must maintain an interest expense coverage ratio of not less than 5.00 to 1.00, and a leverage ratio for any period of four consecutive fiscal quarters that is not greater than 2.50 to 1.00.

In addition, all obligations of Alcoa Corporation or a domestic entity under the Revolving Credit Agreement are secured by, subject to certain exceptions, a first priority lien on substantially all assets of Alcoa Corporation and the material domestic wholly-owned subsidiaries of Alcoa Corporation and certain equity interests of specified non-U.S. subsidiaries. All other obligations under the Revolving Credit Facility are secured by, subject to certain exceptions, a first priority security interest in substantially all assets of Alcoa Corporation, ANHBV, the material domestic wholly-owned subsidiaries of Alcoa Corporation, and the material foreign wholly-owned subsidiaries of Alcoa Corporation located in Australia, Brazil, Canada, Luxembourg, the Netherlands, and Norway, including equity interests of certain subsidiaries that directly hold equity interests in AWAC entities. Our ability to comply with these agreements may be affected by events beyond our control, including prevailing economic, financial and industry conditions. These covenants could have an adverse effect on our business by limiting our ability to take advantage of financing, merger and acquisition or other opportunities. The breach of any of these covenants or restrictions could result in a default under the Revolving Credit Agreement or the indenture governing our notes.

For more information on the restrictive covenants in the Revolving Credit Agreement, see Item 7 “Management’s Discussion and Analysis of Financial Condition and Results of Operations—Liquidity and Capital Resources—Financing Activities.”

Our failure to comply with the agreements relating to our outstanding indebtedness, including as a result of events beyond our control, could result in an event of default that could materially and adversely affect our business, financial condition, results of operations or cash flows.

If there were an event of default under any of the agreements relating to our outstanding indebtedness, including the Revolving Credit Agreement and the indenture governing our notes, we may not be able to incur additional indebtedness under the Revolving Credit Agreement and the holders of the defaulted debt could cause all amounts outstanding with respect to that debt to be due and payable immediately. We cannot assure that our assets or cash flow would be sufficient to fully repay borrowings under our outstanding debt instruments if accelerated upon an event of default, which could have a material

adverse effect on our ability to continue to operate as a going concern. Further, if we are unable to repay, refinance or restructure our secured indebtedness, the holders of such indebtedness could proceed against the collateral securing that indebtedness. In addition, any event of default or declaration of acceleration under one debt instrument also could result in an event of default under one or more of our other debt instruments.

Cybersecurity Risks

Cyber-attacks and security breaches may threaten the integrity of our intellectual property and other sensitive information, disrupt our business operations, expose us to potential liability, and result in reputational harm and other negative consequences that could have a material adverse effect on our financial condition and results of operations.

We face global cybersecurity threats, which may range from uncoordinated individual attempts to sophisticated and targeted measures, known as advanced persistent threats, directed at the Company. Cyber-attacks and other cyber incidents are occurring more frequently, are constantly evolving in nature, are becoming more sophisticated, and are being made by groups and individuals with a wide range of expertise and motives. Cyber-attacks and security breaches may include, but are not limited to, attempts to access information or digital infrastructure, computer viruses, denial of service and other electronic security breaches.

We believe that we face a heightened threat of cyber-attacks due to the industries we serve and the locations of our operations. Due to the evolving nature of cybersecurity threats, the scope and impact of any incident cannot be predicted. While the Company continually works to safeguard our systems and mitigate potential risks, there is no assurance that such actions will be sufficient to prevent cyber-attacks or security breaches that manipulate or improperly use our systems or networks, compromise confidential or otherwise protected information, destroy or corrupt data, or otherwise disrupt our operations. The occurrence of such events could negatively impact our reputation and our competitive position and could result in litigation with third parties, regulatory action, loss of business, potential liability and increased remediation costs, any of which could have a material adverse effect on our financial condition and results of operations. Such security breaches could also result in a violation of applicable U.S. and international privacy and other laws, and subject us to private consumer, business partner, or securities litigation and governmental investigations and proceedings, any of which could result in our exposure to material civil or criminal liability. For example, the General Data Protection Regulation (GDPR) became effective in the European Union in May 2018 and subjects companies to a range of new compliance obligations regarding the handling of personal data. In the event our operations are found to be in violation of the GDPR's requirements, we may be subject to significant civil penalties, business disruption and reputational harm, any of which could have a material adverse effect on our business.

In addition, cyber-attacks or breaches could require significant management attention and resources, and result in the diminution of the value of our investment in research and development. Furthermore, while we have disaster recovery and business continuity plans in place, if our information technology systems are damaged, breached or cease to function properly for any reason, including the poor performance of, failure of or cyber-attack on third-party service providers, catastrophic events, power outages, cyber-security breaches, network outages, failed upgrades or other similar events and, if the disaster recovery and business continuity plans do not effectively resolve such issues on a timely basis, we may suffer interruptions in our ability to manage or conduct business as well as reputational harm, and may be subject to governmental investigations and litigation, any of which may adversely impact our business, results of operations, cash flows and financial condition.

Employee- and Pension-Related Risks

Loss of key personnel may adversely affect our business.

Our success greatly depends on the performance of our executive management team. The loss of the services of any member of our executive management team or other key persons could have a material adverse effect on our business, results of operations and financial condition.

Union disputes and other employee relations issues could adversely affect our financial results.

A significant portion of our employees are represented by labor unions in a number of countries under various collective bargaining agreements with varying durations and expiration dates. See "Business—Employees." Union disputes and other employee relations issues could adversely affect our financial results. We may not be able to satisfactorily renegotiate collective bargaining agreements when they expire. In addition, existing collective bargaining agreements may not prevent a strike or work stoppage at our facilities in the future. We may also be subject to general country strikes or work stoppages unrelated to our business or collective bargaining agreements. A labor dispute or work stoppage of employees covered by collective bargaining agreements could have a material adverse effect on production at one or more of our facilities, and depending on the length of work stoppage, on our financial results.

An adverse decline in the liability discount rate, lower-than-expected investment return on pension assets and other factors could affect our results of operations or amount of pension funding contributions in future periods.

Our results of operations may be negatively affected by the amount of expense we record for our pension and other post-retirement benefit plans, reductions in the fair value of plan assets, and other factors. We calculate income or expense for our plans using actuarial valuations in accordance with accounting principles generally accepted in the United States of America (“GAAP”).

These valuations reflect assumptions about financial market and other economic conditions, which may change based on changes in key economic indicators. The most significant year-end assumptions used by the Company to estimate pension or other postretirement benefit income or expense for the following year are the discount rate applied to plan liabilities and the expected long-term rate of return on plan assets. In addition, the Company is required to make an annual measurement of plan assets and liabilities, which may result in a significant charge to stockholders’ equity. See “Management’s Discussion and Analysis of Financial Condition and Results of Operations—Critical Accounting Policies and Estimates—Pension and Other Postretirement Benefits” and Note N to the Consolidated Financial Statements under the caption “Pension and Other Postretirement Benefits.” Although GAAP expense and pension funding contributions are impacted by different regulations and requirements, the key economic factors that affect GAAP expense would also likely affect the amount of cash or securities we would contribute to the pension plans.

Potential pension contributions include both mandatory amounts required under federal law and discretionary contributions to improve the plans’ funded status. Higher than expected pension contributions due to a decline in the plans’ funded status as a result of declines in the discount rate or lower-than-expected investment returns on plan assets could have a material negative effect on our cash flows. Adverse capital market conditions could result in reductions in the fair value of plan assets and increase our liabilities related to such plans, adversely affecting our liquidity and results of operations.

Limited Operating History Risks

We have only operated as an independent company since November 1, 2016, and our historical financial information may not be a reliable indicator of our future results.

The historical information about Alcoa Corporation in this report refers to Alcoa Corporation’s businesses as operated by and integrated with ParentCo prior to November 1, 2016. Some of the historical financial information included in this report is derived from the consolidated financial statements and accounting records of ParentCo. Accordingly, the historical financial information relating to 2016 and earlier years included in this report does not necessarily reflect the financial condition, results of operations or cash flows that we would have achieved as a separate, publicly traded company during those particular periods presented or those that we will achieve in the future primarily as a result of significant changes in our cost structure, management, financing and business operations as a result of operating as a company separate from ParentCo. For additional information about the past financial performance of our business and the basis of presentation of the historical consolidated financial statements, see “Selected Financial Data of Alcoa Corporation,” “Management’s Discussion and Analysis of Financial Condition and Results of Operations” and the historical financial statements and accompanying notes included elsewhere in this report.

In connection with our Separation Transaction from ParentCo, Arconic agreed to indemnify us for certain liabilities and we agreed to indemnify Arconic for certain liabilities which could negatively impact financial results if indemnity liabilities arise in the future.

In connection with the Separation Transaction, Arconic agreed to indemnify us for certain liabilities, and we agreed to indemnify Arconic for certain liabilities, in each case for uncapped amounts. Indemnities that we may be required to provide Arconic are not subject to any cap, may be significant and could negatively impact our business. Third parties could also seek to hold us responsible for any of the liabilities that Arconic has agreed to retain. Any amounts we are required to pay pursuant to these indemnification obligations and other liabilities could require us to divert cash that would otherwise have been used in furtherance of our operating business. Further, the indemnity from Arconic may not be sufficient to protect us against the full amount of such liabilities, and Arconic may not be able to fully satisfy its indemnification obligations. Moreover, even if we ultimately succeed in recovering from Arconic any amounts for which we are held liable, we may be temporarily required to bear these losses ourselves. Each of these risks could negatively affect our business, results of operations and financial condition.

Business Strategy Risks

We may not be able to realize the expected benefits from our strategy of creating a lower cost, competitive commodity business by optimizing our portfolio.

We are continuing to execute a strategy of creating a lower cost, competitive integrated aluminum production business by implementing productivity and cost-reduction initiatives, and optimizing our portfolio of assets. We are taking decisive

actions to lower the cost base of our operations, including through procurement strategies for raw materials, labor productivity, improving operating performance, deploying Company-wide business process models, reducing overhead costs, closing, selling or curtailing high-cost global smelting capacity, optimizing alumina refining capacity, and pursuing the sale of our interest in certain other operations. We may not be able to realize the expected benefits or cost savings from this strategy.

We have made, and may continue to plan and execute, acquisitions and divestitures and take other actions to grow or streamline our portfolio. There is no assurance that anticipated benefits of our strategic actions will be realized. With respect to portfolio optimization actions such as divestitures, curtailments and closures, we may face barriers to exit from unprofitable businesses or operations, including high exit costs or objections from various stakeholders. In addition, we may incur unforeseen liabilities for divested entities if a buyer fails to honor all commitments. Our business operations are capital intensive, and curtailment or closure of operations or facilities may include significant charges, including asset impairment charges and other measures. There can be no assurance that divestitures or closures will be undertaken or completed in their entirety as planned at the anticipated cost, or that such actions will be beneficial to the Company.

Joint ventures and other strategic alliances may not be successful.

We participate in joint ventures and have formed strategic alliances and may enter into other similar arrangements in the future. For example, AWAC is an unincorporated global joint venture between Alcoa and Alumina Limited. AWAC consists of a number of affiliated entities, which own, operate or have an interest in, bauxite mines and alumina refineries, as well as an aluminum smelter, in seven countries. In addition, Alcoa is party to a joint venture with Ma'aden, the Saudi Arabian Mining Company, to develop a fully integrated aluminum complex (including a bauxite mine, alumina refinery, aluminum smelter and rolling mill) in the Kingdom of Saudi Arabia. Although the Company has, in connection with these and our other existing joint ventures and strategic alliances, sought to protect our interests, joint ventures and strategic alliances inherently involve special risks. Whether or not the Company holds majority interests or maintains operational control in such arrangements, our partners may:

- have economic, political or business interests or goals that are inconsistent with, or opposed to those of, the Company;
- exercise veto rights so as to block actions that we believe to be in our or the joint venture's or strategic alliance's best interests;
- take action contrary to our policies or objectives with respect to our investments; or
- as a result of financial or other difficulties, be unable or unwilling to fulfill their obligations under the joint venture, strategic alliance or other agreements, such as contributing capital to expansion or maintenance projects.

There can be no assurance that our joint ventures or strategic alliances will be beneficial to us, whether due to the above-described risks, unfavorable global economic conditions, increases in construction costs, currency fluctuations, political risks, or other factors.

We could be adversely affected by changes in the business or financial condition of a significant customer or joint venture partner.

A significant downturn or deterioration in the business or financial condition of a key customer or joint venture partner could affect our results of operations in a particular period. Our customers may experience delays in the launch of new products, labor strikes, diminished liquidity or credit unavailability, weak demand for their products, or other difficulties in their businesses. If we are not successful in replacing business lost from such customers, profitability may be adversely affected. Our joint venture partners could be rendered unable to contribute their share of operating or capital costs, having an adverse impact on our business.

Risks Related to Our Industry

Competition Risks

We face significant competition, which may have an adverse effect on profitability.

We compete with a variety of both U.S. and non-U.S. aluminum industry competitors as well as with producers of other materials, such as steel, titanium, plastics, composites, ceramics, and glass, among others. Technological advancements or other developments by or affecting Alcoa's competitors or customers could affect our results of operations. In addition, our competitive position depends, in part, on our ability to leverage innovation expertise across businesses and key end markets and us having access to an economical power supply to sustain our operations in various countries. See "Business—Competition."

Our business is capital intensive, and if there are downturns in the industries that we serve, we may be forced to significantly curtail or suspend operations with respect to those industries, which could result in our recording asset impairment charges or taking other measures that may adversely affect our results of operations and profitability.

Our business operations are capital intensive. If there are downturns in the industries that we serve, we may be forced to significantly curtail or suspend our operations with respect to those industries, including laying-off employees, recording asset impairment charges and other measures. In addition, we may not realize the benefits or expected returns from announced plans, programs, initiatives and capital investments. Any of these events could adversely affect our results of operations and profitability.

Commodity Risks

The aluminum industry and aluminum end-use markets are highly cyclical and are influenced by a number of factors, including global economic conditions.

The nature of the industries in which our customers operate causes demand for our products to be cyclical, creating potential uncertainty regarding future profitability. The demand for aluminum is sensitive to, and quickly impacted by, demand for the finished goods manufactured by our customers in industries, such as the commercial construction, transportation, and automotive industries, which may change as a result of changes in the global economy, currency exchange rates, energy prices or other factors beyond our control. Various changes in general economic conditions may affect the industries in which our customers operate. The demand for aluminum is highly correlated to economic growth. The Chinese market is a significant source of global demand for, and supply of, commodities, including aluminum. A sustained slowdown in Chinese aluminum demand due to slower economic growth or change in government policies, or a significant slowdown in other markets, that is not offset by decreases in supply of aluminum or increased aluminum demand in emerging economies, such as India, Brazil, and several Southeast Asian countries, could have an adverse effect on the global supply and demand for aluminum and aluminum prices. As a result of these factors, our profitability is subject to significant fluctuation.

While we believe the long-term prospects for aluminum and aluminum products are positive, we are unable to predict the future course of industry variables or the strength of the global economy and the effects of government intervention. Negative economic conditions, such as a major economic downturn, a prolonged recovery period, a downturn in the commodity sector, or disruptions in the financial markets, could have a material adverse effect on our business, financial condition or results of operations.

While the aluminum market is often the leading cause of changes in the alumina and bauxite markets, those markets also have industry-specific risks including, but not limited to, global freight markets, energy markets, and regional supply-demand imbalances. Aluminum industry specific risks can have a material effect on profitability for the alumina and bauxite markets.

We could be materially adversely affected by declines in aluminum and alumina prices, including global, regional and product-specific prices.

The overall price of primary aluminum consists of several components: (i) the underlying base metal component, which is typically based on quoted prices from the LME; (ii) the regional premium, which comprises the incremental price over the base LME component that is associated with the physical delivery of metal to a particular region (e.g., the Midwest premium for metal sold in the United States); and (iii) the product premium, which represents the incremental price for receiving physical metal in a particular shape (e.g., coil, billet, slab, rod, etc.) or alloy. Each of the above three components has its own drivers of variability.

The LME price is typically driven by macroeconomic factors, global supply and demand of aluminum (including expectations for growth and contraction and the level of global inventories), and trading activity of financial investors. Furthermore, an imbalance in global supply and demand of aluminum, such as decreasing demand without corresponding supply declines, could have a negative impact on aluminum pricing. In 2018, cash LME pricing for aluminum experienced a significant amount of volatility, reaching a high of \$2,602 per metric ton in April and a low of \$1,869 per metric ton in December. High LME inventories could lead to a reduction in the price of aluminum and declines in the LME price have had a negative impact on our results of operations. Further, in recent years, LME policies have undergone rule changes that resulted in an increased minimum daily load-out rate and caps on warehouse charges. These rule changes, and any subsequent changes the exchange chooses to make, could impact the supply/demand balance in the primary aluminum physical market and may impact regional delivery premiums and LME aluminum prices. Product premiums generally are a function of supply and demand for a given primary aluminum shape and alloy combination in a particular region. Periods of industry overcapacity may also result in a weak aluminum pricing environment. Regional premiums tend to vary based on the supply of and demand for metal in a particular region and associated transportation costs.

A sustained weak LME aluminum pricing environment, deterioration in LME aluminum prices, or a decrease in regional premiums or product premiums could have a material adverse effect on our business, financial condition, and results of operations or cash flow. Most of our alumina contracts contain two pricing components: (1) the API price basis, and (2) a

negotiated adjustment basis that takes into account various factors, including freight, quality, customer location and market conditions. Because the API component can exhibit significant volatility due to market exposure, revenue associated with our alumina operations are exposed to market pricing. Our bauxite-related contracts are typically one to two-year contracts with very little, if any, market exposure; however, we intend to enter into long-term bauxite contracts and therefore, our revenue associated with our bauxite operations may become further exposed to market pricing.

Our profitability could be adversely affected by increases in the cost of raw materials, by significant lag effects of decreases in commodity or LME-linked costs or by large or sudden shifts in the global inventory of aluminum and the resulting market price impacts.

Our results of operations are affected by changes in the cost of raw materials, including energy, carbon products, caustic soda and other key inputs, as well as freight costs associated with transportation of raw materials to refining and smelting locations. We may not be able to fully offset the effects of higher raw material costs or energy costs through price increases, productivity improvements or cost reduction programs. Similarly, our operating results are affected by significant lag effects of declines in key costs of production that are commodity or LME-linked. For example, declines in the costs of alumina and power during a particular period may not be adequate to offset sharp declines in metal price in that period. We could also be adversely affected by large or sudden shifts in the global inventory of aluminum and the resulting market price impacts. Increases in the cost of raw materials or decreases in input costs that are disproportionate to concurrent sharper decreases in the price of aluminum, or shifts in global inventory of aluminum that result in changes to market prices, could have a material adverse effect on our operating results.

Market-driven balancing of global aluminum supply and demand may be disrupted by non-market forces.

In response to market-driven factors relating to the global supply and demand of aluminum and alumina, we have curtailed or closed portions of our aluminum and alumina production capacity. Certain other industry producers have independently undertaken to reduce production as well. Reductions in production may be delayed or impaired by the terms of long-term contracts to buy power or raw materials.

The existence of non-market forces on global aluminum industry capacity, such as political pressures in certain countries to keep jobs or to maintain or further develop industry self-sufficiency, may prevent or delay the closure or curtailment of certain producers' smelters, irrespective of their position on the industry cost curve. For example, Chinese excess capacity and increased exports from China of heavily subsidized aluminum products could materially disrupt world aluminum markets causing pricing deterioration. If industry overcapacity exists due to the disruption by such non-market forces on the market-driven balancing of the global supply and demand of aluminum, a resulting weak pricing environment and margin compression may adversely affect the operating results of the Company.

Our operations consume substantial amounts of energy; profitability may decline if energy costs rise or if energy supplies are interrupted.

Although we generally expect to meet the energy requirements for our alumina refineries and primary aluminum smelters from internal sources or from long-term contracts, certain conditions could negatively affect our results of operations, including the following:

- significant increases in electricity costs rendering smelter operations uneconomic;
- significant increases in fuel oil or natural gas prices;
- unavailability of electrical power or other energy sources due to droughts, hurricanes or other natural causes;
- unavailability of energy due to local or regional energy shortages resulting in insufficient supplies to serve consumers;
- interruptions in energy supply or unplanned outages due to equipment failure or other causes;
- curtailment of one or more refineries or smelters due to the inability to extend energy contracts upon expiration or to negotiate new arrangements on cost-effective terms or due to the unavailability of energy at competitive rates; or
- curtailment of one or more facilities due to discontinuation of power supply interruptibility rights granted to us under an interruptibility regime in place under the laws of the country in which the facility is located, or due to a determination that energy arrangements do not comply with applicable laws, thus rendering the operations that had been relying on such country's interruptibility regime or energy framework uneconomic.

If events such as those listed above were to occur, the resulting high energy costs, the disruption of an energy source, the requirement to repay all or a portion of the benefit we received under a power supply interruptibility regime, or the requirement to remedy any non-compliance of an energy framework to comply with applicable laws, could have a material adverse effect on our business and results of operations.

Risks Related to Stock Ownership in the Company

Actions of activist stockholders of Alcoa could be disruptive and potentially costly, and the possibility that activist stockholders may contest, or seek changes that conflict with, our strategic direction could cause uncertainty about the strategic direction of our business

Activist stockholders may from time to time attempt to effect changes in our strategic direction and, in furtherance thereof, may seek changes in how Alcoa is governed. While our Board of Directors and management team strive to maintain constructive, ongoing communications with Alcoa stockholders, including activist stockholders, and welcome their views and opinions with the goal of working together constructively to enhance value for all stockholders, activist campaigns that contest, or conflict with, our strategic direction could have an adverse effect on us because: (i) responding to actions by activist stockholders can disrupt our operations, be costly and time-consuming, and divert the attention of our Board and senior management from the pursuit of business strategies, which could adversely affect our results of operations and financial condition; (ii) perceived uncertainties as to our future direction may cause stock price decline and lead to the perception of a change in the direction of the business, instability or lack of continuity which may be exploited by our competitors, cause concern to our current or potential customers, may result in the loss of potential business opportunities and make it more difficult to attract and retain qualified personnel and business partners; and (iii) these types of actions could cause significant fluctuations in our stock price based on temporary or speculative market perceptions or other factors that do not necessarily reflect the underlying fundamentals and prospects of our business.

Anti-takeover provisions could enable our management to resist a takeover attempt by a third party and limit the power of our stockholders, which could decrease the trading price of our common stock.

Alcoa's amended and restated certificate of incorporation and amended bylaws contain, and Delaware law contains, provisions that are intended to deter coercive takeover practices and inadequate takeover bids by making such practices or bids unacceptably expensive to the bidder and to encourage prospective acquirers to negotiate with Alcoa's Board of Directors rather than to attempt a hostile takeover. These provisions include, among others:

- the inability of our stockholders to act by written consent unless unanimous;
- the ability of our remaining directors to fill vacancies on our Board of Directors;
- procedural rules regarding how stockholders may present proposals or nominate directors for election at stockholder meetings; and
- the right of our Board of Directors to issue preferred stock without stockholder approval.

In addition, we are subject to Section 203 of the Delaware General Corporation Law ("DGCL"), which provides that, subject to limited exceptions, persons that acquire, or are affiliated with persons that acquire, more than 15% of the outstanding voting stock of a Delaware corporation may not engage in a business combination with that corporation, including by merger, consolidation or acquisitions of additional shares, for a three-year period following the date on which that person or any of its affiliates becomes the holder of more than 15% of the corporation's outstanding voting stock.

We believe these provisions protect our stockholders from coercive or otherwise unfair takeover tactics by requiring potential acquirers to negotiate with our Board of Directors and by providing our Board of Directors with more time to assess any acquisition proposal. These provisions are not intended to make Alcoa immune from takeovers; however, these provisions will apply even if the offer may be considered beneficial by some stockholders and could delay or prevent an acquisition that our Board of Directors determines is not in the best interests of Alcoa and our stockholders. These provisions may also prevent or discourage attempts to remove and replace incumbent directors. These provisions of our certificate of incorporation and bylaws, and Delaware law, that have the effect of delaying or deterring a change in control of the Company could limit the opportunity for our stockholders to receive a premium for their shares and could affect the price that some investors are willing to pay for Alcoa stock.

Item 1B. Unresolved Staff Comments.

None.

Item 2. Properties.

Alcoa Corporation's principal executive offices, located at 201 Isabella Street, Suite 500, Pittsburgh, Pennsylvania 15212-5858, are leased.

In addition, Alcoa leases some of its facilities; however, it is the opinion of management that the leases do not materially affect the continued use of the properties or the properties' values.

Although our facilities vary in terms of age and condition, Alcoa believes that its facilities are suitable and adequate for its operations. See Notes B and J to the financial statements for information on properties, plants and equipment.

Alcoa has active plants and holdings under Bauxite, Alumina, and Aluminum segments. Please see the tables and related text in the relevant sections of this report.

Item 3. Legal Proceedings.

In the ordinary course of its business, Alcoa is involved in a number of lawsuits and claims, both actual and potential.

Litigation

Italy 148. Beginning in 2006, ParentCo and the Italian Energy Authority (Autorità di Regolazione per Energia Reti e Ambiente, formerly l'Autorità per l'Energia Elettrica, il Gas e il Sistema Idrico, the "Energy Authority") had been in a dispute regarding the calculation of a drawback applied to a portion of the price of power under a special tariff received by Alcoa Trasformazioni S.r.l. ("Trasformazioni," previously a subsidiary of ParentCo; now a subsidiary of Alcoa Corporation). This dispute arose as a result of a resolution (148/2004) issued in 2004 by the Energy Authority that changed the method for calculating the drawback. Through 2009, Trasformazioni continued to receive the power price drawback for its Portovesme and Fusina smelters in accordance with the original resolution (204/1999), at which time the European Commission declared all such special tariffs to be impermissible "state aid." Between 2006 and 2014, several judicial hearings occurred related to continuous appeals filed by both ParentCo and the Energy Authority regarding the dispute on the calculation of the drawback; a hearing on the latest appeal was scheduled for May 2018 (see below). Additionally, between 2012 and 2013, Trasformazioni received multiple letters from the agency responsible for making and collecting payments on behalf of the Energy Authority demanding payment for the difference in the drawback calculation between the two resolutions. The latest such demand was for \$97 million (€76 million), including interest, and allegedly included consideration of a third resolution (44/2012) issued in 2012 on the calculation of the drawback; Trasformazioni rejected this demand.

In the meantime, as a result of the conclusion of the European Commission Matter in January 2016 (see Note R to the Consolidated Financial Statements in Part II Item 8 of Alcoa Corporation's Annual Report on Form 10-K for the year ended December 31, 2017), ParentCo's management modified its outlook with respect to a portion of the then-pending legal proceedings related to the drawback dispute. As such, a charge of \$37 million (€34 million) was recorded in Restructuring and other charges on the Company's Statement of Consolidated Operations for the year ended December 31, 2015 to establish a partial reserve for this matter.

In December 2017, through an agreement with the Energy Authority, Alcoa Corporation settled this matter for \$18 million (€15 million) (paid in January 2018). Accordingly, the Company recorded a reduction of \$22 million (€19 million) (the U.S. dollar amount reflects the effects of foreign currency movements since 2015) to its previously established reserve in Restructuring and other charges on Alcoa Corporation's Statement of Consolidated Operations. In January 2018, subsequent to making the previously referenced payment, Alcoa Corporation and the respective state attorney in Italy filed a joint request with the Regional Administrative Court for Lombardy to have this matter formally dismissed. On October 9, 2018, the court formally dismissed the case and this matter is now closed.

Environmental Matters

Alcoa is involved in proceedings under the Comprehensive Environmental Response, Compensation and Liability Act, also known as Superfund (CERCLA) and analogous state provisions regarding the usage, disposal, storage or treatment of hazardous substances at a number of sites in the U.S. The Company has committed to participate, or is engaged in negotiations with, federal or state authorities relative to its alleged liability for participation, in clean-up efforts at several such sites. The most significant of these matters are discussed in Note R to the Consolidated Financial Statements under the caption "Contingencies and Commitments—Environmental Matters."

The Separation and Distribution Agreement between Alcoa Corporation and Arconic includes provisions for the assignment or allocation of environmental liabilities between Alcoa Corporation and Arconic, including certain remediation obligations associated with environmental matters. In general, the respective parties will be responsible for the environmental matters associated with their operations, and with the properties and other assets assigned to each. Additionally, the Separation and Distribution Agreement lists environmental matters with a shared responsibility between the two companies with an

allocation of responsibility and the lead party responsible for management of each matter. For matters assigned to Alcoa Corporation under the Separation and Distribution Agreement, Alcoa Corporation has agreed to indemnify Arconic in whole or in part for environmental liabilities arising from operations prior to the Separation Date. The following discussion provides details regarding the current status of certain matters related to current or former Alcoa Corporation sites. With the exception of the Fusina, Italy matter, Alcoa Corporation assumed full responsibility of the matters described below.

In August 2005, Dany Lavoie, a resident of Baie Comeau in the Canadian Province of Québec, filed a Motion for Authorization to Institute a Class Action and for Designation of a Class Representative against Alcoa Canada Ltd., Alcoa Limitée, Société Canadienne de Metaux Reynolds Limitée and Canadian British Aluminum in the Superior Court of Québec in the District of Baie Comeau, alleging that defendants, as the present and past owners and operators of an aluminum smelter in Baie Comeau, had negligently allowed the emission of certain contaminants from the smelter on the lands and houses of the St. Georges neighborhood and its environs causing property damage and health concerns. In May 2007, the court authorized a class action suit on behalf of all people who suffered property or personal injury damages caused by the emission of Polycyclic Aromatic Hydrocarbons, or “PAHs” from the Company’s aluminum smelter in Baie Comeau. In September 2007, plaintiffs filed the claim against the original defendants. The Soderberg smelting process that plaintiffs allege to be the source of emissions of concern has ceased operations and has been dismantled. The court has identified a sampling expert and the parties are advising the expert on their respective views on the appropriate sampling protocol. Further proceedings in the case will await the independent expert’s report. At this stage of the proceeding, we are unable to reasonably predict an outcome or to estimate a range of reasonably possible loss.

In 1996, ParentCo acquired the Fusina, Italy smelter and rolling operations and the Portovesme, Italy smelter (both of which are owned by Alcoa’s subsidiary, Alcoa Trasformazioni S.r.l. (“Trasformazioni”)) from Alumix, an entity owned by the Italian Government. ParentCo also acquired the extrusion plants located in Feltre and Bolzano, Italy. At the time of the acquisition, Alumix indemnified ParentCo for pre-existing environmental contamination at the sites. In 2004, the Italian Ministry of Environment (MOE) issued orders to Trasformazioni and Alumix for the development of a clean-up plan related to soil contamination in excess of allowable limits under legislative decree and to institute emergency actions and pay natural resource damages. In April 2006, Trasformazioni’s Fusina site was also sued by the MOE and Minister of Public Works (MOPW) in the Civil Court of Venice for alleged environmental damages, in parallel with the orders already issued by the MOE. Most, if not all, of the underlying activities occurred during the ownership of Alumix, the governmental entity that sold the Italian plants to ParentCo.

In January 2014, Trasformazioni and Ligestra S.r.l. (“Ligestra”), the successor to Alumix, signed a final settlement agreement with respect to all environmental issues at the Fusina site, whereby the parties share all remediation costs and environmental damages claimed by the MOE and the MOPW; Ligestra assumed 50% to 80% of all payments and remediation costs. The remediation project filed by ParentCo and Ligestra has been approved by the MOE. See Note R to the Consolidated Financial Statements under the caption “Fusina and Portovesme, Italy.” In April 2016, the settlement was ratified by the Ministers and the court case has been finally dismissed.

ParentCo and Ligestra have signed a similar agreement relating to the Portovesme site that is contingent upon final acceptance of the proposed soil remediation project for Portovesme. The MOE issued a Ministerial Decree approving the final project in October 2015. In December 2017, a framework for the future settlement of the groundwater remediation project was included within an agreement to transfer the ownership of the Portovesme smelter to an Italian government agency. The MOE has confirmed its acceptance of the proposal set out in the framework; however, the total cost of the groundwater remediation project will not be determined until the final remedial design is completed in 2019.

On November 30, 2010, Alcoa World Alumina Brasil Ltda. (“AWAB”) received notice of a lawsuit that had been filed by the public prosecutors of the State of Pará in Brazil in November 2009 regarding the impact of the new bauxite mine in Juruti, alleging that certain conditions of the original installation license were not met by AWAB, a subsidiary of Alcoa. The suit additionally names the State of Pará, which, through its Environmental Agency, had issued the operating license for ParentCo’s new bauxite mine in Juruti. Our position is that any impact from the project had been fully repaired when the suit was filed. We believe that Jará Lake has not been affected by any project activity and any evidence of pollution from the project would be unreliable. Given that this proceeding is in its preliminary stage and the current uncertainty in this case, we are unable to reasonably predict an outcome or to estimate a range of reasonably possible loss.

St. Croix Proceedings - Abednego and Abraham cases. On January 14, 2010, ParentCo was served with a multi-plaintiff action complaint involving several thousand individual persons claiming to be residents of St. Croix alleging personal injury or property damage from Hurricane Georges or winds blowing material from the St. Croix Alumina, L.L.C. (“SCA”) facility on the island of St. Croix (U.S. Virgin Islands) since the time of the hurricane. This complaint, Abednego, et al. v. Alcoa, et al. was filed in the Superior Court of the Virgin Islands, St. Croix Division. The complaint names as defendants the same entities that were sued in a February 1999 action arising out of the impact of Hurricane Georges on the island and added as a defendant the current owner of the alumina facility property.

On March 1, 2012, ParentCo was served with a separate multi-plaintiff action complaint involving approximately 200 individual persons alleging claims essentially identical to those set forth in the *Abednego v. Alcoa* complaint. This complaint, *Abraham, et al. v. Alcoa, et al.*, was filed on behalf of plaintiffs previously dismissed in the federal court proceeding involving the original litigation over Hurricane Georges impacts. The matter was originally filed in the Superior Court of the Virgin Islands, St. Croix Division, on March 30, 2011.

By order dated August 10, 2015, the Superior Court dismissed plaintiffs' complaints without prejudice to re-file the complaints individually, rather than as a multi-plaintiff filing. The order also preserves the defendants' grounds for dismissal if new, individual complaints are filed. In July 2017, the court issued an order that accepted as timely all complaints that had already been filed or would be filed by the end of the month and consolidated all such complaints into the Red Dust Claims docket (Master Case No.: SX-15-CV-620). Following this order, a total of 430 complaints were filed and accepted by the court by the deadline, which included claims of approximately 1,360 individuals. On November 15, 2018, the Red Dust Claims docket was transferred to the Complex Litigation Division within the Superior Court of the Virgin Islands. We are unable to reasonably predict an outcome or to estimate a range of reasonably possible loss.

Asbestos Litigation

Some of our subsidiaries as premises owners are defendants in active lawsuits filed on behalf of persons alleging injury as a result of occupational exposure to asbestos at various facilities. A former affiliate of a subsidiary has been named, along with a large common group of industrial companies, in a pattern complaint where our involvement is not evident. Since 1999, several thousand such complaints have been filed. To date, the former affiliate has been dismissed from almost every case that was actually placed in line for trial. Our subsidiaries and acquired companies all have had numerous insurance policies over the years that provide coverage for asbestos based claims. Many of these policies provide layers of coverage for varying periods of time and for varying locations. We have significant insurance coverage and believe that our reserves are adequate for known asbestos exposure related liabilities. The costs of defense and settlement have not been and are not expected to be material to the results of operations, cash flows, and financial position of Alcoa Corporation.

Tax

Spain. In July 2013, following a corporate income tax audit covering the 2006 through 2009 tax years, an assessment was received as a result of Spain's tax authorities disallowing certain interest deductions claimed by a former Spanish consolidated tax group previously owned by ParentCo. The following month, ParentCo filed an appeal of this assessment in Spain's Central Tax Administrative Court. In conjunction with this appeal, as required under Spanish tax law, ParentCo provided financial assurance in this matter in the form of both a bank guarantee (Arconic) and a lien secured with the San Ciprian smelter (Alcoa Corporation) to Spain's tax authorities. In January 2015, Spain's Central Tax Administrative Court denied ParentCo's appeal of this assessment. Two months later, ParentCo filed an appeal of the assessment in Spain's National Court (the "National Court"). The amount of this assessment, including interest, was \$152 million (€131 million) as of June 30, 2018.

On July 6, 2018, the National Court denied ParentCo's appeal of the assessment; however, the decision includes a requirement that Spain's tax authorities issue a new assessment, which considers available net operating losses of the former Spanish consolidated tax group from prior tax years that can be utilized during the assessed tax years. Spain's tax authorities will not issue a new assessment until this matter is resolved; however, based on estimated calculations completed by Arconic and Alcoa Corporation (collectively, the "Companies"), the amount of the new assessment, including applicable interest, is expected to be in the range of \$25 million to \$61 million (€21 million to €53 million) after consideration of available net operating losses and tax credits. Under the Tax Matters Agreement related to the Separation Transaction, Arconic and Alcoa Corporation are responsible for 51% and 49%, respectively, of the assessed amount in the event of an unfavorable outcome. On July 12, 2018, the Companies sent a letter to the National Court seeking clarification on one part of the decision. A response was received from the National Court on October 1, 2018, resulting in no change to its July 6, 2018 decision. On November 8, 2018, Arconic, with Alcoa Corporation's participation and consent, petitioned for an appeal to the Supreme Court of Spain.

Notwithstanding the petition for appeal, based on a review of the bases on which the National Court decided this matter, Alcoa Corporation management no longer believes that the Companies are more likely than not (greater than 50%) to prevail in this matter. Accordingly, Alcoa Corporation recorded a charge of \$30 million (€26 million) in Provision for income taxes on the Company's Statement of Consolidated Operations to establish a liability for its 49% share of the estimated loss in this matter, representing management's best estimate at this time. As indicated above, at a future point in time, the Companies will receive an updated assessment from Spain's tax authorities, which may result in a change to management's estimate following further analysis.

Separately, in January 2017, the National Court issued a decision in favor of the former Spanish consolidated tax group related to a similar assessment for the 2003 through 2005 tax years, effectively making that assessment null and void. Additionally, in August 2017, in lieu of receiving a formal assessment, the Companies reached a settlement with Spain's tax

authorities for the 2010 through 2013 tax years that had been under audit for a similar matter. Alcoa Corporation's share of this settlement was not material to the Company's Consolidated Financial Statements. The ultimate outcomes related to the 2003 through 2005 and the 2010 through 2013 tax years are not indicative of the potential ultimate outcome of the assessment for the 2006 through 2009 tax years due to procedural differences. Also, it is possible that the Companies may receive similar assessments for tax years subsequent to 2013; however, management does not expect any such assessment, if received, to be material to Alcoa Corporation's Consolidated Financial Statements.

Brazil (AWAB). In March 2013, AWAB was notified by the Brazilian Federal Revenue Office (RFB) that approximately \$110 (R\$220) of value added tax credits previously claimed are being disallowed and a penalty of 50% assessed. Of this amount, AWAB received \$41 (R\$82) in cash in May 2012. The value added tax credits were claimed by AWAB for both fixed assets and export sales related to the Juruti bauxite mine and São Luís refinery expansion. The RFB has disallowed credits they allege belong to the consortium in which AWAB owns an interest and should not have been claimed by AWAB. Credits have also been disallowed as a result of challenges to apportionment methods used, questions about the use of the credits, and an alleged lack of documented proof. AWAB presented defense of its claim to the RFB on April 8, 2013. If AWAB is successful in this administrative process, the RFB would have no further recourse. If unsuccessful in this process, AWAB has the option to litigate at a judicial level. Separately from AWAB's administrative appeal, in June 2015, a new tax law was enacted repealing the provisions in the tax code that were the basis for the RFB assessing a 50% penalty in this matter. As such, the estimated range of reasonably possible loss is \$0 to \$26 (R\$103), whereby the maximum end of the range represents the portion of the disallowed credits applicable to the export sales and excludes the 50% penalty. Additionally, the estimated range of disallowed credits related to AWAB's fixed assets is \$0 to \$29 (R\$117), which would increase the net carrying value of AWAB's fixed assets if ultimately disallowed. It is management's opinion that the allegations have no basis; however, at this time, the Company is unable to reasonably predict an outcome for this matter.

Other

On October 19, 2015, a subsidiary of Alcoa, Alúmina Española S.A., received a request by the Court of Vivero, Spain to provide the names of the "manager," as well as those of the "environmental managers," of the San Ciprián alumina refinery from 2009 to the present date. Upon reviewing the documents filed with the Court, ParentCo learned for the first time that the request is the result of a criminal proceeding that began in 2010 after the filing of a claim by two San Ciprián neighbors alleging that the plant's activities had adverse effects on vegetation, crops and human health. In 2011 and 2012, some neighbors claimed individually in the criminal court for caustic spill damages to vehicles, and the judge decided to administer all issues in the court proceeding (865/2011). On March 23, 2017, the criminal court provisionally dismissed the case in light of the conclusions of a technical report submitted by an expert and the position of the public prosecutor, neither of whom found any criminal liability in Alúmina Española S.A. activity. In April 2017, Alúmina Española S.A. received confirmation that the criminal court matter had been definitively closed.

Other Contingencies

Reynolds. On January 11, 2016, Sherwin Alumina Company, LLC ("Sherwin"), the current owner of a refinery previously owned by ParentCo (see below), and one of its affiliate entities, filed bankruptcy petitions in Corpus Christi, Texas for reorganization under Chapter 11 of the U.S. Bankruptcy Code. Sherwin informed the bankruptcy court that it intends to cease operations because it is not able to continue its bauxite supply agreement. On November 23, 2016, the bankruptcy court approved Sherwin's plans for cessation of its operations. On February 16, 2017, Sherwin filed a bankruptcy Chapter 11 Plan (the "Plan") and on February 17, 2017 the court approved that Plan.

In 2000, ParentCo acquired Reynolds Metals Company ("Reynolds," a subsidiary of Alcoa Corporation), which included an alumina refinery in Gregory, Texas. As a condition of the Reynolds acquisition, ParentCo was required to divest this alumina refinery. In accordance with the terms of the divestiture in 2000, ParentCo agreed to retain responsibility for certain environmental obligations (see Environmental Matters above) and assigned to the buyer an Energy Services Agreement ("ESA") with Gregory Power Partners ("Gregory Power") for purchase of steam and electricity by the refinery.

Through the bankruptcy proceedings, the owner of Sherwin exercised its right under the U.S. Bankruptcy Code to reject the agreement from 2000 containing the previously mentioned retained responsibility, which had the effect of terminating all rights and responsibilities of the parties to the agreement.

As a result of Sherwin's initial bankruptcy filing, separate legal actions were initiated against Reynolds by Gregory Power and Sherwin as described below.

Gregory Power. On January 26, 2016, Gregory Power delivered notice to Reynolds that Sherwin's bankruptcy filing constitutes a breach of the ESA; on January 29, 2016, Reynolds responded that the filing does not constitute a breach. On September 16, 2016, Gregory Power filed a complaint in the bankruptcy case against Reynolds alleging breach of the ESA. In response to this complaint, on November 10, 2016, Reynolds filed both a motion to dismiss, including a jury demand, and

a motion to withdraw the reference to the bankruptcy court based on the jury demand. On July 18, 2017, the district court ordered that any trial would be held to a jury in district court, but that the bankruptcy court would retain jurisdiction on all pre-trial matters. Since that time, Gregory Power filed an amended complaint to include Allied Alumina LLC (“Allied”), the successor to the original purchaser of the refinery from Reynolds. In September 2018, Reynolds and Allied filed their respective answers to the amended complaint, and Allied filed a cross complaint against Reynolds, which was answered by Reynolds on October 15, 2018. The court has yet to rule on several pending pretrial matters. At this time, Alcoa Corporation is unable to reasonably predict the ultimate outcome of this matter.

Sherwin. On October 4, 2016, the Texas Commission on Environmental Quality (TCEQ) filed suit against Sherwin in the bankruptcy proceeding seeking to hold Sherwin responsible for remediation of alleged environmental conditions at the Sherwin refinery site and related bauxite residue waste disposal areas (known as the Copano facility). On October 11, 2016, Sherwin filed a similar suit against Reynolds in the case. As provided in the Plan, Sherwin, including certain affiliated companies, and Reynolds had been negotiating an allocation among them as to the ownership of and responsibility for certain areas of the refinery and the Copano facility. In March 2018, Reynolds and Sherwin reached a settlement agreement that assigns to Reynolds all environmental liabilities associated with the Copano facility and assigns to Sherwin all environmental liabilities associated with the Sherwin refinery site. Additionally, Reynolds and the TCEQ reached an agreement that defines the operating and environmental steps required for the Copano facility, which Reynolds intends to operate for the purpose of managing materials other than bauxite residue waste, including third-party dredge material. The effectiveness and enforceability of each of these two agreements are pre-conditioned on the other being accepted by the bankruptcy court. A public notice and comment period on these agreements expired on April 26, 2018 without material affect to the documents. On June 5, 2018, the bankruptcy court accepted and entered the agreements into the judicial record as submitted. May 21, 2018 serves as the “effective date” for both agreements.

On June 5, 2018, the transaction between Sherwin and Reynolds was completed. Under the agreement with Sherwin, in exchange for assuming full responsibility for the environmental-related liabilities (see below related to the Company’s existing reserve) associated with the Copano facility, Reynolds assumed ownership of the land that comprises the Copano facility, as well as land that serves as a buffer around the Copano facility and other related assets. A third-party appraisal estimated the fair value of the land and other assets to be \$16 million. Under the agreement with TCEQ, a portion of the Copano facility must be closed within 10 years and the remaining portion must be closed within 30 years, both timeframes began on the effective date. Also, Reynolds is required to install upgrades to certain dust control systems and repair certain structures and drainage systems at the Copano facility, and prepare and submit to TCEQ a preliminary groundwater assessment report and a drinking water survey report related to the Copano facility within 180 days of the effective date. Accordingly, the Company recognized \$16 million in properties, plants, and equipment, \$9 million in environmental remediation liabilities, and \$7 million in other related liabilities. Additionally, the Company paid \$12 million into a trust managed by the state of Texas as financial assurance of the Company’s performance in completing the required obligations. This amount will be returned to the Company upon satisfactory completion of the future closure of the Copano facility in accordance with all applicable laws and regulations. On June 7, 2018, Sherwin filed a notice of dismissal in the suit against Reynolds; the dismissal was immediately effective as no court order was required.

At the time the agreements were signed by all parties, the Company had a reserve of \$29 million for its proportionate share of environmental-related matters at both the Sherwin refinery site and the Copano facility based on the terms of the divestiture of the Sherwin refinery in 2000 (see Note R to the Consolidated Financial Statements under the caption “Sherwin, TX”). While Reynolds no longer has any responsibility for environmental-related matters at the Sherwin refinery site, it assumed additional responsibility for environmental-related matters at the Copano facility (\$9 million – see above). In management’s judgment, the \$38 million reserve as of December 31, 2018 is sufficient to satisfy the Company’s revised responsibilities and obligations under the settlement agreements. Upon changes in facts or circumstances, a change to the reserve may be required.

Suralco. On December 16, 2016, Boskalis International B.V. (Boskalis) initiated a binding arbitration proceeding against Suriname Aluminum Company, LLC (Suralco), an AWAC company, seeking \$47 million plus prejudgment interest and associated taxes in connection with a dispute arising under a contract for mining services in Suriname between Boskalis and Suralco. Boskalis asserted four separate claims under the contract.

In February 2018, the arbitration hearing was held before a three-person panel under the rules of the International Chamber of Commerce. The panel issued its decision on May 29, 2018, finding in favor of Boskalis on two claims and against Boskalis on two claims. For the two claims on which Boskalis prevailed, the panel awarded Boskalis \$29 million, including prejudgment interest of \$3 million. The award is final and cannot be appealed. Accordingly, Alcoa Corporation recorded a charge of \$29 million (\$17 million after noncontrolling interest), including \$26 million in Cost of goods sold and \$3 million in Interest expense on the Company’s Statement of Consolidated Operations. On June 6, 2018, the Company made the \$29 million cash payment to Boskalis closing this matter.

The claim that represented the majority of the arbitration award centered around a contract provision requiring Suralco to make a “true up” payment at the end of the contract in the event that Suralco was unable to receive delivery of the full

contract quantity, thus allowing Boskalis to recover its fixed production costs and a suitable return on its investment. While Suralco argued that all required deliveries had been made during the amended contract term and that no “true up” payment was required because a “true up” would amount to a double payment for bauxite deliveries after the initial contract term, Boskalis argued that the deliveries were not made within the original contract term and thus, a “true up” payment was required. On the basis of its analysis of the facts and applicable law, management concluded that the likelihood of an unfavorable decision on Boskalis’ claims was remote (25% or less). Throughout the course of the proceeding, and even after the conclusion of the hearing, management’s judgment of the likelihood of an unfavorable outcome remained the same.

General

In addition to the matters discussed above, various other lawsuits, claims, and proceedings have been or may be instituted or asserted against Alcoa Corporation, including those pertaining to environmental, safety and health, commercial, tax, product liability, intellectual property infringement, employment, and employee and retiree benefit matters, and other actions and claims arising out of the normal course of business. While the amounts claimed in these other matters may be substantial, the ultimate liability is not readily determinable because of the considerable uncertainties that exist. Accordingly, it is possible that the Company’s liquidity or results of operations in a particular period could be materially affected by one or more of these other matters. However, based on facts currently available, management believes that the disposition of these other matters that are pending or asserted will not have a material adverse effect, individually or in the aggregate, on the financial position of the Company.

Item 4. Mine Safety Disclosures.

The information concerning mine safety violations or other regulatory matters required by Section 1503(a) of the Dodd-Frank Wall Street Reform and Consumer Protection Act and Item 104 of Regulation S-K (17 CFR 229.104) is included in Exhibit 95.1 of this report, which is incorporated herein by reference.

PART II

Item 5. Market for Registrant's Common Equity, Related Stockholder Matters and Issuer Purchases of Equity Securities.

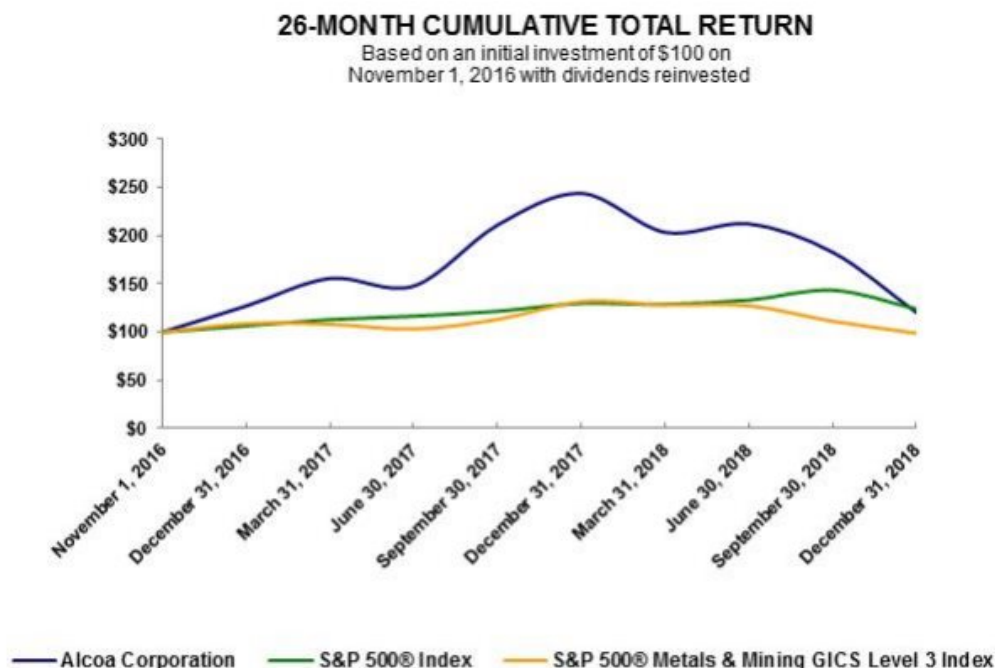
Shares of the Company's common stock are listed on the New York Stock Exchange and trade under the symbol "AA" in "regular-way" trading, which began on November 1, 2016 immediately following the Separation Transaction.

Alcoa Corporation did not pay dividends in 2018, 2017, or in 2016 (beginning November 1, 2016). Dividends on Alcoa Corporation common stock are subject to authorization by the Company's Board of Directors. The payment and amount of dividends, if any, depends upon matters deemed relevant by the Company's Board of Directors, such as Alcoa Corporation's results of operations, financial condition, cash requirements, future prospects, any limitations imposed by law, credit agreements or senior securities, and other factors deemed relevant and appropriate. The Company's senior secured revolving credit facility and the indenture governing our senior unsecured notes restrict our ability to pay dividends in certain circumstances. For more information, see Item 7 "Management's Discussion and Analysis of Financial Condition and Results of Operations – Liquidity and Capital Resources – Financing Activities."

As of February 20, 2019, there were approximately 12,000 holders of record of shares of the Company's common stock. Because many of Alcoa Corporation's shares are held by brokers and other institutions on behalf of stockholders, the Company is unable to estimate the total number of stockholders represented by these recordholders.

Stock Performance Graph

The following graph compares Alcoa Corporation's cumulative 26-month total shareholder return with (1) the Standard & Poor's (S&P) 500® Index and (2) the S&P 500® Metals & Mining GICS Level 3 Index, a group of companies categorized by S&P as active in the "Metals and Mining" industry within the "Materials" market sector. This comparison was based on an initial investment of \$100, including the reinvestment of any dividends from November 1, 2016 (beginning of "regular way" trading for Alcoa Corporation) through December 31, 2018. Such information shall not be deemed to be "filed."



	November 1, 2016	December 31, 2016	March 31, 2017	June 30, 2017	September 30, 2017	December 31, 2017	March 31, 2018	June 30, 2018	September 30, 2018	December 31, 2018
Alcoa Corporation	\$ 100	\$ 127	\$ 156	\$ 148	\$ 211	\$ 244	\$ 203	\$ 212	\$ 183	\$ 120
S&P 500® Index	100	106	113	116	122	130	129	133	143	124
S&P 500® Metals & Mining GICS Level 3 Index	100	109	108	103	113	131	128	127	111	99

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Source: Research Data Group, Inc. (www.researchdatagroup.com/S&P.htm)

Unregistered Sales of Equity Securities

On March 14, 2016, Alcoa Corporation issued 1,000 shares of its common stock to ParentCo pursuant to Section 4(a)(2) of the Securities Act of 1933, as amended. The Company did not register the issuance of these shares under the Securities Act of 1933, as amended, because such issuance did not constitute a public offering.

Issuer Purchases of Equity Securities

On October 17, 2018, Alcoa Corporation announced that its Board of Directors authorized a common stock repurchase program under which the Company may purchase shares of its outstanding common stock up to an aggregate transactional value of \$200 million, depending on cash availability, market conditions, and other factors.

Repurchases under the program may be made using a variety of methods, which may include open market purchases, privately negotiated transactions, or pursuant to a Rule 10b5-1 plan. This program does not have a predetermined expiration date. Alcoa Corporation intends to retire the repurchased shares of common stock. In December 2018, the Company repurchased 1,723,800 shares of its common stock for \$50 million (weighted average share price of \$29.01 (includes \$0.02 broker commission)); these shares were immediately retired.

Item 6. Selected Financial Data.

(dollars in millions, except per-share amounts and average realized prices; metric tons in thousands (kmt))

For the year ended December 31,	2018	2017	2016	2015	2014
Sales	\$ 13,403	\$ 11,652	\$ 9,318	\$ 11,199	\$ 13,147
Restructuring and other charges	527	309	318	983	863
Net income (loss)	871	559	(346)	(739)	(347)
Net income (loss) attributable to Alcoa Corporation	227	217	(400)	(863)	(256)
Earnings per share attributable to Alcoa Corporation common shareholders ⁽¹⁾ :					
Basic	\$ 1.22	\$ 1.18	\$ (2.19)	\$ (4.73)	\$ (1.40)
Diluted	1.20	1.16	(2.19)	(4.73)	(1.40)
Shipments of alumina (kmt)	9,259	9,220	9,071	10,755	10,652
Shipments of aluminum products (kmt)	3,268	3,356	3,147	3,227	3,518
Average realized price per metric ton of alumina	\$ 455	\$ 340	\$ 253	\$ 311	\$ 320
Average realized price per metric ton of primary aluminum	2,484	2,224	1,862	2,092	2,396
Cash dividends declared per common share ⁽²⁾	\$ —	\$ —	\$ —	\$ *	\$ *
Total assets	15,938	17,447	16,741	16,413	18,680
Total debt	1,802	1,412	1,445	225	342
Cash provided from (used for) operations	448	1,224	(311)	875	842
Capital expenditures	(399)	(405)	(404)	(391)	(444)

(1) For all periods presented prior to 2016, earnings per share was calculated based on the 182,471,195 shares of Alcoa Corporation common stock distributed on November 1, 2016 in conjunction with the completion of the Separation Transaction and is considered pro forma in nature.

(2) Dividends on common stock are subject to authorization by Alcoa Corporation's Board of Directors. Alcoa Corporation did not declare any dividends in 2018, 2017, and from November 1, 2016 through December 31, 2016.

* Prior to November 1, 2016, Alcoa Corporation was not a standalone publicly-traded company with issued and outstanding common stock.

Prior to the Separation Date, Alcoa Corporation did not operate as a separate, standalone entity. Alcoa Corporation's operations were included in ParentCo's financial results. Accordingly, for all periods prior to the Separation Date, Alcoa Corporation's Consolidated Financial Statements were prepared from ParentCo's historical accounting records and were presented on a standalone basis as if Alcoa Corporation's operations had been conducted independently from ParentCo. Such Consolidated Financial Statements include the historical operations that were considered to comprise Alcoa Corporation's businesses, as well as certain assets and liabilities that were historically held at ParentCo's corporate level but were specifically identifiable or otherwise attributable to Alcoa Corporation.

The selected Statement of Consolidated Operations and Consolidated Balance Sheet information in the table above for all periods was derived from Alcoa Corporation's audited Consolidated Financial Statements.

The data presented in the Selected Financial Data table should be read in conjunction with the information provided in Management's Discussion and Analysis of Financial Condition and Results of Operations in Part II Item 7 and the Consolidated Financial Statements in Part II Item 8 of this Form 10-K.

Item 7. Management's Discussion and Analysis of Financial Condition and Results of Operations.

(dollars in millions, except per-share amounts, average realized prices, and average cost amounts;
dry metric tons in millions (mdmt); metric tons in thousands (kmt))

Overview

Our Business

Alcoa Corporation (or the "Company") is a vertically integrated aluminum company comprised of bauxite mining, alumina refining, aluminum production (smelting, casting, and rolling), and energy generation. Aluminum is a commodity that is traded on the London Metal Exchange (LME) and priced daily. Additionally, alumina is subject to market pricing through the Alumina Price Index (API), which is calculated by the Company based on the weighted average of a prior month's daily spot prices published by the following three indices: CRU Metallurgical Grade Alumina Price; Platts Metals Daily Alumina PAX Price; and Metal Bulletin Non-Ferrous Metals Alumina Index. As a result, the price of both aluminum and alumina is subject to significant volatility and, therefore, influences the operating results of Alcoa Corporation.

The Company has more than 40 operating locations (through direct and indirect ownership) in 10 countries around the world, situated primarily in Australia, Brazil, Canada, Iceland, Norway, Spain, and the United States. Governmental policies, laws and regulations, and other economic factors, including inflation and fluctuations in foreign currency exchange rates and interest rates, affect the results of operations in these countries.

References in this Management's Discussion and Analysis of Financial Condition and Results of Operations to "ParentCo" refer to Alcoa Inc., a Pennsylvania corporation, and its consolidated subsidiaries (through October 31, 2016, at which time was renamed Arconic Inc. (Arconic)).

Separation Transaction

On November 1, 2016 (the "Separation Date"), ParentCo separated into two standalone, publicly-traded companies, Alcoa Corporation and Arconic, effective at 12:01 a.m. Eastern Standard Time (the "Separation Transaction"). Alcoa Corporation includes the Alumina and Primary Metals segments, which comprised the bauxite mining, alumina refining, aluminum smelting and casting, and energy operations of ParentCo, as well as the Warrick, Indiana rolling operations and the 25.1% equity interest in the rolling mill at the joint venture in Saudi Arabia, both of which were part of ParentCo's Global Rolled Products segment. Arconic includes the operations that comprise the Global Rolled Products (except for the aforementioned rolling operations that were included in Alcoa Corporation), Engineered Products and Solutions, and Transportation and Construction Solutions segments. ParentCo shareholders of record as of the close of business on October 20, 2016 (the "Record Date") received one share of Alcoa Corporation common stock, representing in aggregate 80.1% of the common stock of the Company, for every three shares of ParentCo common stock held as of the close of business on the Record Date (cash was paid by ParentCo to its' shareholders in lieu of fractional shares). Arconic retained the remaining 19.9% of Alcoa Corporation common stock (Arconic sold this retained interest in 2017).

To effect the Separation Transaction, ParentCo undertook a series of transactions to separate the net assets and certain legal entities of ParentCo, resulting in a cash payment of \$1,072 to ParentCo by Alcoa Corporation (an additional \$247 was paid to Arconic by the Company in 2017 – see Financing Activities in Liquidity and Capital Resources below) with the net proceeds of a previous debt offering (see Financing Activities in Liquidity and Capital Resources below). Additionally, 146,159,428 shares and 36,311,767 shares of the Company's common stock were distributed to ParentCo shareholders and retained by Arconic, respectively. "Regular-way" trading of Alcoa Corporation's common stock began with the opening of the New York Stock Exchange on November 1, 2016 under the ticker symbol "AA." The Company's common stock has a par value of \$0.01 per share.

In connection with the Separation Transaction, Alcoa Corporation and Arconic entered into certain agreements to implement the legal and structural separation between the two companies, govern the relationship between the Company and Arconic after the completion of the Separation Transaction, and allocate between Alcoa Corporation and Arconic various assets, liabilities, and obligations, including, among other things, employee benefits, environmental liabilities, intellectual property, and tax-related assets and liabilities. These agreements included a Separation and Distribution Agreement, Tax Matters Agreement, Employee Matters Agreement, Transition Services Agreement, certain Patent, Know-How, Trade Secret License and Trademark License Agreements, and Stockholder and Registration Rights Agreement.

ParentCo incurred costs to evaluate, plan, and execute the Separation Transaction, and Alcoa Corporation was allocated a pro rata portion of those costs based on segment revenue (see Cost Allocations below). ParentCo recognized \$152 from January 2016 through October 2016 for costs related to the Separation Transaction, of which \$68 was allocated to Alcoa Corporation. The allocated amounts were included in Selling, general administrative, and other expenses on the Company's Statement of Consolidated Operations.

Basis of Presentation. The Consolidated Financial Statements of Alcoa Corporation are prepared in conformity with accounting principles generally accepted in the United States of America (GAAP). In accordance with GAAP, certain situations require management to make estimates based on judgments and assumptions, which may affect the reported amounts of assets and liabilities and the disclosure of contingent assets and liabilities at the date of the financial statements. They also may affect the reported amounts of revenues and expenses during the reporting periods. Actual results could differ from those estimates upon subsequent resolution of identified matters.

Prior to the Separation Date, the Company did not operate as a separate, standalone entity. Alcoa Corporation's operations were included in ParentCo's financial results. Accordingly, for all periods prior to the Separation Date, Alcoa Corporation's Consolidated Financial Statements were prepared from ParentCo's historical accounting records and were presented on a standalone basis as if Alcoa Corporation's operations had been conducted independently from ParentCo. Such Consolidated Financial Statements include the historical operations that were considered to comprise Alcoa Corporation's businesses, as well as certain assets and liabilities that were historically held at ParentCo's corporate level but were specifically identifiable or otherwise attributable to Alcoa Corporation.

Cost Allocations. The description and information on cost allocations is applicable for all periods included in Alcoa Corporation's Consolidated Financial Statements prior to the Separation Date.

The Consolidated Financial Statements of Alcoa Corporation include general corporate expenses of ParentCo that were not historically charged to Alcoa Corporation for certain support functions that were provided on a centralized basis, such as expenses related to finance, audit, legal, information technology, human resources, communications, compliance, facilities, employee benefits and compensation, and research and development activities. These general corporate expenses were included on the Company's Statement of Consolidated Operations within Cost of goods sold, Selling, general administrative and other expenses, and Research and development expenses. These expenses were allocated to Alcoa Corporation on the basis of direct usage when identifiable, with the remainder allocated based on Alcoa Corporation's segment revenue as a percentage of ParentCo's total segment revenue for both Alcoa Corporation and Arconic.

All external debt not directly attributable to Alcoa Corporation was excluded from the Company's Consolidated Balance Sheet. Financing costs related to these debt obligations were allocated to Alcoa Corporation based on the ratio of capital invested in Alcoa Corporation to the total capital invested by ParentCo in both Alcoa Corporation and Arconic, and were included on the Company's Statement of Consolidated Operations within Interest expense.

The following table reflects the allocations described above:

	2016
Cost of goods sold ⁽¹⁾	\$ 40
Selling, general administrative, and other expenses ⁽²⁾	150
Research and development expenses	2
Provision for depreciation, depletion, and amortization	18
Restructuring and other charges	1
Interest expense	198
Other income, net	(7)

⁽¹⁾ Allocation principally relates to expenses for ParentCo's retained pension and other postretirement benefits associated with closed and sold operations.

⁽²⁾ Allocation includes costs incurred by ParentCo associated with the Separation Transaction (see above).

Management believes the assumptions regarding the allocation of ParentCo's general corporate expenses and financing costs were reasonable.

Nevertheless, the Consolidated Financial Statements of Alcoa Corporation may not include all of the actual expenses that would have been incurred and may not reflect Alcoa Corporation's consolidated results of operations, financial position, and cash flows had it been a standalone company during the periods prior to the Separation Date. Actual costs that would have been incurred if Alcoa Corporation had been a standalone company would depend on multiple factors, including organizational structure, capital structure, and strategic decisions made in various areas, including information technology and infrastructure. Transactions between Alcoa Corporation and ParentCo were considered to be effectively settled for cash at the time the transaction was recorded. The total net effect of the settlement of these transactions is reflected on Alcoa Corporation's Statement of Consolidated Cash Flows as a financing activity and on the Company's Consolidated Balance Sheet as Parent Company net investment.

Results of Operations

Earnings Summary

Net income attributable to Alcoa Corporation for 2018 was \$227 compared with \$217 in 2017. The change of \$10 was primarily due to improved pricing for both aluminum products and alumina, mostly offset by several factors as follows: increased input costs and other operational expenses, a net charge for several actions associated with employee retirement benefit plans, a higher income tax provision, higher net income attributable to a noncontrolling interest partner in certain of Alcoa Corporation's operations, and a charge to establish an allowance on certain value-added tax credits.

Net income attributable to Alcoa Corporation for 2017 was \$217 compared with Net loss attributable to Alcoa Corporation of \$400 in 2016. The change of \$617 was mainly the result of a higher average realized price for each of primary aluminum and alumina and the absence of allocated interest expense and costs related to the Separation Transaction. These positive impacts were partially offset by a higher income tax provision; higher net income attributable to a noncontrolling interest partner in certain of Alcoa Corporation's operations; increased raw materials, maintenance, and transportation costs; and net unfavorable foreign currency movements.

Sales—Sales for 2018 were \$13,403 compared with \$11,652 in 2017, an improvement of \$1,751, or 15%. The increase was largely attributable to a higher average realized price for each of alumina, primary aluminum, and flat-rolled aluminum. This positive impact was slightly offset by decreased shipments for both aluminum products and bauxite and the absence of surplus energy sales (\$105) related to the closed Rockdale (Texas) smelter due to the early termination of a power contract in October 2017.

Sales for 2017 were \$11,652 compared with \$9,318 in 2016, an improvement of \$2,334, or 25%. The increase was principally driven by a higher average realized price for each of primary aluminum and alumina and increased shipments for each of aluminum products, alumina, and bauxite. These positive impacts were slightly offset by realized losses from embedded derivatives (designated as cash flow hedges of forward aluminum sales) in energy supply contracts due to the rise in LME aluminum prices.

Cost of Goods Sold—COGS as a percentage of Sales was 75.2% in 2018 compared with 77.2% in 2017. The percentage was positively impacted by a higher average realized price for both alumina and aluminum products, a favorable last in, first out (LIFO) inventory adjustment (difference of \$91—see Reconciliation of Total Segment Adjusted EBITDA to Consolidated Net Income (Loss) Attributable to Alcoa Corporation in Segment Information below), and net favorable foreign currency movements due to a stronger U.S. dollar. These positive impacts were partially offset by higher input costs for carbon materials, energy, and caustic soda; increased maintenance and transportation expenses; and tariffs on aluminum imports (\$84—see Aluminum in Segment Information below).

COGS as a percentage of Sales was 77.2% in 2017 compared with 84.5% in 2016. The percentage was positively impacted by a higher average realized price for each of primary aluminum and alumina, somewhat offset by several factors as follows: higher input costs, particularly for energy (including \$21 related to a financial contract—see below) and caustic soda; net unfavorable foreign currency movements due to a weaker U.S. dollar; increased maintenance and transportation expenses; an unfavorable LIFO inventory adjustment (difference of \$81—see Reconciliation of Total Segment Adjusted EBITDA to Consolidated Net Income (Loss) Attributable to Alcoa Corporation in Segment Information below); and costs related to the partial restart of the Warrick (Indiana) smelter (\$46—see Aluminum in Segment Information below).

Alcoa Corporation has purchased electricity in the spot market for one of its smelters since the Company's contract with a local energy provider expired in October 2016, as a new energy contract was not able to be negotiated. In order to manage the Company's exposure against the variable energy rates that occur in the spot market, Alcoa Corporation had previously entered into a financial contract with a counterparty to effectively convert the Company's variable power price to a fixed power price. At the beginning of 2017, Alcoa Corporation held a favorable position in the financial contract, which was scheduled to early terminate in August 2017, as a result of a decision made by management in August 2016.

In January 2017, Alcoa Corporation began the process of restarting capacity at this smelter, which was halted due to an unexpected power outage that occurred in December 2016. As a result, Alcoa Corporation and the same counterparty to the existing financial contract entered into a new financial contract to effectively convert the Company's variable power price to a fixed power price from August 2017 through July 2021. Additionally, the effective termination of the existing financial contract was moved up to July 31, 2017. In order to obtain the most favorable terms under the new financial contract that could be negotiated, Alcoa Corporation conceded a portion of the existing financial contract that was favorable to the Company for the April through July 2017 period.

As a result of this concession, Alcoa Corporation sought an additional financial contract to cover the exposure to variable power rates for the April through July 2017 period. In March 2017, Alcoa Corporation secured such a contract with a different counterparty; however, the price of power in the spot market rose significantly between January and March 2017. Consequently, the fixed power price secured by this additional financial contract was significantly higher than the fixed

power price previously secured by the existing financial contract described above. Accordingly, Alcoa Corporation realized higher energy costs (included in COGS) of \$21 and mark-to-market losses (included in Other income, net) related to the financial contracts of \$13 in 2017.

Selling, General Administrative, and Other Expenses—SG&A expenses were \$248, or 1.9% of Sales, in 2018 compared with \$280, or 2.4% of Sales, in 2017. The decline of \$32 was primarily related to decreases in various expenses, including employee transfer and relocation costs and legal and consulting fees, and net favorable foreign currency movements, largely due to a stronger U.S. dollar against the Brazilian real. These positive impacts were partially offset by higher stock-based compensation expense related to corporate employees (\$10).

SG&A expenses were \$280, or 2.4% of Sales, in 2017 compared with \$356, or 3.8% of Sales, in 2016. The decrease of \$76 was mostly attributable to the absence of costs related to the Separation Transaction (\$73), which includes an allocation of \$68 from ParentCo prior to the Separation Date.

Provision for Depreciation, Depletion, and Amortization—The provision for DD&A was \$733 in 2018 compared with \$750 in 2017. The decline of \$17, or 2%, was principally caused by net favorable foreign currency movements, largely due to a stronger U.S. dollar against the Brazilian real, and lower expense related to a group of assets from ParentCo's 1998 acquisition of Alumax reaching the end of their depreciable lives. These positive impacts were partially offset by higher amortization of deferred mining costs (\$23) and an increase in write-offs of previously capitalized costs for projects no longer being pursued (\$4).

The provision for DD&A was \$750 in 2017 compared with \$718 in 2016. The increase of \$32, or 4%, was mainly caused by unfavorable foreign currency movements due to a weaker U.S. dollar, particularly against the Brazilian real and Australian dollar, and incremental expense due to the capitalization in 2017 of new bauxite residue storage areas.

Restructuring and Other Charges—Restructuring and other charges for each year in the three-year period ended December 31, 2018 were comprised of the following:

	2018	2017	2016
Settlements and/or curtailments related to retirement benefits (N)	\$ 331	\$ 8	\$ 17
Allowance on value-added tax credits (S)	107	—	—
Power contract payments – non-recurring	62	244	—
Asset impairments	18	40	155
Asset retirement obligations (Q)	5	10	97
Environmental remediation (R)	2	8	26
Layoff costs	2	15	15
Legal matter in Italy (R)	—	(22)	—
Other	48	49	44
Reversals of previously recorded layoff and other costs	(48)	(43)	(36)
Restructuring and other charges	\$ 527	\$ 309	\$ 318

* In 2016, Other includes \$1 related to the allocation of restructuring charges to Alcoa Corporation from ParentCo (see Cost Allocations under Separation Transaction above).

Layoff costs were recorded based on approved detailed action plans submitted by the operating locations that specified positions to be eliminated, benefits to be paid under existing severance plans, union contracts or statutory requirements, and the expected timetable for completion of the plans.

2018 Actions. In 2018, Alcoa Corporation recorded Restructuring and other charges of \$527, which were comprised of the following components: \$331 (net) related to settlements and curtailments of certain pension and other postretirement employee benefits (see Pension and Other Postretirement Benefits in Critical Accounting Policies and Estimates below); \$107 to establish an allowance on state value-added tax credits related to the Company's operations in Brazil; \$86 for additional costs related to the curtailed Wenatchee (Washington) smelter, including \$73 associated with 2018 management decisions (see below); a \$15 net benefit related to the Portovesme (Italy) smelter, composed of a \$38 reversal and a \$23 charge; and an \$18 net charge for other items.

In June 2018, management decided not to restart the fully curtailed Wenatchee smelter within the term provided in the related electricity supply agreement. Alcoa Corporation was therefore required to make a \$62 payment to the energy supplier under the provisions of the agreement. Additionally, management decided to permanently close one (38 kmt) of the four potlines at this smelter. This potline has not operated since 2001 and the investments needed to restart this line are cost prohibitive. The remaining three curtailed potlines have a capacity of 146 kmt. In connection with these decisions, the Company recognized a charge of \$73, composed of the \$62 payment, \$10 for asset impairments, and \$1 for asset retirement obligations triggered by the decision to decommission the potline.

2017 Actions. In 2017, Alcoa Corporation recorded Restructuring and other charges of \$309, which were comprised of the following components: \$244 related to the early termination of a power contract (see below); \$49 for exit costs related to a decision to permanently close and demolish a smelter (see below); \$41 for additional contract costs related to the curtailed Wenatchee and São Luís (Brazil) smelters; \$22 for layoff costs, including the separation of approximately 130 employees (115 in the Aluminum segment), mostly for voluntary separation programs; a \$22 reversal to reduce a reserve previously established at the end of 2015 related to a legal matter in Italy; an \$18 net charge for other items, including the relocation of the Company's headquarters and principal executive office from New York, New York to Pittsburgh, Pennsylvania; and a \$43 reversal associated with several reserves related to prior periods (see below).

In October 2017, Alcoa Corporation and Luminant Generation Company LLC (Luminant) executed an early termination agreement of a power contract, as well as other related fuel and lease agreements, effective October 1, 2017, related to the Company's Rockdale (Texas) smelter, which has been fully curtailed since the end of 2008. In accordance with the terms of the early termination agreement, Alcoa made a cash payment of \$238 and transferred approximately 2,200 acres of related land and other assets and liabilities to Luminant (net asset carrying value of \$6).

Since the curtailment of the Rockdale smelter, the Company had been selling surplus electricity into the energy market. The power contract was set to expire no earlier than 2038, except for limited circumstances in which one or both parties could elect to early terminate without penalty for which conditions had never been met. In 2017 (through September 30) and 2016, Alcoa Corporation recognized \$105 and \$141, respectively, in Sales and \$148 and \$210, respectively, in Cost of goods sold on the Company's Statement of Consolidated Operations related to the sale of the surplus electricity and the cost of the Luminant power contract.

As a result of the early termination of the power contract, Alcoa initiated a strategic review of the remaining buildings and equipment associated with the smelter, casthouse, and the aluminum powder plant at the Rockdale location. ParentCo previously decided to curtail the operating capacity of the Rockdale smelter in 2008 as a result of an uncompetitive power supply and then-overall unfavorable market conditions. Under this review, which was completed in December 2017, management determined that the Rockdale operations have limited economic prospects. Consequently, management approved the permanent closure and demolition of the Rockdale smelter (capacity of 191 kmt-per-year) and related operations effective immediately. Demolition and remediation activities related to this action began in 2018 and are expected to be completed by the end of 2022. Separately, the Company continues to own more than 30,000 acres of land surrounding the Rockdale operations.

In 2017, costs related to this decision included asset impairments of \$32, representing the write-off of the remaining book value of all related properties, plants, and equipment; \$1 for the layoff of approximately 10 employees (Corporate); and \$16 in other costs. Additionally in 2017, remaining inventories, mostly operating supplies and raw materials, were written down to their net realizable value, resulting in a charge of \$6, which was recorded in Cost of goods sold on the Company's Statement of Consolidated Operations. The other costs of \$16 represent \$8 in asset retirement obligations and \$8 in environmental remediation, both of which were triggered by the decisions to permanently close and demolish the Rockdale facilities.

In July 2017, Alcoa Corporation announced plans to restart three (capacity of 161 kmt-per-year) of the five potlines (capacity of 269 kmt-per-year) at the Warrick (Indiana) smelter. This smelter was previously permanently closed in March 2016 by ParentCo (see 2016 Actions below). The capacity identified for restart will directly supply the existing rolling mill at the Warrick location to improve efficiency of the integrated site and provide an additional source of metal to help meet an anticipated increase in production volumes. As a result of the decision to reopen this smelter, in 2017, Alcoa Corporation reversed \$33 in remaining liabilities related to the original closure decision. These liabilities consisted of \$20 in asset retirement obligations and \$4 in environmental remediation obligations, which were necessary due to the previous decision to demolish the smelter, and \$9 in severance and contract termination costs. Additionally, the carrying value of the smelter and related assets was reduced to zero as the smelter ramped down between the permanent closure decision date (end of 2015) and the end of March 2016. Once these assets are placed back into service in conjunction with the restart, their carrying value will remain zero. As such, only newly acquired or constructed assets related to the Warrick smelter will be depreciated.

As of December 31, 2018, the separations associated with 2017 restructuring programs were essentially complete. In 2018 and 2017, cash payments of \$3 and \$9, respectively, were made against layoff reserves related to 2017 restructuring programs.

2016 Actions. In 2016, Alcoa Corporation recorded Restructuring and other charges of \$318, which were comprised of the following components: \$131 for exit costs related to a decision to permanently close and demolish a refinery (see below); \$87 for additional net costs related to decisions made in late 2015 to permanently close and demolish the Warrick smelter and to curtail both the Wenatchee smelter and Point Comfort (Texas) refinery; \$72 for the impairment of an interest in gas exploration assets in Western Australia (see below); \$32 for layoff costs related to cost reduction initiatives, including the separation of approximately 75 employees (60 in the Aluminum segment and 15 in the Bauxite segment) and related pension

settlement costs; an \$8 net charge for other items; and a \$12 reversal associated with a number of small layoff reserves related to prior periods.

In December 2016, management approved the permanent closure of the Suralco refinery (capacity of 2,207 kmt-per-year) in Suriname. The Suralco refinery had been fully curtailed since November 2015. Management of ParentCo decided to curtail the remaining operating capacity of the Suralco refinery during 2015 in an effort to improve the position of ParentCo's refining operations on the global alumina cost curve. Since that time, management of ParentCo (through October 31, 2016) and then separately management of Alcoa Corporation (from November 1, 2016 through the end of 2016) had been in discussions with the Government of the Republic of Suriname to determine the best long-term solution for Suralco due to limited bauxite reserves and the absence of a long-term energy alternative. The decision to permanently close the Suralco refinery was based on the ultimate conclusion of those discussions. Demolition and remediation activities related to this action began in 2017 and are expected to be completed by the end of 2022. The related bauxite mines in Suriname will also be permanently closed while the hydroelectric facility that supplied power to the Suralco refinery, known as Afobaka, will continue to operate and supply power to the Government of the Republic of Suriname.

In 2016, costs related to the closure and curtailment actions included accelerated depreciation of \$70 related to the Warrick smelter as it continued to operate through March 2016; asset impairments of \$16, representing the write-off of the remaining book value of various assets; a reversal of \$24 associated with severance costs initially recorded in late 2015; and \$156 in other costs. Additionally in 2016, remaining inventories, mostly operating supplies and raw materials, were written down to their net realizable value, resulting in a charge of \$5, which was recorded in Cost of goods sold on the Company's Statement of Consolidated Operations. The other costs of \$156 represent \$94 in asset retirement obligations and \$26 in environmental remediation, both of which were triggered by the decisions to permanently close and demolish the Suralco refinery (includes the rehabilitation of related bauxite mines) and the rehabilitation of a coal mine related to the Warrick smelter, \$32 for contract terminations, and \$4 in other related costs.

Also in December 2016, management of Alcoa Corporation concluded that an interest in certain gas exploration assets in Western Australia has been impaired. Alcoa of Australia (AofA – see Noncontrolling Interest below) owns an interest in a gas exploration project (relinquished in June 2018) that was initially entered into in 2007 as a potential source of low-cost gas to supply AofA's refineries in Western Australia. This interest, now at 43% (as of December 31, 2016), relates to four separate gas wells. In late 2016, AofA received the results of a technical analysis performed earlier in the year for two of the wells and an updated analysis for a third well that concluded that the cost of gas recovery would be significantly higher than the market price of gas. For the fourth well, the results of a technical analysis performed prior to 2016 indicated that the cost of gas recovery would be lower than the market price of gas and, therefore, would require additional investment to move to the next phase of commercial evaluation, which management previously supported. In late 2016, management re-evaluated its options related to the fourth well and decided it is not economical to make such a commitment for the foreseeable future. As a result, AofA fully impaired its \$72 interest.

As of June 30, 2017, the separations associated with 2016 restructuring programs were essentially complete. In 2017 and 2016, cash payments of \$2 and \$7, respectively, were made against layoff reserves related to 2016 restructuring programs.

Alcoa Corporation does not include Restructuring and other charges in the results of its reportable segments. The impact of allocating such charges to segment results would have been as follows:

	2018	2017	2016
Bauxite	\$ 1	\$ 2	\$ (5)
Alumina	112	3	72
Aluminum	102	51	75
Segment total	215	56	142
Corporate	312	253	176
Total restructuring and other charges	\$ 527	\$ 309	\$ 318

Interest Expense—Interest expense was \$122 in 2018 compared with \$104 in 2017. The increase of \$18, or 17%, was primarily driven by interest expense (\$19) associated with a \$500 debt issuance in May 2018 (see Financing Activities in Liquidity and Capital Resources below).

Interest expense was \$104 in 2017 compared with \$243 in 2016. The decline of \$139, or 57%, was largely related to the absence of an allocation (\$198) to Alcoa Corporation of ParentCo's interest expense related to the Separation Transaction, somewhat offset by higher interest expense (\$64) associated with a \$1,250 debt issuance in September 2016 (see Financing Activities in Liquidity and Capital Resources below).

Other Expenses (Income), net—Other expenses, net was \$64 in 2018 compared with \$27 in 2017. The change of \$37 was mostly due to the absence of a gain (\$122) on the sale of the Yadkin Hydroelectric Project (Yadkin —see Aluminum in Segment Information below) and higher non-service costs related to pension and other postretirement employee benefit plans

(\$54). These items were partially offset by a net favorable change in each of the following: foreign currency movements (\$65), mark-to-market derivative instruments (\$49), and Alcoa Corporation's share of the earnings of the aluminum complex joint venture in Saudi Arabia (\$11).

Other expenses, net was \$27 in 2017 compared with Other income, net of \$65 in 2016. The change of \$92 was principally caused by the absence of gains on the sales of several assets as follows: wharf property near the Intalco (Washington) smelter (\$118), an equity interest in a natural gas pipeline in Australia (\$27), and several parcels of land (\$19); higher non-service costs related to pension and other postretirement employee benefit plans (\$61); a net unfavorable change in mark-to-market derivative instruments (\$15) (see Cost of Goods Sold above); and the absence of a benefit for an arbitration recovery related to a 2010 fire at the Iceland smelter (\$14). These items were partially offset by a gain on the sale of Yadkin (\$122) and a smaller equity loss related to Alcoa Corporation's share of the earnings of the aluminum complex joint venture in Saudi Arabia (\$42).

Income Taxes—Alcoa Corporation's effective tax rate was 45.5% (provision on income) in 2018 compared with the U.S. federal statutory rate of 21% (see U.S. Tax Cuts and Jobs Act below). The effective tax rate differs (by 24.5 percentage points) from the U.S. federal statutory rate principally driven by foreign income taxed in higher rate jurisdictions and domestic losses not tax benefitted, including a net settlement/curtailment charge associated with several changes to U.S. retirement benefit plans (see Pension and Other Postretirement Benefits in Critical Accounting Policies and Estimates below).

Alcoa Corporation's effective tax rate was 51.8% (provision on income) in 2017 compared with the U.S. federal statutory rate of 35%. The effective tax rate differs (by 16.8 percentage points) from the U.S. federal statutory rate mainly due to domestic losses not tax benefitted, including a \$244 charge for the early termination of a power contract (see Restructuring and Other Charges above), a \$60 discrete income tax charge for a valuation allowance on the remaining deferred tax assets in Iceland (see Income Taxes in Critical Accounting Policies and Estimates below), a \$26 discrete income charge for the remeasurement of certain deferred tax assets in Brazil due to a tax rate change (see below), and a \$22 discrete income charge associated with U.S. tax legislation enacted in December 2017 (see U.S. Tax Cuts and Jobs Act below). The domestic losses not tax benefitted are net of a \$122 gain on the sale of Yadkin (see Other Expenses (Income), net above and Aluminum in Segment Information below).

In mid-2017, AWAB received approval for a tax holiday related to the operation of the Juruti (Brazil) bauxite mine. This tax holiday was made effective as of January 1, 2017 (retroactively) and decreases AWAB's tax rate on income generated by the Juruti mine from 34% to 15.25%, which will result in future cash tax savings over a 10-year period. As a result of this income tax rate change, AWAB's existing deferred tax assets that are expected to reverse during the holiday period were remeasured at the lower tax rate. This remeasurement resulted in both a decrease to AWAB's deferred tax assets and a discrete income tax charge of \$26 (\$15 after noncontrolling interest).

Alcoa Corporation's effective tax rate was 113.6% (provision on a loss) in 2016 compared with the U.S. federal statutory rate of 35%. The effective tax rate differs (by 148.6 percentage points) from the U.S. federal statutory rate primarily related to U.S. losses and tax credits with no tax benefit realizable in Alcoa Corporation.

Management anticipates that the effective tax rate in 2019 will be between 65% and 70%. However, business portfolio actions, changes in the current economic environment, tax legislation or rate changes, currency fluctuations, ability to realize deferred tax assets, and the results of operations in certain taxing jurisdictions may cause this estimated rate to fluctuate.

U.S. Tax Cuts and Jobs Act of 2017. On December 22, 2017, U.S. tax legislation known as the U.S. Tax Cuts and Jobs Act of 2017 (the "TCJA") was enacted. For corporations, the TCJA amends the U.S. Internal Revenue Code by reducing the corporate income tax rate and modifying several business deduction and international tax provisions. Specifically, the corporate income tax rate was reduced to 21% from 35%. Other significant changes, in general, include the following, among others: (i) a mandatory one-time deemed repatriation of accumulated foreign earnings at either an 8% or 15.5% tax rate, depending on circumstances; (ii) dividends received from foreign subsidiaries can be deducted in full regardless of ownership interest (previously such dividends were fully taxable); (iii) a 21% or 10.5% tax (effective in 2018), depending on circumstances, on a new category of income, referred to as global intangible low tax income (GILTI), related to earnings of foreign entities above a prescribed return on the associated fixed asset base; (iv) a 5% to 10% tax (effective in 2018) on base erosion payments (deductible cross-border payments to related parties) that exceed 3% of a company's deductible expenses; and (v) net operating losses have an unlimited carryforward period (previously 20 years) and no carryback period (previously 2 years), but deductions for such losses are limited to 80% of taxable income (previously 100% of taxable income) beginning with the 2018 tax year.

As a result of the close proximity of the enactment date of the TCJA in relation to Alcoa Corporation's 2017 calendar year-end, management elected January 17, 2018 as a cut-off date for purposes of recognizing any impacts from the TCJA in the Company's 2017 Consolidated Financial Statements. This date coincided with Alcoa Corporation's public release of its preliminary financial results for the fourth quarter and year ended December 31, 2017. Accordingly, the Company's preliminary analysis of the provisions of the TCJA resulted in a discrete income tax charge of \$22, which was reflected in Provision for income taxes on the accompanying Statement of Consolidated Operations for 2017, as described below.

The \$22 charge relates specifically to management's reasonable estimate of the corporate income tax rate change, which resulted in the remeasurement of Alcoa Corporation's deferred income tax accounts. On a gross basis, the Company reduced its deferred tax assets, valuation allowance, and deferred tax liabilities by \$506, \$433, and \$51, respectively.

Management also completed a preliminary analysis of the remaining provisions of the TCJA, including those specifically described above, in order to make a reasonable estimate as of the cut-off date, which resulted in no additional impact to the Company's 2017 Consolidated Financial Statements. Specifically, the reasonable estimate for the TCJA provisions described above was based on the following: for (i), (ii), and (iii), Alcoa Corporation's existing tax profile, which includes significant current U.S. tax losses that would be applied against such taxable income, as well as significant foreign tax credits that can be applied against these taxes; for (iv) management estimates that the Company will be under the 3% threshold; and for (v) Alcoa Corporation's deferred income tax assets related to U.S. net operating losses were fully reserved as of December 31, 2017.

The Company's preliminary analyses and provisional estimates of the financial statement impacts of the TCJA were completed in accordance with guidance issued by the SEC under Staff Accounting Bulletin No. 118, *Income Tax Accounting Implications of the Tax Cuts and Jobs Act*.

Throughout the majority of 2018, management continued to gather information and perform additional analysis of the TCJA provisions related to Alcoa Corporation's 2017 Consolidated Financial Statements. Upon completion of this analysis, management concluded that there was no material impact to the Company's 2017 Consolidated Financial Statements related to both the reduced corporate income tax rate and the other applicable provisions of the TCJA.

Also in 2018, management completed its analysis of the impact of the tax law changes, including GILTI, that became effective January 1, 2018 under the TCJA related to Alcoa Corporation's 2018 Consolidated Financial Statements. The Company made an accounting policy election to include as a period cost the tax impact generated by including GILTI in U.S. taxable income. The inclusion of GILTI in 2018 U.S. taxable income was fully offset by current U.S. tax losses and net operating loss carryforwards as expected. None of the remaining provisions of the TCJA had a material impact on Alcoa Corporation's 2018 Consolidated Financial Statements.

Noncontrolling Interest—Net income attributable to noncontrolling interest was \$644 in 2018 compared with \$342 in 2017 and \$54 in 2016. These amounts are entirely related to Alumina Limited's 40% ownership interest in several affiliated operating entities, which own, have an interest in, or operate the bauxite mines and alumina refineries within Alcoa Corporation's Bauxite and Alumina segments (except for the Poços de Caldas mine and refinery and a portion of the São Luís refinery, all in Brazil) and a portion (55%) of the Portland smelter (Australia) within the Company's Aluminum segment. These individual entities comprise an unincorporated global joint venture between Alcoa Corporation and Alumina Limited known as Alcoa World Alumina and Chemicals (AWAC). Alcoa Corporation owns 60% of these individual entities, which are consolidated by the Company for financial reporting purposes and include AofA, Alcoa World Alumina LLC (AWA), Alcoa World Alumina Brasil Ltda. (AWAB), and Alúmina Española, S.A. (Española). Alumina Limited's 40% interest in the earnings of such entities is reflected as Noncontrolling interest on Alcoa Corporation's Statement of Consolidated Operations.

In 2018, these combined entities generated higher net income compared to 2017. The favorable change in earnings was mainly attributable to an improvement in operating results (see Alumina in Segment Information below), increased earnings in the mining and refining company of the Saudi Arabia joint venture, and the absence of both \$34 (\$10 was noncontrolling interest's share) in combined higher energy costs and mark-to-market losses (see Cost of Goods Sold above) and \$26 (\$15 was noncontrolling interest's share) for the remeasurement of certain deferred tax assets (see Income Taxes above). These positive impacts were somewhat offset by a higher income tax provision as a result of the improved operating results and a \$77 (\$31 was noncontrolling interest's share) charge (AWAB's share) to establish an allowance on state value-added tax credits in Brazil (see Restructuring and Other Charges above).

In 2017, these combined entities generated higher net income compared to 2016. The favorable change in earnings was primarily the result of an improvement in operating results (see Bauxite and Alumina in Segment Information below) and the absence of both restructuring charges related to the permanent closure of the Suralco refinery and related bauxite mines (see Restructuring and Other Charges above) and a charge for the impairment of an interest in certain gas exploration assets in Western Australia (see Restructuring and Other Charges above). These positive impacts were somewhat offset by a higher income tax provision as a result of the improved operating results, \$34 (\$10 was noncontrolling interest's share) in combined

higher energy costs and mark-to-market losses (see Cost of Goods Sold above), the absence of a \$27 (\$8 was noncontrolling interest's share) gain on the sale of an equity interest in a natural gas pipeline in Australia, and a discrete income tax charge of \$26 (\$15 was noncontrolling interest's share) for the remeasurement of certain deferred tax assets (see Income Taxes above).

Segment Information

Alcoa Corporation is a producer of bauxite, alumina, and aluminum products (primary and flat-rolled). The Company's operations consist of three worldwide reportable segments: Bauxite, Alumina, and Aluminum. Segment performance under Alcoa Corporation's management reporting system is evaluated based on a number of factors; however, the primary measure of performance is the Adjusted EBITDA (Earnings before interest, taxes, depreciation, and amortization) of each segment. The Company calculates segment Adjusted EBITDA as Total sales (third-party and intersegment) minus the following items: Cost of goods sold; Selling, general administrative, and other expenses; and Research and development expenses. Alcoa Corporation's Adjusted EBITDA may not be comparable to similarly titled measures of other companies.

Adjusted EBITDA for all reportable segments totaled \$3,203 in 2018, \$2,725 in 2017, and \$1,453 in 2016. The following information provides production, shipments, sales, and Adjusted EBITDA data for each reportable segment, as well as certain realized price and average cost data, for each of the three years in the period ended December 31, 2018. See Note E to the Consolidated Financial Statements in Part II Item 8 of this Form 10-K for additional information.

Bauxite

	2018	2017	2016
Production ⁽¹⁾ (mdmt)	45.8	45.8	45.0
Third-party shipments (mdmt)	5.7	6.6	6.4
Intersegment shipments (mdmt)	41.2	41.1	40.5
Total shipments (mdmt)	46.9	47.7	46.9
Third-party sales	\$ 271	\$ 333	\$ 315
Intersegment sales	944	875	751
Total sales	\$ 1,215	\$ 1,208	\$ 1,066
Adjusted EBITDA	\$ 426	\$ 424	\$ 374
Operating costs ⁽²⁾	\$ 869	\$ 839	\$ 743
Average cost per dry metric ton of bauxite	\$ 19	\$ 18	\$ 16

(1) The production amounts do not include additional bauxite (approximately 3 mdmt per annum) that AWAC is entitled to receive (i.e. an amount in excess of its equity ownership interest) from certain other partners at the mine in Guinea.

(2) Includes all production-related costs, including conversion costs, such as labor, materials, and utilities; depreciation, depletion, and amortization; and plant administrative expenses.

Overview. This segment represents the Company's global bauxite mining operations. A portion of this segment's production represents the offtake from equity method investments in Brazil and Guinea, as well as AWAC's share of production related to an equity investment in Saudi Arabia. The bauxite mined by this segment is sold primarily to internal customers within the Alumina segment; a portion of the bauxite is sold to external customers. Bauxite mined by this segment and used internally is transferred to the Alumina segment at negotiated terms that are intended to approximate market prices; sales to third-parties are conducted on a contract basis. Generally, this segment's sales are transacted in U.S. dollars while costs and expenses are transacted in the local currency of the respective operations, which are the Australian dollar and the Brazilian real. Most of the operations that comprise the Bauxite segment are part of AWAC (see Noncontrolling Interest in Earnings Summary above).

Business Update. In August 2018, the Bauxite segment's two mines in Australia experienced a nearly eight-week strike by the unionized labor force. These two mines continued to operate during the strike with minimal disruption, resulting in an immaterial impact to this segment's production and financial results. The labor force has returned to work while negotiations between the Company and the union continue.

Production. In 2018, bauxite production was flat compared to 2017, as higher production at four of this segment's seven mine operations was completely offset by lower production at the Trombetas (Brazil) and Boke (Guinea) mines. The higher production was largely the result of planned increases at the Huntly (Australia), Al Ba'itha (Saudi Arabia), and Juruti (Brazil) mines. The lower production at the Trombetas mine was due to the consortium's decision to reduce production in response to a partial curtailment of a third-party alumina refinery in Brazil.

In 2017, bauxite production increased by 0.8 mdmt compared to 2016. The improvement was principally related to a planned increase in production at the Juruti mine and higher production at the Huntly mine, somewhat offset by lower production at both the Trombetas and Boké mines. The Trombetas mine experienced disruption to its normal operations due to separate

weather events that impacted the tailing ponds (bauxite waste storage areas) and the washing plant in the first half (heavy rain) and the second half (drought conditions) of 2017, respectively. The Boké mine experienced disruption to its normal operations as a result of two separate force majeure events (civil unrest) during 2017.

Sales. Third-party sales for the Bauxite segment decreased 19% in 2018 compared with 2017, largely attributable to a 14% decline in volume.

Third-party sales for this segment increased 6% in 2017 compared with 2016, mainly due to a 3% improvement in volume as this segment expands its third-party bauxite business.

Intersegment sales for the Bauxite segment increased 8% in 2018 compared with 2017 and 17% in 2017 compared with 2016, both of which were primarily driven by a higher average realized price.

Adjusted EBITDA. Adjusted EBITDA for the Bauxite segment increased \$2 in 2018 compared with 2017, principally the result of the previously mentioned higher average realized price for intersegment sales and net favorable foreign currency movements due to a stronger U.S. dollar against the Brazilian real and Australian dollar. These positive impacts were mostly offset by higher operating costs, including maintenance, fuel oil (price), and transportation.

Adjusted EBITDA for this segment improved \$50 in 2017 compared with 2016, mainly related to the previously mentioned higher average realized price for intersegment sales and increased third-party shipments. These positive impacts were partially offset by higher costs for energy (including the absence of a one-time tax credit), transportation (exports from Western Australia to third-party customers), and royalties (higher third-party sales); unfavorable impacts from the previously mentioned disruptions in Brazil and Guinea; and net unfavorable foreign currency movements due to a weaker U.S. dollar against the Australian dollar and Brazilian real.

Forward-Look. In 2019, higher production at the Huntly mine and increased total shipments are anticipated.

Alumina

	2018	2017	2016
Production (kmt)	12,857	13,096	13,251
Third-party shipments (kmt)	9,259	9,220	9,071
Intersegment shipments (kmt)	4,326	4,475	4,703
Total shipments ⁽¹⁾ (kmt)	13,585	13,695	13,774
Third-party sales	\$ 4,215	\$ 3,133	\$ 2,300
Intersegment sales	2,101	1,723	1,307
Total sales	\$ 6,316	\$ 4,856	\$ 3,607
Adjusted EBITDA	\$ 2,373	\$ 1,289	\$ 376
Average realized third-party price per metric ton of alumina	\$ 455	\$ 340	\$ 253
Operating costs ⁽²⁾	\$ 3,892	\$ 3,506	\$ 3,178
Average cost per metric ton of alumina	\$ 286	\$ 256	\$ 231

(1) Total shipments include metric tons that were not produced by the Alumina segment. Such alumina was purchased by this segment to satisfy certain customer commitments. The Alumina segment bears the risk of loss of the purchased alumina until control of the product has been transferred to this segment's customer.

(2) Includes all production-related costs, including raw materials consumed; conversion costs, such as labor, materials, and utilities; depreciation and amortization; and plant administrative expenses.

Overview. This segment represents the Company's worldwide refining system, which processes bauxite into alumina. The alumina produced by this segment is sold primarily to internal and external aluminum smelter customers; a portion of the alumina is sold to external customers who process it into industrial chemical products. Approximately two-thirds of Alumina's production is sold under supply contracts to third parties worldwide, while the remainder is used internally by the Aluminum segment. Alumina produced by this segment and used internally is transferred to the Aluminum segment at prevailing market prices. A portion of this segment's third-party sales are completed through the use of agents, alumina traders, and distributors. Generally, this segment's sales are transacted in U.S. dollars while costs and expenses are transacted in the local currency of the respective operations, which are the Australian dollar, the Brazilian real, the U.S. dollar, and the euro. Most of the operations that comprise the Alumina segment are part of AWAC (see Noncontrolling Interest in Earnings Summary above). This segment also includes AWAC's 25.1% ownership interest in a mining and refining joint venture company in Saudi Arabia.

Business Update. In August 2018, the Alumina segment's three refineries in Australia experienced a nearly eight-week strike by the unionized labor force. These three plants continued to operate during the strike with minimal disruption,

resulting in an immaterial impact to this segment's production and financial results. The labor force has returned to work while negotiations between the Company and the union continue.

Capacity. At December 31, 2018 and 2017, the Alumina segment had 2,519 kmt of curtailed refining capacity (idle assets and process slowdowns) on a base capacity of 15,064 kmt. Both curtailed and base capacity were unchanged compared to December 31, 2016.

Production. In 2018, alumina production decreased by 239 kmt compared to 2017, principally caused by equipment and process issues at the three refineries in Australia and the São Luís (Brazil) refinery.

In 2017, alumina production declined by 155 kmt compared to 2016, primarily related to the absence of production from the remaining operating capacity at the Point Comfort (Texas) refinery, which was fully curtailed by the end of June 2016 (670 kmt was curtailed at the end of 2015).

Sales. Third-party sales for the Alumina segment rose 35% in 2018 compared with 2017, largely attributable to a 34% improvement in average realized price. The change in average realized price was mainly driven by a 36% higher average alumina index price (on 30-day lag). In 2018, 96% of smelter-grade third-party shipments were based on the alumina index/spot price compared with 86% in 2017.

Third-party sales for this segment improved 36% in 2017 compared with 2016, mostly the result of a 34% rise in average realized price and a 2% increase in volume. The change in average realized price was principally related to a 44% higher average alumina index price (on 30-day lag). In 2017, 86% of smelter-grade third-party shipments were based on the alumina index/spot price compared with 84% in 2016.

Intersegment sales for the Alumina segment increased 22% in 2018 compared with 2017 and 32% in 2017 compared with 2016, both of which were primarily driven by a higher average realized price, slightly offset by lower demand from the Aluminum segment (see Aluminum below).

Adjusted EBITDA. Adjusted EBITDA for the Alumina segment rose \$1,084 in 2018 compared with 2017, largely attributable to the previously mentioned higher average realized prices. Other positive contributions to the improvement were favorable mix and net favorable foreign currency movements due to a stronger U.S. dollar, particularly against the Australian dollar and Brazilian real. These positive impacts were somewhat offset by higher costs for direct materials, including caustic soda, bauxite, and energy; lower total volume; and increased maintenance expenses, partly due to the previously mentioned operational issues.

Adjusted EBITDA for this segment improved \$913 in 2017 compared with 2016, mostly due to the previously mentioned higher average realized prices, somewhat offset by higher costs for bauxite and caustic soda, net unfavorable foreign currency movements due to a weaker U.S. dollar, especially against the Australian dollar, and an increase in maintenance expense (including outages in Western Australia).

Forward-Look. In 2019, higher costs for both bauxite and energy are expected while lower costs for caustic soda are anticipated.

Aluminum

	2018	2017	2016
Third-party aluminum shipments ⁽¹⁾ (kmt)	3,268	3,356	3,147
Third-party sales	\$ 8,829	\$ 8,027	\$ 6,531
Intersegment sales	18	21	42
Total sales	\$ 8,847	\$ 8,048	\$ 6,573
Adjusted EBITDA	\$ 404	\$ 1,012	\$ 703
<i>Primary aluminum information⁽²⁾</i>			
Production (kmt)	2,259	2,328	2,368
Third-party shipments ⁽³⁾ (kmt)	2,732	2,773	2,793
Third-party sales	\$ 6,787	\$ 6,168	\$ 5,201
Average realized third-party price per metric ton ⁽⁴⁾	\$ 2,484	\$ 2,224	\$ 1,862
Total shipments ⁽³⁾ (kmt)	2,844	2,952	2,953
Operating costs ⁽⁵⁾	\$ 7,022	\$ 5,882	\$ 5,193
Average cost per metric ton	\$ 2,469	\$ 1,992	\$ 1,758

(1) Third-party aluminum shipments are composed of both primary aluminum and flat-rolled aluminum.

(2) The primary aluminum information presented does not include flat-rolled aluminum.

- (3) Third-party and Total primary aluminum shipments include metric tons that were not produced by the Aluminum segment. Such aluminum was purchased by this segment to satisfy certain customer commitments. The Aluminum segment bears the risk of loss of the purchased aluminum until control of the product has been transferred to this segment's customer.
- (4) Average realized price per metric ton of primary aluminum includes three elements: a) the underlying base metal component, based on quoted prices from the LME; b) the regional premium, which represents the incremental price over the base LME component that is associated with the physical delivery of metal to a particular region (e.g., the Midwest premium for metal sold in the United States); and c) the product premium, which represents the incremental price for receiving physical metal in a particular shape (e.g., billet, slab, rod, etc.) or alloy.
- (5) Includes all production-related costs, including raw materials consumed; conversion costs, such as labor, materials, and utilities; depreciation and amortization; and plant administrative expenses.

Overview. This segment consists of the Company's (i) worldwide smelting and casthouse system, which processes alumina into primary aluminum, (ii) portfolio of energy assets in Brazil, Canada, and the United States, and (iii) rolling mill in the United States.

Aluminum's combined smelting and casting operations produce primary aluminum products, virtually all of which is sold to external customers and traders; a portion of this primary aluminum is consumed by the rolling mill. The smelting operations produce molten primary aluminum, which is then formed by the casting operations into either common alloy ingot (e.g., t-bar, sow, standard ingot) or into value-add ingot products (e.g., foundry, billet, rod, and slab). A variety of external customers purchase the primary aluminum products for use in fabrication operations, which produce products primarily for the transportation, building and construction, packaging, wire, and other industrial markets. Results from the sale of aluminum powder and scrap are also included in this segment, as well as the impacts of embedded aluminum derivatives related to energy supply contracts.

The energy assets supply power to external customers in Brazil and, to a lesser extent, in the United States, and internal customers in the Aluminum (Canadian smelters and Warrick (Indiana) smelter and rolling mill) and Alumina segments (Brazilian refineries).

The rolling mill produces aluminum sheet primarily sold directly to customers in the packaging market for the production of aluminum cans (beverage and food). Additionally, from the Separation Date through the end of 2018, Alcoa Corporation had a tolling arrangement (contractually ended on December 31, 2018) with Arconic whereby Arconic's rolling mill in Tennessee produced can sheet products for certain customers of the Company's rolling operations. Alcoa Corporation supplied all of the raw materials to the Tennessee facility and paid Arconic for the tolling service. Seasonal increases in can sheet sales are generally experienced in the second and third quarters of the calendar year.

Generally, this segment's aluminum sales are transacted in U.S. dollars while costs and expenses of this segment are transacted in the local currency of the respective operations, which are the U.S. dollar, the euro, the Norwegian krone, the Icelandic krona, the Canadian dollar, the Brazilian real, and the Australian dollar.

This segment also includes Alcoa Corporation's 25.1% ownership interest in both a smelting and rolling mill joint venture company in Saudi Arabia.

Business Update. In January 2018, a lockout of the bargained hourly employees commenced at the Bécancour (Canada) smelter, as labor negotiations reached an impasse. Accordingly, management initiated a curtailment of two (207 kmt (Alcoa's share)) of the three potlines at the smelter. Additionally, in December 2018, half (52 kmt (Alcoa's share)) of the one operating potline at the Bécancour smelter was curtailed. This additional curtailment was deemed necessary to ensure continued safety and maintenance due to recent retirements and departures among the salaried workforce.

In June 2018, management approved the permanent closure of one (38 kmt) of the four potlines at the Wenatchee (Washington) smelter. This potline has not operated since 2001, and the investments needed to restart that line are cost prohibitive. The other three potlines (146 kmt) at this smelter remain curtailed. See Restructuring and other charges in Earnings Summary above for a description of charges associated with this closure.

In October 2018, Alcoa Corporation initiated a formal 30-day consultation process for the collective dismissal of all of the employees at two smelters in Spain, Avilés (317 employees) and La Coruña (369 employees), with the workers' representatives. This action was the result of an internal analysis that determined that organizational improvements could be achieved if the Company ceased aluminum production at these two smelters and reorganized production at Alcoa Corporation's San Ciprian plant in Spain. On January 22, 2019, the workforce at the Avilés and La Coruña aluminum plants ratified an agreement previously reached on January 16, 2019 between the Company and the workers' representatives related to this process. As a result, Alcoa Corporation curtailed the two smelters' remaining, combined operating capacity of 124 kmt (completed on February 14, 2019). The casthouse at each plant and the paste facility at La Coruña will remain in operation. In accordance with the ratified agreement, the Company will maintain the smelters in restart condition in the event an

agreement to sell the plants can be reached by June 30, 2019. Depending on the ultimate outcome of the sale process, Alcoa Corporation may record restructuring-related charges in the first half of 2019 for the employee severance actions and the closure of the two smelters.

In February 2017, Alcoa Corporation's wholly-owned subsidiary, Alcoa Power Generating Inc., completed the sale of a 215-megawatt hydroelectric project, Yadkin, to Cube Hydro Carolinas, LLC (see Other expenses (income), net in Earnings Summary above). Yadkin encompasses four hydroelectric power developments (reservoirs, dams, and powerhouses), known as High Rock, Tuckertown, Narrows, and Falls, situated along a 38-mile stretch of the Yadkin River through the central part of North Carolina. Prior to the divestiture, the power generated by Yadkin was primarily sold into the open market. Yadkin generated sales of \$29 in 2016, and had approximately 30 employees as of December 31, 2016.

In July 2017, Alcoa Corporation announced plans to restart three (161 kmt of capacity) of the five potlines (269 kmt of capacity) at the Warrick (Indiana) smelter, which was previously permanently closed in March 2016 by ParentCo. The capacity identified for restart will directly supply the existing rolling mill at the Warrick location, to improve efficiency of the integrated site and provide an additional source of metal to help meet an anticipated increase in production volumes. See COGS and Restructuring and other charges in Earnings Summary above for a description of the financial impacts of this decision. Alcoa completed the restart of two potlines (108 kmt) in June 2018 and a third potline in December 2018 (53 kmt). The restart of the third potline had been previously delayed in May 2018 due to pot instability, which in turn caused a temporary power outage.

Capacity. At December 31, 2018, the Aluminum segment had 916 kmt of idle smelting capacity on a base capacity of 3,173 kmt. In 2018, idle capacity increased 60 kmt and base capacity decreased 38 kmt compared to 2017. The increase in idle capacity was due to the curtailment of 259 kmt at the Bécancour smelter, partially offset by the restart of 161 kmt at the Warrick smelter and the permanent closure of 38 kmt at the Wenatchee smelter. The decrease in base capacity during 2018 was due to the permanent closure of 38 kmt at the Wenatchee smelter.

At December 31, 2017, this segment had 856 kmt of idle smelting capacity on a base capacity of 3,211 kmt. In 2017, both idle and base capacity increased 269 kmt compared to 2016 related to the Warrick smelter. At the end of March 2016, the capacity of the Warrick smelter was removed from this segment's base capacity due to the permanent closure of the facility at that time. As a result of the decision to partially restart the smelter, the capacity of the Warrick smelter was included in both the idle and base capacity at December 31, 2017.

Production. In 2018, primary aluminum production decreased by 69 kmt compared to 2017, primarily due to lower production at the Bécancour smelter as a result of the previously mentioned curtailment, partially offset by new production at the Warrick smelter due to the previously mentioned restart of capacity and higher production at the Portland (Australia) smelter as a result of the completed restart in mid-2017 of capacity that was curtailed in December 2016 (see below).

In 2017, primary aluminum production declined by 40 kmt compared to 2016, mainly the result of lower production at the Portland smelter due to an unexpected power outage that occurred in December 2016 as a result of a fault in the Victorian transmission network. This event resulted in management halting production of one of the potlines at that time; ramp up to full production was completed in mid-2017.

Sales. Third-party sales for the Aluminum segment increased 10% in 2018 compared with 2017, principally related to a 12% rise in average realized price of primary aluminum and higher pricing for flat-rolled aluminum, slightly offset by a 3% decrease in overall aluminum volume. The change in average realized price of primary aluminum was largely attributable to a 9% higher average LME price (on 15-day lag) and increased regional premiums, particularly the Midwest premium (United States and Canada), which rose by an average of 111%. Since March 2018, the Midwest premium has significantly increased as a result of the imposition of a 10% tariff on aluminum imports under the U.S. government's Section 232 action. The lower overall aluminum volume was mostly caused by a decline in flat-rolled aluminum shipments in accordance with the targeted volumes defined in the tolling arrangement with Arconic and decreased primary aluminum shipments.

Third-party sales for this segment improved 23% in 2017 compared with 2016, primarily driven by a 19% rise in average realized price of primary aluminum and a 7% increase in overall aluminum volume, slightly offset by realized losses from embedded derivatives (designated as cash flow hedges of forward aluminum sales) in energy supply contracts due to the rise in LME aluminum prices. The change in average realized price of primary aluminum was mainly attributable to a 22% higher average LME price (on 15-day lag). The higher overall aluminum volume was related to this segment's rolling operations, largely due to a tolling arrangement with Arconic.

Adjusted EBITDA. Adjusted EBITDA for the Aluminum segment decreased \$608 in 2018 compared with 2017, principally caused by higher costs for alumina, carbon materials, and energy; tariffs on imports from this segment's foreign operations, primarily from Canada, which was subjected to U.S. Section 232 tariffs effective June 1, 2018; increased transportation and maintenance expenses; lower overall aluminum volume; realized losses from embedded derivatives in energy supply contracts due to the rise in LME aluminum prices; and net unfavorable foreign currency movements due to a weaker U.S. dollar, particularly against the euro. These negative impacts were somewhat offset by the previously mentioned higher pricing for both primary aluminum and flat-rolled aluminum.

Adjusted EBITDA for this segment improved \$309 in 2017 compared with 2016, mostly the result of the previously mentioned higher average realized price of primary aluminum, partially offset by higher costs for both alumina and energy.

Forward-Look. In 2019, higher production at the Warrick smelter will be offset by lower production at the Avilés, La Coruña, and Bécancour smelters. Also, lower costs for alumina are anticipated while higher costs for energy are expected. Additionally, increased direct costs related to the payment of Section 232 tariffs on U.S. aluminum imports are expected (first half of the year).

Reconciliations of Certain Segment Information

Reconciliation of Total Segment Third-Party Sales to Consolidated Sales

	2018	2017	2016
Bauxite	\$ 271	\$ 333	\$ 315
Alumina	4,215	3,133	2,300
Aluminum:			
Primary aluminum	6,787	6,168	5,201
Other ⁽¹⁾	2,042	1,859	1,330
Total segment third-party sales	13,315	11,493	9,146
Other	88	159	172
Consolidated sales	\$ 13,403	\$ 11,652	\$ 9,318

- (1) Other includes third-party sales of flat-rolled aluminum and energy, as well as realized gains and losses related to embedded derivative instruments designated as cash flow hedges of forward sales of aluminum.

Reconciliation of Total Segment Operating Costs to Consolidated Cost of Goods Sold

	2018	2017	2016
Bauxite	\$ 869	\$ 839	\$ 743
Alumina	3,892	3,506	3,178
Primary aluminum	7,022	5,882	5,193
Other ⁽¹⁾	1,914	1,689	1,227
Total segment operating costs	13,697	11,916	10,341
Eliminations ⁽²⁾	(3,051)	(2,577)	(2,085)
Provision for depreciation, depletion, amortization ⁽³⁾	(699)	(704)	(676)
Other ⁽⁴⁾	134	356	297
Consolidated cost of goods sold	\$ 10,081	\$ 8,991	\$ 7,877

- (1) Other largely relates to the Aluminum segment's flat-rolled aluminum product division.
- (2) This line item represents the elimination of cost of goods sold related to intersegment sales between Bauxite and Alumina and between Alumina and Aluminum.
- (3) Depreciation, depletion, and amortization is included in the operating costs used to calculate average cost for each of the bauxite, alumina, and primary aluminum product divisions (see Bauxite, Alumina, and Aluminum above). However, for financial reporting purposes, depreciation, depletion, and amortization is presented as a separate line item on Alcoa Corporation's Statement of Consolidated Operations.
- (4) Other includes costs related to Transformation, the impacts of LIFO inventory accounting and metal price lag, and certain other items that impact Cost of goods sold on Alcoa Corporation's Statement of Consolidated Operations that are not included in the operating costs of the segments (see footnotes 2, 3, and 5 in the Reconciliation of Total Segment Adjusted EBITDA to Consolidated Net Income (Loss) Attributable to Alcoa Corporation below).

Reconciliation of Total Segment Adjusted EBITDA to Consolidated Net Income (Loss) Attributable to Alcoa Corporation

	2018	2017	2016
Net income (loss) attributable to Alcoa Corporation:			
Total segment Adjusted EBITDA	\$ 3,203	\$ 2,725	\$ 1,453
Unallocated amounts:			
Transformation ^{(1),(2)}	(3)	(49)	(168)
Corporate inventory accounting ^{(1),(3)}	11	(107)	(14)
Corporate expenses ⁽⁴⁾	(96)	(131)	(171)
Provision for depreciation, depletion, and amortization ⁽⁶⁾	(733)	(750)	(718)
Restructuring and other charges ⁽⁶⁾	(527)	(309)	(318)
Interest expense ⁽⁶⁾	(122)	(104)	(243)
Other (expenses) income, net ⁽⁶⁾	(64)	(27)	65
Other ^{(1),(5)}	(72)	(89)	(48)
Consolidated income (loss) before income taxes	1,597	1,159	(162)
Provision for income taxes ⁽⁶⁾	(726)	(600)	(184)
Net income attributable to noncontrolling interest ⁽⁶⁾	(644)	(342)	(54)
Consolidated net income (loss) attributable to Alcoa Corporation	\$ 227	\$ 217	\$ (400)

- (1) Effective in the first quarter of 2018, management elected to change the presentation of certain line items in the reconciliation of total segment Adjusted EBITDA to consolidated net income (loss) attributable to Alcoa Corporation to provide additional transparency to the nature of these reconciling items. Accordingly, Transformation (see footnote 2), which was previously reported within Other, is presented as a separate line item. Additionally, Impact of LIFO and Metal price lag, which were previously reported as separate line items, are now combined and reported in a new line item labeled Corporate inventory accounting (see footnote 3). Also, the impact of intersegment profit eliminations, which was previously reported within Other, is reported in the new Corporate inventory accounting line item. The applicable information for all prior periods presented was recast to reflect these changes.
- (2) Transformation includes, among other items, the Adjusted EBITDA of previously closed operations.
- (3) Corporate inventory accounting is composed of the impacts of LIFO inventory accounting, metal price lag, and intersegment profit eliminations. Metal price lag describes the timing difference created when the average price of metal sold differs from the average cost of the metal when purchased by Alcoa Corporation's rolled aluminum operations. In general, when the price of metal increases, metal price lag is favorable, and when the price of metal decreases, metal price lag is unfavorable.
- (4) Corporate expenses are composed of general administrative and other expenses of operating the corporate headquarters and other global administrative facilities, as well as research and development expenses of the corporate technical center.
- (5) Other includes certain items that impact Cost of goods sold and Selling, general administrative, and other expenses on Alcoa Corporation's Statement of Consolidated Operations that are not included in the Adjusted EBITDA of the reportable segments.
- (6) Notable changes in these reconciling items are described in Results of Operations above.

The notable changes in the reconciling items other than those described in Results of Operations above (see footnote 6 in the table directly above) for 2018 compared with 2017 consisted of:

- a change in Transformation, largely attributable to the absence of a loss on a power contract (terminated in October 2017) associated with the closed Rockdale (Texas) smelter (i.e. the cost of power under the contract exceeded the price of the surplus electricity sold into the energy market);
- a change in Corporate inventory accounting, principally driven by a favorable LIFO inventory adjustment (\$91) as a result of a decrease in the price of alumina at December 31, 2018 indexed to December 31, 2017 compared to an increase in the price of alumina at December 31, 2017 indexed to December 31, 2016; and
- a decline in Corporate expenses, primarily due to decreases across several corporate overhead costs.

The notable changes in the reconciling items other than those described in Results of Operations above (see footnote 6 in the table directly above) for 2017 compared with 2016 consisted of:

- a change in Transformation, mainly the result of a smaller loss associated with each of the following: the then-closed Warrick smelter (holding costs), the sale of energy at the then-curtailed Rockdale smelter (i.e. the cost of power under the contract exceeded the price of the surplus electricity sold into the energy market), and the closed refinery in Suriname (holding costs), as well as higher energy sales in Suriname;
- a change in Corporate inventory accounting, mostly caused by an unfavorable LIFO inventory adjustment (\$81) as a result of a further increase in the price of alumina at December 31, 2017 indexed to December 31, 2016 compared to an increase in the price of alumina at December 31, 2016 indexed to December 31, 2015; and
- a decline in Corporate expenses, largely attributable to the absence of costs related to the Separation Transaction (\$73), which includes an allocation of \$68 from ParentCo prior to the Separation Date, mostly offset by a decrease in corporate overhead expenses.

Environmental Matters

See the Environmental Matters section of Note R to the Consolidated Financial Statements in Part II Item 8 of this Form 10-K.

Liquidity and Capital Resources

Alcoa Corporation's primary future cash needs are centered on operating activities, particularly working capital, as well as sustaining and return-seeking capital expenditures. The Company's ability to fund its cash needs depends on the Company's ongoing ability to generate and raise cash in the future. Although management believes that Alcoa Corporation's future cash from operations, together with the Company's access to capital markets, will provide adequate resources to fund Alcoa Corporation's operating and investing needs, the Company's access to, and the availability of, financing on acceptable terms in the future will be affected by many factors, including: (i) Alcoa Corporation's credit rating; (ii) the liquidity of the overall capital markets; and (iii) the current state of the economy and commodity markets. There can be no assurances that the Company will continue to have access to capital markets on terms acceptable to Alcoa Corporation.

For all periods prior to the Separation Date, ParentCo provided capital, cash management, and other treasury services to Alcoa Corporation. Only cash amounts specifically attributable to Alcoa Corporation were reflected in the Company's Consolidated Financial Statements. Transfers of cash, both to and from ParentCo's centralized cash management system, were reflected as a component of Parent Company net investment in Alcoa Corporation's Consolidated Financial Statements.

Cash provided from operations and financing activities is expected to be adequate to cover Alcoa Corporation's operational and business needs over the next 12 months. For an analysis of long-term liquidity, see Contractual Obligations and Off-Balance Sheet Arrangements below.

At December 31, 2018, the Company's cash and cash equivalents were \$1,113, of which \$1,056 was held outside the United States. Alcoa Corporation has a number of commitments and obligations related to the Company's operations in various foreign jurisdictions, resulting in the need for cash outside the United States. Alcoa Corporation continuously evaluates its local and global cash needs for future business operations, which may influence future repatriation decisions.

Cash from Operations

Cash provided from operations was \$448 in 2018 compared with cash provided from operations of \$1,224 in 2017 and cash used for operations of \$311 in 2016.

In 2018, cash provided from operations was comprised of a positive add-back for non-cash transactions in earnings of \$1,363 and net income of \$871, mostly offset by pension contributions of \$992, an unfavorable change in working capital of \$596, and a combined negative change in noncurrent assets and noncurrent liabilities of \$198.

The pension contributions reflect \$725 of unscheduled payments made in 2018, including a combined \$620 to three of the Company's U.S. defined benefit pension plans and a combined \$105 to two of the Company's Canadian defined benefit pension plans. The additional payments to the U.S. plans were discretionary in nature and were funded with \$492 in net proceeds from a May 2018 debt issuance (see Financing Activities below) and \$128 of available cash on hand. The primary purpose for issuing debt to fund a portion of the discretionary contributions to the U.S. plans was to reduce near-term pension funding risk with a fixed-rate, 10-year maturity instrument. Of the additional payments to the Canadian plans, \$89 was made in April 2018 to facilitate the annuitization of a portion of the future obligations under these plans and maintain the funding level of the remaining plan obligations.

The components of the unfavorable change in working capital were as follows:

- a negative change of \$43 in receivables, primarily due to higher pricing for alumina and aluminum product shipments;
- an unfavorable change of \$278 in inventories, mainly caused by increased costs for raw materials;
- a negative change of \$32 in prepaid expenses and other current assets;
- an unfavorable change of \$165 in accounts payable, trade, largely attributable to a reduction in restart costs related to the Warrick smelter (see Aluminum in Segment Information above) and fewer purchases of raw materials;
- a negative change of \$319 in accrued expenses, principally driven by payments for the following: \$133 under other postretirement employee benefit plans, \$105 related to asset retirement obligations and environmental remediation, \$102 for restructuring-related actions (includes \$62 under the provisions of an electricity supply agreement for the Wenatchee (Washington) smelter – see Restructuring and Other Charges in Earnings Summary above), \$101 for interest related to the Company's outstanding notes due in 2024, 2026, and 2028 (see 144A Debt in Financing Activities below), \$74 (final payment) related to a legacy legal matter with the U.S. government assumed by the Company in the Separation Transaction, and \$18 for the settlement of a legal matter in Italy; and
- a favorable change of \$241 in taxes, including income taxes, mostly related to an increase in the income tax provision for operations in Australia.

In 2017, cash provided from operations was comprised of a positive add-back for non-cash transactions in earnings of \$1,297 and net income of \$559, somewhat offset by an unfavorable change in working capital of \$388, pension contributions of \$106, and a combined negative change in noncurrent assets and noncurrent liabilities of \$138.

The components of the unfavorable change in working capital were as follows:

- a negative change of \$118 in receivables, mostly related to higher sales;
- an unfavorable change of \$238 in inventories, primarily due to increased costs for raw materials;
- a positive change of \$43 in prepaid expenses and other current assets, principally driven by a decline in prepayments for aluminum inventory from the joint venture in Saudi Arabia;
- a favorable change of \$377 in accounts payable, trade, mainly the result of increased costs for raw materials and timing of payments;
- a negative change of \$563 in accrued expenses, largely attributable to payments for the following: \$238 to early terminate a power supply contract related to the Rockdale (Texas) smelter (see Restructuring and Other Charges in Earnings Summary above), \$117 related to asset retirement obligations and environmental remediation, \$116 under other postretirement employee benefit plans, \$86 for interest related to the Company's outstanding notes due in 2024 and 2026 (see 144A Debt in Financing Activities below), \$74 related to a legacy legal matter with the U.S. government assumed by the Company in the Separation Transaction, and \$73 for restructuring-related actions; and
- a positive change of \$111 in taxes, including income taxes, primarily related to an increase in the income tax provision as a result of improved results.

In 2016, cash used for operations was comprised of an unfavorable change in working capital of \$747, a net loss of \$346, a negative change in noncurrent assets of \$184 (see below), and pension contributions of \$66. These negative impacts were partially offset by a positive add-back for non-cash transactions in earnings of \$952 and a favorable change in noncurrent liabilities of \$80.

AofA has a gas supply agreement to power its three alumina refineries in Western Australia beginning in July 2020 for a 12-year period. The terms of this agreement required AofA to make a prepayment of \$500 in two installments, the first of which was made in June 2015 for \$300. The second installment of \$200 was made in April 2016.

Financing Activities

Cash used for financing activities was \$288 in 2018 compared with cash used for financing activities of \$506 in 2017 and cash provided from financing activities of \$749 in 2016.

The use of cash in 2018 was primarily caused by \$678 in net cash paid to Alumina Limited (see Noncontrolling interest in Earnings Summary above), \$135 in payments on debt, mostly related to the early repayment (\$122) of the remaining outstanding loans from Brazil's National Bank for Economic and Social Development associated with the construction of the Estreito hydroelectric power project, and \$50 for the repurchase of shares of the Company's common stock (see Common Stock Repurchase Program below). These items were partially offset by \$560 in additions to debt, virtually all of which was related to \$492 in net proceeds from the issuance of new senior debt securities (see 144A Debt below) and \$68 in borrowings under an existing term loan by AofA.

The use of cash in 2017 was mainly driven by a cash payment of \$247 to Arconic related to the Separation Transaction, mostly representing \$243 of the net proceeds (see Investing Activities below) from the sale of Yadkin (see Aluminum in Segment Information above) in accordance with the Separation and Distribution Agreement, and \$262 in net cash paid to Alumina Limited (see Noncontrolling Interest in Earnings Summary above).

The source of cash in 2016 was principally the result of \$1,228 in additions to debt, representing the net proceeds from the issuance of new senior debt securities (see 144A Debt below) and \$806 in net transfers from ParentCo prior to the Separation Date. These items were partially offset by \$1,072 in cash provided to ParentCo in conjunction with the completion of the Separation Transaction, \$185 in net cash paid to Alumina Limited (see Noncontrolling Interest in Earnings Summary above), and \$34 in payments on debt.

Credit Facility. On November 21, 2018, Alcoa Corporation and Alcoa Nederland Holding B.V. (ANHBV), a wholly-owned subsidiary of the Company, entered into a Second Amendment and Restatement Agreement to the Revolving Credit Agreement dated September 16, 2016 and the Amendment and Restatement Agreement dated November 14, 2017 (the Revolving Credit Agreement as revised by the Amendment and Restatement Agreement, the "Amended Revolving Credit Agreement"), in each case, with a syndicate of lenders and issuers named therein to revise certain terms and provisions of the Amended Revolving Credit Agreement (the Amended Revolving Credit Agreement as revised by the Second Amendment and Restatement Agreement, the "Second Amended Revolving Credit Agreement"). Unless noted otherwise, the terms and provisions described below for the Second Amended Revolving Credit Agreement were applicable to the Amended Revolving Credit Agreement from November 14, 2017 to November 20, 2018. See "Financing Activities" under Liquidity and Capital Resources in Management's Discussion and Analysis of Financial Condition and Results of Operations included in Part II Item 7 of the Company's Annual Report on Form 10-K for the year ended December 31, 2017 for the notable terms and provisions under the Revolving Credit Agreement from September 16, 2016 to November 13, 2017.

The Second Amended Revolving Credit Agreement provides a \$1,500 senior secured revolving credit facility (the "Revolving Credit Facility") to be used for working capital and/or other general corporate purposes of Alcoa Corporation and its subsidiaries. Subject to the terms and conditions of the Second Amended Revolving Credit Agreement, ANHBV may from time to time request the issuance of letters of credit up to \$750 under the Revolving Credit Facility, subject to a sublimit of \$400 for any letters of credit issued for the account of Alcoa Corporation or any of its domestic subsidiaries. Additionally, ANHBV may from time to time request that each of the lenders provide one or more additional tranches of term loans and/or increase the aggregate amount of revolving commitments, together in an aggregate principal amount of up to \$500.

The Revolving Credit Facility is scheduled to mature on November 21, 2023 (previously November 14, 2022), unless extended or earlier terminated in accordance with the provisions of the Second Amended Revolving Credit Agreement. ANHBV may make extension requests during the term of the Revolving Credit Facility, subject to the lender consent requirements set forth in the Second Amended Revolving Credit Agreement. Under the provisions of the Second Amended Revolving Credit Agreement, ANHBV will pay a quarterly commitment fee ranging from 0.200% to 0.425% (previously 0.225% to 0.450%) (based on Alcoa Corporation's leverage ratio) on the unused portion of the Revolving Credit Facility.

A maximum of \$750 in outstanding borrowings under the Revolving Credit Facility may be denominated in euros. Loans will bear interest at a rate per annum equal to an applicable margin plus, at ANHBV's option, either (a) an adjusted LIBOR rate or (b) a base rate determined by reference to the highest of (1) the U.S. prime rate as published in the Wall Street Journal (previously the prime rate of JPMorgan Chase Bank, N.A.), (2) the greater of the federal funds effective rate and the overnight bank funding rate, plus 0.5%, and (3) the one month adjusted LIBOR rate plus 1% per annum. The applicable margin for all loans will vary based on Alcoa Corporation's leverage ratio and will range from 1.50% to 2.25% (previously 1.75% to 2.50%) for LIBOR loans and 0.50% to 1.25% (previously 0.75% to 1.50%) for base rate loans, subject in each case to a reduction of 25 basis points if Alcoa Corporation attains at least a Baa3 rating from either Moody's Investor Service or BBB- rating from Standard and Poor's Global Ratings. Outstanding borrowings may be prepaid without premium or penalty, subject to customary breakage costs.

All obligations of Alcoa Corporation or a domestic entity under the Revolving Credit Facility are secured by, subject to certain exceptions (including a limitation of pledges of equity interests in certain foreign subsidiaries to 65%, and certain thresholds with respect to real property), a first priority lien on substantially all assets of Alcoa Corporation and the material domestic wholly-owned subsidiaries of Alcoa Corporation and certain equity interests of specified non-U.S. subsidiaries. All other obligations under the Revolving Credit Facility are secured by, subject to certain exceptions (including certain

thresholds with respect to real property), a first priority security interest in substantially all assets of Alcoa Corporation, ANHBV, the material domestic wholly-owned subsidiaries of Alcoa Corporation, and the material foreign wholly-owned subsidiaries of Alcoa Corporation located in Australia, Brazil, Canada, Luxembourg, the Netherlands, and Norway, including equity interests of certain subsidiaries that directly hold equity interests in AWAC entities. However, no AWAC entity is a guarantor of any obligation under the Revolving Credit Facility and no asset of any AWAC entity, or equity interests in any AWAC entity, will be pledged to secure the obligations under the Revolving Credit Facility. Under the Second Amended Revolving Credit Agreement, each of the mentioned companies shall be released from all obligations under the first priority lien and/or first priority security interest upon (i) Alcoa Corporation attaining at least a Baa3 rating from either Moody's Investor Service or BBB- rating from Standard and Poor's Global Ratings, in each case with a stable outlook or better, (ii) ANHBV delivering the required written notice, and (iii) no default or event of default, as defined in the Second Amended Revolving Credit Agreement, has occurred or is continuing (the date on which such conditions are met, the "Collateral Release Date").

The Second Amended Revolving Credit Agreement includes a number of customary affirmative covenants. Additionally, the Second Amended Revolving Credit Agreement contains a number of negative covenants (applicable to Alcoa Corporation and certain subsidiaries described as restricted), that, subject to certain exceptions, include limitations on (among other things): liens; fundamental changes; sales of assets; indebtedness (see below); entering into restrictive agreements; restricted payments (see below), including repurchases of common stock and shareholder dividends (see below); investments (see below), loans, advances, guarantees, and acquisitions; transactions with affiliates; amendment of certain material documents; and a covenant prohibiting reductions in the ownership of AWAC entities, and certain other specified restricted subsidiaries of Alcoa Corporation, below an agreed level. The Second Amended Revolving Credit Agreement also includes financial covenants requiring the maintenance of a specified interest expense coverage ratio of not less than 5.00 to 1.00, and a leverage ratio for any period of four consecutive fiscal quarters that is not greater than 2.50 to 1.00 (2.00 to 1.00 beginning on and subsequent to the Collateral Release Date, may be increased to a level not higher than 2.25 to 1.00 under certain circumstances). As of December 31, 2018 and 2017, Alcoa Corporation was in compliance with all such covenants.

The indebtedness, restricted payments, and investments negative covenants include general exceptions to allow for potential future transactions incremental to those specifically provided for in the Second Amended Revolving Credit Agreement. The indebtedness negative covenant provides for an incremental amount not to exceed the greater of \$1,000 and 6.0% of Alcoa Corporation's consolidated total assets. Additionally, the restricted payments negative covenant provides for an aggregate amount not to exceed \$100 and the investments negative covenant provides for an aggregate amount not to exceed \$400, both of which contain two conditions in which these limits may increase. First, in any fiscal year, the thresholds for the restricted payments and investments negative covenants increase by \$250 and \$200, respectively, if the consolidated net leverage ratio is not greater than 1.50 (previously 1.20) to 1.00 and 1.50 (previously 1.30) to 1.00, respectively, as of the end of the prior fiscal year. Secondly, in regards to both the \$100 and \$250 for restricted payments and the \$200 for investments, 50% of any unused amount of these base amounts in any fiscal year may be used in the next succeeding fiscal year.

The following describes the specific restricted payment negative covenant for share repurchases and the application of the restricted payments general exception (described above) to both share repurchases and ordinary dividend payments.

Alcoa Corporation may repurchase shares of its common stock pursuant to stock option exercises and benefit plans in an aggregate amount not to exceed \$25 during any fiscal year, except that 50% of any unused amount of the base amount in any fiscal year may be used in the next succeeding fiscal year following the use of the base amount in said fiscal year. Additionally, as described above, the Second Amended Revolving Credit Agreement provides general exceptions to the restricted payments negative covenant that would allow Alcoa Corporation to execute share repurchases for any purpose in any fiscal year by an aggregate amount of up to \$100 (see above for conditions that provide for this limit to increase), assuming no other restricted payments have reduced, in part or whole, the available limit.

Also, any ordinary dividend payments made by Alcoa Corporation are only subject to the general exception for restricted payments described above. Accordingly, Alcoa Corporation may make annual ordinary dividends in any fiscal year by an aggregate amount of up to \$100 (see above for conditions that provide for this limit to increase), assuming no other restricted payments have reduced, in part or whole, the available limit. The limits of the restricted payments negative covenant under the Notes indenture (see 144A Debt below) would govern the amount of ordinary dividend payments Alcoa Corporation could make in a given timeframe if the allowed amount is less than the limits of the restricted payments negative covenant under the Second Amended Revolving Credit Agreement.

The Second Amended Revolving Credit Agreement contains customary events of default, including with respect to a failure to make payments under the Revolving Credit Facility, cross-default and cross-judgment default, and certain bankruptcy and insolvency events.

There were no amounts outstanding at December 31, 2018 and 2017 and no amounts were borrowed during 2018 and 2017 under the Revolving Credit Facility.

144A Debt. In May 2018, ANHBV completed a Rule 144A (U.S. Securities Act of 1933, as amended) debt offering for \$500 of 6.125% Senior Notes due 2028 (the “2028 Notes”). ANHBV received \$492 in net proceeds from the debt offering reflecting a discount to the initial purchasers of the 2028 Notes. The net proceeds, along with available cash on hand, were used to make discretionary contributions to certain U.S. defined benefit pension plans (see Cash from Operations above). The discount to the initial purchasers, as well as costs to complete the financing, was deferred and is being amortized to interest expense over the term of the 2028 Notes. Interest on the 2028 Notes will be paid semi-annually in November and May, which commenced November 15, 2018.

ANHBV has the option to redeem the 2028 Notes on at least 30 days, but not more than 60 days, prior notice to the holders of the 2028 Notes under multiple scenarios, including, in whole or in part, at any time or from time to time after May 2023 at a redemption price specified in the indenture (up to 103.063% of the principal amount plus any accrued and unpaid interest in each case). Also, the 2028 Notes are subject to repurchase upon the occurrence of a change in control repurchase event (as defined in the indenture) at a repurchase price in cash equal to 101% of the aggregate principal amount of the 2028 Notes repurchased, plus any accrued and unpaid interest on the 2028 Notes repurchased.

The 2028 Notes are senior unsecured obligations of ANHBV and do not entitle the holders to any registration rights pursuant to a registration rights agreement. ANHBV does not intend to file a registration statement with respect to resales of or an exchange offer for the 2028 Notes. The 2028 Notes are guaranteed on a senior unsecured basis by Alcoa Corporation and its subsidiaries that are guarantors under the Second Amended Revolving Credit Agreement (the “subsidiary guarantors” and, together with Alcoa Corporation, the “guarantors”) (see Credit Facility above). Each of the subsidiary guarantors will be released from their 2028 Notes guarantees upon the occurrence of certain events, including the release of such guarantor from its obligations as a guarantor under the Second Amended Revolving Credit Agreement.

The 2028 Notes indenture includes several customary affirmative covenants. Additionally, the 2028 Notes indenture contains several negative covenants, that, subject to certain exceptions, include limitations on liens, limitations on sale and leaseback transactions, and a prohibition on a reduction in the ownership of AWAC entities below an agreed level. The negative covenants in the 2028 Notes indenture are less extensive than those in the 2024 Notes and 2026 Notes (see below) indenture and the Second Amended Revolving Credit Agreement. For example, the 2028 Notes indenture does not include a limitation on restricted payments, such as repurchases of common stock and shareholder dividends.

The 2028 Notes rank equally in right of payment with all of ANHBV’s existing and future senior indebtedness, including the 2024 Notes and 2026 Notes; rank senior in right of payment to any future subordinated obligations of ANHBV; and are effectively subordinated to ANHBV’s existing and future secured indebtedness, including under the Second Amended Revolving Credit Agreement, to the extent of the value of property and assets securing such indebtedness.

In September 2016, ANHBV completed a Rule 144A (U.S. Securities Act of 1933, as amended) debt offering for \$750 of 6.75% Senior Notes due 2024 (the “2024 Notes”) and \$500 of 7.00% Senior Notes due 2026 (the “2026 Notes” and, collectively with the 2024 Notes, the “Notes”). ANHBV received \$1,228 in net proceeds from the debt offering reflecting a discount to the initial purchasers of the Notes. The net proceeds were used to make a payment to ParentCo to fund the transfer of certain assets from ParentCo to Alcoa Corporation in connection with the Separation Transaction, and the remaining net proceeds were used for general corporate purposes. The discount to the initial purchasers, as well as costs to complete the financing, was deferred and is being amortized to interest expense over the respective terms of the Notes. Interest on the Notes is paid semi-annually in March and September, which commenced March 31, 2017.

ANHBV has the option to redeem the Notes on at least 30 days, but not more than 60 days, prior notice to the holders of the Notes under multiple scenarios, including, in whole or in part, at any time or from time to time after September 2019, in the case of the 2024 Notes, or after September 2021, in the case of the 2026 Notes, at a redemption price specified in the indenture (up to 105.063% of the principal amount for the 2024 Notes and up to 103.500% of the principal amount of the 2026 Notes, plus any accrued and unpaid interest in each case). Also, the Notes are subject to repurchase upon the occurrence of a change in control repurchase event (as defined in the indenture) at a repurchase price in cash equal to 101% of the aggregate principal amount of the Notes repurchased, plus any accrued and unpaid interest on the Notes repurchased.

The Notes are senior unsecured obligations of ANHBV and do not entitle the holders to any registration rights pursuant to a registration rights agreement. ANHBV does not intend to file a registration statement with respect to resales of or an exchange offer for the Notes. The Notes are guaranteed on a senior unsecured basis by Alcoa Corporation and its subsidiaries that are guarantors under the Second Amended Revolving Credit Agreement (the “subsidiary guarantors” and, together with Alcoa Corporation, the “guarantors”) (see Credit Facility above). Each of the subsidiary guarantors will be released from their Notes guarantees upon the occurrence of certain events, including the release of such guarantor from its obligations as a guarantor under the Second Amended Revolving Credit Agreement.

The Notes indenture contains various restrictive covenants similar to those described above for the Second Amended Revolving Credit Agreement, including a limitation on restricted payments, with, among other exceptions, capacity to pay annual ordinary dividends. Under the indenture, Alcoa Corporation may declare and make annual ordinary dividends in an

aggregate amount not to exceed \$38 in each of the November 1, 2016 through December 31, 2017 time period and annual 2018 (no such dividends were made), \$50 in each of annual 2019 and 2020, and \$75 in the January 1, 2021 through September 30, 2026 (maturity date of the 2026 Notes) time period, except that 50% of any unused amount of the base amount in any of the specified time periods may be used in the next succeeding period following the use of the base amount in said time period. Additionally, the restricted payments negative covenant includes a general exception to allow for potential future transactions incremental to those specifically provided for in the Notes indenture. This general exception provides for an aggregate amount of restricted payments not to exceed the greater of \$250 and 1.5% of Alcoa Corporation's consolidated total assets. Accordingly, Alcoa Corporation may make annual ordinary dividends in any fiscal year by an aggregate amount of up to \$250, assuming no other restricted payments have reduced, in part or whole, the available limit. The limits of the restricted payments negative covenant under the Second Amended Revolving Credit Agreement (see Credit Facility above) would govern the amount of ordinary dividend payments Alcoa Corporation could make in a given timeframe if the allowed amount is less than the limits of the restricted payments negative covenant under the Notes indenture.

Ratings. Alcoa Corporation's cost of borrowing and ability to access the capital markets are affected not only by market conditions but also by the short- and long-term debt ratings assigned to Alcoa Corporation's debt by the major credit rating agencies.

On May 2, 2018, Fitch Ratings (Fitch) affirmed a BB+ rating for Alcoa Corporation's long-term debt. Additionally, Fitch raised the current outlook to positive from stable.

On May 14, 2018, Moody's Investor Service (Moody's) upgraded its rating for Alcoa Corporation's long-term debt to Ba1 from Ba2. Additionally, Moody's affirmed the current outlook as stable.

On May 14, 2018, Standard and Poor's Global Ratings (S&P) upgraded its rating for Alcoa Corporation's long-term debt to BB+ from BB. Additionally, S&P assigned the current outlook as stable.

Common Stock Repurchase Program. In October 2018, Alcoa Corporation's Board of Directors authorized a common stock repurchase program under which the Company may purchase shares of its outstanding common stock up to an aggregate transactional value of \$200, depending on cash availability, market conditions, and other factors. Repurchases under the program may be made using a variety of methods, which may include open market purchases, privately negotiated transactions, or pursuant to a Rule 10b5-1 plan. This program does not have a predetermined expiration date. Alcoa Corporation intends to retire the repurchased shares of common stock. In December 2018, the Company repurchased 1,723,800 shares of its common stock for \$50; these shares were immediately retired.

Investing Activities

Cash used for investing activities was \$405 in 2018 compared with \$226 in 2017 and \$149 in 2016.

The use of cash in 2018 was largely attributable to \$399 in capital expenditures (includes spend related to environmental control of \$145), composed of \$307 in sustaining and \$92 in return-seeking.

The use of cash in 2017 was due to \$405 in capital expenditures (includes spend related to environmental control of \$92), composed of \$287 in sustaining and \$118 in return-seeking, and \$66 in contributions related to the aluminum complex joint venture in Saudi Arabia. These items were partially offset by \$245 in net proceeds received (see Financing Activities above) from the sale of Yadkin (see Aluminum in Segment Information above).

The use of cash in 2016 was primarily due to \$404 in capital expenditures (includes spend related to environmental control of \$83), composed of \$322 in sustaining and \$82 in return-seeking. This item was partially offset by \$265 in combined proceeds from the sale of an equity interest in a natural gas pipeline in Australia (\$145) and the sale of wharf property near the Intalco, Washington smelter (\$120).

Contractual Obligations and Off-Balance Sheet Arrangements

Contractual Obligations. Alcoa Corporation is required to make future payments under various contracts, including long-term purchase obligations, lease agreements, and financing arrangements. The Company also has commitments to fund its pension plans, provide payments for other postretirement benefit plans, and fund capital projects. As of December 31, 2018, a summary of Alcoa Corporation's outstanding contractual obligations is as follows (these contractual obligations are grouped in the same manner as they are classified in the Statement of Consolidated Cash Flows in order to provide a better understanding of the nature of the obligations and to provide a basis for comparison to historical information):

	Total	2019	2020-2021	2022-2023	Thereafter
Operating activities:					
Energy-related purchase obligations	\$ 15,989	\$ 922	\$ 1,961	\$ 2,299	\$ 10,807
Raw material purchase obligations	5,012	812	671	555	2,974
Other purchase obligations	1,087	303	331	214	239
Operating leases	209	74	98	16	21
Interest related to total debt	880	119	235	233	293
Estimated minimum required pension funding	1,700	310	810	580	—
Other postretirement benefit payments	880	110	220	210	340
Layoff and other restructuring payments	47	38	8	—	1
Deferred revenue arrangements	69	8	16	16	29
Uncertain tax positions	42	—	—	—	42
Financing activities:					
Total debt	1,841	1	85	2	1,753
Dividends to shareholders	—	—	—	—	—
Repurchase of common stock	—	—	—	—	—
Distributions to noncontrolling interest	—	—	—	—	—
Investing activities:					
Capital projects	172	144	21	5	2
Equity contributions	16	—	16	—	—
Totals	\$ 27,944	\$ 2,841	\$ 4,472	\$ 4,130	\$ 16,501

Obligations for Operating Activities

Energy-related purchase obligations consist primarily of electricity and natural gas contracts with expiration dates ranging from 1 year to 29 years. Raw material obligations consist mostly of bauxite (relates to AWAC's bauxite mine interests in Guinea and Brazil), caustic soda, alumina, aluminum fluoride, calcined petroleum coke, and cathode blocks with expiration dates ranging from less than 1 year to 16 years. Other purchase obligations consist principally of freight for bauxite and alumina with expiration dates ranging from 1 to 14 years. Many of these purchase obligations contain variable pricing components, and, as a result, actual cash payments may differ from the estimates provided in the preceding table. In accordance with the terms of several of these supply contracts, obligations may be reduced as a result of an interruption to operations, such as a plant curtailment or a force majeure event. Operating leases represent multi-year obligations for certain land and buildings, alumina refinery process control technology, plant equipment, vehicles, and computer equipment.

Interest related to total debt is based on interest rates in effect as of December 31, 2018 and is calculated on debt with maturities that extend to 2028. As the contractual interest rates for certain debt are variable, actual cash payments may differ from the estimates provided in the preceding table.

Estimated minimum required pension funding and other postretirement benefit payments are based on actuarial estimates using current assumptions for, among others, discount rates, long-term rate of return on plan assets, rate of compensation increases, and/or health care cost trend rates. The minimum required contributions for pension funding are estimated to be \$310 for 2019, \$455 for 2020, \$355 for 2021, \$300 for 2022, and \$280 for 2023. Under ERISA (Employee Retirement Income Security Act of 1974) regulations, a plan sponsor that establishes a pre-funding balance by making discretionary contributions to a U.S. defined benefit pension plan may elect to apply all or a portion of this balance toward its minimum required contribution obligations to the related plan in future years. In 2019, management will consider making such election related to the Company's U.S. plans. Other postretirement benefit payments are expected to approximate \$105 to \$110 annually for years 2019 through 2023 and \$68 annually for years 2024 through 2028. Such payments will be slightly offset by subsidy receipts related to Medicare Part D, which are estimated to approximate \$5 to \$10 annually for years 2019 through 2028. Alcoa Corporation has determined that it is not practicable to present pension funding and other postretirement benefit payments beyond 2023 and 2028, respectively.

Layoff and other restructuring payments expected to be paid within one year relate to take-or-pay provisions of supply contracts associated with curtailed facilities, a contractual commitment to an Italian government agency related to the transfer of the Portovesme smelter, severance costs, and the termination of an office lease contract. Amounts scheduled to be paid beyond one year largely relate to the previously mentioned commitment in Italy, which is expected to be paid in 2020.

Deferred revenue arrangements require Alcoa Corporation to deliver alumina to a certain customer over the specified contract period (through 2027). While this obligation is not expected to result in cash payments, it is included in the preceding table as the Company would have such an obligation if the specified product deliveries could not be made.

Uncertain tax positions taken or expected to be taken on an income tax return may result in additional payments to tax authorities. The amount in the preceding table includes interest and penalties accrued related to such positions as of December 31, 2018. The total amount of uncertain tax positions is included in the “Thereafter” column as the Company is not able to reasonably estimate the timing of potential future payments. If a tax authority agrees with the tax position taken or expected to be taken or the applicable statute of limitations expires, then additional payments will not be necessary.

Obligations for Financing Activities

Total debt amounts in the preceding table represent the principal amounts of all outstanding long-term debt, which have maturities that extend to 2028.

As of December 31, 2018, Alcoa Corporation had 184,770,249 issued and outstanding shares of common stock. Dividends on common stock are subject to authorization by the Company’s Board of Directors. Alcoa Corporation did not declare or pay any dividends in 2018.

In October 2018, Alcoa Corporation’s Board of Directors authorized a common stock repurchase program under which the Company may purchase shares of its outstanding common stock up to an aggregate transactional value of \$200, depending on cash availability, market conditions, and other factors. Additionally, this program does not have a predetermined expiration date. Accordingly, amounts have not been included in the preceding table. In December 2018, the Company repurchased 1,723,800 shares of its common stock for \$50.

Effective on November 1, 2016, certain documents that govern the AWAC joint venture relationship between Alcoa Corporation and Alumina Limited were revised. One of the provisions of the revised documents relates to required cash distributions from the entities that comprise the joint venture to the two partners. On a quarterly basis, each of certain identified entities that comprise the AWAC joint venture must distribute (i) 50% of the entity’s net income, if any, based on the previous quarter’s results, and (ii) the available cash, if any, of each entity, subject to certain thresholds that the entities must maintain a minimum cash on hand that ranges from \$5 to \$85 depending on the entity. Available cash is defined as an entity’s cash and cash equivalents less any projected negative free cash flow of the entity for the upcoming quarter. Free cash flow is defined as cash flow from operating activities less sustaining capital expenditures. Estimates of potential cash distributions to Alumina Limited have not been included in the preceding table since this would require Alcoa Corporation to provide proprietary information related to forecasted results of the entities that comprise the AWAC joint venture. In 2018, 2017, and 2016, Alumina Limited received distributions of \$827, \$342, and \$233, respectively, from the entities that comprise AWAC based on the provisions of the respective current or prior agreement applicable to these years.

Obligations for Investing Activities

Capital projects in the preceding table only include amounts approved by management as of December 31, 2018. Funding levels may vary in future years based on anticipated construction schedules of the projects. It is expected that significant expansion projects will be funded through various sources, including cash provided from operations. Total capital expenditures are anticipated to be approximately \$450 in 2019, comprised of \$300 for sustaining projects and \$150 for return-seeking projects.

Alcoa Corporation is a participant in a joint venture related to an integrated aluminum complex in Saudi Arabia, comprised of a bauxite mine, alumina refinery, aluminum smelter, and rolling mill, which requires the Company to contribute approximately \$1,100 (estimate of initial investment). As of December 31, 2018, Alcoa Corporation has made equity contributions of \$982. Based on changes to both the project’s capital investment and equity and debt structure from the initial plans, the estimated \$1,100 equity contribution may be reduced. The Company does not anticipate making any additional equity contributions under the initial \$1,100 plan although a formal determination is yet to be made. Accordingly, further contribution amounts have not been included in the preceding table. Separate from the capital investment in the project, Alcoa Corporation contributed \$66 to the joint venture in 2017 for short-term funding purposes in accordance with the terms of the joint venture companies’ financing arrangements. The Company may be required to make such additional contributions in future periods.

In June 2018, Alcoa Corporation, Rio Tinto plc, and the provincial government of Quebec, Canada launched a new joint venture, Elysis Limited Partnership (Elysis). The purpose of this partnership is to advance larger scale development and

commercialization of the Company's patent-protected technology that produces oxygen and eliminates all direct greenhouse gas emissions from the traditional aluminum smelting process. This joint venture requires Alcoa Corporation to invest \$21 (C\$28) over the next three years. In 2018, the Company contributed \$5 (C\$6) toward its initial investment commitment in Elysis.

Off-Balance Sheet Arrangements. At December 31, 2018, the Company has maximum potential future payments for guarantees issued on behalf of a third party of \$60. These guarantees expire at various times between 2018 and 2021 and relate to project financing for the aluminum complex in Saudi Arabia. The borrower is the rolling mill company that is part of the joint venture in which Alcoa Corporation is a participant. In December 2017 and July 2018, the smelting company and the mining and refining company, respectively, refinanced and/or amended all of their existing outstanding debt. The guarantees that were previously required of the Company related to both the smelting company and the mining and refining company were effectively terminated.

Alcoa Corporation has outstanding bank guarantees and letters of credit related to, among others, energy contracts, environmental obligations, legal and tax matters, outstanding debt, leasing obligations, workers compensation, and customs duties. The total amount committed under these instruments, which automatically renew or expire at various dates between 2019 and 2022, was \$373 (includes \$136 issued under a standby letter of credit agreement—see below) at December 31, 2018. Additionally, Arconic has outstanding bank guarantees and letters of credit related to the Company in the amount of \$29 at December 31, 2018. In the event Arconic would be required to perform under any of these instruments, Arconic would be indemnified by Alcoa Corporation in accordance with the Separation and Distribution Agreement. Likewise, the Company has outstanding bank guarantees and letters of credit related to Arconic in the amount of \$15 at December 31, 2018. In the event Alcoa Corporation would be required to perform under any of these instruments, the Company would be indemnified by Arconic in accordance with the Separation and Distribution Agreement.

In August 2017, Alcoa Corporation entered into a standby letter of credit agreement, which expires on August 17, 2019 (extended in August 2018), with three financial institutions. The agreement provides for a \$150 facility, which will be used by the Company for matters in the ordinary course of business. Alcoa Corporation's obligations under this facility will be secured in the same manner as obligations under the Company's Second Amended Revolving Credit Agreement (see Financing Activities in Liquidity and Capital Resources above). Additionally, this facility contains similar representations and warranties and affirmative, negative, and financial covenants as the Company's Second Amended Revolving Credit Agreement (see Financing Activities in Liquidity and Capital Resources above). As of December 31, 2018, letters of credit aggregating \$136 were issued under this facility.

Alcoa Corporation also has outstanding surety bonds primarily related to tax matters, contract performance, workers compensation, environmental-related matters, and customs duties. The total amount committed under these bonds, which automatically renew or expire at various dates, mostly in 2019, was \$40 at December 31, 2018. Additionally, Arconic has outstanding surety bonds related to the Company in the amount of \$16 at December 31, 2018. In the event Arconic would be required to perform under any of these instruments, Arconic would be indemnified by Alcoa Corporation in accordance with the Separation and Distribution Agreement. Likewise, the Company has outstanding surety bonds related to Arconic in the amount of \$2 at December 31, 2018. In the event Alcoa Corporation would be required to perform under any of these instruments, the Company would be indemnified by Arconic in accordance with the Separation and Distribution Agreement.

Critical Accounting Policies and Estimates

The preparation of the Company's Consolidated Financial Statements in accordance with accounting principles generally accepted in the United States of America requires management to make certain estimates based on judgments and assumptions regarding uncertainties that affect the amounts reported in the Consolidated Financial Statements and disclosed in the Notes to the Consolidated Financial Statements. Areas that require such estimates include the review of properties, plants, and equipment, equity investments, and goodwill for impairment, and accounting for each of the following: asset retirement obligations; environmental and litigation matters; stock-based compensation; pension plans and other postretirement benefits obligations; derivatives and hedging activities; and income taxes.

Management uses historical experience and all available information to make these estimates, and actual results may differ from those used to prepare the Company's Consolidated Financial Statements at any given time. Despite these inherent limitations, management believes that Management's Discussion and Analysis of Financial Condition and Results of Operations and the Consolidated Financial Statements, including the Notes to the Consolidated Financial Statements, provide a meaningful and fair perspective of Alcoa Corporation.

A summary of the Company's significant accounting policies is included in Note B to the Consolidated Financial Statements in Part II Item 8 of this Form 10-K. Management believes that the application of these policies on a consistent basis enables Alcoa Corporation to provide the users of the Consolidated Financial Statements with useful and reliable information about the Company's operating results and financial condition.

Prior to the Separation Date, the Company did not operate as a separate, standalone entity. Alcoa Corporation's operations were included in ParentCo's financial results. Accordingly, for all periods prior to the Separation Date, the Company's Consolidated Financial Statements were prepared from ParentCo's historical accounting records and were presented on a standalone basis as if Alcoa Corporation's operations had been conducted independently from ParentCo. Such Consolidated Financial Statements include the historical operations that were considered to comprise Alcoa Corporation's businesses, as well as certain assets and liabilities that were historically held at ParentCo's corporate level but were specifically identifiable or otherwise attributable to Alcoa Corporation. The Critical Accounting Policies described below reflect any incremental judgments and assumptions made by management in the preparation of the Company's Consolidated Financial Statements prior to the Separation Date (see Separation Transaction in Overview above for additional information).

Properties, Plants, and Equipment. Properties, plants, and equipment are reviewed for impairment whenever events or changes in circumstances indicate that the carrying amount of such assets (asset group) may not be recoverable. Recoverability of assets is determined by comparing the estimated undiscounted net cash flows of the operations related to the assets (asset group) to their carrying amount. An impairment loss would be recognized when the carrying amount of the assets (asset group) exceeds the estimated undiscounted net cash flows. The amount of the impairment loss to be recorded is calculated as the excess of the carrying value of the assets (asset group) over their fair value, with fair value determined using the best information available, which generally is a discounted cash flow (DCF) model. The determination of what constitutes an asset group, the associated estimated undiscounted net cash flows, and the estimated useful lives of assets also require significant judgments.

Equity Investments. Alcoa Corporation invests in a number of privately-held companies, primarily through joint ventures and consortia, which are accounted for using the equity method. The equity method is applied in situations where Alcoa Corporation has the ability to exercise significant influence, but not control, over the investee. Management reviews equity investments for impairment whenever certain indicators are present suggesting that the carrying value of an investment is not recoverable. This analysis requires a significant amount of judgment from management to identify events or circumstances indicating that an equity investment is impaired. The following items are examples of impairment indicators: significant, sustained declines in an investee's revenue, earnings, and cash flow trends; adverse market conditions of the investee's industry or geographic area; the investee's ability to continue operations measured by several items, including liquidity; and other factors. Once an impairment indicator is identified, management uses considerable judgment to determine if the impairment is other than temporary, in which case the equity investment is written down to its estimated fair value. An impairment that is other than temporary could significantly and adversely impact reported results of operations.

Goodwill. Goodwill is not amortized; it is instead reviewed for impairment annually (in the fourth quarter) or more frequently if indicators of impairment exist or if a decision is made to sell or exit a business. A significant amount of judgment is involved in determining if an indicator of impairment has occurred. Such indicators may include, among others, deterioration in general economic conditions, negative developments in equity and credit markets, adverse changes in the markets in which an entity operates, increases in input costs that have a negative effect on earnings and cash flows, or a trend of negative or declining cash flows over multiple periods. The fair value that could be realized in an actual transaction may differ from that used to evaluate goodwill for impairment.

Goodwill is allocated among and evaluated for impairment at the reporting unit level, which is defined as an operating segment or one level below an operating segment. Alcoa Corporation has five reporting units of which three are included in the Aluminum segment (smelting/casting, energy generation, and rolling operations). The remaining two reporting units are the Bauxite and Alumina segments. Of these five reporting units, only Bauxite and Alumina contain goodwill. As of December 31, 2018, the carrying value of the goodwill for Bauxite and Alumina was \$51 and \$100, respectively. These amounts include an allocation of goodwill held at the corporate level (\$49 to Bauxite and \$97 to Alumina).

In reviewing goodwill for impairment, an entity has the option to first assess qualitative factors to determine whether the existence of events or circumstances leads to a determination that it is more likely than not (greater than 50%) that the estimated fair value of a reporting unit is less than its carrying amount. If an entity elects to perform a qualitative assessment and determines that an impairment is more likely than not, the entity is then required to perform a quantitative impairment test (described below), otherwise no further analysis is required. An entity also may elect not to perform the qualitative assessment and, instead, proceed directly to the quantitative impairment test. The ultimate outcome of the goodwill impairment review for a reporting unit should be the same whether an entity chooses to perform the qualitative assessment or proceeds directly to the quantitative impairment test.

Alcoa Corporation's policy for its annual review of goodwill is to perform the qualitative assessment for all reporting units not subjected directly to the quantitative impairment test. Generally, management will proceed directly to the quantitative impairment test for each of its two reporting units that contain goodwill at least once during every three-year period, as part of its annual review of goodwill.

Under the qualitative assessment, various events and circumstances (or factors) that would affect the estimated fair value of a reporting unit are identified (similar to impairment indicators above). These factors are then classified by the type of impact

they would have on the estimated fair value using positive, neutral, and adverse categories based on current business conditions. Additionally, an assessment of the level of impact that a particular factor would have on the estimated fair value is determined using high, medium, and low weighting. Furthermore, management considers the results of the most recent quantitative impairment test completed for a reporting unit and compares the weighted average cost of capital (WACC) between the current and prior years for each reporting unit.

During the 2018 annual review of goodwill, management performed the qualitative assessment for the Alumina reporting unit. Management concluded it was not more likely than not that the respective estimated fair value of this reporting unit was less than the respective carrying value. As such, no further analysis was required.

Under the quantitative impairment test, the evaluation of impairment involves comparing the current fair value of each reporting unit to its carrying value, including goodwill. Alcoa Corporation uses a DCF model to estimate the current fair value of its reporting units when testing for impairment, as management believes forecasted cash flows are the best indicator of such fair value. A number of significant assumptions and estimates are involved in the application of the DCF model to forecast operating cash flows, including markets and market share, sales volumes and prices, production costs, tax rates, capital spending, discount rate, and working capital changes. Certain of these assumptions can vary significantly among the reporting units. Cash flow forecasts are generally based on approved business unit operating plans for the early years and historical relationships in later years. The betas used in calculating the individual reporting units' WACC rate are estimated for each business with the assistance of valuation experts.

In the event the estimated fair value of a reporting unit per the DCF model is less than the carrying value, an impairment loss equal to the excess of the reporting unit's carrying value over its fair value not to exceed the total amount of goodwill applicable to that reporting unit would be recognized.

During the 2018 annual review of goodwill, management proceeded directly to the quantitative impairment test for the Bauxite reporting unit. The estimated fair value of this reporting unit was substantially in excess of its carrying value, resulting in no impairment.

Management last proceeded directly to the quantitative impairment test for the Alumina reporting unit in 2016. At that time, the estimated fair value of the Alumina reporting unit was substantially in excess of its carrying value, resulting in no impairment. Additionally, in all prior years presented, there have been no triggering events that necessitated an impairment test for either the Bauxite or Alumina reporting units.

Asset Retirement Obligations. Alcoa Corporation recognizes asset retirement obligations (AROs) related to legal obligations associated with the standard operation of bauxite mines, alumina refineries, and aluminum smelters. These AROs consist primarily of costs associated with mine reclamation, closure of bauxite residue areas, spent pot lining disposal, and landfill closure. Alcoa Corporation also recognizes AROs for any significant lease restoration obligation, if required by a lease agreement, and for the disposal of regulated waste materials related to the demolition of certain power facilities. The fair values of these AROs are recorded on a discounted basis, at the time the obligation is incurred, and accreted over time for the change in present value. Additionally, Alcoa Corporation capitalizes asset retirement costs by increasing the carrying amount of the related long-lived assets and depreciating these assets over their remaining useful life.

Certain conditional asset retirement obligations (CAROs) related to alumina refineries, aluminum smelters, rolling mills, and energy generation facilities have not been recorded in the Consolidated Financial Statements due to uncertainties surrounding the ultimate settlement date. A CARO is a legal obligation to perform an asset retirement activity in which the timing and/or method of settlement are conditional on a future event that may or may not be within Alcoa Corporation's control. Such uncertainties exist as a result of the perpetual nature of the structures, maintenance and upgrade programs, and other factors. At the date a reasonable estimate of the ultimate settlement date can be made (e.g., planned demolition), Alcoa Corporation would record an ARO for the removal, treatment, transportation, storage, and/or disposal of various regulated assets and hazardous materials such as asbestos, underground and aboveground storage tanks, polychlorinated biphenyls, various process residuals, solid wastes, electronic equipment waste, and various other materials. Such amounts may be material to the Consolidated Financial Statements in the period in which they are recorded. If Alcoa Corporation was required to demolish all such structures immediately, the estimated CARO as of December 31, 2018 ranges from \$3 to \$28 per structure (24 structures) in today's dollars.

Environmental Matters. Expenditures for current operations are expensed or capitalized, as appropriate. Expenditures relating to existing conditions caused by past operations, which will not contribute to future revenues, are expensed. Liabilities are recorded when remediation costs are probable and can be reasonably estimated. The liability may include costs such as site investigations, consultant fees, feasibility studies, outside contractors, and monitoring expenses. Estimates are generally not discounted or reduced by potential claims for recovery, which are recognized as agreements are reached with third parties. The estimates also include costs related to other potentially responsible parties to the extent that Alcoa Corporation has reason to believe such parties will not fully pay their proportionate share. The liability is continuously

reviewed and adjusted to reflect current remediation progress, prospective estimates of required activity, and other factors that may be relevant, including changes in technology or regulations.

Litigation Matters. For asserted claims and assessments, liabilities are recorded when an unfavorable outcome of a matter is deemed to be probable and the loss is reasonably estimable. Management determines the likelihood of an unfavorable outcome based on many factors such as, among others, the nature of the matter, available defenses and case strategy, progress of the matter, views and opinions of legal counsel and other advisors, applicability and success of appeals processes, and the outcome of similar historical matters. Once an unfavorable outcome is deemed probable, management weighs the probability of estimated losses, and the most reasonable loss estimate is recorded. If an unfavorable outcome of a matter is deemed to be reasonably possible, then the matter is disclosed and no liability is recorded. With respect to unasserted claims or assessments, management must first determine that the probability that an assertion will be made is likely, then, a determination as to the likelihood of an unfavorable outcome and the ability to reasonably estimate the potential loss is made. Legal matters are reviewed on a continuous basis to determine if there has been a change in management's judgment regarding the likelihood of an unfavorable outcome or the estimate of a potential loss.

Stock-based Compensation. For all periods prior to the Separation Date, eligible employees attributable to Alcoa Corporation operations participated in ParentCo's stock-based compensation plans. The compensation expense recorded by Alcoa Corporation included the expense associated with these employees, as well as the expense associated with the allocation of stock-based compensation expense for ParentCo's corporate employees. Beginning on the Separation Date and forward, Alcoa Corporation recorded stock-based compensation expense for all eligible Company employees. The following accounting policy describes how stock-based compensation expense is initially determined for both Alcoa Corporation and ParentCo.

Compensation expense for employee equity grants is recognized using the non-substantive vesting period approach, in which the expense (net of estimated forfeitures) is recognized ratably over the requisite service period based on the grant date fair value. The fair value of new stock options is estimated on the date of grant using a lattice-pricing model. Determining the fair value of stock options at the grant date requires judgment, including estimates for the average risk-free interest rate, dividend yield, volatility, annual forfeiture rate, and exercise behavior. These assumptions may differ significantly between grant dates because of changes in the actual results of these inputs that occur over time.

In 2018, 2017, and 2016, Alcoa Corporation recognized stock-based compensation expense of \$35, \$24, and \$28 (\$16 relates to the allocation of expense for ParentCo's corporate employees), respectively. As part of both Alcoa Corporation's and ParentCo's stock-based compensation plan design in the respective periods, individuals who are retirement-eligible have a six-month requisite service period in the year of grant. As a result, a larger portion of expense will be recognized in the first half of each year for these retirement-eligible employees. Of the total pretax stock-based compensation expense recognized in 2018, 2017, and 2016, \$5, \$4, and \$7, respectively, pertains to the acceleration of expense related to retirement-eligible employees.

Most plan participants can choose whether to receive their award in the form of stock options, stock units, or a combination of both. This choice is made before the grant is issued and is irrevocable.

Pension and Other Postretirement Benefits. For all periods prior to August 1, 2016 (see below), certain employees attributable to Alcoa Corporation operations participated in defined benefit pension and other postretirement benefit plans (the "Shared Plans") sponsored by ParentCo, which also included participants attributable to non-Alcoa Corporation operations. Alcoa Corporation accounted for these Shared Plans as multiemployer benefit plans. Accordingly, Alcoa Corporation did not record an asset or liability to recognize the funded status of the Shared Plans. However, the related expense recorded by Alcoa Corporation was based primarily on pensionable compensation and estimated interest costs related to employees attributable to Alcoa Corporation operations.

Prior to the Separation Date, certain other plans that were entirely attributable to employees of Alcoa Corporation-related operations (the "Direct Plans") were accounted for as defined benefit pension and other postretirement benefit plans. Accordingly, the funded and unfunded position of each Direct Plan was recorded in the Consolidated Balance Sheet. Actuarial gains and losses that had not yet been recognized through earnings were recorded in accumulated other comprehensive income, net of taxes, until they were amortized as a component of net periodic benefit cost. The determination of benefit obligations and recognition of expenses related to the Direct Plans is dependent on various assumptions (see below).

In preparation for the Separation Transaction, effective August 1, 2016, certain of the Shared Plans were separated into standalone plans for both Alcoa Corporation (the "New Direct Plans") and ParentCo. Additionally, certain of the other remaining Shared Plans were assumed by Alcoa Corporation (the "Additional New Direct Plans"). Accordingly, beginning on August 1, 2016 and forward, the standalone plans and assumed plans were accounted for as defined benefit pension and other postretirement plans. Additionally, the Direct Plans continued to be accounted for as defined benefit pension and other postretirement plans.

Liabilities and expenses for pension and other postretirement benefits are determined using actuarial methodologies and incorporate significant assumptions, including the interest rate used to discount the future estimated liability, the expected long-term rate of return on plan assets, and several assumptions relating to the employee workforce (salary increases, health care cost trend rates, retirement age, and mortality).

The interest rate used to discount future estimated liabilities is determined using a Company-specific yield curve model (above-median) developed with the assistance of an external actuary. The cash flows of the plans' projected benefit obligations are discounted using a single equivalent rate derived from yields on high quality corporate bonds, which represent a broad diversification of issuers in various sectors. The yield curve model parallels the plans' projected cash flows, which have a weighted average duration of 11 years, and the underlying cash flows of the bonds included in the model exceed the cash flows needed to satisfy the Company's plans' obligations multiple times. If a deep market of high quality corporate bonds does not exist in a country, then the yield on government bonds plus a corporate bond yield spread is used. In 2018 and 2017, the weighted average discount rate used to determine benefit obligations for pension plans was 4.21% and 3.68%, respectively, and for other postretirement benefit plans was 4.25% and 3.54%, respectively. The impact on the combined pension and other postretirement liabilities of a change in the weighted average discount rate of 1/4 of 1% would be approximately \$160 and either a charge or credit of approximately \$5 to pretax earnings in the following year.

The expected long-term rate of return on plan assets is generally applied to a five-year market-related value of plan assets (a four-year average or the fair value at the plan measurement date is used for certain non-U.S. plans). The process used by management to develop this assumption is one that relies on forward-looking investment returns by asset class. Management incorporates expected future investment returns on current and planned asset allocations using information from various external investment managers and consultants, as well as management's own judgment. For 2018, 2017, and 2016, management used 6.89%, 7.47%, and 7.31%, respectively, as its weighted-average expected long-term rate of return, which was based on the prevailing and planned strategic asset allocations, as well as estimates of future returns by asset class. For 2019, management anticipates that 6.59% will be the weighted-average expected long-term rate of return. A change in the assumption for the weighted average expected long-term rate of return on plan assets of 1/4 of 1% would impact pretax earnings by approximately \$15 for 2019.

Plan Actions—In 2018, management initiated several actions to certain of the pension and other postretirement benefit plans as follows:

- **Action# 1**—In January 2018, Alcoa Corporation notified all U.S. and Canadian salaried employees, who are participants in three of the Company's defined benefit pension plans, that they will cease accruing retirement benefits for future service, effective January 1, 2021. This change will affect approximately 800 employees, who will be transitioned to country-specific defined contribution plans, in which Alcoa Corporation will contribute 3% of these participants' eligible earnings on an annual basis. Such contributions will be incremental to any employer savings match the employees may receive under existing defined contribution plans. Participants already collecting benefits under these defined benefit pension plans are not affected by these changes.
- **Action# 2**—In January 2018, the Company notified U.S. salaried employees and retirees that it will no longer contribute to pre-Medicare retiree medical coverage, effective January 1, 2021. This change affects approximately 700 participants in one plan.
- **Action# 3**—In April 2018, the Alcoa Corporation signed group annuity contracts to transfer the obligation to pay the remaining retirement benefits of approximately 2,100 retirees from two Canadian defined benefit pension plans to three insurance companies. The transfer of \$560 in both plan obligations and plan assets, as well as a transaction fee of \$23, was completed on April 13, 2018. The Company contributed \$89 between the two plans to facilitate the transaction and maintain the funding level of the remaining plan obligations. Prior to these transactions, these two Canadian pension plans combined had approximately 3,500 participants.
- **Action# 4**—In August 2018, Alcoa Corporation signed a group annuity contract to transfer the obligation to pay the remaining retirement benefits of approximately 10,500 retirees from three U.S. defined benefit pension plans to one insurance company. The transfer of \$287 in both plan obligations and plan assets, as well as a transaction fee of \$10, was completed on August 7, 2018. Additionally, approximately 1,000 plan participants elected to receive lump sum settlements, representing \$75 in plan obligations and \$85 in plan assets. Prior to these two transactions, these three U.S. pension plans combined had approximately 43,400 participants.
- **Action# 5**—In August 2018, the Company notified certain U.S. salaried retirees that life insurance will no longer be provided, effective September 1, 2018. This change affects approximately 5,500 participants in one plan. As part of this change, Alcoa Corporation made a one-time transition payment to the affected retirees totaling \$23 in September 2018.

These actions resulted in the curtailment or settlement of benefits thereby requiring remeasurement, including an update to the discount rates used to determine benefit obligations, of the affected plans. The following table presents certain information and the financial impacts of these actions on the Company's Consolidated Financial Statements:

Action #	Number of plans	Number of affected plan participants	Weighted average discount rate as of December 31, 2017	Plan remeasurement date	Weighted average discount rate as of plan remeasurement date	(Decrease) increase to accrued pension benefits liability ⁽¹⁾	Decrease to accrued other postretirement benefits liability ⁽¹⁾	Curtailment charge (gain) ⁽²⁾	Settlement charge ⁽²⁾
1	3	~800	3.65%	January 31, 2018	3.80%	\$ (57)	\$ —	\$ 5	\$ —
2	1	~700	3.29%	January 31, 2018	3.43%	—	(7)	(28)	—
3	2	~2,100	3.43%	March 31, 2018	3.60%	24	—	—	167
4	3	~11,500	3.70%	July 31, 2018	4.39%	(110)	—	—	230
5	1	~5,500	3.61%	July 31, 2018	4.35%	—	(86)	—	(56)
		~20,600				\$ (143)	\$ (93)	\$ (23)	\$ 341

(1) A negative amount indicates a corresponding decrease to Accumulated other comprehensive loss and a positive amount indicates a corresponding increase to Accumulated other comprehensive loss.

(2) These amounts represent the accelerated amortization of a portion of the existing prior service cost or benefit for curtailments and net actuarial loss for settlements and were reclassified from Accumulated other comprehensive loss to Restructuring and other charges (see this caption in Earnings Summary above) on the Company's Statement of Consolidated Operations.

The eight plans affected by the curtailment and settlement actions described above represented 65% of the combined net unfunded status of the Company's pension and other postretirement benefit plans as of December 31, 2017.

Derivatives and Hedging. Derivatives are held for purposes other than trading and are part of a formally documented risk management program.

Alcoa Corporation accounts for hedges of firm customer commitments for aluminum as fair value hedges. The fair values of the derivatives and changes in the fair values of the underlying hedged items are reported as assets and liabilities in the Consolidated Balance Sheet. Changes in the fair values of these derivatives and underlying hedged items generally offset and are recorded each period in Sales, consistent with the underlying hedged item.

The Company accounts for hedges of foreign currency exposures and certain forecasted transactions as cash flow hedges. The fair values of the derivatives are recorded as assets and liabilities in the Consolidated Balance Sheet. The changes in the fair values of these derivatives are recorded in Other comprehensive income (loss) and are reclassified to Sales, Cost of goods sold, or Other expenses (income), net in the period in which earnings are impacted by the hedged items or in the period that the transaction no longer qualifies as a cash flow hedge. These contracts cover the same periods as known or expected exposures, generally not exceeding five years.

On April 1, 2018, Alcoa Corporation adopted new accounting guidance for hedging activities (see Recently Adopted Accounting Guidance below), which included the elimination of the concept of ineffectiveness, effective on January 1, 2018. Accordingly, there is no longer a requirement to separately measure and report ineffectiveness. Therefore, the following policy description of effectiveness was applicable to periods prior to January 1, 2018. For derivatives designated as fair value hedges, Alcoa Corporation measures hedge effectiveness by formally assessing, at inception and at least quarterly, the historical high correlation of changes in the fair value of the hedged item and the derivative hedging instrument. For derivatives designated as cash flow hedges, Alcoa Corporation measures hedge effectiveness by formally assessing, at inception and at least quarterly, the probable high correlation of the expected future cash flows of the hedged item and the derivative hedging instrument. The ineffective portions of both types of hedges are recorded in Sales or Other expenses (income), net in the current period. If the hedging relationship ceases to be highly effective or it becomes probable that an expected transaction will no longer occur, future gains or losses on the derivative instrument are recorded in Other expenses (income), net.

If no hedging relationship is designated, the derivative is marked to market through Other expenses (income), net.

Cash flows from derivatives are recognized in the Statement of Consolidated Cash Flows in a manner consistent with the underlying transactions.

Income Taxes. Beginning on the Separation Date and forward, the provision for income taxes was determined using the asset and liability approach of accounting for income taxes. Under this approach, the provision for income taxes represents income taxes paid or payable (or received or receivable) for the current year plus the change in deferred taxes during the year. Deferred taxes represent the future tax consequences expected to occur when the reported amounts of assets and liabilities are recovered or paid, and result from differences between the financial and tax bases of Alcoa Corporation's assets and liabilities and are adjusted for changes in tax rates and tax laws when enacted.

In all periods prior to the Separation Date, Alcoa Corporation's operations were included in the income tax filings of ParentCo. The provision for income taxes in Alcoa Corporation's Statement of Consolidated Operations was determined in the same manner described above, but on a separate return methodology as if the Company was a standalone taxpayer filing hypothetical income tax returns where applicable. Any additional accrued tax liability or refund arising as a result of this approach was assumed to be immediately settled with ParentCo as a component of Parent Company net investment. Deferred tax assets were also determined in the same manner described above and were reflected in the Consolidated Balance Sheet for net operating losses, credits or other attributes to the extent that such attributes were expected to transfer to Alcoa Corporation upon the Separation Transaction. Any difference from attributes generated in a hypothetical return on a separate return basis was adjusted as a component of Parent Company net investment.

Valuation allowances are recorded to reduce deferred tax assets when it is more likely than not (greater than 50%) that a tax benefit will not be realized. In evaluating the need for a valuation allowance, management considers all potential sources of taxable income, including income available in carryback periods, future reversals of taxable temporary differences, projections of taxable income, and income from tax planning strategies, as well as all available positive and negative evidence. Positive evidence includes factors such as a history of profitable operations, projections of future profitability within the carryforward period, including from tax planning strategies, and Alcoa Corporation's experience with similar operations. Existing favorable contracts and the ability to sell products into established markets are additional positive evidence. Negative evidence includes items such as cumulative losses, projections of future losses, or carryforward periods that are not long enough to allow for the utilization of a deferred tax asset based on existing projections of income. In certain jurisdictions, deferred tax assets related to cumulative losses exist without a valuation allowance where in management's judgment the weight of the positive evidence more than offsets the negative evidence of the cumulative losses. Upon changes in facts and circumstances, management may conclude that deferred tax assets for which no valuation allowance is currently recorded may not be realized, resulting in a future charge to establish a valuation allowance. Existing valuation allowances are re-examined under the same standards of positive and negative evidence. If it is determined that it is more likely than not that a deferred tax asset will be realized, the appropriate amount of the valuation allowance, if any, is released. Deferred tax assets and liabilities are also re-measured to reflect changes in underlying tax rates due to law changes and the granting and lapse of tax holidays.

The composition of Alcoa Corporation's net deferred tax asset by jurisdiction as of December 31, 2018 was as follows:

	Domestic	Foreign	Total
Deferred tax assets	\$ 895	\$ 1,665	\$ 2,560
Valuation allowance	(783)	(905)	(1,688)
Deferred tax liabilities	(102)	(469)	(571)
	\$ 10	\$ 291	\$ 301

The Company has several income tax filers in various foreign countries. Of the \$291 net deferred tax asset included under the "Foreign" column in the table above, approximately 80% relates to four of Alcoa Corporation's income tax filers as follows: a \$209 deferred tax asset for Alumínio in Brazil; a \$140 net deferred tax asset for AWAB in Brazil; a \$94 deferred tax asset for Española (collectively with Alumínio and AWAB, the "Foreign Filers") in Spain; and a \$220 net deferred tax liability for AofA.

The future realization of the net deferred tax asset for each of the Foreign Filers was based on projections of the respective future taxable income (defined as the sum of pretax income, other comprehensive income, and permanent tax differences), exclusive of reversing temporary differences and carryforwards. The realization of the net deferred tax assets of the Foreign Filers is not dependent on any tax planning strategies. The Foreign Filers each generated taxable income in the three-year cumulative period ending December 31, 2018. Management has also forecasted taxable income for each of the Foreign Filers in 2019 and for the foreseeable future. This forecast is based on macroeconomic indicators and involves assumptions related to, among others: commodity prices; volume levels; and key inputs and raw materials, such as bauxite, caustic soda, energy, labor, and transportation costs. These are the same assumptions utilized by management to develop the financial and operating plan that is used to manage the Company and measure performance against actual results.

The majority of the Foreign Filers' net deferred tax assets relate to tax loss carryforwards. The Foreign Filers do not have a history of tax loss carryforwards expiring unused. Additionally, tax loss carryforwards have an infinite life under the respective income tax codes in Brazil and Spain. That said, utilization of an existing tax loss carryforward is limited to 30% and 25% of taxable income in a particular year in Brazil and Spain, respectively.

Accordingly, management concluded that the net deferred tax assets of the Foreign Filers will more likely than not be realized in future periods, resulting in no need for a partial or full valuation allowance as of December 31, 2018.

In 2018, Alcoa Corporation immediately established a full valuation allowance of \$86 related to an initial deferred tax asset associated with the Company's equity interest in Elysis Limited Partnership ("Elysis"). In June 2018, Alcoa Corporation contributed certain intellectual property and patents and made an initial cash investment of \$5 to Elysis. This deferred tax

asset relates to an outside basis difference created by the excess of the tax basis (i.e. fair value) of these assets over the carrying value of the investment in Elysis recorded by the Company. The initial purpose of Elysis is to advance development of aluminum smelter technology with the ultimate goal of commercialization. After weighing all available positive and negative evidence, management determined it is not more likely than not that Alcoa Corporation will realize the tax benefit of this deferred tax asset. This conclusion was based on the fact that Elysis is expected to generate losses for the foreseeable future as Elysis incurs expenses during the development stage without a committed future revenue stream. The need for this valuation allowance will be assessed on a continuous basis in future periods and, as a result, a portion or all of the allowance may be reversed based on changes in facts and circumstances.

In 2017, the Company established a valuation allowance of \$94 related to the remaining deferred tax assets in Iceland (an initial allowance was previously established in 2015). This amount was comprised of a \$60 discrete income charge recognized in the Provision for income taxes on the accompanying Consolidated Statement of Operations and a \$34 charge to Accumulated other comprehensive loss on the accompanying Consolidated Balance Sheet. These deferred tax assets relate to tax loss carryforwards, which have an expiration period ranging from 2017 to 2026, and deferred losses associated with derivative and hedging activities. After weighing all available positive and negative evidence, management determined that it was no longer more likely than not that Alcoa Corporation will realize the tax benefit of these deferred tax assets. This conclusion was based on existing cumulative losses and a short expiration period. Such losses were generated as a result of intercompany interest expense under the Company's global treasury and cash management system and the realization of deferred losses associated with an LME-linked embedded derivative in a power contract. This interest expense is expected to continue and additional deferred losses associated with the embedded derivative will be realized in future years. As a result, management estimates that there will not be sufficient taxable income available to utilize the operating losses during the expiration period. The need for this valuation allowance will be assessed on a continuous basis in future periods and, as a result, a portion or all of the allowance may be reversed based on changes in facts and circumstances.

Tax benefits related to uncertain tax positions taken or expected to be taken on a tax return are recorded when such benefits meet a more likely than not threshold. Otherwise, these tax benefits are recorded when a tax position has been effectively settled, which means that the statute of limitation has expired or the appropriate taxing authority has completed their examination even though the statute of limitations remains open. Interest and penalties related to uncertain tax positions are recognized as part of the provision for income taxes and are accrued beginning in the period that such interest and penalties would be applicable under relevant tax law until such time that the related tax benefits are recognized.

Related Party Transactions

Alcoa Corporation buys products from and sells products to various related companies, consisting of entities in which Alcoa Corporation retains a 50% or less equity interest, at negotiated prices between the two parties. These transactions were not material to the financial position or results of operations of Alcoa Corporation for all periods presented.

Recently Adopted Accounting Guidance

See the Recently Adopted Accounting Guidance section of Note B to the Consolidated Financial Statements in Part II Item 8 of this Form 10-K.

Recently Issued Accounting Guidance

See the Recently Issued Accounting Guidance section of Note B to the Consolidated Financial Statements in Part II Item 8 of this Form 10-K.

Item 7A. Quantitative and Qualitative Disclosures About Market Risk.

See the Derivatives section of Note O to the Consolidated Financial Statements in Part II Item 8 of this Form 10-K.

Item 8. Financial Statements and Supplementary Data.

Management's Reports to Alcoa Corporation Stockholders

Management's Report on Financial Statements and Practices

The accompanying Consolidated Financial Statements of Alcoa Corporation and its subsidiaries (the "Company") were prepared by management, which is responsible for their integrity and objectivity, in accordance with accounting principles generally accepted in the United States of America (GAAP) and include amounts that are based on management's best judgments and estimates. The other financial information included in the Company's Annual Report on Form 10-K for the year ended December 31, 2018 is consistent with that in the financial statements.

Management recognizes its responsibility for conducting the Company's affairs according to the highest standards of personal and corporate conduct. This responsibility is characterized and reflected in key policy statements issued from time to time regarding, among other things, conduct of its business activities within the laws of the host countries in which the Company operates and potentially conflicting outside business interests of its employees. The Company maintains a systematic program to assess compliance with these policies.

Management's Report on Internal Control over Financial Reporting

Management is responsible for establishing and maintaining adequate internal control over financial reporting, as defined in Rules 13a-15(f) and 15d-15(f) of the U.S. Securities Exchange Act of 1934 (as amended), for the Company. The Company's internal control over financial reporting is a process designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with GAAP. The Company's internal control over financial reporting includes those policies and procedures that (i) pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of the assets of the Company, (ii) provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with GAAP, and that receipts and expenditures of the Company are being made only in accordance with authorizations of management and directors of the Company, and (iii) provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use, or disposition of the Company's assets that could have a material effect on the financial statements.

Because of its inherent limitations, internal control over financial reporting may not prevent or detect misstatements. Also, projections of any evaluation of effectiveness to future periods are subject to the risk that controls may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate.

Management conducted an assessment to evaluate the effectiveness of the Company's internal control over financial reporting as of December 31, 2018 using the criteria in *Internal Control—Integrated Framework* (2013) issued by the Committee of Sponsoring Organizations of the Treadway Commission. Based on this assessment, management concluded that the Company maintained effective internal control over financial reporting as of December 31, 2018.

PricewaterhouseCoopers LLP, an independent registered public accounting firm, audited the effectiveness of the Company's internal control over financial reporting as of December 31, 2018, as stated in their report, which is included herein.

/s/ Roy C. Harvey

Roy C. Harvey
President and
Chief Executive Officer

/s/ William F. Oplinger

William F. Oplinger
Executive Vice President and
Chief Financial Officer

February 25, 2019

Report of Independent Registered Public Accounting Firm

To the Shareholders and Board of Directors of Alcoa Corporation:

Opinions on the Financial Statements and Internal Control over Financial Reporting

We have audited the accompanying consolidated balance sheets of Alcoa Corporation and its subsidiaries (the “Company”) as of December 31, 2018 and 2017, and the related consolidated statements of operations, comprehensive income (loss), changes in equity and cash flows for each of the three years in the period ended December 31, 2018, including the related notes (collectively referred to as the “consolidated financial statements”). We also have audited the Company’s internal control over financial reporting as of December 31, 2018, based on criteria established in *Internal Control—Integrated Framework* (2013) issued by the Committee of Sponsoring Organizations of the Treadway Commission (COSO).

In our opinion, the consolidated financial statements referred to above present fairly, in all material respects, the financial position of the Company as of December 31, 2018 and 2017, and the results of its operations and its cash flows for each of the three years in the period ended December 31, 2018 in conformity with accounting principles generally accepted in the United States of America. Also in our opinion, the Company maintained, in all material respects, effective internal control over financial reporting as of December 31, 2018, based on criteria established in *Internal Control—Integrated Framework* (2013) issued by the COSO.

Change in Accounting Principle

As discussed in Note B under the heading “Recently Adopted Accounting Guidance,” the Company changed the manner in which it presents restricted cash in the statement of consolidated cash flows in 2018.

Basis for Opinions

The Company’s management is responsible for these consolidated financial statements, for maintaining effective internal control over financial reporting, and for its assessment of the effectiveness of internal control over financial reporting, included in the accompanying Management’s Report on Internal Control over Financial Reporting. Our responsibility is to express opinions on the Company’s consolidated financial statements and on the Company’s internal control over financial reporting based on our audits. We are a public accounting firm registered with the Public Company Accounting Oversight Board (United States) (PCAOB) and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audits in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audits to obtain reasonable assurance about whether the consolidated financial statements are free of material misstatement, whether due to error or fraud, and whether effective internal control over financial reporting was maintained in all material respects.

Our audits of the consolidated financial statements included performing procedures to assess the risks of material misstatement of the consolidated financial statements, whether due to error or fraud, and performing procedures that respond to those risks. Such procedures included examining, on a test basis, evidence regarding the amounts and disclosures in the consolidated financial statements. Our audits also included evaluating the accounting principles used and significant estimates made by management, as well as evaluating the overall presentation of the consolidated financial statements. Our audit of internal control over financial reporting included obtaining an understanding of internal control over financial reporting, assessing the risk that a material weakness exists, and testing and evaluating the design and operating effectiveness of internal control based on the assessed risk. Our audits also included performing such other procedures as we considered necessary in the circumstances. We believe that our audits provide a reasonable basis for our opinions.

Definition and Limitations of Internal Control over Financial Reporting

A company’s internal control over financial reporting is a process designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles. A company’s internal control over financial reporting includes those policies and procedures that (i) pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of the assets of the company; (ii) provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with generally accepted accounting principles, and that receipts and expenditures of the company are being made only in accordance with authorizations of management and directors of the company; and (iii) provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use, or disposition of the company’s assets that could have a material effect on the financial statements.

Because of its inherent limitations, internal control over financial reporting may not prevent or detect misstatements. Also, projections of any evaluation of effectiveness to future periods are subject to the risk that controls may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate.

/s/ PricewaterhouseCoopers LLP

PricewaterhouseCoopers LLP
Pittsburgh, Pennsylvania
February 25, 2019

We have served as the Company's auditor since 2015.

Alcoa Corporation and subsidiaries
Statement of Consolidated Operations
(in millions, except per-share amounts)

For the year ended December 31,	2018	2017	2016
Sales (E)	\$ 13,403	\$ 11,652	\$ 9,318
Cost of goods sold (exclusive of expenses below)	10,081	8,991	7,877
Selling, general administrative, and other expenses	248	280	356
Research and development expenses	31	32	33
Provision for depreciation, depletion, and amortization	733	750	718
Restructuring and other charges (D)	527	309	318
Interest expense (S)	122	104	243
Other expenses (income), net (S)	64	27	(65)
Total costs and expenses	11,806	10,493	9,480
Income (Loss) before income taxes	1,597	1,159	(162)
Provision for income taxes (P)	726	600	184
Net income (loss)	871	559	(346)
Less: Net income attributable to noncontrolling interest	644	342	54
Net Income (Loss) Attributable to Alcoa Corporation	227	217	(400)
Earnings per Share Attributable to Alcoa Corporation Common Shareholders (F):			
Basic	\$ 1.22	\$ 1.18	\$ (2.19)
Diluted	\$ 1.20	\$ 1.16	\$ (2.19)

The accompanying notes are an integral part of the consolidated financial statements.

Alcoa Corporation and subsidiaries
Statement of Consolidated Comprehensive Income (Loss)
(in millions)

For the year ended December 31,	Alcoa Corporation			Noncontrolling interest			Total		
	2018	2017	2016	2018	2017	2016	2018	2017	2016
Net income (loss)	\$ 227	\$ 217	\$ (400)	\$ 644	\$ 342	\$ 54	\$ 871	\$ 559	\$ (346)
Other comprehensive income									
(loss) income, net of tax (G):									
Change in unrecognized net actuarial loss and prior service cost/benefit related to pension and other postretirement benefits	503	(456)	(202)	1	9	—	504	(447)	(202)
Foreign currency translation adjustments	(604)	188	213	(229)	96	102	(833)	284	315
Net change in unrecognized gains/losses on cash flow hedges	718	(1,139)	(346)	(20)	50	4	698	(1,089)	(342)
Total Other comprehensive income (loss), net of tax	617	(1,407)	(335)	(248)	155	106	369	(1,252)	(229)
Comprehensive income (loss)	\$ 844	\$ (1,190)	\$ (735)	\$ 396	\$ 497	\$ 160	\$ 1,240	\$ (693)	\$ (575)

The accompanying notes are an integral part of the consolidated financial statements.

Alcoa Corporation and subsidiaries
Consolidated Balance Sheet
(in millions)

December 31,	2018	2017
Assets		
Current assets:		
Cash and cash equivalents (O)	\$ 1,113	\$ 1,358
Receivables from customers	830	811
Other receivables	173	232
Inventories (I)	1,644	1,453
Fair value of derivative instruments (O)	73	113
Prepaid expenses and other current assets	301	271
Total current assets	4,134	4,238
Properties, plants, and equipment, net (J)	8,327	9,138
Investments (H)	1,360	1,410
Deferred income taxes (P)	560	814
Fair value of derivative instruments (O)	82	128
Other noncurrent assets (S)	1,475	1,719
Total Assets	\$ 15,938	\$ 17,447
Liabilities		
Current liabilities:		
Accounts payable, trade	\$ 1,663	\$ 1,898
Accrued compensation and retirement costs	400	459
Taxes, including income taxes	426	282
Fair value of derivative instruments (O)	82	185
Other current liabilities (C)	347	412
Long-term debt due within one year (L & O)	1	16
Total current liabilities	2,919	3,252
Long-term debt, less amount due within one year (L & O)	1,801	1,388
Accrued pension benefits (N)	1,407	2,341
Accrued other postretirement benefits (N)	868	1,100
Asset retirement obligations (Q)	529	617
Environmental remediation (R)	236	258
Fair value of derivative instruments (O)	261	1,105
Noncurrent income taxes (P)	301	309
Other noncurrent liabilities and deferred credits (S)	222	279
Total liabilities	8,544	10,649
Contingencies and commitments (R)		
Equity		
Alcoa Corporation shareholders' equity:		
Common stock (M)	2	2
Additional capital	9,611	9,590
Retained earnings	341	113
Accumulated other comprehensive loss (G)	(4,565)	(5,182)
Total Alcoa Corporation shareholders' equity	5,389	4,523
Noncontrolling interest (A)	2,005	2,275
Total equity	7,394	6,798
Total Liabilities and Equity	\$ 15,938	\$ 17,447

The accompanying notes are an integral part of the consolidated financial statements.

Alcoa Corporation and subsidiaries
Statement of Consolidated Cash Flows
(in millions)

For the year ended December 31,	2018	2017	2016
Cash from Operations			
Net income (loss)	\$ 871	\$ 559	\$ (346)
Adjustments to reconcile net income (loss) to cash from operations:			
Depreciation, depletion, and amortization	733	752	718
Deferred income taxes (P)	(36)	176	(46)
Equity earnings, net of dividends (H)	17	9	48
Restructuring and other charges (D)	527	309	318
Net gain from investing activities—asset sales (S)	—	(116)	(164)
Net periodic pension benefit cost (N)	146	111	66
Stock-based compensation (M)	35	24	28
Other	(59)	32	(16)
Changes in assets and liabilities, excluding effects of acquisitions, divestitures, and foreign currency translation adjustments:			
(Increase) in receivables	(43)	(118)	(234)
(Increase) Decrease in inventories	(278)	(238)	1
(Increase) Decrease in prepaid expenses and other current assets	(32)	43	(52)
(Decrease) Increase in accounts payable, trade	(165)	377	6
(Decrease) in accrued expenses	(319)	(563)	(320)
Increase (Decrease) in taxes, including income taxes	241	111	(148)
Pension contributions (N)	(992)	(106)	(66)
(Increase) in noncurrent assets	(101)	(99)	(184)
(Decrease) Increase in noncurrent liabilities	(97)	(39)	80
Cash provided from (used for) operations	448	1,224	(311)
Financing Activities			
Net transfers from former parent company	—	—	806
Cash paid to former parent company related to separation (A)	—	(247)	(1,072)
Net change in short-term borrowings			
(original maturities of three months or less)	—	7	(4)
Additions to debt (original maturities greater than three months) (L)	560	21	1,228
Payments on debt (original maturities greater than three months) (L)	(135)	(60)	(34)
Proceeds from the exercise of employee stock options (M)	23	43	10
Repurchase of common stock (M)	(50)	—	—
Contributions from noncontrolling interest (A)	149	80	48
Distributions to noncontrolling interest	(827)	(342)	(233)
Other	(8)	(8)	—
Cash (used for) provided from financing activities	(288)	(506)	749
Investing Activities			
Capital expenditures	(399)	(405)	(404)
Proceeds from the sale of assets and businesses (C)	1	245	112
Additions to investments (H)	(7)	(66)	(3)
Sales of investments (H)	—	—	146
Cash used for investing activities	(405)	(226)	(149)
Effect of exchange rate changes on cash and cash equivalents and restricted cash	(4)	14	13
Net change in cash and cash equivalents and restricted cash	(249)	506	302
Cash and cash equivalents and restricted cash at beginning of year	1,365	859	557
Cash and cash equivalents and restricted cash at end of year	\$ 1,116	\$ 1,365	\$ 859

The accompanying notes are an integral part of the consolidated financial statements.

Alcoa Corporation and subsidiaries
Statement of Changes in Consolidated Equity
(in millions)

	Alcoa Corporation shareholders							
	Parent Company net investment	Common stock	Additional capital	Retained (deficit) earnings	Accumulated other compre- hensive loss	Noncontrolling interest	Total equity	
Balance at December 31, 2015	\$ 11,042	\$ —	\$ —	\$ —	\$ (1,600)	\$ 2,071	\$ 11,513	
Net (loss) income	(296)	—	—	(104)	—	54	(346)	
Other comprehensive (loss) income (G)	—	—	—	—	(335)	106	(229)	
Establishment of additional defined benefit plans (N)	176	—	—	—	(2,704)	—	(2,528)	
Change in Parent Company net investment	(603)	—	—	—	—	—	(603)	
Cash provided at separation to Parent Company (A)	(1,072)	—	—	—	—	—	(1,072)	
Separation-related adjustments (A)	(9,247)	—	9,521	—	864	—	1,138	
Issuance of common stock (M)	—	2	(2)	—	—	—	—	
Stock-based compensation (M)	—	—	2	—	—	—	2	
Common stock issued: compensation plans (M)	—	—	10	—	—	—	10	
Contributions (A)	—	—	—	—	—	48	48	
Distributions	—	—	—	—	—	(233)	(233)	
Other	—	—	—	—	—	(3)	(3)	
Balance at December 31, 2016	—	2	9,531	(104)	(3,775)	2,043	7,697	
Net income	—	—	—	217	—	342	559	
Other comprehensive (loss) income (G)	—	—	—	—	(1,407)	155	(1,252)	
Stock-based compensation (M)	—	—	24	—	—	—	24	
Common stock issued: compensation plans (M)	—	—	43	—	—	—	43	
Contributions (A)	—	—	—	—	—	80	80	
Distributions	—	—	—	—	—	(342)	(342)	
Other	—	—	(8)	—	—	(3)	(11)	
Balance at December 31, 2017	—	2	9,590	113	(5,182)	2,275	6,798	
Net income	—	—	—	227	—	644	871	
Other comprehensive income (loss) (G)	—	—	—	—	617	(248)	369	
Stock-based compensation (M)	—	—	35	—	—	—	35	
Common stock issued: compensation plans (M)	—	—	23	—	—	—	23	
Repurchase of common stock (M)	—	—	(50)	—	—	—	(50)	
Contributions (A)	—	—	—	—	—	149	149	
Distributions	—	—	—	—	—	(827)	(827)	
Other	—	—	13	1	—	12	26	
Balance at December 31, 2018	\$ —	\$ 2	\$ 9,611	\$ 341	\$ (4,565)	\$ 2,005	\$ 7,394	

The accompanying notes are an integral part of the consolidated financial statements.

Alcoa Corporation and subsidiaries
Notes to the Consolidated Financial Statements
(dollars in millions, except per-share amounts; metric tons in thousands (kmt))

A. Basis of Presentation

Alcoa Corporation (or the “Company”) is a vertically integrated aluminum company comprised of bauxite mining, alumina refining, aluminum production (smelting, casting, and rolling), and energy generation. The Company has more than 40 operating locations (through direct and indirect ownership) in 10 countries around the world, situated primarily in Australia, Brazil, Canada, Iceland, Norway, Spain, and the United States.

References in these Notes to “ParentCo” refer to Alcoa Inc., a Pennsylvania corporation, and its consolidated subsidiaries (through October 31, 2016, at which time was renamed Arconic Inc. (Arconic)).

Separation Transaction. On November 1, 2016 (the “Separation Date”), ParentCo separated into two standalone, publicly-traded companies, Alcoa Corporation and Arconic, effective at 12:01 a.m. Eastern Standard Time (the “Separation Transaction”). Alcoa Corporation includes the Alumina and Primary Metals segments, which comprised the bauxite mining, alumina refining, aluminum smelting and casting, and energy operations of ParentCo, as well as the Warrick, Indiana rolling operations and the 25.1% equity interest in the rolling mill at the joint venture in Saudi Arabia, both of which were part of ParentCo’s Global Rolled Products segment. Arconic includes the operations that comprise the Global Rolled Products (except for the aforementioned rolling operations that were included in Alcoa Corporation), Engineered Products and Solutions, and Transportation and Construction Solutions segments. ParentCo shareholders of record as of the close of business on October 20, 2016 (the “Record Date”) received one share of Alcoa Corporation common stock, representing in aggregate 80.1% of the common stock of the Company, for every three shares of ParentCo common stock held as of the close of business on the Record Date (cash was paid by ParentCo to its’ shareholders in lieu of fractional shares). Arconic retained the remaining 19.9% of Alcoa Corporation common stock (Arconic sold this retained interest in 2017).

To effect the Separation Transaction, ParentCo undertook a series of transactions to separate the net assets and certain legal entities of ParentCo, resulting in a cash payment of \$1,072 to ParentCo by Alcoa Corporation (an additional \$247 was paid to Arconic by the Company in 2017, including \$243 associated with the sale of certain of the Alcoa Corporation’s energy operations – see Note C) with the net proceeds of a previous debt offering (see Note L). Additionally, 146,159,428 shares and 36,311,767 shares of the Company’s common stock were distributed to ParentCo shareholders and retained by Arconic, respectively. “Regular-way” trading of Alcoa Corporation’s common stock began with the opening of the New York Stock Exchange on November 1, 2016 under the ticker symbol “AA.” The Company’s common stock has a par value of \$0.01 per share.

In connection with the Separation Transaction, Alcoa Corporation and Arconic entered into certain agreements to implement the legal and structural separation between the two companies, govern the relationship between the Company and Arconic after the completion of the Separation Transaction, and allocate between Alcoa Corporation and Arconic various assets, liabilities, and obligations, including, among other things, employee benefits, environmental liabilities, intellectual property, and tax-related assets and liabilities. These agreements included a Separation and Distribution Agreement, Tax Matters Agreement, Employee Matters Agreement, Transition Services Agreement, certain Patent, Know-How, Trade Secret License and Trademark License Agreements, and Stockholder and Registration Rights Agreement.

ParentCo incurred costs to evaluate, plan, and execute the Separation Transaction, and Alcoa Corporation was allocated a pro rata portion of those costs based on segment revenue (see Cost Allocations below). ParentCo recognized \$152 from January 2016 through October 2016 for costs related to the Separation Transaction, of which \$68 was allocated to Alcoa Corporation. The allocated amounts were included in Selling, general administrative, and other expenses on the accompanying Statement of Consolidated Operations.

Basis of Presentation. The Consolidated Financial Statements of Alcoa Corporation are prepared in conformity with accounting principles generally accepted in the United States of America (GAAP). In accordance with GAAP, certain situations require management to make estimates based on judgments and assumptions, which may affect the reported amounts of assets and liabilities and the disclosure of contingent assets and liabilities at the date of the financial statements. They also may affect the reported amounts of revenues and expenses during the reporting periods. Actual results could differ from those estimates upon subsequent resolution of identified matters. Certain amounts in previously issued financial statements were reclassified to conform to the current period presentation (see Recently Adopted Accounting Guidance in Note B).

Principles of Consolidation. The Consolidated Financial Statements of the Company include the accounts of Alcoa Corporation and companies in which Alcoa Corporation has a controlling interest, including those that comprise the Alcoa World Alumina & Chemicals (AWAC) joint venture (see below). Intercompany transactions have been eliminated. The equity method of accounting is applied to investments in affiliates and other joint ventures over which the Company has

significant influence but does not have effective control. Investments in affiliates in which Alcoa Corporation cannot exercise significant influence are accounted for on the cost method.

AWAC is an unincorporated global joint venture between Alcoa Corporation and Alumina Limited and consists of several affiliated operating entities, which own, have an interest in, or operate the bauxite mines and alumina refineries within the Company's Bauxite and Alumina segments (except for the Poços de Caldas mine and refinery and a portion of the São Luís refinery, all in Brazil) and a portion (55%) of the Portland smelter (Australia) within the Company's Aluminum segment. Alcoa Corporation owns 60% and Alumina Limited owns 40% of these individual entities, which are consolidated by the Company for financial reporting purposes and include Alcoa of Australia Limited (AofA), Alcoa World Alumina LLC (AWA), Alcoa World Alumina Brasil Ltda. (AWAB), and Alúmina Española, S.A. (Española). Alumina Limited's interest in the equity of such entities is reflected as Noncontrolling interest on the accompanying Consolidated Balance Sheet. In 2018, 2017, and 2016, AWAC received \$149, \$80, and \$48, respectively, in contributions from Alumina Limited.

Management evaluates whether an Alcoa Corporation entity or interest is a variable interest entity and whether the Company is the primary beneficiary. Consolidation is required if both of these criteria are met. Alcoa Corporation does not have any variable interest entities requiring consolidation.

Prior to the Separation Date, the Company did not operate as a separate, standalone entity. Alcoa Corporation's operations were included in ParentCo's financial results. Accordingly, for all periods prior to the Separation Date, the accompanying Consolidated Financial Statements were prepared from ParentCo's historical accounting records and were presented on a standalone basis as if Alcoa Corporation's operations had been conducted independently from ParentCo. Such Consolidated Financial Statements include the historical operations that were considered to comprise Alcoa Corporation's businesses, as well as certain assets and liabilities that were historically held at ParentCo's corporate level but were specifically identifiable or otherwise attributable to Alcoa Corporation. ParentCo's net investment in these operations is reflected as Parent Company net investment on the accompanying Consolidated Financial Statements. All significant transactions and accounts within Alcoa Corporation have been eliminated. All significant intercompany transactions between ParentCo and Alcoa Corporation were included within Parent Company net investment on the accompanying Consolidated Financial Statements.

Cost Allocations. The description and information on cost allocations is applicable for all periods included in the accompanying Consolidated Financial Statements prior to the Separation Date.

The Consolidated Financial Statements of Alcoa Corporation include general corporate expenses of ParentCo that were not historically charged to Alcoa Corporation for certain support functions that were provided on a centralized basis, such as expenses related to finance, audit, legal, information technology, human resources, communications, compliance, facilities, employee benefits and compensation, and research and development activities. Such general corporate expenses were included on the accompanying Statement of Consolidated Operations within Cost of goods sold, Selling, general administrative and other expenses, and Research and development expenses. These expenses were allocated to Alcoa Corporation on the basis of direct usage when identifiable, with the remainder allocated based on Alcoa Corporation's segment revenue as a percentage of ParentCo's total segment revenue for both Alcoa Corporation and Arconic.

All external debt not directly attributable to Alcoa Corporation was excluded from the Company's Consolidated Balance Sheet. Financing costs related to these debt obligations were allocated to Alcoa Corporation based on the ratio of capital invested in Alcoa Corporation to the total capital invested by ParentCo in both Alcoa Corporation and Arconic, and were included on the accompanying Statement of Consolidated Operations within Interest expense.

The following table reflects the allocations described above:

	2016
Cost of goods sold ⁽¹⁾	\$ 40
Selling, general administrative, and other expenses ⁽²⁾	150
Research and development expenses	2
Provision for depreciation, depletion, and amortization	18
Restructuring and other charges	1
Interest expense	198
Other income, net	(7)

(1) Allocation principally relates to expenses for ParentCo's retained pension and other postretirement benefits associated with closed and sold operations.

(2) Allocation includes costs incurred by ParentCo associated with the Separation Transaction (see Separation Transaction above).

Management believes the assumptions regarding the allocation of ParentCo's general corporate expenses and financing costs were reasonable.

Nevertheless, the Consolidated Financial Statements of Alcoa Corporation may not include all of the actual expenses that would have been incurred and may not reflect the Company's consolidated results of operations, financial position, and cash flows had it been a standalone company during the periods prior to the Separation Date. Actual costs that would have been incurred if Alcoa Corporation had been a standalone company would depend on multiple factors, including organizational structure, capital structure, and strategic decisions made in various areas, including information technology and infrastructure. Transactions between Alcoa Corporation and ParentCo were considered to be effectively settled for cash at the time the transaction was recorded. The total net effect of the settlement of these transactions is reflected on the accompanying Statement of Consolidated Cash Flows as a financing activity and on Alcoa Corporation's Consolidated Balance Sheet as Parent Company net investment.

Cash Management. The description and information on cash management is applicable for all periods included in the Consolidated Financial Statements prior to the Separation Date.

Cash was managed centrally with certain net earnings reinvested locally and working capital requirements met from existing liquid funds. Accordingly, the cash and cash equivalents held by ParentCo at the corporate level were not attributed to Alcoa Corporation for any of the periods prior to the Separation Date. Only cash amounts specifically attributable to Alcoa Corporation were reflected in the Company's Consolidated Balance Sheet. Transfers of cash, both to and from ParentCo's centralized cash management system, were reflected as a component of Parent Company net investment on Alcoa Corporation's Consolidated Balance Sheet and as a financing activity on the accompanying Consolidated Statement of Cash Flows.

ParentCo had an arrangement with several financial institutions to sell certain customer receivables without recourse on a revolving basis. The sale of such receivables was completed through the use of a bankruptcy-remote special-purpose entity, which was a consolidated subsidiary of ParentCo. In connection with this arrangement, certain of Alcoa Corporation's customer receivables were sold on a revolving basis to this bankruptcy-remote subsidiary of ParentCo; these sales were reflected as a component of Parent Company net investment on Alcoa Corporation's Consolidated Balance Sheet.

ParentCo participated in several accounts payable settlement arrangements with certain vendors and third-party intermediaries. These arrangements provided that, at the vendor's request, the third-party intermediary advance the amount of the scheduled payment to the vendor, less an appropriate discount, before the scheduled payment date and ParentCo made payment to the third-party intermediary on the date stipulated in accordance with the commercial terms negotiated with its vendors. In connection with these arrangements, certain of Alcoa Corporation's accounts payable were settled, at the vendor's request, before the scheduled payment date; these settlements were reflected as a component of Parent Company net investment on Alcoa Corporation's Consolidated Balance Sheet.

Related Party Transactions. Alcoa Corporation buys products from and sells products to various related companies, consisting of entities in which the Company retains a 50% or less equity interest, at negotiated prices between the two parties. These transactions were not material to the financial position or results of operations of Alcoa Corporation for all periods presented.

B. Summary of Significant Accounting Policies

Cash Equivalents. Cash equivalents are highly liquid investments purchased with an original maturity of three months or less.

Inventory Valuation. Inventories are carried at the lower of cost or market, with cost for a substantial portion of U.S. inventories and a small portion of Canadian inventories determined under the last-in, first-out (LIFO) method. The cost of other inventories is principally determined under the average-cost method.

Effective January 1, 2019, Alcoa Corporation will discontinue the use of the LIFO method for the referenced inventories. The cost of these inventories will now be determined on the average-cost method. In accordance with GAAP, all prior periods presented in the Company's Consolidated Financial Statements will be recast to retroactively apply this inventory costing change. Alcoa Corporation is still finalizing this change in accounting principle; however, management does not expect the inventory costing change to have a material impact on the Company's Statement of Consolidated Operations for the year ended December 31, 2018.

Properties, Plants, and Equipment. Properties, plants, and equipment are recorded at cost. Also, interest related to the construction of qualifying assets is capitalized as part of the construction costs. Depreciation is recorded principally on the straight-line method at rates based on the estimated useful lives of the assets. For greenfield assets (i.e. construction of new assets on undeveloped land) the units of production method is used to record depreciation. These assets require a significant period (generally greater than one-year) to ramp-up to full production capacity. As a result, the units of production method is deemed a more systematic and rational method for recognizing depreciation on these assets. Depreciation is recorded on temporarily idled facilities until such time management approves a permanent closure. The following table details the weighted-average useful lives of structures and machinery and equipment by type of operation (numbers in years):

Segment	Structures	Machinery and equipment
Bauxite mining	35	16
Alumina refining	30	28
Aluminum smelting and casting	36	22
Energy generation	33	24
Aluminum rolling	31	23

Repairs and maintenance are charged to expense as incurred. Gains or losses from the sale of assets are generally recorded in Other expenses (income), net.

Properties, plants, and equipment are reviewed for impairment whenever events or changes in circumstances indicate that the carrying amount of such assets (asset group) may not be recoverable. Recoverability of assets is determined by comparing the estimated undiscounted net cash flows of the operations related to the assets (asset group) to their carrying amount. An impairment loss would be recognized when the carrying amount of the assets (asset group) exceeds the estimated undiscounted net cash flows. The amount of the impairment loss to be recorded is calculated as the excess of the carrying value of the assets (asset group) over their fair value, with fair value determined using the best information available, which generally is a discounted cash flow (DCF) model. The determination of what constitutes an asset group, the associated estimated undiscounted net cash flows, and the estimated useful lives of assets also require significant judgments.

Equity Investments. Alcoa Corporation invests in a number of privately-held companies, primarily through joint ventures and consortia, which are accounted for using the equity method. The equity method is applied in situations where Alcoa Corporation has the ability to exercise significant influence, but not control, over the investee. Management reviews equity investments for impairment whenever certain indicators are present suggesting that the carrying value of an investment is not recoverable. This analysis requires a significant amount of judgment from management to identify events or circumstances indicating that an equity investment is impaired. The following items are examples of impairment indicators: significant, sustained declines in an investee's revenue, earnings, and cash flow trends; adverse market conditions of the investee's industry or geographic area; the investee's ability to continue operations measured by several items, including liquidity; and other factors. Once an impairment indicator is identified, management uses considerable judgment to determine if the impairment is other than temporary, in which case the equity investment is written down to its estimated fair value. An impairment that is other than temporary could significantly and adversely impact reported results of operations.

Deferred Mining Costs. Alcoa Corporation recognizes deferred mining costs during the development stage of a mine life cycle. Such costs include the construction of access and haul roads, detailed drilling and geological analysis to further define the grade and quality of the known bauxite, and overburden removal costs. These costs relate to sections of the related mines where Alcoa Corporation is either currently extracting bauxite or is preparing for production in the near term. These sections are outlined and planned incrementally and generally are mined over periods ranging from one to five years, depending on mine specifics. The amount of geological drilling and testing necessary to determine the economic viability of the bauxite deposit being mined is such that the reserves are considered to be proven, and the mining costs are amortized based on this level of reserves. Deferred mining costs are included in Other noncurrent assets on the accompanying Consolidated Balance Sheet.

Goodwill and Other Intangible Assets. Goodwill is not amortized; it is instead reviewed for impairment annually (in the fourth quarter) or more frequently if indicators of impairment exist or if a decision is made to sell or exit a business. A significant amount of judgment is involved in determining if an indicator of impairment has occurred. Such indicators may include, among others, deterioration in general economic conditions, negative developments in equity and credit markets, adverse changes in the markets in which an entity operates, increases in input costs that have a negative effect on earnings and cash flows, or a trend of negative or declining cash flows over multiple periods. The fair value that could be realized in an actual transaction may differ from that used to evaluate goodwill for impairment.

Goodwill is allocated among and evaluated for impairment at the reporting unit level, which is defined as an operating segment or one level below an operating segment. Alcoa Corporation has five reporting units, of which three are included in

the Aluminum segment (smelting/casting, energy generation, and rolling operations). The remaining two reporting units are the Bauxite and Alumina segments. Of these five reporting units, only Bauxite and Alumina contain goodwill. As of December 31, 2018, the carrying value of the goodwill for Bauxite and Alumina was \$51 and \$100, respectively. These amounts include an allocation of goodwill held at the corporate level (see Note K).

In reviewing goodwill for impairment, an entity has the option to first assess qualitative factors to determine whether the existence of events or circumstances leads to a determination that it is more likely than not (greater than 50%) that the estimated fair value of a reporting unit is less than its carrying amount. If an entity elects to perform a qualitative assessment and determines that an impairment is more likely than not, the entity is then required to perform a quantitative impairment test (described below), otherwise no further analysis is required. An entity also may elect not to perform the qualitative assessment and, instead, proceed directly to the quantitative impairment test. The ultimate outcome of the goodwill impairment review for a reporting unit should be the same whether an entity chooses to perform the qualitative assessment or proceeds directly to the quantitative impairment test.

Alcoa Corporation's policy for its annual review of goodwill is to perform the qualitative assessment for all reporting units not subjected directly to the quantitative impairment test. Generally, management will proceed directly to the quantitative impairment test for each of its two reporting units that contain goodwill at least once during every three-year period, as part of its annual review of goodwill.

Under the qualitative assessment, various events and circumstances (or factors) that would affect the estimated fair value of a reporting unit are identified (similar to impairment indicators above). These factors are then classified by the type of impact they would have on the estimated fair value using positive, neutral, and adverse categories based on current business conditions. Additionally, an assessment of the level of impact that a particular factor would have on the estimated fair value is determined using high, medium, and low weighting. Furthermore, management considers the results of the most recent quantitative impairment test completed for a reporting unit and compares the weighted average cost of capital (WACC) between the current and prior years for each reporting unit.

During the 2018 annual review of goodwill, management performed the qualitative assessment for the Alumina reporting unit. Management concluded it was not more likely than not that the respective estimated fair value of this reporting unit was less than the respective carrying value. As such, no further analysis was required.

Under the quantitative impairment test, the evaluation of impairment involves comparing the current fair value of each reporting unit to its carrying value, including goodwill. Alcoa Corporation uses a DCF model to estimate the current fair value of its reporting units when testing for impairment, as management believes forecasted cash flows are the best indicator of such fair value. A number of significant assumptions and estimates are involved in the application of the DCF model to forecast operating cash flows, including markets and market share, sales volumes and prices, production costs, tax rates, capital spending, discount rate, and working capital changes. Certain of these assumptions can vary significantly among the reporting units. Cash flow forecasts are generally based on approved business unit operating plans for the early years and historical relationships in later years. The betas used in calculating the individual reporting units' WACC rate are estimated for each business with the assistance of valuation experts.

In the event the estimated fair value of a reporting unit per the DCF model is less than the carrying value, an impairment loss equal to the excess of the reporting unit's carrying value over its fair value not to exceed the total amount of goodwill applicable to that reporting unit would be recognized.

During the 2018 annual review of goodwill, management proceeded directly to the quantitative impairment test for the Bauxite reporting unit. The estimated fair value of this reporting unit was substantially in excess of its carrying value, resulting in no impairment.

Management last proceeded directly to the quantitative impairment test for the Alumina reporting unit in 2016. At that time, the estimated fair value of the Alumina reporting unit was substantially in excess of its carrying value, resulting in no impairment. Additionally, in all prior years presented, there have been no triggering events that necessitated an impairment test for either the Bauxite or Alumina reporting units.

Intangible assets with finite useful lives are amortized generally on a straight-line basis over the periods benefited. The following table details the weighted-average useful lives of software and other intangible assets by type of operation (numbers in years):

Segment	Software	Other intangible assets
Bauxite mining	6	10
Alumina refining	6	20
Aluminum smelting and casting	4	39
Energy generation	3	28
Aluminum rolling	4	20

Asset Retirement Obligations. Alcoa Corporation recognizes asset retirement obligations (AROs) related to legal obligations associated with the standard operation of bauxite mines, alumina refineries, and aluminum smelters. These AROs consist primarily of costs associated with mine reclamation, closure of bauxite residue areas, spent pot lining disposal, and landfill closure. Alcoa Corporation also recognizes AROs for any significant lease restoration obligation, if required by a lease agreement, and for the disposal of regulated waste materials related to the demolition of certain power facilities. The fair values of these AROs are recorded on a discounted basis, at the time the obligation is incurred, and accreted over time for the change in present value. Additionally, Alcoa Corporation capitalizes asset retirement costs by increasing the carrying amount of the related long-lived assets and depreciating these assets over their remaining useful life.

Certain conditional asset retirement obligations (CAROs) related to alumina refineries, aluminum smelters, rolling mills, and energy generation facilities have not been recorded in the Consolidated Financial Statements due to uncertainties surrounding the ultimate settlement date. A CARO is a legal obligation to perform an asset retirement activity in which the timing and/or method of settlement are conditional on a future event that may or may not be within Alcoa Corporation's control. Such uncertainties exist as a result of the perpetual nature of the structures, maintenance and upgrade programs, and other factors. At the date a reasonable estimate of the ultimate settlement date can be made (e.g., planned demolition), Alcoa Corporation would record an ARO for the removal, treatment, transportation, storage, and/or disposal of various regulated assets and hazardous materials such as asbestos, underground and aboveground storage tanks, polychlorinated biphenyls (PCBs), various process residuals, solid wastes, electronic equipment waste, and various other materials. Such amounts may be material to the Consolidated Financial Statements in the period in which they are recorded.

Environmental Matters. Expenditures for current operations are expensed or capitalized, as appropriate. Expenditures relating to existing conditions caused by past operations, which will not contribute to future revenues, are expensed. Liabilities are recorded when remediation costs are probable and can be reasonably estimated. The liability may include costs such as site investigations, consultant fees, feasibility studies, outside contractors, and monitoring expenses. Estimates are generally not discounted or reduced by potential claims for recovery, which are recognized as agreements are reached with third parties. The estimates also include costs related to other potentially responsible parties to the extent that Alcoa Corporation has reason to believe such parties will not fully pay their proportionate share. The liability is continuously reviewed and adjusted to reflect current remediation progress, prospective estimates of required activity, and other factors that may be relevant, including changes in technology or regulations.

Litigation Matters. For asserted claims and assessments, liabilities are recorded when an unfavorable outcome of a matter is deemed to be probable and the loss is reasonably estimable. Management determines the likelihood of an unfavorable outcome based on many factors such as, among others, the nature of the matter, available defenses and case strategy, progress of the matter, views and opinions of legal counsel and other advisors, applicability and success of appeals processes, and the outcome of similar historical matters. Once an unfavorable outcome is deemed probable, management weighs the probability of estimated losses, and the most reasonable loss estimate is recorded. If an unfavorable outcome of a matter is deemed to be reasonably possible, then the matter is disclosed and no liability is recorded. With respect to unasserted claims or assessments, management must first determine that the probability that an assertion will be made is likely, then, a determination as to the likelihood of an unfavorable outcome and the ability to reasonably estimate the potential loss is made. Legal matters are reviewed on a continuous basis to determine if there has been a change in management's judgment regarding the likelihood of an unfavorable outcome or the estimate of a potential loss.

Revenue Recognition. The Company recognizes revenue when it satisfies a performance obligation(s) in accordance with the provisions of a customer order or contract. This is achieved when control of the product has been transferred to the customer, which is generally determined when title, ownership, and risk of loss pass to the customer, all of which occurs upon shipment or delivery of the product. The shipping terms vary across all businesses and depend on the product, the country of origin, and the type of transportation (commercial delivery truck, train, or vessel). Accordingly, except for the sale of electricity, the sale of Alcoa Corporation's products to its customers represent single performance obligations for which revenue is recognized at a point in time. Based on the foregoing, no significant judgment is required to determine when control of a product has been transferred to a customer.

The Company measures revenue based on the consideration it expects to be entitled to receive in exchange for its products. The standard terms and conditions of customer orders and contracts include general rights of return and product warranty provisions related to nonconforming or “out-of-spec” product. Depending on the circumstances, the product is either replaced or a quality adjustment is issued. Historically, such returns and adjustments have not been material to Alcoa Corporation’s Consolidated Financial Statements.

The Company considers shipping and handling activities as costs to fulfill the promise to transfer the related products. As a result, customer payments of shipping and handling costs are recorded as a component of revenue. Also, Alcoa Corporation may collect various taxes (e.g., sales, use, value-added, excise) from its customers related to the sale of its products and remit such amounts to governmental authorities. As such, amounts paid to the Company for these types of taxes are excluded from the transaction price used to determine the proper measurement of revenue.

Stock-Based Compensation. For all periods prior to the Separation Date, eligible employees attributable to Alcoa Corporation operations participated in ParentCo’s stock-based compensation plans. The compensation expense recorded by Alcoa Corporation included the expense associated with these employees, as well as the expense associated with the allocation of stock-based compensation expense for ParentCo’s corporate employees. Beginning on the Separation Date and forward, Alcoa Corporation recorded stock-based compensation expense for all eligible Company employees. The following accounting policy describes how stock-based compensation expense is initially determined for both Alcoa Corporation and ParentCo.

Compensation expense for employee equity grants is recognized using the non-substantive vesting period approach, in which the expense (net of estimated forfeitures) is recognized ratably over the requisite service period based on the grant date fair value. The fair value of new stock options is estimated on the date of grant using a lattice-pricing model. Determining the fair value of stock options at the grant date requires judgment, including estimates for the average risk-free interest rate, dividend yield, volatility, annual forfeiture rate, and exercise behavior. These assumptions may differ significantly between grant dates because of changes in the actual results of these inputs that occur over time.

Most plan participants can choose whether to receive their award in the form of stock options, stock units, or a combination of both. This choice is made before the grant is issued and is irrevocable.

Pension and Other Postretirement Benefit Plans. For all periods prior to August 1, 2016 (see below), certain employees attributable to Alcoa Corporation operations participated in defined benefit pension and other postretirement benefit plans (the “Shared Plans”) sponsored by ParentCo, which also included participants attributable to non-Alcoa Corporation operations. Alcoa Corporation accounted for these Shared Plans as multiemployer benefit plans. Accordingly, Alcoa Corporation did not record an asset or liability to recognize the funded status of the Shared Plans. However, the related expense recorded by Alcoa Corporation was based primarily on pensionable compensation and estimated interest costs related to employees attributable to Alcoa Corporation operations.

Prior to the Separation Date, certain other plans that were entirely attributable to employees of Alcoa Corporation-related operations (the “Direct Plans”) were accounted for as defined benefit pension and other postretirement benefit plans. Accordingly, the funded and unfunded position of each Direct Plan was recorded in the Consolidated Balance Sheet. Actuarial gains and losses that had not yet been recognized through earnings were recorded in accumulated other comprehensive income, net of taxes, until they were amortized as a component of net periodic benefit cost. The determination of benefit obligations and recognition of expenses related to the Direct Plans is dependent on various assumptions. The major assumptions primarily relate to discount rates, long-term expected rates of return on plan assets, and future compensation increases. ParentCo’s management developed each assumption using relevant company experience in conjunction with market-related data for each individual location in which such plans exist.

In preparation for the Separation Transaction, effective August 1, 2016, certain of the Shared Plans were separated into standalone plans for both Alcoa Corporation and ParentCo (see Note N). Additionally, certain of the other remaining Shared Plans were assumed by Alcoa Corporation (See Note N). Accordingly, beginning on August 1, 2016 and forward, the standalone plans and assumed plans were accounted for as defined benefit pension and other postretirement plans. Additionally, the Direct Plans continued to be accounted for as defined benefit pension and other postretirement plans.

Derivatives and Hedging. Derivatives are held for purposes other than trading and are part of a formally documented risk management program.

Alcoa Corporation accounts for hedges of firm customer commitments for aluminum as fair value hedges. The fair values of the derivatives and changes in the fair values of the underlying hedged items are reported as assets and liabilities in the Consolidated Balance Sheet. Changes in the fair values of these derivatives and underlying hedged items generally offset and are recorded each period in Sales, consistent with the underlying hedged item.

The Company accounts for hedges of foreign currency exposures and certain forecasted transactions as cash flow hedges. The fair values of the derivatives are recorded as assets and liabilities in the Consolidated Balance Sheet. The changes in the

fair values of these derivatives are recorded in Other comprehensive income (loss) and are reclassified to Sales, Cost of goods sold, or Other expenses (income), net in the period in which earnings are impacted by the hedged items or in the period that the transaction no longer qualifies as a cash flow hedge. These contracts cover the same periods as known or expected exposures, generally not exceeding five years.

On April 1, 2018, Alcoa Corporation adopted new accounting guidance for hedging activities (see Recently Adopted Accounting Guidance below), which included the elimination of the concept of ineffectiveness, effective on January 1, 2018. Accordingly, there is no longer a requirement to separately measure and report ineffectiveness. Therefore, the following policy description of effectiveness was applicable to periods prior to January 1, 2018. For derivatives designated as fair value hedges, Alcoa Corporation measures hedge effectiveness by formally assessing, at inception and at least quarterly, the historical high correlation of changes in the fair value of the hedged item and the derivative hedging instrument. For derivatives designated as cash flow hedges, Alcoa Corporation measures hedge effectiveness by formally assessing, at inception and at least quarterly, the probable high correlation of the expected future cash flows of the hedged item and the derivative hedging instrument. The ineffective portions of both types of hedges are recorded in Sales or Other expenses (income), net in the current period. If the hedging relationship ceases to be highly effective or it becomes probable that an expected transaction will no longer occur, future gains or losses on the derivative instrument are recorded in Other expenses (income), net.

If no hedging relationship is designated, the derivative is marked to market through Other expenses (income), net.

Cash flows from derivatives are recognized in the Statement of Consolidated Cash Flows in a manner consistent with the underlying transactions.

Income Taxes. Beginning on the Separation Date and forward, the provision for income taxes was determined using the asset and liability approach of accounting for income taxes. Under this approach, the provision for income taxes represents income taxes paid or payable (or received or receivable) for the current year plus the change in deferred taxes during the year. Deferred taxes represent the future tax consequences expected to occur when the reported amounts of assets and liabilities are recovered or paid, and result from differences between the financial and tax bases of Alcoa Corporation's assets and liabilities and are adjusted for changes in tax rates and tax laws when enacted.

In all periods prior to the Separation Date, Alcoa Corporation's operations were included in the income tax filings of ParentCo. The provision for income taxes in Alcoa Corporation's Statement of Consolidated Operations was determined in the same manner described above, but on a separate return methodology as if the Company was a standalone taxpayer filing hypothetical income tax returns where applicable. Any additional accrued tax liability or refund arising as a result of this approach was assumed to be immediately settled with ParentCo as a component of Parent Company net investment. Deferred tax assets were also determined in the same manner described above and were reflected in the Consolidated Balance Sheet for net operating losses, credits or other attributes to the extent that such attributes were expected to transfer to Alcoa Corporation upon the Separation Transaction. Any difference from attributes generated in a hypothetical return on a separate return basis was adjusted as a component of Parent Company net investment.

Valuation allowances are recorded to reduce deferred tax assets when it is more likely than not (greater than 50%) that a tax benefit will not be realized. In evaluating the need for a valuation allowance, management considers all potential sources of taxable income, including income available in carryback periods, future reversals of taxable temporary differences, projections of taxable income, and income from tax planning strategies, as well as all available positive and negative evidence. Positive evidence includes factors such as a history of profitable operations, projections of future profitability within the carryforward period, including from tax planning strategies, and Alcoa Corporation's experience with similar operations. Existing favorable contracts and the ability to sell products into established markets are additional positive evidence. Negative evidence includes items such as cumulative losses, projections of future losses, or carryforward periods that are not long enough to allow for the utilization of a deferred tax asset based on existing projections of income. Deferred tax assets for which no valuation allowance is recorded may not be realized upon changes in facts and circumstances, resulting in a future charge to establish a valuation allowance. Existing valuation allowances are re-examined under the same standards of positive and negative evidence. If it is determined that it is more likely than not that a deferred tax asset will be realized, the appropriate amount of the valuation allowance, if any, is released. Deferred tax assets and liabilities are also re-measured to reflect changes in underlying tax rates due to law changes and the granting and lapse of tax holidays.

Tax benefits related to uncertain tax positions taken or expected to be taken on a tax return are recorded when such benefits meet a more likely than not threshold. Otherwise, these tax benefits are recorded when a tax position has been effectively settled, which means that the statute of limitation has expired or the appropriate taxing authority has completed their examination even though the statute of limitations remains open. Interest and penalties related to uncertain tax positions are recognized as part of the provision for income taxes and are accrued beginning in the period that such interest and penalties would be applicable under relevant tax law until such time that the related tax benefits are recognized.

Foreign Currency. The local currency is the functional currency for Alcoa Corporation's significant operations outside the United States, except for certain operations in Canada and Iceland, where the U.S. dollar is used as the functional currency. The determination of the functional currency for Alcoa Corporation's operations is made based on the appropriate economic and management indicators.

Recently Adopted Accounting Guidance. On January 1, 2018, Alcoa Corporation adopted changes issued by the Financial Accounting Standards Board (FASB) to the recognition of revenue from contracts with customers. This guidance created a comprehensive framework for all entities in all industries to apply in the determination of when to recognize revenue, and, therefore, supersedes virtually all existing revenue recognition requirements and guidance. This framework is expected to result in less complex guidance in application while providing a consistent and comparable methodology for revenue recognition. The core principle of the guidance is that an entity should recognize revenue to depict the transfer of promised goods or services to customers in an amount that reflects the consideration to which the entity expects to be entitled in exchange for those goods or services. To achieve this principle, an entity should apply the following steps: (i) identify the contract(s) with a customer, (ii) identify the performance obligations in the contract(s), (iii) determine the transaction price, (iv) allocate the transaction price to the performance obligations in the contract(s), and (v) recognize revenue when, or as, the entity satisfies a performance obligation. Management's assessment of this guidance was applied only to those customer contracts that were open on the date of adoption under the modified retrospective method. Through a previously established project team, the Company completed a detailed review of the terms and provisions of its customer contracts, as well as evaluated these contracts under the new guidance, throughout 2017 and concluded that Alcoa Corporation's revenue recognition practices were in compliance with this framework. That said, the Company did make some minor modifications to its internal accounting policies and internal control structure to ensure that any future customer contracts that may have different terms and conditions of those that the Company has today are properly evaluated under the new guidance. Other than providing additional disclosure (see Revenue Recognition above and the Product Information section in Note E), the adoption of this guidance had no impact on the Consolidated Financial Statements.

On January 1, 2018, Alcoa Corporation adopted guidance issued by the FASB to the accounting and reporting of certain equity investments. This guidance requires equity investments (except those accounted for under the equity method of accounting or those that result in consolidation of the investee) to be measured at fair value with changes in fair value recognized in net income. However, an entity may choose to measure equity investments that do not have readily determinable fair values at cost minus impairment, if any, plus or minus changes resulting from observable price changes in orderly transactions for the identical or similar investment of the same issuer. Additionally, the impairment assessment of equity investments without readily determinable fair values has been simplified by requiring a qualitative assessment to identify impairment. The adoption of this guidance had no impact on the Consolidated Financial Statements, as all of Alcoa Corporation's equity investments are accounted for under the equity method of accounting.

On January 1, 2018, Alcoa Corporation adopted guidance issued by the FASB to the presentation of several items in the statement of cash flows. Specifically, the guidance identifies nine cash flow items and the sections where they must be presented within the statement of cash flows, including distributions received from equity method investees, proceeds from the settlement of insurance claims, and restricted cash. Other than as it relates to restricted cash, the adoption of this guidance had no impact on the Consolidated Financial Statements. This guidance requires that restricted cash be aggregated with cash and cash equivalents in both the beginning-of-period and end-of-period line items at the bottom of the statement of cash flows. Previously, the change in restricted cash between the beginning-of-period and end-of period was reflected as either an investing, financing, operating, or non-cash activity based on the underlying nature of the transaction. Accordingly, for the accompanying Statement of Consolidated Cash Flows for the year ended December 31, 2018, the Cash and cash equivalents and restricted cash at beginning of year and Cash and cash equivalents and restricted cash at end of year line items include restricted cash of \$7 and \$3, respectively. Additionally, the Company's Statement of Consolidated Cash Flows for the years ended December 31, 2017 and 2016 were recast to reflect this change in presentation as follows (only line items impacted are reflected in the table):

For the year ended December 31,	2017			2016		
	As previously reported	Change	As recast	As previously reported	Change	As recast
Financing activities						
Net transfers from former parent company	\$ —	\$ —	\$ —	\$ 802	\$ 4	\$ 806
Additions to debt (original maturities greater than three months*)	—	—	—	—	1,228	1,228
Cash (used for) provided from financing activities	(506)	—	(506)	(483)	1,232	749
Investing activities						
Net change in restricted cash	—	—	—	1,226	(1,226)	—
Cash (used for) provided from investing activities	(226)	—	(226)	1,077	(1,226)	(149)
Effect of exchange rate changes on cash and cash equivalents and restricted cash	13	1	14	13	—	13
Net change in cash and cash equivalents and restricted cash	505	1	506	296	6	302
Cash and cash equivalents and restricted cash at beginning of year	853	6	859	557	—	557
Cash and cash equivalents and restricted cash at end of year	1,358	7	1,365	853	6	859

* In September 2016, a subsidiary of the Company issued \$1,250 in new senior notes (see Note L) in preparation for the Separation Transaction. The net proceeds of \$1,228 from the debt issuance were required to be placed in escrow contingent on completion of the Separation Transaction. As a result, the \$1,228 of escrowed cash was recorded as restricted cash. Prior to the adoption of this new guidance, in previously issued reports, the issuance of the new senior notes and the increase in restricted cash were properly excluded from Alcoa Corporation's Statement of Consolidated Cash Flows for the year ended December 31, 2016 as noncash financing and investing activities, respectively. However, in this report, the adoption of the new accounting guidance results in the issuance of debt being included in the Company's Statement of Consolidated Cash Flows for the year ended December 31, 2016 as a cash transaction.

See Note S for a reconciliation of Cash and cash equivalents and Restricted cash reported in the accompanying Consolidated Balance Sheet that sum to the Cash and cash equivalents and restricted cash at both the beginning of year and end of year presented on the accompanying Statement of Consolidated Cash Flows for the year ended December 31, 2018.

On January 1, 2018, Alcoa Corporation adopted guidance issued by the FASB to the accounting for intra-entity transactions, other than inventory. The guidance requires the current and deferred income tax consequences of an intra-entity transfer to be recorded immediately when the transaction occurs; the exception to defer the tax consequences of inventory transactions is maintained. Prior to this guidance, no immediate tax impact was permitted to be recognized in an entity's financial statements as a result of intra-entity transfers of assets. An entity was precluded from reflecting a tax benefit or expense from an intra-entity asset transfer between entities that file separate tax returns, whether or not such entities are in different tax jurisdictions, until the asset had been sold to a third party or otherwise recovered. The buyer of such asset was prohibited from recognizing a deferred tax asset for the temporary difference arising from the excess of the buyer's tax basis over the cost to the seller. The adoption of this guidance had an immaterial impact on the Consolidated Financial Statements.

On January 1, 2018, Alcoa Corporation adopted guidance issued by the FASB to accounting for business combinations. This guidance clarifies the definition of a business for the purposes of evaluating whether a particular transaction should be accounted for as an acquisition or disposal of a business or an asset. Generally, a business is an integrated set of assets and activities that contain inputs, processes, and outputs, although outputs are not required. This guidance provides a "screen" to determine whether an integrated set of assets and activities qualifies as a business. If substantially all of the fair value of the gross assets is concentrated in a single identifiable asset or a group of similar identifiable assets, the definition of a business has not been met and the transaction should be accounted for as an acquisition or disposal of an asset. Otherwise, an entity is required to evaluate whether the integrated set of assets and activities include, at a minimum, an input and a substantive process that together significantly contribute to the ability to create output and are no longer to consider whether a market participant could replace any missing elements. This guidance also narrows the definition of an output. Previously, an output was defined as the ability to provide a return in the form of dividends, lower costs, or other economic benefits directly to investors, owners, members, or participants. An output is now defined as the ability to provide goods or services to customers, investment income, or other revenues. The adoption of this guidance had no immediate impact on the Consolidated Financial Statements; however, this guidance will need to be considered in the event Alcoa Corporation acquires or disposes of an integrated set of assets and activities.

On January 1, 2018, Alcoa Corporation early adopted guidance issued by the FASB to the assessment of goodwill for impairment as it relates to the quantitative test. Prior to this guidance, there were two steps when performing a quantitative impairment test. The first step required an entity to compare the current fair value of a reporting unit to its carrying value. In the event the reporting unit's estimated fair value was less than its carrying value, an entity performed the second step, which was to compare the carrying amount of the reporting unit's goodwill with the implied fair value of that goodwill. The implied fair value of goodwill is the excess of the fair value of the reporting unit over the fair value amounts assigned to all of the assets and liabilities of that unit as if the reporting unit was acquired in a business combination and the fair value of the reporting unit represented the purchase price. If the carrying value of goodwill exceeded its implied fair value, an impairment loss equal to such excess was recognized. This guidance eliminates the second step of the quantitative impairment test. Accordingly, an entity would recognize an impairment of goodwill for a reporting unit, if under what was previously referred to as the first step, the estimated fair value of the reporting unit is less than the carrying value. The impairment would be equal to the excess of the reporting unit's carrying value over its fair value not to exceed the total amount of goodwill applicable to that reporting unit. The adoption of this guidance had no immediate impact on the Consolidated Financial Statements; however, this guidance will need to be considered each time the Company performs an assessment of goodwill for impairment under the quantitative test (see Goodwill and Other Intangible Assets above).

On January 1, 2018, Alcoa Corporation adopted guidance issued by the FASB to the presentation of net periodic benefit cost related to pension and other postretirement benefit plans. This guidance requires that an entity report the service cost component of net periodic benefit cost in the same line item(s) on its income statement as other compensation costs arising from services rendered by the pertinent employees during a reporting period. The other components of net periodic benefit cost (see Note N) are required to be reported separately from the service cost component. In other words, these other components may be aggregated and presented as a separate line item or they may be reported in existing line items on the income statement other than such line items that include the service cost component. Previously, Alcoa Corporation reported all components of net periodic benefit cost, except for certain settlements, curtailments, and special termination benefits, in Cost of goods sold (business employees) and Selling, general administrative, and other expenses (corporate employees) consistent with the location of other compensation costs related to the respective employees. The non-service cost components noted as exceptions are reported in Restructuring and other charges, as applicable. Additionally, this guidance only permits the service cost component to be capitalized as applicable (e.g., as a cost of internally manufactured inventory). Upon adoption of this guidance, management began reporting the non-service cost components of net periodic benefit cost, except for certain settlements, curtailments, and special termination benefits that will continue to be reported in Restructuring and other charges, in Other expenses (income), net on the accompanying Statement of Consolidated Operations (see Note N). For the year ended December 31, 2018, the non-service cost components reported in Other expenses, net was \$139. Additionally, the Statement of Consolidated Operations for the years ended December 31, 2017 and 2016 was recast to reflect the reclassification of the non-service cost components of net periodic benefit cost to Other expense (income), net from both Cost of goods sold and Selling, general administrative, and other expenses as follows:

For the year ended December 31,	2017			2016		
	As previously reported	Change	As recast	As previously reported	Change	As recast
Cost of goods sold	\$ 9,072	\$ (81)	\$ 8,991	\$ 7,898	\$ (21)	\$ 7,877
Selling, general administrative, and other expenses	284	(4)	280	359	(3)	356
Other expenses (income), net	(58)	85	27	(89)	24	(65)

Under the practical expedient option provided for in the guidance, the Company used previously disclosed amounts for non-service cost components to recast these line items for the years ended December 31, 2017 and 2016. Furthermore, Alcoa Corporation no longer capitalizes any non-service cost components as part of the cost of inventory prospectively beginning January 1, 2018.

On January 1, 2018, Alcoa Corporation adopted guidance issued by the FASB to the accounting for stock-based compensation when there has been a modification to the terms or conditions of a share-based payment award. This guidance requires an entity to account for the modification only when there has been a substantive change to the terms or conditions of a share-based payment award. A substantive change occurs when the fair value, vesting conditions or balance sheet classification (liability or equity) of a share-based payment award is/are different immediately before and after the modification. Previously, an entity was required to account for any modification in the terms or conditions of a share-based payment award. The adoption of this guidance had no immediate impact on the Consolidated Financial Statements; however, this guidance will need to be considered if the Company initiates a modification that is determined to be a substantive change to an outstanding share-based award. Additionally, the Company will no longer account for any future non-substantive change to the terms or conditions of a share-based payment awards as a modification.

On April 1, 2018, Alcoa Corporation early adopted guidance issued by the FASB to the accounting for hedging activities retroactive to January 1, 2018. This guidance permits hedge accounting for risk components in hedging relationships involving nonfinancial risk and interest rate risk; reduces current limitations on the designation and measurement of a hedged item in a fair value hedge of interest rate risk; removes the requirement to separately measure and report hedge ineffectiveness; provides an election to systematically and rationally recognize in earnings the initial value of any amount excluded from the assessment of hedge effectiveness for all types of hedges; and eases the requirements of effectiveness testing. Additionally, modifications to existing disclosures, as well as additional disclosures, are required, as applicable, to reflect these changes regarding the measurement and recognition of hedging activities. This guidance is to be initially applied only to hedging instruments that exist as of the adoption date using the modified retrospective method. In other words, any financial statement impact from application of these changes to open hedging instruments as of the adoption date related to periods prior to the adoption year is to be recognized through a cumulative effect adjustment in beginning retained earnings of the adoption year. Accordingly, upon adoption of this guidance, Alcoa Corporation recognized an immaterial cumulative effect adjustment within equity effective January 1, 2018 related to open Level 1 hedging instruments as of the adoption date. The Company had no open Level 2 hedging instruments as of the adoption date and there was no financial statement impact from Alcoa Corporation's open Level 3 hedging instruments as of the adoption date. This guidance will also be applied prospectively upon the Company entering into any new hedging instruments. See the Derivatives section of Note O for additional information.

Recently Issued Accounting Guidance. In January 2018, the FASB issued guidance regarding the assessment of land easements (or rights of way) under the pending lease accounting requirements to be adopted on January 1, 2019 (see below). This guidance provides an entity an option to not evaluate existing or expired land easements as leases in preparation for the adoption of the new lease accounting requirements, as long as such land easements were recorded as something other than leases under current accounting requirements. That said, any new land easement acquired or existing land easement modified on January 1, 2019 or later must be assessed for lease accounting under the new requirements. This guidance becomes effective for Alcoa Corporation on January 1, 2019. Management plans to elect the option to not evaluate existing or expired land easements that are currently accounted for as something other than leases under the new lease accounting requirements. The Company's land easements are currently accounted for as fixed assets and are immaterial to Alcoa Corporation's Consolidated Financial Statements. Accordingly, management has determined that the adoption of this guidance will not have an immediate impact on the Company's Consolidated Financial Statements. The new lease accounting requirements will need to be considered if the Company acquires a new land easement or modifies an existing land easement on January 1, 2019 or later.

In February 2018, the FASB issued guidance regarding the reclassification of certain income tax effects reported in accumulated comprehensive income (loss) in response to U.S. tax legislation enacted on December 22, 2017 known as the U.S. Tax Cuts and Jobs Act of 2017 (the "TCJA"). For corporations, one of the main provisions of the TCJA was the reduction in the corporate income tax rate to 21% from 35%. Under current income tax accounting requirements, an entity was required to remeasure applicable U.S. deferred tax assets and deferred tax liabilities at the 21% tax rate effective on the TCJA enactment date. This remeasurement was required to be recognized in an entity's income tax provision in its income

statement. However, certain of these deferred tax assets and deferred tax liabilities relate to income tax effects initially recognized at the 35% tax rate through other comprehensive income (loss) on items reported within accumulated other comprehensive income (loss) on an entity's balance sheet. Consequently, an entity's financial statements will reflect an inconsistency between the deferred tax assets and deferred tax liabilities measured at 21% and the related income tax effects in accumulated other comprehensive income (loss) recorded at 35%. Accordingly, this guidance provides a one-time option to remeasure the income tax effects within accumulated other comprehensive income (loss) at the 21% income tax rate. The impact from this remeasurement is to be recorded directly in retained earnings on an entity's balance sheet. This guidance becomes effective for Alcoa Corporation on January 1, 2019, with early adoption permitted. Management has concluded its analysis and decided not to elect this option as permitted in the new guidance.

In June 2018, the FASB issued guidance regarding the accounting for nonemployee share-based payment transactions. This guidance effectively changes the accounting for such transactions to be consistent with the accounting for employee share-based payment transactions. The nonemployee share-based payment transactions subject to this guidance are those in which a grantor acquires goods or services to be used or consumed in a grantor's own operations by issuing share-based payment awards. This guidance is not to be applied to other nonemployee share-based payment transactions, such as those used to effectively provide (1) financing to the issuer or (2) awards granted in conjunction with selling goods or services to customers as part of a contract accounted for under revenue recognition principles. This guidance becomes effective for Alcoa Corporation on January 1, 2019, with early adoption permitted. The only nonemployees to receive share-based payments from Alcoa Corporation are the members of the Company's Board of Directors. Accordingly, management does not expect the adoption of this guidance to have a material impact on the Consolidated Financial Statements.

In August 2018, the FASB issued separate guidance regarding the respective disclosure requirements associated with fair value measurements and defined benefit plans. This guidance makes changes to the disclosures of fair value measurements and defined benefit plans through several removals, modifications, additions, and/or clarifications of the existing requirements. The following are the changes that will have an immediate disclosure impact for Alcoa Corporation upon adoption of the guidance for fair value measurements: (i) disclosure of the valuation processes for Level 3 fair value measurements is no longer required, (ii) changes in unrealized gains and losses for the reporting period included in other comprehensive income (loss) for recurring Level 3 fair value measurements held at the end of the reporting period is a new disclosure requirement, and (iii) the range and weighted average (or other reasonable and rational method) of significant unobservable inputs used to develop Level 3 fair value measurements is a new disclosure requirement. The following are the changes that will have an immediate disclosure impact for Alcoa Corporation upon adoption of the guidance for defined benefit plans: (i) disclosure of the amounts in accumulated other comprehensive income (loss) expected to be recognized as components of net periodic benefit cost over the next fiscal year is no longer required, (ii) disclosure of the effects of a one-percentage-point change in assumed health care cost trend rates on both the aggregate of the service and interest cost components of net periodic benefit costs and the benefit obligation for postretirement health care benefits is no longer required, and (iii) an explanation of the reasons for significant gains and losses related to changes in the benefit obligation for the reporting period is a new disclosure requirement. The guidance for fair value measurements and defined benefit plans becomes effective for Alcoa Corporation on January 1, 2020 and December 31, 2020, respectively, with early adoption permitted. Other than updating the applicable disclosures, the adoption of this guidance will not have an impact on the Company's Consolidated Financial Statements.

In August 2018, the FASB issued guidance regarding the accounting for implementation costs incurred in a cloud computing arrangement that is a service contract (in other words, does not contain a software license). This guidance aligns the accounting for cloud computing implementation costs with that of costs to develop or obtain internal-use software, meaning such costs that are part of the application development stage are capitalized as an asset and amortized over the term of the arrangement, otherwise, such costs are expensed as incurred. Additionally, this guidance requires applying existing impairment guidance for long-lived assets to the capitalized implementation costs. Furthermore, this guidance requires the following presentation in an entity's financial statements: (i) payments for the capitalized implementation costs should be classified on the cash flows statement in the same manner as payments for the service fees associated with the arrangement, (ii) the capitalized implementation costs should be presented in the same asset line item on the balance sheet as any prepayment for the service fees associated with the arrangement, and (iii) the amortization of the capitalized implementation costs should be reflected in the same expense line item on the income statement as the service fees associated with the arrangement. This guidance becomes effective for Alcoa Corporation on January 1, 2020, with early adoption permitted. Management is currently evaluating the potential impact of this guidance on the Consolidated Financial Statements.

In February 2016, the FASB issued guidance regarding the accounting for leases. This guidance requires lessees to recognize a right-of-use asset and lease liability on the balance sheet for leases classified as operating leases. For leases with a term of 12 months or less, a lessee is permitted to make an accounting policy election by class of underlying asset not to recognize a right of use asset and lease liability. Additionally, when measuring assets and liabilities arising from a lease, optional payments should be included only if the lessee is reasonably certain to exercise an option to extend the lease, exercise a purchase option, or not exercise an option to terminate the lease. A right-of-use asset represents an entity's right to use the underlying asset for the lease term, and a lease liability represents an entity's obligation to make lease payments. Currently, an asset and liability only are recorded for leases classified as capital leases (financing leases). The measurement, recognition, and presentation of expenses and cash flows arising from leases by a lessee remains the same. This guidance becomes effective for Alcoa Corporation on January 1, 2019. Through a previously established cross-functional project team, the Company has completed the accumulation of all leases into a lease management system and has validated the information for accuracy and completeness. Additionally, the project team has finished the system implementation. This system will be the primary source for the Company's lease information and the related accounting. Upon adoption of the new lease guidance, management expects to record a right-of-use asset and lease liability, each in the amount of \$181, on Alcoa Corporation's Consolidated Balance Sheet for several types of operating leases, including land and buildings, alumina refinery process control technology, plant equipment, vehicles, and computer equipment. This amount is equivalent to the aggregate future minimum lease payments on a discounted basis. Additionally, in July 2018, the FASB issued guidance to provide for an alternative transition method to the new lease guidance, whereby an entity can choose to not reflect the impact of the new lease guidance in the prior periods included in its financial statements. The Company intends to elect this alternative transition method on the January 1, 2019 adoption date.

In June 2016, the FASB added a new impairment model (known as the current expected credit loss (CECL) model) that is based on expected losses rather than incurred losses. Under the new guidance, an entity recognizes as an allowance its estimate of expected credit losses. The CECL model applies to most debt instruments, trade receivables, lease receivables, financial guarantee contracts, and other loan commitments. The CECL model does not have a minimum threshold for recognition of impairment losses and entities will need to measure expected credit losses on assets that have a low risk of loss. These changes become effective for Alcoa Corporation on January 1, 2020. Management is currently evaluating the potential impact of these changes on the Consolidated Financial Statements.

C. Acquisitions and Divestitures

In February 2017, Alcoa Corporation's wholly-owned subsidiary, Alcoa Power Generating Inc., completed the sale of its 215-megawatt Yadkin Hydroelectric Project (Yadkin) to Cube Hydro Carolinas, LLC for \$249 in cash (\$8 of which was received in June and November 2017 combined as post-closing adjustments). In 2017, Alcoa Corporation recognized a gain of \$122 (pre- and after-tax) in Other expenses, net on the accompanying Statement of Consolidated Operations. In accordance with the Separation and Distribution Agreement (see Note A), Alcoa Corporation remitted \$243 of the proceeds to Arconic. At December 31, 2016, Alcoa Corporation had a liability of \$243, which was included in Other current liabilities on the Company's Consolidated Balance Sheet. The sale of Yadkin is subject to further post-closing adjustments related to potential earnouts through January 31, 2027, unless the provisions of the earnouts are met earlier. Any such adjustment would result in Alcoa Corporation receiving additional cash (none of which would be remitted to Arconic) and recognizing nonoperating income. Yadkin encompasses four hydroelectric power developments (reservoirs, dams, and powerhouses), known as High Rock, Tuckertown, Narrows, and Falls, situated along a 38-mile stretch of the Yadkin River through the central part of North Carolina. Prior to the divestiture, the power generated by Yadkin was primarily sold into the open market. Yadkin generated sales of \$29 in 2016, and had approximately 30 employees as of December 31, 2016.

D. Restructuring and Other Charges

Restructuring and other charges for each year in the three-year period ended December 31, 2018 were comprised of the following:

	2018	2017	2016
Settlements and/or curtailments related to retirement benefits (N)	\$ 331	\$ 8	\$ 17
Allowance on value-added tax credits (S)	107	—	—
Power contract payments – non-recurring	62	244	—
Asset impairments	18	40	155
Asset retirement obligations (Q)	5	10	97
Environmental remediation (R)	2	8	26
Layoff costs	2	15	15
Legal matter in Italy (R)	—	(22)	—
Other	48	49	44
Reversals of previously recorded layoff and other costs	(48)	(43)	(36)
Restructuring and other charges	\$ 527	\$ 309	\$ 318

* In 2016, Other includes \$1 related to the allocation of restructuring charges to Alcoa Corporation from ParentCo (see Note A).

Layoff costs were recorded based on approved detailed action plans submitted by the operating locations that specified positions to be eliminated, benefits to be paid under existing severance plans, union contracts or statutory requirements, and the expected timetable for completion of the plans.

2018 Actions. In 2018, Alcoa Corporation recorded Restructuring and other charges of \$527, which were comprised of the following components: \$331 (net) related to settlements and curtailments of certain pension and other postretirement employee benefits (see Note N); \$107 to establish an allowance on certain value-added tax credits related to the Company's operations in Brazil (see Note S); \$86 for additional costs related to the curtailed Wenatchee (Washington) smelter, including \$73 associated with 2018 management decisions (see below); a \$15 net benefit related to the Portovesme (Italy) smelter, composed of a \$38 reversal and a \$23 charge (see "Italy 148" in the Litigation section of Note R); and an \$18 net charge for other items.

In June 2018, management decided not to restart the fully curtailed Wenatchee smelter within the term provided in the related electricity supply agreement. Alcoa Corporation was therefore required to make a \$62 payment to the energy supplier under the provisions of the agreement. Additionally, management decided to permanently close one (38 kmt) of the four potlines at this smelter. This potline has not operated since 2001 and the investments needed to restart this line are cost prohibitive. The remaining three curtailed potlines have a capacity of 146 kmt. In connection with these decisions, the Company recognized a charge of \$73, composed of the \$62 payment, \$10 for asset impairments, and \$1 for asset retirement obligations triggered by the decision to decommission the potline.

2017 Actions. In 2017, Alcoa Corporation recorded Restructuring and other charges of \$309, which were comprised of the following components: \$244 related to the early termination of a power contract (see below); \$49 for exit costs related to a decision to permanently close and demolish a smelter (see below); \$41 for additional contract costs related to the curtailed Wenatchee and São Luís (Brazil) smelters; \$22 for layoff costs, including the separation of approximately 130 employees (115 in the Aluminum segment), mostly for voluntary separation programs; a \$22 reversal to reduce a reserve previously established at the end of 2015 related to a legal matter in Italy (see "Italy 148" in the Litigation section of Note R); an \$18 net charge for other items, including the relocation of the Company's headquarters and principal executive office from New York, New York to Pittsburgh, Pennsylvania; and a \$43 reversal associated with several reserves related to prior periods (see below).

In October 2017, Alcoa Corporation and Luminant Generation Company LLC (Luminant) executed an early termination agreement of a power contract, as well as other related fuel and lease agreements, effective October 1, 2017, related to the Company's Rockdale (Texas) smelter, which has been fully curtailed since the end of 2008. In accordance with the terms of the early termination agreement, Alcoa made a cash payment of \$238 and transferred approximately 2,200 acres of related land and other assets and liabilities to Luminant (net asset carrying value of \$6).

Since the curtailment of the Rockdale smelter, the Company had been selling surplus electricity into the energy market. The power contract was set to expire no earlier than 2038, except for limited circumstances in which one or both parties could elect to early terminate without penalty for which conditions had never been met. In 2017 (through September 30) and 2016, Alcoa Corporation recognized \$105 and \$141, respectively, in Sales and \$148 and \$210, respectively, in Cost of goods sold on the accompanying Statement of Consolidated Operations related to the sale of the surplus electricity and the cost of the Luminant power contract.

As a result of the early termination of the power contract, Alcoa initiated a strategic review of the remaining buildings and equipment associated with the smelter, casthouse, and the aluminum powder plant at the Rockdale location. ParentCo previously decided to curtail the operating capacity of the Rockdale smelter in 2008 as a result of an uncompetitive power supply and then-overall unfavorable market conditions. Under this review, which was completed in December 2017, management determined that the Rockdale operations have limited economic prospects. Consequently, management approved the permanent closure and demolition of the Rockdale smelter (capacity of 191 kmt-per-year) and related operations effective immediately. Demolition and remediation activities related to this action began in 2018 and are expected to be completed by the end of 2022. Separately, the Company continues to own more than 30,000 acres of land surrounding the Rockdale operations.

In 2017, costs related to this decision included asset impairments of \$32, representing the write-off of the remaining book value of all related properties, plants, and equipment; \$1 for the layoff of approximately 10 employees (Corporate); and \$16 in other costs. Additionally in 2017, remaining inventories, mostly operating supplies and raw materials, were written down to their net realizable value, resulting in a charge of \$6, which was recorded in Cost of goods sold on the accompanying Statement of Consolidated Operations. The other costs of \$16 represent \$8 in asset retirement obligations and \$8 in

environmental remediation, both of which were triggered by the decisions to permanently close and demolish the Rockdale facilities.

In July 2017, Alcoa Corporation announced plans to restart three (capacity of 161 kmt-per-year) of the five potlines (capacity of 269 kmt-per-year) at the Warrick (Indiana) smelter. This smelter was previously permanently closed in March 2016 by ParentCo (see 2016 Actions below). The capacity identified for restart will directly supply the existing rolling mill at the Warrick location to improve efficiency of the integrated site and provide an additional source of metal to help meet an anticipated increase in production volumes. As a result of the decision to reopen this smelter, in 2017, Alcoa Corporation reversed \$33 in remaining liabilities related to the original closure decision. These liabilities consisted of \$20 in asset retirement obligations and \$4 in environmental remediation obligations, which were necessary due to the previous decision to demolish the smelter, and \$9 in severance and contract termination costs. Additionally, the carrying value of the smelter and related assets was reduced to zero as the smelter ramped down between the permanent closure decision date (end of 2015) and the end of March 2016. Once these assets are placed back into service in conjunction with the restart, their carrying value will remain zero. As such, only newly acquired or constructed assets related to the Warrick smelter will be depreciated.

As of December 31, 2018, the separations associated with 2017 restructuring programs were essentially complete. In 2018 and 2017, cash payments of \$3 and \$9, respectively, were made against layoff reserves related to 2017 restructuring programs.

2016 Actions. In 2016, Alcoa Corporation recorded Restructuring and other charges of \$318, which were comprised of the following components: \$131 for exit costs related to a decision to permanently close and demolish a refinery (see below); \$87 for additional net costs related to decisions made in late 2015 to permanently close and demolish the Warrick smelter and to curtail both the Wenatchee smelter and Point Comfort (Texas) refinery; \$72 for the impairment of an interest in gas exploration assets in Western Australia (see below); \$32 for layoff costs related to cost reduction initiatives, including the separation of approximately 75 employees (60 in the Aluminum segment and 15 in the Bauxite segment) and related pension settlement costs (see Note N); an \$8 net charge for other items; and a \$12 reversal associated with a number of small layoff reserves related to prior periods.

In December 2016, management approved the permanent closure of the Suralco refinery (capacity of 2,207 kmt-per-year) in Suriname. The Suralco refinery had been fully curtailed since November 2015. Management of ParentCo decided to curtail the remaining operating capacity of the Suralco refinery during 2015 in an effort to improve the position of ParentCo's refining operations on the global alumina cost curve. Since that time, management of ParentCo (through October 31, 2016) and then separately management of Alcoa Corporation (from November 1, 2016 through the end of 2016) had been in discussions with the Government of the Republic of Suriname to determine the best long-term solution for Suralco due to limited bauxite reserves and the absence of a long-term energy alternative. The decision to permanently close the Suralco refinery was based on the ultimate conclusion of those discussions. Demolition and remediation activities related to this action began in 2017 and are expected to be completed by the end of 2022. The related bauxite mines in Suriname will also be permanently closed while the hydroelectric facility that supplied power to the Suralco refinery, known as Afobaka, will continue to operate and supply power to the Government of the Republic of Suriname.

In 2016, costs related to the closure and curtailment actions included accelerated depreciation of \$70 related to the Warrick smelter as it continued to operate through March 2016; asset impairments of \$16, representing the write-off of the remaining book value of various assets; a reversal of \$24 associated with severance costs initially recorded in late 2015; and \$156 in other costs. Additionally in 2016, remaining inventories, mostly operating supplies and raw materials, were written down to their net realizable value, resulting in a charge of \$5, which was recorded in Cost of goods sold on the accompanying Statement of Consolidated Operations. The other costs of \$156 represent \$94 in asset retirement obligations and \$26 in environmental remediation, both of which were triggered by the decisions to permanently close and demolish the Suralco refinery (includes the rehabilitation of related bauxite mines) and the rehabilitation of a coal mine related to the Warrick smelter, \$32 for contract terminations, and \$4 in other related costs.

Also in December 2016, management of Alcoa Corporation concluded that an interest in certain gas exploration assets in Western Australia has been impaired. AofA owns an interest in a gas exploration project (relinquished in June 2018) that was initially entered into in 2007 as a potential source of low-cost gas to supply AofA's refineries in Western Australia. This interest, now at 43% (as of December 31, 2016), relates to four separate gas wells. In late 2016, AofA received the results of a technical analysis performed earlier in the year for two of the wells and an updated analysis for a third well that concluded that the cost of gas recovery would be significantly higher than the market price of gas. For the fourth well, the results of a technical analysis performed prior to 2016 indicated that the cost of gas recovery would be lower than the market price of gas and, therefore, would require additional investment to move to the next phase of commercial evaluation, which management previously supported. In late 2016, management re-evaluated its options related to the fourth well and decided it is not economical to make such a commitment for the foreseeable future. As a result, AofA fully impaired its \$72 interest.

As of June 30, 2017, the separations associated with 2016 restructuring programs were essentially complete. In 2017 and 2016, cash payments of \$2 and \$7, respectively, were made against layoff reserves related to 2016 restructuring programs.

Alcoa Corporation does not include Restructuring and other charges in the results of its reportable segments. The impact of allocating such charges to segment results would have been as follows:

	2018	2017	2016
Bauxite	\$ 1	\$ 2	\$ (5)
Alumina	112	3	72
Aluminum	102	51	75
Segment total	215	56	142
Corporate	312	253	176
Total restructuring and other charges	\$ 527	\$ 309	\$ 318

Activity and reserve balances for restructuring charges were as follows:

	Layoff costs	Other costs	Total
Reserve balances at December 31, 2015	\$ 137	\$ 15	\$ 152
2016:			
Cash payments	(74)	(35)	(109)
Restructuring charges	32	168	200
Other*	(57)	(120)	(177)
Reserve balances at December 31, 2016	38	28	66
2017:			
Cash payments	(30)	(43)	(73)
Restructuring charges	23	67	90
Other*	(20)	(18)	(38)
Reserve balances at December 31, 2017	11	34	45
2018:			
Cash payments	(7)	(95)	(102)
Restructuring charges	2	117	119
Other*	(1)	(14)	(15)
Reserve balances at December 31, 2018	\$ 5	\$ 42	\$ 47

* Other includes reversals of previously recorded restructuring charges and the effects of foreign currency translation. In 2017 and 2016, Other for Layoff costs also included a reclassification of \$8 and \$16 in pension and/or other postretirement benefits costs, as these obligations were included in Alcoa Corporation's separate liability for pension and other postretirement benefits obligations (see Note N). Additionally, in 2018, 2017, and 2016, Other for Other costs also included a reclassification of the following restructuring charges: \$5, \$10, and \$97, respectively, in asset retirement and \$2, \$8, and \$26, respectively, in environmental obligations, as these liabilities were included in Alcoa Corporation's separate reserves for asset retirement obligations (see Note Q) and environmental remediation (see Note R).

The remaining reserves are expected to be paid in cash during 2019, with the exception of \$9, of which \$8 is expected to be paid in 2020 related to the Portovesme smelter (see "Italy 148" in the Litigation section of Note R).

E. Segment and Related Information

Segment Information

Alcoa Corporation is a producer of bauxite, alumina, and aluminum products (primary and flat-rolled). The Company has three operating and reportable segments, which are organized by product on a global basis: Bauxite, Alumina, and Aluminum. Segment performance under Alcoa Corporation's management reporting system is evaluated based on a number of factors; however, the primary measure of performance is the Adjusted EBITDA (Earnings before interest, taxes, depreciation, and amortization) of each segment. The Company calculates segment Adjusted EBITDA as Total sales (third-party and intersegment) minus the following items: Cost of goods sold; Selling, general administrative, and other expenses; and Research and development expenses. Alcoa Corporation's Adjusted EBITDA may not be comparable to similarly titled measures of other companies. The chief operating decision maker function regularly reviews the financial information, including Sales and Adjusted EBITDA, of these three operating segments to assess performance and allocate resources.

Segment assets include, among others, customer receivables (third-party and intersegment), inventories (excluding LIFO adjustments), properties, plants, and equipment, and equity investments. The accounting policies of the segments are the same as those described in the Summary of Significant Accounting Policies (see Note B). Transactions among segments are

established based on negotiation among the parties. Differences between segment totals and Alcoa Corporation's consolidated totals for line items not reconciled are in Corporate.

The following are detailed descriptions of Alcoa Corporation's reportable segments:

Bauxite. This segment represents the Company's global bauxite mining operations. A portion of this segment's production represents the offtake from equity method investments in Brazil and Guinea, as well as AWAC's share of production related to an equity investment in Saudi Arabia. The bauxite mined by this segment is sold primarily to internal customers within the Alumina segment; a portion of the bauxite is sold to external customers. Bauxite mined by this segment and used internally is transferred to the Alumina segment at negotiated terms that are intended to approximate market prices; sales to third-parties are conducted on a contract basis. Generally, this segment's sales are transacted in U.S. dollars while costs and expenses are transacted in the local currency of the respective operations, which are the Australian dollar and the Brazilian real. Most of the operations that comprise the Bauxite segment are part of AWAC (see Principles of Consolidation in Note A).

Alumina. This segment represents the Company's worldwide refining system, which processes bauxite into alumina. The alumina produced by this segment is sold primarily to internal and external aluminum smelter customers; a portion of the alumina is sold to external customers who process it into industrial chemical products. Approximately two-thirds of Alumina's production is sold under supply contracts to third parties worldwide, while the remainder is used internally by the Aluminum segment. Alumina produced by this segment and used internally is transferred to the Aluminum segment at prevailing market prices. A portion of this segment's third-party sales are completed through the use of agents, alumina traders, and distributors. Generally, this segment's sales are transacted in U.S. dollars while costs and expenses are transacted in the local currency of the respective operations, which are the Australian dollar, the Brazilian real, the U.S. dollar, and the euro. Most of the operations that comprise the Alumina segment are part of AWAC (see Principles of Consolidation in Note A). This segment also includes AWAC's 25.1% ownership interest in a mining and refining joint venture company in Saudi Arabia (see Note H).

Aluminum. This segment consists of the Company's (i) worldwide smelting and casthouse system, which processes alumina into primary aluminum, (ii) portfolio of energy assets in Brazil, Canada, and the United States, and (iii) rolling mill in the United States.

Aluminum's combined smelting and casting operations produce primary aluminum products, virtually all of which is sold to external customers and traders; a portion of this primary aluminum is consumed by the rolling mill. The smelting operations produce molten primary aluminum, which is then formed by the casting operations into either common alloy ingot (e.g., t-bar, sow, standard ingot) or into value-add ingot products (e.g., foundry, billet, rod, and slab). A variety of external customers purchase the primary aluminum products for use in fabrication operations, which produce products primarily for the transportation, building and construction, packaging, wire, and other industrial markets. Results from the sale of aluminum powder and scrap are also included in this segment, as well as the impacts of embedded aluminum derivatives (see Note O) related to energy supply contracts.

The energy assets supply power to external customers in Brazil and, to a lesser extent, in the United States, and internal customers in the Aluminum (Canadian smelters and Warrick (Indiana) smelter and rolling mill) and Alumina segments (Brazilian refineries).

The rolling mill produces aluminum sheet primarily sold directly to customers in the packaging market for the production of aluminum cans (beverage and food). Additionally, from the Separation Date through the end of 2018, Alcoa Corporation had a tolling arrangement (contractually ended on December 31, 2018) with Arconic whereby Arconic's rolling mill in Tennessee produced can sheet products for certain customers of the Company's rolling operations. Alcoa Corporation supplied all of the raw materials to the Tennessee facility and paid Arconic for the tolling service. Seasonal increases in can sheet sales are generally experienced in the second and third quarters of the calendar year.

Generally, this segment's aluminum sales are transacted in U.S. dollars while costs and expenses of this segment are transacted in the local currency of the respective operations, which are the U.S. dollar, the euro, the Norwegian krone, the Icelandic krona, the Canadian dollar, the Brazilian real, and the Australian dollar.

This segment also includes Alcoa Corporation's 25.1% ownership interest in both a smelting and rolling mill joint venture company in Saudi Arabia (see Note H).

The operating results, capital expenditures, and assets of Alcoa Corporation's reportable segments were as follows:

	Bauxite	Alumina	Aluminum	Total
2018				
Sales:				
Third-party sales	\$ 271	\$ 4,215	\$ 8,829	\$ 13,315
Intersegment sales	944	2,101	18	3,063
Total sales	\$ 1,215	\$ 6,316	\$ 8,847	\$ 16,378
Adjusted EBITDA	\$ 426	\$ 2,373	\$ 404	\$ 3,203
Supplemental information:				
Depreciation, depletion, and amortization	\$ 111	\$ 197	\$ 394	\$ 702
Equity income (loss)	—	32	(38)	(6)
2017				
Sales:				
Third-party sales	\$ 333	\$ 3,133	\$ 8,027	\$ 11,493
Intersegment sales	875	1,723	21	2,619
Total sales	\$ 1,208	\$ 4,856	\$ 8,048	\$ 14,112
Adjusted EBITDA	\$ 424	\$ 1,289	\$ 1,012	\$ 2,725
Supplemental information:				
Depreciation, depletion, and amortization	\$ 82	\$ 207	\$ 419	\$ 708
Equity loss	—	(5)	(19)	(24)
2016				
Sales:				
Third-party sales	\$ 315	\$ 2,300	\$ 6,531	\$ 9,146
Intersegment sales	751	1,307	42	2,100
Total sales	\$ 1,066	\$ 3,607	\$ 6,573	\$ 11,246
Adjusted EBITDA	\$ 374	\$ 376	\$ 703	\$ 1,453
Supplemental information:				
Depreciation, depletion, and amortization	\$ 77	\$ 186	\$ 414	\$ 677
Equity loss	—	(40)	(24)	(64)
2018				
Assets:				
Capital expenditures	\$ 47	\$ 194	\$ 125	\$ 366
Equity investments	189	290	856	1,335
Total assets	1,448	4,643	7,722	13,813
2017				
Assets:				
Capital expenditures	\$ 53	\$ 144	\$ 178	\$ 375
Equity investments	191	262	930	1,383
Total assets	1,609	5,129	8,060	14,798

The following tables reconcile certain segment information to consolidated totals:

	2018	2017	2016
Sales:			
Total segment sales	\$ 16,378	\$ 14,112	\$ 11,246
Elimination of intersegment sales	(3,063)	(2,619)	(2,100)
Other	88	159	172
Consolidated sales	\$ 13,403	\$ 11,652	\$ 9,318

	2018	2017	2016
Net income (loss) attributable to Alcoa Corporation:			
Total segment Adjusted EBITDA	\$ 3,203	\$ 2,725	\$ 1,453
Unallocated amounts:			
Transformation ^{(1),(2)}	(3)	(49)	(168)
Corporate inventory accounting ^{(1),(3)}	11	(107)	(14)
Corporate expenses ⁽⁴⁾	(96)	(131)	(171)
Provision for depreciation, depletion, and amortization	(733)	(750)	(718)
Restructuring and other charges (D)	(527)	(309)	(318)
Interest expense (S)	(122)	(104)	(243)
Other (expenses) income, net (S)	(64)	(27)	65
Other ⁽⁵⁾	(72)	(89)	(48)
Consolidated income (loss) before income taxes	1,597	1,159	(162)
Provision for income taxes (P)	(726)	(600)	(184)
Net income attributable to noncontrolling interest	(644)	(342)	(54)
Consolidated net income (loss) attributable to Alcoa Corporation	\$ 227	\$ 217	\$ (400)

- (1) Effective in the first quarter of 2018, management elected to change the presentation of certain line items in the reconciliation of total segment Adjusted EBITDA to consolidated net income (loss) attributable to Alcoa Corporation to provide additional transparency to the nature of these reconciling items. Accordingly, Transformation (see footnote 2), which was previously reported within Other, is presented as a separate line item. Additionally, Impact of LIFO and Metal price lag, which were previously reported as separate line items, are now combined and reported in a new line item labeled Corporate inventory accounting (see footnote 3). Also, the impact of intersegment profit eliminations, which was previously reported within Other, is reported in the new Corporate inventory accounting line item. The applicable information for all prior periods presented was recast to reflect these changes.
- (2) Transformation includes, among other items, the Adjusted EBITDA of previously closed operations.
- (3) Corporate inventory accounting is composed of the impacts of LIFO inventory accounting, metal price lag, and intersegment profit eliminations. Metal price lag describes the timing difference created when the average price of metal sold differs from the average cost of the metal when purchased by Alcoa Corporation's rolled aluminum operations. In general, when the price of metal increases, metal price lag is favorable, and when the price of metal decreases, metal price lag is unfavorable.
- (4) Corporate expenses are composed of general administrative and other expenses of operating the corporate headquarters and other global administrative facilities, as well as research and development expenses of the corporate technical center.
- (5) Other includes certain items that impact Cost of goods sold and Selling, general administrative, and other expenses on Alcoa Corporation's Statement of Consolidated Operations that are not included in the Adjusted EBITDA of the reportable segments.

December 31,	2018	2017
Assets:		
Total segment assets	\$ 13,813	\$ 14,798
Elimination of intersegment receivables	(271)	(299)
Unallocated amounts:		
Cash and cash equivalents	1,113	1,358
LIFO reserve	(307)	(306)
Corporate fixed assets, net	520	520
Corporate goodwill	146	148
Deferred income taxes	563	814
Other	361	414
Consolidated assets	\$ 15,938	\$ 17,447

Product Information

Alcoa Corporation has five product divisions as follows:

Bauxite—Bauxite is a reddish clay rock that is mined from the surface of the earth's terrain. This ore is the basic raw material used to produce alumina and is the primary source of aluminum.

Alumina—Alumina is an oxide that is extracted from bauxite and is the basic raw material used to produce primary aluminum. This product can also be consumed for non-metallurgical purposes, such as industrial chemical products.

Primary aluminum—Primary aluminum is metal in the form of a common alloy ingot (e.g., t-bar, sow, standard ingot) or a value-add ingot (e.g., billet, rod, and slab). These products are sold primarily to customers that produce products for the transportation, building and construction, packaging, wire, and other industrial markets.

Flat-rolled aluminum—Flat-rolled aluminum is metal in the form of sheet, which is sold primarily to customers that produce beverage and food cans, including body, tab, and end stock.

Energy—Energy is the generation of electricity, which is sold in the wholesale market to traders, large industrial consumers, distribution companies, and other generation companies.

The following table represents the general commercial profile of the Company’s Bauxite, Alumina, Primary aluminum, and Flat-rolled aluminum product divisions (see text below table for Energy):

Product division	Pricing components	Shipping terms ⁽⁴⁾	Payment terms ⁽⁵⁾
Bauxite	Negotiated	FOB/CIF	LC Sight
Alumina:			
Smelter-grade	API ⁽¹⁾ /spot	FOB	LC Sight/CAD/Net 30 days
Non-metallurgical	Negotiated	FOB/CIF	Net 30 days
Primary aluminum:			
Common alloy ingot	LME + Regional premium ⁽²⁾	DAP/CIF	Net 30 to 45 days
Value-add ingot	LME + Regional premium + Product premium ⁽²⁾	DAP/CIF	Net 30 to 45 days
Flat-rolled aluminum	Metal + Conversion ⁽³⁾	DAP	Negotiated

- (1) API (Alumina Price Index) is a pricing mechanism that is calculated by the Company based on the weighted average of a prior month’s daily spot prices published by the following three indices: CRU Metallurgical Grade Alumina Price; Platts Metals Daily Alumina PAX Price; and Metal Bulletin Non-Ferrous Metals Alumina Index.
- (2) LME (London Metal Exchange) is a globally recognized exchange for commodity trading, including aluminum. The LME pricing component represents the underlying base metal component, based on quoted prices for aluminum on the exchange. The regional premium represents the incremental price over the base LME component that is associated with the physical delivery of metal to a particular region (e.g., the Midwest premium for metal sold in the United States). The product premium represents the incremental price for receiving physical metal in a particular shape (e.g., billet, rod, slab, etc.) or alloy.
- (3) Metal represents the underlying base metal component plus a regional premium (see footnote 2). Conversion represents the incremental price over the metal price component that is associated with converting primary or scrap aluminum into sheet.
- (4) CIF (cost, insurance, and freight) means that the Company pays for these items until the product reaches the buyer’s designated destination point related to transportation by vessel. DAP (delivered at place) means the same as CIF related to all methods of transportation. FOB (free on board) means that the Company pays for costs, insurance, and freight until the product reaches the seller’s designated shipping point.
- (5) The net number of days means that the customer is required to remit payment to the Company for the invoice amount within the designated number of days. LC Sight is a letter of credit that is payable immediately (usually within five to ten business days) after a seller meets the requirements of the letter of credit (i.e. shipping documents that evidence the seller performed its obligations as agreed to with a buyer). CAD (cash against documents) is a payment arrangement in which a seller instructs a bank to provide shipping and title documents to the buyer at the time the buyer pays in full the accompanying bill of exchange.

For the Company’s Energy product division, sales of electricity are based on current market prices. Electricity is provided to customers on demand through a national or regional power grid; the customer simultaneously receives and consumes the electricity. Payment terms are generally within 10 days related to the previous 30 days of electricity consumption.

The following table details Alcoa Corporation's Sales by product division:

	2018	2017	2016
Sales:			
Primary aluminum	\$ 6,787	\$ 6,168	\$ 5,204
Alumina	4,209	3,121	2,280
Flat-rolled aluminum	1,884	1,666	1,068
Energy	335	446	422
Bauxite	254	333	315
Other*	(66)	(82)	29
	\$ 13,403	\$ 11,652	\$ 9,318

* Other includes realized gains and losses related to embedded derivative instruments designated as cash flow hedges of forward sales of aluminum (see Note O).

Geographic Area Information

Geographic information for Sales was as follows (based upon the country where the point of sale originated):

	2018	2017	2016
Sales:			
United States ⁽¹⁾	\$ 5,941	\$ 5,370	\$ 4,365
Spain ⁽²⁾	3,806	3,303	2,663
Australia	2,930	2,266	1,644
Brazil	498	569	432
Canada	162	93	141
Other	66	51	73
	\$ 13,403	\$ 11,652	\$ 9,318

(1) Sales of a portion of the alumina from refineries in Australia, Brazil, and Suriname (prior to closure in December 2016) and most of the aluminum from smelters in Canada occurred in the United States.

(2) Sales of the aluminum produced from smelters in Iceland and Norway, as well as the off-take related to an interest in the Saudi Arabia joint venture (see Note H), occurred in Spain.

Geographic information for long-lived assets was as follows (based upon the physical location of the assets):

December 31,	2018	2017
Long-lived assets:		
Australia	\$ 2,002	\$ 2,220
Brazil	1,729	2,111
United States	1,599	1,658
Iceland	1,216	1,276
Canada	1,064	1,116
Norway	381	427
Spain	321	316
Other	15	14
	\$ 8,327	\$ 9,138

F. Earnings Per Share

Basic earnings per share (EPS) amounts are computed by dividing Net income (loss) attributable to Alcoa Corporation by the average number of common shares outstanding. Diluted EPS amounts assume the issuance of common stock for all potentially dilutive share equivalents outstanding.

The share information used to compute basic and diluted EPS attributable to Alcoa Corporation common shareholders was as follows (in millions):

	2018	2017	2016
Average shares outstanding—basic	186	184	183
Effect of dilutive securities:			
Stock options	1	1	—
Stock units	2	2	—
Average shares outstanding—diluted	189	187	183

Options to purchase 1 million shares of common stock outstanding as of December 31, 2018 at a weighted average exercise price of \$38.67 per share were not included in the computation of diluted EPS because the exercise prices of these options were greater than the average market price of Alcoa Corporation's common stock.

In 2016, basic average shares outstanding and diluted average shares outstanding were the same because the effect of potential shares of common stock was anti-dilutive. Options to purchase 1 million shares of common stock outstanding as of December 31, 2016 at a weighted average exercise price of \$33.05 per share were not included in the computation of diluted EPS because the exercise prices of these options were greater than the average market price of Alcoa Corporation's common stock. Additionally, 1 million stock units and stock options combined were not included in the computation of diluted EPS because Alcoa Corporation generated a net loss. Had Alcoa Corporation generated net income in 2016, 1 million potential shares of common stock related to stock units and stock options combined would have been included in diluted average shares outstanding.

G. Accumulated Other Comprehensive Loss

The following table details the activity of the three components that comprise Accumulated other comprehensive loss for both Alcoa Corporation's shareholders and noncontrolling interest:

	Alcoa Corporation			Noncontrolling interest		
	2018	2017	2016	2018	2017	2016
Pension and other postretirement benefits (N)						
Balance at beginning of period	\$ (2,786)	\$ (2,330)	\$ (352)	\$ (47)	\$ (56)	\$ (56)
Establishment of additional defined benefit plans	—	—	(2,704)	—	—	—
Separation-related adjustments (A)	—	—	928	—	—	—
Other comprehensive income (loss):						
Unrecognized net actuarial loss and prior service cost/benefit	19	(671)	(307)	(3)	9	2
Tax (expense) benefit	(8)	25	6	—	(2)	(6)
Total Other comprehensive income (loss) before reclassifications, net of tax	11	(646)	(301)	(3)	7	(4)
Amortization of net actuarial loss and prior service cost/benefit ⁽¹⁾	546	199	107	4	2	5
Tax expense ⁽²⁾	(54)	(9)	(8)	—	—	(1)
Total amount reclassified from Accumulated other comprehensive loss, net of tax ⁽⁷⁾	492	190	99	4	2	4
Total Other comprehensive income (loss)	503	(456)	(202)	1	9	—
Balance at end of period	\$ (2,283)	\$ (2,786)	\$ (2,330)	\$ (46)	\$ (47)	\$ (56)
Foreign currency translation						
Balance at beginning of period	\$ (1,467)	\$ (1,655)	\$ (1,851)	\$ (581)	\$ (677)	\$ (779)
Separation-related adjustments (A)	—	—	(17)	—	—	—
Other comprehensive (loss) income ⁽³⁾	(604)	188	213	(229)	96	102
Balance at end of period	\$ (2,071)	\$ (1,467)	\$ (1,655)	\$ (810)	\$ (581)	\$ (677)
Cash flow hedges (O)						
Balance at beginning of period	\$ (929)	\$ 210	\$ 603	\$ 51	\$ 1	\$ (3)
Separation-related adjustments (A)	—	—	(47)	—	—	—
Other comprehensive income (loss):						
Net change from periodic revaluations	803	(1,489)	(558)	(4)	83	38
Tax (expense) benefit	(159)	251	233	1	(25)	(12)
Total Other comprehensive income (loss) before reclassifications, net of tax	644	(1,238)	(325)	(3)	58	26
Net amount reclassified to earnings:						
Aluminum contracts ⁽⁴⁾	108	130	7	—	—	—
Financial contracts ⁽⁵⁾	(37)	(19)	(54)	(24)	(12)	(37)
Foreign exchange contracts ⁽⁴⁾	6	(2)	—	—	—	—
Interest rate contract ⁽⁶⁾	—	—	7	—	—	5
Sub-total	77	109	(40)	(24)	(12)	(32)
Tax (expense) benefit ⁽²⁾	(3)	(10)	19	7	4	10
Total amount reclassified from Accumulated other comprehensive loss, net of tax ⁽⁷⁾	74	99	(21)	(17)	(8)	(22)
Total Other comprehensive income (loss)	718	(1,139)	(346)	(20)	50	4
Balance at end of period	\$ (211)	\$ (929)	\$ 210	\$ 31	\$ 51	\$ 1

- (1) These amounts were included in the computation of net periodic benefit cost for pension and other postretirement benefits (see Note N). For 2018, the amounts for Alcoa Corporation include \$330, (net) and for Noncontrolling interest include \$1 related to settlements and/or curtailments of certain pension and other postretirement employee benefits (see Note N).
- (2) These amounts were reported in Provision for income taxes on the accompanying Statement of Consolidated Operations.
- (3) In all periods presented, there were no tax impacts related to rate changes and no amounts were reclassified to earnings.
- (4) These amounts were reported in Sales on the accompanying Statement of Consolidated Operations.
- (5) The 2018 and 2017 amounts were reported in Cost of goods sold and the 2016 amounts were reported in Other expenses (income), net on the accompanying Statement of Consolidated Operations.

- (6) These amounts were included in Other expenses (income), net on the accompanying Statement of Consolidated Operations.
- (7) A positive amount indicates a corresponding charge to earnings and a negative amount indicates a corresponding benefit to earnings. These amounts were reflected on the accompanying Statement of Consolidated Operations in the line items indicated in footnotes 1 through 6.

H. Investments

December 31,	2018	2017
Equity investments	\$ 1,350	\$ 1,400
Other investments	10	10
	\$ 1,360	\$ 1,410

Equity Investments. The following table summarizes information of Alcoa Corporation's equity investments as of December 31, 2018 and 2017 (the Elysis Limited Partnership began in June 2018 (see below)):

Investee	Country	Nature of investment ⁽⁴⁾	Ownership interest
Ma'aden Aluminum Company ⁽¹⁾	Saudi Arabia	Aluminum smelter and casthouse	25.1%
Ma'aden Bauxite and Alumina Company ⁽¹⁾	Saudi Arabia	Bauxite mine and alumina refinery	25.1% ⁽⁵⁾
Ma'aden Rolling Company ⁽¹⁾	Saudi Arabia	Aluminum rolling mill	25.1%
Halco Mining, Inc. ⁽²⁾	Guinea	Bauxite mine	45% ⁽⁵⁾
Energetica Barra Grande S.A.	Brazil	Hydroelectric generation facility	42.18%
Pechiney Reynolds Quebec, Inc. ⁽³⁾	Canada	Aluminum smelter	50%
Consorcio Serra do Facão	Brazil	Hydroelectric generation facility	34.97%
Mineração Rio do Norte S.A.	Brazil	Bauxite mine	18.2% ⁽⁵⁾
Manicouagan Power Limited Partnership	Canada	Hydroelectric generation facility	40%
Elysis Limited Partnership	Canada	Aluminum smelting technology	48.235%

- (1) See Saudi Arabia Joint Venture below for additional information.
- (2) Halco Mining, Inc. owns 100% of Boké Investment Company, which owns 51% of Compagnie des Bauxites de Guinée.
- (3) Pechiney Reynolds Quebec, Inc. owns a 50.1% interest in the Bécancour smelter in Quebec, Canada thereby entitling Alcoa Corporation to a 25.05% interest in the smelter. Through two wholly-owned Canadian subsidiaries, Alcoa Corporation also owns 49.9% of the Bécancour smelter.
- (4) Each of the investees either owns the facility listed or has an ownership interest in an entity that owns the facility listed.
- (5) A portion or all of each of these ownership interests are held by majority-owned subsidiaries that are part of AWAC.

In June 2018, Alcoa Corporation, Rio Tinto plc, and the provincial government of Quebec, Canada launched a new joint venture, Elysis Limited Partnership (Elysis). The purpose of this partnership is to advance larger scale development and commercialization of the Company's patent-protected technology that produces oxygen and eliminates all direct greenhouse gas emissions from the traditional aluminum smelting process. Alcoa Corporation and Rio Tinto plc, as general partners, each own a 48.235% stake in Elysis, and the Quebec provincial government, as a limited partner, owns a 3.53% stake. The federal government of Canada and Apple Inc., as well as the Quebec provincial government, will provide initial financing to the partnership. The total planned combined investment (equity and debt) of the five participants in the joint venture is \$145 (C\$188). Alcoa Corporation and Rio Tinto plc will invest a combined \$42 (C\$55) over the next three years, as well as contribute and license certain intellectual property and patents to Elysis. In 2018, the Company contributed \$5 (C\$6) toward its initial investment commitment in Elysis.

In 2018, 2017, and 2016, Alcoa Corporation received \$45, \$71, and \$74, respectively, in dividends from these equity investments. Financial information for these equity investments is as follows (amounts represent 100% of the investee's financial information):

	Saudi Arabia Joint Venture(1)	Halco Mining, Inc.	Energetica Barra Grande S.A.	Pechiney Reynolds Quebec, Inc.	Consorcio Serra do Facão	Mineração Rio do Norte S.A.	Manicouagan Power L.P.	DBNGP Trust(2)	Total
Profit and loss data— year ended December 31, 2018									
Sales	\$ 3,986	\$ 402	\$ 84	\$ 120	\$ 93	\$ 400	\$ 106	\$ —	\$ 5,191
Cost of goods sold	3,334	268	66	110	71	254	9	—	4,112
Income before income taxes	301	41	17	8	21	120	96	—	604
Net income	9	38	6	16	19	33	89	—	210
Equity in net income of affiliated companies, before reconciling adjustments	2	17	3	8	7	6	36	—	79
Other	(13)	(2)	—	(1)	(1)	(8)	(3)	—	(28)
Alcoa Corporation's equity in net (loss) income of affiliated companies	(11)	15	3	7	6	(2)	33	—	51
Profit and loss data— year ended December 31, 2017									
Sales	\$ 3,032	\$ 416	\$ 131	\$ 332	\$ 103	\$ 350	\$ 105	\$ —	\$ 4,469
Cost of goods sold	2,776	266	117	292	48	273	9	—	3,781
(Loss) income before income taxes	(142)	50	13	35	45	35	96	—	132
Net (loss) income	(157)	47	5	23	46	30	88	—	82
Equity in net (loss) income of affiliated companies, before reconciling adjustments	(39)	21	2	11	16	6	35	—	52
Other	9	(1)	—	—	—	—	2	—	10
Alcoa Corporation's equity in net (loss) income of affiliated companies	(30)	20	2	11	16	6	37	—	62
Profit and loss data— year ended December 31, 2016									
Sales	\$ 1,970	\$ 437	\$ 60	\$ 309	\$ 90	\$ 451	\$ 104	\$ 86	\$ 3,507
Cost of goods sold	1,905	242	35	272	65	297	10	18	2,844
(Loss) income before income taxes	(295)	53	16	36	8	152	94	21	85
Net (loss) income	(295)	50	15	16	5	129	87	14	21
Equity in net (loss) income of affiliated companies, before reconciling adjustments	(75)	23	6	8	2	23	35	3	25
Other	7	2	(1)	(4)	—	(1)	—	—	3
Alcoa Corporation's equity in net (loss) income of affiliated companies	(68)	25	5	4	2	22	35	3	28

	Saudi Arabia Joint Venture(1)	Halco Mining, Inc.	Energetica Barra Grande S.A.	Pechiney Reynolds Quebec, Inc.	Consortio Serra do Facão	Mineração Rio do Norte S.A.	Manicouagan Power L.P.	DBNGP Trust(2)	Total
Balance sheet data—as of December 31, 2018									
Current assets	\$ 1,684	\$ 58	\$ 18	\$ 139	\$ 43	\$ 127	\$ 23	\$ —	\$ 2,092
Noncurrent assets	9,115	164	224	97	242	653	76	—	10,571
Current liabilities	1,379	10	5	49	20	116	11	—	1,590
Noncurrent liabilities	6,101	17	18	4	83	422	—	—	6,645
Balance sheet data—as of December 31, 2017									
Current assets	\$ 1,415	\$ 40	\$ 44	\$ 140	\$ 79	\$ 121	\$ 23	\$ —	\$ 1,862
Noncurrent assets	9,373	174	285	106	261	744	72	—	11,015
Current liabilities	1,331	1	48	65	25	220	9	—	1,699
Noncurrent liabilities	6,191	12	6	12	117	413	—	—	6,751

- (1) The amounts included in this column represent the combined financial information related to Ma'aden Aluminum Company, Ma'aden Bauxite and Alumina Company, and Ma'aden Rolling Company.
- (2) AofA sold its interest in the Dampier to Bunbury Natural Gas Pipeline (DBNGP) Trust in April 2016 (see DBNGP Trust below).

Saudi Arabia Joint Venture—Alcoa Corporation and Saudi Arabian Mining Company (known as “Ma’aden”) have a 30-year (from December 2009) joint venture shareholders agreement (automatic extension for an additional 20 years, unless the parties agree otherwise or unless earlier terminated) setting forth the terms for the development, construction, ownership, and operation of an integrated aluminum complex in Saudi Arabia. Specifically, the project developed by the joint venture consists of: (i) a bauxite mine for the extraction of approximately 4,000 kmt of bauxite from the Al Ba’itha bauxite deposit near Quiba in the northern part of Saudi Arabia; (ii) an alumina refinery with an initial capacity of 1,800 kmt; (iii) a primary aluminum smelter with an initial capacity of 740 kmt; and (iv) an aluminum rolling mill with an initial capacity of 380 kmt. The refinery, smelter, and rolling mill were constructed in an industrial area at Ras Al Khair on the east coast of Saudi Arabia. The facilities use critical infrastructure, including power generation derived from reserves of natural gas, as well as port and rail facilities, developed by the government of Saudi Arabia. First production from the smelter, rolling mill, and mine and refinery occurred in December of 2012, 2013, and 2014, respectively.

In 2012, Alcoa Corporation and Ma’aden agreed to expand the capabilities of the rolling mill to include a capacity of 100 kmt dedicated to supplying the automotive, building and construction, and foil packaging markets with aluminum sheet. First production related to the expanded capacity occurred in 2014. This expansion did not result in additional equity investment (see below) due to significant savings from a change in the project execution strategy of the initial 380 kmt capacity of the rolling mill.

The joint venture is owned 74.9% by Ma’aden and 25.1% by Alcoa Corporation and consists of three separate companies as follows: one each for the mine and refinery, the smelter, and the rolling mill. The Alcoa Corporation affiliates that hold the Company’s interests in the smelting company and the rolling mill company are wholly-owned by Alcoa Corporation, and the Alcoa Corporation affiliate that holds the Company’s interests in the mining and refining company is majority-owned (part of AWAC) by Alcoa Corporation. Except in limited circumstances, Alcoa Corporation may not sell, transfer or otherwise dispose of or encumber or enter into any agreement in respect of the votes or other rights attached to its interests in the joint venture without Ma’aden’s prior written consent.

Ma’aden and Alcoa Corporation have put and call options, respectively, whereby Ma’aden can require Alcoa Corporation to purchase from Ma’aden, or Alcoa Corporation can require Ma’aden to sell to Alcoa Corporation, a 14.9% interest in the joint venture at the then fair market value. These options may only be exercised in a six-month window that opens five years after the last Commercial Production Date (as defined in the joint venture shareholders agreement) of the three joint venture companies and, if exercised, must be exercised for the full 14.9% interest. The Commercial Production Date was declared on September 1, 2014 for the smelting company and on October 1, 2016 for the mining and refining company. There has not been a similar declaration yet for the rolling mill company.

Ma’aden and Alcoa Corporation also may not sell, transfer, or otherwise dispose of, pledge, or encumber any interests in the joint venture until five years after the last Commercial Production Date. Under the joint venture shareholders agreement, upon the occurrence of an unremedied event of default by Alcoa Corporation, Ma’aden may purchase, or, upon the occurrence of an unremedied event of default by Ma’aden, Alcoa Corporation may sell, its interest for consideration that varies depending on the time of the default.

A number of Alcoa Corporation employees perform various types of services for the smelting, rolling mill, and mining and refining companies as part of the operation of the fully-integrated aluminum complex. At December 31, 2018 and 2017, the

Company had an aggregate outstanding receivable of \$11 and \$13, respectively, from the smelting, rolling mill, and mining and refining companies for labor and other employee-related expenses.

Capital investment in the project is expected to total approximately \$10,800 (SAR 40.5 billion) and has been funded through a combination of equity contributions by the joint venture partners and project financing obtained by the joint venture companies, which has been partially guaranteed by both partners (see below). Both the equity contributions and the guarantees of the project financing are based on the joint venture partners' ownership interests. Originally, it was estimated that Alcoa Corporation's total equity contribution in the joint venture related to the capital investment in the project would be approximately \$1,100, of which Alcoa Corporation has contributed \$982, including \$1 in 2016. Based on changes to both the project's capital investment and equity and debt structure from the initial plans, the estimated \$1,100 equity contribution may be reduced. Separate from the capital investment in the project, Alcoa Corporation contributed \$66 (Ma'aden contributed \$199) to the joint venture in 2017 for short-term funding purposes in accordance with the terms of the joint venture companies' financing arrangements. Both partners may be required to make such additional contributions in future periods. As of December 31, 2018 and 2017, the carrying value of Alcoa Corporation's investment in this joint venture was \$874 and \$887, respectively.

The rolling mill company has project financing totaling \$1,179 (reflects principal repayments made through December 31, 2018), of which \$296 represents Alcoa Corporation's 25.1% interest in the rolling mill company. Alcoa Corporation has issued guarantees (see below) to the lenders in the event of default on the debt service requirements by the rolling mill company through 2018 and 2021 (Ma'aden issued similar guarantees related to its 74.9% interest). Alcoa Corporation's guarantees for the rolling mill company cover total debt service requirements of \$50 in principal and up to a maximum of approximately \$10 in interest per year (based on projected interest rates). Previously, Alcoa Corporation issued similar guarantees related to the project financing of both the smelting company and the mining and refining company. In December 2017 and July 2018, the smelting company and the mining and refining company, respectively, refinanced and/or amended all of their existing outstanding debt. The guarantees that were previously required of Alcoa Corporation related to both the smelting company and the mining and refining company were effectively terminated. At December 31, 2018 and 2017, the combined fair value of the guarantees was \$1 and \$3, respectively, which was included in Other noncurrent liabilities and deferred credits on the accompanying Consolidated Balance Sheet.

As a result of the Separation Transaction, the various lenders to the joint venture companies required Arconic to maintain joint and several guarantees with Alcoa Corporation. In the event of default by any of the joint venture companies, the lenders would make a claim against both Alcoa Corporation and Arconic. Accordingly, Alcoa Corporation would perform under its guarantee; however, if the Company failed to perform, Arconic would be required to perform under its own guarantee. Arconic would then subsequently seek indemnification from Alcoa Corporation under the terms of the Separation and Distribution Agreement.

DBNGP Trust—In April 2016, AofA sold its 20% interest in a consortium, which owned the DBNGP in Western Australia, to the only other member of the consortium, DUET Group. AofA received \$145 (A\$192) in cash, which was included in Sales of investments on the accompanying Statement of Consolidated Cash Flows, and recorded a gain of \$27 (A\$35) (\$11 (A\$15) after-tax and noncontrolling interest) in Other income, net on the accompanying Statement of Consolidated Operations. As part of the sale transaction, AofA will maintain its current access to approximately 30% of the DBNGP transmission capacity for gas supply to its three alumina refineries in Western Australia under an existing agreement to purchase gas transmission services from the DBNGP. At December 31, 2018 and 2017, AofA has an asset of \$275 (A\$393) and \$300 (A\$385), respectively, representing prepayments made under the agreement for future gas transmission services. In 2016, prior to the sale transaction, AofA made contributions of \$3 (A\$5) to the consortium under an equity call plan.

I. Inventories

December 31,	2018		2017	
Finished goods	\$	346	\$	296
Work-in-process		315		258
Bauxite and alumina		609		585
Purchased raw materials		535		473
Operating supplies		146		147
LIFO reserve		(307)		(306)
	\$	1,644	\$	1,453

At December 31, 2018 and 2017, the total amount of inventories valued on a LIFO basis was \$501, or 26%, and \$516, or 29%, respectively, of total inventories before LIFO adjustments. The inventory values, prior to the application of LIFO, are generally determined under the average cost method, which approximates current cost.

J. Properties, Plants, and Equipment, Net

December 31,	2018	2017
Land and land rights, including mines	\$ 328	\$ 346
Structures (by type of operation):		
Bauxite mining	1,119	1,250
Alumina refining	2,478	2,664
Aluminum smelting and casting	3,532	3,575
Energy generation	506	552
Aluminum rolling	285	298
Other	380	417
	8,300	8,756
Machinery and equipment (by type of operation):		
Bauxite mining	480	508
Alumina refining	3,604	4,009
Aluminum smelting and casting	6,489	6,827
Energy generation	889	905
Aluminum rolling	1,029	1,020
Other	282	288
	12,773	13,557
	21,401	22,659
Less: accumulated depreciation, depletion, and amortization	13,480	13,908
	7,921	8,751
Construction work-in-progress	406	387
	\$ 8,327	\$ 9,138

As of December 31, 2018 and 2017, the net carrying value of temporarily idled refining assets was \$132 and \$141, respectively, representing 2,305 kmt of idle capacity in both periods. Also, as of December 31, 2018 and 2017, the net carrying value of temporarily idled smelting assets was \$427 and \$248, respectively, representing 916 kmt and 856 kmt, respectively, of idle capacity.

K. Goodwill and Other Intangible Assets

Goodwill, which is included in Other noncurrent assets on the accompanying Consolidated Balance Sheet, was as follows:

December 31,	2018		2017	
Bauxite	\$	2	\$	2
Alumina		3		4
Aluminum ⁽¹⁾		—		—
Corporate ⁽²⁾		146		148
	\$	151	\$	154

- (1) The carrying value of Aluminum's goodwill is zero, comprised of goodwill of \$989 and accumulated impairment losses of \$989 as of both December 31, 2018 and 2017. Additionally, the carrying value of Corporate's goodwill is net of accumulated impairment losses of \$742 as of both December 31, 2018 and 2017.
- (2) As of December 31, 2018, the \$146 of goodwill reflected in Corporate is allocated to two of Alcoa Corporation's three reportable segments (\$49 to Bauxite and \$97 to Alumina) for purposes of impairment testing (see Note B). This goodwill is reflected in Corporate for segment reporting purposes because it is not included in management's assessment of performance by the two reportable segments.

Other intangible assets, which are included in Other noncurrent assets on the accompanying Consolidated Balance Sheet, were as follows:

December 31,	2018			2017		
	Gross carrying amount	Accumulated amortization	Net carrying amount	Gross carrying amount	Accumulated amortization	Net carrying amount
Computer software	\$ 237	\$ (211)	\$ 26	\$ 241	\$ (212)	\$ 29
Patents and licenses	25	(7)	18	25	(6)	19
Other intangibles	19	(6)	13	21	(7)	14
Total other intangible assets	\$ 281	\$ (224)	\$ 57	\$ 287	\$ (225)	\$ 62

Computer software consists primarily of software costs associated with an enterprise business solution within Alcoa Corporation to drive common systems among all businesses.

Amortization expense related to the intangible assets in the tables above for the years ended December 31, 2018, 2017, and 2016 was \$12, \$12, and \$7, respectively, and is expected to be approximately \$10 annually from 2019 to 2023.

L. Debt

Long-Term Debt.

December 31,	2018		2017	
6.75% Notes, due 2024	\$	750	\$	750
7.00% Notes, due 2026		500		500
6.125% Notes, due 2028		500		—
BNDES Loans (see below for weighted average rates)		—		137
Other		91		50
Unamortized discounts and deferred financing costs		(39)		(33)
		1,802		1,404
Less: amount due within one year		1		16
	\$	1,801	\$	1,388

The principal amount of long-term debt maturing in each of the next five years is \$1 in 2019, \$84 in 2020, and \$1 in each of 2021, 2022, and 2023.

144A Debt—In May 2018, Alcoa Nederland Holding B.V. (ANHBV), a wholly-owned subsidiary of Alcoa Corporation, completed a Rule 144A (U.S. Securities Act of 1933, as amended) debt offering for \$500 of 6.125% Senior Notes due 2028 (the “2028 Notes”). ANHBV received \$492 in net proceeds from the debt offering reflecting a discount to the initial purchasers of the 2028 Notes. The net proceeds, along with available cash on hand, were used to make discretionary contributions to certain U.S. defined benefit pension plans (see Note N). The discount to the initial purchasers, as well as costs to complete the financing, was deferred and is being amortized to interest expense over the term of the 2028 Notes. Interest on the 2028 Notes is paid semi-annually in November and May, which commenced November 15, 2018.

ANHBV has the option to redeem the 2028 Notes on at least 30 days, but not more than 60 days, prior notice to the holders of the 2028 Notes under multiple scenarios, including, in whole or in part, at any time or from time to time after May 2023 at a redemption price specified in the indenture (up to 103.063% of the principal amount plus any accrued and unpaid interest in each case). Also, the 2028 Notes are subject to repurchase upon the occurrence of a change in control repurchase event (as defined in the indenture) at a repurchase price in cash equal to 101% of the aggregate principal amount of the 2028 Notes repurchased, plus any accrued and unpaid interest on the 2028 Notes repurchased.

The 2028 Notes are senior unsecured obligations of ANHBV and do not entitle the holders to any registration rights pursuant to a registration rights agreement. ANHBV does not intend to file a registration statement with respect to resales of or an exchange offer for the 2028 Notes. The 2028 Notes are guaranteed on a senior unsecured basis by Alcoa Corporation and its subsidiaries that are guarantors under the Second Amended Revolving Credit Agreement (the “subsidiary guarantors” and, together with Alcoa Corporation, the “guarantors”) (see Credit Facility below). Each of the subsidiary guarantors will be released from their 2028 Notes guarantees upon the occurrence of certain events, including the release of such guarantor from its obligations as a guarantor under the Second Amended Revolving Credit Agreement.

The 2028 Notes indenture includes several customary affirmative covenants. Additionally, the 2028 Notes indenture contains several negative covenants, that, subject to certain exceptions, include limitations on liens, limitations on sale and leaseback transactions, and a prohibition on a reduction in the ownership of AWAC entities below an agreed level. The negative covenants in the 2028 Notes indenture are less extensive than those in the 2024 Notes and 2026 Notes (see below) indenture and the Second Amended Revolving Credit Agreement. For example, the 2028 Notes indenture does not include a limitation on restricted payments, such as repurchases of common stock and shareholder dividends.

The 2028 Notes rank equally in right of payment with all of ANHBV’s existing and future senior indebtedness, including the 2024 Notes and 2026 Notes; rank senior in right of payment to any future subordinated obligations of ANHBV; and are effectively subordinated to ANHBV’s existing and future secured indebtedness, including under the Second Amended Revolving Credit Agreement, to the extent of the value of property and assets securing such indebtedness.

In September 2016, ANHBV completed a Rule 144A (U.S. Securities Act of 1933, as amended) debt offering for \$750 of 6.75% Senior Notes due 2024 (the “2024 Notes”) and \$500 of 7.00% Senior Notes due 2026 (the “2026 Notes” and, collectively with the 2024 Notes, the “Notes”). ANHBV received \$1,228 in net proceeds from the debt offering reflecting a discount to the initial purchasers of the Notes. The net proceeds were used to make a payment to ParentCo to fund the transfer of certain assets from ParentCo to Alcoa Corporation in connection with the Separation Transaction, and the remaining net proceeds were used for general corporate purposes. The discount to the initial purchasers, as well as costs to complete the financing, was deferred and is being amortized to interest expense over the respective terms of the Notes. Interest on the Notes is paid semi-annually in March and September, which commenced March 31, 2017.

ANHBV has the option to redeem the Notes on at least 30 days, but not more than 60 days, prior notice to the holders of the Notes under multiple scenarios, including, in whole or in part, at any time or from time to time after September 2019, in the case of the 2024 Notes, or after September 2021, in the case of the 2026 Notes, at a redemption price specified in the indenture (up to 105.063% of the principal amount for the 2024 Notes and up to 103.500% of the principal amount of the 2026 Notes, plus any accrued and unpaid interest in each case). Also, the Notes are subject to repurchase upon the occurrence of a change in control repurchase event (as defined in the indenture) at a repurchase price in cash equal to 101% of the aggregate principal amount of the Notes repurchased, plus any accrued and unpaid interest on the Notes repurchased.

The Notes are senior unsecured obligations of ANHBV and do not entitle the holders to any registration rights pursuant to a registration rights agreement. ANHBV does not intend to file a registration statement with respect to resales of or an exchange offer for the Notes. The Notes are guaranteed on a senior unsecured basis by Alcoa Corporation and its subsidiaries that are guarantors under the Second Amended Revolving Credit Agreement (the “subsidiary guarantors” and, together with Alcoa Corporation, the “guarantors”) (see Credit Facility below). Each of the subsidiary guarantors will be released from their Notes guarantees upon the occurrence of certain events, including the release of such guarantor from its obligations as a guarantor under the Second Amended Revolving Credit Agreement.

The Notes indenture contains various restrictive covenants similar to those described below for the Second Amended Revolving Credit Agreement, including a limitation on restricted payments, with, among other exceptions, capacity to pay annual ordinary dividends. Under the indenture, Alcoa Corporation may declare and make annual ordinary dividends in an aggregate amount not to exceed \$38 in each of the November 1, 2016 through December 31, 2017 time period and annual 2018 (no such dividends were made), \$50 in each of annual 2019 and 2020, and \$75 in the January 1, 2021 through September 30, 2026 (maturity date of the 2026 Notes) time period, except that 50% of any unused amount of the base amount

in any of the specified time periods may be used in the next succeeding period following the use of the base amount in said time period. Additionally, the restricted payments negative covenant includes a general exception to allow for potential future transactions incremental to those specifically provided for in the Notes indenture. This general exception provides for an aggregate amount of restricted payments not to exceed the greater of \$250 and 1.5% of Alcoa Corporation's consolidated total assets. Accordingly, Alcoa Corporation may make annual ordinary dividends in any fiscal year by an aggregate amount of up to \$250, assuming no other restricted payments have reduced, in part or whole, the available limit. The limits of the restricted payments negative covenant under the Second Amended Revolving Credit Agreement (see Credit Facility below) would govern the amount of ordinary dividend payments Alcoa Corporation could make in a given timeframe if the allowed amount is less than the limits of the restricted payments negative covenant under the Notes indenture.

BNDES Loans—Prior to July 5, 2016, Alcoa Alumínio (Alumínio), an indirect wholly-owned subsidiary of Alcoa Corporation, had a loan agreement with Brazil's National Bank for Economic and Social Development (BNDES) that provided for a financing commitment of \$397 (R\$687), which was divided into three subloans and was used to pay for certain expenditures of the Estreito hydroelectric power project. On July 5, 2016, this loan agreement was amended to change the borrower from Alumínio to a wholly-owned subsidiary of Alumínio. Interest on the three subloans was a Brazil real rate of interest equal to BNDES' long-term interest rate, 7.00% as of December 31, 2017, plus a weighted-average margin of 2.74%. Principal and interest were payable monthly, which began in October 2011 and were originally scheduled to end in September 2029 for two of the subloans totaling R\$667 and began in July 2012 and ended in June 2018 for the subloan of R\$20. During 2018 and 2017, Alumínio's subsidiary repaid \$132 (R\$539) and \$15 (R\$49), respectively, of outstanding borrowings and/or deferred interest. The repayments in 2018 include early repayments of a combined \$122 (R\$500) made in September and December, representing the remaining outstanding loan balance and deferred interest. These early repayments were made without penalty under the approval of BNDES. With the full repayment of this loan, the commitment was effectively terminated. As of December 31, 2017, outstanding borrowings were \$137 (R\$454) and the weighted-average interest rate was 9.74%, and deferred interest related to the borrowings were \$25 (R\$82).

Additionally, Alumínio had a loan agreement with BNDES that provided for a financing commitment of \$85 (R\$177), which also was used to pay for certain expenditures of the Estreito hydroelectric power project. Interest on the loan was a Brazil real rate of interest equal to BNDES' long-term interest rate plus a margin of 1.55%. Principal and interest were payable monthly, which began in January 2013 and were originally scheduled to end in September 2029. During 2017, Alumínio repaid \$44 (R\$138) of outstanding borrowings, which include an early repayment of \$41 (R\$131) made in August, representing the remaining outstanding loan balance. This early repayment was made without penalty under the approval of BNDES. With the full repayment of this loan, the commitment was effectively terminated.

Credit Facility. On November 21, 2018, Alcoa Corporation and ANHBV entered into a Second Amendment and Restatement Agreement to the Revolving Credit Agreement dated September 16, 2016 and the Amendment and Restatement Agreement dated November 14, 2017 (the Revolving Credit Agreement as revised by the Amendment and Restatement Agreement, the "Amended Revolving Credit Agreement"), in each case, with a syndicate of lenders and issuers named therein to revise certain terms and provisions of the Amended Revolving Credit Agreement (the Amended Revolving Credit Agreement as revised by the Second Amendment and Restatement Agreement, the "Second Amended Revolving Credit Agreement"). Unless noted otherwise, the terms and provisions described below for the Second Amended Revolving Credit Agreement were applicable to the Amended Revolving Credit Agreement from November 14, 2017 to November 20, 2018. See "Credit Facility" in Note L to the Consolidated Financial Statements included in Part II Item 8 of the Company's Annual Report on Form 10-K for the year ended December 31, 2017 for the notable terms and provisions under the Revolving Credit Agreement from September 16, 2016 to November 13, 2017.

The Second Amended Revolving Credit Agreement provides a \$1,500 senior secured revolving credit facility (the "Revolving Credit Facility") to be used for working capital and/or other general corporate purposes of Alcoa Corporation and its subsidiaries. Subject to the terms and conditions of the Second Amended Revolving Credit Agreement, ANHBV may from time to time request the issuance of letters of credit up to \$750 under the Revolving Credit Facility, subject to a sublimit of \$400 for any letters of credit issued for the account of Alcoa Corporation or any of its domestic subsidiaries. Additionally, ANHBV may from time to time request that each of the lenders provide one or more additional tranches of term loans and/or increase the aggregate amount of revolving commitments, together in an aggregate principal amount of up to \$500.

The Revolving Credit Facility is scheduled to mature on November 21, 2023 (previously November 14, 2022), unless extended or earlier terminated in accordance with the provisions of the Second Amended Revolving Credit Agreement. ANHBV may make extension requests during the term of the Revolving Credit Facility, subject to the lender consent requirements set forth in the Second Amended Revolving Credit Agreement. Under the provisions of the Second Amended Revolving Credit Agreement, ANHBV will pay a quarterly commitment fee ranging from 0.200% to 0.425% (previously 0.225% to 0.450%) (based on Alcoa Corporation's leverage ratio) on the unused portion of the Revolving Credit Facility.

A maximum of \$750 in outstanding borrowings under the Revolving Credit Facility may be denominated in euros. Loans will bear interest at a rate per annum equal to an applicable margin plus, at ANHBV's option, either (a) an adjusted LIBOR rate or (b) a base rate determined by reference to the highest of (1) the U.S. prime rate as published in the Wall Street Journal (previously the prime rate of JPMorgan Chase Bank, N.A.), (2) the greater of the federal funds effective rate and the

overnight bank funding rate, plus 0.5%, and (3) the one month adjusted LIBOR rate plus 1% per annum. The applicable margin for all loans will vary based on Alcoa Corporation's leverage ratio and will range from 1.50% to 2.25% (previously 1.75% to 2.50%) for LIBOR loans and 0.50% to 1.25% (previously 0.75% to 1.50%) for base rate loans, subject in each case to a reduction of 25 basis points if Alcoa Corporation attains at least a Baa3 rating from either Moody's Investor Service or BBB- rating from Standard and Poor's Global Ratings. Outstanding borrowings may be prepaid without premium or penalty, subject to customary breakage costs.

All obligations of Alcoa Corporation or a domestic entity under the Revolving Credit Facility are secured by, subject to certain exceptions (including a limitation of pledges of equity interests in certain foreign subsidiaries to 65%, and certain thresholds with respect to real property), a first priority lien on substantially all assets of Alcoa Corporation and the material domestic wholly-owned subsidiaries of Alcoa Corporation and certain equity interests of specified non-U.S. subsidiaries. All other obligations under the Revolving Credit Facility are secured by, subject to certain exceptions (including certain thresholds with respect to real property), a first priority security interest in substantially all assets of Alcoa Corporation, ANHBV, the material domestic wholly-owned subsidiaries of Alcoa Corporation, and the material foreign wholly-owned subsidiaries of Alcoa Corporation located in Australia, Brazil, Canada, Luxembourg, the Netherlands, and Norway, including equity interests of certain subsidiaries that directly hold equity interests in AWAC entities. However, no AWAC entity is a guarantor of any obligation under the Revolving Credit Facility and no asset of any AWAC entity, or equity interests in any AWAC entity, will be pledged to secure the obligations under the Revolving Credit Facility. Under the Second Amended Revolving Credit Agreement, each of the mentioned companies shall be released from all obligations under the first priority lien and/or first priority security interest upon (i) Alcoa Corporation attaining at least a Baa3 rating from either Moody's Investor Service or BBB- rating from Standard and Poor's Global Ratings, in each case with a stable outlook or better, (ii) ANHBV delivering the required written notice, and (iii) no default or event of default, as defined in the Second Amended Revolving Credit Agreement, has occurred or is continuing (the date on which such conditions are met, the "Collateral Release Date").

The Second Amended Revolving Credit Agreement includes a number of customary affirmative covenants. Additionally, the Second Amended Revolving Credit Agreement contains a number of negative covenants (applicable to Alcoa Corporation and certain subsidiaries described as restricted), that, subject to certain exceptions, include limitations on (among other things): liens; fundamental changes; sales of assets; indebtedness (see below); entering into restrictive agreements; restricted payments (see below), including repurchases of common stock and shareholder dividends (see below); investments (see below), loans, advances, guarantees, and acquisitions; transactions with affiliates; amendment of certain material documents; and a covenant prohibiting reductions in the ownership of AWAC entities, and certain other specified restricted subsidiaries of Alcoa Corporation, below an agreed level. The Second Amended Revolving Credit Agreement also includes financial covenants requiring the maintenance of a specified interest expense coverage ratio of not less than 5.00 to 1.00, and a leverage ratio for any period of four consecutive fiscal quarters that is not greater than 2.50 to 1.00 (2.00 to 1.00 beginning on and subsequent to the Collateral Release Date, may be increased to a level not higher than 2.25 to 1.00 under certain circumstances). As of December 31, 2018 and 2017, Alcoa Corporation was in compliance with all such covenants.

The indebtedness, restricted payments, and investments negative covenants include general exceptions to allow for potential future transactions incremental to those specifically provided for in the Second Amended Revolving Credit Agreement. The indebtedness negative covenant provides for an incremental amount not to exceed the greater of \$1,000 and 6.0% of Alcoa Corporation's consolidated total assets. Additionally, the restricted payments negative covenant provides for an aggregate amount not to exceed \$100 and the investments negative covenant provides for an aggregate amount not to exceed \$400, both of which contain two conditions in which these limits may increase. First, in any fiscal year, the thresholds for the restricted payments and investments negative covenants increase by \$250 and \$200, respectively, if the consolidated net leverage ratio is not greater than 1.50 (previously 1.20) to 1.00 and 1.50 (previously 1.30) to 1.00, respectively, as of the end of the prior fiscal year. Secondly, in regards to both the \$100 and \$250 for restricted payments and the \$200 for investments, 50% of any unused amount of these base amounts in any fiscal year may be used in the next succeeding fiscal year.

The following describes the specific restricted payment negative covenant for share repurchases and the application of the restricted payments general exception (described above) to both share repurchases and ordinary dividend payments.

Alcoa Corporation may repurchase shares of its common stock pursuant to stock option exercises and benefit plans in an aggregate amount not to exceed \$25 during any fiscal year, except that 50% of any unused amount of the base amount in any fiscal year may be used in the next succeeding fiscal year following the use of the base amount in said fiscal year. Additionally, as described above, the Second Amended Revolving Credit Agreement provides general exceptions to the restricted payments negative covenant that would allow Alcoa Corporation to execute share repurchases for any purpose in any fiscal year by an aggregate amount of up to \$100 (see above for conditions that provide for this limit to increase), assuming no other restricted payments have reduced, in part or whole, the available limit.

Also, any ordinary dividend payments made by Alcoa Corporation are only subject to the general exception for restricted payments described above. Accordingly, Alcoa Corporation may make annual ordinary dividends in any fiscal year by an aggregate amount of up to \$100 (see above for conditions that provide for this limit to increase), assuming no other restricted

payments have reduced, in part or whole, the available limit. The limits of the restricted payments negative covenant under the Notes indenture (see 144A Debt above) would govern the amount of ordinary dividend payments Alcoa Corporation could make in a given timeframe if the allowed amount is less than the limits of the restricted payments negative covenant under the Second Amended Revolving Credit Agreement.

The Second Amended Revolving Credit Agreement contains customary events of default, including with respect to a failure to make payments under the Revolving Credit Facility, cross-default and cross-judgment default, and certain bankruptcy and insolvency events.

There were no amounts outstanding at December 31, 2018 and 2017 and no amounts were borrowed during 2018 and 2017 under the Revolving Credit Facility.

M. Preferred and Common Stock

Preferred Stock. Alcoa Corporation is authorized to issue 100,000,000 shares of preferred stock at a par value of \$0.01 per share. At December 31, 2018 and 2017, the Company had no issued preferred stock.

Common Stock. Alcoa Corporation is authorized to issue 750,000,000 shares of common stock at a par value of \$0.01 per share. On November 1, 2016, in conjunction with the Separation Transaction, the Company distributed 182,471,195 shares of its common stock. Of this amount, 146,159,428 shares were distributed to ParentCo's shareholders and 36,311,767 shares were retained by ParentCo (Arconic sold all of these shares in 2017). As of December 31, 2018 and 2017, Alcoa Corporation had 184,770,249 and 185,200,713, respectively, issued and outstanding shares of common stock.

Under its employee stock-based compensation plan, the Company issued shares of 1,293,336 in 2018, 2,269,718 in 2017, and 459,800 from November 1, 2016 through December 31, 2016. Also, as of December 31, 2018, 25,977,146 shares of common stock were available for issuance under Alcoa Corporation's employee stock-based compensation plan. The Company issues new shares to satisfy the exercise of stock options and the conversion of stock units.

In October 2018, Alcoa Corporation's Board of Directors authorized a common stock repurchase program under which the Company may purchase shares of its outstanding common stock up to an aggregate transactional value of \$200, depending on cash availability, market conditions, and other factors. Repurchases under the program may be made using a variety of methods, which may include open market purchases, privately negotiated transactions, or pursuant to a Rule 10b5-1 plan. This program does not have a predetermined expiration date. Alcoa Corporation intends to retire the repurchased shares of common stock. In December 2018, the Company repurchased 1,723,800 shares of its common stock for \$50; these shares were immediately retired.

Dividends on common stock are subject to authorization by Alcoa Corporation's Board of Directors. The Company did not declare any dividends in 2018, 2017, and from November 1, 2016 through December 31, 2016.

Stock-based Compensation

In 2018, 2017, and the last two months of 2016, eligible Alcoa Corporation employees participated in the Company's stock-based compensation plan. In all periods prior to the Separation Date, eligible Alcoa Corporation employees participated in ParentCo's stock-based compensation plan. The stock-based compensation expense recorded by the Company in the referenced periods includes expense associated with employees historically attributable to Alcoa Corporation's operations and an allocation of expense (see Note A) related to ParentCo's corporate employees.

Effective November 1, 2016, all outstanding stock options (vested and non-vested) and non-vested stock units originally granted under ParentCo's stock-based compensation plan related to the Company's employees were replaced with similar stock options and stock units under Alcoa Corporation's stock-based compensation plan. In order to preserve the intrinsic value of the stock options and stock units originally granted under ParentCo's stock-based compensation plan, the number of stock options and stock units issued under the Company's stock-based compensation plan were increased by a ratio of 1.34 developed by dividing the October 31, 2016 closing market price of ParentCo's common stock (\$28.72) by the October 31, 2016 closing market price of Alcoa Corporation's "when issued" common stock (\$21.44). This resulted in a beginning balance of outstanding stock options and stock units under the Company's stock-based compensation plan of 4,673,829 and 2,605,423, respectively, as of November 1, 2016.

The following description of Alcoa Corporation's stock-based compensation plan is not materially different from the description of ParentCo's stock-based compensation plan prior to the Separation Transaction.

Stock options and stock units are generally granted in either January or February each calendar year to eligible employees (the Company's Board of Directors also receive certain stock units; however, these amounts are not material). Most plan participants can choose whether to receive their award in the form of stock options, stock units, or a combination of both. This choice is made before the grant is issued and is irrevocable. Stock options are granted at the closing market price of

Alcoa Corporation's common stock on the date of grant and grade vest over a three-year service period (1/3 each year) with a ten-year contractual term. Stock units cliff vest on the third anniversary of the award grant date and certain of these units also include either a market (2018, 2017, and 2016 (third tranche only-see below)) or performance (2018, 2017, and 2016) condition.

The final number of market-based and performance-based stock units earned is dependent on Alcoa Corporation's achievement of certain targets over a three-year measurement period for the 2018 and 2017 grants and a one-year measurement period for each of the three tranches of the 2016 grants. For market-based stock units granted in 2018 and 2017, the award will be earned at the end of the measurement period based on the Company's total shareholder return measured against the total shareholder return of the Standard & Poor's 500® Index from January 1 of the grant year through December 31 of the third year in the service period. For performance-based stock units granted in 2018 and 2017, the award will be earned at the end of the measurement period based on the Company's performance against a pre-established return-on-capital target measured from January 1 of the grant year through December 31 of the third year in the service period. For performance-based stock units granted in 2016, one-third of the award was to be earned each year during the respective measurement period based on the Company's performance against a pre-established return-on-capital target for that year measured from January 1 through December 31 (the majority of the third tranche and the entire second tranche of the 2016 performance units were not earned in 2018 and 2017, respectively). In January 2018, a portion of the third tranche of the 2016 performance-based stock units were changed to market-based stock units, which would be earned at the end of the measurement period based on the Company's total shareholder return measured against the total shareholder return of the Standard & Poor's 500® Index from January 1, 2018 through December 31, 2018 (none of the 2016 market-based stock units were earned in 2018).

In 2018, 2017, and 2016, Alcoa Corporation recognized stock-based compensation expense of \$35, \$24, and \$28, respectively, of which approximately 80% to 90% related to stock units in each period (there was no stock-based compensation expense capitalized in 2018, 2017, or 2016). Of the total pretax stock-based compensation expense recognized in 2016, \$16 relates to the allocation of expense for ParentCo's corporate employees. As part of both Alcoa Corporation's and ParentCo's stock-based compensation plan design in the respective periods, individuals who are retirement-eligible have a six-month requisite service period in the year of grant. As a result, a larger portion of expense was recognized in the first half of each year for these retirement-eligible employees. Of the total pretax stock-based compensation expense recognized in 2018, 2017, and 2016, \$5, \$4, and \$7, respectively, pertains to the acceleration of expense related to retirement-eligible employees.

Stock-based compensation expense is based on the grant date fair value of the applicable equity grant. For both stock units with no performance or market condition and stock units with a performance condition, the fair value was equivalent to the closing market price of either Alcoa Corporation's or ParentCo's common stock on the date of grant in the respective periods. For stock units with a market condition, the fair value was estimated on the date of grant using a Monte Carlo simulation model, which generated a result of \$73.13 and \$52.01 per unit in 2018 and 2017, respectively. The Monte Carlo simulation model uses certain assumptions to estimate the fair value of a market-based stock unit, including volatility (38.47% for the Company and 12.12% for the Standard & Poor's 500® Index) and a risk-free interest rate (2.17%) (the assumptions used to estimate the fair value of stock units granted in 2017 were not materially different). For stock options, the fair value was estimated on the date of grant using a lattice-pricing model, which generated a result of \$21.32, \$12.45, and \$2.12 per option in 2018, 2017, and 2016, respectively (see below for updated fair value amount for 2016 grants). The lattice-pricing model uses several assumptions to estimate the fair value of a stock option, including an average risk-free interest rate, dividend yield, volatility, annual forfeiture rate, exercise behavior, and contractual life.

The following describes in detail the assumptions used by the Company to estimate the fair value of stock options granted in 2018 (the assumptions used to estimate the fair value of stock options granted in 2017 (by Alcoa Corporation) and 2016 (by ParentCo) were not materially different). The risk-free interest rate (2.63%) was based on a yield curve of interest rates at the time of the grant over the contractual life of the option. The dividend yield (0.0%) was based on the fact that the Company did not pay any dividends from the Separation Date through 2017 and did not have any immediate plans to pay dividends in 2018. Volatility (43.32%) was based on historical and implied volatilities over the term of the option. Alcoa Corporation utilized historical option forfeiture data to estimate annual pre- and post-vesting forfeitures (4%). Exercise behavior (63%) was based on a weighted average exercise ratio (exercise patterns for grants issued over the number of years in the contractual option term) of an option's intrinsic value resulting from historical employee exercise behavior. Based upon the other assumptions used in the determination of the fair value, the life of an option (6.0 years) was an output of the lattice-pricing model. As Alcoa Corporation was a standalone publicly-traded company only for a two-month period in 2016, the assumptions used to estimate the fair value of stock options granted in February 2017 were largely based on historical ParentCo information, where applicable (Alcoa Corporation did not grant any stock options from November 1, 2016 through December 31, 2016).

The respective fair value of stock options outstanding as of October 31, 2016 (originally granted under ParentCo's stock-based compensation plan to Alcoa Corporation employees) were adjusted to reflect both the impact of ParentCo's 1-for-3 reverse stock split that occurred on October 5, 2016 and to maintain the intrinsic value of the stock options as a result of the

Separation Transaction. Accordingly, the fair value of the stock options originally granted in 2016 was adjusted to \$4.75. Alcoa Corporation did not recognize any incremental stock-based compensation expense as a result of this adjustment.

The activity for stock options and stock units during 2018 was as follows:

	Stock options		Stock units	
	Number of options	Weighted average exercise price	Number of units	Weighted average FMV per unit
Outstanding, January 1, 2018	2,687,107	\$ 25.48	2,301,332	\$ 26.93
Granted	189,455	53.30	635,477	52.81
Exercised	(896,645)	25.06	—	—
Converted*	—	—	(505,930)	34.55
Expired or forfeited	(19,990)	20.51	(40,941)	31.73
Performance share adjustment	—	—	(84,793)	15.09
Outstanding, December 31, 2018	1,959,927	28.41	2,305,145	32.75

* The number of converted units includes 109,239 shares “withheld” to meet the Company’s statutory tax withholding requirements related to the income earned by the employees as a result of vesting in the units.

As of December 31, 2018, the 1,959,927 outstanding stock options had a weighted average remaining contractual life of 5.50 years and a total intrinsic value of \$8. Additionally, 1,298,021 of the total outstanding stock options were fully vested and exercisable and had a weighted average remaining contractual life of 4.35 years, a weighted average exercise price of \$26.18, and a total intrinsic value of \$5 as of December 31, 2018. Cash received from stock option exercises was \$23, \$43, and \$10 in 2018, 2017, and 2016, respectively, and the total intrinsic value of stock options exercised during 2018, 2017, and 2016 was \$26, \$24, and \$4, respectively.

At December 31, 2018, there was \$32 (pretax) of combined unrecognized compensation expense related to non-vested grants of both stock options and stock units. This expense is expected to be recognized over a weighted average period of 1.65 years.

N. Pension and Other Postretirement Benefits

Defined Benefit Plans

Alcoa Corporation sponsors several defined benefit pension plans covering most U.S. employees and certain employees in foreign locations (see Plan Actions below). Pension benefits generally depend on length of service, job grade, and remuneration. Substantially all benefits are paid through pension trusts that are sufficiently funded to ensure that all plans can pay benefits to retirees as they become due. Most salaried and non-bargaining hourly U.S. employees hired after March 1, 2006 participate in a defined contribution plan instead of a defined benefit plan.

The Company also maintains health care and life insurance postretirement employee benefit plans covering eligible U.S. retired employees and certain retirees from foreign locations (see Plan Actions below). Generally, the medical plans are unfunded and pay a percentage of medical expenses, reduced by deductibles and other coverage. Life benefits are generally provided by insurance contracts. Alcoa Corporation retains the right, subject to existing agreements, to change or eliminate these benefits. All salaried and certain non-bargaining hourly U.S. employees hired after January 1, 2002 and certain bargaining hourly U.S. employees hired after July 1, 2010 are not eligible for postretirement health care benefits. All salaried and certain hourly U.S. employees that retire on or after April 1, 2008 are not eligible for postretirement life insurance benefits.

As of January 1, 2018, the pension benefit plans and the other postretirement benefit plans cover an aggregate of approximately 54,000 and approximately 48,000 participants, respectively.

Plan Actions. In 2018, management initiated several actions to certain of the pension and other postretirement benefit plans as follows:

- **Action# 1**—In January 2018, Alcoa Corporation notified all U.S. and Canadian salaried employees, who are participants in three of the Company’s defined benefit pension plans, that they will cease accruing retirement benefits for future service, effective January 1, 2021. This change will affect approximately 800 employees, who will be transitioned to country-specific defined contribution plans, in which Alcoa Corporation will contribute 3% of these participants’ eligible earnings on an annual basis. Such contributions will be incremental to any employer

savings match the employees may receive under existing defined contribution plans. Participants already collecting benefits under these defined benefit pension plans are not affected by these changes.

- **Action# 2**—In January 2018, the Company notified U.S. salaried employees and retirees that it will no longer contribute to pre-Medicare retiree medical coverage, effective January 1, 2021. This change affects approximately 700 participants in one plan.
- **Action# 3**—In April 2018, the Alcoa Corporation signed group annuity contracts to transfer the obligation to pay the remaining retirement benefits of approximately 2,100 retirees from two Canadian defined benefit pension plans to three insurance companies. The transfer of \$560 in both plan obligations and plan assets, as well as a transaction fee of \$23, was completed on April 13, 2018. The Company contributed \$89 between the two plans to facilitate the transaction and maintain the funding level of the remaining plan obligations. Prior to these transactions, these two Canadian pension plans combined had approximately 3,500 participants.
- **Action# 4**—In August 2018, Alcoa Corporation signed a group annuity contract to transfer the obligation to pay the remaining retirement benefits of approximately 10,500 retirees from three U.S. defined benefit pension plans to one insurance company. The transfer of \$287 in both plan obligations and plan assets, as well as a transaction fee of \$10, was completed on August 7, 2018. Additionally, approximately 1,000 plan participants elected to receive lump sum settlements, representing \$75 in plan obligations and \$85 in plan assets. Prior to these two transactions, these three U.S. pension plans combined had approximately 43,400 participants.
- **Action# 5**—In August 2018, the Company notified certain U.S. salaried retirees that life insurance will no longer be provided, effective September 1, 2018. This change affects approximately 5,500 participants in one plan. As part of this change, Alcoa Corporation made a one-time transition payment to the affected retirees totaling \$23 in September 2018.

These actions resulted in the curtailment or settlement of benefits thereby requiring remeasurement, including an update to the discount rates used to determine benefit obligations, of the affected plans. The following table presents certain information and the financial impacts of these actions on the accompanying Consolidated Financial Statements:

Action #	Number of plans	Number of affected plan participants	Weighted average discount rate as of December 31, 2017	Plan remeasurement date	Weighted average discount rate as of plan remeasurement date	(Decrease) increase to accrued pension benefits liability ⁽¹⁾	Decrease to accrued other postretirement benefits liability ⁽¹⁾	Curtailment charge (gain) ⁽²⁾	Settlement charge ⁽²⁾
1	3	~800	3.65%	January 31, 2018	3.80%	\$ (57)	\$ —	\$ 5	\$ —
2	1	~700	3.29%	January 31, 2018	3.43%	—	(7)	(28)	—
3	2	~2,100	3.43%	March 31, 2018	3.60%	24	—	—	167
4	3	~11,500	3.70%	July 31, 2018	4.39%	(110)	—	—	230
5	1	~5,500	3.61%	July 31, 2018	4.35%	—	(86)	—	(56)
		~20,600				\$ (143)	\$ (93)	\$ (23)	\$ 341

(1) A negative amount indicates a corresponding decrease to Accumulated other comprehensive loss and a positive amount indicates a corresponding increase to Accumulated other comprehensive loss.

(2) These amounts represent the accelerated amortization of a portion of the existing prior service cost or benefit for curtailments and net actuarial loss for settlements and were reclassified from Accumulated other comprehensive loss to Restructuring and other charges (see Note D) on the accompanying Statement of Consolidated Operations.

The eight plans affected by the curtailment and settlement actions described above represented 65% of the combined net unfunded status of the Company's pension and other postretirement benefit plans as of December 31, 2017.

Separation Transaction. The above descriptions of retirement benefits for Alcoa Corporation participants also describe the retirement benefits provided by ParentCo to its employees and retirees prior to the Separation Date.

For all periods prior to August 1, 2016 (see below), eligible employees attributable to Alcoa Corporation operations participated in the U.S. defined benefit pension and other postretirement benefit plans sponsored by ParentCo (the "Shared Plans"), which included Arconic and ParentCo corporate participants. The Company accounted for its portion of the Shared Plans as multiemployer benefit plans. Accordingly, Alcoa Corporation did not record an asset or liability to recognize the funded status of the Shared Plans. The multiemployer contribution expense attributable to employees of Alcoa Corporation-related operations was based primarily on pensionable compensation of such employees for the pension plans and estimated interest costs for the other postretirement benefit plans. Additionally, for all periods prior to August 1, 2016, Alcoa Corporation recorded an allocation of expenses for the Shared Plans attributable to ParentCo corporate participants, as well as to closed and sold operations (see Cost Allocations in Note A).

Also, certain of the ParentCo plans described above were specific to employees attributable to Alcoa Corporation operations (non-U.S.) in their entirety (the “Direct Plans”). The Company accounted for the Direct Plans as defined benefit pension and other postretirement benefit plans. Accordingly, the funded status of each of the Direct Plans was recorded in Alcoa Corporation’s Consolidated Balance Sheet. Actuarial gains and losses that had not yet been recognized in earnings were recorded in Accumulated other comprehensive loss until they were amortized as a component of net periodic benefit cost. The determination of benefit obligations and recognition of expenses related to Direct Plans are dependent on various assumptions. The major assumptions primarily relate to discount rates, long-term expected rates of return on plan assets, and future compensation increases. Management develops each assumption using relevant company experience in conjunction with market-related data for each of the plans.

In preparation for the Separation Transaction, effective August 1, 2016, certain of the Shared Plans were separated into standalone plans for both Alcoa Corporation (the “New Direct Plans”) and Arconic. Accordingly, the New Direct Plans for the Company were measured as of August 1, 2016. One of the primary assumptions used to measure the New Direct Plans was a weighted average discount rate of 3.48%. This measurement yielded a combined net unfunded status of \$2,348. Additionally, certain other Shared Plans were assumed by Alcoa Corporation (the “Additional New Direct Plans,” and collectively with the Direct Plans and New Direct Plans, the “Cumulative Direct Plans”) that did not require to be separated and/or to be remeasured. The Additional New Direct Plans had a combined net unfunded status of \$180. The aggregate combined net unfunded status of the New Direct Plans and the Additional New Direct Plans was recognized in the Company’s Consolidated Balance Sheet at that time, consisting of a current liability of \$136 and a noncurrent liability of \$2,392. Additionally, Alcoa Corporation recognized \$2,704 in Accumulated other comprehensive loss.

The following table summarizes the total expenses recognized by the Company related to all pension and other postretirement benefits:

Type of Plan	Type of Expense	Pension benefits			Other postretirement benefits		
		2018	2017	2016	2018	2017	2016
Cumulative Direct Plans	Net periodic benefit cost	\$ 561	\$ 119	\$ 83	\$ (32)	\$ 50	\$ 21
Shared Plans	Multiemployer contribution expense	—	—	28	—	—	12
Shared Plans	Cost allocation	—	—	25	—	—	8
		\$ 561	\$ 119	\$ 136	\$ (32)	\$ 50	\$ 41

The funded status of Alcoa Corporation’s Cumulative Direct Plans is measured as of December 31 each calendar year. All of the information that follows for pension and other postretirement benefit plans is only applicable to the Cumulative Direct Plans, as appropriate.

Obligations and Funded Status

December 31,	Pension benefits		Other postretirement benefits	
	2018	2017	2018	2017
Change in benefit obligation				
Benefit obligation at beginning of year	\$ 7,639	\$ 7,269	\$ 1,218	\$ 1,286
Service cost	60	84	5	5
Interest cost	232	250	34	38
Amendments	-	2	(5)	—
Actuarial (gains) losses	(346)	388	(88)	(1)
Settlements	(1,009)	(64)	(57)	—
Curtailments	(22)	—	—	—
Benefits paid, net of participants' contributions	(407)	(437)	(140)	(116)
Medicare Part D subsidy receipts	—	—	7	5
Foreign currency translation impact	(150)	147	(1)	1
Benefit obligation at end of year*	\$ 5,997	\$ 7,639	\$ 973	\$ 1,218
Change in plan assets				
Fair value of plan assets at beginning of year	\$ 5,322	\$ 5,421	\$ —	\$ —
Actual return on plan assets	(129)	187	—	—
Employer contributions	996	111	—	—
Participant contributions	12	15	—	—
Benefits paid	(403)	(432)	—	—
Administrative expenses	(31)	(41)	—	—
Settlements	(1,030)	(62)	—	—
Foreign currency translation impact	(127)	123	—	—
Fair value of plan assets at end of year*	\$ 4,610	\$ 5,322	\$ —	\$ —
Funded status*	\$ (1,387)	\$ (2,317)	\$ (973)	\$ (1,218)
Less: Amounts attributed to joint venture partners	(33)	(37)	—	—
Net funded status	\$ (1,354)	\$ (2,280)	\$ (973)	\$ (1,218)
Amounts recognized in the Consolidated Balance Sheet consist of:				
Noncurrent assets	\$ 63	\$ 72	\$ —	\$ —
Current liabilities	(10)	(11)	(105)	(118)
Noncurrent liabilities	(1,407)	(2,341)	(868)	(1,100)
Net amount recognized	\$ (1,354)	\$ (2,280)	\$ (973)	\$ (1,218)
Amounts recognized in Accumulated Other Comprehensive Loss consist of:				
Net actuarial loss	\$ 3,261	\$ 3,743	\$ 176	\$ 281
Prior service cost (benefit)	21	35	(4)	(30)
Total, before tax effect	3,282	3,778	172	251
Less: Amounts attributed to joint venture partners	40	45	—	—
Net amount recognized, before tax effect	\$ 3,242	\$ 3,733	\$ 172	\$ 251
Other Changes in Plan Assets and Benefit Obligations Recognized in Other Comprehensive Income (Loss) consist of:				
Net actuarial loss (benefit)	\$ 132	\$ 676	\$ (88)	\$ (1)
Amortization of accumulated net actuarial loss	(614)	(187)	(17)	(13)
Prior service (benefit) cost	(1)	2	(62)	—
Amortization of prior service (cost) benefit	(13)	(9)	88	6
Total, before tax effect	(496)	482	(79)	(8)
Less: Amounts attributed to joint venture partners	(5)	9	—	—
Net amount recognized, before tax effect	\$ (491)	\$ 473	\$ (79)	\$ (8)

* At December 31, 2018, the benefit obligation, fair value of plan assets, and funded status for U.S. pension plans were \$4,246, \$3,160, and \$(1,086), respectively. At December 31, 2017, the benefit obligation, fair value of plan assets, and funded status for U.S. pension plans were \$5,093, \$3,195, and \$(1,898), respectively.

Pension Plan Benefit Obligations

	Pension benefits	
	2018	2017
The aggregate projected benefit obligation and accumulated benefit obligation for all defined benefit pension plans was as follows:		
Projected benefit obligation	\$ 5,997	\$ 7,639
Accumulated benefit obligation	5,792	7,426
The aggregate projected benefit obligation and fair value of plan assets for pension plans with projected benefit obligations in excess of plan assets was as follows:		
Projected benefit obligation	5,502	7,061
Fair value of plan assets	4,051	4,671
The aggregate accumulated benefit obligation and fair value of plan assets for pension plans with accumulated benefit obligations in excess of plan assets was as follows:		
Accumulated benefit obligation	5,380	6,885
Fair value of plan assets	4,051	4,671

Components of Net Periodic Benefit Cost

	Pension benefits ⁽¹⁾			Other postretirement benefits ⁽²⁾		
	2018	2017	2016	2018	2017	2016
Service cost	\$ 54	\$ 71	\$ 61	\$ 5	\$ 5	\$ 2
Interest cost ⁽³⁾	227	244	138	34	38	16
Expected return on plan assets ⁽³⁾	(341)	(398)	(242)	—	—	—
Recognized net actuarial loss ⁽³⁾	198	185	102	13	13	8
Amortization of prior service cost (benefit) ⁽³⁾	8	9	7	—	(6)	(5)
Settlements ⁽⁴⁾	410	5	16	(56)	—	—
Curtailments ⁽⁵⁾	5	—	—	(28)	—	—
Special termination benefits ⁽⁶⁾	—	3	1	—	—	—
Net periodic benefit cost ⁽⁷⁾	\$ 561	\$ 119	\$ 83	\$ (32)	\$ 50	\$ 21

(1) In 2018, 2017, and 2016, net periodic benefit cost for U.S. pension plans was \$358, \$74, and \$21, respectively.

(2) In 2018, 2017, and 2016, net periodic benefit cost for other postretirement benefits reflects a reduction of \$8, \$8 and \$6, respectively, related to the recognition of the federal subsidy awarded under Medicare Part D.

(3) These amounts were reported in Other expenses (income), net on the accompanying Statement of Consolidated Operations (see Notes B (Recently Adopted Accounting Guidance) and S).

(4) These amounts were reported in Restructuring and other charges on the accompanying Statement of Consolidated Operations (see Note D). In 2018, settlements were due to management actions (see Plan Actions above) (\$341) and payment of lump sum benefits (\$13). In 2017, settlements were due to payment of lump sum benefits. In 2016, settlements were due to workforce reductions and payment of lump sum benefits.

(5) These amounts were reported in Restructuring and other charges on the accompanying Statement of Consolidated Operations (see Note D). In 2018, curtailments were due to management actions (see Plan Actions above).

(6) These amounts were reported in Restructuring and other charges on the accompanying Statement of Consolidated Operations (see Note D). In 2017 and 2016, special termination benefits were due to workforce reductions.

(7) Amounts attributed to joint venture partners are not included.

Amounts Expected to be Recognized in Net Periodic Benefit Cost

	Pension benefits	Other postretirement benefits
	2019	2019
Net actuarial loss recognition	\$ 167	\$ 10
Prior service cost recognition	6	1

Assumptions. Weighted average assumptions used to determine benefit obligations for pension and other postretirement benefit plans were as follows:

December 31,	2018	2017
Discount rate—pension plans	4.21%	3.68%
Discount rate—other postretirement benefit plans	4.25	3.54
Rate of compensation increase—pension plans	3.26	3.28

The discount rate is determined using a Company-specific yield curve model (above-median) developed with the assistance of an external actuary. The cash flows of the plans' projected benefit obligations are discounted using a single equivalent rate derived from yields on high quality corporate bonds, which represent a broad diversification of issuers in various sectors. The yield curve model parallels the plans' projected cash flows, which have a weighted average duration of 11 years, and the underlying cash flows of the bonds included in the model exceed the cash flows needed to satisfy the Alcoa Corporation's plan obligations multiple times. If a deep market of high quality corporate bonds does not exist in a country, then the yield on government bonds plus a corporate bond yield spread is used.

The rate of compensation increase is based upon anticipated compensation increases and estimated inflation. For 2019, the rate of compensation increase will be 3.26%.

Weighted average assumptions used to determine net periodic benefit cost for pension and other postretirement benefit plans were as follows:

	2018	2017	2016
Discount rate—pension plans	3.59%	3.61%	3.45%
Discount rate—other postretirement benefit plans	3.18	3.30	2.90
Expected long-term rate of return on plan assets—pension plans	6.89	7.47	7.31
Rate of compensation increase—pension plans	3.28	3.61	3.65

The expected long-term rate of return on plan assets is generally applied to a five-year market-related value of plan assets (a four-year average or the fair value at the plan measurement date is used for certain non-U.S. plans). The process used by management to develop this assumption is one that relies on forward-looking investment returns by asset class. Management incorporates expected future investment returns on current and planned asset allocations using information from various external investment managers and consultants, as well as management's own judgment (see Plan Assets below). For 2018, 2017, and 2016, the expected long-term rate of return used by management was based on the prevailing and planned strategic asset allocations, as well as estimates of future returns by asset class. For 2019, management anticipates that 6.59% will be the weighted-average expected long-term rate of return.

Assumed health care cost trend rates for U.S. other postretirement benefit plans were as follows (non-U.S. plans are not material):

	2018	2017	2016
Health care cost trend rate assumed for next year	5.5%	5.5%	5.5%
Rate to which the cost trend rate gradually declines	4.5%	4.5%	4.5%
Year that the rate reaches the rate at which it is assumed to remain	2022	2021	2020

The assumed health care cost trend rate is used to measure the expected cost of gross eligible charges covered by the Company's other postretirement benefit plans. For 2019, a 5.5% trend rate will be used, reflecting management's best estimate of the change in future health care costs covered by the plans. The plans' actual annual health care cost trend experience from the Separation Date through the end of 2018 has ranged from (0.5)% to 0.8%. Management does not believe this three-year range is indicative of expected increases for future health care costs over the long-term.

Assumed health care cost trend rates have an effect on the amounts reported for a health care plan. A one-percentage point change in these assumed rates would have the following effects:

	1% increase	1% decrease
Effect on other postretirement benefit obligations	\$ 65	\$ (58)
Effect on total of service and interest cost components	2	(2)

Plan Assets. Alcoa Corporation's pension plan investment policy and weighted average asset allocations at December 31, 2018 and 2017, by asset class, were as follows:

Asset class	Policy range	Plan assets at December 31,	
		2018	2017
Equities	10–60%	36%	40%
Fixed income	10–65%	51	35
Other investments	0–35%	13	25
Total		100%	100%

The principal objectives underlying the investment of the pension plan assets are to ensure that the Company can properly fund benefit obligations as they become due under a broad range of potential economic and financial scenarios, maximize the long-term investment return with an acceptable level of risk based on such obligations, and broadly diversify investments across and within various asset classes to protect asset values against adverse movements.

Through 2017, specific objectives for long-term investment strategy included reducing the volatility of pension assets relative to pension liabilities and achieving risk factor diversification across the balance of the asset portfolio. A portion of the assets were matched to the interest rate profile of the benefit obligation through long duration fixed income investments and fixed income derivative instruments. Exposure to broad equity risk was decreased and diversified through investments in discretionary and systematic macro hedge funds, long/short equity hedge funds, and global and emerging market equities. Investments were further diversified by strategy, asset class, geography, and sector in an effort to enhance returns and mitigate downside risk. Several external investment managers were used to gain broad exposure to the financial markets and to mitigate manager-concentration risk. This investment strategy was defined prior to the Separation Date by ParentCo management and maintained by Alcoa Corporation management; however, this strategy resulted in investment returns less than those expected since the Separation Date.

Accordingly, in 2018, management implemented a less-complex, peer-like investment strategy and, as a result, restructured the asset portfolio. This new strategy resulted in investing a higher percentage of the portfolio in assets that match the interest rate and credit risk profiles of the benefit obligations, as well as investing in assets expected to generate favorable risk-adjusted returns over a long-term investment horizon. To achieve this new strategy, the portfolio no longer includes investments in discretionary and systematic macro hedge funds and only includes a minimal amount of investments in long/short equity hedge funds (expected to be eliminated in 2019). Instead, the portfolio includes a larger allocation to investments in long-duration government debt, long-duration corporate credit, and real estate (occurred in late 2017), as well as new investments in high yield and emerging market sovereign debt and global-listed infrastructure. Additionally, the number of asset managers was decreased. The Company's new strategy was substantially implemented by the end of 2018. As a result, the actual asset class mix noted above was in line with the expected asset class mix of approximately 30% in equities, approximately 50% in fixed income, and approximately 20% in other investments.

Investment practices comply with the requirements of applicable laws and regulations in the respective jurisdictions, including the Employee Retirement Income Security Act of 1974 (ERISA) in the United States. The use of derivative instruments by external investment managers is permitted where appropriate and necessary for achieving overall investment policy objectives and for mitigating interest rate and other asset class risks.

The following section describes the valuation methodologies used by the trustees to measure the fair value of pension plan assets. For plan assets measured at net asset value, this refers to the net asset value of the investment on a per share basis (or its equivalent) as a practical expedient. Otherwise, an indication of the level in the fair value hierarchy in which each type of asset is generally classified is provided (see Note O for the definition of fair value and a description of the fair value hierarchy).

Equities—These securities consist of: (i) direct investments in the stock of publicly traded U.S. and non-U.S. companies and are valued based on the closing price reported in an active market on which the individual securities are traded (generally classified in Level 1); (ii) the plans' share of commingled funds that are invested in the stock of publicly traded companies and are valued at net asset value; and (iii) direct investments in long/short equity hedge funds and private equity (limited partnerships and venture capital partnerships) and are valued at net asset value.

Fixed income—These securities consist of: (i) U.S. government debt and are generally valued using quoted prices (included in Level 1); (ii) cash and cash equivalents invested in publicly-traded funds and are valued based on the closing price reported in an active market on which the individual securities are traded (generally classified in Level 1); (iii) publicly traded U.S. and non-U.S. fixed interest obligations (principally corporate bonds and debentures) and are valued through consultation and evaluation with brokers in the institutional market using quoted prices and other observable market data (included in Level 2); and (iv) cash and cash equivalents invested in institutional funds and are valued at net asset value.

Other investments—These investments include, among others: (i) real estate investment trusts valued based on the closing price reported in an active market on which the investments are traded (included in Level 1); (ii) the plans' share of commingled funds that are invested in real estate partnerships and are valued at net asset value; (iii) direct investments in discretionary and systematic macro hedge funds and private real estate (includes limited partnerships) and are valued at net asset value; and (iv) absolute return strategy funds and are valued at net asset value.

The fair value methods described above may not be indicative of net realizable value or reflective of future fair values. Additionally, while Alcoa Corporation believes the valuation methods used by the plans' trustees are appropriate and consistent with other market participants, the use of different methodologies or assumptions to determine the fair value of certain financial instruments could result in a different fair value measurement at the reporting date.

The following table presents the fair value of pension plan assets classified under either the appropriate level of the fair value hierarchy or net asset value:

December 31, 2018	Level 1	Level 2	Level 3	Net Asset Value	Total
Equities:					
Equity securities	\$ 662	\$ —	\$ —	\$ 813	\$ 1,475
Long/short equity hedge funds	—	—	—	6	6
Private equity	—	—	—	186	186
	\$ 662	\$ —	\$ —	\$ 1,005	\$ 1,667
Fixed income:					
Intermediate and long duration government/credit	\$ 925	\$ 697	\$ —	\$ 327	\$ 1,949
Cash and cash equivalent funds	56	—	—	325	381
Other	—	14	—	—	14
	\$ 981	\$ 711	\$ —	\$ 652	\$ 2,344
Other investments:					
Real estate	\$ 230	\$ —	\$ —	\$ 318	\$ 548
Other	—	—	—	32	32
	\$ 230	\$ —	\$ —	\$ 350	\$ 580
Total⁽¹⁾	\$ 1,873	\$ 711	\$ —	\$ 2,007	\$ 4,591

December 31, 2017	Level 1	Level 2	Level 3	Net Asset Value	Total
Equities:					
Equity securities	\$ 906	\$ —	\$ —	\$ 869	\$ 1,775
Long/short equity hedge funds	—	—	—	152	152
Private equity	—	—	—	226	226
	\$ 906	\$ —	\$ —	\$ 1,247	\$ 2,153
Fixed income:					
Intermediate and long duration government/credit	\$ 95	\$ 378	\$ —	\$ 264	\$ 737
Cash and cash equivalent funds	313	—	—	742	1,055
Other	—	56	—	—	56
	\$ 408	\$ 434	\$ —	\$ 1,006	\$ 1,848
Other investments:					
Real estate	\$ 241	\$ —	\$ —	\$ 365	\$ 606
Discretionary and systematic macro hedge funds	—	—	—	581	581
Other	—	—	—	132	132
	\$ 241	\$ —	\$ —	\$ 1,078	\$ 1,319
Total⁽²⁾	\$ 1,555	\$ 434	\$ —	\$ 3,331	\$ 5,320

(1) As of December 31, 2018, the total fair value of pension plan assets excludes a net receivable of \$19, which represents securities not yet settled plus interest and dividends earned on various investments.

(2) As of December 31, 2017, the total fair value of pension plan assets excludes a net receivable of \$2, which represents securities not yet settled plus interest and dividends earned on various investments, less an amount due to Arconic pension plans from Alcoa Corporation pension plans related to the separation of certain plans between the two companies.

Funding and Cash Flows. It is Alcoa Corporation's policy to fund amounts for defined benefit pension plans sufficient to meet the minimum requirements set forth in applicable country benefits laws and tax laws, including ERISA for U.S. plans.

From time to time, the Company contributes additional amounts as deemed appropriate. In 2018, 2017, and 2016, cash contributions to Alcoa Corporation's defined benefit pension plans were \$992, \$106, and \$66.

Contributions made in 2018 include a combined \$725 of unscheduled contributions to several defined benefit pension plans, including a combined \$620 to three of the Company's U.S. defined benefit pension plans and a combined \$105 to two of the Company's Canadian defined benefit pension plans (inclusive of \$89 for Action# 3 in Plan Actions above). The additional payments to the U.S. plans were discretionary in nature and were funded with \$492 in net proceeds from a May 2018 debt issuance (see Note L) and \$128 of available cash on hand. The primary purpose for issuing debt to fund a portion of the discretionary contributions to the U.S. plans was to reduce near-term pension funding risk with a fixed rate, 10-year maturity instrument.

Alcoa Corporation's minimum required contribution to defined benefit pension plans in 2019 is estimated to be \$310, of which \$270 is for U.S. plans. Under ERISA regulations, a plan sponsor that establishes a pre-funding balance by making discretionary contributions to a U.S. defined benefit pension plan may elect to apply all or a portion of this balance toward its minimum required contribution obligations to the related plan in future years. In 2019, management will consider making such election related to the Company's U.S. plans.

Benefit payments expected to be paid to pension and other postretirement benefit plan participants and expected Medicare Part D subsidy receipts are as follows:

Year ended December 31,	Pension benefits	Gross Other postretirement benefits	Medicare Part D subsidy receipts	Net Other postretirement benefits
2019	\$ 420	\$ 110	\$ 10	\$ 100
2020	420	110	10	100
2021	425	110	5	105
2022	425	105	5	100
2023	425	105	5	100
2024 through 2028	2,060	340	25	315
	\$ 4,175	\$ 880	\$ 60	\$ 820

Defined Contribution Plans

The Company sponsors savings and investment plans in several countries, including Australia and the United States. Prior to the Separation Date, employees attributable to Alcoa Corporation operations participated in ParentCo-sponsored plans. In the United States, employees may contribute a portion of their compensation to the plans, and Alcoa Corporation (ParentCo prior to Separation Date) matches a specified percentage of these contributions in equivalent form of the investments elected by the employee. Also, the Company makes contributions to a retirement savings account based on a percentage of eligible compensation for certain U.S. employees hired after March 1, 2006 that are not able to participate in Alcoa Corporation's defined benefit pension plans. The Company's expenses related to all defined contribution plans were \$69 in 2018, \$65 in 2017, and \$57 in 2016.

O. Derivatives and Other Financial Instruments

Fair Value. Fair value is defined as the price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date. The fair value hierarchy distinguishes between (i) market participant assumptions developed based on market data obtained from independent sources (observable inputs) and (ii) an entity's own assumptions about market participant assumptions developed based on the best information available in the circumstances (unobservable inputs). The fair value hierarchy consists of three broad levels, which gives the highest priority to unadjusted quoted prices in active markets for identical assets or liabilities (Level 1) and the lowest priority to unobservable inputs (Level 3). The three levels of the fair value hierarchy are described below:

- Level 1—Unadjusted quoted prices in active markets that are accessible at the measurement date for identical, unrestricted assets or liabilities.
- Level 2—Inputs other than quoted prices included within Level 1 that are observable for the asset or liability, either directly or indirectly, including quoted prices for similar assets or liabilities in active markets; quoted prices for identical or similar assets or liabilities in markets that are not active; inputs other than quoted prices that are observable for the asset or liability (e.g., interest rates); and inputs that are derived principally from or corroborated by observable market data by correlation or other means.
- Level 3—Inputs that are both significant to the fair value measurement and unobservable.

Derivatives. Alcoa Corporation is exposed to certain risks relating to its ongoing business operations, including financial, market, political, and economic risks. The following discussion provides information regarding Alcoa Corporation's exposure to the risks of changing commodity prices and foreign currency exchange rates.

Alcoa Corporation's commodity and derivative activities are subject to the management, direction, and control of the Strategic Risk Management Committee (SRMC), which consists of at least three members, including the chief executive officer and the chief financial officer. The remaining member(s) are other officers and/or employees of the Company as the chief executive officer may designate from time to time. Currently, the only other member of the SRMC is Alcoa Corporation's treasurer. The SRMC meets on a periodic basis to review derivative positions and strategy and reports to the Audit Committee of Alcoa Corporation's Board of Directors on the scope of its activities.

Alcoa Corporation's aluminum, energy, and foreign exchange contracts are held for purposes other than trading. They are used primarily to mitigate uncertainty and volatility, and to cover underlying exposures. Alcoa Corporation is not involved in trading activities for energy, weather derivatives, or other nonexchange commodity trading activities.

Several of Alcoa Corporation's aluminum, energy, and foreign exchange contracts are classified as Level 1 or Level 2 under the fair value hierarchy. The total fair value of these derivative contracts recorded as assets and liabilities was \$2 and \$54, respectively, at December 31, 2018 and \$44 and \$117, respectively, at December 31, 2017. In 2017 and 2016, Alcoa Corporation recognized a loss of \$22 and less than \$1, respectively, in Other expenses (income), net on the accompanying Statement of Consolidated Operations related to these contracts. Certain of these contracts are designated as either fair value or cash flow hedging instruments. For the contracts designated as cash flow hedges, Alcoa Corporation recognized an unrealized gain of \$24, an unrealized loss of \$92, and an unrealized gain of \$2 in Other comprehensive income (loss) in 2018, 2017, and 2016, respectively. Additionally, Alcoa Corporation reclassified a realized loss of \$14 and \$15 in 2018 and 2017, respectively, from Accumulated other comprehensive loss to Sales.

In addition to the Level 1 and 2 derivative instruments described above, Alcoa Corporation has several derivative instruments classified as Level 3 under the fair value hierarchy. These instruments are composed of (i) embedded aluminum derivatives and an embedded credit derivative related to energy supply contracts and (ii) freestanding financial contracts related to energy purchases made in the spot market, all of which are associated with nine smelters and three refineries. Certain of the embedded aluminum derivatives and financial contracts are designated as cash flow hedging instruments. All of these Level 3 derivative instruments are described below in detail and are enumerated as D1 through D11.

The following section describes the valuation methodologies used by Alcoa Corporation to measure its Level 3 derivative instruments at fair value. Derivative instruments classified as Level 3 in the fair value hierarchy represent those in which management has used at least one significant unobservable input in the valuation model. Alcoa Corporation uses a discounted cash flow model to fair value all Level 3 derivative instruments. Where appropriate, the description below includes the key inputs to those models and any significant assumptions. These valuation models are reviewed and tested at least on an annual basis.

Inputs in the valuation models for Level 3 derivative instruments are composed of the following: (i) quoted market prices (e.g., aluminum prices on the 10-year London Metal Exchange (LME) forward curve and energy prices), (ii) significant other observable inputs (e.g., information concerning time premiums and volatilities for certain option type embedded derivatives and regional premiums for aluminum contracts), and (iii) unobservable inputs (e.g., aluminum and energy prices beyond those quoted in the market). For periods beyond the term of quoted market prices for aluminum, Alcoa Corporation estimates the price of aluminum by extrapolating the 10-year LME forward curve. Additionally, for periods beyond the term of quoted market prices for energy, management has developed a forward curve based on independent consultant market research. Where appropriate, valuations are adjusted for various factors such as liquidity, bid/offer spreads, and credit considerations. Such adjustments are generally based on available market evidence (Level 2). In the absence of such evidence, management's best estimate is used (Level 3). If a significant input that is unobservable in one period becomes observable in a subsequent period, the related asset or

liability would be transferred to the appropriate classification (Level 1 or 2) in the period of such change (there were no such transfers in the periods presented).

D1 through D5—Alcoa Corporation has two power contracts (D1 and D2), each of which contain an embedded derivative that indexes the price of power to the LME price of aluminum. Additionally, Alcoa Corporation has three power contracts (D3 through D5), each of which contain an embedded derivative that indexes the price of power to the LME price of aluminum plus the Midwest premium. The embedded derivatives in these five power contracts are primarily valued using observable market prices; however, due to the length of the contracts, the valuation models also require management to estimate the long-term price of aluminum based upon an extrapolation of the 10-year LME forward curve (one of the contracts no longer requires the use of prices beyond this curve). Additionally, for three of the contracts, management also estimates the Midwest premium, generally, for the next twelve months based on recent transactions and then holds constant the premium estimated in that twelfth month constant for the remaining duration of the contract. Significant increases or

decreases in the actual LME price beyond 10 years would result in a higher or lower fair value measurement. An increase in actual LME price and/or the Midwest premium over the inputs used in the valuation models will result in a higher cost of power and a corresponding decrease to the derivative asset or increase to the derivative liability. The embedded derivatives have been designated as cash flow hedges of forward sales of aluminum. Unrealized gains and losses were included in Accumulated other comprehensive loss on the accompanying Consolidated Balance Sheet while realized gains and losses were included in Sales on the accompanying Statement of Consolidated Operations.

D6—Alcoa Corporation had a power contract (expired in October 2016—see D10 below) separate from above that contains an LME-linked embedded derivative. Prior to its expiration, the embedded derivative was valued using the probability and interrelationship of future LME prices, Australian dollar to U.S. dollar exchange rates, and the U.S. consumer price index. Significant increases or decreases in the LME price would result in a higher or lower fair value measurement. An increase in actual LME price over the inputs used in the valuation model will result in a higher cost of power and a corresponding decrease to the derivative asset. This embedded derivative did not qualify for hedge accounting treatment. Unrealized gains and losses from the embedded derivative were included in Other expenses (income), net on the accompanying Statement of Consolidated Operations while realized gains and losses were included in Cost of goods sold on the accompanying Statement of Consolidated Operations as electricity purchases were made under the contract. At the time this derivative asset was recognized, an equivalent amount was recognized as a deferred credit in Other noncurrent liabilities and deferred credits on the Consolidated Balance Sheet. The amortization of this deferred credit was recognized in Other expenses (income), net on the accompanying Statement of Consolidated Operations as power was received over the life of the contract.

D7—Alcoa Corporation had a natural gas supply contract (expired in October 2018), which had an LME-linked ceiling. Prior to its expiration, this embedded derivative was valued using probabilities of future LME aluminum prices and the price of Brent crude oil (priced on Platts), including the interrelationships between the two commodities subject to the ceiling. Any change in the interrelationship would result in a higher or lower fair value measurement. An LME ceiling was embedded into the contract price to protect against an increase in the price of oil without a corresponding increase in the price of LME. An increase in oil prices with no similar increase in the LME price would limit the increase of the price paid for natural gas. This embedded derivative did not qualify for hedge accounting treatment. Unrealized gains and losses from the embedded derivative were included in Other expenses (income), net on the accompanying Statement of Consolidated Operations while realized gains and losses were included in Cost of goods sold on the accompanying Statement of Consolidated Operations as gas purchases were made under the contract.

D8—In 2016, Alcoa Corporation and the related counterparty elected to modify the pricing of an existing power contract for a smelter in the United States. This amendment contains an embedded derivative that indexes the price of power to the LME price of aluminum plus the Midwest premium. The embedded derivative is valued using the interrelationship of future metal prices (LME base plus Midwest premium) and the amount of megawatt hours of energy needed to produce the forecasted metric tons of aluminum at the smelter. Significant increases or decreases in the metal price would result in a higher or lower fair value measurement. An increase in actual metal price over the inputs used in the valuation model will result in a higher cost of power and a corresponding increase to the derivative liability. Management elected not to qualify the embedded derivative for hedge accounting treatment. Unrealized gains and losses from the embedded derivative were included in Other expenses (income), net on the accompanying Statement of Consolidated Operations while realized gains and losses were included in Cost of goods sold on the accompanying Statement of Consolidated Operations as electricity purchases were made under the contract. At the time this derivative liability was recognized, an equivalent amount was recognized as a deferred charge in Other noncurrent assets on the accompanying Consolidated Balance Sheet. The amortization of this deferred charge is recognized in Other expenses (income), net on the accompanying Statement of Consolidated Operations as power is received over the life of the contract.

D9—Alcoa Corporation has a power contract, which contains an embedded derivative that indexes the spread between the Company's estimated 30-year debt yield and the counterparty's 30-year debt yield. As Alcoa Corporation does not have outstanding 30-year debt, the Company's estimated 30-year debt yield is represented by the sum of (i) the excess of the yield on Alcoa's outstanding notes due 2026 over the yield on only the Ba/BB-rated company debt included in Barclays High Yield Index for intermediate (10-year) credits and (ii) the yield on only the Ba/BB-rated company debt included in Barclays High Yield Index for long (30-year) credits. In accordance with the terms of the power contract, this calculation may be changed in January of each calendar year. Management uses market prices, historical relationships, and forecast services to determine fair value. Significant increases or decreases in any of these inputs would result in a lower or higher fair value measurement. A wider credit spread between Alcoa Corporation and the counterparty would result in a higher cost of power and a corresponding increase in the derivative liability. This embedded derivative did not qualify for hedge accounting treatment. Unrealized gains and losses were included in Other expenses (income), net on the accompanying Statement of Consolidated Operations while realized gains and losses were included in Cost of goods sold on the accompanying Statement of Consolidated Operations as electricity purchases were made under the contract.

D10 and D11—Alcoa Corporation had a financial contract (D10) that hedged the anticipated power requirements at one of its smelters that began in November 2016. At that time, the energy supply contract related to this smelter had expired (see D6 above) and Alcoa Corporation began purchasing electricity directly from the spot market. Beyond the term where market

information is available, management developed a forward curve, for valuation purposes, based on independent consultant market research. Significant increases or decreases in the power market may result in a higher or lower fair value measurement of the financial contract. Lower prices in the power market would cause a decrease in the derivative asset. The financial contract had been designated as a cash flow hedge of future purchases of electricity (this designation ceased in December 2016 —see below). Through November 2016, unrealized gains and losses on this contract were recorded in Accumulated other comprehensive loss on the accompanying Consolidated Balance Sheet, while realized gains and losses were recorded in Cost of goods sold as electricity purchases were made from the spot market. In August 2016, Alcoa Corporation gave the required notice to terminate this financial contract one year from the date of notification. As a result, Alcoa Corporation decreased both the related derivative asset recorded in Other noncurrent assets and the unrealized gain recorded in Accumulated other comprehensive loss by \$84, which related to the August 2017 through 2036 timeframe, resulting in no impact to Alcoa Corporation's earnings. In December 2016, the smelter experienced an unplanned outage, resulting in a portion of the financial contract no longer qualifying for hedge accounting, at which point management elected to discontinue hedge accounting for all of the remainder of the contract (through August 2017). As a result, Alcoa Corporation reclassified an unrealized gain of \$7 from Accumulated other comprehensive loss to Other expenses, net related to the portion of the contract that no longer qualified for hedge accounting. The remaining \$6 unrealized gain in Accumulated other comprehensive loss related to the portion management elected to discontinue hedge accounting was reclassified to Cost of goods sold as electricity purchases were made from the spot market through the termination date of the financial contract. Additionally, from December 2016 through August 2017, unrealized gains and losses on this contract were recorded in Other expenses (income), net, and realized gains and losses were recorded in Other expenses (income), net as electricity purchases were made from the spot market.

In January 2017, Alcoa Corporation and the counterparty entered into a new financial contract (D11) to hedge the anticipated power requirements at this smelter for the period from August 2017 through July 2021 and amended the existing financial contract to both reduce the hedged amount of anticipated power requirements and to move up the effective termination date to July 31, 2017. The new financial contract has been designated as a cash flow hedge of future purchases of electricity. Unrealized gains and losses on the new financial contract were recorded in Accumulated other comprehensive loss on the accompanying Consolidated Balance Sheet while realized gains and losses were recorded (began in August 2017) in Cost of goods sold as electricity purchases were made from the spot market.

The following table presents quantitative information related to the significant unobservable inputs described above for Level 3 derivative instruments:

	Fair value at December 31, 2018*	Unobservable input	Range (\$ in full amounts)
Assets:			
Financial contract (D11)	\$ 112	Interrelationship of forward energy price and the Consumer Price Index and price of electricity beyond forward curve	Electricity: \$68.60 per megawatt hour in 2019 to \$44.91 per megawatt hour in 2021
Embedded aluminum derivatives (D3 through D5)	20	Price of aluminum beyond forward curve	Aluminum: \$2,426 per metric ton in April 2029 to \$2,458 per metric ton in December 2029 (two contracts) and \$2,756 per metric ton in 2036 (one contract) Midwest premium: \$0.1900 per pound in 2019 to \$0.1800 per pound in 2029 (two contracts) and 2036 (one contract)
Liabilities:			
Embedded aluminum derivative (D1)	234	Interrelationship of LME price to the amount of megawatt hours of energy needed to produce the forecasted metric tons of aluminum	Aluminum: \$1,823 per metric ton in 2019 to \$2,350 per metric ton in 2027 Electricity: rate of 4 million megawatt hours per year
Embedded aluminum derivative (D8)	5	Interrelationship of LME price to the amount of megawatt hours of energy needed to produce the forecasted metric tons of aluminum	Aluminum: \$1,823 per metric ton in January 2019 to \$1,848 per metric ton in March 2019 Midwest premium: \$0.1900 per pound in January 2019 to \$0.1900 per pound in March 2019 Electricity: rate of 2 million megawatt hours per year
Embedded aluminum derivative (D2)	9	Interrelationship of LME price to overall energy price	Aluminum: \$1,946 per metric ton in January 2019 to \$1,907 per metric ton in December 2019
Embedded credit derivative (D9)	20	Estimated spread between the respective 30-year debt yield of Alcoa Corporation and counterparty	3.11% (30-year debt yields: Alcoa Corporation—7.47% (estimated) and counterparty—4.36%)

* The fair value of the embedded aluminum derivatives (D3 through D5) reflected as an asset in this table is lower by \$21 compared to the respective amount reflected in the Level 3 tables presented below. This is due to the fact that these contracts are in an asset position for the noncurrent portion and are in a liability position for the current portion, which are reflected as such on the accompanying Consolidated Balance Sheet. However, these derivatives are reflected as a net asset in the above table for purposes of presenting the assumptions utilized to measure the fair value of the derivative instrument in its entirety.

The fair values of Level 3 derivative instruments recorded as assets and liabilities in the accompanying Consolidated Balance Sheet were as follows:

	December 31, 2018	December 31, 2017
Asset Derivatives		
Derivatives designated as hedging instruments:		
Fair value of derivative instruments—current:		
Financial contract	\$ 70	\$ 96
Fair value of derivative instruments—noncurrent:		
Embedded aluminum derivatives	41	—
Financial contract	42	101
Total derivatives designated as hedging instruments	\$ 153	\$ 197
Total Asset Derivatives	\$ 153	\$ 197
Liability Derivatives		
Derivatives designated as hedging instruments:		
Fair value of derivative instruments—current:		
Embedded aluminum derivatives	\$ 46	\$ 120
Fair value of derivative instruments—noncurrent:		
Embedded aluminum derivatives	218	992
Total derivatives designated as hedging instruments	\$ 264	\$ 1,112
Derivatives not designated as hedging instruments:		
Fair value of derivative instruments—current:		
Embedded aluminum derivative	\$ 5	\$ 28
Embedded credit derivative	4	4
Fair value of derivative instruments—noncurrent:		
Embedded aluminum derivative	—	6
Embedded credit derivative	16	23
Total derivatives not designated as hedging instruments	\$ 25	\$ 61
Total Liability Derivatives	\$ 289	\$ 1,173

The following table shows the net fair values of the Level 3 derivative instruments at December 31, 2018 and the effect on these amounts of a hypothetical change (increase or decrease of 10%) in the market prices or rates that existed as of December 31, 2018:

	Fair value asset/(liability)	Index change of + / -10%
Embedded aluminum derivatives	\$ (228)	\$ 343
Embedded credit derivative	(20)	2
Financial contract	112	35

The following tables present a reconciliation of activity for Level 3 derivative instruments:

	Assets		Liabilities	
	Embedded aluminum derivatives	Financial contracts	Embedded aluminum derivatives	Embedded credit derivative
2018				
Opening balance—January 1, 2018	\$ —	\$ 197	\$ 1,146	\$ 27
Total gains or losses (realized and unrealized) included in:				
Sales	—	—	(100)	—
Cost of goods sold	—	(62)	—	(3)
Other expenses, net	—	—	(19)	(4)
Other comprehensive income	40	(11)	(745)	—
Purchases, sales, issuances, and settlements*	—	—	—	—
Transfers into and/or out of Level 3*	—	—	—	—
Other	1	(12)	(13)	—
Closing balance—December 31, 2018	\$ 41	\$ 112	\$ 269	\$ 20
Change in unrealized gains or losses included in earnings for derivative instruments held at December 31, 2018:				
Sales	\$ —	\$ —	\$ —	\$ —
Cost of goods sold	—	—	—	—
Other expenses, net	—	—	(19)	(4)

* In 2018, there were no purchases, sales, issuances or settlements of Level 3 derivative instruments. Additionally, there were no transfers of derivative instruments into or out of Level 3.

	Assets		Liabilities	
	Embedded aluminum derivatives	Financial contracts	Embedded aluminum derivatives	Embedded credit derivative
2017				
Opening balance—January 1, 2017	\$ 497	\$ 17	\$ 232	\$ 35
Total gains or losses (realized and unrealized) included in:				
Sales	3	—	(110)	—
Cost of goods sold	—	(31)	—	(5)
Other expenses, net	1	(7)	18	(3)
Other comprehensive loss	(499)	88	1,022	—
Purchases, sales, issuances, and settlements*	—	119	—	—
Transfers into and/or out of Level 3*	—	—	—	—
Other	(2)	11	(16)	—
Closing balance—December 31, 2017	\$ —	\$ 197	\$ 1,146	\$ 27
Change in unrealized gains or losses included in earnings for derivative instruments held at December 31, 2017:				
Sales	\$ —	\$ —	\$ —	\$ —
Cost of goods sold	—	—	—	—
Other expenses, net	1	(7)	18	(3)

* In January 2017, there was an issuance of a new financial contract (see D11 above). There were no purchases, sales or settlements of Level 3 derivative instruments. Additionally, there were no transfers of derivative instruments into or out of Level 3.

Derivatives Designated As Hedging Instruments—Cash Flow Hedges

For derivative instruments that are designated and qualify as cash flow hedges, effective on January 1, 2018, the entire amount of unrealized gains or losses on the derivative is reported as a component of other comprehensive income. Prior to January 1, 2018, only the effective portion of unrealized gains or losses on the derivative is reported as a component of other comprehensive income while the ineffective portion of unrealized gains or losses is recognized directly in earnings immediately. On April 1, 2018, Alcoa Corporation adopted guidance issued by the FASB to the accounting for hedging activities (see Recently Adopted Accounting Guidance in Note B), which included the elimination of the concept of ineffectiveness. Accordingly, there is no longer a requirement to separately measure and report ineffectiveness. In all periods presented, realized gains or losses on the derivative are reclassified from other comprehensive income into earnings in the same period or periods during which the hedged transaction impacts earnings. Additionally, gains and losses on the derivative representing hedge components excluded from the assessment of effectiveness are recognized directly in earnings immediately.

Alcoa Corporation has five Level 3 embedded aluminum derivatives and one Level 3 financial contract (through November 2016 – see D10 above) that have been designated as cash flow hedges as described below. Additionally, in January 2017, Alcoa Corporation entered into a new financial contract (see D11 above), which was designated as a cash flow hedging instrument and was classified as Level 3 under the fair value hierarchy, that replaced the existing financial contract (see D10 above) in August 2017.

Embedded aluminum derivatives (D1 through D5). Alcoa Corporation has entered into energy supply contracts that contain pricing provisions related to the LME aluminum price. The LME-linked pricing features are considered embedded derivatives. Five of these embedded derivatives have been designated as cash flow hedges of forward sales of aluminum. At December 31, 2018 and 2017, these embedded aluminum derivatives hedge forecasted aluminum sales of 2,508 kmt and 2,859 kmt, respectively.

In 2018, 2017, and 2016, Alcoa Corporation recognized a net unrealized gain of \$785, a net unrealized loss of \$1,521, and a net unrealized loss of \$615, respectively, in Other comprehensive income (loss) related to these five derivative instruments. Additionally, Alcoa Corporation reclassified a realized loss of \$100, \$113, and \$7 from Accumulated other comprehensive loss to Sales in 2018, 2017, and 2016, respectively. Assuming market rates remain constant with the rates at December 31, 2018, a realized loss of \$46 is expected to be recognized in Sales over the next 12 months.

There was no ineffectiveness related to these five derivative instruments in 2017 and 2016.

Financial contracts (D10 and D11). Alcoa Corporation had a financial contract to hedge the anticipated power requirements at one of its smelters that became effective when the existing power contract expired in October 2016. In August 2016, Alcoa Corporation elected to terminate most of the remaining term of this financial contract (see D10 above). Additionally, in December 2016, management elected to discontinue hedge accounting for this contract (see D10 above). This financial contract hedged forecasted electricity purchases of 1,969,544 megawatt hours prior to December 2016. In 2017, Alcoa Corporation reclassified a realized gain of \$6 from Accumulated other comprehensive loss to Cost of goods sold. In 2016, Alcoa Corporation recognized an unrealized gain of \$96 in Other comprehensive loss. Additionally, Alcoa Corporation recognized a gain of \$3 in Other income, net related to hedge ineffectiveness in 2016.

In addition, in January 2017, Alcoa Corporation entered into a new financial contract that hedges the anticipated power requirements at this smelter for the period from August 2017 through July 2021 (see D11 above). At December 31, 2018 and 2017, this financial contract hedges forecasted electricity purchases of 6,348,276 and 8,805,456, respectively, megawatt hours. In 2018 and 2017, Alcoa Corporation recognized an unrealized loss of \$11 and an unrealized gain of \$88, respectively, in Other comprehensive income (loss). Additionally, Alcoa Corporation reclassified a realized gain of \$62 and \$25 in 2018 and 2017, respectively, from Accumulated other comprehensive loss to Cost of goods sold. Assuming market rates remain consistent with the rates at December 31, 2018, a realized gain of \$70 is expected to be recognized in Cost of goods sold over the next 12 months. The amount of hedge ineffectiveness related to this derivative instrument was not material in 2017.

Derivatives Not Designated As Hedging Instruments

Alcoa Corporation has two (three prior to October 2016) Level 3 embedded aluminum derivatives (D6 through D8) and one Level 3 embedded credit derivative (D9) that do not qualify for hedge accounting treatment and one Level 3 financial contract for which management elected to discontinue hedge accounting treatment (see D10 above). As such, gains and losses related to the changes in fair value of these instruments are recorded directly in earnings. In 2018, 2017, and 2016, Alcoa Corporation recognized a gain of \$23, a loss of \$22, a loss of \$17, respectively, in Other expenses (income), net, of which a gain of \$19, a loss of \$18, and a loss of \$15, respectively, related to the embedded aluminum derivatives, a gain of \$4, a gain of \$3, and a loss of \$5, respectively, related to the embedded credit derivative, and a loss of \$7 (2017) and a gain of \$3 (2016) related to the financial contract.

Material Limitations

The disclosures with respect to commodity prices and foreign currency exchange risk do not consider the underlying commitments or anticipated transactions. If the underlying items were included in the analysis, the gains or losses on the futures contracts may be offset. Actual results will be determined by several factors that are not under Alcoa Corporation's control and could vary significantly from those factors disclosed.

Alcoa Corporation is exposed to credit loss in the event of nonperformance by counterparties on the above instruments, as well as credit or performance risk with respect to its hedged customers' commitments. Alcoa Corporation does not anticipate nonperformance by any of these parties. Contracts are with creditworthy counterparties and are further supported by cash, treasury bills, or irrevocable letters of credit issued by carefully chosen banks. In addition, various master netting arrangements are in place with counterparties to facilitate settlement of gains and losses on these contracts.

Other Financial Instruments. The carrying values and fair values of Alcoa Corporation's other financial instruments were as follows:

	2018		2017	
	Carrying value	Fair value	Carrying value	Fair value
December 31,				
Cash and cash equivalents	\$ 1,113	\$ 1,113	\$ 1,358	\$ 1,358
Restricted cash	3	3	7	7
Long-term debt due within one year	1	1	16	16
Long-term debt, less amount due within one year	1,801	1,863	1,388	1,555

The following methods were used to estimate the fair values of other financial instruments:

Cash and cash equivalents and Restricted cash. The carrying amounts approximate fair value because of the short maturity of the instruments. The fair value amounts for Cash and cash equivalents and Restricted cash were classified in Level 1 of the fair value hierarchy.

Long-term debt due within one year and Long-term debt, less amount due within one year. The fair value was based on quoted market prices for public debt and on interest rates that are currently available to Alcoa Corporation for issuance of debt with similar terms and maturities for non-public debt. The fair value amounts for all Long-term debt were classified in Level 2 of the fair value hierarchy.

P. Income Taxes

Provision for income taxes. The components of income (loss) before income taxes were as follows:

	2018	2017	2016
Domestic	\$ (771)	\$ (712)	\$ (688)
Foreign	2,368	1,871	526
	\$ 1,597	\$ 1,159	\$ (162)

Provision for income taxes consisted of the following:

	2018	2017	2016
Current:			
Federal*	\$ 5	\$ 3	\$ 9
Foreign	757	421	221
State and local	—	—	—
	762	424	230
Deferred:			
Federal*	(21)	24	—
Foreign	(15)	152	(46)
State and local	—	—	—
	(36)	176	(46)
Total	\$ 726	\$ 600	\$ 184

* Includes U.S. income taxes related to foreign income.

A reconciliation of the U.S. federal statutory rate to Alcoa Corporation's effective tax rate was as follows (the effective tax rate was a provision on income in 2018 and 2017 and a provision on a loss in 2016):

	2018	2017	2016
U.S. federal statutory rate	21.0%	35.0%	35.0%
Taxes on foreign operations—rate differential	12.8	(10.8)	44.3
Global intangible low-taxed income ⁽¹⁾	10.0	—	—
Changes in valuation allowances	3.4	25.8	(1.9)
Tax holidays ⁽²⁾	(3.2)	0.4	11.2
Unrecognized tax benefits	1.9	(1.0)	(1.1)
Other taxes related to foreign operations	1.1	1.3	(19.5)
Noncontrolling interest	1.0	1.4	(7.3)
Statutory tax rate and law changes	0.1	0.1	(0.6)
Impact of U.S. Tax Cuts and Jobs Act of 2017	—	1.9	—
Losses and credits with no tax benefit ⁽³⁾	—	(0.2)	(163.2)
Nondeductible costs related to the Separation Transaction	—	—	(9.6)
Other	(2.6)	(2.1)	(0.9)
Effective tax rate	45.5%	51.8%	(113.6)%

- (1) As noted in U.S. Tax Cuts and Jobs Act of 2017 below, the impact of the global intangible low-taxed income provisions reflected in this table were fully offset by the utilization of a majority of the Company's 2018 loss in the United States (reflected in the U.S. federal statutory rate change line item), as well as the utilization of a portion of the Company's U.S. tax loss carryforwards (reflected in the Changes in valuation allowance line item as the applicable U.S. deferred tax assets have a full valuation allowance).
- (2) In 2018 and 2017, the income of certain operations of several of the Company's subsidiaries in Brazil was taxed at a lower rate as a result of approved tax holidays. The difference between the respective holiday rates and the statutory rates resulted in a benefit of \$46 and \$20, or \$0.24 and \$0.11 per diluted share, in 2018 and 2017, respectively. The majority of these tax holidays expire at the end of 2022 and one tax holiday expires at the end of 2026 (see below). In 2018 and 2017, this line item also includes a benefit of \$5 and a charge of \$26, respectively, for the remeasurement of certain deferred tax assets related to these tax holidays in Brazil (see below).
- (3) In 2016, hypothetical net operating losses and tax credits were determined on a separate return basis for which it is more likely than not that a tax benefit will not be realized. The related deferred tax asset and offsetting valuation allowance have been adjusted to Parent Company net investment and, as such, are not reflected in subsequent deferred tax and valuation allowance tables.

In mid-2017, AWAB received approval for a tax holiday related to the operation of the Juruti (Brazil) bauxite mine. This tax holiday was made effective as of January 1, 2017 (retroactively) and decreases AWAB's tax rate on income generated by the Juruti mine from 34% to 15.25%, which will result in future cash tax savings over a 10-year period. As a result of this income tax rate change, AWAB's existing deferred tax assets that are expected to reverse during the holiday period were remeasured at the lower tax rate. In 2017, this remeasurement resulted in both a decrease to AWAB's deferred tax assets and a discrete income tax charge of \$26 (\$15 after noncontrolling interest). An updated analysis of the deferred tax assets expected to reverse during the holiday period resulted in both an increase to AWAB's deferred tax assets and a discrete income tax benefit of \$5 (\$3 after noncontrolling interest) in 2018.

Deferred income taxes. The components of deferred tax assets and liabilities based on the underlying attributes without regard to jurisdiction were as follows:

	2018		2017	
	Deferred tax assets	Deferred tax liabilities	Deferred tax assets	Deferred tax liabilities
December 31,				
Tax loss carryforwards	\$ 1,231	\$ —	\$ 1,185	\$ —
Employee benefits	683	—	949	—
Loss provisions	212	—	246	—
Investment basis differences	162	—	72	—
Depreciation	91	428	141	432
Derivatives and hedging activities	53	39	287	70
Tax credit carryforwards	27	—	193	—
Deferred income/expense	10	103	11	109
Other	87	1	28	57
	2,556	571	3,112	668
Valuation allowance	(1,684)	—	(1,927)	—
	\$ 872	\$ 571	\$ 1,185	\$ 668

The following table details the expiration periods of the deferred tax assets presented above:

	Expires within 10 years	Expires within 11-20 years	No expiration*	Other*	Total
December 31, 2018					
Tax loss carryforwards	\$ 307	\$ 254	\$ 670	\$ —	\$ 1,231
Tax credit carryforwards	18	9	—	—	27
Other	—	—	305	993	1,298
Valuation allowance	(325)	(263)	(370)	(726)	(1,684)
	\$ —	\$ —	\$ 605	\$ 267	\$ 872

* Deferred tax assets with no expiration may still have annual limitations on utilization. Other represents deferred tax assets whose expiration is dependent upon the reversal of the underlying temporary difference.

The total deferred tax asset (net of valuation allowance) is supported by projections of future taxable income exclusive of reversing temporary differences and taxable temporary differences that reverse within the carryforward period. The composition of Alcoa Corporation's net deferred tax asset by jurisdiction as of December 31, 2018 was as follows:

	Domestic	Foreign	Total
Deferred tax assets	\$ 891	\$ 1,665	\$ 2,556
Valuation allowance	(779)	(905)	(1,684)
Deferred tax liabilities	(102)	(469)	(571)
	\$ 10	\$ 291	\$ 301

The Company has several income tax filers in various foreign countries. Of the \$291 net deferred tax asset included under the "Foreign" column in the table above, approximately 80% relates to four of Alcoa Corporation's income tax filers as follows: a \$209 deferred tax asset for Aluminio in Brazil; a \$140 net deferred tax asset for AWAB in Brazil; a \$94 deferred tax asset for Española (collectively with Aluminio and AWAB, the "Foreign Filers") in Spain; and a \$220 net deferred tax liability for AofA.

The future realization of the net deferred tax asset for each of the Foreign Filers was based on projections of the respective future taxable income (defined as the sum of pretax income, other comprehensive income, and permanent tax differences), exclusive of reversing temporary differences and carryforwards. The realization of the net deferred tax assets of the Foreign Filers is not dependent on any tax planning strategies. The Foreign Filers each generated taxable income in the three-year cumulative period ending December 31, 2018. Management has also forecasted taxable income for each of the Foreign Filers in 2019 and for the foreseeable future. This forecast is based on macroeconomic indicators and involves assumptions related to, among others: commodity prices; volume levels; and key inputs and raw materials, such as bauxite, caustic soda, energy, labor, and transportation costs. These are the same assumptions utilized by management to develop the financial and operating plan that is used to manage the Company and measure performance against actual results.

The majority of the Foreign Filers' net deferred tax assets relate to tax loss carryforwards. The Foreign Filers do not have a history of tax loss carryforwards expiring unused. Additionally, tax loss carryforwards have an infinite life under the respective income tax codes in Brazil and Spain. That said, utilization of an existing tax loss carryforward is limited to 30% and 25% of taxable income in a particular year in Brazil and Spain, respectively.

Accordingly, management concluded that the net deferred tax assets of the Foreign Filers will more likely than not be realized in future periods, resulting in no need for a partial or full valuation allowance as of December 31, 2018.

The following table details the changes in the valuation allowance:

December 31,	2018	2017	2016
Balance at beginning of year	\$ (1,927)	\$ (1,755)	\$ (712)
Establishment of new allowances ⁽¹⁾	(86)	(94)	—
Net change to existing allowances ⁽²⁾	312	(33)	(1,056)
Foreign currency translation	17	(45)	13
Balance at end of year	\$ (1,684)	\$ (1,927)	\$ (1,755)

(1) This line item reflects valuation allowances initially established as a result of a change in management's judgment regarding the realizability of deferred tax assets.

(2) This line item reflects movements in previously established valuation allowances, which increase or decrease as the related deferred tax assets increase or decrease. Such movements occur as a result of remeasurement due to a tax rate change and changes in the underlying attributes of the deferred tax assets, including expiration of the attribute and reversal of the temporary difference that gave rise to the deferred tax asset.

In 2018, Alcoa Corporation immediately established a full valuation allowance of \$86 related to an initial deferred tax asset associated with the Company's equity interest in Elysis (see Note H). At inception, Alcoa Corporation contributed certain intellectual property and patents and made an initial cash investment of \$5 to Elysis. This deferred tax asset relates to an outside basis difference created by the excess of the tax basis (i.e. fair value) of these assets over the carrying value of the investment in Elysis recorded by the Company. The initial purpose of Elysis is to advance development of aluminum smelter technology with the ultimate goal of commercialization. After weighing all available positive and negative evidence, management determined it is not more likely than not that Alcoa Corporation will realize the tax benefit of this deferred tax asset. This conclusion was based on the fact that Elysis is expected to generate losses for the foreseeable future as Elysis incurs expenses during the development stage without a committed future revenue stream. The need for this valuation allowance will be assessed on a continuous basis in future periods and, as a result, a portion or all of the allowance may be reversed based on changes in facts and circumstances.

In 2017, the Company established a valuation allowance of \$94 related to the remaining deferred tax assets in Iceland (an initial allowance was previously established in 2015). This amount was comprised of a \$60 discrete income charge recognized in the Provision for income taxes on the accompanying Consolidated Statement of Operations and a \$34 charge to Accumulated other comprehensive loss on the accompanying Consolidated Balance Sheet. These deferred tax assets relate to tax loss carryforwards, which have an expiration period ranging from 2017 to 2026, and deferred losses associated with derivative and hedging activities. After weighing all available positive and negative evidence, management determined that it was no longer more likely than not that Alcoa Corporation will realize the tax benefit of these deferred tax assets. This conclusion was based on existing cumulative losses and a short expiration period. Such losses were generated as a result of intercompany interest expense under the Company's global treasury and cash management system and the realization of deferred losses associated with an LME-linked embedded derivative in a power contract (see Note O). This interest expense is expected to continue and additional deferred losses associated with the embedded derivative will be realized in future years. As a result, management estimates that there will not be sufficient taxable income available to utilize the operating losses during the expiration period. The need for this valuation allowance will be assessed on a continuous basis in future periods and, as a result, a portion or all of the allowance may be reversed based on changes in facts and circumstances.

Undistributed net earnings. The cumulative amount of Alcoa Corporation's foreign undistributed net earnings deemed to be permanently reinvested was approximately \$1,010 as of December 31, 2018. This amount relates to foreign undistributed net earnings generated prior to the Separation Date, as well as approximately \$230 of certain earnings generated during 2018 and 2017. Alcoa Corporation has several commitments and obligations related to the Company's operations in various foreign jurisdictions; therefore, management has no plans to distribute such earnings in the foreseeable future. Alcoa Corporation continuously evaluates its local and global cash needs for future business operations and anticipated debt facilities, which may influence future repatriation decisions. As described below (see U.S. Tax Cuts and Jobs Act of 2017 below), beginning on January 1, 2018, dividends received from foreign subsidiaries will no longer be subject to U.S. federal income tax; however, there was a mandatory one-time deemed repatriation of existing foreign undistributed net earnings during 2017 that may have resulted in a tax obligation for the Company. Based on an analysis completed in 2018, management determined that Alcoa Corporation had sufficient U.S. tax losses and foreign tax credits to apply against such tax, resulting in no impact to the Company's Consolidated Financial Statements. Accordingly, with the exception of potential foreign currency exchange

rate differences, the earnings described above will not be subject to residual U.S. income tax if repatriated in the future. Additionally, any such repatriation will not be subject to foreign income tax with the exception of withholding tax in certain jurisdictions. Management does not expect any such withholding tax to be material to the Company's Consolidated Financial Statements.

Unrecognized tax benefits. Alcoa Corporation and its subsidiaries file income tax returns in the U.S. federal jurisdiction and various foreign and U.S. state jurisdictions. With few exceptions, the Company is not subject to income tax examinations by tax authorities for years prior to 2014. For U.S. federal income tax purposes, virtually all of Alcoa Corporation's U.S. operations were included in the income tax filings of ParentCo's U.S. consolidated tax group prior to the Separation Date. Since that time, the Company's U.S. consolidated tax group, comprised of the referenced U.S. operations, has filed both a two-month (related to 2016) and a 2017 U.S. federal income tax return, which have not been examined by the Internal Revenue Service. The U.S. federal income tax filings of ParentCo's U.S. consolidated tax group have been examined for all prior periods through the Separation Date. Foreign jurisdiction tax authorities are in the process of examining income tax returns of several of Alcoa Corporation's subsidiaries for various tax years between and including 2006 through 2017. For U.S. state income tax purposes, Alcoa Corporation and its subsidiaries remain subject to income tax examinations for the 2014 tax year and forward (as of December 31, 2018, there are no active examinations).

A reconciliation of the beginning and ending amount of unrecognized tax benefits (excluding interest and penalties) was as follows:

December 31,	2018		2017		2016	
Balance at beginning of year	\$	10	\$	23	\$	22
Additions for tax positions of the current year		1		1		3
Additions for tax positions of prior years		20		—		1
Reductions for tax positions of prior years		—		(5)		(2)
Settlements with tax authorities		—		(6)		(2)
Expiration of the statute of limitations		—		(3)		—
Foreign currency translation		(1)		—		1
Balance at end of year	\$	30	\$	10	\$	23

For all periods presented, a portion of the balance at end of year pertains to state tax liabilities, which are presented before any offset for federal tax benefits. The effect of unrecognized tax benefits, if recorded, that would impact the annual effective tax rate for 2018, 2017, and 2016 would be 2%, 1%, and 10%, respectively, of pretax book income (loss). In 2018, the Company recorded a charge of \$30 (€26), including \$10 (€9) for interest, in Provision for income taxes on the accompanying Statement of Consolidated Operations to establish a liability for its 49% share of the estimated loss on a disputed income tax matter (see "Spain" in the Tax section of Note R). Alcoa Corporation does not anticipate that changes in its unrecognized tax benefits will have a material impact on the Statement of Consolidated Operations during 2019.

It is the Company's policy to recognize interest and penalties related to income taxes as a component of the Provision for income taxes on the accompanying Statement of Consolidated Operations. In 2018, 2017, and 2016, Alcoa Corporation recognized \$10, \$1, and \$1, respectively, in interest and penalties. Due to the expiration of the statute of limitations, settlements with tax authorities, and refunded overpayments, the Company also recognized interest income of \$1, \$6, and \$2 in 2018, 2017, and 2016, respectively. As of December 31, 2018 and 2017, the amount accrued for the payment of interest and penalties was \$12 and \$2, respectively.

U.S. Tax Cuts and Jobs Act of 2017. On December 22, 2017, U.S. tax legislation known as the U.S. Tax Cuts and Jobs Act of 2017 (the "TCJA") was enacted. For corporations, the TCJA amends the U.S. Internal Revenue Code by reducing the corporate income tax rate and modifying several business deduction and international tax provisions. Specifically, the corporate income tax rate was reduced to 21% from 35%. Other significant changes, in general, include the following, among others: (i) a mandatory one-time deemed repatriation of accumulated foreign earnings (see Undistributed net earnings above) at either an 8% or 15.5% tax rate, depending on circumstances; (ii) dividends received from foreign subsidiaries can be deducted in full regardless of ownership interest (previously such dividends were fully taxable); (iii) a 21% or 10.5% tax (effective in 2018), depending on circumstances, on a new category of income, referred to as global intangible low tax income (GILTI), related to earnings of foreign entities above a prescribed return on the associated fixed asset base; (iv) a 5% to 10% tax (effective in 2018) on base erosion payments (deductible cross-border payments to related parties) that exceed 3% of a company's deductible expenses; and (v) net operating losses have an unlimited carryforward period (previously 20 years) and no carryback period (previously 2 years), but deductions for such losses are limited to 80% of taxable income (previously 100% of taxable income) beginning with the 2018 tax year.

As a result of the close proximity of the enactment date of the TCJA in relation to Alcoa Corporation's 2017 calendar year-end, management elected January 17, 2018 as a cut-off date for purposes of recognizing any impacts from the TCJA in the Company's 2017 Consolidated Financial Statements. This date coincided with Alcoa Corporation's public release of its preliminary financial results for the fourth quarter and year ended December 31, 2017. Accordingly, the Company's preliminary analysis of the provisions of the TCJA resulted in a discrete income tax charge of \$22, which was reflected in Provision for income taxes on the accompanying Statement of Consolidated Operations for 2017, as described below.

The \$22 charge relates specifically to management's reasonable estimate of the corporate income tax rate change, which resulted in the remeasurement of Alcoa Corporation's deferred income tax accounts. On a gross basis, the Company reduced its deferred tax assets, valuation allowance, and deferred tax liabilities by \$506, \$433, and \$51, respectively.

Management also completed a preliminary analysis of the remaining provisions of the TCJA, including those specifically described above, in order to make a reasonable estimate as of the cut-off date, which resulted in no additional impact to the Company's 2017 Consolidated Financial Statements. Specifically, the reasonable estimate for the TCJA provisions described above was based on the following: for (i), (ii), and (iii), Alcoa Corporation's existing tax profile, which includes significant current U.S. tax losses that would be applied against such taxable income, as well as significant foreign tax credits that can be applied against these taxes; for (iv) management estimates that the Company will be under the 3% threshold; and for (v) Alcoa Corporation's deferred income tax assets related to U.S. net operating losses were fully reserved as of December 31, 2017.

The Company's preliminary analyses and provisional estimates of the financial statement impacts of the TCJA were completed in accordance with guidance issued by the SEC under Staff Accounting Bulletin No. 118, *Income Tax Accounting Implications of the Tax Cuts and Jobs Act*.

Throughout the majority of 2018, management continued to gather information and perform additional analysis of the TCJA provisions related to Alcoa Corporation's 2017 Consolidated Financial Statements. Upon completion of this analysis, management concluded that there was no material impact to the Company's 2017 Consolidated Financial Statements related to both the reduced corporate income tax rate and the other applicable provisions of the TCJA.

Also in 2018, management completed its analysis of the impact of the tax law changes, including GILTI, that became effective January 1, 2018 under the TCJA related to Alcoa Corporation's 2018 Consolidated Financial Statements. The Company made an accounting policy election to include as a period cost the tax impact generated by including GILTI in U.S. taxable income. The inclusion of GILTI in 2018 U.S. taxable income was fully offset by current U.S. tax losses and net operating loss carryforwards as expected. None of the remaining provisions of the TCJA had a material impact on Alcoa Corporation's 2018 Consolidated Financial Statements.

Q. Asset Retirement Obligations

Alcoa Corporation has recorded AROs related to legal obligations associated with the standard operation of bauxite mines, alumina refineries, and aluminum smelters. These AROs consist primarily of costs associated with mine reclamation, closure of bauxite residue areas, spent pot lining disposal, and landfill closure. Alcoa Corporation also recognizes AROs for any significant lease restoration obligation, if required by a lease agreement, and for the disposal of regulated waste materials related to the demolition of certain power facilities.

In addition to AROs, certain CAROs related to alumina refineries, aluminum smelters, rolling mills, and energy generation facilities have not been recorded in the Consolidated Financial Statements due to uncertainties surrounding the ultimate settlement date. Such uncertainties exist as a result of the perpetual nature of the structures, maintenance and upgrade programs, and other factors. At the date a reasonable estimate of the ultimate settlement date can be made (e.g., planned demolition), Alcoa Corporation would record an ARO for the removal, treatment, transportation, storage, and/or disposal of various regulated assets and hazardous materials such as asbestos, underground and aboveground storage tanks, PCBs, various process residuals, solid wastes, electronic equipment waste, and various other materials. If Alcoa Corporation was required to demolish all such structures immediately, the estimated CARO as of December 31, 2018 ranges from \$3 to \$28 per structure (24 structures) in today's dollars.

The following table details the carrying value of recorded AROs by major category (of which \$122 and \$108 was classified as a current liability as of December 31, 2018 and 2017, respectively):

December 31,	2018	2017
Mine reclamation	\$ 198	\$ 221
Closure of bauxite residue areas	231	238
Spent pot lining disposal	113	125
Demolition*	76	113
Landfill closure	33	27
Other	—	1
	\$ 651	\$ 725

* In 2018, 2017, and 2016, AROs were recorded as a result of management's decision to permanently close and demolish certain structures (see Note D).

The following table details the changes in the total carrying value of recorded AROs:

December 31,	2018	2017
Balance at beginning of year	\$ 725	\$ 708
Accretion expense	17	17
Payments	(80)	(69)
Liabilities incurred	63	70
Reversals of previously recorded liabilities*	(37)	(27)
Foreign currency translation and other	(37)	26
Balance at end of year	\$ 651	\$ 725

* In 2018 and 2017, Reversals of previously recorded liabilities include \$36 and \$20 related to the Portovesme (Italy) and Warrick (Indiana) smelters, respectively (see Note D).

R. Contingencies and Commitments

Unless specifically described to the contrary, all matters within Note R are the full responsibility of Alcoa Corporation pursuant to the Separation and Distribution Agreement. Additionally, the Separation and Distribution Agreement provides for cross-indemnities between the Company and Arconic for claims subject to indemnification.

Contingencies

Litigation.

Italy 148—Beginning in 2006, ParentCo and the Italian Energy Authority (Autorità di Regolazione per Energia Reti e Ambiente, formerly l'Autorità per l'Energia Elettrica, il Gas e il Sistema Idrico, the "Energy Authority") had been in a dispute regarding the calculation of a drawback applied to a portion of the price of power under a special tariff received by Alcoa Trasformazioni S.r.l. ("Trasformazioni," previously a subsidiary of ParentCo; now a subsidiary of Alcoa Corporation). This dispute arose as a result of a resolution (148/2004) issued in 2004 by the Energy Authority that changed the method for calculating the drawback. Through 2009, Trasformazioni continued to receive the power price drawback for its Portovesme and Fusina smelters in accordance with the original resolution (204/1999), at which time the European Commission declared all such special tariffs to be impermissible "state aid." Between 2006 and 2014, several judicial hearings occurred related to continuous appeals filed by both ParentCo and the Energy Authority regarding the dispute on the calculation of the drawback; a hearing on the latest appeal was scheduled for May 2018 (see below). Additionally, between 2012 and 2013, Trasformazioni received multiple letters from the agency responsible for making and collecting payments on behalf of the Energy Authority demanding payment for the difference in the drawback calculation between the two resolutions. The latest such demand was for \$97 (€76), including interest, and allegedly included consideration of a third resolution (44/2012) issued in 2012 on the calculation of the drawback; Trasformazioni rejected this demand.

In the meantime, as a result of the conclusion of the European Commission Matter in January 2016 (see Note R to the Consolidated Financial Statements in Part II Item 8 of Alcoa Corporation's Annual Report on Form 10-K for the year ended December 31, 2017), ParentCo's management modified its outlook with respect to a portion of the then-pending legal proceedings related to the drawback dispute. As such, a charge of \$37 (€34) was recorded in Restructuring and other charges for the year ended December 31, 2015 to establish a partial reserve for this matter.

In December 2017, through an agreement with the Energy Authority, Alcoa Corporation settled this matter for \$18 (€15) (paid in January 2018). Accordingly, the Company recorded a reduction of \$22 (€19) (the U.S. dollar amount reflects the

effects of foreign currency movements since 2015) to its previously established reserve in Restructuring and other charges (see Note D) on the accompanying Statement of Consolidated Operations. In January 2018, subsequent to making the previously referenced payment, Alcoa Corporation and the respective state attorney in Italy filed a joint request with the Regional Administrative Court for Lombardy to have this matter formally dismissed. On October 9, 2018, the court formally dismissed the case and this matter is now closed.

Also in December 2017, as part of a separate but related agreement to the above, the Company agreed to transfer ownership of the Portovesme smelter (permanently closed in 2014) to Invitalia, an Italian government agency responsible for managing economic development. Under the provisions of the agreement, the Company will retain the responsibility for environmental-related obligations associated with decommissioning the Portovesme smelter (see below). The agreement further provides that the Company may be relieved of such obligations upon Invitalia exercising an option to receive a cash payment of \$23 (€20) from the Company. Additionally, this agreement included a framework for the future settlement of a groundwater remediation project related to the Portovesme site (see Fusina and Portovesme, Italy in Environmental Matters below). In February 2018, the Company completed the transfer of ownership of the Portovesme smelter to Invitalia. The carrying value of the assets related to the Portovesme site were previously written down to zero as a direct result of ParentCo's decision in 2014 to decommission the facility.

In mid-2018, Invitalia sold the Portovesme smelter to SiderAlloys International S.A., a Switzerland company, which intends to restart the facility. In June 2018, Invitalia gave notice to the Company that it was exercising its option under the December 2017 agreement to receive the cash payment thereby releasing the Company from responsibility of all environmental-related obligations associated with a future decommissioning of the Portovesme smelter. The cash payment will be made in three installments, one in each of 2018 (paid \$8 (€7) on June 18), 2019, and 2020. Accordingly, Alcoa Corporation recognized a \$15 net benefit in Restructuring and other charges (see Note D) on the accompanying Statement of Consolidated Operations, comprised of (i) a \$38 reversal of previously accrued asset retirement obligations (\$36) and environmental reserves (\$2) related to the Company's former decommissioning plan for the Portovesme smelter, and (ii) a \$23 charge to establish a liability for the planned cash payment to Invitalia.

Environmental Matters. Alcoa Corporation participates in environmental assessments and cleanups at several locations. These include owned or operating facilities and adjoining properties, previously owned or operating facilities and adjoining properties, and waste sites, including Superfund (Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)) sites.

A liability is recorded for environmental remediation when a cleanup program becomes probable and the costs can be reasonably estimated. As assessments and cleanups proceed, the liability is adjusted based on progress made in determining the extent of remedial actions and related costs. The liability can change substantially due to factors such as, among others, the nature and extent of contamination, changes in remedial requirements, and technological changes.

Alcoa Corporation's remediation reserve balance was \$280 and \$294 at December 31, 2018 and 2017 (of which \$44 and \$36 was classified as a current liability), respectively, and reflects the most probable costs to remediate identified environmental conditions for which costs can be reasonably estimated.

In 2018, the remediation reserve was increased by \$16 due to an increase of \$9 related to the former Sherwin location (see below), a reversal of \$2 (recorded in Restructuring and other charges) related to the Portovesme location (unrelated to the matter below – see Italy 148 in Litigation above), and a net charge of \$9 (\$7 and \$2 were recorded in Cost of goods sold and Restructuring and other charges, respectively) associated with several sites. In 2017, the remediation reserve was increased by \$1 due to a charge of \$8 related to the planned demolition of the Rockdale smelter (see Note D), a combined reduction of \$6 related to the Baie Comeau and Mosjøen locations (see below), a reversal of \$4 related to the restart of the Warrick smelter (see Note D), and a net charge of \$3 associated with several other sites. In 2016, the remediation reserve was increased by \$39 due to a charge of \$26 related to the planned demolition of the Suriname refinery and permanent closure of the related bauxite mines (see Note D) and a net charge of \$13 associated with several other sites. Of the changes to the remediation reserve in 2017 and 2016, \$4 and \$26, respectively, was recorded in Restructuring and other charges, while the remainder was recorded in Cost of goods sold on the accompanying Statement of Consolidated Operations.

Payments related to remediation expenses applied against the reserve were \$25, \$48, and \$32 in 2018, 2017, and 2016, respectively. These amounts include expenditures currently mandated, as well as those not required by any regulatory authority or third party. In 2018, the change in the reserve also reflects a decrease of \$6 due to the effects of foreign currency translation and an increase of \$1 for reclassifications made between this reserve and the Company's liability for asset retirement obligations. In 2017, the change in the reserve also reflects an increase of \$17, including \$11 due to the effects of foreign currency translation and \$5 for the reclassification of an amount previously included in Asset retirement obligations on Alcoa Corporation's Consolidated Balance Sheet as of December 31, 2016. In 2016, the change in the reserve also reflects an increase for each of the following: \$60 of obligations transferred from ParentCo in connection with the Separation Transaction on November 1, 2016, including Sherwin and East St. Louis described below; \$17 for the reclassification of amounts included in other reserves within Other noncurrent liabilities and deferred credits on Alcoa Corporation's Consolidated Balance Sheet as of December 31, 2015; and \$5 due to the effects of foreign currency translation.

The Separation and Distribution Agreement includes provisions for the assignment or allocation of environmental liabilities between Alcoa Corporation and Arconic, including certain remediation obligations associated with environmental matters. In general, the respective parties are responsible for the environmental matters associated with their operations, and with the properties and other assets assigned to each. Additionally, the Separation and Distribution Agreement lists environmental matters with a shared responsibility between the two companies with an allocation of responsibility and the lead party responsible for management of each matter. For matters assigned to Alcoa Corporation and Arconic under the Separation and Distribution Agreement, the companies have agreed to indemnify each other in whole or in part for environmental liabilities arising from operations prior to the Separation Date.

The following description provides details regarding the current status of certain significant reserves related to current or former Alcoa Corporation sites. With the exception of the Fusina, Italy matter, Alcoa Corporation assumed full responsibility of the matters described below.

General—The Company is in the process of decommissioning various plants in several countries. As a result, redeveloping these sites for reuse or returning the land to a natural state requires the performance of certain remediation activities. In aggregate, the majority of these activities will be completed at various times in the future with the latest expected to be in 2026, after which ongoing monitoring and other activities will be required. At December 31, 2018 and 2017, the reserve balance associated with these activities was \$132 and \$150, respectively.

Sherwin, TX—In connection with ParentCo's sale of the Sherwin alumina refinery, which was required to be divested as part of ParentCo's acquisition of Reynolds Metals Company in 2000, ParentCo agreed to retain responsibility for the remediation of the then-existing environmental conditions, as well as a pro rata share of the final closure of the active bauxite residue waste disposal areas (known as the Copano facility). All ParentCo obligations regarding the Sherwin refinery and Copano facility were transferred from ParentCo to Alcoa Corporation as part of the Separation Transaction on November 1, 2016. Since October 2016, Reynolds Metals Company, a subsidiary of Alcoa Corporation, had been involved in a legal dispute with the owner of Sherwin related to the allocation of responsibility for the environmental obligations at this site. In April 2018, Reynolds Metals Company reached a settlement agreement with the owner of Sherwin, as well as a separate agreement with the Texas Commission on Environmental Quality, that revised the environmental responsibilities and obligations for each related to the Sherwin refinery site and Copano facility. These agreements became effective on May 21, 2018. Accordingly, the Company increased the reserve associated with this matter by \$9 to reflect certain incremental obligations under the agreements. At December 31, 2018 and 2017, the reserve balance associated with this matter was \$38 and \$29, respectively. In management's judgment, the Company's reserve as of December 31, 2018 is sufficient to satisfy the provisions of the settlement agreements. Upon changes in facts or circumstances, a change to the reserve may be required. See "Sherwin" in the Other section below for a complete description of this matter.

Baie Comeau, Quebec, Canada—Alcoa Corporation has a remediation project related to known polychlorinated biphenyls (PCBs) and polycyclic aromatic hydrocarbons (PAHs) contained in sediments of the Anse du Moulin bay, which is near the Company's Baie Comeau smelter. The project, which was approved by the Quebec Ministry of Sustainable Development, Environment, Wildlife and Parks through a final ministerial decree issued in July 2015, is aimed at dredging and capping of the contaminated sediments. The project work began in April 2017 and was virtually completed in December 2017. At the end of 2017, the Company decreased the reserve for Baie Comeau by \$4 to reflect the final cost estimate of the remaining work and the subsequent monitoring program, which is expected to last through 2023. At December 31, 2018 and 2017, the reserve balance associated with this matter was \$3 and \$5, respectively.

Fusina and Portovesme, Italy—The following matters are in regards to an order issued in 2004 to Alcoa Trasformazioni S.r.l. (“Trasformazioni”) (Trasformazioni is now a subsidiary of Alcoa Corporation and owns the Fusina smelter and Portovesme smelter (until February 2017 – see Italy 148 in Litigation above) sites, and Fusina Rolling S.r.l., a new ParentCo subsidiary, now owns the Fusina rolling operations) by the Italian Ministry of Environment and Protection of Land and Sea (the “MOE”) for the development of a clean-up plan related to soil and groundwater contamination in excess of allowable limits under legislative decree and, for only the Fusina site, to institute emergency actions and pay natural resource damages.

For the Fusina site, Trasformazioni has a soil and groundwater remediation project, which was approved by the MOE through a final ministerial decree issued in August 2014. Additionally, under an administrative agreement reached in February 2014 with the MOE, Trasformazioni is required to make annual payments over a 10-year period for groundwater emergency containment and natural resource damages related to the Fusina site. Trasformazioni began work on the soil remediation project in October 2017 and expects to complete the project by the end of 2019. The MOE assumed the responsibility for the execution of the groundwater remediation/emergency containment in accordance with the February 2014 settlement agreement, as part of a regional effort by the MOE, and project work is slated to begin in 2020. At December 31, 2018 and 2017, the reserve balance associated with all of the foregoing Fusina-related matters (excluding a portion related to the rolling operations – see below) was \$5 and \$8, respectively.

Effective with the Separation Transaction, Arconic retained the portion of Trasformazioni’s obligation related to the Fusina rolling operations. Specifically, under the Separation and Distribution Agreement, Trasformazioni, and with it the Fusina properties, were assigned to Alcoa Corporation. Fusina Rolling S.r.l., entered into a lease agreement for the portion of property that included the rolling operations. Pursuant to the Separation and Distribution Agreement, the liabilities at Fusina described above were allocated between Alcoa Corporation (Trasformazioni) and Arconic (Fusina Rolling S.r.l.).

For the Portovesme site, Trasformazioni has a soil remediation project, which was approved by the MOE through a final ministerial decree issued in October 2015. Project work on the soil remediation project commenced in mid-2016 and is expected to be completed by the end of 2019. Additionally, Trasformazioni, along with four other entities that operated in the same industrial park, have submitted a groundwater remediation project, which was preliminarily approved in 2010 by the MOE. Since that time, the parties have performed additional studies and work to be incorporated into the final remedial design. In December 2017, a framework for the future settlement of the groundwater remediation project was included within an agreement to transfer the ownership of the Portovesme smelter to an Italian government agency (see Italy 148 in Litigation above). The MOE has confirmed its acceptance of the proposal set out in the framework; however, the total cost of the groundwater remediation project will not be determined until the final remedial design is completed in mid-2019. The ultimate outcome of this matter may result in a change to the existing reserve for Portovesme. At December 31, 2018 and 2017, the reserve balance associated with all of the foregoing Portovesme-related matters was \$12 and \$16, respectively.

Mosjøen, Norway—Alcoa Corporation has a remediation project related to known PAHs in the sediments located in the harbor and extending out into the fjord, which are near the Company’s Mosjøen smelter. The project, which was approved by the Norwegian Environmental Agency through a final order issued in June 2015, is aimed at dredging and capping of the contaminated sediments. In order to allow for the sediment dredging in the harbor, the project also includes stabilization of the wharf. Project work commenced in early 2016 and the main portion of such work was completed in the second half of 2017. At that time, the Company reexamined its cost estimate for the remaining project work, resulting in a reduction of the reserve associated with this matter by \$2. In mid-2018, the remaining project work was completed. At December 31, 2018, there is a small reserve balance for required ongoing reporting and monitoring activities. At December 31, 2017, the reserve balance associated with this matter was \$2.

East St. Louis, IL—Alcoa Corporation has an ongoing remediation project related to an area used for the disposal of bauxite residue from ParentCo’s former alumina refining operations. The project, which was selected by the U.S. Environmental Protection Agency (EPA) in a Record of Decision issued in July 2012 and approved in a consent decree entered as final in February 2014 by the U.S. Department of Justice, is aimed at implementing a soil cover over the affected area. As a result, ParentCo began the project work in March 2014; the fieldwork on a majority of this project was completed by the end of June 2016. A completion report was approved by the EPA in September 2016 and this matter, for the completed portion of the project, transitioned into a long-term (approximately 30 years) inspection, maintenance, and monitoring program. Fieldwork for the remaining portion of the project is expected to be completed in 2020, at which time it would also transition into a long-term inspection, maintenance, and monitoring program. This obligation was transferred from ParentCo to Alcoa Corporation as part of the Separation Transaction on November 1, 2016. At December 31, 2018 and 2017, the reserve balance associated with this matter was \$3 and \$4, respectively.

Tax.

Spain—In July 2013, following a corporate income tax audit covering the 2006 through 2009 tax years, an assessment was received as a result of Spain’s tax authorities disallowing certain interest deductions claimed by a former Spanish consolidated tax group previously owned by ParentCo. The following month, ParentCo filed an appeal of this assessment in Spain’s Central Tax Administrative Court. In conjunction with this appeal, as required under Spanish tax law, ParentCo

provided financial assurance in this matter in the form of both a bank guarantee (Arconic) and a lien secured with the San Ciprian smelter (Alcoa Corporation) to Spain's tax authorities. In January 2015, Spain's Central Tax Administrative Court denied ParentCo's appeal of this assessment. Two months later, ParentCo filed an appeal of the assessment in Spain's National Court (the "National Court"). The amount of this assessment, including interest, was \$152 (€131) as of June 30, 2018.

On July 6, 2018, the National Court denied ParentCo's appeal of the assessment; however, the decision includes a requirement that Spain's tax authorities issue a new assessment, which considers available net operating losses of the former Spanish consolidated tax group from prior tax years that can be utilized during the assessed tax years. Spain's tax authorities will not issue a new assessment until this matter is resolved; however, based on estimated calculations completed by Arconic and Alcoa Corporation (collectively, the "Companies"), the amount of the new assessment, including applicable interest, is expected to be in the range of \$25 to \$61 (€21 to €53) after consideration of available net operating losses and tax credits. Under the Tax Matters Agreement related to the Separation Transaction, Arconic and Alcoa Corporation are responsible for 51% and 49%, respectively, of the assessed amount in the event of an unfavorable outcome. On July 12, 2018, the Companies sent a letter to the National Court seeking clarification on one part of the decision. A response was received from the National Court on October 1, 2018, resulting in no change to its July 6, 2018 decision. On November 8, 2018, the Companies filed a petition for appeal to Spain's Supreme Court, to which Spain's tax authorities have filed their opposition.

Notwithstanding the petition for appeal, based on a review of the bases on which the National Court decided this matter, Alcoa Corporation management no longer believes that the Companies are more likely than not (greater than 50%) to prevail in this matter. Accordingly, Alcoa Corporation recorded a charge of \$30 (€26) in Provision for income taxes on the accompanying Statement of Consolidated Operations to establish a liability for its 49% share of the estimated loss in this matter, representing management's best estimate at this time. As indicated above, at a future point in time, the Companies will receive an updated assessment from Spain's tax authorities, which may result in a change to management's estimate following further analysis.

Separately, in January 2017, the National Court issued a decision in favor of the former Spanish consolidated tax group related to a similar assessment for the 2003 through 2005 tax years, effectively making that assessment null and void. Additionally, in August 2017, in lieu of receiving a formal assessment, the Companies reached a settlement with Spain's tax authorities for the 2010 through 2013 tax years that had been under audit for a similar matter. Alcoa Corporation's share of this settlement was not material to the Company's Consolidated Financial Statements. The ultimate outcomes related to the 2003 through 2005 and the 2010 through 2013 tax years are not indicative of the potential ultimate outcome of the assessment for the 2006 through 2009 tax years due to procedural differences. Also, it is possible that the Companies may receive similar assessments for tax years subsequent to 2013; however, management does not expect any such assessment, if received, to be material to Alcoa Corporation's Consolidated Financial Statements.

Brazil (AWAB)—In March 2013, AWAB was notified by the Brazilian Federal Revenue Office (RFB) that approximately \$110 (R\$220) of value added tax credits previously claimed are being disallowed and a penalty of 50% assessed. Of this amount, AWAB received \$41 (R\$82) in cash in May 2012. The value-added tax credits were claimed by AWAB for both fixed assets and export sales related to the Juruti bauxite mine and São Luis refinery expansion. The RFB has disallowed credits they allege belong to the consortium in which AWAB owns an interest and should not have been claimed by AWAB. Credits have also been disallowed as a result of challenges to apportionment methods used, questions about the use of the credits, and an alleged lack of documented proof. AWAB presented defense of its claim to the RFB on April 8, 2013. If AWAB is successful in this administrative process, the RFB would have no further recourse. If unsuccessful in this process, AWAB has the option to litigate at a judicial level. Separately from AWAB's administrative appeal, in June 2015, new tax law was enacted repealing the provisions in the tax code that were the basis for the RFB assessing a 50% penalty in this matter. As such, the estimated range of reasonably possible loss is \$0 to \$27 (R\$103), whereby the maximum end of the range represents the portion of the disallowed credits applicable to the export sales and excludes the 50% penalty. Additionally, the estimated range of disallowed credits related to AWAB's fixed assets is \$0 to \$30 (R\$117), which would increase the net carrying value of AWAB's fixed assets if ultimately disallowed. It is management's opinion that the allegations have no basis; however, at this time, the Company is unable to reasonably predict an outcome for this matter.

Brazil (Alumínio)—Between 2000 and 2002, Alumínio sold approximately 2,000 metric tons of metal per month from its Poços de Caldas facility, located in the State of Minas Gerais (the "State"), Brazil, to Alfio, a customer also located in the State. Sales in the State were exempted from value-added tax (VAT) requirements. Alfio subsequently sold metal to customers outside of the State, but did not pay the required VAT on those transactions. In July 2002, Alumínio received an assessment from State auditors on the theory that Alumínio should be jointly and severally liable with Alfio for the unpaid VAT. In June 2003, the administrative tribunal found Alumínio liable, and Alumínio filed a judicial case in the State in February 2004 contesting the finding. In May 2005, the Court of First Instance found Alumínio solely liable, and a panel of a State appeals court confirmed this finding in April 2006. Alumínio filed a special appeal to the Superior Tribunal of Justice (STJ) in Brasília (the federal capital of Brazil) later in 2006. In 2011, the STJ (through one of its judges) reversed the judgment of the lower courts, finding that Alumínio should neither be solely nor jointly and severally liable with Alfio for the VAT, which ruling was then appealed by the State. In August 2012, the STJ agreed to have the case reheard before a five-

judge panel. On February 21, 2017, the lead judge of the STJ issued a ruling confirming that Alumínio should be held liable in this matter. On March 16, 2017, Alumínio filed an appeal to have its case reheard before the five-judge panel as originally agreed to by the STJ in August 2012. Separately, in June 2017, the State opened a tax amnesty program. At the end of August 2017, Alumínio elected to submit this matter for consideration into the amnesty program, which the State approved. As a result, under the terms of the amnesty program, this matter was settled for \$8 (R\$25). In 2017, a charge for the settlement amount was recorded in Cost of goods sold on the accompanying Statement of Consolidated Operations. Prior to submitting this matter for consideration into the amnesty program, the assessment, including penalties and interest, totaled \$46 (R\$145). This matter is now closed.

Other.

Reynolds—On January 11, 2016, Sherwin Alumina Company, LLC (“Sherwin”), the current owner of a refinery previously owned by ParentCo (see below), and one of its affiliate entities, filed bankruptcy petitions in Corpus Christi, Texas for reorganization under Chapter 11 of the U.S. Bankruptcy Code. Sherwin informed the bankruptcy court that it intends to cease operations because it is not able to continue its bauxite supply agreement. On November 23, 2016, the bankruptcy court approved Sherwin’s plans for cessation of its operations. On February 16, 2017, Sherwin filed a bankruptcy Chapter 11 Plan (the “Plan”) and, on February 17, 2017, the court approved that Plan.

In 2000, ParentCo acquired Reynolds Metals Company (“Reynolds,” a subsidiary of Alcoa Corporation), which included an alumina refinery in Gregory, Texas. As a condition of the Reynolds acquisition, ParentCo was required to divest this alumina refinery. In accordance with the terms of the divestiture in 2000, ParentCo agreed to retain responsibility for certain environmental obligations (see Sherwin, TX in Environmental Matters above) and assigned to the buyer an Energy Services Agreement (“ESA”) with Gregory Power Partners (“Gregory Power”) for purchase of steam and electricity by the refinery.

Through the bankruptcy proceedings, the owner of Sherwin exercised its right under the U.S. Bankruptcy Code to reject the agreement from 2000 containing the previously mentioned retained responsibility, which had the effect of terminating all rights and responsibilities of the parties to the agreement.

As a result of Sherwin’s initial bankruptcy filing, separate legal actions were initiated against Reynolds by Gregory Power and Sherwin as described below.

Gregory Power: On January 26, 2016, Gregory Power delivered notice to Reynolds that Sherwin’s bankruptcy filing constitutes a breach of the ESA; on January 29, 2016, Reynolds responded that the filing does not constitute a breach. On September 16, 2016, Gregory Power filed a complaint in the bankruptcy case against Reynolds alleging breach of the ESA. In response to this complaint, on November 10, 2016, Reynolds filed both a motion to dismiss, including a jury demand, and a motion to withdraw the reference to the bankruptcy court based on the jury demand. On July 18, 2017, the district court ordered that any trial would be held to a jury in district court, but that the bankruptcy court would retain jurisdiction on all pre-trial matters. Since that time, Gregory Power filed an amended complaint to include Allied Alumina LLC (“Allied”), the successor to the original purchaser of the refinery from Reynolds. In September 2018, Reynolds and Allied filed their respective answers to the amended complaint, and Allied filed a cross complaint against Reynolds, which was answered by Reynolds on October 15, 2018. The court has yet to rule on several pending pretrial matters. At this time, Alcoa Corporation is unable to reasonably predict the ultimate outcome of this matter.

Sherwin: On October 4, 2016, the Texas Commission on Environmental Quality (TCEQ) filed suit against Sherwin in the bankruptcy proceeding seeking to hold Sherwin responsible for remediation of alleged environmental conditions at the Sherwin refinery site and related bauxite residue waste disposal areas (known as the Copano facility). On October 11, 2016, Sherwin filed a similar suit against Reynolds in the case. As provided in the Plan, Sherwin, including certain affiliated companies, and Reynolds had been negotiating an allocation among them as to the ownership of and responsibility for certain areas of the refinery and the Copano facility. In March 2018, Reynolds and Sherwin reached a settlement agreement that assigns to Reynolds all environmental liabilities associated with the Copano facility and assigns to Sherwin all environmental liabilities associated with the Sherwin refinery site. Additionally, Reynolds and the TCEQ reached an agreement that defines the operating and environmental steps required for the Copano facility, which Reynolds intends to operate for the purpose of managing materials other than bauxite residue waste, including third-party dredge material. The effectiveness and enforceability of each of these two agreements are pre-conditioned on the other being accepted by the bankruptcy court. A public notice and comment period on these agreements expired on April 26, 2018 without material affect to the documents. On June 5, 2018, the bankruptcy court accepted and entered the agreements into the judicial record as submitted (May 21, 2018 serves as the “effective date” for both agreements).

On June 5, 2018, the transaction between Sherwin and Reynolds was completed. Under the agreement with Sherwin, in exchange for assuming full responsibility for the environmental-related liabilities (see below related to the Company’s existing reserve) associated with the Copano facility, Reynolds assumed ownership of the land that comprises the Copano facility, as well as land that serves as a buffer around the Copano facility and other related assets. A third-party appraisal estimated the fair value of the land and other assets to be \$16. Under the agreement with TCEQ, a portion of the Copano

facility must be closed within 10 years and the remaining portion must be closed within 30 years, both timeframes began on the effective date. Also, Reynolds is required to install upgrades to certain dust control systems and repair certain structures and drainage systems at the Copano facility, and prepare and submit to TCEQ a preliminary groundwater assessment report (submitted on November 5, 2018) and a drinking water survey report (waived due to no evidence of a contaminant release) related to the Copano facility within 180 days of the effective date. Accordingly, the Company recognized \$16 in properties, plants, and equipment, \$9 in environmental remediation liabilities, and \$7 in other related liabilities. Additionally, the Company paid \$12 into a trust managed by the state of Texas as financial assurance of the Company's performance in completing the required obligations. This amount will be returned to the Company upon satisfactory completion of the future closure of the Copano facility in accordance with all applicable laws and regulations. On June 7, 2018, Sherwin filed a notice of dismissal in the suit against Reynolds; the dismissal was immediately effective as no court order was required.

At the time the agreements were signed by all parties, the Company had a reserve of \$29 for its proportionate share of environmental-related matters at both the Sherwin refinery site and the Copano facility based on the terms of the divestiture of the Sherwin refinery in 2000 (see Sherwin, TX in Environmental Matters above). While Reynolds no longer has any responsibility for environmental-related matters at the Sherwin refinery site, it assumed additional responsibility for environmental-related matters at the Copano facility (\$9 – see above). In management's judgment, the \$38 reserve as of December 31, 2018 is sufficient to satisfy the Company's revised responsibilities and obligations under the settlement agreements. Upon changes in facts or circumstances, a change to the reserve may be required.

Suralco—On December 16, 2016, Boskalis International B.V. (Boskalis) initiated a binding arbitration proceeding against Suriname Aluminum Company, LLC (Suralco), an AWAC company, seeking \$47 plus prejudgment interest and associated taxes in connection with a dispute arising under a contract for mining services in Suriname between Boskalis and Suralco. Boskalis asserted four separate claims under the contract.

In February 2018, the arbitration hearing was held before a three-person panel under the rules of the International Chamber of Commerce. The panel issued its decision on May 29, 2018, finding in favor of Boskalis on two claims and against Boskalis on two claims. For the two claims on which Boskalis prevailed, the panel awarded Boskalis \$29, including prejudgment interest of \$3. The award is final and cannot be appealed. Accordingly, Alcoa Corporation recorded a charge of \$29 (\$17 after noncontrolling interest), including \$26 in Cost of goods sold and \$3 in Interest expense on the accompanying Statement of Consolidated Operations. On June 6, 2018, the Company made the \$29 cash payment to Boskalis closing this matter.

The claim that represented the majority of the arbitration award centered around a contract provision requiring Suralco to make a "true up" payment at the end of the contract in the event that Suralco was unable to receive delivery of the full contract quantity, thus allowing Boskalis to recover its fixed production costs and a suitable return on its investment. While Suralco argued that all required deliveries had been made during the amended contract term and that no "true up" payment was required because a "true up" would amount to a double payment for bauxite deliveries after the initial contract term, Boskalis argued that the deliveries were not made within the original contract term and thus, a "true up" payment was required. On the basis of its analysis of the facts and applicable law, management concluded that the likelihood of an unfavorable decision on Boskalis' claims was remote (25% or less). Throughout the course of the proceeding, and even after the conclusion of the hearing, management's judgment of the likelihood of an unfavorable outcome remained the same.

General. In addition to the matters discussed above, various other lawsuits, claims, and proceedings have been or may be instituted or asserted against Alcoa Corporation, including those pertaining to environmental, safety and health, commercial, tax, product liability, intellectual property infringement, employment, and employee and retiree benefit matters, and other actions and claims arising out of the normal course of business. While the amounts claimed in these other matters may be substantial, the ultimate liability is not readily determinable because of the considerable uncertainties that exist. Accordingly, it is possible that the Company's liquidity or results of operations in a particular period could be materially affected by one or more of these other matters. However, based on facts currently available, management believes that the disposition of these other matters that are pending or asserted will not have a material adverse effect, individually or in the aggregate, on the financial position of the Company.

Commitments

Purchase Obligations. Alcoa Corporation is party to unconditional purchase obligations for energy that expire between 2028 and 2037. Commitments related to these contracts total \$151 in 2019, \$209 in 2020, \$213 in 2021, \$217 in 2022, \$223 in 2023, and \$2,718 thereafter. Expenditures under these contracts totaled \$169 in 2018, \$199 in 2017, and \$181 in 2016. Additionally, the Company has entered into other purchase commitments for energy, raw materials, and other goods and services, which total \$1,886 in 2019, \$1,312 in 2020, \$1,229 in 2021, \$1,313 in 2022, \$1,315 in 2023, and \$11,302 thereafter.

AofA has a gas supply agreement to power its three alumina refineries in Western Australia beginning in July 2020 for a 12-year period. The terms of this agreement required AofA to make a prepayment of \$500 in two installments, the first of which was made in June 2015 for \$300. The second installment of \$200 was made in April 2016 and was included in (Increase) in noncurrent assets on the accompanying Statement of Consolidated Cash Flows. At December 31, 2018 and 2017, Alcoa

Corporation has an asset of \$458 (A\$654) and \$510 (A\$654), respectively, which was included in Other noncurrent assets (see Note S) on the accompanying Consolidated Balance Sheet.

Operating Leases. Certain land and buildings, alumina refinery process control technology, plant equipment, vehicles, and computer equipment are under operating lease agreements. Total expense for all leases was \$102 in 2018, \$101 in 2017, and \$90 in 2016. Under long-term operating leases, minimum annual lease payments (undiscounted) are \$74 in 2019, \$56 in 2020, \$42 in 2021, \$11 in 2022, \$5 in 2023, and \$21 thereafter.

Guarantees of Third Parties. At December 31, 2018, the Company has maximum potential future payments for guarantees issued on behalf of a third party of \$60. These guarantees expire at various times between 2018 and 2021 and relate to project financing for the aluminum complex in Saudi Arabia (see Note H).

Bank Guarantees and Letters of Credit. Alcoa Corporation has outstanding bank guarantees and letters of credit related to, among others, energy contracts, environmental obligations, legal and tax matters, outstanding debt, leasing obligations, workers compensation, and customs duties. The total amount committed under these instruments, which automatically renew or expire at various dates between 2019 and 2022, was \$373 (includes \$136 issued under a standby letter of credit agreement—see below) at December 31, 2018. Additionally, Arconic has outstanding bank guarantees and letters of credit related to the Company in the amount of \$29 at December 31, 2018. In the event Arconic would be required to perform under any of these instruments, Arconic would be indemnified by Alcoa Corporation in accordance with the Separation and Distribution Agreement. Likewise, the Company has outstanding bank guarantees and letters of credit related to Arconic in the amount of \$15 at December 31, 2018. In the event Alcoa Corporation would be required to perform under any of these instruments, the Company would be indemnified by Arconic in accordance with the Separation and Distribution Agreement.

In August 2017, Alcoa Corporation entered into a standby letter of credit agreement, which expires on August 17, 2019 (extended in August 2018), with three financial institutions. The agreement provides for a \$150 facility, which will be used by the Company for matters in the ordinary course of business. Alcoa Corporation's obligations under this facility will be secured in the same manner as obligations under the Company's Second Amended Revolving Credit Agreement (see Note L). Additionally, this facility contains similar representations and warranties and affirmative, negative, and financial covenants as the Company's Second Amended Revolving Credit Agreement (see Note L). As of December 31, 2018, letters of credit aggregating \$136 were issued under this facility.

Surety Bonds. Alcoa Corporation has outstanding surety bonds primarily related to tax matters, contract performance, workers compensation, environmental-related matters, and customs duties. The total amount committed under these bonds, which automatically renew or expire at various dates, mostly in 2019, was \$40 at December 31, 2018. Additionally, Arconic has outstanding surety bonds related to the Company in the amount of \$16 at December 31, 2018. In the event Arconic would be required to perform under any of these instruments, Arconic would be indemnified by Alcoa Corporation in accordance with the Separation and Distribution Agreement. Likewise, the Company has outstanding surety bonds related to Arconic in the amount of \$2 at December 31, 2018. In the event Alcoa Corporation would be required to perform under any of these instruments, the Company would be indemnified by Arconic in accordance with the Separation and Distribution Agreement.

S. Other Financial Information

Interest Cost Components

	2018	2017	2016
Amount charged to expense	\$ 122	\$ 104	\$ 243
Amount capitalized	14	17	23
	\$ 136	\$ 121	\$ 266

Other Expenses (Income), Net

	2018	2017	2016
Equity loss	\$ 17	\$ 28	\$ 70
Foreign currency (gains) losses, net	(57)	8	8
Net gain from asset sales	—	(116)	(164)
Net (gain) loss on mark-to-market derivative instruments (O)	(25)	24	9
Non-service costs – Pension & OPEB (N)	139	85	24
Other, net	(10)	(2)	(12)
	\$ 64	\$ 27	\$ (65)

In 2017, Net gain from asset sales included a \$122 gain related to the sale of Yadkin (see Note C). In 2016, Net gain from asset sales included a \$118 gain related to the sale of wharf property near the Intalco (Washington) smelter and a \$27 gain related to the sale of an equity interest in a natural gas pipeline in Australia (see Note H).

Other Noncurrent Assets

December 31,	2018		2017	
Gas supply prepayment (R)	\$	458	\$	510
Prepaid gas transmission contract (H)		275		300
Value-added tax credits		210		340
Goodwill (K)		151		154
Deferred mining costs, net		123		139
Prepaid pension benefit (N)		63		72
Intangibles, net (K)		57		62
Other		138		142
	\$	1,475	\$	1,719

The Value-added tax (VAT) credits (federal and state) relate to two of the Company's subsidiaries in Brazil, AWAB and Alumínio, concerning the São Luís refinery. This refinery pays VAT on the purchase of goods and services used in the alumina production process. Instead of expensing the paid VAT, such amounts are capitalized as credits as they, generally, can be utilized to offset the VAT charged on domestic sales of alumina and aluminum. However, there is not a domestic market in Brazil for the sale of alumina and the São Luís smelter has been fully curtailed since April 2015. That said, the federal VAT credits can be used to reduce other types of federal tax obligations; conversely, there is no other available opportunity to monetize the state VAT credits. For a significant portion of time, including 2017 and 2018, since the São Luís smelter curtailment, management has negotiated with multiple electricity providers to obtain an economical power supply to facilitate a potential restart of the São Luís smelter in the event that persistent favorable market conditions develop to no avail.

In the fourth quarter of 2018, management performed an updated assessment of the future realizability of the state VAT credits amid unfavorable market conditions (e.g., a declining LME aluminum price) and a perceived inability to obtain a favorable power contract in the near-term for the São Luís smelter. As a result of this analysis, management determined it necessary to stop recording additional state VAT credits; instead, the state VAT will be expensed in Cost of goods sold as incurred by the São Luís refinery. Additionally, the Company recorded a \$107 charge in Restructuring and other charges (see Note D) on the accompanying Statement of Consolidated Operations to establish an allowance on the accumulated state VAT balances. While the Company retains the ability to utilize the state credits in the future, only the restart of the São Luís smelter provides the opportunity to monetize these credits. No allowance was established on the federal VAT credits as they can be monetized without the restart of the São Luís smelter. Management continues to believe the São Luís smelter assets are valuable for the future, and, as such, the Company continues to maintain these assets.

Other Noncurrent Liabilities and Deferred Credits

December 31,	2018		2017	
Accrued compensation and retirement costs	\$	107	\$	127
Deferred alumina sales revenue		61		68
Other		54		84
	\$	222	\$	279

Cash and Cash Equivalents and Restricted Cash

December 31,	2018		2017	
Cash and cash equivalents	\$	1,113	\$	1,358
Restricted cash*		3		7
	\$	1,116	\$	1,365

* These amounts are reported in Prepaid expenses and other current assets on the accompanying Consolidated Balance Sheet.

Cash Flow Information

Cash paid for interest and income taxes was as follows:

	2018		2017		2016	
Interest, net of amount capitalized	\$	111	\$	100	\$	226
Income taxes, net of amount refunded		507		363		265

T. Subsequent Events

Management evaluated all activity of Alcoa Corporation and concluded that no subsequent events have occurred that would require recognition in the Consolidated Financial Statements or disclosure in the Notes to the Consolidated Financial Statements, except as described below.

On January 22, 2019, the workforce at the Company's Avilés and La Coruña aluminum plants in Spain ratified an agreement previously reached on January 16, 2019 between Alcoa Corporation and the workers' representatives related to the Company's initiation of a collective dismissal process in October 2018. As a result, Alcoa Corporation curtailed the two smelters' remaining, combined operating capacity of 124 kmt (completed on February 14, 2019). The casthouse at each plant and the paste facility at La Coruña will remain in operation. This action was the result of an internal analysis that determined that organizational improvements could be achieved if the Company ceased aluminum production at these two smelters and reorganized production at Alcoa Corporation's San Ciprián aluminum plant in Spain. In accordance with the ratified agreement, the Company will maintain the smelters in restart condition in the event an agreement to sell the plants can be reached by June 30, 2019. Depending on the ultimate outcome of the sale process, Alcoa Corporation may record restructuring-related charges in the first half of 2019 for the employee severance actions and the closure of the two smelters. Such charges are estimated to range between \$215 and \$250 (pre- and after-tax), or \$1.14 to \$1.35 per diluted share, of which approximately 40% would be non-cash. The remaining 60% will result in cash outlays, most of which will be paid in the remainder of 2019.

Supplemental Financial Information (unaudited)

Quarterly Data
(in millions, except per-share amounts)

	First	Second	Third	Fourth⁽²⁾	Year
2018					
Sales	\$ 3,090	\$ 3,579	\$ 3,390	\$ 3,344	\$ 13,403
Net income	\$ 274	\$ 230	\$ 155	\$ 212	\$ 871
Net income (loss) attributable to Alcoa Corporation	\$ 150	\$ 75	\$ (41)	\$ 43	\$ 227
Earnings per share attributable to Alcoa Corporation common shareholders ⁽¹⁾ :					
Basic	\$ 0.81	\$ 0.40	\$ (0.22)	\$ 0.23	\$ 1.22
Diluted	\$ 0.80	\$ 0.39	\$ (0.22)	\$ 0.23	\$ 1.20
2017					
Sales	\$ 2,655	\$ 2,859	\$ 2,964	\$ 3,174	\$ 11,652
Net income (loss)	\$ 308	\$ 138	\$ 169	\$ (56)	\$ 559
Net income (loss) attributable to Alcoa Corporation	\$ 225	\$ 75	\$ 113	\$ (196)	\$ 217
Earnings per share attributable to Alcoa Corporation common shareholders ⁽¹⁾ :					
Basic	\$ 1.23	\$ 0.41	\$ 0.61	\$ (1.06)	\$ 1.18
Diluted	\$ 1.21	\$ 0.40	\$ 0.60	\$ (1.06)	\$ 1.16

(1) Per share amounts are calculated independently for each period presented; therefore, the sum of the quarterly per share amounts may not equal the per share amounts for the year.

(2) In the fourth quarter of 2018, Alcoa Corporation recorded restructuring and other charges of \$138 (pretax), which was primarily the result of a charge to establish an allowance on certain non-U.S. value-added tax credits (see Notes D and S). In the fourth quarter of 2017, Alcoa Corporation recorded restructuring and other charges of \$297 (pretax), which were primarily related to both the termination of a power contract associated with and the permanent closure of the Rockdale (Texas) smelter (see Note D), and discrete income tax charges of \$98 for (i) a valuation allowance on certain non-U.S. deferred tax assets, (ii) the remeasurement of certain non-U.S. deferred tax assets due to a tax rate change, and (iii) the remeasurement of U.S. deferred tax assets and liabilities at the new corporate income tax rate of 21% (from 35%) under the 2017 Tax Cuts and Jobs Act signed into law on December 22, 2017 (see Note P).

Item 9. Changes in and Disagreements with Accountants on Accounting and Financial Disclosure.

None.

Item 9A. Controls and Procedures.

(a) Evaluation of Disclosure Controls and Procedures

Alcoa Corporation's Chief Executive Officer and Chief Financial Officer have evaluated the Company's disclosure controls and procedures, as defined in Rules 13a-15(e) and 15d-15(e) of the U.S. Securities Exchange Act of 1934, as amended, as of the end of the period covered by this report, and they have concluded that these controls and procedures are effective as of December 31, 2018.

(b) Management's Annual Report on Internal Control over Financial Reporting

Management's Report on Internal Control over Financial Reporting is included in Part II, Item 8 of this Form 10-K.

(c) Attestation Report of the Registered Public Accounting Firm

The effectiveness of Alcoa Corporation's internal control over financial reporting as of December 31, 2018 has been audited by PricewaterhouseCoopers LLP, an independent registered public accounting firm, as stated in their report, which is included in Part II, Item 8 of this Form 10-K.

(d) Changes in Internal Control over Financial Reporting

There have been no changes in internal control over financial reporting during the fourth quarter of 2018 that have materially affected, or are reasonably likely to materially affect, the Company's internal control over financial reporting.

Item 9B. Other Information.

None.

PART III

Item 10. Directors, Executive Officers and Corporate Governance.

The information required by Item 401 of Regulation S-K regarding executive officers is set forth in Part I, Item 1 of this report under “Executive Officers of the Registrant.” The information required by Item 401 of Regulation S-K regarding directors is contained under the caption “Item 1 Election of Directors” of Alcoa Corporation’s Definitive Proxy Statement for the 2019 Annual Meeting of Stockholders (“Proxy Statement”), which will be filed with the Securities and Exchange Commission within 120 days of the end of Alcoa Corporation’s fiscal year ended December 31, 2018 and is incorporated herein by reference.

The information required by Item 405 of Regulation S-K is contained under the caption “Beneficial Ownership—Section 16(a) Beneficial Ownership Reporting Compliance” of the Proxy Statement and is incorporated herein by reference.

The Company’s Code of Conduct, which incorporates a Code of Ethics for the CEO, CFO and Other Financial Professionals, is publicly available on the Company’s Internet website at <http://www.alcoa.com> under the section “Investors—Corporate Governance—Governance Documents—Code of Conduct.” The remaining information required by Item 406 of Regulation S-K is contained under the captions “Corporate Governance” and “Corporate Governance—Code of Conduct” of the Proxy Statement and is incorporated herein by reference.

The information required by Items 407(c)(3), (d)(4) and (d)(5) of Regulation S-K is included under the captions “Item 1 Election of Directors—Nominating Board Candidates - Procedures and Director Qualifications” and “Corporate Governance—Board Information—Board Meetings and Attendance” and “—Board Information—Committees of the Board—Audit Committee,” respectively, of the Proxy Statement and is incorporated herein by reference.

Item 11. Executive Compensation.

The information required by Item 402 of Regulation S-K is contained under the captions “Item 1 Election of Directors—Non-Employee Director Compensation Program,” “Executive Compensation” (excluding the information under the caption “—Compensation Committee Report”), and “Corporate Governance— Board Information—The Board’s Role in Risk Oversight” of the Proxy Statement. Such information is incorporated herein by reference.

The information required by Items 407(e)(4) and (e)(5) of Regulation S-K is contained under the captions “Corporate Governance—Compensation Matters—Compensation Committee Interlocks and Insider Participation” and “Executive Compensation—Compensation Committee Report”, respectively, of the Proxy Statement. Such information (other than the Compensation Committee Report, which shall not be deemed to be “filed”) is incorporated herein by reference.

Item 12. Security Ownership of Certain Beneficial Owners and Management and Related Stockholder Matters.

The information required by Item 201(d) of Regulation S-K relating to securities authorized for issuance under equity compensation plans is contained under the caption “Equity Compensation Plan Information” of the Proxy Statement and is incorporated herein by reference.

The information required by Item 403 of Regulation S-K is contained under the captions “Beneficial Ownership—Stock Ownership of Certain Beneficial Owners” and “—Stock Ownership of Directors and Executive Officers” of the Proxy Statement and is incorporated herein by reference.

Item 13. Certain Relationships and Related Transactions, and Director Independence.

The information required by Item 404 of Regulation S-K is contained under the captions “Corporate Governance —Related Person Transactions” of the Proxy Statement and is incorporated herein by reference.

The information required by Item 407(a) of Regulation S-K regarding director independence is contained under the captions “Item 1 Election of Directors” and “Corporate Governance” of the Proxy Statement and is incorporated herein by reference.

Item 14. Principal Accounting Fees and Services.

The information required by Item 9(e) of Schedule 14A is contained under the captions “Item 2 Ratification of Appointment of the Independent Auditors” (excluding the information under the caption “—Report of the Audit Committee”) of the Proxy Statement and is incorporated herein by reference.

PART IV

Item 15. Exhibits, Financial Statement Schedules.

(a) The consolidated financial statements and exhibits listed below are filed as part of this report.

(1) The Company's consolidated financial statements, the notes thereto and the report of the Independent Registered Public Accounting Firm are included in Part II Item 8 of this report.

(2) Financial statement schedules have been omitted because they are not applicable, not required, or the required information is included in the consolidated financial statements or notes thereto.

(3) Exhibits.

<u>Exhibit No.</u>	<u>Description of Exhibit</u>
3.1	<u>Amended and Restated Certificate of Incorporation of Alcoa Corporation (incorporated by reference to Exhibit 3.1 to the Company's Current Report on Form 8-K filed November 3, 2016 (File No. 1-37816))</u>
3.2	<u>Amended and Restated Bylaws of Alcoa Corporation, as adopted on December 6, 2017 (incorporated by reference to Exhibit 3.1 to the Company's Current Report on Form 8-K filed December 8, 2017 (File No. 1-37816))</u>
4.1	<u>Indenture, dated September 27, 2016, among Alcoa Nederland Holding B.V., Alcoa Upstream Corporation and The Bank of New York Mellon Trust Company, N.A. (incorporated by reference to Exhibit 10.19 to Amendment No. 4 to the Company's Registration Statement on Form 10 filed September 29, 2016 (File No. 1-37816))</u>
4.2	<u>Supplemental Indenture, dated as of November 1, 2016, among the entities listed in Annex A thereto, subsidiaries of Alcoa Corporation, Alcoa Corporation, Alcoa Nederland Holding B.V. and The Bank Of New York Mellon Trust Company, N.A. (incorporated by reference to Exhibit 4.3 to the Company's Current Report on Form 8-K filed November 4, 2016 (File No. 1-37816))</u>
4.3	<u>Indenture, dated May 17, 2018, among Alcoa Nederland Holding B.V., Alcoa Corporation, certain subsidiaries of Alcoa Corporation, and the Bank of New York Mellon Trust Company, N.A., as trustee (incorporated by reference to Exhibit 4.1 to the Company's Current Report on Form 8-K filed May 17, 2018 (File No. 1-37816))</u>
10.1	<u>Separation and Distribution Agreement, dated as of October 31, 2016, by and between Arconic Inc. and Alcoa Corporation (incorporated by reference to Exhibit 2.1 to the Company's Current Report on Form 8-K filed November 4, 2016 (File No. 1-37816))*</u>
10.2	<u>Tax Matters Agreement, dated as of October 31, 2016, by and between Arconic Inc. and Alcoa Corporation (incorporated by reference to Exhibit 2.3 to the Company's Current Report on Form 8-K filed November 4, 2016 (File No. 1-37816))</u>
10.3	<u>Alcoa Corporation to Arconic Inc. Patent, Know-How, and Trade Secret License Agreement, dated as of October 31, 2016, by and between Alcoa USA Corp. and Arconic Inc. (incorporated by reference to Exhibit 2.5 to the Company's Current Report on Form 8-K filed November 4, 2016 (File No. 1-37816))</u>
10.4	<u>Arconic Inc. to Alcoa Corporation Patent, Know-How, and Trade Secret License Agreement, dated as of October 31, 2016, by and between Arconic Inc. and Alcoa USA Corp. (incorporated by reference to Exhibit 2.6 to the Company's Current Report on Form 8-K filed November 4, 2016 (File No. 1-37816))</u>
10.5	<u>Amended and Restated Alcoa Corporation to Arconic Inc. Trademark License Agreement, dated as of June 25, 2017, by and between Alcoa USA Corp. and Arconic Inc. (incorporated by reference to Exhibit 2 to the Company's Quarterly Report on Form 10-Q filed August 3, 2017 (File No. 1-37816))</u>
10.6	<u>Second Amendment and Restatement Agreement, dated as of November 21, 2018, which includes, as Exhibit A thereto, the Revolving Credit Agreement, dated as of September 16, 2016, as amended as of October 26, 2016, as amended and restated as of November 14, 2017, and as amended and restated as of November 21, 2018, among Alcoa Corporation, Alcoa Nederland Holding B.V., the lenders and issuers from time to time party thereto, and JPMorgan Chase Bank, N.A., as administrative agent for the lenders and issuers (incorporated by reference to Exhibit 10.1 to the Company's Current Report on Form 8-K filed November 26, 2018 (File No. 1-37816))</u>

**Exhibit
No.**

Description of Exhibit

- 10.7 [Amended and Restated Charter of the Strategic Council for the AWAC Joint Venture \(incorporated by reference to Exhibit 10.1 to the Company's Current Report on Form 8-K filed November 4, 2016 \(File No. 1-37816\)\)](#)
- 10.8 [Side Letter of November 1, 2016, between Alcoa Corporation and Alumina Limited clarifying transfer restrictions \(incorporated by reference to Exhibit 10.3 to the Company's Current Report on Form 8-K filed November 4, 2016 \(File No. 1-37816\)\)](#)
- 10.9 [Third Amended and Restated Limited Liability Company Agreement of Alcoa World Alumina LLC, dated as of November 1, 2016, by and among Alcoa USA Corp., ASC Alumina, Alumina International Holdings Pty Ltd, Alumina \(USA\) Inc., Reynolds Metals Company, LLC and Reynolds Metals Exploration, Inc. \(incorporated by reference to Exhibit 10.2 to the Company's Current Report on Form 8-K filed November 4, 2016 \(File No. 1-37816\)\)](#)
- 10.10 [Amended and Restated Limited Liability Company Agreement of Alcoa Alumina & Chemicals, L.L.C. dated as of December 31, 1994 \(incorporated by reference to Exhibit 99.4 to Alcoa Inc.'s Current Report on Form 8-K filed November 28, 2001 \(File No. 1-03610\)\)](#)
- 10.11 [Shareholders' Agreement between Alcoa of Australia Limited, Alcoa Australian Pty Ltd and Alumina Limited, originally dated as of May 10, 1996 \(incorporated by reference to Exhibit 10.13 to Amendment No. 2 to the Company's Registration Statement on Form 10 filed September 1, 2016 \(File No. 1-37816\)\)](#)
- 10.12 [Kwinana State Agreement of 1961 \(incorporated by reference to Exhibit 10.7 to Amendment No. 2 to the Company's Registration Statement on Form 10 filed September 1, 2016 \(File No. 1-37816\)\)](#)
- 10.13 [Pinjarra State Agreement of 1969 \(incorporated by reference to Exhibit 10.8 to Amendment No. 2 to the Company's Registration Statement on Form 10 filed September 1, 2016 \(File No. 1-37816\)\)](#)
- 10.14 [Wagerup State Agreement of 1978 \(incorporated by reference to Exhibit 10.9 to Amendment No. 2 to the Company's Registration Statement on Form 10 filed September 1, 2016 \(File No. 1-37816\)\)](#)
- 10.15 [Alumina Refinery Agreement of 1987 \(incorporated by reference to Exhibit 10.10 to Amendment No. 2 to the Company's Registration Statement on Form 10 filed September 1, 2016 \(File No. 1-37816\)\)](#)
- 10.16 [Aluminum Project Framework Shareholders' Agreement, dated December 20, 2009, between Alcoa Inc. and Saudi Arabian Mining Company \(Ma'aden\) \(incorporated by reference to Exhibit 10\(i\) to Alcoa Inc.'s Annual Report on Form 10-K for the year ended December 31, 2009, filed February 18, 2010 \(File No. 1-03610\)\)](#)
- 10.17 [First Supplemental Agreement, dated March 30, 2010, to the Aluminium Project Framework Shareholders Agreement, dated December 20, 2009, between Saudi Arabian Mining Company \(Ma'aden\) and Alcoa Inc. \(incorporated by reference to Exhibit 10\(c\) to Alcoa Inc.'s Quarterly Report on Form 10-Q for the quarter ended March 31, 2010, filed April 22, 2010 \(File No. 1-03610\)\)](#)
- 10.18 [Alcoa Corporation 2016 Stock Incentive Plan \(as Amended and Restated as of May 9, 2018\), \(incorporated by reference to Exhibit 99.1 to the Company's Current Report on Form 8-K filed May 15, 2018 \(File No. 1-37816\)\)**](#)
- 10.19 [Alcoa USA Corp. Deferred Compensation Plan \(incorporated by reference to Exhibit 10.2 to Amendment No. 1 to the Company's Registration Statement on Form 10 filed August 12, 2016 \(File No. 1-37816\)\)**](#)
- 10.20 [Alcoa USA Corp. Nonqualified Supplemental Retirement Plan C \(incorporated by reference to Exhibit 10.3 to Amendment No. 1 to the Company's Registration Statement on Form 10 filed August 12, 2016 \(File No. 1-37816\)\)**](#)
- 10.21 [Amendment 1 to Alcoa USA Corp. Nonqualified Supplemental Retirement Plan C, effective January 1, 2021 \(incorporated by reference to Exhibit 10.9 to the Company's Annual Report on Form 10-K for the year ended December 31, 2017, filed February 23, 2018 \(File No. 137816\)\)**](#)
- 10.22 [Form of Amended and Restated Indemnification Agreement by and between Alcoa Corporation and individual directors or officers, effective August 1, 2017 \(incorporated by reference to Exhibit 10.5 to the Company's Quarterly Report on Form 10-Q filed August 3, 2017 \(File No. 1-37816\)\)**](#)
- 10.23 [Alcoa Corporation Annual Cash Incentive Compensation Plan \(as Amended and Restated\), effective February 21, 2018 \(incorporated by referenced to Exhibit 10 to the Company's Quarterly Report on Form 10-Q filed May 9, 2018 \(File No. 1-37816\)\)**](#)

Exhibit No.	Description of Exhibit
10.24	<u>Alcoa Corporation Amended and Restated Change in Control Severance Plan, dated as of July 31, 2017 (incorporated by reference to Exhibit 10.4 to the Company's Quarterly Report on Form 10-Q filed August 3, 2017 (File No. 1-37816))**</u>
10.25	<u>Form of Alcoa Corporation Chief Executive Officer and Chief Financial Officer Severance Agreement, effective December 1, 2016 (incorporated by reference to Exhibit 10.28 to the Company's Registration Statement on Form S-1 filed January 18, 2017 (File No. 333-215606))**</u>
10.26	<u>Form of Alcoa Corporation Corporate Officer Severance Agreement, effective December 1, 2016 (incorporated by reference to Exhibit 10.27 to the Company's Registration Statement on Form S-1 filed January 18, 2017 (File No. 333-215606))**</u>
10.27	<u>Terms and Conditions for Employee Restricted Share Units (incorporated by reference to Exhibit 10.29 to the Company's Registration Statement on Form S-1 filed January 18, 2017 (File No. 333-215606))**</u>
10.28	<u>Terms and Conditions for Employee Stock Option Awards (incorporated by reference to Exhibit 10.30 to the Company's Registration Statement on Form S-1 filed January 18, 2017 (File No. 333-215606))**</u>
10.29	<u>Terms and Conditions for Employee Special Retention Awards (incorporated by reference to Exhibit 10.31 to the Company's Registration Statement on Form S-1 filed January 18, 2017 (File No. 333-215606))**</u>
10.30	<u>Terms and Conditions for Employee Restricted Share Units, dated January 24, 2018 (incorporated by reference to Exhibit 10.29 to the Company's Annual Report on Form 10-K for the year ended December 31, 2017, filed February 23, 2018 (File No. 137816))**</u>
10.31	<u>Terms and Conditions for Employee Stock Option Awards, dated January 24, 2018 (incorporated by reference to Exhibit 10.30 to the Company's Annual Report on Form 10-K for the year ended December 31, 2017, filed February 23, 2018 (File No. 137816))**</u>
10.32	<u>Terms and Conditions for Employee Special Retention Awards (Restricted Share Units), dated January 24, 2018 (incorporated by reference to Exhibit 10.31 to the Company's Annual Report on Form 10-K for the year ended December 31, 2017, filed February 23, 2018 (File No. 137816))**</u>
10.33	<u>Alcoa Corporation Non-Employee Director Compensation Policy, effective November 1, 2016 (incorporated by reference to Exhibit 10.32 to the Company's Registration Statement on Form S-1 filed January 18, 2017 (File No. 333-215606))**</u>
10.34	<u>Terms and Conditions for Deferred Fee Restricted Share Units Director Awards, effective December 1, 2016 (incorporated by reference to Exhibit 10.34 to the Company's Registration Statement on Form S-1 filed January 18, 2017 (File No. 333-215606))**</u>
10.35	<u>Terms and Conditions for Restricted Share Units Annual Director Awards, effective December 1, 2016 (incorporated by reference to Exhibit 10.35 to the Company's Registration Statement on Form S-1 filed January 18, 2017 (File No. 333-215606))**</u>
10.36	<u>Terms and Conditions for Restricted Share Units Annual Director Awards, effective May 9, 2017 (incorporated by reference to Exhibit 10.3 to the Company's Quarterly Report Form 10-Q filed on August 3, 2017 (File No. 1-37816))**</u>
10.37	<u>Alcoa Corporation 2016 Deferred Fee Plan for Directors, effective November 1, 2016, as amended and restated on December 5, 2018 (filed herewith)**</u>
21.1	<u>List of Subsidiaries (filed herewith)</u>
23.1	<u>Consent of PricewaterhouseCoopers LLP (filed herewith)</u>
31.1	<u>Certification of Chief Executive Officer required by Securities and Exchange Commission Rule 13a-14(a) or 15d-14(a) (filed herewith)</u>
31.2	<u>Certification of Principal Financial Officer required by Securities and Exchange Commission Rule 13a-14(a) or 15d-14(a) (filed herewith)</u>
32.1	<u>Certification pursuant to 18 U.S.C. Section 1350 (filed herewith)</u>
95.1	<u>Mine Safety Disclosure (filed herewith)</u>
99.1	<u>Amended and Restated Grantor Trust Agreement by and between Alcoa Corporation and Wells Fargo Bank, National Association, effective October 24, 2017 (incorporated by reference to Exhibit 99.1 to the Company's Annual Report on Form 10-K for the year ended December 31, 2017, filed February 23, 2018 (File No. 137816))</u>

Exhibit**No.****Description of Exhibit**

101.INS	XBRL Instance Document (filed herewith)
101.SCH	XBRL Taxonomy Extension Schema Document (filed herewith)
101.CAL	XBRL Taxonomy Extension Calculation Linkbase Document (filed herewith)
101.DEF	XBRL Taxonomy Extension Definition Linkbase Document (filed herewith)
101.LAB	XBRL Taxonomy Extension Label Linkbase Document (filed herewith)
101.PRE	XBRL Taxonomy Extension Presentation Linkbase Document (filed herewith)

* Schedules and exhibits have been omitted pursuant to Item 601(b)(2) of Regulation S-K. The Company hereby undertakes to furnish copies of any of the omitted schedules and exhibits upon request by the Commission.

** Denotes management contracts or compensatory plans or arrangements required to be filed as Exhibits to this Form 10-K.

Amendments and modifications to other Exhibits previously filed have been omitted when, in the opinion of the registrant, such Exhibits as amended or modified are no longer material or, in certain instances, are no longer required to be filed as Exhibits.

No other instruments defining the rights of holders of long-term debt of the registrant or its subsidiaries have been filed as Exhibits because no such instruments met the threshold materiality requirements under Regulation S-K. The registrant agrees, however, to furnish a copy of any such instruments to the Commission upon request.

Item 16. Form 10-K Summary.

Not applicable.

SIGNATURES

Pursuant to the requirements of Section 13 or 15(d) of the Securities Exchange Act of 1934, the registrant has duly caused this report to be signed on its behalf by the undersigned, thereunto duly authorized.

ALCOA CORPORATION

By: /s/ Molly S. Beerman
Molly S. Beerman
Vice President and Controller

Pursuant to the requirements of the Securities Exchange Act of 1934, this report has been signed below by the following persons on behalf of the registrant and in the capacities indicated and as of February 25, 2019.

/s/ Roy C. Harvey
Roy C. Harvey
President, Chief Executive Officer and Director
(Principal Executive Officer and Director)

/s/ Molly S. Beerman
Molly S. Beerman
Vice President and Controller
(Principal Accounting Officer)

/s/ Michael G. Morris
Michael G. Morris
Director, Chairman of the Board of Directors

/s/ Timothy P. Flynn
Timothy P. Flynn
Director

/s/ James A. Hughes
James A. Hughes
Director

/s/ James W. Owens
James W. Owens
Director

/s/ Suzanne Sitherwood
Suzanne Sitherwood
Director

/s/ Ernesto Zedillo
Ernesto Zedillo
Director

/s/ William F. Oplinger
William F. Oplinger
Executive Vice President and Chief Financial Officer (Principal Financial Officer)

/s/ Mary Anne Citrino
Mary Anne Citrino
Director

/s/ Kathryn S. Fuller
Kathryn S. Fuller
Director

/s/ James E. Nevels
James E. Nevels
Director

/s/ Carol L. Roberts
Carol L. Roberts
Director

/s/ Steven W. Williams
Steven W. Williams
Director

ALCOA CORPORATION

2016 DEFERRED FEE PLAN FOR DIRECTORS

(Effective November 1, 2016 and as amended and restated on December 5, 2018)

ARTICLE I INTRODUCTION

Alcoa Corporation (the "Company") has established this 2016 Deferred Fee Plan for Directors, as amended (the "Plan") to provide non-employee directors with an opportunity to defer receipt of fees earned for services as a member of the Company's Board of Directors (the "Board"), to provide for deferrals of Restricted Share Units (as defined herein) with respect to common stock of the Company granted to non-employee directors, and to receive liabilities transferred from the Alcoa Inc. Plans.

ARTICLE II DEFINITIONS

2.1 Definitions. The following definitions apply unless the context clearly indicates otherwise:

- (a) Alcoa Inc. Plans means the Alcoa Inc. Deferred Fee Plan for Directors (the "Alcoa Inc. 1999 Plan") and the Alcoa Inc. 2005 Deferred Fee Plan for Directors (the "Alcoa Inc. 2005 Plan").
- (b) Legacy Alcoa DSU Account means any amount held in a Director's Deferred Fee Account that is notionally credited in Shares, in accordance with the terms of the Employee Matters Agreement and Article VII.
- (c) Alcoa Stock Fund means, with respect to a Director who prior to the Effective Date participated in one or both of the Alcoa Inc. Plans, the investment option established under the Alcoa Inc. Plans with reference to the Alcoa Stock Fund under Alcoa Inc.'s principal tax-qualified retirement savings plan for salaried employees.
- (d) Annual Equity Award means the annual Restricted Share Unit award that a Director will be entitled to receive as compensation for serving as a Director in a relevant year (not including any Fees), which will be granted under the Stock Plan.
- (e) Beneficiary means the person or persons designated by a Director under Section 4.1 to receive any amount payable under Section 5.3.
- (f) Board has the meaning ascribed to such term in Article I.
- (g) Chairman means the Chairman of the Board.
- (h) Code means the United States Internal Revenue Code of 1986, as amended, and the regulations promulgated thereunder.
- (i) Company has the meaning ascribed to such term in Article I.
- (j) Credits means amounts credited to a Director's Deferred Fee Account, with all Investment Option units valued by reference to the comparable fund offered under the Savings Plan.

- (k) Deferred Fee Account means a bookkeeping account established by the Company in the name of a Director with respect to amounts deferred into Investment Options hereunder. For the avoidance of doubt, Deferred Fee Account does not include any amounts deferred into Deferred Fee RSU Awards.
- (l) Deferred Fee RSU Award means each award of Restricted Share Units granted in lieu of Fees pursuant to a deferral election made by a Director pursuant to Article III.
- (m) Director means a nonemployee member of the Board who participates in this Plan. Any Director who is a director or chairman of the board of directors of a subsidiary or affiliate of the Company shall not, by virtue thereof, be deemed to be an employee of the Company or such subsidiary or affiliate for purposes of eligibility under this Plan.
- (n) Director Share Ownership Guideline means the minimum value of Shares (or, if applicable, units in the Legacy Alcoa DSU Account), required to be held by each Director until retirement from the Board, as established from time to time by the Board. Effective November 1, 2016, the Director Share Ownership Guideline for a Director is \$750,000. A Director's compliance with the Director Share Ownership Guideline shall be measured based on the value of the Director's investment as of January 1 of each year, or on such other date as may be designated by the Secretary's office (the "Annual Valuation Date").
- (o) Effective Date means November 1, 2016, the effective date of the separation of the Company's business from Alcoa Inc.'s business.
- (p) Employee Matters Agreement means the Employee Matters Agreement dated as of the Effective Date by and between Alcoa Inc. and the Company relating to the transfer of employees in connection with the separation of the Company's business from Alcoa Inc.'s business, as amended, which agreement is incorporated herein by reference.
- (q) Equity Restructuring means a nonreciprocal transaction between the Company and its shareholders, such as a stock dividend, stock split (including a reverse stock split), spin-off, rights offering or recapitalization through a large, nonrecurring cash dividend, that affects the Shares (or other securities of the Company) or the price of Shares (or other securities) and causes a change in the per share value of the Shares.
- (r) Fair Market Value means, with respect to Shares on any given date, the closing price per Share on that date as reported on the New York Stock Exchange or other stock exchange on which the Shares principally trade. If the New York Stock Exchange or such other exchange is not open for business on the date fair market value is being determined, the closing price as reported for the next business day on which that exchange is open for business will be used.
- (s) Fees means all cash amounts payable to a Director for services rendered as a member of the Board that are specifically designated as fees, including, but not limited to, annual and/or quarterly retainer fees, fees (if any) paid for attending meetings of the Board or any Committee thereof, fees for serving as a Committee Chair, as Lead Director or Chairman or as a member of a Committee, and any per diem fees.

- (t) Investment Options means the respective options established hereunder with reference to the comparable funds under the Savings Plan, with the exception of the Company's Stock Fund.
- (u) Plan has the meaning ascribed to such term in Article I.
- (v) Restricted Share Unit means an award of a right to receive Shares, including any such award that is granted under, and subject to the terms of, the Stock Plan.
- (w) Shares means the shares of common stock of the Company, \$0.01 par value per Share.
- (x) Savings Plan means the Company's principal tax-qualified retirement savings plan for salaried employees.
- (y) Secretary means the Secretary of the Company.
- (z) Separation from Service means a "separation from service" as defined in Section 409A of the Code.
- (aa) Stock Plan means the Alcoa Corporation 2016 Stock Incentive Plan, as may be amended from time to time in accordance with its terms, and any successor thereto.
- (bb) Unforeseeable Emergency means a severe financial hardship to the Director resulting from (1) an illness or accident of the Director or his or her spouse or dependent; (2) loss of the Director's property due to casualty; or (3) other similar extraordinary and unforeseeable circumstances arising as a result of events beyond the Director's control. For the avoidance of doubt, a circumstance does not constitute an "Unforeseeable Emergency" for purposes of the Plan unless such circumstance constitutes an "unforeseeable emergency" as defined in Section 409A of the Code.

ARTICLE III DEFERRAL OF COMPENSATION

- 3.1 Deferral of Fees. A Director may elect, with respect to each calendar year, to defer under the Plan the receipt of all Fees or a specified portion (in 1% increments) of the Fees otherwise payable to him or her and may elect to invest such deferred Fees in one or more Investment Options and/or in Deferred Fee RSU Awards. Fees deferred in respect of each calendar year shall be separately designated and tracked in an individual sub-account to the Director's Deferred Fee Account (each, an "Annual Sub-Account") and shall be paid in accordance with Article V of the Plan.
- 3.2 Deferral of Restricted Share Units. Unless otherwise determined by the Board or as may be required pursuant to Section 6.6, any Restricted Share Units granted to a Director (whether as a Deferred Fee RSU Award or an Annual Equity Award) shall, once any vesting requirements have been met (*i.e.*, once earned and non-forfeitable), be deferred and paid in accordance with Article V of the Plan. Any dividend equivalents on Restricted Share Units shall be deferred and paid in the same manner and at the same time as the Restricted Share Units to which they relate.
- 3.3 Manner of Electing Deferral. A Director may elect to defer the receipt of all or certain Fees and may elect the form of payment of Restricted Share Units by giving written notice (including by electronic means) to the Secretary on an election form provided by the Company, or in any other

manner that is deemed sufficient from time to time by the Board (including by means of a standing election intended to apply to subsequent calendar years until modified by the Director). Such election form will require the Director to specify (i) the percentage (if any) of the Director's Fees that will be deferred and the manner of investment of such deferred Fees in accordance with Sections 3.5 and 3.6, and (ii) the form of payment of any deferred Fees (including Deferred Fee RSU Awards) and, separately, of the Director's Annual Equity Award, which in each case, may be either a single lump sum payment or ten (10) annual installment payments (and no other number of installments). In the event and to the extent that a Director fails to specify the form of payment, payment will be made in a lump sum. Payment will be made in accordance with Article V of the Plan.

- 3.4 Timing of Elections of Deferral. An election to defer Fees and to elect the form of payment of an Annual Equity Award shall be made prior to the beginning of the calendar year in which the Fees will be earned or, as applicable, the Annual Equity Award will be granted (including by means of a standing election intended to apply to subsequent calendar years until modified by the Director); provided, however, that an election made within 30 days after a person first becomes a Director shall be effective for Fees earned, or any Annual Equity Award granted, in the same calendar year, but after the date of such deferral election. The election to defer receipt of payment may not be cancelled or modified after it becomes irrevocable under Section 409A of the Code unless the Chairman, in his sole discretion, determines in accordance with Section 5.1 that an Unforeseeable Emergency exists, or except as otherwise permitted by the Code.
- 3.5 Deferring Fees into Investment Options. A Director may designate all or a portion of his or her deferred Fees to be invested in one or more of the Investment Options, in which case, the Director's deferred Fees shall be credited to the designated Investment Option(s) at the beginning of the calendar quarter following the quarter in which such Fees were earned. Such Fees shall be credited to the Director's Deferred Fee Account as Credits for "units" in the Director's Deferred Fee Account. As of any specified date, the value per unit in the Director's Deferred Fee Account shall be deemed to be the value determined for the comparable fund under the Savings Plan.
- 3.6 Deferred Fee RSU Awards. A Director may designate all or a portion of his or her deferred Fees to be invested in Deferred Fee RSU Awards, except that a deferral of Fees pursuant to an election made within 30 days after a person first becomes a Director may be invested in Deferred Fee RSU Awards only with respect to any Fees to be earned in the quarter (or other Fees payment period) following the quarter in which the Director commences service on the Board. The number of Restricted Share Units subject to each Deferred Fee RSU Award shall be determined by dividing the dollar amount of the Fees subject to the Director's election by the Fair Market Value of a Share on the date(s) that such Fees (or any installment thereof) would otherwise have been paid in cash to the Director (the "Fees Payment Date"). Unless otherwise determined by the Board, the Deferred Fee RSU Award shall (i) be granted on the applicable Fees Payment Date(s), (ii) not be subject to vesting requirements or other forfeiture restrictions, and (iii) be granted under, and subject to the terms of, the Stock Plan and evidenced by a form of Award Agreement (as defined in the Stock Plan) that shall be approved by the Board prior to the grant of any such Deferred Fee RSU Award, which Award Agreement is incorporated by reference into this Section 3.6. The Shares subject to the Deferred Fee RSU Award shall be delivered to the Director in accordance with Article V of the Plan.
- 3.7 Subsequent Deferral Elections. After a deferral election made by a Director in accordance with this Article III has become irrevocable under Section 409A of the Code, the Director may elect to change the time and form of payment of the deferred amount covered by such election only once

by submitting a payment election change at least (12) months prior to the date on which the deferred amount (or first installment thereof, as applicable) is scheduled to be paid (the "First Scheduled Payment Date") that will result in a delay of payment (or commencement of payment) of such deferred amount (*i.e.*, a re-deferral) until the date that is at least five (5) years after the First Scheduled Payment Date. A payment election change is irrevocable upon receipt and shall not take effect until the first date that is at least twelve (12) months after the date of receipt. Any such change in the time and form of payment of deferred Fees will apply to, and require a five (5) year re-deferral of, all deferred Fees (including Deferred Fee RSU Awards) previously deferred under the Plan by the Director as of the date of such change. Equally, any such change in the time and form of payment of an Annual Equity Award will apply to, and require a five (5) year re-deferral of, all Annual Equity Awards or any other deferred Restricted Share Units or deferred equity awards previously deferred under the Plan by the Director as of the date of such change.

- 3.8 Transfers Between Investment Options. Subject to Section 7.3, to the extent that a Director has Credits notionally invested in one or more Investment Options (other than the Legacy Alcoa DSU Account, if applicable), the Director may elect to designate a different Investment Option for all or any portion of such Credits in accordance with the procedures established by the Board from time to time.
- 3.9 Method of Payment. All payments with respect to a Director's Deferred Fee Account shall be made in cash, and no Director shall have the right to demand payment in Shares or in any other medium. Subject to the terms of the Stock Plan, if applicable, and except as set forth in Section 5.2, all payments with respect to Deferred Fee RSU Awards and Annual Equity Awards shall be made in Shares.

ARTICLE IV BENEFICIARIES

- 4.1 Designation of Beneficiary. Each Director may designate from time to time one or more natural persons or entities as his or her Beneficiary or Beneficiaries to whom the amounts credited to his or her Deferred Fee Account and/or his or her Deferred Fee RSU Awards are to be paid if he or she dies before all such amounts have been paid to the Director. Each Beneficiary designation shall be made on a form prescribed by the Company and shall be effective only when filed with the Secretary during the Director's lifetime. Each Beneficiary designation filed with the Secretary shall revoke all Beneficiary designations previously made. The revocation of a Beneficiary designation shall not require the consent of any Beneficiary. In the absence of an effective Beneficiary designation, or if payment cannot be made to a Beneficiary, payment shall be made to the Director's estate. Any beneficiary designation with respect to an Annual Equity Award or Deferred Fee RSU Award will be made in accordance with the terms of the Stock Plan, to the extent applicable.

ARTICLE V PAYMENTS

- 5.1 Payment upon Unforeseeable Emergency. No payment may be made from a Director's Deferred Fee Account or in settlement of a Director's Annual Equity Awards and Deferred Fee RSU Awards except as provided in this Article V, unless an Unforeseeable Emergency exists as determined by the Chairman in his sole discretion. If an Unforeseeable Emergency is determined by the Chairman to exist, the Chairman shall determine when and to what extent Credits in the Director's Deferred Fee Account and/or Shares underlying the Director's Annual Equity Awards and Deferred Fee RSU Awards may be paid to such Director prior to or after the Director's

Separation from Service; provided, however, that the amounts distributed in connection with such an emergency cannot exceed the amounts necessary to satisfy the emergency plus what is necessary to pay taxes reasonably anticipated as a result of the distribution, after taking into account the extent to which the hardship is or may be relieved through reimbursement or compensation by insurance or otherwise or by liquidation of the Director's assets (to the extent such liquidation would not itself cause severe financial hardship). All payments with respect to an Unforeseeable Emergency shall be made in a lump sum upon the Chairman's determination that an Unforeseeable Emergency exists, subject to any advance approval by the Board as may be required for purposes of exemption under Section 16(b) of the Securities Exchange Act of 1934, as amended.

5.2 Payment upon a Director's Separation from Service.

- (a) Payment of any amount in a Director's Deferred Fee Account (valued in accordance with the last sentence of Section 3.5) and of the Director's Deferred Fee RSU Awards (if any) and Annual Equity Awards shall be made following the Director's Separation from Service, as set forth in this Section 5.2, except as otherwise set forth in Section 5.1 or Section 5.3.
- (b) To the extent a Director elected to receive a lump sum payment, such payment shall be made in the sixth calendar month that commences following the date of the Director's Separation from Service, but in no event earlier than after a full six (6) months following such Separation from Service, subject to any subsequent deferral election made by the Director pursuant to Section 3.7.
- (c) To the extent a Director elected to receive installment payments, the first such installment payment shall be made either (i) during the sixth calendar month that commences following the Director's Separation from Service, but in no event earlier than after a full six (6) months following such Separation from Service, or (ii) during the first month of the calendar year following the Director's Separation from Service, whichever of (i) or (ii) occurs later, subject to any subsequent deferral election made by the Director pursuant to Section 3.7. Subsequent installment payments shall be made during the first calendar month of each succeeding year until the Director's Deferred Fee Account is exhausted or all Restricted Share Units have been paid, as applicable. If the Director elected to receive deferred Fees credited to any Annual Sub-Account or settlement of a Deferred Fee RSU Award or Annual Equity Award in installment payments, the amount of each payment shall be, respectively, a fraction of the value of the Director's Annual Sub-Account and in such sub-account, or a fraction of the number of Restricted Share Units that remains subject to such Deferred Fee RSU Award or Annual Equity Award, in each case on the last day of the calendar month preceding payment, the numerator of which fraction is one and the denominator of which is the total number of installments elected minus the number of installments previously paid. Any fractional Share portion of an installment payment of a Deferred Fee RSU Award or Annual Equity Award, or any portion of a dividend equivalent on such award that was not reinvested in additional Restricted Share Units pursuant to its terms, will be paid in cash at the same time as the installment payment to which it is attributable.

5.3 Payment upon a Director's Death. If a Director dies with any amount credited to his or her Deferred Fee Account and/or any outstanding Deferred Fee RSU Awards, the value of said Deferred Fee Account and/or Shares underlying such Deferred Fee RSU Awards shall be paid as soon as administratively practicable in a single payment to the Beneficiary (or in separate payments to the Beneficiaries if more than one were designated by the Director) or to the

Director's estate, as the case may be (subject to the terms of the Stock Plan if and to the extent applicable to the Deferred Fee RSU Awards). If a Director dies with any outstanding Annual Equity Awards that are vested (or become vested upon the Director's death), such awards shall be paid as soon as administratively practicable in a single payment to the party eligible to receive such payment under the terms of the Stock Plan.

- 5.4 Separate Payments. Each payment payable under this Plan is intended to constitute a separate payment for purposes of Section 409A of the Code.

ARTICLE V MISCELLANEOUS

- 6.1 Director's Rights Unsecured. Payments payable hereunder shall be payable out of the general assets of the Company, and no segregation of assets for such payments shall be made by the Company. The right of any Director or Beneficiary to receive payments from a Deferred Fee Account shall be a claim against the general assets of the Company as an unsecured general creditor. The Company may, in its absolute discretion, establish one or more trusts or reserves, which may be funded by reference to amounts of Credits standing in the Director's Deferred Fee Accounts hereunder or otherwise. Any such trust or reserve shall remain subject to the claims of creditors of the Company. If any amounts held in a trust of the above described nature are found (due to the creation or operation of said trust) in a final decision by a court of competent jurisdiction, or under a "determination" by the Internal Revenue Service in a closing agreement in audit or final refund disposition (within the meaning of Section 1313(a) of the Code), to have been includable in the gross income of a Director or Beneficiary prior to payment of such amounts from said trust, the trustee for the trust shall, as soon as practicable, pay to such Director or Beneficiary an amount equal to the amount determined to have been includable in gross income in such determination, and shall accordingly reduce the Director's or Beneficiary's future benefits payable under this Plan. The trustee shall not make any distribution to a Director or Beneficiary pursuant to this paragraph unless it has received a copy of the written determination described above, together with any legal opinion that it may request as to the applicability thereof.
- 6.2 Responsibility for Taxes. The Director or Beneficiary is liable for any and all taxes that are applicable to the amounts payable under the Plan, including any taxes deemed payable prior to payment out of the Plan.
- 6.3 Nonassignability. The right of any Director or Beneficiary to the payment of Credits in a Deferred Fee Account shall not be assigned, transferred, pledged or encumbered and shall not be subject in any manner to alienation or anticipation.
- 6.4 Administration and Interpretation. The Plan shall be administered by the Board. Subject to the terms of the Plan and applicable law and without limitation, the Board shall have full power and authority to: (i) designate Directors for participation, (ii) determine the terms and conditions of any deferral made under the Plan, (iii) interpret and administer the Plan and any instrument or agreement relating to, or deferral made under, the Plan, (iv) establish, amend, suspend or waive such rules and regulations and appoint such agents as it shall deem appropriate for the proper administration of the Plan, and (v) make any other determination and take any other action that the Board deems necessary or desirable for the administration of the Plan. To the extent permitted by applicable laws, the Board may, in its discretion, delegate to the Secretary's office any or all authority and responsibility to act with respect to administrative matters relating to the Plan, and to the extent set forth in the Plan, the Board may delegate certain questions of

construction and interpretation to the Chairman, whose decision on such matters shall be final and binding. The determination of the Board on all matters within its authority relating to the Plan shall be final, conclusive and binding upon all parties, including the Company, its shareholders, the Directors and any Beneficiary.

- 6.5 Section 409A of the Code. The Plan is intended to comply with the requirements of Section 409A of the Code, and the provisions of the Plan and any deferral election form shall be interpreted in a manner that satisfies the requirements of Section 409A of the Code, and the Plan shall be operated accordingly. If any provision of the Plan or any term or condition of any deferral election form would otherwise frustrate or conflict with this intent, the provision, such provision, term or condition will be interpreted and deemed amended so as to avoid this conflict. Although the Company may attempt to avoid adverse tax treatment under Section 409A of the Code, the Company makes no representation to that effect and expressly disavows any covenant to maintain favorable or avoid unfavorable tax treatment. The Company shall be unconstrained in its corporate activities without regard to the potential negative tax impact on a Director.
- 6.6 Non-U.S. Directors. Directors who are foreign nationals or residents or employed outside the United States, or both, may participate in the Plan on such terms and conditions different from those applicable to Directors who are not foreign nationals or residents or who are employed in the United States as may, in the judgment of the Board, be necessary or desirable in order to recognize differences in local law, regulations or tax policy.
- 6.7 Amendment and Termination. The Plan may be amended, modified or terminated at any time by the Board. No amendment, modification or termination shall, without the consent of a Director, adversely affect such Director's rights with respect to amounts theretofore credited to his or her Deferred Fee Account or with respect to Annual Equity Awards or Deferred Fee RSU Awards theretofore granted to such Director.
- 6.8 Notices. All notices to the Company under the Plan shall be in writing and shall be given to the Secretary or to an agent or other person designated by the Secretary.
- 6.9 Governing Law. This Plan shall be construed in accordance with and governed by the laws of the State of Delaware, excluding any choice of law provisions, which may indicate the application of the laws of another jurisdiction.

ARTICLE VIITRANSFER OF LIABILITIES UNDER ALCOA INC. PLANS

- 7.1 Transfer of Liabilities. In accordance with the terms of the Employee Matters Agreement, if prior to the Effective Date a Director participated in one or both of the Alcoa Inc. Plans, the Director's Deferred Fee Account or Legacy Alcoa DSU Account, as applicable, will be credited with the applicable amount of such Director's deferred fee account balance under the Alcoa Inc. Plan(s) and all liabilities relating to the participation of the Director in the Alcoa Inc. Plan(s) shall be transferred to this Plan and assumed by the Company. To the extent the Director's deferred fee account balance under the Alcoa Inc. Plan(s) was invested in one or more investment options other than the Alcoa Stock Fund, it will be reflected as a Credit in an equivalent Investment Option(s) in the Director's Deferred Fee Account, as determined by the Company.
- 7.2 Adjustment of Credits in Alcoa Stock Fund. Any amount transferred from a Director's deferred fee account under an Alcoa Inc. Plan that was notionally invested in the Alcoa Stock Fund will, following adjustment of such amount in accordance with the terms of the Employee Matters

Agreement, be held as a Credit in the Legacy Alcoa DSU Account and will be subject to the terms set forth in Section 7.3 and Section 7.4.

- 7.3 Transfers to or from the Legacy Alcoa DSU Account. The Legacy Alcoa DSU Account has been established solely for the purpose of receiving amounts transferred from a Director's deferred fee account under an Alcoa Inc. Plan and is not an Investment Option under this Plan. No deferred Fees or Credits notionally invested in Investment Options may be credited to, or transferred into, the Legacy Alcoa DSU Account. A Director who holds Credits in the Legacy Alcoa DSU Account may not transfer such Credits to other Investment Options if, as of the last Annual Valuation Date, the Director is not in compliance with the Director Share Ownership Guideline. If the Director is in compliance with the Director Share Ownership Guideline as of the last Annual Valuation Date, the Director may transfer Credits from the Legacy Alcoa DSU Account to other Investment Options only upon preclearance of such transaction by the Secretary in accordance with the Company's Insider Trading Policy. Notwithstanding the foregoing, beginning six (6) months after the Director's Separation from Service, and prior to a complete distribution of any amounts in the Director's Deferred Fee Account, the Director may transfer Credits from the Legacy Alcoa DSU Account to other Investment Options to the same extent and frequency as a participant in the Savings Plan may transfer investment credits into or out of the Company's Stock Fund. Any transfer out of the Legacy Alcoa DSU Account permitted by this Section 7.3 can be accomplished only once every fifteen (15) days. In addition, such transfers shall be subject to reasonable administrative minimums, and any other restrictions recommended by counsel to ensure compliance with applicable law.
- 7.4 Capitalization Adjustments. In the event of any stock dividend, stock split, combination or exchange of shares, merger, consolidation or other distribution (other than normal cash dividends) of Company assets to shareholders, or any other change affecting the Shares or the price of the Shares or, alternatively, in the event of an Equity Restructuring, any Credits in the Legacy Alcoa DSU Account will be subject to the applicable adjustment provisions of the Stock Plan.
- 7.5 Assumption of Terms of Alcoa Inc. Plans. Deferred fee amounts that are transferred to a Director's Deferred Fee Account from his or her account under an Alcoa Inc. Plan will be subject to the same terms and conditions as applied under the applicable Alcoa Inc. Plan. To effectuate the foregoing, the Company hereby adopts the terms of the Alcoa Inc. 1999 Plan as Appendix A to the Plan and the terms of the Alcoa Inc. 2005 Plan as Appendix B to the Plan (together, the "Appendices"), which shall apply, respectively, to deferred fee amounts transferred from the Alcoa Inc. 1999 Plan and the Alcoa Inc. 2005 Plan. For purposes of the Company's adoption of the terms of the Alcoa Inc. Plans, unless the context otherwise requires, references in an Alcoa Inc. Plan to: (i) the "Company" means Alcoa Corporation, (ii) the "Board of Directors" or the "Board" means the Board of Directors of Alcoa Corporation, (iii) the "Alcoa Stock Fund" means the Legacy Alcoa DSU Account, (iv) "stock," "common stock" or "shares" means shares of Alcoa Corporation common stock, and (v) "Investment Options" means the Investment Options under Section 2.1(t) of the Plan. Further, notwithstanding the terms of the Alcoa Inc. Plans, transfers of Credits between Investment Options or from the Legacy Alcoa DSU Account will be governed by Section 3.8 and Section 7.3 of the Plan, and any change to a Director's previous deferral election that is permitted under the Alcoa Inc. 2005 Plan will be subject to the subsequent deferral election requirements in Section 3.7 of the Plan. The Appendices, as modified by this Section 7.5, are incorporated by reference in this Article VII.

APPENDIX A

ALCOA INC.

DEFERRED FEE PLAN FOR DIRECTORS

(Amended July 9, 1999)

Article I

INTRODUCTION

Alcoa Inc. (the "Company") has established this Deferred Fee Plan for Directors (the "Plan") to provide non-employee Directors with an opportunity to defer receipt of cash fees to be earned for services rendered as a Director, generally until after termination of service as a Director.

Article II

DEFINITIONS

2.1 Definitions. The following definitions apply unless the context clearly indicates otherwise:

- (a) Alcoa Stock Option shall mean the Investment Option established hereunder with reference to the Alcoa Stock fund under the Savings Plan.
- (b) Beneficiary means the person or persons designated by a Participant under Section 4.1 to receive any amount payable under Section 5.3.
- (c) Board of Directors means the Board of Directors of the Company.
- (d) Committee means the Inside Director Committee of the Board.
- (e) Credits means amounts credited to a Participant's Deferred Fee Account, with all Investment Option units valued by reference to the comparable fund offered under the Company's principal savings plan for salaried employees ("Savings Plan").
- (f) Deferred Fee Account means a bookkeeping account established by the Company in the name of a Director with respect to amounts deferred hereunder.
- (g) Director means a non-employee member of the Board of Directors. Any Director who is a director or chairman of the board of directors of a subsidiary or affiliate of the Company shall not, by virtue thereof, be deemed to be an employee of the Company or such subsidiary or affiliate for purposes of eligibility under this Plan.
- (h) Fees means all cash amounts payable to a Director for services rendered as a Director and which are specifically designated as fees, including, but not limited to, annual and/or quarterly retainer fees, fees (if any) paid for attending meetings of the Board of Directors or any committee thereof and any per diem fees.

- (i) Investment Option means the respective options established hereunder with reference to the comparable funds under the Savings Plan, except as otherwise determined by the Committee for any fund added to the Savings Plan after January 1, 1993.
- (j) Participant means a person who has elected to participate in the Plan.
- (k) Secretary means the Secretary of the Company.
- (l) Unforeseeable Emergency means a severe financial hardship resulting from extraordinary and unforeseeable circumstances arising as a result of one or more recent events beyond the control of the Participant, which cannot be eliminated by other reasonably available resources of the Participant.

Article III

DEFERRAL OF COMPENSATION

- 3.1 Amount of Deferral. A Director may elect to defer receipt of all Fees, or of all Fees of one or more types, or a specified portion (in 10% increments) of either of the foregoing, otherwise payable to him or her.
- 3.2 Manner of Electing Deferral. A Director may elect, or modify a prior election, to defer the receipt of all or certain Fees by giving written notice to the Secretary on a form provided by the Company.
- 3.3 Time of Election of Deferral; Revocation. An election to defer Fees shall be made prior to the beginning of the calendar quarter in which the Fees will be earned; provided, however, that an election made within 30 days after a person first becomes a Director shall be effective for Fees earned after such election is made. An election shall continue in effect until the end of the Participant's service as a Director or until the Secretary is notified in writing of a cancellation or modification of the election pursuant to this Section 3.3, whichever shall occur first; provided, however, that unless and then only to the extent that the Committee, in its sole discretion, determines that an Unforeseeable Emergency exists, the election deferring receipt of payment may not be canceled or modified except with regard to Fees to be earned in the quarter(s) beginning after the date the election is so canceled or modified.
- 3.4 Deferring Fees. A Participant shall designate the portion of his or her deferred Fees to be invested in one or more of the Investment Options. Beginning January 1, 1996, all Fees deferred by a Participant in any calendar year shall be invested in the Alcoa Stock Option until one-half of the amount of the annual retainer fee to which such Participant is entitled for such year has been so invested. Thereafter, designations of other Investment Options by a Participant may be made or shall be given effect. A Participant's deferred Fees shall be credited to the designated Investment Option(s) at the end of the month in which such deferred Fees would have been payable to such Participant but for an election to defer receipt of those Fees, except that the retainer fees shall be credited as of the first day of January, April, July and October of the year in which they are earned. Such Fees shall be credited to a Participant's Deferred Fee Account as Credits for "units" in the Participant's Deferred Fee Account. As of any specified date the value per unit shall be deemed to be the value determined for the comparable fund under the Savings Plan.

- 3.5 Transfers. A Participant may elect to designate a different Investment Option for all or any portion of the Credits for units in the various Investment Options in his or her Deferred Fee Account, except that Credits for units in the Alcoa Stock Option may not be transferred to any other Investment Option while the Participant is a Director. Beginning six months after termination of Board service and prior to a complete distribution of the Participant's account, the Participant may transfer Credits for units in the Alcoa Stock Option to other Investment Options to the same extent and frequency as a participant in the Savings Plan. A written election for transfer on a form provided by the Company must be received by the Secretary prior to 4:00 p.m. Eastern Time the business day when it is to become effective. Such election shall be subject to reasonable administrative minimums, and any restrictions recommended by counsel to assure that the Alcoa Stock Option does not become subject to Section 16 of the Securities Exchange Act of 1934 and/or to assure compliance with the provisions thereof.
- 3.6 Method of Payment.
- (a) All payments with respect to a Participant's Deferred Fee Account shall be made in cash, and no Participant shall have the right to demand payment in shares of Company stock or in any other medium.
 - (b) Payments shall be made in a lump sum or, at the election of the Participant, in annual or quarterly installments. The date of the first such payment shall not be later than the first day of the first calendar quarter subsequent to the Participant's attainment of age 70 in which the Participant shall not be serving as a Director.
 - (c) An election to receive installment payments in lieu of a lump sum must be made at least one year before the Participant's service as a Director terminates.
- 3.7 Election for pre-1990. Any Participant who deferred Fees payable for any year prior to 1990 shall be permitted to elect to designate one or more of the current Investment Options for all (but not less than all) of the amount credited to his Deferred Fee Account. The election must be received by the Secretary prior to the effective date fixed by the Committee and is subject to the approval of the Committee. Through the date such election becomes effective (if any) his Deferred Fee Account will earn interest as provided in the Plan prior to the 1989 amendments.
- 3.8 Transition Provision for 1992. The blackout period from November 2, 1992 through January 1, 1993 and the mapping of Credits from the old to the new Investment Options shall be administered under the Plan in the same fashion as for the Savings Plan, except as otherwise determined by the Committee.

Article IV

BENEFICIARIES

- 4.1 Designation of Beneficiary. Each Participant may designate from time to time any person or persons, natural or otherwise, as his Beneficiary or Beneficiaries to whom the amounts credited to his or her Deferred Fee Account are to be paid if he or she dies before all such amounts have been paid to the Participant. Each Beneficiary designation shall be made on a form prescribed by the Company and shall be effective only when filed with the Secretary during the Participant's lifetime. Each Beneficiary designation filed with the Secretary shall revoke all Beneficiary designations previously made. The revocation of a Beneficiary designation shall not require the

consent of any Beneficiary. In the absence of an effective Beneficiary designation or if payment can be made to no Beneficiary, payment shall be made to the Participant's estate.

Article V

PAYMENTS

- 5.1 **Payment of Deferred Fees.** No payment may be made from a Director's Deferred Fee Account except as provided in this Article, unless and then only to the extent that an Unforeseeable Emergency exists as determined by the Committee in its sole discretion. In the latter case the Committee shall determine when and to what extent Credits in a Participant's Deferred Fee Account may be paid to such Participant prior to or after termination as a Director.
- 5.2 **Payment Upon Termination as Director.** The value of a Participant's Deferred Fee Account shall be payable in cash in a lump sum on or about the first day of the calendar quarter succeeding the quarter in which the Participant's service as a Director is terminated, or, if elected in advance under Section 3.6 hereof, in a lump sum or annual or quarterly installments beginning as specified in the election. If installments are elected, the amount of each payment shall be a fraction of the value of the Participant's Deferred Fee Account on the last day of the calendar quarter preceding payment, the numerator of which is one and the denominator of which is the total number of installments elected minus the number of installments previously paid. Such installment payments shall be made on or about the first day of each succeeding year or quarterly period until said Account is exhausted, except as provided in Section 5.1 or Section 5.3.
- 5.3 **Payment Upon Participant's Death.** If a Participant dies with any amount credited to his or her Deferred Fee Account, the value of said Account shall be paid in a single payment(s) to the Beneficiary(ies) or estate, as the case may be, on or about the first day of the calendar quarter next following the date of death or such later date as shall have been selected by the Participant with the consent of the Committee.

Article VI

MISCELLANEOUS

- 6.1 **Participant's Rights Unsecured.** The right of any Participant to receive payments from his or her Deferred Fee Account shall be a claim against the general assets of the Company as an unsecured general creditor. The Company may, in its absolute discretion, establish one or more trusts or reserves which may be funded by reference to amounts of Credits standing in Participants' Deferred Fee Accounts hereunder or otherwise.
- 6.2 **Non-assignability.** The right of any Participant or Beneficiary to the payment of Credits in a Deferred Fee Account shall not be assigned, transferred, pledged or encumbered and shall not be subject in any manner to alienation or anticipation.
- 6.3 **Administration and Interpretation.** The Plan shall be administered by the Committee which shall have authority to adopt rules and regulations for carrying out the Plan and to interpret, construe and implement its provisions. Decisions of the Committee shall be final and binding. Routine administration may be delegated by the Committee.

- 6.4 Amendment and Termination. The Plan may be amended, modified or terminated at any time by the Board of Directors. No amendment, modification or termination shall, without the consent of a Participant, adversely affect such Participant's rights with respect to amounts theretofore credited to his or her Deferred Fee Account or earlier effect the payment of Fees already deferred.
- 6.5 Notices. All notices to the Company under the Plan shall be in writing and shall be given to the Secretary or to an agent or other person designated by the Secretary.
- 6.6 Governing Law. This Plan shall be construed in accordance with and governed by the laws of the Commonwealth of Pennsylvania, excluding any choice of law provisions which may indicate the application of the laws of another jurisdiction.

APPENDIX B

ALCOA INC.

2005 DEFERRED FEE PLAN FOR DIRECTORS

(Effective January 1, 2005; As Amended Effective January 1, 2015)

ARTICLE I - INTRODUCTION

Alcoa Inc. (the “Company”) has established this 2005 Deferred Fee Plan for Directors (the “Plan”) to provide nonemployee directors with an opportunity to defer receipt of fees earned for services as a member of the Company’s Board of Directors (the “Board”) in 2005 and beyond.

ARTICLE II - DEFERRAL OF COMPENSATION

2.1 **Definitions.** The following definitions apply unless the context clearly indicates otherwise:

- (a) **Alcoa Stock Fund** means the Investment Option established hereunder with reference to the Alcoa Stock Fund under the Savings Plan.
- (b) **Beneficiary** means the person or persons designated by a Director under Section 4.1 to receive any amount payable under Section 5.3.
- (c) **Board** has the meaning ascribed to such term in Article I.
- (d) **Chairman** means the Chairman of the Board.
- (e) **Company** has the meaning ascribed to such term in Article I.
- (f) **Credits** means amounts credited to a Director’s Deferred Fee Account, with all Investment Option units valued by reference to the comparable fund offered under the Savings Plan.
- (g) **Deferred Fee Account** means a bookkeeping account established by the Company in the name of a Director with respect to amounts deferred hereunder.
- (h) **Director** means a nonemployee member of the Board who participates in this Plan. Any Director who is a director or chairman of the board of directors of a subsidiary or affiliate of the Company shall not, by virtue thereof, be deemed to be an employee of the Company or such subsidiary or affiliate for purposes of eligibility under this Plan.
- (i) **Director Share Ownership Guideline** means the minimum value of Alcoa common stock or units in the Alcoa Stock Fund required to be held by each Director, as established from time to time by the Board. Effective January 1, 2015, the Director Share Ownership Guideline for a Director shall be \$750,000. A Director is required to invest 50% of the Director’s annual Fees in Alcoa common stock or defer into the Alcoa Stock Fund under this Plan until the value of the investment reaches \$750,000. The investment will be valued on the first Monday in December of each year and shall be held until retirement from the Board. Until the Director Share Ownership Guideline is satisfied by a particular Director, he or she is required to defer the Required Deferral Amount (defined below) or otherwise use that amount of annual Fees for the purchase of Alcoa common stock.

- (j) Fees means all cash amounts payable to a Director for services rendered as a member of the Board in 2005 and thereafter that are specifically designated as fees, including, but not limited to, annual and/or quarterly retainer fees, fees (if any) paid for attending meetings of the Board or any Committee thereof, fees for serving as a Committee Chair, as Lead Director or as a member of a Committee, and any per diem fees.
- (k) Investment Options means the respective options established hereunder with reference to the comparable funds under the Savings Plan.
- (l) Plan has the meaning ascribed to such term in Article I.
- (m) Required Deferral Amount means 50% of annual Fees, until such time as a Director has satisfied the then applicable Director Share Ownership Guideline.
- (n) Savings Plan means the Company's principal savings plan for salaried employees.
- (o) Secretary means the Secretary of the Company.
- (p) Unforeseen Emergency means a severe financial hardship to the Director resulting from (1) an illness or accident affecting the Director or his or her spouse or dependent; (2) loss of the Director's property due to casualty; or (3) other similar extraordinary and unforeseeable circumstances arising as a result of events beyond the Director's control.

ARTICLE III - BENEFICIARIES

- 3.1 Amount of Deferral. Beginning January 1, 2005, until a Director owns beneficial shares of Alcoa common stock and/or has units in the Alcoa Stock Fund with a value at least equal to the then applicable Director Share Ownership Guideline, the Director will be required to either defer at least the Required Deferral Amount in the Alcoa Stock Fund or use such amount to purchase Alcoa common stock. Beyond that requirement, a Director may elect to defer receipt of all Fees, or of all Fees of one or more types, or a specified portion (in 1% increments) otherwise payable to him or her.
- 3.2 Manner of Electing Deferral. A Director may elect, or modify a prior election, to defer the receipt of all or certain Fees by giving written notice to the Secretary on a form provided by the Company, or in any other manner that is deemed sufficient from time to time by the Chairman.
- 3.3 Annual Elections of Deferral. An election to defer Fees shall be made prior to the beginning of the calendar year in which the Fees will be earned; provided, however, that an election made within 30 days after a person first becomes a Director shall be effective for Fees earned during that year. An election shall continue in effect until the end of the year following the date of the deferral election, or until the end of the Director's service on the Board, whichever shall occur first. The election to defer receipt of payment may not be canceled or modified unless the Chairman, in his sole discretion, determines that an Unforeseen Emergency exists, or except as otherwise permitted by Internal Revenue Service regulations.
- 3.4 Deferring Fees. A Director shall designate the portion of his or her deferred Fees to be invested in one or more of the Investment Options. Until the Director Share Ownership Guideline is satisfied, the Required Deferral Amount is required to be deferred into the Alcoa Stock Fund or used to purchase Alcoa common stock. Any Director who has satisfied the Director Share

Ownership Guideline or who wishes to defer funds other than the Required Deferral Amount may designate Investment Options other than the Alcoa Stock Fund for those amounts. A Director's deferred Fees shall be credited to the designated Investment Option(s) at the beginning of the calendar quarter following the quarter in which such Fees were earned. Such Fees shall be credited to the Director's Deferred Fee Account as Credits for "units" in the Director's Deferred Fee Account. As of any specified date, the value per unit in the Director's Deferred Fee Account shall be deemed to be the value determined for the comparable fund under the Savings Plan.

- 3.5 Transfers. A Director may elect to designate a different Investment Option for all or any portion of the Credits for units in the various Investment Options in his or her Deferred Fee Account, provided that, once the value of the Credits in the Alcoa Stock Fund equals the Director Share Ownership Guideline, Credits for at least that value must be maintained in the Alcoa Stock Fund for the duration of the Director's service on the Board. Beginning six (6) months after termination of Board service, and prior to a complete distribution of the Director's Deferred Fee Account, the Director may transfer Credits in units in the Alcoa Stock Fund to other Investment Options to the same extent and frequency as a participant in the Savings Plan. A written election on a form provided by the Company for transfer of investments into or out of any Investment Option other than the Alcoa Stock Fund must be received by the Secretary prior to 4:00 p.m. Eastern Time on the business day when it is to become effective. Transfer of investments into or out of the Alcoa Stock Fund must be received by 8:00 a.m. Eastern Time on the business day it is to become effective. Such transfers into or out of the Alcoa Stock Fund can be accomplished only once every fifteen (15) days. In addition, such transfers shall be subject to reasonable administrative minimums, and any restrictions recommended by counsel to ensure compliance with applicable law.
- 3.6 Method of Payment.
- (a) All payments with respect to a Director's Deferred Fee Account shall be made in cash, and no Director shall have the right to demand payment in shares of Alcoa common stock or in any other medium.
 - (b) Payments shall be made in a lump sum as soon as administratively practicable following six (6) months after the conclusion of the Director's service on the Board. Notwithstanding the foregoing, a Director can elect (at the time of making his or her annual deferral designation under Section 3.3) to receive the deferred Fees in up to ten (10) annual installments. The first such installment payment shall occur during the sixth month following the conclusion of the Director's service on the Board, or during the first month of the calendar year following the conclusion of the Director's service on the Board, whichever occurs later.
 - (c) A Director may make an election to receive deferred Fees in up to ten (10) annual installments or a lump sum payment, provided that if such election is made by a Director to change the manner of payment of the Credits in such Director's Deferred Fee Account and not with respect to the annual deferral designation made for Fees to be earned in an upcoming year, such payment election change (i) must be made at least twelve (12) months before the Director's service on the Board ends, (ii) will be effective twelve (12) months following the date of the payment election change, and (iii) will result in a delay of payment of such deferred Fees until the later of (x) five (5) years from the date of the payment election change and (y) the end of the Director's service on the Board. A payment election change is irrevocable upon receipt unless a Director makes a subsequent payment election change, in which case such subsequent

payment election change shall be subject to the requirements of the foregoing clauses (i) to (iii).

ARTICLE IV -

BENEFICIARIES

- 4.1 Designation of Beneficiary. Each Director may designate from time to time one or more natural persons or entities as his or her Beneficiary or Beneficiaries to whom the amounts credited to his or her Deferred Fee Account are to be paid if he or she dies before all such amounts have been paid to the Director. Each Beneficiary designation shall be made on a form prescribed by the Company and shall be effective only when filed with the Secretary during the Director's lifetime. Each Beneficiary designation filed with the Secretary shall revoke all Beneficiary designations previously made. The revocation of a Beneficiary designation shall not require the consent of any Beneficiary. In the absence of an effective Beneficiary designation, or if payment can be made to no Beneficiary, payment shall be made to the Director's estate.

ARTICLE V -

PAYMENTS

- 5.1 Payment of Deferred Fees. No payment may be made from a Director's Deferred Fee Account except as provided in this Article, unless an Unforeseen Emergency exists as determined by the Chairman in his sole discretion. If an Unforeseen Emergency is determined by the Chairman to exist, the Chairman shall determine when and to what extent Credits in the Director's Deferred Fee Account may be paid to such Director prior to or after the Director's service on the Board; *provided, however*, that the amounts distributed in connection with such an emergency cannot exceed the amounts necessary to satisfy the emergency plus what is necessary to pay taxes reasonably anticipated as a result of the distribution, after taking into account the extent to which the hardship is or may be relieved through reimbursement or compensation by insurance or otherwise or by liquidation of the Director's assets (to the extent such liquidation would not itself cause severe financial hardship.).
- 5.2 Payment upon Termination of Service on the Board. The value of a Director's Deferred Fee Account, determined in accordance with the last sentence of Section 3.4, shall be payable in cash in a lump sum as soon as administratively practicable following six (6) months after the Director's service on the Board ends, or if elected in advance by the Director under Section 3.6 hereof, in annual installments. If installments had been elected, the amount of each payment shall be a fraction of the value of the Director's Deferred Fee Account designated by the Director for installment payments and in such account on the last day of the calendar month preceding payment, the numerator of which is one and the denominator of which is the total number of installments elected minus the number of installments previously paid. The first installment payment shall be made as provided in the last sentence of Section 3.6(b), and all subsequent installment payments shall be made during the first month of each succeeding year until said account is exhausted, except as provided in Section 5.1 or Section 5.3.
- 5.3 Payment upon a Director's Death. If a Director dies with any amount credited to his or her Deferred Fee Account, the value of said account shall be paid as soon as administratively practicable in a single payment to the Beneficiary (or in several payments to the Beneficiaries if more than one were named by the Director) or to the Director's estate, as the case may be.

- 6.1 Director's Rights Unsecured. Payments payable hereunder shall be payable out of the general assets of the Company, and no segregation of assets for such payments shall be made by the Company. The right of any Director or Beneficiary to receive payments from a Deferred Fee Account shall be a claim against the general assets of the Company as an unsecured general creditor. The Company may, in its absolute discretion, establish one or more trusts or reserves, which may be funded by reference to amounts of Credits standing in the Director's Deferred Fee Accounts hereunder or otherwise. Any such trust or reserve shall remain subject to the claims of creditors of the Company. If any amounts held in a trust of the above described nature are found (due to the creation or operation of said trust) in a final decision by a court of competent jurisdiction, or under a "determination" by the Internal Revenue Service in a closing agreement in audit or final refund disposition (within the meaning of Section 1313(a) of the Internal Revenue Code of 1986, as amended), to have been includable in the gross income of a Director or Beneficiary prior to payment of such amounts from said trust, the trustee for the trust shall, as soon as practicable, pay to such Director or Beneficiary an amount equal to the amount determined to have been includable in gross income in such determination, and shall accordingly reduce the Director's or Beneficiary's future benefits payable under this Plan. The trustee shall not make any distribution to a Director or Beneficiary pursuant to this paragraph unless it has received a copy of the written determination described above, together with any legal opinion that it may request as to the applicability thereof.
- 6.2 Responsibility for Taxes. The Director or Beneficiary is liable for any and all taxes that are applicable to the amounts payable under the Plan, including any taxes deemed payable prior to payment out of the Plan.
- 6.3 Nonassignability. The right of any Director or Beneficiary to the payment of Credits in a Deferred Fee Account shall not be assigned, transferred, pledged or encumbered and shall not be subject in any manner to alienation or anticipation.
- 6.4 Administration and Interpretation. The Plan shall be administered by the Secretary's office. Questions of construction and interpretation will be referred to the Chairman. The Chairman's decision shall be final and binding.
- 6.5 Amendment and Termination. The Plan may be amended, modified or terminated at any time by the Board. No amendment, modification or termination shall, without the consent of a Director, adversely affect such Director's rights with respect to amounts theretofore credited to his or her Deferred Fee Account or earlier effect the payment of Fees already deferred.
- 6.6 Notices. All notices to the Company under the Plan shall be in writing and shall be given to the Secretary or to an agent or other person designated by the Secretary.
- 6.7 Governing Law. This Plan shall be construed in accordance with and governed by the laws of the Commonwealth of Pennsylvania, excluding any choice of law provisions, which may indicate the application of the laws of another jurisdiction.

APPENDIX C

ALCOA CORPORATION

2016 DEFERRED FEE PLAN FOR DIRECTORS

APPENDIX C

Terms Applicable to Directors in Canada

Pursuant to Section 6.6 of the Alcoa Corporation 2016 Deferred Fee Plan for Directors, as amended (the "Plan"), the following provisions apply to participation in the Plan by any Director who is tax resident in Canada. Capitalized terms not defined in this Appendix C have the meanings set forth in the Plan.

- C-1. Form of Deferred Investment. Notwithstanding anything in the Plan to the contrary, including without limitation Section 3.5, a Director may not designate any portion of his or her Fees to be deferred and invested in the Investment Options; however, a Director may designate all or a portion of his or her Fees to be deferred and invested in Deferred Fee RSU Awards, pursuant to Section 3.6 of the Plan.
- C-2. Form of Payment. Notwithstanding anything in the Plan to the contrary, including without limitation Sections 3.3 and 5.2(c), a Director may not elect to receive installment payments of Fees deferred into Deferred Fee RSU Awards under the Plan or of Annual Equity Awards. All Fees deferred under the Plan and all Annual Equity Awards will be paid to the Director in a single lump sum payment following the Director's separation from service, in accordance with Section 5.2(a) and (b) of the Plan.
- C-3. No Payment upon Unforeseeable Emergency. Notwithstanding anything in the Plan to the contrary, including without limitation Section 5.1 of the Plan, no payment of any Fees deferred under the Plan or of any Annual Equity Award may be made upon an Unforeseeable Emergency (as defined in Section 2.1(bb) of the Plan).

SUBSIDIARIES OF THE REGISTRANT

Name	State or Country of Organization
Alcoa - Aluminerie De Deschambault L.P.	Canada
Alcoa Aluminio S.A.	Brazil
Alcoa Canada Co.	Canada
Alcoa Fjarðaál sf	Iceland
Alcoa Holland B.V.	Netherlands
Alcoa Nederland Holding B.V.	Netherlands
Alcoa Norway ANS	Norway
Alcoa of Australia Limited ¹	Australia
Alcoa Power Generating Inc. ²	Tennessee
Alcoa Saudi Rolling Inversiones S.L.	Spain
Alcoa Saudi Smelting Inversiones S.L.	Spain
Alcoa Treasury S.a.r.l.	Luxembourg
Alcoa USA Corp.	Delaware
Alcoa USA Holding Company	Delaware
Alcoa Warrick LLC	Delaware
Alcoa Wolinbec Company	Canada
Alcoa World Alumina LLC ^{1,3}	Delaware
Alcoa World Alumina Brasil Ltda. ¹	Brazil
Alcoa World Alumina Saudi Limited ¹	Hong Kong
Alcoa-Lauralco Management Company	Canada
Alumina Española, S.A. ¹	Spain
Aluminio Espanol, S.L.U.	Spain
Estreito Energia S.A.	Brazil
Luxcoa S.a.r.l.	Luxembourg
Reynolds Bécancour, Inc.	Delaware
Reynolds Metals Company, LLC	Delaware
Suriname Aluminum Company, L.L.C. ¹	Delaware

The names of particular subsidiaries have been omitted because, considered in the aggregate as a single subsidiary, they would not constitute, as of the end of the year covered by this report, a “significant subsidiary” as defined in Regulation S-X under the Securities Exchange Act of 1934, as amended.

- 1 Owned directly or indirectly 60% by Alcoa Corporation and 40% by Alumina Limited.
- 2 Registered to do business in Tennessee under the name APG Trading and the name Tapoco and in Washington under the name of Colockum.
- 3 Registered to do business in Pennsylvania and Texas under the name of Alcoa World Chemicals.

CONSENT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

We hereby consent to the incorporation by reference in the Registration Statement on Form S-8 (Nos. 333-214420, 333-214423, 333-218038, and 333-228258) of Alcoa Corporation of our report dated February 25, 2019 relating to the financial statements and the effectiveness of internal control over financial reporting, which appears in this Form 10-K.

/s/ PricewaterhouseCoopers LLP

PricewaterhouseCoopers LLP
Pittsburgh, Pennsylvania
February 25, 2019

CERTIFICATIONS

I, Roy C. Harvey, certify that:

1. I have reviewed this annual report on Form 10-K of Alcoa Corporation;
2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;
3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;
4. The registrant's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:
 - (a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;
 - (b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;
 - (c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and
 - (d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and
5. The registrant's other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):
 - (a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and
 - (b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: February 25, 2019

/s/ Roy C. Harvey

Name: Roy C. Harvey

Title: President and
Chief Executive Officer

CERTIFICATIONS

I, William F. Oplinger, certify that:

1. I have reviewed this annual report on Form 10-K of Alcoa Corporation;
2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;
3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;
4. The registrant's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:
 - (a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;
 - (b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;
 - (c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and
 - (d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and
5. The registrant's other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):
 - (a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and
 - (b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: February 25, 2019

/s/ William F. Oplinger

Name: William F. Oplinger
 Title: Executive Vice President and
 Chief Financial Officer

CERTIFICATION PURSUANT TO
18 U.S.C. SECTION 1350
AS ADOPTED PURSUANT TO
SECTION 906 OF THE SARBANES-OXLEY ACT OF 2002

In connection with the Annual Report of Alcoa Corporation (the “Company”) on Form 10-K for the period ended December 31, 2018 as filed with the Securities and Exchange Commission on the date hereof (the “Report”), each of the undersigned, in the capacities and on the dates indicated below, hereby certifies pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, that to his knowledge:

1. The Report fully complies with the requirements of Section 13(a) or 15(d) of the Securities Exchange Act of 1934; and
2. The information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company.

Date: February 25, 2019

/s/ Roy C. Harvey

Roy C. Harvey
President and Chief Executive Officer

Date: February 25, 2019

/s/ William F. Oplinger

William F. Oplinger
Executive Vice President and
Chief Financial Officer

A signed original of this written statement required by Section 906, or other document authenticating, acknowledging, or otherwise adopting the signature that appears in typed form within the electronic version of this written statement required by Section 906, has been provided to the Company and will be retained by the Company and furnished to the Securities and Exchange Commission or its staff upon request.

The foregoing certification is being furnished solely pursuant to 18 U.S.C. Section 1350 and is not being filed as part of this report.

Mine Safety Disclosure

At Alcoa Corporation, management strives to work safely in a manner that protects and promotes the health and well-being of the Company's employees, contractors, and the communities in which Alcoa Corporation operates because it is fundamentally the right thing to do. Despite uncertainties and economic challenges, the Company remains committed to living its values and managing risks accordingly.

Alcoa Corporation's health and safety systems are anchored by committed people who are actively engaged and effectively support a safe work environment, safe work methods, and overall production system stability. Each day, people at all levels proactively monitor and intervene to defend against weaknesses that develop in the Company's safety systems by identifying potential hazards and error-likely situations and responding to eliminate or control them.

In the table below, there are disclosures involving the Point Comfort, TX alumina refinery. All citations have been or are being addressed; none constituted an imminent danger.

Dodd-Frank Act Disclosure of Mine Safety and Health Administration Safety Data

Certain of Alcoa Corporation's U.S. facilities are subject to regulation by the Mine Safety and Health Administration (MSHA) under the U.S. Federal Mine Safety and Health Act of 1977 (the "Mine Act"). The MSHA inspects these facilities on a regular basis and issues various citations and orders when it believes a violation has occurred under the Mine Act. Whenever the MSHA issues a citation or order, it also generally proposes a civil penalty, or fine, related to the alleged violation. Citations or orders can be contested and appealed, and as part of that process, are often reduced in severity and amount, and are sometimes dismissed.

Management believes the following mine safety disclosures meet the requirements of section 1503(a) of the Dodd-Frank Wall Street Reform and Consumer Protection Act (the "Dodd-Frank Act").

Mine Safety Data. The table and other data below present mine safety information related to the Company's U.S. facilities subject to MSHA regulation, as required by section 1503(a)(1) of the Dodd-Frank Act. The following data reflects citations and orders received from the MSHA during the year ended December 31, 2018, as reflected in the MSHA system on December 31, 2018, and the proposed penalties received from the MSHA during such period (\$ in full amounts).

Mine or Operating Name/ MSHA Identification Number(1)	Section 104 S&S Citations(3) (#)	Section 104(b) Orders(4) (#)	Section 104(d) Citations and Orders(5) (#)	Section 110(b)(2) Violations(6) (#)	Section 107(a) Orders(7) (#)	Total Dollar Value of MSHA Assessments Pro- posed(8) (\$)	Total Number of Mining Related Fatalities (#)	Received Notice of Pattern of Violations Under Section 104(e) (yes/no)	Received Notice of Potential to Have Pattern Under Section 104(e) (yes/no)	Legal Actions Pending as of Last Day of Period (#)	Legal Actions Initiated During Period (#)	Legal Actions Resolved During Period (#)
Point Comfort, TX Alumina Refinery ⁽²⁾	1	—	—	—	—	\$ 6,260	—	no	no	1	—	3

- (1) The MSHA assigns an identification number to each mine or operation and may or may not assign separate identification numbers to related facilities. The information provided in this table is presented by mine or operation rather than the MSHA identification number because that is how Alcoa Corporation manages and operates its business, and management believes that this presentation is more useful to investors.
- (2) Under the Interagency Agreement dated March 29, 1979 between the MSHA, the U.S. Department of Labor, and The Occupational Safety and Health Administration, alumina refineries (such as the Company's Point Comfort facility) are subject to MSHA jurisdiction.
- (3) Represents the total number of citations issued under section 104 of the Mine Act, for violations of mandatory health or safety standards that could significantly and substantially contribute to a serious injury if left unabated. This includes the citations listed under the column headed section 104(d).
- (4) Represents the total number of orders issued under section 104(b) of the Mine Act, which represents a failure to abate a citation under section 104(a) within the period prescribed by the MSHA. This results in an order of immediate withdrawal from the area of the mine affected by the condition until the MSHA determines that the violation has been abated.
- (5) Represents the total number of citations and orders issued under section 104(d) of the Mine Act for unwarrantable failure to comply with mandatory health or safety standards.
- (6) Represents the total number of flagrant violations identified under section 110(b)(2) of the Mine Act.
- (7) Represents the total number of imminent danger orders issued under section 107(a) of the Mine Act.
- (8) Amounts represent the total dollar value of proposed assessments received.

During the year ended December 31, 2018, Alcoa Corporation had no mining-related fatalities, and none of the Company's mining operations received written notice from the MSHA of a pattern of, or the potential to have a pattern of, violations of mandatory health or safety standards that are of such nature as could have significantly and substantially contributed to the cause and effect of mine health or safety hazards under section 104(e) of the Mine Act.

The Federal Mine Safety and Health Review Commission (the "Commission") is an independent adjudicative agency that provides administrative trial and appellate review of legal disputes arising under the Mine Act. As of December 31, 2018, Alcoa Corporation had one matter pending before the Commission concerning a retaliation complaint filed by an employee in 2015. On December 17, 2017, this matter was dismissed by an Administrative Law Judge after a trial on the merits; however, the employee appealed this decision to the Commission, where the matter is pending. On May 2, 2018, three other matters concerning contests of citations or orders issued under section 104 of the Mine Act, along with the contests of the proposed penalties for each of these, were resolved, as the Commission upheld the January 18, 2017 decision made by an Administrative Law Judge in the Company's favor.