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, 2019
OR
☐ TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d)
OF THE SECURITIES EXCHANGE ACT OF 1934

Commission File Number 1-3610

ARCONIC INC.

(Exact name of registrant as specified in its charter)

Delaware	25-0317820
(State of incorporation)	(I.R.S. Employer Identification No.)

201 Isabella Street, Suite 200, Pittsburgh, Pennsylvania 15212-5872
(Address of principal executive offices) (Zip code)

Investor Relations----------------(412) 553-1950
Office of the Secretary-----------(412) 553-1940

(Registrant's telephone numbers, including area code)

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

Title of each class	Trading Symbol	Name of each exchange on which registered
Common Stock, par value $1.00 per share	**ARNC**	**New York Stock Exchange**
$3.75 Cumulative Preferred Stock, par value $100.00 per share	**ARNC PR**	**NYSE American**

Securities registered pursuant to Section 12(g) of the Act: **None**

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 whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, or a smaller reporting 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 ✓.

The aggregate market value of the outstanding common stock, other than shares held by persons who may be deemed affiliates of the registrant, as of the last business day of the registrant's most recently completed second fiscal quarter was approximately $11 billion. As of February 21, 2020, there were 435,918,568 shares of common stock, par value $1.00 per share, of the registrant outstanding.

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 2020 Annual Meeting of Shareholders to be filed pursuant to Regulation 14A (Proxy Statement).

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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 the Proxy Statement. Unless otherwise provided herein, any reference in this report to disclosures in the Proxy Statement shall constitute incorporation by reference of only that specific disclosure into this Form 10-K.

PART I

Item 1. Business.

General

Arconic Inc. is a Delaware corporation with its principal office in Pittsburgh, Pennsylvania and the successor to Arconic Pennsylvania (as defined below) which was formed in 1888 and formerly known as Alcoa Inc. In this report, unless the context otherwise requires, "Arconic" or the "Company" means Arconic Inc., a Delaware corporation, and all subsidiaries consolidated for the purposes of its financial statements.

The Company's Internet address is http://www.arconic.com. Arconic 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 soon as reasonably practicable after the Company electronically files such material with, or furnishes it to, the Securities and Exchange Commission (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.

Forward-Looking Statements

This report contains (and oral communications made by Arconic may contain) 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," "guidance," "intends," "may," "outlook," "plans," "projects," "seeks," "sees," "should," "targets," "will," "would," or other words of similar meaning. All statements that reflect Arconic's expectations, assumptions or projections about the future, other than statements of historical fact, are forward-looking statements, including, without limitation, forecasts relating to the growth of the aerospace, automotive, commercial transportation and other end markets; statements and guidance regarding future financial results or operating performance; statements about Arconic's strategies, outlook, business and financial prospects; and statements regarding potential share gains. Forward-looking statements are not guarantees of future performance and are subject to risks, uncertainties, and changes in circumstances that are difficult to predict. Although Arconic believes that the 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 Arconic'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 Note T to the Consolidated Financial Statements in Part II, Item 8. (Financial Statements and Supplementary Data). Market projections are subject to the risks discussed in this report and other risks in the market. Arconic disclaims any intention or obligation to update publicly any forward-looking statements, whether in response to new information, future events or otherwise, except as required by applicable law.

Overview

Arconic Inc. ("Arconic" or the "Company") is a global leader in lightweight metals engineering and manufacturing. Arconic's innovative, multi-material products, which include aluminum, titanium, and nickel, are used worldwide in aerospace, automotive, commercial transportation, building and construction, industrial applications, defense, and packaging.

Arconic is a global company operating in 18 countries. Based upon the country where the point of sale occurred, the United States and Europe generated 67% and 23%, respectively, of Arconic's sales in 2019. In addition, Arconic has operating activities in numerous countries and regions outside the United States, including Europe, Canada, China, Japan, and Russia. 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 countries with such operating activities.

Arconic has two reportable segments, which are organized by product on a worldwide basis: Engineered Products and Forgings (EP&F) and Global Rolled Products (GRP).

Background

Arconic Inc. Reincorporation

On December 31, 2017 (the "Effective Date"), Arconic Inc., a Pennsylvania corporation ("Arconic Pennsylvania" or, prior to the Reincorporation (as defined below), the "Company"), effected the change of the Company's jurisdiction of incorporation from Pennsylvania to Delaware (the "Reincorporation") by merging (the "Reincorporation Merger") with a direct wholly owned Delaware subsidiary, Arconic (in this section, "Arconic Delaware" or, following the Reincorporation, the "Company"), pursuant to an Agreement and Plan of Merger (the "Reincorporation Merger Agreement"), dated as of October 12, 2017, by and between Arconic Pennsylvania and Arconic Delaware. Arconic Pennsylvania shareholders approved the Reincorporation Merger to effect the Reincorporation at a Special Meeting of Shareholders held on November 30, 2017. As a result of the Reincorporation, (i) Arconic Pennsylvania has ceased to exist, (ii) Arconic Delaware automatically inherited the reporting obligations of Arconic Pennsylvania under the Securities Exchange Act of 1934, as amended (the "Exchange Act"), and (iii) Arconic Delaware is deemed to be the successor issuer to Arconic Pennsylvania.

The common stock, par value $1.00 per share, of Arconic Pennsylvania (the "Arconic Pennsylvania Common Stock") was listed for trading on the New York Stock Exchange and traded under the symbol "ARNC." As of the Effective Date, this symbol, without interruption, represents shares of common stock, par value $1.00 per share, of Arconic Delaware (the "Arconic Delaware Common Stock"). There was no change in the Exchange Act File Number assigned by the SEC as a result of the Reincorporation.

As of the Effective Date, the rights of the Company's stockholders began to be governed by the General Corporation Law of the State of Delaware, the Certificate of Incorporation of Arconic Delaware (the "Delaware Certificate") and the Bylaws of Arconic Delaware (the "Delaware Bylaws").

Other than the change in corporate domicile, the Reincorporation did not result in any change in the business, physical location, management, financial condition or number of authorized shares of the Company, nor did it result in any change in location of its current employees, including management. On the Effective Date, (i) the directors and officers of Arconic Pennsylvania prior to the Reincorporation continued as the directors and officers of Arconic Delaware after the Reincorporation, (ii) each outstanding share of Arconic Pennsylvania Common Stock was automatically converted into one share of Arconic Delaware Common Stock, (iii) each outstanding share of Serial Preferred Stock, par value $100 per share, of Arconic Pennsylvania (the "Arconic Pennsylvania Preferred Stock") was automatically converted into one share of Serial Preferred Stock, par value $100 per share, of Arconic Delaware (the "Arconic Delaware Preferred Stock") and (iv) all of Arconic Pennsylvania's employee benefit and compensation plans immediately prior to the Reincorporation were continued by Arconic Delaware, and each outstanding equity award and notional share unit relating to shares of Arconic Pennsylvania Common Stock was converted into an equity award or notional share unit, as applicable, relating to an equivalent number of shares of Arconic Delaware Common Stock on the same terms and subject to the same conditions. Beginning at the effective time of the Reincorporation, each certificate representing Arconic Pennsylvania Common Stock or Arconic Pennsylvania Preferred Stock was deemed for all corporate purposes to evidence ownership of Arconic Delaware Common Stock or Arconic Delaware Preferred Stock, as applicable. The Company's stockholders may, but are not required to, exchange their stock certificates as a result of the Reincorporation.

The foregoing descriptions of the Arconic Delaware Common Stock, the Arconic Delaware Preferred Stock, the Delaware Certificate and the Delaware Bylaws are qualified in their entirety by the full text of the Delaware Certificate and the Delaware Bylaws, which are filed as Exhibits 3(a) and 3(b), respectively, to this report.

Alcoa Corporation Separation Transaction

On November 1, 2016, Alcoa Inc. completed the separation of its business into two independent, publicly traded companies (the "Separation of Alcoa") – Alcoa Corporation and Arconic Inc. (the new name for Alcoa Inc.). Following the Separation of Alcoa, Alcoa Corporation holds the Alumina and Primary Metals segments, the rolling mill at the Warrick, Indiana operations and the 25.1% stake in the Ma'aden Rolling Company in Saudi Arabia previously held by the Company. The Company retained the Global Rolled Products (other than the rolling mill at the Warrick, Indiana operations and the 25.1% ownership stake in the Ma'aden Rolling Company), Engineered Products and Solutions and Transportation and Construction Solutions segments.

The Separation of Alcoa was effected by a pro rata distribution of 80.1% of the outstanding shares of Alcoa Corporation common stock to the Company's shareholders (the "Distribution of Alcoa"). The Company's shareholders of record as of the close of business on October 20, 2016 (the "Record Date") received one share of Alcoa Corporation common stock for every three shares of the Company's common stock held as of the Record Date. The Company did not issue fractional shares of Alcoa Corporation common stock in the Distribution of Alcoa. Instead, each shareholder otherwise entitled to receive a fractional share of Alcoa Corporation common stock received cash in lieu of fractional shares.

The Company distributed 146,159,428 shares of common stock of Alcoa Corporation in the Distribution of Alcoa and retained 36,311,767 shares, or approximately 19.9%, of the common stock of Alcoa Corporation immediately following the Distribution of Alcoa. As a result of the Distribution of Alcoa, Alcoa Corporation became an independent public company trading under the symbol "AA" on the New York Stock Exchange, and the Company trades under the symbol "ARNC" on the New York Stock Exchange.

During 2017, the Company disposed of its retained interest in Alcoa Corporation. In February 2017, the Company sold 23,353,000 shares of Alcoa Corporation stock at $38.03 per share, which resulted in cash proceeds of $888 million and a gain of $351 million. In April and May 2017, the Company acquired a portion of its outstanding notes held by two investment banks (the "Investment Banks") in exchange for cash and the Company's remaining 12,958,767 shares (valued at $35.91 per share) in

Alcoa Corporation stock (the "Debt-for-Equity Exchange") and recorded a gain of $167 million. The gains of $351 million and $167 million associated with the disposition of the Alcoa Corporation shares were recorded in Other expense (income), net in the accompanying Statement of Consolidated Operations in Part II, Item 8 (Financial Statements and Supplementary Data).

On October 31, 2016, in connection with the Separation of Alcoa and the Distribution of Alcoa, Arconic entered into several agreements with Alcoa Corporation or its subsidiaries that govern the relationship of the parties following the Distribution of Alcoa, including the following: Separation and Distribution Agreement, Transition Services Agreement, Tax Matters Agreement, Employee Matters Agreement, certain Patent, Know-How, Trade Secret License and Trademark License Agreements, Toll Processing and Services Agreement, Master Agreement for the Supply of Primary Aluminum, Massena Lease and Operations Agreement, Fusina Lease and Operations Agreement, and Stockholder and Registration Rights Agreement. The Toll Processing and Services Agreement expired by its terms at the end of 2018.

Recent Developments

On January 22, 2019, the Company announced that its Board of Directors (the Board) had determined to no longer pursue a potential sale of Arconic as part of its strategy and portfolio review. Management and the Board had been conducting a rigorous and comprehensive strategy and portfolio review over the past year and as part of that process had considered a sale of the Company, among other matters. However, the Company did not receive a proposal for a full-Company transaction that management and the Board believed would be in the best interest of Arconic's shareholders and other stakeholders. Management and the Board remain confident in Arconic's significant potential and are strongly focused on enhancing value for shareholders, through continued operational improvements and through other potential initiatives which had been previously identified in the strategy and portfolio review.

On February 8, 2019, Arconic announced, as part of its strategy and portfolio review, a separation of its portfolio into two independent, publicly-traded companies (the "Separation of Arconic"). The Engineered Products and Forgings (EP&F) businesses (engine products, fastening systems, engineered structures and forged wheels) will remain in the existing company, which will be renamed Howmet Aerospace Inc. and change its stock ticker from "ARNC" to "HWM" in connection with the separation. The Global Rolled Products (GRP) businesses (global rolled products, aluminum extrusions and building and construction systems) will be held by a new company that will be named Arconic Corporation at separation and that intends to list its common stock on the New York Stock Exchange under the symbol "ARNC."

On February 6, 2020, the Company announced that its Board of Directors has approved the completion of the Separation of Arconic.

Timothy D. Myers will serve as Arconic Corporation Chief Executive Officer. The Arconic Inc. Board has also named new directors to the Arconic Corporation and Howmet Aerospace Boards:

- Joining the Arconic Corporation Board of Directors will be: Timothy Myers; William Austen; Christopher Ayers*; Margaret Billson; Austin Camporin; Jacques Croisetiere; Elmer Doty*; Carol Eicher; Fritz Henderson; E. Stanley O'Neal*; and Jeffrey Stafeil.

  ** Will resign from the Arconic Inc. Board*

- Joining the Howmet Aerospace Board will be: Joseph Cantie; Robert Leduc; Jody Miller; and Nicole Piasecki.

The Separation of Arconic will occur by means of a pro rata distribution by Arconic Inc. (which will be renamed Howmet Aerospace Inc.) of all of the outstanding common stock of Arconic Corporation (the "Distribution of Arconic"). The Distribution of Arconic is intended to qualify as a tax-free transaction to Arconic Inc. stockholders for U.S. federal income tax purposes.

Distribution of Arconic Information

At the time of separation, Arconic Inc. stockholders are expected to receive one share of Arconic Corporation common stock for every four shares of Arconic Inc. common stock held as of the record date. The record date will be March 19, 2020 and the time of the distribution will be 12:01 A.M. on April 1, 2020.

At the time of separation, stockholders of Arconic Inc. will retain their shares of Arconic Inc. Due to the name change of Arconic Inc. to Howmet Aerospace Inc. upon separation, these shares will become Howmet Aerospace Inc. shares.

No fractional shares of Arconic Corporation common stock will be issued in the distribution, and stockholders will receive cash in lieu of fractional shares. The separation distribution is expected to be paid on April 1, 2020 to Arconic Inc. stockholders of record as of the close of business on the record date.

The distribution remains subject to the satisfaction or waiver of the conditions described in Arconic Rolled Products Corporation's Registration Statement on Form 10, as amended. The Form 10 has been filed by Arconic Rolled Products Corporation with the SEC and is available at www.arconic.com.

No action is required by Arconic Inc. stockholders to receive shares of Arconic Corporation common stock in the distribution. Arconic Inc. expects to make available an information statement to all stockholders entitled to receive the distribution of shares of Arconic Corporation common stock. The information statement is filed as an exhibit to Arconic Rolled Products Corporation's Registration Statement on Form 10 and describes Arconic Corporation and certain risks of owning Arconic Corporation common stock and provides other information regarding the separation and distribution.

Trading Common Stock

Arconic Inc. stockholders who hold shares of common stock on the record date of March 19, 2020, and decide to sell any of those shares before the distribution date, should consult their stockbroker, bank or other nominee to understand whether the shares of Arconic Inc. common stock will be sold with or without entitlement to Arconic Corporation common stock pursuant to the distribution.

Beginning on or about March 18, 2020, and continuing up to and through the distribution date, two markets are expected for Arconic Inc. common stock: the "regular-way" market and the "ex-distribution" market. Shares that trade in the "regular-way" market will be entitled to shares of Arconic Corporation common stock distributed pursuant to the distribution; shares that trade in the "ex-distribution" market will trade under the symbol HWM WI and without an entitlement to shares of Arconic Corporation common stock distributed pursuant to the distribution.

Arconic Corporation anticipates "when-issued" trading of its common stock will begin on or about March 18, 2020, under the symbol ARNC WI, and will continue up to and through the distribution date. "Regular-way" trading in Arconic Corporation's common stock is expected to begin on April 1, 2020.

The separation date may change if certain conditions are not satisfied by that date, as described in Arconic Rolled Products Corporation's information statement filed with the Form 10.

Note Offering

On February 7, 2020, the Company announced that Arconic Rolled Products Corporation (the "Issuer"), which is currently a wholly-owned subsidiary of Arconic, closed its offering of $600,000,000 aggregate principal amount of 6.125% second-lien notes due 2028 (the "Notes").

The Issuer intends to use the proceeds from the offering to make a payment to Arconic to fund the transfer of certain assets from Arconic to the Issuer in connection with the Separation of Arconic and for general corporate purposes. The net proceeds from the offering will be held in escrow until the completion of the Separation of Arconic and the satisfaction of certain other escrow release conditions. Prior to the separation, the Notes will not be guaranteed. Following the separation, the Notes will be guaranteed by certain of the Issuer's wholly-owned domestic subsidiaries. Each of the Notes and the related guarantees will be secured on a second-priority basis by liens on certain assets of the Issuer and the guarantors.

The Notes and related guarantees were sold in a private placement to qualified institutional buyers in accordance with Rule 144A under the Securities Act of 1933, as amended (the "Securities Act"), and to certain non-United States persons in offshore transactions in accordance with Regulation S under the Securities Act.

The Notes and related guarantees have not been and will not be registered under the Securities Act or the securities laws of any other jurisdiction and may not be offered or sold in the United States or to, or for the benefit of, U.S. persons absent registration under, or an applicable exemption from, the registration requirements of the Securities Act.

Description of the Business

Information describing Arconic's businesses can be found on the indicated pages of this report:

Major Product Sales

Products that contributed 10% or more to consolidated sales for the years ended December 31, 2019, 2018, and 2017, were:

	For the Year Ended December 31,		
	2019	2018	2017
Innovative flat-rolled products	39%	40%	39%
Engine products	24%	21%	21%
Fastening systems	11%	11%	11%
Engineered structures	8%	13%	13%

Arconic has no customer that accounts for 10% or more of its consolidated sales. However, certain of the Company's businesses are dependent upon a few significant customers. The loss of any such significant customer could have a material adverse effect on such businesses.

Engineered Products and Forgings

Arconic's Engineered Products and Forgings segment ("EP&F") produces products that are used primarily in the aerospace (commercial and defense), industrial, commercial transportation, and power generation end markets. Such products include fastening systems (titanium, steel, and nickel superalloys) and seamless rolled rings (mostly nickel superalloys); investment castings (nickel superalloys, titanium, and aluminum), including airfoils; forged jet engine components (e.g., jet engine disks); extruded, machined and forged aircraft parts (titanium and aluminum); and forged aluminum commercial vehicle wheels, all of which are sold directly to customers and through distributors. A small part of this segment also produces various forged and machined metal products (titanium and aluminum) for various end markets.

In the third quarter of 2019, the Company realigned its operations by eliminating its Transportation and Construction Solutions (TCS) segment and transferring the Forged Wheels business to its EP&F segment and the Building and Construction Systems business to its GRP segment, consistent with how the Chief Executive Officer is assessing operating performance and allocating capital in conjunction with the planned Separation of Arconic. The Latin American extrusions business, which was formerly part of the Company's TCS segment until its sale in April of 2018, was moved to Corporate. In the first quarter of 2019, the Company transferred its aluminum extrusions operations (Aluminum Extrusions) from its Engineered Structures business unit within the EP&F segment to the GRP segment, based on synergies with GRP including similar customer base, technologies, and manufacturing capabilities.

Engine Products. Engine Products produces investment cast airfoils, seamless rolled rings and closed-die (including isothermal) forged turbine disks for aero engine and industrial gas turbines, as well as other structural aero engine components. Engine Products also provides additive manufacturing technologies, superalloy ingots, open-die forging, machining, performance coatings, and hot isostatic pressing for high performance parts.

Fastening Systems. Fastening Systems produces aerospace fastening systems, as well as commercial transportation fasteners. The business's high-tech, multi-material fastening systems are found nose to tail on aircraft and aero engines. The business's products are also critical components of industrial gas turbines, automobiles, commercial transportation vehicles, and construction and industrial equipment.

Engineered Structures. Engineered Structures produces titanium and aluminum ingots and mill products for aerospace and defense applications and is vertically integrated to produce structural investment castings, forgings and extrusions, for airframe, wing, aero-engine, and landing gear components. Engineered Structures also provides multi-material airframe subassemblies and solutions related to advanced technologies and materials, such as 3D printing and titanium aluminides.

Forged Wheels. Forged Wheels provides forged aluminum wheels and related products for heavy-duty trucks and the commercial transportation markets.

For additional discussion of the EP&F segment's business, see “Results of Operations—Segment Information” in Part II, Item 7. (Management’s Discussion and Analysis of Financial Condition and Results of Operations) and Note B to the Consolidated Financial Statements in Part II, Item 8. (Financial Statements and Supplementary Data).

On May 31, 2019, Arconic sold a small additive manufacturing facility outside of Austin, TX within the EP&F segment. The sale is subject to certain post-closing adjustments.

On August 15, 2019, Arconic sold inventories and properties, plants, and equipment related to a small energy business (RTI Energy) within the EP&F segment.

In December 2019, Arconic closed the sale of its forgings business in the United Kingdom subject to working capital and other adjustments. The forgings business primarily produced steel, titanium, and nickel based forged components for aerospace, mining, and off-highway markets and its operating results and assets and liabilities were included in the EP&F segment.

Engineered Products and Forgings Principal Facilities[1]

Country	Facility	Products
Australia	Oakleigh	Fasteners
Canada	Georgetown, Ontario[2]	Aerospace Castings
	Laval, Québec	Aerospace Castings and Machining
China	Suzhou[2]	Fasteners, Rings and Forgings
France	Dives-sur-Mer	Aerospace and Industrial Gas Turbine Castings
	Evron	Aerospace and Specialty Castings
	Gennevilliers	Aerospace and Industrial Gas Turbine Castings
	Montbrison	Fasteners
	St. Cosme-en-Vairais[2]	Fasteners
	Toulouse	Fasteners
	Us-par-Vigny	Fasteners
Germany	Bestwig	Aerospace Castings
	Erwitte	Aerospace Castings
	Hildesheim-Bavenstedt[2]	Fasteners
	Kelkheim[2]	Fasteners
Hungary	Nemesvámos	Fasteners
	Székesfehérvár	Aerospace and Industrial Gas Turbine Castings and Forgings
Japan	Jôetsu City[2]	Forgings
	Nomi	Aerospace and Industrial Gas Turbine Castings
Mexico	Ciudad Acuña[2]	Aerospace Castings/Fasteners and Rings
	Monterrey	Forgings
Morocco	Casablanca[2]	Fasteners
United Kingdom	Ecclesfield	Ingot Castings
	Exeter[2]	Aerospace and Industrial Gas Turbine Castings and Alloy
	Glossop	Ingot Castings
	Ickles	Ingot Castings
	Leicester[2]	Fasteners
	Low Moor	Extrusions
	Redditch[2]	Fasteners
	Telford	Fasteners
	Welwyn Garden City	Aerospace Formed Parts

Country	Facility	Products
United States	Tucson, AZ[2]	Fasteners
	Carson, CA[2]	Fasteners
	City of Industry, CA[2]	Fasteners
	Fontana, CA	Rings
	Fullerton, CA[2]	Fasteners
	Rancho Cucamonga, CA	Rings
	Sylmar, CA	Fasteners
	Torrance, CA	Fasteners
	Branford, CT	Aerospace Coatings
	Winsted, CT	Aerospace Machining
	Savannah, GA	Forgings
	La Porte, IN	Aerospace and Industrial Gas Turbine Castings
	Whitehall, MI	Aerospace and Industrial Gas Turbine Castings and Coatings, Titanium Alloy and Specialty Products
	Washington, MO	Aerospace Formed Parts, Titanium Mill Products
	Big Lake, MN	Aerospace Machining
	New Brighton, MN	Aerospace Machining
	Dover, NJ	Aerospace and Industrial Gas Turbine Castings and Alloy
	Verdi, NV	Rings
	Kingston, NY[2]	Fasteners
	Rochester, NY	Rings
	Barberton, OH	Forgings
	Canton, OH[2]	Ferro-Titanium Alloys and Titanium Mill Products
	Cleveland, OH	Investment Casting Equipment, Aerospace Components, Castings, Forgings and Oil & Gas Drilling Products
	Niles, OH	Titanium Mill Products
	Morristown, TN[2]	Aerospace and Industrial Gas Turbine Ceramic Products
	Houston, TX[2]	Extrusions
	Waco, TX[2]	Fasteners
	Wichita Falls, TX	Aerospace and Industrial Gas Turbine Castings
	Hampton, VA[2]	Aerospace and Industrial Gas Turbine Castings
	Martinsville, VA	Titanium Mill Products

[1] Principal facilities are listed, and do not include 22 locations that serve as sales and administrative offices, distribution centers or warehouses.

[2] Leased property or partially leased property.

Global Rolled Products

Arconic's Global Rolled Products segment ("GRP") produces aluminum sheet and plate, aluminum extruded and machined parts, integrated aluminum structural systems, and architectural extrusions used in the automotive, aerospace, building and construction, industrial, packaging, and commercial transportation end markets. The following represent the business units within the Company's GRP segment:

Rolled Products. Rolled products are used in the production of finished goods ranging from airframes and automotive body panels to industrial plate and brazing sheet. Sheet and plate are used extensively in the transportation industries as well as in building and construction. They are also used for industrial applications such as tooling plate for the production of plastic products.

Aluminum Extrusions. Aluminum Extrusions produces a range of extruded products, including aerospace shapes (wing stringer, floor beams, fuselage, cargo), automotive shapes (driveshafts, anti-lock brake housings, turbo charger), seamless tube, hollows, mortar fins and high strength rod and bar. With process and product technologies that include large and small extrusion presses, integrated cast houses, horizontal heat treat furnaces, vertical heat treat furnaces, annealing furnaces, induction billet heating and ultrasonic inspection capabilities, the Extrusions unit serves a broad range of customers in several of core market segments.

***Building and Construction Systems*.** Building and Construction Systems (BCS) manufactures differentiated products and building envelope solutions, including entrances, curtain walls, windows, composite panel and coil coated sheet. The business operates in two market segments: architectural systems, which carry the Kawneer® brand, and architectural products, which carry the Reynobond® and Reynolux® brands. The BCS business has competitive positions in both market segments, attributable to its strong brand recognition, high quality products and strong relationships through the building and construction value chain.

As noted above, in the third quarter of 2019, the Company realigned its operations by eliminating its TCS segment and transferring the Forged Wheels business to its EP&F segment and the Building and Construction Systems (BCS) business to its GRP segment, consistent with how the Chief Executive Officer is assessing operating performance and allocating capital in conjunction with the planned Separation of Arconic. In the first quarter of 2019, the Company transferred its aluminum extrusions operations (Aluminum Extrusions) from its Engineered Structures business unit within the EP&F segment to the GRP segment, based on synergies with GRP including similar customer base, technologies, and manufacturing capabilities.

For additional discussion of the Global Rolled Products segment's business, see "Results of Operations—Segment Information" in Part II, Item 7. (Management's Discussion and Analysis of Financial Condition and Results of Operations) and Note B to the Consolidated Financial Statements in Part II, Item 8. (Financial Statements and Supplementary Data).

In February 2019, the Company announced an investment of approximately $100 million to expand its hot mill capability and add downstream equipment capabilities to manufacture industrial and automotive aluminum products in its Tennessee Operations facility near Knoxville, Tennessee. The project, which is expected to create 70 new jobs, is already underway and is expected to be complete by the fourth quarter of 2020.

In August 2019, Arconic reached an agreement to sell its aluminum rolling mill in Itapissuma, Brazil for $50 million in cash, subject to working capital and other adjustments. The rolling mill produces specialty foil and sheet products and its operating results and assets and liabilities are included in the GRP segment. The sale transaction closed February 1, 2020.

On October 30, 2019, Arconic reached an agreement to sell its hard alloy extrusions plant in South Korea for $61 million in cash, subject to working capital and other adjustments. The operating results and assets and liabilities of this plant are included in the GRP segment. The sale transaction is expected to close in the first quarter of 2020, subject to regulatory approvals and customary closing conditions.

Global Rolled Products Principal Facilities[1]

Country	Location	Products
Canada	Lethbridge, Alberta	Architectural Products
China	Kunshan	Sheet and Plate
	Qinhuangdao[2]	Sheet and Plate
France	Merxheim[2]	Architectural Products
Germany	Hannover[2]	Extrusions
Hungary	Székesfehérvár	Sheet and Plate/Slabs and Billets
South Korea	Kyoungnam	Extrusions
Russia	Samara	Sheet and Plate/Extrusions and Forgings
United Kingdom	Birmingham	Plate
	Runcorn	Architectural Products
United States	Chandler, AZ[2]	Extrusions
	Springdale, AR	Architectural Products
	Visalia, CA	Architectural Products
	Eastman, GA	Architectural Products
	Danville, IL[2]	Sheet and Plate
	Lafayette, IN	Extrusions
	Davenport, IA	Sheet and Plate
	Hutchinson, KS[3]	Sheet and Plate
	Baltimore, MD[2]	Extrusions
	Massena, NY	Extrusions
	Bloomsburg, PA	Architectural Products
	Cranberry, PA	Architectural Products
	Lancaster, PA	Sheet and Plate
	Alcoa, TN	Sheet
	Texarkana, TX[2, 4]	Slabs
	San Antonio, TX[5]	Micromill™

1 Principal facilities are listed, and do not include 20 locations that serve as service centers or administrative offices. These service centers perform light manufacturing, such as assembly and fabrication of certain products.

2 Leased property or partially leased property.

3 Properties are satellite locations of the Davenport, Iowa facility.

4 The aluminum slab that is cast at Texarkana is turned into aluminum sheets at Arconic’s expanded automotive facility in Davenport, Iowa and its rolling mill in Lancaster, Pennsylvania. In October 2018, the Company sold the rolling mill and cast house to Ta Chen International, Inc. and leased the cast house building and equipment for a term of 18 months. The Company’s lease expires April 30, 2020.

5 Micromill™ production facility produces sheet for automotive and industrial applications using Arconic innovative production process. The Company curtailed operations in San Antonio in late December 2019.

Sources and Availability of Raw Materials

Important raw materials purchased in 2019 for each of the Company's reportable segments are listed below.

Engineered Products and Forgings	Global Rolled Products
Alloying materials	Alloying materials
Cobalt	Aluminum coil
Electricity	Aluminum scrap
Natural gas	Coatings
Nickel alloys	Electricity
Primary aluminum (ingot, billet, P1020, high purity)	Lube oil
Stainless steel	Natural gas
Steel	Packaging materials
Titanium alloys	Paint/Coating
Titanium sponge	Primary aluminum (ingot, slab, billet, P1020, high purity)
	Resin
	Steam

Generally, other 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.

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 patents, 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. The patents owned by Arconic generally concern metal alloys, particular products, manufacturing equipment or techniques. Arconic'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 the end of 2019, the Company's worldwide patent portfolio consists of approximately 1,635 granted patents (1,004 EP&F patents and 631 GRP patents) and 538 pending patent applications (284 EP&F patent applications and 254 GRP patent applications).

The Company also has a significant number of trade secrets, mostly regarding manufacturing processes and material compositions that give many of its businesses important advantages in their markets. The Company continues to strive to improve those processes and generate new material compositions that provide additional benefits. With respect to domestic and international registered trademarks, the Company has many that have significant recognition within the markets that are served. Examples include the name "Arconic" and the Arconic symbol for aluminum, nickel, and titanium products, Howmet® metal castings, Huck® fasteners, Kawneer® building panels and Dura-Bright® wheels with easy-clean surface treatments. A significant trademark filing campaign for the names "Howmet" and "Howmet Aerospace" along with its "H" logo was initiated in 2019, in support of the corporate launch of Howmet Aerospace Inc. As of the end of 2019, the Company's worldwide trademark portfolio consists of approximately 2,066 registered trademarks (1,450 EP&F trademarks and 616 GRP trademarks) and 818 pending trademark applications (361 EP&F trademark applications and 457 GRP trademark applications). The Company's rights under its trademarks are important to the Company as a whole and, to varying degrees, important to each business segment.

Competitive Conditions

Engineered Products and Forgings (EP&F)

EP&F's business units - Fastening Systems, Engine Products, Engineered Structures and Forged Wheels - are subject to substantial and intense competition in the markets they serve. Although Arconic believes its advanced technology, manufacturing processes and experience provide advantages to Arconic's customers, such as high quality and superior mechanical properties that meet the Company's customers' most stringent requirements, many of the products Arconic makes can be produced by competitors using similar types of manufacturing processes as well as alternative forms of manufacturing. Despite intense competition, Arconic continues as a market leader in most of its principal markets. Several factors, including Arconic's legacy of technical innovation, state-of-the-art capabilities, engaged employees and long-standing customer relationships, enable the Company to maintain its competitive position.

Principal competitors in the EP&F segment include Berkshire Hathaway Inc., through its 2016 acquisition of Precision Castparts Corporation and subsidiaries, for titanium and titanium-based alloys, precision forgings, seamless rolled rings, investment castings and aerospace fasteners; VSMPO (Russia) for titanium and titanium-based alloys and precision forgings; the High-Performance Materials & Components segment of Allegheny Technologies, Inc. (ATI) for titanium and titanium-based alloys, precision forgings, and investment castings; Lisi Aerospace (France) for aerospace fasteners; and Aubert & Duval (part of Eramet Group in France) for precision forgings.

In the forged aluminum wheels business, Forged Wheels competes against steel and aluminum wheel suppliers in the commercial transportation industry under the product brand name Alcoa® Wheels for the major regions that it serves (Americas, Europe, Japan, China, and Australia). Its larger aluminum wheel competitors are Accuride Corporation, Speedline (member of the Ronal Group), Nippon Steel Corporation, Dicastal, Alux, and Wheels India Limited. In recent years, Forged Wheels has seen an increase in the number of aluminum wheel suppliers (both forged and cast aluminum wheels) from China, Taiwan, India and South Korea attempting to penetrate the global commercial transportation market.

Other competitors for EP&F include:

- Doncasters Group Ltd. (UK) - investment castings
- Consolidated Precision Products Corp., owned by Warburg Pincus - investment castings
- Weber Metals, part of Otto Fuchs - precision forgings
- Forgital - seamless rings
- Frisa (Mexico) - seamless rings

Several of Arconic’s largest customers have captive superalloy furnaces for producing airfoil investment castings for their own use. Many other companies around the world also produce superalloy investment castings, and some of these companies currently compete with Arconic in the aerospace and other markets, while others are capable of competing with the Company should they choose to do so.

International competition in the investment castings**,** fasteners, rings and forgings markets may also increase in the future as a result of strategic alliances among engine original equipment manufacturers (OEMs), aero-structure prime contractors, and overseas companies, especially in developing markets, particularly where “offset” or “local content” requirements create purchase obligations with respect to products manufactured in or directed to a particular country.

Global Rolled Products (GRP)

Rolled Products

Arconic’s Rolled Products business unit is one of the leaders in many of the aluminum flat rolled markets in which it participates, including ground transportation (including brazing sheet), aerospace, industrial and packaging markets. While Rolled Products participates in markets where Arconic believes it has a significant competitive advantage due to customer intimacy, advanced manufacturing capability, unique technology and/or differentiated products, in certain cases, our competitors are capable of making products similar to Arconic’s products. We continuously work to maintain and enhance our competitive position through innovation: new alloys such as aluminum lithium aerospace alloys, differentiated products such as our 5-layer brazing products and break-through processes such as A951™ bonding technology.

Some of Arconic’s Rolled Products markets are global and some are more regionally focused. Participation in these segments by competitors varies. For example, Novelis is the largest flat rolled products producer competing in automotive, but it does not participate in the aerospace market. On the other hand, Kaiser participates in aerospace, but does not participate in the automotive sheet market. Other competitors include Aleris, AMAG, Constellium, Hydro, Kobe, Nanshan, and UACJ.

Additionally, there are a number of new competitors emerging, particularly in China and other developing economies. Arconic expects that this competitive pressure will continue and increase in the future as customers seek to globalize their supply bases in order to reduce costs.

List of Major Competitors for Rolled Products:

- Aleris
- AMAG (Austria)
- Constellium (Netherlands)
- Granges (Sweden)
- Hydro (Norway)
- Kaiser Aluminum
- Kobe (Japan)
- Nanshan (China)
- Novelis
- UACJ (Japan)

Aluminum Extrusions

The Aluminum Extrusions business unit is a leader in many of the markets in which it participates, including aerospace, automotive (including driveshafts) and industrial markets. While Aluminum Extrusions participates in markets where Arconic believes we have a significant competitive position due to customer intimacy, advanced manufacturing capability, unique technology and/or differentiated products, in certain cases, our competitors are capable of making products similar to Arconic's products. We continuously work to maintain and enhance our competitive position through innovation: new alloys such as aluminum lithium aerospace alloys and differentiated products.

Some of Arconic's Aluminum Extrusions markets are worldwide and some are more regionally focused. Participation in these segments by competitors varies. For example, UAC is the largest competitor in aerospace extrusions, but it does not participate in the drawn tubing market. On the other hand, Unna participates in drawn tubing, but they do not compete in extrusions. Other competitors include Kaiser, Constellium, Otto Fuchs, Taber, Ye Fong, and Impol.

Additionally, there are a number of other competitors emerging, particularly in China and other developing economies. We expect that this competitive pressure will continue and increase in the future as customers seek to globalize their supply bases in order to reduce costs.

List of Major Competitors for Aluminum Extrusions:

- Constellium (France)
- Impol (Poland)
- Kaiser
- Otto Fuchs (Germany)
- Taber
- UAC (USA/Romania)
- Unna (Germany)
- Ye Fong (Taiwan)

BCS

In North America, Arconic's BCS business unit primarily competes in the nonresidential building segment. In Europe, it competes in both the residential and the nonresidential building segments. Arconic's competitive advantage is based on strong brands, innovative products, customer intimacy and technical services.

In the architectural systems market, Arconic competes with regional competitors like Apogee, YKK, and Oldcastle in North America and Schüco, Hydro/SAPA and Reynaers in Europe. The competitive landscape in the architectural systems market has been relatively stable since the mid-2000s, with the major competitors in North America and Europe remaining constant, despite some industry consolidation in North America during the late 2000s.

The primary product categories in architectural products are aluminum composite material and coil coated sheet. The architectural products business is a more global market and is primarily served by subsidiaries of larger companies like Alpolic (Mitsubishi Corporation), Alucobond (Schweiter Technologies) and Novelis (Aditya Birla Group).

List of Major Competitors for Architectural Systems:

- North America - Apogee, Oldcastle and YKK
- Europe - Schüco (Germany), Hydro/SAPA (Norway), Reynaers (Belgium) and Corialis (Belgium)

List of Major Competitors for Architectural Products:

- Composite Material - Alucobond (Switzerland), Alucoil (Spain) and Alpolic (Japan)
- Coil Coated Sheet - Euramax, Novelis and Hydro (Norway)

Environmental Matters

Information relating to environmental matters is included in Note T to the Consolidated Financial Statements under the caption "Environmental Matters." Approved capital expenditures for new or expanded facilities for environmental control are $14 million for 2020 and estimated expenditures for such purposes are $15 million for 2021.

Employees

Total worldwide employment at the end of 2019 was approximately 41,700 employees in 28 countries. Many, but less than 50%, of these employees are represented by labor unions. The Company believes that relations with its employees and any applicable union representatives generally are good.

In the United States, the largest collective bargaining agreement is the master collective bargaining agreement between Arconic and the United Steelworkers (USW). The USW master agreement covers approximately 3,000 employees at four U.S. locations; the current labor agreement expires on May 15, 2022. There are 17 other collective bargaining agreements in the United States with varying expiration dates, including those in the master agreement.

On a regional basis, collective bargaining agreements with varying expiration dates cover employees in Europe and Russia, North America, South America and Asia.

Executive Officers of the Registrant

The names, ages, positions and areas of responsibility of the executive officers of the Company as of February 26, 2020 are listed below.

Ken Giacobbe, 54, Executive Vice President and Chief Financial Officer. Mr. Giacobbe was elected Executive Vice President and Chief Financial Officer of Arconic effective November 1, 2016. Mr. Giacobbe joined Arconic in 2004 as Vice President of Finance for Global Extruded Products, part of Alcoa Forgings and Extrusions. He then served as Vice President of Finance for the Company's Building and Construction Systems business from 2008 until 2011. In 2011, he assumed the role of Group Controller for the Engineered Products and Forgings segment. From January 2013 until October 2016, Mr. Giacobbe served as Chief Financial Officer of the Engineered Products and Forgings segment. Before joining Arconic, Mr. Giacobbe held senior finance roles at Avaya and Lucent Technologies.

Neil E. Marchuk, 62, Executive Vice President, Human Resources. Mr. Marchuk was elected to his current position effective March 1, 2019. Prior to joining Arconic, from January 2016 to February 2019, he was Executive Vice President and Chief Human Resources Officer at Adient, an automotive manufacturer. From July 2006 to May 2015, Mr. Marchuk was Executive Vice President of Human Resource at TRW Automotive, and served as TRW's Vice President, Human Resources from September 2004 to July 2006. Prior to joining TRW, from December 2001 to August 2004, Mr. Marchuk was Director Corporate Human Resources for E.I. Du Pont De Nemours and Company ("E.I. Du Pont"). From September 1999 to November 2001, Mr. Marchuk was Director Global HR Delivery for E.I. Du Pont. From February 1999 to August 1999, Mr. Marchuk served E.I. Du Pont as its Global HR Director Global Services Division.

Timothy D. Myers, 54, Executive Vice President and Group President, Global Rolled Products. Mr. Myers has served as Executive Vice President and Group President, Global Rolled Products, which now includes Arconic's Extrusions and Building and Construction Systems businesses, since October 2017. From May 2016 to June 2019, he served as Executive Vice President and Group President of Arconic's Transportation and Construction Solutions segment, which then comprised Arconic Wheel and Transportation Products and Building and Construction Systems and which segment was eliminated in the third quarter of 2019, with the Building and Construction Systems business then moved to the Global Rolled Products segment. Prior to that assignment, he was President of Alcoa Wheel and Transportation Products, from June 2009 to May 2016. Mr. Myers was Vice President and General Manager, Commercial Vehicle Wheels for the Alcoa Wheel Products business from January 2006 to June 2009. Mr. Myers joined Arconic in 1991 as an automotive applications engineer in the Commercial Rolled Products Division, and held a series of engineering, marketing, sales and management positions with the Company since that time.

Paul Myron, 53, Vice President and Controller. Mr. Myron was elected Vice President and Controller of Arconic effective November 1, 2016. Mr. Myron joined Arconic as a systems analyst in Pittsburgh and in 1992 relocated to the Company's

Davenport, Iowa facility as a product accountant. He served in numerous financial management positions from 1995 until 2000 when he was named Commercial Manager and Controller for the Atlantic division of the Alcoa World Alumina and Chemicals business. In 2002, Mr. Myron was appointed Vice President of Finance, Alcoa Primary Metals and later became Vice President of Finance, Alcoa World Alumina and Chemicals. In 2005 Mr. Myron was named Director of Financial Planning and Analysis, accountable for Arconic’s financial planning, analysis, and reporting worldwide. In February 2012, he became Director of Finance Initiatives for the Engineered Products and Forgings segment, overseeing specific financial initiatives and projects within the group. From July 2012 until his most recent appointment, Mr. Myron served as Vice President, Finance and Business Excellence for the Arconic Power and Propulsion business.

John C. Plant, 66, Chairman and Chief Executive Officer. Mr. Plant was appointed Chief Executive Officer of Arconic effective February 6, 2019. He has served as Arconic's Chairman since October 2017 and as a member of the Board since February 2016. Mr. Plant previously served as Chairman of the Board, President and Chief Executive Officer of TRW Automotive from 2011 to 2015, and as its President and Chief Executive Officer from 2003 to 2011. TRW Automotive was acquired by ZF Friedrichshafen AG in May 2015. Mr. Plant was a co-member of the Chief Executive Office of TRW Inc. from 2001 to 2003 and an Executive Vice President of TRW from the company's 1999 acquisition of Lucas Varity to 2003. Prior to TRW, Mr. Plant was President of Lucas Varity Automotive and managing director of the Electrical and Electronics division from 1991 through 1997.

Katherine H. Ramundo, 52, Executive Vice President, Chief Legal Officer and Secretary. Ms. Ramundo was elected to her current position effective November 1, 2016. Prior to joining Arconic, from January 2013 through August 2015, she was Executive Vice President, General Counsel and Secretary of ANN INC., the parent company of ANN TAYLOR and LOFT brands, based in New York. Prior to ANN INC., she served as Vice President, Deputy General Counsel and Assistant Secretary at Colgate-Palmolive, where she held various legal roles from November 1997 to January 2013. She began her career as a litigator in New York, practicing at major law firms, including Cravath, Swaine & Moore and Sidley & Austin.

The Company’s executive officers are elected or appointed to serve until the next annual meeting of the Board of Directors (held in conjunction with the annual meeting of shareholders) except in the case of earlier death, retirement, resignation or removal.

Item 1A. Risk Factors.

Arconic’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 Arconic’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 Arconic or that Arconic currently deems immaterial also may materially adversely affect the Company in future periods.

Risks Related to Our Business

The markets for Arconic’s products are highly cyclical and are influenced by a number of factors, including global economic conditions.

Arconic is subject to cyclical fluctuations in global economic conditions and lightweight metals end-use markets. Arconic sells many products to industries that are cyclical, such as the aerospace, automotive, commercial transportation and building and construction industries, and the demand for its products is sensitive to, and quickly impacted by, demand for the finished goods manufactured by its customers in these industries, which may change as a result of changes in regional or worldwide economies, currency exchange rates, energy prices or other factors beyond its control.

In particular, Arconic derives a significant portion of its revenue from products sold to the aerospace industry, which can be highly cyclical and reflective of changes in the general economy. The commercial aerospace industry is historically driven by the demand from commercial airlines for new aircraft. The U.S. and international commercial aviation industries may face challenges arising from competitive pressures and fuel costs. Demand for commercial aircraft is influenced by airline industry profitability, trends in airline passenger traffic, the state of U.S., regional and world economies, the ability of aircraft purchasers to obtain required financing and numerous other factors including the effects of terrorism, health and safety concerns, environmental constraints imposed upon aircraft operators, the retirement of older aircraft, the performance and cost of alternative materials, and technological improvements to aircraft. The military aerospace cycle is highly dependent on U.S. and foreign government funding; however, it is also driven by the effects of terrorism, a changing global political environment, U.S. foreign policy, the retirement of older military aircraft, and technological improvements to new engines.

Further, the demand for Arconic’s automotive and ground transportation products is driven by the number of vehicles produced by automotive and commercial transportation manufacturers and volume of aluminum content per vehicle. The automotive industry is sensitive to general economic conditions, including credit markets and interest rates, and consumer spending and preferences regarding vehicle ownership and usage, vehicle size, configuration and features. Automotive and commercial transportation sales and production can also be affected by other factors, including the age of the vehicle fleet and related scrappage rates, labor relations issues, fuel prices, regulatory requirements, government initiatives, trade agreements and levels of competition both within and outside of the aluminum industry.

Arconic is unable to predict the future course of industry variables, the strength of the U.S., regional or global economies, or the effects of government actions. Negative economic conditions, such as a major economic downturn, a prolonged recovery period, or disruptions in the financial markets, could have a material adverse effect on Arconic's business, financial condition or results of operations.

Arconic faces significant competition, which may have an adverse effect on profitability.

As discussed in Part I, Item 1. (Business-Competitive Conditions) of this report, the markets for Arconic's products are highly competitive. Arconic's competitors include a variety of both U.S. and non-U.S. companies in all major markets. New product offerings, new technologies in the marketplace or new facilities may compete with or replace Arconic products. The willingness of customers to accept substitutes for the products sold by Arconic, the ability of large customers to exert leverage in the marketplace to affect the pricing for Arconic's products, and technological advancements or other developments by or affecting Arconic's competitors or customers could adversely affect Arconic's business, financial condition or results of operations.

In addition, Arconic may face increased competition due to industry consolidation. As companies attempt to strengthen or maintain their market positions in an evolving industry, companies could be acquired or merged. Companies that are strategic alliance partners in some areas of Arconic's business may acquire or form alliances with Arconic's competitors, thereby reducing their business with Arconic. Industry consolidation may result in stronger competitors who are better able to obtain favorable terms from suppliers or who are better able to compete as sole-source vendors for customers. Consolidation within Arconic's customer base may result in customers who are better able to command increased leverage in negotiating prices and other terms of sale, which could adversely affect Arconic's profitability. Moreover, if, as a result of increased leverage, customers require Arconic to reduce its pricing such that its gross margins are diminished, Arconic could decide not to sell certain products to a particular customer, or not to sell certain products at all, which would decrease Arconic's revenue. Consolidation within Arconic's customer base may also lead to reduced demand for Arconic's products, a combined entity replacing Arconic's products with those of Arconic's competitors and cancellations of orders. The result of these developments could have a material adverse effect on Arconic's business, operating results and financial condition.

Arconic could be adversely affected by changes in the business or financial condition or the loss of a significant customer or customers.

Arconic has long-term contracts with a significant number of its customers, some of which are subject to renewal, renegotiation or re-pricing at periodic intervals or upon changes in competitive supply conditions. Arconic's failure to successfully renew, renegotiate or favorably re-price such agreements, or a material deterioration in or termination of these customer relationships, could result in a reduction or loss in customer purchase volume or revenue.

Additionally, a significant downturn or deterioration in the business or financial condition or loss of a key customer supplied by Arconic could affect Arconic's financial results. Arconic's 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. For example, in 2019, Boeing announced a temporary reduction in the production rate of, and subsequently announced a temporary suspension of production of, the Boeing 737 MAX aircraft, which has resulted in, and is expected to continue to result in, a reduction in sales of aluminum sheet and plate and other products that Arconic produces for Boeing airplanes. As no firm timeline has been established for either the adjustment of Boeing's manufacturing plans, or for returning the aircraft into service, we are currently unable to definitively quantify any such potential impact.

Arconic's customers may also change their business strategies or modify their business relationships with Arconic, including to reduce the amount of Arconic's products they purchase or to switch to alternative suppliers. If Arconic's customers reduce, terminate or delay purchases from Arconic due to the foregoing factors or otherwise and Arconic is unsuccessful in enforcing its contract rights or replacing such business in whole or in part or replaces it with less profitable business, our financial condition and results of operations may be adversely affected.

Arconic could encounter manufacturing difficulties or other issues that impact product performance, quality or safety, which could affect Arconic's reputation, business and financial statements.

The manufacture of many of Arconic's products is a highly exacting and complex process. Problems may arise during manufacturing for a variety of reasons, including equipment malfunction, failure to follow specific protocols, specifications and procedures, including those related to quality or safety, problems with raw materials, supply chain interruptions, natural disasters, labor unrest and environmental factors. Such problems could have an adverse impact on the Company's ability to fulfill orders or on product quality or on performance. Product manufacturing or performance issues could result in recalls, customer penalties, contract cancellation and product liability exposure. Because of approval, license and qualification requirements applicable to manufacturers and/or their suppliers, alternatives to mitigate manufacturing disruptions may not be readily available to Arconic or its customers. Accordingly, manufacturing problems, product defects or other risks associated with our products, could result in significant costs to and liability for us that could have a material adverse effect on our business, financial condition or results of operations, including the payment of potentially substantial monetary damages, fines or penalties, as well as negative publicity and damage to our reputation, which could adversely impact product demand and customer relationships.

Arconic's business depends, in part, on its ability to meet increased program demand successfully and to mitigate the impact of program cancellations, reductions and delays.

Arconic is currently under contract to supply components for a number of new and existing commercial, general aviation, military aircraft and aircraft engine programs as well as aluminum sheet and extrusions for a number of aluminum-intensive automotive vehicle programs. Many of these programs are scheduled for production increases over the next several years. If Arconic fails to meet production levels or encounters difficulty or unexpected costs in meeting such levels, it could have a material adverse effect on the Company's business, financial condition or results of operations. Similarly, program cancellations, reductions or delays could also have a material adverse effect on Arconic's business.

Product liability, product safety, personal injury, property damage, and recall claims and investigations may materially affect Arconic's financial condition and damage Arconic's reputation.

The manufacture and sale of our products exposes Arconic to potential product liability, personal injury, property damage and related claims. These claims may arise from failure to meet product specifications, design flaws in our products, malfunction of our products, misuse of our products, use of our products in an unintended, unapproved or unrecommended manner, or use of our products with systems not manufactured or sold by us. New data and information, including information about the ways in which Arconic's products are used, may lead Arconic, regulatory authorities, government agencies or other entities or organizations to publish guidelines or recommendations, or impose restrictions, related to the manufacturing or use of Arconic's products.

In the event that an Arconic product fails to perform as expected, regardless of fault, or is used in an unexpected manner, and such failure or use results in, or is alleged to result in, bodily injury and/or property damage or other losses, Arconic may be subject to product liability lawsuits and other claims, or may be required or requested by its customers to participate in a recall or other corrective action involving such product. In addition, if an Arconic product is perceived to be defective or unsafe, sales of Arconic's products could be diminished, Arconic's reputation could be adversely impacted and Arconic could be subject to further liability claims. Moreover, events that give rise to actual, potential or perceived product safety concerns could expose Arconic to government investigations or regulatory enforcement actions.

There can be no assurance that Arconic will be successful in defending any such proceedings or that insurance available to Arconic will be sufficient to cover any losses associated with such proceedings. An adverse outcome in one or more of these proceedings or investigations could: (i) have a material adverse effect on Arconic's business, financial condition or profitability; (ii) impose substantial monetary damages and/or non-monetary penalties; (iii) result in additional litigation, regulatory investigations or other proceedings involving Arconic; result in loss of customers; (iv) require changes to our products or business operations; or (v) damage Arconic's reputation and/or negatively impact the market price of Arconic's common stock. Even if Arconic successfully defends against these types of claims, Arconic could still be required to spend a substantial amount of money in connection with legal proceedings or investigations with respect to such claims; Arconic's management could be required to devote significant time, attention and operational resources responding to and defending against these claims and responding to these investigations; and Arconic's reputation could suffer. Product liability claims and related lawsuits and investigations, product recalls, and allegations of product safety or quality issues, regardless of their validity or ultimate outcome, may have a material adverse effect on Arconic's business, financial condition and reputation and on our ability to attract and retain customers.

For further discussion of potential liability associated with some of our products, including proceedings and investigations relating to the June 13, 2017 fire at the Grenfell Tower in London, U.K., see Part I, Item 3. (Legal Proceedings) of this report.

Arconic's global operations expose Arconic to risks that could adversely affect Arconic's business, financial condition, results of operations, cash flows or the market price of its securities.

Arconic has operations or activities in numerous countries and regions outside the United States, including Europe, Canada, China, Japan and Russia. As a result, Arconic's global operations are affected by economic, political and other conditions in the foreign countries in which Arconic does business as well as U.S. laws regulating international trade, including:

- 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, sanctions and trade barriers (including tariffs imposed by the United States as well as retaliatory tariffs imposed by China or other foreign entities), taxation, exchange controls, employment regulations and repatriation of assets or earnings;

- geopolitical risks such as political instability, civil unrest, expropriation, nationalization of properties by a government, imposition of sanctions, and renegotiation or nullification of existing agreements;
- war or terrorist activities;
- kidnapping of personnel;
- major public health issues such as an outbreak of a pandemic or epidemic (such as Sudden Acute Respiratory Syndrome, Avian Influenza, H7N9 virus, coronavirus (including the novel strain that surfaced in Wuhan, China in December 2019, which has resulted in travel restrictions and shutdown of certain businesses in the region), or the Ebola virus), which could cause disruptions in Arconic’s operations, workforce or supply chain;
- difficulties enforcing contractual rights and intellectual property, including a lack of remedies for misappropriation in certain jurisdictions;
- changes in trade and tax laws that may result in our customers being subjected to increased taxes, duties and tariffs and reduce their willingness to use our services in countries in which we are currently manufacturing their products;
- rising labor costs;
- labor unrest, including strikes;
- compliance with antitrust and competition regulations;
- compliance with foreign labor laws, which generally provide for increased notice, severance and consultation requirements compared to U.S. laws;
- aggressive, selective or lax enforcement of laws and regulations by national governmental authorities;
- compliance with the Foreign Corrupt Practices Act and other anti-bribery and corruption laws;
- compliance with U.S. laws concerning trade, including the International Traffic in Arms Regulations, the Export Administration Regulations, and the sanctions, regulations and embargoes administered by the U.S. Department of Treasury’s Office of Foreign Assets Control;
- imposition of currency controls; and
- adverse tax audit rulings,

Although the effect of any of the foregoing factors is difficult to predict, any one or more of them could adversely affect Arconic’s business, financial condition, or results of operations. The Company’s international operations subject Arconic to complex and dynamic laws and regulations that, in some cases, could result in conflict or inconsistency between applicable laws and/or legal obligations. While Arconic believes it has adopted appropriate risk management, compliance programs and insurance arrangements to address and reduce the associated risks, such measures may provide inadequate protection against costs, penalties, liabilities or other potential risks such as loss of export privileges or repatriation of assets that may arise from such events.

A material disruption of Arconic’s operations, particularly at one or more of the Company’s manufacturing facilities, could adversely affect Arconic’s business.

If Arconic’s operations, particularly one of the Company’s manufacturing facilities, were to be disrupted as a result of significant equipment failures, natural disasters, power outages, fires, explosions, terrorism, theft, sabotage, adverse weather conditions, public health crises, labor disputes or other reasons, Arconic may be unable to effectively meet its obligations to or demand from its customers, which could adversely affect Arconic’s financial performance.

Interruptions in production could increase Arconic’s costs and reduce its sales. Any interruption in production capability could require the Company to incur costs for premium freight, make substantial capital expenditures or purchase alternative material at higher costs to fill customer orders, which could negatively affect Arconic’s profitability and financial condition. Furthermore, because customers may be dependent on planned deliveries from us, customers that have to reschedule their own production due to our delivery delays may be able to pursue financial claims against us, and we may incur costs to correct such problems in addition to any liability resulting from such claims. Arconic maintains property damage insurance that the Company believes to be adequate to provide for reconstruction of facilities and equipment, as well as business interruption insurance to mitigate losses resulting from significant production interruption or shutdown caused by an insured loss. However, any recovery under Arconic’s insurance policies may not offset the lost profits or increased costs that may be experienced during the disruption of operations, which could adversely affect Arconic’s business, results of operations, financial condition and cash flow.

Arconic may be unable to realize future targets or goals established for its business segments, or complete projects, at the levels, projected costs or by the dates targeted.

From time to time, Arconic may announce future targets or goals for its business, which are based on the Company's then current expectations, estimates, forecasts and projections about the operating environment, economies and markets in which Arconic operates. Future targets and goals reflect the Company's beliefs and assumptions and its perception of historical trends, then current conditions and expected future developments, as well as other factors appropriate in the circumstances. As such, targets and goals are inherently subject to significant business, economic, competitive and other uncertainties and contingencies regarding future events, including the risks discussed in this report. The actual outcome may be materially different. There can be no assurance that any targets or goals established by the Company will be accomplished at the levels or by the dates targeted, if at all. Failure to achieve the targets or goals by the Company may have a material adverse effect on its business, financial condition, results of operations or the market price of its securities.

In addition, the implementation of Arconic's business strategy periodically involves the entry into and the execution of complex projects, which place significant demands on the Company's management and personnel, and may depend on numerous factors beyond the Company's control. There can be no assurance that such projects will be completed within budgeted costs, on a timely basis, or at all, whether due to the risks described in this report, or other factors. The failure to complete a material project as planned, or a significant delay in a material project, whatever the cause, could have an adverse effect on Arconic's business, financial condition, or results of operations.

Information technology system failures, cyber attacks and security breaches may threaten the integrity of Arconic's intellectual property and other sensitive information, disrupt its business operations, and result in reputational harm and other negative consequences that could have a material adverse effect on its financial condition and results of operations.

Arconic relies on its information technology systems to manage and operate its business, process transactions, and summarize its operating results. Arconic's information technology systems are subject to damage or interruption from power outages, computer, network and telecommunications failures, computer viruses, and catastrophic events, such as fires, floods, earthquakes, tornadoes, hurricanes, acts of war or terrorism, and usage errors by employees. If Arconic's information technology systems are damaged or cease to function properly, the Company may have to make a significant investment to fix or replace them, and Arconic may suffer loss of critical data and interruptions or delays in its operations. Any material disruption in the Company's information technology systems, or delays or difficulties in implementing or integrating new systems or enhancing current systems, could have an adverse effect on Arconic's business, financial condition or results of operations.

Arconic also faces 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 security breaches may include, but are not limited to, attempts to access information, computer viruses, denial of service and other electronic security breaches.

The Company believes that it faces a heightened threat of cyber attacks due to the industries it serves, the locations of its operations and its technological innovations. The Company has experienced cybersecurity attacks in the past, including breaches of its information technology systems in which information was taken, and may experience them in the future, potentially with more frequency or sophistication. Based on information known to date, past attacks have not had a material impact on Arconic's financial condition or results of operations. However, due to the evolving nature of cybersecurity threats, the scope and impact of any future incident cannot be predicted.

Arconic employs a number of measures to protect and defend against cyber attacks, including technical security controls, data encryption, firewalls, intrusion prevention systems, anti-virus software and frequent backups. Additionally, the Company conducts regular periodic training of its employees regarding the protection of sensitive information which includes training intended to prevent the success of "phishing" attacks. While the Company continually works to safeguard its 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 its systems or networks, compromise confidential or otherwise protected information, destroy or corrupt data, or otherwise disrupt its operations. The occurrence of such events could negatively impact Arconic's reputation and its 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 its financial condition and results of operations. In addition, such attacks or breaches could require significant management attention and resources, and could result in the diminution of the value of the Company's investment in research and development.

Arconic's enterprise risk management program and disclosure controls and procedures address cybersecurity and include elements intended to ensure that there is an analysis of potential disclosure obligations arising from cyber attacks and security breaches. Arconic also maintains compliance programs to address the potential applicability of restrictions against trading while in possession of material, nonpublic information generally and in connection with a cyber attack or security breach.

However, a breakdown in existing controls and procedures around the Company's cybersecurity environment may prevent Arconic from detecting, reporting or responding to cyber incidents in a timely manner and could have a material adverse effect on the Company's financial condition or the market price of its securities.

Arconic may be unable to develop innovative new products or implement technology initiatives successfully.

Arconic's competitive position and future performance depends, in part, on the Company's ability to:

- identify and evolve with emerging technological and broader industry trends in Arconic's target end-markets;
- identify and successfully execute on a strategy to remain an essential and sustainable element of its customers' supply chains;
- fund, develop, manufacture and bring innovative new products and services to market quickly and cost-effectively;
- monitor disruptive technologies and understand customers' and competitors' abilities to deploy those disruptive technologies; and
- achieve sufficient return on investment for new products based on capital expenditures and research and development spending.

Arconic is working on new developments for a number of strategic projects, including advanced alloy development, engineered finishes and product design, rolling technology, and other advanced manufacturing technologies.

While Arconic intends to continue to develop innovative new products and services, it may not be able to successfully differentiate its products or services from those of its competitors or match the level of research and development spending of its competitors, including those developing technology to displace Arconic's current products. In addition, Arconic may not be able to adapt to evolving markets and technologies or achieve and maintain technological advantages. There can be no assurance that any of Arconic's new products or services, development programs or technologies will be commercially adopted or beneficial to Arconic.

Arconic could be adversely affected by reductions in defense spending.

Arconic's products are used in a variety of military applications, including military aircraft and armored vehicles. Although many of the programs in which Arconic participates extend several years, they are subject to annual funding through congressional appropriations. Changes in military strategy and priorities, or reductions in defense spending, may affect current and future funding of these programs and could reduce the demand for Arconic's products, which could adversely affect Arconic's business, financial condition or results of operations.

Arconic may face challenges to its intellectual property rights which could adversely affect the Company's reputation, business and competitive position.

Arconic owns important intellectual property, including patents, trademarks, copyrights and trade secrets. The Company's intellectual property plays an important role in maintaining Arconic's competitive position in a number of the markets that the Company serves. Arconic's competitors may develop technologies that are similar or superior to Arconic's proprietary technologies or design around the patents Arconic owns or licenses. Despite its controls and safeguards, Arconic's technology may be misappropriated by its employees, its competitors or other third parties. The pursuit of remedies for any misappropriation of Arconic intellectual property is expensive and the ultimate remedies may be deemed insufficient. Further, in jurisdictions where the enforcement of intellectual property rights is less robust, the risk of misappropriation of Arconic intellectual property increases, despite efforts the Company undertakes to protect it. Developments or assertions by or against Arconic relating to intellectual property rights, and any inability to protect or enforce Arconic's rights sufficiently, could adversely affect Arconic's business and competitive position.

A decline in Arconic's financial performance or outlook or a deterioration in its credit profile could negatively impact the Company's access to capital markets, reduce its liquidity and increase its borrowing costs.

Arconic has significant capital requirements and depends, in part, upon the issuance of debt to fund its operations and contractual commitments and pursue strategic acquisitions. A decline in the Company's financial performance or outlook due to internal or external factors could affect the Company's access to, and the availability or cost of, financing on acceptable terms and conditions. There can be no assurance that Arconic will have access to the global capital market on terms the Company finds acceptable. Limitations on Arconic's ability to access the global capital markets, a reduction in the Company's liquidity or an increase in borrowing costs could materially and adversely affect Arconic's ability to maintain or grow its business, which in turn may adversely affect its financial condition and results of operations.

A downgrade of Arconic's credit ratings could limit Arconic's ability to obtain future financing, increase its borrowing costs, increase the pricing of its credit facilities, adversely affect the market price of its securities,

trigger letter of credit or other collateral postings, or otherwise impair its business, financial condition, and results of operations.

Arconic's credit ratings are important to the Company's cost of capital. 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, execution and timeliness of financial reporting. 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 Arconic receives impact our borrowing costs as well as the terms upon which we will have access to capital. Failure to maintain 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.

On May 1, 2017, Standard and Poor's Ratings Services (S&P) affirmed Arconic's long-term debt at BBB-, an investment grade rating, with a stable outlook, and its short-term debt at A-3. On February 7, 2019, S&P placed the rating on negative credit watch and, subsequently, on April 26, S&P affirmed the long-term debt rating at BBB- but changed the outlook to negative. On January 28, 2020, S&P affirmed the long-term debt rating at BBB- but changed the outlook to stable in expectation of the Separation impact. On November 1, 2016, Moody's Investor Service (Moody's) downgraded Arconic's long-term debt rating from Ba1, a non-investment grade, to Ba2 with a stable outlook and its short-term debt rating from Speculative Grade Liquidity-1 to Speculative Grade Liquidity-2. Moody's ratings and outlooks were affirmed on November 2, 2017, October 8, 2018, and October 9, 2019. On January 24, 2020, Moody's affirmed the long-term debt rating at Ba2 but changed the outlook to negative. On April 21, 2016, Fitch affirmed Arconic's long-term debt rating at BB+, a non-investment grade, and short-term debt at B. Additionally, Fitch changed the outlook from positive to evolving. On July 7, 2016, Fitch changed the outlook from evolving to stable (ratings and outlook were affirmed on July 3, 2017). On September 27, 2018, Fitch changed the outlook from stable to positive (ratings and outlook were affirmed on October 8, 2019).

There can be no assurance that one or more of these or other rating agencies will not take negative actions with respect to Arconic's ratings in the future. Increased debt levels, macroeconomic conditions, a deterioration in the Company's debt protection metrics, a contraction in the Company's liquidity, or other factors could potentially trigger such actions. A rating agency may lower, suspend or withdraw entirely a rating or place it on negative outlook or watch if, in that rating agency's judgment, circumstances so warrant.

A downgrade of Arconic's credit ratings by one or more rating agencies could: (i) result in adverse consequences, including: adversely impact the market price of Arconic's securities; (ii) adversely affect existing financing (for example, a downgrade by S&P or Moody's would subject Arconic to higher costs under Arconic's Five-Year Revolving Credit Agreement and certain of its other revolving credit facilities); (iii) limit access to the capital (including commercial paper) or credit markets or otherwise adversely affect the availability of other new financing on favorable terms, if at all; (iv) result in more restrictive covenants in agreements governing the terms of any future indebtedness that the Company incurs; (v) increase the cost of borrowing or fees on undrawn credit facilities; or (vi) result in vendors or counterparties seeking collateral or letters of credit from Arconic.

Limitations on Arconic's ability to access the global capital markets, a reduction in Arconic's liquidity or an increase in borrowing costs could materially and adversely affect Arconic's ability to maintain or grow its business, which in turn may adversely affect its financial condition, liquidity and results of operations.

Arconic's business and growth prospects may be negatively impacted by limits in its capital expenditures.

Arconic requires substantial capital to invest in growth opportunities and to maintain and prolong the life and capacity of its existing facilities. Insufficient cash generation or capital project overruns may negatively impact Arconic's ability to fund as planned its sustaining and return-seeking capital projects. Over the long term, Arconic's ability to take advantage of improved market conditions or growth opportunities in its businesses may be constrained by earlier capital expenditure restrictions, which could adversely affect the long-term value of its business and the Company's position in relation to its competitors.

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

Arconic's results of operations may be negatively affected by the amount of expense Arconic records for its pension and other postretirement benefit plans, reductions in the fair value of plan assets and other factors. Arconic calculates income or expense for its 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 Arconic 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, Arconic is required to make an annual measurement of plan assets and liabilities, which may result in a significant charge to shareholders' equity. For a discussion regarding how Arconic's financial statements can be affected by pension and other postretirement benefits accounting policies, see "Critical Accounting Policies and Estimates-Pension and Other Postretirement Benefits" in Part II, Item 7. (Management's Discussion and Analysis of Financial Condition and Results of Operations) and Note F to the Consolidated Financial Statements-Pension and Other Postretirement Benefits in Part II, Item 8. (Financial Statements and Supplementary Data). 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 Arconic 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. The Moving Ahead for Progress in the 21st Century Act ("MAP-21"), enacted in 2012, provided temporary relief for employers like Arconic who sponsor defined benefit pension plans related to funding contributions under the Employee Retirement Income Security Act of 1974 by allowing the use of a 25-year average discount rate within an upper and lower range for purposes of determining minimum funding obligations. In 2014, the Highway and Transportation Funding Act (HATFA) was signed into law. HATFA extended the relief provided by MAP-21 and modified the interest rates that had been set by MAP-21. In 2015, the Bipartisan Budget Act of 2015 (BBA 2015) was signed into law. BBA 2015 extends the relief period provided by HATFA. Arconic believes that the relief provided by BBA 2015 will moderately reduce the cash flow sensitivity of the Company's U.S. pension plans' funded status over the next several years due to recent and potential future declines in discount rates. However, higher than expected pension contributions due to a decline in the plans' funded status as a result of unpredictable future declines in the discount rate or lower-than-expected investment returns on plan assets could have a material negative effect on the Company's cash flows. Adverse capital market conditions could result in reductions in the fair value of plan assets and increase the Company's liabilities related to such plans, which could adversely affect Arconic's liquidity and results of operations.

Unanticipated changes in Arconic's tax provisions or exposure to additional tax liabilities could affect Arconic's future profitability.

Arconic is subject to income taxes in both the United States and various non-U.S. jurisdictions. Its 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. Arconic's 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 its deferred tax assets. The Company's 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 its tax exposures.

Corporate tax law changes continue to be analyzed in the United States and in many other jurisdictions. In particular, on December 22, 2017, the Tax Cuts and Jobs Act (the "2017 Act") was signed into law, significantly reforming the United States Internal Revenue Code of 1986, as amended. During 2018, the Internal Revenue Service (the "IRS") began a number of guidance projects which serve to both interpret and implement the 2017 Act. Those guidance projects, which include both Proposed and Final Treasury Regulations, continued in 2019 and may continue in 2020. Arconic continues to review the components of the 2017 Act, as well as the ongoing interpretive guidance, and evaluate its consequences. As such, the ultimate impact of the 2017 Act may differ from reported amounts due to, among other things, changes in interpretations and assumptions the Company has made to date; and actions the Company may take as a result of the 2017 Act and related guidance. These changes to the U.S. corporate tax system could have a substantial impact, positive or negative, on Arconic's future effective tax rate, cash tax expenditures, and deferred tax assets and liabilities.

Arconic may be unable to realize the expected benefits from acquisitions, divestitures, joint ventures and strategic alliances.

Arconic has made, and may continue to plan and execute, acquisitions and divestitures and take other actions to grow its business or streamline its portfolio. There is no assurance that anticipated benefits will be realized. Acquisitions present significant challenges and risks, including the effective integration of the business into the Company, unanticipated costs and liabilities, and the ability to realize anticipated benefits, such as growth in market share, revenue or margins, at the levels or in the timeframe expected. The Company may be unable to manage acquisitions successfully. Additionally, adverse factors may prevent Arconic from realizing the benefits of its growth projects, including unfavorable global economic conditions, currency fluctuations, or unexpected delays in target timelines.

With respect to portfolio optimization actions such as divestitures, curtailments and closures, Arconic may face barriers to exit from unprofitable businesses or operations, including high exit costs or objections from customers, suppliers, unions, local or national governments, or other stakeholders. In addition, Arconic may retain unforeseen liabilities for divested entities or businesses, including, but not limited to, if a buyer fails to honor all commitments. Arconic's business operations are capital intensive, and curtailment or closure of operations or facilities may include significant charges, including employee separation costs, asset impairment charges and other measures.

In addition, Arconic has participated in, and may continue to participate in, joint ventures, strategic alliances and other similar arrangements from time to time. Although the Company has, in connection with past and existing joint ventures, sought to protect its interests, joint ventures and strategic alliances inherently involve special risks. Whether or not Arconic holds majority interests or maintains operational control in such arrangements, its partners may:

- have economic or business interests or goals that are inconsistent with or opposed to those of the Company;
- exercise veto rights to block actions that Arconic believes to be in our or the joint venture's or strategic alliance's best interests;
- take action contrary to Arconic's policies or objectives with respect to 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 acquisitions, growth investments, divestitures, closures, joint ventures, strategic alliances or similar arrangements will be undertaken or completed in their entirety as planned or that they will be beneficial to Arconic, whether due to the above-described risks, unfavorable global economic conditions, increases in construction costs, currency fluctuations, political risks, or other factors.

Arconic's business could be adversely affected by increases in the cost of aluminum.

Arconic derives a significant portion of its revenue from aluminum-based products. The price of primary aluminum has historically been subject to significant cyclical price fluctuations and the timing of changes in the market price of aluminum is largely unpredictable. Although the Company's pricing of products is generally intended to pass substantially all the risk of metal price fluctuations on to the Company's customers or is otherwise hedged, there are situations where Arconic is unable to pass on the entire cost of increases to its customers and there is a potential time lag on certain products between increases in costs for aluminum and the point when the Company can implement a corresponding increase in price to its customers and/or there are other timing factors that may result in Arconic's exposure to certain price fluctuations which could have a material adverse effect on Arconic's business, financial condition or results of operations. Further, since metal prices fluctuate among the various exchanges, Arconic competitors may enjoy a metal price advantage from time to time.

Arconic may be adversely affected by changes in the availability or cost of other raw materials (including, but not limited to, cobalt, nickel, titanium sponge, vanadium, copper, magnesium and zinc), as well as freight costs associated with transportation of raw materials. The availability and costs of certain raw materials necessary for the production of Arconic's products may be influenced by private or government entities including mergers and acquisitions, changes in world politics or regulatory requirements (such as human rights regulations or environmental regulations), labor relations between the producers and their work forces, unstable governments in exporting nations, export quotas, sanctions, new or increased import duties, countervailing or anti-dumping duties, market forces of supply and demand, and inflation. In addition, from time to time, commodity prices may fall rapidly. When this happens, suppliers may withdraw capacity from the market until prices improve, which may cause periodic supply interruptions. Arconic may be unable to offset fully the effects of raw material shortages or higher costs through customer price increases, productivity improvements or cost reduction programs. Shortages or price fluctuations in raw materials could have a material adverse effect on Arconic's operating results.

Arconic is dependent on a limited number of suppliers for a substantial portion of our aluminum and certain other raw materials essential to our operations.

Arconic has supply arrangements with a limited number of suppliers for aluminum and other raw materials. We maintain annual or long-term contracts for a majority of our supply requirements, and for the remainder we depend on spot purchases. From time to time, increasing demand levels have caused regional supply constraints in the industry and further increases in demand levels could exacerbate these issues. Such constraints could impact our production or force us to purchase primary metal and other supplies from alternative sources, which may not be available in sufficient quantities or may only be available on terms that are less favorable to us. Further, there can be no assurance that we will be able to renew, or obtain replacements for, any of our long-term contracts when they expire on terms that are as favorable as our existing agreements or at all. Additionally, Arconic could have exposure if a key supplier in a particular region is unable to deliver sufficient quantities of a necessary material on a timely basis. In addition, a significant downturn in the business or financial condition of our significant suppliers exposes us to the risk of default by the supplier on our contractual agreements, and this risk is increased by weak and deteriorating economic conditions on a global, regional or industry sector level.

Arconic is exposed to fluctuations in foreign currency exchange rates and interest rates, as well as inflation, economic factors, and currency controls in the countries in which it operates.

Economic factors, including inflation and fluctuations in foreign currency exchange rates and interest rates, competitive factors in the countries in which Arconic operates, and continued volatility or deterioration in the global economic and financial environment could affect Arconic’s revenues, expenses and results of operations. Changes in the valuation of the U.S. dollar against other currencies, including the Euro, British pound, Canadian dollar, Chinese yuan (renminbi), Japanese yen and Russian ruble, may affect Arconic’s profitability as some important inputs are purchased in other currencies, while the Company’s products are generally sold in U.S. dollars.

In addition, a portion of Arconic’s indebtedness, including certain borrowings under the Company’s Five-Year Credit Facility, bears interest at rates equal to the London Interbank Offering Rate (“LIBOR”) plus an applicable margin based on the credit ratings of Arconic’s outstanding senior unsecured long-term debt. Accordingly, the Company is subject to risk from changes in interest rates on the variable component of the rate. Further, 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 changes in the cost of Arconic’s variable rate indebtedness.

Arconic also faces risks arising from the imposition of cash repatriation restrictions and exchange controls. Cash repatriation restrictions and exchange controls may limit the Company’s ability to convert foreign currencies into U.S. dollars or to remit dividends and other payments by Arconic’s foreign subsidiaries or businesses located in or conducted within a country imposing restrictions or controls. While Arconic currently has no need, and does not intend, to repatriate or convert cash held in countries that have significant restrictions or controls in place, should the Company need to do so to fund its operations, it may be unable to repatriate or convert such cash, or be unable to do so without incurring substantial costs. Arconic currently has substantial operations in countries that have cash repatriation restrictions or exchange controls in place, including China, and, if the Company were to need to repatriate or convert such cash, these controls and restrictions may have an adverse effect on Arconic’s operating results and financial condition.

Arconic may not realize expected benefits from its productivity and cost-reduction initiatives.

Arconic has undertaken, and may continue to undertake, productivity and cost-reduction initiatives to improve performance and conserve cash, including deployment of company-wide business process models, such as Arconic’s degrees of implementation process in which ideas are executed in a disciplined manner to generate savings, and operating cost reductions. There is no assurance that these initiatives will be successful or beneficial to Arconic or that estimated cost savings from such activities will be realized. If Arconic fails to achieve net cost savings at anticipated levels, its business, financial condition or results of operations could be adversely affected.

Arconic’s customers may reduce their demand for aluminum products in favor of alternative materials.

Certain applications of Arconic’s aluminum-based products compete with products made from other materials, such as steel, titanium and composites. The willingness of customers to pursue materials other than aluminum often depends upon the desire to achieve specific attributes. For example, the commercial aerospace industry has used and continues to evaluate the further use of alternative materials to aluminum, such as titanium and composites, in order to reduce the weight and increase the fuel efficiency of aircraft. Additionally, the automotive industry, while motivated to reduce vehicle weight through the use of aluminum, may revert to steel or other materials for certain applications. Further, the decision to use aluminum may be impacted by aluminum prices or compatibility of aluminum with other materials used by a customer in a given application. The willingness of customers to accept other materials in lieu of aluminum could adversely affect the demand for certain of Arconic’s products, and thus adversely affect Arconic’s business, financial condition or results of operations.

Labor disputes and other employee relations issues could adversely affect Arconic’s business, financial condition or results of operations.

A significant portion of Arconic’s employees are represented by labor unions in a number of countries under various collective bargaining agreements with varying durations and expiration dates. For more information, see “Employees” in Part I, Item 1. (Business) of this report. While Arconic previously has been successful in renegotiating its collective bargaining agreements with various unions, Arconic may not be able to satisfactorily renegotiate all collective bargaining agreements in the United States and other countries when they expire. In addition, existing collective bargaining agreements may not prevent a strike or work stoppage at Arconic’s facilities in the future. Arconic may also be subject to general country strikes or work stoppages unrelated to its business or collective bargaining agreements. Any such work stoppages (or potential work stoppages) could have a material adverse effect on Arconic’s business, financial condition or results of operations.

A failure to attract, retain or provide adequate succession plans for key personnel could adversely affect Arconic's operations and competitiveness.

Arconic's existing operations and development projects require highly skilled executives and staff with relevant industry and technical experience. The inability of the Company to attract and retain such people may adversely impact Arconic's ability to meet project demands adequately and fill roles in existing operations. Skills shortages in engineering, manufacturing, technology, construction and maintenance contractors and other labor market inadequacies may also impact activities. These shortages may adversely impact the cost and schedule of development projects and the cost and efficiency of existing operations.

In addition, the continuity of key personnel and the preservation of institutional knowledge are vital to the success of the Company's growth and business strategy. The loss of key members of management and other personnel could significantly harm Arconic's business, and any unplanned turnover, or failure to develop adequate succession plans for key positions, could deplete the Company's institutional knowledge base, result in loss of technical or other expertise, delay or impede the execution of the Company's business plans and erode Arconic's competitiveness.

Arconic may be exposed to significant legal proceedings, investigations or changes in U.S. federal, state or foreign law, regulation or policy.

Arconic's 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 Arconic. The Company may experience an unfavorable change in effective tax rates or 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.

Arconic is also subject to a variety of legal and regulatory compliance risks in the United States and abroad in connection with its business and products. These risks include, among other things, potential claims relating to product liability, product testing, health and safety, environmental matters, employment matters, required record keeping and record retention, compliance with securities laws, intellectual property rights, government contracts and taxes, insurance or commercial matters, as well as compliance with U.S. and foreign laws and regulations, including those governing import and export, anti-bribery, antitrust and competition, sales and trading practices, human rights and modern slavery, sourcing of raw materials, third-party relationships, supply chain operations and the manufacture and sale of products. Arconic may be a party to litigation in a foreign jurisdiction where geopolitical risks might influence the ultimate outcome of such litigation. Arconic could be subject to fines, penalties, damages (in certain cases, treble damages), or suspension or debarment from government contracts.

The global and diverse nature of Arconic's operations means that these risks will continue to exist, and additional legal proceedings and contingencies may arise from time to time. While Arconic believes it has adopted appropriate risk management and compliance programs to address and reduce these risks, including insurance arrangements with respect to these risks, such measures may provide inadequate protection against liabilities that may arise. In addition, various factors or developments can lead the Company to change current estimates of liabilities or make such estimates for matters previously unsusceptible to 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 the Company's financial condition, results of operations or cash flows in a particular period. Litigation and compliance efforts may require substantial attention from management and could result in significant legal expenses, settlement costs or damage awards that could have a material impact on the Company's financial position, results of operations and cash flows. For additional information regarding the legal proceedings involving the Company, including proceedings and investigations relating to the June 13, 2017 fire at the Grenfell Tower in London, U.K., see the discussion in Part I, Item 3. (Legal Proceedings) of this report and in Note T to the Consolidated Financial Statements in Part II, Item 8. (Financial Statements and Supplementary Data).

Arconic is exposed to environmental and safety risks and is subject to a broad range of health, safety and environmental laws and regulations which may result in substantial costs and liabilities.

Arconic's operations worldwide are subject to numerous complex and increasingly stringent health, safety and environmental laws and regulations. The costs of complying with such laws and regulations, including participation in assessments 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 present, 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 Arconic may be liable may arise in the future at its present sites, at sites owned or operated by its predecessors or affiliates, at sites that it may acquire in the future, or at third-party sites used by Arconic, its predecessors or affiliates for material and waste handling and disposal. Compliance with health, safety and environmental laws and regulations, including remediation obligations, may prove to be more challenging and costly than the Company anticipates. Arconic's results of operations or liquidity in a particular period could be affected by certain health, safety or environmental matters, including remediation costs and damages related to certain sites as well as other health and safety risks relating to its operations and products. Additionally, evolving regulatory standards and expectations can result in increased litigation and/or increased costs, including increased remediation costs, all of which can have a material and adverse effect on the Company's financial condition, results of operations and cash flows.

In addition, the industrial activities conducted at Arconic's facilities present a significant risk of injury or death to our employees, customers or third parties that may be on site. We have experienced serious injuries in the past, notwithstanding the safety protocols, practices and precautions we take. Our operations are subject to regulation by various federal, state and local agencies in the United States and regulation by foreign government entities abroad responsible for employee health and safety, including the Occupational Safety and Health Administration. From time to time, we have incurred fines for violations of various health and safety standards. While we maintain insurance and have in place policies to minimize such risks, we may nevertheless be unable to avoid material liabilities for any injury or death that may occur in the future. These types of incidents may not be covered by or may exceed our insurance coverage and could have a material adverse effect on our results of operations and financial condition or result in negative publicity and/or significant reputational harm.

Arconic is subject to privacy and data security/protection laws in the jurisdictions in which it operates and may be exposed to substantial costs and liabilities associated with such laws and regulations.

The regulatory environment surrounding information security and privacy is increasingly demanding, with frequent imposition of new and changing requirements. For example, the European Union's General Data Protection Regulation ("GDPR"), which became effective in May 2018, imposed significant new requirements on how companies process and transfer personal data, as well as significant fines for non-compliance. Compliance with changes in privacy and information security laws and standards may result in significant expense due to increased investment in technology and the development of new operational processes, which could have a material adverse effect on Arconic's financial condition and results of operations. In addition, the payment of potentially significant fines or penalties in the event of a breach of the GDPR or other privacy and information security laws, as well as the negative publicity associated with such a breach, could damage the Company's reputation and adversely impact product demand and customer relationships.

Failure to comply with domestic or international employment and related laws could result in penalties or costs that could have a material adverse effect on Arconic's business results.

Arconic is subject to a variety of domestic and foreign employment laws, such as the Fair Labor Standards Act (which governs such matters as minimum wages, overtime and other working conditions), state and local wage laws, the Employee Retirement Income Security Act, and regulations related to safety, discrimination, organizing, whistle-blowing, classification of employees, privacy and severance payments, citizenship requirements, and healthcare insurance mandates. Allegations that Arconic has violated such laws or regulations could damage the Company's reputation and lead to fines from or settlements with federal, state or foreign regulatory authorities or damages payable to employees, which could have a material adverse impact on Arconic's operations and financial condition.

Arconic may be affected by global climate change or by legal, regulatory, or market responses to such change.

Increased concern over climate change has led to new and proposed legislative and regulatory initiatives, such as cap-and-trade systems, additional limits on emissions of greenhouse gases or Corporate Average Fuel Economy (CAFE) standards in the United States. New or revised laws and regulations in this area could directly and indirectly affect Arconic and its customers and suppliers, including by increasing the costs of production or impacting demand for certain products, which could result in an adverse effect on our financial condition, results of operations and cash flows. Compliance with any new or more stringent laws or regulations, or stricter interpretations of existing laws, could require additional expenditures by the Company or its customers or suppliers. Also, Arconic relies on natural gas, electricity, fuel oil and transport fuel to operate its facilities. Any increased costs of these energy sources because of new laws could be passed along to the Company and its customers and suppliers, which could also have a negative impact on Arconic's profitability.

Changes in the United Kingdom's economic and other relationships with the European Union could adversely affect Arconic.

In March 2017, the United Kingdom formally triggered the process to withdraw from the European Union (also referred to as "Brexit") following the results of a national referendum that took place in June 2016. The United Kingdom formally left the European Union on January 31, 2020. A transition period through December 31, 2020 has been established to allow the United Kingdom and the European Union to negotiate the terms of the United Kingdom's withdrawal. However, there is continued uncertainty surrounding the future relationship between the United Kingdom and the European Union, including trade agreements between the United Kingdom and the European Union.

The ultimate effects of Brexit on Arconic are difficult to predict, but because the Company currently operates and conducts business in the United Kingdom and in Europe, Brexit could cause disruptions and create uncertainty to Arconic's businesses, including affecting the business of and/or our relationships with Arconic's customers and suppliers, as well as altering the relationship among tariffs and currencies, including the value of the British pound and the Euro relative to the U.S. dollar. Such disruptions and uncertainties could adversely affect Arconic's financial condition, operating results and cash flows. In addition, Brexit could result in legal uncertainty and potentially divergent national laws and regulations as new legal relationships between the United Kingdom and the European Union are established. The ultimate effects of Brexit on Arconic will also depend on the terms of any agreements the United Kingdom and the European Union make to retain access to each other's respective markets either during the transition period or more permanently.

Dividends on Arconic common stock could be reduced or eliminated in the event of material future deterioration in business conditions or in other circumstances.

Arconic has historically paid dividends on its common stock; however, it has no obligation to do so. The existence, timing, declaration, amount and payment of future dividends to Arconic's stockholders falls within the discretion of Arconic's Board of Directors, and the Company's dividend policy may change at any time without advance notice to Arconic's stockholders. For example, on February 8, 2019, in connection with the Company's ongoing strategic and portfolio review, Arconic announced that it expected to reduce its quarterly common stock dividend from $0.06 to $0.02 per share. The Arconic Board of Directors' decisions regarding the payment of dividends will depend on many factors, such as Arconic's financial condition, earnings, capital requirements, debt service obligations, covenants associated with certain of the Company's debt service obligations, industry practice, legal requirements, regulatory constraints and other factors that Arconic's Board of Directors deems relevant. Arconic's Board of Directors may determine to further reduce or eliminate Arconic's common stock dividend in the event of material future deteriorations in business conditions or in other circumstances.

Anti-takeover provisions could prevent or delay a change in control of Arconic, including a takeover attempt by a third party and limit the power of Arconic's shareholders.

Arconic's Certificate of Incorporation and 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 Arconic's Board of Directors rather than to attempt a hostile takeover. For example, Arconic is subject to Section 203 of the Delaware General Corporation Law, which imposes certain restrictions on mergers and other business combinations between the Company and any holder of 15% or more of the Company's outstanding common stock, which could make it more difficult for another party to acquire Arconic. Additionally, the Company's Certificate of Incorporation authorizes Arconic's Board of Directors to issue preferred stock or adopt other anti-takeover measures without shareholder approval. These provisions may apply even if an offer may be considered beneficial by some shareholders and could delay or prevent an acquisition that Arconic's Board of Directors determines is not in the best interests of Arconic's shareholders. These provisions may also limit the price that investors might be willing to pay in the future for shares of Arconic common stock or prevent or discourage attempts to remove and replace incumbent directors.

Risks Related to the Separation of Alcoa

The Separation of Alcoa could result in substantial tax liability.

It was a condition to the Distribution of Alcoa that (i) the private letter ruling from the Internal Revenue Service (the "IRS") regarding certain U.S. federal income tax matters relating to the Separation of Alcoa and the Distribution of Alcoa received by Arconic remain valid and be satisfactory to Arconic's Board of Directors and (ii) Arconic receive an opinion of its outside counsel, satisfactory to the Board of Directors, regarding the qualification of the Distribution of Alcoa, together with certain related transactions, as a transaction that is generally tax-free, for U.S. federal income tax purposes, under Sections 355 and 368(a)(1)(D) of the Internal Revenue Code of 1986, as amended (the "Code"). Both of these conditions were satisfied prior to the Distribution of Alcoa. However, the IRS private letter ruling and the opinion of counsel were based upon and relied on, among other things, various facts and assumptions, as well as certain representations, statements and undertakings of Arconic and Alcoa Corporation, including those relating to the past and future conduct of Arconic and Alcoa Corporation. If any of these representations, statements or undertakings is, or becomes, inaccurate or incomplete, or if Arconic or Alcoa Corporation breaches any of its representations or covenants contained in any of the Separation of Alcoa-related agreements and documents or in any documents relating to the IRS private letter ruling and/or the opinion of counsel, the IRS private letter ruling and/or the opinion of counsel may be invalid and the conclusions reached therein could be jeopardized.

Notwithstanding Arconic's receipt of the IRS private letter ruling and the opinion of counsel, the IRS could determine that the Distribution of Alcoa and/or certain related transactions should be treated as taxable transactions for U.S. federal income tax purposes if it determines that any of the representations, assumptions or undertakings upon which the IRS private letter ruling or the opinion of counsel was based are false or have been violated. In addition, the IRS private letter ruling does not address all of the issues that are relevant to determining whether the Distribution of Alcoa, together with certain related transactions, qualifies as a transaction that is generally tax-free for U.S. federal income tax purposes, and the opinion of counsel represents the judgment of such counsel and is not binding on the IRS or any court and the IRS or a court may disagree with the conclusions in the opinion of counsel. Accordingly, notwithstanding receipt by Arconic of the IRS private letter ruling and the opinion of counsel, there can be no assurance that the IRS will not assert that the Distribution of Alcoa and/or certain related transactions do not qualify for tax-free treatment for U.S. federal income tax purposes or that a court would not sustain such a challenge. In the event the IRS were to prevail with such challenge, Arconic, Alcoa Corporation and Arconic shareholders could be subject to significant U.S. federal income tax liability.

If the Distribution of Alcoa, together with certain related transactions, fails to qualify as a transaction that is generally tax-free, for U.S. federal income tax purposes, under Sections 355 and 368(a)(1)(D) of the Code, in general, for U.S. federal income tax purposes, Arconic would recognize taxable gain as if it had sold the Alcoa Corporation common stock in a taxable sale for its fair market value and Arconic shareholders who received Alcoa Corporation shares in the distribution would be subject to tax as if they had received a taxable distribution equal to the fair market value of such shares.

Under current U.S. federal income tax law, even if the Distribution of Alcoa, together with certain related transactions, otherwise qualifies for tax-free treatment under Sections 355 and 368(a)(1)(D) of the Code, the Distribution of Alcoa may nevertheless be rendered taxable to Arconic and its shareholders as a result of certain post-Distribution of Alcoa transactions, including certain acquisitions of shares or assets of Arconic or Alcoa Corporation. The possibility of rendering the Distribution of Alcoa taxable as a result of such transactions may limit Arconic's ability to pursue certain equity issuances, strategic transactions or other transactions that would otherwise maximize the value of Arconic's business. Under the Tax Matters Agreement that Arconic entered into with Alcoa Corporation, Alcoa Corporation may be required to indemnify Arconic against any additional taxes and related amounts resulting from (i) an acquisition of all or a portion of the equity securities or assets of Alcoa Corporation, whether by merger or otherwise (and regardless of whether Alcoa Corporation participated in or otherwise facilitated the acquisition), (ii) issuing equity securities beyond certain thresholds, (iii) repurchasing shares of Alcoa Corporation stock other than in certain open-market transactions, (iv) ceasing actively to conduct certain of its businesses, (v) other actions or failures to act by Alcoa Corporation or (vi) any of Alcoa Corporation's representations, covenants or undertakings contained in any of the Separation of Alcoa-related agreements and documents or in any documents relating to the IRS private letter ruling and/or the opinion of counsel being incorrect or violated. However, the indemnity from Alcoa Corporation may be insufficient to protect Arconic against the full amount of such additional taxes or related liabilities, and Alcoa Corporation may be unable to satisfy its indemnification obligations fully. Moreover, even if Arconic ultimately succeeds in recovering from Alcoa Corporation any amounts for which Arconic is held liable, Arconic may be temporarily required to bear such losses. In addition, Arconic and Arconic's subsidiaries may incur certain tax costs in connection with the Separation of Alcoa, including tax costs resulting from separations in non-U.S. jurisdictions, which may be material. Each of these risks could negatively affect Arconic's business, results of operations and financial condition.

Risks Related to the Separation of Arconic

The Separation of Arconic involves significant time and expense, which could disrupt or adversely affect Arconic's business, may not achieve some or all of the anticipated benefits, is subject to various risks and uncertainties and may not be completed in accordance with the expected plans or anticipated timelines, or at all.

On February 8, 2019, Arconic announced plans to separate into two independent, publicly-traded companies, composed of the Engineered Products and Forgings businesses, on the one hand, and the Global Rolled Products businesses, on the other hand. The Separation of Arconic will be subject to the satisfaction of a number of customary conditions, including, among others, receipt of a tax opinion from external counsel.

Arconic expects that the process of completing the Separation of Arconic will be time-consuming and involve significant costs and expenses, which may be significantly higher than what it currently anticipates and may not yield a benefit if the Separation of Arconic is not completed. Executing the Separation of Arconic will also require significant time and attention from Arconic's senior management and employees, which could disrupt the Company's ongoing business and adversely affect financial results and results of operations. Arconic may also experience increased difficulties in attracting, retaining and motivating employees or maintaining or initiating relationships with lead suppliers, customers and other parties with which Arconic currently does business, or may do business in the future, during the pendency of the Separation of Arconic and following its completion, which could have a material and adverse effect on Arconic's businesses, financial condition, results of operations and prospects, or the businesses, financial condition, results of operations and prospects of the independent companies resulting from the Separation of Arconic. And, although we intend for the separation transactions to be tax-free to the Company's shareholders for U.S. federal income tax purposes, there can be no assurance that Separation of Arconic will so qualify. If the Separation of Arconic were ultimately determined to be taxable, we, the Company's shareholders and/or the new independent company would incur income tax liabilities that could be significant.

Arconic may not realize some or all of the anticipated strategic, financial, operational or other benefits from the Separation of Arconic. For example, as independent companies, the Engineered Products & Forgings and Global Rolled Products businesses will be smaller, less diversified companies with a narrower business focus and may be more vulnerable to changing market conditions, such as changes in industry conditions, which could result in increased volatility in their cash flows, working capital and financing requirements and could materially and adversely affect the respective business, financial condition and results of operations. Moreover, following the Separation of Arconic, there can be no assurance that either company will be able to obtain an investment grade rating from nationally recognized credit rating agencies, which could, among other things, increase the non-investment grade rated company's cost of capital. Further, there can be no assurance that the combined value of the common stock of the two companies will be equal to or greater than what the value of Arconic's common stock would have been had the proposed Separation of Arconic not occurred.

Additionally, the separation is subject to market, regulatory and certain other conditions. Unanticipated developments, including, among others, failure of the Separation of Arconic to qualify for the expected tax treatment, the possibility that any third-party consents required in connection with the Separation of Arconic will not be received, material adverse changes in business or industry conditions and changes in global economic and financial market conditions generally, could delay or prevent the completion of the Separation of Arconic, or cause the Separation of Arconic to occur on terms or conditions that are different or less favorable than expected.

Item 1B. Unresolved Staff Comments.

None.

Item 2. Properties.

Arconic's principal office and corporate center is located at 201 Isabella Street, Suite 200, Pittsburgh, Pennsylvania 15212-5858. The Arconic Technology Center for research and development is located at 100 Technical Drive, New Kensington, Pennsylvania 15069-0001.

Arconic 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.

Arconic believes that its facilities are suitable and adequate for its operations. Although no title examination of properties owned by Arconic has been made for the purpose of this report, the Company knows of no material defects in title to any such properties. See Notes A and M to the Consolidated Financial Statements in Part II, Item 8. (Financial Statements and Supplementary Data) of this Form 10-K.

Arconic has active plants and holdings under the following segments and in the following geographic areas:

ENGINEERED PRODUCTS AND FORGINGS

See the table and related text in the **Engineered Products and Forgings Facilities** section on page 7 of this report.

GLOBAL ROLLED PRODUCTS

See the table and related text in the **Global Rolled Products Facilities** section on page 10 of this report.

Item 3. Legal Proceedings.

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

Environmental Matters

Arconic is involved in proceedings under the Comprehensive Environmental Response, Compensation and Liability Act, also known as Superfund (CERCLA) or 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, the remediation of the Grasse River in Massena, NY, is discussed in the Environmental Matters section of Note T to the Consolidated Financial Statements under the caption "Environmental Matters".

Reynobond PE

As previously reported, on June 13, 2017, the Grenfell Tower in London, U.K. caught fire resulting in fatalities, injuries and damage. A French subsidiary of Arconic, Arconic Architectural Products SAS (AAP SAS), supplied a product, Reynobond PE, to its customer, a cladding system fabricator, which used the product as one component of the overall cladding system on Grenfell Tower. The fabricator supplied its portion of the cladding system to the façade installer, who then completed and installed the system under the direction of the general contractor. Neither Arconic nor AAP SAS was involved in the design or installation of the system used at the Grenfell Tower, nor did it have a role in any other aspect of the building's refurbishment or original design. Regulatory investigations into the overall Grenfell Tower matter are being conducted, including a criminal investigation by the London Metropolitan Police Service (the "Police"), a Public Inquiry by the British government and a consumer protection inquiry by a French public authority. The Public Inquiry was announced by the U.K. Prime Minister on June 15, 2017 and subsequently was authorized to examine the circumstances leading up to and surrounding the Grenfell Tower fire in order to make findings of fact and recommendations to the U.K. Government on matters such as the design, construction, and modification of the building, the role of relevant public authorities and contractors, the implications of the fire for the adequacy and enforcement of relevant regulations, arrangements in place for handling emergencies, and the handling of concerns from residents, among other things. Hearings for Phase 1 of the Public Inquiry began on May 21, 2018 and concluded on December 12, 2018. Phase 2 hearings of the Public Inquiry began in early 2020, following which a final report will be written and subsequently published. AAP SAS is participating as a Core Participant in the Public Inquiry and is also cooperating with the ongoing parallel investigation by the Police. The Company no longer sells the PE product for architectural use on buildings. Given the preliminary nature of these investigations and the uncertainty of potential future litigation, the Company cannot reasonably estimate at this time the likelihood of an unfavorable outcome or the possible loss or range of losses in the event of an unfavorable outcome.

Behrens et al. v. Arconic Inc. et al. As previously reported, on June 6, 2019, 247 plaintiffs comprised of survivors and estates of decedents of the Grenfell Tower fire filed a complaint against “Arconic Inc., Alcoa Inc., and Arconic Architectural Products, LLC” (collectively, for purposes of the description of such proceeding, the “Arconic Defendants”), as well as Saint-Gobain Corporation, d/b/a Celotex and Whirlpool Corporation, in the Court of Common Pleas of Philadelphia County. The complaint alleges claims under Pennsylvania state law for products liability and wrongful death related to the fire. In particular, the plaintiffs allege that the Arconic Defendants knowingly supplied a dangerous product (Reynobond PE) for installation on the Grenfell Tower despite knowing that Reynobond PE was unfit for use above a certain height. The Arconic Defendants removed the case to the United States District Court for the Eastern District of Pennsylvania on June 19, 2019. On August 29, 2019, the Arconic Defendants moved to dismiss the complaint on the bases, among other things, that: (i) the case should be heard in the United Kingdom, not the United States; (ii) there is no jurisdiction over necessary parties; and (iii) Pennsylvania products liability law does not apply to manufacture and sale of product overseas. On December 23, 2019, the Court issued an order denying the motion to dismiss the complaint on bases (ii) and (iii) and suggesting a procedure for limited discovery followed by further briefing on those subjects. Discovery is ongoing on defendants’ motion to have the case dismissed in favor of a UK forum (forum non conveniens). On January 23, 2020, the Court ordered that the parties complete discovery relating to forum non conveniens by March 16, 2020, and that briefing conclude on April 13, 2020. The Court will hold oral argument on this motion on May 7, 2020. Given the preliminary nature of this matter and the uncertainty of litigation, the Company cannot reasonably estimate at this time the likelihood of an unfavorable outcome or the possible loss or range of losses in the event of an unfavorable outcome.

Howard v. Arconic Inc. et al. As previously reported, a purported class action complaint related to the Grenfell Tower fire was filed on August 11, 2017, in the United States District Court for the Western District of Pennsylvania against Arconic Inc. and Klaus Kleinfeld. A related purported class action complaint was filed in the United States District Court for the Western District of Pennsylvania on September 15, 2017, under the caption *Sullivan v. Arconic Inc. et al.*, against Arconic Inc. three former Arconic executives, several current and former Arconic directors, and banks that acted as underwriters for Arconic’s September 18, 2014 preferred stock offering (the “Preferred Offering”). The plaintiff in *Sullivan* had previously filed a purported class action against the same defendants on July 18, 2017 in the Southern District of New York and, on August 25, 2017, voluntarily dismissed that action without prejudice. On February 7, 2018, on motion from certain putative class members, the court consolidated *Howard* and *Sullivan*, closed *Sullivan*, and appointed lead plaintiffs in the consolidated case. On April 9, 2018, the lead plaintiffs in the consolidated purported class action filed a consolidated amended complaint. The consolidated amended complaint alleged that the registration statement for the Preferred Offering contained false and misleading statements and omitted to state material information, including by allegedly failing to disclose material uncertainties and trends resulting from sales of Reynobond PE for unsafe uses and by allegedly expressing a belief that appropriate risk management and compliance programs had been adopted while concealing the risks posed by Reynobond PE sales. The consolidated amended complaint also alleged that between November 4, 2013 and June 23, 2017 Arconic and Kleinfeld made false and misleading statements and failed to disclose material information about the Company’s commitment to safety, business and financial prospects, and the risks of the Reynobond PE product, including in Arconic’s Form 10-Ks for the fiscal years ended December 31, 2013, 2014, 2015, and 2016, its Form 10-Qs and quarterly financial press releases from the fourth quarter of 2013 through the first quarter of 2017, its 2013, 2014, 2015, and 2016 Annual Reports, its 2016 Annual Highlights Report, and on its official website. The consolidated amended complaint sought, among other things, unspecified compensatory damages and an award of attorney and expert fees and expenses. On June 8, 2018, all defendants moved to dismiss the consolidated amended complaint for failure to state a claim. On June 21, 2019, the Court granted the defendants’ motion to dismiss in full, dismissing the consolidated amended complaint in its entirety without prejudice. On July 23, 2019, the lead plaintiffs filed a second amended complaint. The second amended complaint alleges generally the same claims as the consolidated amended complaint with certain additional allegations, as well as claims that the risk factors set forth in the registration statement for the Preferred Offering were inadequate and that certain additional statements in the sources identified above were misleading. The second amended complaint seeks, among other things, unspecified compensatory damages and an award of attorney and expert fees and expenses. On September 11, 2019, all defendants moved to dismiss the second amended complaint. Plaintiffs' opposition to that motion was filed on November 1, 2019 and all defendants filed a reply brief on November 26, 2019. Given the preliminary nature of this matter and the uncertainty of litigation, the Company cannot reasonably estimate at this time the likelihood of an unfavorable outcome or the possible loss or range of losses in the event of an unfavorable outcome.

Raul v. Albaugh, *et al.* As previously reported, on June 22, 2018, a derivative complaint was filed nominally on behalf of Arconic by a purported Arconic stockholder against the then members of Arconic's Board of Directors and Klaus Kleinfeld and Ken Giacobbe, naming Arconic as a nominal defendant, in the United States District Court for the District of Delaware. The complaint raises similar allegations as the consolidated amended complaint and second amended complaint in *Howard*, as well as allegations that the defendants improperly authorized the sale of Reynobond PE for unsafe uses, and asserts claims under Section 14(a) of the Exchange Act and Delaware state law. On July 13, 2018, the parties filed a stipulation agreeing to stay this case until the final resolution of the *Howard* case, the Grenfell Tower Public Inquiry in London, and the investigation by the Police and on July 23, 2018, the Court approved the stay. Given the preliminary nature of this matter and the uncertainty of litigation, the Company cannot reasonably estimate at this time the likelihood of an unfavorable outcome or the possible loss or range of losses in the event of an unfavorable outcome.

While the Company believes that these cases are without merit and intends to challenge them vigorously, there can be no assurances regarding the ultimate resolution of these matters.

Stockholder Demands. As previously reported, the Board of Directors also received letters, purportedly sent on behalf of stockholders, reciting allegations similar to those made in the federal court lawsuits and demanding that the Board authorize the Company to initiate litigation against members of management, the Board, and others. The Board of Directors appointed a Special Litigation Committee of the Board to review, investigate, and make recommendations to the Board regarding the appropriate course of action with respect to these stockholder demand letters. On May 22, 2019, the Special Litigation Committee, following completion of its investigation into the claims demanded in the demand letters, recommended to the Board that it reject the demands to authorize commencement of litigation. On May 28, 2019, the Board adopted the Special Litigation Committee's findings and recommendations and rejected the demands that it authorize commencement of actions to assert the claims set forth in the demand letters.

Other Matters

As previously reported, Arconic Inc. and its subsidiaries and former subsidiaries are defendants in lawsuits filed on behalf of persons alleging injury as a result of occupational or other exposure to asbestos. Arconic, its subsidiaries and former subsidiaries have numerous insurance policies over many years that provide coverage for asbestos related claims. Arconic has significant insurance coverage and believes that Arconic's reserves are adequate for its 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 the Company.

Tax

Pursuant to the Tax Matters Agreement, dated as of October 31, 2016, entered into between the Company and Alcoa Corporation in connection with the Separation of Alcoa, the Company shares responsibility with Alcoa Corporation for, and Alcoa Corporation has agreed to partially indemnify the Company with respect to, the following matter.

As previously reported, in July 2013, following a Spanish corporate income tax audit covering the 2006 through 2009 tax years, an assessment was received mainly disallowing certain interest deductions claimed by a Spanish consolidated tax group owned by the Company. In August 2013, the Company filed an appeal of this assessment in Spain's Central Tax Administrative Court, which was denied in January 2015. Arconic filed another appeal in Spain's National Court in March 2015 which was denied in July 2018. The National Court's decision requires the assessment for the 2006 through 2009 tax years to be reissued to take into account the outcome of the 2003 to 2005 audit which was closed in 2017. The Company estimates the revised assessment to be $172 million (€154 million), including interest.

In March 2019, the Supreme Court of Spain accepted the Company's petition to review the National Court's decision, and the Company has filed a formal appeal of the assessment. The Supreme Court is reviewing the assessment on its merits and will render a final decision. In the event the Company receives an unfavorable ruling from the Supreme Court of Spain, a portion of the assessment may be offset with existing net operating losses and tax credits available to the Spanish consolidated tax group, which would be shared between the Company and Alcoa Corporation as provided for in the Tax Matters Agreement.

In the third quarter of 2018, Arconic established an income tax reserve, and an indemnification receivable representing Alcoa Corporation's 49% share of the liability. As of the end of 2019, the balances of the reserve, including interest, and the receivable are $59 million (€53 million) and $29 million (€26 million), respectively.

Additionally, while the tax years 2010 through 2013 are closed to audit, it is possible that the Company may receive assessments for tax years subsequent to 2013. Any potential assessment for an individual tax year is not expected to be material to the Company's consolidated operations. At this time, the Company is unable to reasonably predict an ultimate outcome for this matter.

Matters Previously Reported – Alcoa Corporation

We have included the matters discussed below in which the Company remains party to proceedings relating to Alcoa Corporation in accordance with SEC regulations. The Separation and Distribution Agreement, dated October 31, 2016, entered into between the Company and Alcoa Corporation in connection with the Separation of Alcoa, provides for cross-indemnities between the Company and Alcoa Corporation for claims subject to indemnification. The Company does not expect any of such matters to result in a net claim against it.

St. Croix Proceedings

Red Dust Docket Cases, (St. Croix) f/k/a Abednego, Laurie L.A., et al. v. St. Croix Alumina, L.L.C., et al. As previously reported, on January 14, 2010, Arconic was served with a multi-plaintiff action complaint involving several thousand individual persons claiming to be residents of St. Croix who are alleged to have suffered 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. Following an unsuccessful attempt by Arconic and SCA to remove the case to federal court, the case has been lodged in the Superior Court. 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.

Also as previously reported, on March 1, 2012, Arconic 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.

Arconic and other defendants in the Abraham and Abednego cases filed or renewed motions to dismiss each case in March 2012 and August 2012 following service of the Abraham complaint on Arconic and remand of the Abednego complaint to Superior Court, respectively. 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. On July 7, 2017, the Court issued an order and associated memoranda on plaintiff's multiple motions for extension of time to file the individual Complaints. Following the court's July 7, 2017 order, a total of 429 complaints were filed and accepted by the court by the deadline of July 30, 2017 (and consolidated into the *Red Dust Claims* docket (Master Case No.: SX-15-CV-620)). These complaints include claims of about 1,260 individual plaintiffs.

On November 5, 2018, notice of an order of reassignment was entered, transferring the claims to the newly created Complex Litigation Division of the Superior Court of the Virgin Islands, Division of St. Croix. On January 28, 2019, the plaintiffs filed a motion asking for a determination that expert testimony will not be required on the issue of causation, which defendants opposed. The Court has not ruled on that motion.

Other Contingencies

In addition to the matters discussed above, various other lawsuits, claims, and proceedings have been or may be instituted or asserted against Arconic, including those pertaining to environmental, product liability, safety and health, employment, tax and antitrust matters. While the amounts claimed in these other matters may be substantial, the ultimate liability cannot currently be determined because of the considerable uncertainties that exist. Therefore, it is possible that the Company's liquidity or results of operations in a 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 results of operations, financial position, or cash flows of the Company.

Item 4. Mine Safety Disclosures.

Not applicable.

PART II

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

The Company's common stock is listed on the New York Stock Exchange. Prior to the Separation of Alcoa Corporation from the Company, the Company's common stock traded under the symbol "AA." In connection with the Separation of Alcoa, on November 1, 2016, the Company changed its stock symbol and its common stock began trading under the symbol "ARNC."

On October 5, 2016, the Company's common shareholders approved a 1-for-3 reverse stock split of the Company's outstanding and authorized shares of common stock (the "Reverse Stock Split"). As a result of the Reverse Stock Split, every three shares of issued and outstanding common stock were combined into one issued and outstanding share of common stock, without any change in the par value per share. The Reverse Stock Split reduced the number of shares of common stock outstanding from approximately 1.3 billion shares to approximately 0.4 billion shares, and proportionately decreased the number of authorized shares of common stock from 1.8 billion to 0.6 billion shares. The Company's common stock began trading on a Reverse Stock Split-adjusted basis on October 6, 2016.

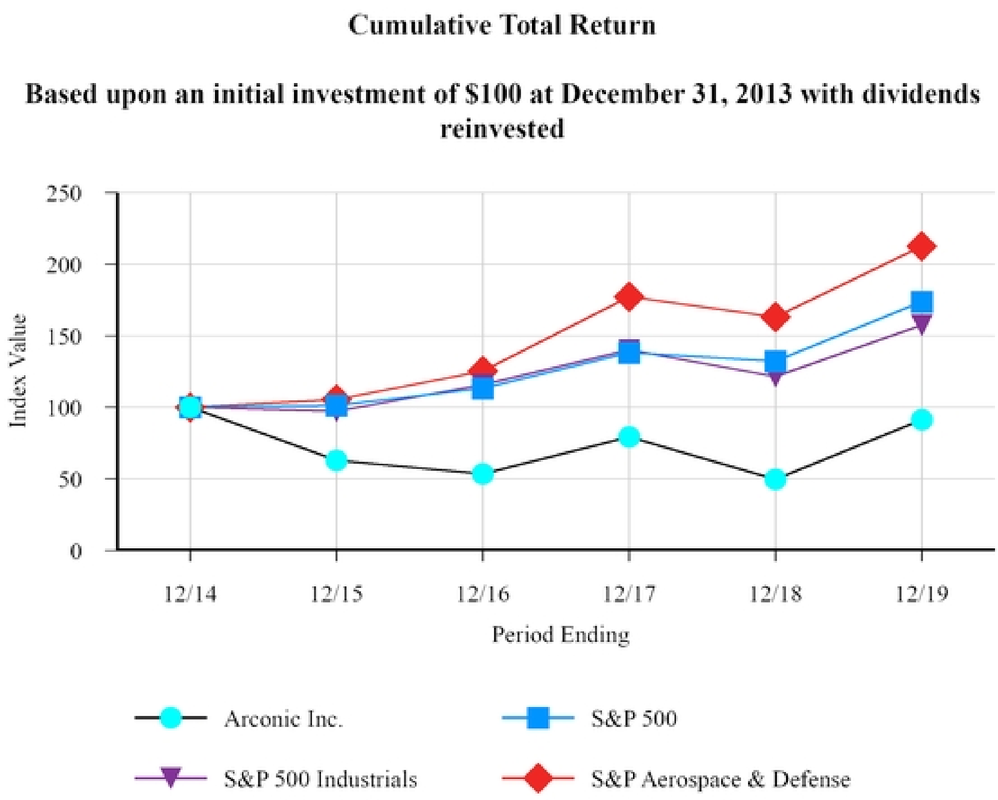
On November 1, 2016, the Company completed the Separation of Alcoa. The Separation of Alcoa was effected by means of a pro rata distribution by the Company of 80.1% of the outstanding shares of Alcoa Corporation common stock to the Company's shareholders. The Company's shareholders of record as of the close of business on October 20, 2016 (the "Record Date") received one share of Alcoa Corporation common stock for every three shares of the Company's common stock held as of the Record Date. The Company retained 19.9% of the outstanding common stock of Alcoa Corporation immediately following the Separation of Alcoa. See disposition of retained shares in Note U to the Consolidated Financial Statements in Part II Item 8 of this Form 10-K.

In conjunction with the Separation of Arconic, the Company will remain publicly traded and will change its name to "Howmet Aerospace Inc." ("Howmet Aerospace") and its stock symbol from "ARNC" to "HWM", and "Arconic Rolled Products Corporation" will change its name to "Arconic Corporation" and its common stock will be listed on the New York Stock Exchange under the symbol "ARNC."

The number of holders of record of common stock was approximately 10,874 as of February 21, 2020.

Stock Performance Graph

The following graph compares the most recent five-year performance of the Company's common stock with (1) the Standard & Poor's (S&P) 500® Index, (2) the S&P 500® Industrials Index, a group of 70 companies categorized by Standard & Poor's as active in the "industrials" market sector, and (3) the S&P Aerospace & Defense Select Industry Index, a group of 32 companies categorized by Standard & Poor's as active in the "aerospace & defense" industry. The graph assumes, in each case, an initial investment of $100 on December 31, 2014, and the reinvestment of dividends. Historical prices prior to the Separation of Alcoa on November 1, 2016, have been adjusted to reflect the value of the Separation transaction. The graph, table and related information shall not be deemed to be "filed" with the SEC, nor shall such information be incorporated by reference into future filings under the Securities Act of 1933 or Securities Exchange Act of 1934, each as amended, except to the extent that the Company specifically incorporates it by reference into such filing.



As of December 31,	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
Arconic Inc.	$ 100	$ 63.15	$ 53.54	$ 79.44	$ 49.70	$ 91.24
S&P 500® Index	100	101.38	113.51	138.29	132.23	173.86
S&P 500® Industrials Index	100	97.47	115.85	140.22	121.58	157.29
S&P Aerospace & Defense Select Industry Index	100	105.43	125.36	177.24	162.93	212.35

Issuer Purchases of Equity Securities

Period	Total Number of Shares Purchased	Average Price Paid Per Share	Total Number of Shares Purchased as Part of Publicly Announced Repurchase Plans or Programs[1]	Approximate Dollar Value of Shares that May Yet Be Purchased Under the Plans or Programs
October 1 - October 31, 2019	—	$ —	—	$ 400,000,000
November 1 - November 30, 2019[2]	1,626,681	$ 30.74	1,626,681	$ 350,000,000
December 1 - December 31, 2019	—	$ —	—	$ 350,000,000
Total for quarter ended December 31, 2019	1,626,681			

(1) On February 5, 2018, the Company announced that its Board of Directors (the Board) had authorized the repurchase of up to $500 million of the Company's outstanding common stock (the "February 2018 Share Repurchase Program"). There was no stated expiration for the February 2018 Share Repurchase Program, and no shares were repurchased during 2018. On February 8, 2019, the Company announced that the Board had authorized the repurchase of an additional $500 million of the Company's outstanding common stock, effective through the end of 2020. On May 20, 2019, the Company announced that the Board had authorized the repurchase of a further $500 million of the Company's outstanding common stock (the "May 2019 Share Repurchase Program"). There was no stated expiration for the May 2019 Share Repurchase Program.

(2) On November 14, 2019, the Company entered into an agreement with Citigroup Global Markets Inc. to repurchase $50 million of its common stock (the “November 2019 share repurchase program”), pursuant to the share repurchase programs previously authorized by its Board. All of the shares repurchased were immediately retired. After giving effect to the November 2019 share repurchase program, $350 million remains available under the prior authorizations by the Board for share repurchases through the end of 2020.

Item 6. Selected Financial Data.

(dollars in millions, except per-share amounts)

For the year ended December 31,	**2019**	**2018**	**2017**	**2016**	**2015**
Sales	$ 14,192	$ 14,014	$ 12,960	$ 12,394	$ 12,413
Amounts attributable to Arconic:					
Income (loss) from continuing operations	$ 470	$ 642	$ (74)	$ (1,062)	$ (157)
Income (loss) from discontinued operations	—	—	—	121	(165)
Net income (loss)	$ 470	$ 642	$ (74)	$ (941)	$ (322)
Earnings (loss) per share attributable to Arconic common shareholders:					
Basic:					
Income (loss) from continuing operations	$ 1.05	$ 1.33	$ (0.28)	$ (2.58)	$ (0.54)
Income (loss) from discontinued operations	—	—	—	0.27	(0.39)
Net income (loss)	$ 1.05	$ 1.33	$ (0.28)	$ (2.31)	$ (0.93)
Diluted:					
Income (loss) from continuing operations	$ 1.03	$ 1.30	$ (0.28)	$ (2.58)	$ (0.54)
Income (loss) from discontinued operations	—	—	—	0.27	(0.39)
Net income (loss)	$ 1.03	$ 1.30	$ (0.28)	$ (2.31)	$ (0.93)
Cash dividends declared per common share	$ 0.12	$ 0.24	$ 0.24	$ 0.36	$ 0.36
Total assets	17,578	18,693	18,718	20,038	36,477
Total debt	5,940	6,330	6,844	8,084	8,827
Cash provided from (used for) operations	406	217	(39)	95	764
Capital expenditures:					
Capital expenditures—continuing operations	586	768	596	827	789
Capital expenditures—discontinued operations	—	—	—	298	391
Total capital expenditures	$ 586	$ 768	$ 596	$ 1,125	$ 1,180

Effective November 1, 2016, Alcoa Inc. separated into two standalone, publicly-traded companies, Arconic Inc. (the new name for Alcoa Inc.) and Alcoa Corporation (the "Separation of Alcoa"). The results of operations of Alcoa Corporation for all periods prior to the Separation of Alcoa were retrospectively reflected in the table above as discontinued operations and, as such, were excluded from continuing operations for all prior periods presented prior to the Separation of Alcoa. The cash flow information presented in the table above included the cash flows related to Alcoa Corporation for the first ten months of 2016 and full year 2015.

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 and Notes in Part II, Item 8. (Financial Statements and Supplementary Data) 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; shipments in thousands of metric tons [kmt])

Overview

Our Business

Arconic Inc. ("Arconic" or the "Company") is a global leader in lightweight metals engineering and manufacturing. Arconic's innovative, multi-material products, which include aluminum, titanium, and nickel, are used worldwide in aerospace, automotive, commercial transportation, building and construction, industrial applications, defense, and packaging.

Arconic is a global company operating in 18 countries. Based upon the country where the point of sale occurred, the United States and Europe generated 67% and 23%, respectively, of Arconic's sales in 2019. In addition, Arconic has operating activities in numerous countries and regions outside the United States, including Europe, Canada, China, Japan, and Russia. 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 countries with such operating activities.

Management Review of 2019 and Outlook for the Future

In 2019, Sales increased 1% over 2018 as a result of volume growth in the aerospace, packaging, commercial transportation, and industrial end markets; and favorable product pricing in the Global Rolled Products (GRP) and Engineered Products and Forgings (EP&F) segments; partially offset by lower aluminum prices; and lower sales of $216 from divestitures of forgings businesses in the United Kingdom (divested in December 2019) and Eger, Hungary (divested in December 2018), Latin America extrusions (divested in April 2018), and the completed ramp down of Arconic's North American packaging operations (in December 2018). In the segments, Segment operating profit increased 27% from 2018 due to favorable product pricing, net cost savings, lower raw material costs including aluminum price, and higher volumes, partially offset by the impact of the Tennessee plant transition to industrial production, operational challenges at one aluminum extrusions plant, and higher variable compensation costs.

Management continued its focus on liquidity and cash flows as well as improving its operating performance through cost reductions, streamlined organizational structures, margin enhancement, and profitable revenue generation. Management has continued its intensified focus on capital efficiency. This focus and the related results enabled Arconic to end 2019 with a solid financial position.

The following financial information reflects certain key highlights of Arconic's 2019 results:

- Sales of $14,192, up 1% from 2018, with growth in key end markets, and Net income of $470, or $1.03 per diluted share;
- Total segment operating profit of $2,015, an increase of $429, or 27%, from 2018[1];
- Cash provided from operations of $406; cash used for financing activities of $1,568, reflecting the Company's repurchase of $1,150 of its common stock and the repayment of convertible notes in 2019; and cash provided from investing activities of $583;
- Cash on hand at the end of the year of $1,648; and
- Total debt of $5,940, a decrease of $390 from 2018, reflecting repayment of $403 of convertible notes in October 2019.

(1) *For the reconciliation of Total segment operating profit to Consolidated income before income taxes and related information, see page 43.*

The Company rapidly executed on the separation plan that was announced in February 2019 and is targeting completion of the separation on April 1, 2020. The company will separate into two independent, publicly-traded companies, to be named Howmet Aerospace Inc. (Remain Co.) and Arconic Corporation (Spin Co.) (the "Separation of Arconic"). Remain Co. will be comprised of the Company's Engineered Products and Forgings businesses (engine products, fastening systems, engineered structures and forged wheels) and will be renamed Howmet Aerospace Inc. at separation and change its stock ticker from "ARNC" to "HWM." Spin Co. will be comprised of the Company's Global Rolled Products businesses (global rolled products, aluminum extrusions and building and construction systems) and will be held by a new company that will be named Arconic Corporation at separation and that intends to list its common stock on the New York Stock Exchange under the symbol "ARNC."

On February 5, 2020, Arconic's Board of Directors approved the completion of the Separation of Arconic by means of a pro rata distribution by the Company of all of the outstanding common stock of Arconic Corporation, with each Arconic Inc. stockholder of record as of the close of business on March 19, 2020 receiving one share of Arconic Corporation common stock for every four shares of the Company's common stock held as of the record date. On February 7, 2020, the Company announced that Arconic Rolled Products Corporation (the "Issuer"), which is currently a wholly-owned subsidiary of Arconic, closed its offering of $600 aggregate principal amount of 6.125% second-lien notes due 2028. The proceeds will be used to make a payment to Arconic to fund the transfer of certain assets to the Issuer in connection with the separation and for general corporate purposes. On February 13, 2020, the Registration Statement on Form 10 for Arconic Rolled Products Corporation was declared effective by the Securities and Exchange Commission.

In conjunction with the Separation of Arconic, the Company realigned its reporting segments in the third quarter of 2019 by eliminating its Transportation and Construction Solutions segment and transferring the forged wheels business to the EP&F segment and transferring the building and construction systems business to the GRP segment. The Company also executed on its plan to sell businesses that do not best fit into one of its two segments, having signed or closed on divestitures in 2019 resulting in proceeds of approximately $190.

Results of Operations

Earnings Summary

Sales. Sales for 2019 were $14,192 compared with $14,014 in 2018, an increase of $178, or 1%. The increase was primarily due to volume growth in the aerospace, packaging, commercial transportation, and industrial end markets; favorable product pricing and mix in the GRP segment; and favorable product pricing in the EP&F segment when fulfilling volume above contractual share, renewing contracts, and selling non-contractual spot business; partially offset by lower aluminum prices; lower sales of $216 from the completed ramp down of Arconic's North American packaging operations (in December 2018) and the divestitures of forgings businesses in the United Kingdom (divested in December 2019) and Hungary (divested in December 2018), and the Latin America extrusions business (divested in April 2018); and unfavorable foreign currency movements.

Sales for 2018 were $14,014 compared with $12,960 in 2017, an increase of $1,054, or 8%. The increase was the result of strong volume growth across both segments, primarily in the aerospace engines and defense, automotive, commercial transportation, industrial, and building and construction end markets; higher aluminum prices and favorable product mix primarily in the GRP segment; and favorable foreign currency movements; partially offset by a decline in volumes in the industrial gas turbine end market; lower sales of $190 from the divestitures of the Latin America extrusions business, the rolling mill in Fusina, Italy (divested in March 2017), and the ramp down of Arconic's North American packaging operations; and costs of $38 in 2018 related to settlements of certain customer claims primarily related to product introductions.

Cost of Goods Sold (COGS). COGS as a percentage of Sales was 79.1% in 2019 compared with 81.3% in 2018. The decrease was primarily due to lower raw material costs including aluminum prices; net cost savings; favorable product pricing; and costs incurred in 2018 that did not recur in 2019 related to settlements of certain customer claims of $38 noted above and a charge related to a physical inventory adjustment at one plant in the GRP segment of $23. These positive impacts were partially offset by unfavorable product mix; a charge for environmental remediation at Grasse River of $25; the impairment of energy business assets of $10; and a charge primarily for a one-time signing bonus for employees associated with the collective bargaining agreement negotiation of $9. In June of 2019 the Company and the United Steelworkers reached a tentative three-year labor agreement covering approximately 3,400 employees at four U.S. locations; the previous labor agreement expired on May 15, 2019. The tentative agreement was ratified on July 11, 2019. Additionally, in 2019, the Company sustained a fire at a fasteners plant in France and recorded charges of $26 for higher operating costs, equipment and inventory damage, and repairs and cleanup costs. The Company submitted an insurance claim and received a partial settlement of $25, which was in excess of its $10 insurance deductible. The insurance claim included $8 of margin not recognized from lost revenue due to the fire. The Company anticipates a charge of approximately $10 to $15 in the first quarter of 2020, with additional impacts in subsequent quarters as the business continues to recover from the fire, which are also expected to be covered by insurance proceeds.

COGS as a percentage of Sales was 81.3% in 2018 compared with 78.9% in 2017. The increase was the result of higher aluminum prices; unfavorable aerospace product mix; higher transportation costs; manufacturing inefficiencies in Engineered Structures; performance shortfalls in the Disks asset group; costs related to settlements of certain customer claims noted above; and the impact of a charge related to a physical inventory adjustment at one plant in the GRP segment of $23 that was recorded in the second quarter of 2018. While a portion of this charge for the physical inventory adjustment related to prior years, the majority related to the first half of 2018. The out-of-period amounts were not material to any interim or annual periods.

Selling, General Administrative, and Other Expenses (SG&A). SG&A expenses were $704, or 5.0% of Sales, in 2019 compared with $604, or 4.3% of Sales, in 2018. The increase in SG&A of $100, or 17%, was primarily due to costs associated with the planned Separation of Arconic of $78 and higher annual incentive compensation accruals and executive compensation costs, partially offset by lower costs driven by overhead cost reductions and lower net legal and other advisory costs related to Grenfell Tower of $10, primarily due to insurance reimbursements.

SG&A expenses were $604, or 4.3% of Sales, in 2018 compared with $715, or 5.5% of Sales, in 2017. The decrease in SG&A of $111, or 16%, was the result of proxy, advisory and governance-related costs of $58, costs related to the Separation of Alcoa Inc. of $18, and costs associated with the Company's Delaware reincorporation of $3 in 2017, none of which recurred in 2018.

Additionally, lower expenses driven by lower annual incentive compensation accruals and overhead cost reductions were somewhat offset by an increase in legal and other advisory costs related to Grenfell Tower of $4 as well as strategy and portfolio review costs of $7 in 2018.

Research and Development Expenses (R&D). R&D expenses were $70 in 2019 compared with $103 in 2018. The decrease of $33, or 32%, was primarily due to the consolidation of the Company's primary R&D facility in conjunction with ongoing cost reduction efforts.

R&D expenses were $103 in 2018 compared with $109 in 2017. The decrease of $6, or 6%, was the result of lower spending.

Provision for Depreciation and Amortization (D&A). The provision for D&A was $536 in 2019 compared with $576 in 2018. The decrease of $40, or 7%, was primarily due to the impact of divestitures, as well as asset impairments in the EP&F segment during the second quarter of 2019 (see Note M to the Consolidated Financial Statements in Part II, Item 8. (Financial Statements and Supplementary Data) of this Form 10-K).

The provision for D&A was $576 in 2018 compared with $551 in 2017. The increase of $25, or 5%, was primarily due to capital projects placed into service.

Impairment of Goodwill. In 2017, the Company recognized an impairment of goodwill of $719 related to the annual impairment review of its Arconic Forgings and Extrusions (AFE) business (see Goodwill under Critical Accounting Policies and Estimates below).

Restructuring and Other Charges. Restructuring and other charges were $620 in 2019 compared with $9 in 2018 and $165 in 2017.

Restructuring and other charges in 2019 primarily included asset impairments of $556, related to the Disks asset group of $428, agreements to sell the Company’s Brazilian rolling mill operations, the U.K. forgings business, and a small additive business of $112, and a trade name intangible asset and properties, plant, and equipment related to the Company’s primary research and development facility of $25; and a charge for layoff costs of $103, including the separation of approximately 1,310 employees; partially offset by a benefit from the elimination of the life insurance benefit for the U.S. salaried and non-bargaining hourly retirees of the Company and its subsidiaries of $58; and a gain for contingent consideration received from the sale of the Texarkana rolling mill of $20.

Restructuring and other charges in 2018 primarily included a charge for pension and other postretirement benefits net settlements and curtailments of $91; a loss on the sale of the Hungary forgings business of $43; and a charge for layoff costs of $20, including the separation of approximately 125 employees; partially offset by a gain on the asset sale of the Texarkana rolling mill of $154.

Restructuring and other charges in 2017 primarily included a charge for layoff costs of $69, including the separation of approximately 880 employees; a charge related to the sale of the Italy rolling mill of $60; and a charge for the impairment of assets associated with the sale of the Latin America extrusions business of $41.

See Note C to the to the Consolidated Financial Statements in Part II, Item 8. (Financial Statements and Supplementary Data) of this Form 10-K.

Interest Expense. Interest expense was $338 in 2019 compared with $378 in 2018. The decrease of $40, or 11%, was primarily due to lower debt outstanding, driven by the repayment of the aggregate outstanding principal amount of the 1.63% Convertible Notes of approximately $403 on October 15, 2019, as well as costs incurred of $19 in 2018 related to the premium paid on the early redemption of the Company’s then outstanding 5.72% Senior Notes due 2019 that did not recur in 2019.

Interest expense was $378 in 2018 compared with $496 in 2017. The decrease of $118, or 24%, was the result of higher costs incurred in 2017 related to the early redemption of the Company’s outstanding debt than were incurred during 2018, as well as lower debt outstanding.

Other Expense (Income), Net. Other expense, net was $122 in 2019 compared with $79 in 2018. The increase of $43 was primarily due to an increase in deferred compensation arrangements and related investment performance and the benefit recognized in 2018 from establishing a tax indemnification receivable reflecting Alcoa Corporation’s 49% share of a Spanish tax reserve of $29 that did not recur in 2019, partially offset by favorable foreign currency movements.

Other expense, net was $79 in 2018 compared with Other income, net of $486 in 2017. The decrease in Other income, net of $565 was the result of gains recorded during 2017 related to the sale of a portion of Arconic’s investment in Alcoa Corporation common stock of $351, the Debt-for-Equity Exchange (in April and May 2017, the Company acquired a portion of its outstanding notes held by two investment banks (the “Investment Banks”) in exchange for cash and the Company’s remaining 12,958,767 shares (valued at $35.91 per share) in Alcoa Corporation stock and recorded a gain of $167), income associated with an adjustment to the contingent earn-out liability related to the Firth Rixson acquisition of $81 (see Note S to the Consolidated Financial Statements in Part II, Item 8. (Financial Statements and Supplementary Data) of this Form 10-K), and income due to the reversal of a liability associated with a separation-related guarantee of $25, none of which recurred in 2018, and unfavorable foreign currency movements, somewhat offset by lower non-service related net periodic benefit cost and the benefit of $29 from establishing a tax indemnification receivable reflecting Alcoa Corporation’s 49% share of a Spanish tax reserve (see Note T to the Consolidated Financial Statements in Part II, Item 8. (Financial Statements and Supplementary Data) of this Form 10-K).

Income Taxes. Arconic’s effective tax rate was 18.3% in 2019 compared with the U.S. federal statutory rate of 21%. The effective rate differs from the U.S. federal statutory rate primarily as a result of a $94 net benefit related to a U.S. tax election which caused the deemed liquidation of a foreign subsidiary’s assets into its U.S. tax parent, a $24 net benefit associated with the deduction of foreign taxes that were previously claimed as a U.S. foreign tax credit, and a $12 net benefit for foreign tax rate changes, partially offset by the tax impact of $89 of non-deductible executive compensation and transaction costs, $53 of impairment charges related to the Company’s Brazilian rolling mill operations and other foreign losses with no tax benefit, a $14 charge for U.S. state taxes, and by foreign income subject to U.S. taxes.

Arconic’s effective tax rate was 26.0% in 2018 compared with the U.S. federal statutory rate of 21%. The effective tax rate differs from the U.S. federal statutory rate primarily as a result of a $60 charge to establish a tax reserve in Spain, a $59 net charge resulting from the Company’s finalized analysis of the U.S. Tax Cuts and Jobs Acts of 2017 ("the 2017 Act"), a $13 charge for U.S. state taxes, foreign income taxed in higher rate jurisdictions, and foreign losses with no tax benefit, partially offset by a $74 benefit related to the reversal of a foreign recapture obligation, a $38 benefit to reverse a foreign tax reserve that is effectively settled, and a $10 benefit for the release of U.S. valuation allowances.

Arconic’s effective tax rate was 115.7% in 2017 compared with the U.S. federal statutory rate of 35%. The effective tax rate differs from the U.S. federal statutory rate primarily as a result of a $719 impairment of goodwill, a $41 impairment of assets in the Latin America extrusions business, and a $60 charge related to the sale of a rolling mill in Italy that are nondeductible for income tax purposes, a $272 tax charge as a provisional impact of the 2017 Act, and a $23 tax charge for an increase in an uncertain tax position in Germany, partially offset by a $73 tax benefit related to the sale and Debt-for-Equity Exchange of the Alcoa Corporation stock, a $69 tax benefit for the release of U.S. state valuation allowances net of the federal tax benefit, a $27 favorable tax impact associated with a non-taxable earn-out liability adjustment in connection with the Firth Rixson acquisition, and by foreign income taxed in lower rate jurisdictions. Arconic’s effective tax rate was 356.5% in 2016 compared with the U.S. fed

Arconic anticipates that the effective tax rate in 2020 will be between 26.5% and 28.5%. However, the planned Separation of Arconic, other business portfolio actions, changes in the current economic environment, tax legislation or rate changes, currency fluctuations, ability to realize deferred tax assets, movements in stock price impacting tax benefits or deficiencies on stock-based payment awards, and the results of operations in certain taxing jurisdictions may cause this estimated rate to fluctuate.

Net Income. Net income was $470 for 2019, or $1.03 per diluted share, compared to Net income of $642 for 2018, or $1.33 per share. The decrease in results of $172 was primarily due to higher Restructuring and other charges; higher SG&A expenses due to costs associated with the planned Separation of Arconic of $70 ($78 before-tax) and higher annual incentive compensation accruals and executive compensation costs; and higher Other expense, net due to an increase in deferred compensation arrangements and related investment performance and the benefit recognized in 2018 from establishing a tax indemnification receivable reflecting Alcoa Corporation’s 49% share of a Spanish tax reserve of $28 ($29 before-tax) that did not recur in 2019; partially offset by volume growth; favorable product pricing; net cost savings; lower D&A due to the impact of divestitures as well as asset impairments in the EP&F segment; lower Interest expense due to lower debt outstanding and costs incurred of $15 ($19 before-tax) in 2018 related to the premium paid on the early redemption of debt that did not recur in 2019; lower R&D expenses due to the consolidation of the Company's primary R&D facility in conjunction with ongoing cost reduction efforts; and lower Income taxes primarily as a result of a benefit related to a U.S. tax election which caused the deemed liquidation of a foreign subsidiary’s assets into its U.S. tax parent.

Net income was $642 for 2018, or $1.30 per diluted share, compared to a Net loss of $74 for 2017, or $0.28 per share. The increase in results of $716 was due in part to the following items that occurred in 2017 but did not recur in 2018: a charge for goodwill impairment of $719 ($719 pre-tax); gains related to the sale of a portion of Arconic’s investment in Alcoa Corporation common stock and the Debt-for-Equity Exchange of $405 ($518 pre-tax); and favorable adjustments to contingent earn-out and guarantee liabilities of $97 ($106 pre-tax). Additional favorable impacts in 2018 included: volume growth across both segments; lower SG&A expenses due to proxy and separation costs incurred in 2017 and not recurring in 2018, as well as lower incentive compensation accruals; lower Restructuring and other charges driven primarily by the gain on sale of the Texarkana rolling mill, offset by pension settlement charges and the loss on sale of the forgings business in Hungary; lower Interest expense due to lower debt levels; lower pension expenses; and lower Income taxes. These favorable impacts were partially offset by unfavorable aerospace product mix, higher aluminum prices, manufacturing inefficiencies in Engineered Structures, performance shortfalls in the Disks asset group, settlements of certain customer claims, and an unfavorable physical inventory adjustment at one plant.

Segment Information

Arconic's operations consist of two worldwide reportable segments: Engineered Products and Forgings (EP&F) and Global Rolled Products (GRP). Segment performance under Arconic's management reporting system is evaluated based on a number of factors; however, the primary measure of performance is Segment operating profit. Arconic's definition of Segment operating profit is Operating income excluding Special items. Special items include Restructuring and other charges and Impairment of goodwill. Segment operating profit may not be comparable to similarly titled measures of other companies. Differences between segment totals and consolidated Arconic are in Corporate.

In the third quarter of 2019, the Company realigned its operations by eliminating its Transportation and Construction Solutions (TCS) segment and transferring the Forged Wheels business to its EP&F segment and the Building and Solutions Systems (BCS) business to its GRP segment, consistent with how the Chief Executive Officer is assessing operating performance and allocating capital in conjunction with the planned Separation of Arconic (see Note U to the Consolidated Financial Statements in Part II, Item 8. (Financial Statements and Supplementary Data) of this Form 10-K). The Latin America extrusions business, which was formerly part of the Company's TCS segment until its sale in April of 2018 (see Note S to the Consolidated Financial Statements in Part II, Item 8. (Financial Statements and Supplementary Data) of this Form 10-K), was moved to Corporate. In the first quarter of 2019, management transferred its aluminum extrusions operations from its Engineered Structures business unit within the EP&F segment to the GRP segment, based on synergies with the GRP segment including similar customer base, technologies, and manufacturing capabilities. Prior period financial information has been recast to conform to current year presentation.

Arconic produces aerospace engine parts and components, aerospace fastening systems, and aluminum sheet and plate products for Boeing 737 MAX airplanes. The temporary reduction in the production rate of the 737 MAX airplanes that was announced by Boeing in April 2019 did not have a significant impact on the Company's sales or segment operating profit in 2019. In late December 2019, Boeing announced a temporary suspension of production of the 737 MAX airplanes. In 2020, the Company expects a reduction in production rate to have a negative impact on sales of approximately $400 along with a corresponding impact on segment operating profit in the EP&F and GRP segments.

Segment operating profit for all reportable segments totaled $2,015 in 2019, $1,586 in 2018, and $1,689 in 2017. The following information provides Sales and Segment operating profit for each reportable segment, as well as certain shipment data for GRP, for each of the three years in the period ended December 31, 2019. See Note B to the Consolidated Financial Statements in Part II, Item 8. (Financial Statements and Supplementary Data) of this Form 10-K.

Engineered Products and Forgings

	2019	2018	2017
Third-party sales	$ 7,105	$ 6,798	$ 6,300
Segment operating profit	$ 1,390	$ 1,105	$ 1,119

The Engineered Products and Forgings segment produces products that are used primarily in the aerospace (commercial and defense), industrial, commercial transportation, and power generation end markets. Such products include fastening systems (aluminum, titanium, steel, and nickel superalloys) and seamless rolled rings (mostly nickel superalloys); investment castings (nickel superalloys, titanium, and aluminum), including airfoils; forged jet engine components (e.g., jet engine disks); extruded, machined and forged aircraft parts (titanium and aluminum); and forged aluminum commercial vehicle wheels, all of which are sold directly to customers and through distributors. Approximately 70% of the third-party sales in this segment are from the aerospace end market. A small part of this segment also produces various forged and machined metal products (titanium and aluminum) for various end markets. Seasonal decreases in sales are experienced for certain products in the third quarter of the year due to the European summer slowdown. Generally, the sales and costs and expenses of this segment are transacted in the local currency of the respective operations, which are mostly the U.S. dollar, British pound and the euro.

On December 1, 2019, Arconic completed the divestiture of its forgings business in the United Kingdom. The forgings business primarily produces steel, titanium, and nickel based forged components for aerospace, mining, and off-highway markets. This business generated third-party sales of $116, $131, and $127 in 2019, 2018, and 2017, respectively, and had 540 employees at the time of the divestiture.

On December 31, 2018, as part of the Company's then ongoing strategy and portfolio review, Arconic completed the sale of its forgings business in Hungary that manufactured high volume steel forgings for drivetrain components in the European heavy-duty truck and automotive market. This business generated third-party sales of $32 and $38 in 2018 and 2017, respectively, and had 180 employees at the time of the divestiture.

Third-party sales for the Engineered Products and Forgings segment increased $307, or 5%, in 2019 compared with 2018, primarily as a result of higher aerospace and commercial transportation volumes and favorable product pricing, partially offset by unfavorable foreign currency movements and lower sales of $47 from divestitures of forgings businesses in the United Kingdom (divested in December 2019) and Hungary (divested in December 2018).

Third-party sales for this segment increased $498, or 8%, in 2018 compared with 2017, primarily attributable to higher volumes in the aerospace engines, defense, and commercial transportation end markets and favorable foreign currency movements, partially offset by a decline in volumes in the industrial gas turbine market and lower aerospace pricing principally in the fasteners business.

Segment operating profit for the Engineered Products and Forgings segment increased $285, or 26%, in 2019 compared with 2018, due to net cost savings, higher volumes as noted previously, favorable product pricing, and lower raw material costs, partially offset by the unfavorable impact of new product introductions in aerospace engines and unfavorable product mix.

Segment operating profit for this segment decreased $14, or 1%, in 2018 compared with 2017, primarily attributable to performance shortfalls in the Disks asset group; manufacturing inefficiencies in the Engineered Structures business, associated with the now resolved forging press outage at the Cleveland facility that impacted the fourth quarter of 2018 with higher costs of $10; unfavorable aerospace engine mix and new product introductions; and lower aerospace pricing principally in the fasteners business; partly offset by the strength in aerospace engine, defense, and commercial transportation volumes and net cost savings.

In 2020 compared to 2019, demand in the commercial aerospace end market, excluding the impact of Boeing 737 MAX, is expected to remain strong, driven by the ramp-up of new aerospace engine platforms. Demand in the defense end market is expected to continue to grow due to the ramp-up of certain aerospace programs, while the commercial transportation end market is expected to be down. Net cost savings and favorable pricing are expected to continue.

In mid-February 2020, a fire occurred at the Company’s forged wheels plant located in Barberton, Ohio. While some equipment has safely been returned to service at reduced production levels, the extent of the damage and the financial impact are not yet known as the investigation into the cause of the fire and its full impact continues. The Company has insurance with a deductible of $10.

Global Rolled Products

	2019	2018	2017
Third-party sales	$ 7,082	$ 7,223	$ 6,540
Intersegment sales	183	205	183
Total sales	$ 7,265	$ 7,428	$ 6,723
Segment operating profit	$ 625	$ 481	$ 570
Third-party aluminum shipments (kmt)	1,379	1,301	1,249

The Global Rolled Products segment produces aluminum sheet and plate, aluminum extruded and machined parts, integrated aluminum structural systems, and architectural extrusions used in the automotive, aerospace, building and construction, industrial, packaging, and commercial transportation end markets. Products are sold directly to customers and through distributors. While the customer base for flat-rolled products is large, a significant amount of sales of sheet and plate is to a relatively small number of customers. Generally, the sales and costs and expenses of this segment are transacted in the local currency of the respective operations, which are mostly the U.S. dollar, Chinese yuan, the euro, the Russian ruble, the Brazilian real, and the British pound.

In March 2017, Arconic completed the sale of its Fusina, Italy rolling mill. The rolling mill generated third-party sales of $54 in 2017 and had approximately 312 employees.

Third-party sales for the Global Rolled Products segment decreased $141, or 2%, in 2019 compared with 2018, primarily as a result of lower aluminum prices, the absence of sales of $144 from the completed ramp down of Arconic's North American packaging operations (completed in December 2018), and unfavorable foreign currency movements, partially offset by favorable product pricing and mix and higher volumes in the packaging, aerospace, and industrial end markets.

Third-party sales for this segment increased $683, or 10%, in 2018 compared with 2017, primarily attributable to higher aluminum prices; higher volumes in the automotive, commercial transportation, and industrial end markets; and favorable product mix; partially offset by the absence of sales of $54 from the rolling mill in Fusina, Italy and the planned ramp down of Arconic's North American packaging operations.

Segment operating profit for the Global Rolled Products segment increased $144, or 30%, in 2019 compared with 2018, due to favorable pricing adjustments on industrial and commercial transportation products; favorable aluminum price impacts; net cost savings; favorable product mix; and the impact of a charge incurred in 2018 related to a physical inventory adjustment at one plant that did not recur in 2019; partially offset by operational challenges at one aluminum extrusions plant and the impact of the Tennessee plant transition to industrial production.

Segment operating profit for this segment decreased $89, or 16%, in 2018 compared with 2017, primarily driven by operational challenges at one plant, higher aluminum prices, unfavorable aerospace wide-body production mix, higher transportation costs and scrap spreads, and a physical inventory adjustment of $23; partially offset by higher automotive, commercial transportation and industrial volumes.

On February 1, 2020, Arconic sold its aluminum rolling mill in Itapissuma, Brazil. This rolling mill generated sales of $143 in 2019 and had 513 employees at the time of divestiture.

In 2020 compared to 2019, demand from the automotive end market is expected to be up, while headwinds will continue in the commercial transportation end market. The aerospace airframe end market will be heavily influenced by the 737 MAX situation. Growth is expected with the Tennessee industrial products ramp-up. The BCS business expects continued growth and margin expansion. Net productivity improvements are also anticipated to continue.

Reconciliation of Total segment operating profit to Consolidated income from continuing operations before income taxes

	2019	2018	2017
Total segment operating profit	$ 2,015	$ 1,586	$ 1,689
Unallocated amounts:			
Impairment of goodwill	—	—	(719)
Restructuring and other charges	(620)	(9)	(165)
Corporate expense	(360)	(252)	(325)
Consolidated operating income	$ 1,035	$ 1,325	$ 480
Interest expense	(338)	(378)	(496)
Other (expense) income, net	(122)	(79)	486
Consolidated income from continuing operations before income taxes	$ 575	$ 868	$ 470

See Impairment of Goodwill, Restructuring and Other Charges, Interest Expense, and Other Expense (Income), Net, discussions above under Results of Operations for reference.

Corporate expense increased $108, or 43%, in 2019 compared with 2018 primarily due to costs associated with the planned Separation of Arconic of $78; higher annual incentive compensation accruals and executive compensation costs; environmental remediation costs for Grasse River of $25; impairment of energy business assets of $10; net impacts associated with a fire at a fasteners plant of $9 (net of insurance reimbursements); and collective bargaining agreement negotiation costs of $9; partially offset by costs incurred in 2018 that did not recur in 2019 related to settlements of certain customer claims of $38; lower costs driven by overhead cost reductions; lower research and development expenses; and lower net legal and other advisory costs related to Grenfell Tower of $10 primarily due to insurance reimbursements.

Corporate expense decreased $73, or 22%, in 2018 compared with 2017 primarily due to proxy, advisory and governance-related costs of $58 and costs related to the Separation of Alcoa Inc. of $18 in 2017, neither of which recurred in 2018. Also, lower expenses driven by lower annual incentive compensation accruals and overhead cost reductions were partially offset by costs incurred in the second quarter of 2018 related to the settlements of certain customer claims primarily related to product introductions of $38, an increase in legal and other advisory costs related to Grenfell Tower of $4, and strategy and portfolio review costs of $7 in 2018.

Environmental Matters

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

Liquidity and Capital Resources

Arconic maintains a disciplined approach to cash management and strengthening of its balance sheet. Management continued to focus on actions to improve Arconic's cost structure and liquidity, providing the Company with the ability to operate effectively. Such actions included procurement efficiencies and overhead rationalization to reduce costs, working capital initiatives, and maintaining a sustainable level of capital expenditures.

Cash provided from operations and financing activities is expected to be adequate to cover Arconic'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, 2019, cash and cash equivalents of Arconic were $1,648, of which $414 was held by Arconic's non-U.S. subsidiaries. If the cash held by non-U.S. subsidiaries were to be repatriated to the U.S., the company does not expect there to be additional material income tax consequences.

Operating Activities

Cash provided from operations in 2019 was $406 compared with $217 in 2018. The increase of $189, or 87%, was primarily due to higher operating results and lower pension contributions of $30, partially offset by higher working capital of $112. The components of the change in working capital included unfavorable changes in accounts payable of $395 and taxes, including income taxes of $106, partially offset by favorable changes in receivables of $165 and accrued expenses of $148.

Cash provided from operations in 2018 was $217 compared with Cash used for operations $39 in 2017. The increase of $256 was primarily due to lower working capital of $209 and a favorable change in noncurrent liabilities of $169 due primarily to reversals in 2017 related to the Firth Rixson earn-out liability of $81 and separation-related guarantee liability of $25, partially offset by lower operating results. The components of the change in working capital included favorable changes in accounts payable of $277, taxes, including income taxes of $127, and inventories of $118, partially offset by unfavorable changes in receivables of $227, accrued expenses of $74, and prepaid expenses and other current assets of $12.

Financing Activities

Cash used for financing activities was $1,568 in 2019 compared with $649 in 2018 and $1,015 in 2017.

The use of cash in 2019 was primarily related to the repurchase of $1,150 of common stock (see Note H to the Consolidated Financial Statements in Part II, Item 8. (Financial Statements and Supplementary Data); repayments on borrowings under certain revolving credit facilities (see below) and repayments on debt, primarily the aggregate outstanding principal amount of the 1.63% Convertible Notes of approximately $403 (see Note P to the Consolidated Financial Statements in Part II, Item 8. (Financial Statements and Supplementary Data); and dividends paid to shareholders of $57. These items were partially offset by additions to debt for borrowings under certain revolving credit facilities of $400 and proceeds from the exercise of employee stock options of $56.

The use of cash in 2018 was principally the result of $1,103 in repayments on borrowings under certain revolving credit facilities (see below) and repayments on debt, primarily related to the early redemption of the then remaining outstanding 5.72% Notes due in 2019 (see Note P to the Consolidated Financial Statements in Part II, Item 8. (Financial Statements and Supplementary Data) of this Form 10-K) and $119 in dividends to shareholders. These items were partially offset by $600 in additions to debt, primarily from borrowings under certain revolving credit facilities.

The use of cash in 2017 was principally the result of $1,634 in repayments on borrowings under certain revolving credit facilities (see below) and repayments on debt, primarily related to the early redemption of the Company’s 6.50% Bonds due 2018, 6.75% Notes due 2018, and a portion of the 5.72% Notes due 2019 (see Note P to the Consolidated Financial Statements in Part II, Item 8. (Financial Statements and Supplementary Data) of this Form 10-K); $162 in dividends to shareholders; and $52 in premiums paid on early redemption of debt. These items were partially offset by $816 in additions to debt, primarily from borrowings under certain revolving credit facilities, and $50 of proceeds from the exercise of stock options.

In September 2014, Arconic completed two public securities offerings under its shelf registration statement for (i) $1,250 of 25 million depositary shares, each representing a 1/10th interest in a share of Arconic’s 5.375% Class B Mandatory Convertible Preferred Stock, Series 1, par value $1 per share, liquidation preference $500 per share, and (ii) $1,250 of 5.125% Notes due 2024. The net proceeds of the offerings were used to finance the cash portion of the acquisition of Firth Rixson. On October 2, 2017, all outstanding 24,975,978 depositary shares were converted at a rate of 1.56996 into 39,211,286 common shares; 24,022 depositary shares were previously tendered for early conversion into 31,420 shares of Arconic common stock. No gain or loss was recognized associated with this noncash equity transaction.

Arconic maintains a Five-Year Revolving Credit Agreement (the “Credit Agreement”) with a syndicate of lenders and issuers named therein that expires on June 29, 2023 and provides for a senior unsecured revolving credit facility of $3,000. In addition to the Credit Agreement, Arconic has a number of other credit agreements that provide a combined borrowing capacity of $640 as of December 31, 2019. See Note P to the Consolidated Financial Statements in Part II, Item 8. (Financial Statements and Supplementary Data) of this Form 10-K.

Arconic’s costs 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 Arconic by the major credit rating agencies.

On May 1, 2017, Standard and Poor’s Ratings Services (S&P) affirmed Arconic’s long-term debt at BBB-, an investment grade rating, with a stable outlook, and its short-term debt at A-3. On February 7, 2019, S&P placed the rating on negative credit watch and, subsequently, on April 26, S&P affirmed the long-term debt rating at BBB- but changed the outlook to negative. On January 28, 2020, S&P affirmed the long-term debt rating at BBB- but changed the outlook to stable in expectation of the separation impact. On November 1, 2016, Moody’s Investor Service (Moody’s) downgraded Arconic’s long-term debt rating from Ba1, a non-investment grade, to Ba2 with a stable outlook and its short-term debt rating from Speculative Grade Liquidity-1 to Speculative Grade Liquidity-2. Moody's ratings and outlooks were affirmed on November 2, 2017, October 8, 2018, and October 9, 2019. On January 24, 2020, Moody's affirmed the long-term debt rating at Ba2 but changed the outlook to negative. On April 21, 2016, Fitch affirmed Arconic's long-term debt rating at BB+, a non-investment grade, and short-term debt at B. Additionally, Fitch changed the outlook from positive to evolving. On July 7, 2016, Fitch changed the outlook from evolving to stable (ratings and outlook were affirmed on July 3, 2017). On September 27, 2018, Fitch changed the outlook from stable to positive (ratings and outlook were affirmed on October 8, 2019).

Investing Activities

Cash provided from investing activities was $583 in 2019 compared with $565 in 2018 and $1,320 in 2017.

The source of cash in 2019 was primarily due to cash receipts from sold receivables of $995, proceeds from the sale of assets and businesses of $103 (see Note S to the Consolidated Financial Statements in Part II, Item 8. (Financial Statements and Supplementary Data), and the sale of fixed income securities of $73, partially offset by capital expenditures of $586, including expansion of a wheels plant in Hungary, expansion of aerospace airfoils capacity in the United States, and transition of the Tennessee plant to industrial production.

The source of cash in 2018 included cash receipts from sold receivables of $1,016 and proceeds from the sale of the Texarkana, Texas rolling mill and cast house of $302, partially offset by capital expenditures of $768, including the horizontal heat treat furnace at the Davenport, Iowa plant and an expansion of a wheels plant in Szekesfehervar, Hungary.

The source of cash in 2017 included proceeds of $888 from the sale of a portion of Arconic's investment in Alcoa Corporation common stock, cash receipts from sold receivables of $792, and the receipt of proceeds from the sale of the Yadkin Hydroelectric Project of $243 (see Note U to the Consolidated Financial Statements in Part II, Item 8. (Financial Statements and Supplementary Data) of this Form 10-K), somewhat offset by cash used for capital expenditures of $596, including the aerospace expansion (very thick plate stretcher and horizontal heat treat furnace) at the Davenport, Iowa plant and a titanium aluminide furnace at the Niles, Ohio facility, and the injection of $10 into the rolling business in Italy prior to its sale.

Noncash Financing and Investing Activities

On October 2, 2017, all outstanding 24,975,978 depositary shares (each depositary share representing a 1/10th interest in a share of the mandatory convertible preferred stock) were converted at a rate of 1.56996 into 39,211,286 common shares; 24,022 depositary shares were previously tendered for early conversion into 31,420 shares of Arconic common stock. No gain or loss was recognized associated with this equity transaction. See Note H to the Consolidated Financial Statements in Part II, Item 8. (Financial Statements and Supplementary Data) of this Form 10-K.

In the second quarter of 2017, the Company completed a Debt-for-Equity Exchange with the Investment Banks for the remaining portion of Arconic's retained interest in Alcoa Corporation common stock for a portion of the Company's outstanding notes held by the Investment Banks for $465 including accrued and unpaid interest. See Note P to the Consolidated Financial Statements in Part II, Item 8. (Financial Statements and Supplementary Data) of this Form 10-K.

Contractual Obligations and Off-Balance Sheet Arrangements

Contractual Obligations. Arconic is required to make future payments under various contracts, including long-term purchase obligations, financing arrangements, and lease agreements. Arconic also has commitments to fund its pension plans, provide payments for other postretirement benefit plans, and fund capital projects. As of December 31, 2019, a summary of Arconic'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	2020	2021-2022	2023-2024	Thereafter
Operating activities:					
Energy-related purchase obligations	$ 57	$ 29	$ 25	$ 3	$ —
Raw material purchase obligations	569	495	64	8	2
Other purchase obligations	134	80	49	5	—
Operating leases	317	81	108	58	70
Interest related to total debt	1,975	344	444	344	843
Estimated minimum required pension funding	1,705	475	655	575	—
Other postretirement benefit payments	655	80	160	155	260
Layoff and other restructuring payments	34	34	—	—	—
Deferred revenue arrangements	36	6	30	—	—
Uncertain tax positions	220	—	—	—	220
Financing activities:					
Total debt	5,940	1,028	1,871	1,246	1,795
Dividends to shareholders	—	—	—	—	—
Investing activities:					
Capital projects	401	247	121	33	—
Totals	$ 12,043	$ 2,899	$ 3,527	$ 2,427	$ 3,190

Obligations for Operating Activities

Energy-related purchase obligations consist primarily of electricity and natural gas contracts with expiration dates ranging from one year to five years. Raw material purchase obligations consist mostly of aluminum, titanium sponge, and various other metals with expiration dates ranging from less than one year to six 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.

Operating leases represent multi-year obligations for certain land and buildings, plant equipment, vehicles, and computer equipment.

Interest related to total debt is based on interest rates in effect as of December 31, 2019 and is calculated on debt with maturities that extend to 2042.

Estimated minimum required pension funding and postretirement benefit payments are based on actuarial estimates using current assumptions for discount rates, long-term rate of return on plan assets, and health care cost trend rates, among others. It is Arconic's policy to fund amounts for pension plans sufficient to meet the minimum requirements set forth in applicable country benefits laws and tax laws. Periodically, Arconic contributes additional amounts as deemed appropriate. The estimates reported in the preceding table include amounts sufficient to meet the minimum required, along with approximately $60 of contributions in 2020 related to actions designed to reduce future obligations. Arconic has determined that it is not practicable to present pension funding and other postretirement benefit payments beyond 2024 and 2029, respectively.

Layoff and other restructuring payments to be paid within one year primarily relate to severance costs, special layoff benefit payments, and lease termination costs.

Deferred revenue arrangements require Arconic to deliver product to certain customers over the specified contract period (through 2020 for a sheet and plate contract and 2021 for certain aerospace parts contracts). While these obligations are not expected to result in cash payments, they represent contractual obligations for which the Company would be obligated 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, 2019. 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

Arconic has historically paid quarterly dividends on its preferred and common stock. Including dividends on preferred stock, Arconic paid $57 in dividends to shareholders during 2019. Because all dividends are subject to approval by Arconic's Board of Directors, amounts are not included in the preceding table unless such authorization has occurred. As of December 31, 2019, there were 432,855,183 shares of outstanding common stock and 546,024 shares of outstanding Class A preferred stock. In 2019, the preferred stock dividend was $3.75 per share and the common stock dividend was $0.12 per share.

Obligations for Investing Activities

Capital projects in the preceding table only include amounts approved by management as of December 31, 2019. 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 less than four percent of sales in 2020.

Off-Balance Sheet Arrangements

At December 31, 2019, Arconic had outstanding bank guarantees related to tax matters, outstanding debt, workers' compensation, environmental obligations, energy contracts, and customs duties, among others. The total amount committed under these guarantees, which expire at various dates between 2020 and 2040 was $31 at December 31, 2019.

Pursuant to the Separation and Distribution Agreement between Arconic and Alcoa Corporation, Arconic was required to provide certain guarantees for Alcoa Corporation, which had a combined fair value of $9 and $6 at December 31, 2019 and 2018, respectively, and were included in Other noncurrent liabilities and deferred credits on the accompanying Consolidated Balance Sheet. Arconic was required to provide guarantees related to two long-term supply agreements for energy for Alcoa Corporation facilities in the event of an Alcoa Corporation payment default. In October 2017, Alcoa Corporation announced that it had terminated one of the two agreements, the electricity contract with Luminant Generation Company LLC that was tied to its Rockdale Operations, effective as of October 1, 2017. As a result of the termination of the Rockdale electricity contract, Arconic recorded income of $25 in the fourth quarter of 2017 associated with reversing the fair value of the electricity contract guarantee. For the remaining long-term supply agreement, Arconic is required to provide a guarantee up to an estimated present value amount of approximately $1,353 and $1,087 at December 31, 2019 and December 31, 2018, respectively, in the event of an Alcoa Corporation payment default. This guarantee expires in 2047. For this guarantee, subject to its provisions, Arconic is secondarily liable in the event of a payment default by Alcoa Corporation. Arconic currently views the risk of an Alcoa Corporation payment default on its obligations under the contract to be remote. In December 2019, Arconic entered into a one-year insurance policy with a limit of $80 relating to the remaining long-term energy supply agreement. The premium is expected to be paid by Alcoa Corporation. The decision to enter into a claims purchase agreement or insurance policy will be made on an annual basis going forward.

Arconic has outstanding letters of credit primarily related to workers' compensation, environmental obligations, and leasing obligations. The total amount committed under these letters of credit, which automatically renew or expire at various dates, mostly in 2020, was $142 at December 31, 2019.

Pursuant to the Separation and Distribution Agreement, Arconic was required to retain letters of credit of $52 that had previously been provided related to both Arconic and Alcoa Corporation workers' compensation claims which occurred prior to November 1, 2016. Alcoa Corporation workers' compensation claims and letter of credit fees paid by Arconic are being proportionally billed to and are being fully reimbursed by Alcoa Corporation.

Arconic 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 surety bonds, which expire at various dates, primarily in 2020, was $50 at December 31, 2019.

Pursuant to the Separation and Distribution Agreement, Arconic was required to provide surety bonds related to Alcoa Corporation workers' compensation claims which occurred prior to November 1, 2016 and, as a result, Arconic has $24 in outstanding surety bonds relating to these liabilities. Alcoa Corporation workers' compensation claims and surety bond fees paid by Arconic are being proportionally billed to and are being fully reimbursed by Alcoa Corporation.

Critical Accounting Policies and Estimates

The preparation of the Consolidated Financial Statements in accordance with accounting principles generally accepted in the United States of America requires management to make certain judgments, estimates, and assumptions regarding uncertainties that affect the amounts reported in the Consolidated Financial Statements and disclosed in the accompanying Notes. Areas that require significant judgments, estimates, and assumptions include accounting for environmental and litigation matters; the testing of goodwill, other intangible assets, and properties, plants, and equipment for impairment; estimating fair value of businesses acquired or divested; pension plans and other postretirement benefits obligations; stock-based compensation; and income taxes.

Management uses historical experience and all available information to make these judgments, estimates, and assumptions, 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 and accompanying Notes provide a meaningful and fair perspective of the Company.

A summary of the Company's significant accounting policies is included in Note A to the Consolidated Financial Statements. Management believes that the application of these policies on a consistent basis enables the Company to provide the users of the Consolidated Financial Statements with useful and reliable information about the Company's operating results and financial condition.

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 sales, 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. Claims for recovery are recognized when probable and as agreements are reached with third parties. The estimates also include costs related to other potentially responsible parties to the extent that Arconic 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 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, among others. 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.

Goodwill. Goodwill is not amortized; instead, it is 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 realign a business. A significant amount of judgment is involved in determining if an indicator of impairment has occurred. Such indicators may include 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, among others. The fair value that could be realized in an actual transaction may differ from that used to evaluate the impairment of goodwill.

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. For 2019, Arconic had seven reporting units, of which four were included in the EP&F segment (Fastening Systems, Engineered Structures, Engine Products, and Forged Wheels), and three were included in the GRP segment (Global Rolled Products, Aluminum Extrusions, and BCS.)

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 the 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.

Arconic determines annually, based on facts and circumstances, which of its reporting units will be subject to the qualitative assessment. For those reporting units where a qualitative assessment is either not performed or for which the conclusion is that an impairment is more likely than not, a quantitative impairment test will be performed. Arconic's policy is that a quantitative impairment test be performed for each reporting unit at least once during every three-year period.

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 2019 annual review of goodwill, management proceeded directly to the quantitative impairment test for all seven of its reporting units. The estimated fair values for each of the seven reporting units exceeded their respective carrying values by more than 50%, thus, there was no goodwill impairment. 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. Arconic uses a discounted cash flow (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 sales growth (volumes and pricing), production costs, capital spending, and discount rate. Most of these assumptions 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 WACC rate for the individual reporting units is estimated with the assistance of valuation experts. Arconic would recognize an impairment charge for the amount by which the carrying amount exceeds the reporting unit's fair value without exceeding the total amount of goodwill allocated to that reporting unit.

In the first quarter of 2019, management transferred its aluminum extrusions business (Aluminum Extrusions) from Engineered Structures within the EP&F segment to the GRP segment, based on synergies with the GRP segment including similar customer base, technologies, and manufacturing capabilities. Management assessed and concluded that the remaining Engineered Structures business unit and the Aluminum Extrusions business unit represent reporting units. As a result of the reorganization, goodwill of $110 was reallocated from Engineered Structures to Aluminum Extrusions and these reporting units were evaluated for impairment during the first quarter of 2019. The estimated fair value of each of these reporting units substantially exceeded their carrying value; thus, there was no goodwill impairment. In the second quarter of 2019, management transferred its castings operations from Engineered Structures to Engine Products within the EP&F segment based on process expertise for investment castings that existed within Engine Products. As a result, goodwill of $105 was reallocated from Engineered Structures to Engine Products and these reporting units were evaluated for impairment during the second quarter of 2019. The estimated fair value of each of these reporting units substantially exceeded their carrying value; thus, there was no impairment. As a result of the elimination of the TCS segment in the third quarter of 2019 (see Segment Information above), the Company transferred $7 of Forged Wheels goodwill and $68 of BCS goodwill from the TCS segment to the EP&F and GRP segments, respectively. Both Forged Wheels and BCS are considered reporting units.

In the second quarter of 2019, as a result of the decline in the forecasted financial performance and related impairment of long-lived assets of the Disks asset group within Engine Products, the Company also performed an interim impairment evaluation of goodwill for Engine Products. The estimated fair value of the reporting unit was substantially in excess of its carrying value; thus, there was no impairment of goodwill.

In connection with the interim impairment evaluation of long-lived assets for the Disks asset group within Engine Products in the second quarter of 2018, which resulted from a decline in forecasted financial performance for the business in connection with its updated three-year strategic plan, the Company also performed an interim impairment evaluation of goodwill for Engine Products. The estimated fair value of the reporting unit was substantially in excess of the carrying value; thus, there was no impairment of goodwill.

Goodwill impairment tests in 2018 and 2017 indicated that goodwill was not impaired for any of the Company's reporting units, except for the AFE business (the AFE operations were realigned and transferred to Aluminum Extrusions and Engine Products) whose estimated fair value was lower than its carrying value. As such, Arconic recorded an impairment for the full amount of goodwill in the AFE reporting unit of $719 in 2017. The decrease in fair value of AFE was primarily due to unfavorable performance that was impacting operating margins and a higher discount rate due to an increase in the risk-free rate of return, while the carrying value increased compared to prior year.

Properties, Plants, and Equipment and Other Intangible Assets. Properties, plants, and equipment and Other intangible assets 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 measured 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 DCF model. The determination of what constitutes an asset group, the associated estimated undiscounted net cash flows, and the estimated useful lives of the assets also require significant judgments.

During the second quarter of 2019, the Company updated its five-year strategic plan and determined that there was a decline in the forecasted financial performance for the Disks asset group within the EP&F segment. As such, the Company evaluated the recoverability of the Disks asset group long-lived assets by comparing the carrying value to the undiscounted cash flows of the Disks asset group. The carrying value exceeded the undiscounted cash flows and therefore the Disks asset group long-lived assets were deemed to be impaired. The impairment charge was measured as the amount of carrying value in excess of fair value of the long-lived assets, with fair value determined using a DCF model and a combination of sales comparison and cost approach valuation methods including an estimate for economic obsolescence. The impairment charge of $428 recorded in the second quarter of 2019 impacted properties, plants, and equipment; intangible assets; and certain other noncurrent assets by $198, $197, and $33, respectively. The impairment charge was recorded in Restructuring and other charges in the Statement of Consolidated Operations.

During the second quarter of 2018, the Company updated its three-year strategic plan and determined that there was a decline in the forecasted financial performance for the Disks asset group within the EP&F segment. As such, the Company evaluated the recoverability of the long-lived assets by comparing their carrying value of approximately $515 to the estimated undiscounted net cash flows of the Disks asset group, resulting in an estimated fair value in excess of their carrying value of approximately 13%; thus, there was no impairment.

Discontinued Operations and Assets Held for Sale. The fair values of all businesses to be divested are estimated using accepted valuation techniques such as a DCF model, valuations performed by third parties, earnings multiples, or indicative bids, when available. A number of significant estimates and assumptions are involved in the application of these techniques, including the forecasting of markets and market share, sales volumes and prices, costs and expenses, and multiple other factors. Management considers historical experience and all available information at the time the estimates are made; however, the fair value that is ultimately realized upon the divestiture of a business may differ from the estimated fair value reflected in the Consolidated Financial Statements.

Pension and Other Postretirement Benefits. 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 (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, including finance and banking, industrials, transportation, and utilities, among others. The yield curve model parallels the plans' projected cash flows, which have an average duration of 10 years. 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. In 2019, 2018, and 2017, the discount rate used to determine benefit obligations for U.S. pension and other postretirement benefit plans was 3.30%, 4.35%, and 3.75%, respectively. The impact on the liabilities of a change in the discount rate of 1/4 of 1% would be approximately $220 and either a charge or credit of approximately $1 to after-tax 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 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 a combination of historical asset return information and forward-looking returns by asset class. As it relates to historical asset return information, management focuses on various historical moving averages when developing this assumption. While consideration is given to recent performance and historical returns, the assumption represents a long-term, prospective return. Management also incorporates expected future returns on current and planned asset allocations using information from various external investment managers and consultants, as well as management's own judgment.

For 2019, 2018, and 2017, management used 7.00%, 7.00%, and 7.75%, respectively, as its 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. These rates fell within the respective range of the 20-year moving average of actual performance and the expected future return developed by asset class. For 2020, management anticipates that 7.00% will be the expected long-term rate of return. The decrease of 75 basis points in the 2018 expected long-term rate of return was due to a decrease in the expected return by asset class and the 20-year moving average. A change in the assumption for the expected long-term rate of return on plan assets of 1/4 of 1% would impact after-tax earnings by approximately $9 for 2020.

In 2019, a net loss of $388 (after-tax) was recorded in other comprehensive loss, primarily due to the decrease in the discount rate of 105 basis points, which was partially offset by the plan asset performance that was greater than expected, and by the amortization of actuarial losses. In 2018, a net loss of $114 (after-tax) was recorded in other comprehensive loss, primarily due to the impact of the adoption of new accounting guidance that permits a reclassification to Retained earnings (accumulated deficit) for stranded tax effects resulting from the Tax Cuts and Jobs Act of 2017, as well as the plan asset performance that was less than expected, which were partially offset by the increase in the discount rate of 60 basis points and the amortization of actuarial losses. In 2017, a net loss of $220 (after-tax) was recorded in other comprehensive loss, primarily due to the decrease in the discount rate of 45 basis points and plan asset performance less than expected, which were partially offset by the amortization of actuarial losses.

Stock-Based Compensation. Arconic recognizes compensation expense for employee equity grants using the non-substantive vesting period approach, in which the expense is recognized ratably over the requisite service period based on the grant date fair value. Forfeitures are accounted for as they occur. The fair value of new stock options is estimated on the date of grant using a lattice-pricing model. The fair value of performance awards containing a market condition is valued using a Monte Carlo valuation model. Determining the fair value at the grant date requires judgment, including estimates for the average risk-free interest rate, dividend yield, volatility, 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.

Compensation expense recorded in 2019, 2018, and 2017 was $78 ($70 after-tax), $50 ($39 after-tax), and $54 ($36 after-tax), respectively.

Income Taxes. The provision for income taxes is 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 Arconic's assets and liabilities and are adjusted for changes in tax rates and tax laws when enacted.

The 2017 Act created a new requirement that certain income earned by foreign subsidiaries, Global Intangible Low Taxed Income (GILTI), must be included in the gross income of the U.S. shareholder. The 2017 Act also established the Base Erosion and Anti-Abuse Tax (BEAT). Until regulations are finalized, judgement will be required to apply preliminary guidance, including proposed regulations, to Arconic's facts and circumstances.

Valuation allowances are recorded to reduce deferred tax assets when it is more likely than not 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 Arconic'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.

In 2018, Arconic made a final accounting policy election to apply a tax law ordering approach when considering the need for a valuation allowance on net operating losses expected to offset GILTI income inclusions. Under this approach, reductions in cash tax savings are not considered as part of the valuation allowance assessment. Instead, future GILTI inclusions are considered a source of taxable income that support the realizability of deferred tax assets.

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 limitations 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.

Recently Adopted Accounting Guidance. See the Recently Adopted Accounting Guidance section of Note A to the Consolidated Financial Statements in Part II, Item 8. (Financial Statements and Supplementary Data) of this Form 10-K.

Recently Issued Accounting Guidance. See the Recently Issued Accounting Guidance section of Note A to the Consolidated Financial Statements in Part II, Item 8. (Financial Statements and Supplementary Data) of this Form 10-K.

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

Not material.

Item 8. Financial Statements and Supplementary Data.

Management's Reports to Arconic Shareholders

Management's Report on Financial Statements and Practices

The accompanying Consolidated Financial Statements of Arconic Inc. and its subsidiaries (the "Company") were prepared by management, which is responsible for their integrity and objectivity. The statements were prepared in accordance with accounting principles generally accepted in the United States of America and include amounts that are based on management's best judgments and estimates. The other financial information included in the annual report is consistent with that in the financial statements.

Management also 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 for the Company. In order to evaluate the effectiveness of internal control over financial reporting, as required by Section 404 of the Sarbanes-Oxley Act, management has conducted an assessment, including testing, using the criteria in *Internal Control—Integrated Framework (2013)*, issued by the Committee of Sponsoring Organizations of the Treadway Commission (COSO). The Company's system of internal control over financial reporting is 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. 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 accounting principles generally accepted in the United States of America, 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.

Based on the assessment, management has concluded that the Company maintained effective internal control over financial reporting as of December 31, 2019, based on criteria in *Internal Control—Integrated Framework (2013)* issued by the COSO.

The effectiveness of the Company's internal control over financial reporting as of December 31, 2019 has been audited by PricewaterhouseCoopers LLP, an independent registered public accounting firm, as stated in their report, which is included herein.

/s/ John C. Plant

John C. Plant
Chairman and Chief Executive Officer

/s/ Ken Giacobbe

Ken Giacobbe
Executive Vice President and
Chief Financial Officer

Report of Independent Registered Public Accounting Firm

To the Board of Directors and Shareholders of Arconic Inc.

Opinions on the Financial Statements and Internal Control over Financial Reporting

We have audited the accompanying consolidated balance sheet of Arconic Inc. and its subsidiaries (the "Company") as of December 31, 2019 and 2018, and the related consolidated statements of operations, of comprehensive income (loss), of changes in equity and of cash flows for each of the three years in the period ended December 31, 2019, 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, 2019, 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, 2019 and 2018, and the results of its operations and its cash flows for each of the three years in the period ended December 31, 2019 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, 2019, based on criteria established in *Internal Control - Integrated Framework* (2013) issued by the COSO.

Change in Accounting Principle

As discussed in Note A to the consolidated financial statements, the Company changed the manner in which it accounts for leases in 2019.

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.

Critical Audit Matters

The critical audit matters communicated below are matters arising from the current period audit of the consolidated financial statements that were communicated or required to be communicated to the audit committee and that (i) relate to accounts or disclosures that are material to the consolidated financial statements and (ii) involved our especially challenging, subjective, or complex judgments. The communication of critical audit matters does not alter in any way our opinion on the consolidated financial statements, taken as a whole, and we are not, by communicating the critical audit matters below, providing separate opinions on the critical audit matters or on the accounts or disclosures to which they relate.

Goodwill Impairment Assessment - Engine Products and Engineered Structures Reporting Units

As described in Notes A and N to the consolidated financial statements, the Company’s consolidated goodwill balance was $4,493 million as of December 31, 2019, and the amount of the goodwill associated with the Engine Products and Engineered Structures reporting units was $2,164 million and $289 million, respectively. Goodwill is reviewed for impairment annually (in the fourth quarter) or more frequently if indicators of impairment exist. The evaluation of impairment involves comparing the current fair value of each reporting unit to its carrying value, including goodwill. Fair value is estimated using a discounted cash flow model. The determination of fair value using this technique requires management to use significant estimates and assumptions related to forecasting operating cash flows, including sales growth (volumes and pricing), production costs, capital spending, and discount rate.

The principal considerations for our determination that performing procedures relating to the goodwill impairment assessment of the Engine Products and Engineered Structures reporting units is a critical audit matter are there was significant judgment by management when developing the fair value measurements of the reporting units. This in turn led to a high degree of auditor judgment, effort and subjectivity in performing procedures and evaluating audit evidence related to management’s cash flow projections and significant assumptions, including sales growth (volumes and pricing), production costs, and discount rates. In addition, the audit effort involved the use of professionals with specialized skill and knowledge to assist in performing these procedures and evaluating the audit evidence obtained.

Addressing the matter involved performing procedures and evaluating audit evidence in connection with forming our overall opinion on the consolidated financial statements. These procedures included testing the effectiveness of controls relating to management’s annual goodwill impairment assessment, including controls over the valuation of the Company’s reporting units. These procedures also included, among others, testing management’s process for developing the fair value estimates; evaluating the appropriateness of the discounted cash flow model and performing sensitivity analyses over the assumptions in the model; testing the completeness, accuracy, and relevance of underlying data used in the model; and evaluating the significant assumptions used by management, including sales growth (volumes and pricing), production costs, and discount rates. Evaluating management’s assumptions related to sales growth (volumes and pricing) and production costs involved evaluating whether the assumptions used by management were reasonable by considering the current and past performance of the reporting units, obtaining evidence to support the reasonableness of the assumptions, and considering whether the assumptions were consistent with evidence obtained in other areas of the audit. Professionals with specialized skill and knowledge were used to assist in the evaluation of the discounted cash flow models and certain significant assumptions, including the discount rates.

Properties, Plants, and Equipment Impairment Assessment - Disks Asset Group

As described in Notes A and M to the consolidated financial statements, the Company’s consolidated properties, plants and equipment balance was $5,463 million as of December 31, 2019. During the second quarter of 2019, management recorded an impairment charge of $428 million to reduce the carrying value of the long-lived assets in the Disks asset group to their fair value, which included impairment charges to properties, plants and equipment of $198 million. Long-lived assets are reviewed for impairment whenever events indicate that the carrying amount of the asset group may not be recoverable. The impairment charge was measured as the amount of carrying value in excess of fair value of the long-lived assets, with fair value determined using a discounted cash flow model and a combination of sales comparison and cost approach valuation methods, including an estimate for economic obsolescence.

The principal considerations for our determination that performing procedures relating to the properties, plants, and equipment impairment assessment of the Disks asset group is a critical audit matter are there was significant judgment by management when developing the fair value of the properties, plants and equipment in the Disks asset group. This in turn led to a high degree of auditor judgment, effort and subjectivity in performing procedures and evaluating audit evidence related to management's valuation methods and significant assumptions, including economic obsolescence. In addition, the audit effort involved the use of professionals with specialized skill and knowledge to assist in performing these procedures and evaluating the audit evidence obtained.

Addressing the matter involved performing procedures and evaluating audit evidence in connection with forming our overall opinion on the consolidated financial statements. These procedures included testing the effectiveness of controls relating to management's asset group impairment assessment, including controls over the valuation of the asset group. These procedures also included, among others, evaluating (i) the appropriateness of management's valuation methodologies and (ii) the reasonableness of the estimated economic obsolescence utilized in determining the fair value of properties, plants and equipment in the Disks asset group. Professionals with specialized skill and knowledge were utilized to assist in the evaluation of the valuation methods and certain significant assumptions, including economic obsolescence.

/s/ PricewaterhouseCoopers LLP
Pittsburgh, Pennsylvania
February 26, 2020

We have served as the Company's auditor since 1950.

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

For the year ended December 31,	**2019**	**2018**	**2017**
Sales (B)	$ 14,192	$ 14,014	$ 12,960
Cost of goods sold (exclusive of expenses below)	11,227	11,397	10,221
Selling, general administrative, and other expenses	704	604	715
Research and development expenses	70	103	109
Provision for depreciation and amortization	536	576	551
Impairment of goodwill (A and N)	—	—	719
Restructuring and other charges (C)	620	9	165
Operating income	1,035	1,325	480
Interest expense (D)	338	378	496
Other expense (income), net (E)	122	79	(486)
Income before income taxes	575	868	470
Provision for income taxes (G)	105	226	544
Net income (loss)	$ 470	$ 642	$ (74)
Amounts Attributable to Arconic Common Shareholders (I):			
Net income (loss)	$ 477	$ 651	$ (127)
Earnings (loss) per share - basic	$ 1.05	$ 1.33	$ (0.28)
Earnings (loss) per share - diluted	$ 1.03	$ 1.30	$ (0.28)
Average Shares Outstanding (I):			
Average shares outstanding - basic	446	483	451
Average shares outstanding - diluted	463	503	451

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

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

	Arconic			Noncontrolling Interests			Total		
For the year ended December 31,	**2019**	**2018**	**2017**	**2019**	**2018**	**2017**	**2019**	**2018**	**2017**
Net income (loss)	$ 470	$ 642	$ (74)	$ —	$ —	$ —	$ 470	$ 642	$ (74)
Other comprehensive income (loss), net of tax (J):									
Change in unrecognized net actuarial loss and prior service cost/benefit related to pension and other postretirement benefits	(388)	255	(220)	—	—	—	(388)	255	(220)
Foreign currency translation adjustments	(13)	(146)	252	—	—	2	(13)	(146)	254
Net change in unrealized gains on debt securities	3	(1)	(134)	—	—	—	3	(1)	(134)
Net change in unrecognized gains/losses on cash flow hedges	(3)	(23)	26	—	—	—	(3)	(23)	26
Total Other comprehensive (loss) income, net of tax	(401)	85	(76)	—	—	2	(401)	85	(74)
Comprehensive income (loss)	$ 69	$ 727	$ (150)	$ —	$ —	$ 2	$ 69	$ 727	$ (148)

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

Arconic and subsidiaries
Consolidated Balance Sheet
(in millions)

December 31,	**2019**	**2018**
Assets		
Current assets:		
Cash and cash equivalents	$ 1,648	$ 2,277
Receivables from customers, less allowances of $3 in 2019 and $4 in 2018 (K)	967	1,047
Other receivables (K)	484	451
Inventories (L)	2,429	2,492
Prepaid expenses and other current assets	314	314
Total current assets	5,842	6,581
Properties, plants, and equipment, net (M)	5,463	5,704
Goodwill (A and N)	4,493	4,500
Deferred income taxes (G)	608	573
Intangibles, net (N)	658	919
Other noncurrent assets (A and O)	514	416
Total assets	$ 17,578	$ 18,693
Liabilities		
Current liabilities:		
Accounts payable, trade	$ 2,043	$ 2,129
Accrued compensation and retirement costs	432	370
Taxes, including income taxes	87	118
Accrued interest payable	112	113
Other current liabilities (A and O)	418	356
Short-term debt (P and Q)	1,034	434
Total current liabilities	4,126	3,520
Long-term debt, less amount due within one year (P and Q)	4,906	5,896
Accrued pension benefits (F)	2,460	2,230
Accrued other postretirement benefits (F)	714	723
Other noncurrent liabilities and deferred credits (A and O)	751	739
Total liabilities	12,957	13,108
Contingencies and commitments (T)		
Equity		
Arconic shareholders’ equity:		
Preferred stock (H)	55	55
Common stock (H)	433	483
Additional capital (H)	7,319	8,319
Retained earnings (accumulated deficit) (A)	129	(358)
Accumulated other comprehensive loss (A and J)	(3,329)	(2,926)
Total Arconic shareholders’ equity	4,607	5,573
Noncontrolling interests	14	12
Total equity	4,621	5,585
Total liabilities and equity	$ 17,578	$ 18,693

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

Arconic and subsidiaries
Statement of Consolidated Cash Flows
(in millions)

For the year ended December 31,	2019	2018	2017
Operating activities			
Net income (loss)	$ 470	$ 642	$ (74)
Adjustments to reconcile net income (loss) to cash provided from (used for) operations:			
Depreciation and amortization	536	576	551
Deferred income taxes	(19)	31	434
Impairment of goodwill (A and N)	—	—	719
Restructuring and other charges	620	9	165
Net loss (gain) from investing activities - asset sales	7	10	(513)
Net periodic pension benefit cost (F)	115	130	217
Stock-based compensation	60	50	67
Other	13	75	112
Changes in assets and liabilities, excluding effects of acquisitions, divestitures, and foreign currency translation adjustments:			
(Increase) in receivables	(977)	(1,142)	(915)
(Increase) in inventories	(3)	(74)	(192)
Decrease (increase) in prepaid expenses and other current assets	4	(1)	11
(Decrease) increase in accounts payable, trade	(56)	339	62
(Decrease) in accrued expenses	(42)	(190)	(116)
(Decrease) increase in taxes, including income taxes	(2)	104	(23)
Pension contributions	(268)	(298)	(310)
(Increase) in noncurrent assets	(7)	(20)	(41)
(Decrease) in noncurrent liabilities	(45)	(24)	(193)
Cash provided from (used for) operations	406	217	(39)
Financing Activities			
Net change in short-term borrowings (original maturities of three months or less)	2	(7)	(2)
Additions to debt (original maturities greater than three months) (P)	400	600	816
Payments on debt (original maturities greater than three months) (P)	(806)	(1,103)	(1,634)
Premiums paid on early redemption of debt (P)	—	(17)	(52)
Proceeds from exercise of employee stock options	56	16	50
Dividends paid to shareholders	(57)	(119)	(162)
Distributions to noncontrolling interests	—	—	(14)
Repurchase of common stock (H)	(1,150)	—	—
Other	(13)	(19)	(17)
Cash used for financing activities	(1,568)	(649)	(1,015)
Investing Activities			
Capital expenditures	(586)	(768)	(596)
Proceeds from the sale of assets and businesses (S)	103	309	(9)
Sales of investments (U)	73	9	890
Cash receipts from sold receivables (K)	995	1,016	792
Other (U)	(2)	(1)	243
Cash provided from investing activities	583	565	1,320
Effect of exchange rate changes on cash, cash equivalents and restricted cash	—	(4)	9
Net change in cash, cash equivalents and restricted cash	(579)	129	275
Cash, cash equivalents and restricted cash at beginning of year	2,282	2,153	1,878
Cash, cash equivalents and restricted cash at end of year	$ 1,703	$ 2,282	$ 2,153

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

Arconic and subsidiaries
Statement of Changes in Consolidated Equity
(in millions, except per-share amounts)

	Arconic Shareholders							
	Preferred stock	**Mandatory convertible preferred stock**	**Common stock**	**Additional capital**	**Retained earnings (accumulated deficit)**	**Accumulated Other Comprehensive Loss**	**Noncontrolling interests**	**Total equity**
Balance at December 31, 2016	$ 55	$ 3	$ 438	$ 8,214	$ (1,027)	$ (2,568)	$ 26	$ 5,141
Net loss	—	—	—	—	(74)	—	—	(74)
Other comprehensive (loss) income (J)	—	—	—	—	—	(76)	2	(74)
Cash dividends declared:								
Preferred–Class A @ $3.75 per share	—	—	—	—	(2)	—	—	(2)
Preferred–Class B @ $20.1563 per share	—	—	—	—	(51)	—	—	(51)
Common @ $0.24 per share	—	—	—	—	(109)	—	—	(109)
Stock-based compensation (H)	—	—	—	67	—	—	—	67
Common stock issued: compensation plans (H)	—	—	—	21	—	—	—	21
Conversion of mandatory convertible preferred stock (H)	—	(3)	39	(36)	—	—	—	—
Issuance of common stock (H)	—	—	4	—	—	—	—	4
Distributions	—	—	—	—	—	—	(14)	(14)
Other	—	—	—	—	15	—	—	15
Balance at December 31, 2017	$ 55	$ —	$ 481	$ 8,266	$ (1,248)	$ (2,644)	$ 14	$ 4,924
Adoption of accounting standard (A)	—	—	—	—	367	(367)	—	—
Net income	—	—	—	—	642	—	—	642
Other comprehensive income (J)	—	—	—	—	—	85	—	85
Cash dividends declared:								
Preferred–Class A @ $3.75 per share	—	—	—	—	(2)	—	—	(2)
Common @ $0.24 per share	—	—	—	—	(117)	—	—	(117)
Stock-based compensation (H)	—	—	—	50	—	—	—	50
Common stock issued: compensation plans (H)	—	—	2	3	—	—	—	5
Other	—	—	—	—	—	—	(2)	(2)
Balance at December 31, 2018	**$ 55**	**$ —**	**$ 483**	**$ 8,319**	**$ (358)**	**$ (2,926)**	**$ 12**	**$ 5,585**
Adoption of accounting standard (A)	—	—	—	—	75	(2)	—	73
Net income	—	—	—	—	470	—	—	470
Other comprehensive loss (J)	—	—	—	—	—	(401)	—	(401)
Cash dividends declared:								
Preferred–Class A @ $3.75 per share	—	—	—	—	(2)	—	—	(2)
Common @ $0.12 per share	—	—	—	—	(56)	—	—	(56)
Repurchase and retirement of common stock (H)	—	—	(55)	(1,095)	—	—	—	(1,150)
Stock-based compensation (H)	—	—	—	57	—	—	—	57
Common stock issued: compensation plans (H)	—	—	5	36	—	—	—	41
Other	—	—	—	2	—	—	2	4
Balance at December 31, 2019	$ 55	$ —	$ 433	$ 7,319	$ 129	$ (3,329)	$ 14	$ 4,621

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

Arconic and subsidiaries
Notes to the Consolidated Financial Statements
(dollars in millions, except per-share amounts)

A. Summary of Significant Accounting Policies

Basis of Presentation. The Consolidated Financial Statements of Arconic Inc. and subsidiaries (“Arconic” or the “Company”) are prepared in conformity with accounting principles generally accepted in the United States of America (GAAP) and require management to make certain judgments, estimates, and assumptions. These 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 sales and expenses during the reporting period. 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 Note B).

In the third quarter of 2019, the Company realigned its operations by eliminating its Transportation and Construction Solutions (TCS) segment and transferring the Forged Wheels business to the Engineered Products and Forgings (EP&F) segment and the Building and Construction Systems (BCS) business to the Global Rolled Products (GRP) segment. See Note B for further details.

On February 8, 2019, the Company announced the separation of its portfolio into two independent, publicly-traded companies (the "Separation of Arconic"). The EP&F segment will remain in the existing company (Remain Co.) which will be renamed Howmet Aerospace Inc. at separation. The GRP segment will comprise Spin Co. and will be named Arconic Corporation at separation. The Company is targeting to complete the Separation of Arconic on April 1, 2020. See Note U for further details.

Principles of Consolidation. The Consolidated Financial Statements include the accounts of Arconic and companies in which Arconic has a controlling interest. Intercompany transactions have been eliminated. Investments in affiliates in which Arconic cannot exercise significant influence that do not have readily determinable fair values are accounted for at cost minus impairment, if any, plus or minus changes resulting from observable price changes in orderly transactions for the identical or a similar investment of the same issuer.

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

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 and net realizable value, with cost for approximately half of U.S. inventories determined under the last-in, first-out (LIFO) method. The cost of other inventories is determined under a combination of the first-in, first-out (FIFO) and average-cost methods.

Properties, Plants, and Equipment. Properties, plants, and equipment are recorded at cost. Depreciation is recorded principally on the straight-line method at rates based on the estimated useful lives of the assets. The following table details the weighted-average useful lives of structures and machinery and equipment by reporting segment (numbers in years):

	Structures	Machinery and equipment
Engineered Products and Forgings	29	17
Global Rolled Products	31	21

Gains or losses from the sale of asset groups are generally recorded in Restructuring and other charges while the sale of individual assets are recorded in Other expense (income), net (see policy below for assets classified as held for sale and discontinued operations). Repairs and maintenance are charged to expense as incurred. Interest related to the construction of qualifying assets is capitalized as part of the construction costs.

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 measured 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 the assets also require significant judgments. See Note M for further information.

Goodwill. Goodwill is not amortized; instead, it is 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 realign a business. A significant amount of judgment is involved in determining if an indicator of impairment has occurred. Such indicators may include 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, among others. The fair value that could be realized in an actual transaction may differ from that used to evaluate the impairment of goodwill.

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. For 2019, Arconic had seven reporting units, of which four were included in the Engineered Products and Forgings (EP&F) segment (Fastening Systems, Engineered Structures, Engine Products, and Forged Wheels), and three were included in the Global Rolled Products (GRP) segment (Global Rolled Products, Aluminum Extrusions, and BCS). More than 90% of Arconic’s total goodwill at December 31, 2019 was allocated to the four EP&F reporting units: Engine Products ($2,164), Fastening Systems ($1,607), Engineered Structures ($289), and Forged Wheels ($7).

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 the 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.

Arconic determines annually, based on facts and circumstances, which of its reporting units will be subject to the qualitative assessment. For those reporting units where a qualitative assessment is either not performed or for which the conclusion is that an impairment is more likely than not, a quantitative impairment test will be performed. Arconic’s policy is that a quantitative impairment test be performed for each reporting unit at least once during every three-year period.

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 2019 annual review of goodwill, management proceeded directly to the quantitative impairment test for all seven of its reporting units. The estimated fair values for each of the seven reporting units exceeded their respective carrying values by more than 50%, thus, there was no goodwill impairment. 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. Arconic 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 sales growth (volumes and pricing), production costs, capital spending, and discount rate. Most of these assumptions 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 WACC rate for the individual reporting units is estimated with the assistance of valuation experts. Arconic would recognize an impairment charge for the amount by which the carrying amount exceeds the reporting unit’s fair value without exceeding the total amount of goodwill allocated to that reporting unit.

In the first quarter of 2019, management transferred its aluminum extrusions business (Aluminum Extrusions) from Engineered Structures within the EP&F segment to the GRP segment, based on synergies with the GRP segment including similar customer base, technologies, and manufacturing capabilities. Management assessed and concluded that the remaining Engineered Structures business unit and the Aluminum Extrusions business unit represent reporting units. As a result of the reorganization, goodwill of $110 was reallocated from Engineered Structures to Aluminum Extrusions and these reporting units were evaluated for impairment during the first quarter of 2019. The estimated fair value of each of these reporting units substantially exceeded their carrying value; thus, there was no goodwill impairment. In the second quarter of 2019, management transferred its castings operations from Engineered Structures to Engine Products within the EP&F segment based on process expertise for investment castings that existed within Engine Products. As a result, goodwill of $105 was reallocated from Engineered Structures to Engine Products and these reporting units were evaluated for impairment during the second quarter of 2019. The estimated fair value of each of these reporting units substantially exceeded their carrying value; thus, there was no impairment. As a result of the elimination of the TCS segment in the third quarter of 2019 (see Note B), the Company transferred $7 of

Forged Wheels goodwill and $68 of BCS goodwill from the TCS segment to the EP&F and GRP segments, respectively. Both Forged Wheels and BCS are considered reporting units.

In the second quarter of 2019, as a result of the decline in the forecasted financial performance and related impairment of long-lived assets of the Disks asset group within Engine Products (see Note M), the Company also performed an interim impairment evaluation of goodwill for Engine Products. The estimated fair value of the reporting unit was substantially in excess of its carrying value; thus, there was no impairment of goodwill.

In connection with the interim impairment evaluation of long-lived assets for the Disks asset group within Engine Products in the second quarter of 2018 (see Note M), which resulted from a decline in forecasted financial performance for the business in connection with its updated three-year strategic plan, the Company also performed an interim impairment evaluation of goodwill for Engine Products. The estimated fair value of the reporting unit was substantially in excess of the carrying value; thus, there was no impairment of goodwill.

Goodwill impairment tests in 2018 and 2017 indicated that goodwill was not impaired for any of the Company's reporting units, except for the Arconic Forgings and Extrusions business (AFE) (the AFE operations were realigned and transferred to Aluminum Extrusions and Engine Products) whose estimated fair value was lower than its carrying value. As such, Arconic recorded an impairment for the full amount of goodwill in the AFE reporting unit of $719 in 2017. The decrease in fair value of AFE was primarily due to unfavorable performance that was impacting operating margins and a higher discount rate due to an increase in the risk-free rate of return, while the carrying value increased compared to prior year.

Other Intangible Assets. Intangible assets with indefinite useful lives are not amortized while 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 reporting segment (numbers in years):

	Software	Other intangible assets
Engineered Products and Forgings	5	32
Global Rolled Products	5	13

Leases. The Company determines whether a contract contains a lease at inception. The Company leases land and buildings, plant equipment, vehicles, and computer equipment which have been classified as operating leases. Certain real estate leases include one or more options to renew; the exercise of lease renewal options is at the Company's discretion. The Company includes renewal option periods in the lease term when it is determined that the options are reasonably certain to be exercised. Certain of Arconic's real estate lease agreements include rental payments that either have fixed contractual increases over time or adjust periodically for inflation. Certain of the Company's lease agreements include variable lease payments. The variable portion of payments is not included in the initial measurement of the right-of-use asset or lease liability due to the uncertainty of the payment amount and is recorded as lease cost in the period incurred. The Company also rents or subleases certain real estate to third parties, which is not material to the consolidated financial statements.

Operating lease right-of-use assets and lease liabilities with an initial term greater than 12 months are recorded on the balance sheet at the present value of the future minimum lease payments over the lease term at the lease commencement date and are recognized as lease expense on a straight-line basis over the lease term. The Company uses an incremental collateralized borrowing rate based on the information available at the lease commencement date in determining the present value of future payments, as most of its leases do not provide an implicit rate. The operating lease right-of-use assets also include any lease prepayments made and were reduced by lease incentives and accrued exit costs.

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 sales, 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. Claims for recovery are recognized when probable and as agreements are reached with third parties. The estimates also include costs related to other potentially responsible parties to the extent that Arconic 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 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, among others. 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's contracts with customers are comprised of acknowledged purchase orders incorporating the Company's standard terms and conditions, or for larger customers, may also generally include terms under negotiated multi-year agreements. These contracts with customers typically consist of the manufacture of products which represent single performance obligations that are satisfied upon transfer of control of the product to the customer. The Company produces fastening systems; seamless rolled rings; investment castings, including airfoils and forged jet engine components; extruded, machined and formed aircraft parts; aluminum sheet and plate; integrated aluminum structural systems; architectural extrusions; and forged aluminum commercial vehicle wheels. Transfer of control is assessed based on alternative use of the products we produce and our enforceable right to payment for performance to date under the contract terms. Transfer of control and revenue recognition generally occur upon shipment or delivery of the product, which is when title, ownership and risk of loss pass to the customer and is based on the applicable shipping terms. The shipping terms vary across all businesses and depend on the product, the country of origin, and the type of transportation (truck, train, or vessel). An invoice for payment is issued at time of shipment. Our business units set commercial terms on which Arconic sells products to its customers. These terms are influenced by industry custom, market conditions, product line (specialty versus commodity products), and other considerations.

In certain circumstances, Arconic receives advanced payments from its customers for product to be delivered in future periods. These advanced payments are recorded as deferred revenue until the product is delivered and title and risk of loss have passed to the customer in accordance with the terms of the contract. Deferred revenue is included in Other current liabilities and Other noncurrent liabilities and deferred credits on the accompanying Consolidated Balance Sheet.

Income Taxes. The provision for income taxes is 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 Arconic's assets and liabilities and are adjusted for changes in tax rates and tax laws when enacted.

Valuation allowances are recorded to reduce deferred tax assets when it is more likely than not 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 Arconic'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.

In 2018, Arconic made a final accounting policy election to apply a tax law ordering approach when considering the need for a valuation allowance on net operating losses expected to offset Global Intangible Low Taxed Income (GILTI) income inclusions. Under this approach, reductions in cash tax savings are not considered as part of the valuation allowance assessment. Instead, future GILTI inclusions are considered a source of taxable income that support the realizability of deferred tax assets.

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 limitations 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.

Stock-Based Compensation. Arconic recognizes compensation expense for employee equity grants using the non-substantive vesting period approach, in which the expense is recognized ratably over the requisite service period based on the grant date fair value. Forfeitures are accounted for as they occur. The fair value of new stock options is estimated on the date of grant using a lattice-pricing model. The fair value of performance awards containing a market condition is valued using a Monte Carlo valuation model. Determining the fair value at the grant date requires judgment, including estimates for the average risk-free interest rate, dividend yield, volatility, 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.

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

Acquisitions. Arconic's business acquisitions are accounted for using the acquisition method. The purchase price is allocated to the assets acquired and liabilities assumed based on their estimated fair values. Any excess purchase price over the fair value of the net assets acquired is recorded as goodwill. For all acquisitions, operating results are included in the Statement of Consolidated Operations from the date of the acquisition.

Discontinued Operations and Assets Held for Sale. For those businesses where management has committed to a plan to divest, each business is valued at the lower of its carrying amount or estimated fair value less cost to sell. If the carrying amount of the business exceeds its estimated fair value, an impairment loss is recognized. Fair value is estimated using accepted valuation techniques such as a DCF model, valuations performed by third parties, earnings multiples, or indicative bids, when available. A number of significant estimates and assumptions are involved in the application of these techniques, including the forecasting of markets and market share, sales volumes and prices, costs and expenses, and multiple other factors. Management considers historical experience and all available information at the time the estimates are made; however, the fair value that is ultimately realized upon the divestiture of a business may differ from the estimated fair value reflected in the Consolidated Financial Statements. Depreciation and amortization expense is not recorded on assets of a business to be divested once they are classified as held for sale. Businesses to be divested are generally classified in the Consolidated Financial Statements as either discontinued operations or held for sale.

For businesses classified as discontinued operations, the balance sheet amounts and results of operations should be reclassified from their historical presentation to assets and liabilities of discontinued operations on the Consolidated Balance Sheet and to discontinued operations on the Statement of Consolidated Operations, respectively, for all periods presented. The gains or losses associated with these divested businesses are recorded in discontinued operations on the Statement of Consolidated Operations. The Statement of Consolidated Cash Flows is not required to be reclassified for discontinued operations for any period. Segment information does not include the assets or operating results of businesses classified as discontinued operations for all periods presented. These businesses are expected to be disposed of within one year.

For businesses classified as held for sale that do not qualify for discontinued operations treatment, the balance sheet and cash flow amounts should be reclassified from their historical presentation to assets and liabilities of operations held for sale for all periods presented. The results of operations continue to be reported in continuing operations. The gains or losses associated with these divested businesses are recorded in Restructuring and other charges on the Statement of Consolidated Operations. The segment information includes the assets and operating results of businesses classified as held for sale for all periods presented.

Recently Adopted Accounting Guidance. In February 2016, the Financial Accounting Standards Board (FASB) issued changes to the accounting and presentation of leases. These changes require lessees to recognize a right-of-use asset and lease liability on the balance sheet, initially measured at the present value of the future lease payments for all operating leases with a term greater than 12 months.

These changes became effective for Arconic on January 1, 2019 and have been applied using the modified retrospective approach as of the date of adoption, under which leases existing at, or entered into after, January 1, 2019 were required to be recognized and measured. Prior period amounts have not been adjusted and continue to be reflected in accordance with the Company's historical accounting. The Company elected the package of practical expedients permitted under the transition guidance within the new standard, which among other things, allowed the Company to carry forward the historical lease classification. The Company also elected to separate lease components from non-lease components for all classes of assets.

The adoption of this new lease standard resulted in the Company recording operating lease right-of-use assets and lease liabilities of approximately $320 on the Consolidated Balance Sheet as of January 1, 2019. Also, the Company reclassified cash proceeds of $119 from Other noncurrent liabilities and deferred credits, assets of $24 from Properties, plants, and equipment, net, and deferred tax assets of $22 from Other noncurrent assets to Retained earnings (accumulated deficit) reflecting the cumulative effect of an accounting change related to the sale-leaseback of the Texarkana, Texas cast house (see Note S). The adoption of the standard had no impact on the Statement of Consolidated Operations or Statement of Consolidated Cash Flows.

In August 2017, the FASB issued guidance that made more financial and nonfinancial hedging strategies eligible for hedge accounting. It also amended the presentation and disclosure requirements and changed how companies assess effectiveness. It is intended to more closely align hedge accounting with companies' risk management strategies, simplify the application of hedge accounting, and increase transparency as to the scope and results of hedging programs. These changes became effective for Arconic on January 1, 2019. For cash flow hedges, Arconic recorded a cumulative effect adjustment of $2 related to eliminating the separate measurement of ineffectiveness by decreasing Accumulated other comprehensive loss and increasing Retained earnings (accumulated deficit) on the accompanying Consolidated Balance Sheet. The amendments to presentation and disclosure are required prospectively. Arconic has determined that under the new accounting guidance it is able to more broadly use cash flow hedge accounting for its variable priced inventory purchases and customer sales.

In February 2018, the FASB issued guidance that allows an optional reclassification from Accumulated other comprehensive loss to Accumulated deficit for stranded tax effects resulting from the Tax Cuts and Jobs Act enacted on December 22, 2017. Stranded tax effects were created when deferred taxes, originally established in Other comprehensive income at 35%, were revalued to 21% as a component of income tax expense from continuing operations. The Company elected to early adopt this provision in the fourth quarter of 2018 and reclassified $367 of beneficial stranded tax effects in Accumulated other comprehensive loss to Retained earnings (accumulated deficit) in its Consolidated Balance Sheet and Statement of Changes in Consolidated Equity.

In March 2019, the Securities and Exchange Commission (SEC) issued guidance to modernize and simplify certain disclosure requirements in a manner that reduces the costs and burdens on preparers while continuing to provide all material information to investors. This guidance became effective on May 2, 2019 and has been applied to filings thereafter. The adoption of this guidance did not have a material impact on the Notes to the Consolidated Financial Statements.

Recently Issued Accounting Guidance. 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 became effective for Arconic on January 1, 2020. Management has determined that the adoption of this guidance did not have a material impact on the Consolidated Financial Statements.

In August 2018, the FASB issued guidance that impacts disclosures for defined benefit pension plans and other postretirement benefit plans. These changes become effective for Arconic's annual report for the year ending December 31, 2020, with early adoption permitted. Management has determined that the adoption of this guidance will not have a material impact on the Consolidated Financial Statements.

In December 2019, the FASB issued guidance that is intended to simplify various aspects related to the accounting for income taxes. These changes become effective on January 1, 2021, with early adoption permitted. Management is currently evaluating the potential impact of these changes on the Consolidated Financial Statements.

B. Segment and Geographic Area Information

Arconic is a global leader in lightweight metals engineering and manufacturing. Arconic's innovative, multi-material products, which include aluminum, titanium, and nickel, are used worldwide in aerospace, automotive, commercial transportation, building and construction, industrial applications, defense, and packaging. Arconic's operations consist of two worldwide reportable segments: EP&F and GRP. Segment performance under Arconic's management reporting system is evaluated based on a number of factors; however, the primary measure of performance is Segment operating profit. Arconic's definition of Segment operating profit is Operating income excluding Special items. Special items include Restructuring and other charges and Impairment of goodwill. Segment operating profit may not be comparable to similarly titled measures of other companies. Differences between segment totals and consolidated Arconic are in Corporate.

In the third quarter of 2019, the Company realigned its operations by eliminating its TCS segment and transferring the Forged Wheels business to its EP&F segment and BCS to its GRP segment, consistent with how the Chief Executive Officer is assessing operating performance and allocating capital in conjunction with the planned Separation of Arconic (see Note U). The Latin America extrusions business, which was formerly part of the Company's TCS segment until its sale in April of 2018 (see Note S), was moved to Corporate. In the first quarter of 2019, management transferred its aluminum extrusions operations from its Engineered Structures business unit within the EP&F segment to the GRP segment, based on synergies with the GRP segment including similar customer base, technologies, and manufacturing capabilities. Prior period financial information has been recast to conform to current year presentation.

The accounting policies of the segments are the same as those described in the Summary of Significant Accounting Policies (see Note A). Transactions among segments are established based on negotiation among the parties. Differences between segment totals and Arconic's consolidated totals for line items not reconciled are in Corporate.

Engineered Products and Forgings. This segment produces products that are used primarily in the aerospace (commercial and defense), industrial, commercial transportation, and power generation end markets. Such products include fastening systems (aluminum, titanium, steel, and nickel superalloys) and seamless rolled rings (mostly nickel superalloys); investment castings (nickel superalloys, titanium, and aluminum), including airfoils; forged jet engine components (e.g., jet engine disks); extruded, machined and forged aircraft parts (titanium and aluminum); and forged aluminum commercial vehicle wheels, all of which are sold directly to customers and through distributors. Approximately 70% of the third-party sales in this segment are from the aerospace end market. A small part of this segment also produces various forged and machined metal products (titanium and aluminum) for various end markets. Seasonal decreases in sales are experienced for certain products in the third quarter of the year due to the European summer slowdown.

Global Rolled Products. This segment produces aluminum sheet and plate, aluminum extruded and machined parts, integrated aluminum structural systems, and architectural extrusions used in the automotive, aerospace, building and construction, industrial, packaging, and commercial transportation end markets. Products are sold directly to customers and through distributors. While the customer base for flat-rolled products is large, a significant amount of sales of sheet and plate are to a relatively small number of customers.

The operating results and assets of Arconic's reportable segments were as follows:

	Engineered Products and Forgings	Global Rolled Products	Total
2019			
Sales:			
Third-party sales	$ 7,105	$ 7,082	$ 14,187
Intersegment sales	—	183	183
Total segment sales	$ 7,105	$ 7,265	$ 14,370
Profit and loss:			
Segment operating profit	$ 1,390	$ 625	$ 2,015
Restructuring and other charges	509	81	590
Provision for depreciation and amortization	269	233	502
2018			
Sales:			
Third-party sales	$ 6,798	$ 7,223	$ 14,021
Intersegment sales	—	205	205
Total segment sales	$ 6,798	$ 7,428	$ 14,226
Profit and loss:			
Segment operating profit	$ 1,105	$ 481	$ 1,586
Restructuring and other charges	70	(157)	(87)
Provision for depreciation and amortization	289	253	542
2017			
Sales:			
Third-party sales	$ 6,300	$ 6,540	$ 12,840
Intersegment sales	—	183	183
Total segment sales	$ 6,300	$ 6,723	$ 13,023
Profit and loss:			
Segment operating profit	$ 1,119	$ 570	$ 1,689
Restructuring and other charges	30	83	113
Provision for depreciation and amortization	275	243	518
2019			
Assets:			
Capital expenditures	$ 344	$ 189	$ 533
Goodwill	4,067	426	4,493
Total assets[(1)]	10,034	4,907	14,941
2018			
Assets:			
Capital expenditures	$ 407	$ 308	$ 715
Goodwill	4,186	314	4,500
Total assets	10,494	4,845	15,339

[(1)] Segment assets at December 31, 2019 included operating lease right-of-use assets (see Notes A and O). Segment assets for the EP&F segment at December 31, 2019 were impacted by a long-lived asset impairment charge of $428 recorded in the second quarter of 2019 (see Note M).

The following tables reconcile certain segment information to consolidated totals:

For the year ended December 31,	2019	2018	2017
Sales:			
Total segment sales	$ 14,370	$ 14,226	$ 13,023
Elimination of intersegment sales	(183)	(205)	(183)
Corporate	5	(7)	120
Consolidated sales	$ 14,192	$ 14,014	$ 12,960

For the year ended December 31,	2019	2018	2017
Total segment operating profit	$ 2,015	$ 1,586	$ 1,689
Unallocated amounts:			
Impairment of goodwill	—	—	(719)
Restructuring and other charges	(620)	(9)	(165)
Corporate expense	(360)	(252)	(325)
Consolidated operating income	$ 1,035	$ 1,325	$ 480
Interest expense	(338)	(378)	(496)
Other (expense) income, net	(122)	(79)	486
Consolidated income before income taxes	$ 575	$ 868	$ 470

December 31,	2019	2018
Assets:		
Total segment assets	$ 14,941	$ 15,339
Unallocated amounts:		
Cash and cash equivalents	1,648	2,277
Deferred income taxes	608	573
Corporate fixed assets, net	326	334
Fair value of derivative contracts	6	37
Other	49	133
Consolidated assets	$ 17,578	$ 18,693

Sales by major product grouping were as follows:

For the year ended December 31,	2019	2018	2017
Sales:			
Innovative flat-rolled products	$ 5,471	$ 5,604	$ 5,000
Engine products	3,452	3,220	2,965
Fastening systems	1,561	1,531	1,484
Engineered structures	1,123	1,081	1,023
Architectural aluminum systems	1,118	1,135	1,069
Forged wheels	969	966	828
Aluminum extrusions	493	484	471
Other	5	(7)	120
	$ 14,192	$ 14,014	$ 12,960

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

For the year ended December 31,	2019	2018	2017
Sales:			
United States	$ 9,548	$ 9,137	$ 8,167
France	864	936	965
United Kingdom	732	737	721
Hungary	719	823	739
China	630	632	615
Russia	511	553	500
Germany	322	302	309
Canada	313	285	261
Japan	190	170	141
Brazil	159	214	285
Other	204	225	257
	$ 14,192	$ 14,014	$ 12,960

Geographic information for long-lived assets was as follows (based upon the physical location of the assets):

December 31,	2019	2018
Long-lived assets:		
United States	$ 4,193	$ 4,148
China	338	326
Hungary	302	257
Russia	233	253
United Kingdom	189	253
France	185	163
Germany	86	84
Canada	57	61
Mexico	57	45
Brazil	5	54
Other	69	60
	$ 5,714	$ 5,704

The following table disaggregates revenue by major end market served. Differences between segment totals and consolidated Arconic are in Corporate. In 2018, Corporate included $38 of costs related to settlements of certain customer claims primarily related to product introductions.

For the year ended December 31,	Engineered Products and Forgings	Global Rolled Products	Total Segment
2019			
Aerospace	$ 5,075	$ 1,251	$ 6,326
Transportation	1,289	2,418	3,707
Building and construction	—	1,300	1,300
Industrial and Other	741	2,113	2,854
Total end-market revenue	$ 7,105	$ 7,082	$ 14,187
2018			
Aerospace	$ 4,722	$ 1,116	$ 5,838
Transportation	1,302	2,550	3,852
Building and construction	—	1,357	1,357
Industrial and Other	774	2,200	2,974
Total end-market revenue	$ 6,798	$ 7,223	$ 14,021
2017			
Aerospace	$ 4,347	$ 1,109	$ 5,456
Transportation	1,098	2,072	3,170
Building and construction	—	1,269	1,269
Industrial and Other	855	2,090	2,945
Total end-market revenue	$ 6,300	$ 6,540	$ 12,840

C. Restructuring and Other Charges

Restructuring and other charges for each year in the three-year period ended December 31, 2019 were comprised of the following:

	2019	2018	2017
Non-cash asset impairments	$ 570	$ 13	$ 58
Layoff costs	103	20	64
Pension and Other postretirement benefits - net settlement and curtailment charges	(49)	91	—
Net (gain) loss on divestitures of assets and businesses (S)	(20)	(109)	57
Other	26	13	(3)
Reversals of previously recorded layoff costs	(10)	(19)	(11)
Restructuring and other charges	$ 620	$ 9	$ 165

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.

2019 Actions. In 2019, Arconic recorded Restructuring and other charges of $620 ($512 after-tax), this included a non-cash charge for asset impairments of $570 ($477 after-tax), primarily comprised of $428 ($345 after-tax) for impairment of the Disks long-lived asset group, a charge of $112 ($109 after-tax) for impairment of assets associated with agreements to sell the Company’s Brazilian rolling mill operations ($53), the U.K. forgings business ($46), and a small additive business ($13), a charge of $25 ($19 after-tax) for impairment of a trade name intangible asset and properties, plant, and equipment related to the Company’s primary research and development facility, and a charge of $5 ($4 after-tax) for an impairment of a cost method investment of the GRP segment; a charge of $103 ($78 after-tax) for layoff costs, including the separation of approximately

1,310 employees (484 in the GRP segment, 460 in Corporate, and 366 in the EP&F segment); a charge of $26 ($21 after-tax) for other miscellaneous items including lease terminations of $12 primarily related to a corporate aircraft, accelerated depreciation of $9, a net charge of $2 for executive severance net of the benefit of forfeited executive stock compensation, and a charge for various other exit costs of $4; and a charge of $9 ($7 after-tax) for pension settlement accounting. These charges were partially offset by a benefit of $58 ($45 after-tax) from the elimination of the life insurance benefit for the U.S. salaried and non-bargaining hourly retirees of the Company and its subsidiaries; a benefit of $10 ($9 after-tax) from the reversal of a number of current year layoff reserves; and a gain of $20 ($17 after-tax) for contingent consideration received from the Texarkana sale.

As of December 31, 2019, approximately 947 of the 1,310 employees were separated. The remaining separations for the 2019 restructuring programs are expected to be completed in 2020. In 2019, cash payments of $65 were made against layoff reserves related to 2019 restructuring programs.

2018 Actions. In 2018, Arconic recorded Restructuring and other charges of $9 ($9 after-tax), which included a net gain on the sale of several assets and businesses of $109 ($81 after-tax), primarily made up of a gain on the asset sale of Texarkana of $154 ($119 after-tax) and loss on the sale of the Hungary forgings business of $43 ($39 after-tax) (see note S); charges of $96 ($75 after-tax) for pension settlement and $23 ($18 after-tax) for pension curtailment; a postretirement curtailment benefit of $28 ($22 after-tax) (see note F); and a charge of $20 ($17 after-tax) for layoff costs, including the separation of approximately 125 employees (89 in the EP&F segment and 36 in Corporate); a charge of $12 ($9 after-tax) for contract termination costs and asset impairments associated with the shutdown of a facility in Acuna, Mexico; a charge of $6 ($4 after-tax) for contract termination costs related to the New York office; a charge of $8 ($4 after-tax) for other miscellaneous items including accelerated depreciation and asset impairments; and a benefit of $19 ($15 after-tax) for the reversal of a number of layoff reserves related to prior periods.

As of December 31, 2019, the separations associated with the 2018 restructuring programs were essentially complete. In 2019 and 2018, cash payments of $4 and $9, respectively, were made against layoff reserves related to the 2018 restructuring programs.

2017 Actions. In 2017, Arconic recorded Restructuring and other charges of $165 ($143 after-tax), which were comprised of the following components: a charge of $69 ($47 after-tax) for layoff costs related to cost reduction initiatives including the separation of approximately 880 employees (403 in the EP&F segment, 336 in the GRP segment, and 141 in Corporate), a charge of $60 ($60 after-tax) related to the sale of the Italy rolling mill; a charge of $41 ($41 after-tax) for the impairment of assets associated with the sale of the Latin America extrusions business (see Note S); a net benefit of $6 ($4 after-tax) for the reversal of forfeited executive stock compensation of $13, partially offset by a charge of $7 for the related severance; a net charge of $12 ($7 after-tax) for other miscellaneous items; and a benefit of $11 ($8 after-tax) for the reversal of a number of small layoff reserves related to prior periods.

As of December 31, 2019, the separations associated with the 2017 restructuring programs were essentially complete. In 2019, 2018, and 2017, cash payments of $5, $34, and $28, respectively, were made against layoff reserves related to the 2017 restructuring programs.

Activity and reserve balances for restructuring charges were as follows:

	Layoff costs	Other exit costs	Total
Reserve balances at December 31, 2016	$ 50	$ 9	$ 59
2017			
Cash payments	(59)	(6)	(65)
Restructuring charges	64	1	65
Other(1)	1	(2)	(1)
Reserve balances at December 31, 2017	$ 56	$ 2	$ 58
2018			
Cash payments	$ (47)	$ (2)	$ (49)
Restructuring charges	111	13	124
Other(2)	(110)	2	(108)
Reserve balances at December 31, 2018	$ 10	$ 15	$ 25
2019			
Cash payments	$ (74)	$ (5)	$ (79)
Restructuring charges	56	574	630
Other(3)	39	(581)	(542)
Reserve balances at December 31, 2019	$ 31	$ 3	$ 34

(1) In 2017, Other for layoff costs included a reclassification of a stock awards reversal of $13, offset by reversals of previously recorded restructuring charges of $11 and foreign currency translation of $1.

(2) In 2018, Other for layoff costs included reclassifications of $119 in pension costs and a $28 credit in postretirement benefits, as the impacts were reflected in Arconic's separate liabilities for Accrued pension benefits and Accrued postretirement benefits, and reversals of previously recorded restructuring charges of $19.

(3) In 2019, Other for layoff costs included reclassifications of a $58 credit for elimination of life insurance benefits for U.S. salaried and non-bargaining hourly retirees, a charge of $9 for pension plan settlement accounting, as the impacts were reflected in Arconic's separate liabilities for Accrued pension benefits and Accrued postretirement benefits, and reversals of previously recorded restructuring charges of $10.

In 2019, Other for other exit costs included a charge of $428 for impairment of the Disks long-lived asset group; a charge of $112 for impairment of assets associated with agreement to sell the Company’s Brazilian rolling mill operations, the U.K. forgings business, and a small additive business; a charge of $25 for impairment of properties, plants, and equipment related to the Company’s primary research and development facility and a trade name intangible asset; a charge of $12 for lease terminations; a charge of $9 for accelerated depreciation as the impacts were primarily reflected in various noncurrent asset accounts; a charge of $5 related to the impairment of a cost method investment of GRP, and a charge of $1 related to other miscellaneous items; partially offset by a gain of $20 related to contingent consideration from the Texarkana sale. Additionally, Other included the reclassification of $9 in lease exit costs to reduce right-of-use assets within Other noncurrent assets in accordance with the new lease accounting standard.

The remaining reserves are expected to be paid in cash during 2020.

D. Interest Cost Components

For the year ended December 31,	2019	2018	2017
Amount charged to expense	$ 338	$ 378	$ 496
Amount capitalized	33	23	22
	$ 371	$ 401	$ 518

E. Other Expense (Income), Net

For the year ended December 31,	2019	2018	2017
Non-service related net periodic benefit cost	$ 116	$ 112	$ 154
Interest income	(25)	(23)	(19)
Foreign currency (gains) losses, net	(1)	26	(5)
Net loss (gain) from asset sales	7	10	(513)
Other, net	25	(46)	(103)
	$ 122	$ 79	$ (486)

In 2019, Other, net included an increase in deferred compensation arrangements and related investment performance. In 2018, Non-service related net periodic benefit cost included lower net actuarial losses as a result of pension actions taken during 2018 (see Note F) and Other, net included a benefit from establishing a tax indemnification receivable of $29 reflecting Alcoa Corporation’s 49% share of a Spanish tax reserve (see Note T). In 2017, Net loss (gain) from asset sales included a gain on the sale of a portion of Arconic’s investment in Alcoa Corporation common stock of $351 (see Note U) and a gain of $167 on the Debt-for-Equity Exchange (see Note U). In 2017, Other, net included an adjustment of $81 to the contingent earn-out liability related to the 2014 acquisition of Firth Rixson (see Note S) and an adjustment of $25 associated with a separation-related guarantee liability (see Note T).

F. Pension and Other Postretirement Benefits

Arconic maintains pension plans covering most U.S. employees and certain employees in foreign locations. Pension benefits generally depend on length of service and job grade. 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.

Arconic also maintains health care and life insurance postretirement benefit plans covering eligible U.S. retired employees and certain retirees from foreign locations. 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. Arconic 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.

Effective January 1, 2015, Arconic no longer offers postretirement health care benefits to Medicare-eligible, primarily non-bargaining, U.S. retirees through Company-sponsored plans. Qualifying retirees (hired prior to January 1, 2002), both current and future, may access these benefits in the marketplace by purchasing coverage directly from insurance carriers.

On April 1, 2018, benefit accruals for future service and compensation under all of the Company's qualified and non-qualified defined benefit pension plans for U.S. salaried and non-bargaining hourly employees ceased. As a result of this change, in 2018, the Company recorded a decrease to the Accrued pension benefit liability of $136 related to the reduction of future benefits ($141 offset in Accumulated other comprehensive loss) and curtailment charges of $5 in Restructuring and other charges.

On April 13, 2018, the United Auto Workers ratified a new five-year labor agreement, covering approximately 1,300 U.S. employees of Arconic, which expires on March 31, 2023. A provision within the agreement includes a retirement benefit increase for future retirees that participate in a defined benefit pension plan, which impacts approximately 300 of those employees. In addition, effective January 1, 2019, benefit accruals for future service ceased. As result of these changes, in 2018, a curtailment charge of $9 was recorded in Restructuring and other charges.

In 2018, the Company announced that effective December 31, 2018, it would end all pre-Medicare medical, prescription drug and vision coverage for current and future salaried and non-bargained hourly employees and retirees of the Company and its subsidiaries. As a result of this change, in 2018, the Company recorded a decrease to the Accrued other postretirement benefits liability of $32 related to the reduction of future benefits, $4 offset in Accumulated other comprehensive loss, and a curtailment benefit of $28 in Restructuring and other charges.

In 2018, the company communicated to plan participants that effective in the first quarter of 2019, benefit accruals for future service and compensation for employees in the United Kingdom defined benefit pension plans will cease. The plan curtailment resulted in a $13 decrease in the Accrued pension benefits liability which was offset in Accumulated other comprehensive loss. Additionally, on October 29, 2018, the United Kingdom High Court ruled that defined benefit pension plans offering Guaranteed Minimum Pensions must review benefits accrued between May 1990 to April 1997 to ensure gender pay equality. The review resulted in an increase to the Accrued pension benefits liability of $9 and a corresponding curtailment charge that was recorded in Restructuring and other charges.

In 2019, the Company communicated to plan participants that for its U.S. salaried and non-bargained hourly retirees of the Company and its subsidiaries, it would eliminate the life insurance benefit effective May 1, 2019, and certain health care subsidies effective December 31, 2019. As a result of these changes, in 2019, the Company recorded a decrease to the Accrued other postretirement benefits liability of $75, which was offset by a curtailment benefit of $58 in Restructuring and other charges and $17 in Accumulated other comprehensive loss.

In June 2019, the Company and the United Steelworkers (USW) reached a tentative three-year labor agreement that was ratified on July 11, 2019 covering approximately 3,400 employees at four U.S. locations; the previous labor agreement expired on May 15, 2019. In 2019, the Company recognized $9 in Cost of goods sold on the accompanying Statement of Consolidated Operations primarily for a one-time signing bonus for employees. Additionally, on July 25, 2019, the USW ratified a new four-year labor agreement covering approximately 560 employees at the Company’s Niles, Ohio facility. The prior labor agreement expired on June 30, 2018.

In 2019 and 2018, the Company applied settlement accounting to U.S. pension plans due to lump sum payments to participants which resulted in settlement charges of $9 and $96 that were recorded in Restructuring and other charges.

The funded status of all of Arconic's pension and other postretirement benefit plans are measured as of December 31 each calendar year.

Obligations and Funded Status

	Pension benefits		Other postretirement benefits	
December 31,	**2019**	**2018**	**2019**	**2018**
Change in benefit obligation				
Benefit obligation at beginning of year	$ 6,476	$ 7,359	$ 806	$ 927
Service cost	25	46	7	7
Interest cost	235	219	28	28
Amendments	—	18	(78)	(25)
Actuarial losses (gains)	974	(372)	100	(51)
Settlements	(23)	(146)	—	—
Curtailments	—	(154)	—	—
Benefits paid	(477)	(422)	(82)	(86)
Medicare Part D subsidy receipts	—	—	5	6
Foreign currency translation impact	39	(72)	—	—
Benefit obligation at end of year(1)	$ 7,249	$ 6,476	$ 786	$ 806
Change in plan assets(1)				
Fair value of plan assets at beginning of year	$ 4,334	$ 4,862	$ —	$ —
Actual return on plan assets	731	(144)	—	—
Employer contributions	268	298	—	—
Benefits paid	(453)	(397)	—	—
Administrative expenses	(34)	(33)	—	—
Settlements	(22)	(178)	—	—
Foreign currency translation impact	44	(74)	—	—
Fair value of plan assets at end of year(1)	$ 4,868	$ 4,334	$ —	$ —
Net funded status	$ (2,381)	$ (2,142)	$ (786)	$ (806)
Amounts recognized in the Consolidated Balance Sheet consist of:				
Noncurrent assets	$ 104	$ 111	$ —	$ —
Current liabilities	(25)	(23)	(72)	(83)
Noncurrent liabilities	(2,460)	(2,230)	(714)	(723)
Net amount recognized	$ (2,381)	$ (2,142)	$ (786)	$ (806)
Amounts recognized in Accumulated Other Comprehensive Loss consist of:				
Net actuarial loss	$ 3,375	$ 2,957	$ 179	$ 87
Prior service cost (benefit)	1	3	(37)	(27)
Net amount recognized, before tax effect	$ 3,376	$ 2,960	$ 142	$ 60
Other changes in plan assets and benefit obligations recognized in Other Comprehensive Loss consist of:				
Net actuarial loss (gain)	$ 566	$ (19)	$ 100	$ (52)
Amortization of accumulated net actuarial loss	(148)	(264)	(8)	(7)
Prior service cost (benefit)	—	19	(78)	(25)
Amortization of prior service (cost) benefit	(2)	(26)	68	35
Net amount recognized, before tax effect	$ 416	$ (290)	$ 82	$ (49)

(1) At December 31, 2019, the benefit obligation, fair value of plan assets, and funded status for U.S. pension plans were $5,884, $3,513, and $(2,371), respectively. At December 31, 2018, the benefit obligation, fair value of plan assets, and funded status for U.S. pension plans were $5,282, $3,123, and $(2,159) respectively.

Pension Plan Benefit Obligations

	Pension benefits	
	2019	**2018**
The projected benefit obligation and accumulated benefit obligation for all defined benefit pension plans were as follows:		
Projected benefit obligation	$ 7,249	$ 6,476
Accumulated benefit obligation	7,219	6,444
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	6,064	5,435
Fair value of plan assets	3,579	3,182
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	6,045	5,415
Fair value of plan assets	3,579	3,179

Components of Net Periodic Benefit Cost

	Pension benefits[(1)]			Other postretirement benefits[(2)]		
For the year ended December 31,	**2019**	**2018**	**2017**	**2019**	**2018**	**2017**
Service cost	$ 25	$ 46	$ 90	$ 7	$ 7	$ 7
Interest cost	235	219	234	28	28	30
Expected return on plan assets	(286)	(306)	(332)	—	—	—
Recognized net actuarial loss	139	168	220	4	7	5
Amortization of prior service cost (benefit)	2	3	5	(6)	(7)	(8)
Settlements[(3)]	9	96	—	—	—	—
Curtailments[(4)]	—	23	—	(58)	(28)	—
Net periodic benefit cost[(5)]	$ 124	$ 249	$ 217	$ (25)	$ 7	$ 34

(1) In 2019, 2018 and 2017, net periodic benefit cost for U.S. pension plans was $127, $239, and $206, respectively.

(2) In 2019, 2018 and 2017, net periodic benefit cost for other postretirement benefits reflects a reduction of $11, $10, and $11, respectively, related to the recognition of the federal subsidy awarded under Medicare Part D.

(3) In 2019 and 2018, settlements were due to workforce reductions (see Note C) and the payment of lump sum benefits.

(4) In 2019 and 2018, curtailments were due to a reduction of future benefits, resulting in the recognition of favorable and unfavorable plan amendments.

(5) Service cost was included within Cost of goods sold, Selling, general administrative, and other expenses, and Research and development expenses; curtailments and settlements were included in Restructuring and other charges; and all other cost components were recorded in Other expense (income), net in the Statement of Consolidated Operations.

Amounts Expected to be Recognized in Net Periodic Benefit Cost

	Pension benefits	Other postretirement benefits
December 31,	**2020**	**2020**
Net actuarial loss recognition	$ 176	$ 8
Prior service cost (benefit) recognition	—	(7)

Assumptions

Weighted average assumptions used to determine benefit obligations for U.S. pension and other postretirement benefit plans were as follows (assumptions for non-U.S. plans did not differ materially):

December 31,	2019	2018
Discount rate	3.30%	4.35%
Rate of compensation increase	—	3.50
Cash balance plan interest crediting rate	3.00	3.00

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, including finance and banking, industrials, transportation, and utilities, among others. The yield curve model parallels the plans' projected cash flows, which have an average duration of 10 years. 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.

Benefit accruals for future compensation under the Company's major salaried and non-bargained hourly defined benefit pension plans have ceased. The rate of compensation increase no longer impacts the determination of the benefit obligation and is not reported in the preceding table effective December 31, 2019.

Weighted average assumptions used to determine net periodic benefit cost for U.S. pension and other postretirement benefit plans were as follows (assumptions for non-U.S. plans did not differ materially):

	2019	2018	2017
Discount rate to calculate service cost[(1)]	4.35%	3.75%	4.20%
Discount rate to calculate interest cost[(1)]	4.00	3.30	3.60
Expected long-term rate of return on plan assets	7.00	7.00	7.75
Rate of compensation increase	3.50	3.50	3.50
Cash balance plan interest crediting rate	3.00	3.00	3.00

(1) In all periods presented, the respective discount rates were used to determine net periodic benefit cost for most U.S. pension plans for the full annual period. However, the discount rates for a limited number of plans were updated during 2019, 2018, and 2017 to reflect the remeasurement of these plans due to new union labor agreements, settlements, and/or curtailments. The updated discount rates used were not significantly different from the discount rates presented.

The expected long-term rate of return on plan assets is generally applied to a five-year market-related value of plan assets (a 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 a combination of historical asset return information and forward-looking returns by asset class. As it relates to historical asset return information, management focuses on various historical moving averages when developing this assumption. While consideration is given to recent performance and historical returns, the assumption represents a long-term, prospective return. Management also incorporates expected future returns on current and planned asset allocations using information from various external investment managers and consultants, as well as management's own judgment.

For 2019, 2018, and 2017, 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. These rates fell within the respective range of the 20-year moving average of actual performance and the expected future return developed by asset class. In 2018, management reduced the expected long-term rate of return by 75 basis points due to a decrease in the expected return by asset class and the 20-year moving average. For 2020, management anticipates that 7.00% will be the expected long-term rate of return.

Assumed health care cost trend rates for U.S. other postretirement benefit plans were as follows (assumptions for non-U.S. plans did not differ materially):

	2019	2018	2017
Health care cost trend rate assumed for next year	5.50%	5.50%	5.50%
Rate to which the cost trend rate gradually declines	4.50	4.50	4.50
Year that the rate reaches the rate at which it is assumed to remain	2023	2022	2021

The assumed health care cost trend rate is used to measure the expected cost of gross eligible charges covered by Arconic's other postretirement benefit plans. For 2020, 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 over the past three years has ranged from (3.8)% to 0.7%. 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 the 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	$ 23	$ (22)
Effect on total of service and interest cost components	1	(1)

Plan Assets

Arconic's pension plans' investment policy and weighted average asset allocations at December 31, 2019 and 2018, by asset class, were as follows:

		Plan assets at December 31,	
Asset class	**Policy range**	**2019**	**2018**
Equities	20–55%	31%	29%
Fixed income	25–55%	50	48
Other investments	15–35%	19	23
Total		100%	100%

The principal objectives underlying the investment of the pension plans' assets are to ensure that Arconic 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. Specific objectives for long-term investment strategy include reducing the volatility of pension assets relative to pension liabilities and achieving diversification across the balance of the asset portfolio. The use of derivative instruments is permitted where appropriate and necessary for achieving overall investment policy objectives. The investment strategy uses long duration cash bonds and derivative instruments to offset a portion of the interest rate sensitivity of U.S. pension liabilities. Exposure to broad equity risk is decreased and diversified through investments in discretionary and systematic macro hedge funds, long/short equity hedge funds, high yield bonds, emerging market debt and global and emerging market equities. Investments are further diversified by strategy, asset class, geography, and sector to enhance returns and mitigate downside risk. A large number of external investment managers are used to gain broad exposure to the financial markets and to mitigate manager-concentration risk.

Investment practices comply with the requirements of the Employee Retirement Income Security Act of 1974 (ERISA) and other applicable laws and regulations.

The following section describes the valuation methodologies used to measure the fair value of pension plan assets, including an indication of the level in the fair value hierarchy in which each type of asset is generally classified (see Note Q 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 equity derivatives, that 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 the net asset value of shares held at December 31 (included in Level 1); and (iii) direct investments in long/short equity hedge funds and private equity (limited partnerships and venture capital partnerships) that are valued at net asset value.

Fixed income. These securities consist of: (i) U.S. government debt that 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);

(iv) fixed income derivatives that are generally valued using industry standard models with market-based observable inputs (included in Level 2); and (v) cash and cash equivalents invested in institutional funds and are valued at net asset value.

Other investments. These investments include, among others: (i) exchange traded funds, such as gold, and real estate investment trusts and are valued based on the closing price reported in an active market on which the investments are traded (included in Level 1) and (ii) direct investments of discretionary and systematic macro hedge funds and private real estate (includes limited partnerships) 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 Arconic 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 the appropriate level of the fair value hierarchy or net asset cost:

December 31, 2019	Level 1	Level 2	Net asset value	Total
Equities:				
Equity securities	$ 590	$ —	$ 508	$ 1,098
Long/short equity hedge funds	—	—	260	260
Private equity	—	—	155	155
	$ 590	$ —	$ 923	$ 1,513
Fixed income:				
Intermediate and long duration government/credit	$ 121	$ 1,047	$ 1,003	$ 2,171
Other	126	7	144	277
	$ 247	$ 1,054	$ 1,147	$ 2,448
Other investments:				
Real estate	$ 104	$ —	$ 165	$ 269
Discretionary and systematic macro hedge funds	—	—	405	405
Other	—	—	240	240
	$ 104	$ —	$ 810	$ 914
Net plan assets[(1)]	$ 941	$ 1,054	$ 2,880	$ 4,875

December 31, 2018	Level 1	Level 2	Net Asset Value	Total
Equities				
Equity securities	$ 318	$ —	$ 578	$ 896
Long/short equity hedge funds	—	—	232	232
Private equity	—	—	147	147
	$ 318	$ —	$ 957	$ 1,275
Fixed income:				
Intermediate and long duration government/credit	$ 200	$ 934	$ 770	$ 1,904
Other	9	9	152	170
	$ 209	$ 943	$ 922	$ 2,074
Other investments:				
Real estate	$ 81	$ —	$ 164	$ 245
Discretionary and systematic macro hedge funds	—	—	471	471
Other	56	—	212	268
	$ 137	$ —	$ 847	$ 984
Net plan assets[(2)]	$ 664	$ 943	$ 2,726	$ 4,333

(1) As of December 31, 2019, the total fair value of pension plans' assets excludes a net payable of $7, which represents securities purchased and sold but not yet settled plus interest and dividends earned on various investments.

(2) As of December 31, 2018, the total fair value of pension plans' assets excludes a net receivable of $1, which represents securities purchased and sold but not yet settled plus interest and dividends earned on various investments.

Funding and Cash Flows

It is Arconic’s policy to fund amounts for pension plans sufficient to meet the minimum requirements set forth in applicable country benefits laws and tax laws. Periodically, Arconic contributes additional amounts as deemed appropriate. In 2019 and 2018, cash contributions to Arconic’s pension plans were $268 and $298, respectively. The $268 includes $53 contributed to the Company’s U.S. plans that was in excess of the minimum required under ERISA.

The contribution to the Company’s pension plans in 2020 is estimated to be $475 (of which $403 is for U.S. plans). The minimum required is $415, along with approximately $60 of contributions related to actions designed to reduce future obligations.

During the third quarter of 2016, the Pension Benefit Guaranty Corporation approved management’s plan to separate the Alcoa Inc. pension plans between Arconic Inc. and Alcoa Corporation. The plan stipulated that Arconic make cash contributions of $150 over a period of 30 months (from November 1, 2016) to its two largest pension plans. The Company satisfied the requirements of the plan by making payments of $34, $66, and $50 in April 2019, March 2018, and April 2017, respectively.

Benefit payments expected to be paid to pension and other postretirement benefit plans’ participants and expected Medicare Part D subsidy receipts are as follows utilizing the current assumptions outlined above:

For the year ended December 31,	Pension benefits paid	Gross Other post-retirement benefits	Medicare Part D subsidy receipts	Net Other post-retirement benefits
2020	$ 470	$ 80	$ 5	$ 75
2021	465	80	5	75
2022	460	80	5	75
2023	455	80	5	75
2024	450	75	5	70
Thereafter	2,120	260	25	235
	$ 4,420	$ 655	$ 50	$ 605

Defined Contribution Plans

Arconic sponsors savings and investment plans in various countries, primarily in the United States. Arconic’s contributions and expenses related to these plans were $125, $123, and $89 in 2019, 2018, and 2017, respectively. In the United States, employees may contribute a portion of their compensation to the plans, and Arconic matches a portion of these contributions in equivalent form of the investments elected by the employee.

G. Income Taxes

The components of income from continuing operations before income taxes were as follows:

For the year ended December 31,	2019	2018	2017
United States	$ 275	$ 518	$ 500
Foreign	300	350	(30)
	$ 575	$ 868	$ 470

The provision for income taxes consisted of the following:

For the year ended December 31,	2019	2018	2017
Current:			
Federal[1]	$ 4	$ 45	$ —
Foreign	108	138	98
State and local	5	4	(2)
	117	187	96
Deferred:			
Federal	65	146	489
Foreign	(53)	(94)	37
State and local	(24)	(13)	(78)
	(12)	39	448
Total	$ 105	$ 226	$ 544

(1) Includes U.S. taxes related to foreign income

A reconciliation of the U.S. federal statutory rate to Arconic's effective tax rate was as follows (the effective tax rate for all periods was a provision on income):

For the year ended December 31,	2019	2018	2017
U.S. federal statutory rate	21.0 %	21.0 %	35.0 %
Foreign tax rate differential	2.6	2.4	(8.7)
U.S. and residual tax on foreign earnings	6.0	1.6	(0.1)
U.S. State and local taxes	2.5	1.5	0.7
Federal benefit of state tax	0.4	(0.3)	3.7
Permanent differences related to asset disposals and items included in restructuring and other charges[1]	(22.9)	(16.9)	(167.4)
Non-deductible transaction costs	1.6	—	0.3
Non-deductible officer compensation	1.8	0.1	—
Statutory tax rate and law changes[2]	(0.2)	6.5	52.5
Tax holidays	(3.2)	(1.6)	(3.0)
Changes in valuation allowances[3]	(14.2)	0.9	137.9
Impairment of goodwill	—	—	53.5
Changes in uncertain tax positions	6.1	12.8	10.1
Prior year tax adjustments[4]	15.2	(2.6)	(0.9)
Other	1.6	0.6	2.1
Effective tax rate	18.3 %	26.0 %	115.7 %

(1) In 2019, a net tax benefit was recognized related to a U.S. tax election which caused the deemed liquidation of a foreign subsidiary's assets into its U.S. tax parent. The benefit is partially offset by an increase in uncertain tax positions. Losses reported in Spain's 2017 tax return related to the Separation of Alcoa are offset by an increased valuation allowance.

(2) In 2018, the Company finalized its accounting for the Tax Cuts and Jobs Act of 2017 ("the 2017 Act") and recorded an additional $59 charge. In December 2017, an estimated $272 tax charge was recorded with respect to the enactment of the 2017 Act.

(3) In 2019, the Company released a valuation allowance related to 2015 and 2016 foreign tax credits, subsequent to filing U.S. amended tax returns to deduct, rather than credit, foreign taxes.

(4) In 2019, the Company filed U.S. amended tax returns to deduct, rather than credit, 2015 and 2016 foreign taxes resulting in a tax cost associated with the write-off of the deferred tax asset for the credit, partially offset by a tax benefit for the deduction.

On December 22, 2017, the 2017 Act was signed into law, making significant changes to the Internal Revenue Code. Changes include, but are not limited to, a corporate tax rate decrease from 35% to 21% effective for tax years beginning after December 31, 2017, the transition of U.S. international taxation from a worldwide tax system to a territorial system, and a one-time transition tax on the non-previously taxed post-1986 foreign earnings and profits of certain U.S.-owned foreign corporations as of December 31, 2017. Also on December 22, 2017, Staff Accounting Bulletin No. 118 ("SAB 118"), Income Tax Accounting Implications of the Tax Cuts and Jobs Act, was issued by the SEC to address the application of U.S. GAAP for financial reporting. SAB 118 permitted the use of provisional amounts based on reasonable estimates in the financial statements. SAB 118 also provided that the tax impact may be considered incomplete in situations when a registrant does not have the necessary information available, prepared, or analyzed (including computations) in reasonable detail to complete the accounting for certain income tax effects of the 2017 Act.

The Company calculated a reasonable estimate of the impact of the 2017 Act's tax rate reduction and one-time transition tax in its 2017 year end income tax provision in accordance with its understanding of the 2017 Act and guidance available and, as a result, recorded a $272 tax charge in the fourth quarter of 2017, the period in which the legislation was enacted.

In 2018, the Company included a $59 tax charge in income from continuing operations as a result of finalizing its accounting for the 2017 Tax Act in accordance with SAB 118. This charge primarily related to a $16 charge for the one-time transition tax and a $43 charge to update deferred tax balances.

The components of net deferred tax assets and liabilities were as follows:

	2019		2018	
December 31,	**Deferred tax assets**	**Deferred tax liabilities**	**Deferred tax assets**	**Deferred tax liabilities**
Depreciation	$ 25	$ 729	$ 38	$ 694
Employee benefits	887	16	836	27
Loss provisions	92	—	94	—
Deferred income/expense	96	943	22	1,102
Interest	56	—	—	—
Tax loss carryforwards	2,932	—	3,159	—
Tax credit carryforwards	379	—	579	—
Other	52	16	94	20
	$ 4,519	$ 1,704	$ 4,822	$ 1,843
Valuation allowance	(2,256)	—	(2,486)	—
	$ 2,263	$ 1,704	$ 2,336	$ 1,843

The following table details the expiration periods of the deferred tax assets presented above:

December 31, 2019	**Expires within 10 years**	**Expires within 11-20 years**	**No expiration[(1)]**	**Other[(2)]**	**Total**
Tax loss carryforwards	$ 452	$ 235	$ 2,245	$ —	$ 2,932
Tax credit carryforwards	300	69	10	—	379
Other	—	—	120	1,088	1,208
Valuation allowance	(711)	(176)	(1,306)	(63)	(2,256)
	$ 41	$ 128	$ 1,069	$ 1,025	$ 2,263

(1) Deferred tax assets with no expiration may still have annual limitations on utilization.

(2) Other represents deferred tax assets whose expiration is dependent upon the reversal of the underlying temporary difference. A substantial amount of Other relates to employee benefits that will become deductible for tax purposes over an extended period of time as contributions are made to employee benefit plans and payments are made to retirees.

The total deferred tax asset (net of valuation allowance) is supported by projections of future taxable income exclusive of reversing temporary differences (27%) and taxable temporary differences that reverse within the carryforward period (73%).

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 Arconic'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.

In 2018, Arconic made a final accounting policy election to apply a tax law ordering approach when considering the need for a valuation allowance on net operating losses expected to offset GILTI income inclusions. Under this approach, reductions in cash tax savings are not considered as part of the valuation allowance assessment. Instead, future GILTI inclusions are considered a source of taxable income that support the realizability of deferred tax assets.

Arconic's foreign tax credits in the United States have a 10-year carryforward period with expirations ranging from 2020 to 2028 (as of December 31, 2019). Valuation allowances were initially established in prior years on a portion of the foreign tax credit carryforwards, primarily due to insufficient foreign source income to allow for full utilization of the credits within the expiration period. After consideration of all available evidence including potential tax planning strategies, incremental valuation allowances of $46 and $9 were recognized in 2018 and 2017, respectively. No additional valuation allowance was recorded in 2019 as the Company intends to deduct, rather than credit, foreign taxes. Foreign tax credits of $88, $8, and $57 expired at the end of 2019, 2018, and 2017, respectively, resulting in a corresponding decrease to the valuation allowance. The valuation allowance was also reduced by $113 as a result of Arconic deducting foreign taxes that were previously claimed as a U.S. foreign tax credit. At December 31, 2019, the cumulative amount of the valuation allowance was $216. The need for this valuation allowance will be reassessed on a continuous basis in future periods and, as a result, the allowance may increase or decrease based on changes in facts and circumstances.

Arconic also recorded a valuation allowance of $10 related to capital losses and capital investments in 2019. Capital losses can only offset capital gain income. Arconic does not have sufficient sources of capital gain income to support the utilization of these losses and investments. The need for valuation allowances against capital losses and investments will be reassessed on a continuing basis.

Arconic released $13 and $10 of certain U.S. state valuation allowances in 2019 and 2018, respectively. After weighing all available positive and negative evidence, the Company determined that the underlying net deferred tax assets were more likely than not realizable based on projected taxable income estimates. Valuation allowances of $672 remain against other net state deferred tax assets expected to expire before utilization. The need for valuation allowances against net state deferred tax assets will be reassessed on a continuous basis in future periods and, as a result, the allowance may increase or decrease based on changes in facts and circumstances.

In 2018, Arconic reduced a valuation allowance by $92 as a result of increasing a tax reserve for unrecognized tax benefits in Spain. The valuation allowance reduction was partially offset by a $20 charge with respect to losses no longer supported by reversing temporary differences. Arconic also recorded an additional valuation allowance of $61 and $675 in 2018 and 2017, respectively, which offsets a deferred tax asset recorded for additional losses reported on the Spanish tax return related to the Separation of Alcoa that are not more likely than not to be realized.

The following table details the changes in the valuation allowance:

December 31,	2019	2018	2017
Balance at beginning of year	$ 2,486	$ 2,584	$ 1,940
Increase to allowance	37	136	831
Release of allowance	(222)	(154)	(246)
Acquisitions and divestitures	(2)	—	(1)
Tax apportionment, tax rate and tax law changes	(13)	(14)	(24)
Foreign currency translation	(30)	(66)	84
Balance at end of year	$ 2,256	$ 2,486	$ 2,584

As a result of the 2017 Act, the non-previously taxed post-1986 foreign earnings and profits (calculated based on U.S. tax principles) of certain U.S.-owned foreign corporations has been subject to U.S. tax under the one-time transition tax provisions. The 2017 Act also created a new requirement that certain income earned by foreign subsidiaries, GILTI, must be included in the gross income of the U.S. shareholder. The 2017 Act also established the Base Erosion and Anti-Abuse Tax (BEAT). In the first quarter of 2018, Arconic made a final accounting policy election to treat taxes due from future inclusions in U.S. taxable income related to GILTI as a current period expense when incurred. Arconic has estimated a GILTI inclusion for 2019 and 2018 and recorded tax expense accordingly. Arconic does not anticipate being subject to BEAT for 2019 and 2018.

Foreign U.S. GAAP earnings that have not otherwise been subject to U.S. tax, will generally be exempt from future U.S. tax under the 2017 Act when distributed. Such distributions, as well as distributions of previously taxed foreign earnings, could potentially be subject to U.S. state tax in certain states, and foreign withholding taxes. Foreign currency gains/losses related to the translation of previously taxed earnings from functional currency to U.S. dollars could also be subject to U.S. tax when distributed. At this time, Arconic has no plans to distribute such earnings in the foreseeable future. If such earnings were to be distributed, Arconic would expect the potential U.S. state tax and withholding tax impacts to be immaterial and the potential deferred tax liability associated with future foreign currency gains to be impracticable to determine.

Arconic and its subsidiaries file income tax returns in the U.S. federal jurisdiction and various states and foreign jurisdictions. With a few minor exceptions, Arconic is no longer subject to income tax examinations by tax authorities for years prior to 2006. All U.S. tax years prior to 2019 have been audited by the Internal Revenue Service. Various state and foreign jurisdiction tax authorities are in the process of examining Arconic's income tax returns for various tax years through 2018.

A reconciliation of the beginning and ending amount of unrecognized tax benefits (excluding interest and penalties) was as follows:

December 31,	2019	2018	2017
Balance at beginning of year	$ 166	$ 73	$ 28
Additions for tax positions of the current year	34	—	23
Additions for tax positions of prior years	3	143	27
Reductions for tax positions of prior years	—	(42)	—
Settlements with tax authorities	—	—	—
Expiration of the statute of limitations	(2)	(6)	(5)
Foreign currency translation	(4)	(2)	—
Balance at end of year	$ 197	$ 166	$ 73

For all periods presented, a portion of the balance 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 2019, 2018, and 2017 would be approximately 13%, 5%, and 15%, respectively, of pre-tax book income. Arconic does not anticipate that changes in its unrecognized tax benefits will have a material impact on the Statement of Consolidated Operations during 2020.

It is Arconic'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. Arconic recognized interest of $6, $22 and $1 for 2019, 2018, and 2017, respectively. Due to the expiration of the statute of limitations, settlements with tax authorities, and refunded overpayments, Arconic recognized interest income of $0, $1, and $2 in 2019, 2018, and 2017, respectively. As of December 31, 2019, 2018, and 2017, the amount accrued for the payment of interest and penalties was $23, $21, and $2, respectively.

H. Preferred and Common Stock

Preferred Stock. Arconic has two classes of preferred stock: Class A Preferred Stock and Class B Serial Preferred Stock. Class A Preferred Stock has 660,000 shares authorized at a par value of $100 per share with an annual $3.75 cumulative dividend preference per share. There were 546,024 shares of Class A Preferred Stock outstanding at December 31, 2019 and 2018. Class B Serial Preferred Stock has 10,000,000 shares authorized at a par value of $1 per share. There were no shares of Class B Serial Preferred Stock outstanding at December 31, 2019 and 2018 (see below).

In September 2014, Arconic completed a public offering under its shelf registration statement for $1,250 of 25 million depositary shares, each of which represented a 1/10th interest in a share of Arconic's 5.375% Class B Mandatory Convertible Preferred Stock, Series 1, par value $1 per share, liquidation preference $500 per share (the "Mandatory Convertible Preferred Stock"). The 25 million depositary shares were equivalent to 2.5 million shares of Mandatory Convertible Preferred Stock. Each depositary share entitled the holder, through the depositary, to a proportional fractional interest in the rights and preferences of a share of Mandatory Convertible Preferred Stock, including conversion, dividend, liquidation, and voting rights, subject to terms of the deposit agreement. Arconic received $1,213 in net proceeds from the public offering reflecting an underwriting discount. The net proceeds were used, together with the net proceeds of issued debt, to finance the cash portion of the acquisition of Firth Rixson. The underwriting discount was recorded as a decrease to Additional capital. The Mandatory Convertible Preferred Stock constituted a series of Arconic's Class B Serial Preferred Stock, which ranks senior to Arconic's common stock and junior to Arconic's Class A Preferred Stock and existing and future indebtedness. Holders of the Mandatory Convertible Preferred Stock generally had no voting rights.

Dividends on the Mandatory Convertible Preferred Stock were cumulative in nature and paid at the rate of $26.8750 per annum per share in 2016 and 2015, which commenced January 1, 2015 (paid on December 30, 2014).

On October 2, 2017, all outstanding 24,975,978 depositary shares (each depositary share representing a 1/10th interest in a share of the mandatory convertible preferred stock) were converted at a rate of 1.56996 into 39,211,286 common shares; 24,022 depositary shares were previously tendered for early conversion into 31,420 shares of Arconic common stock. No gain or loss was recognized associated with this equity transaction. Dividends on the Mandatory Convertible Preferred Stock were paid at the rate of $20.1563 per share in 2017.

Common Stock. At December 31, 2019, there were 600,000,000 shares authorized and 432,855,183 shares issued and outstanding. Dividends paid of $0.12 per annum ($0.06 dividend in the first quarter of 2019 and $0.02 per quarter for the remainder of the year) in 2019 and $0.24 per annum or $0.06 per quarter in 2018 and 2017.

As of December 31, 2019, 47 million shares of common stock were reserved for issuance under Arconic's stock-based compensation plans. As of December 31, 2019, 37 million shares remain available for issuance. Arconic issues new shares to satisfy the exercise of stock options and the conversion of stock awards.

In July 2015, through the acquisition of RTI International Metals Inc. (RTI), Arconic assumed the obligation to repay two tranches of convertible debt; one tranche was due and settled in cash on December 1, 2015 (principal amount of $115) and the other tranche was due on October 15, 2019 (principal amount of $403), unless earlier converted or purchased by Arconic at the holder's option under specific conditions. No shares of the Company's common stock were issued in connection with the maturity or final conversion of this convertible debt. See Note P for additional details.

Share Activity (number of shares)

	Common stock	
	Treasury	**Outstanding**
Balance at end of 2016	—	438,519,780
Conversion of convertible notes	—	39,242,706
Issued for stock-based compensation plans	—	3,654,051
Balance at end of 2017	—	481,416,537
Issued for stock-based compensation plans	—	1,854,180
Balance at end of 2018	—	483,270,717
Issued for stock-based compensation plans	—	4,436,830
Repurchase and retirement of common stock	—	(54,852,364)
Balance at end of 2019	—	432,855,183

On February 19, 2019, the Company entered into an accelerated share repurchase (ASR) agreement with JPMorgan Chase Bank to repurchase $700 of its common stock (the "February 2019 ASR"), pursuant to the share repurchase programs previously authorized by its Board of Directors (the Board). Under the February 2019 ASR, Arconic received an initial delivery of shares on February 21, 2019 and additional shares on April 29, 2019. On May 2, 2019, the Company entered into an ASR agreement with JPMorgan Chase Bank to repurchase $200 of its common stock (the "May 2019 ASR"), pursuant to the share repurchase programs previously authorized by its Board. Under the May 2019 ASR, Arconic received an initial delivery of shares on May 6, 2019 and additional shares on June 12, 2019. On May 14, 2019, the Board authorized an additional share repurchase program of up to $500 of its outstanding common stock. On August 6, 2019, the Company entered into an ASR agreement with Goldman Sachs & Co. LLC to repurchase $200 of its common stock (the "August 2019 ASR"), pursuant to the share repurchase programs previously authorized by its Board. Under the August 2019 ASR, Arconic received an initial delivery of shares on August 8, 2019 and additional shares on October 3, 2019. On November 14, 2019, the Company entered into an agreement with Citigroup Global Markets Inc. to repurchase $50 of its common stock (the "November 2019 share repurchase program"), pursuant to the share repurchase programs previously authorized by its Board. All of the shares repurchased during 2019 were immediately retired. After giving effect to the February 2019 ASR, May 2019 ASR, August 2019 ASR, and November 2019 share repurchase program, $350 remains available under the prior authorizations by the Board for share repurchases through the end of 2020.

The following table provides details for the share repurchases during 2019.

Share delivery date	Number of shares	Average price	Total
February 21, 2019	31,908,831		
April 29, 2019	4,525,592		
February 2019 ASR total	36,434,423	$19.21	$700
May 6, 2019	7,455,732		
June 12, 2019	1,561,249		
May 2019 ASR total	9,016,981	$22.18	$200
August 8, 2019	6,791,172		
October 3, 2019	983,107		
August 2019 ASR total	7,774,279	$25.73	$200
November 18, 2019	428,000		
November 19, 2019	428,000		
November 20, 2019	370,000		
November 21, 2019	400,681		
November 2019 share repurchase program	1,626,681	$30.74	$50
2019 Share repurchase total	54,852,364	$20.97	$1,150

Stock-Based Compensation

Arconic has a stock-based compensation plan under which stock options and/or restricted stock unit awards are granted in the first quarter of each year to eligible employees. Stock options are granted at the closing market price of Arconic's common stock on the date of grant and typically vest over a three-year service period (1/3 each year) with a ten-year contractual term. Restricted stock unit awards typically vest over a three-year service period from the date of grant. As part of Arconic's stock-based compensation plan design, individuals who are retirement-eligible have a six-month requisite service period in the year of grant. Certain of the restricted stock unit awards include performance and market conditions and are granted to a limited number of eligible employees. In 2019, performance stock awards were granted to the CEO that vest either based on achievement of the planned Separation of Arconic (see Note U for further details) or the achievement of certain stock price thresholds. Performance stock awards granted in the first quarter of 2019 were converted to restricted stock unit awards (at target), in order to address the planned Separation of Arconic. For performance stock awards issued in 2018 and 2017, the final number of shares earned will be based on Arconic's achievement of sales and profitability targets over the respective performance periods and will be earned at the end of the third year. Additionally, the 2018 and 2017 performance stock awards will be scaled by a total shareholder return ("TSR") multiplier, which depends upon relative performance against the TSRs of a group of peer companies.

In conjunction with their employment agreements, certain current and former executives were granted cash bonus awards based on the achievement of certain stock price thresholds. These awards are liability classified and were marked-to-market each quarter using a Monte Carlo simulation. At the end of the year, the stock price thresholds have been fully reached. The cash payment of $23 will occur in 2021 in accordance with the terms of the agreements.

In 2019, 2018, and 2017, Arconic recognized stock-based compensation expense of $78 ($70 after-tax), $50 ($39 after-tax), and $54 ($36 after-tax), respectively. Cash bonus awards of $21 were recorded in 2019. Of the remaining stock-based compensation expense in 2019, more than 95% relates to restricted stock unit awards. The expense related to restricted stock unit awards in 2018 and 2017 was approximately 85%. No stock-based compensation expense was capitalized in any of those years. Stock-based compensation expense was reduced by $3 and $13 in 2019 and 2017, respectively, for certain executive pre-vest cancellations which were recorded in Restructuring and other charges within the Statement of Consolidated Operations. At December 31, 2019, there was $50 (pre-tax) of unrecognized compensation expense related to non-vested stock option grants and non-vested restricted stock unit award grants. This expense is expected to be recognized over a weighted average period of 1.3 years.

Stock-based compensation expense is based on the grant date fair value of the applicable equity grant. For restricted stock unit awards, the fair value was equivalent to the closing market price of Arconic's common stock on the date of grant. The weighted average grant date fair value of the 2019 performance stock awards with a market condition (achievement of certain stock price thresholds) was $11.93. The grant date fair value of the 2018 performance stock awards containing a market condition (scaled by TSR multiplier) was $20.25. The 2019 and 2018 performance awards were valued using a Monte Carlo model. A Monte Carlo simulation uses assumptions of stock price behavior to estimate the probability of satisfying market conditions and the resulting fair value of the award. The risk-free interest rate (1.6% in 2019 and 2.7% in 2018) was based on a yield curve of interest rates at the time of the grant based on the remaining performance period. In 2019 volatility was estimated using implied and historical volatility (33.4%). Because of limited historical information due to the Separation of Alcoa, 2018 volatility (32.0%) was estimated using implied volatility, and the representative price return approach, which uses price returns of comparable companies, was used to develop a correlation assumption. For stock options, the fair value was estimated on the date of grant using a lattice-pricing model, which generated a result of $9.79 and $6.26 per option in 2018 and 2017, respectively. There were no stock options issued in 2019. The lattice-pricing model uses a number of assumptions to estimate the fair value of a stock option, including a risk-free interest rate, dividend yield, volatility, exercise behavior, and contractual life. The following paragraph describes in detail the assumptions used 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 were not materially different, except as noted below).

The risk-free interest rate (2.5%) was based on a yield curve of interest rates at the time of the grant based on the contractual life of the option. The dividend yield (0.9%) was based on a one-year average. Volatility (34.0% for 2018 and 38.1% in 2017) was based on comparable companies and implied volatilities over the term of the option. Arconic utilized historical option forfeiture data to estimate annual post-vesting forfeitures (6%). Exercise behavior (61%) 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. The activity for stock options and stock awards during 2019 was as follows (options and awards in millions):

	Stock options		Stock awards	
	Number of options	Weighted average exercise price	Number of awards	Weighted average FMV per award
Outstanding, December 31, 2018	10	$ 24.95	7	$ 21.13
Granted	—	—	4	19.80
Exercised	(2)	21.34	—	—
Converted	—	—	(3)	15.78
Expired or forfeited	(1)	28.37	(1)	22.10
Performance share adjustment	—	—	—	19.96
Outstanding, December 31, 2019	7	$ 25.75	7	$ 22.05

As of December 31, 2019, the number of stock options outstanding had a weighted average remaining contractual life of 3.4 years and a total intrinsic value of $40. Additionally, 5.9 million of the stock options outstanding were fully vested and exercisable and had a weighted average remaining contractual life of 3.0 years, a weighted average exercise price of $25.80, and a total intrinsic value of $36 as of December 31, 2019. In 2019, 2018, and 2017, the cash received from stock option exercises was $56, $16, and $50 and the total tax benefit realized from these exercises was $4, $2, and $4, respectively. The total intrinsic value of stock options exercised during 2019, 2018, and 2017 was $17, $7, and $13, respectively.

I. Earnings Per Share

Basic earnings per share (EPS) amounts are computed by dividing earnings (loss), after the deduction of preferred stock dividends declared, 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 information used to compute basic and diluted EPS attributable to Arconic common shareholders was as follows (shares in millions):

For the year ended December 31,	2019	2018	2017
Net income (loss)	$ 470	$ 642	$ (74)
Less: preferred stock dividends declared	(2)	(2)	(53)
Net income (loss) available to Arconic common shareholders - basic	468	640	(127)
Add: interest expense related to convertible notes	9	11	—
Net income (loss) available to Arconic common shareholders - diluted	$ 477	$ 651	$ (127)
Average shares outstanding - basic	446	483	451
Effect of dilutive securities:			
Stock options	1	1	—
Stock and performance awards	5	5	—
Convertible notes[(1)]	11	14	—
Average shares outstanding - diluted	463	503	451

(1) The convertible notes matured on October 15, 2019 (see Note P). No shares of the Company's common stock were issued in connection with the maturity or the final conversion of the convertible notes. As of October 15, 2019, the calculation of average diluted shares outstanding ceased to include the approximately 15 million shares of common stock and the corresponding interest expense previously attributable to the convertible notes.

Common stock outstanding at December 31, 2019 and 2018 was 433 million and 483 million, respectively. The decrease in common stock outstanding at December 31, 2019 was primarily due to the impact of share repurchases of approximately 55 million in 2019 (see Note H). As average shares outstanding are used in the calculation for both basic and diluted EPS, the full impact of share repurchases was not realized in EPS in 2019 as the share repurchases occurred at varying points during 2019.

The following shares were excluded from the calculation of average shares outstanding – diluted as their effect was anti-dilutive (shares in millions).

	2019	2018	2017
Mandatory convertible preferred stock	n/a	n/a	39
Convertible notes	—	—	14
Stock options[(1)]	1	9	11
Stock awards	—	—	7

(1) The average exercise price of options per share was $35.75, $26.79, and $33.32 for 2019, 2018, and 2017, respectively.

In 2017, had Arconic generated sufficient net income, 30 million, 14 million, 5 million, and 1 million potential shares of common stock related to the mandatory convertible preferred stock, convertible notes, stock awards, and stock options, respectively, would have been included in diluted average shares outstanding. The mandatory convertible preferred stock converted on October 2, 2017 (see Note H).

J. Accumulated Other Comprehensive Loss

The following table details the activity of the four components that comprise Accumulated other comprehensive loss for both Arconic's shareholders and noncontrolling interests:

	Arconic			Noncontrolling Interests		
	2019	2018	2017	2019	2018	2017
Pension and other postretirement benefits (F)						
Balance at beginning of period	$ (2,344)	$ (2,230)	$ (2,010)	$ —	$ —	$ —
Adoption of accounting standard (A)	—	(369)	—	—	—	—
Other comprehensive (loss) income:						—
Unrecognized net actuarial gain and prior service cost/benefit	(587)	70	(466)	—	—	—
Tax benefit (expense)	129	(19)	102	—	—	—
Total Other comprehensive (loss) income before reclassifications, net of tax	(458)	51	(364)	—	—	—
Amortization of net actuarial loss and prior service cost[1]	90	262	222	—	—	—
Tax expense[2]	(20)	(58)	(78)	—	—	—
Total amount reclassified from Accumulated other comprehensive loss, net of tax[3]	70	204	144	—	—	—
Total Other comprehensive (loss) income	(388)	255	(220)	—	—	—
Balance at end of period	$ (2,732)	$ (2,344)	$ (2,230)	$ —	$ —	$ —
Foreign currency translation						
Balance at beginning of period	$ (583)	$ (437)	$ (689)	$ —	$ —	$ (2)
Other comprehensive (loss) income[4]	(13)	(146)	252	—	—	2
Balance at end of period	$ (596)	$ (583)	$ (437)	$ —	$ —	$ —
Debt securities						
Balance at beginning of period	$ (3)	$ (2)	$ 132	$ —	$ —	$ —
Other comprehensive income (loss)[5]	3	(1)	(134)	—	—	—
Balance at end of period	$ —	$ (3)	$ (2)	$ —	$ —	$ —
Cash flow hedges						
Balance at beginning of period	$ 4	$ 25	$ (1)	$ —	$ —	$ —
Adoption of accounting standard (A)	(2)	2	—	—	—	—
Other comprehensive (loss) income:						
Net change from periodic revaluations	(9)	(15)	37	—	—	—
Tax benefit (expense)	3	3	(9)	—	—	—
Total Other comprehensive (loss) income before reclassifications, net of tax	(6)	(12)	28	—	—	—
Net amount reclassified to earnings						
Aluminum contracts[6]	5	(8)	(2)	—	—	—
Interest rate contracts[8]	—	(2)	—	—	—	—
Nickel contracts[7]	(1)	(4)	(1)	—	—	—
Sub-total	4	(14)	(3)	—	—	—
Tax (expense) benefit[2]	(1)	3	1	—	—	—
Total amount reclassified from Accumulated other comprehensive loss, net of tax[3]	3	(11)	(2)	—	—	—
Total Other comprehensive (loss) income	(3)	(23)	26	—	—	—
Balance at end of period	$ (1)	$ 4	$ 25	$ —	$ —	$ —
Accumulated other comprehensive loss	$ (3,329)	$ (2,926)	$ (2,644)	$ —	$ —	$ —

(1) These amounts were recorded in Other expense (income), net (see Note E).

(2) These amounts were included in Provision for income taxes on the accompanying Statement of Consolidated Operations.

(3) A positive amount indicates a corresponding charge to earnings and a negative amount indicates a corresponding benefit to earnings.

(4) In all periods presented, no amounts were reclassified to earnings.

(5) Realized gains and losses were included in Other expense (income), net, on the accompanying Statement of Consolidated Operations.

(6) These amounts were included in Sales on the accompanying Statement of Consolidated Operations.

(7) These amounts were included in Cost of goods sold on the accompanying Statement of Consolidated Operations.

(8) These amounts were included in Interest expense on the accompanying Statement of Consolidated Operations.

K. Receivables

Sale of Receivables Program

Arconic has an arrangement with three financial institutions to sell certain customer receivables without recourse on a revolving basis. The sale of such receivables is completed using a bankruptcy remote special purpose entity, which is a consolidated subsidiary of Arconic. This arrangement provides up to a maximum funding of $400 for receivables sold. Arconic maintains a beneficial interest, or a right to collect cash, on the sold receivables that have not been funded (deferred purchase program). On March 30, 2012, Arconic initially sold $304 of customer receivables in exchange for $50 in cash and $254 of deferred purchase program under the arrangement. Arconic has received additional net cash funding of $300 ($3,558 in draws and $3,258 in repayments) since the program’s inception, including net cash draws totaling $0 ($600 in draws and $600 in repayments) in 2019 and net cash draws totaling $0 ($600 in draws and $600 in repayments) in 2018.

As of December 31, 2019, and 2018, the deferred purchase program receivable was $246 and $234, respectively, which was included in Other receivables on the accompanying Consolidated Balance Sheet. The deferred purchase program receivable is reduced as collections of the underlying receivables occur; however, as this is a revolving program, the sale of new receivables will result in an increase in the deferred purchase program receivable. The gross amount of receivables sold and total cash collected under this program since its inception was $48,383 and $47,787 respectively. Arconic services the customer receivables for the financial institutions at market rates; therefore, no servicing asset or liability was recorded.

In 2019 and 2018, the gross cash outflows and inflows associated with the deferred purchase program receivable were $6,599 and $6,586 respectively, and $6,375 and $6,328, respectively.

Cash receipts from customer payments on sold receivables (which are cash receipts on the underlying trade receivables that have been previously sold in this program) as well as cash receipts and cash disbursements from draws and repayments under the program are presented as cash receipts from sold receivables within investing activities in the Statement of Consolidated Cash Flows.

On January 2, 2020, the Company entered into an amendment to remove subsidiaries of the GRP business from the sale of receivables program in preparation for the planned Separation of Arconic and repurchased the remaining $282 unpaid receivables of GRP customers in a non-cash transaction by reducing the amount of the deferred purchase program receivable.

Allowance for Doubtful Accounts

The following table details the changes in the allowance for doubtful accounts related to customer receivables and other receivables:

	Customer receivables			Other receivables		
	2019	2018	2017	2019	2018	2017
Balance at beginning of year	$ 4	$ 8	$ 13	$ 31	$ 34	$ 32
Provision for doubtful accounts	3	2	1	13	7	9
Write off of uncollectible accounts	(2)	(2)	(5)	(2)	(2)	(1)
Recoveries of prior write-offs	—	—	—	(5)	(3)	(3)
Other	(2)	(4)	(1)	(4)	(5)	(3)
Balance at end of year	$ 3	$ 4	$ 8	$ 33	$ 31	$ 34

L. Inventories

December 31,	2019	2018
Finished goods	$ 671	$ 668
Work-in-process	1,316	1,371
Purchased raw materials	343	366
Operating supplies	99	87
Total inventories	$ 2,429	$ 2,492

At December 31, 2019 and 2018, the portion of inventories valued on a LIFO basis was $1,257 and $1,292, respectively. If valued on an average-cost basis, total inventories would have been $445 and $530 higher at December 31, 2019 and 2018, respectively. During 2019 and 2018, reductions in LIFO inventory quantities caused partial liquidations of the lower cost LIFO inventory base. These liquidations resulted in the recognition of immaterial income amounts in 2019, 2018, and 2017.

In the second quarter of 2018, a charge of $23 was recorded in Cost of goods sold and Inventories to reflect a physical inventory adjustment at one plant in the GRP segment (this plant was previously included in the EP&F segment prior to the transfer of the aluminum extrusions operations from the EP&F segment to the GRP segment in the first quarter of 2019 - see Note C). While a portion of this charge relates to prior years, the majority relates to 2018. The out-of-period amounts were not material to any interim or annual periods.

M. Properties, Plants, and Equipment, Net

December 31,	2019	2018
Land and land rights	$ 128	$ 136
Structures:		
Engineered Products and Forgings	812	769
Global Rolled Products	1,304	1,317
Other	269	278
	2,385	2,364
Machinery and equipment:		
Engineered Products and Forgings	3,514	3,433
Global Rolled Products	5,401	5,356
Other	378	445
	9,293	9,234
	11,806	11,734
Less: accumulated depreciation and amortization	7,074	6,769
	4,732	4,965
Construction work-in-progress	731	739
	$ 5,463	$ 5,704

During the second quarter of 2019, the Company updated its five-year strategic plan and determined that there was a decline in the forecasted financial performance for the Disks asset group within the EP&F segment. As such, the Company evaluated the recoverability of the Disks asset group long-lived assets by comparing the carrying value to the undiscounted cash flows of the Disks asset group. The carrying value exceeded the undiscounted cash flows and therefore the Disks asset group long-lived assets were deemed to be impaired. The impairment charge was measured as the amount of carrying value in excess of fair value of the long-lived assets, with fair value determined using a DCF model and a combination of sales comparison and cost approach valuation methods including an estimate for economic obsolescence. The impairment charge of $428 recorded in the second quarter of 2019 impacted properties, plants, and equipment; intangible assets; and certain other noncurrent assets by $198, $197, and $33, respectively. The impairment charge was recorded in Restructuring and other charges in the Statement of Consolidated Operations in 2019.

During the second quarter of 2018, the Company updated its three-year strategic plan and determined that there was a decline in the forecasted financial performance for the Disks asset group within the EP&F segment. As such, the Company evaluated the recoverability of the long-lived assets by comparing their carrying value of approximately $515 to the estimated undiscounted net cash flows of the Disks asset group, resulting in an estimated fair value in excess of their carrying value of approximately 13%; thus, there was no impairment. There were no indicators of impairment identified for the Disks asset group during the third or fourth quarters of 2018 and, as such, the Company did not evaluate the recoverability of its long-lived assets.

N. Goodwill and Other Intangible Assets

The following table details the changes in the carrying amount of goodwill:

	Engineered Products and Forgings	Global Rolled Products	Total
Balances at December 31, 2017			
Goodwill	$ 4,931	$ 351	$ 5,282
Accumulated impairment losses[1]	(719)	(28)	(747)
Goodwill, net	4,212	323	4,535
Acquisitions and Divestitures (F)	(1)	—	(1)
Translation and other	(25)	(9)	(34)
Balances at December 31, 2018			
Goodwill	4,905	342	5,247
Accumulated impairment losses	(719)	(28)	(747)
Goodwill, net	4,186	314	4,500
Divestitures (T)	(13)	—	(13)
Translation and other	4	2	6
Transfer from Engineered Structures to Aluminum Extrusions	(110)	110	—
Balances at December 31, 2019			
Goodwill	4,786	454	5,240
Accumulated impairment losses	(719)	(28)	(747)
Goodwill, net	$ 4,067	$ 426	$ 4,493

(1) $25 of fully impaired goodwill related to Latin America Extrusions has been moved to Corporate. See Note B.

In 2017, Arconic recognized an impairment of goodwill in the amount of $719 related to the annual impairment review of the Arconic Forgings and Extrusions business. See Goodwill policy in Note A.

Other intangible assets were as follows:

December 31, 2019	Gross carrying amount	Accumulated amortization	Intangibles, net
Computer software	$ 744	$ (659)	$ 85
Patents and licenses	95	(93)	2
Other intangibles	714	(175)	539
Total amortizable intangible assets	1,553	(927)	626
Indefinite-lived trade names and trademarks	32	—	32
Total other intangible assets	$ 1,585	$ (927)	$ 658

December 31, 2018	Gross carrying amount	Accumulated amortization	Intangibles, net
Computer software	$ 768	$ (657)	$ 111
Patents and licenses	110	(107)	3
Other intangibles	922	(149)	773
Total amortizable intangible assets	1,800	(913)	887
Indefinite-lived trade names and trademarks	32	—	32
Total other intangible assets	$ 1,832	$ (913)	$ 919

During the second quarter of 2019, the Company recorded a charge of $197 for intangible asset impairments associated with the Disks long-lived asset group. See Note M for additional details.

Computer software consists primarily of software costs associated with an enterprise business solution within Arconic to drive common systems among all businesses.

Amortization expense related to the intangible assets in the tables above for the years ended December 31, 2019, 2018, and 2017 was $70, $81, and $71, respectively, and is expected to be in the range of approximately $50 to $60 annually from 2020 to 2024.

O. Leases

Operating lease cost, which includes short-term leases and variable lease payments and approximates cash paid, was $145, $144, and $113 in 2019, 2018, and 2017, respectively.

Operating lease right-of-use assets and lease liabilities in the Consolidated Balance Sheet were as follows:

	December 31, 2019
Right-of-use assets classified in Other noncurrent assets	$ 252
Current portion of lease liabilities classified in Other current liabilities	71
Long-term portion of lease liabilities classified in Other noncurrent liabilities and deferred credits	194
Total lease liabilities	$ 265

Future minimum contractual operating lease obligations were as follows:

	December 31, 2019	December 31, 2018
2019	$ —	$ 94
2020	81	74
2021	62	54
2022	46	40
2023	34	30
2024	24	—
Thereafter	70	87
Total lease payments	$ 317	$ 379
Less: Imputed interest	(52)	
Present value of lease liabilities	$ 265	

Right-of-use assets obtained in exchange for operating lease obligations in 2019 were $41. The weighted-average remaining lease term and weighted-average discount rate at December 31, 2019 was 6 years and 6.0%, respectively.

P. Debt

Long-Term Debt.

December 31,	2019	2018
1.63% Convertible Notes, due 2019	$ —	$ 403
6.150% Notes, due 2020	1,000	1,000
5.40% Notes, due 2021	1,250	1,250
5.87% Notes, due 2022	627	627
5.125% Notes, due 2024	1,250	1,250
5.90% Notes, due 2027	625	625
6.75% Bonds, due 2028	300	300
5.95% Notes due 2037	625	625
Iowa Finance Authority Loan, due 2042 (4.75%)	250	250
Other[1]	(18)	(29)
	5,909	6,301
Less: amount due within one year	1,003	405
	$ 4,906	$ 5,896

(1) Includes various financing arrangements related to subsidiaries, unamortized debt discounts related to outstanding notes and bonds listed in the table above, an equity option related to the convertible notes due in 2019, and unamortized debt issuance costs.

The principal amount of long-term debt maturing in each of the next five years is $1,000 in 2020, $1,250 in 2021, $627 in 2022, $0 in 2023, and $1,250 in 2024.

Public Debt. On October 15, 2019, the 1.63% Convertible Notes ("the Notes") matured in accordance with their terms and the Company repaid in cash on the maturity date the aggregate outstanding principal amount of the Notes of approximately $403 together with accrued and unpaid interest, pursuant to the terms of the Notes.

During the first quarter of 2018, the Company completed the early redemption of its remaining outstanding 5.72% Notes due in 2019, with aggregate principal amount of $500, for $518 in cash including accrued and unpaid interest. As a result, the Company recorded a charge of $19 in Interest expense in the accompanying Statement of Consolidated Operations for 2018 primarily for the premium paid on the early redemption of these notes in excess of their carrying value.

During the second quarter of 2017, the Company announced three separate cash tender offers by the Investment Banks for the purchase of the Company’s 6.50% Bonds due 2018 (the “6.50% Bonds”), 6.75% Notes due 2018 (the “6.75% Notes”), and 5.72% Notes due 2019 (the “5.72% Notes”), up to a maximum purchase amount of $1,000 aggregate principal amount of notes, subject to certain conditions. The Investment Banks purchased notes totaling $805 aggregate principal amount, including $150 aggregate principal amount of 6.50% Bonds, $405 aggregate principal amount of 6.75% Notes, and $250 aggregate principal amount of 5.72% Notes.

Also, during the second quarter of 2017, the Company agreed to acquire the notes from the Investment Banks for $409 in cash plus its remaining investment in Alcoa Corporation common stock (12,958,767 shares valued at $35.91 per share) for total consideration of $874 including accrued and unpaid interest. The Company recorded a charge of $58 ($27 in cash) primarily for the premium for the early redemption of the notes, a benefit of $8 for the proceeds of a related interest rate swap agreement, and a charge of $2 for legal fees associated with the transaction in Interest expense, and recorded a gain of $167 in Other expense (income), net in the accompanying Statement of Consolidated Operations for the Debt-for-Equity Exchange.

Finally, during the second quarter of 2017, the Company completed the early redemption of its remaining outstanding 6.50% Bonds, with aggregate principal amount of $100, and its remaining outstanding 6.75% Notes, with aggregate principal amount of $345, for $479 in cash including accrued and unpaid interest. As a result of the early redemption of the 6.50% Bonds and 6.75% Notes, the Company recorded a charge of $24 in Interest expense in the accompanying Statement of Consolidated Operations for the premium paid for the early redemption of these notes in excess of their carrying value.

The Company has the option to redeem certain of its Notes and Bonds in whole or part, at any time at a redemption price equal to the greater of principal amount or the sum of the present values of the remaining scheduled payments, discounted using a defined treasury rate plus a spread, plus in either case accrued and unpaid interest to the redemption date.

Credit Facilities. On July 25, 2014, Arconic entered into a Five-Year Revolving Credit Agreement with a syndicate of lenders and issuers named therein, which provides for a senior unsecured revolving credit facility (the “Credit Facility”). By an Extension Request and Amendment Letter dated as of June 5, 2015, the maturity date of the Credit Facility was extended to July 25, 2020. On September 16, 2016, Arconic entered into Amendment No. 1 to the Five-Year Revolving Credit Agreement to permit the Separation of Alcoa and to amend certain terms of the Credit Agreement, including the replacement of the existing financial covenant with a leverage ratio and reduction of total commitments available from $4,000 to $3,000. On June 29, 2018, Arconic entered into Amendment No. 2 (“Amendment No. 2”) to amend and restate the Five-Year Revolving Credit Agreement. The Five-Year Revolving Credit Agreement, as so amended and restated, is herein referred to as the “Credit Agreement.”

The Credit Agreement provides a $3,000 Credit Facility, the proceeds of which are to be used to provide working capital or for other general corporate purposes of Arconic. Subject to the terms and conditions of the Credit Agreement, Arconic may from time to time request increases in lender commitments under the Credit Facility, not to exceed $500 in aggregate principal amount, and may also request the issuance of letters of credit, subject to a letter of credit sublimit of $1,000 of the Credit Facility. Pursuant to the Credit Agreement, Arconic shall not permit the ratio of Consolidated Net Debt to Consolidated EBITDA (each as defined in the Credit Agreement) as of the end of each fiscal quarter for the period of the four fiscal quarters most recently ended, to be greater than 4.50 to 1.00, which maximum level will step down successively to 4.00 to 1.00 on December 31, 2018, and to 3.50 to 1.00 on December 31, 2019 and thereafter.

The Credit Agreement includes additional covenants, including, among others, (a) limitations on Arconic’s ability to incur liens securing indebtedness for borrowed money, (b) limitations on Arconic’s ability to consummate a merger, consolidation or sale of all or substantially all of its assets, and (c) limitations on Arconic’s ability to change the nature of its business. As of December 31, 2019, Arconic was in compliance with all such covenants.

The Credit Facility matures on June 29, 2023, unless extended or earlier terminated in accordance with the provisions of the Credit Agreement. Arconic may make two one-year extension requests during the term of the Credit Facility, subject to the lender consent requirements set forth in the Credit Agreement. Under the provisions of the Credit Agreement, Arconic will pay a fee of 0.25% per annum (based on Arconic’s current long-term debt ratings) of the total commitment to maintain the Credit Facility.

The Credit Facility is unsecured and amounts payable under it will rank *pari passu* with all other unsecured, unsubordinated indebtedness of Arconic. Borrowings under the Credit Facility may be denominated in U.S. dollars or euros. Loans will bear interest at a base rate or a rate equal to LIBOR, plus, in each case, an applicable margin based on the credit ratings of Arconic’s outstanding senior unsecured long-term debt. The applicable margin on base rate loans and LIBOR loans will be 0.50% and 1.50% per annum, respectively, based on Arconic’s current long-term debt ratings. Loans may be prepaid without premium or penalty, subject to customary breakage costs.

The obligation of Arconic to pay amounts outstanding under the Credit Facility may be accelerated upon the occurrence of an “Event of Default” as defined in the Credit Agreement. Such Events of Default include, among others, (a) non-payment of obligations; (b) breach of any representation or warranty in any material respect; (c) non-performance of covenants and obligations; (d) with respect to other indebtedness in a principal amount in excess of $100 million, a default thereunder that causes such indebtedness to become due prior to its stated maturity or a default in the payment at maturity of any principal of such indebtedness; (e) the bankruptcy or insolvency of Arconic; and (f) a change in control of Arconic.

There were no amounts outstanding at December 31, 2019 and 2018 and no amounts were borrowed during 2019, 2018, or 2017 under the Credit Facility.

In addition to the Credit Agreement above, Arconic has a number of other credit agreements that provide a combined borrowing capacity of $640 as of December 31, 2019, all of which is due to expire in 2020. The purpose of any borrowings under these credit arrangements is to provide for working capital requirements and for other general corporate purposes. The covenants contained in all these arrangements are the same as the Credit Agreement. In 2019, 2018, and 2017, Arconic borrowed and repaid $400, $600, and $810, respectively, under the respective credit arrangements. The weighted-average interest rate and weighted-average days outstanding of the respective borrowings during 2019, 2018, and 2017 were 3.7%, 3.3%, and 2.6%, respectively, and 49 days, 46 days, and 46 days, respectively.

Short-Term Debt. At December 31, 2019 and 2018, short-term debt was $31 and $29, respectively. These amounts included $29 and $29 at December 31, 2019 and 2018, respectively, related to accounts payable settlement arrangements with certain vendors and third-party intermediaries. These arrangements provide that, at the vendor’s request, the third-party intermediary advances the amount of the scheduled payment to the vendor, less an appropriate discount, before the scheduled payment date and Arconic makes payment to the third-party intermediary on the date stipulated in accordance with the commercial terms negotiated with its vendors. Arconic records imputed interest related to these arrangements in Interest expense on the accompanying Statement of Consolidated Operations.

Commercial Paper. Arconic had no outstanding commercial paper at December 31, 2019 and 2018. In 2019, Arconic did not issue commercial paper. In 2018, the average outstanding commercial paper was $49. Commercial paper matures at various times within one year and had an annual weighted average interest rate of 2.5% during 2018.

Q. 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.

The carrying values of Cash and cash equivalents, Restricted cash, Derivatives, Noncurrent receivables, and Short-term debt included in the Consolidated Balance Sheet approximate their fair value. The Company holds exchange-traded fixed income securities which are considered available-for-sale securities that are carried at fair value which is based on quoted market prices which are classified in Level 1 of the fair value hierarchy. The fair value of Long-term debt, less amount due within one year was based on quoted market prices for public debt and on interest rates that are currently available to Arconic 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.

	2019		2018	
December 31,	**Carrying value**	**Fair value**	**Carrying value**	**Fair value**
Long-term debt, less amount due within one year	$ 4,906	$ 5,337	$ 5,896	$ 5,873

Restricted cash was $55 (see Note S), $6, and $4 in 2019, 2018, and 2017, respectively, and was recorded in Prepaid expenses and other current assets on the Consolidated Balance Sheet.

R. Cash Flow Information

Cash paid for interest and income taxes was as follows:

	2019	2018	2017
Interest, net of amount capitalized	$ 340	$ 391	$ 508
Income taxes, net of amount refunded	$ 122	$ 74	$ 118

Noncash Financing and Investing Activities. On October 2, 2017, all outstanding 24,975,978 depositary shares (each depositary share representing a 1/10th interest in a share of the mandatory convertible preferred stock) were converted at a rate of 1.56996 into 39,211,286 common shares; 24,022 depositary shares were previously tendered for early conversion into 31,420 shares of Arconic common stock. No gain or loss was recognized associated with this equity transaction (see Note H).

In the second quarter of 2017, the Company completed a Debt-for-Equity Exchange with the Investment Banks for the remaining portion of Arconic's retained interest in Alcoa Corporation common stock for a portion of the Company's outstanding notes held by the Investment Banks for $465 including accrued and unpaid interest (see Note P).

S. Acquisitions and Divestitures

2019 Divestitures. On May 31, 2019, Arconic sold a small additive manufacturing facility within the EP&F segment for $1 in cash, which resulted in a loss of $13 recorded in Restructuring and other charges in the Statement of Consolidated Operations. The sale is subject to certain post-closing adjustments.

On August 15, 2019, Arconic sold inventories and properties, plants, and equipment related to a small energy business within the EP&F segment for $13 in cash. Arconic recognized a charge of $10 related to inventory impairment and recorded the charge in Cost of goods sold in the Statement of Consolidated Operations.

On October 30, 2019, Arconic reached an agreement to sell its hard alloy extrusions plant in South Korea for $61 in cash, subject to working capital and other adjustments. The operating results and assets and liabilities of this plant are included in the GRP segment. The sale transaction is expected to close in the first quarter of 2020, subject to regulatory approvals and customary closing conditions. Arconic expects to recognize a gain of $25 to $30 upon the sale, which will be recorded in Restructuring and other charges in the Statement of Consolidated Operations.

On December 1, 2019, Arconic completed the sale of its forgings business in the United Kingdom for $64 in cash, which resulted in a loss on sale of $46 which was recorded in Restructuring and other charges in the Statement of Consolidated Operations. Of the cash proceeds received, $53 was recorded as Restricted cash within Prepaid expenses and other current assets on the Consolidated Balance Sheet at December 31, 2019 as its use is subject to restriction by the U.K. pension authority until certain U.K. pension plan changes have been made and approved. The forgings business primarily produces steel, titanium, and nickel based forged components for aerospace, mining, and off-highway markets and its operating results and assets and liabilities are included in the EP&F segment. The sale remains subject to certain post-closing adjustments. This business generated sales of $116, $131, and $127 in 2019, 2018, and 2017, and had 540 employees at the time of divestiture.

On February 1, 2020, Arconic sold its aluminum rolling mill in Itapissuma, Brazil for $50 in cash, subject to working capital and other adjustments. The rolling mill produces specialty foil and sheet products and its operating results and assets and liabilities were included in the GRP segment. As a result of entering into the agreement to sell in August 2019, Arconic recognized a charge of $53 in 2019 related to a non-cash impairment of the net book value of the business, primarily properties, plants, and equipment. This charge was recorded in Restructuring and other charges in the Statement of Consolidated Operations. This business generated sales of $143, $179, and $162 in 2019, 2018, and 2017 respectively, and had 513 employees at the time of divestiture.

2018 Divestitures. On April 2, 2018, Arconic completed the sale of the Latin America extrusions business to a subsidiary of Hydro Extruded Solutions AS for $2, following the settlement of post-closing and other adjustments in December 2018. As a result of entering into the agreement to sell the Latin America extrusions business in December 2017, a charge of $41 was recognized in Restructuring and other charges in the Statement of Consolidated Operations related to the non-cash impairment of the net book value of the business and an additional charge of $2 related to a post-closing adjustment was recorded in 2018. The operating results and assets and liabilities of the business were included in the TCS segment at the time of divestiture, but were transferred to Corporate in connection with a segment change (see Note B). This business generated sales of $25 and $115 in 2018 and 2017 and had 612 employees at the time of divestiture.

On July 31, 2018, the Company announced that it had initiated a sale process of BCS, as part of the Company's then ongoing strategy and portfolio review. In the first quarter of 2019, the Company decided to no longer pursue the sale of BCS.

On October 31, 2018, the Company sold its Texarkana, Texas rolling mill and cast house, which had a combined net book value of $63, to Ta Chen International, Inc. for $302 in cash, including the settlement of post-closing adjustments, plus additional contingent consideration of up to $50. The contingent consideration relates to the achievement of various milestones within 36 months of the transaction closing date associated with operationalizing the rolling mill equipment. The operating results and assets and liabilities of the business were included in the GRP segment. The Texarkana rolling mill facility had previously been idle since late 2009. In early 2016, the Company restarted the Texarkana cast house to meet demand for aluminum slab. As part of the agreement, the Company will continue to produce aluminum slab at the facility for a period of 18 months through a lease back of the cast house building and equipment, after which time, Ta Chen may perform toll processing of metal for the Company for a period of six months. The Company will supply Ta Chen with cold-rolled aluminum coil during this 24-month period.

The sale of the rolling mill and cast house had been accounted for separately. The gain on the sale of the rolling mill of $154, including the fair value of contingent consideration of $5 was recorded in the fourth quarter of 2018. In the fourth quarter of 2019, the Company received additional contingent consideration of $20 and recorded a gain. These amounts were recorded in Restructuring and other charges in the Statement of Consolidated Operations. The Company continues to reevaluate its estimate of the remaining $25 of contingent consideration to which it will be entitled at the end of each reporting period and will recognize any changes thereto in the Statement of Consolidated Operations.

The Company had continuing involvement related to the lease back of the cast house. As a result, in 2018, the Company continued to treat the cast house building and equipment that it sold to Ta Chen as owned and therefore reflected the following balances in its Consolidated Balance Sheet at December 31, 2018: assets of $24 in Properties, plants, and equipment, net; cash proceeds of $119 in Other noncurrent liabilities and deferred credits (which included a deferred gain of $95); and a deferred tax asset of $22 in Other noncurrent assets. In conjunction with the adoption of the new lease accounting standard (see Note A), the Company's continuing involvement no longer requires deferral of the recognition of the cast house sale. As such, the cash proceeds, fixed assets, and deferred tax asset related to the cast house were reclassified to Retained earnings (accumulated deficit) as a cumulative effect of an accounting change.

On December 31, 2018, as part of the Company's then ongoing strategy and portfolio review, Arconic completed the sale of its forgings business in Hungary to Angstrom Automotive Group LLC for $2, which resulted in a loss of $43 recorded in Restructuring and other charges in the Statement of Consolidated Operations. While owned by Arconic, the operating results and assets and liabilities of the business were included in the EP&F segment. This business generated sales of $32 and $38 in 2018 and 2017, respectively, and had 180 employees at the time of the divestiture.

2017 Divestitures. In March 2017, Arconic completed the sale of its rolling mill in Italy to Slim Aluminium. While owned by Arconic, the operating results and assets and liabilities of the Fusina, Italy rolling mill were included in the GRP segment. As part of the transaction, Arconic injected $10 of cash into the business and provided a third-party guarantee with a fair value of $5 related to Slim Aluminium's environmental remediation. The Company recorded a loss on the sale of $60, which was recorded in Restructuring and other charges on the Statement of Consolidated Operations in 2017. The rolling mill generated sales of approximately $54 in 2017 and had approximately 312 employees.

2014 Acquisitions. In November 2014, Arconic acquired Firth Rixson. The purchase price included an earn-out agreement that required Arconic to make earn-out payments up to an aggregate maximum amount of $150 through December 31, 2020 upon certain conditions. This earn-out was contingent on the Firth Rixson forgings business in Savannah, Georgia achieving certain identified financial targets through December 31, 2020. During 2016, management determined that payment of the maximum amount was not probable based on the forecasted financial performance of this location. Therefore, the fair value of this liability was reduced by $56 with a corresponding credit to Other expense (income), net on the accompanying Statement of Consolidated Operations. During 2017, management determined that payment of the remaining amount of the contingent liability was not probable based on the forecasted financial performance of this location. Therefore, the fair value of this liability was reduced by $81 to zero at December 31, 2017 with a corresponding credit to Other expense (income), net on the accompanying Statement of Consolidated Operations. The fair value of this liability has remained at zero at December 31, 2019 and December 31, 2018 based on the forecasted financial performance of this location.

T. Contingencies and Commitments

Contingencies

Environmental Matters. Arconic participates in environmental assessments and cleanups at more than 100 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 the nature and extent of contamination, changes in remedial requirements, and technological changes, among others.

Arconic's remediation reserve balance was $230 at December 31, 2019 and $266 at December 31, 2018 recorded in Other noncurrent liabilities and deferred credits in the Consolidated Balance Sheet (of which $94 and $81, respectively, were classified as a current liability), and reflects the most probable costs to remediate identified environmental conditions for which costs can be reasonably estimated. Payments related to remediation expenses applied against the reserve were $65 in 2019 and $32 in 2018 and included expenditures currently mandated, as well as those not required by any regulatory authority or third party. The higher payments in 2019 compared with 2018 reflect the start of construction related to the Grasse River project. Arconic expects that trend to continue for 2020 as reflected by the increase in the portion of the reserve that is considered a current liability.

Included in annual operating expenses are the recurring costs of managing hazardous substances and environmental programs. These costs are estimated to be approximately 1% or less of Cost of goods sold.

The following discussion provides details regarding the current status of the most significant remediation reserves related to a current Arconic site.

Massena West, NY—Arconic has an ongoing remediation project related to the Grasse River, which is adjacent to Arconic's Massena plant site. Many years ago, it was determined that sediments and fish in the river contain varying levels of polychlorinated biphenyls (PCBs). The project, which was selected by the U.S. Environmental Protection Agency (EPA) in a Record of Decision issued in April 2013, is aimed at capping PCB contaminated sediments with concentration in excess of one part per million in the main channel of the river and dredging PCB contaminated sediments in the near-shore areas where total PCBs exceed one part per million. At December 31, 2019 and 2018, the reserve balances associated with this matter were $171 and $198, respectively. In the first quarter of 2019, Arconic received approval from the EPA of its final remedial design which is now under construction and is expected to be completed in 2022. During the second quarter of 2019, Arconic recorded a charge of $25 due to changes required in the remedial design and post-construction monitoring. As the project proceeds, the liability may be updated due to factors such as changes in remedial requirements, site restoration costs, and ongoing operation and maintenance costs, among others.

Tax. Pursuant to the Tax Matters Agreement, dated as of October 31, 2016, entered into between the Company and Alcoa Corporation in connection with the Separation of Alcoa, the Company shares responsibility with Alcoa Corporation for, and Alcoa Corporation has agreed to partially indemnify the Company with respect to the following matter.

As previously reported, in July 2013, following a Spanish corporate income tax audit covering the 2006 through 2009 tax years, an assessment was received mainly disallowing certain interest deductions claimed by a Spanish consolidated tax group owned by the Company. In August 2013, the Company filed an appeal of this assessment in Spain's Central Tax Administrative Court, which was denied in January 2015. Arconic filed another appeal in Spain's National Court in March 2015 which was denied in July 2018. The National Court's decision requires the assessment for the 2006 through 2009 tax years to be reissued to take into account the outcome of the 2003 to 2005 audit which was closed in 2017. The Company estimates the revised assessment to be $172 (€154), including interest.

In March 2019, the Supreme Court of Spain accepted the Company's petition to review the National Court's decision, and the Company has filed a formal appeal of the assessment. The Supreme Court is reviewing the assessment on its merits and will render a final decision. In the event the Company receives an unfavorable ruling from the Supreme Court of Spain, a portion of the assessment may be offset with existing net operating losses and tax credits available to the Spanish consolidated tax group, which would be shared between the Company and Alcoa Corporation as provided for in the Tax Matters Agreement.

In the third quarter of 2018, Arconic established an income tax reserve and an indemnification receivable representing Alcoa Corporation's 49% share of the liability. As of the end of 2019, the balances of the reserve, including interest, and the receivable are $59 million (€53 million) and $29 million (€26 million), respectively.

Additionally, while the tax years 2010 through 2013 are closed to audit, it is possible that the Company may receive assessments for tax years subsequent to 2013. Any potential assessment for an individual tax year is not expected to be material to the Company's consolidated operations.

Reynobond PE. As previously reported, on June 13, 2017, the Grenfell Tower in London, U.K. caught fire resulting in fatalities, injuries and damage. A French subsidiary of Arconic, Arconic Architectural Products SAS (AAP SAS), supplied a product, Reynobond PE, to its customer, a cladding system fabricator, which used the product as one component of the overall cladding system on Grenfell Tower. The fabricator supplied its portion of the cladding system to the façade installer, who then completed and installed the system under the direction of the general contractor. Neither Arconic nor AAP SAS was involved in the design or installation of the system used at the Grenfell Tower, nor did it have a role in any other aspect of the building's refurbishment or original design. Regulatory investigations into the overall Grenfell Tower matter are being conducted, including a criminal investigation by the London Metropolitan Police Service (the "Police"), a Public Inquiry by the British government and a consumer protection inquiry by a French public authority. The Public Inquiry was announced by the U.K. Prime Minister on June 15, 2017 and subsequently was authorized to examine the circumstances leading up to and surrounding the Grenfell Tower fire in order to make findings of fact and recommendations to the U.K. Government on matters such as the design, construction and modification of the building, the role of relevant public authorities and contractors, the implications of the fire for the adequacy and enforcement of relevant regulations, arrangements in place for handling emergencies and the handling of concerns from residents, among other things. Hearings for Phase 1 of the Public Inquiry began on May 21, 2018 and concluded on December 12, 2018. Phase 2 hearings of the Public Inquiry began in early 2020, following which a final report will be written and subsequently published. AAP SAS is participating as a Core Participant in the Public Inquiry and is also cooperating with the ongoing parallel investigation by the Police. The Company no longer sells the PE product for architectural use on buildings. Given the preliminary nature of these investigations and the uncertainty of potential future litigation, the Company cannot reasonably estimate at this time the likelihood of an unfavorable outcome or the possible loss or range of losses in the event of an unfavorable outcome.

Behrens et al. v. Arconic Inc. et al. As previously reported, on June 6, 2019, 247 plaintiffs comprised of survivors and estates of decedents of the Grenfell Tower fire filed a complaint against "Arconic Inc., Alcoa Inc. and Arconic Architectural Products, LLC" (collectively, for purposes of the description of such proceeding, the "Arconic Defendants"), as well as Saint-Gobain Corporation, d/b/a Celotex and Whirlpool Corporation, in the Court of Common Pleas of Philadelphia County. The complaint alleges claims under Pennsylvania state law for products liability and wrongful death related to the fire. In particular, the plaintiffs allege that the Arconic Defendants knowingly supplied a dangerous product (Reynobond PE) for installation on the Grenfell Tower despite knowing that Reynobond PE was unfit for use above a certain height. The Arconic Defendants removed the case to the United States District Court for the Eastern District of Pennsylvania on June 19, 2019. On August 29, 2019, the Arconic Defendants moved to dismiss the complaint on the bases, among other things, that: (i) the case should be heard in the United Kingdom, not the United States; (ii) there is no jurisdiction over necessary parties; and (iii) Pennsylvania products liability law does not apply to manufacture and sale of product overseas. On December 23, 2019, the Court issued an order denying the motion to dismiss the complaint on bases (ii) and (iii) and suggesting a procedure for limited discovery followed by further briefing on those subjects. Discovery is ongoing on defendants' motion to have the case dismissed in favor of a UK forum (forum non conveniens). On January 23, 2020, the Court ordered that the parties complete discovery relating to forum non conveniens by March 16, 2020, and that briefing conclude on April 13, 2020. The Court will hold oral argument on this motion on May 7, 2020. Given the preliminary nature of this matter and the uncertainty of litigation, the Company cannot reasonably estimate at this time the likelihood of an unfavorable outcome or the possible loss or range of losses in the event of an unfavorable outcome.

Howard v. Arconic Inc. et al. As previously reported, a purported class action complaint related to the Grenfell Tower fire was filed on August 11, 2017 in the United States District Court for the Western District of Pennsylvania against Arconic Inc. and Klaus Kleinfeld. A related purported class action complaint was filed in the United States District Court for the Western District of Pennsylvania on September 15, 2017, under the caption *Sullivan v. Arconic Inc. et al.*, against Arconic Inc., three former Arconic executives, several current and former Arconic directors, and banks that acted as underwriters for Arconic's September 18, 2014 preferred stock offering (the "Preferred Offering"). The plaintiff in *Sullivan* had previously filed a purported class action against the same defendants on July 18, 2017 in the Southern District of New York and, on August 25, 2017, voluntarily dismissed that action without prejudice. On February 7, 2018, on motion from certain putative class members, the court consolidated *Howard* and *Sullivan*, closed *Sullivan*, and appointed lead plaintiffs in the consolidated case. On April 9, 2018, the lead plaintiffs in the consolidated purported class action filed a consolidated amended complaint. The consolidated amended complaint alleged that the registration statement for the Preferred Offering contained false and misleading statements and omitted to state material information, including by allegedly failing to disclose material uncertainties and trends resulting from sales of Reynobond PE for unsafe uses and by allegedly expressing a belief that appropriate risk management and compliance programs had been adopted while concealing the risks posed by Reynobond PE sales. The consolidated amended complaint also alleged that between November 4, 2013 and June 23, 2017 Arconic and Kleinfeld made false and misleading statements and failed to disclose material information about the Company's commitment to safety, business and financial prospects, and the risks of the Reynobond PE product, including in Arconic's Form 10-Ks for the fiscal years ended December 31, 2013, 2014, 2015, and 2016, its Form 10-Qs and quarterly financial press releases from the fourth quarter of 2013 through the first quarter of 2017, its 2013, 2014, 2015, and 2016 Annual Reports, its 2016 Annual Highlights Report, and on its official website. The consolidated amended complaint sought, among other things, unspecified compensatory damages and an award of attorney and expert fees and expenses. On June 8, 2018, all defendants moved to dismiss the consolidated amended complaint for failure to state a claim. On June 21, 2019, the Court granted the defendants' motion to dismiss in full, dismissing the consolidated amended complaint in its entirety without prejudice. On July 23, 2019, the lead plaintiffs filed a second amended complaint. The second amended complaint alleges generally the same claims as the consolidated amended complaint with certain additional allegations, as well as claims that the risk factors set forth in the registration statement for the Preferred Offering were inadequate and that certain additional statements in the sources identified above were misleading. The second amended complaint seeks, among other things, unspecified compensatory damages and an award of attorney and expert fees and expenses. On September 11, 2019, all defendants moved to dismiss the second amended complaint. Plaintiffs' opposition to that motion was filed by November 1, 2019 and all defendants filed a reply brief on November 26, 2019. Given the preliminary nature of this matter and the uncertainty of litigation, the Company cannot reasonably estimate at this time the likelihood of an unfavorable outcome or the possible loss or range of losses in the event of an unfavorable outcome.

Raul v. Albaugh, et al. As previously reported, on June 22, 2018, a derivative complaint was filed nominally on behalf of Arconic by a purported Arconic stockholder against the then members of Arconic's Board of Directors and Klaus Kleinfeld and Ken Giacobbe, naming Arconic as a nominal defendant, in the United States District Court for the District of Delaware. The complaint raises similar allegations as the consolidated amended complaint and second amended complaint in *Howard*, as well as allegations that the defendants improperly authorized the sale of Reynobond PE for unsafe uses, and asserts claims under Section 14(a) of the Exchange Act and Delaware state law. On July 13, 2018, the parties filed a stipulation agreeing to stay this case until the final resolution of the *Howard* case, the Grenfell Tower Public Inquiry in London, and the investigation by the Police and on July 23, 2018, the Court approved the stay. Given the preliminary nature of this matter and the uncertainty of litigation, the Company cannot reasonably estimate at this time the likelihood of an unfavorable outcome or the possible loss or range of losses in the event of an unfavorable outcome.

While the Company believes that these cases are without merit and intends to challenge them vigorously, there can be no assurances regarding the ultimate resolution of these matters.

Stockholder Demands. As previously noted, the Board of Directors also received letters, purportedly sent on behalf of stockholders, reciting allegations similar to those made in the federal court lawsuits and demanding that the Board authorize the Company to initiate litigation against members of management, the Board and others. The Board of Directors appointed a Special Litigation Committee of the Board to review, investigate, and make recommendations to the Board regarding the appropriate course of action with respect to these stockholder demand letters. On May 22, 2019, the Special Litigation

Committee, following completion of its investigation into the claims demanded in the demand letters, recommended to the Board that it reject the demands to authorize commencement of litigation. On May 28, 2019, the Board adopted the Special Litigation Committee's findings and recommendations and rejected the demands that it authorize commencement of actions to assert the claims set forth in the demand letters.

Other. In addition to the matters discussed above, various other lawsuits, claims, and proceedings have been or may be instituted or asserted against Arconic, including those pertaining to environmental, product liability, safety and health, employment, tax and antitrust matters. While the amounts claimed in these other matters may be substantial, the ultimate liability cannot currently be determined because of the considerable uncertainties that exist. Therefore, it is possible that the Company's liquidity or results of operations in a 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 results of operations, financial position or cash flows of the Company.

Commitments

Purchase Obligations. Arconic has entered into purchase commitments for raw materials, energy and other goods and services, which total $604 in 2020, $93 in 2021, $45 in 2022, $12 in 2023, $4 in 2024, and $2 thereafter.

Operating Leases. See Note O for the operating lease future minimum contractual obligations.

Guarantees. At December 31, 2019, Arconic had outstanding bank guarantees related to tax matters, outstanding debt, workers' compensation, environmental obligations, energy contracts, and customs duties, among others. The total amount committed under these guarantees, which expire at various dates between 2020 and 2040 was $31 at December 31, 2019.

Pursuant to the Separation and Distribution Agreement between Arconic and Alcoa Corporation, Arconic was required to provide certain guarantees for Alcoa Corporation, which had a combined fair value of $9 and $6 at December 31, 2019 and 2018, respectively, and were included in Other noncurrent liabilities and deferred credits on the accompanying Consolidated Balance Sheet. Furthermore, Arconic was required to provide guarantees related to two long-term supply agreements for energy for Alcoa Corporation facilities in the event of an Alcoa Corporation payment default. In October 2017, Alcoa Corporation announced that it had terminated one of the two agreements, the electricity contract with Luminant Generation Company LLC that was tied to its Rockdale Operations, effective as of October 1, 2017. As a result of the termination of the Rockdale electricity contract, Arconic recorded income of $25 in the fourth quarter of 2017 associated with reversing the fair value of the electricity contract guarantee. For the remaining long-term supply agreement, Arconic is required to provide a guarantee up to an estimated present value amount of approximately $1,353 and $1,087 at December 31, 2019 and December 31, 2018, respectively, in the event of an Alcoa Corporation payment default. This guarantee expires in 2047. For this guarantee, subject to its provisions, Arconic is secondarily liable in the event of a payment default by Alcoa Corporation. Arconic currently views the risk of an Alcoa Corporation payment default on its obligations under the contract to be remote. In December 2019, Arconic entered into a one-year insurance policy with a limit of $80 relating to the remaining long-term energy supply agreement. The premium is expected to be paid by Alcoa Corporation. The decision to enter into a claims purchase agreement or insurance policy will be made on an annual basis going forward.

Letters of Credit. Arconic has outstanding letters of credit, primarily related to workers' compensation, environmental obligations and leasing obligations. The total amount committed under these letters of credit, which automatically renew or expire at various dates, mostly in 2020, was $142 at December 31, 2019.

Pursuant to the Separation and Distribution Agreement, Arconic was required to retain letters of credit of $52 that had previously been provided related to both Arconic and Alcoa Corporation workers' compensation claims which occurred prior to November 1, 2016. Alcoa Corporation workers' compensation claims and letter of credit fees paid by Arconic are being proportionally billed to and are being fully reimbursed by Alcoa Corporation.

Surety Bonds. Arconic 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 surety bonds, which expire at various dates, primarily in 2020, was $50 at December 31, 2019.

Pursuant to the Separation and Distribution Agreement, Arconic was required to provide surety bonds related to Alcoa Corporation workers' compensation claims which occurred prior to November 1, 2016 and, as a result, Arconic has $24 in outstanding surety bonds relating to these liabilities. Alcoa Corporation workers' compensation claims and surety bond fees paid by Arconic are being proportionately billed to and that portion billed is being fully reimbursed by Alcoa Corporation.

U. Separation Transactions

2019 Proposed Separation Transaction. On February 8, 2019, Arconic announced, as part of its strategy and portfolio review, a separation of its portfolio into two independent, publicly-traded companies (the "Separation of Arconic"). The EP&F segment will remain in the existing company (Remain Co.) which will be renamed Howmet Aerospace Inc. at separation. The GRP segment will comprise Spin Co. and will be named Arconic Corporation at separation. The Company has also executed on the sale of businesses that do not best fit into the EP&F and GRP segments. The Company is targeting to complete the Separation of Arconic on April 1, 2020. The Separation of Arconic remains subject to the satisfaction of certain conditions and may change if certain conditions are not satisfied by that date, as described in Arconic Rolled Products Corporation's ("Arconic Corporation") information statement filed with the Form 10.

On February 5, 2020, Arconic's Board of Directors approved the completion of the separation by means of a pro rata distribution (the "Distribution") by the Company of all of the outstanding common stock of Arconic Corporation. To consummate the separation and the Distribution, the Board declared a pro rata distribution of Arconic Corporation common stock, which is expected to be effective at 12:01 a.m. Eastern Time on April 1, 2020, to Company stockholders of record as of the close of business on March 19, 2020 (the "Record Date"). In the Distribution, each Company stockholder will receive one share of Arconic Corporation common stock for every four shares of the Company's common stock held as of the close of business on the Record Date. Stockholders will receive cash in lieu of fractional shares of Arconic Corporation common stock.

Timothy D. Myers will serve as Arconic Corporation Chief Executive Officer. Arconic's Board of Directors has also named new directors to the Arconic Corporation and Howmet Aerospace Boards. Joining the Arconic Corporation Board of Directors will be: Timothy Myers; William Austen; Christopher Ayers; Margaret Billson; Austin Camporin; Jacques Croisetiere; Elmer Doty; Carol Eicher; Fritz Henderson; E. Stanley O'Neal; and Jeffrey Stafeil. Christopher Ayers, Elmer Doty and Stanley O'Neal will resign from the Arconic Inc. Board of Directors. Joining the Howmet Aerospace Board of Directors will be: Joseph Cantie; Robert Leduc; Jody Miller; and Nicole Piasecki.

On February 7, 2020, the Company announced that Arconic Rolled Products Corporation (the "Issuer"), which is currently a wholly-owned subsidiary of Arconic, closed its offering of $600 aggregate principal amount of 6.125% second-lien notes due 2028 (the "Notes"). The Issuer intends to use the proceeds from the offering to make a payment to Arconic to fund the transfer of certain assets from Arconic to the Issuer in connection with the Separation of Arconic and for general corporate purposes. The net proceeds from the offering will be held in escrow until the completion of the separation and the satisfaction of certain other escrow release conditions. Prior to the separation, the Notes will not be guaranteed. Following the separation, the Notes will be guaranteed by certain of the Issuer's wholly-owned domestic subsidiaries. Each of the Notes and the related guarantees will be secured on a second-priority basis by liens on certain assets of the Issuer and the guarantors.

On February 13, 2020, the Form 10 for Arconic Rolled Products Corporation was declared effective by the SEC.

In 2019, Arconic recognized $78 in Selling, general administrative, and other expenses on the accompanying Statement of Consolidated Operations for costs related to the Separation of Arconic.

2016 Separation Transaction. The separation of Alcoa Inc. into two standalone, publicly-traded companies, Arconic Inc. (the new name for Alcoa Inc.) and Alcoa Corporation, became effective on November 1, 2016 (the "Separation of Alcoa"). As part of the Separation of Alcoa, Arconic retained 19.9% of the Alcoa Corporation common stock (36,311,767 shares). In February 2017, Arconic sold 23,353,000 of its shares of Alcoa Corporation common stock at $38.03 per share, which resulted in cash proceeds of $888 which were recorded in Sales of investments within Investing Activities in the accompanying Statement of Consolidated Cash Flows, and a gain of $351 which was recorded in Other expense (income), net in the accompanying Statement of Consolidated Operations. In April and May 2017, the Company acquired a portion of its outstanding notes held by two investment banks (the "Investment Banks") in exchange for cash and the Company's remaining 12,958,767 Alcoa Corporation shares (valued at $35.91 per share) (the "Debt-for-Equity Exchange") (See Note P). A gain of $167 on the Debt-for-Equity Exchange was recorded in Other expense (income), net in the accompanying Statement of Consolidated Operations. As of May 4, 2017, the Company no longer maintained a retained interest in Alcoa Corporation common stock.

As part of the Separation of Alcoa, Arconic was required to provide maximum potential future payment guarantees for Alcoa Corporation issued on behalf of a third party, guarantees related to two long-term Alcoa Corporation energy supply agreements, guarantees related to certain Alcoa Corporation environmental liabilities and energy supply contracts, letters of credit and surety bonds related to Alcoa Corporation workers' compensation claims which occurred prior to November 1, 2016, and letters of credit for certain Alcoa Corporation equipment leases and energy contracts (see Note T).

As part of the Separation of Alcoa, Arconic received proceeds of $243 in 2017 related to Alcoa Corporation's sale of its Yadkin Hydroelectric Project, which were included in Other within Investing Activities in the Statement of Consolidated Cash Flows.

During 2017, Arconic recognized $18 ($12 after-tax) in Selling, general administrative, and other expenses on the accompanying Statement of Consolidated Operations for costs related to the Separation of Alcoa.

V. Subsequent Events

Management evaluated all activity of Arconic 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 noted below:

See Note K for details of an amendment to remove GRP from the sale of receivables program.

See Note S for details of the divestiture of the Company's aluminum rolling mill in Itapissuma, Brazil.

See Note U for updates on the planned Separation of Arconic.

On February 25, 2020, the Company announced that its current Chief Executive Officer, John C. Plant, and Tolga Oal, who currently serves as President of the Company's Engineered Structures business unit, will serve as Co-Chief Executive Officers of the Company following the Separation of Arconic. Until the Separation of Arconic, Mr. Plant will continue to serve as sole Chief Executive Officer of the Company and Mr. Oal will hold the title of Co-Chief Executive Officer Designate. Mr. Plant will serve as Executive Chairman of the Board of Directors of Howmet Aerospace following the Separation of Arconic.

Supplemental Financial Information (unaudited)

Quarterly Data
(in millions, except per-share amounts)

	First	Second[2]	Third	Fourth[3]	Year
2019					
Sales	$ 3,541	$ 3,691	$ 3,559	$ 3,401	$ 14,192
Net income (loss)	$ 187	$ (121)	$ 95	$ 309	$ 470
Earnings (loss) per share attributable to Arconic common shareholders[1]:					
Basic					
Net income (loss) per share—basic	$ 0.40	$ (0.27)	$ 0.22	$ 0.71	$ 1.05
Diluted					
Net income (loss) per share—diluted	$ 0.39	$ (0.27)	$ 0.21	$ 0.70	$ 1.03
2018					
Sales	$ 3,445	$ 3,573	$ 3,524	$ 3,472	$ 14,014
Net income	$ 143	$ 120	$ 161	$ 218	$ 642
Earnings per share attributable to Arconic common shareholders[1]:					
Basic					
Net income per share—basic	$ 0.30	$ 0.25	$ 0.33	$ 0.45	$ 1.33
Diluted					
Net income per share—basic	$ 0.29	$ 0.24	$ 0.32	$ 0.44	$ 1.30

(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 second quarter of 2019, the Company recorded an impairment charge of $428 related to its disks business (see Note M).

(3) In the fourth quarter of 2019, the Company incurred costs associated with the planned Separation of Arconic of $28 ($34 pre-tax), recorded a gain for contingent consideration received related to the 2018 sale of the Texarkana rolling mill of $15 ($20 pre-tax), and recorded several discrete tax items principally related to a benefit for a U.S. tax election which caused the deemed liquidation of a foreign subsidiary's assets into its U.S. tax parent. In the fourth quarter of 2018, Arconic recorded a gain of $119 ($154 pre-tax) on the sale of the Texarkana rolling mill, offset by pension plan settlement charges of $72 ($92 pre-tax) associated with significant lump sum payments made to participants and a loss of $39 ($43 pre-tax) on the sale of the forging business in Hungary. Additionally, Arconic recorded discrete tax items primarily comprised of a benefit related to certain prior year foreign investment losses no longer recapturable.

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

Arconic'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 Securities Exchange Act of 1934, as of the end of the period covered by this report, and they have concluded that these controls and procedures are effective.

(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 beginning on page 53.

(c) Attestation Report of the Registered Public Accounting Firm

The effectiveness of Arconic's internal control over financial reporting as of December 31, 2019 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 on page 54.

(d) Changes in Internal Control over Financial Reporting

There have been no changes in internal control over financial reporting during the fourth quarter of 2019, 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 directors is contained under the caption "Item 1 Election of Directors" of the Proxy Statement and is incorporated by reference. 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 405 of Regulation S-K is contained under the caption "Section 16(a) Beneficial Ownership Reporting Compliance" of the Proxy Statement and is incorporated by reference.

The Company's Code of Ethics for the CEO, CFO and Other Financial Professionals is publicly available on the Company's Internet website at http://www.arconic.com under the section "Investors—Corporate Governance." The remaining information required by Item 406 of Regulation S-K is contained under the captions "Corporate Governance" and "Corporate Governance—Business Conduct Policies and Code of Ethics" of the Proxy Statement and is incorporated 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—Committees of the Board—Audit Committee" of the Proxy Statement and is incorporated by reference.

Item 11. Executive Compensation.

The information required by Item 402 of Regulation S-K is contained under the captions "Director Compensation", "Executive Compensation" and "Corporate Governance—Recovery of Incentive Compensation" of the Proxy Statement. Such information is incorporated 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 Committee Interlocks and Insider Participation" and "Item 3 Advisory Approval of Executive Compensation—Compensation Committee Report" of the Proxy Statement. Such information (other than the Compensation Committee Report, which shall not be deemed to be "filed") is incorporated 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 by reference.

The information required by Item 403 of Regulation S-K is contained under the captions “Arconic Stock Ownership— Stock Ownership of Certain Beneficial Owners” and “— Stock Ownership of Directors and Executive Officers” of the Proxy Statement and is incorporated 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 “Executive Compensation” (excluding the information under the caption “Compensation Committee Report”) and “Corporate Governance— Related Person Transactions” of the Proxy Statement and is incorporated 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 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 Independent Registered Public Accounting Firm—Report of the Audit Committee” and “— Audit and Non-Audit Fees” of the Proxy Statement and in Attachment A (Pre-Approval Policies and Procedures for Audit and Non-Audit Services) thereto and is incorporated 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 on pages 54 through 106 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.

Exhibit Number	Description*
2(a)	Share Purchase Agreement, dated as of June 25, 2014, by and among Alcoa Inc., Alcoa IH Limited, FR Acquisition Corporation (US), Inc., FR Acquisitions Corporation (Europe) Limited, FR Acquisition Finance Subco (Luxembourg), S.à.r.l. and Oak Hill Capital Partners III, L.P. and Oak Hill Capital Management Partners III, L.P., collectively in their capacity as the Seller Representative, incorporated by reference to exhibit 2.1 to the Company’s Current Report on Form 8-K (Commission file number 1-3610) dated June 27, 2014.
2(b)	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 (Commission file number 1-3610) dated November 4, 2016.
2(c)	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 (Commission file number 1-3610) dated November 4, 2016.
2(d)	Employee Matters Agreement, dated as of October 31, 2016, by and between Arconic Inc. and Alcoa Corporation, incorporated by reference to exhibit 2.4 to the Company’s Current Report on Form 8-K (Commission file number 1-3610) dated November 4, 2016.
2(d)(1)	Amendment No. 1, dated December 13, 2016, to Employee Matters Agreement, dated as of October 31, 2016, by and between Arconic Inc. and Alcoa Corporation, incorporated by reference to exhibit 2(e)(1) to the Company’s Annual Report on Form 10-K (Commission file number 1-3610) for the year ended December 31, 2016.

2(e)	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 (Commission file number 1-3610) dated November 4, 2016.
2(f)	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 (Commission file number 1-3610) dated November 4, 2016.
2(g)	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 (Commission file number 1-3610) for the quarter ended June 30, 2017.
2(h)	Master Agreement for the Supply of Primary Aluminum, dated as of October 31, 2016, by and between Alcoa Corporation and its affiliates and Arconic Inc., incorporated by reference to exhibit 2.9 to the Company’s Current Report on Form 8-K (Commission file number 1-3610) dated November 4, 2016.
2(i)	Massena Lease and Operations Agreement, dated as of October 31, 2016, by and between Arconic Inc. and Alcoa Corporation, incorporated by reference to exhibit 2.10 to the Company’s Current Report on Form 8-K (Commission file number 1-3610) dated November 4, 2016.
2(j)	Agreement and Plan of Merger, dated October 12, 2017, by and between Arconic Inc., a Pennsylvania corporation, and Arconic Inc., a Delaware corporation, incorporated by reference to exhibit 2.1 to the Company’s Current Report on Form 8-K (Commission file number 1-3610) dated January 4, 2018.
3(a)	Certificate of Incorporation of Arconic Inc., a Delaware corporation, incorporated by reference to exhibit 3.1 to the Company’s Current Report on Form 8-K (Commission file number 1-3610) dated January 4, 2018.
3(a)(1)	Amendment to Arconic Inc. Certificate of Incorporation, effective as of the Separation of Arconic, incorporated by reference to exhibit 3.1 to the Company’s Current Report on Form 8-K (Commission file number 1-3610) dated February 6, 2020.
3(b)	Bylaws of Arconic Inc., a Delaware corporation, incorporated by reference to exhibit 3.2 to the Company’s Current Report on Form 8-K (Commission file number 1-3610) dated January 4, 2018.
3(b)(1)	Amendment to Arconic Inc. Bylaws, effective as of the Separation of Arconic, incorporated by reference to exhibit 3.2 to the Company’s Current Report on Form 8-K (Commission file number 1-3610) dated February 6, 2020.
4(a)	Form of Certificate for Shares of Common Stock of Arconic Inc., a Delaware corporation, incorporated by reference to exhibit 4.1 to the Company’s Current Report on Form 8-K (Commission file number 1-3610) dated January 4, 2018.
4(b)	Bylaws. See exhibits 3(b) and 3(b)(1) above.
4(c)	Form of Indenture, dated as of September 30, 1993, between Alcoa Inc. and The Bank of New York Trust Company, N.A., as successor to J. P. Morgan Trust Company, National Association (formerly Chase Manhattan Trust Company, National Association), as successor Trustee to PNC Bank, National Association, as Trustee (undated form of Indenture incorporated by reference to exhibit 4(a) to Registration Statement No. 33-49997 on Form S-3).
4(c)(1)	First Supplemental Indenture, dated as of January 25, 2007, between Alcoa Inc. and The Bank of New York Trust Company, N.A., as successor to J.P. Morgan Trust Company, National Association (formerly Chase Manhattan Trust Company, National Association), as successor Trustee to PNC Bank, National Association, as Trustee, incorporated by reference to exhibit 99.4 to the Company’s Current Report on Form 8-K (Commission file number 1-3610) dated January 25, 2007.
4(c)(2)	Second Supplemental Indenture, dated as of July 15, 2008, between Alcoa Inc. and The Bank of New York Mellon Trust Company, N.A., as successor in interest to J. P. Morgan Trust Company, National Association (formerly Chase Manhattan Trust Company, National Association, as successor to PNC Bank, National Association), as Trustee, incorporated by reference to exhibit 4(c) to the Company’s Current Report on Form 8-K (Commission file number 1-3610) dated July 15, 2008.

4(c)(3)	Fourth Supplemental Indenture, dated as of December 31, 2017, between Arconic Inc., a Pennsylvania corporation, Arconic Inc., a Delaware corporation, and The Bank of New York Mellon Trust Company, N.A., as trustee, incorporated by reference to exhibit 4.3 to the Company's Current Report on Form 8-K (Commission file number 1-3610) dated January 4, 2018.
4(d)	Form of 6.75% Bonds Due 2028, incorporated by reference to exhibit 4(d) to the Company's Annual Report on Form 10-K (Commission file number 1-3610) for the year ended December 31, 2017.
4(e)	Form of 5.90% Notes Due 2027, incorporated by reference to exhibit 4(e) to the Company's Annual Report on Form 10-K (Commission file number 1-3610) for the year ended December 31, 2008.
4(f)	Form of 5.95% Notes Due 2037, incorporated by reference to exhibit 4(f) to the Company's Annual Report on Form 10-K (Commission file number 1-3610) for the year ended December 31, 2008.
4(g)	Form of 5.87% Notes Due 2022, incorporated by reference to exhibit 4.2 to the Company's Current Report on Form 8-K (Commission file number 1-3610) dated February 21, 2007.
4(h)	Form of 6.150% Notes Due 2020, incorporated by reference to exhibit 4 to the Company's Current Report on Form 8-K (Commission file number 1-3610) dated August 3, 2010.
4(i)	Form of 5.40% Notes Due 2021, incorporated by reference to exhibit 4 to the Company's Current Report on Form 8-K (Commission file number 1-3610) dated April 21, 2011.
4(j)	Form of 5.125% Notes Due 2024, incorporated by reference to exhibit 4.5 to the Company's Current Report on Form 8-K (Commission file number 1-3610) dated September 22, 2014.
4(k)	Arconic Bargaining Retirement Savings Plan (formerly known as the Alcoa Retirement Savings Plan for Bargaining Employees), as Amended and Restated effective January 1, 2015, incorporated by reference to exhibit 4(p) to the Company's Annual Report on Form 10-K (Commission file number 1-3610) for the year ended December 31, 2015.
4(l)	Arconic Salaried Retirement Savings Plan (formerly known as the Alcoa Retirement Savings Plan for Salaried Employees), as Amended and Restated effective January 1, 2015, incorporated by reference to exhibit 4(s) to the Company's Annual Report on Form 10-K (Commission file number 1-3610) for the year ended December 31, 2015.
4(m)	Arconic Retirement Savings Plan for ATEP Bargaining Employees, effective January 1, 2017, incorporated by reference to exhibit 4 to Post-Effective Amendment, dated December 30, 2016, to Registration Statement No. 333-32516 on Form S-8.
4(n)	Arconic Corp. Hourly 401(k) Plan, effective as of February 1, 2020, incorporated by reference to exhibit 4(a) to Post-Effective Amendment dated February 3, 2020, to Registration Statement No. 333-32516 on Form S-8.
4(o)	Arconic Corp. Salaried 401(k) Plan, effective as of February 1, 2020, incorporated by reference to exhibit 4(b) to Post-Effective Amendment dated February 3, 2020, to Registration Statement No. 333-32516 on Form S-8.
4(p)	Description of Arconic Inc.'s Securities Registered Pursuant to Section 12 of the Securities Exchange Act of 1934.
4(q)	Indenture, dated February 7, 2020, among Arconic Rolled Products Corporation, the guarantors from time to time party thereto, U.S. Bank National Association, as trustee, U.S. Bank National Association, as collateral agent, and U.S. Bank National Association, as registrar, paying agent and authenticating agent, incorporated by reference to exhibit 99.2 to the Company's Current Report on Form 8-K (Commission file number 1-3610) dated February 7, 2020.
10(a)	Earnout Agreement, dated as of June 25, 2014, by and among Alcoa Inc., FR Acquisition Finance Subco (Luxembourg), S.à.r.l. and Oak Hill Capital Partners III, L.P. and Oak Hill Capital Management Partners III, L.P., collectively in their capacity as the Seller Representative, incorporated by reference to exhibit 10.1 to the Company's Current Report on Form 8-K (Commission file number 1-3610) dated June 27, 2014.
10(b)	Five-Year Revolving Credit Agreement, dated as of July 25, 2014, among Alcoa Inc., the Lenders and Issuers named therein, Citibank, N.A., as Administrative Agent for the Lenders and Issuers, and JPMorgan Chase Bank, N.A., as Syndication Agent, incorporated by reference to exhibit 10.2 to the Company's Current Report on Form 8-K (Commission file number 1-3610) dated July 31, 2014.

10(b)(1)	Extension Request and Amendment Letter, dated as of June 5, 2015, among Alcoa Inc., each lender and issuer party thereto, and Citibank, N.A., as Administrative Agent, effective July 7, 2015, incorporated by reference to exhibit 10.1 to the Company's Current Report on Form 8-K (Commission file number 1-3610) dated July 13, 2015.
10(b)(2)	Amendment No. 1, dated September 16, 2016, to the Five-Year Revolving Credit Agreement dated as of July 25, 2014, among Arconic Inc., the lenders and issuers named therein, Citibank, N.A., as administrative agent, and JPMorgan Chase Bank, N.A. as syndication agent, incorporated by reference to Exhibit 10.1 to the Company's Current Report on Form 8-K (Commission file number 1-3610) dated September 19, 2016.
10(b)(3)	Assumption Agreement, dated as of December 31, 2017, by Arconic Inc., a Delaware corporation, in favor of and for the benefit of the Lenders and Citibank, N.A., as administrative agent, incorporated by reference to exhibit 4.4 to the Company's Current Report on Form 8-K (Commission file number 1-3610) dated January 4, 2018.
10(b)(4)	Amendment No. 2, dated as of June 29, 2018, to the Company's Five-Year Revolving Credit Agreement dated as of July 25, 2014, by and among the Company, a syndicate of lenders and issuers named therein, Citibank, N.A., as administrative agent for the lenders and issuers, and JPMorgan Chase Bank, N.A., as syndication agent, incorporated by reference to Exhibit 10.1 to the Company's Current Report on Form 8-K dated July 2, 2018.
10(c)	Plea Agreement dated January 8, 2014, between the United States of America and Alcoa World Alumina LLC, incorporated by reference to exhibit 10(l) to the Company's Annual Report on Form 10-K (Commission file number 1-3610) for the year ended December 31, 2013.
10(d)	Agreement, dated February 1, 2016, by and between Elliott Associates, L.P., Elliott International, L.P., Elliott International Capital Advisors Inc. and Alcoa Inc., incorporated by reference to exhibit 10.1 to the Company's Current Report on Form 8-K (Commission file number 1-3610) dated February 1, 2016.
10(e)	Settlement Agreement, dated as of May 22, 2017, by and among Elliott Associates, L.P., Elliott International, L.P., Elliott International Capital Advisors Inc. and Arconic Inc., incorporated by reference to exhibit 10.1 to the Company's Current Report on Form 8-K (Commission file number 1-3610) dated May 22, 2017 (reporting an event on May 21, 2017).
10(f)	Letter Agreement, by and among Arconic Inc. and Elliott Associates, L.P., Elliott International, L.P. and Elliott International Capital Advisors Inc., dated as of December 19, 2017, incorporated by reference to exhibit 10.1 to the Company's Current Report on Form 8-K (Commission file number 1-3610) dated December 19, 2017.
10(g)	Registration Rights Agreement, by and among Arconic Inc. and Elliott Associates, L.P., Elliott International, L.P. and Elliott International Capital Advisors Inc., dated as of December 19, 2017, incorporated by reference to exhibit 10.2 to the Company's Current Report on Form 8-K (Commission file number 1-3610) dated December 19, 2017.
10(g)(1)	Amendment to Registration Rights Agreement, by and among Arconic Inc. and Elliott Associates, L.P., Elliott International, L.P. and Elliott International Capital Advisors Inc., dated as of February 2, 2018, incorporated by reference to exhibit 10.1 to the Company's Current Report on Form 8-K (Commission file number 1-3610) dated February 6, 2018.
10(h)	Arconic Inc. 2020 Annual Cash Incentive Plan, incorporated by reference to exhibit 10.1 to the Company's Current Report on Form 8-K (Commission file number 1-3610) dated December 10, 2019.
10(i)	Arconic Employees' Excess Benefits Plan C (formerly referred to as the Alcoa Inc. Employees' Excess Benefits Plan, Plan C), as amended and restated effective August 1, 2016, incorporated by reference to exhibit 10(j) to the Company's Annual Report on Form 10-K (Commission file number 1-3610) for the year ended December 31, 2016.
10(i)(1)	First Amendment to Arconic Employees' Excess Benefits Plan C (as amended and restated effective August 1, 2016), effective January 1, 2018, incorporated by reference to exhibit 10(l)(1) to the Company's Annual Report on Form 10-K (Commission file number 1-3610) for the year ended December 31, 2017.
10(i)(2)	Second Amendment to Arconic Employees' Excess Benefits Plan C (as amended and restated effective August 1, 2016), effective January 1, 2018, incorporated by reference to exhibit 10(l)(2) to the Company's Annual Report on Form 10-K (Commission file number 1-3610) for the year ended December 31, 2017.

10(i)(3)	Third Amendment to Arconic Employees' Excess Benefits Plan C (as amended and restated effective August 1, 2016), incorporated by reference to exhibit 10.1 to the Company's Current Report on Form 8-K (Commission file number 1-3610) dated January 8, 2018.
10(j)	Deferred Fee Plan for Directors, as amended effective July 9, 1999, incorporated by reference to exhibit 10(g)(1) to the Company's Quarterly Report on Form 10-Q (Commission file number 1-3610) for the quarter ended June 30, 1999.
10(k)	Amended and Restated Deferred Fee Plan for Directors, effective November 1, 2016, incorporated by reference to exhibit 10(c) to the Company's Quarterly Report on Form 10-Q (Commission file number 1-3610) for the quarter ended September 30, 2016.
10(l)	Non-Employee Director Compensation Policy, effective February 6, 2019, incorporated by reference to exhibit 10(m) to the Company's Annual Report on Form 10-K (Commission file number 1-3610) for the year ended December 31, 2018.
10(m)	Fee Continuation Plan for Non-Employee Directors, incorporated by reference to exhibit 10(k) to the Company's Annual Report on Form 10-K (Commission file number 1-3610) for the year ended December 31, 1989.
10(m)(1)	Amendment to Fee Continuation Plan for Non-Employee Directors, effective November 10, 1995, incorporated by reference to exhibit 10(i)(1) to the Company's Annual Report on Form 10-K (Commission file number 1-3610) for the year ended December 31, 1995.
10(m)(2)	Second Amendment to the Fee Continuation Plan for Non-Employee Directors, effective September 15, 2006, incorporated by reference to exhibit 10.2 to the Company's Current Report on Form 8-K (Commission file number 1-3610) dated September 20, 2006.
10(n)	Arconic Deferred Compensation Plan, as amended and restated effective August 1, 2016, incorporated by reference to exhibit 10(p) to the Company's Annual Report on Form 10-K (Commission file number 1-3610) for the year ended December 31, 2016.
10(n)(1)	First Amendment to the Arconic Deferred Compensation Plan (as amended and restated effective August 1, 2016), effective January 1, 2018, incorporated by reference to exhibit 10(r)(1) to the Company's Annual Report on Form 10-K (Commission file number 1-3610) for the year ended December 31, 2017.
10(o)	Summary of the Executive Split Dollar Life Insurance Plan, dated November 1990, incorporated by reference to exhibit 10(m) to the Company's Annual Report on Form 10-K (Commission file number 1-3610) for the year ended December 31, 1990.
10(p)	Amended and Restated Dividend Equivalent Compensation Plan, effective January 1, 1997, incorporated by reference to exhibit 10(h) to the Company's Quarterly Report on Form 10-Q (Commission file number 1-3610) for the quarter ended September 30, 2004.
10(q)	Form of Indemnity Agreement between the Company and individual directors or officers, incorporated by reference to exhibit 10(j) to the Company's Annual Report on Form 10-K (Commission file number 1-3610) for the year ended December 31, 1987.)
10(r)	Form of Indemnification Agreement between the Company and individual directors or officers, incorporated by reference to exhibit 10.1 to the Company's Current Report on Form 8-K (Commission file number 1-3610) dated January 25, 2018.
10(s)	Amended and Restated 2009 Alcoa Stock Incentive Plan, dated February 15, 2011, incorporated by reference to exhibit 10(z)(1) to the Company's Annual Report on Form 10-K (Commission file number 1-3610) for the year ended December 31, 2010.
10(t)	Arconic Supplemental Pension Plan for Senior Executives (formerly referred to as the Alcoa Supplemental Pension Plan for Senior Executives), as amended and restated effective August 1, 2016, incorporated by reference to exhibit 10(v) to the Company's Annual Report on Form 10-K (Commission file number 1-3610) for the year ended December 31, 2016.
10(t)(1)	First Amendment to Arconic Supplemental Pension Plan for Senior Executives (as amended and restated effective August 1, 2016), effective January 1, 2018, incorporated by reference to exhibit 10(x)(1) to the Company's Annual Report on Form 10-K (Commission file number 1-3610) for the year ended December 31, 2017.

10(t)(2)	Second Amendment to Arconic Supplemental Pension Plan for Senior Executives (as amended and restated effective August 1, 2016), effective January 1, 2018, incorporated by reference to exhibit 10(x)(2) to the Company’s Annual Report on Form 10-K (Commission file number 1-3610) for the year ended December 31, 2017.
10(u)	Deferred Fee Estate Enhancement Plan for Directors, effective July 10, 1998, incorporated by reference to exhibit 10(r) to the Company’s Annual Report on Form 10-K (Commission file number 1- 3610) for the year ended December 31, 1998.
10(v)	Arconic Inc. Change in Control Severance Plan, as amended and restated, effective May 14, 2019, incorporated by reference to Exhibit 10.2 to the Company's Current Report on Form 8-K dated May 17, 2019.
10(w)	Letter Agreement, dated August 14, 2007, between Alcoa Inc. and Klaus Kleinfeld, incorporated by reference to exhibit 10(b) to the Company’s Quarterly Report on Form 10-Q (Commission file number 1-3610) for the quarter ended September 30, 2007.
10(x)	Executive Severance Agreement, as amended and restated effective December 8, 2008, between Alcoa Inc. and Klaus Kleinfeld, incorporated by reference to exhibit 10(gg) to the Company’s Annual Report on Form 10-K (Commission file number 1-3610) for the year ended December 31, 2008.
10(x)(1)	Letter Agreement between Arconic Inc. and Klaus Kleinfeld, dated February 27, 2017, incorporated by reference to exhibit 10(y)(1) to the Company’s Annual Report on Form 10-K (Commission file number 1-3610) for the year ended December 31, 2016.
10(y)	Separation Agreement between Arconic Inc. and Klaus Kleinfeld, dated July 31, 2017, incorporated by reference to exhibit 10(c) to the Company’s Quarterly Report on Form 10-Q (Commission file number 1-3610) for the quarter ended June 30, 2017.
10(z)	Form of Executive Severance Agreement between the Company and new officers entered into after July 22, 2010, incorporated by reference to exhibit 10(a) to the Company’s Quarterly Report on Form 10-Q (Commission file number 1-3610) for the quarter ended September 30, 2010.
10(aa)	Arconic Inc. Executive Severance Plan, as amended and restated, effective May 14, 2019, incorporated by reference to Exhibit 10.3 to the Company's Current Report on Form 8-K dated May 17, 2019.
10(bb)	Letter Agreement, by and between Alcoa Inc. and Katherine H. Ramundo, dated as of July 28, 2016, incorporated by reference to exhibit 10(ff) to the Company’s Annual Report on Form 10-K (Commission file number 1-3610) for the year ended December 31, 2017.
10(cc)	Letter Agreement, from Arconic Inc. to Katherine H. Ramundo, dated as of May 31, 2018, incorporated by reference to exhibit 10(c) to the Company’s Quarterly Report on Form 10-Q (Commission file number 1-3610) for the quarter ended June 30, 2018.
10(dd)	Letter Agreement between Arconic Inc. and David P. Hess, dated May 17, 2017, incorporated by reference to exhibit 10.1 to the Company’s Current Report on Form 8-K (Commission file number 1-3610) dated May 22, 2017 (reporting an event on May 17, 2017).
10(ee)	Letter Agreement, by and between Arconic Inc. and Charles P. Blankenship, dated as of October 19, 2017, incorporated by reference to exhibit 10.1 to the Company’s Current Report on Form 8-K (Commission file number 1-3610) dated October 23, 2017
10(ff)	Separation Agreement between Arconic Inc. and Charles P. Blankenship, dated as of March 14, 2019, incorporated by reference to Exhibit 10.1 to the Company's Current Report on Form 8-K dated March 18, 2019.
10(gg)	Letter Agreement, by and between Arconic Inc. and Mark J. Krakowiak, dated as of January 20, 2018, incorporated by reference to exhibit 10(ii) to the Company’s Annual Report on Form 10-K (Commission file number 1-3610) for the year ended December 31, 2017.
10(hh)	Letter Agreement, from Arconic Inc. to Ken Giacobbe, dated as of February 14, 2019, incorporated by reference to exhibit 10(hh) to the Company’s Annual Report on Form 10-K (Commission file number 1-3610) for the year ended December 31, 2018.

10(ii)	Letter Agreement, by and between Arconic Inc. and John C. Plant, dated as of February 6, 2019, incorporated by reference to exhibit 10(a) to the Company's Quarterly Report on Form 10-Q (Commission file number 1-3610) for the quarter ended March 31, 2019.
10(jj)	Letter Agreement, by and between Arconic Inc. and John C. Plant, dated as of August 1, 2019, incorporated by reference to Exhibit 10.1 to the Company's Current Report on Form 8-K dated August 2, 2019.
10(kk)	Letter Agreement, by and between Arconic Inc. and John C. Plant, dated as of February 24, 2020, incorporated by reference to Exhibit 10.1 to the Company's Current Report on Form 8-K dated February 25, 2020.
10(ll)	Letter Agreement, by and between Arconic Inc. and Elmer L. Doty, dated as of February 6, 2019, incorporated by reference to exhibit 10(b) to the Company's Quarterly Report on Form 10-Q (Commission file number 1-3610) for the quarter ended March 31, 2019.
10(mm)	Letter Agreement, by and between Arconic Inc. and Neil E. Marchuk, dated as of February 13, 2019, incorporated by reference to exhibit 10(c) to the Company's Quarterly Report on Form 10-Q (Commission file number 1-3610) for the quarter ended March 31, 2019.
10(nn)	Letter Agreement between Arconic Inc. and Timothy D. Myers, dated as of January 13, 2020, incorporated by reference to exhibit 10.1 to the Company's Current Report on Form 8-K (Commission file number 1-3610) dated January 17, 2020.
10(oo)	Letter Agreement between Arconic Inc. and Tolga Oal, dated as of January 24, 2020, incorporated by reference to exhibit 10.2 to the Company's Current Report on Form 8-K (Commission file number 1-3610) dated January 25, 2020.
10(pp)	Arconic Global Pension Plan, as amended and restated effective August 1, 2016, incorporated by reference to exhibit 10(bb) to the Company's Annual Report on Form 10-K (Commission file number 1-3610) for the year ended December 31, 2016.
10(qq)	Global Expatriate Employee Policy (pre-January 1, 2003), incorporated by reference to exhibit 10(uu) to the Company's Annual Report on Form 10-K (Commission file number 1-3610) for the year ended December 31, 2005.
10(rr)	Arconic Inc. Legal Fee Reimbursement Plan, effective as of April 30, 2018, incorporated by reference to exhibit 10(b) to the Company's Quarterly Report on Form 10-Q (Commission file number 1-3610) for the quarter ended March 31, 2018.
10(ss)	Summary Description of Equity Choice Program for Performance Equity Award Participants, dated November 2005, incorporated by reference to exhibit 10.6 to the Company's Current Report on Form 8-K (Commission file number 1-3610) dated November 16, 2005.
10(tt)	2013 Arconic Stock Incentive Plan, as Amended and Restated, incorporated by reference to Exhibit 10.1 to the Company's Current Report on Form 8-K dated May 17, 2019.
10(tt)(1)	Terms and Conditions (Australian Addendum) to the 2013 Arconic Stock Incentive Plan, effective May 3, 2013, incorporated by reference to exhibit 10(d) to the Company's Current Report on Form 8-K (Commission file number 1-3610) dated May 8, 2013.
10(uu)	RTI International Metals, Inc. 2004 Stock Plan, incorporated by reference to exhibit 4(b) to the Company's Current Report on Form 8-K (Commission file number 1-3610) dated July 23, 2015.
10(vv)	RTI International Metals, Inc. 2014 Stock and Incentive Plan, incorporated by reference to exhibit 4(a) to the Company's Current Report on Form 8-K (Commission file number 1-3610) dated July 23, 2015.
10(vv)(1)	First Amendment to the RTI International Metals, Inc. 2014 Stock and Incentive Plan, as amended and assumed by Arconic Inc., dated February 1, 2018, incorporated by reference to exhibit 10(oo)(1) to the Company's Annual Report on Form 10-K (Commission file number 1-3610) for the year ended December 31, 2017.
10(ww)	Form of Award Agreement for Stock Options, effective January 1, 2010, incorporated by reference to exhibit 10(ddd) to the Company's Annual Report on Form 10-K (Commission file number 1-3610) for the year ended December 31, 2009.

10(xx)	Terms and Conditions for Stock Options, effective January 1, 2011, incorporated by reference to exhibit 10(c) to the Company's Quarterly Report on Form 10-Q (Commission file number 1-3610) for the quarter ended June 30, 2011.
10(yy)	Terms and Conditions for Stock Option Awards, effective May 3, 2013, incorporated by reference to exhibit 10(b) to the Company's Current Report on Form 8-K (Commission file number 1-3610) dated May 8, 2013.
10(zz)	Terms and Conditions for Stock Option Awards under the 2013 Arconic Stock Incentive Plan, effective July 22, 2016, incorporated by reference to Exhibit 10(d) to the Company's Quarterly Report on Form 10-Q (Commission file number 1-3610) for the quarter ended June 30, 2016.
10(aaa)	Global Stock Option Award Agreement, effective January 19, 2018, incorporated by reference to exhibit 10(uu) to the Company's Annual Report on Form 10-K (Commission file number 1-3610) for the year ended December 31, 2017.
10(bbb)	Form of Stock Option Award Agreement, incorporated by reference to exhibit 10(f) to the Company's Quarterly Report on Form 10-Q (Commission file number 1-3610) for the quarter ended June 30, 2018.
10(ccc)	Terms and Conditions for Restricted Share Units, effective May 3, 2013, incorporated by reference to exhibit 10(c) to the Company's Current Report on Form 8-K (Commission file number 1- 3610) dated May 8, 2013.
10(ddd)	Terms and Conditions for Restricted Share Units under the 2013 Arconic Stock Incentive Plan, effective July 22, 2016, incorporated by reference to Exhibit 10(c) to the Company's Quarterly Report on Form 10-Q (Commission file number 1-3610) for the quarter ended June 30, 2016.
10(eee)	Terms and Conditions for Restricted Share Units for Annual Director Awards under the 2013 Arconic Stock Incentive Plan, effective November 30, 2016, incorporated by reference to exhibit 10(vv) to the Company's Annual Report on Form 10-K (Commission file number 1-3610) for the year ended December 31, 2016.
10(fff)	Terms and Conditions for Restricted Share Units for Annual Director Awards under the 2013 Arconic Stock Incentive Plan, as Amended and Restated, effective December 5, 2017, incorporated by reference to exhibit 10(a) to the Company's Quarterly Report on Form 10-Q (Commission file number 1-3610) for the quarter ended March 31, 2018.
10(ggg)	Terms and Conditions for Deferred Fee Restricted Share Units for Director Awards under the 2013 Arconic Stock Incentive Plan, effective November 30, 2016, incorporated by reference to exhibit 10(ww) to the Company's Annual Report on Form 10-K (Commission file number 1-3610) for the year ended December 31, 2016.
10(hhh)	Terms and Conditions for Restricted Share Units issued on or after January 13, 2017, under the 2013 Arconic Stock Incentive Plan, effective January 13, 2017, incorporated by reference to exhibit 10(xx) to the Company's Annual Report on Form 10-K (Commission file number 1-3610) for the year ended December 31, 2016.
10(iii)	Terms and Conditions for Restricted Share Units - Interim CEO (David P. Hess) Award, effective October 23, 2017, incorporated by reference to exhibit 10(ccc) to the Company's Annual Report on Form 10-K (Commission file number 1-3610) for the year ended December 31, 2017.
10(jjj)	Terms and Conditions for Restricted Share Units - Non-Executive Chairman (John C. Plant) Director Award, effective October 23, 2017, incorporated by reference to exhibit 10(ddd) to the Company's Annual Report on Form 10-K (Commission file number 1-3610) for the year ended December 31, 2017.
10(kkk)	Terms and Conditions for Restricted Share Units - Non-Executive Chairman (John C. Plant) Director Award, effective October 23, 2018, incorporated by reference to exhibit 10(a) to the Company's Quarterly Report on Form 10-Q (Commission file number 1-3610) for the quarter ended September 30, 2018.
10(lll)	Global Restricted Share Unit Award Agreement, effective January 19, 2018, incorporated by reference to exhibit 10(eee) to the Company's Annual Report on Form 10-K (Commission file number 1-3610) for the year ended December 31, 2017.
10(mmm)	Terms and Conditions for Restricted Share Units issued on or after January 19, 2018, under the 2013 Arconic Stock Incentive Plan, effective January 19, 2018, incorporated by reference to exhibit 10(fff) to the Company's Annual Report on Form 10-K (Commission file number 1-3610) for the year ended December 31, 2017.

10(nnn)	Form of Restricted Share Unit Award Agreement, incorporated by reference to exhibit 10(g) to the Company's Quarterly Report on Form 10-Q (Commission file number 1-3610) for the quarter ended June 30, 2018.
10(ooo)	Restricted Share Unit Award Agreement - Executive Vice President, Human Resources (Neil E. Marchuk) Annual Equity Award, effective March 15, 2019, incorporated by reference to exhibit 10(f) to the Company's Quarterly Report on Form 10-Q (Commission file number 1-3610) for the quarter ended March 31, 2019.
10(ppp)	Restricted Share Unit Award Agreement - Executive Vice President, Human Resources (Neil E. Marchuk) Sign-on Equity Award, effective March 15, 2019, incorporated by reference to exhibit 10(g) to the Company's Quarterly Report on Form 10-Q (Commission file number 1-3610) for the quarter ended March 31, 2019.
10(qqq)	Terms and Conditions for Special Retention Awards under the 2013 Arconic Stock Incentive Plan, effective January 1, 2015, incorporated by reference to exhibit 10(a) to the Company's Quarterly Report on Form 10-Q (Commission file number 1-3610) for the quarter ended June 30, 2015.
10(rrr)	Terms and Conditions for Special Retention Awards under the 2013 Arconic Stock Incentive Plan, effective July 22, 2016, incorporated by reference to exhibit 10(e) to the Company's Quarterly Report on Form 10-Q (Commission file number 1-3610) for the quarter ended June 30, 2016.
10(sss)	Global Special Retention Award Agreement, effective January 19, 2018, incorporated by reference to exhibit 10(kkk) to the Company's Annual Report on Form 10-K (Commission file number 1-3610) for the year ended December 31, 2017.
10(ttt)	Special Retention Award Agreement - Katherine H. Ramundo, effective May 16, 2018, incorporated by reference to exhibit 10(d) to the Company's Quarterly Report on Form 10-Q (Commission file number 1-3610) for the quarter ended June 30, 2018.
10(uuu)	Special Retention Award Agreement - Paul Myron, effective May 16, 2018, incorporated by reference to exhibit 10(e) to the Company's Quarterly Report on Form 10-Q (Commission file number 1-3610) for the quarter ended June 30, 2018.
10(vvv)	Special Retention Award Agreement - Ken Giacobbe, effective February 12, 2019, incorporated by reference to exhibit 10(nnn) to the Company's Annual Report on Form 10-K (Commission file number 1-3610) for the year ended December 31, 2018.
10(www)	Special Retention Award Agreement - Paul Myron, effective February 28, 2019, incorporated by reference to exhibit 10(d) to the Company's Quarterly Report on Form 10-Q (Commission file number 1-3610) for the quarter ended March 31, 2019.
10(xxx)	Special Retention Award Agreement - Neil E. Marchuk, effective May 14, 2019, incorporated by reference to exhibit 10(d) to the Company's Quarterly Report on Form 10-Q (Commission file number 1-3610) for the quarter ended June 30, 2019.
21	Subsidiaries of the Registrant.
23	Consent of Independent Registered Public Accounting Firm.
24	Power of Attorney for certain directors.
31	Certifications pursuant to Section 302 of the Sarbanes-Oxley Act of 2002.
32	Certification pursuant to Section 906 of the Sarbanes-Oxley Act of 2002.
101. INS	XBRL Instance Document.
101. SCH	XBRL Taxonomy Extension Schema Document.
101. CAL	XBRL Taxonomy Extension Calculation Linkbase Document.
101. DEF	XBRL Taxonomy Extension Definition Linkbase Document.
101. LAB	XBRL Taxonomy Extension Label Linkbase Document.

101. PRE	XBRL Taxonomy Extension Presentation Linkbase Document.
104	The cover page of this Annual Report on Form 10-K for the year ended December 31, 2019, formatted in Inline XBRL and contained in Exhibit 101).

* Exhibit Nos. 10(h) through 10(xxx) are management contracts or compensatory plans 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.

None.

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.

ARCONIC INC.

February 26, 2020	By	/s/ Paul Myron
		Paul Myron
		Vice President and Controller (Also signing as Principal Accounting Officer)

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 and on the dates indicated.

Signature	Title	Date
/s/ John C. Plant		February 26, 2020
John C. Plant	Chairman and Chief Executive Officer (Principal Executive Officer and Director)	
/s/ Ken Giacobbe		February 26, 2020
Ken Giacobbe	Executive Vice President and Chief Financial Officer (Principal Financial Officer)	

James F. Albaugh, Amy E. Alving, Christopher L. Ayers, Elmer L. Doty, Rajiv L. Gupta, Sean O. Mahoney, David J. Miller, E. Stanley O'Neal, and Ulrich R. Schmidt, each as a Director, on February 26, 2020, by Paul Myron, their Attorney-in-Fact.*

*By	/s/ Paul Myron
	Paul Myron
	Attorney-in-Fact

DESCRIPTION OF THE REGISTRANT'S SECURITIES REGISTERED PURSUANT TO SECTION 12 OF THE SECURITIES EXCHANGE ACT OF 1934

As of the date of the Annual Report on Form 10-K of which this exhibit is a part, Arconic Inc. ("Arconic" or the "Company") has the following classes of securities registered under Section 12 of the Securities Exchange Act of 1934, as amended (the "Exchange Act"): (1) 600,000,000 shares of common stock, par value of $1.00 per share (the "Common Stock") and (2) 660,000 shares of Serial Preferred Stock, par value of $100.00 per share (the "Serial Preferred Stock").

Common Stock

The following briefly summarizes certain terms of the Common Stock. This summary does not describe every aspect of the Common Stock and is subject, and is qualified in its entirety by reference, to all of the provisions of our certificate of incorporation (the "Certificate of Incorporation") and our bylaws (the "Bylaws").

Dividend Rights

Holders of Common Stock are entitled to receive dividends as declared by the Company's Board of Directors (the "Board"). However, no dividend will be declared or paid on the Common Stock until the Company has paid (or declared and set aside funds for payment of) all dividends that have accrued on all classes of outstanding Preferred Stock, which currently comprise the Serial Preferred Stock described above.

Voting Rights

Holders of Common Stock are entitled to one vote per share.

Liquidation Rights

Upon any liquidation, dissolution or winding up of the Company, whether voluntary or involuntary, after payments to creditors and holders of the Serial Preferred Stock and Class B Serial Preferred Stock, par value of $1.00 per share (collectively, the "Preferred Stock") of amounts to which they are then entitled under the terms of the classes or series of the Preferred Stock and the Certificate of Incorporation, plus any accrued dividends, the Company's remaining assets will be divided among holders of Common Stock. Under the Certificate of Incorporation, the consolidation or merger of the Company with or into any other corporation or corporations or share exchange or division involving the Company in pursuance of applicable statutes providing for the consolidation, merger, share exchange or division shall not be deemed a liquidation, dissolution or winding up of the Company.

Preemptive or Other Subscription Rights

Holders of Common Stock do not have any preemptive right to subscribe for any securities of the Company.

Conversion and Other Rights

No conversion, redemption or sinking fund provisions apply to the Common Stock, and the Common Stock is not liable to further call or assessment by the Company.

Other Matters

Limitation of Liability. Delaware law permits a corporation to adopt a provision in its certificate of incorporation eliminating or limiting, with exceptions, the monetary liability of a director to the corporation or its stockholders for breach of the director's fiduciary duties. The Company's Certificate of Incorporation includes provisions that eliminate the liability of directors to the Company or its stockholders for monetary damages for a breach of fiduciary duties as directors to the fullest extent permitted by Delaware law. Under Delaware law, such a provision may not eliminate or limit a director's monetary liability for: (i) breaches of the director's duty of loyalty to the corporation or its stockholders; (ii) acts or omissions not in good faith or involving intentional misconduct or knowing violation of law; (iii) the payment of unlawful dividends or stock repurchases or redemptions; or (iv) transactions in which the director received an improper personal benefit.

Anti-Takeover Effects. Certain provisions of Delaware law and the Certificate of Incorporation and the Bylaws may have certain anti-takeover effects and may delay, defer or prevent a change in control of the Company.

Under Section 203 of the General Corporation Law of the State of Delaware (the "DGCL"), a Delaware corporation is generally prohibited from engaging in a "business combination" with an "interested stockholder" for three years following the time that such person or entity becomes an interested stockholder, unless (i) prior to the time that such stockholder became an interested stockholder, the board of directors approved either the business combination or the transaction which resulted in the stockholder becoming an interested stockholder, (ii) upon consummation of the transaction which resulted in the stockholder becoming an interested stockholder, the interested stockholder owned at least 85% of the outstanding voting stock, excluding for purposes of determining the voting stock outstanding (but not the outstanding voting stock owned by the interested stockholder) those shares (A) owned by persons who are directors and also officers and (B) in employee stock plans in which employee participants do not have the right to determine confidentially whether shares subject to the plan will be tendered in a tender or exchange offer, or (iii) at or following the time that such stockholder become an interested stockholder, the board of directors and two-thirds of the shares (other than owned by the interested stockholder) approve the transaction. A corporation may "opt out" of Section 203 of the DGCL in its certificate of incorporation. The Company has not "opted out" of, and is subject to, Section 203 of the DGCL.

In addition, the Certificate of Incorporation and the Bylaws contain provisions which:

- provide that the Board may authorize the issuance from time to time of shares of preferred stock and in general may fix the designations, powers, rights, preferences, qualifications, limitations and restrictions thereof;

- establish advance notice requirements for stockholders to nominate candidates for election as directors or present other business for consideration at meetings of stockholders; and

- pursuant to Section 115 of the DGCL, provide that the sole and exclusive forum for certain "internal corporate claims" will be a state court located within the State of Delaware (or, if no state court located within the State of Delaware has jurisdiction, the federal court for the District of Delaware).

The above provisions of the Certificate of Incorporation and the Bylaws may have certain anti-takeover effects.

The transfer agent, registrar and dividend disbursing agent for the Common Stock is Computershare Trust Company, N.A.

Serial Preferred Stock

The following briefly summarizes certain terms of the Serial Preferred Stock. This summary does not describe every aspect of the Serial Preferred Stock and is subject, and is qualified in its entirety by reference, to all of the provisions of the Certificate of Incorporation and the Bylaws.

General

The Board may authorize the issuance of shares of Preferred Stock in one or more series and may fix the specific number of shares and, subject to the Certificate of Incorporation, the relative rights and preferences of any such series so established. All shares of preferred stock must be identical, except with respect to the following relative rights and preferences, any of which may vary between different series:

- the rate of dividend, including the date from which dividends will be cumulative;
- the price at, and the terms and conditions on, which shares may be redeemed;
- the amounts payable on shares in the event of voluntary or involuntary liquidation;
- sinking fund provisions for the redemption or purchase of shares in the event shares of any series of preferred stock are issued with sinking fund provisions; and
- the terms and conditions on which the shares of any series may be converted in the event the shares of any series are convertible.

Each share of any series of Preferred Stock shall be identical with all other shares of such series, except as to date from which dividends shall be cumulative. No restriction applies to Arconic’s repurchase or redemption of the Serial Preferred Stock while there is any arrearage in the payment of dividends or any applicable sinking fund installments on the Serial Preferred Stock.

Dividends

The holders of the Serial Preferred Stock will be entitled to receive, when and as declared by the Board, out of surplus or net profits legally available therefor, cumulative dividends at an annual rate of $3.75 per share, payable quarterly on the first days of January, April, July and October in each year. The dividends on any shares of Serial Preferred Stock shall be cumulative from such date as shall be fixed for that purpose by the Board prior to the issue of such shares or, if no such date shall be fixed by the Board, from the quarterly dividend payment date next preceding the date of issue of such shares.

Redemption

The Company may redeem all or any part of the Serial Preferred Stock at any time at the option of the Board. Such redemption will be at $100 per share, plus any accrued and unpaid dividends.

The Company must publish notice of such redemption in daily newspapers in the English language of general circulation in the Borough of Manhattan, New York, New York, and in the City of Pittsburgh, Pennsylvania, as well as by mail to each record holder. The Company must give such notice not less than 30 days nor more than 60 days before the date fixed for redemption. If the Company redeems only part of the Serial Preferred Stock, the Company will select the shares to be redeemed pro rata or by lot, as the Board determines.

If notice of redemption has been given, from and after the redemption date for the shares of Serial Preferred Stock called for redemption, the following will occur, unless the Company fails to provide funds for payment of the redemption price:

- such shares will no longer be deemed to be outstanding; and
- holders will have no further rights as shareholders of the Company, except the right to receive the redemption price.

All shares of Serial Preferred Stock which the Company redeems will be cancelled and not reissued.

Liquidation Preference

Upon any liquidation, dissolution or winding up of the Company, each holder of Serial Preferred Stock will be entitled to receive, out of the assets of the Company available for distribution to shareholders, $100 per share plus accrued and unpaid dividends, before any payment or distribution is made to the holders of the Common Stock or the Class B Serial Preferred Stock.

Preemptive Rights

Holders of Serial Preferred Stock do not have any preemptive right to subscribe for any securities of the Company.

Conversion and Exchange Rights

Serial Preferred Stock is not convertible or exchangeable for the Common Stock.

Voting Rights

Except as expressly required by applicable law or in the Certificate of Incorporation, the holders of the Serial Preferred Stock will not be entitled to vote. If at any time the amount of any accrued and unpaid dividends on the Preferred Stock is at least equal to the amount of four quarterly dividends, the holders of the Preferred Stock will have one vote per share, provided, however, that such voting rights of the holders of the Preferred Stock will continue only until all quarterly dividends accrued on the Preferred Stock have been paid or declared and a sum sufficient for the payment thereof set apart.

The Company must obtain the consent of the holders of at least a majority of the outstanding Preferred Stock, voting as a class, to do the following:

- authorize any additional class of stock or increase the authorized number of shares of Preferred Stock or any class of stock which ranks on a parity with the Preferred Stock as to dividends or assets; or
- merge or consolidate with or into any other corporation if the corporation surviving or resulting from such merger or consolidation would have any authorized class of stock ranking senior to or on a parity with the

Preferred Stock, except the same number of shares of stock with the same rights and preferences as the authorized stock of the corporation immediately before such merger or consolidation.

Except in pursuance of a merger or consolidation with or into another corporation in the foregoing paragraph, the Company may not, without the consent of the holders of at least sixty-six and two-thirds percent of the outstanding Preferred Stock, voting as a class:

- make any adverse change in the rights and preferences of the Preferred Stock. If such a change would affect any series of Preferred Stock adversely as compared to the effect on any other series of Preferred Stock, no such change may be made without the additional consent of the holders of at least sixty-six and two-thirds percent of the outstanding shares of such series of Preferred Stock;

- authorize any additional class of stock or increase the authorized number of shares of any class of stock which ranks senior to the Preferred Stock as to dividends or assets; or

- sell or otherwise part with control of all or substantially all of its property or business or voluntarily liquidate, dissolve or wind up its affairs.

Exhibit 21

SUBSIDIARIES OF THE REGISTRANT
(As of December 31, 2019)

Name	State or Country of Organization
Arconic Rolled Products Corporation	Delaware
Arconic UK Holdings Limited	United Kingdom
Arconic Manufacturing (G.B.) Limited	United Kingdom
Alumax LLC	Delaware
Kawneer Company, Inc.	Delaware
Alumax Mill Products, Inc.	Delaware
Arconic Domestic LLC	Delaware
Arconic Securities LLC	Delaware
Howmet International Inc.	Delaware
Howmet Holdings Corporation	Delaware
Howmet Corporation	Delaware
Arconic International Holding Company LLC	Delaware
Arconic Luxembourg S.à r.l.	Luxembourg
Arconic-Köfém Kft	Hungary
Arconic Global Treasury Services S.a.r.l.	Luxembourg
Cordant Technologies Holding LLC	Delaware
Arconic Global Fasteners & Rings, Inc.	Delaware
Huck International Inc.	Delaware
FR Acquisition Corporation (US), Inc.	Delaware
JFB Firth Rixson Inc.	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 that term is defined in Regulation S-X under the Securities Exchange Act of 1934.

Exhibit 23

CONSENT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

We hereby consent to the incorporation by reference in the Registration Statements on Form S-8 (Nos. 333-32516, 333-106411, 333-128445, 333-146330, 333-153369, 333-155668, 333-159123, 333-168428, 333-170801, 333-182899, 333-189882, 333-203275, 333-209772, 333-212246, 333-229727, 333-229914 and 333-232219) of Arconic Inc. of our report dated February 26, 2020 relating to the financial statements and the effectiveness of internal control over financial reporting, which appears in this Form 10-K.

/s/ PricewaterhouseCoopers LLP
Pittsburgh, Pennsylvania
February 26, 2020

Exhibit 24

POWER OF ATTORNEY

KNOW ALL PERSONS BY THESE PRESENTS that each of the undersigned Directors of Arconic Inc. (the “Company”) hereby constitutes and appoints KEN GIACOBBE, PETER HONG, W. PAUL MYRON and KATHERINE H. RAMUNDO, or any of them, his or her true and lawful attorneys-in-fact and agents, with full power of substitution, to do any and all acts and things and to execute any and all instruments that said attorneys-in-fact and agents, or any of them, may deem necessary or advisable or may be required:

(1) To enable the Company to comply with the Securities Exchange Act of 1934, as amended (the “1934 Act”), and any rules, regulations or requirements of the Securities and Exchange Commission (the “Commission”) in respect thereof, in connection with the filing under the 1934 Act of the Company’s Annual Report on Form 10-K for the year ended December 31, 2019 (the “2019 Annual Report”), including specifically, but without limiting the generality of the foregoing, power and authority to sign the name of each of the undersigned in the capacity of Director of the Company to the 2019 Annual Report to be filed with the Commission and to any instruments or documents filed as part of or in connection with the 2019 Annual Report, including any amendments or supplements thereto;

(2) To enable the Company to comply with the Securities Act of 1933, as amended (the “1933 Act”), and any rules, regulations or requirements of the Commission in respect thereof, in connection with the registration under the 1933 Act during 2020 of the offer and sale or delivery of shares of common stock of the Company to be issued under the 2013 Arconic Stock Incentive Plan, as Amended and Restated, as such plan may be amended and/or restated from time to time (including any amendments thereto or restatements thereof, the “2013 Plan”), the 2009 Alcoa Stock Incentive Plan (the “2009 Plan”), the RTI International Metals, Inc. 2014 Stock and Incentive Plan, as amended (the “RTI 2014 Plan”) and the RTI International Metals, Inc. 2004 Stock Plan, as amended (the “RTI 2004 Plan”), including specifically, but without limiting the generality of the foregoing, power and authority to sign the name of each of the undersigned in the capacity of Director of the Company to any registration statement on Form S-8, or on such other form as may be appropriate, to be filed with the Commission in respect of said shares and the 2013 Plan, the 2009 Plan, the RTI 2014 Plan or the RTI 2004 Plan, or any of them, to any and all pre-effective amendments, post-effective amendments and supplements to any such registration statement, and to any instruments or documents filed as part of or in connection with any such registration statement or any such amendments or supplements thereto; and

(3) To enable the Company to comply with the 1933 Act, and any rules, regulations or requirements of the Commission in respect thereof, in connection with the registration under the 1933 Act during 2020 of the offer and sale or delivery of shares of common stock of the Company to be issued under the Company’s employee retirement savings plans (together with interests in such plans), including, without limitation, the Howmet Aerospace Hourly Retirement Savings Plan (f/k/a the Arconic Bargaining Retirement Savings Plan), the Howmet Aerospace Salaried Retirement Savings Plan (f/k/a the Arconic Salaried Retirement Savings Plan), the Howmet Aerospace Niles Bargaining Retirement Savings Plan (f/k/a the Arconic Retirement Savings Plan for ATEP Bargaining Employees), the Arconic Corp. Hourly 401(k) Plan, the Arconic Corp. Salaried 401(k) Plan and employee retirement or other savings plans sponsored by the Company or its subsidiaries or entities acquired by the Company from time to time (the “Plans”), including specifically, but without limiting the generality of the foregoing, power and authority to sign the name of each of the undersigned in the capacity of Director of the Company to any registration statement on Form S-8, or on such other form as may be appropriate, to be filed with the Commission in respect of said shares and the Plans (or interests in such Plans), or any of them, to any and all pre-effective amendments, post-effective amendments and supplements to any such registration statement, and to any instruments or documents filed as part of or in connection with any such registration statement or any such amendments or supplements thereto; and

(4) To enable the Company to comply with the 1933 Act, and any rules, regulations or requirements of the Commission in respect thereof, in connection with the registration under the 1933 Act on an unallocated basis of the Company’s securities, including debt securities, preferred stock, common stock and hybrid securities (including convertible or exchangeable securities); warrants to purchase debt or equity securities of the Company; stock purchase contracts and stock purchase units; and trust preferred securities of a trust or similar vehicle and related guarantees thereof by the Company, including specifically, but without limiting the generality of the foregoing, power and authority (i) to sign the name of each of the undersigned in the capacity of Director of the Company to one or more registration statements on Form S-3 or such other form as such attorneys-in-fact, or any of them, may deem necessary or desirable (including any registration statement filed pursuant to Rule 462 under the 1933 Act), and to any and all amendments and post-effective amendments and supplements to any such registration statements, and to any and all instruments or documents filed as part of or in connection with any such registration statements or amendments or supplements thereto, and (ii) to file the same with all exhibits thereto with the Commission; and

granting unto each of said attorneys-in-fact and agents full power and authority to do and perform each and every act and thing requisite and necessary to be done, as fully to all intents and purposes as the undersigned might or could do in person, and each of the undersigned hereby ratifies and confirms all that said attorneys-in-fact and agents, or any of them, shall do or cause to be done by virtue hereof.

This power of attorney will be governed by and construed in accordance with the laws of the State of Delaware. The execution of this power of attorney is not intended to, and does not, revoke any prior powers of attorney. This power of attorney may be signed in any number of counterparts, each of which shall constitute an original and all of which, taken together, shall constitute one power of attorney.

IN WITNESS WHEREOF, each of the undersigned has subscribed these presents this 29th day of January 2020.

/s/ James F. Albaugh	/s/ Amy E. Alving
James F. Albaugh	Amy E. Alving
/s/ Christopher L. Ayers	/s/ Elmer L. Doty
Christopher L. Ayers	Elmer L. Doty
/s/ Rajiv L. Gupta	/s/ Sean O. Mahoney
Rajiv L. Gupta	Sean O. Mahoney
/s/ David J. Miller	/s/ E. Stanley O’Neal
David J. Miller	E. Stanley O’Neal
/s/ John C. Plant	/s/ Ulrich R. Schmidt
John C. Plant	Ulrich R. Schmidt

Exhibit 31

Certifications

I, John C. Plant, certify that:

1. I have reviewed this annual report on Form 10-K of Arconic Inc.;

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 26, 2020

/s/ John C. Plant

John C. Plant

Chairman and Chief Executive Officer

I, Ken Giacobbe, certify that:

1. I have reviewed this annual report on Form 10-K of Arconic Inc.;

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 26, 2020

/s/ Ken Giacobbe

Ken Giacobbe

Executive Vice President and Chief Financial Officer

Exhibit 32

Certification
Pursuant to Section 906 of the Sarbanes-Oxley Act of 2002

Pursuant to Section 906 of the Sarbanes-Oxley Act of 2002 (subsections (a) and (b) of Section 1350, Chapter 63 of Title 18, United States Code), each of the undersigned officers of Arconic Inc., a Delaware corporation (the “Company”), does hereby certify that:

The Annual Report on Form 10-K for the period ended December 31, 2019 (the “Form 10-K”) of the Company fully complies with the requirements of section 13(a) or 15(d) of the Securities Exchange Act of 1934 and information contained in the Form 10-K fairly presents, in all material respects, the financial condition and results of operations of the Company.

Dated:	February 26, 2020	/s/ John C. Plant
		John C. Plant
		Chairman and Chief Executive Officer
Dated:	February 26, 2020	/s/ Ken Giacobbe
		Ken Giacobbe
		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 to the Securities and Exchange Commission as an exhibit to the Form 10-K and shall not be considered filed as part of the Form 10-K.