Arconic Inc.
Form 10-K
February 21, 2019
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UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
WASHINGTON, D.C. 20549
FORM 10-K
[x] ANNUAL REPORT PURSUANT TO SECTION 13 OR 15(d) OF
THE SECURITIES EXCHANGE ACT OF 1934
For The Fiscal Year Ended December 31, 2018
OR
[ ] TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d)
OF THE SECURITIES EXCHANGE ACT OF 1934
Commission File Number 1-3610
ARCONIC INC.
(Exact name of registrant as specified in its charter)
Delaware 25-0317820
(State of incorporation) (I.R.S. Employer Identification No.)
390 Park Avenue, New York, New York 10022-4608
(Address of principal executive offices) (Zip code)
Registrant's telephone numbers:
Investor Relations----------------(212) 836-2758
Office of the Secretary-----------(212) 836-2732
Securities registered pursuant to Section 12(b) of the Act:

Title of each class	Name of each exchange on which registered
Common Stock, par value $1.00 per share	New York Stock Exchange
$3.75 Cumulative Preferred Stock, par value $100.00 per share	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 if disclosure of delinquent filers pursuant to Item 405 of Regulation S-K is not contained herein, and will not be contained, to the best of registrant's knowledge, in definitive proxy or information statements incorporated by reference in Part III of this Form 10-K or any amendment to this Form 10-K. []
Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, 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 $8 billion. As of February 15, 2019, there were 484,940,842 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 2019 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.

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PART I

Item 1. Business.

General

Arconic Inc. is a Delaware corporation with its principal office in New York, New York 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," " "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 U 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 ("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 65% and 24%, respectively, of Arconic's sales in 2018. In addition, Arconic has operating activities in Brazil, Canada, China, Japan, and Russia, among others. Governmental policies, laws and regulations, and other economic factors, including inflation and fluctuations in foreign currency exchange rates and interest rates, affect the results of operations in these countries.

Arconic's operations consist of three worldwide reportable segments: Engineered Products and Solutions, Global Rolled Products and Transportation and Construction Solutions.

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

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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") – Alcoa Corporation and Arconic Inc. (the new name for Alcoa Inc.). Following the Separation, 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 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"). 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. 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 and retained 36,311,767 shares, or approximately 19.9%, of the common stock of Alcoa Corporation immediately following the Distribution. As a result of the Distribution, 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

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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 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 and the Distribution, Arconic entered into several agreements with Alcoa Corporation or its subsidiaries that govern the relationship of the parties following the Distribution, 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 have 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 have been previously identified in the strategy and portfolio review. The Company has announced the following key initiatives as part of its ongoing strategy and portfolio review:

- Commenced plans to reduce operating costs by approximately $200 million on an annual run-rate basis, designed to maximize the impact in 2019;
- Announced the planned separation of its portfolio into Engineered Products and Forgings and Global Rolled Products, with a spin-off of one of the businesses;
- Considering the potential sale of businesses that do not best fit into one of the two segments above;
- Intends to execute its previously authorized $500 million share repurchase program in the first half of 2019;
- The Board also authorized an additional $500 million of share repurchases, effective through the end of 2020; and
- Expects to reduce its quarterly common stock dividend from $0.06 to $0.02 per share.

On February 6, 2019, the Company announced that the Board appointed John C. Plant, current Chairman of the Board, as Chairman and Chief Executive Officer of the Company, effective February 6, 2019, to succeed Chip Blankenship, who ceased to serve as Chief Executive Officer of the Company and resigned as a member of the Board, in each case as of that date. In addition, the Company announced that the Board appointed Elmer L. Doty, current member of the Board, as President and Chief Operating Officer, a newly created position, effective February 6, 2019. Mr. Doty will remain a member of the Board. The Company also announced that Arthur D. Collins, Jr., current member of the Board, has been appointed interim Lead Independent Director of the Company, effective February 6, 2019.

On February 19, 2019, the Company entered into an accelerated share repurchase ("ASR") agreement with JPMorgan Chase Bank to repurchase $700 million of its common stock, pursuant to the share repurchase program previously authorized by the Board. Under the ASR agreement, Arconic will receive initial delivery of approximately 32 million shares on February 21, 2019. The final number of shares to be repurchased will be based on the volume-weighted average price of Arconic's common stock during the term of the transaction, less a discount. The ASR agreement is expected to be completed during the first half of 2019.

The Company will evaluate its organizational structure in conjunction with the planned separation of its portfolio and changes to its reportable segments are expected in the first half of 2019.

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Description of the Business

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

Major Product Revenues

Products that contributed 10% or more to consolidated revenues for the years ended December 31, 2018, 2017 and 2016, were:

	For the Year Ended December 31,		
	2018	2017	2016
Innovative flat-rolled products	40%	39%	39%
Engines	21%	21%	21%
Engineered structures	13%	13%	14%
Fastening systems	11%	11%	12%

Arconic has no customer that accounts for 10% or more of its consolidated revenues. 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 Solutions

Arconic's Engineered Products and Solutions segment ("EP&S") develops and manufactures high performance products mainly for the aerospace (commercial and defense), commercial transportation, and power generation end markets. Such products include fastening systems (titanium, steel, and nickel superalloys); seamless rolled rings (nickel superalloys, steel and titanium); investment castings (nickel superalloys, titanium, and aluminum), including airfoils and structural components; forged airframe and jet engine components (nickel superalloys, titanium, aluminum), including bulkheads, disks and shafts; extruded airframe components (aluminum); and various other forged and extruded metallic components for the oil and gas, industrial products, automotive, and land and sea defense end markets.

In January 2018, EP&S announced a change in the organizational structure of the segment, from four business units to three business units, with a focus on aligning its internal structure to core markets and customers and reducing costs. The three business units are Arconic Engines; Arconic Fastening Systems; and Arconic Engineered Structures.

Arconic Engines (AEN). AEN 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. AEN also provides additive manufacturing technologies, superalloy ingots, open-die forging, machining, performance coatings, and hot isostatic pressing for high performance parts.

Arconic Fastening Systems (AFS). AFS 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

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business’s products are also critical components of industrial gas turbines, automobiles, commercial transportation vehicles, and construction and industrial equipment.

Arconic Engineered Structures (AES). AES 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, as well as lightweight drive shafts for the commercial transportation industries. AES also provides multi-material airframe subassemblies and solutions related to advanced technologies and materials, such as 3D printing and titanium aluminides.

For additional discussion of the EP&S 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 C to the Consolidated Financial Statements in Part II, Item 8. (Financial Statements and Supplementary Data).

In July 2018, Arconic announced a two-year Joint Development Agreement with Lockheed Martin to develop customized lightweight material systems and advanced manufacturing processes, such as metal 3D printing, to advance current and next-generation aerospace and defense solutions - including new structures and systems.

In December 2018, as part of the Company’s ongoing strategy and portfolio review, Arconic completed the sale of its Eger, Hungary forgings business that manufactured high volume steel forgings for drivetrain components in the European heavy-duty truck and automotive market to Angstrom Automotive Group LLC.

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Engineered Products and Solutions 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 and Rings
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
	Hannover[2]	Extrusions
	Hildesheim-Bavenstedt[2]	Fasteners
	Kelkheim[2]	Fasteners
Hungary	Nemesvámos	Fasteners
	Székesfehérvár	Aerospace and Industrial Gas Turbine Castings and Forgings
Japan	Nomi	Aerospace and Industrial Gas Turbine Castings
Mexico	Ciudad Acuña[2]	Aerospace Castings/Fasteners and Rings
Morocco	Casablanca[2]	Fasteners
South Korea	Kyoungnam	Extrusions
United Kingdom	Darley Dale	Forgings
	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
	Meadowhall	Forgings
	Provincial Park	Forgings
	Redditch[2]	Fasteners
	River Don	Forgings
	Telford	Fasteners
	Welwyn Garden City	Aerospace Formed Parts

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Country	Facility	Products
United States	Chandler, AZ	Extrusions
	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
	Lafayette, IN	Extrusions
	La Porte, IN	Aerospace and Industrial Gas Turbine Castings
	Baltimore, MD[2]	Extrusions
	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
	Massena, NY	Extrusions
	Rochester, NY	Rings
	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
	Austin, TX[2]	Additively Manufactured Parts
	Houston, TX[2]	Extrusions
	Spring, TX	Deep Water Drilling Machining
	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 14 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”) has a single group organization structure and produces a range of aluminum sheet and plate products for the following markets:

Aerospace and Automotive - GRP provides a wide range of products, including many highly-differentiated sheet and plate products, for the worldwide aerospace and regional automotive markets.

Brazing, Commercial Transportation and Industrial - GRP provides specialty aluminum sheet and plate products for automotive, commercial transportation and industrial applications including proprietary heat exchanger products like multilayer brazing sheet.

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Packaging - GRP serves the packaging market in Russia, Asia and Latin America through regional facilities.
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 C to the Consolidated Financial Statements in Part II, Item 8. (Financial Statements and Supplementary Data).
In July 2018, the Company announced it had signed a new long-term contract with Boeing to supply aluminum sheet and plate for all models produced by Boeing Commercial Airplanes. The multiyear contract, which extends and adds to the Companies' 2014 contract, is the largest to date and captures growth in the build rate increases of the Boeing 737 program.
On October 31, 2018, the Company sold its Texarkana, Texas rolling mill and cast house to Ta Chen International, Inc. for $302 million in cash, subject to post-closing adjustments, plus additional contingent consideration of up to $50 million. 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 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 will 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.
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.
Global Rolled Products Principal Facilities

Country	Location	Products
Brazil	Itapissuma	Specialty Foil
China	Kunshan	Sheet and Plate
	Qinhuangdao[1]	Sheet and Plate
Hungary	Székesfehérvár	Sheet and Plate/Slabs and Billets
Russia	Samara	Sheet and Plate/Extrusions and Forgings
United Kingdom	Birmingham	Plate
United States	Davenport, IA	Sheet and Plate
	Danville, IL[2]	Sheet and Plate
	Hutchinson, KS[2]	Sheet and Plate
	Lancaster, PA	Sheet and Plate
	Alcoa, TN	Sheet
	Texarkana, TX[1, 3]	Slabs
	San Antonio, TX[4]	Micromill™

1 Leased property or partially leased property.
2 Properties are satellite locations of the Davenport, Iowa facility.
3 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. See discussion above concerning the sale of this facility.
4 Micromill™ production facility produces sheet for automotive and industrial applications using Arconic innovative production process.

Transportation and Construction Solutions
Arconic's Transportation and Construction Solutions segment ("TCS") produces products that are used mostly in the commercial transportation and nonresidential building and construction end markets. Such products include integrated aluminum structural systems, architectural extrusions and forged aluminum commercial vehicle wheels.

The Transportation and Construction Solutions segment is comprised of two business units: Arconic Wheel and Transportation Products; and Building and Construction Systems.
Arconic Wheel and Transportation Products (AWTP). AWTP provides forged aluminum wheels and related products for heavy-duty trucks and the commercial transportation markets.

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Building and Construction Systems (BCS). BCS provides building and construction architectural framing products and aluminum curtain wall and front entry systems.
For additional discussion of the Transportation and Construction Solutions 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 C to the Consolidated Financial Statements in Part II, Item 8. (Financial Statements and Supplementary Data).
In April 2018, the Company completed the sale of its Latin America Extrusions business to a subsidiary of Hydro Extruded Solutions AS. The sale is part of Arconic's continued drive to streamline its business portfolio, reduce complexity and further focus on its higher-margin products and profitable growth.
On July 31, 2018, the Company announced that it had initiated a sale process of its BCS business, as part of the Company's ongoing strategy and portfolio review that commenced in January 2018.

Transportation and Construction Solutions Principal Facilities[1]

Country	Facility	Products
Canada	Lethbridge, Alberta	Architectural Products
China	Suzhou[2]	Forgings
France	Merxheim[2]	Architectural Products
Hungary	Székesfehérvár	Forgings
Japan	Jôetsu City[2]	Forgings
Mexico	Monterrey	Forgings
United Kingdom	Runcorn	Architectural Products
United States	Springdale, AR	Architectural Products
	Visalia, CA	Architectural Products
	Eastman, GA	Architectural Products
	Barberton, OH	Forgings
	Cleveland, OH	Forgings
	Bloomsburg, PA	Architectural Products
	Cranberry, PA	Architectural Products

1 Principal facilities are listed, and do not include 8 locations that serve as sales and administrative offices, distribution centers or warehouses. In addition to the facilities listed above, TCS has 20 service centers. These centers perform light manufacturing, such as assembly and fabrication of certain products.
2 Leased property or partially leased property.

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Sources and Availability of Raw Materials

Important raw materials purchased in 2018 for each of the Company's reportable segments are listed below.

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

Transportation and Construction Solutions
Aluminum coil
Aluminum scrap
Electricity
Natural gas
Paint/Coating
Primary aluminum (billet)
Resin

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 2018, the Company's worldwide patent portfolio consists of approximately 1,863 granted patents and 824 pending 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 name "Arconic" was completed in 2016, in support of the corporate launch of Arconic Inc. As of the end of 2018, the Company's worldwide trademark portfolio consists of approximately 1,967 registered trademarks and 465 pending 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 Solutions (EP&S)

EP&S's business units - AFS, AEN and AES -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

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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&S segment include Berkshire Hathaway Inc., through its 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.

Other competitors include:

- Kaiser Aluminum - for extruded products
- Universal Alloy Corp., part of Montana Tech Components - for extruded products
- Doncasters Group Ltd. (UK) - for investment castings
- Consolidated Precision Products Corp., part of Warburg Pincus - for investment castings
- Weber Metals, part of Otto Fuchs - for precision forgings
- Forgital - for seamless rings
- Frisa (Mexico) - for 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)

GRP is one of the leaders in many of the aluminum flat rolled products markets in which it participates, including aerospace, automotive, commercial transportation, industrial markets (including brazing sheet) and packaging. However, much like other Arconic businesses, GRP is subject to substantial and intense competition in all of its markets.

While GRP participates in markets where Arconic believes the Company has a significant competitive advantage due to customer intimacy, advanced manufacturing capability, unique technology and/or differentiated products, in certain cases, the Company's competitors are capable of making products similar to Arconic's. The Company continuously works to maintain and enhance its competitive advantage through innovation: new alloys such as aerospace alloys, differentiated products such as the Company's 5-layer brazing products and break-through processes such as Arconic Micromill® technology.

Some of GRP's markets are worldwide and some are more regionally focused. Participation in these segments by GRP's 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, Constellium participates in all major market segments including aerospace, brazing, industrial, commercial transportation and packaging. Granges participates only in the brazing sheet market. Other GRP competitors include Aleris, AMAG, Hydro, Kaiser, Kobe, Nanshan, and UACJ. The competitive landscape is changing - in this past year, Novelis announced the acquisition of aluminum rolled products producer Aleris and Braidy Industries announced its intention to build a new aluminum mill near Ashland, Kentucky for automotive production.

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. The Company continually monitors and plans for these new emerging players.

Summary of Major Competitors for GRP:

- Constellium (The Netherlands)
- Novelis
- Kaiser Aluminum
- AMAG (Austria)
- UACJ (Japan)

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- Aleris
- Hydro (Norway)
- Nanshan (China)
- Granges (Sweden)
- Kobe (Japan)

Transportation and Construction Solutions (TCS)
In the forged aluminum wheels business, AWTP competes in commercial transportation, under the product brand name Alcoa® Wheels, for the major regions that it serves (Americas, Europe, Japan, China, and Australia). AWTP competes against steel wheels, as well as aluminum. Its larger competitors are Accuride Corporation, Nippon Steel & Sumitomo Metal Corporation, Zhejiang Dicastal Hongxin Technology Co. Ltd, Wheels India Limited and Speedline (member of the Ronal Group). AWTP has continued to see aluminum wheel suppliers (both forged and cast aluminum wheels) from China, Taiwan, India and South Korea attempting to penetrate the commercial transportation market.
BCS is a manufacturer of aluminum architectural systems and products in North America and Europe. In North America, BCS primarily competes in the nonresidential building segment. In Europe, it competes in both the residential and the nonresidential building segments. BCS competes with regional and local players in the architectural systems and more global companies in the products markets. BCS's competitive advantage is the cornerstone to its strong brand, innovative products, customer intimacy and technical services. Over the past decade, the regional competitors, primarily in North America, have narrowed the product portfolio and technical services advantages. However, BCS has maintained its competitive advantage through innovative products like highly energy-efficient high-thermal products and differentiated services. BCS sales are derived mainly from the retail, office, education and healthcare building segments.
BCS is organized into two business segments: architectural systems and architectural products. The primary product categories in architectural systems are storefront, framing and entrances (SEF), curtain walls, and windows. In the SEF and curtain wall businesses, BCS competes with competitors like Apogee, YKK, Oldcastle, Schüco, Hydro/SAPA and Reynaers in their aluminum framing systems business. The architectural products business is more global and is primarily served by subsidiaries of larger companies like Alpolic (Mitsubishi Corporation), Alucobond (Schweiter Technologies) and Novelis (Aditya Birla Group). The primary product categories are aluminum composite material and coil coated sheet. 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 still operating in their markets, despite some industry consolidation in North America during the late 2000s.
Summary of Major Competitors:
AWTP:

- Accuride Corporation
- Nippon Steel & Sumitomo Metal Corporation (Japan)
- Zhejiang Dicastal Hongxin Technology Co. Ltd (China)
- Wheels India Limited (India)
- Speedline (member of the Ronal Group in Switzerland)

BCS:

- Apogee, Oldcastle and YKK
- Alpolic, Alucobond and Alucoil
- Schüco (Germany), Hydro/SAPA (Norway), Reynaers (Belgium) and Corialis (Belgium)
- Alucobond, Alucoil, Euramax and Novelis

Research and Development
Arconic, at its light metals research center, engages in research and development (R&D) programs that include process and product development, and basic and applied research.
Throughout 2018, the Company continued working on new developments in all business segments and leveraging new technologies. The Company has continued investing in additive manufacturing, with a focus on producing metal powder materials tailored for a range of additive process technologies, and furthering its development of advanced 3D printing design and manufacturing techniques-such as Arconic's Ampliforge™ process-to improve production speeds,

reduce costs, and achieve material properties not possible through other additive flowpaths. The Company's powder production facility was completed at the Arconic Technology Center (ATC) in 2016. This facility will continue its focus on material development in aluminum, nickel and titanium alloys.

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The Company is also producing and qualifying additively manufactured aerospace, automotive and defense components via laser powder bed printing technology. It also is developing more formable titanium plate based wrought products for customers.

Arconic's Micromill® technology, which enables aluminum sheet to be produced in a matter of minutes rather than weeks and with enhanced structural properties, continues to grow. Specifically, the Arconic Micromill® technology located in San Antonio continues to transition to commercial production. In addition, the Company has invested in further developing Micromill™ technology, including installation of a pilot line at the ATC.

The Company continues to develop differentiated pretreatment technology, for example, by continuing to improve on its A951 technology, which enables aluminum to be joined with steel (e.g., in automotive applications). In addition, the Company continues to advance its joining methods/fasteners (like RSR™) and highly formable and high strength automotive sheet products for automotive original equipment manufacturer applications in both cosmetic hang on parts and structural body-in-white applications. A pilot coating line was installed at ATC in 2018.

The Company continued its differentiation in the commercial transportation market with Dura-Bright® EVO, UltraOne™ and European UltraOne™ wheel products.

The Company also continues to develop and deploy proprietary processing technologies in the manufacture of aerospace components, as well as a continued commitment and commercialization of a portfolio of proprietary aerospace fasteners. One such example is Ergo-Tech® blind fasteners which enable automated assembly operations.

Environmental Matters

Information relating to environmental matters is included in Note U to the Consolidated Financial Statements under the caption "Environmental Matters". Approved capital expenditures for new or expanded facilities for environmental control are $28 million for 2019 and estimated expenditures for such purposes are $8 million for 2020.

Employees

Total worldwide employment at the end of 2018 was approximately 43,000 employees in 29 countries. About 18,600 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, approximately 7,900 employees are represented by various labor unions. The largest collective bargaining agreement is the master collective bargaining agreement between Arconic and the United Steelworkers (USW). The USW master agreement covers approximately 3,400 employees at four U.S. locations; the current labor agreement expires on May 15, 2019. There are 17 other collective bargaining agreements in the United States with varying expiration dates.

On a regional basis, collective bargaining agreements with varying expiration dates cover approximately 8,900 employees in Europe and Russia, 8,100 employees in North America, 600 employees in South America, and 1,000 employees in Asia.

Executive Officers of the Registrant

The names, ages, positions and areas of responsibility of the executive officers of the Company as of February 21, 2019 are listed below.

Elmer L. Doty, 64, Director, President and Chief Operating Officer. Mr. Doty was appointed President and Chief Operating Officer of Arconic effective February 6, 2019, and has served on the Arconic Board of Directors since May 2017. From March 2016 until February 2019, Mr. Doty was an Operating Executive at The Carlyle Group LP, multinational private equity, alternative asset management and financial services corporation, where he held a similar position from March 2012 to December 2012. From December 2012 to February 2016, Mr. Doty was President and Chief Executive Officer of Accudyne Industries LLC, a provider of precision-engineered flow control systems and industrial compressors. Mr. Doty also was the President and Chief Executive Officer of Vought Aircraft Industries, Inc. from 2006 until its acquisition in 2010 by Triumph Group, a leader in manufacturing and overhauling aerospace structures, systems and components. Prior to Vought, Mr. Doty was Executive Vice President and General Manager of the Land Systems Division of United Defense Industries, Inc. (now BAE Systems). Earlier in his career, Mr. Doty held executive positions at General Electric Company and FMC Corporation.

Ken Giacobbe, 53, 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 Solutions segment. From January 2013 until October 2016, Mr. Giacobbe served as Chief Financial Officer of the Engineered Products and Solutions segment. Before joining Arconic, Mr. Giacobbe held senior finance roles at Avaya and Lucent Technologies.

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Timothy D. Myers, 53, Executive Vice President and Group President, Global Rolled Products and Transportation and Construction Solutions. Mr. Myers was appointed Executive Vice President and Group President, Global Rolled Products and Transportation and Construction Solutions in October 2017. Prior to being appointed to his current role, he was Executive Vice President and Group President, Transportation and Construction Solutions from May 2016 to October 2017. 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, 52, 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 Solutions 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, 65, 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, 51, 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.

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, and commercial transportation 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

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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, and technological improvements to new engines. 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 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 manufacturers and Arconic 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 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.

While Arconic believes that the long-term prospects for its products are positive, the Company 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 intervention. 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 hold their market positions in an evolving industry, companies could be acquired or may be unable to continue operations. 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 compete as sole-source vendors for customers. If there is consolidation among Arconic's customer base, those customers may be 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, customer pressures require Arconic to reduce its pricing such that its gross margins are diminished, the Company could decide not to sell certain products under such less favorable terms, which would decrease Arconic's revenue. Consolidation among the Company's customer base may also lead to reduced demand for Arconic's solutions, replacement of Arconic products by the combined entity with those of Arconic's competitors and cancellations of orders, each of which could have a material adverse effect on Arconic's business, operating results and financial condition.

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 customer's supply chain;
- 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 in all business segments, including additive manufacturing, alloy development, engineered finishes and product design, high speed continuous casting and rolling technology, and other advanced manufacturing technologies. For more information on Arconic's research and development programs, see "Research and Development" in Part I, Item 1. (Business-Research and Development) of this report.

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While Arconic intends to continue committing substantial financial resources and effort to the development of 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 changes in the business or financial condition or the loss of a significant customer or customers.

A significant downturn or deterioration in the business or financial condition or loss of a key customer or customers supplied by Arconic could affect Arconic's financial results in a particular period. 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. 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 is unsuccessful in replacing business lost from such customers, profitability 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 performance. Product manufacturing or performance issues could result in recalls, customer penalties, contract cancellation and product liability exposure, including if any of our products are non-compliant or are used in an unintended and/or unapproved manner that results in injuries or other damages. Because of approval and license requirements applicable to manufacturers and/or their suppliers, alternatives to mitigate manufacturing disruptions may not be readily available to the Company or its customers. Accordingly, manufacturing problems, product defects or other risks associated with our products, including their use or application, could result in significant costs to and liability for Arconic that could have a material adverse effect on its 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 the Company's 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 and is the sole supplier of aluminum sheet 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.

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's global operations and status as a public company expose the Company 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, Brazil, Canada, China, Japan, and Russia. As a result, the Company'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, taxation, exchange controls, employment regulations and repatriation of earnings;

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- 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, or the Ebola virus), which could cause disruptions in Arconic's operations or workforce;
- difficulties enforcing intellectual property and contractual rights 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 ("FCPA") and other anti-bribery and corruption laws;
- compliance with U.S. laws concerning trade, including the International Traffic in Arms Regulations ("ITAR"), the Export Administration Regulations ("EAR"), and the sanctions, regulations and embargoes administered by the U.S. Department of Treasury's Office of Foreign Asset Controls ("OFAC");
- imposition of currency controls;
- adverse tax audit rulings; and
- unexpected events, including fires or explosions at facilities, and natural disasters.

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. While Arconic believes it has adopted appropriate risk management, compliance programs and insurance arrangements to address and reduce the risks associated with these factors, such measures may provide inadequate protection against costs or liabilities that may arise from such events.

As a public company, Arconic is subject to, among other things, the reporting requirements of the Securities Exchange Act of 1934, as amended, the Sarbanes-Oxley Act, the Dodd-Frank Wall Street Reform and Consumer Protection Act and the regulations of the New York Stock Exchange. Arconic's failure to comply with applicable law could subject it to penalties under federal securities laws, expose it to lawsuits and restrict its ability to access financing. Under the Sarbanes-Oxley Act, Arconic must maintain effective disclosure controls and procedures and internal control over financial reporting. There can be no assurance that Arconic's internal control over financial reporting will be effective in the future or that a material weakness will not be discovered with respect to a prior period for which the Company had previously believed that internal controls were effective. Any failure to maintain effective disclosure controls and procedures or internal control over financial reporting could result in adverse regulatory consequences and/or a loss of investor confidence, which could limit the Company's ability to access the global capital markets and could have a material adverse effect on the Company's business, financial condition or the market price of Arconic securities.

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, the Company 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 the Company's costs and reduce its sales. Any interruption in production capability could require the Company to 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. 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.

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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. The pursuit of remedies for any misappropriation of Arconic intellectual property is expensive and the ultimate remedies may be deemed insufficient. Further, as the Company expands its operations 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.

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. Although management believes that its strategic actions are beneficial to Arconic, 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 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 its 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 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 management believes are 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.

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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.

Arconic's plans to restructure the Company, including separating into two companies and the possible sales of businesses, will involve significant time and expense, which could disrupt or adversely affect Arconic's business, may not achieve some or all of the anticipated benefits, are 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 Engineered Products & Forgings and Global Rolled Products, with a spin-off of one of the businesses, and to consider the possible sales of certain businesses.

Arconic expects that the process of completing the proposed separation and possible sales of businesses 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 and/or sales are not completed. Executing these transactions 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 and/or possible sales of businesses and following their 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.

Arconic may not realize some or all of the anticipated strategic, financial, operational or other benefits from the separation and/or possible sales of businesses. 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, 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 not occurred. In addition, if Arconic pursues the possible sales of businesses, it may face barriers to exit or objections from various stakeholders, and/or may retain liabilities for divested entities. There can be no assurance that any such sales will be undertaken or completed or that they will be beneficial to Arconic, whether due to the above-described risks, unfavorable global economic conditions, currency fluctuations, political risks, or other factors.

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

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 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

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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 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.

A decline in Arconic's financial performance or outlook could negatively impact the Company's access to the global capital markets, reduce the Company's 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 rating agencies routinely evaluate Arconic's credit profile and assign debt ratings to the Company. This evaluation is based on a number of factors, which include financial strength, business and financial risk, as well as transparency with rating agencies and timeliness of financial reporting. 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 changed the outlook from stable to negative credit watch. On October 8, 2018, Moody’s Investor Service (Moody’s) affirmed Arconic’s long-term debt rating at Ba2, a non-investment grade, with a stable outlook, and its short-term debt rating at Speculative Grade Liquidity-2. On September 27, 2018, 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 stable to positive.

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. 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 adversely impact the market price of Arconic's securities; 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); 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; result in more restrictive covenants in agreements governing the terms of any future indebtedness that the Company incurs; increase the cost of borrowing or fees on undrawn credit facilities; result in vendors or counterparties seeking collateral or letters of credit from Arconic; or otherwise impair Arconic's business, 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 G 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 HAFTA. 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 to potential declines in discount rates over the next several years. However, higher than expected pension contributions due to a decline in the plans' funded status as a result of declines in the discount rate or lower-than-expected investment returns on plan assets could have a material negative effect on 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

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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 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, will continue into 2019. The Company 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'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 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.

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, Chinese yuan (renminbi) 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

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implementation process in which ideas are executed in a disciplined manner to generate savings, and operating cost reductions, including, among others, those announced on February 8, 2019, in connection with the Company's ongoing strategic and portfolio review. 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 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. 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.

Arconic's profitability could be adversely affected by volatility in the availability or cost of raw materials.

Arconic's results of operations may be affected by changes in the availability or cost of raw materials (including, but not limited to, aluminum, cobalt, nickel, titanium sponge and vanadium), 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, 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.

Union 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, 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 a 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. The Company may be a party to litigation in a foreign jurisdiction where geopolitical risks might influence the ultimate outcome of such litigation. The Company is also subject to a variety of legal and regulatory compliance risks associated with its business and products. These risks include, among other things, potential claims relating to product liability, product testing, health and safety, environmental matters, required record keeping and record retention, intellectual property rights, government contracts and taxes, as well as compliance with U.S. and foreign laws and regulations 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 could be subject to fines, penalties, damages (in certain cases, treble damages), or suspension or debarment from government contracts.

For example, 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 the Company's products could be diminished, and the Company could be subject to further liability claims. Even if Arconic successfully defends against these types of claims, the Company could still be required to spend a substantial amount of money in connection with legal proceedings or investigations with respect to such claims; the Company's management could be required to devote significant time, attention and operational resources responding to and defending against these claims; and Arconic's reputation could suffer, any of which could have a material adverse effect on its financial condition and results of operations.

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. 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. 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. For additional information regarding the legal proceedings involving the Company, see the discussion in Part I, Item 3. (Legal Proceedings) of this report and in Note U to the Consolidated Financial Statements in Part II, Item 8. (Financial Statements and Supplementary Data).

Arconic is subject to a broad range of health, safety and environmental laws and regulations in the jurisdictions in which it operates and may be exposed to substantial costs and liabilities associated with such laws and regulations.

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 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, where no problem is currently known, at previously owned sites, sites previously operated by the Company, sites owned by its predecessors or sites that it may acquire in the future. Compliance with health, safety and environmental laws and regulations, including remediation obligations, may prove to be more challenging and costly than the Company anticipates. For example, new data and information, including information about the ways in which the Company's products are used, may lead the Company, regulatory authorities, government agencies or other entities or organizations to publish guidelines or recommendations, or impose restrictions, related to the manufacturing or use of the Company’s products. This could lead to reduced sales or market acceptance of the Company’s products. 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, all of which can have a material and adverse effect on the Company’s financial condition, results of operations and cash flows.

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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 GDRP 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.

Arconic may be subject to securities litigation, which could cause the Company to incur substantial costs and divert management’s attention and resources.

Arconic currently is, and may in the future become, subject to claims and litigation alleging violations of the securities laws. Arconic is generally obliged, to the extent permitted by law, to indemnify its current and former directors and officers who are named as defendants in these types of lawsuits. Regardless of the outcome, securities litigation 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.

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 (“ERISA”), 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’s customers and suppliers (through an increase in the cost of production or their ability to produce satisfactory products) or business (through an impact on Arconic’s inventory availability, cost of sales, operations or demand for Arconic 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.

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.

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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 shareholders 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 shareholders. 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.

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 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 a transitional period or more permanently.

Arconic may not achieve some or all of the expected benefits of the Separation from Alcoa Corporation, and failure to realize such benefits in a timely manner may materially adversely affect Arconic's business.

Arconic may be unable to achieve the full strategic and financial benefits expected to result from the Separation, or such benefits may be delayed or not occur at all. The Separation is expected to provide the following benefits, among others: (i) enabling the management of each company to pursue more effectively its own distinct operating priorities and strategies, to focus on strengthening its core business and its unique needs, and to pursue distinct and targeted opportunities for long-term growth and profitability; (ii) permitting each company to allocate its financial resources to meet the unique needs of its own business, allowing each company to intensify its focus on its distinct strategic priorities and to pursue more effectively its own distinct capital structures and capital allocation strategies; (iii) allowing each company to articulate more effectively a clear investment thesis to attract a long-term investor base suited to its business and providing investors with two distinct and targeted investment opportunities; (iv) creating an independent equity currency tracking each company's underlying business, affording Arconic and Alcoa Corporation direct access to the capital markets and facilitating each company's ability to consummate future acquisitions or other restructuring transactions utilizing its common stock; (v) allowing each company more consistent application of incentive structures and targets, due to the common nature of the underlying businesses; and (vi) separating and simplifying the structures required to manage two distinct and differing underlying businesses.

Arconic may not achieve these and other anticipated benefits for a variety of reasons, including, among others: (i) Arconic may be more susceptible to market fluctuations and other adverse events than if Alcoa Corporation were still a part of the Company because Arconic's business is less diversified than it was prior to the completion of the Separation; and (ii) as a smaller, independent company, Arconic may be unable to obtain certain goods, services and technologies at prices or on terms as favorable as those it obtained prior to completion of the Separation. If Arconic fails to achieve some or all of the benefits expected to result from the Separation, or if such benefits are delayed, it could have a material adverse effect on Arconic's competitive position, business, financial condition, results of operations and cash flows.

Alcoa Corporation may fail to perform under various transaction agreements that were executed as part of the Separation.

In connection with the Separation, Arconic and Alcoa Corporation entered into a Separation and Distribution Agreement and also entered into various other agreements, of which the following were still in effect during 2018: a Tax Matters Agreement, an Employee Matters Agreement, intellectual property license agreements, a metal supply agreement, real estate and office leases and a spare parts loan agreement. The Separation and Distribution Agreement, the Tax Matters Agreement and the Employee Matters Agreement, together with the documents and agreements by which the internal reorganization of the

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Company prior to the Separation was effected, determined the allocation of assets and liabilities between the companies following the Separation for those respective areas and included any necessary indemnifications related to liabilities and obligations. Arconic will rely on Alcoa Corporation to satisfy its performance and payment obligations under these agreements. If Alcoa Corporation is unable or unwilling to satisfy its obligations under these agreements, including its indemnification obligations, we could incur operational difficulties and/or losses.

In connection with the Separation from Alcoa Corporation, Alcoa Corporation has agreed to indemnify Arconic for certain liabilities and Arconic has agreed to indemnify Alcoa Corporation for certain liabilities. If Arconic is required to pay under these indemnities to Alcoa Corporation, Arconic's financial results could be negatively impacted. The Alcoa Corporation indemnity may be insufficient to hold Arconic harmless from the full amount of liabilities for which Alcoa Corporation will be allocated responsibility, and Alcoa Corporation may be unable to satisfy its indemnification obligations in the future.

Pursuant to the Separation and Distribution Agreement and certain other agreements with Alcoa Corporation, Alcoa Corporation has agreed to indemnify Arconic for certain liabilities, and Arconic has agreed to indemnify Alcoa Corporation for certain liabilities, in each case for uncapped amounts. Indemnities that Arconic may be required to provide Alcoa Corporation are not subject to any cap, may be significant and could negatively impact Arconic's business. Third parties could also seek to hold Arconic responsible for any of the liabilities that Alcoa Corporation has agreed to retain. Any amounts Arconic is required to pay pursuant to these indemnification obligations and other liabilities could require Arconic to divert cash that would otherwise have been used in furtherance of the Company's operating business. Further, the indemnity from Alcoa Corporation may be insufficient to protect Arconic against the full amount of such 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. Each of these risks could negatively affect Arconic's business, results of operations and financial condition.

The Separation could result in substantial tax liability.

It was a condition to the Distribution 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 and the Distribution 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, 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. 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- 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 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, 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 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, 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, together with certain related transactions, otherwise qualifies for tax-free treatment under Sections 355 and 368(a)(1)(D) of the Code, the Distribution may nevertheless be

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rendered taxable to Arconic and its shareholders as a result of certain post-Distribution transactions, including certain acquisitions of shares or assets of Arconic or Alcoa Corporation. The possibility of rendering the Distribution 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-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, 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.

Item 1B. Unresolved Staff Comments.

None.

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Item 2. Properties.

Arconic's principal office is located at 390 Park Avenue, New York, New York 10022-4608. Arconic's corporate center is located at 201 Isabella Street, 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 N 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 SOLUTIONS

See the table and related text in the Engineered Products and Solutions Facilities section on page 6 of this report.

GLOBAL ROLLED PRODUCTS

See the table and related text in the Global Rolled Products Facilities section on page 8 of this report.

TRANSPORTATION AND CONSTRUCTION SOLUTIONS

See the table and related text in the Transportation and Construction Solutions section on page 9 of this report.

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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 U to the Consolidated Financial Statements under the caption "Environmental Matters".
Reynobond PE
As previously reported, on June 13, 2017, the Grenfell Tower in London, UK 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 Metro Police, a Public Inquiry by the British government and a consumer protection inquiry by a French public authority. AAP SAS has sought and received core participant status in the Public Inquiry. The Company will no longer sell the PE product for architectural use on buildings.
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 August 25, 2017, under the caption Sullivan v. Arconic Inc. et al., against Arconic Inc., two 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 alleges 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 alleges 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, and its 2016 Annual Highlights Report. The consolidated amended complaint seeks, 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. Briefing on that motion is now closed and the parties await a ruling.
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 shareholder against all current members of Arconic's Board of Directors, 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 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 Securities Exchange Act of 1934 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 London Metropolitan Police Service and on June 23, 2018, the Court approved the stay.

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. Given the preliminary nature of these matters 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. The Board of Directors has also received letters, purportedly sent on behalf of shareholders, 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 has appointed a Special Litigation Committee of the Board to review and make recommendations to the Board regarding the appropriate course of action with respect to these shareholder demand letters. The Special Litigation Committee and the Board are continuing to consider the appropriate responses to the shareholder demand letters in view of developments in proceedings concerning the Grenfell Tower fire.

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, 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 $174 million (€152 million), including interest.

The Company has petitioned to the Supreme Court of Spain to review the National Court’s decision. If the petition is accepted, the Supreme Court will review the assessment on its merits and render a final decision. In the event the Company is unsuccessful in appealing the assessment to 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. As a result of the National Court decision, an income tax reserve, including interest, of $60 million (€52 million) was established in 2018. Concurrent with the establishment of the reserve, an indemnification receivable of $29 million (€25 million), representing Alcoa Corporation’s 49% share of the liability, was also recorded in 2018.

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, 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

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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 December 11, 2017, the court issued a new scheduling order and further set a scheduling conference for January 18, 2018. At that conference, the court set the next status conference for late July 2018.

The July 2018 status conference was canceled. 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. Following the transfer, the Court scheduled a status conference to discuss the most efficient manner in which to proceed with discovery. The conference took place on January 24, 2019. The Court has not issued a discovery schedule. 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, 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 its business into two independent, publicly traded companies: the Company and Alcoa Corporation. The Separation 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. See disposition of retained shares in Note V to the Consolidated Financial Statements in Part II Item 8 of this Form 10-K.

The number of holders of record of common stock was approximately 11,668 as of February 15, 2019.

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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® Materials Index, a group of 25 companies categorized by Standard & Poor’s as active in the “materials” market sector, (3) the S&P Aerospace & Defense Select Industry Index, a group of 33 companies categorized by Standard & Poor’s as active in the “aerospace & defense” industry and (4) the S&P 500® Industrials Index, a group of 69 companies categorized by Standard & Poor’s as active in the “industrials” market sector. The graph assumes, in each case, an initial investment of $100 on December 31, 2013, and the reinvestment of dividends. Historical prices prior to the separation of Alcoa Corporation from the Company 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.

Please note that the Company intends to replace the S&P 500® Materials Index with the S&P Aerospace & Defense Select Industry Index and the S&P 500® Industrials Index in subsequent stock performance graphs. We believe that the companies and industries represented in the S&P Aerospace & Defense Select Industry Index and the S&P 500® Industrials Index better reflect the markets in which the Company currently participates. All three indices are represented in the graph below.

As of December 31,	2013	2014	2015	2016	2017	2018
Arconic Inc.	$100	$149.83	$94.62	$80.22	$119.02	$74.47
S&P 500® Index	100	113.69	115.26	129.05	157.22	150.33
S&P 500® Materials Index	100	106.91	97.95	114.30	141.55	120.74
S&P Aerospace & Defense Select Industry Index	100	111.43	117.49	139.70	197.50	181.56
S&P 500® Industrials Index	100	109.83	107.04	127.23	153.99	133.53

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Item 6. Selected Financial Data.

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 Transaction”). The financial results of Alcoa Corporation for all periods prior to the Separation Transaction have been retrospectively reflected in the Statement of Consolidated Operations as discontinued operations and, as such, have been excluded from continuing operations and segment results for 2016 and all prior periods presented prior to the Separation Transaction. The cash flows related to Alcoa Corporation have not been segregated and are included in the Statement of Consolidated Cash Flows for 2016 and all prior periods presented.

(dollars in millions, except per-share amounts)

For the year ended December 31,	2018	2017	2016	2015	2014
Sales	$14,014	$12,960	$12,394	$12,413	$12,542
Amounts attributable to Arconic:					
Income (loss) from continuing operations[1]	$642	$(74)	$(1,062)	$(157)	$(61)
Income (loss) from discontinued operations[2]	—	—	121	(165)	329
Net income (loss)	$642	$(74)	$(941)	$(322)	$268
Earnings (loss) per share attributable to Arconic common shareholders:[3]					
Basic:					
Income (loss) from continuing operations	$1.33	$(0.28)	$(2.58)	$(0.54)	$(0.21)
Income (loss) from discontinued operations	—	—	0.27	(0.39)	0.85
Net income (loss)	$1.33	$(0.28)	$(2.31)	$(0.93)	$0.64
Diluted:					
Income (loss) from continuing operations	$1.30	$(0.28)	$(2.58)	$(0.54)	$(0.21)
Income (loss) from discontinued operations	—	—	0.27	(0.39)	0.84
Net income (loss)	$1.30	$(0.28)	$(2.31)	$(0.93)	$0.63
Cash dividends declared per common share[1]	$0.24	$0.24	$0.36	$0.36	$0.36
Total assets	18,693	18,718	20,038	36,477	37,298
Total debt	6,330	6,844	8,084	8,827	8,445
Cash provided from (used for) operations[4]	217	(39)	95	764	1,674
Capital expenditures:					
Capital expenditures—continuing operations	768	596	827	789	775
Capital expenditures—discontinued operations	—	—	298	391	444
Total capital expenditures	$768	$596	$1,125	$1,180	$1,219

(1) Calculated from the accompanying Statement of Consolidated Operations as Income (loss) from continuing operations after income taxes less Net income from continuing operations attributable to noncontrolling interests.

(2) Calculated from the accompanying Statement of Consolidated Operations as Income from discontinued operations after income taxes less Net income from discontinued operations attributable to noncontrolling interests.

(3) Per share data has been retroactively restated to reflect the 1-for-3 reverse stock split which became effective on October 6, 2016 (see Note I to the Consolidated Financial Statements in Part II, Item 8. (Financial Statements and Supplementary Data) of this Form 10-K).

(4) Cash provided from (used for) operations has not been restated for discontinued operations presentation for 2016 and all prior periods presented (see Basis of Presentation section of Note A to the Consolidated Financial Statements in Part II, Item 8. (Financial Statements and Supplementary Data) of this Form 10-K). Cash provided from (used for) operations in 2014 has not been recast for the impact of the new accounting pronouncements that were adopted in the first quarter of 2018 (see 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).

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.

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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 ("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 65% and 24%, respectively, of Arconic's sales in 2018. In addition, Arconic has operating activities in Brazil, Canada, China, Japan, and Russia, among others. Governmental policies, laws and regulations, and other economic factors, including inflation and fluctuations in foreign currency exchange rates and interest rates, affect the results of operations in these countries.
Management Review of 2018 and Outlook for the Future
In 2018, Arconic's revenues increased 8% over 2017 as a result of higher volumes across all segments including strong volume growth in aerospace engines and defense, automotive, commercial transportation, industrial, and building and construction end markets; higher aluminum pricing and favorable product mix primarily impacting the Global Rolled Products segment; and favorable foreign currency movements; partially offset by a decline in volumes in the industrial gas turbine end market; lower sales of $90 from the divestiture of the Latin America extrusions business (divested in April 2018), $54 from the divestiture of the rolling mill in Fusina, Italy (divested in March 2017), and $46 from the ramp down of Arconic's North American packaging operations (completed in December 2018); and costs of $38 in 2018 related to settlements of certain customer claims primarily related to product introductions. In the segments, Segment operating profit decreased 6% from 2017 as volume growth was more than offset by performance shortfalls in the disks operations, manufacturing inefficiencies in the Engineered Structures business, unfavorable product mix, and higher aluminum prices.
Net income was $642 in 2018 compared to a Net loss of $74 in 2017. There were several significant items that impacted the fourth quarter of 2018. The Company recognized proceeds of approximately $300 in cash and recorded a gain of $119 ($154 pre-tax) on the sale of the Texarkana rolling mill. The Company recorded a loss of $39 ($43 pre-tax) on the sale of the Eger, Hungary forgings business. The Company also recorded a charge of $72 ($92 pre-tax) for pension plan settlement charges associated with significant lump sum payments made to participants. Additionally, the Company recorded several discrete tax items, including benefits related to the reversal of a foreign deferred tax liability of $74 as well as the release of valuation allowances and revaluation of deferred taxes.
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 2018 with a solid financial position.
The following financial information reflects certain key measures of Arconic's 2018 results:

- Sales of $14,014, up 8% from 2017, with growth from all segments as key end markets remained healthy, and Net income of $642, or $1.30 per diluted share;
- Total segment operating profit of $1,581, a decrease of $97, or 6%, from 2017[1];
- Cash provided from operations of $217, cash used for financing activities of $649, and cash provided from investing activities of $565, reflecting improvements in working capital;
- Cash on hand at the end of the year of $2,277; and
- Total debt of $6,330, a decrease in total debt of $514 from 2017.

(1) For the reconciliation of Total segment operating profit to Consolidated income before income taxes and related information, see page 43.
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 have 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 have been previously identified in the strategy and portfolio review. The Company has announced the following key initiatives as part of its ongoing

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strategy and portfolio review:

- Commenced plans to reduce operating costs by approximately $200 on an annual run-rate basis, designed to maximize the impact in 2019;
- Announced the planned separation of its portfolio into Engineered Products and Forgings and Global Rolled Products, with a spin-off of one of the businesses;
- Considering the potential sale of businesses that do not best fit into one of the two segments above;
- Intends to execute its previously authorized $500 share repurchase program in the first half of 2019;
- The Board also authorized an additional $500 of share repurchases, effective through the end of 2020; and
- Expects to reduce its quarterly common stock dividend from $0.06 to $0.02 per share.

On February 6, 2019, the Company announced that the Board appointed John C. Plant, current Chairman of the Board, as Chairman and Chief Executive Officer of the Company, effective February 6, 2019, to succeed Chip Blankenship, who ceased to serve as Chief Executive Officer of the Company and resigned as a member of the Board, in each case as of that date. In addition, the Company announced that the Board appointed Elmer L. Doty, current member of the Board, as President and Chief Operating Officer, a newly created position, effective February 6, 2019. Mr. Doty will remain a member of the Board. The Company also announced that Arthur D. Collins, Jr., current member of the Board, has been appointed interim Lead Independent Director of the Company, effective February 6, 2019.

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, pursuant to the share repurchase program previously authorized by the Board. Under the ASR agreement, Arconic will receive initial delivery of approximately 32 million shares on February 21, 2019. The final number of shares to be repurchased will be based on the volume-weighted average price of Arconic's common stock during the term of the transaction, less a discount. The ASR agreement is expected to be completed during the first half of 2019.

The Company will evaluate its organizational structure in conjunction with the planned separation of its portfolio and changes to its reportable segments are expected in the first half of 2019.

In 2019, management projects that sales will be up approximately 2% to 4% supported by increases in most of the Company's key end markets, as robust growth and the Company's unique position in those markets is expected to continue. These increases will be partly offset by the expected decline in aluminum prices in 2019 compared with 2018. Earnings per share is expected to grow as management continues to focus on operational performance and driving further cost reductions. The Company expects favorable impacts from volume, net cost savings, aerospace pricing, and lower aluminum pricing, which will be pressured by the continuation of new product introductions in aerospace as well as higher transportation costs and aluminum scrap spreads. Cash flows are expected to keep pace for the full year in 2019 compared with 2018, resulting from improved operating performance and the focus on capital efficiency that is expected to drive lower capital expenditures. Cash flows in the first quarter of 2019 are expected to reflect the typical use of cash based on anticipated timing of working capital increases and interest payments.

2016 Separation Transaction. On November 1, 2016, the Company completed the separation of its business into two standalone, publicly-traded companies, Arconic Inc. and Alcoa Corporation. Following the Separation Transaction, Arconic comprises the Global Rolled Products (other than the rolling mill in Warrick, Indiana, and the 25.1% equity ownership stake in the Ma'aden Rolling Company), the Engineered Products and Solutions, and the Transportation and Construction Solutions segments. Alcoa Corporation comprises the Alumina and Primary Metals segments, the rolling mill in Warrick, Indiana, and the 25.1% equity ownership stake in the Ma'aden Rolling Company in Saudi Arabia.

The Separation Transaction was effected by the distribution of 80.1% of the outstanding shares of Alcoa Corporation common stock to the Company's shareholders (the "Distribution"). 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 distributed 146,159,428 shares of common stock of Alcoa Corporation in the Distribution and retained 36,311,767 shares, or approximately 19.9% (see disposition of retained shares under Results of Operations below), of the common stock of Alcoa Corporation immediately following the Distribution. As a result of the Distribution, Alcoa Corporation is now 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.

On October 31, 2016, Arconic entered into several agreements with Alcoa Corporation that govern the relationship of the parties following the completion of the Separation Transaction. These agreements include the following: Separation and Distribution Agreement, Transition Services Agreement, Tax Matters Agreement, Employee Matters Agreement, Alcoa Corporation to Arconic Inc. Patent, Know-How, and Trade Secret License Agreement, Arconic Inc. to Alcoa Corporation Patent, Know-How, and Trade Secret License Agreement, Alcoa Corporation to Arconic Inc. Trademark License Agreement, Toll Processing and Services Agreement, Master Agreement for the Supply of Primary Aluminum, Massena Lease and

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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.

Results of Operations

Earnings Summary

Sales. 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 all 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 Global Rolled Products 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 (divested in April 2018), the rolling mill in Fusina, Italy (divested in March 2017), and the ramp down of Arconic's North American packaging operations (completed in December 2018); and costs of $38 in 2018 related to settlements of certain customer claims primarily related to product introductions.

Sales for 2017 were $12,960 compared with $12,394 in 2016, an increase of $566, or 5%. The increase was the result of strong volume growth in all segments and higher aluminum pricing, partially offset by the planned ramp down and Toll Processing Agreement relating to the Company's North America packaging business in Tennessee in the Global Rolled Products segment, as well as unfavorable product pricing in both the Engineered Products and Solutions and Global Rolled Products segments. Pursuant to the Toll Processing Agreement that Arconic entered into with Alcoa Corporation on October 31, 2016 in connection with the Separation Transaction, Arconic provides can body stock to Alcoa Corporation using aluminum supplied by Alcoa Corporation, resulting in the absence of metal sales in 2017 compared to 2016.

Cost of Goods Sold (COGS). 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 the Engineered Structures business; performance shortfalls in the disks operations; costs related to settlements of certain customer claims noted above; and the impact of a $23 charge related to a physical inventory adjustment at one plant in the Engineered Products and Solutions segment 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.

COGS as a percentage of Sales was 78.9% in 2017 compared with 78.2% in 2016. The increase was primarily attributable to cost increases, including net higher aluminum prices of $84 and ramp-up costs related to new commercial aerospace engines, and a lower margin product mix, partially offset by net cost savings.

Selling, General Administrative, and Other Expenses (SG&A). 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 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.

SG&A expenses were $715, or 5.5% of Sales, in 2017 compared with $924, or 7.5% of Sales, in 2016.

The decrease in SG&A was the result of expenses related to the Separation Transaction of $193 in 2016 compared to $18 in 2017, as well as ongoing overhead cost reduction efforts, partially offset by proxy, advisory and governance-related costs of $58, external legal and other advisory costs related to Grenfell Tower of $14, and costs associated with the Company's Delaware reincorporation of $3 in 2017.

Research and Development Expenses (R&D). R&D expenses were $103 in 2018 compared with $109 in 2017 and $130 in 2016. The decrease in both periods was the result of lower spending.

Provision for Depreciation and Amortization (D&A). The provision for D&A was $576 in 2018 compared with $551 in 2017 and $535 in 2016. The increase in both periods 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 the Arconic Forgings and Extrusions business (see Goodwill under Critical Accounting Policies and Estimates below).

Restructuring and Other Charges. Restructuring and other charges were $9 in 2018 compared with $165 in 2017. The decrease of $156 was primarily due to the gain on the sale of the Texarkana rolling mill of $154, lower layoff costs, and a postretirement curtailment benefit of $28, partially offset by pension plan settlement charges of $96 associated with significant lump sum payments made to participants, a loss on the sale of the Eger, Hungary forgings business of $43, and pension curtailment charges of $23. In 2017, the Company recorded a loss on the sale of the Fusina, 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 T to the

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

Restructuring and other charges were $165 in 2017 compared with $155 in 2016. The increase of $10 was primarily due to a loss of $60 on the sale of the Fusina, Italy rolling mill and a charge of $41 for the impairment of assets associated with the sale of the Latin America extrusions business (divested in 2018) in 2017, partially offset by $57 for costs related to the exit of certain legacy Firth Rixson operations in the U.K. and $37 for exit costs related to the decision in 2016 to permanently shut down a can sheet facility. See Note T 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 $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.

Interest expense was $496 in 2017 compared with $499 in 2016. The decrease of $3, or 1%, was primarily due to lower interest expense resulting from lower outstanding debt, mostly offset by $73 primarily in higher premiums paid in 2017 related to the early redemption of $1,250 in debt. In the second quarter of 2017, Arconic redeemed all of the Company's 6.50% Bonds due 2018 and 6.75% Notes due 2018, and a portion of the Company's 5.72% Notes due 2019 in advance of the respective maturity dates.

Other Expense (Income), Net. 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 of $81 associated with an adjustment to the contingent earn-out liability related to the Firth Rixson acquisition (see Note T to the Consolidated Financial Statements in Part II, Item 8. (Financial Statements and Supplementary Data) of this Form 10-K), and income of $25 due to the reversal of a liability associated with a separation-related guarantee, 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 U to the Consolidated Financial Statements in Part II, Item 8. (Financial Statements and Supplementary Data) of this Form 10-K).

Other income, net was $486 in 2017 compared with Other expense, net of $41 in 2016. The increase in other income, net of $527 was primarily due to the gain on the sale of a portion of Arconic's investment in Alcoa Corporation common stock of $351 (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 and a gain of $351) and the gain of $167 on the Debt-for-Equity Exchange, income of $25 associated with a higher reversal of a contingent earn-out liability related to the Firth Rixson acquisition (see Note T to the Consolidated Financial Statements in Part II, Item 8. (Financial Statements and Supplementary Data) of this Form 10-K), and income of $25 due to the reversal of a liability associated with a separation-related guarantee. The Company was required to provide a guarantee for an Alcoa Corporation electricity contract in the event of an Alcoa Corporation payment default. In the fourth quarter of 2017, Alcoa Corporation announced that it had terminated the electricity contract at its Rockdale Operations and, as a result, Arconic reversed its associated guarantee liability.

Income 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. federal statutory rate of 35%. The effective tax rate differs from the U.S. federal statutory rate primarily due to a $1,267 discrete income tax charge for valuation allowances related to the Separation Transaction (see Note H to the Consolidated Financial Statements in Part II, Item 8. (Financial Statements and Supplementary Data) of this Form 10-K), a $95 tax charge associated with the redemption of company-owned life insurance policies whose tax basis was less than the redemption amount resulting in a taxable gain, a $51 net charge for the remeasurement of certain deferred tax assets and liabilities due to tax rate and tax law changes, and a $34 unfavorable tax impact related to certain separation costs which are nondeductible for income tax purposes, somewhat offset by a $39 discrete income tax benefit for the release of valuation allowances in Canada and Russia, a $38 tax benefit related to currency impacts of a distribution of previously taxed income, and a $26 favorable tax impact associated with non-taxable settlement proceeds and earn-out liability adjustments in connection with the Firth Rixson acquisition. Management anticipates that the effective tax rate in 2019 will be between 26.5% and 28.5%. However, 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.

Income (Loss) From Continuing Operations After Income Taxes. Income from continuing operations after income taxes was $642 for 2018, or $1.30 per diluted share, compared to a loss from continuing operations after income taxes 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 of $97 ($106 pre-tax) to contingent earn-out and guarantee liabilities as noted below. Additional favorable impacts in 2018 included: volume growth across all 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 Eger, Hungary forgings business; 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 the Engineered Structures business, performance shortfalls in the disks operations, settlements of certain customer claims, and an unfavorable physical inventory adjustment at one plant.

Loss from continuing operations after income taxes was $74 for 2017, or $0.28 per diluted share, compared with $1,062 for 2016, or $2.58 per share. The increase in results of $988 was primarily attributable to charges for tax valuation allowances and costs related to the Separation Transaction in 2016; a gain of $238 ($351 pre-tax) on the sale of a portion of Arconic's investment in Alcoa Corporation common stock and a gain of $167 ($167 pre-tax) on the Debt-for-Equity Exchange in 2017; income of $25 ($25 pre-tax) associated with a higher reversal of a contingent earn-out liability related to the Firth Rixson acquisition and income of $16 ($25 pre-tax) due to the reversal of a liability associated with a separation-related guarantee; net cost savings; and higher sales volumes across all segments; partially offset by a charge for goodwill impairment of $719 ($719 pre-tax); a charge related to the 2017 Act of $272; $47 ($73 pre-tax) of higher premiums paid for the early redemption of debt in 2017; higher LIFO inventory expense associated with higher aluminum prices; charges for asset impairments of the Fusina, Italy rolling mill of $60 ($60 pre-tax) and Latin America extrusions business of $41 ($41 pre-tax) based on the sale of these businesses; unfavorable product pricing, primarily in aerospace; and lower-margin product mix.

Segment Information

Arconic's operations consist of three worldwide reportable segments: Engineered Products and Solutions, Global Rolled Products and Transportation and Construction Solutions (see below). In the first quarter of 2018, the Company changed its primary measure of segment performance from Adjusted earnings before interest, tax, depreciation, and amortization ("Adjusted EBITDA") to Segment operating profit, which more closely aligns segment performance with Operating income as presented in the Statement of Consolidated Operations. 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 also includes certain items that, under the previous segment performance measure, were recorded in Corporate, such as the impact of LIFO inventory accounting, metal price lag, intersegment profit eliminations, and derivative activities. Segment operating profit may not be comparable to similarly titled measures of other companies. Differences between segment totals and consolidated Arconic are in Corporate. Prior period financial information has been recast to conform to current year presentation.

Segment operating profit for all reportable segments totaled $1,581 in 2018, $1,678 in 2017, and $1,622 in 2016. The following information provides Sales and Segment operating profit for each reportable segment, as well as certain shipment data for Global Rolled Products, for each of the three years in the period ended December 31, 2018. See Note C to the Consolidated Financial Statements in Part II, Item 8. (Financial Statements and Supplementary Data) of this Form 10-K.

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Engineered Products and Solutions

	2018	2017	2016
Third-party sales	$6,316	$5,943	$5,728
Segment operating profit	$891	$964	$955

The Engineered Products and Solutions 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 (titanium, steel, and nickel superalloys); seamless rolled rings (mostly nickel superalloys); investment castings (nickel superalloys, titanium, and aluminum), including airfoils and forged jet engine components (e.g., jet engine disks), and extruded, machined and formed aircraft parts (titanium and aluminum), all of which are sold directly to customers and through distributors. More than 75% of the third-party sales in this segment are from the aerospace end market. A small part of this segment also produces various forged, extruded, and machined metal products (titanium, aluminum and steel) for the oil and gas, automotive, and land and sea defense end markets. Seasonal decreases in sales are generally experienced in the third quarter of the year due to the European summer slowdown across all end markets. 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 31, 2018, as part of the Company's ongoing strategy and portfolio review, Arconic completed the sale of its Eger, Hungary forgings business 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, $38, and $29 in 2018, 2017, and 2016, respectively, and had 180 employees at the time of the divestiture. See Restructuring and other charges under Results of Operations above.

In April 2016, Arconic completed the sale of the Remmele Medical business (that was part of the RTI International Metals Inc. (RTI) acquisition) that manufactured precision-machined metal products for customers in the minimally invasive surgical device and implantable device markets. Remmele Medical generated third-party sales of $23 from January 1, 2016 through the divestiture date, and, at the time of the divestiture, had approximately 330 employees.

Third-party sales for the Engineered Products and Solutions segment increased $373, or 6%, in 2018 compared with 2017, primarily attributable to higher volumes in the aerospace engines and defense 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.

Third-party sales for this segment increased $215, or 4%, in 2017 compared with 2016, primarily attributable to volume growth in both aerospace engines and airframes, partially offset by lower product pricing, primarily in the aerospace end market, and the absence of sales of $23 related to the Remmele Medical business, which was sold in April 2016.

Segment operating profit for the Engineered Products and Solutions segment decreased $73, or 8%, in 2018 compared with 2017, primarily attributable to performance shortfalls in the disks operations; manufacturing inefficiencies in the Engineered Structures business, including 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; a physical inventory adjustment of $23; and lower aerospace pricing principally in the fasteners business; partly offset by the strength in aerospace engine and defense volumes.

Segment operating profit for this segment increased $9, or 1%, in 2017 compared with 2016, primarily on higher volumes and net cost savings, partially offset by product pricing pressures, ramp up costs associated with increasing production volumes of new aerospace engine parts, and a lower margin product mix.

In 2019, demand in the commercial aerospace end market is expected to remain strong, driven by the ramp-up of new aerospace engine platforms. Demand in the defense end market is expected to grow due to the continuing ramp-up of certain aerospace programs, while declines in the industrial gas turbine market are expected to continue, albeit at lower levels than in 2018. Net cost savings and favorable pricing are expected.

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Global Rolled Products(1)

	2018	2017	2016
Third-party sales	$5,604	$5,000	$4,865
Intersegment sales	160	148	118
Total sales	$5,764	$5,148	$4,983
Segment operating profit	$386	$424	$421
Third-party aluminum shipments (kmt)	1,249	1,197	1,339

(1) Excludes the Warrick, IN rolling operations and the equity interest in the rolling mill at the joint venture in Saudi Arabia, both of which were previously part of the Global Rolled Products segment but became part of Alcoa Corporation effective November 1, 2016.

The Global Rolled Products segment produces aluminum sheet and plate for a variety of end markets. Sheet and plate is sold directly to customers and through distributors related to the aerospace, automotive, commercial transportation, packaging, building and construction, and industrial products (mainly used in the production of machinery and equipment and consumer durables) end markets. A small portion of this segment also produces aseptic foil for the packaging end market. 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.

On April 6, 2018, the U.S. Treasury Department's Office of Foreign Asset Control ("OFAC") announced new sanctions against Russian "oligarchs" and extended those sanctions to companies that are majority-owned or substantively controlled by those oligarchs. These sanctions block U.S. persons - both individuals and companies - from engaging in transactions with listed oligarchs and their companies. These sanctions originally extended to UC Rusal PLC ("Rusal"), which supplies primary aluminum to Arconic in Europe, the United States, and to the Company's Samara plant in Russia. The Company operated under a series of temporary licenses issued by OFAC until January 27, 2019 when OFAC removed Rusal from the list of sanctioned parties. The Company complies with and expects to continue to comply with all other aspects of these sanctions and we do not anticipate any interruption in Samara's ability to operate normally.

In March 2017, Arconic completed the sale of its Fusina, Italy rolling mill. The rolling mill generated third-party sales of $54 and $165 for 2017 and 2016, respectively. At the time of the divestiture, the rolling mill had approximately 312 employees. See Restructuring and other charges under Results of Operations above.

On November 1, 2016, Arconic entered into a Toll Processing Agreement with Alcoa Corporation for the tolling of metal for the Warrick, IN rolling mill which became a part of Alcoa Corporation upon the completion of the Separation Transaction. As part of this arrangement, Arconic provided a toll processing service to Alcoa Corporation to produce can sheet products at its facility in Tennessee through the end date of the contract, December 31, 2018. Alcoa Corporation supplied all required raw materials to Arconic and Arconic processed the raw materials into finished can sheet coils ready for shipment to the end customer. Tolling revenue for 2018, 2017, and the two months ended December 31, 2016 was $144, $190 and $37, respectively.

Third-party sales for the Global Rolled Products segment increased $604, or 12%, 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 (divested in March 2017) and the planned ramp down of Arconic's North American packaging operations (completed in December 2018).

Third-party sales for this segment increased $135, or 3%, in 2017 compared with 2016, primarily attributable to volume growth in the automotive end market and higher aluminum pricing, partially offset by the impact of $362 associated with the ramp-down and Toll Processing Agreement with Alcoa Corporation at the Company's North America packaging business in Tennessee, the absence of sales of $111 from the rolling mill in Fusina, Italy, aerospace customer inventory destocking and reduced build rates, and pricing pressures in the global packaging market.

Segment operating profit for the Global Rolled Products segment decreased $38, or 9%, in 2018 compared with 2017, primarily driven by unfavorable aerospace wide-body production mix, higher aluminum prices, and higher transportation costs and scrap spreads, partially offset by higher automotive, commercial transportation and industrial volumes. The higher aluminum prices negatively impacted segment operating profit margin by $30, or 100 basis points, in 2018 compared with 2017.

Segment operating profit for this segment increased $3, or 1%, in 2017 compared with 2016, primarily driven by net cost savings and increased automotive volumes, partially offset by lower aerospace volume from customer destocking and reduced build rates, continued pricing pressure on global packaging products and higher aluminum prices. The higher aluminum prices

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negatively impacted segment operating profit margin by $37, or 150 basis points, in 2017 compared with 2016.
In 2019, demand in the North America commercial transportation, brazing, and industrial end markets is expected to grow as a result of the International Trade Commission initiated common alloy trade case. Demand in the automotive end market is expected to continue to grow due to the growing demand for innovative products and aluminum-intensive vehicles. Demand from the commercial airframe end market is expected to be flat as the ramp-up of new programs is offset by lower build rates for aluminum intensive wide-body programs. Net productivity improvements are anticipated to continue.
Transportation and Construction Solutions

	2018	2017	2016
Third-party sales	$2,126	$2,011	$1,802
Segment operating profit	$304	$290	$246

The Transportation and Construction Solutions segment produces products that are used mostly in the commercial transportation and nonresidential building and construction end markets. Such products include integrated aluminum structural systems, architectural extrusions, and forged aluminum commercial vehicle wheels, which are sold both directly to customers and through distributors. A small part of this segment also produces aluminum products for the industrial products end market. Generally, the sales and costs and expenses of this segment are transacted in the local currency of the respective operations, which are primarily the U.S. dollar, the euro, and the Brazilian real.
On July 31, 2018, the Company announced that it had initiated a sale process of its Building and Construction Systems (BCS) business, as part of the Company's ongoing strategy and portfolio review that commenced in January 2018. BCS generated third-party sales of approximately $1,140, $1,070, and $1,010 for 2018, 2017, and 2016, respectively. The sale process continues to progress. The Company's decision regarding whether to sell the business will not be finalized until final binding offers are evaluated. Until the Company makes that final decision, the BCS business will remain classified as held and in-use in the Consolidated Financial Statements.
On April 2, 2018, Arconic completed the sale of its Latin America extrusions business as part of its continued drive to streamline its business portfolio, reduce complexity and further focus on its higher-margin products and profitable growth. This business generated sales of $25, $115, and $103 in 2018, 2017, and 2016 respectively, and had 612 employees at the time of the divestiture. See Restructuring and Other Charges under Results of Operations above.
Third-party sales for the Transportation and Construction Solutions segment increased $115, or 6%, in 2018 compared with 2017, primarily driven by higher volumes in the commercial transportation and building and construction end markets, favorable foreign currency movements and higher aluminum prices, partially offset by the absence of sales of $90 resulting from the divestiture of the Latin America extrusions business in April 2018.
Third-party sales for this segment increased $209, or 12%, in 2017 compared with 2016, primarily driven by increased volumes in the commercial transportation and building and construction end markets, higher aluminum pricing, and favorable foreign currency movements, partially offset by lower product pricing.
Segment operating profit for the Transportation and Construction Solutions segment increased $14, or 5%, in 2018 compared with 2017, principally driven by higher volumes in the commercial transportation and building and construction end markets and net cost savings, which more than offset higher aluminum prices. The higher aluminum prices negatively impacted segment operating margin by $57, or 270 basis points, in 2018 compared with 2017.
Segment operating profit for this segment increased $44, or 18%, in 2017 compared with 2016, principally driven by net cost savings and higher volumes, partially offset by lower product pricing in the heavy-duty truck market, unfavorable product mix, and higher aluminum prices. The higher aluminum prices negatively impacted segment operating margin by $8, or 90 basis points, in 2017 compared with 2016.
In 2019, we expect continued growth in the North American and European commercial transportation and building and construction markets and continued demand for innovative products. Net productivity improvements are anticipated to continue.

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

	2018	2017	2016
Total segment operating profit	$1,581	$1,678	$1,622
Unallocated amounts:			
Impairment of goodwill	—	(719)	—
Restructuring and other charges	(9)	(165)	(155)
Corporate expense	(247)	(314)	(513)
Consolidated operating income	$1,325	$480	$954
Interest expense	(378)	(496)	(499)
Other (expense) income, net	(79)	486	(41)
Consolidated income from continuing operations before income taxes	$868	$470	$414

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

Corporate expense decreased 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.

Corporate expense decreased in 2017 compared with 2016 primarily attributable to costs incurred in 2016 related to the Separation Transaction, partially offset by proxy, advisory and governance-related costs and legal and other advisory costs related to Grenfell Tower incurred in 2017.

Environmental Matters

See the Environmental Matters section of Note U 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, 2018, cash and cash equivalents of Arconic were $2,277, of which $541 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.

The Statement of Consolidated Cash Flows has not been restated for discontinued operations, therefore the discussion below concerning Operating Activities, Financing Activities, and Investing Activities for the year ended December 31, 2016 includes the results of both Arconic and Alcoa Corporation up through the completion of the Separation Transaction on November 1, 2016.

Operating Activities

Cash provided from operations in 2018 was $217 compared with cash used for operations of $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 of $277 in accounts payable, $127 in taxes, including income taxes, and $118 in inventories, partially offset by unfavorable changes of $227 in receivables, $74 in accrued expenses, and $12 in prepaid expenses and other current assets.

Cash used for operations in 2017 was $39 compared with Cash provided from operations $95 in 2016. The decrease of $134 was primarily due to lower operating results and higher pension contributions of $20, partially offset by a favorable change in noncurrent assets of $111 due to the prepayment of $200 made in April 2016 related to a gas supply agreement for the Australia alumina refineries (Alcoa Corporation), a favorable change in noncurrent liabilities of $55, and lower cash used for working capital of $17. The components of the change in working capital included favorable changes of $101 in receivables; $87 in prepaid expenses and other current assets; and $278 in accrued expenses; mostly offset by unfavorable changes in working capital, including $163 in inventories; $170 in accounts payable, trade; and $116 in taxes, including income taxes.

Financing Activities

Cash used for financing activities was $649 in 2018 compared with $1,015 in 2017 and $757 in 2016.

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 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.

The use of cash in 2016 was principally the result of $2,734 in payments on debt, mostly related to the repayment of borrowings under certain revolving credit facilitates (see below) and the repayment in December 2016 of $750 of outstanding principal of 5.55% Notes due February 2017; $228 in dividends to shareholders; and $175 in net cash paid to noncontrolling interests (Alcoa Corporation). These items were mostly offset by $1,962 in additions to debt, virtually all of which was the result of borrowing under certain revolving credit facilities, and $421 in net cash transferred from Alcoa Corporation at the completion of the Separation Transaction.

In July 2015, through the acquisition of 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 is due on October 15, 2019 (principal amount of $403), unless earlier converted or purchased by Arconic at the holder's option under specific conditions. Upon conversion of the 2019 convertible notes, holders will receive, at Arconic's election, cash, shares of common stock (approximately 14,453,000 shares using the December 31, 2018 conversion rate of 35.9125 shares per $1,000 (not in millions) bond or per-share conversion price of $27.8455), or a combination of cash and shares. On the maturity date, each holder of outstanding notes will be entitled to receive $1,000 (not in millions) in cash for each $1,000 (not in millions) bond, together with accrued and unpaid interest.

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 $715 as of December 31, 2018. 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 changed the outlook from stable to negative credit watch. 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 and its short-term debt rating from Speculative Grade Liquidity-1 to Speculative Grade Liquidity-2. Additionally, Moody's changed the outlook from negative to stable (ratings and outlook were affirmed on November 2, 2017 and October 8, 2018). 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

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27, 2018, Fitch changed the outlook from stable to positive (ratings and outlook were affirmed on September 27, 2018).

Investing Activities

Cash provided from investing activities was $565 in 2018 compared with $1,320 in 2017 and $591 in 2016.

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, 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 Fusina rolling business prior to its sale.

The source of cash in 2016 was mainly due to $778 of cash receipts from sold receivables, $692 in proceeds from the sale of assets and businesses, including $457 from the redemption of company-owned life insurance policies, $120 in proceeds related to the sale of the Intalco smelter wharf property (Alcoa Corporation), and $102 in proceeds ($99 net of transaction costs) from the sale of the Remmele Medical business, which was part of Arconic's acquisition of RTI in July 2015; and $280 in sales of investments, composed primarily of $145 for an equity interest in a natural gas pipeline in Australia (Alcoa Corporation) and $130 for securities held by Arconic's captive insurance company. These sources of cash were partially offset by $1,125 in capital expenditures ($298 Alcoa Corporation), 29% of which related to growth projects, including the aerospace expansion (very thick plate stretcher) at the Davenport, Iowa plant and a titanium aluminide furnace at the Niles, Ohio facility.

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 I 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.

On October 5, 2016, Arconic completed a 1-for-3 reverse stock split of its outstanding and authorized shares of common stock, pursuant to the authorization provided at a special meeting of Arconic common shareholders (the "Reverse Stock Split"). 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. The par value of the common stock remained at $1.00 per share. Accordingly, Common stock and Additional capital in the Company's Statement of Changes in Consolidated Equity at December 31, 2016 reflect a decrease and increase of $877, respectively.

In August 2016, Arconic retired its outstanding treasury stock consisting of approximately 76 million shares. As a result, Common stock and Additional capital were decreased by $76 and $2,563, respectively, in the Company's Statement of Changes in Consolidated Equity at December 31, 2016, to reflect the retirement of the treasury shares.

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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, 2018, 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	2019	2020-2021	2022-2023	Thereafter
Operating activities:					
Energy-related purchase obligations	$72	$37	$ 28	$ 7	$ —
Raw material purchase obligations	829	652	155	19	3
Other purchase obligations	102	81	13	6	2
Operating leases	379	94	128	70	87
Interest related to total debt	2,326	351	592	370	1,013
Estimated minimum required pension funding	1,860	255	840	765	—
Other postretirement benefit payments	730	90	170	170	300
Layoff and other restructuring payments	25	19	4	1	1
Deferred revenue arrangements	18	12	6	—	—
Uncertain tax positions	187	—	—	—	187
Financing activities:					
Total debt	6,330	421	2,243	623	3,043
Dividends to shareholders	—	—	—	—	—
Investing activities:					
Capital projects	665	532	133	—	—
Totals	$13,523	$2,544	$ 4,312	$ 2,031	$ 4,636

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, 2018 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, rate of compensation increases, 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. In 2018, the Company funded $298, of which $72 was contributed to its U.S. plans in excess of the minimum required under the Employee Retirement Income Security Act (ERISA). The estimates reported in the preceding table include amounts sufficient to meet the minimum required, along with a $34 contribution in 2019 related to an agreement with the Pension Benefit Guaranty Corporation (PBGC) (see Note G to the Consolidated Financial Statements in Part II, Item 8. (Financial Statements and Supplementary Data) of this Form 10-K). Arconic has determined that it is not practicable to present pension funding and other postretirement benefit payments beyond 2023 and 2028, respectively.

Layoff and other restructuring payments to be paid within one year primarily relate to severance costs, special layoff benefit payments, and lease termination costs, while payments expected to be paid over the next several years relate to lease termination costs.

Deferred revenue arrangements require Arconic to deliver product to a customer over the specified contract period through 2020 for a sheet and plate contract. 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.

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

Obligations for Financing Activities

Arconic has historically paid quarterly dividends on its preferred and common stock. Including dividends on preferred stock, Arconic paid $119 in dividends to shareholders during 2018. 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, 2018, there were 483,270,717 shares of outstanding common stock and 546,024 shares of outstanding Class A preferred stock. In 2018, the annual preferred stock dividend was $3.75 per share and the annual common stock dividend was $0.24 per share.

Obligations for Investing Activities

Capital projects in the preceding table only include amounts approved by management as of December 31, 2018. Funding levels may vary in future years based on anticipated construction schedules of the projects. It is expected that significant expansion projects will be funded through various sources, including cash provided from operations. Total capital expenditures are anticipated to be approximately $700 in 2019.

Off-Balance Sheet Arrangements

At December 31, 2018, Arconic has 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 2019 and 2026 was $37 at December 31, 2018.

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 $6 and $8 at December 31, 2018 and 2017, respectively, and were included in Other noncurrent liabilities and deferred credits on the accompanying Consolidated Balance Sheet. Arconic was required to provide payment guarantees for Alcoa Corporation issued on behalf of a third party related to project financing for Alcoa Corporation's aluminum complex in Saudi Arabia. During the third quarter of 2018, Arconic was released from this guarantee. 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 $1,087 and $1,297 at December 31, 2018 and December 31, 2017, 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 2016, Arconic entered into a one-year claims purchase agreement with a bank covering claims up to $245 related to the Saudi Arabian joint venture and two long-term energy supply agreements. The majority of the premium was paid by Alcoa Corporation. The agreement matured in December 2017 and was not renewed in 2018 due to the decline in exposure to guarantee claims including a substantial reduction in the guarantees related to the Saudi Arabian joint venture and also the elimination of the guarantee related to the Rockdale energy contract. In December 2018, 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 2019, was $136 at December 31, 2018.

Pursuant to the Separation and Distribution Agreement, Arconic was required to retain letters of credit of $54 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 2019, was $50 at December 31, 2018.

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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 $25 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 revenues, are expensed. Liabilities are recorded when remediation costs are probable and can be reasonably estimated. The liability may include costs such as site investigations, consultant fees, feasibility studies, outside contractors, and monitoring expenses. Estimates are generally not discounted or reduced by potential claims for recovery. 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. Arconic had six reporting units for 2018, of which three were included in the Engineered Products and Solutions segment (Arconic Fastening Systems, Arconic Engines, Arconic Engineered Structures), two were included in the Transportation and Construction Solutions segment (Arconic Wheel and Transportation Products and Building and Construction Systems), and the remaining reporting unit was the Global Rolled Products segment.
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.

During the 2018 annual review of goodwill, management proceeded directly to the quantitative impairment test for all six of its reporting units. The estimated fair values for each of the six reporting units exceeded their respective carrying values by more than 25%, 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 model (DCF) 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.

Goodwill impairment tests in 2017 and 2016 indicated that goodwill was not impaired for any of the Company's reporting units, except for the Arconic Forgings and Extrusions (AFE) business 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. The decrease in the AFE fair value 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 calculated as the excess of the carrying value of the assets (asset group) over their fair value, with fair value determined using the best information available, which generally is a DCF model. The determination of what constitutes an asset group, the associated estimated undiscounted net cash flows, and the estimated useful lives of assets also require significant judgments.

In 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 operations, an asset group within the AEN business unit. 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 operations, resulting in an estimated fair value in excess of their carrying value of approximately 13%; thus, there was no impairment. If the disks operations do not achieve the revised forecasted financial performance or if there are changes in any significant assumptions, a material non-cash impairment of long-lived assets may occur in future periods. These significant assumptions include sales growth, cost of raw materials, ramp up of additional production capacity, and working capital. A 1% decrease in the forecasted net cash flows would reduce the undiscounted cash flows by approximately $6. There were no

indicators of impairment identified for the disks operations during the third or fourth quarters of 2018 and, as such, the Company did not evaluate the recoverability of its long-lived assets.
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.

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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 (salary increases, health care cost trend rates, retirement age, and mortality).
The interest rate used to discount future estimated liabilities is determined using a Company-specific yield curve model (above-median) developed with the assistance of an external actuary. The cash flows of the plans' projected benefit obligations are discounted using a single equivalent rate derived from yields on high quality corporate bonds, which represent a broad diversification of issuers in various sectors, 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 2018, 2017, and 2016, the discount rate used to determine benefit obligations for U.S. pension and other postretirement benefit plans was 4.35%, 3.75%, and 4.20%, respectively. The impact on the liabilities of a change in the discount rate of 1/4 of 1% would be approximately $170 and either a charge or credit of approximately $2 to after-tax earnings in the following year.
In conjunction with the annual measurement of the funded status of Arconic's pension and other postretirement benefit plans at December 31, 2015, management elected to change the manner in which the interest cost component of net periodic benefit cost will be determined in 2016 and beyond. Previously, the interest cost component was determined by multiplying the single equivalent rate described above and the aggregate discounted cash flows of the plans' projected benefit obligations. Under the new methodology, the interest cost component will be determined by aggregating the product of the discounted cash flows of the plans' projected benefit obligations for each year and an individual spot rate (referred to as the "spot rate" approach). This change resulted in a lower interest cost component of net periodic benefit cost under the new methodology compared to the previous methodology in 2018, 2017, and 2016 of $24, $34, and $84, respectively, for pension plans and $4, $6, and $14, respectively, for other postretirement benefit plans. Management believes this new methodology, which represents a change in an accounting estimate, is a better measure of the interest cost as each year's cash flows are specifically linked to the interest rates of bond payments in the same respective 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 2018, 2017, and 2016, management used 7.00%, 7.75%, 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 2019, 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 $10 for 2019.
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 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. In 2016, a net benefit of $1,601 (after-tax and noncontrolling interest) was

recorded in other comprehensive loss, primarily due to the transfer of $2,080 to Alcoa Corporation which was partially offset by a net charge of $479. The charge was due to the unfavorable performance of the plan assets and a 9 basis point decrease in the discount rate, 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.

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Compensation expense recorded in 2018, 2017, and 2016 was $50 ($39 after-tax), $54 ($36 after-tax), and $76 ($51 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 supports 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.

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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, 2018, 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, 2018 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

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Report of Independent Registered Public Accounting Firm

To the Shareholders and Board of Directors of Arconic Inc.

Opinions on the Financial Statements and Internal Control over Financial Reporting

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

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

Basis for Opinions

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

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

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

Definition and Limitations of Internal Control over Financial Reporting

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

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

/s/ PricewaterhouseCoopers LLP
Pittsburgh, Pennsylvania
February 21, 2019
We have served as the Company’s auditor since 1950.

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

For the year ended December 31,	2018	2017	2016
Sales (B and C)	$14,014	$12,960	$12,394
Cost of goods sold (exclusive of expenses below)	11,397	10,221	9,696
Selling, general administrative, and other expenses	604	715	924
Research and development expenses	103	109	130
Provision for depreciation and amortization	576	551	535
Impairment of goodwill (A and O)	—	719	—
Restructuring and other charges (D)	9	165	155
Operating income	1,325	480	954
Interest expense (E)	378	496	499
Other expense (income), net (F)	79	(486)	41
Income from continuing operations before income taxes	868	470	414
Provision for income taxes (H)	226	544	1,476
Income (loss) from continuing operations after income taxes	642	(74)	(1,062)
Income from discontinued operations after income taxes (V)	—	—	184
Net income (loss)	642	(74)	(878)
Less: Net income from discontinued operations attributable to noncontrolling interests (V)	—	—	63
Net income (loss) Attributable to Arconic	$642	$(74)	$(941)
Amounts Attributable to Arconic Common Shareholders (J):			
Net income (loss)	$651	$(127)	$(1,010)
Earnings (loss) per share—basic:			
Continuing operations	$1.33	$(0.28)	$(2.58)
Discontinued operations	—	—	0.27
Net earnings (loss) per share-basic	$1.33	$(0.28)	$(2.31)
Earnings (loss) per share—diluted			
Continuing operations	$1.30	$(0.28)	$(2.58)
Discontinued operations	—	—	0.27
Net earnings (loss) per share-diluted	$1.30	$(0.28)	$(2.31)

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

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

	Arconic			Noncontrolling Interests			Total		
For the year ended December 31,	2018	2017	2016	2018	2017	2016	2018	2017	2016
Net income (loss)	$642	$(74)	$(941)	$—	$—	$63	$642	$(74)	$(878)
Other comprehensive income (loss), net of tax (K):									
Change in unrecognized net actuarial loss and prior service cost/benefit related to pension and other postretirement benefits	255	(220)	(479)	—	—	(3)	255	(220)	(482)
Foreign currency translation adjustments	(146)	252	268	—	2	182	(146)	254	450
Net change in unrealized gains on available-for-sale securities	(1)	(134)	137	—	—	—	(1)	(134)	137
Net change in unrecognized gains/losses on cash flow hedges	(23)	26	(617)	—	—	5	(23)	26	(612)
Total Other comprehensive income (loss), net of tax	85	(76)	(691)	—	2	184	85	(74)	(507)
Comprehensive income (loss)	$727	$(150)	$(1,632)	$—	$2	$247	$727	$(148)	$(1,385)

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

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Arconic and subsidiaries
Consolidated Balance Sheet
(in millions)

December 31,	2018	2017
Assets		
Current assets:		
Cash and cash equivalents	2,277	$2,150
Receivables from customers, less allowances of $4 in 2018 and $8 in 2017 (L)	1,047	1,035
Other receivables (L)	451	339
Inventories (M)	2,492	2,480
Prepaid expenses and other current assets	314	374
Total current assets	6,581	6,378
Properties, plants, and equipment, net (N)	5,704	5,594
Goodwill (A and O)	4,500	4,535
Deferred income taxes (H)	573	743
Intangibles, net (O)	919	987
Other noncurrent assets	416	481
Total assets	$18,693	$18,718
Liabilities		
Current liabilities:		
Accounts payable, trade	2,129	$1,839
Accrued compensation and retirement costs	370	399
Taxes, including income taxes	118	75
Accrued interest payable	113	124
Other current liabilities	356	349
Short-term debt (P and R)	434	38
Total current liabilities	3,520	2,824
Long-term debt, less amount due within one year (P and R)	5,896	6,806
Accrued pension benefits (G)	2,230	2,564
Accrued other postretirement benefits (G)	723	841
Other noncurrent liabilities and deferred credits (Q)	739	759
Total liabilities	13,108	13,794
Contingencies and commitments (U)		
Equity		
Arconic shareholders' equity:		
Preferred stock (I)	55	55
Common stock (I)	483	481
Additional capital	8,319	8,266
Accumulated deficit (A)	(358)	(1,248)
Accumulated other comprehensive loss (A and K)	(2,926)	(2,644)
Total Arconic shareholders' equity	5,573	4,910
Noncontrolling interests	12	14
Total equity	5,585	4,924
Total liabilities and equity	$18,693	$18,718

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

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

For the year ended December 31,	2018	2017	2016
Operating activities			
Net income (loss)	$642	$(74)	$(878)
Adjustments to reconcile net income (loss) to cash provided from (used for) operations:			
Depreciation and amortization	576	551	1,132
Deferred income taxes	31	434	1,125
Equity income, net of dividends	—	—	42
Impairment of goodwill (A and O)	—	719	—
Restructuring and other charges	9	165	257
Net loss (gain) from investing activities - asset sales	10	(513)	(156)
Net periodic pension benefit cost (G)	130	217	304
Stock-based compensation	50	67	86
Other	75	112	63
Changes in assets and liabilities, excluding effects of acquisitions, divestitures, and foreign currency translation adjustments:			
(Increase) in receivables (A)	(1,142)	(915)	(1,016)
(Increase) in inventories	(74)	(192)	(29)
(Increase) decrease in prepaid expenses and other current assets	(1)	11	(76)
Increase in accounts payable, trade	339	62	232
(Decrease) in accrued expenses	(190)	(116)	(394)
Increase (decrease) in taxes, including income taxes	104	(23)	93
Pension contributions	(298)	(310)	(290)
(Increase) in noncurrent assets	(20)	(41)	(152)
(Decrease) in noncurrent liabilities	(24)	(193)	(248)
Cash provided from (used for) operations	217	(39)	95
Financing Activities			
Net change in short-term borrowings (original maturities of three months or less)	(7)	(2)	(3)
Additions to debt (original maturities greater than three months) (P)	600	816	1,962
Payments on debt (original maturities greater than three months) (P)	(1,103)	(1,634)	(2,734)
Premiums paid on early redemption of debt (A and P)	(17)	(52)	(3)
Proceeds from exercise of employee stock options	16	50	4
Dividends paid to shareholders	(119)	(162)	(228)
Distributions to noncontrolling interests	—	(14)	(226)
Contributions from noncontrolling interests	—	—	51
Net cash transferred from Alcoa Corporation at separation	—	—	421
Other	(19)	(17)	(1)
Cash used for financing activities	(649)	(1,015)	(757)
Investing Activities			
Capital expenditures	(768)	(596)	(1,125)
Acquisitions, net of cash acquired (S)	—	—	10
Proceeds from the sale of assets and businesses (S)	309	(9)	692
Sales of investments (S and V)	9	890	280
Cash receipts from sold receivables (A and L)	1,016	792	778
Other (V)	(1)	243	(44)
Cash provided from investing activities	565	1,320	591
Effect of exchange rate changes on cash, cash equivalents and restricted cash	(4)	9	(8)

Net change in cash, cash equivalents and restricted cash (A)	129	275	(79)
Cash, cash equivalents and restricted cash at beginning of year (A)	2,153	1,878	1,957
Cash, cash equivalents and restricted cash at end of year (A)	$2,282	$2,153	$1,878

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 (deficit)	Treasury stock	Accumulated Other Comprehensive Loss	Noncontrolling interests	Total equity
Balance at December 31, 2015	$55	$ 3	$1,391	$10,019	$8,834	$(2,825)	$ (5,431)	$ 2,085	$14,131
Net (loss) income	—	—	—	—	(941)	—	—	63	(878)
Other comprehensive (loss) income (K)	—	—	—	—	—	—	(691)	184	(507)
Cash dividends declared:									
Preferred–Class A @ $3.75 per share	—	—	—	—	(2)	—	—	—	(2)
Preferred–Class B @ $26.8750 per share	—	—	—	—	(67)	—	—	—	(67)
Common @ $0.36 per share	—	—	—	—	(159)	—	—	—	(159)
Stock-based compensation (I)	—	—	—	86	—	—	—	—	86
Common stock issued: compensation plans (I)	—	—	—	(205)	—	186	—	—	(19)
Retirement of Treasury stock (I)			(76)	(2,563)		2,639			—
Reverse stock split (I)			(877)	877					—
Distribution of Alcoa Corporation					(8,692)		3,554	(2,133)	(7,271)
Distributions	—	—	—	—	—	—	—	(226)	(226)
Contributions	—	—	—	—	—	—	—	51	51
Other	—	—	—	—	—	—	—	2	2
Balance at December 31, 2016	$55	$ 3	$438	$8,214	$(1,027)	$—	$ (2,568)	$ 26	$5,141
Net loss	—	—	—	—	(74)	—	—	—	(74)
Other comprehensive loss (K)	—	—	—	—	—	—	(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 (I)	—	—	—	67	—	—	—	—	67
Common stock issued: compensation plans (I)	—	—	—	21	—	—	—	—	21
Conversion of mandatory convertible preferred stock (I)	—	(3)	39	(36)	—	—	—	—	—
Issuance of common stock (I)	—	—	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 (K)	—	—	—	—	—	—	85	—	85
Cash dividends declared:									
Preferred–Class A @ $3.75 per share	—	—	—	—	(2)	—	—	—	(2)
Common @ $0.24 per share	—	—	—	—	(117)	—	—	—	(117)
Stock-based compensation (I)	—	—	—	50	—	—	—	—	50
Common stock issued: compensation plans (I)	—	—	2	3	—	—	—	—	5
Other	—	—	—	—	—	—	—	(2)	(2)
Balance at December 31, 2018	$55	$ —	$483	$8,319	$(358)	$—	$ (2,926)	$ 12	$5,585

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

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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 revenues 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 below and Note C)
On January 1, 2018, Arconic adopted new guidance issued by the Financial Accounting Standards Board (FASB) related to the following: presentation of net periodic pension cost and net periodic postretirement benefit cost that required a reclassification of costs within the Statement of Consolidated Operations; presentation of certain cash receipts and cash payments within the Statement of Consolidated Cash Flows that required a reclassification of amounts between operating and either financing or investing activities; the classification of restricted cash within the Statement of Consolidated Cash Flows; and the reclassification from Accumulated other comprehensive loss to Accumulated deficit in the Consolidated Balance Sheet of stranded tax effects resulting from the Tax Cuts and Jobs Act enacted on December 22, 2017. See Recently Adopted Accounting Guidance below for further details.
Also on January 1, 2018, the Company changed its primary measure of segment performance from Adjusted earnings before interest, tax, depreciation and amortization ("Adjusted EBITDA") to Segment operating profit, which more closely aligns segment performance with Operating income as presented in the Statement of Consolidated Operations. See Note C for further details.
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 Transaction"). The financial results of Alcoa Corporation for 2016 have been retrospectively reflected in the Statement of Consolidated Operations as discontinued operations and, as such, have been excluded from continuing operations and segment results for 2016. The cash flows and comprehensive income related to Alcoa Corporation have not been segregated and are included in the Statement of Consolidated Cash Flows and Statement of Consolidated Comprehensive Income (Loss), respectively, for 2016. See Note V for additional information related to the Separation Transaction and discontinued operations.
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 are accounted for on the cost method.
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 Solutions	29	17

Global Rolled Products	31	21
Transportation and Construction Solutions	27	18

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 calculated as the excess of the carrying value of the assets (asset group) over their fair value, with fair value determined using the best information available, which generally is a discounted cash flow (DCF) model. The determination of what constitutes an asset group, the associated estimated undiscounted net cash flows, and the estimated useful lives of the assets also require significant judgments. See Note N 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. Arconic had eight reporting units for 2017 and 2016, of which four were included in the Engineered Products and Solutions segment (Arconic Fastening Systems and Rings, Arconic Power and Propulsion, Arconic Forgings and Extrusions, and Arconic Titanium and Engineered Products), three were included in the Transportation and Construction Solutions segment (Arconic Wheel and Transportation Products, Building and Construction Systems, and Latin America Extrusions), and the remaining reporting unit was the Global Rolled Products segment.

In January 2018, management changed the organizational structure of the businesses in the Engineered Products and Solutions segment from four business units to three business units with a focus on aligning its internal structure to core markets and customers and reducing cost. As a result, management assessed and concluded that each of the three new business units (Arconic Fastening Systems (AFS), Arconic Engines (AEN), and Arconic Engineered Structures (AES)) represent reporting units for goodwill impairment evaluation purposes. Goodwill was reallocated to the three new reporting units and both the historical and new Engineered Products and Solutions reporting units were evaluated for impairment during the first quarter of 2018. The estimated fair value of each reporting unit substantially exceeded its carrying value; thus, there was no goodwill impairment. In April 2018, Arconic completed the sale of its Latin America extrusions business and, therefore, it is no longer a reporting unit for the Company. More than 90% of Arconic's total goodwill at December 31, 2018 was allocated to the three Engineered Products and Solutions reporting units: AEN ($2,065), AFS ($1,607), and AES ($507).

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 2018 annual review of goodwill, management proceeded directly to the quantitative impairment test for all six of its reporting units. The estimated fair values for each of the six reporting units exceeded their respective carrying values by more than 25%, 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

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discounted cash flow model (DCF) 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 connection with the interim impairment evaluation of long-lived assets for the disks operations (an asset group within the AEN business unit) 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 the AEN reporting unit. 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 2017 and 2016 indicated that goodwill was not impaired for any of the Company's reporting units, except for the Arconic Forgings and Extrusions (AFE) business 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. The decrease in the AFE fair value 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 Solutions	5	33
Global Rolled Products	5	9
Transportation and Construction Solutions	5	16

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. The Company's objective is to have net 30-day terms. 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.

Environmental Matters. Expenditures for current operations are expensed or capitalized, as appropriate. Expenditures relating to existing conditions caused by past operations, which will not contribute to future revenues, are expensed. Liabilities are recorded when remediation costs are probable and can be reasonably estimated. The liability may include costs such as site investigations, consultant fees, feasibility studies, outside contractors, and monitoring expenses. Estimates are generally not discounted or reduced by potential claims for recovery. 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

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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.

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.

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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 are 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 are 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 May 2014, the FASB issued changes to the recognition of revenue from contracts with customers. These changes created a comprehensive framework for all entities in all industries to apply in the determination of when to recognize revenue and, therefore, supersede virtually all existing revenue recognition requirements and guidance. This framework is expected to result in less complex guidance in application while providing a consistent and comparable methodology for revenue recognition. The core principle of the guidance is that an entity should recognize revenue to depict the transfer of promised goods or services to customers in an amount that reflects the consideration to which the entity expects to be entitled in exchange for those goods or services. To achieve this principle, an entity should apply the following steps: (i) identify the contract(s) with a customer, (ii) identify the performance obligations in the contract(s), (iii) determine the transaction price, (iv) allocate the transaction price to the performance obligations in the contract(s), and (v) recognize revenue when, or as, the entity satisfies a performance obligation. These changes became effective for Arconic on January 1, 2018. Arconic adopted this new guidance using the modified retrospective transition approach applied to those contracts that were not completed as of January 1, 2018. There was no cumulative effect adjustment to the opening balance of retained earnings in the Consolidated Balance Sheet in 2018, as the adoption did not result in a change to our timing of revenue recognition, which continues to be at a point in time. See the Revenue Recognition policy above.

In January 2016, the FASB issued changes to equity investments. These changes require equity investments (except those accounted for under the equity method of accounting or those that result in consolidation of the investee) to be measured at fair value with changes in fair value recognized in net income. However, an entity may choose to measure equity investments that do not have readily determinable fair values using the measurement alternative of cost minus impairment, if any, plus or minus changes resulting from observable price changes in orderly transactions for the identical or similar investment of the same issuer. Also, the impairment assessment of equity investments without readily determinable fair values has been simplified by requiring a qualitative assessment to identify impairment. Also, the new guidance required changes in fair value of equity securities to be recognized immediately as a component of net income instead of being reported in accumulated other comprehensive loss until the gain (loss) is realized. These changes became effective for Arconic on January 1, 2018 and have been applied on a prospective basis. Arconic elected the measurement alternative for its equity investments that do not have readily determinable fair values. The adoption of this guidance did not have a material impact on the Consolidated Financial Statements.

In August 2016, the FASB issued changes to the classification of certain cash receipts and cash payments within the statement of cash flows. The guidance identifies eight specific cash flow items and the sections where they must be presented within the statement of cash flows. These changes became effective for Arconic on January 1, 2018 and have been be applied retrospectively. As a result of the adoption, Arconic reclassified cash received related to beneficial interest in previously transferred trade accounts receivable from operating activities to investing activities in the Statement of Consolidated Cash Flows. This new accounting standard does not reflect a change in our underlying business or activities. The reclassification of cash received related to beneficial interest in previously transferred trade accounts receivable was $792 and $778 for 2017 and

2016, respectively. In addition, Arconic reclassified $52 and $3 of cash paid for debt prepayments including extinguishment costs from operating activities to financing activities for 2017 and 2016, respectively.

In November 2016, the FASB issued changes to the classification of cash and cash equivalents within the statement of cash flow. Restricted cash and cash equivalents will be included within the cash and cash equivalents line on the cash flow statement and a reconciliation must be prepared to the statement of financial position. Transfers between restricted cash and cash equivalents and cash and cash equivalents will no longer be presented as cash flow activities in the Statement of Consolidated Cash Flows and for material balances of restricted cash and cash equivalents, Arconic will disclose information regarding the nature of the restrictions. These changes became effective for Arconic on January 1, 2018 and have been applied retrospectively. Management has determined that the adoption of this guidance did not have a material impact on the Statement of Consolidated Cash Flows. Restricted cash was $6, $4, and $15 in 2018, 2017, and 2016, respectively.

In March 2017, the FASB issued changes to the presentation of net periodic pension cost and net periodic postretirement benefit cost. The new guidance requires registrants to present the service cost component of net periodic benefit cost in the same income statement line item or items as other employee compensation costs arising from services rendered during the period. Also, only the service cost component will be eligible for asset capitalization. Registrants will present the other components of net periodic benefit cost separately from the service cost component; and, the line item or items used in the income statement to present the other components of net periodic benefit cost must be disclosed. These changes became effective for Arconic on January 1, 2018 and were adopted retrospectively for the presentation of the service cost component and the other components of net periodic benefit cost in the Statement of Consolidated Operations, and prospectively for the asset capitalization of the service cost component of net periodic benefit cost. The Company recorded the service related net periodic benefit cost within Cost of goods sold, Selling, general administrative, and other expenses and Research and development expenses and recorded the non-service related net periodic benefit cost (except for the curtailment cost which was recorded in Restructuring and other charges) separately from service cost in Other expense (income), net within the Statement of Consolidated Operations. The impact of the retrospective adoption of this guidance was an increase to consolidated Operating income of $154 and $135, while there was no impact to consolidated Net income, for 2017 and 2016, respectively.

In May 2017, the FASB issued clarification to guidance on the modification accounting criteria for share-based payment awards. The new guidance requires registrants to apply modification accounting unless three specific criteria are met. The three criteria are 1) the fair value of the award is the same before and after the modification, 2) the vesting conditions are the same before and after the modification and 3) the classification as a debt or equity award is the same before and after the modification. These changes became effective for Arconic on January 1, 2018 and were applied prospectively to new awards modified after adoption. The adoption of this guidance did not have a material impact on the Consolidated Financial Statements.

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 Accumulated deficit in its Consolidated Balance Sheet and Statement of Changes in Consolidated Equity.

In August 2018, the FASB issued guidance which requires cloud computing arrangement implementation costs to be accounted for in accordance with the software stage model, regardless of whether or not the cloud computing arrangement contains a license. Arconic adopted this guidance in the third quarter of 2018. The adoption of this guidance did not have a material impact on the Consolidated Financial Statements.

Also, in August 2018, the Securities and Exchange Commission (SEC) issued guidance to eliminate or modify certain disclosure requirements that have become redundant, overlapping, outdated or superseded in light of other SEC rules, GAAP or changes in the information environment. This guidance became effective on November 5, 2018 and will be applied to filings thereafter. The adoption of this guidance did not have a material impact on the Consolidated

Financial Statements.

Recently Issued Accounting Guidance. In February 2016, the 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 for all leases with terms longer than 12 months. For leases with a term of 12 months or less, a lessee is permitted to make an accounting policy election by class of underlying asset not to recognize a right of use asset and lease liability. Also, when measuring assets and liabilities arising from a lease, optional payments should be included only if the lessee is reasonably certain to exercise an option to extend the lease, exercise a purchase option, or not exercise an option to terminate the lease. As originally released, the standards update required application at the beginning of the earliest comparative period presented at the time of adoption. However, in July 2018, the FASB provided entities the option to instead apply the provisions of the new leases guidance at the effective date, without adjusting the comparative periods presented. The Company expects to apply the provisions of the new

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leases guidance at the effective date, without adjusting the comparative periods presented. These changes became effective for Arconic on January 1, 2019.

Arconic's current operating lease portfolio is primarily comprised of land and buildings, plant equipment, vehicles, and computer equipment. A cross-functional implementation team has determined the scope of arrangements that will be subject to this standard and continues to assess the impact to the Company's systems, processes and internal controls. Arconic has contracted with a third-party vendor to implement a software solution. Concurrently, Arconic has been compiling and uploading lease data into the software solution to account for leases under the new standard. Management continues to evaluate the impact of these changes on the Consolidated Balance Sheet, which will require right of use assets and lease liabilities be recorded for operating leases. Arconic anticipates the impact of adoption on January 1, 2019 will result in a right of use asset and total lease liability related to operating leases in the range of $300 to $340, while the accounting for capital leases will remain unchanged. The adoption is not expected to have a material impact on the Statement of Consolidated Operations or Statement of Consolidated Cash Flows.

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

In August 2017, the FASB issued guidance that will make more financial and nonfinancial hedging strategies eligible for hedge accounting. It also amends the presentation and disclosure requirements and changes 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 and net investment hedges existing at the date of adoption, Arconic will apply a cumulative-effect adjustment related to eliminating the separate measurement of ineffectiveness to Accumulated other comprehensive loss with a corresponding adjustment to the opening balance of Accumulated deficit as of the beginning of the fiscal year in which the amendment is adopted. The amended presentation and disclosure guidance is required only prospectively. Arconic has engaged a third-party consultant to assist with a review of the Company's risk management and hedging strategies, with any changes to be implemented in conjunction with the adoption of the new guidance. Under the new guidance, Management expects to utilize cash flow hedge accounting of its variable priced purchases and sales. Management determined that the adoption of this guidance will 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. 20.

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B. Revenue from Contracts with Customers

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 Solutions	Global Rolled Products	Transportation and Construction Solutions	Total Segment
2018				
Aerospace	$ 4,947	$ 891	$ —	$ 5,838
Transportation	440	2,443	969	3,852
Building and construction	—	217	1,150	1,367
Industrial and Other	929	2,053	7	2,989
Total end-market revenue	$ 6,316	$ 5,604	$ 2,126	$ 14,046
2017				
Aerospace	$ 4,572	$ 883	$ —	$ 5,455
Transportation	383	1,981	805	3,169
Building and construction	—	204	1,113	1,317
Industrial and Other	988	1,932	93	3,013
Total end-market revenue	$ 5,943	$ 5,000	$ 2,011	$ 12,954
2016				
Aerospace	$ 4,358	$ 942	$ —	$ 5,300
Transportation	347	1,577	708	2,632
Building and construction	—	200	1,060	1,260
Industrial and Other	1,023	2,146	34	3,203
Total end-market revenue	$ 5,728	$ 4,865	$ 1,802	$ 12,395

C. 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 segments are organized by product on a worldwide basis. In the first quarter of 2018, the Company changed its primary measure of segment performance from Adjusted earnings before interest, tax, depreciation, and amortization ("Adjusted EBITDA") to Segment operating profit, which more closely aligns segment performance with Operating income as presented in the Statement of Consolidated Operations. 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 also includes certain items that, under the previous segment performance measure, were recorded in Corporate, such as the impact of LIFO inventory accounting, metal price lag, intersegment profit eliminations, and derivative activities. Segment operating profit may not be comparable to similarly titled measures of other companies. Differences between segment totals and consolidated Arconic are in Corporate. 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.

Arconic's operations consist of three worldwide reportable segments as follows:

Engineered Products and Solutions. 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 (titanium, steel, and nickel superalloys); seamless rolled rings (mostly nickel superalloys); investment castings (nickel superalloys, titanium, and aluminum), including airfoils and forged jet engine components (e.g., jet engine disks); and extruded,

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machined and formed aircraft parts (titanium and aluminum), all of which are sold directly to customers and through distributors. More than 75% of the third-party sales in this segment are from the aerospace end market. A small part of this segment also produces various forged, extruded, and machined metal products (titanium, aluminum and steel) for the oil and gas, automotive, and land and sea defense end markets. Seasonal decreases in sales are generally experienced in the third quarter of the year due to the European summer slowdown across all end markets.

Global Rolled Products. This segment produces aluminum sheet and plate for a variety of end markets. Sheet and plate is sold directly to customers and through distributors related to the aerospace, automotive, commercial transportation, packaging, building and construction, and industrial products (mainly used in the production of machinery and equipment and consumer durables) end markets. A small portion of this segment also produces aseptic foil for the packaging end market. 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.

Transportation and Construction Solutions. This segment produces products that are used mostly in the commercial transportation and nonresidential building and construction end markets. Such products include integrated aluminum structural systems, architectural extrusions, and forged aluminum commercial vehicle wheels, which are sold both directly to customers and through distributors. A small part of this segment also produces aluminum products for the industrial products end market.

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

	Engineered Products and Solutions	Global Rolled Products	Transportation and Construction Solutions	Total
2018				
Sales:				
Third-party sales	$ 6,316	$ 5,604	$ 2,126	$ 14,046
Intersegment sales	—	160	—	160
Total sales	$ 6,316	$ 5,764	$ 2,126	$ 14,206
Profit and loss:				
Segment operating profit	$ 891	$ 386	$ 304	$ 1,581
Restructuring and other charges	71	(156)	1	(84)
Provision for depreciation and amortization	282	212	50	544
2017				
Sales:				
Third-party sales	$ 5,943	$ 5,000	$ 2,011	$ 12,954
Intersegment sales	—	148	—	148
Total sales	$ 5,943	$ 5,148	$ 2,011	$ 13,102
Profit and loss:				
Segment operating profit	$ 964	$ 424	$ 290	$ 1,678
Restructuring and other charges	30	72	52	154
Provision for depreciation and amortization	268	205	50	523
2016				
Sales:				
Third-party sales	$ 5,728	$ 4,865	$ 1,802	$ 12,395
Intersegment sales	—	118	—	118
Total sales	$ 5,728	$ 4,983	$ 1,802	$ 12,513
Profit and loss:				
Segment operating profit	$ 955	$ 421	$ 246	$ 1,622
Restructuring and other charges	78	40	14	132
Provision for depreciation and amortization	255	201	48	504
2018				
Assets:				
Capital expenditures	$ 349	$ 255	$ 111	$ 715
Goodwill	4,179	245	76	4,500
Total assets	10,346	3,934	1,089	15,369
2017				
Assets:				
Capital expenditures	$ 308	$ 178	$ 57	$ 543
Goodwill	4,205	252	78	4,535
Total assets	10,325	3,955	1,041	15,321

The following tables reconcile certain segment information to consolidated totals:

For the year ended December 31,	2018	2017	2016
Sales:			
Total segment sales	$ 14,206	$ 13,102	$ 12,513
Elimination of intersegment sales	(160)	(148)	(118)
Corporate	(32)	6	(1)
Consolidated sales	$ 14,014	$ 12,960	$ 12,394

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For the year ended December 31,	2018	2017	2016
Total segment operating profit	$1,581	$1,678	$1,622
Unallocated amounts:			
Impairment of goodwill	—	(719)	—
Restructuring and other charges	(9)	(165)	(155)
Corporate expense	(247)	(314)	(513)
Consolidated operating income	$1,325	$480	$954
Interest expense	(378)	(496)	(499)
Other (expense) income, net	(79)	486	(41)
Consolidated income before income taxes	$868	$470	$414

December 31,	2018	2017
Assets:		
Total segment assets	$15,369	$15,321
Unallocated amounts:		
Cash and cash equivalents	2,277	2,150
Deferred income taxes	573	743
Corporate fixed assets, net	305	310
Fair value of derivative contracts	37	91
Other	132	103
Consolidated assets	$18,693	$18,718

Sales by major product grouping were as follows:

For the year ended December 31,	2018	2017	2016
Sales:			
Innovative flat-rolled products	$5,588	$4,992	$4,864
Engines	2,940	2,708	2,560
Engineered structures	1,839	1,743	1,683
Fastening systems	1,531	1,484	1,463
Architectural aluminum systems	1,140	1,065	1,010
Aluminum wheels	969	805	689
Other	7	163	125
	$14,014	$12,960	$12,394

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

For the year ended December 31,	2018	2017	2016
Sales:			
United States	$9,137	$8,167	$7,823
France	936	965	930
Hungary	823	739	619
United Kingdom	737	721	711
China	632	615	582
Russia	553	500	433
Germany	302	309	284
Canada	285	261	262
Brazil	214	285	250
Japan	170	141	145
Other	225	257	355
	$14,014	$12,960	$12,394

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

December 31,	2018	2017
Long-lived assets:		
United States	$4,148	$4,005
China	326	347
Hungary	257	227
Russia	253	276
United Kingdom	253	259
France	163	159
Germany	84	88
Canada	61	63
Brazil	54	62
Other	105	108
	$5,704	$5,594

D. Restructuring and Other Charges

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

	2018	2017	2016
Asset impairments	$13	$58	$80
Layoff costs	20	64	68
Pension and Other postretirement benefits - net settlement and curtailment charges	91	—	2
Net (gain) loss on divestitures of assets and businesses (T)	(109)	57	3
Other	13	(3)	27
Reversals of previously recorded layoff costs	(19)	(11)	(25)
Restructuring and other charges	$9	$165	$155

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

2018 Actions. In 2018, 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 Eger, Hungary forgings business of $43 ($39 after-tax) (see note T); 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 G); and a charge of $20 ($17 after-tax) for layoff costs, including the separation of approximately 125 employees (89 in the Engineered Products and Solutions 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, 2018, approximately 110 of the 125 employees were separated. The remaining separations for 2018 restructuring programs are expected to be completed by the end of 2019. In 2018, cash payments of $9 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: $69 ($47 after-tax) for layoff costs related to cost reduction initiatives including the separation of approximately 880 employees (400 in the Engineered Products and Solutions segment, 245 in the Global Rolled Products segment, 135 in the Transportation and Construction Solutions segment, and 100 in Corporate), a charge of $60 ($60 after-tax) related to the sale of the Fusina, 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 T); 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-

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tax) for other miscellaneous items; and a favorable benefit of $11 ($8 after-tax) for the reversal of a number of small layoff reserves related to prior periods.

As of December 31, 2018, approximately 570 of the 660 employees (previously 760) were separated. The total number of employees associated with 2017 restructuring programs was updated to reflect employees, who were initially identified for separation, accepting other positions within Arconic and natural attrition. The remaining separations for 2017 restructuring programs are expected to be completed by the end of 2019. In 2018 and 2017, cash payments of $34 and $28, respectively, were made against layoff reserves related to 2017 restructuring programs.

2016 Actions. In 2016, Arconic recorded Restructuring and other charges of $155 ($114 after-tax), which were comprised of the following components: $57 ($46 after-tax) for costs related to the exit of certain legacy Firth Rixson operations in the U.K.; $37 ($24 after-tax) for exit costs related to the decision to permanently shut down a can sheet facility; $20 ($14 after-tax) for costs related to the closures of five facilities, primarily in the Transportation and Construction Solutions segment and Engineered Products and Solutions segment, including the separation of approximately 280 employees; $53 ($33 after-tax) for other layoff costs, including the separation of approximately 1,315 employees (1,045 in the Engineered Products and Solutions segment, 210 in Corporate, 30 in the Global Rolled Products segment, and 30 in the Transportation and Construction Solutions segment); $11 ($8 after-tax) for other miscellaneous items, including $3 ($2 after-tax) for the sale of Remmele Medical, an RTI subsidiary; $2 ($1 after-tax) for a pension settlement; and $25 ($12 after-tax) for the reversal of a number of small layoff reserves related to prior periods.

In 2016, management made the decision to exit certain legacy Firth Rixson facilities in the U.K. Costs related to these actions included asset impairments and accelerated depreciation of $51; other exit costs of $4; and $2 for the separation of 60 employees.

Also in 2016, management approved the shutdown and demolition of the can sheet facility in Tennessee upon completion of the Toll Processing and Services Agreement with Alcoa Corporation. Costs related to this action included $21 in asset impairments; $9 in other exit costs; and $7 for the separation of 145 employees. The other exit costs of $9 represent $4 in asset retirement obligations and $3 in environmental remediation, both of which were triggered by the decision to permanently shut down and demolish the can sheet facility in Tennessee, and $2 in other exit costs.

As of December 31, 2018, the separations associated with the 2016 restructuring programs were essentially complete. In 2018, 2017, and 2016, cash payments of $4, $26, and $16, respectively, were made against layoff reserves related to 2016 restructuring programs.

Activity and reserve balances for restructuring charges were as follows:

	Layoff costs	Other exit costs	Total
Reserve balances at December 31, 2015	$ 84	$ 9	$ 93
2016			
Cash payments	(73)	(13)	(86)
Restructuring charges	70	27	97
Other[(1)]	(31)	(14)	(45)
Reserve balances at December 31, 2016	$ 50	$ 9	$ 59
2017			
Cash payments	$ (59)	$ (6)	$ (65)
Restructuring charges	64	1	65
Other[(2)]	1	(2)	(1)
Reserve balances at December 31, 2017	$ 56	$ 2	$ 58
2018			
Cash payments	$ (47)	$ (2)	$ (49)
Restructuring charges	111	13	124
Other[(3)]	(110)	2	(108)
Reserve balances at December 31, 2018	$ 10	$ 15	$ 25

(1) In 2016, Other for layoff costs included reversals of previously recorded restructuring charges of $25, effects of foreign currency translation and other of $4, and a reclassification of $2 in pension costs, as the impact was reflected in Arconic's separate liability for Accrued pension benefits. Other for other exit costs included reclassifications of $8 in asset retirement and $2 in environmental obligations, as the impacts were reflected in Arconic's separate liabilities

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for asset retirement obligations and environmental remediation, and a reclassification of $4 in legal obligations, as the impact was included in Arconic's separate liability for legal costs.

(2) 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.

(3) 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.

The remaining reserves are expected to be paid in cash during 2019, with the exception of approximately $5 to $7, which is expected to be paid over the next several years for lease termination costs.

E. Interest Cost Components

For the year ended December 31,	2018	2017	2016
Amount charged to expense	$378	$496	$499
Amount capitalized	23	22	32
	$401	$518	$531

F. Other Expense (Income), Net

For the year ended December 31,	2018	2017	2016
Non-service related net periodic benefit cost	$112	$154	$135
Interest income	(23)	(19)	(16)
Foreign currency losses (gains), net	26	(5)	(4)
Net loss (gain) from asset sales	10	(513)	11
Other, net	(46)	(103)	(85)
	$79	$(486)	$41

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 G) 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 U). 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 V) and a gain of $167 on the Debt-for-Equity Exchange (see Note V). 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 T) and an adjustment of $25 associated with a separation-related guarantee liability (see Note U). In 2016, Non-service related net periodic benefit cost included a reduction of the recognition of actuarial losses and a methodology change in the calculation of interest cost, which were partially offset by the reduction in the expected return on plan assets. In 2016, Other, net included an adjustment of $56 to the contingent earn-out liability and a post-closing adjustment of $20, both related to the acquisition of Firth Rixson.

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G. 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, job grade, and remuneration. Substantially all benefits are paid through pension trusts that are sufficiently funded to ensure that all plans can pay benefits to retirees as they become due. Most salaried and non-bargaining hourly U.S. employees hired after March 1, 2006 participate in a defined contribution plan instead of a defined benefit plan.

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.

In the first quarter of 2018, the Company announced that, effective 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 the first quarter of 2018, the Company recorded a decrease to the Accrued pension benefits 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 will cease. As result of these changes, a curtailment charge of $9 was recorded in Restructuring and other charges in the second quarter of 2018.

In the third quarter of 2018, the Company announced that effective December 31, 2018, it will 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 the third quarter of 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 the fourth quarter, 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 the third and fourth quarters of 2018, settlement accounting applied to certain U.S. pension plans due to lump sum payments to participants, resulting in settlement charges of $96 that were recorded in Restructuring and other charges.

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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,	2018	2017	2018	2017
Change in benefit obligation				
Benefit obligation at beginning of year	$7,359	$7,026	$ 927	$ 980
Service cost	46	90	7	7
Interest cost	219	234	28	30
Amendments	18	1	(25)	—
Actuarial (gains) losses	(372)	311	(51)	1
Settlements	(146)	—	—	—
Curtailments	(154)	—	—	—
Benefits paid	(422)	(425)	(86)	(98)
Medicare Part D subsidy receipts	—	—	6	7
Foreign currency translation impact	(72)	122	—	—
Benefit obligation at end of year[1]	$6,476	$7,359	$ 806	$ 927
Change in plan assets[1]				
Fair value of plan assets at beginning of year	$4,862	$4,666	$ —	$ —
Actual return on plan assets	(144)	212	—	—
Employer contributions	298	310	—	—
Benefits paid	(397)	(404)	—	—
Administrative expenses	(33)	(33)	—	—
Settlements	(178)	—	—	—
Foreign currency translation impact	(74)	111	—	—
Fair value of plan assets at end of year[1]	$4,334	$4,862	$ —	$ —
Net funded status	$(2,142)	$(2,497)	$ (806)	$ (927)
Amounts recognized in the Consolidated Balance Sheet consist of:				
Noncurrent assets	$111	$89	$ —	$ —
Current liabilities	(23)	(22)	(83)	(86)
Noncurrent liabilities	(2,230)	(2,564)	(723)	(841)
Net amount recognized	$(2,142)	$(2,497)	$ (806)	$ (927)
Amounts recognized in Accumulated Other Comprehensive Loss consist of:				
Net actuarial loss	$2,957	$3,240	$ 87	$ 146
Prior service cost (benefit)	3	10	(27)	(37)
Net amount recognized, before tax effect	$2,960	$3,250	$ 60	$ 109
Other changes in plan assets and benefit obligations recognized in Other Comprehensive Loss consist of:				
Net actuarial (gain) loss	$(19)	$481	$ (52)	$ 1
Amortization of accumulated net actuarial loss	(264)	(220)	(7)	(5)
Prior service cost (benefit)	19	—	(25)	—
Amortization of prior service (cost) benefit	(26)	(5)	35	8
Net amount recognized, before tax effect	$(290)	$256	$ (49)	$ 4

(1) 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. At December 31, 2017, the benefit obligation, fair value of plan assets, and funded status for U.S. pension plans were $6,018, $3,544, and $(2,474) respectively.

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Pension Plan Benefit Obligations

	Pension benefits	
	2018	2017
The projected benefit obligation and accumulated benefit obligation for all defined benefit pension plans was as follows:		
Projected benefit obligation	$6,476	$7,359
Accumulated benefit obligation	6,444	7,169
The aggregate projected benefit obligation and fair value of plan assets for pension plans with projected benefit obligations in excess of plan assets was as follows:		
Projected benefit obligation	5,435	6,600
Fair value of plan assets	3,182	4,016
The aggregate accumulated benefit obligation and fair value of plan assets for pension plans with accumulated benefit obligations in excess of plan assets was as follows:		
Accumulated benefit obligation	5,415	6,422
Fair value of plan assets	3,179	3,998

Components of Net Periodic Benefit Cost

	Pension benefits[1]			Other postretirement benefits[2]		
For the year ended December 31,	2018	2017	2016	2018	2017	2016
Service cost	$46	$90	$155	$ 7	$ 7	$ 13
Interest cost	219	234	431	28	30	63
Expected return on plan assets	(306)	(332)	(677)	—	—	—
Recognized net actuarial loss	168	220	380	7	5	24
Amortization of prior service cost (benefit)	3	5	13	(7)	(8)	(24)
Settlements[3]	96	—	19	—	—	—
Curtailments[4]	23	—	—	(28)	—	—
Special termination benefits[5]	—	—	2	—	—	—
Net periodic benefit cost[6]	$249	$217	$323	$ 7	$ 34	$ 76
Discontinued operations	—	—	122	—	—	41
Net amount recognized in Statement of Consolidated Operations	$249	$217	$201	$ 7	$ 34	$ 35

Note: the footnotes below include components of Net Periodic Benefit Cost related to Alcoa Corporation through the completion of the Separation Transaction in 2016.

(1) In 2018, 2017 and 2016, net periodic benefit cost for U.S. pension plans was $239, $206, and $261, respectively.

(2) In 2018, 2017 and 2016, net periodic benefit cost for other postretirement benefits reflects a reduction of $10, $11, and $22, respectively, related to the recognition of the federal subsidy awarded under Medicare Part D.

(3) In 2018 and 2016, settlements were due to workforce reductions (see Note D) and the payment of lump sum benefits and/or purchases of annuity contracts.

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

(5) In 2016, special termination benefits were due to workforce reductions (see Note D).

(6) Amounts attributed to joint venture partners are not included. 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.

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Amounts Expected to be Recognized in Net Periodic Benefit Cost

December 31,	Pension benefits 2019	Other postretirement benefits 2019
Net actuarial loss recognition	$ 139	$ 3
Prior service cost (benefit) recognition	2	(4)

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,	2018	2017
Discount rate	4.35%	3.75%
Rate of compensation increase	3.50	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.

The rate of compensation increase is based upon actual experience. For 2019, the rate of compensation increase will be 3.5%, which approximates the five-year average.

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):

	2018	2017	2016
Discount rate to calculate service cost(1)	3.75%	4.20%	4.29%
Discount rate to calculate interest cost(1)	3.30	3.60	3.15
Expected long-term rate of return on plan assets	7.00	7.75	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 2018, 2017, and 2016 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.

In conjunction with the annual measurement of the funded status of Arconic's pension and other postretirement benefit plans at December 31, 2015, management elected to change the manner in which the interest cost component of net periodic benefit costs is determined in 2016 and beyond. Previously, the interest component was determined by multiplying the single equivalent rate and the aggregate discounted cash flows of the plans' projected benefit obligations. Under the new methodology, the interest cost component is determined by aggregating the product of the discounted cash flows of the plans' projected benefit obligations for each year and an individual spot rate (referred to as the "spot rate" approach). This change resulted in a lower interest cost component of net periodic benefit cost under the new methodology compared to the previous methodology in 2018, 2017, and 2016 of $24, $34, and $84, respectively, for pension plans and $4, $6, and $14, respectively, for other postretirement benefit plans. Management believes this new methodology, which represents a change in an accounting estimate, is a better measure of the interest cost as each year's cash flows are specifically linked to the interest rates of bond payments in the same respective 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

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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 2018, 2017, and 2016, the expected long-term rate of return used by management was based on the prevailing and planned strategic asset allocations, as well as estimates of future returns by asset class. 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 2019, 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):

	2018	2017	2016
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	2022	2021	2020

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 2019, a 5.5% trend rate will be used, reflecting management's best estimate of the change in future health care costs covered by the plans. The plans' actual annual health care cost trend experience over the past three years has ranged from (3.3)% to (0.5)%. 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	$ 22	$ (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, 2018 and 2017, by asset class, were as follows:

		Plan assets at December 31,	
Asset class	Policy range	2018	2017
Equities	20–55%	29 %	28 %
Fixed income	25–55%	48	47
Other investments	15–35%	23	25
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 has used 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 has been 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.

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The following section describes the valuation methodologies used by the trustees 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 R 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.

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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, 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	