AIR PRODUCTS & CHEMICALS INC /DE/
Form 10-K
November 20, 2018
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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 30 September 2018**

OR

¨ **TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934 For the transition period from _____ to _____**

Commission file number **001-04534**

AIR PRODUCTS AND CHEMICALS, INC.

7201 Hamilton Boulevard **State of incorporation: Delaware**

Allentown, Pennsylvania, 18195-1501 **I.R.S. identification number: 23-1274455**

Tel. (610) 481-4911

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

Title of Each Class:	**Registered on:**
Common Stock, par value $1.00 per share	**New York Stock Exchange**
2.0% Euro Notes due 2020	**New York Stock Exchange**
0.375% Euro Notes due 2021	**New York Stock Exchange**
1.0% Euro Notes due 2025	**New York Stock Exchange**

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 x NO ¨

Indicate by check mark if the registrant is not required to file reports pursuant to Section 13 or Section 15(d) of the Act. YES ¨ NO x

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 (or for such shorter period that the registrant was required to file such reports), and (2) has been subject to such filing requirements for the past 90 days. YES x 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 x NO ¨

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

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

Large accelerated filer x 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 Act). YES ¨ NO x

The aggregate market value of the voting stock held by non-affiliates of the registrant on 31 March 2018 was approximately $34.8 billion. For purposes of the foregoing calculations, all directors and/or executive officers have been deemed to be affiliates, but the registrant disclaims that any such director and/or executive officer is an affiliate.

The number of shares of common stock outstanding as of 31 October 2018 was 219,533,532.

DOCUMENTS INCORPORATED BY REFERENCE

Portions of the registrant’s definitive Proxy Statement for the Annual Meeting of Shareholders to be held on 24 January 2019 are incorporated by reference into Part III.

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AIR PRODUCTS AND CHEMICALS, INC.
ANNUAL REPORT ON FORM 10-K
For the fiscal year ended 30 September 2018
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FORWARD-LOOKING STATEMENTS

This Annual Report on Form 10-K contains “forward-looking statements” within the safe harbor provisions of the Private Securities Litigation Reform Act of 1995. Forward-looking statements include all statements that do not relate solely to historical or current facts and can generally be identified by words such as “anticipate,” “believe,” “could,” “estimate,” “expect,” “forecast,” “goal,” “intend,” “may,” “outlook,” “plan,” “positioned,” “possible,” “p
“project,” “should,” “target,” “will,” “would,” and similar expressions or variations thereof, or the negative thereof, but these terms are not the exclusive means of identifying such statements. Forward-looking statements are based on management’s expectations and assumptions as of the date of this report and are not guarantees of future performance. You are cautioned not to place undue reliance on our forward-looking statements. Forward-looking statements may relate to a number of matters, including expectations regarding revenue, margins, expenses, earnings, tax provisions, cash flows, pension obligations, share repurchases or other statements regarding economic conditions or our business outlook; statements regarding plans, projects, strategies and objectives for our future operations, including our ability to win new projects and execute the projects in our backlog; and statements regarding our expectations with respect to pending legal claims or disputes. While forward-looking statements are made in good faith and based on assumptions, expectations and projections that management believes are reasonable based on currently available information, actual performance and financial results may differ materially from projections and estimates expressed in the forward-looking statements because of many factors, including, without limitation:

- changes in global or regional economic conditions, supply and demand dynamics in the market segments we serve, or in the financial markets;
- risks associated with having extensive international operations, including political risks, risks associated with unanticipated government actions and risks of investing in developing markets;
- project delays, contract terminations, customer cancellations, or postponement of projects and sales;
- future financial and operating performance of major customers and joint venture partners;
- our ability to develop, implement, and operate new technologies, or to execute the projects in our backlog;
- tariffs, economic sanctions and regulatory activities in jurisdictions in which we and our affiliates and joint ventures operate;
- the impact of environmental, tax or other legislation, as well as regulations affecting our business and related compliance requirements, including regulations related to global climate change;
- changes in tax rates and other changes in tax law;
- the timing, impact, and other uncertainties relating to acquisitions and divestitures, including our ability to integrate acquisitions and separate divested businesses, respectively;
- risks relating to cybersecurity incidents, including risks from the interruption, failure or compromise of our information systems;
- catastrophic events, such as natural disasters, acts of war, or terrorism;
- the impact of price fluctuations in natural gas and disruptions in markets and the economy due to oil price volatility;
- costs and outcomes of legal or regulatory proceedings and investigations;
- asset impairments due to economic conditions or specific events;
- significant fluctuations in interest rates and foreign currency exchange rates from those currently anticipated;
- damage to facilities, pipelines or delivery systems, including those we own or operate for third parties;
- availability and cost of raw materials; and
- the success of productivity and operational improvement programs.

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In addition to the foregoing factors, forward-looking statements contained herein are qualified with respect to the risks disclosed elsewhere in this document, including in Item 1A, Risk Factors, Item 7, Management's Discussion and Analysis of Financial Condition and Results of Operations, and Item 7A, Quantitative and Qualitative Disclosures About Market Risk. Any of these factors, as well as those not currently anticipated by management, could cause our results of operations, financial condition or liquidity to differ materially from what is expressed or implied by any forward-looking statement. Except as required by law, we disclaim any obligation or undertaking to update or revise any forward-looking statements contained herein to reflect any change in assumptions, beliefs, or expectations or any change in events, conditions, or circumstances upon which any such forward-looking statements are based.

PART I

ITEM 1. BUSINESS

Air Products and Chemicals, Inc., a Delaware corporation originally founded in 1940, serves customers globally with a unique portfolio of products, services, and solutions that include atmospheric gases, process and specialty gases, equipment, and services. The Company is the world's largest supplier of hydrogen and has built leading positions in growth markets such as helium and natural gas liquefaction. As used in this report, unless the context indicates otherwise, the terms "we," "our," "us," the "Company," or "registrant" include controlled subsidiaries, affiliates, and predecessors of Air Products and its controlled subsidiaries and affiliates.

During its fiscal year ended 30 September 2018 ("fiscal year2018"), the Company reported its continuing operations in five reporting segments under which it managed its operations, assessed performance, and reported earnings: Industrial Gases – Americas; Industrial Gases – EMEA (Europe, Middle East, and Africa); Industrial Gases – Asia; Industrial Gases – Global; and Corporate and other.

Except as otherwise noted, the description of the Company's business below reflects the Company's continuing operations. Refer to Management's Discussion and Analysis of Financial Condition and Results of Operations and Note 25, Business Segment and Geographic Information, and Note 3, Discontinued Operations, to the consolidated financial statements for additional details on our reportable business segments and our discontinued operations.

Industrial Gases Business

The Company's Industrial Gases business produces atmospheric gases (oxygen, nitrogen, argon, and rare gases); process gases (hydrogen, helium, carbon dioxide, carbon monoxide, syngas, and specialty gases); and equipment for the production or processing of gases, such as air separation units and non-cryogenic generators. Atmospheric gases are produced through various air separation processes of which cryogenic is the most prevalent. Process gases are produced by methods other than air separation. For example, hydrogen, carbon monoxide and syngas are produced by steam methane reforming of natural gas and by the gasification of liquid and solid hydrocarbons. Hydrogen is also produced by purifying byproduct sources obtained from the chemical and petrochemical industries; and helium is produced as a byproduct of gases extracted from underground reservoirs, primarily natural gas, but also carbon dioxide purified before resale.

The Company's Industrial Gases business is organized and operated regionally. The regional Industrial Gases segments (Americas, EMEA, and Asia) supply gases and related equipment in the relevant region to diversified customers in many industries, including those in refining, chemical, gasification, metals, electronics, manufacturing, and food and beverage. Hydrogen is used by refiners to facilitate the conversion of heavy crude feedstock and lower the sulfur content of gasoline and diesel fuels. The chemicals industry uses hydrogen, oxygen, nitrogen, carbon monoxide, and syngas as feedstocks in the production of many basic chemicals. The energy production industry uses nitrogen injection for enhanced recovery of oil and natural gas and oxygen for gasification. Oxygen is used in combustion and industrial heating applications, including in the gasification, steel, certain nonferrous metals, glass, and cement industries. Nitrogen applications are used in food processing for freezing and preserving flavor and nitrogen

for inerting is used in various fields, including the metals, chemical, and semiconductor industries. Helium is used in laboratories and healthcare for cooling and in other industries for pressurizing, purging, and lifting. Argon is used in the metals and other industries for its unique inerting, thermal conductivity, and other properties. Industrial gases are also used in welding and providing healthcare and are utilized in various manufacturing processes to make them more efficient and to optimize performance.

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We distribute gases to our customers through a variety of supply modes:

Liquid Bulk—Product is delivered in bulk (in liquid or gaseous form) by tanker or tube trailer and stored, usually in its liquid state, in equipment designed and installed typically by the Company at the customer's site for vaporizing into a gaseous state as needed. Liquid bulk sales are usually governed by three- to five-year contracts.

Packaged Gases—Small quantities of product are delivered in either cylinders or dewars. The Company operates packaged gas businesses in Europe, Asia, and Latin America. In the United States, the Company's packaged gas business sells products (principally helium) only for the electronics and magnetic resonance imaging industries.

On-Site Gases—Large quantities of hydrogen, nitrogen, oxygen, carbon monoxide, and syngas (a mixture of hydrogen and carbon monoxide) are provided to customers, principally the energy production and refining, chemical, gasification, and metals industries worldwide, that require large volumes of gases and have relatively constant demand. Gases are produced at large facilities located adjacent to customers' facilities or by pipeline systems from centrally located production facilities and are generally governed by 15- to 20-year contracts. The Company also delivers small quantities of product through small on-site plants (cryogenic or non-cryogenic generators), typically either via a 10- to 15- year sale of gas contract or through the sale of the equipment to the customer.

Electricity is the largest cost component in the production of atmospheric gases. Steam methane reformers utilize natural gas as the primary raw material and gasifiers use liquid and solid hydrocarbons as the principal raw material for the production of hydrogen, carbon monoxide and syngas. We mitigate electricity, natural gas, and hydrocarbon price fluctuations contractually through pricing formulas, surcharges, and cost pass-through and tolling arrangements. During fiscal year 2018, no significant difficulties were encountered in obtaining adequate supplies of power and natural gas.

The Company obtains helium from a number of sources globally, including crude helium for purification from the U.S. Bureau of Land Management's helium reserve.

The regional Industrial Gases segments also include our share of the results of several joint ventures accounted for by the equity method. The largest of these joint ventures operate in Mexico, Italy, South Africa, India, Saudi Arabia, and Thailand.

Each of the regional Industrial Gases segments competes against two global industrial gas companies: Air Liquide S.A. and Linde plc (the successor to Praxair, Inc. and Linde AG, pursuant to a combination that became effective on 31 October 2018), as well as regional competitors. Competition in Industrial Gases is based primarily on price, reliability of supply, and the development of industrial gas applications. In locations where we have pipeline networks, which enable us to provide reliable and economic supply of products to larger customers, we derive a competitive advantage.

Overall regional industrial gases sales constituted approximately 94% of consolidated sales in fiscal year 2018, 90% in fiscal year 2017, and 90% in fiscal year 2016. Sales of tonnage hydrogen and related products constituted approximately 25% of consolidated sales in fiscal year 2018, 24% in fiscal year 2017, and 21% in fiscal year 2016. Sales of atmospheric gases constituted approximately 46% of consolidated sales in fiscal year 2018, 45% in fiscal year 2017, and 46% in fiscal year 2016.

Industrial Gases Equipment

The Company designs and manufactures equipment for air separation, hydrocarbon recovery and purification, natural gas liquefaction ("LNG"), and liquid helium and liquid hydrogen transport and storage. The Industrial Gases – Global segment includes activity related to cryogenic and gas processing equipment for air separation. The equipment is sold worldwide to customers in a variety of industries, including chemical and petrochemical manufacturing, oil and gas recovery and processing, and steel and primary metals processing. The Corporate and other segment includes three global equipment businesses: our LNG equipment business, our Gardner Cryogenics business fabricating helium and hydrogen transport and storage containers, and our Rotoflow business which manufactures turboexpanders and other precision rotating equipment. Steel, aluminum, and capital equipment subcomponents (compressors, etc.) are the

principal raw materials in the manufacturing of equipment. Adequate raw materials for individual projects are acquired under firm purchase agreements. Equipment is produced at the Company’s manufacturing sites with certain components being procured from subcontractors and vendors. Competition in the equipment business is based primarily on technological performance, service, technical know-how, price, and performance guarantees. Sale of equipment constituted approximately 6% of consolidated sales in fiscal year 2018, 10% in fiscal year 2017, and 10% in fiscal year 2016.

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The backlog of equipment orders was approximately $.2 billion on 30 September 2018 (as compared to a total backlog of approximately $.5 billion on 30 September 2017). The Company estimates that approximately 50% of the total sales backlog as of 30 September 2018 will be recognized as revenue during fiscal year 2019, dependent on execution schedules of the relevant projects.

International Operations

The Company, through subsidiaries, affiliates, and less-than-controlling interests, conducts business in 50 countries outside the United States. Its international businesses are subject to risks customarily encountered in foreign operations, including fluctuations in foreign currency exchange rates and controls; import and export controls; and other economic, political, and regulatory policies of local governments described in Item 1A, Risk Factors, below.

The Company has majority or wholly owned foreign subsidiaries that operate in Canada; 16 European countries (including the United Kingdom, the Netherlands, and Spain); eight Asian countries (including China, South Korea, and Taiwan); seven Latin American countries (including Chile and Brazil); four countries in the Middle East, and two African countries. The Company also owns less-than-controlling interests in entities operating in Europe, Asia, Africa, the Middle East, and Latin America (including Italy, Germany, China, India, Saudi Arabia, Thailand, Oman, South Africa, and Mexico).

Financial information about the Company's foreign operations and investments is included in Note 8, Summarized Financial Information of Equity Affiliates; Note 22, Income Taxes; and Note 25, Business Segment and Geographic Information, to the consolidated financial statements included under Item 8, below. Information about foreign currency translation is included under "Foreign Currency" in Note 1, Major Accounting Policies, and information on the Company's exposure to currency fluctuations is included in Note 13, Financial Instruments, to the consolidated financial statements, included under Item 8, below, and in "Foreign Currency Exchange Rate Risk," included under Item 7A, below. Export sales from operations in the United States to third-party customers amounted to $33.1 million, $64.2 million, and $134.9 million in fiscal years 2018, 2017, and 2016, respectively.

Technology Development

The Company pursues a market-oriented approach to technology development through research and development, engineering, and commercial development processes. It conducts research and development principally in its laboratories located in the United States (Trexlertown, Pennsylvania), Canada (Vancouver), the United Kingdom (Basingstoke and Carrington), Spain (Barcelona), China (Shanghai), and Saudi Arabia (Dhahran). The Company also funds and cooperates in research and development programs conducted by a number of major universities and undertakes research work funded by others, principally the United States government.

The Company's research groups are aligned with and support the research efforts of various businesses throughout the Company. Development of technology for use within the Industrial Gases business focuses primarily on new and improved processes and equipment for the production and delivery of industrial gases and new or improved applications for industrial gas products.

During fiscal year 2018, the Company owned approximately 535 United States patents, approximately 2,888 foreign patents, and was a licensee under certain patents owned by others. While the patents and licenses are considered important, the Company does not consider its business as a whole to be materially dependent upon any particular patent, patent license, or group of patents or licenses.

Environmental Controls

The Company is subject to various environmental laws and regulations in the countries in which it has operations. Compliance with these laws and regulations results in higher capital expenditures and costs. In the normal course of business, the Company is involved in legal proceedings under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA: the federal Superfund law); Resource Conservation and Recovery Act (RCRA); and similar state and foreign environmental laws relating to the designation of certain sites for investigation or remediation. The Company's accounting policy for environmental expenditures is discussed in Note 1, Major Accounting Policies, and environmental loss

contingencies are discussed in Note 17, Commitments and Contingencies, to the consolidated financial statements, included under Item 8, below.

The amounts charged to income from continuing operations related to environmental matters totaled $12.8 million in fiscal year 2018, $11.4 million in fiscal year 2017, and $12.2 million in fiscal year 2016. These amounts represent an estimate of expenses for compliance with environmental laws and activities undertaken to meet internal Company standards. Refer to Note 17, Commitments and Contingencies, to the consolidated financial statements for additional information.

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The Company estimates that we spent approximately $3 million in fiscal year 2018, $7 million in fiscal year 2017, and $3 million in fiscal year 2016 on capital projects reflected in continuing operations to control pollution. Capital expenditures to control pollution are estimated to be approximately $4 million in both fiscal years 2019 and 2020.

Employees

On 30 September 2018, the Company (including majority-owned subsidiaries) had approximately 16,300 employees, of whom approximately 16,000 were full-time employees and of whom approximately 11,800 were located outside the United States. The Company has collective bargaining agreements with unions at various locations that expire on various dates over the next four years. The Company considers relations with its employees to be satisfactory.

Available Information

All periodic and current reports, registration statements, and other filings that the Company is required to file with the Securities and Exchange Commission ("SEC"), including the Company’s 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) of the Securities Exchange Act of 1934 (the "Exchange Act"), are available free of charge through the Company’s website at www.airproducts.com. Such documents are available as soon as reasonably practicable after electronic filing of the material with the SEC. All such reports filed during the period covered by this report were available on the Company’s website on the same day as filing. In addition, our filings with the SEC are available free of charge on the SEC's website, www.sec.gov.

Seasonality

The Company’s businesses are not subject to seasonal fluctuations to any material extent.

Inventories

The Company maintains limited inventory where required to facilitate the supply of products to customers on a reasonable delivery schedule. Inventory consists primarily of crude helium, industrial gas, and specialty gas inventories supplied to customers through liquid bulk and packaged gases supply modes.

Customers

We do not have a homogeneous customer base or end market, and no single customer accounts for more than 10% of our consolidated revenues. We do have concentrations of customers in specific industries, primarily refining, chemicals, and electronics. Within each of these industries, the Company has several large-volume customers with long-term contracts. A negative trend affecting one of these industries, or the loss of one of these major customers, although not material to our consolidated revenue, could have an adverse impact on our financial results.

Governmental Contracts

Our business is not subject to a government entity’s renegotiation of profits or termination of contracts that would be material to our business as a whole.

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Executive Officers of the Company

The Company's executive officers and their respective positions and ages on20 November 2018 follow. Information with respect to offices held is stated in fiscal years.

Name	Age	Office
M. Scott Crocco	54	Executive Vice President and Chief Financial Officer (became Executive Vice President and Chief Financial Officer in 2016; Senior Vice President and Chief Financial Officer in 2013; and Vice President and Corporate Controller in 2008).
Seifi Ghasemi	74	Chairman, President, and Chief Executive Officer (became Chairman, President and Chief Executive Officer in 2014 and previously served as Chairman and Chief Executive Officer of Rockwood Holdings, Inc. beginning in 2001). Mr. Ghasemi is a member and Chairman of the Board of Directors and the Chairman of the Executive Committee of the Board of Directors.
Sean D. Major	54	Executive Vice President, General Counsel and Secretary (Secretary since December 2017 and Executive Vice President and General Counsel since May 2017). Previously, Mr. Major served as Executive Vice President, General Counsel and Secretary for Joy Global Inc. since 2007. From 1998 until joining Joy Global Inc. in 2007, Mr. Major was employed by Johnson Controls, Inc., serving in roles of increasing legal responsibility, including Assistant General Counsel and Assistant Secretary.
Dr. Samir Serhan	57	Executive Vice President (since December 2016). Previously, Dr. Serhan served as President, Global HyCO, since 2014 for Praxair Inc. From 2000-2014, he worked in leadership positions in the U.S. and Germany for The Linde Group, including Managing Director of Linde Engineering from 2008-2014.

ITEM 1A. RISK FACTORS

Our operations are affected by various risks, many of which are beyond our control. In evaluating investment in the Company and the forward-looking information contained in this Annual Report on Form 10-K or presented elsewhere by management from time to time, you should consider the following risk factors. Any of the following risks could have a material adverse effect on our business, operating results, financial condition, and the actual outcome of matters as to which forward-looking statements are made and could adversely affect the value of an investment in our common stock as well. While we believe we have identified and discussed below the key risk factors affecting our business, there may be additional risks and uncertainties that adversely affect our business, performance, or financial condition in the future that are not presently known, are not currently believed to be significant, or are not identified below because they are common to all businesses.

Changes in global and regional economic conditions, the markets we serve, or the financial markets may adversely affect our results of operations and cash flows.

Unfavorable conditions in the global economy or regional economies, the markets we serve or financial markets may decrease the demand for our goods and services and adversely impact our revenues, operating results, and cash flows.

Demand for our products and services depends in part on the general economic conditions affecting the countries and markets in which we do business. Weak economic conditions in certain geographies and changing supply and demand balances in the markets we serve have negatively impacted demand for our products and services in the past and may do so in the future. Reduced demand for our products and services would have a negative impact on our revenues and earnings. In addition, reduced demand could depress sales, reduce our margins, constrain our operating flexibility or reduce efficient utilization of our manufacturing capacity, or result in charges which are unusual or nonrecurring. Excess capacity in our manufacturing facilities or those of our competitors could decrease our ability to maintain pricing and generate profits.

Our operating results in one or more segments may also be affected by uncertain or deteriorating economic conditions for particular customer markets within a segment. A decline in the industries served by our customers or adverse events or circumstances affecting individual customers can impair the ability of such customers to satisfy their obligations to the Company, resulting in uncollected receivables, unanticipated contract terminations, project delays, or inability to recover plant investments, any of which may negatively impact our financial results.

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Weak overall demand or specific customer conditions may also cause customer shutdowns or default, or other inabilities to operate facilities profitably, and may force sale or abandonment of facilities and equipment or prevent projects from coming on-stream. These or other events associated with weak economic conditions or specific end market, product, or customer events may require us to record an impairment on tangible assets, such as facilities and equipment, or intangible assets, such as intellectual property or goodwill, which would have a negative impact on our financial results.

Our extensive international operations can be adversely impacted by operational, economic, political, security, legal, and currency translation risks that could decrease profitability.

In fiscal year 2018, over 60% of our sales were derived from customers outside the United States and many of our operations, suppliers, and employees are located outside the United States. Our operations in foreign jurisdictions may be subject to risks including exchange control regulations, import and trade restrictions, trade policy and other potentially detrimental domestic and foreign governmental practices or policies affecting U.S. companies doing business abroad. Changing economic and political conditions within foreign jurisdictions, strained relations between countries, or the imposition of tariffs or international sanctions can cause fluctuations in demand, price volatility, supply disruptions, or loss of property. The occurrence of any of these risks could have a material adverse impact on our financial condition, results of operation, and cash flows.

Our growth strategies depend in part on our ability to further penetrate markets outside the United States, particularly in higher-growth markets, and involve larger and more complex projects, including world-scale gasification projects, in regions where there is the potential for significant economic and political disruptions, including Russia, the Middle East and China. We are actively investing significant capital and other resources, in some cases through joint ventures, in developing or high growth markets, which present special risks. Our operations in these markets may be subject to greater risks than those faced by our operations in mature economies, including political and economic instability, project delay or abandonment due to unanticipated government actions, inadequate investment in infrastructure, undeveloped property rights and legal systems, unfamiliar regulatory environments, relationships with local partners, language and cultural differences and talent risks. Our contracts in these locations may be subject to cancellation without full compensation for loss. Successful operation of particular facilities or execution of projects may be disrupted by civil unrest, acts of sabotage or terrorism, and other local security concerns. Such concerns may require us to incur greater costs for security or require us to shut down operations for a period of time.

Because the majority of our revenue is generated from sales outside the United States, we are exposed to fluctuations in foreign currency exchange rates. Our business is primarily exposed to translational currency risk as the results of our foreign operations are translated into U.S. dollars at current exchange rates throughout the fiscal period. Our policy is to minimize cash flow volatility from changes in currency exchange rates. We choose not to hedge the translation of our foreign subsidiaries' earnings into dollars. Accordingly, reported sales, net earnings, cash flows, and fair values have been, and in the future will be, affected by changes in foreign exchange rates. For a more detailed discussion of currency exposure, see Item 7A, Quantitative and Qualitative Disclosures About Market Risk, below.

Operational and project execution risks may adversely affect our operations or financial results.

Some of our projects, including some of our largest growth projects, involve challenging engineering, procurement and construction phases that may occur in more risky locations and over extended time periods, sometimes up to several years. We may encounter difficulties in engineering, delays in designs or materials provided by the customer or a third party, equipment and materials delivery delays, schedule changes, customer scope changes, delays related to obtaining regulatory permits and rights-of-way, inability to find adequate sources of labor in the locations where we are building new plants, weather-related delays, delays by customers' contractors in completing their portion of a project, technical or transportation difficulties, and other factors, some of which are beyond our control, but which may impact our ability to complete a project within the original delivery schedule. In some cases, delays and additional costs may be substantial, and we may be required to cancel a project and/or compensate the customer for

the delay. We may not be able to recover any of these costs. These factors could also negatively impact our reputation or relationships with our customers, which could adversely affect our ability to secure new contracts in the future, and these risks are more significant as we take on larger and more complex projects, including gasification projects, as part of our growth strategy.

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The operation of our facilities, pipelines, and delivery systems inherently entails hazards that require continuous oversight and control, such as pipeline leaks and ruptures, fire, explosions, toxic releases, mechanical failures, or vehicle accidents. If operational risks materialize, they could result in loss of life, damage to the environment, or loss of production, all of which could negatively impact our ongoing operations, reputation, financial results, and cash flows. In addition, our operating results are dependent on the continued operation of our production facilities and our ability to meet customer requirements, which depend, in part, on our ability to properly maintain and replace aging assets.

We are subject to extensive government regulation in the jurisdictions in which we do business. Regulations addressing, among other things, environmental compliance, import/export restrictions, anti-bribery and corruption, and taxes, can negatively impact our financial condition, results of operation, and cash flows.

We are subject to government regulation in the United States and in the foreign jurisdictions where we conduct business. The application of laws and regulations to our business is sometimes unclear. Compliance with laws and regulations may involve significant costs or require changes in business practices that could result in reduced profitability. If there is a determination that we have failed to comply with applicable laws or regulations, we may be subject to penalties or sanctions that could adversely impact our reputation and financial results. Compliance with changes in laws or regulations can result in increased operating costs and require additional capital expenditures. Export controls or other regulatory restrictions could prevent us from shipping our products to and from some markets or increase the cost of doing so. Changes in tax laws and regulations and international tax treaties could affect the financial results of our businesses. Increasingly aggressive enforcement of anti-bribery and anti-corruption requirements, including the U.S. Foreign Corrupt Practices Act, the United Kingdom Bribery Act and the China Anti-Unfair Competition Law, could subject us to criminal or civil sanctions if a violation is deemed to have occurred. In addition, we are subject to laws and sanctions imposed by the U.S. and other jurisdictions where we do business that may prohibit us, or certain of our affiliates, from doing business in certain countries, or restricting the kind of business that we may conduct. Such restrictions may provide a competitive advantage to competitors who are not subject to comparable restrictions or prevent us from taking advantage of growth opportunities.

Further, we cannot guarantee that our internal controls and compliance systems will always protect us from acts committed by employees, agents, business partners, or businesses that we acquire that would violate U.S. and/or non-U.S. laws, including the laws governing payments to government officials, bribery, fraud, kickbacks and false claims, pricing, sales and marketing practices, conflicts of interest, competition, export and import compliance, money laundering, and data privacy. Any such improper actions or allegations of such acts could damage our reputation and subject us to civil or criminal investigations in the United States and in other jurisdictions and related shareholder lawsuits, could lead to substantial civil and criminal, monetary and non-monetary penalties, and could cause us to incur significant legal and investigatory fees. In addition, the government may seek to hold us liable as a successor for violations committed by companies in which we invest or that we acquire.

We may be unable to successfully identify, execute or effectively integrate acquisitions, or effectively disentangle divested businesses.

Our ability to grow revenue, earnings, and cash flow at anticipated rates depends in part on our ability to identify, successfully acquire and integrate businesses and assets at appropriate prices, and realize expected growth, synergies, and operating efficiencies. We may not be able to complete transactions on favorable terms, on a timely basis or at all. In addition, our results of operations and cash flows may be adversely impacted by the failure of acquired businesses or assets to meet expected returns, the failure to integrate acquired businesses, the inability to dispose of non-core assets and businesses on satisfactory terms and conditions, and the discovery of unanticipated liabilities or other problems in acquired businesses or assets for which we lack adequate contractual protections or insurance. In addition, we may incur asset impairment charges related to acquisitions that do not meet expectations.

We continually assess the strategic fit of our existing businesses and may divest businesses that are deemed not to fit with our strategic plan or are not achieving the desired return on investment. These transactions pose risks and challenges that could negatively impact our business and financial statements. For example, when we decide to sell or otherwise dispose of a business or assets, we may be unable to do so on satisfactory terms within our anticipated time frame or at all. In addition, divestitures or other dispositions may dilute our earnings per share, have other adverse financial and accounting impacts, distract management, and give rise to disputes with buyers. In addition, we have agreed, and may in the future agree, to indemnify buyers against known and unknown contingent liabilities. Our financial results could be impacted adversely by claims under these indemnities.

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The security of our information technology systems could be compromised, which could adversely affect our ability to operate.

We depend on information technology to enable us to operate efficiently and interface with customers as well as to maintain financial accuracy and efficiency. Our information technology capabilities are delivered through a combination of internal and external services and service providers. If we do not allocate and effectively manage the resources necessary to build and sustain the proper technology infrastructure, we could be subject to transaction errors, processing inefficiencies, the loss of customers, business disruptions, or the loss of or damage to our confidential business information due to a security breach. In addition, our information technology systems may be damaged, disrupted or shut down due to attacks by computer hackers, computer viruses, employee error or malfeasance, power outages, hardware failures, telecommunication or utility failures, catastrophes or other unforeseen events, and in any such circumstances our system redundancy and other disaster recovery planning may be ineffective or inadequate. Security breaches of our systems (or the systems of our customers, suppliers or other business partners) could result in the misappropriation, destruction or unauthorized disclosure of confidential information or personal data belonging to us or to our employees, partners, customers or suppliers, and may subject us to legal liability.

As with most large systems, our information technology systems have in the past been, and in the future likely will be subject to computer viruses, malicious codes, unauthorized access and other cyber-attacks, and we expect the sophistication and frequency of such attacks to continue to increase. To date, we are not aware of any significant impact on our operations or financial results from such attempts; however, unauthorized access could disrupt our business operations, result in the loss of assets, and have a material adverse effect on our business, financial condition, or results of operations. Any of the attacks, breaches or other disruptions or damage described above could: interrupt our operations at one or more sites; delay production and shipments; result in the theft of our and our customers' intellectual property and trade secrets; damage customer and business partner relationships and our reputation; result in defective products or services, legal claims and proceedings, liability and penalties under privacy laws, or increased costs for security and remediation; or raise concerns regarding our accounting for transactions. Each of these consequences could adversely affect our business, reputation and our financial statements.

Our business involves the use, storage, and transmission of information about our employees, vendors, and customers. The protection of such information, as well as our proprietary information, is critical to us. The regulatory environment surrounding information security and privacy is increasingly demanding, with the frequent imposition of new and constantly changing requirements. We have established policies and procedures to help protect the security and privacy of this information. We also, from time to time, export sensitive customer data and technical information to recipients outside the United States. Breaches of our security measures or the accidental loss, inadvertent disclosure, or unapproved dissemination of proprietary information or sensitive or confidential data about us or our customers, including the potential loss or disclosure of such information or data as a result of fraud, trickery, or other forms of deception, could expose us, our customers, or the individuals affected to a risk of loss or misuse of this information, which could ultimately result in litigation and potential legal and financial liability. These events could also damage our reputation or otherwise harm our business.

Interruption in ordinary sources of raw material or energy supply or an inability to recover increases in energy and raw material costs from customers could result in lost sales or reduced profitability.

Hydrocarbons, including natural gas, are the primary feedstock for the production of hydrogen, carbon monoxide, and syngas. Energy, including electricity, natural gas, and diesel fuel for delivery trucks is the largest cost component of our business. Because our industrial gas facilities use substantial amounts of electricity, energy price fluctuations could materially impact our revenues and earnings. A disruption in the supply of energy, components, or raw materials, whether due to market conditions, legislative or regulatory actions, natural events, or other disruption, could prevent us from meeting our contractual commitments

and harm our business and financial results.

Our supply of crude helium for purification and resale is largely dependent upon natural gas production by crude helium suppliers. Lower natural gas production resulting from natural gas pricing dynamics, supplier operating or transportation issues or other interruptions in sales from crude helium suppliers, can reduce our supplies of crude helium available for processing and resale to customers.

We typically contract to pass-through cost increases in energy and raw materials to customers, but cost variability can still have a negative impact on our results. We may be unable to raise prices as quickly as costs rise, or competitive pressures may prevent full recovery of such costs. Increases in energy or raw material costs that cannot be passed on to customers for competitive or other reasons may negatively impact our revenues and earnings. Even where costs are passed through, price increases can cause lower sales volume.

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Catastrophic events could disrupt our operations or the operations of our suppliers or customers, having a negative impact on our business, financial results, and cash flows.
Our operations could be impacted by catastrophic events outside our control, including severe weather conditions such as hurricanes, floods, earthquakes, storms, epidemics, or acts of war and terrorism. Any such event could cause a serious business disruption that could affect our ability to produce and distribute products and possibly expose us to third-party liability claims. Additionally, such events could impact our suppliers or customers, which could cause energy and raw materials to be unavailable to us, or our customers to be unable to purchase or accept our products and services. Any such occurrence could have a negative impact on our operations and financial results.

New technologies create performance risks that could impact our financial results or reputation.
We are continually developing and implementing new technologies and product offerings. Existing technologies are being implemented in products and designs or at scales beyond our experience base. These technological expansions can create nontraditional performance risks to our operations. Failure of the technologies to work as predicted, or unintended consequences of new designs or uses, could lead to cost overruns, project delays, financial penalties, or damage to our reputation. Large scale gasification projects may contain processes or technologies that we have not operated at the same scale or in the same combination, and although such projects generally include technologies and processes that have been demonstrated previously by others, such technologies or processes may be new to us and may introduce new risks to our operations.

Legislative, regulatory and societal responses to global climate change create financial risk.
We are the world’s leading supplier of hydrogen, the primary use of which is the production of ultra-low sulfur transportation fuels that have significantly reduced transportation emissions and helped improve human health. To make the high volumes of hydrogen needed by our customers, we use steam methane reforming, which releases carbon dioxide. Some of our operations are within jurisdictions that have or are developing regulatory regimes governing emissions of greenhouse gases ("GHG"), including carbon dioxide. These include existing coverage under the European Union Emission Trading system, the California cap and trade schemes, Alberta’s Carbon Competitiveness Incentive Regulation, China’s Emission Trading Scheme, South Korea’s Emission Trading Scheme, nation-wide expansion of the China Emission Trading Scheme, revisions to the Alberta regulation, and Environment Canada's developing Output Based Pricing System. In addition, the U.S. Environmental Protection Agency ("EPA") requires mandatory reporting of GHG emissions and is regulating GHG emissions for new construction and major modifications to existing facilities. Some jurisdictions have various mechanisms to target the power sector to achieve emission reductions, which often result in higher power costs.
Increased public concern may result in more international, U.S. federal, and/or regional requirements to reduce or mitigate the effects of GHG. Although uncertain, these developments could increase our costs related to consumption of electric power and hydrogen production. We believe we will be able to mitigate some of the increased costs through contractual terms, but the lack of definitive legislation or regulatory requirements prevents an accurate estimate of the long-term impact these measures will have on our operations. Any legislation that limits or taxes GHG emissions could negatively impact our growth, increase our operating costs, or reduce demand for certain of our products.

Our financial results may be affected by various legal and regulatory proceedings, including those involving antitrust, tax, environmental, or other matters.
We are subject to litigation and regulatory investigations and proceedings in the normal course of business and could become subject to additional claims in the future, some of which could be material. While we seek to limit our liability in our commercial contractual arrangements, there are no guarantees that each contract will contain suitable limitations of liability or that limitations of liability will be enforceable. Also, the outcome of existing legal proceedings may differ from our expectations because the outcomes of litigation, including regulatory matters, are often difficult to predict reliably. Various factors or developments can lead us to change current estimates of liabilities and related insurance receivables, where applicable, or make

such estimates for matters previously not susceptible 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, settlement, or unfavorable development could result in charges that could have a material adverse effect on our financial condition, results of operations, and cash flows in any particular period.

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Costs and expenses resulting from compliance with environmental regulations may negatively impact our operations and financial results.

We are subject to extensive federal, state, local, and foreign environmental and safety laws and regulations concerning, among other things, emissions in the air; discharges to land and water; and the generation, handling, treatment, and disposal of hazardous waste and other materials. We take our environmental responsibilities very seriously, but there is a risk of environmental impact inherent in our manufacturing operations and in the transportation of our products. Future developments and more stringent environmental regulations may require us to make additional unforeseen environmental expenditures. In addition, laws and regulations may require significant expenditures for environmental protection equipment, compliance, and remediation. These additional costs may adversely affect financial results. For a more detailed description of these matters, see Item 1 - Business Environmental Controls, above.

Implementation of the United Kingdom's ("UK") exit from European Union ("EU") membership could adversely affect our European Operations.

The UK's exit from EU membership may adversely affect customer demand, our relationships with customers and suppliers and our European business. Although it is unknown what the terms of the United Kingdom's future relationship with the EU will be, it is possible that there will be greater restrictions on imports and exports between the United Kingdom and EU members and increased regulatory complexities. Any of these factors could adversely affect customer demand, our relationships with customers and suppliers, and our European business.

Inability to compete effectively in a segment could adversely impact sales and financial performance.

We face strong competition from large global competitors and many smaller regional ones in many of our business segments. Introduction by competitors of new technologies, competing products, or additional capacity could weaken demand for or impact pricing of our products, negatively impacting financial results. In addition, competitors' pricing policies could affect our profitability or market share.

A change of tax law in key jurisdictions could result in a material increase in our tax expense.

The multinational nature of our business subjects us to taxation in the United States and numerous foreign jurisdictions. Due to economic and political conditions, tax rates in various jurisdictions may be subject to significant change. The company's future effective tax rates could be affected by changes in the mix of earnings in countries with differing statutory tax rates, changes in the valuation of deferred tax assets and liabilities, or changes in tax laws or their interpretation.

Changes to income tax laws and regulations in any of the jurisdictions in which we operate, or in the interpretation of such laws, could significantly increase our effective tax rate and adversely impact our financial condition, results of operations or cash flows. In December 2017, the U.S. enacted the Tax Cuts and Jobs Act ("the Tax Act"), which significantly revised the U.S. federal corporate income tax law by, among other things, lowering the corporate income tax rate, implementing a territorial tax system, and imposing a one-time tax on unremitted cumulative non-U.S. earnings of foreign subsidiaries. As a result of the Tax Act, we recorded a discrete net tax expense of $180.6 for fiscal 2018, including a reduction in the deemed repatriation tax related to the taxation of deemed foreign dividends that may be eliminated by future legislation. Various levels of government are increasingly focused on tax reform and other legislative action to increase tax revenue. Further changes in tax laws in the U.S. or foreign jurisdictions where we operate could have a material adverse effect on our business, results of operations, or financial condition.

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We could incur significant liability if the distribution of Versum common stock to our stockholders is determined to be a taxable transaction.

We have received an opinion from outside tax counsel to the effect that the spin-off of Versum qualifies as a transaction that is described in Sections 355(a) and 368(a)(1)(D) of the Internal Revenue Code. The opinion relies on certain facts, assumptions, representations and undertakings from Versum and us regarding the past and future conduct of the companies' respective businesses and other matters. If any of these facts, assumptions, representations or undertakings are incorrect or not satisfied, our shareholders and we may not be able to rely on the opinion of tax counsel and could be subject to significant tax liabilities. Notwithstanding the opinion of tax counsel we have received, the IRS could determine on audit that the spin-off is taxable if it determines that any of these facts, assumptions, representations or undertakings are not correct or have been violated or if it disagrees with the conclusions in the opinion. If the spin-off is determined to be taxable for U.S. federal income tax purposes, our shareholders that are subject to U.S. federal income tax and we could incur significant U.S. federal income tax liabilities.

ITEM 1B. UNRESOLVED STAFF COMMENTS

We have not received any written comments from the Commission staff that remain unresolved.

ITEM 2. PROPERTIES

Air Products and Chemicals, Inc. owns its principal administrative offices, which are the Company's headquarters located in Trexlertown, Pennsylvania, Hersham, England, and Santiago, Chile. The Company leases the principal administrative office in Shanghai, China. The Company leases administrative offices in the United States, Spain, Malaysia, and China for its Global Business Support organization.

The following is a description of the properties used by our five business segments. We believe that our facilities are suitable and adequate for our current and anticipated future levels of operation.

Industrial Gases – Americas

This business segment currently operates from over 400 production and distribution facilities in North and South America (approximately one-fourth of which are located on owned property), and 10% of which are integrated sites that serve dedicated customers as well as merchant customers. The Company has sufficient property rights and permits for the ongoing operation of our pipeline systems in the Gulf Coast, California, and Arizona in the United States and Alberta and Ontario, Canada. Management and sales support is based in our Trexlertown and Santiago offices referred to above, and at 12 leased properties located throughout North and South America.

Hydrogen fueling stations built by the Company support commercial markets in California and Japan as well as demonstration projects in Europe and other parts of Asia.

Industrial Gases – EMEA

This business segment currently operates from over 180 production and distribution facilities in Europe, the Middle East, and Africa (approximately one-third of which are on owned property). The Company has sufficient property rights and permits for the ongoing operation of our pipeline systems in the Netherlands, the United Kingdom, Belgium, France, and Germany. Management and sales support for this business segment is based in Hersham, England, referred to above, Barcelona, Spain and at 16 leased regional office sites and at least 15 leased local office sites, located throughout the region.

Industrial Gases – Asia

Industrial Gases – Asia currently operates from over 170 production and distribution facilities within Asia (approximately one-fourth of which are on owned property or long duration term grants). The Company has sufficient property rights and permits for the ongoing operation of our pipeline systems in China, South Korea, Taiwan, Malaysia, Singapore, and Indonesia. Management and sales support for this business segment is based in Shanghai, China and Kuala Lumpur, Malaysia, and in 18 leased office locations throughout the region.

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Industrial Gases – Global

Management, sales, and engineering support for this business segment is based in our principal administrative offices noted above, and an office in India.

Equipment is manufactured in Missouri, Pennsylvania, and China.

Research and development ("R&D") activities for this business segment are conducted at owned locations in the U.S., the United Kingdom, and Spain, and 4 leased locations in Canada, Europe, and Asia.

Helium is processed at multiple sites in the U.S. and then distributed to/from transfill sites globally.

Corporate and other

Corporate administrative functions are based in the Company's administrative offices referred to above.

The LNG business operates a manufacturing facility in Florida in the United States with management, engineering, and sales support based in the Trexlertown offices referred to above and a nearby leased office.

The Gardner Cryogenic business operates at facilities in Pennsylvania and Kansas in the United States and in France.

The Rotoflow business operates manufacturing and service facilities in Texas and Pennsylvania in the United States with management, engineering, and sales support based in the Trexlertown offices referred to above and a nearby leased office.

ITEM 3. LEGAL PROCEEDINGS

In the normal course of business, the Company and its subsidiaries are involved in various legal proceedings, including contract, product liability, intellectual property, insurance, and regulatory matters. Although litigation with respect to these matters is routine and incidental to the conduct of our business, such litigation could result in large monetary awards, especially if compensatory and/or punitive damages are awarded. However, we believe that litigation currently pending to which we are a party will be resolved without any material adverse effect on our financial position, earnings, or cash flows.

From time to time, we are also involved in proceedings, investigations, and audits involving governmental authorities in connection with environmental, health, safety, competition, and tax matters.

The Company is a party to proceedings under CERCLA, the RCRA, and similar state and foreign environmental laws relating to the designation of certain sites for investigation or remediation. Presently there are 32 sites on which a final settlement has not been reached where the Company, along with others, has been designated a potentially responsible party by the Environmental Protection Agency or is otherwise engaged in investigation or remediation, including cleanup activity at certain of its current and former manufacturing sites. We do not expect that any sums we may have to pay in connection with these environmental matters would have a material adverse impact on our consolidated financial position. Additional information on the Company's environmental exposure is included under Item 1. Business, Environmental Controls.

In September 2010, the Brazilian Administrative Council for Economic Defense ("CADE") issued a decision against our Brazilian subsidiary, Air Products Brasil Ltda., and several other Brazilian industrial gas companies for alleged anticompetitive activities. CADE imposed a civil fine of R$179.2 million (approximately $44 million at 30 September 2018) on Air Products Brasil Ltda. This fine was based on a recommendation by a unit of the Brazilian Ministry of Justice, whose investigation began in 2003, alleging violation of competition laws with respect to the sale of industrial and medical gases. The fines are based on a percentage of the Company's total revenue in Brazil in 2003.

We have denied the allegations made by the authorities and filed an appeal in October 2010 to the Brazilian courts. On 6 May 2014, our appeal was granted and the fine against Air Products Brasil Ltda. was dismissed. CADE has appealed that ruling and the matter remains pending. The Company, with advice of its outside legal counsel, has assessed the status of this matter and has concluded that, although an adverse final judgment after exhausting all appeals is possible, such a judgment is not probable. As a result, no provision has been made in the consolidated financial statements.

Other than this matter, we do not currently believe there are any legal proceedings, individually or in the aggregate, that are reasonably possible to have a material impact on our financial condition, results of operations, or cash flows. However, a future charge for regulatory fines or damage awards could have a significant impact on our net income in the period in which it is recorded.

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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

Our common stock (ticker symbol APD) is listed on the New York Stock Exchange. Our transfer agent and registrar is Broadridge Corporate Issuer Solutions, Inc., P.O. Box 1342, Brentwood, New York 11717, telephone (844) 318-0129 (U.S.) or (720) 358-3595 (all other locations); website, http://shareholder.broadridge.com/airproducts; and e-mail address, shareholder@broadridge.com. As of 31 October 2018, there were 5,391 record holders of our common stock.

Cash dividends on the Company's common stock are paid quarterly. It is our expectation that we will continue to pay cash dividends in the future at comparable or increased levels. The Board of Directors determines whether to declare dividends and the timing and amount based on financial condition and other factors it deems relevant. Dividend information for each quarter of fiscal years 2018 and 2017 is summarized below:

	2018	2017
First quarter	**$.95**	$.86
Second quarter	**1.10**	.95
Third quarter	**1.10**	.95
Fourth quarter	**1.10**	.95
Total	**$4.25**	$3.71

Purchases of Equity Securities by the Issuer

On 15 September 2011, the Board of Directors authorized the repurchase of up to $1.0 billion of our outstanding common stock. This program does not have a stated expiration date. We repurchase shares pursuant to Rules 10b5-1 and 10b-18 under the Securities Exchange Act of 1934, as amended, through repurchase agreements established with one or more brokers. There were no purchases of stock during fiscal year 2018. At 30 September 2018, $485.3 million in share repurchase authorization remained. Additional purchases will be completed at the Company's discretion while maintaining sufficient funds for investing in its businesses and growth opportunities.

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Performance Graph

The performance graph below compares the five-year cumulative returns of the Company's common stock with those of the Standard & Poor's 500 Index (S&P 500 Index) and the Standard & Poor's 500 Materials Index (S&P 500 Materials Index). The figures assume an initial investment of $100 and the reinvestment of all dividends.

COMPARISON OF FIVE YEAR CUMULATIVE SHAREHOLDER RETURN

Air Products, S&P 500 Index, and S&P 500 Materials Index

Comparative Growth of a $100 Investment

(Assumes Reinvestment of All Dividends)

	Sept 2013	Sept 2014	Sept 2015	Sept 2016	Sept 2017	Sept 2018
Air Products	100	128	122	149	168	191
S&P 500 Index	100	120	116	137	161	191
S&P 500 Materials Index	100	122	96	120	146	152

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ITEM 6. SELECTED FINANCIAL DATA

Unless otherwise indicated, information presented is on a continuing operations basis.

(Millions of dollars, except for share and per share data)	**2018[A]**	2017[A]	2016[A]	2015[A]	2014[A]
Operating Results					
Sales	**$8,930**	$8,188	$7,504	$7,824	$8,384
Cost of sales[B]	**6,190**	5,752	5,177	5,584	6,178
Selling and administrative[B]	**761**	714	684	765	876
Research and development	**65**	58	72	76	78
Cost reduction and asset actions	**—**	151	35	180	11
Operating income[B]	**1,966**	1,440	1,535	1,276	976
Equity affiliates' income[C]	**175**	80	147	152	149
Income from continuing operations attributable to Air Products	**1,456**	1,134	1,100	933	697
Net income attributable to Air Products[D]	**1,498**	3,000	631	1,278	992
Basic earnings per common share attributable to Air Products:					
Income from continuing operations	**6.64**	5.20	5.08	4.34	3.28
Net income[D]	**6.83**	13.76	2.92	5.95	4.66
Diluted earnings per common share attributable to Air Products:					
Income from continuing operations	**6.59**	5.16	5.04	4.29	3.24
Net income[D]	**6.78**	13.65	2.89	5.88	4.61
Year-End Financial Position					
Plant and equipment, at cost	**$21,490**	$19,548	$18,660	$17,999	$18,180
Total assets[D]	**19,178**	18,467	18,029	17,317	17,648
Working capital[D]	**2,744**	3,388	1,034	(851)	199
Total debt[E]	**3,813**	3,963	5,211	5,856	6,081
Air Products shareholders' equity[D]	**10,858**	10,086	7,080	7,249	7,366
Total equity[D]	**11,176**	10,186	7,213	7,381	7,521
Financial Ratios					
Return on average Air Products shareholders' equity[F]	**13.9%**	13.2%	15.4%	12.7%	9.5%
Operating margin[B]	**22.0%**	17.6%	20.5%	16.3%	11.6%
Selling and administrative as a percentage of sales[B]	**8.5%**	8.7%	9.1%	9.8%	10.4%
Total debt to total capitalization[E][G]	**25.4%**	28.0%	41.9%	44.2%	43.8%
Other Data					
Income from continuing operations including noncontrolling interests	**$1,491**	$1,155	$1,122	$966	$691
Adjusted EBITDA[B][H]	**3,116**	2,799	2,622	2,422	2,322
Adjusted EBITDA margin[B]	**34.9%**	34.2%	34.9%	31.0%	27.7%
Depreciation and amortization	**971**	866	855	859	876
Capital expenditures on a GAAP basis[I]	**1,914**	1,056	908	1,201	1,297
Capital expenditures on a non-GAAP basis[I]	**1,934**	1,066	935	1,575	1,498
Cash provided by operating activities	**2,555**	2,534	2,259	2,047	1,862
Cash used for investing activities	**(1,649)**	(1,418)	(865)	(1,147)	(1,257)
Cash used for financing activities	**(1,360)**	(2,041)	(860)	(960)	(524)
Dividends declared per common share	**4.25**	3.71	3.39	3.20	3.02
Weighted Average Common Shares – Basic (in millions)	**219**	218	216	215	213
Weighted Average Common Shares – Diluted (in millions)	**221**	220	218	217	215
Book value per common share at year-end	**$49.46**	$46.19	$32.57	$33.66	$34.49
Shareholders at year-end	**5,500**	5,700	6,000	6,400	6,600
Employees at year-end[J]	**16,300**	15,300	18,600	19,700	21,200

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Unless otherwise stated, selected financial data is presented in accordance with U.S. generally accepted accounting principles (GAAP). The Company has presented certain financial measures on a non-GAAP ("adjusted") basis to exclude items which management does not believe to be indicative of ongoing business trends. Refer to pages 33-39 for reconciliations of the GAAP to non-GAAP measures for fiscal years 2018, 2017, and 2016. Descriptions of the excluded items appear on pages 25-28. For fiscal year 2015, these items include: (i) a charge to operating income of $8 ($.03 per share) related to business separation costs, (ii) a charge to operating income of $180 ($133 after-tax, or $.61 per share) related to business restructuring and cost reduction actions, (iii) a gain of $18 ($11 after tax, or $.05 per share) reflected in operating income

(A) related to the gain on previously held equity interest in a liquefied atmospheric industrial gases production joint venture, (iv) a gain of $34 ($28 after tax, or $.13 per share) reflected in operating income resulting from the sale of two parcels of land, and (v) a charge to other non-operating income (expense), net related to pension settlement losses of $19 ($12 after-tax, or $.06 per share). For fiscal year 2014, these items include: (i) a charge to operating income of $11 ($7 after-tax, or $.03 per share) related to business restructuring and cost reduction actions, (ii) a charge to operating income of $310 ($275 attributable to Air Products, after-tax, or $1.27 per share) related to the impairment of goodwill and intangible assets, and (iii) a charge to other non-operating income (expense), net related to pension settlement losses of $5 ($3 after-tax, or $.02 per share).

(B) Reflects adoption of guidance on presentation of net periodic pension and postretirement benefit cost on a retrospective basis during the first quarter of fiscal year 2018. Refer to Note 2, New Accounting Guidance, to the consolidated financial statements for additional information.

(C) Fiscal year 2017 includes the third quarter impact of an other-than-temporary noncash impairment charge of $79.5 ($.36 per share) on our investment in Abdullah Hashim Industrial Gases & Equipment Co., Ltd. (AHG), a 25% owned equity affiliate in our Industrial Gases – EMEA segment.

(D) Information presented on a total company basis, which includes both continuing and discontinued operations.

(E) Total debt includes long-term debt, including debt to related parties, current portion of long-term debt, and short-term borrowings as of the end of the year for continuing operations.

(F) Calculated using income from continuing operations attributable to Air Products and five-quarter average Air Products shareholders' equity.

(G) Total capitalization includes total debt for continuing operations plus total equity plus redeemable noncontrolling interest as of the end of the year. Redeemable noncontrolling interest was $287 as of 30 September 2014. There was no redeemable noncontrolling interest for the other periods presented.

(H) A reconciliation of income from continuing operations on a GAAP basis to adjusted EBITDA is presented on pages 36-39.

(I) Capital expenditures presented on a GAAP basis include additions to plant and equipment, acquisitions, less cash acquired, and investment in and advances to unconsolidated affiliates. The Company utilizes a non-GAAP measure in the computation of capital expenditures and includes spending associated with facilities accounted for as capital leases and purchases of noncontrolling interests. Refer to page 41 for a reconciliation of the GAAP to non-GAAP measures for fiscal years 2018, 2017, and 2016. In fiscal year 2015, the GAAP measure was adjusted by $96 and $278 for spending associated with facilities accounted for as capital leases and purchases of noncontrolling interests, respectively. In fiscal year 2014, the GAAP measure was adjusted by $200 for spending associated with facilities accounted for as capital leases.

(J) Includes full- and part-time employees from continuing and discontinued operations.

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ITEM 7. MANAGEMENT'S DISCUSSION AND ANALYSIS OF FINANCIAL CONDITION AND RESULTS OF OPERATIONS

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This Management's Discussion and Analysis contains "forward-looking statements" within the safe harbor provisions of the Private Securities Litigation Reform Act of 1995, including statements about business outlook. These forward-looking statements are based on management's expectations and assumptions as of the date of this report and are not guarantees of future performance. Actual performance and financial results may differ materially from projections and estimates expressed in the forward-looking statements because of many factors not anticipated by management, including, without limitation, those described in our Forward-Looking Statements and Part I, Item 1A. Risk Factors, of this Annual Report on Form 10-K.

The following discussion should be read in conjunction with the consolidated financial statements and the accompanying notes contained in this report. Unless otherwise indicated, financial information is presented on a continuing operations basis. All comparisons in the discussion are to the corresponding prior year, unless otherwise stated. All amounts presented are in accordance with U.S. generally accepted accounting principles (GAAP), except as noted. All amounts are presented in millions of dollars, except for per share data, unless otherwise indicated.

Captions such as income from continuing operations attributable to Air Products, net income attributable to Air Products, and diluted earnings per share attributable to Air Products are simply referred to as "income from continuing operations," "net income," and "diluted earnings per share (EPS)" throughout this Management's Discussion and Analysis, unless otherwise stated.

The discussion of results that follows includes comparisons to certain non-GAAP ("adjusted") financial measures. The presentation of non-GAAP measures is intended to provide investors, potential investors, securities analysts, and others with useful supplemental information to evaluate the performance of the business because such measures, when viewed together with our financial results computed in accordance with GAAP, provide a more complete understanding of the factors and trends affecting our historical financial performance and projected future results. The reconciliations of reported GAAP results to non-GAAP measures are presented on pages 33-39. Descriptions of the excluded items appear on pages 25-28.

BUSINESS OVERVIEW

Air Products and Chemicals, Inc. is a world-leading Industrial Gases company in operation for over 75 years. The Company's core industrial gases business provides atmospheric, process, and specialty gases and related equipment to many industries including refining, chemical, gasification, metals, electronics, manufacturing, and food and beverage. Air Products is also the world's leading supplier of liquefied natural gas (LNG) process technology and equipment. With operations in 50 countries, in fiscal year 2018 we had sales of $8.9 billion, assets of $19.2 billion, and a worldwide workforce of approximately 16,300 full- and part-time employees.

As of 30 September 2018, our operations were organized into five reportable business segments: Industrial Gases – Americas; Industrial Gases – EMEA (Europe, Middle East, and Africa); Industrial Gases – Asia; Industrial Gases – Global; and Corporate and other. The financial statements and analysis that follow discuss our results based on these operations. Refer to Note 25, Business Segment and Geographic Information, to the consolidated financial statements for additional details on our reportable business segments.

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2018 IN SUMMARY

In fiscal year 2018, we delivered strong safety and financial results. Sales of $8.9 billion increased nine percent over the prior year primarily driven by higher volumes from base business growth and new, large industrial gas project onstreams. The higher regional volumes were partially offset by lower sale of equipment activity on our Jazan project as we near project completion. In addition, we began to execute our gasification strategy with the completion and onstream of the Lu'An acquisition and our announcements of the Jazan gasifier/power project in Jazan, Saudi Arabia, the Yankuang coal-to-syngas production facility in Yulin City, Shaanxi Province, China, and the Jiutai coal-to-syngas project in Hohhot, China.

We delivered operating margin of 22.0% and adjusted EBITDA margin of 34.9%. Diluted EPS of $6.59 increased 28% from the prior year. On a non-GAAP basis, adjusted diluted EPS of $7.45 increased 18%.

Highlights for 2018

- Sales of $8,930.2 increased 9%, or $742.6, from underlying sales growth of 7% and favorable currency impacts of 2%. The underlying sales growth was primarily driven by higher volumes across all regional Industrial Gases segments, partially offset by lower sale of equipment activity in the Industrial Gases – Global segment.
- Operating income of $1,965.6 increased 37%, or $525.6, and operating margin of 22.0% increased 440 bp. On a non‑GAAP basis, adjusted operating income of $1,941.5 increased 9%, or $167.7, and adjusted operating margin of 21.7% was flat.
- Income from continuing operations of $1,455.6 increased 28%, or $321.2, and diluted EPS of $6.59 increased 28%, or $1.43. On a non-GAAP basis, adjusted income from continuing operations of $1,644.7 increased 19%, or $258.8, and adjusted diluted EPS of $7.45 increased 18%, or $1.14. A summary table of changes in diluted earnings per share is presented on the following page.
- Adjusted EBITDA of $3,115.5 increased 11%, or $316.3. Adjusted EBITDA margin of 34.9% increased 70 bp.
- We completed the formation of a syngas supply joint venture with Lu'An, including the acquisition of Lu'An's gasification and syngas purification assets.
- We increased our quarterly dividend by 16% from $.95 to $1.10 per share, or $4.40 per share annually, the largest increase in Company history. This represents the 36th consecutive year that we have increased our dividend payment.

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Changes in Diluted Earnings per Share Attributable to Air Products

	2018	2017	Increase (Decrease)
Diluted Earnings per Share			
Net income	**$6.78**	$13.65	($6.87)
Income from discontinued operations	**.19**	8.49	(8.30)
Income from Continuing Operations – GAAP	**$6.59**	$5.16	$1.43
Operating Income Impact (after-tax)			
Underlying business			
Volume			$.71
Price/raw materials			.16
Costs			(.45)
Currency			.16
Change in inventory valuation method			.08
Business separation costs			.12
Cost reduction and asset actions			.49
Goodwill and intangible asset impairment charge			.70
Gain on land sale			(.03)
Total Operating Income Impact (after-tax)			$1.94
Other Impact (after-tax)			
Equity affiliates' income			.15
Equity method investment impairment charge			.36
Interest expense			(.03)
Other non-operating income (expense), net			(.04)
Income tax			.44
Tax reform repatriation			(2.16)
Tax reform benefit related to deemed foreign dividends			.25
Tax reform rate change and other			.96
Tax restructuring			.16
Tax benefit associated with business separation			(.02)
Tax election benefit			(.50)
Noncontrolling interests			(.05)
Weighted average diluted shares			(.03)
Total Other Impact (after-tax)			($.51)
Total Change in Diluted Earnings per Share from Continuing Operations – GAAP Measure			$1.43

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	2018	2017	Increase (Decrease)
Income from Continuing Operations – GAAP Basis	**$6.59**	$5.16	$1.43
Change in inventory valuation method	**(.08)**	—	($.08)
Business separation costs	**—**	.12	(.12)
Tax benefit associated with business separation	**—**	(.02)	.02
Cost reduction and asset actions	**—**	.49	(.49)
Goodwill and intangible asset impairment charge	**—**	.70	(.70)
Gain on land sale	**—**	(.03)	.03
Equity method investment impairment charge	**—**	.36	(.36)
Pension settlement loss	**.15**	.03	.12
Tax reform repatriation	**2.16**	—	2.16
Tax reform benefit related to deemed foreign dividends	**(.25)**	—	(.25)
Tax reform rate change and other	**(.96)**	—	(.96)
Tax restructuring	**(.16)**	—	(.16)
Tax election benefit	**—**	(.50)	.50
Income from Continuing Operations – Non-GAAP Measure	**$7.45**	$6.31	$1.14

2019 OUTLOOK

In fiscal year 2019, we intend to grow our earnings by continuing to improve our base businesses and by bringing new, large projects onstream. We expect the full year impact of the Lu'An project to be a large contributor to our earnings growth. Backed by our strong financial position, we will strive to continue to win and invest in key growth projects, including large gasification projects that are consistent with our onsite business model. In addition, we expect lower sale of equipment activity from our Jazan project as it nears completion.

The above guidance should be read in conjunction with the section entitled “Forward-Looking Statements” of this Annual Report on Form 10-K.

RESULTS OF OPERATIONS

Discussion of Consolidated Results

	2018	2017	2016
Sales	**$8,930.2**	$8,187.6	$7,503.7
Operating income	**1,965.6**	1,440.0	1,535.1
Operating margin	**22.0 %**	17.6 %	20.5 %
Equity affiliates’ income	**174.8**	80.1	147.0
Income from continuing operations	**1,455.6**	1,134.4	1,099.5
Non-GAAP Measures			
Adjusted EBITDA	**$3,115.5**	$2,799.2	$2,621.8
Adjusted EBITDA margin	**34.9 %**	34.2 %	34.9 %
Adjusted operating income	**1,941.5**	1,773.8	1,620.2
Adjusted operating margin	**21.7 %**	21.7 %	21.6 %
Adjusted equity affiliates' income	**203.3**	159.6	147.0

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	% Change from Prior Year	
Sales	**2018**	2017
Underlying business		
Volume	**6** **%**	6 %
Price	**1** **%**	1 %
Energy and raw material cost pass-through	**—** **%**	3 %
Currency	**2** **%**	(1)%
Total Consolidated Sales Change	**9** **%**	9 %

2018 vs. 2017

Sales of $8,930.2 increased 9%, or $742.6. Underlying sales increased 7% from higher volumes of 6% and higher pricing of 1%. Volumes were higher across all regional Industrial Gases segments driven by new project onstreams, primarily in the Industrial Gases – Asia and Industrial Gases – EMEA segments, underlying base business growth, and an equipment sale resulting from the termination of a contract in the Industrial Gases – Asia segment. The regional volume increase was partially offset by lower sale of equipment activity in the Industrial Gases – Global segment. The pricing improvement was primarily attributable to the China and Europe merchant businesses. Energy and natural gas cost pass-through to customers was flat versus the prior year. Favorable currency impacts, primarily from the Euro, the British Pound Sterling, and the Chinese Renminbi, increased sales by 2%.

2017 vs. 2016

Sales of $8,187.6 increased 9.0%, or $683.9. Underlying sales increased 7% from higher volumes of 6% and higher pricing of 1%. Higher volumes, primarily due to new project onstreams, underlying base business growth across the Industrial Gases regions, and continued progress on the Jazan project within our Industrial Gases – Global segment, were partially offset by lower LNG project activity in the Corporate and other segment. The pricing improvement was primarily attributable to the Industrial Gases – Asia segment. Higher energy and natural gas cost pass-through to customers increased sales by 3%, and unfavorable currency effects reduced sales by 1%.

Operating Income and Margin

2018 vs. 2017

Operating income of $1,965.6 increased 37%, or $525.6, due to higher volumes of $204, a prior year goodwill and intangible asset impairment charge of $162, prior year cost reduction and asset actions of $151, favorable currency impacts of $47, favorable pricing, net of energy, fuel, and raw material costs, of $47, prior year business separation costs of $33, and a favorable impact from the change in inventory valuation method of $24, partially offset by unfavorable net operating costs of $130 and a prior year gain on land sale of $12. The increase in net operating costs was primarily driven by higher planned maintenance costs, lower cost reimbursement, including costs for transitions services, and higher costs to support growth opportunities. Operating margin of 22.0% increased 440 bp, primarily due to the goodwill and intangible asset impairment charge, cost reduction and asset actions, and business separation costs in the prior year.

On a non-GAAP basis, adjusted operating income of $1,941.5 increased 9%, or $167.7, primarily due to higher volumes, favorable currency impacts, and favorable pricing, net of energy, fuel, and raw material costs, partially offset by unfavorable net operating costs. Adjusted operating margin of 21.7% was flat as higher volumes and favorable pricing, net of power costs, were mostly offset by higher costs.

2017 vs. 2016

Operating income of $1,440.0 decreased 6%, or $95.1, as a goodwill and intangible asset impairment charge of $162, higher cost reduction and asset actions of $117, and unfavorable currency impacts of $9 were partially offset by favorable volumes of $83, favorable net operating costs of $73, lower business separation costs of $18, a gain on sale of land of $12, and favorable pricing, net of energy, fuel, and raw material costs of $7. Operating margin of 17.6% decreased 290 bp, primarily due to the goodwill and

intangible asset impairment charge and higher cost reduction and asset actions.
On a non-GAAP basis, adjusted operating income of $1,773.8 increased 9%, or $153.6, primarily due to higher volumes and favorable cost performance. Adjusted operating margin of 21.7% increased 10 bp as lower costs were partially offset by higher energy and natural gas pass-through to customers.

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Adjusted EBITDA

We define Adjusted EBITDA as income from continuing operations (including noncontrolling interests) excluding certain disclosed items, which the Company does not believe to be indicative of underlying business trends, before interest expense, other non-operating income (expense), net, income tax provision, and depreciation and amortization expense. Adjusted EBITDA provides a useful metric for management to assess operating performance.

2018 vs. 2017

Adjusted EBITDA of $3,115.5 increased 11%, or $316.3, primarily due to higher volumes, favorable currency, positive pricing, and income from regional industrial gases equity affiliates, partially offset by higher costs. Adjusted EBITDA margin of 34.9% increased 70 bp, primarily due to higher volumes and income from regional industrial gases equity affiliates, partially offset by higher costs.

2017 vs. 2016

Adjusted EBITDA of $2,799.2 increased 7%, or $177.4, primarily due to higher volumes and favorable cost performance. Adjusted EBITDA margin of 34.2% decreased 70 bp, primarily due to a 90 bp impact from higher energy pass-through to customers.

Equity Affiliates' Income

2018 vs. 2017

Income from equity affiliates of $174.8 increased $94.7. The fiscal year 2017 income included a noncash impairment charge of $79.5 ($.36 per share) on our investment in Abdullah Hashim Industrial Gases & Equipment Co., Ltd. (AHG), a 25%-owned equity affiliate in our Industrial Gases – EMEA segment. This charge has been excluded from segment results. Refer to Note 8, Summarized Financial Information of Equity Affiliates, to the consolidated financial statements for additional information. Fiscal year 2018 included an expense of $28.5 resulting from the U.S. Tax Cuts and Jobs Act. Refer to Note 22, Income Taxes, to the consolidated financial statements for additional information. On a non-GAAP basis, adjusted equity affiliates' income of $203.3 increased 27%, or $43.7, primarily driven by Industrial Gases – Americas and Industrial Gases – EMEA affiliates.

2017 vs. 2016

Income from equity affiliates of $80.1 decreased $66.9, primarily due to a noncash impairment charge of $79.5 ($.36 per share) on our investment in AHG in fiscal year 2017. On a non-GAAP basis, adjusted equity affiliates' income of $159.6 increased 9%, or $12.6.

Cost of Sales and Gross Margin

2018 vs. 2017

Cost of sales of $6,189.5 increased 8%, or $438.0, primarily due to higher costs attributable to sales volumes of $225, unfavorable currency impacts of $133, and higher other costs, including maintenance costs, of $97, partially offset by the benefit from the change in inventory valuation method from a last-in, first-out (LIFO) basis to a first-in, first-out (FIFO) basis of $24 in fiscal year 2018. For additional information on the change in inventory valuation method, refer to Note 1, Major Accounting Policies, and Note 7, Inventories, to the consolidated financial statements.

Gross margin of 30.7% increased 90 bp, primarily due to higher volumes, favorable pricing, net of raw materials, and the benefit from the change in inventory valuation adjustment, partially offset by higher other costs.

2017 vs. 2016

Cost of sales of $5,751.5 increased 11%, or $574.2, due to higher costs attributable to sales volumes of $418, higher energy and natural gas cost pass-through to customers of $218, and higher other costs of $21, partially offset by favorable currency impacts of $83.

Gross margin of 29.8% decreased 120 bp, primarily due to higher energy and natural gas cost pass-through to customers and unfavorable volume mix.

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Selling and Administrative Expense

2018 vs. 2017

Selling and administrative expense of $760.8 increased 7%, or $47.3, primarily driven by unfavorable currency impacts and higher costs to support growth opportunities, partially offset by cost reductions associated with the completion of transition services agreements with Versum and Evonik. Selling and administrative expense as a percent of sales decreased to 8.5% in fiscal year 2018 from 8.7% in fiscal year 2017.

2017 vs. 2016

Selling and administrative expense of $713.5 increased 4%, or $29.7, primarily due to costs in support of transition services agreements with Versum and Evonik, for which the reimbursement is reflected in "Other income (expense), net." Selling and administrative expense as a percent of sales decreased to 8.7% in fiscal year 2017 from 9.1% in fiscal year 2016.

Research and Development

2018 vs. 2017

Research and development expense of $64.5 increased 12%, or $6.9. Research and development expense as a percent of sales in fiscal years 2018 and 2017 was .7%.

2017 vs. 2016

Research and development expense of $57.6 decreased 20%, or $14.2. Research and development expense as a percent of sales decreased to .7% in fiscal year 2017 from 1.0% in fiscal year 2016.

Business Separation Costs

In fiscal year 2017, we completed the separation of the divisions comprising the former Materials Technologies segment through the spin-off of the Electronics Materials Division (EMD) as Versum Materials, Inc. (Versum) and the sale of the Performance Materials Division (PMD) to Evonik Industries AG (Evonik). For additional information on the dispositions, refer to Note 3, Discontinued Operations, to the consolidated financial statements.

In connection with the dispositions, we incurred net separation costs of $30.2 ($26.5 after-tax, or $.12 per share) in fiscal year 2017. The net costs include legal and advisory fees of $32.5, which are reflected on the consolidated income statements as “Business separation costs,” and a pension settlement benefit of $2.3 presented within "Other non-operating income (expense), net." Our fiscal year 2017 income tax provision includes net tax benefits of $5.5 ($.02 per share), primarily related to changes in tax positions on business separation activities.

In fiscal year 2016, we incurred business separation costs of $50.6 ($46.7 after-tax, or $.21 per share) for legal and advisory fees. Our fiscal year 2016 income tax provision includes additional tax expense related to the separation of $51.8 ($.24 per share), of which $45.7 resulted from a dividend to repatriate $443.8 from a subsidiary in South Korea to the U.S. in anticipation of the separation of EMD from the industrial gases business in South Korea.

Cost Reduction and Asset Actions

In fiscal year 2017, we recognized a net expense of $151.4 ($109.3 attributable to Air Products, after-tax, or $.49 per share) for cost reduction and asset actions. The year-to-date net expense included a charge of $154.8 for actions taken during fiscal year 2017, partially offset by the favorable settlement of the remaining $3.4 accrued balance associated with business restructuring actions taken in 2015. The charge included asset actions of $88.5 and severance actions of $66.3.

In fiscal year 2016, we recognized an expense of $34.5 ($24.7 after-tax, or $.11 per share) for severance and other benefits.

The charges we record for cost reduction and asset actions have been excluded from segment operating income. Refer to Note 5, Cost Reduction and Asset Actions, to the consolidated financial statements for additional details on these actions.

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Goodwill and Intangible Asset Impairment Charge

During the third quarter of fiscal year 2017, we determined that the goodwill and indefinite-lived intangible assets (primarily acquired trade names) associated with our Latin America reporting unit of our Industrial Gases – Americas segment were impaired. We recorded a noncash impairment charge of $162.1 ($154.1 attributable to Air Products, after-tax, or $.70 per share), which was driven by lower economic growth and profitability in the region. This impairment charge has been excluded from segment results. Refer to Note 10, Goodwill, and Note 11, Intangible Assets, to the consolidated financial statements for additional information.

Other Income (Expense), Net

Items recorded to "Other income (expense), net" arise from transactions and events not directly related to our principal income earning activities. The detail of "Other income (expense), net" is presented in Note 23, Supplemental Information, to the consolidated financial statements.

2018 vs. 2017

Other income (expense), net of $50.2 decreased $70.8, primarily due to lower income from the transition services agreements with Versum and Evonik, lower income from the sale of assets and investments, lower favorable contract settlements, and an unfavorable foreign exchange impact.

2017 vs. 2016

Other income (expense), net of $121.0 increased $71.6, primarily due to income from transition services agreements with Versum and Evonik, income from the sale of assets and investments, including a gain of $12.2 ($7.6 after-tax, or $.03 per share) resulting from the sale of a parcel of land, and a favorable foreign exchange impact.

Interest Expense

	2018	2017	2016
Interest incurred	**$150.0**	$139.6	$147.9
Less: Capitalized interest	**19.5**	19.0	32.7
Interest Expense	**$130.5**	$120.6	$115.2

2018 vs. 2017

Interest incurred increased $10.4 as project financing associated with the Lu'An joint venture and a higher average interest rate on the debt portfolio were partially offset by the impact from a lower average debt balance. The change in capitalized interest was driven by an increase in the carrying value of projects under construction.

2017 vs. 2016

Interest incurred decreased $8.3 as the impact from a lower average debt balance of $26 was partially offset by the impact from a higher average interest rate on the debt portfolio of $19. The change in capitalized interest was driven by a decrease in the carrying value of projects under construction, primarily as a result of our decision to exit from the EfW business.

Other Non-Operating Income (Expense), Net

2018 vs. 2017

Other non-operating income (expense), net of $5.1 decreased $11.5. During the fourth quarter of fiscal year 2018, we recognized a pension settlement loss of $43.7 ($33.2 after-tax, or $.15 per share) that primarily resulted from the transfer of certain pension payment obligations to an insurer for our U.S. salaried and hourly plans through the purchase of an irrevocable, nonparticipating group annuity contract with plan assets. For additional information, refer to Note 16, Retirement Benefits, to the consolidated financial statements. This loss was partially offset by higher interest income on cash and cash items and short-term investments and lower other non-service pension expense. The prior year pension expense included a settlement loss of $10.5 ($6.6 after-tax, or $.03 per share) associated with the U.S. Supplementary Pension Plan and a settlement benefit of $2.3 related to the disposition of EMD and PMD.

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2017 vs. 2016

Other non-operating income of $16.6 increased $22.0 from an expense of $5.4 in fiscal year 2016, primarily due to interest income on cash and time deposits, which are comprised primarily of proceeds from the sale of PMD. Fiscal year 2016 included a pension settlement loss of $5.1 ($3.3 after-tax, or $.02 per share) to accelerate recognition of a portion of actuarial losses deferred in accumulated other comprehensive loss, primarily associated with the U.S. Supplementary Pension Plan. In fiscal year 2016, interest income was included in "Other income (expense), net" and was not material.

Loss on Extinguishment of Debt

On 30 September 2016, in anticipation of the spin-off of EMD, Versum issued $425.0 of notes to Air Products, who then exchanged these notes with certain financial institutions for $418.3 of Air Products' outstanding commercial paper. This noncash exchange, which was excluded from the consolidated statements of cash flows, resulted in a loss of $6.9 ($4.3 after-tax, or $.02 per share). This loss was deductible for tax purposes.

Effective Tax Rate

The effective tax rate equals the income tax provision divided by income from continuing operations before taxes. Refer to Note 22, Income Taxes, to the consolidated financial statements for details on factors affecting the effective tax rate.

2018 vs. 2017

The effective tax rate was 26.0% and 18.4% in fiscal years 2018 and 2017, respectively. The current year rate was higher primarily due to the enactment of the U.S. Tax Cuts and Jobs Act ("the Tax Act") in the first quarter of fiscal year 2018, which significantly changed existing U.S. tax laws, including a reduction in the federal corporate income tax rate from 35% to 21% that became effective 1 January 2018, a deemed repatriation tax on unremitted foreign earnings, as well as other changes. As a result of the Tax Act, our income tax provision for fiscal year 2018 reflects a discrete net income tax expense of $180.6. This included a deemed repatriation tax on accumulated unremitted foreign earnings and adjustments to the future cost of repatriation from foreign investments of $448.6, partially offset by a benefit of $56.2 related to the U.S. taxation of deemed foreign dividends under the Tax Act. This benefit may be eliminated by future legislation. Fiscal year 2018 tax expense also includes a benefit of $211.8, primarily from the re-measurement of our net U.S. deferred tax liabilities at the lower corporate tax rate. In fiscal year 2018, we also recorded a tax benefit of $35.7 from the restructuring of foreign subsidiaries.

The income tax provision in fiscal year 2017 included a net income tax benefit of $111.4 resulting from a tax election related to a non-U.S. subsidiary. The effective tax rate in the prior year was also impacted by a goodwill impairment charge of $145.3 in our Latin America reporting unit and an impairment of $79.5 of an equity method investment for which no tax benefits were available.

On a non-GAAP basis, the adjusted effective tax rate decreased from 23.2% in fiscal year 2017 to 18.6% in fiscal year 2018. We estimate that the lower U.S. federal statutory rate and other impacts of the Tax Act reduced our fiscal year 2018 adjusted effective tax rate by approximately 3.5%. The current year rate was also lower due to a benefit of $9.1 related to a final foreign tax audit settlement.

We are reporting the impacts of the Tax Act provisionally based upon reasonable estimates as of 30 September 2018. The impacts are not yet finalized as they are dependent on factors and analysis not yet known or fully completed, including but not limited to, further book to U.S. tax adjustments for the earnings of foreign entities, the issuance of additional guidance, as well as our ongoing analysis of the Tax Act.

As a fiscal year-end taxpayer, certain provisions of the Tax Act became effective in our fiscal year 2018, while other provisions do not become effective until fiscal year 2019. The corporate tax rate reduction is effective as of 1 January 2018 and, accordingly, reduces our 2018 fiscal year U.S. federal statutory rate to a blended rate of approximately 24.5%.

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2017 vs. 2016

The effective tax rate was 18.4% and 27.8% in fiscal years 2017 and 2016, respectively. The 2017 rate included an impact of approximately 700 bp from a net income tax benefit resulting from a tax election related to a non-U.S. subsidiary and an impact of approximately 100 bp from excess tax benefits on share-based compensation resulting from the adoption of new accounting guidance in the first quarter of fiscal year 2017. These impacts were partially offset by an increase of approximately 200 bp due to both a goodwill impairment charge in our Latin America reporting unit and an impairment of an equity method investment for which no tax benefits were available. The 2016 rate included a 330 bp impact from tax costs associated with business separation, primarily resulting from a dividend declared in 2016 to repatriate cash from a foreign subsidiary as discussed above under Business Separation Costs. The remaining change was primarily due to the impact of business separation costs for which a tax benefit was estimated to not be available. On a non-GAAP basis, the adjusted effective tax rate decreased from 24.2% in fiscal year 2016 to 23.2% in fiscal year 2017, primarily due to excess tax benefits on share-based compensation.

Discontinued Operations

In fiscal year 2018, income from discontinued operations, net of tax, of $42.2 includes an income tax benefit of $25.6 resulting from the resolution of uncertain tax positions taken in conjunction with the disposition of our former European Homecare business in fiscal year 2012. In addition, we recorded an after-tax benefit of $17.6 resulting from the resolution of certain post-closing adjustments associated with the sale of PMD. Refer to Note 22, Income Taxes, to the consolidated financial statements for additional information. These benefits were partially offset by an after-tax loss of $1.0 related to EfW project exit activities, which were completed during the first quarter of fiscal year 2018.

In fiscal year 2017, income from discontinued operations, net of tax, of $1,866.0 includes a gain of $2,870 ($1,828 after-tax, or $8.32 per share) for the sale of PMD to Evonik. The sale closed on 3 January 2017 for $3.8 billion in cash. In addition, we recorded a loss on the disposal of EfW of $59.3 ($47.1 after-tax) during the first quarter of 2017, primarily for land lease obligations and to update our estimate of the net realizable value of the plant assets.

In fiscal year 2016, the loss from discontinued operations, net of tax, of $460.5 includes a loss of $945.7 ($846.6 after-tax) from the write down of EfW plant assets to their estimated net realizable value and a liability recorded for plant disposition and other costs. This loss was partially offset by the results of PMD and EMD.

Refer to Note 3, Discontinued Operations, to the consolidated financial statements for additional information.

Segment Analysis

Industrial Gases – Americas

	2018	2017	2016
Sales	**$3,758.8**	$3,637.0	$3,344.1
Operating income	**927.9**	946.1	891.3
Operating margin	**24.7** **%**	26.0 %	26.7 %
Equity affiliates' income	**82.0**	58.1	52.7
Adjusted EBITDA	**1,495.2**	1,468.6	1,387.6
Adjusted EBITDA margin	**39.8** **%**	40.4 %	41.5 %

	% Change from Prior Year	
Sales	**2018**	2017
Underlying business		
Volume	**4** **%**	2 %
Price	**—** **%**	— %
Energy and raw material cost pass-through	**(1** **)%**	6 %
Currency	**—** **%**	1 %
Total Industrial Gases – Americas Sales Change	**3** **%**	9 %

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2018 vs. 2017

Sales of $3,758.8 increased 3%, or $121.8. Underlying sales were up 4% from higher volumes, primarily in our onsite and merchant businesses, as pricing was flat. The onsite increase was primarily driven by higher hydrogen volumes in North America. Lower energy and natural gas cost pass-through to customers decreased sales by 1%. Currency was flat versus the prior year.

Operating income of $927.9 decreased 2%, or $18.2, primarily due to higher costs of $84 and lower pricing, net of power and fuel costs, of $13, partially offset by higher volumes of $76 and favorable currency impacts of $3. The higher costs included higher maintenance and supply chain costs. Operating margin of 24.7% decreased 130 bp from the prior year, primarily due to higher costs, partially offset by favorable volumes.

Equity affiliates' income of$82.0 increased 41%, or $23.9, primarily due to volume growth.

2017 vs. 2016

Underlying sales were up 2% from stronger hydrogen volumes and a new hydrogen plant in Canada. Higher energy and natural gas cost pass-through to customers increased sales by 6%. Favorable currency effects, primarily from the Chilean Peso, increased sales by 1%.

Operating income of $946.1 increased 6%, or $54.8, primarily due to lower operating costs of $35 and higher volumes of $18. Operating costs were lower due to benefits from productivity improvements. Operating margin decreased 70 bp from the prior year primarily due to higher energy and natural gas pass-through to customers, partially offset by favorable cost performance.

Equity affiliates' income of $58.1 increased $5.4, primarily due to lower maintenance expense and a new plant onstream.

Industrial Gases – EMEA

	2018	2017	2016
Sales	**$2,193.3**	$1,780.4	$1,704.4
Operating income	**445.8**	395.5	387.0
Operating margin	**20.3 %**	22.2 %	22.7 %
Equity affiliates' income	**61.1**	47.1	36.5
Adjusted EBITDA	**705.5**	619.7	609.2
Adjusted EBITDA margin	**32.2 %**	34.8 %	35.7 %

	% Change from Prior Year	
Sales	**2018**	2017
Underlying business		
Volume	**12 %**	6 %
Price	**1 %**	— %
Energy and raw material cost pass-through	**3 %**	1 %
Currency	**7 %**	(3)%
Total Industrial Gases – EMEA Sales Change	**23 %**	4 %

2018 vs. 2017

Sales of $2,193.3 increased 23%, or $412.9. Underlying sales were up 13% from higher volumes of 12% and higher pricing of 1%. The volume increase was primarily driven by a hydrogen plant in India and higher merchant volumes. Higher energy and natural gas cost pass-through to customers increased sales by 3%. Favorable currency impacts, primarily from the Euro and British Pound Sterling, increased sales by 7%.

Operating income of $445.8 increased 13%, or $50.3, due to higher volumes of $38, favorable currency impacts of $26, and higher pricing, net of power and fuel costs, of $4, partially offset by unfavorable costs $18. Operating margin of 20.3% decreased 190 bp from the prior year, primarily due to unfavorable costs and lower margins on the hydrogen volumes in India.

Equity affiliates' income of$61.1 increased 30%, or $14.0, primarily due to volume growth, lower costs, and favorable currency.

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2017 vs. 2016

Underlying sales were up 6% from higher volumes as pricing was flat. Volumes increased primarily due to a new plant onstream in India. Higher energy and natural gas cost pass-through to customers increased sales by 1%. Unfavorable currency effects, primarily from the British Pound Sterling, reduced sales by 3%.

Operating income of $395.5 increased 2%, or $8.5, primarily due to lower operating costs of $27 and higher volumes, including a new plant onstream, of $15, partially offset by lower price net of power costs of $18 and unfavorable currency impacts of $15. Operating costs were lower primarily due to benefits from operational improvements. Operating margin decreased 50 bp from the prior year, as lower price net of power costs, higher energy and natural gas pass-through to customers, and unfavorable currency impacts were partially offset by favorable cost performance.

Equity affiliates' income of $47.1 increased $10.6, primarily due to higher volumes.

Industrial Gases – Asia

	2018	2017	2016
Sales	**$2,458.0**	$1,964.7	$1,720.4
Operating income	**689.9**	532.6	452.8
Operating margin	**28.1** %	27.1 %	26.3 %
Equity affiliates' income	**58.3**	53.5	57.8
Adjusted EBITDA	**1,014.0**	789.3	708.5
Adjusted EBITDA margin	**41.3** %	40.2 %	41.2 %

	% Change from Prior Year	
Sales	**2018**	2017
Underlying business		
Volume	**17** %	14 %
Price	**4** %	1 %
Energy and raw material cost pass-through	**—** %	— %
Currency	**4** %	(1)%
Total Industrial Gases – Asia Sales Change	**25** %	14 %

2018 vs. 2017

Sales of $2,458.0 increased 25%, or $493.3. Underlying sales were up 21% from higher volumes of 17% and higher pricing of 4%. The volume increase was primarily driven by new plant onstreams, including the Lu'An project, an equipment sale resulting from the termination of a contract in the first quarter of fiscal year 2018, and higher merchant volumes, partially offset by the impact of short-term sale of equipment activity in fiscal year 2017. Pricing improved across Asia driven primarily by the China merchant market. Energy and natural gas cost pass-through to customers was flat versus the prior year. Favorable currency impacts, primarily from the Chinese Renminbi, South Korean Won, and Taiwan Dollar, increased sales by 4%.

Operating income of $689.9 increased 30%, or $157.3, due to higher volumes of $107, favorable price, net of power costs, of $53, and favorable currency impacts of $21, partially offset by higher operating costs of $24. Operating margin of 28.1% increased 100 bp as favorable price, net of power costs, and higher volumes were partially offset by unfavorable cost performance.

Equity affiliates' income of$58.3 increased 9%, or $4.8, primarily due to higher volumes.

2017 vs. 2016

Underlying sales were up 15% from higher volumes of 14% and higher pricing of 1%. Volumes increased primarily due to new plant onstreams, sale of equipment activity, and base business growth driven by higher merchant volumes across Asia. Pricing was up 1% primarily due to increases in China wholesale, spot, and underlying prices during the second half of the year across all merchant liquid product lines. Unfavorable currency effects reduced sales by 1%, primarily from the Chinese Renminbi, partially offset by strengthening of the South Korean Won and Taiwan Dollar.

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Operating income of $532.6 increased 18%, or $79.8, due to higher volumes of $68 and higher price net of power costs of $24, partially offset by higher operating costs of $8 and an unfavorable currency impact of $4. Operating margin increased 80 bp, primarily due to higher price net of power costs and favorable volumes partially offset by unfavorable cost performance.

Equity affiliates' income of $53.5 decreased $4.3, primarily due to favorable contract and insurance settlements in fiscal year 2016.

Industrial Gases – Global

The Industrial Gases – Global segment includes sales of cryogenic and gas processing equipment for air separation and centralized global costs associated with management of all the Industrial Gases segments.

	2018	2017	2016
Sales	**$436.1**	$722.9	$498.8
Operating income (loss)	**53.9**	71.1	(21.5)
Adjusted EBITDA	**63.9**	80.9	(13.6)

2018 vs. 2017

Sales of $436.1 decreased 40%, or $286.8. The decrease in sales was primarily driven by lower sale of equipment activity on the multiple air separation units that will serve Saudi Aramco's Jazan oil refinery and power plant in Saudi Arabia. We expect to complete this project in 2019.

Operating income of $53.9 decreased 24%, or $17.2, primarily due to the lower sale of equipment activity.

2017 vs. 2016

Sales of $722.9 increased $224.1, or 45%. The increase in sales was primarily driven by higher sales activity for our Jazan sale of equipment project.

Operating income of $71.1 increased $92.6 from an operating loss in fiscal year 2016, primarily from income on the Jazan project and productivity improvements.

Corporate and other

The Corporate and other segment includes our LNG and helium storage and distribution sale of equipment businesses and corporate support functions that benefit all segments. The results of the Corporate and other segment also include income and expense that is not directly associated with the other segments, such as foreign exchange gains and losses and stranded costs related to the former Materials Technologies segment, which is presented within discontinued operations. Stranded costs primarily relate to costs in support of transition services agreements with Versum and Evonik, the majority of which were reimbursed to Air Products. All transition services were completed during fiscal year 2018.

	2018	2017	2016
Sales	**$84.0**	$82.6	$236.0
Operating loss	**(176.0)**	(171.5)	(89.4)
Adjusted EBITDA	**(163.1)**	(159.3)	(69.9)

2018 vs. 2017

Sales of $84.0 increased 2%, or $1.4. Operating loss of $176.0 increased 3%, or $4.5.

2017 vs. 2016

Sales of $82.6 decreased $153.4, primarily due to lower LNG activity. Operating loss of $171.5 increased $82.1 due to lower LNG activity, partially offset by productivity improvements and income from transition service agreements with Versum and Evonik.

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RECONCILIATION OF NON-GAAP FINANCIAL MEASURES

(Millions of dollars unless otherwise indicated, except for per share data)

The Company has presented certain financial measures on a non-GAAP (“adjusted”) basis and has provided a reconciliation to the most directly comparable financial measure calculated in accordance with GAAP. These financial measures are not meant to be considered in isolation or as a substitute for the most directly comparable financial measure calculated in accordance with GAAP. The Company believes these non-GAAP measures provide investors, potential investors, securities analysts, and others with useful information to evaluate the performance of the business because such measures, when viewed together with our financial results computed in accordance with GAAP, provide a more complete understanding of the factors and trends affecting our historical financial performance and projected future results.

In many cases, our non-GAAP measures are determined by adjusting the most directly comparable GAAP financial measure to exclude certain disclosed items (“non-GAAP adjustments”) that we believe are not representative of the underlying business performance. For example, in fiscal years 2017 and 2016, we restructured the Company to focus on its core Industrial Gases business. This resulted in significant cost reduction and asset actions that we believe were important for investors to understand separately from the performance of the underlying business. Additionally, in fiscal year 2018, we recorded discrete impacts associated with the Tax Act. The reader should be aware that we may incur similar expenses in the future. The tax impact on our pre-tax non-GAAP adjustments reflects the expected current and deferred income tax expense impact of the transactions and is impacted primarily by the statutory tax rate of the various relevant jurisdictions and the taxability of the adjustments in those jurisdictions. Investors should also consider the limitations associated with these non-GAAP measures, including the potential lack of comparability of these measures from one company to another.

During the first quarter of fiscal year 2018, we adopted accounting guidance on the presentation of net periodic pension and postretirement benefit cost. Certain prior year information has been reclassified to conform to the fiscal year 2018 presentation. Refer to Note 2, New Accounting Guidance, to the consolidated financial statements for additional information.

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Presented below are reconciliations of the reported GAAP results to the non-GAAP measures:

CONSOLIDATED RESULTS

	Continuing Operations					
	Operating Income	Operating Margin[A]	Equity Affiliates' Income	Income Tax Provision	Net Income	Diluted EPS
2018 GAAP	**$1,965.6**	**22.0 %**	**$174.8**	**$524.3**	**$1,455.6**	**$6.59**
2017 GAAP	**1,440.0**	**17.6 %**	**80.1**	**260.9**	**1,134.4**	**5.16**
Change GAAP	$525.6	440 bp	$94.7	$263.4	$321.2	$1.43
% Change GAAP	37 %		118 %	101 %	28 %	28 %
2018 GAAP	$1,965.6	22.0 %	$174.8	$524.3	$1,455.6	$6.59
Change in inventory valuation method	(24.1)	(.3)%	—	(6.6)	(17.5)	(.08)
Pension settlement loss[B]	—	— %	—	10.5	33.2	.15
Tax reform repatriation	—	— %	28.5	(448.6)	477.1	2.16
Tax reform benefit related to deemed foreign dividends	—	— %	—	56.2	(56.2)	(.25)
Tax reform rate change and other	—	— %	—	211.8	(211.8)	(.96)
Tax restructuring	—	— %	—	35.7	(35.7)	(.16)
2018 Non-GAAP Measure	**$1,941.5**	**21.7 %**	**$203.3**	**$383.3**	**$1,644.7**	**$7.45**
2017 GAAP	$1,440.0	17.6 %	$80.1	$260.9	$1,134.4	$5.16
Business separation costs	32.5	.4 %	—	3.7	26.5	.12
Tax benefit associated with business separation	—	— %	—	5.5	(5.5)	(.02)
Cost reduction and asset actions[C]	151.4	1.8 %	—	41.6	109.3	.49
Goodwill and intangible asset impairment charge[D]	162.1	2.0 %	—	4.6	154.1	.70
Gain on land sale	(12.2)	(.1)%	—	(4.6)	(7.6)	(.03)
Equity method investment impairment charge	—	— %	79.5	—	79.5	.36
Pension settlement loss[B]	—	— %	—	3.9	6.6	.03
Tax election benefit	—	— %	—	111.4	(111.4)	(.50)
2017 Non-GAAP Measure	**$1,773.8**	**21.7 %**	**$159.6**	**$427.0**	**$1,385.9**	**$6.31**
Change Non-GAAP Measure	$167.7	—	$43.7	($43.7)	$258.8	$1.14
% Change Non-GAAP Measure	9 %		27 %	(10)%	19 %	18 %

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	Continuing Operations				
	Operating Income	Operating Margin[A]	Equity Affiliates' Income	Income Tax Provision	Net Income	Diluted EPS
2017 GAAP	**$1,440.0**	**17.6 %**	**$80.1**	**$260.9**	**$1,134.4**	**$5.16**
2016 GAAP	**1,535.1**	**20.5 %**	**147.0**	**432.6**	**1,099.5**	**5.04**
Change GAAP	($95.1)	(290) bp	($66.9)	($171.7)	$34.9	$.12
% Change GAAP	(6)%		(46)%	(40)%	3 %	2 %
2017 GAAP	$1,440.0	17.6 %	$80.1	$260.9	$1,134.4	$5.16
Business separation costs	32.5	.4 %	—	3.7	26.5	.12
Tax benefit associated with business separation	—	— %	—	5.5	(5.5)	(.02)
Cost reduction and asset actions[C]	151.4	1.8 %	—	41.6	109.3	.49
Goodwill and intangible asset impairment charge[D]	162.1	2.0 %	—	4.6	154.1	.70
Gain on land sale	(12.2)	(.1)%	—	(4.6)	(7.6)	(.03)
Equity method investment impairment charge	—	— %	79.5	—	79.5	.36
Pension settlement loss[B]	—	— %	—	3.9	6.6	.03
Tax election benefit	—	— %	—	111.4	(111.4)	(.50)
2017 Non-GAAP Measure	**$1,773.8**	**21.7 %**	**$159.6**	**$427.0**	**$1,385.9**	**$6.31**
2016 GAAP	$1,535.1	20.5 %	$147.0	$432.6	$1,099.5	$5.04
Business separation costs	50.6	.7 %	—	3.9	46.7	.21
Tax costs associated with business separation	—	— %	—	(51.8)	51.8	.24
Cost reduction and asset actions	34.5	.4 %	—	9.8	24.7	.11
Pension settlement loss[B]	—	— %	—	1.8	3.3	.02
Loss on extinguishment of debt[E]	—	— %	—	2.6	4.3	.02
2016 Non-GAAP Measure	**$1,620.2**	**21.6 %**	**$147.0**	**$398.9**	**$1,230.3**	**$5.64**
Change Non-GAAP Measure	$153.6	10 bp	$12.6	$28.1	$155.6	$.67
% Change Non-GAAP Measure	9 %		9 %	7 %	13 %	12 %

[A] Operating margin is calculated by dividing operating income by sales.

[B] Reflected on the consolidated income statements in "Other non-operating income (expense), net." Fiscal year 2018 includes a before-tax impact of $43.7 primarily resulting from the transfer of certain pension payment obligations to an insurer through the purchase of an irrevocable, nonparticipating group annuity contract during the fourth quarter.

[C] Noncontrolling interests impact of $.5 in fiscal year 2017.

[D] Noncontrolling interests impact of $3.4 in fiscal year 2017.

[E] Income from continuing operations before taxes impact of $6.9 in fiscal year 2016.

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ADJUSTED EBITDA

We define Adjusted EBITDA as income from continuing operations (including noncontrolling interests) excluding certain disclosed items, which the Company does not believe to be indicative of underlying business trends, before interest expense, other non-operating income (expense), net, income tax provision, and depreciation and amortization expense. Adjusted EBITDA provides a useful metric for management to assess operating performance.

Below is a reconciliation of income from continuing operations on a GAAP basis to adjusted EBITDA:

	2018	2017	2016	2015	2014
Income From Continuing Operations[(A)]	**$1,490.7**	$1,155.2	$1,122.0	$965.9	$691.0
Less: Change in inventory valuation method	**24.1**	—	—	—	—
Add: Interest expense	**130.5**	120.6	115.2	102.8	124.0
Less: Other non-operating income (expense), net	**5.1**	16.6	(5.4)	(42.3)	(51.7)
Add: Income tax provision	**524.3**	260.9	432.6	300.2	258.1
Add: Depreciation and amortization	**970.7**	865.8	854.6	858.5	875.6
Add: Business separation costs	**—**	32.5	50.6	7.5	—
Add: Cost reduction and asset actions	**—**	151.4	34.5	180.1	11.1
Add: Goodwill and intangible asset impairment charge	**—**	162.1	—	—	310.1
Less: Gain on previously held equity interest	**—**	—	—	17.9	—
Less: Gain on land sales	**—**	12.2	—	33.6	—
Add: Equity method investment impairment charge	**—**	79.5	—	—	—
Add: Loss on extinguishment of debt	**—**	—	6.9	16.6	—
Add: Tax reform repatriation - equity method investment	**28.5**	—	—	—	—
Adjusted EBITDA	**$3,115.5**	$2,799.2	$2,621.8	$2,422.4	$2,321.6
Adjusted EBITDA margin	**34.9 %**	34.2 %	34.9 %	31.0 %	27.7 %
Change GAAP					
Income from continuing operations change	**$335.5**	$33.2	$156.1	$274.9	
Income from continuing operations % change	**29 %**	3 %	16 %	40 %	
Change Non-GAAP					
Adjusted EBITDA change	**$316.3**	$177.4	$199.4	$100.8	
Adjusted EBITDA % change	**11 %**	7 %	8 %	4 %	
Adjusted EBITDA margin change	70 bp	(70) bp	390 bp	330 bp	

(A) Includes net income attributable to noncontrolling interests.

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Below is a summary of segment operating income:

	Industrial Gases–Americas	Industrial Gases–EMEA	Industrial Gases–Asia	Industrial Gases–Global	Corporate and other	Segment Total
GAAP Measure						
Twelve Months Ended 30 September 2018						
Operating income (loss)	$927.9	$445.8	$689.9	$53.9	($176.0)	$1,941.5
Operating margin	24.7 %	20.3 %	28.1 %			21.7 %
Twelve Months Ended 30 September 2017						
Operating income (loss)	$946.1	$395.5	$532.6	$71.1	($171.5)	$1,773.8
Operating margin	26.0 %	22.2 %	27.1 %			21.7 %
Twelve Months Ended 30 September 2016						
Operating income (loss)	$891.3	$387.0	$452.8	($21.5)	($89.4)	$1,620.2
Operating margin	26.7 %	22.7 %	26.3 %			21.6 %
2018 vs. 2017						
Operating income (loss) change	($18.2)	$50.3	$157.3	($17.2)	($4.5)	$167.7
Operating income (loss) % change	(2)%	13 %	30 %	(24)%	(3)%	9 %
Operating margin change	(130) bp	(190) bp	100 bp			—
2017 vs. 2016						
Operating income (loss) change	$54.8	$8.5	$79.8	$92.6	($82.1)	$153.6
Operating income (loss) % change	6 %	2 %	18 %	431 %	(92)%	9 %
Operating margin change	(70) bp	(50) bp	80 bp			10 bp

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Below is a reconciliation of segment operating income to adjusted EBITDA:

	Industrial Gases–Americas	Industrial Gases–EMEA	Industrial Gases–Asia	Industrial Gases–Global	Corporate and other	Segment Total
Non-GAAP Measure						
Twelve Months Ended 30 September 2018						
Operating income (loss)	$927.9	$445.8	$689.9	$53.9	($176.0)	$1,941.5
Add: Depreciation and amortization	485.3	198.6	265.8	8.1	12.9	970.7
Add: Equity affiliates' income	82.0	61.1	58.3	1.9	—	203.3
Adjusted EBITDA	$1,495.2	$705.5	$1,014.0	$63.9	($163.1)	$3,115.5
Adjusted EBITDA margin[(A)]	39.8 %	32.2 %	41.3 %			34.9 %
Twelve Months Ended 30 September 2017						
Operating income (loss)	$946.1	$395.5	$532.6	$71.1	($171.5)	$1,773.8
Add: Depreciation and amortization	464.4	177.1	203.2	8.9	12.2	865.8
Add: Equity affiliates' income	58.1	47.1	53.5	.9	—	159.6
Adjusted EBITDA	$1,468.6	$619.7	$789.3	$80.9	($159.3)	$2,799.2
Adjusted EBITDA margin[(A)]	40.4 %	34.8 %	40.2 %			34.2 %
Twelve Months Ended 30 September 2016						
Operating income (loss)	$891.3	$387.0	$452.8	($21.5)	($89.4)	$1,620.2
Add: Depreciation and amortization	443.6	185.7	197.9	7.9	19.5	854.6
Add: Equity affiliates' income	52.7	36.5	57.8	—	—	147.0
Adjusted EBITDA	$1,387.6	$609.2	$708.5	($13.6)	($69.9)	$2,621.8
Adjusted EBITDA margin[(A)]	41.5 %	35.7 %	41.2 %			34.9 %
2018 vs. 2017						
Adjusted EBITDA change	$26.6	$85.8	$224.7	($17.0)	($3.8)	$316.3
Adjusted EBITDA % change	2 %	14 %	28 %	(21)%	(2)%	11 %
Adjusted EBITDA margin change	(60) bp	(260) bp	110 bp			70 bp
2017 vs. 2016						
Adjusted EBITDA change	$81.0	$10.5	$80.8	$94.5	($89.4)	$177.4
Adjusted EBITDA % change	6 %	2 %	11 %	695 %	(128)%	7 %
Adjusted EBITDA margin change	(110) bp	(90) bp	(100) bp			(70) bp

[(A)] Adjusted EBITDA margin is calculated by dividing Adjusted EBITDA by sales.

Below is a reconciliation of segment total operating income to consolidated operating income:

Operating Income	**2018**	2017	2016
Segment total	**$1,941.5**	$1,773.8	$1,620.2
Change in inventory valuation method	**24.1**	—	—
Business separation costs	**—**	(32.5)	(50.6)
Cost reduction and asset actions	**—**	(151.4)	(34.5)
Goodwill and intangible asset impairment charge	**—**	(162.1)	—
Gain on land sale	**—**	12.2	—
Consolidated Total	**$1,965.6**	$1,440.0	$1,535.1

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Below is a reconciliation of segment total equity affiliates' income to consolidated equity affiliates' income:

Equity Affiliates' Income	**2018**	2017	2016
Segment total	**$203.3**	$159.6	$147.0
Equity method investment impairment charge	**—**	(79.5)	—
Tax reform repatriation - equity method investment	**(28.5)**	—	—
Consolidated Total	**$174.8**	$80.1	$147.0

INCOME TAXES

The tax impact of our pre-tax non-GAAP adjustments reflects the expected current and deferred income tax expense impact of the transactions and is impacted primarily by the statutory tax rate of the various relevant jurisdictions and the taxability of the adjustments in those jurisdictions. For additional discussion on the fiscal year 2018 non-GAAP tax adjustments, including the impact of the U.S. Tax Cuts and Jobs Act, refer to Note 22, Income Taxes, to the consolidated financial statements.

	Effective Tax Rate		
	2018	2017	2016
Income Tax Provision—GAAP	**$524.3**	**$260.9**	**$432.6**
Income From Continuing Operations Before Taxes—GAAP	**$2,015.0**	**$1,416.1**	**$1,554.6**
Effective Tax Rate—GAAP	**26.0 %**	**18.4 %**	**27.8 %**
Income Tax Provision—GAAP	$524.3	$260.9	$432.6
Change in inventory valuation method	(6.6)	—	—
Business separation costs	—	3.7	3.9
Tax benefit (costs) associated with business separation	—	5.5	(51.8)
Cost reduction and asset actions	—	41.6	9.8
Goodwill and intangible asset impairment charge	—	4.6	—
Gain on land sale	—	(4.6)	—
Pension settlement loss	10.5	3.9	1.8
Loss on extinguishment of debt	—	—	2.6
Tax reform repatriation	(448.6)	—	—
Tax reform benefit related to deemed foreign dividends	56.2	—	—
Tax reform rate change and other	211.8	—	—
Tax restructuring	35.7	—	—
Tax election benefit	—	111.4	—
Income Tax Provision—Non-GAAP Measure	**$383.3**	**$427.0**	**$398.9**
Income from Continuing Operations before Taxes—GAAP	$2,015.0	$1,416.1	$1,554.6
Change in inventory valuation method	(24.1)	—	—
Business separation costs	—	30.2	50.6
Cost reduction and asset actions	—	151.4	34.5
Goodwill and intangible asset impairment charge	—	162.1	—
Gain on land sale	—	(12.2)	—
Equity method investment impairment charge	—	79.5	—
Pension settlement loss	43.7	10.5	5.1
Loss on extinguishment of debt	—	—	6.9
Tax reform repatriation - equity method investment	28.5	—	—
Income From Continuing Operations Before Taxes—Non-GAAP Measure	**$2,063.1**	**$1,837.6**	**$1,651.7**
Effective Tax Rate—Non-GAAP Measure	**18.6 %**	**23.2 %**	**24.2 %**

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LIQUIDITY AND CAPITAL RESOURCES

We maintained a strong financial position throughout 2018 and as of 30 September 2018 our consolidated balance sheet included cash and cash items of $2,791.3. We continue to have consistent access to commercial paper markets, and cash flows from operating and financing activities are expected to meet liquidity needs for the foreseeable future.

As of 30 September 2018, we had $995.1 of foreign cash and cash items compared to a total amount of cash and cash items of $2,791.3. As a result of the Tax Act, we currently do not expect that a significant portion of the earnings of our foreign subsidiaries and affiliates will be subject to U.S. income tax upon subsequent repatriation to the United States. Depending on the country in which the subsidiaries and affiliates reside, the repatriation of these earnings may be subject to foreign withholding and other taxes. However, since we have significant current investment plans outside the U.S., it is our intent to permanently reinvest the majority of our foreign cash and cash items that would be subject to additional taxes outside the U.S. Refer to Note 22, Income Taxes, for additional information.

Our cash flows from operating, investing, and financing activities from continuing operations, as reflected in the consolidated statements of cash flows, are summarized in the following table:

Cash provided by (used for)	**2018**	2017	2016
Operating activities	**$2,554.7**	$2,534.1	$2,258.8
Investing activities	**(1,649.1)**	(1,417.7)	(864.8)
Financing activities	**(1,359.8)**	(2,040.9)	(860.2)

Operating Activities

For the year ended 2018, cash provided by operating activities was $2,554.7. Income from continuing operations of $1,455.6 was adjusted for items including depreciation and amortization, deferred income taxes, impacts from the Tax Act, undistributed earnings of unconsolidated affiliates, share-based compensation, and noncurrent capital lease receivables. Other adjustments of $131.6 include a $54.9 net impact from the remeasurement of intercompany transactions. The related hedging instruments that eliminate the earnings impact are included as a working capital adjustment in other receivables or payables and accrued liabilities. In addition, other adjustments were impacted by cash received from the early termination of a cross currency swap of $54.4, as well as the excess of pension expense over pension contributions of $23.5. The working capital accounts were a use of cash of $265.4, primarily driven by payables and accrued liabilities, inventories, and trade receivables, partially offset by other receivables. The use of cash in payables and accrued liabilities of $277.7 includes a decrease in customer advances of $145.7 primarily related to sale of equipment activity and $67.1 for maturities of forward exchange contracts that hedged foreign currency exposures. The use of cash in inventories primarily resulted from the purchase of helium molecules. In addition, inventories reflect the noncash impact of our change in accounting for U.S. inventories from LIFO to FIFO. The source of cash from other receivables of $123.6 was primarily due to the maturities of forward exchange contracts that hedged foreign currency exposures

For the year ended 2017, cash provided by operating activities was $2,534.1. Income from continuing operations of $1,134.4 included a goodwill and intangible asset impairment charge of $162.1, an equity method investment impairment charge of $79.5, and a write-down of long-lived assets associated with restructuring of $69.2. Refer to Note 5, Cost Reduction and Asset Actions; Note 8, Summarized Financial Information of Equity Affiliates; Note 10, Goodwill; and Note 11, Intangible Assets, of the consolidated financial statements for additional information on these charges. Other adjustments of $165.4 included changes in uncertain tax positions and the fair value of foreign exchange contracts that hedge intercompany loans as well as pension contributions and expense. The working capital accounts were a source of cash of $48.0 that were primarily driven by payables and accrued liabilities and other receivables, partially offset by other working capital and trade receivables. The increase in payables and accrued liabilities of $163.8 was primarily due to timing differences related to payables and accrued liabilities and an increase in customer advances of $52.8 primarily related to sale of equipment activity. The source of cash from other receivables of $124.7 was primarily due to the maturities of forward exchange contracts that

hedged foreign currency exposures. Other working capital was a use of cash of $154.0, primarily driven by payments for income taxes. Trade receivables was a use of cash of $73.6 which is primarily due to timing differences.

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For the year ended 2016, cash provided by operating activities was $2,258.8. Income from continuing operations of $1,099.5 included a loss on extinguishment of debt of $6.9. Other adjustments of $156.7 were primarily driven by the remeasurement of intercompany transactions as the related hedging instruments that eliminate the earnings impact are included in other receivables and payables and accrued liabilities. The working capital accounts were a source of cash of $21.2 that were primarily driven by payables and accrued liabilities and inventory partially offset by trade receivables and other working capital. The increase in payables and accrued liabilities of $60.1 was primarily related to an increase in customer advances which includes payment from our joint venture in Jazan, Saudi Arabia and was partially offset by the changes in the fair value of foreign exchange contracts that hedge intercompany loans. The use of cash from other working capital of $47.8 was primarily driven by advances associated with the purchase of helium partially offset by an increase in accrued income taxes, including the impacts of higher income.

Investing Activities

For the year ended 30 September 2018, cash used for investing activities was $1,649.1. Capital expenditures for plant and equipment was $1,568.4. Cash paid for acquisitions, net of cash acquired was $345.4. Refer to Note 6,

Acquisitions, to the consolidated financial statements for further details. Purchases of investments of $530.3 include short-term instruments with original maturities greater than three months and less than one year. Proceeds from investments of $748.2 resulted from maturities of short-term instruments with original maturities greater than three months and less than one year.

For the year ended 30 September 2017, cash used for investing activities was $1,417.7. Capital expenditures for plant and equipment was $1,039.7. Purchases of investments of $2,692.6 exceeded our proceeds from investments of $2,290.7.

For the year ended 30 September 2016, cash used for investing activities was $864.8, driven by capital expenditures for plant and equipment of $907.7. Proceeds from the sale of assets and investments of $44.6 was primarily driven by the receipt of $30.0 for our rights to a corporate aircraft that was under construction.

Capital Expenditures

Capital expenditures are detailed in the following table:

	2018	2017	2016
Additions to plant and equipment	**$1,568.4**	$1,039.7	$907.7
Acquisitions, less cash acquired	**345.4**	8.2	—
Investments in and advances to unconsolidated affiliates	**—**	8.1	—
Capital Expenditures on a GAAP Basis	**$1,913.8**	$1,056.0	$907.7
Capital lease expenditures[(A)]	**20.2**	9.9	27.2
Capital Expenditures on a Non-GAAP Basis	**$1,934.0**	$1,065.9	$934.9

(A) We utilize a non-GAAP measure in the computation of capital expenditures and include spending associated with facilities accounted for as capital leases. Certain contracts associated with facilities that are built to provide product to a specific customer are required to be accounted for as leases, and such spending is reflected as a use of cash in the consolidated statements of cash flows within "Cash Provided by Operating Activities" if the arrangement qualifies as a capital lease. The presentation of this non-GAAP measure is intended to enhance the usefulness of information by providing a measure that our management uses internally to evaluate and manage our expenditures.

Capital expenditures on a GAAP basis in fiscal year 2018 totaled $1,913.8, compared to $1,056.0 in fiscal year 2017. The increase of $857.8 was primarily due to major project spending and higher business combination activity, including the purchase of gasification and syngas clean up assets from Lu'An. Refer to Note 6, Acquisitions, to the consolidated financial statements for additional information. Additions to plant and equipment also included support capital of a routine, ongoing nature, including expenditures for distribution equipment and facility improvements.

Capital expenditures on a non-GAAP basis in fiscal year 2018 totaled $1,934.0 compared to $1,065.9 in fiscal year 2017. The increase of $868.1 was primarily due to higher major project spending and higher business combination activity.

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On 19 April 2015, a joint venture between Air Products and ACWA Holding entered into a 20-year oxygen and nitrogen supply agreement to supply Saudi Aramco's oil refinery and power plant being built in Jazan, Saudi Arabia. Air Products owns 25% of the joint venture. During 2016, we recorded a noncash transaction of $26.9 to our investment in net assets of and advances to equity affiliates to increase our obligation to invest in the joint venture to $94.4. This noncash transaction was excluded from the consolidated statements of cash flows. We expect to invest approximately $100 in this joint venture.

Sales backlog represents our estimate of revenue to be recognized in the future on our share of Air Products' sale of equipment orders and related process technologies that are under firm contracts. The sales backlog for the Company at 30 September 2018 was $204 compared to $481 at 30 September 2017.

2019 Outlook

Capital expenditures for new plant and equipment in fiscal year 2019 are expected to be approximately $2,300 to $2,500. A majority of the total capital expenditures are expected to be for new plants that are currently under construction or expected to start construction. It is anticipated that capital expenditures will be funded principally with our current cash balance and cash generated from continuing operations. In addition, we intend to continue to evaluate acquisitions of small and medium size industrial gas companies or assets from other industrial gas companies; the purchase of existing industrial gas facilities from our customers to create long-term contracts where we own and operate the plant and sell industrial gases to the customer based on a fixed fee; and investment in very large industrial gas projects driven by demand for more energy, cleaner energy, and emerging market growth.

Financing Activities

For the year ended 2018, cash used for financing activities was $1,359.8. This consisted primarily of dividend payments to shareholders of $897.8 and payments on long-term debt of $418.7. Payments on long-term debt primarily related to the repayment of a 1.2% U.S. Senior Note of $400.0 that matured on 16 October 2017.

For the year ended 2017, cash used for financing activities was $2,040.9. This consisted primarily of repayments of commercial paper and short-term borrowings of $798.6, dividend payments to shareholders of $787.9 and payments on long-term debt of $483.9. Payments on long-term debt primarily consisted of the repayment of a 4.625% Eurobond of €300 million ($317.2) that matured on 15 March 2017 and $138.0 for the repayment of industrial revenue bonds.

For the year ended 2016, cash used for financing activities was $860.2. Our borrowings (short- and long-term proceeds, net of repayments) were a net use of cash of $237.7 and included the repayment of the 2.0% Senior Note of $350.0 million on 2 August 2016, and a $144.2 use of cash for net commercial paper and other short-term debt borrowings which were partially offset by debt proceeds from the issuance of a .375% Eurobond of €350 million ($386.9) on 1 June 2016. Versum distributed in-kind notes with an aggregate principal amount of $425.0 to Air Products. However, since Air Products exchanged these notes with certain financial institutions for $418.3 of Air Products' outstanding commercial paper, this noncash debt for debt exchange was excluded from the consolidated statements of cash flows. Refer to Note 4, Materials Technologies Separation, to the consolidated financial statements for additional details. We also used cash to pay dividends of $721.2 and received proceeds from stock option exercises of $141.3.

Discontinued Operations

For the year ended 2018, cash flows of discontinued operations were not material.

For the year ended 2017, cash flows of discontinued operations primarily included impacts associated with the spin-off of EMD as Versum on 1 October 2016 and the sale of PMD to Evonik on 3 January 2017. Cash used for operating activities of $966.2 was primarily driven by taxes paid on the gain on the sale of PMD. Cash provided by investing activities of $3,750.6 primarily resulted from the proceeds on the sale of PMD. Cash provided by financing activities resulted from a $69.5 receipt of cash from Versum related to finalization of the spin-off.

For the year ended 2016, discontinued operations primarily includes the Energy-from-Waste business, which the Company decided to exit in the second quarter of 2016, and the Materials Technologies business

which contained two divisions, EMD and PMD. Cash provided by discontinued operations was $753.6 primarily driven by income from operations of discontinued operations, which excludes the noncash impairment charge, of $386.1 and long-term debt proceeds from Versum's Term Loan B of $575.0, partially offset by capital expenditures for plant and equipment of $245.1. Refer to Note 3, Discontinued Operations, to the consolidated financial statements for additional information.

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Financing and Capital Structure

Capital needs in fiscal year 2018 were satisfied primarily with cash from operations. At the end of 2018, total debt outstanding was $3,812.6 compared to $3,962.8 at the end of 2017, and cash and cash items were $2,791.3 compared to $3,273.6 at the end of 2017. Total debt as of 30 September 2018 includes related party debt of 2.6 billion RMB ($384) associated with the Lu'An joint venture.

On 31 March 2017, we entered into a five-year $2,500.0 revolving credit agreement maturing 31 March 2022 with a syndicate of banks (the “2017 Credit Agreement”), under which senior unsecured debt is available to both the Company and certain of its subsidiaries. On 28 September 2018, we amended the 2017 Credit Agreement to reduce the maximum borrowing capacity to $2,300.0. No other terms were impacted by the amendment.

The 2017 Credit Agreement provides a source of liquidity for the Company and supports its commercial paper program. The Company’s only financial covenant under the 2017 Credit Agreement is a maximum ratio of total debt to total capitalization (total debt plus total equity) no greater than 70%. Total debt at 30 September 2018 and 2017 expressed as a percentage of total capitalization was 25.4% and 28.0%, respectively. No borrowings were outstanding under the 2017 Credit Agreement as of 30 September 2018. Commitments totaling $7.0 are maintained by our foreign subsidiaries, all of which was borrowed and outstanding at 30 September 2018.

As of 30 September 2018, we are in compliance with all of the financial and other covenants under our debt agreements.

On 15 September 2011, the Board of Directors authorized the repurchase of up to $1,000 of our outstanding common stock. We did not purchase any of our outstanding shares during fiscal years 2018, 2017 or 2016. At 30 September 2018, $485.3 in share repurchase authorization remains.

2019 Outlook

Cash flows from operations and financing activities are expected to meet liquidity needs for the foreseeable future and our working capital balance was $2,743.9 at 30 September 2018. We expect that we will continue to be in compliance with all of our financial covenants.

Dividends

Dividends are declared by the Board of Directors and are usually paid during the sixth week after the close of the fiscal quarter. During 2018, the Board of Directors increased the quarterly dividend from $.95 per share to $1.10 per share, or $4.40 per share annually.

CONTRACTUAL OBLIGATIONS

We are obligated to make future payments under various contracts, such as debt agreements, lease agreements, unconditional purchase obligations, and other long-term obligations. The following table summarizes our obligations on a continuing operations basis as of 30 September 2018:

	Total	2019	2020	2021	2022	2023	Thereafter
Debt maturities	$3,774	$407	$381	$474	$448	$449	$1,615
Contractual interest on debt	589	101	81	71	57	46	233
Capital leases	23	2	2	3	1	1	14
Operating leases	334	66	50	41	31	23	123
Pension obligations	310	53	40	41	41	41	94
Unconditional purchase obligations	7,660	851	362	342	318	326	5,461
Deemed repatriation tax related to the Tax Act	184	—	14	16	16	16	122
Obligation for future contribution to an equity affiliate	100	—	100	—	—	—	—
Total Contractual Obligations	$12,974	$1,480	$1,030	$988	$912	$902	$7,662

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Debt Obligations

Our debt obligations include the maturity payments of the principal amount of long-term debt, including the current portion and amounts owed to related parties, and the related contractual interest obligations. Refer to Note 15, Debt, to the consolidated financial statements for additional information on our debt obligations. Contractual interest is the interest we are contracted to pay on our debt obligations without taking into account the interest impact of interest rate swaps related to any of this debt, which at current interest rates would slightly decrease contractual interest. We had approximately $640 of long-term debt subject to variable interest rates at 30 September 2018, excluding fixed-rate debt that has been swapped to variable-rate debt. The rate assumed for the variable interest component of the contractual interest obligation was the rate in effect at 30 September 2018. Variable interest rates are primarily determined by U.S. short-term tax-exempt interest rates and by interbank offer rates.

Leases

Refer to Note 12, Leases, to the consolidated financial statements for additional information on capital and operating leases.

Pension Obligations

The amounts in the table above represent the current estimated cash payments to be made by us that, in total, equal the recognized pension liabilities for our U.S. and international pension plans. For additional information, refer to Note 16, Retirement Benefits, to the consolidated financial statements. These payments are based upon the current valuation assumptions and regulatory environment.

The total accrued liability for pension benefits may be impacted by interest rates, plan demographics, actual return on plan assets, continuation or modification of benefits, and other factors. Such factors can significantly impact the amount of the liability and related contributions.

Unconditional Purchase Obligations

Approximately $6,800 of our unconditional purchase obligations relate to helium purchases. The majority of these obligations occur after fiscal year 2023. Helium purchases include crude feedstock supply to multiple helium refining plants in North America as well as refined helium purchases from sources around the world. As a rare byproduct of natural gas production in the energy sector, these helium sourcing agreements are medium- to long-term and contain take-if-tendered provisions. The refined helium is distributed globally and sold as a merchant gas, primarily under medium-term requirements contracts. While contract terms in the energy sector are longer than those in merchant, helium is a rare gas used in applications with few or no substitutions because of its unique physical and chemical properties.

Approximately $210 of our long-term unconditional purchase obligations relate to feedstock supply for numerous HyCO (hydrogen, carbon monoxide, and syngas) facilities. The price of feedstock supply is principally related to the price of natural gas. However, long-term take-or-pay sales contracts to HyCO customers are generally matched to the term of the feedstock supply obligations and provide recovery of price increases in the feedstock supply. Due to the matching of most long-term feedstock supply obligations to customer sales contracts, we do not believe these purchase obligations would have a material effect on our financial condition or results of operations.

The unconditional purchase obligations also include other product supply and purchase commitments and electric power and natural gas supply purchase obligations, which are primarily pass-through contracts with our customers.

Purchase commitments to spend approximately $455 for additional plant and equipment are included in the unconditional purchase obligations in 2019.

We also purchase materials, energy, capital equipment, supplies, and services as part of the ordinary course of business under arrangements that are not unconditional purchase obligations. The majority of such purchases are for raw materials and energy, which are obtained under requirements-type contracts at market prices.

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Income Tax Liabilities

Tax liabilities related to unrecognized tax benefits as of 30 September 2018 were $233.6. These tax liabilities were excluded from the Contractual Obligations table as it is impractical to determine a cash impact by year given that payments will vary according to changes in tax laws, tax rates, and our operating results. In addition, there are uncertainties in timing of the effective settlement of our uncertain tax positions with respective taxing authorities. However, the Contractual Obligations table above includes our accrued liability of approximately $184 for deemed repatriation tax that is payable over eight years related to the Tax Act. Refer to Note 22, Income Taxes, to the consolidated financial statements for additional information.

Obligation for Future Contribution to an Equity Affiliate

On 19 April 2015, a joint venture between Air Products and ACWA Holding entered into a 20-year oxygen and nitrogen supply agreement to supply Saudi Aramco's oil refinery and power plant being built in Jazan, Saudi Arabia. Air Products owns 25% of the joint venture and guarantees the repayment of its share of an equity bridge loan. In total, we expect to invest approximately $100 in this joint venture. As of 30 September 2018, we recorded a noncurrent liability of $94.4 for our obligation to make future equity contributions in 2020 based on our proportionate share of the advances received by the joint venture under the loan.

Expected Investment in Joint Venture

On 12 August 2018, Air Products entered an agreement to form a gasification/power joint venture ("JV") with Saudi Aramco and ACWA in Jazan, Saudi Arabia. Air Products will own at least 55% of the JV, with Saudi Aramco and ACWA Power owning the balance. The JV will purchase the gasification assets, power block, and the associated utilities from Saudi Aramco for approximately $8 billion. Our expected investment has been excluded from the contractual obligations table above pending closing, which is currently expected in fiscal year 2020.

The JV will own and operate the facility under a 25-year contract for a fixed monthly fee. Saudi Aramco will supply feedstock to the JV, and the JV will produce power, hydrogen and other utilities for Saudi Aramco.

PENSION BENEFITS

The Company and certain of its subsidiaries sponsor defined benefit pension plans and defined contribution plans that cover a substantial portion of its worldwide employees. The principal defined benefit pension plans are the U.S. salaried pension plan and the U.K. pension plan. These plans were closed to new participants in 2005, after which defined contribution plans were offered to new employees. The shift to defined contribution plans is expected to continue to reduce volatility of both plan expense and contributions.

The fair market value of plan assets for our defined benefit pension plans as of the 30 September 2018 measurement date decreased to $4,273.1 from $4,409.2 at the end of fiscal year 2017. The projected benefit obligation for these plans was $4,583.3 and $5,107.2 at the end of fiscal years 2018 and 2017, respectively. The net unfunded liability decreased $387.8 from $698.0 to $310.2, primarily due to higher discount rates and favorable asset experience. Refer to Note 16, Retirement Benefits, to the consolidated financial statements for comprehensive and detailed disclosures on our postretirement benefits.

Pension Expense

	2018		2017		2016	
Pension expense – Continuing operations	**$91.8**		$72.0		$55.8	
Settlements, termination benefits, and curtailments (included above)	**48.9**		15.0		6.0	
Weighted average discount rate – Service cost	**3.2**	**%**	2.9	%	4.1	%

Weighted average discount rate – Interest cost	**2.9**	**%**	2.5	%	3.4	%
Weighted average expected rate of return on plan assets	**6.9**	**%**	7.4	%	7.5	%
Weighted average expected rate of compensation increase	**3.5**	**%**	3.5	%	3.5	%

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2018 vs. 2017

Pension expense, excluding settlements, termination benefits, and curtailments ("special items"), decreased from the prior year primarily due to recognition of favorable asset experience, partially offset by lower expected returns on assets. In fiscal year 2018, special items of $48.9 included a pension settlement loss of $43.7 primarily resulting from the transfer of certain U.S. pension payment obligations to an insurer during the fourth quarter, $4.8 of pension settlement losses related to lump sum payouts from the U.S. Supplemental Pension Plan, and $.4 of termination benefits, all of which are reflected in "Other non-operating income (expense), net" on the consolidated income statements.

2017 vs. 2016

Pension expense, excluding special items, increased from fiscal year 2016 primarily due to a decrease in the discount rate offset by favorable asset experience. Special items of $15.0 included pension settlement losses of $10.5 related to the U.S. Supplementary Pension Plan, as well as curtailment and termination benefits of $4.5.

2019 Outlook

In fiscal year 2019, pension expense, excluding special items, is expected to be approximately $20 to $30. This results from lower loss amortization primarily due to favorable asset experience and the impact of higher discount rates, partially offset by lower expected returns on assets. Pension settlement losses of $10 to $15 are expected, depending on the timing of retirements. In fiscal year 2019, we expect pension expense to include approximately $75 for amortization of actuarial losses. In fiscal year 2018, pension expense included amortization of actuarial losses of $128. Net actuarial gains of $232 were recognized in accumulated other comprehensive income in fiscal year 2018. Actuarial gains/losses are amortized into pension expense over prospective periods to the extent they are not offset by future gains or losses. Future changes in the discount rate and actual returns on plan assets different from expected returns would impact the actuarial gains/losses and resulting amortization in years beyond fiscal year 2019.

Subsequent Event – GMP Equalization

On 26 October 2018, the United Kingdom High Court issued a ruling in a case relating to equalization of pension plan participants' benefits for the gender effects of Guaranteed Minimum Pensions ("GMP equalization"). The ruling relates to the Lloyds Banking Group pension plans but impacts other U.K. defined benefit pension plans. We are still assessing the impact of this ruling. If we determine that the ruling impacts our U.K. pension plan, the approach to achieve GMP equalization may retroactively increase our benefit obligation for some participants in the plan and may impact funding requirements.

Pension Funding

Pension funding includes both contributions to funded plans and benefit payments for unfunded plans, which are primarily non-qualified plans. With respect to funded plans, our funding policy is that contributions, combined with appreciation and earnings, will be sufficient to pay benefits without creating unnecessary surpluses.

In addition, we make contributions to satisfy all legal funding requirements while managing our capacity to benefit from tax deductions attributable to plan contributions. With the assistance of third party actuaries, we analyze the liabilities and demographics of each plan, which help guide the level of contributions. During 2018 and 2017, our cash contributions to funded plans and benefit payments for unfunded plans were $68.3 and $64.1, respectively.

For fiscal year 2019, cash contributions to defined benefit plans are estimated to be $45 to $65. The estimate is based on expected contributions to certain international plans and anticipated benefit payments for unfunded plans, which are dependent upon the timing of retirements. Actual future contributions will depend on future funding legislation, discount rates, investment performance, plan design, and various other factors. Refer to the Contractual Obligations discussion on pages 43-44 for a projection of future contributions.

ENVIRONMENTAL MATTERS

We are subject to various environmental laws and regulations in the countries in which we have operations. Compliance with these laws and regulations results in higher capital expenditures and costs. In the normal course of business, we are involved in legal proceedings under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA: the federal Superfund law); Resource Conservation and Recovery Act (RCRA); and similar state and foreign environmental laws relating to the designation of certain sites for investigation or remediation. Our accounting policy for environmental expenditures is discussed in Note 1, Major Accounting Policies, to the consolidated financial statements, and environmental loss contingencies are discussed in Note 17, Commitments and Contingencies, to the consolidated financial statements.

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The amounts charged to income from continuing operations related to environmental matters totaled $12.8, $11.4, and $12.2 in fiscal years 2018, 2017, and 2016, respectively. These amounts represent an estimate of expenses for compliance with environmental laws and activities undertaken to meet internal Company standards. Refer to Note 17, Commitments and Contingencies, to the consolidated financial statements for additional information.

Although precise amounts are difficult to determine, we estimate that we spent $3, $7, and $3 in fiscal years 2018, 2017, and 2016, respectively, on capital projects to control pollution. Capital expenditures to control pollution are estimated to be approximately $4 in both fiscal years 2019 and 2020.

We accrue environmental investigatory and remediation costs for identified sites when it is probable that a liability has been incurred and the amount of loss can be reasonably estimated. The potential exposure for such costs is estimated to range from $76 to a reasonably possible upper exposure of $90 as of 30 September 2018. The consolidated balance sheets at 30 September 2018 and 2017 included an accrual of $76.8 and $83.6, respectively, primarily as part of other noncurrent liabilities. The accrual for the environmental obligations includes amounts for the Pace, Florida; Piedmont, South Carolina; and Pasadena, Texas, locations which were a part of previously divested chemicals businesses. Refer to Note 17, Commitments and Contingencies, to the consolidated financial statements for further details on these facilities.

Actual costs to be incurred at identified sites in future periods may vary from the estimates, given inherent uncertainties in evaluating environmental exposures. Subject to the imprecision in estimating future environmental costs, we do not expect that any sum we may have to pay in connection with environmental matters in excess of the amounts recorded or disclosed above would have a material adverse impact on our financial position or results of operations in any one year.

Some of our operations are within jurisdictions that have or are developing regulatory regimes governing emissions of greenhouse gases ("GHG"), including carbon dioxide. These include existing coverage under the European Union Emission Trading system, the California cap and trade schemes, Alberta’s Carbon Competitiveness Incentive Regulation, China’s Emission Trading Scheme, South Korea’s Emission Trading Scheme, nation-wide expansion of the China Emission Trading Scheme, revisions to the Alberta regulation, and Environment Canada's developing Output Based Pricing System. In addition, the U.S. Environmental Protection Agency ("EPA") requires mandatory reporting of GHG emissions and is regulating GHG emissions for new construction and major modifications to existing facilities. Some jurisdictions have various mechanisms to target the power sector to achieve emission reductions, which often result in higher power costs.

Increased public concern may result in more international, U.S. federal, and/or regional requirements to reduce or mitigate the effects of GHG. Although uncertain, these developments could increase our costs related to consumption of electric power and hydrogen production. We believe we will be able to mitigate some of the increased costs through contractual terms, but the lack of definitive legislation or regulatory requirements prevents an accurate estimate of the long-term impact these measures will have on our operations. Any legislation that limits or taxes GHG emissions could negatively impact our growth, increase our operating costs, or reduce demand for certain of our products.

Regulation of GHG may also produce new opportunities for us. We continue to develop technologies to help our facilities and our customers lower energy consumption, improve efficiency, and lower emissions. We also have developed a portfolio of technologies that capture carbon dioxide from steam methane reforming, enable cleaner transportation fuels, and facilitate alternate fuel source development. In addition, the potential demand for clean coal could increase demand for oxygen, one of our main products, and our proprietary technology for delivering low-cost oxygen.

OFF-BALANCE SHEET ARRANGEMENTS

We have entered into certain guarantee agreements as discussed in Note 17, Commitments and Contingencies, to the consolidated financial statements. In addition, we are not a primary beneficiary in any material variable interest entity. Our off-balance sheet arrangements are not reasonably likely to have a

material impact on financial condition, changes in financial condition, results of operations, or liquidity.

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RELATED PARTY TRANSACTIONS

We have related party sales to some of our equity affiliates and joint venture partners. Sales to related parties totaled approximately $340, $580, and $320 during fiscal years 2018, 2017, and 2016, respectively, and primarily related to Jazan sale of equipment activity. Agreements with related parties include terms that are consistent with those that we believe would have been negotiated at an arm's length with an independent party.

In addition, we completed the formation of Air Products Lu An (Changzhi) Co., Ltd., a 60%-owned JV with Lu'An Clean Energy Company ("Lu'An"), and the JV acquired gasification and syngas clean-up assets from Lu'An during the third quarter of 2018. In connection with the acquisition, Lu'An made a loan of 2.6 billion RMB to the JV, and we established a liability of 2.3 billion RMB for cash payments expected to be made to or on behalf of Lu'An in fiscal year 2019. As of 30 September 2018, long-term debt payable to Lu'An of 2.6 billion RMB ($384) is presented on the consolidated balance sheets as "Long-term debt – related party," and our expected remaining cash payments of approximately 2.2 billion RMB ($330) are presented within "Payables and accrued liabilities."

INFLATION

We operate in many countries that experience volatility in inflation and foreign exchange rates. The ability to pass on inflationary cost increases is an uncertainty due to general economic conditions and competitive situations. It is estimated that the cost of replacing our plant and equipment today is greater than its historical cost. Accordingly, depreciation expense would be greater if the expense were stated on a current cost basis.

CRITICAL ACCOUNTING POLICIES AND ESTIMATES

Note 1, Major Accounting Policies, to the consolidated financial statements describes our major accounting policies. Judgments and estimates of uncertainties are required in applying our accounting policies in many areas. However, application of the critical accounting policies discussed below requires management's significant judgments, often as the result of the need to make estimates of matters that are inherently uncertain. If actual results were to differ materially from the estimates made, the reported results could be materially affected. Our management has reviewed these critical accounting policies and estimates and related disclosures with our audit committee.

Depreciable Lives of Plant and Equipment

Net plant and equipment at 30 September 2018 totaled $9,923.7, and depreciation expense totaled $940.7 during fiscal year 2018. Plant and equipment is recorded at cost and depreciated using the straight-line method, which deducts equal amounts of the cost of each asset from earnings every year over its estimated economic useful life.

Economic useful life is the duration of time an asset is expected to be productively employed by us, which may be less than its physical life. Assumptions on the following factors, among others, affect the determination of estimated economic useful life: wear and tear, obsolescence, technical standards, contract life, market demand, competitive position, raw material availability, and geographic location.

The estimated economic useful life of an asset is monitored to determine its appropriateness, especially in light of changed business circumstances. For example, changes in technology, changes in the estimated future demand for products, or excessive wear and tear may result in a shorter estimated useful life than originally anticipated. In these cases, we would depreciate the remaining net book value over the new estimated remaining life, thereby increasing depreciation expense per year on a prospective basis. Likewise, if the estimated useful life is increased, the adjustment to the useful life decreases depreciation expense per year on a prospective basis.

The regional Industrial Gases segments have numerous long-term customer supply contracts for which we construct an on-site plant adjacent to or near the customer's facility. These contracts typically have initial contract terms of 10 to 20 years. Depreciable lives of the production assets related to long-term contracts are matched to the contract lives. Extensions to the contract term of supply frequently occur prior to the expiration of the initial term. As contract terms are extended, the depreciable life of the remaining net book

value of the production assets is adjusted to match the new contract term, as long as it does not exceed the remaining physical life of the asset.

Our regional Industrial Gases segments also have contracts for liquid or gaseous bulk supply and, for smaller customers, packaged gases. The depreciable lives of production facilities associated with these contracts are
generally 15 years. These depreciable lives have been determined based on historical experience combined with judgment on future assumptions such as technological advances, potential obsolescence, competitors' actions, etc.

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In addition, we may purchase assets through transactions accounted for as either an asset acquisition or a business combination. Depreciable lives are assigned to acquired assets based on our historical experience with similar assets. Management monitors its assumptions and may potentially need to adjust depreciable life as circumstances change.

A change in the weighted average remaining depreciable life by one year for assets associated with our regional Industrial Gases segments would impact annual depreciation expense as summarized below:

	Decrease Life By 1 Year	Increase Life By 1 Year
Industrial Gases – Regional	$45	($39)

Impairment of Assets

Plant and Equipment

Plant and equipment meeting the held for sale criteria are reported at the lower of carrying amount or fair value less cost to sell. Plant and equipment held for use is grouped for impairment testing at the lowest level for which there is identifiable cash flows. Impairment testing of the asset group occurs whenever events or changes in circumstances indicate that the carrying amount of the assets may not be recoverable. Such circumstances would include a significant decrease in the market value of a long-lived asset grouping, a significant adverse change in the manner in which the asset grouping is being used or in its physical condition, an accumulation of costs significantly in excess of the amount originally expected for the acquisition or construction of the long-lived asset, a history of operating or cash flow losses associated with the use of the asset grouping, or changes in the expected useful life of the long-lived assets.

If such circumstances are determined to exist, an estimate of undiscounted future cash flows produced by that asset group is compared to the carrying value to determine whether impairment exists. If an asset group is determined to be impaired, the loss is measured based on the difference between the asset group’s fair value and its carrying value. An estimate of the asset group’s fair value is based on the discounted value of its estimated cash flows.

The assumptions underlying the undiscounted future cash flow projections require significant management judgment. Factors that management must estimate include industry and market conditions, sales volume and prices, costs to produce, inflation, etc. The assumptions underlying the cash flow projections represent management’s best estimates at the time of the impairment review. Changes in key assumptions or actual conditions that differ from estimates could result in an impairment charge. We use reasonable and supportable assumptions when performing impairment reviews and cannot predict the occurrence of future events and circumstances that could result in impairment charges.

In fiscal year 2018, there was no need to test for impairment on any of our asset groupings as no events or changes in circumstances indicated that the carrying amount of the asset groupings may not be recoverable.

In fiscal year 2017, we performed interim impairment testing of our Latin America reporting unit (LASA) long-lived assets and indefinite-lived intangible assets, including goodwill, as of 30 June 2017. See the *2017 Impairment Testing* discussions under the Goodwill and Intangible Assets sections below. We also tested the recoverability of LASA's long-lived assets, including finite-lived intangible assets subject to amortization, and concluded that they were recoverable from expected future undiscounted cash flows.

In fiscal year 2016, the Board of Directors approved the Company’s exit of its EfW business. We assessed the recoverability of capital costs for the two projects associated with this business and recorded an impairment charge of $913.5 to reduce the carrying values of plant assets to their estimated net realizable value. We estimated the net realizable value of the projects assuming an orderly liquidation of assets capable of being marketed on a secondary equipment market based on market quotes and our experience with selling similar equipment. An asset’s orderly liquidation value is the amount that could be realized from a liquidation sale, given a reasonable period of time to find a buyer, selling the asset in the existing condition where it is located, and assuming the highest and best use of the asset by market participants. The loss was measured as the difference between the orderly liquidation value of the assets and the net

book value of the assets. The loss was recorded in the results of discontinued operations.

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During the first quarter of fiscal year 2017, we recorded an additional loss of $6.3 to update our estimate of the net realizable value of the plant assets. The loss was recorded in the results of discontinued operations. In fiscal year 2017, we also recorded a charge of $45.7 to write-down the air separation unit in the Industrials Gases – EMEA segment that was constructed mainly to provide oxygen to one of the EfW plants to its net realizable value of $1.4. The charge was recorded in the results of continuing operations. The remaining assets associated with EfW were liquidated during fiscal year 2018 with no value remaining as of 30 September 2018.

Refer to Note 3, Discontinued Operations, and Note 5, Cost Reduction and Asset Actions, to the consolidated financial statements for additional information.

Goodwill

The acquisition method of accounting for business combinations requires us to make use of estimates and judgments to allocate the purchase price paid for acquisitions to the fair value of the net tangible and identifiable intangible assets. Goodwill represents the excess of the aggregate purchase price (plus the fair value of any noncontrolling interest and previously held equity interest in the acquiree) over the fair value of identifiable net assets of an acquired entity. Goodwill was $788.9 as of 30 September 2018. Disclosures related to goodwill are included in Note 10, Goodwill, to the consolidated financial statements.

We review goodwill for impairment annually in the fourth quarter of the fiscal year and whenever events or changes in circumstances indicate that the carrying value of goodwill might not be recoverable. The tests are done at the reporting unit level, which is defined as being equal to or one level below the operating segment for which discrete financial information is available and whose operating results are reviewed by segment managers regularly. We have five business segments that are comprised of ten reporting units within seven operating segments. Refer to Note 25, Business Segment and Geographic Information, for additional information. Reporting units are primarily based on products and subregions within each reportable segment. The majority of our goodwill is assigned to reporting units within our regional Industrial Gases segments.

As part of the goodwill impairment testing, we have the option to first assess qualitative factors to determine whether it is more likely than not that the fair value of a reporting unit is less than its carrying value. If we choose not to complete a qualitative assessment for a given reporting unit, or if the initial assessment indicates that it is more likely than not that the carrying value of a reporting unit exceeds its estimated fair value, a quantitative test is required. We choose to bypass the qualitative assessment and conduct quantitative testing to determine if the carrying value of the reporting unit exceeds its fair value. An impairment loss will be recognized for the amount by which the carrying value of the reporting unit exceeds its fair value, not to exceed the total amount of goodwill allocated to that reporting unit.

To determine the fair value of a reporting unit, we initially use an income approach valuation model, representing the present value of estimated future cash flows. Our valuation model uses a discrete growth period and an estimated exit trading multiple. The income approach is an appropriate valuation method due to our capital-intensive nature, the long-term contractual nature of our business, and the relatively consistent cash flows generated by our reporting units. The principal assumptions utilized in our income approach valuation model include revenue growth rates, operating profit and/or EBITDA margins, discount rate, and exit multiple. Projected revenue growth rates and operating profit and/or EBITDA assumptions are consistent with those utilized in our operating plan and/or revised forecasts and long-term financial planning process. The discount rate assumption is calculated based on an estimated market-participant risk-adjusted weighted-average cost of capital, which includes factors such as the risk-free rate of return, cost of debt, and expected equity premiums. The exit multiple is determined from comparable industry transactions and where appropriate, reflects expected long-term growth rates.

If our initial review under the income approach indicates there may be impairment, we incorporate results under the market approach to further evaluate the existence of impairment. When the market approach is utilized, fair value is estimated based on market multiples of revenue and earnings derived from comparable publicly-traded industrial gases companies and/or regional manufacturing companies engaged

in the same or similar lines of business as the reporting unit, adjusted to reflect differences in size and growth prospects. When both the income and market approach are utilized, we review relevant facts and circumstances and make a qualitative assessment to determine the proper weighting. Management judgment is required in the determination of each assumption utilized in the valuation model, and actual results could differ from the estimates.

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2018 Impairment Testing

During the fourth quarter of fiscal year 2018, we conducted our annual goodwill impairment test. We determined that the fair value of all our reporting units substantially exceeded their carrying value except LASA, for which the fair value exceeded the carrying value by 8%.

The excess of fair value over carrying value for our reporting units other than LASA ranged from approximately 110% to approximately 280%. Management judgment is required in the determination of each assumption utilized in the valuation model, and actual results could differ from the estimates. In order to evaluate the sensitivity of the fair value calculation on the goodwill impairment test, we applied a hypothetical 10% decrease to the fair value of these reporting units. In this scenario, the fair value of our reporting units other than LASA continued to exceed their carrying value by a range of approximately 90% to 240%.

As of 30 September 2018, the carrying value of LASA goodwill was $65.6, or less than 1% of consolidated total assets. Further events that could have a negative impact on the level of excess fair value over carrying value of the reporting unit include but are not limited to a decline in market share, pricing pressures, and further economic weakening in the markets we serve. Revenue growth and EBITDA margin assumptions are two primary drivers of the fair value of LASA. We determined that, with other assumptions held constant, a decrease in revenue rates of approximately 230 basis points or a decrease in EBITDA margin of approximately 210 basis points would result in an impairment of the remaining goodwill balance. The carrying value of LASA's other material assets at 30 September 2018 included: Plant and equipment, net of $341.1; customer relationships of $152.1; and trade names and trademarks of $48.4. The trade names and trademarks are classified as indefinite-lived intangible assets.

Future events that could have a negative impact on the level of excess fair value over carrying value of the reporting units include, but are not limited to: long-term economic weakness, decline in market share, pricing pressures, inability to successfully implement cost improvement measures, increases to our cost of capital, and changes to the structure of our business as a result of future reorganizations or divestitures of assets or businesses. Negative changes in one or more of these factors, among others, could result in impairment charges.

2017 Impairment Testing

For the first nine months of fiscal year 2017, volumes declined in our LASA reporting unit, and overall revenue growth did not meet expectations. Due to weak economic conditions in Latin America and expectations for continued volume weakness in the Latin American countries and markets in which we operate, we lowered our long-term growth projections for LASA by more than 200 basis points, which also unfavorably impacted our EBITDA margin. Management considered the revised projections for LASA to be indicators of potential impairment and, accordingly, performed interim impairment testing of our long-lived assets and indefinite-lived intangible assets, including goodwill, as of 30 June 2017 utilizing the revised projections. LASA represented approximately 6% of the Company’s total revenue in 2017 with business units in Chile, Colombia, and other Latin America countries.

We estimated the fair value of LASA as of 30 June 2017 based on two valuation approaches, the income approach and the market approach, as described above. We reviewed relevant facts and circumstances in determining the weighting of the approaches. Under the income approach, we estimated the fair value of LASA based on management's estimates of revenue growth rates and EBITDA margins, taking into consideration business and market conditions for the Latin American countries and markets in which we operate. These estimates were consistent with our revised forecast and long-term financial planning processes, which included a reduction in sales growth by more than 200 basis points from that previously identified. We calculated the discount rate based on a market-participant, risk-adjusted weighted average cost of capital, which considers industry-specific rates of return on debt and equity capital for a target industry capital structure, adjusted for risks associated with business size and geography. Under the market approach, we estimated fair value based on market multiples of revenue and earnings derived from publicly-traded industrial gases companies and regional manufacturing companies, adjusted to reflect

differences in size and growth prospects.

Based on the results of the valuations, we determined that the goodwill associated with LASA was impaired and recorded a noncash impairment charge of $145.3, the amount by which the carrying value of the reporting unit exceeded its fair value, during the third quarter of 2017. This impairment is reflected on our consolidated income statements within “Goodwill and intangible asset impairment charge.” This charge was not deductible for tax purposes and is excluded from segment operating income.

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Intangible Assets

Intangible assets, net with determinable lives at 30 September 2018 totaled $387.3 and consisted primarily of customer relationships, purchased patents and technology, and land use rights. These intangible assets are tested for impairment as part of the long-lived asset grouping impairment tests. Impairment testing of the asset group occurs whenever events or changes in circumstances indicate that the carrying value of the assets may not be recoverable. See the impairment discussion above under Plant and Equipment for a description of how impairment losses are determined.

Indefinite-lived intangible assets at 30 September 2018 totaled $51.2 and consisted of trade names and trademarks. Indefinite-lived intangibles are subject to impairment testing at least annually or more frequently if events or changes in circumstances indicate that potential impairment exists. The impairment test for indefinite-lived intangible assets involves calculating the fair value of the indefinite-lived intangible assets and comparing the fair value to their carrying value. If the fair value is less than the carrying value, the difference is recorded as an impairment loss. To determine fair value, we utilize the royalty savings method, a form of the income approach. This method values an intangible asset by estimating the royalties avoided through ownership of the asset.

Disclosures related to intangible assets other than goodwill are included in Note 11, Intangible Assets, to the consolidated financial statements.

2018 Impairment Testing

In the fourth quarter of 2018, we conducted our annual impairment test of indefinite-lived intangibles which resulted in no impairment.

2017 Impairment Testing

During the third quarter of fiscal year 2017, we conducted an interim impairment test of the indefinite-lived intangible assets associated with LASA. We determined that the carrying value of trade names and trademarks was in excess of fair value, and as a result, we recorded a noncash impairment charge of $16.8 to reduce these indefinite-lived intangible assets to their fair value. This impairment charge has been excluded from segment operating income and is reflected on our consolidated income statements within “Goodwill and intangible asset impairment charge."

Equity Investments

Investments in and advances to equity affiliates totaled $1,277.2 at 30 September 2018. The majority of our investments are non-publicly traded ventures with other companies in the industrial gas business. Summarized financial information of equity affiliates is included in Note 8, Summarized Financial Information of Equity Affiliates, to the consolidated financial statements. Equity investments are reviewed for impairment whenever events or changes in circumstances indicate that the carrying amount of the investment may not be recoverable.

An impairment loss is recognized in the event that an other-than-temporary decline in fair value of an investment occurs. Management’s estimate of fair value of an investment is based on the income approach and/or market approach. We utilize estimated discounted future cash flows expected to be generated by the investee under the income approach. For the market approach, we utilize market multiples of revenue and earnings derived from comparable publicly-traded industrial gases companies. Changes in key assumptions about the financial condition of an investee or actual conditions that differ from estimates could result in an impairment charge.

During the third quarter of fiscal year 2017, Abdullah Hashim Industrial Gases & Equipment Co., Ltd. (AHG), a 25% owned equity affiliate in our Industrial Gases – EMEA segment, completed a review of its business plan and outlook. As a result of the revised business plan, we determined there was an other-than-temporary impairment of our investment in AHG and recorded a noncash impairment charge of $79.5 to reduce the carrying value of our investment. The impairment charge is reflected on our consolidated income statements within “Equity affiliates' income.” This charge was not deductible for tax purposes and has been excluded from segment results.

The decline in value resulted from expectations for lower future cash flows to be generated by AHG, primarily due to challenging economic conditions in Saudi Arabia, including the impacts of lower prices in the oil and gas industry, increased competition, and capital project growth opportunities not materializing as anticipated.

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The AHG investment was valued based on the results of the income and market valuation approaches. The income approach utilized a discount rate based on a market-participant, risk-adjusted weighted average cost of capital, which considers industry required rates of return on debt and equity capital for a target industry capital structure adjusted for risks associated with size and geography. Other significant estimates and assumptions that drove our updated valuation of AHG included revenue growth rates and profit margins that were lower than those upon acquisition and our assessment of AHG's business improvement plan effectiveness. Under the market approach, we estimated fair value based on market multiples of revenue and earnings derived from publicly-traded industrial gases companies engaged in similar lines of business, adjusted to reflect differences in size and growth prospects.

Revenue Recognition –*Percentage-of-Completion Method*

Revenue from equipment sale contracts is recorded primarily using the percentage-of-completion method. Under this method, revenue from the sale of major equipment, such as LNG heat exchangers and large air separation units, is primarily recognized based on costs incurred to date compared with total estimated costs to be incurred. We estimate the profit on a contract as the difference between the total estimated revenue and expected costs to complete the contract and recognize the profit over the life of the contract. Accounting for contracts using the percentage-of-completion method requires management judgment relative to assessing risks and their impact on the estimate of revenues and costs. Our estimates are impacted by factors such as the potential for incentives or penalties on performance, schedule and technical issues, labor productivity, the complexity of work performed, the cost and availability of materials, and performance of subcontractors. When adjustments in estimated total contract revenues or estimated total costs are required, any changes in the estimated profit from prior estimates are recognized in the current period for the inception-to-date effect of such change. When estimates of total costs to be incurred on a contract exceed estimates of total revenues to be earned, a provision for the entire estimated loss on the contract is recorded in the period in which the loss is determined.

In addition to the typical risks associated with underlying performance of project procurement and construction activities, our Jazan large air separation unit sale of equipment project within our Industrial Gases – Global segment requires monitoring of risks associated with schedule, geography, and other aspects of the contract and their effects on our estimates of total revenues and total costs to complete the contract.

Changes in estimates on projects accounted for under the percentage-of-completion method, including the Jazan project, favorably impacted operating income by approximately $38, $27, and $20 in fiscal years 2018, 2017, and 2016, respectively. Our changes in estimates would not have significantly impacted amounts recorded in prior years.

We assess the performance of our sale of equipment projects as they progress. Our earnings could be positively or negatively impacted by changes to our forecast of revenues and costs on these projects.

Income Taxes

We account for income taxes under the asset and liability method. Under this method, deferred tax assets and liabilities are recognized for the tax effects of temporary differences between the financial reporting and tax bases of assets and liabilities measured using enacted tax rates in effect for the year in which the differences are expected to be recovered or settled. At 30 September 2018, accrued income taxes, including the amount recorded in noncurrent, was $244.0 and net deferred tax liabilities was $653.7. Tax liabilities related to uncertain tax positions as of 30 September 2018 were $233.6, excluding interest and penalties. Income tax expense for the year ended 30 September 2018 was $524.3 and includes a discrete net income tax expense of $180.6 related to the Tax Act. The net expense was recorded based on provisional estimates pursuant to the SEC Staff Accounting Bulletin No. 118. Subsequent adjustments, if any, will be accounted for in the period such adjustments are identified. Disclosures related to income taxes are included in Note 22, Income Taxes, to the consolidated financial statements.

Management judgment is required concerning the ultimate outcome of tax contingencies and the realization of deferred tax assets.

Actual income taxes paid may vary from estimates, depending upon changes in income tax laws, actual results of operations, and the final audit of tax returns by taxing authorities. Tax assessments may arise several years after tax returns have been filed. We believe that our recorded tax liabilities adequately provide for these assessments.

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Deferred tax assets are recorded for operating losses and tax credit carryforwards. However, when we do not expect sufficient sources of future taxable income to realize the benefit of the operating losses or tax credit carryforwards, these deferred tax assets are reduced by a valuation allowance. A valuation allowance is recognized if, based on the weight of available evidence, it is considered more likely than not that some portion or all of the deferred tax asset will not be realized. The factors used to assess the likelihood of realization include forecasted future taxable income and available tax planning strategies that could be implemented to realize or renew net deferred tax assets in order to avoid the potential loss of future tax benefits. The effect of a change in the valuation allowance is reported in the income tax expense. A 1% point increase/decrease in our effective tax rate would decrease/increase net income by approximately $20.

Pension and Other Postretirement Benefits

The amounts recognized in the consolidated financial statements for pension and other postretirement benefits are determined on an actuarial basis utilizing numerous assumptions. The discussion that follows provides information on the significant assumptions and expense associated with the defined benefit plans. Actuarial models are used in calculating the expense and liability related to the various defined benefit plans. These models have an underlying assumption that the employees render service over their service lives on a relatively consistent basis; therefore, the expense of benefits earned should follow a similar pattern.

Several assumptions and statistical variables are used in the models to calculate the expense and liability related to the plans. We determine assumptions about the discount rate, the expected rate of return on plan assets, and the rate of compensation increase. Note 16, Retirement Benefits, to the consolidated financial statements includes disclosure of these rates on a weighted-average basis for both the U.S. and international plans. The actuarial models also use assumptions about demographic factors such as retirement age, mortality, and turnover rates. Mortality rates are based on the most recent U.S. and international mortality tables. We believe the actuarial assumptions are reasonable. However, actual results could vary materially from these actuarial assumptions due to economic events and different rates of retirement, mortality, and turnover.

One of the assumptions used in the actuarial models is the discount rate used to measure benefit obligations. This rate reflects the prevailing market rate for high-quality, fixed-income debt instruments with maturities corresponding to the expected timing of benefit payments as of the annual measurement date for each of the various plans. The Company measures the service cost and interest cost components of pension expense by applying spot rates along the yield curve to the relevant projected cash flows. The rates along the yield curve are used to discount the future cash flows of benefit obligations back to the measurement date. These rates change from year to year based on market conditions that affect corporate bond yields. A higher discount rate decreases the present value of the benefit obligations and results in lower pension expense. A 50 bp increase/decrease in the discount rate decreases/increases pension expense by approximately $32 per year.

The expected rate of return on plan assets represents an estimate of the average rate of return to be earned by plan assets over the period that the benefits included in the benefit obligation are to be paid. The expected return on plan assets assumption is based on a weighted average of estimated long-term returns of major asset classes and the historical performance of plan assets. In determining estimated asset class returns, we take into account historical and future expected long-term returns and the value of active management, as well as the interest rate environment. Asset allocation is determined based on long-term return, volatility and correlation characteristics of the asset classes, the profiles of the plans' liabilities, and acceptable levels of risk. Lower returns on the plan assets result in higher pension expense. A 50 bp increase/decrease in the estimated rate of return on plan assets decreases/increases pension expense by approximately $21 per year.

We use a market-related valuation method for recognizing certain investment gains or losses for our significant pension plans. Investment gains or losses are the difference between the expected return and

actual return on plan assets. The expected return on plan assets is determined based on a market-related value of plan assets. For equities, this is a calculated value that recognizes investment gains and losses in fair value related to equities over a five-year period from the year in which they occur and reduces year-to-year volatility. The market-related value for fixed income investments equals the actual fair value. Expense in future periods will be impacted as gains or losses are recognized in the market-related value of assets.

The expected rate of compensation increase is another key assumption. We determine this rate based on review of the underlying long-term salary increase trend characteristic of labor markets and historical experience, as well as comparison to peer companies. A 50 bp increase/decrease in the expected rate of compensation increases/decreases pension expense by approximately $11 per year.

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Loss Contingencies

In the normal course of business, we encounter contingencies, or situations involving varying degrees of uncertainty as to the outcome and effect on the Company. We accrue a liability for loss contingencies when it is considered probable that a liability has been incurred and the amount of loss can be reasonably estimated. When only a range of possible loss can be established, the most probable amount in the range is accrued. If no amount within
this range is a better estimate than any other amount within the range, the minimum amount in the range is accrued.

Contingencies include those associated with litigation and environmental matters, for which our accounting policy is discussed in Note 1, Major Accounting Policies, to the consolidated financial statements, and details are provided in Note 17, Commitments and Contingencies, to the consolidated financial statements. Significant judgment is required to determine both the probability and whether the amount of loss associated with a contingency can be reasonably estimated. These determinations are made based on the best available information at the time. As additional information becomes available, we reassess probability and estimates of loss contingencies. Revisions to the estimates associated with loss contingencies could have a significant impact on our results of operations in the period in which an accrual for loss contingencies is recorded or adjusted. For example, due to the inherent uncertainties related to environmental exposures, a significant increase to environmental liabilities could occur if a new site is designated, the scope of remediation is increased, a different remediation alternative is identified, or our proportionate share is increased. Similarly, a future charge for regulatory fines or damage awards associated with litigation could have a significant impact on our net income in the period in which it is recorded.

NEW ACCOUNTING GUIDANCE

See Note 2, New Accounting Guidance, to the consolidated financial statements for information concerning the implementation and impact of new accounting guidance.

ITEM 7A. QUANTITATIVE AND QUALITATIVE DISCLOSURES ABOUT MARKET RISK

Our earnings, cash flows, and financial position are exposed to market risks relating to fluctuations in interest rates and foreign currency exchange rates. It is our policy to minimize our cash flow exposure to adverse changes in currency exchange rates and to manage the financial risks inherent in funding with debt capital.

We address these financial exposures through a controlled program of risk management that includes the use of derivative financial instruments. We have established counterparty credit guidelines and generally enter into
transactions with financial institutions of investment grade or better, thereby minimizing the risk of credit loss. All instruments are entered into for other than trading purposes. For details on the types and use of these derivative instruments and the major accounting policies, see Note 1, Major Accounting Policies, and Note 13, Financial Instruments, to the consolidated financial statements, for additional information. Additionally, we mitigate adverse energy price impacts through our cost pass-through contracts with customers and price increases.

Our derivative and other financial instruments consist of long-term debt (including current and related party portions), interest rate swaps, cross currency interest rate swaps, and foreign exchange-forward contracts. The net market value of these financial instruments combined is referred to below as the net financial instrument position and is disclosed in Note 14, Fair Value Measurements, to the consolidated financial statements. At 30 September 2018 and 2017, the net financial instrument position was a liability of $3,736.2 and $3,832.3, respectively.

The analysis below presents the sensitivity of the market value of our financial instruments to selected changes in market rates and prices. Market values are the present value of projected future cash flows based on the market rates and prices chosen. The market values for interest rate risk and foreign currency risk are calculated by us using a third-party software model that utilizes standard pricing models to

determine the present value of the instruments based on market conditions (interest rates, spot and forward exchange rates, and implied volatilities) as of the valuation date.

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Interest Rate Risk

Our debt portfolio as of 30 September 2018, including the effect of currency and interest rate swap agreements, was composed of 66% fixed-rate debt and 34% variable-rate debt. Our debt portfolio as of 30 September 2017, including the effect of currency and interest rate swap agreements, was composed of 65% fixed-rate debt and 35% variable-rate debt.

The sensitivity analysis related to the interest rate risk on the fixed portion of our debt portfolio assumes an instantaneous 100 bp move in interest rates from the level at 30 September 2018, with all other variables held constant. A 100 bp increase in market interest rates would result in a decrease of $96 and $112 in the net liability position of financial instruments at 30 September 2018 and 2017, respectively. A 100 bp decrease in market interest rates would result in an increase of $101 and $119 in the net liability position of financial instruments at 30 September 2018 and 2017, respectively.

Based on the variable-rate debt included in our debt portfolio, including the interest rate swap agreements, a 100 bp increase in interest rates would result in an additional $13 and $14 of interest incurred per year at the end of 30 September 2018 and 2017, respectively. A 100 bp decline in interest rates would lower interest incurred by $13 and $14 per year at 30 September 2018 and 2017, respectively.

Foreign Currency Exchange Rate Risk

The sensitivity analysis related to foreign currency exchange rates assumes an instantaneous 10% change in the foreign currency exchange rates from their levels at 30 September 2018 and 2017, with all other variables held constant. A 10% strengthening or weakening of the functional currency of an entity versus all other currencies would result in a decrease or increase, respectively, of $329 and $312 in the net liability position of financial instruments at 30 September 2018 and 2017, respectively.

The primary currency pairs for which we have exchange rate exposure are the Euro and U.S. Dollar and Chinese Renminbi and U.S. Dollar. Foreign currency debt, cross currency interest rate swaps, and foreign exchange-forward contracts are used in countries where we do business, thereby reducing our net asset exposure. Foreign exchange-forward contracts and cross currency interest rate swaps are also used to hedge our firm and highly anticipated foreign currency cash flows. Thus, there is either an asset/liability or cash flow exposure related to all of the financial instruments in the above sensitivity analysis for which the impact of a movement in exchange rates would be in the opposite direction and materially equal to the impact on the instruments in the analysis.

The majority of the Company’s sales are derived from outside of the United States and denominated in foreign currencies. Financial results therefore will be affected by changes in foreign currency rates. The Chinese Renminbi and the Euro represent the largest exposures in terms of our foreign earnings. We estimate that a 10% reduction in either the Chinese Renminbi or the Euro versus the U.S. Dollar would lower our annual operating income by approximately $30 and $25, respectively.

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ITEM 8. FINANCIAL STATEMENTS AND SUPPLEMENTARY DATA

MANAGEMENT'S REPORT ON INTERNAL CONTROL OVER FINANCIAL REPORTING

Air Products' management is responsible for establishing and maintaining adequate internal control over financial reporting. Our internal control over financial reporting, which is defined in the following sentences, is a process designed to provide reasonable assurance regarding the reliability of our financial reporting and the preparation of financial statements for external purposes in accordance with U.S. generally accepted accounting principles and 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 the transactions are recorded as necessary to permit preparation of financial statements in accordance with U.S. 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 inherent limitations, internal control over financial reporting can only provide reasonable assurance and may not prevent or detect misstatements. Further, because of changes in conditions, the effectiveness of our internal control over financial reporting may vary over time. Our processes contain self-monitoring mechanisms, and actions are taken to correct deficiencies as they are identified.

Management has evaluated the effectiveness of its internal control over financial reporting based on criteria established in Internal Control—Integrated Framework (2013) issued by the Committee of Sponsoring Organizations of the Treadway Commission (COSO). Based on this evaluation, management concluded that, as of 30 September 2018, the Company's internal control over financial reporting was effective.

KPMG LLP, an independent registered public accounting firm, has issued its opinion on the Company's internal control over financial reporting as of 30 September 2018 as stated in its report which appears herein.

/s/ Seifi Ghasemi	/s/ M. Scott Crocco
Seifi Ghasemi	M. Scott Crocco
Chairman, President, and Chief Executive Officer	Executive Vice President and Chief Financial Officer
20 November 2018	20 November 2018

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REPORT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

To the Shareholders and Board of Directors of Air Products and Chemicals, Inc.:

Opinions on the Consolidated *Financial Statements and Internal Control Over Financial Reporting*

We have audited the accompanying consolidated balance sheets of Air Products and Chemicals, Inc. and Subsidiaries (the Company) as of 30 September 2018 and 2017, the related consolidated income statements, consolidated comprehensive income statements, consolidated statements of cash flows and consolidated statements of equity for each of the years in the three-year period ended 30 September 2018, and the related notes and the financial statement schedule referred to in Item 15(a)(2) in this Form 10-K (collectively, the consolidated financial statements). We also have audited the Company's internal control over financial reporting as of 30 September 2018, based on criteria established in *Internal Control - Integrated Framework (2013)* issued by the Committee of Sponsoring Organizations of the Treadway Commission.

In our opinion, the consolidated financial statements referred to above present fairly, in all material respects, the financial position of the Company as of 30 September 2018 and 2017, and the results of its operations and its cash flows for each of the years in the three-year period ended 30 September 2018, in conformity with U.S. generally accepted accounting principles. Also in our opinion, the Company maintained, in all material respects, effective internal control over financial reporting as of 30 September 2018, based on criteria established in *Internal Control - Integrated Framework (2013)* issued by the Committee of Sponsoring Organizations of the Treadway Commission.

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 an opinion on the Company's consolidated financial statements and an opinion 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 (1) pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of the assets of the company; (2) 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 (3) 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/ KPMG LLP

We have served as the Company's auditor since 2002.

Philadelphia, Pennsylvania

20 November 2018

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The Consolidated Financial Statements
Air Products and Chemicals, Inc. and Subsidiaries
CONSOLIDATED INCOME STATEMENTS

Year ended 30 September (Millions of dollars, except for share and per share data)	**2018**	2017	2016
Sales	**$8,930.2**	$8,187.6	$7,503.7
Cost of sales	**6,189.5**	5,751.5	5,177.3
Selling and administrative	**760.8**	713.5	683.8
Research and development	**64.5**	57.6	71.8
Business separation costs	**—**	32.5	50.6
Cost reduction and asset actions	**—**	151.4	34.5
Goodwill and intangible asset impairment charge	**—**	162.1	—
Other income (expense), net	**50.2**	121.0	49.4
Operating Income	**1,965.6**	1,440.0	1,535.1
Equity affiliates' income	**174.8**	80.1	147.0
Interest expense	**130.5**	120.6	115.2
Other non-operating income (expense), net	**5.1**	16.6	(5.4)
Loss on extinguishment of debt	**—**	—	6.9
Income From Continuing Operations Before Taxes	**2,015.0**	1,416.1	1,554.6
Income tax provision	**524.3**	260.9	432.6
Income From Continuing Operations	**1,490.7**	1,155.2	1,122.0
Income (Loss) From Discontinued Operations, net of tax	**42.2**	1,866.0	(460.5)
Net Income	**1,532.9**	3,021.2	661.5
Net Income Attributable to Noncontrolling Interests of Continuing Operations	**35.1**	20.8	22.5
Net Income Attributable to Noncontrolling Interests of Discontinued Operations	**—**	—	7.9
Net Income Attributable to Air Products	**$1,497.8**	$3,000.4	$631.1
Net Income Attributable to Air Products			
Income from continuing operations	**$1,455.6**	$1,134.4	$1,099.5
Income (Loss) from discontinued operations	**42.2**	1,866.0	(468.4)
Net Income Attributable to Air Products	**$1,497.8**	$3,000.4	$631.1
Basic Earnings Per Common Share Attributable to Air Products			
Income from continuing operations	**$6.64**	$5.20	$5.08
Income (Loss) from discontinued operations	**.19**	8.56	(2.16)
Net Income Attributable to Air Products	**$6.83**	$13.76	$2.92
Diluted Earnings Per Common Share Attributable to Air Products			
Income from continuing operations	**$6.59**	$5.16	$5.04
Income (Loss) from discontinued operations	**.19**	8.49	(2.15)
Net Income Attributable to Air Products	**$6.78**	$13.65	$2.89
Weighted Average Common Shares — Basic (in millions)	**219.3**	218.0	216.4
Weighted Average Common Shares — Diluted (in millions)	**220.8**	219.8	218.3

The accompanying notes are an integral part of these statements.

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Air Products and Chemicals, Inc. and Subsidiaries

CONSOLIDATED COMPREHENSIVE INCOME STATEMENTS

Year ended 30 September (Millions of dollars)	**2018**	2017	2016
Net Income	**$1,532.9**	$3,021.2	$661.5
Other Comprehensive Income (Loss), net of tax:			
Translation adjustments, net of tax of $1.1, ($19.3), and ($19.8)	**(244.6)**	101.9	9.9
Net gain (loss) on derivatives, net of tax of $9.7, ($11.0), and $9.1	**45.9**	(12.6)	13.7
Pension and postretirement benefits, net of tax of $55.2, $109.0, and ($157.4)	**179.4**	251.6	(335.1)
Reclassification adjustments:			
Currency translation adjustment	**3.1**	57.3	2.7
Derivatives, net of tax of ($9.2), $11.7, and ($9.4)	**(30.4)**	24.2	(36.0)
Pension and postretirement benefits, net of tax of $44.9, $50.7, and $43.0	**133.1**	110.7	87.2
Total Other Comprehensive Income (Loss)	**86.5**	533.1	(257.6)
Comprehensive Income	**1,619.4**	3,554.3	403.9
Net Income Attributable to Noncontrolling Interests	**35.1**	20.8	30.4
Other Comprehensive Income (Loss) Attributable to Noncontrolling Interests	**(19.0)**	3.7	4.8
Comprehensive Income Attributable to Air Products	**$1,603.3**	$3,529.8	$368.7

The accompanying notes are an integral part of these statements.

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Air Products and Chemicals, Inc. and Subsidiaries

CONSOLIDATED BALANCE SHEETS

30 September (Millions of dollars, except for share and per share data)	**2018**	2017
Assets		
Current Assets		
Cash and cash items	**$2,791.3**	$3,273.6
Short-term investments	**184.7**	404.0
Trade receivables, net	**1,207.2**	1,174.0
Inventories	**396.1**	335.4
Contracts in progress, less progress billings	**77.5**	84.8
Prepaid expenses	**129.6**	191.4
Other receivables and current assets	**295.8**	403.3
Current assets of discontinued operations	**—**	10.2
Total Current Assets	**5,082.2**	5,876.7
Investment in net assets of and advances to equity affiliates	**1,277.2**	1,286.9
Plant and equipment, net	**9,923.7**	8,440.2
Goodwill, net	**788.9**	721.5
Intangible assets, net	**438.5**	368.3
Noncurrent capital lease receivables	**1,013.3**	1,131.8
Other noncurrent assets	**654.5**	641.8
Total Noncurrent Assets	**14,096.1**	12,590.5
Total Assets	**$19,178.3**	$18,467.2
Liabilities and Equity		
Current Liabilities		
Payables and accrued liabilities	**$1,817.8**	$1,814.3
Accrued income taxes	**59.6**	98.6
Short-term borrowings	**54.3**	144.0
Current portion of long-term debt	**406.6**	416.4
Current liabilities of discontinued operations	**—**	15.7
Total Current Liabilities	**2,338.3**	2,489.0
Long-term debt	**2,967.4**	3,402.4
Long-term debt – related party	**384.3**	—
Other noncurrent liabilities	**1,536.9**	1,611.9
Deferred income taxes	**775.1**	778.4
Total Noncurrent Liabilities	**5,663.7**	5,792.7
Total Liabilities	**8,002.0**	8,281.7
Commitments and Contingencies – See Note 17		
Air Products Shareholders' Equity		
Common stock (par value $1 per share; issued 2018 and 2017 - 249,455,584 shares)	**249.4**	249.4
Capital in excess of par value	**1,029.3**	1,001.1
Retained earnings	**13,409.9**	12,846.6
Accumulated other comprehensive loss	**(1,741.9)**	(1,847.4)
Treasury stock, at cost (2018 - 29,940,339 shares; 2017 - 31,109,510 shares)	**(2,089.2)**	(2,163.5)
Total Air Products Shareholders' Equity	**10,857.5**	10,086.2
Noncontrolling Interests	**318.8**	99.3
Total Equity	**11,176.3**	10,185.5
Total Liabilities and Equity	**$19,178.3**	$18,467.2

The accompanying notes are an integral part of these statements.

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Air Products and Chemicals, Inc. and Subsidiaries

CONSOLIDATED STATEMENTS OF CASH FLOWS

Year ended 30 September (Millions of dollars)	**2018**	2017	2016
Operating Activities			
Net income	**$1,532.9**	$3,021.2	$661.5
Less: Net income attributable to noncontrolling interests of continuing operations	**35.1**	20.8	22.5
Less: Net income attributable to noncontrolling interests of discontinued operations	**—**	—	7.9
Net income attributable to Air Products	**1,497.8**	3,000.4	631.1
(Income) Loss from discontinued operations	**(42.2)**	(1,866.0)	468.4
Income from continuing operations attributable to Air Products	**1,455.6**	1,134.4	1,099.5
Adjustments to reconcile income to cash provided by operating activities:			
Depreciation and amortization	**970.7**	865.8	854.6
Deferred income taxes	**(55.4)**	(38.0)	61.8
Loss on extinguishment of debt	**—**	—	6.9
Tax reform repatriation	**240.6**	—	—
Undistributed earnings of unconsolidated affiliates	**(52.3)**	(60.1)	(51.1)
Gain on sale of assets and investments	**(6.9)**	(24.3)	(7.3)
Share-based compensation	**38.8**	39.9	31.0
Noncurrent capital lease receivables	**97.4**	92.2	85.5
Goodwill and intangible asset impairment charge	**—**	162.1	—
Equity method investment impairment charge	**—**	79.5	—
Write-down of long-lived assets associated with cost reduction actions	**—**	69.2	—
Other adjustments	**131.6**	165.4	156.7
Working capital changes that provided (used) cash, excluding effects of acquisitions and divestitures:			
Trade receivables	**(42.8)**	(73.6)	(44.8)
Inventories	**(64.2)**	6.4	32.2
Contracts in progress, less progress billings	**4.7**	(19.3)	28.2
Other receivables	**123.6**	124.7	(6.7)
Payables and accrued liabilities	**(277.7)**	163.8	60.1
Other working capital	**(9.0)**	(154.0)	(47.8)
Cash Provided by Operating Activities	**2,554.7**	2,534.1	2,258.8
Investing Activities			
Additions to plant and equipment	**(1,568.4)**	(1,039.7)	(907.7)
Acquisitions, less cash acquired	**(345.4)**	(8.2)	—
Investment in and advances to unconsolidated affiliates	**—**	(8.1)	—
Proceeds from sale of assets and investments	**48.8**	42.5	44.6
Purchases of investments	**(530.3)**	(2,692.6)	—
Proceeds from investments	**748.2**	2,290.7	—
Other investing activities	**(2.0)**	(2.3)	(1.7)
Cash Used for Investing Activities	**(1,649.1)**	(1,417.7)	(864.8)
Financing Activities			
Long-term debt proceeds	**.5**	2.4	386.9
Payments on long-term debt	**(418.7)**	(483.9)	(480.4)
Net decrease in commercial paper and short-term borrowings	**(78.5)**	(798.6)	(144.2)
Dividends paid to shareholders	**(897.8)**	(787.9)	(721.2)
Proceeds from stock option exercises	**76.2**	68.4	141.3
Other financing activities	**(41.5)**	(41.3)	(42.6)
Cash Used for Financing Activities	**(1,359.8)**	(2,040.9)	(860.2)
Discontinued Operations			
Cash (used for) provided by operating activities	**(12.8)**	(966.2)	401.9

Cash (used for) provided by investing activities	**18.6**	3,750.6	(204.2)
Cash provided by financing activities	**—**	69.5	555.9
Cash Provided by Discontinued Operations	**5.8**	2,853.9	753.6
Effect of Exchange Rate Changes on Cash	**(33.9)**	13.4	7.5
(Decrease) Increase in cash and cash items	**(482.3)**	1,942.8	1,294.9
Cash and Cash items – Beginning of Year	**3,273.6**	1,330.8	206.4
Cash and Cash Items – End of Period	**$2,791.3**	$3,273.6	$1,501.3
Less: Cash and Cash Items – Discontinued Operations	**$—**	$—	$208.1
Cash and Cash Items – Continuing Operations	**$2,791.3**	$3,273.6	$1,293.2

The accompanying notes are an integral part of these statements.

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Air Products and Chemicals, Inc. and Subsidiaries

CONSOLIDATED STATEMENTS OF EQUITY

Year ended 30 September (Millions of dollars)	Common Stock	Capital in Excess of Par Value	Retained Earnings	Accumulated Other Comprehensive Income (Loss)	Treasury Stock	Air Products Shareholders Equity	Non-controlling Interests	Total Equity
Balance 30 September 2015	**$249.4**	**$904.7**	**$10,580.4**	**($2,125.9)**	**($2,359.6)**	**$7,249.0**	**$132.1**	**$7,381.1**
Net income	—	—	631.1	—	—	631.1	30.4	661.5
Other comprehensive income (loss)	—	—	—	(262.4)	—	(262.4)	4.8	(257.6)
Dividends on common stock (per share $3.39)	—	—	(733.7)	—	—	(733.7)	—	(733.7)
Dividends to noncontrolling interests	—	—	—	—	—	—	(33.6)	(33.6)
Share-based compensation	—	37.6	—	—	—	37.6	—	37.6
Issuance of treasury shares for stock option and award plans	—	(5.5)	—	—	132.6	127.1	—	127.1
Tax benefit of stock option and award plans	—	33.2	—	—	—	33.2	—	33.2
Other equity transactions	—	—	(2.3)	—	—	(2.3)	.1	(2.2)
Balance 30 September 2016	**$249.4**	**$970.0**	**$10,475.5**	**($2,388.3)**	**($2,227.0)**	**$7,079.6**	**$133.8**	**$7,213.4**
Net income	—	—	3,000.4	—	—	3,000.4	20.8	3,021.2
Other comprehensive income	—	—	—	529.4	—	529.4	3.7	533.1
Dividends on common stock (per share $3.71)	—	—	(808.5)	—	—	(808.5)	—	(808.5)
Dividends to noncontrolling interests	—	—	—	—	—	—	(28.0)	(28.0)
Share-based compensation	—	40.7	—	—	—	40.7	—	40.7
Issuance of treasury shares for stock option and award plans	—	(9.6)	—	—	63.5	53.9	—	53.9
Spin-off of Versum	—	—	175.0	11.5	—	186.5	(33.9)	152.6
Cumulative change in accounting principle	—	—	8.8	—	—	8.8	—	8.8
Other equity transactions	—	—	(4.6)	—	—	(4.6)	2.9	(1.7)
Balance 30 September 2017	**$249.4**	**$1,001.1**	**$12,846.6**	**($1,847.4)**	**($2,163.5)**	**$10,086.2**	**$99.3**	**$10,185.5**
Net income	—	—	1,497.8	—	—	1,497.8	35.1	1,532.9
Other comprehensive income (loss)	—	—	—	105.5	—	105.5	(19.0)	86.5
Dividends on common stock (per share $4.25)	—	—	(931.8)	—	—	(931.8)	—	(931.8)
Dividends to noncontrolling interests	—	—	—	—	—		(29.9)	(29.9)
Share-based compensation	—	38.1	—	—	—	38.1	—	38.1
Issuance of treasury shares for stock option and award plans	—	(11.3)	—	—	74.3	63.0	—	63.0
Lu'An joint venture	—	—	—	—	—	—	227.4	227.4
Other equity transactions	—	1.4	(2.7)	—	—	(1.3)	5.9	4.6
Balance 30 September 2018	**$249.4**	**$1,029.3**	**$13,409.9**	**($1,741.9)**	**($2,089.2)**	**$10,857.5**	**$318.8**	**$11,176.3**

The accompanying notes are an integral part of these statements.

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1. MAJOR ACCOUNTING POLICIES

Basis of Presentation and Consolidation Principles

The accompanying consolidated financial statements of Air Products and Chemicals, Inc. were prepared in accordance with accounting principles generally accepted in the United States of America (“GAAP”) and include the accounts of Air Products and Chemicals, Inc. and those of its controlled subsidiaries (“we,” “our,” “us,” the “Company,” “Air Products,” or “registrant”), which are generally majority owned. Intercompany transactions and balances are eliminated in consolidation.

We consolidate all entities that we control. The general condition for control is ownership of a majority of the voting interests of an entity. Control may also exist in arrangements where we are the primary beneficiary of a variable interest entity (VIE). An entity that has both the power to direct the activities that most significantly impact the economic performance of a VIE and the obligation to absorb losses or receive benefits significant to the VIE is considered the primary beneficiary of that entity. We have determined that we are not a primary beneficiary in any material VIE.

The results of operations and cash flows for our discontinued operations have been segregated from the results of continuing operations and segment results for all periods presented. The assets and liabilities of the discontinued operations are segregated in the consolidated balance sheets. The comprehensive income related to discontinued operations has not been segregated and is included in the consolidated comprehensive income statement for all periods presented. Refer to Note 3, Discontinued Operations, for detail of the businesses presented in discontinued operations.

The notes to the consolidated financial statements, unless otherwise indicated, are on a continuing operations basis. The term "total company" includes both continuing and discontinued operations.

Reclassifications

The consolidated financial statements and accompanying notes reflect accounting guidance that was adopted during fiscal year 2018. Refer to Note 2, New Accounting Guidance, for additional information. Certain prior year information has been reclassified to conform to the fiscal year 2018 presentation.

Estimates and Assumptions

The preparation of the financial statements in conformity with GAAP requires management to make estimates and assumptions that affect amounts reported in the financial statements and accompanying notes. Actual results could differ from those estimates.

Revenue Recognition

Revenue from product sales is recognized as risk and title to the product transfer to the customer (which generally occurs at the time shipment is made), the sales price is fixed or determinable, and collectability is reasonably assured. Sales returns and allowances are not a business practice in the industry.

Revenue from equipment sale contracts is recorded primarily using the percentage-of-completion method. Under this method, revenue from the sale of major equipment, such as liquefied natural gas (LNG) heat exchangers and large air separation units, is primarily recognized based on costs incurred to date compared with total estimated costs to be incurred. When adjustments in estimated total contract revenues or estimated total costs are required, any changes in the estimated profit from prior estimates are recognized in the current period for the inception-to-date effect of such change. Changes in estimates on projects accounted for under the percentage-of-completion method favorably impacted operating income by approximately $38, $27, and $20 in fiscal years 2018, 2017, and 2016, respectively. Our changes in estimates would not have significantly impacted amounts recorded in prior years.

Certain contracts associated with facilities that are built to provide product to a specific customer are required to be accounted for as leases. In cases where operating lease treatment is appropriate, there is no difference in revenue recognition over the life of the contract as compared to accounting for the contract as product sales. In cases where capital lease treatment is appropriate, the timing of revenue and expense recognition is impacted. Revenue and expense are recognized up front for the sale of equipment component of the contract as compared to revenue recognition over the life of the arrangement under

contracts not qualifying as capital leases. Additionally, a portion of the revenue representing interest income from the financing component of the lease receivable is reflected as sales over the life of the contract. Allowances for credit losses associated with capital lease receivables are recorded using the specific identification method. As of 30 September 2018 and 2017, the credit quality of capital lease receivables did not require a material allowance for credit losses.

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If an arrangement involves multiple deliverables, the delivered items are considered separate units of accounting if the items have value on a stand-alone basis. Revenues are allocated to each deliverable based upon relative selling prices derived from company specific evidence.

Amounts billed for shipping and handling fees are classified as sales in the consolidated income statements.

Amounts billed for sales and use taxes, value-added taxes, and certain excise and other specific transactional taxes imposed on revenue-producing transactions are presented on a net basis and excluded from sales in the consolidated income statements. We record a liability until remitted to the respective taxing authority.

Cost of Sales

Cost of sales predominantly represents the cost of tangible products sold. These costs include labor, raw materials, plant engineering, power, depreciation, production supplies and materials packaging costs, and maintenance costs. Costs incurred for shipping and handling are also included in cost of sales.

Depreciation

Depreciation is recorded using the straight-line method, which deducts equal amounts of the cost of each asset from earnings every year over its expected economic useful life. The principal lives for major classes of plant and equipment are summarized in Note 9, Plant and Equipment, net.

Selling and Administrative

The principal components of selling and administrative expenses are compensation, advertising, and promotional costs. Selling and administrative expenses also include costs for functional support previously provided to the former Electronic Materials and Performance Materials Divisions and in support of transition services agreements with Versum and with Evonik, for which the reimbursement is reflected in "Other income (expense), net" on our consolidated income statements.

Postemployment Benefits

We provide termination benefits to employees as part of ongoing benefit arrangements and record a liability for termination benefits when probable and estimable. These criteria are met when management, with the appropriate level of authority, approves and commits to its plan of action for termination; the plan identifies the employees to be terminated and their related benefits; and the plan is to be completed within one year. We do not provide material one-time benefit arrangements.

Fair Value Measurements

We are required to measure certain assets and liabilities at fair value, either upon initial measurement or for subsequent accounting or reporting. For example, fair value is used in the initial measurement of assets and liabilities acquired in a business combination; on a recurring basis in the measurement of derivative financial instruments; and on a nonrecurring basis when long-lived assets are written down to fair value when held for sale or determined to be impaired. Refer to Note 14, Fair Value Measurements, and Note 16, Retirement Benefits, for information on the methods and assumptions used in our fair value measurements.

Financial Instruments

We address certain financial exposures through a controlled program of risk management that includes the use of derivative financial instruments. The types of derivative financial instruments permitted for such risk management programs are specified in policies set by management. Refer to Note 13, Financial Instruments, for further detail on the types and use of derivative instruments into which we enter.

Major financial institutions are counterparties to all of these derivative contracts. We have established counterparty credit guidelines and generally enter into transactions with financial institutions of investment grade or better. Management believes the risk of incurring losses related to credit risk is remote, and any losses would be immaterial to the consolidated financial results, financial condition, or liquidity.

We recognize derivatives on the balance sheet at fair value. On the date the derivative instrument is entered into, we generally designate the derivative as either (1) a hedge of a forecasted transaction or of the variability of cash flows to be received or paid related to a recognized asset or liability (cash flow hedge), (2) a hedge of a net investment in a foreign operation (net investment hedge), or (3) a hedge of the

fair value of a recognized asset or liability (fair value hedge).

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The following details the accounting treatment of our cash flow, fair value, net investment, and non-designated hedges:

- Changes in the fair value of a derivative that is designated as and meets the cash flow hedge criteria are recorded in accumulated other comprehensive loss (AOCL) to the extent effective and then recognized in earnings when the hedged items affect earnings.
- Changes in the fair value of a derivative that is designated as and meets all the required criteria for a fair value hedge, along with the gain or loss on the hedged asset or liability that is attributable to the hedged risk, are recorded in current period earnings.
- Changes in the fair value of a derivative and foreign currency debt that are designated as and meet all the required criteria for a hedge of a net investment are recorded as translation adjustments in AOCL.
- Changes in the fair value of a derivative that is not designated as a hedge are recorded immediately in earnings.

We formally document the relationships between hedging instruments and hedged items, as well as our risk management objective and strategy for undertaking various hedge transactions. This process includes relating derivatives that are designated as fair value or cash flow hedges to specific assets and liabilities on the balance sheet or to specific firm commitments or forecasted transactions. We also formally assess, at the inception of the hedge and on an ongoing basis, whether derivatives are highly effective in offsetting changes in fair values or cash flows of the hedged item. If it is determined that a derivative is not highly effective as a hedge, or if a derivative ceases to be a highly effective hedge, we will discontinue hedge accounting with respect to that derivative prospectively.

Foreign Currency

Since we do business in many foreign countries, fluctuations in currency exchange rates affect our financial position and results of operations.

In most of our foreign operations, the local currency is considered the functional currency. Foreign subsidiaries translate their assets and liabilities into U.S. dollars at current exchange rates in effect at the end of the fiscal period. The gains or losses that result from this process are shown as translation adjustments in AOCL in the equity section of the balance sheet.

The revenue and expense accounts of foreign subsidiaries are translated into U.S. dollars at the average exchange rates that prevail during the period. Therefore, the U.S. dollar value of these items on the consolidated income statements fluctuates from period to period, depending on the value of the dollar against foreign currencies. Some transactions are made in currencies different from an entity’s functional currency. Gains and losses from these foreign currency transactions are generally reflected in "Other income (expense), net" on our consolidated income statements as they occur.

Environmental Expenditures

Accruals for environmental loss contingencies are recorded when it is probable that a liability has been incurred and the amount of loss can be reasonably estimated. Remediation costs are capitalized if the costs improve the Company’s property as compared with the condition of the property when originally constructed or acquired, or if the costs prevent environmental contamination from future operations. We expense environmental costs related to existing conditions resulting from past or current operations and from which no current or future benefit is discernible. The amounts charged to income from continuing operations related to environmental matters totaled $12.8, $11.4, and $12.2 in fiscal years 2018, 2017, and 2016, respectively.

The measurement of environmental liabilities is based on an evaluation of currently available information with respect to each individual site and considers factors such as existing technology, presently enacted laws and regulations, and prior experience in remediation of contaminated sites. An environmental liability related to cleanup of a contaminated site might include, for example, a provision for one or more of the following types of costs: site investigation and testing costs, remediation costs, post-remediation monitoring costs, natural resource damages, and outside legal fees. These liabilities include costs related to other potentially responsible parties to the extent that we have reason to believe such parties will not fully pay

their proportionate share. They do not consider any claims for recoveries from insurance or other parties and are not discounted.

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As assessments and remediation progress at individual sites, the amount of projected cost is reviewed, and the liability is adjusted to reflect additional technical and legal information that becomes available. Management has an established process in place to identify and monitor the Company's environmental exposures. An environmental accrual analysis is prepared and maintained that lists all environmental loss contingencies, even where an accrual has not been established. This analysis assists in monitoring the Company's overall environmental exposure and serves as a tool to facilitate ongoing communication among the Company's technical experts, environmental managers, environmental lawyers, and financial management to ensure that required accruals are recorded and potential exposures disclosed.

Given inherent uncertainties in evaluating environmental exposures, actual costs to be incurred at identified sites in future periods may vary from the estimates. Refer to Note 17, Commitments and Contingencies, for additional information on the Company's environmental loss contingencies.

The accruals for environmental liabilities are reflected in the consolidated balance sheets, primarily as part of other noncurrent liabilities.

Litigation

In the normal course of business, we are involved in legal proceedings. We accrue a liability for such matters when it is probable that a liability has been incurred and the amount of loss can be reasonably estimated. When only a range of possible loss can be established, the most probable amount in the range is accrued. If no amount within this range is a better estimate than any other amount within the range, the minimum amount in the range is accrued. The accrual for a litigation loss contingency includes estimates of potential damages and other directly related costs expected to be incurred. Refer to Note 17, Commitments and Contingencies, for additional information on our current legal proceedings.

Share-Based Compensation

We have various share-based compensation programs, which include deferred stock units, stock options, and restricted stock. We expense the grant-date fair value of these awards over the vesting period during which employees perform related services. Expense recognition is accelerated for retirement-eligible individuals who would meet the requirements for vesting of awards upon their retirement. Refer to Note 19, Share-Based Compensation, for additional information regarding these awards and the models and assumptions used to determine the grant-date fair value of our awards.

Income Taxes

We account for income taxes under the asset and liability method. Under this method, deferred tax assets and liabilities are recognized for the tax effects of temporary differences between the financial reporting and tax bases of assets and liabilities using enacted tax rates in effect for the year in which the differences are expected to be recovered or settled. A principal temporary difference results from the excess of tax depreciation over book depreciation because accelerated methods of depreciation and shorter useful lives are used for income tax purposes. The cumulative impact of a change in tax rates or regulations is included in income tax expense in the period that includes the enactment date. We recognize deferred tax assets net of existing valuation allowances to the extent we believe that these assets are more likely than not to be realized considering all available evidence.

A tax benefit for an uncertain tax position is recognized when it is more likely than not that the position will be sustained upon examination based on its technical merits. This position is measured as the largest amount of tax benefit that is greater than 50% likely of being realized. Interest and penalties related to unrecognized tax benefits are recognized as a component of income tax expense. For additional information regarding our income taxes, refer to Note 22, Income Taxes.

Other Non-Operating Income (Expense), net

Beginning in the second quarter of fiscal year 2017, other non-operating income (expense), net includes interest income associated with our cash and cash items and short-term investments. Interest income in previous periods was included in "Other income (expense), net." In addition, other non-operating income (expense), net includes non-service cost components of net periodic pension and postretirement benefit cost. Our non-service costs primarily include interest cost, expected return on plan assets, amortization of

actuarial gains and losses, and settlements.

Cash and Cash Items

Cash and cash items include cash, time deposits, treasury securities, and certificates of deposit acquired with an original maturity of three months or less.

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Short-term Investments

Short-term investments include time deposits and certificates of deposit with original maturities greater than three months and less than one year.

Trade Receivables, net

Trade receivables comprise amounts owed to us through our operating activities and are presented net of allowances for doubtful accounts. The allowances for doubtful accounts represent estimated uncollectible receivables associated with potential customer defaults on contractual obligations. A provision for customer defaults is made on a general formula basis when it is determined that the risk of some default is probable and estimable but cannot yet be associated with specific customers. The assessment of the likelihood of customer defaults is based on various factors, including the length of time the receivables are past due, historical experience, and existing economic conditions. The allowance also includes amounts for certain customers where a risk of default has been specifically identified, considering factors such as the financial condition of the customer and customer disputes over contractual terms and conditions. Allowances for doubtful accounts were $91.3 and $93.5 as of 30 September 2018 and 2017, respectively. Provisions to the allowance for doubtful accounts charged against income were $24.0, $45.8, and $21.8 in fiscal years 2018, 2017, and 2016, respectively.

Inventories

We carry inventory on our consolidated balance sheets that is comprised of finished goods, work-in-process, raw materials and supplies. Inventories are stated at the lower of cost or net realizable value. We write down our inventories for estimated obsolescence or unmarketable inventory based upon assumptions about future demand and market conditions.

Effective 1 July 2018, we changed our accounting method for U.S. industrial gases inventories from a last-in, first-out basis (LIFO) to a first-in, first-out basis (FIFO). Previously, the LIFO method was used to determine the cost of industrial gases inventories in the United States. We believe this change in accounting method is preferable as it is consistent with how we manage our business, results in a uniform method to value our inventory across all regions of our business, improves comparability with our peers, and is expected to better reflect the current value of inventory on the consolidated balance sheets. We applied this accounting change as a cumulative effect adjustment to cost of sales in the fourth quarter of fiscal year 2018 and did not restate prior period financial statements because the impact was not material. Refer to Note 7, Inventories, for additional information.

Equity Investments

The equity method of accounting is used when we exercise significant influence but do not have operating control, generally assumed to be 20% – 50% ownership. Under the equity method, original investments are recorded at cost and adjusted by our share of undistributed earnings or losses of these companies. Equity investments are reviewed for impairment whenever events or changes in circumstances indicate that the carrying amount of the investment may not be recoverable.

Plant and Equipment, Net

Plant and equipment, net is stated at cost less accumulated depreciation. Construction costs, labor, and applicable overhead related to installations are capitalized. Expenditures for additions and improvements that extend the lives or increase the capacity of plant assets are capitalized. The costs of maintenance and repairs of plant and equipment are charged to expense as incurred.

Fully depreciated assets are retained in the gross plant and equipment and accumulated depreciation accounts until they are removed from service. In the case of disposals, assets, and related depreciation are removed from the accounts, and the net amounts, less proceeds from disposal, are included in income. Refer to Note 9, Plant and Equipment, net, for further detail.

Computer Software

We capitalize costs incurred to purchase or develop software for internal use. Capitalized costs include purchased computer software packages, payments to vendors/consultants for development and implementation or modification to a purchased package to meet our requirements, payroll and related costs

for employees directly involved in development, and interest incurred while software is being developed. Capitalized computer software costs are reflected in "Plant and equipment, net" on the consolidated balance sheets and are depreciated over the estimated useful life of the software, generally a period of three to five years.

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Capitalized Interest

As we build new plant and equipment, we include in the cost of these assets a portion of the interest payments we make during the year. The amount of capitalized interest was $19.5, $19.0, and $32.7 in fiscal years 2018, 2017, and 2016, respectively.

Impairment of Long-Lived Assets

Long-lived assets are grouped for impairment testing at the lowest level for which there are identifiable cash flows that are largely independent of the cash flows of other assets and liabilities and are evaluated for impairment whenever events or changes in circumstances indicate that the carrying amount of an asset group may not be recoverable. We assess recoverability by comparing the carrying amount of the asset group to estimated undiscounted future cash flows expected to be generated by the asset group. If an asset group is considered impaired, the impairment loss to be recognized is measured as the amount by which the asset group's carrying amount exceeds its fair value. Long-lived assets meeting the held for sale criteria are reported at the lower of carrying amount or fair value less cost to sell.

Asset Retirement Obligations

The fair value of a liability for an asset retirement obligation is recognized in the period in which it is incurred. The fair value of the liability is measured using discounted estimated cash flows and is adjusted to its present value in subsequent periods as accretion expense is recorded. The corresponding asset retirement costs are capitalized as part of the carrying amount of the related long-lived asset and depreciated over the asset's useful life. Our asset retirement obligations are primarily associated with on-site long-term supply contracts under which we have built a facility on land owned by the customer and are obligated to remove the facility at the end of the contract term. Our asset retirement obligations totaled $190.4 and $144.7 at 30 September 2018 and 2017, respectively.

Goodwill

Business combinations 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 (plus the fair value of any noncontrolling interest and previously held equity interest in the acquiree) over the fair market value of the net assets acquired, including identified intangibles, is recorded as goodwill. Preliminary purchase price allocations are made at the date of acquisition and finalized when information about facts and circumstances that existed as of the acquisition date needed to finalize underlying estimates is obtained or when we determine that such information is not obtainable, within a maximum allocation period of one year.

Goodwill is subject to impairment testing at least annually. In addition, goodwill is tested more frequently if a change in circumstances or the occurrence of events indicates that potential impairment exists. Refer to Note 10, Goodwill, for further detail.

Intangible Assets

Intangible assets with determinable lives primarily consist of customer relationships, purchased patents and technology, and land use rights. The cost of intangible assets with determinable lives is amortized on a straight-line basis over the estimated period of economic benefit. No residual value is estimated for these intangible assets. Indefinite-lived intangible assets consist of trade names and trademarks. Indefinite-lived intangibles are subject to impairment testing at least annually. In addition, intangible assets are tested more frequently if a change in circumstances or the occurrence of events indicates that potential impairment exists.

Customer relationships are generally amortized over periods of five to twenty-five years. Purchased patents and technology and other are generally amortized over periods of five to fifteen years. Land use rights, which are included in other intangibles, are generally amortized over a period of fifty years. Amortizable lives are adjusted whenever there is a change in the estimated period of economic benefit. Refer to Note 11, Intangible Assets, for further detail.

Retirement Benefits

The cost of pension benefits is recognized over the employees' service period. We use actuarial methods and assumptions in the valuation of defined benefit obligations and the determination of expense. Differences between actual and expected results or changes in the value of obligations and plan assets are not recognized in earnings as they occur but, rather, systematically and gradually over subsequent periods. Refer to Note 16, Retirement Benefits, for disclosures related to our pension and other postretirement benefits.

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2. NEW ACCOUNTING GUIDANCE

Accounting Guidance Implemented in Fiscal Year 2018

Disclosure Simplification

In August 2018, the SEC issued a final rule on disclosure update and simplification, amending certain disclosure requirements that were redundant, duplicative, overlapping, outdated or superseded. This rule was effective on 5 November 2018. We adopted the amended guidance, which reduced or eliminated certain annual disclosure requirements outside the consolidated financial statements, including the elimination of the ratio of earnings to fixed charges previously filed under Exhibit 12. However, the amendments expanded interim disclosure requirements that will be adopted in our Form 10-Q for our first fiscal quarter ended 31 December 2018, including those related to the analysis of shareholders' equity.

Income Taxes

In March 2018, the Financial Accounting Standards Board (FASB) issued an update for Staff Accounting Bulletin (SAB) No. 118 issued by the SEC in December 2017 related to the U.S. Tax Cuts and Jobs Act (“the Tax Act"). We adopted the SEC guidance under SAB No. 118 in the first quarter of fiscal year 2018. We continue to report the impacts of the Tax Act as provisional based on reasonable estimates as of 30 September 2018. We are continuing to gather additional information and expect to complete our accounting by the first quarter of fiscal year 2019, within the prescribed one-year measurement period. For additional details, see Note 22, Income Taxes.

Presentation of Net Periodic Pension and Postretirement Benefit Cost

In March 2017, the FASB issued guidance for improving the presentation of net periodic pension cost and net periodic postretirement benefit cost. The amendments require the service cost component of net periodic benefit cost to be presented in the same operating income line items as other compensation costs arising from services rendered by employees during the period. The non-service costs (e.g., interest cost, expected return on plan assets, amortization of actuarial gains/losses, settlements) should be presented in the consolidated income statements outside of operating income. The amendments also allow only the service cost component to be eligible for capitalization when applicable. We early adopted this guidance during the first quarter of fiscal year 2018. The amendments have been applied retrospectively for the income statement presentation requirements and prospectively for the limit on costs eligible for capitalization. We applied the practical expedient to use the amounts disclosed in our retirement benefits note for the prior comparative periods as the estimation basis for applying the retrospective presentation requirements.

Prior to adoption of the guidance, we classified all net periodic benefit costs within operating costs, primarily within "Cost of sales" and "Selling and administrative" on the consolidated income statements. The line item classification changes required by the new guidance did not impact our pre-tax earnings or net income; however, "Operating income" and "Other non-operating income (expense), net" changed by immaterial offsetting amounts.

Derivative Contract Novations

In March 2016, the FASB issued guidance to clarify that a change in the counterparty to a derivative instrument that has been designated as a hedging instrument does not, in and of itself, require re-designation of that hedging relationship provided that all other hedge accounting criteria continue to be met. We adopted this guidance in the first quarter of fiscal year 2018. This guidance did not have an impact on our consolidated financial statements upon adoption.

New Accounting Guidance to be Implemented

Revenue Recognition

In May 2014, the FASB issued guidance based on the principle that revenue is recognized in an amount expected to be collected and to which the entity expects to be entitled in exchange for the transfer of goods or services. We will adopt this guidance in fiscal year 2019 under the modified retrospective approach. Upon adoption, we will no longer present "Contracts in progress, less progress billings" on our consolidated

balance sheets and will have expanded disclosure requirements. Otherwise, we do not expect adoption of this guidance to have a material impact on our consolidated financial statements.

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The expected balance sheet impacts of no longer presenting "Contracts in progress, less progress billings" are summarized below:

	30 September 2018	New Revenue Standard Adjustments	1 October 2018
Assets			
Current Assets			
Cash and cash items	$2,791.3	$—	$2,791.3
Short-term investments	184.7	—	184.7
Trade receivables, net	1,207.2	—	1,207.2
Inventories	396.1	—	396.1
Contracts in progress, less progress billings	77.5	(77.5)	—
Prepaid expenses	129.6	—	129.6
Other receivables and current assets	295.8	103.7	399.5
Total Current Assets	5,082.2	26.2	5,108.4
Total Noncurrent Assets	14,096.1	—	14,096.1
Total Assets	$19,178.3	$26.2	$19,204.5
Liabilities and Equity			
Current Liabilities			
Payables and accrued liabilities	$1,817.8	$26.2	$1,844.0
Accrued income taxes	59.6	—	59.6
Short-term borrowings	54.3	—	54.3
Current portion of long-term debt	406.6	—	406.6
Total Current Liabilities	2,338.3	26.2	2,364.5
Total Noncurrent Liabilities	5,663.7	—	5,663.7
Total Liabilities	8,002.0	26.2	8,028.2
Total Equity	11,176.3	—	11,176.3
Total Liabilities and Equity	$19,178.3	$26.2	$19,204.5

Our expanded disclosure requirements will include the disaggregation of revenue and disclosure of the fixed transaction price allocated to remaining performance obligations. We intend to disaggregate our revenue by supply mode. Our fixed transaction price allocated to remaining performance obligations will primarily relate to our onsite gases business.

Leases

In February 2016, the FASB issued guidance that requires lessees to recognize a right-of-use asset and lease liability on the balance sheet for all leases, including operating leases, with a term in excess of 12 months. The guidance also expands the quantitative and qualitative disclosure requirements. The guidance is effective in fiscal year 2020, with early adoption permitted. The guidance must be applied using a modified retrospective approach with the option to apply either at the adoption date or at the earliest comparative period presented in the consolidated financial statements.

The Company is the lessee under various agreements for real estate, distribution equipment, aircraft, and vehicles that are currently accounted for as operating leases. The new guidance will require the Company to record all leases, including operating leases, on the balance sheet with a right-of-use asset and corresponding liability for future payment obligations.

We will adopt this guidance in fiscal year 2020 and are currently evaluating the impact it will have on our consolidated financial statements, including the assessment of our current lease population under the revised definition of what qualifies as a leased asset. In addition, we are implementing a new application to administer the accounting and disclosure requirements under the new guidance.

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Credit Losses on Financial Instruments

In June 2016, the FASB issued guidance on the measurement of credit losses, which requires measurement and recognition of expected credit losses for financial assets, including trade receivables and capital lease receivables, held at the reporting date based on historical experience, current conditions, and reasonable and supportable forecasts. The method to determine a loss is different from the existing guidance, which requires a credit loss to be recognized when it is probable. The guidance is effective beginning in fiscal year 2021, with early adoption permitted beginning in fiscal year 2020. We are currently evaluating the impact this guidance will have on our consolidated financial statements.

Cash Flow Statement Classification

In August 2016, the FASB issued guidance to reduce diversity in practice on how certain cash receipts and cash payments are classified in the statement of cash flows. The guidance is effective beginning in fiscal year 2019, with early adoption permitted, and should be applied retrospectively. We plan to adopt this guidance in fiscal year 2019 and do not expect adoption to have a significant impact on our consolidated financial statements.

Intra-Entity Asset Transfers

In October 2016, the FASB issued guidance on accounting for the income tax effects of intra-entity transfers of assets other than inventory. Current guidance prohibits the recognition of current and deferred income taxes for an intra-entity asset transfer until the asset has been sold to an outside party. Under the new guidance, the income tax consequences of an intra-entity asset transfer are recognized when the transfer occurs. The guidance is effective beginning in fiscal year 2019, with early adoption permitted as of the beginning of an annual reporting period. The guidance must be applied on a modified retrospective basis through a cumulative-effect adjustment to retained earnings as of the date of adoption. We will adopt the guidance in fiscal year 2019 and do not expect adoption of this guidance to have a significant impact on our consolidated financial statements.

Derecognition of Nonfinancial Assets

In February 2017, the FASB issued an update to clarify the scope of guidance on gains and losses from the derecognition of nonfinancial assets and to add guidance for partial sales of nonfinancial assets. We will adopt this guidance in fiscal year 2019 under the modified retrospective approach. We do not expect this update to have a significant impact on our consolidated financial statements.

Hedging Activities

In August 2017, the FASB issued guidance on hedging activities to expand the related presentation and disclosure requirements, change how companies assess effectiveness, and eliminate the separate measurement and reporting of hedge ineffectiveness. The guidance also enables more financial and nonfinancial hedging strategies to become eligible for hedge accounting. The guidance is effective in fiscal year 2020, with early adoption permitted. For cash flow and net investment hedges existing at the date of adoption, an entity should apply a cumulative-effect adjustment to eliminate the separate measurement of ineffectiveness within equity as of the beginning of the fiscal year the guidance is adopted. The amended presentation and disclosure guidance is applied prospectively. We are currently evaluating the impact this guidance will have on our consolidated financial statements.

Reclassification of Certain Tax Effects from Accumulated Other Comprehensive Income

In February 2018, the FASB issued guidance allowing a reclassification from accumulated other comprehensive income to retained earnings for stranded tax effects resulting from the Tax Act. The guidance is effective in fiscal year 2020, with early adoption permitted, including adoption in any interim period. If elected, the reclassification can be applied in either the period of adoption or retrospectively to the period of the Tax Act's enactment (i.e., our first quarter of fiscal year 2018). We are currently evaluating the adoption alternatives and the impact this guidance will have on our consolidated financial statements.

Fair Value Measurement Disclosures

In August 2018, the FASB issued guidance which modifies the disclosure requirements for fair value measurements. The guidance is effective in fiscal year 2021, with early adoption permitted. Certain

amendments must be applied prospectively and other amendments retrospectively. We are currently evaluating the impact this guidance will have on the disclosures in the notes to our consolidated financial statements.

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Retirement Benefit Disclosures
In August 2018, the FASB issued guidance which modifies the disclosure requirements for employers that sponsor defined benefit pension or other postretirement plans. The guidance is effective in fiscal year 2021, with early adoption permitted, and must be applied on a retrospective basis. We are currently evaluating the impact this guidance will have on the disclosures in the notes to our consolidated financial statements.

Cloud Computing Implementation Costs
In August 2018, the FASB issued guidance which aligns the capitalization requirements for implementation costs incurred in a hosting arrangement that is a service contract with the existing capitalization requirements for implementation costs incurred to develop or obtain internal-use software. The guidance is effective in fiscal year 2021, with early adoption permitted, and may be applied either prospectively or retrospectively. We are currently evaluating the impact this guidance will have on our consolidated financial statements.

Related Party Guidance for Variable Interest Entities
In October 2018, the FASB issued an update which amends the guidance for determining whether a decision-making fee is a variable interest. The amendments require consideration of indirect interests held through related parties under common control on a proportional basis rather than as the equivalent of a direct interest in its entirety as currently required. The guidance is effective in fiscal year 2021, with early adoption permitted. The amendments must be applied retrospectively with a cumulative-effect adjustment to retained earnings at the beginning of the earliest period presented. We are currently evaluating the impact this guidance will have on our consolidated financial statements.

3. DISCONTINUED OPERATIONS

In fiscal year 2018, income from discontinued operations, net of tax, of $42.2 includes an income tax benefit of $25.6 resulting from the resolution of uncertain tax positions taken in conjunction with the disposition of our former European Homecare business in fiscal year 2012. In addition, we recorded an after-tax benefit of $17.6 resulting from the resolution of certain post-closing adjustments associated with the sale of our former Performance Materials Division (PMD). Refer to Note 22, Income Taxes, for additional information. These benefits were partially offset by an after-tax loss of $1.0 related to Energy-from-Waste (EfW) project exit activities, which were completed during the first quarter of fiscal year 2018.

There were no assets or liabilities presented in discontinued operations on the consolidated balance sheets as of 30 September 2018. As of 30 September 2017, current assets of discontinued operations of $10.2 related to EfW and current liabilities of discontinued operations of $15.7 primarily related to reserves associated with the disposition of PMD.

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The following table details income from discontinued operations, net of tax, on the consolidated income statements for fiscal year 2017:

Year Ended 30 September 2017	Performance Materials	Energy-from-Waste[A]	Total Discontinued Operations
Sales	$254.8	$—	$254.8
Cost of sales	182.3	13.8	196.1
Selling and administrative	22.5	.7	23.2
Research and development	5.1	—	5.1
Other income (expense), net	.3	(2.0)	(1.7)
Operating Income (Loss)	45.2	(16.5)	28.7
Equity affiliates' income	.3	—	.3
Income (Loss) Before Taxes	45.5	(16.5)	29.0
Income tax benefit[B]	(50.8)	(5.7)	(56.5)
Income (Loss) From Operations of Discontinued Operations, net of tax	96.3	(10.8)	85.5
Gain (Loss) on disposal of business, net of tax[C]	1,827.6	(47.1)	1,780.5
Income (Loss) From Discontinued Operations, net of tax	$1,923.9	($57.9)	$1,866.0

(A) The loss from operations of discontinued operations for EfW primarily relates to costs incurred for ongoing project exit activities, administrative costs, and land lease obligations.

(B) As a result of the expected gain on the sale of PMD, we released valuation allowances related to capital loss and net operating loss carryforwards primarily during the first quarter of 2017 that favorably impacted our income tax provision within discontinued operations by approximately $69.

(C) After-tax gain on sale of $1,827.6 includes expense for income tax reserves for uncertain tax positions of $28.0 gross ($21.0 net) in various jurisdictions.

In fiscal year 2017, income from discontinued operations, net of tax, of $1,866.0 includes a gain of $2,870 ($1,828 after-tax, or $8.32 per share) for the sale of PMD to Evonik Industries AG (Evonik). The sale closed on 3 January 2017 for $3.8 billion in cash. In addition, we recorded a loss on the disposal of EfW of $59.3 ($47.1 after-tax) during the first quarter of 2017, primarily for land lease obligations and to update our estimate of the net realizable value of the plant assets. The loss on disposal was recorded as a component of discontinued operations while the liability associated with land lease obligations was and continues to be recorded in continuing operations. As of 30 September 2018, liabilities associated with EfW recorded in continuing operations were approximately $63 and primarily related to the land lease obligations.

On 1 October 2016 (the distribution date), Air Products completed the spin-off of its Electronic Materials Division (EMD) as Versum Materials, Inc. (Versum), a separate and independent public company. The spin-off was completed by way of a distribution to Air Products' stockholders of all of the then issued and outstanding shares of common stock of Versum on the basis of one share of Versum common stock for every two shares of Air Products' common stock held as of the close of business on 21 September 2016 (the record date for the distribution). Fractional shares of Versum common stock were not distributed to Air Products' common stockholders. Air Products' stockholders received cash in lieu of fractional shares. Subsequent to the distribution, Versum became an independent public company, and its common stock is listed under the symbol "VSM" on the New York Stock Exchange. The spin-off of Versum was treated as a noncash transaction in the consolidated statements of cash flows in fiscal year 2017. Seifi Ghasemi, Director, Chairman, President, and Chief Executive Officer of Air Products, continues to serve as non-executive chairman of the Versum Board of Directors.

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The following table details the loss from discontinued operations, net of tax, on the consolidated income statements for fiscal year 2016:

Year Ended 30 September 2016	Electronic Materials	Performance Materials	Energy-from-Waste[A]	Total Discontinued Operations
Sales	$961.6	$1,059.1	$—	$2,020.7
Cost of sales	521.6	704.5	24.6	1,250.7
Selling and administrative	87.7	76.6	2.8	167.1
Research and development	40.8	19.6	.9	61.3
Other income (expense), net	2.2	4.2	(12.7)	(6.3)
Operating Income (Loss)	313.7	262.6	(41.0)	535.3
Equity affiliates' income	.2	1.4	—	1.6
Interest expense	.3	—	—	.3
Income (Loss) Before Taxes[B]	313.6	264.0	(41.0)	536.6
Income tax provision (benefit)	73.4	80.5	(3.4)	150.5
Income (Loss) From Operations of Discontinued Operations, net of tax	240.2	183.5	(37.6)	386.1
Loss on disposal of business, net of tax	—	—	(846.6)	(846.6)
Income (Loss) From Discontinued Operations, net of tax	240.2	183.5	(884.2)	(460.5)
Net Income Attributable to Noncontrolling Interests of Discontinued Operations	7.9	—	—	7.9
Net Income (Loss) From Discontinued Operations	$232.3	$183.5	($884.2)	($468.4)

[A] The loss from operations of discontinued operations for EfW primarily relates to project suspension costs, land lease obligations, and administrative costs.

[B] In fiscal year 2016, income before taxes from operations of discontinued operations attributable to Air Products was $527.1.

In fiscal year 2016, the Company's Board of Directors approved the exit of the EfW business, and efforts to start up the two EfW projects located in Tees Valley, United Kingdom, were discontinued. The loss from discontinued operations, net of tax, of $460.5 includes a loss of $945.7 ($846.6 after-tax) from the write down of the EfW plant assets to their estimated net realizable value and a liability recorded for plant disposition and other costs. Income tax benefits related only to one of the projects as the other did not qualify for a local tax deduction. We estimated the net realizable value of the projects assuming an orderly liquidation of assets capable of being marketed on a secondary equipment market based on market quotes and our experience with selling similar equipment. An asset's orderly liquidation value is the amount that could be realized from a liquidation sale, given a reasonable period of time to find a buyer, selling the asset in the existing condition where it is located, and assuming the highest and best use of the asset by market participants. A valuation allowance of $58.0 and unrecognized tax benefits of $7.9 were recorded relating to deferred tax assets on capital assets generated from the loss.

Fiscal year 2016 also includes the results of PMD and EMD prior to their dispositions.

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4. MATERIALS TECHNOLOGIES SEPARATION

In fiscal year 2017, we completed the separation of the divisions comprising the former Materials Technologies segment through the spin-off of EMD as Versum and the sale of PMD to Evonik. For additional information on the dispositions, refer to Note 3, Discontinued Operations.

Business Separation Costs

In connection with the dispositions of EMD and PMD, we incurred net separation costs of $30.2 in fiscal year 2017. The net costs include legal and advisory fees of $32.5, which are reflected on the consolidated income statements as “Business separation costs,” and a pension settlement benefit of $2.3 presented within "Other non-operating income (expense), net." Our fiscal year 2017 income tax provision includes net tax benefits of $5.5, primarily related to changes in tax positions on business separation activities.

In fiscal year 2016, we incurred business separation costs of $50.6 for legal and advisory fees. Our fiscal year 2016 income tax provision includes additional tax expense related to the separation of $51.8, of which $45.7 resulted from a dividend that was declared in June 2016 to repatriate $443.8 from a subsidiary in South Korea to the U.S. in anticipation of the separation of EMD from the industrial gases business in South Korea.

Transition Services Agreements

We entered into transition services agreements by which we provided certain transition services to Versum for EMD and to Evonik for PMD subsequent to their respective separation dates. The reimbursement for costs in support of the agreements has been reflected on the consolidated income statements within “Other income (expense), net.” All transition services were completed during fiscal year 2018.

Loss on Extinguishment of Debt

On 30 September 2016, in anticipation of the spin-off, Versum entered into certain financing transactions to allow for a cash distribution of $550.0 and a distribution in-kind of senior unsecured notes (the "Notes") issued by Versum with an aggregate principal amount of $425.0 to Air Products. Air Products then exchanged these Notes with certain financial institutions for $418.3 of Air Products’ outstanding commercial paper. This noncash exchange, which was excluded from the consolidated statements of cash flows, resulted in a loss of $6.9 that has been reflected on the consolidated income statements as “Loss on extinguishment of debt.” This loss was deductible for tax purposes.

5. COST REDUCTION AND ASSET ACTIONS

In fiscal year 2017, we recognized a net expense of $151.4. The year-to-date net expense included a charge of $154.8 for actions taken during fiscal year 2017, partially offset by the favorable settlement of the remaining $3.4 accrued balance associated with business restructuring actions taken in 2015. The charge included asset actions of $88.5 and severance actions of $66.3. The asset actions included charges resulting from the write-down of an air separation unit in the Industrial Gases – EMEA segment that was constructed mainly to provide oxygen to one of the Energy-from-Waste plants, the planned sale of a non-industrial gas hardgoods business in the Industrial Gases – Americas segment, and the closure of a facility in the Corporate and other segment that manufactured LNG heat exchangers. The severance actions related to the elimination or planned elimination of approximately 625 positions, primarily in the Corporate and other segment and in the Industrial Gases – EMEA segment. The actions in the Corporate and other segment were driven by the reorganization of our engineering, manufacturing, and technology functions.

The 2017 charge related to the segments as follows: $39.3 in Industrial Gases – Americas, $77.9 in Industrial Gases – EMEA, $.9 in Industrial Gases – Asia, $2.5 in Industrial Gases – Global, and $34.2 in Corporate and other.

In fiscal year 2016, we recognized an expense of $34.5 for severance and other benefits related to cost reduction actions which resulted in the elimination of approximately 610 positions. The expenses related primarily to the Industrial Gases – Americas segment and the Industrial Gases – EMEA segment.

The charges we record for cost reduction and asset actions have been excluded from segment operating income.

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The following table summarizes the carrying amount of the accrual for cost reduction actions at 30 September 2018:

	Severance and Other Benefits	Asset Actions/Other	Total
2016 Charge	$34.5	$—	$34.5
Cash expenditures	(21.6)	—	(21.6)
Amount reflected in pension liability	(.9)	—	(.9)
Currency translation adjustment	.3	—	.3
30 September 2016	$12.3	$—	$12.3
2017 Charge	66.3	88.5	154.8
Noncash expenses	—	(84.2)	(84.2)
Cash expenditures	(35.7)	(1.2)	(36.9)
Amount reflected in pension liability	(2.0)	—	(2.0)
Amount reflected in other noncurrent liabilities	—	(2.2)	(2.2)
Currency translation adjustment	(.3)	—	(.3)
30 September 2017	$40.6	$.9	$41.5
Cash expenditures	(30.3)	(.9)	(31.2)
Amount reflected in pension liability	(.4)	—	(.4)
30 September 2018	**$9.9**	**$—**	**$9.9**

6. ACQUISITIONS

Asset Acquisition

On 9 September 2017, Air Products signed an agreement to form a joint venture, Air Products Lu An (Changzhi) Co., Ltd. (“the JV”) with Lu’An Clean Energy Company ("Lu’An"). On 26 April 2018 ("the acquisition date"), we completed the formation of the JV, of which Air Products owns 60% and Lu’An owns 40%. The JV receives coal, steam and power from Lu’An and supplies syngas to Lu’An under a long-term onsite contract. The JV is consolidated within the results of the Industrial Gases – Asia segment.

Air Products contributed four large air separation units to the JV with a carrying value of approximately $300, and the JV acquired gasification and syngas clean-up assets from Lu’An for7.9 billion RMB (approximately $1.2 billion). As a result, the carrying value of the plant and equipment of the JV was approximately $1.5 billion at the acquisition date.

We accounted for the acquisition of the gasification and syngas clean-up assets as an asset acquisition. In connection with closing the acquisition, we paid net cash of approximately 1.5 billion RMB ($235) and issued equity of 1.4 billion RMB ($227) to Lu'An for their noncontrolling interest in the JV.

In addition, Lu'An made a loan of 2.6 billion RMB to the JV with regularly scheduled principal and interest payments at a fixed interest rate of 5.5%, and we established a liability of 2.3 billion RMB for cash payments expected to be made to or on behalf of Lu'An in fiscal year 2019.

As of 30 September 2018, long-term debt payable to Lu'An of 2.6 billion RMB ($384) is presented on the consolidated balance sheets as "Long-term debt – related party," and our expected remaining cash payments of approximately 2.2 billion RMB ($330) are presented within "Payables and accrued liabilities."

The issuance of equity to Lu'An for their noncontrolling interest, the long-term debt, and the liability for the remaining cash payments were noncash transactions; therefore, they have been excluded from the consolidated statement of cash flows for the fiscal year ended 30 September 2018.

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Business Combinations

In fiscal year 2018, we completed eight acquisitions that were accounted for as business combinations. These acquisitions had an aggregate purchase price, net of cash acquired, of $355.4. The largest of the acquisitions was completed during the first quarter of fiscal year 2018 and consisted primarily of three air separation units serving onsite and merchant customers in China. This acquisition is expected to strengthen our position in the region. The results of this business are consolidated within our Industrial Gases – Asia segment.

Our fiscal year 2018 business combinations resulted in the recognition of $178.4 of plant and equipment, $78.0 of goodwill, $17.7 of which is deductible for tax purposes, and $105.8 of intangible assets, primarily customer relationships, having a weighted-average useful life of twelve years. The goodwill recognized on the transactions is attributable to expected growth and cost synergies and was primarily recorded in the Industrial Gases – Asia and the Industrial Gases – EMEA segments.

Our 2018 business combinations did not materially impact our consolidated income statements for the periods presented.

7. INVENTORIES

The components of inventories are as follows:

30 September	**2018**	2017
Finished goods	**$125.4**	$120.0
Work in process	**21.2**	15.7
Raw materials, supplies and other	**249.5**	223.0
Total FIFO Cost	**396.1**	358.7
Less: Excess of FIFO cost over LIFO cost	**—**	(23.3)
Inventories	**$396.1**	$335.4

As discussed in Note 1, Major Accounting Policies, we changed our accounting method for U.S. inventories from a LIFO basis to a FIFO basis effective 1 July 2018. As of 30 September 2017, inventories valued using the LIFO method comprised approximately 49% of consolidated inventories before LIFO adjustment. Liquidation of LIFO inventory layers prior to our change in accounting policy in fiscal year 2018 and in fiscal years 2017 and 2016 did not materially affect the results of operations.

We did not restate prior period financial statements for the change in U.S. inventories as the impact was not material. Instead, the Company applied the accounting change as a cumulative effect adjustment to cost of sales in the fourth quarter of fiscal year 2018. This change increased inventories by $24.1 at 1 July 2018 and increased pre-tax income from continuing operations by $24.1 for the quarter and fiscal year ended 30 September 2018.

8. SUMMARIZED FINANCIAL INFORMATION OF EQUITY AFFILIATES

The summarized financial information below is on a combined 100% basis and has been compiled based on financial statements of the companies accounted for by the equity method. The amounts presented include the accounts of the following equity affiliates:

Abdullah Hashim Industrial Gases & Equipment Co., Ltd. (25%);
Air Products South Africa (Proprietary) Limited (50%);
Bangkok Cogeneration Company Limited (49%);
Bangkok Industrial Gases Co., Ltd. (49%);
Chengdu Air & Gas Products Ltd. (50%);
Helios S.p.A. (49%);
High-Tech Gases (Beijing) Co., Ltd. (50%);
INOX Air Products Limited (50%);
Jazan Gas Projects Company (25%);
Kulim Industrial Gases Sdn. Bhd. (50%);
Sapio Produzione Idrogeno Ossigeno S.r.l. (49%);
Tecnologia en Nitrogeno S. de R.L. de C.V. (50%);
Tyczka Industrie-Gases GmbH (50%);
WuXi Hi-Tech Gas Co., Ltd. (50%);

INFRA Group (40%); and principally, other industrial gas producers.

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30 September	**2018**	2017
Current assets	**$1,556.9**	$1,333.2
Noncurrent assets	**4,340.8**	4,026.9
Current liabilities	**635.7**	666.8
Noncurrent liabilities	**2,652.5**	2,194.3

Year Ended 30 September	**2018**	2017	2016
Net sales	**$2,663.1**	$2,343.3	$2,271.6
Sales less cost of sales	**1,050.6**	878.6	871.5
Operating income	**635.3**	509.5	482.1
Net income	**388.0**	343.5	334.1

Dividends received from equity affiliates were $122.5, $99.5, and $95.9 in fiscal years 2018, 2017, and 2016, respectively.

The investment in net assets of and advances to equity affiliates as of 30 September 2018 and 2017 included investment in foreign affiliates of $1,276.0 and $1,285.1, respectively.

As of 30 September 2018 and 2017, the amount of investment in companies accounted for by the equity method included equity method goodwill of $42.4 and $45.8, respectively.

U.S. Tax Cuts and Jobs Act

For the year ended 30 September 2018, equity affiliates' income includes an expense of $28.5 for our proportionate share of the impact of the U.S. Tax Cuts and Jobs Act primarily recorded during the first quarter of fiscal year 2018. This expense is included in the fiscal year 2018 net income on a 100% basis in the table above. Refer to Note 22, Income Taxes, for additional information.

Equity Affiliate Impairment Charge

During the third quarter of fiscal year 2017, we recorded an other-than-temporary impairment charge of $79.5 on our investment in Abdullah Hashim Industrial Gases & Equipment Co., Ltd. (AHG), a 25%-owned equity affiliate in our Industrial Gases – EMEA segment. The impairment charge is reflected on our consolidated income statements within “Equity affiliates' income." This charge was not deductible for tax purposes and has been excluded from segment results.

The decline in value resulted from expectations for lower future cash flows to be generated by AHG, primarily due to challenging economic conditions in Saudi Arabia, including the impacts of lower prices in the oil and gas industry, increased competition, and capital project growth opportunities not materializing as anticipated.

The AHG investment was valued based on the results of the income and market valuation approaches. The income approach utilized a discount rate based on a market-participant, risk-adjusted weighted average cost of capital, which considers industry required rates of return on debt and equity capital for a target industry capital structure adjusted for risks associated with size and geography. Other significant estimates and assumptions that drove our updated valuation of AHG included revenue growth rates and profit margins that were lower than those upon acquisition and our assessment of AHG's business improvement plan effectiveness. Under the market approach, we estimated fair value based on market multiples of revenue and earnings derived from publicly-traded industrial gases companies engaged in similar lines of business, adjusted to reflect differences in size and growth prospects.

Jazan

On 19 April 2015, a joint venture between Air Products and ACWA Holding entered into a 20-year oxygen and nitrogen supply agreement to supply Saudi Aramco’s oil refinery and power plant being built in Jazan, Saudi Arabia. Air Products owns 25% of the joint venture and guarantees the repayment of its share of an equity bridge loan. ACWA also guarantees their share of the loan. We determined that the joint venture is a variable interest entity, for which we are not the primary beneficiary.

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As of 30 September 2018 and 2017, other noncurrent liabilities included $94.4 for our obligation to make future equity contributions in 2020 based on our proportionate share of the advances received by the joint venture under the loan. During fiscal year 2016, we recorded a noncash transaction that resulted in an increase of $26.9 to our investment in net assets of and advances to equity affiliates. This noncash transaction has been excluded from the consolidated statement of cash flows. In total, we expect to invest approximately $100 in this joint venture. There has been no change to our investment during fiscal years 2018 and 2017.

9. PLANT AND EQUIPMENT, NET

The major classes of plant and equipment are as follows:

30 September	Useful Life in years	**2018**	2017
Land		**$269.4**	$231.0
Buildings	30	**988.6**	977.8
Production facilities[A]	10 to 20	**15,082.8**	13,577.1
Distribution and other machinery and equipment[B]	5 to 25	**4,400.9**	3,944.0
Construction in progress		**748.5**	817.9
Plant and equipment, at cost		**21,490.2**	19,547.8
Less: Accumulated depreciation		**11,566.5**	11,107.6
Plant and equipment, net		**$9,923.7**	$8,440.2

(A) Depreciable lives of production facilities related to long-term customer supply contracts are matched to the contract lives.

(B) The depreciable lives for various types of distribution equipment are 10 to 25 years for cylinders, depending on the nature and properties of the product; 20 years for tanks; 7.5 years for customer stations; and 5 to 15 years for tractors and trailers.

The increase in our production facilities during fiscal year 2018 primarily relates to the Lu'An asset acquisition completed in April 2018. Refer to Note 6, Acquisitions, for additional information. Depreciation expense was $940.7, $843.2, and $832.3 in fiscal years 2018, 2017, and 2016, respectively.

10. GOODWILL

Changes to the carrying amount of consolidated goodwill by segment are as follows:

	Industrial Gases–Americas	Industrial Gases–EMEA	Industrial Gases–Asia	Industrial Gases–Global	Corporate and other	Total
Goodwill, net at 30 September 2016	$309.1	$380.6	$135.2	$20.2	$—	$845.1
Impairment loss	(145.3)	—	—	—	—	(145.3)
Acquisitions	—	3.5	—	—	—	3.5
Currency translation	(.1)	18.3	—	—	—	18.2
Goodwill, net at 30 September 2017	$163.7	$402.4	$135.2	$20.2	$—	$721.5
Acquisitions	—	29.5	38.1	—	10.4	78.0
Currency translation	(1.6)	(7.5)	(1.4)	(.1)	—	(10.6)
Goodwill, net at 30 September 2018	**$162.1**	**$424.4**	**$171.9**	**$20.1**	**$10.4**	**$788.9**

30 September	**2018**	2017	2016
Goodwill, gross	**$1,194.7**	$1,138.7	$1,103.7
Accumulated impairment losses[A]	**(405.8)**	(417.2)	(258.6)
Goodwill, net	**$788.9**	$721.5	$845.1

(A) Accumulated impairment losses include the impacts of currency translation. These losses are attributable to our Latin America reporting unit (LASA) within the Industrial Gases – Americas segment.

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We review goodwill for impairment annually in the fourth quarter of the fiscal year and whenever events or changes in circumstances indicate that the carrying value of goodwill might not be recoverable. The impairment test for goodwill involves calculating the fair value of each reporting unit and comparing that value to the carrying value. If the fair value of the reporting unit is less than its carrying value, the difference is recorded as a goodwill impairment charge, not to exceed the total amount of goodwill allocated to that reporting unit. During the fourth quarter of fiscal year 2018, we conducted our annual goodwill impairment test and determined that the fair value of all our reporting units exceeded their carrying value.

During the third quarter of fiscal year 2017, we conducted an interim impairment test of the goodwill associated with our Latin America Reporting unit (LASA) within the Industrial Gases – Americas segment. This was driven by Management's decision to lower long-term growth projections in response to declining volumes and weak economic conditions in Latin America during fiscal year 2017. We determined that the fair value of LASA was less than its carrying value and recorded a noncash impairment charge of $145.3, which is reflected on our consolidated income statements within “Goodwill and intangible asset impairment charge.” This charge was not deductible for tax purposes and has been excluded from segment operating income.

LASA includes assets and goodwill associated with operations in Chile and other Latin American countries. We estimated the fair value of LASA based on two valuation approaches, the income approach and the market approach. We reviewed relevant facts and circumstances in determining the weighting of the approaches.

Under the income approach, we estimated the fair value of LASA based on the present value of estimated future cash flows. Cash flow projections were based on management’s estimates of revenue growth rates and EBITDA margins, taking into consideration business and market conditions for the Latin American countries and markets in which we operate. We calculated the discount rate based on a market-participant, risk-adjusted weighted average cost of capital, which considers industry specific rates of return on debt and equity capital for a target industry capital structure, adjusted for risks associated with business size and geography.

Under the market approach, we estimated fair value based on market multiples of revenue and earnings derived from publicly-traded industrial gases companies and regional manufacturing companies, adjusted to reflect differences in size and growth prospects.

Management judgment is required in the determination of each assumption utilized in the valuation model, and actual results could differ from our estimates.

11. INTANGIBLE ASSETS

The table below provides details of acquired intangible assets:

	30 September 2018			30 September 2017		
	Gross	**Accumulated Amortization/ Impairment**	**Net**	Gross	Accumulated Amortization/ Impairment	Net
Customer relationships	**$491.9**	**($165.5)**	**$326.4**	$424.1	($142.3)	$281.8
Patents and technology	**34.0**	**(11.9)**	**22.1**	13.4	(10.6)	2.8
Other	**72.6**	**(33.8)**	**38.8**	73.4	(36.6)	36.8
Total finite-lived intangibles	**598.5**	**(211.2)**	**387.3**	510.9	(189.5)	321.4
Trade names and trademarks, indefinite-lived	**64.8**	**(13.6)**	**51.2**	67.8	(20.9)	46.9
Total Intangible Assets	**$663.3**	**($224.8)**	**$438.5**	$578.7	($210.4)	$368.3

The increase in net intangible assets during fiscal year 2018 is primarily attributable to intangible assets acquired through business combinations, partially offset by amortization. For additional information on

intangible assets acquired, refer to Note 6, Acquisitions.
Amortization expense for intangible assets was $30.0, $22.6, and $22.3 in fiscal years 2018, 2017, and 2016, respectively. Refer to Note 1, Major Accounting Policies, for amortization periods associated with our intangible assets.

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Projected annual amortization expense for intangible assets as of 30 September 2018 is as follows:

2019	$32.7
2020	32.4
2021	30.5
2022	27.8
2023	27.3
Thereafter	236.6
Total	$387.3

Indefinite-lived intangible assets are subject to impairment testing at least annually or more frequently if events or changes in circumstances indicate that potential impairment exists. The impairment test for indefinite-lived intangible assets involves calculating the fair value of the indefinite-lived intangible assets and comparing the fair value to their carrying value. If the fair value is less than the carrying value, the difference is recorded as an impairment loss. During the fourth quarter of fiscal year 2018, we conducted our annual impairment test of indefinite-lived intangible assets and determined that the fair value of all our intangible assets exceeded their carrying value.

During the third quarter of fiscal year 2017, we conducted an interim impairment test of the indefinite-lived intangible assets associated with LASA within the Industrial Gases – Americas segment and recorded a noncash impairment charge of $16.8 to write down the carrying value of the trade names and trademarks to their fair value. The impairment charge has been excluded from segment operating income and is reflected on our consolidated income statements within “Goodwill and intangible asset impairment charge." As discussed in Note 10, Goodwill, the reduction in value resulted from lowered long-term growth projections. We estimated the fair value of the indefinite-lived intangibles associated with LASA utilizing the royalty savings method, a form of the income approach.

In addition, we tested the recoverability of LASA long-lived assets, including finite-lived intangible assets subject to amortization, in fiscal year 2017 and concluded that they were recoverable from expected future undiscounted cash flows.

12. LEASES

Lessee Accounting

Capital leases, primarily for the right to use machinery and equipment, are included with owned plant and equipment within "Plant and Equipment, net" on the consolidated balance sheets in the amount of $21.6 and $22.3 at 30 September 2018 and 2017, respectively. Related amounts of accumulated depreciation are $6.1 and $5.3, respectively.

Operating leases principally relate to real estate and also include aircraft, distribution equipment, and vehicles. Certain leases include escalation clauses, renewal, and/or purchase options. Rent expense is recognized on a straight-line basis over the minimum lease term. Rent expense under operating leases, including month-to-month agreements, was $82.7, $65.8, and $67.6 in fiscal years 2018, 2017, and 2016, respectively.

At 30 September 2018, minimum payments due under leases associated with continuing operations are as follows:

	Capital Leases	Operating Leases
2019	$1.7	$65.9
2020	1.4	50.4
2021	2.9	41.4
2022	1.3	30.4
2023	1.2	23.3

Thereafter	14.3	123.0
Total	$22.8	$334.4

The present value of the above future capital lease payments totaled $10.5. Refer to Note 15, Debt.

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Included in the operating lease payments disclosed above are future minimum payments due under leases related to the Energy-from-Waste discontinued operations (i.e., Tees Valley, United Kingdom) of approximately $2 in each of the next five years and $40 thereafter, for a total lease commitment of approximately $50. As discussed in Note 3, Discontinued Operations, during the first quarter of 2017, we recorded an accrual for these lease obligations to other noncurrent liabilities in continuing operations.

Lessor Accounting

As discussed under Revenue Recognition in Note 1, Major Accounting Policies, certain contracts associated with facilities that are built to provide product to a specific customer are required to be accounted for as leases.

Operating Leases

Assets subject to operating lease treatment in which we are the lessor are recorded within "Plant and equipment, net" on the consolidated balance sheets. As of 30 September 2018, plant and equipment, at cost, was $2.4 billion, and accumulated depreciation was $.4 billion. Assets subject to operating leases include those of the Lu'An joint venture, which is discussed in Note 6, Acquisitions.

At 30 September 2018, minimum lease payments expected to be collected are as follows:

2019	$261.5
2020	259.1
2021	255.8
2022	251.5
2023	244.9
Thereafter	2,904.8
Total	$4,177.6

Capital Leases

Lease receivables, net, are primarily included within "Noncurrent capital lease receivables" on our consolidated balance sheets, with the remaining balance in "Other receivables and current assets."

The components of lease receivables were as follows:

30 September	**2018**	2017
Gross minimum lease payments receivable	**$1,673.7**	$1,897.0
Unearned interest income	**(568.3)**	(671.9)
Lease Receivables, net	**$1,105.4**	$1,225.1

Lease payments collected in fiscal years 2018, 2017, and 2016 were $182.7, $183.6, and $186.0, respectively. These payments reduced the lease receivable balance by $97.4, $92.2, and $85.5 in fiscal years 2018, 2017, and 2016, respectively.

At 30 September 2018, minimum lease payments expected to be collected are as follows:

2019	$172.5
2020	167.8
2021	161.9
2022	150.6
2023	144.3
Thereafter	876.6
Total	$1,673.7

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13. FINANCIAL INSTRUMENTS

Currency Price Risk Management

Our earnings, cash flows, and financial position are exposed to foreign currency risk from foreign currency-denominated transactions and net investments in foreign operations. It is our policy to minimize our cash flow volatility from changes in currency exchange rates. This is accomplished by identifying and evaluating the risk that our cash flows will change in value due to changes in exchange rates and by executing the appropriate strategies necessary to manage such exposures. Our objective is to maintain economically balanced currency risk management strategies that provide adequate downside protection.

Forward Exchange Contracts

We enter into forward exchange contracts to reduce the cash flow exposure to foreign currency fluctuations associated with highly anticipated cash flows and certain firm commitments, such as the purchase of plant and equipment. We also enter into forward exchange contracts to hedge the cash flow exposure on intercompany loans. This portfolio of forward exchange contracts consists primarily of Euros and U.S. Dollars. The maximum remaining term of any forward exchange contract currently outstanding and designated as a cash flow hedge at 30 September 2018 is 1.9 years.

Forward exchange contracts are also used to hedge the value of investments in certain foreign subsidiaries and affiliates by creating a liability in a currency in which we have a net equity position. The primary currency pair in this portfolio of forward exchange contracts is Euros and U.S. Dollars.

In addition to the forward exchange contracts that are designated as hedges, we utilize forward exchange contracts that are not designated as hedges. These contracts are used to economically hedge foreign currency-denominated monetary assets and liabilities, primarily working capital. The primary objective of these forward exchange contracts is to protect the value of foreign currency-denominated monetary assets and liabilities from the effects of volatility in foreign exchange rates that might occur prior to their receipt or settlement. This portfolio of forward exchange contracts consists of many different foreign currency pairs, with a profile that changes from time to time depending on business activity and sourcing decisions.

The table below summarizes our outstanding currency price risk management instruments:

	30 September 2018		30 September 2017	
	US$ Notional	**Years Average Maturity**	US$ Notional	Years Average Maturity
Forward Exchange Contracts				
Cash flow hedges	**$2,489.1**	**0.4**	$3,150.2	0.4
Net investment hedges	**457.5**	**1.7**	675.5	3.0
Not designated	**1,736.1**	**0.8**	273.8	0.1
Total Forward Exchange Contracts	**$4,682.7**	**0.7**	$4,099.5	0.8

The notional value of forward exchange contracts not designated in the table above increased as a result of repayment of intercompany loans prior to their original maturity dates. The outstanding forward exchange contracts no longer qualified as cash flow hedges due to the early repayment of the loans. In addition, as a result of changes in our currency exposures, we de-designated a portion of forward exchange contracts previously designated as net investment hedges. To eliminate any future earnings impact from these items, we entered into equal and offsetting forward exchange contracts.

In addition to the above, we use foreign currency-denominated debt to hedge the foreign currency exposures of our net investment in certain foreign subsidiaries. The designated foreign currency-denominated debt and related accrued interest included €908.8 million ($1,054.6) at 30 September 2018 and €912.2 million ($1,077.7) at 30 September 2017. The designated foreign currency-denominated

debt is located on the balance sheets in the long-term debt line item.

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Debt Portfolio Management

It is our policy to identify on a continuing basis the need for debt capital and evaluate the financial risks inherent in funding the Company with debt capital. Reflecting the result of this ongoing review, the debt portfolio and hedging program are managed with the objectives and intent to (1) reduce funding risk with respect to borrowings made by us to preserve our access to debt capital and provide debt capital as required for funding and liquidity purposes, and (2) manage the aggregate interest rate risk and the debt portfolio in accordance with certain debt management parameters.

Interest Rate Management Contracts

We enter into interest rate swaps to change the fixed/variable interest rate mix of our debt portfolio in order to maintain the percentage of fixed- and variable-rate debt within the parameters set by management. In accordance with these parameters, the agreements are used to manage interest rate risks and costs inherent in our debt portfolio. Our interest rate management portfolio generally consists of fixed-to-floating interest rate swaps (which are designated as fair value hedges), pre-issuance interest rate swaps and treasury locks (which hedge the interest rate risk associated with anticipated fixed-rate debt issuances and are designated as cash flow hedges), and floating-to-fixed interest rate swaps (which are designated as cash flow hedges). At 30 September 2018, the outstanding interest rate swaps were denominated in U.S. Dollars. The notional amount of the interest rate swap agreements is equal to or less than the designated debt being hedged. When interest rate swaps are used to hedge variable-rate debt, the indices of the swaps and the debt to which they are designated are the same. It is our policy not to enter into any interest rate management contracts which lever a move in interest rates on a greater than one-to-one basis.

Cross Currency Interest Rate Swap Contracts

We enter into cross currency interest rate swap contracts when our risk management function deems necessary. These contracts may entail both the exchange of fixed- and floating-rate interest payments periodically over the life of the agreement and the exchange of one currency for another currency at inception and at a specified future date. The contracts are used to hedge either certain net investments in foreign operations or nonfunctional currency cash flows related to intercompany loans. The current cross currency interest rate swap portfolio consists of fixed-to-fixed swaps primarily between U.S. Dollars and Chinese Renminbi, U.S. Dollars and Chilean Pesos, and U.S. Dollars and Indian Rupee.

The following table summarizes our outstanding interest rate management contracts and cross currency interest rate swaps:

	30 September 2018					30 September 2017				
	US$ Notional	**Average Pay %**		**Average Receive %**	**Years Average Maturity**	US$ Notional	Average Pay %		Average Receive %	Years Average Maturity
Interest rate swaps (fair value hedge)	**$600.0**	**LIBOR**		**2.60**	**% 1.6**	$600.0	LIBOR		2.28	% 1.3
Cross currency interest rate swaps (net investment hedge)	**$201.7**	**4.42**	**%**	**2.97**	**% 3.1**	$539.7	3.27	%	2.59	% 1.9
Cross currency interest rate swaps (cash flow hedge)	**$1,052.7**	**4.99**	**%**	**2.89**	**% 2.3**	$1,095.7	4.96	%	2.78	% 2.4
Cross currency interest rate swaps (not designated)	**$80.2**	**4.88**	**%**	**3.43**	**% 3.9**	$41.6	3.28	%	2.32	% 1.7

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The table below summarizes the fair value and balance sheet location of our outstanding derivatives:

	Balance Sheet Location	30 September **2018**	2017	Balance Sheet Location	30 September **2018**	2017
Derivatives Designated as Hedging Instruments:						
Forward exchange contracts	Other receivables	**$24.9**	$81.7	Accrued liabilities	**$37.0**	$82.0
Interest rate management contracts	Other receivables	**24.3**	11.1	Accrued liabilities	**2.3**	10.7
Forward exchange contracts	Other noncurrent assets	**19.8**	27.1	Other noncurrent liabilities	**4.6**	13.8
Interest rate management contracts	Other noncurrent assets	**48.7**	102.6	Other noncurrent liabilities	**11.6**	22.2
Total Derivatives Designated as Hedging Instruments		**$117.7**	$222.5		**$55.5**	$128.7
Derivatives Not Designated as Hedging Instruments:						
Forward exchange contracts	Other receivables	**7.9**	1.1	Accrued liabilities	**$14.9**	$2.2
Interest rate management contracts	Other receivables	**4.0**	—	Accrued liabilities	**—**	1.0
Forward exchange contracts	Other noncurrent assets	**16.2**	—	Other noncurrent liabilities	**23.7**	—
Interest rate management contracts	Other noncurrent assets	**.3**	4.2	Other noncurrent liabilities	**—**	—
Total Derivatives Not Designated as Hedging Instruments		**$28.4**	$5.3		**$38.6**	$3.2
Total Derivatives		**$146.1**	$227.8		**$94.1**	$131.9

Refer to Note 14, Fair Value Measurements, which defines fair value, describes the method for measuring fair value, and provides additional disclosures regarding fair value measurements.

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The table below summarizes the gain or loss related to our cash flow hedges, fair value hedges, net investment hedges, and derivatives not designated as hedging instruments:

	Year Ended 30 September							
	Forward Exchange Contracts		Foreign Currency Debt		Other[A]		Total	
	2018	2017	**2018**	2017	**2018**	2017	**2018**	2017
Cash Flow Hedges, net of tax:								
Net gain (loss) recognized in OCI (effective portion)	**$2.4**	$.3	**$—**	$—	**$43.5**	($12.9)	**$45.9**	($12.6)
Net (gain) loss reclassified from OCI to sales/cost of sales (effective portion)	**7.1**	18.3	**—**	—	**—**	—	**7.1**	18.3
Net (gain) loss reclassified from OCI to other income (expense), net (effective portion)	**(7.8)**	(3.8)	**—**	—	**(33.8)**	10.5	**(41.6)**	6.7
Net (gain) loss reclassified from OCI to interest expense (effective portion)	**1.2**	(2.1)	**—**	—	**3.9**	2.9	**5.1**	.8
Net (gain) loss reclassified from OCI to other income (expense), net (ineffective portion)	**(.5)**	(1.6)	**—**	—	**(.5)**	—	**(1.0)**	(1.6)
Fair Value Hedges:								
Net gain (loss) recognized in interest expense[B]	**$—**	$—	**$—**	$—	**($10.1)**	($14.7)	**($10.1)**	($14.7)
Net Investment Hedges, net of tax:								
Net gain (loss) recognized in OCI	**($.6)**	($11.1)	**$10.2**	($32.8)	**$11.0**	($15.6)	**$20.6**	($59.5)
Derivatives Not Designated as Hedging Instruments:								
Net gain (loss) recognized in other income (expense), net[C]	**($4.0)**	$4.1	**$—**	$—	**($.8)**	($2.4)	**($4.8)**	$1.7

(A) Other includes the impact on other comprehensive income (OCI) and earnings primarily related to interest rate and cross currency interest rate swaps.

(B) The impact of fair value hedges noted above was largely offset by recognized gains and losses resulting from the impact of changes in related interest rates on outstanding debt.

(C) The impact of the non-designated hedges noted above was largely offset by recognized gains and losses resulting from the impact of changes in exchange rates on assets and liabilities denominated in nonfunctional currencies.

The amount of cash flow hedges' unrealized gains and losses at30 September 2018 that are expected to be reclassified to earnings in the next twelve months is not material.

The cash flows related to all derivative contracts are reported in the operating activities section of the consolidated statements of cash flows.

Credit Risk-Related Contingent Features

Certain derivative instruments are executed under agreements that require us to maintain a minimum credit rating with both Standard & Poor's and Moody's. If our credit rating falls below this threshold, the counterparty to the derivative instruments has the right to request full collateralization on the derivatives' net liability position. The net liability position of derivatives with credit risk-related contingent features was $33.4 as of 30 September 2018 and $34.6 as of 30 September 2017. Because our current credit rating is above the various pre-established thresholds, no collateral has been posted on these liability positions.

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Counterparty Credit Risk Management

We execute financial derivative transactions with counterparties that are highly rated financial institutions, all of which are investment grade at this time. Some of our underlying derivative agreements give us the right to require the institution to post collateral if its credit rating falls below the pre-established thresholds with Standard & Poor's or Moody's. The collateral that the counterparties would be required to post was $97.6 as of 30 September 2018 and $138.5 as of 30 September 2017. No financial institution is required to post collateral at this time, as all have credit ratings at or above the threshold.

14. FAIR VALUE MEASUREMENTS

Fair value is defined as an exit price, i.e., the price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date.

The fair value hierarchy prioritizes the inputs to valuation techniques used to measure fair value into three broad levels as follows:

Level 1— Quoted prices (unadjusted) in active markets for identical assets or liabilities.

Level 2— Inputs that are observable for the asset or liability, either directly or indirectly through market corroboration, for substantially the full term of the asset or liability.

Level 3— Inputs that are unobservable for the asset or liability based on our own assumptions (about the assumptions market participants would use in pricing the asset or liability).

The methods and assumptions used to measure the fair value of financial instruments are as follows:

Short-term Investments

Short-term investments include time deposits with original maturities greater than three months and less than one year. The estimated fair value of the short-term investments, which approximates carrying value as of 30 September 2018 and 2017, was determined using level 2 inputs within the fair value hierarchy. Level 2 measurements were based on current interest rates for similar investments with comparable credit risk and time to maturity.

Derivatives

The fair value of our interest rate management contracts and forward exchange contracts are quantified using the income approach and are based on estimates using standard pricing models. These models take into account the value of future cash flows as of the balance sheet date, discounted to a present value using discount factors that match both the time to maturity and currency of the underlying instruments. The computation of the fair values of these instruments is generally performed by the Company. These standard pricing models utilize inputs which are derived from or corroborated by observable market data such as interest rate yield curves as well as currency spot and forward rates. Therefore, the fair value of our derivatives is classified as a level 2 measurement. On an ongoing basis, we randomly test a subset of our valuations against valuations received from the transaction's counterparty to validate the accuracy of our standard pricing models. Counterparties to these derivative contracts are highly rated financial institutions.

Refer to Note 13, Financial Instruments, for a description of derivative instruments, including details on the balance sheet line classifications.

Long-term Debt, Including Related Party

The fair value of our debt is based on estimates using standard pricing models that take into account the value of future cash flows as of the balance sheet date, discounted to a present value using discount factors that match

both the time to maturity and currency of the underlying instruments. These standard valuation models utilize observable market data such as interest rate yield curves and currency spot rates. Therefore, the fair value of our debt is classified as a level 2 measurement. We generally perform the computation of the fair

value of these instruments.

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The carrying values and fair values of financial instruments were as follows:

	30 September 2018		30 September 2017	
	Carrying Value	Fair Value	Carrying Value	Fair Value
Assets				
Derivatives				
Forward exchange contracts	**$68.8**	**$68.8**	$109.9	$109.9
Interest rate management contracts	**77.3**	**77.3**	117.9	117.9
Liabilities				
Derivatives				
Forward exchange contracts	**$80.2**	**$80.2**	$98.0	$98.0
Interest rate management contracts	**13.9**	**13.9**	33.9	33.9
Long-term debt, including current portion	**3,758.3**	**3,788.2**	3,818.8	3,928.2

The carrying amounts reported on the consolidated balance sheets for cash and cash items, short-term investments, trade receivables, payables and accrued liabilities, accrued income taxes, and short-term borrowings approximate fair value due to the short-term nature of these instruments. Accordingly, these items have been excluded from the above table.

The following table summarizes assets and liabilities measured at fair value on a recurring basis in the consolidated balance sheets:

	30 September 2018				30 September 2017			
	Total	Level 1	Level 2	Level 3	Total	Level 1	Level 2	Level 3
Assets at Fair Value								
Derivatives								
Forward exchange contracts	**$68.8**	**$—**	**$68.8**	**$—**	$109.9	$—	$109.9	$—
Interest rate management contracts	**77.3**	**—**	**77.3**	**—**	117.9	—	117.9	—
Total Assets at Fair Value	**$146.1**	**$—**	**$146.1**	**$—**	$227.8	$—	$227.8	$—
Liabilities at Fair Value								
Derivatives								
Forward exchange contracts	**$80.2**	**$—**	**$80.2**	**$—**	$98.0	$—	$98.0	$—
Interest rate management contracts	**13.9**	**—**	**13.9**	**—**	33.9	—	33.9	—
Total Liabilities at Fair Value	**$94.1**	**$—**	**$94.1**	**$—**	$131.9	$—	$131.9	$—

The following is a tabular presentation of nonrecurring fair value measurements along with the level within the fair value hierarchy in which the fair value measurement in its entirety falls:

	30 June 2017				2017
	Total	Level 1	Level 2	Level 3	Loss
Investment in Equity Affiliate[(A)]	**$68.5**	**$—**	**$—**	**$68.5**	**$79.5**

(A) In fiscal year 2017, we assessed the recoverability of the carrying value of our equity investment in AHG. We estimated the fair value of our investment using weighting of the results of the income and market approaches. An impairment loss was recognized for the difference between the carrying amount and the fair value of the investment as of 30 June 2017. There have been no events during fiscal year 2018 requiring reassessment of our investment. For additional information, see Note 8, Summarized Financial Information of Equity Affiliates.

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During the third quarter ended 30 June 2017, we recognized a goodwill impairment charge of $145.3 and an intangible asset impairment charge of $16.8 associated with our LASA reporting unit. Refer to Note 10, Goodwill, and Note 11, Intangible Assets, for more information related to these charges and the associated fair value measurement methods and significant inputs/assumptions, which were classified as Level 3 since unobservable inputs were utilized in the fair value measurements.

15. DEBT

The tables below summarize our outstanding debt at 30 September 2018 and 2017:

Total Debt

30 September	**2018**	2017
Short-term borrowings	**$54.3**	$144.0
Current portion of long-term debt	**406.6**	416.4
Long-term debt	**2,967.4**	3,402.4
Long-term debt – related party[(A)]	**384.3**	—
Total Debt	**$3,812.6**	$3,962.8

[(A)] Refer to Note 6, Acquisitions, for additional information regarding related party debt.

Short-term Borrowings

Short-term borrowings consisted of bank obligations of $54.3 and $144.0 at 30 September 2018 and 2017, respectively. The weighted average interest rate of short-term borrowings outstanding at 30 September 2018 and 2017 was 5.0% and 4.6%, respectively.

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Long-term Debt

30 September	Fiscal Year Maturities	**2018**	2017
Payable in U.S. Dollars			
Debentures			
8.75%	2021	**$18.4**	$18.4
Medium-term Notes (weighted average rate)			
Series E 7.6%	2026	**17.2**	17.2
Senior Notes			
Note 1.2%	2018	**—**	400.0
Note 4.375%	2019	**400.0**	400.0
Note 3.0%	2022	**400.0**	400.0
Note 2.75%	2023	**400.0**	400.0
Note 3.35%	2024	**400.0**	400.0
Other (weighted average rate)			
Variable-rate industrial revenue bonds 1.51%	2035 to 2050	**631.9**	631.9
Other .25%	2019 to 2022	**.9**	10.9
Payable in Other Currencies			
Eurobonds 2.0%	2020	**348.1**	354.4
Eurobonds .375%	2021	**406.2**	413.5
Eurobonds 1.0%	2025	**348.1**	354.4
Other 4.3%	2019 to 2023	**8.0**	25.8
Related Party[A]			
Chinese Renminbi 5.5%	2020 to 2026	**384.3**	—
Capital Lease Obligations			
United States 5.0%	2018	**—**	.2
Foreign 10.4%	2019 to 2036	**10.5**	10.6
Total Principal Amount		**3,773.6**	3,837.3
Less: Unamortized discount and debt issuance costs		**(15.3)**	(18.5)
Total Long-term Debt		**3,758.3**	3,818.8
Less: Current portion of long-term debt		**(406.6)**	(416.4)
Less: Long-term debt – related party		**(384.3)**	—
Long-term Debt		**$2,967.4**	$3,402.4

[A] Refer to Note 6, Acquisitions, for additional information regarding related party debt.

Maturities of long-term debt, including related party, in each of the next five years and beyond are as follows:

2019	$406.6
2020	380.9
2021	473.9
2022	448.3
2023	448.8
Thereafter	1,615.1
Total	$3,773.6

Various debt agreements to which we are a party include financial covenants and other restrictions, including restrictions pertaining to the ability to create property liens and enter into certain sale and leaseback transactions. As of 30 September 2018, we are in compliance with all the financial and other covenants under our debt agreements.

Additional commitments totaling $7.0 are maintained by our foreign subsidiaries, all of which were borrowed and outstanding at 30 September 2018.

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Cash paid for interest, net of amounts capitalized, was $123.1, $125.9, and $120.6 in fiscal years 2018, 2017, and 2016, respectively.

2017 Credit Agreement

On 31 March 2017, we entered into a five-year $2,500.0 revolving credit agreement maturing 31 March 2022 with a syndicate of banks (the “2017 Credit Agreement”), under which senior unsecured debt is available to both the Company and certain of its subsidiaries. On 28 September 2018, we amended the 2017 Credit Agreement to reduce the maximum borrowing capacity to $2,300.0. No other terms were impacted by the amendment.

The 2017 Credit Agreement provides a source of liquidity for the Company and supports its commercial paper program. The Company’s only financial covenant under the 2017 Credit Agreement is a maximum ratio of total debt to total capitalization (total debt plus total equity) no greater than 70%. No borrowings were outstanding under the 2017 Credit Agreement as of 30 September 2018.

Loss on Extinguishment of Debt

In September 2016, we exchanged notes issued to us by Versum in anticipation of the spin-off. The exchange resulted in a loss of $6.9. Refer to Note 4, Materials Technologies Separation, for additional information.

16. RETIREMENT BENEFITS

The Company and certain of its subsidiaries sponsor defined benefit pension plans and defined contribution plans that cover a substantial portion of its worldwide employees. The principal defined benefit pension plans are the U.S. salaried pension plan and the U.K. pension plan. These plans were closed to new participants in 2005, after which defined contribution plans were offered to new employees. The principal defined contribution plan is the Retirement Savings Plan, in which a substantial portion of the U.S. employees participate. A similar plan is offered to U.K. employees. We also provide other postretirement benefits consisting primarily of healthcare benefits to U.S. retirees who meet age and service requirements.

Defined Benefit Pension Plans

Pension benefits earned are generally based on years of service and compensation during active employment. The cost of our defined benefit pension plans in fiscal years 2018, 2017, and 2016 included the following components:

	2018		2017		2016	
	U.S.	**International**	U.S.	International	U.S.	International
Service cost	**$25.5**	**$25.5**	$29.0	$25.9	$36.5	$24.3
Interest cost	**107.2**	**37.3**	107.5	32.2	110.7	44.3
Expected return on plan assets	**(201.6)**	**(81.7)**	(207.7)	(75.2)	(202.0)	(78.3)
Amortization						
Net actuarial loss	**87.4**	**40.2**	88.7	54.7	85.3	35.6
Prior service cost (credit)	**1.6**	**—**	2.3	(.1)	2.8	(.2)
Settlements	**45.0**	**3.5**	10.5	1.7	5.1	1.3
Curtailments	**—**	**—**	4.3	(1.3)	—	(1.1)
Special termination benefits	**.4**	**—**	2.8	.4	2.0	—
Other	**—**	**1.5**	—	1.1	(.3)	2.1
Net Periodic Benefit Cost – Total	**$65.5**	**$26.3**	$37.4	$39.4	$40.1	$28.0
Less: Discontinued Operations	**—**	**—**	(.7)	(4.1)	(7.9)	(4.4)
Net Periodic Benefit Cost – Continuing Operations	**$65.5**	**$26.3**	$36.7	$35.3	$32.2	$23.6

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As discussed in Note 2, New Accounting Guidance, we early adopted guidance on the presentation of net periodic pension and postretirement benefit cost during the first quarter of fiscal year 2018. The amendments require the service cost component of net periodic benefit cost to be presented within the same line items as other compensation costs arising from services rendered by employees during the period. Accordingly, our service costs are primarily included within "Cost of sales" and "Selling and administrative expense" on our consolidated income statements. The non-service related costs, including pension settlement losses, are presented outside operating income within "Other non-operating income (expense), net." The amount of service costs capitalized in fiscal year 2018 and the amount of net periodic benefit costs capitalized in fiscal years 2017 and 2016 were not material.

During the fourth quarter of fiscal year 2018, we recognized a pension settlement loss of $43.7 primarily resulting from the transfer of certain pension payment obligations for our U.S. salaried and hourly plans to an insurer through the purchase of an irrevocable, nonparticipating group annuity contract with plan assets on 17 September 2018. The transaction does not change the amount of the monthly pension benefits received by affected retirees.

Certain of our pension plans provide for a lump sum benefit payment option at the time of retirement, or for corporate officers, six months after their retirement date. A participant’s vested benefit is considered settled upon cash payment of the lump sum. We recognize pension settlement losses when cash payments exceed the sum of the service and interest cost components of net periodic benefit cost of the plan for the fiscal year. We recognized pension settlement losses of $10.5 and $5.1 in fiscal years 2017 and 2016, respectively, to accelerate recognition of a portion of actuarial losses deferred in accumulated other comprehensive loss, primarily associated with the U.S. Supplementary Pension Plan.

We calculate net periodic benefit cost for a given fiscal year based on assumptions developed at the end of the previous fiscal year. The following table sets forth the weighted average assumptions used in the calculation of net periodic benefit cost:

	2018		2017		2016	
	U.S.	**International**	U.S.	International	U.S.	International
Discount rate – Service cost	**3.9 %**	**2.6 %**	3.6 %	2.1 %	4.5 %	3.4 %
Discount rate – Interest cost	**3.3 %**	**2.2 %**	3.0 %	1.8 %	3.6 %	2.9 %
Expected return on plan assets	**7.5 %**	**5.8 %**	8.0 %	6.1 %	8.0 %	6.3 %
Rate of compensation increase	**3.5 %**	**3.6 %**	3.5 %	3.5 %	3.5 %	3.5 %

The projected benefit obligation (PBO) is the actuarial present value of benefits attributable to employee service rendered to date, including the effects of estimated future salary increases. The following table sets forth the weighted average assumptions used in the calculation of the PBO:

	2018		2017	
	U.S.	**International**	U.S.	International
Discount rate	**4.3 %**	**2.5 %**	3.8 %	2.4 %
Rate of compensation increase	**3.5 %**	**3.5 %**	3.5 %	3.6 %

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The following tables reflect the change in the PBO and the change in the fair value of plan assets based on the plan year measurement date, as well as the amounts recognized in the consolidated balance sheets:

	2018		2017	
	U.S.	**International**	U.S.	International
Change in Projected Benefit Obligation				
Obligation at beginning of year	**$3,357.7**	**$1,749.5**	$3,477.7	$1,849.6
Service cost	**25.5**	**25.5**	29.0	25.9
Interest cost	**107.2**	**37.3**	107.5	32.2
Amendments	**.1**	**.7**	1.9	—
Actuarial gain	**(217.8)**	**(33.9)**	(68.0)	(132.4)
Divestitures	**—**	**—**	—	(34.1)
Curtailments	**—**	**—**	(17.3)	(4.2)
Settlements	**(193.0)**	**(24.6)**	7.0	—
Special termination benefits	**.4**	**—**	2.8	—
Participant contributions	**—**	**1.4**	—	1.4
Benefits paid	**(157.3)**	**(51.3)**	(182.9)	(46.5)
Currency translation/other	**—**	**(44.1)**	—	57.6
Obligation at End of Year	**$2,922.8**	**$1,660.5**	$3,357.7	$1,749.5

	2018		2017	
	U.S.	**International**	U.S.	International
Change in Plan Assets				
Fair value at beginning of year	**$2,869.2**	**$1,540.0**	$2,705.3	$1,411.1
Actual return on plan assets	**150.2**	**115.5**	319.6	87.9
Company contributions	**14.6**	**53.7**	27.2	42.2
Participant contributions	**—**	**1.4**	—	1.4
Divestitures	**—**	**—**	—	(3.0)
Benefits paid	**(157.3)**	**(51.3)**	(182.9)	(46.5)
Settlements	**(191.8)**	**(24.6)**	—	(5.3)
Currency translation/other	**—**	**(46.5)**	—	52.2
Fair Value at End of Year	**$2,684.9**	**$1,588.2**	$2,869.2	$1,540.0
Funded Status at End of Year	**($237.9)**	**($72.3)**	($488.5)	($209.5)

Amounts Recognized				
Noncurrent assets	**$28.2**	**$103.5**	$5.3	$13.1
Accrued liabilities	**23.5**	**1.2**	12.6	—
Noncurrent liabilities	**242.6**	**174.6**	481.2	222.6
Net Liability Recognized	**$237.9**	**$72.3**	$488.5	$209.5

Settlements in the table above primarily reflect the impact of the transfer of certain pension obligations and plan assets of our U.S. salaried and hourly plans to an insurer through the purchase of an irrevocable, nonparticipating group annuity contract in the fourth quarter of fiscal year 2018.

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The changes in plan assets and benefit obligation that have been recognized in other comprehensive income on a pretax basis during fiscal years 2018 and 2017 consist of the following:

	2018		2017	
	U.S.	**International**	U.S.	International
Net actuarial gain arising during the period	**($167.7)**	**($64.6)**	($189.8)	($162.0)
Amortization of net actuarial loss	**(132.4)**	**(43.7)**	(103.3)	(55.7)
Prior service cost arising during the period	**.1**	**.7**	1.9	—
Amortization of prior service cost	**(1.6)**	**—**	(2.3)	.1
Total	**($301.6)**	**($107.6)**	($293.5)	($217.6)

The net actuarial gain represents the actual changes in the estimated obligation and plan assets that have not yet been recognized in the consolidated income statements and are included in accumulated other comprehensive loss. Actuarial gains arising during fiscal year 2018 are primarily attributable to higher discount rates and higher than expected return on plan assets. Accumulated actuarial gains and losses that exceed a corridor are amortized over the average remaining service period of U.S. participants, which was approximately eight years as of 30 September 2018. For U.K. participants, accumulated actuarial gains and losses that exceed a corridor are amortized over the average remaining life expectancy, which was approximately 26 years as of 30 September 2018.

The components recognized in accumulated other comprehensive loss on a pretax basis at 30 September consisted of the following:

	2018		2017	
	U.S.	**International**	U.S.	International
Net actuarial loss	**$680.4**	**$443.6**	$980.5	$551.9
Prior service cost (credit)	**6.6**	**(1.1)**	8.1	(1.8)
Net transition liability	**—**	**.4**	—	.4
Total	**$687.0**	**$442.9**	$988.6	$550.5

The amount of accumulated other comprehensive loss at 30 September 2018 that is expected to be recognized as a component of net periodic pension cost during fiscal year 2019, excluding discontinued operations and amounts that may be recognized through settlement losses, is as follows:

	U.S.	International
Net actuarial loss	$65.1	$11.2
Prior service cost (credit)	1.0	(.2)

The accumulated benefit obligation (ABO) is the actuarial present value of benefits attributed to employee service rendered to a particular date, based on current salaries. The ABO for all defined benefit pension plans was $4,376.4 and $4,842.8 as of 30 September 2018 and 2017, respectively.

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The following table provides information on pension plans where the benefit liability exceeds the value of plan assets:

	30 September 2018		30 September 2017	
	U.S.	**International**	U.S.	International
Pension Plans with PBO in Excess of Plan Assets:				
PBO	**$2,733.6**	**$452.6**	$3,116.7	$465.7
Fair value of plan assets	**2,467.5**	**276.8**	2,623.0	243.1
Pension Plans with ABO in Excess of Plan Assets:				
ABO	**$2,608.6**	**$357.9**	$2,951.0	$365.6
Fair value of plan assets	**2,467.5**	**228.2**	2,623.0	197.1

The tables above include several pension arrangements that are not funded because of jurisdictional practice. The ABO and PBO related to these plans as of 30 September 2018 were $92.8 and $100.9, respectively.

Pension Plan Assets

Our pension plan investment strategy is to invest in diversified portfolios to earn a long-term return consistent with acceptable risk in order to pay retirement benefits and meet regulatory funding requirements while minimizing company cash contributions over time. De-risking strategies are also employed for closed plans as funding improves, generally resulting in higher allocations to long duration bonds. The plans invest primarily in passive and actively managed equity and debt securities. Equity investments are diversified geographically and by investment style and market capitalization. Fixed income investments include sovereign, corporate and asset-backed securities generally denominated in the currency of the plan.

Asset allocation targets are established based on the long-term return, volatility and correlation characteristics of the asset classes, the profiles of the plans' liabilities, and acceptable levels of risk. Actual allocations vary from target due to market changes and are reviewed regularly. Assets are routinely rebalanced through contributions, benefit payments, and otherwise as deemed appropriate. The actual and target allocations at the measurement date are as follows:

	2018 Target Allocation		**2018 Actual Allocation**		2017 Actual Allocation	
	U.S.	**International**	**U.S.**	**International**	U.S.	International
Asset Category						
Equity securities	**38-48%**	**40-49%**	**41%**	**46%**	58%	53%
Debt securities	**44-54%**	**50-60%**	**50%**	**53%**	34%	46%
Real estate/other	**—-10%**	**—-—%**	**8%**	**—%**	7%	1%
Cash	**—%**	**—%**	**1%**	**1%**	1%	—%
Total			**100%**	**100%**	100%	100%

In fiscal year 2018, the 7.5% expected return for U.S. plan assets was based on a weighted average of estimated long-term returns of major asset classes and the historical performance of plan assets. The estimated long-term return for equity, debt securities, and real estate is 8.0%, 5.4%, and 6.9%, respectively. In determining asset class returns, we take into account historical long-term returns and the value of active management, as well as other economic and market factors.

In fiscal year 2018, the 5.8% expected rate of return for international plan assets was based on a weighted average return for plans outside the U.S., which vary significantly in size, asset structure and expected returns. The expected asset return for the U.K. plan, which represents over 80% of the assets of our International plans, is 6.2% and was derived from expected equity and debt security returns of 7.4% and 2.7%, respectively.

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The following table summarizes pension plan assets measured at fair value by asset class (see Note 14, Fair Value Measurements, for definition of the levels):

	30 September 2018				30 September 2017			
	Total	**Level 1**	**Level 2**	**Level 3**	Total	Level 1	Level 2	Level 3
U.S. Qualified Pension Plans								
Cash and cash equivalents	**$13.8**	**$13.8**	**$—**	**$—**	$13.6	$13.6	$—	$—
Equity securities	**397.9**	**397.9**	**—**	**—**	598.6	598.6	—	—
Equity mutual funds	**173.8**	**173.8**	**—**	**—**	276.5	276.5	—	—
Equity pooled funds	**545.2**	**—**	**545.2**	**—**	787.0	—	787.0	—
Fixed income:								
Bonds (government and corporate)	**1,344.6**	**—**	**1,344.6**	**—**	985.7	—	985.7	—
Total U.S. Qualified Pension Plans at Fair Value	**$2,475.3**	**$585.5**	**$1,889.8**	**$—**	$2,661.4	$888.7	$1,772.7	$—
Real estate pooled funds[A]	**$209.6**				$207.8			
Total U.S. Qualified Pension Plans	**$2,684.9**				$2,869.2			
International Pension Plans								
Cash and cash equivalents	**$15.8**	**$15.8**	**$—**	**$—**	$7.3	$7.3	$—	$—
Equity pooled funds	**727.9**	**—**	**727.9**	**—**	821.4	—	821.4	—
Fixed income pooled funds	**615.2**	**—**	**615.2**	**—**	651.3	—	651.3	—
Other pooled funds	**11.6**	**—**	**11.6**	**—**	18.6	—	10.8	7.8
Insurance contracts	**217.7**	**—**	**—**	**217.7**	41.4	—	—	41.4
Total International Pension Plans	**$1,588.2**	**$15.8**	**$1,354.7**	**$217.7**	$1,540.0	$7.3	$1,483.5	$49.2

(A) Real estate pooled funds consist of funds that invest in properties. Interests in these funds are valued using the net asset value ("NAV") per share practical expedient and are not classified in the fair value hierarchy. During fiscal year 2018, we identified that these investments were improperly included in the fair value hierarchy table of our 2017 Form 10-K. Accordingly, we have updated the prior period to conform with the appropriate current year presentation.

The following table summarizes changes in fair value of the pension plan assets classified as Level 3, by asset class:

	Other Pooled Funds	Insurance Contracts	Total
30 September 2016	$7.3	$45.8	$53.1
Actual return on plan assets:			
Assets held at end of year	1.2	(1.0)	.2
Assets sold during the period	.3	—	.3
Purchases, sales, and settlements, net	(1.0)	(3.4)	(4.4)
30 September 2017	$7.8	$41.4	$49.2
Actual return on plan assets:			
Assets held at end of year	—	.9	.9
Assets sold during the period	.5	—	.5
Purchases, sales, and settlements, net	(8.3)	175.4	167.1
30 September 2018	**$—**	**$217.7**	**$217.7**

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The descriptions and fair value methodologies for the U.S. and International pension plan assets are as follows:

Cash and Cash Equivalents

The carrying amounts of cash and cash equivalents approximate fair value due to the short-term maturity.

Equity Securities

Equity securities are valued at the closing market price reported on a U.S. or international exchange where the security is actively traded and are therefore classified as Level 1 assets.

Equity Mutual and Pooled Funds

Shares of mutual funds are valued at the net asset value (NAV) of the fund and are classified as Level 1 assets. Units of pooled funds are valued at the per unit NAV determined by the fund manager based on the value of the underlying traded holdings and are classified as Level 2 assets.

Corporate and Government Bonds

Corporate and government bonds are classified as Level 2 assets, as they are either valued at quoted market prices from observable pricing sources at the reporting date or valued based upon comparable securities with similar yields and credit ratings.

Other Pooled Funds

Other pooled funds classified as Level 2 assets are valued at the NAV of the shares held at year end, which is based on the fair value of the underlying investments. Securities and interests classified as Level 3 are carried at the estimated fair value. The estimated fair value is based on the fair value of the underlying investment values, which includes estimated bids from brokers or other third-party vendor sources that utilize expected cash flow streams and other uncorroborated data including counterparty credit quality, default risk, discount rates, and the overall capital market liquidity.

Insurance Contracts

Insurance contracts are classified as Level 3 assets, as they are carried at contract value, which approximates the estimated fair value. The estimated fair value is based on the fair value of the underlying investment of the insurance company and discount rates that require inputs with limited observability.

Contributions and Projected Benefit Payments

Pension contributions to funded plans and benefit payments for unfunded plans for fiscal year 2018 were $68.3. Contributions for funded plans resulted primarily from contractual and regulatory requirements. Benefit payments to unfunded plans were due primarily to the timing of retirements. We anticipate contributing $45 to $65 to the defined benefit pension plans in fiscal year 2019. These contributions are anticipated to be driven primarily by contractual and regulatory requirements for funded plans and benefit payments for unfunded plans, which are dependent upon timing of retirements.

Projected benefit payments, which reflect expected future service, are as follows:

	U.S.	International
2019	$165.5	$52.8
2020	152.4	53.9
2021	157.0	55.6
2022	163.7	56.0
2023	167.9	60.6
2024-2028	900.2	336.8

These estimated benefit payments are based on assumptions about future events. Actual benefit payments may vary significantly from these estimates.

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Subsequent Event – GMP Equalization

On 26 October 2018, the United Kingdom High Court issued a ruling in a case relating to equalization of pension plan participants' benefits for the gender effects of Guaranteed Minimum Pensions ("GMP equalization"). The ruling relates to the Lloyds Banking Group pension plans but impacts other U.K. defined benefit pension plans. We are still assessing the impact of this ruling. If we determine that the ruling impacts our U.K. pension plan, the approach to achieve GMP equalization may retroactively increase our benefit obligation for some participants in the plan and may impact funding requirements.

Defined Contribution Plans

We maintain a nonleveraged employee stock ownership plan (ESOP) which forms part of the Air Products and Chemicals, Inc. Retirement Savings Plan (RSP). The ESOP was established in May of 2002. The balance of the RSP is a qualified defined contribution plan including a 401(k) elective deferral component. A substantial portion of U.S. employees are eligible and participate.

We treat dividends paid on ESOP shares as ordinary dividends. Under existing tax law, we may deduct dividends which are paid with respect to shares held by the plan. Shares of the Company's common stock in the ESOP totaled 2,378,336 as of 30 September 2018.

Our contributions to the RSP include a Company core contribution for certain eligible employees who do not receive their primary retirement benefit from the defined benefit pension plans, with the core contribution based on a percentage of pay that is dependent on years of service. For the RSP, we also make matching contributions on overall employee contributions as a percentage of the employee contribution and include an enhanced contribution for certain eligible employees that do not participate in the defined benefit pension plans. Worldwide contributions, excluding discontinued operations, expensed to income in fiscal years 2018, 2017, and 2016 were $34.2, $33.7, and $34.6, respectively.

Other Postretirement Benefits

We provide other postretirement benefits consisting primarily of healthcare benefits to certain U.S. retirees who meet age and service requirements. The healthcare benefit is a continued medical benefit until the retiree reaches age 65. Healthcare benefits are contributory, with contributions adjusted periodically. The retiree medical costs are capped at a specified dollar amount, with the retiree contributing the remainder. The cost of these benefits were not material in fiscal years 2018, 2017, and 2016. Accumulated postretirement benefit obligations as of the end of fiscal years 2018 and 2017 were $56.4 and $67.0, respectively, of which $9.4 and $10.0 were current obligations, respectively.

The changes in other postretirement benefit plan obligations that have been recognized in other comprehensive income on a pretax basis during fiscal years 2018 and 2017 were gains of $3.1 and $10.7 that arose during the periods, respectively, and $.3 and $.2 of net actuarial loss amortization, respectively. The net actuarial loss recognized in accumulated other comprehensive loss on a pretax basis was $4.4 at 30 September 2018 and $7.8 at 30 September 2017.

Expected per capita claims costs are currently assumed to be greater than the annual cap; therefore, the assumed healthcare cost trend rate, ultimate trend rate, and the year the ultimate trend rate is reached have no impact on plan obligations.

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17. COMMITMENTS AND CONTINGENCIES

LITIGATION

We are involved in various legal proceedings, including commercial, competition, environmental, health, safety, product liability, and insurance matters. In September 2010, the Brazilian Administrative Council for Economic Defense ("CADE") issued a decision against our Brazilian subsidiary, Air Products Brasil Ltda., and several other Brazilian industrial gas companies for alleged anticompetitive activities. CADE imposed a civil fine of R$179.2 million (approximately $44 at 30 September 2018) on Air Products Brasil Ltda. This fine was based on a recommendation by a unit of the Brazilian Ministry of Justice, whose investigation began in 2003, alleging violation of competition laws with respect to the sale of industrial and medical gases. The fines are based on a percentage of our total revenue in Brazil in 2003.

We have denied the allegations made by the authorities and filed an appeal in October 2010 with the Brazilian courts. On 6 May 2014, our appeal was granted and the fine against Air Products Brasil Ltda. was dismissed. CADE has appealed that ruling and the matter remains pending. We, with advice of our outside legal counsel, have assessed the status of this matter and have concluded that, although an adverse final judgment after exhausting all appeals is possible, such a judgment is not probable. As a result, no provision has been made in the consolidated financial statements. We estimate the maximum possible loss to be the full amount of the fine of R$179.2 million (approximately $44 at 30 September 2018) plus interest accrued thereon until final disposition of the proceedings.

Other than this matter, we do not currently believe there are any legal proceedings, individually or in the aggregate, that are reasonably possible to have a material impact on our financial condition, results of operations, or cash flows.

ENVIRONMENTAL

In the normal course of business, we are involved in legal proceedings under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA: the federal Superfund law); Resource Conservation and Recovery Act (RCRA); and similar state and foreign environmental laws relating to the designation of certain sites for investigation or remediation. Presently, there are 32 sites on which a final settlement has not been reached where we, along with others, have been designated a potentially responsible party by the Environmental Protection Agency or are otherwise engaged in investigation or remediation, including cleanup activity at certain of our current and former manufacturing sites. We continually monitor these sites for which we have environmental exposure.

Accruals for environmental loss contingencies are recorded when it is probable that a liability has been incurred and the amount of loss can be reasonably estimated. The consolidated balance sheets at 30 September 2018 and 2017 included an accrual of $76.8 and $83.6, respectively, primarily as part of other noncurrent liabilities. The environmental liabilities will be paid over a period of up to 30 years. We estimate the exposure for environmental loss contingencies to range from $76 to a reasonably possible upper exposure of $90 as of 30 September 2018.

Actual costs to be incurred at identified sites in future periods may vary from the estimates, given inherent uncertainties in evaluating environmental exposures. Using reasonably possible alternative assumptions of the exposure level could result in an increase to the environmental accrual. Due to the inherent uncertainties related to environmental exposures, a significant increase to the reasonably possible upper exposure level could occur if a new site is designated, the scope of remediation is increased, a different remediation alternative is identified, or a significant increase in our proportionate share occurs. We do not expect that any sum we may have to pay in connection with environmental matters in excess of the amounts recorded or disclosed above would have a material adverse impact on our financial position or results of operations in any one year.

Pace

At 30 September 2018, $26.0 of the environmental accrual was related to the Pace facility.

In 2006, we sold our Amines business, which included operations at Pace, Florida, and recognized a

liability for retained environmental obligations associated with remediation activities at Pace. We are required by the Florida Department of Environmental Protection (FDEP) and the United States Environmental Protection Agency (USEPA) to continue our remediation efforts. We estimated that it would take a substantial period of time to complete the groundwater remediation, and the costs through completion were estimated to range from $42 to $52. As no amount within the range was a better estimate than another, we recognized a before-tax expense of $42 in fiscal 2006 as a component of income from discontinued operations and recorded an environmental accrual of $42 in continuing operations on the consolidated balance sheets. There has been no change to the estimated exposure range related to the Pace facility.

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We have implemented many of the remedial corrective measures at the Pace facility required under 1995 Consent Orders issued by the FDEP and the USEPA. Contaminated soils have been bioremediated, and the treated soils have been secured in a lined on-site disposal cell. Several groundwater recovery systems have been installed to contain and remove contamination from groundwater. We completed an extensive assessment of the site to determine how well existing measures are working, what additional corrective measures may be needed, and whether newer remediation technologies that were not available in the 1990s might be suitable to more quickly and effectively remove groundwater contaminants. Based on assessment results, we completed a focused feasibility study that has identified alternative approaches that may more effectively remove contaminants. We continue to review alternative remedial approaches with the FDEP and have started additional field work to support the design of an improved groundwater recovery network with the objective of targeting areas of higher contaminant concentration and avoiding areas of high groundwater iron which has proven to be a significant operability issue for the project. In the first quarter of 2015, we entered into a new Consent Order with the FDEP requiring us to continue our remediation efforts at the Pace facility. The costs we are incurring under the new Consent Order are consistent with our previous estimates.

Piedmont

At 30 September 2018, $15.7 of the environmental accrual was related to the Piedmont site.

On 30 June 2008, we sold our Elkton, Maryland, and Piedmont, South Carolina, production facilities and the related North American atmospheric emulsions and global pressure sensitive adhesives businesses. In connection with the sale, we recognized a liability for retained environmental obligations associated with remediation activities at the Piedmont site. This site is under active remediation for contamination caused by an insolvent prior owner.

We are required by the South Carolina Department of Health and Environmental Control (SCDHEC) to address both contaminated soil and groundwater. Numerous areas of soil contamination have been addressed, and contaminated groundwater is being recovered and treated. The SCDHEC issued its final approval to the site-wide feasibility study on 13 June 2017 and the Record of Decision for the site on 27 June 2018. Field work has started to support the remedial design, and in the fourth quarter of fiscal year 2018, we signed a Consent Agreement Amendment memorializing our obligations to complete the cleanup of the site. We estimate that source area remediation and groundwater recovery and treatment will continue through 2029. Thereafter, we expect this site to go into a state of monitored natural attenuation through 2047.

We recognized a before-tax expense of $24 in 2008 as a component of income from discontinued operations and recorded an environmental liability of $24 in continuing operations on the consolidated balance sheets. There have been no significant changes to the estimated exposure.

Pasadena

At 30 September 2018, $11.7 of the environmental accrual was related to the Pasadena site.

During the fourth quarter of 2012, management committed to permanently shutting down our polyurethane intermediates (PUI) production facility in Pasadena, Texas. In shutting down and dismantling the facility, we have undertaken certain obligations related to soil and groundwater contaminants. We have been pumping and treating groundwater to control off-site contaminant migration in compliance with regulatory requirements and under the approval of the Texas Commission on Environmental Quality (TCEQ). We estimate that the pump and treat system will continue to operate until 2042.

We plan to perform additional work to address other environmental obligations at the site. This additional work includes remediating, as required, impacted soils, investigating groundwater west of the former PUI facility, performing post closure care for two closed RCRA surface impoundment units, and establishing engineering controls. In 2012, we estimated the total exposure at this site to be $13. There have been no significant changes to the estimated exposure.

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ASSET RETIREMENT OBLIGATIONS

Our asset retirement obligations are primarily associated with on-site long-term supply contracts under which we have built a facility on land owned by the customer and are obligated to remove the facility at the end of the contract term. The retirement of assets includes the contractually required removal of a long-lived asset from service and encompasses the sale, removal, abandonment, recycling, or disposal of the assets as required at the end of the contract terms. These obligations are primarily reflected in "Other noncurrent liabilities" on the consolidated balance sheets. The timing and/or method of settlement of these obligations are conditional on a future event that may or may not be within our control.

Changes to the carrying amount of our asset retirement obligations are as follows:

Balance at 30 September 2016	$119.9
Additional accruals	22.7
Liabilities settled	(4.1)
Accretion expense	5.8
Currency translation adjustment	.4
Balance at 30 September 2017	$144.7
Additional accruals	43.8
Liabilities settled	(2.6)
Accretion expense	7.2
Currency translation adjustment	(2.7)
Balance at 30 September 2018	**$190.4**

The increase in the liability during fiscal year 2018 primarily relates to new obligations associated with the Lu'An asset acquisition completed in April 2018.

GUARANTEES AND WARRANTIES

In April 2015, we entered into joint venture arrangements in Saudi Arabia. An equity bridge loan has been provided to the joint venture until 2020 to fund equity commitments. We guaranteed the repayment of our 25% share of this loan, and our venture partner guaranteed repayment of its share. Our maximum exposure under the guarantee is approximately $100. As of 30 September 2018 and 2017, we recorded a noncurrent liability of $94.4 for our obligation to make future equity contributions based on our proportionate share of the advances received by the joint venture under the loan.

Air Products has also entered into a long-term sale of equipment contract with the joint venture to engineer, procure, and construct the industrial gas facilities that will supply gases to Saudi Aramco. We provided bank guarantees to the joint venture to support our performance under the contract. As of 30 September 2018, our maximum potential payments were $249. Exposures under the guarantees decline over time and will be completely extinguished after completion of the project.

We are party to an equity support agreement and operations guarantee related to an air separation facility constructed in Trinidad for a venture in which we own 50%. At 30 September 2018, maximum potential payments under joint and several guarantees were $27.0. Exposures under the guarantees decline over time and will be completely extinguished by 2024.

During the first quarter of 2014, we sold the remaining portion of our Homecare business and entered into an operations guarantee related to obligations under certain homecare contracts assigned in connection with the transaction. Our maximum potential payment under the guarantee is £20 million (approximately $25 at 30 September 2018), and our exposure will be extinguished by 2020.

To date, no equity contributions or payments have been made since the inception of these guarantees. The fair value of the above guarantees is not material.

We, in the normal course of business operations, have issued product warranties related to equipment sales. Also, contracts often contain standard terms and conditions which typically include a warranty and indemnification to the buyer that the goods and services purchased do not infringe on third-party intellectual property rights. The provision for estimated future costs relating to warranties is not material to the

consolidated financial statements.

We do not expect that any sum we may have to pay in connection with guarantees and warranties will have a material adverse effect on our consolidated financial condition, liquidity, or results of operations.

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UNCONDITIONAL PURCHASE OBLIGATIONS

We are obligated to make future payments under unconditional purchase obligations as summarized below:

2019	$851
2020	362
2021	342
2022	318
2023	326
Thereafter	5,461
Total	$7,660

Approximately $6,800 of our unconditional purchase obligations relate to helium purchases. The majority of these obligations occur after fiscal year 2023. Helium purchases include crude feedstock supply to multiple helium refining plants in North America as well as refined helium purchases from sources around the world. As a rare byproduct of natural gas production in the energy sector, these helium sourcing agreements are medium- to long-term and contain take-if-tendered provisions. The refined helium is distributed globally and sold as a merchant gas, primarily under medium-term requirements contracts. While contract terms in the energy sector are longer than those in merchant, helium is a rare gas used in applications with few or no substitutions because of its unique physical and chemical properties.

Approximately $210 of our long-term unconditional purchase obligations relate to feedstock supply for numerous HyCO (hydrogen, carbon monoxide, and syngas) facilities. The price of feedstock supply is principally related to the price of natural gas. However, long-term take-or-pay sales contracts to HyCO customers are generally matched to the term of the feedstock supply obligations and provide recovery of price increases in the feedstock supply. Due to the matching of most long-term feedstock supply obligations to customer sales contracts, we do not believe these purchase obligations would have a material effect on our financial condition or results of operations.

The unconditional purchase obligations also include other product supply and purchase commitments and electric power and natural gas supply purchase obligations, which are primarily pass-through contracts with our customers.

Purchase commitments to spend approximately $455 for additional plant and equipment are included in the unconditional purchase obligations in 2019.

18. CAPITAL STOCK

Common Stock

Authorized common stock consists of 300 million shares with a par value of $1 per share. As of 30 September 2018, 249 million shares were issued, with 220 million outstanding.

On 15 September 2011, the Board of Directors authorized the repurchase of up to $1.0 billion of our outstanding common stock. We repurchase shares pursuant to Rules 10b5-1 and 10b-18 under the Securities Exchange Act of 1934, as amended, through repurchase agreements established with several brokers. We did not purchase any of our outstanding shares during fiscal year 2018. At 30 September 2018, $485.3 in share repurchase authorization remains.

The following table reflects the changes in common shares:

Year ended 30 September	**2018**	2017	2016
Number of Common Shares Outstanding			
Balance, beginning of year	**218,346,074**	217,350,825	215,359,113
Issuance of treasury shares for stock option and award plans	**1,169,171**	995,249	1,991,712
Balance, end of year	**219,515,245**	218,346,074	217,350,825

Preferred Stock

Authorized preferred stock consists of 25 million shares with a par value of $1 per share, of which 2.5 million were designated as Series A Junior Participating Preferred Stock. There were no shares issued or outstanding as of 30 September 2018 and 2017.

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19. SHARE-BASED COMPENSATION

We have various share-based compensation programs, which include deferred stock units, stock options, and restricted stock. Under all programs, the terms of the awards are fixed at the grant date. We issue shares from treasury stock upon the payout of deferred stock units, the exercise of stock options, and the issuance of restricted stock awards. Share information presented is on a total company basis. As of 30 September 2018, there were 4,869,212 shares available for future grant under our Long-Term Incentive Plan (LTIP), which is shareholder approved.

Share-based compensation cost recognized in the consolidated income statements is summarized below:

	2018	2017	2016
Before-Tax Share-Based Compensation Cost – Total	**$38.8**	$40.7	$37.6
Before-Tax Share-Based Compensation Cost – Discontinued Operations	**—**	.8	6.6
Before-Tax Share-Based Compensation Cost – Continuing Operations	**$38.8**	$39.9	$31.0
Income tax benefit – Continuing Operations	**(9.1)**	(14.0)	(10.8)
After-Tax Share-Based Compensation Cost – Continuing Operations	**$29.7**	$25.9	$20.2

Before-tax share-based compensation cost is primarily included in selling and administrative expense on our consolidated income statements. The amount of share-based compensation cost capitalized in fiscal years 2018, 2017, and 2016 was not material.

On a total company basis, before-tax share-based compensation cost by type of program was as follows:

	2018	2017	2016
Deferred stock units	**$38.3**	$34.5	$29.9
Stock options	**.2**	1.4	4.2
Restricted stock	**.3**	4.8	3.5
Before-Tax Share-Based Compensation Cost – Total	**$38.8**	$40.7	$37.6

Deferred Stock Units

We have granted deferred stock units to executives, selected employees, and outside directors. These deferred stock units entitle the recipient to one share of common stock upon vesting, which is conditioned, for employee recipients, on continued employment during the deferral period and may be conditioned on achieving certain performance targets. We grant deferred stock unit awards with a two- to five-year deferral period that is subject to payout upon death, disability, or retirement. Deferred stock units issued to outside directors are paid after service on the Board of Directors ends at the time elected by the director (not to exceed 10 years after service ends). We generally expense the grant-date fair value of these awards on a straight-line basis over the vesting period; however, expense recognition is accelerated for retirement eligible individuals who meet the requirements for vesting upon retirement. We have elected to account for forfeitures as they occur, rather than to estimate them. Forfeitures have not been significant historically. Market-based deferred stock units vest as long as the employee continues to be employed by the Company and upon the achievement of the performance target. The performance target, which is approved by the Compensation Committee, is the Company's total shareholder return (share price appreciation and dividends paid) in relation to a defined peer group over a three year performance period beginning 1 October of the fiscal year of grant. We granted 105,268, 117,692, and 130,167 market-based deferred stock units in fiscal years 2018, 2017, and 2016, respectively.

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The fair value of market-based deferred stock units was estimated using a Monte Carlo simulation model as these equity awards are tied to a market condition. The model utilizes multiple input variables that determine the probability of satisfying the market condition stipulated in the grant and calculates the fair value of the awards. We generally expense the grant-date fair value of these awards on a straight-line basis over the vesting period. The estimated grant-date fair value of market-based deferred stock units was $202.50, $156.87, and $135.49 per unit in fiscal years 2018, 2017, and 2016, respectively. The calculation of the fair value used the following assumptions:

	2018	2017	2016
Expected volatility	**18.7%**	20.6%	20.5%
Risk-free interest rate	**1.9 %**	1.4 %	1.2 %
Expected dividend yield	**2.6 %**	2.5 %	2.2 %

In addition, during fiscal year 2018, we granted 143,379 time-based deferred stock units at a weighted average grant-date fair value of $162.11. In fiscal years 2017 and 2016, we granted 165,121 and 164,711 time-based deferred stock units at a weighted average grant-date fair value of and $143.75 and $128.03, respectively.

Deferred Stock Units	Shares (000)	Weighted Average Grant-Date Fair Value
Outstanding at 30 September 2017	975	$127.29
Granted	249	179.21
Paid out	(237)	134.99
Forfeited/adjustments	(47)	153.57
Outstanding at 30 September 2018	**940**	**$137.78**

Cash payments made for deferred stock units were $2.2, $2.1, and $2.9 in fiscal years 2018, 2017, and 2016, respectively. As of 30 September 2018, there was $40.5 of unrecognized compensation cost related to deferred stock units. The cost is expected to be recognized over a weighted average period of 1.6 years. The total fair value of deferred stock units paid out during fiscal years 2018, 2017, and 2016, including shares vested in prior periods, was $38.5, $36.6, and $41.6, respectively.

Stock Options

We have granted awards of options to purchase common stock to executives and selected employees. The exercise price of stock options equals the market price of our stock on the date of the grant. Options generally vest incrementally over three years, and remain exercisable for ten years from the date of grant. In fiscal years 2018, 2017, and 2016, no stock options were awarded.

A summary of stock option activity is presented below:

Stock Options	Shares (000)	Weighted Average Exercise Price
Outstanding at 30 September 2017	3,202	$84.85
Exercised	(1,015)	75.15
Forfeited	(1)	124.76
Outstanding and Exercisable at 30 September 2018	**2,186**	**$89.33**

Stock Options	Weighted Average Remaining Contractual Term (in years)	Aggregate Intrinsic Value
Outstanding and Exercisable at 30 September 2018	**3.9**	**$170**

The aggregate intrinsic value represents the amount by which our closing stock price of $167.05 as of 30 September 2018 exceeds the exercise price multiplied by the number of in-the-money options outstanding

or exercisable.

On a total company basis, the intrinsic value of stock options exercised during fiscal years 2018, 2017, and 2016 was $90.4, $57.3, and $115.3, respectively.

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Compensation cost is generally recognized over the stated vesting period consistent with the terms of the arrangement (i.e., either on a straight-line or graded-vesting basis). Expense recognition is accelerated for retirement-eligible individuals who would meet the requirements for vesting of awards upon their retirement. As of 30 September 2018, there was no unrecognized compensation cost as all stock option awards were fully vested.

Cash received from option exercises during fiscal year 2018 was $76.2. The total tax benefit realized from stock option exercises in fiscal year 2018 was $25.8, of which $19.0 was the excess tax benefit.

Restricted Stock

The grant-date fair value of restricted stock is estimated on the date of grant based on the closing price of the stock, and compensation cost is generally amortized to expense on a straight-line basis over the vesting period during which employees perform related services. Expense recognition is accelerated for retirement-eligible individuals who would meet the requirements for vesting of awards upon their retirement. We have elected to account for forfeitures as they occur, rather than to estimate them. Forfeitures have not been significant historically.

We have issued shares of restricted stock to certain officers. Participants are entitled to cash dividends and to vote their respective shares. Restrictions on shares lift in one to four years or upon the earlier of retirement, death, or disability. The shares are nontransferable while subject to forfeiture.

A summary of restricted stock activity is presented below:

Restricted Stock	Shares (000)	Weighted Average Grant-Date Fair Value
Outstanding at 30 September 2017	56	$135.74
Vested	(14)	121.90
Outstanding at 30 September 2018	**42**	**$140.28**

As of 30 September 2018, there was $.1 of unrecognized compensation cost related to restricted stock awards. The cost is expected to be recognized over a weighted average period of 0.5 years. The total fair value of restricted stock vested during fiscal years 2018, 2017, and 2016 was $2.2, $4.1, and $4.3, respectively.

As discussed in Note 3, Discontinued Operations, Air Products completed the spin-off of Versum on 1 October 2016. In connection with the spin-off, the Company adjusted the number of deferred stock units and stock options pursuant to existing anti-dilution provisions in the LTIP to preserve the intrinsic value of the awards immediately before and after the separation. The outstanding awards will continue to vest over the original vesting period defined at the grant date. Outstanding awards at the time of spin-off were primarily converted into awards of the holders' employer following the separation.

Stock awards held upon separation were adjusted based upon the conversion ratio of Air Products' New York Stock Exchange (“NYSE”) volume weighted-average closing stock price on 30 September 2016 ($150.35) to the NYSE volume weighted-average opening stock price on 3 October 2016 ($140.38), or 1.071. The adjustment to the awards did not result in incremental fair value, and no incremental compensation expense was recorded related to the conversion of these awards.

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20. ACCUMULATED OTHER COMPREHENSIVE LOSS

The table below summarizes changes in AOCL, net of tax, attributable to Air Products:

	Derivatives qualifying as hedges	Foreign currency translation adjustments	Pension and postretirement benefits	Total
Balance at 30 September 2015	**($42.9)**	**($956.5)**	**($1,126.5)**	**($2,125.9)**
Other comprehensive income (loss) before reclassifications	13.7	9.9	(335.1)	(311.5)
Amounts reclassified from AOCL	(36.0)	2.7	87.2	53.9
Net current period other comprehensive income (loss)	($22.3)	$12.6	($247.9)	($257.6)
Amount attributable to noncontrolling interest	(.2)	5.4	(.4)	4.8
Balance at 30 September 2016	**($65.0)**	**($949.3)**	**($1,374.0)**	**($2,388.3)**
Other comprehensive income (loss) before reclassifications	(12.6)	101.9	251.6	340.9
Amounts reclassified from AOCL	24.2	57.3	110.7	192.2
Net current period other comprehensive income	$11.6	$159.2	$362.3	$533.1
Spin-off of Versum	.2	6.0	5.3	11.5
Amount attributable to noncontrolling interest	(.1)	3.0	.8	3.7
Balance at 30 September 2017	**($53.1)**	**($787.1)**	**($1,007.2)**	**($1,847.4)**
Other comprehensive income (loss) before reclassifications	45.9	(244.6)	179.4	(19.3)
Amounts reclassified from AOCL	(30.4)	3.1	133.1	105.8
Net current period other comprehensive income (loss)	$15.5	($241.5)	$312.5	$86.5
Amount attributable to noncontrolling interest	—	(18.8)	(.2)	(19.0)
Balance at 30 September 2018	**($37.6)**	**($1,009.8)**	**($694.5)**	**($1,741.9)**

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The table below summarizes the reclassifications out of accumulated other comprehensive loss and the affected line item on the consolidated income statements:

	2018	2017	2016
(Gain) Loss on Cash Flow Hedges, net of tax			
Sales/Cost of sales	**$7.1**	$18.3	$.2
Other income (expense), net	**(42.6)**	5.1	(46.2)
Interest expense	**5.1**	.8	10.0
Total (Gain) Loss on Cash Flow Hedges, net of tax	**($30.4)**	$24.2	($36.0)
Currency Translation Adjustment			
Cost of sales[(A)]	**$3.1**	$—	$—
Cost reduction and assets actions[(B)]	**—**	8.2	—
Loss from discontinued operations, net of tax[(C)]	**—**	49.1	2.7
Total Currency Translation Adjustment	**$3.1**	$57.3	$2.7
Pension and Postretirement Benefits, net of tax[(D)]	**$133.1**	$110.7	$87.2

(A) The fiscal year 2018 impact relates to an equipment sale resulting from the termination of a contract in the Industrial Gases – Asia segment during the first quarter.

(B) The fiscal year 2017 impact relates to the planned sale of a non-industrial gas hardgoods business in the Industrial Gases – Americas segment recorded in the third quarter.

(C) The fiscal year 2017 impact relates to the sale of PMD during the second quarter. The fiscal year 2016 impact primarily relates to the sale of an equity affiliate in the first quarter.

(D) The components of net periodic benefit cost reclassified out of AOCL include items such as prior service cost amortization, actuarial loss amortization, and settlements and are included in “Other non-operating income (expense), net” on the consolidated income statements. Refer to Note 16, Retirement Benefits, for additional information.

21. EARNINGS PER SHARE

The following table sets forth the computation of basic and diluted earnings per share (EPS):

30 September	**2018**	2017	2016
Numerator			
Income from continuing operations	**$1,455.6**	$1,134.4	$1,099.5
Income (Loss) from discontinued operations	**42.2**	1,866.0	(468.4)
Net Income Attributable to Air Products	**$1,497.8**	$3,000.4	$631.1
Denominator (in millions)			
Weighted average common shares — Basic	**219.3**	218.0	216.4
Effect of dilutive securities			
Employee stock option and other award plans	**1.5**	1.8	1.9
Weighted average common shares — Diluted	**220.8**	219.8	218.3
Basic EPS Attributable to Air Products			
Income from continuing operations	**$6.64**	$5.20	$5.08
Income (Loss) from discontinued operations	**.19**	8.56	(2.16)
Net Income Attributable to Air Products	**$6.83**	$13.76	$2.92
Diluted EPS Attributable to Air Products			
Income from continuing operations	**$6.59**	$5.16	$5.04
Income (Loss) from discontinued operations	**.19**	8.49	(2.15)
Net Income Attributable to Air Products	**$6.78**	$13.65	$2.89

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Diluted EPS attributable to Air Products reflects the potential dilution that could occur if stock options or other share-based awards were exercised or converted into common stock. The dilutive effect is computed using the treasury stock method, which assumes all share-based awards are exercised and the hypothetical proceeds from exercise are used by the Company to purchase common stock at the average market price during the period. The incremental shares (difference between shares assumed to be issued versus purchased), to the extent they would have been dilutive, are included in the denominator of the diluted EPS calculation. Outstanding share-based awards of .1 million and .2 million shares were antidilutive and therefore excluded from the computation of diluted EPS for 2018 and 2016, respectively. There were no antidilutive outstanding share-based awards in fiscal year 2017.

22. INCOME TAXES

The following table summarizes the income of U.S. and foreign operations before taxes:

	2018	2017	2016
Income from Continuing Operations before Taxes			
United States	**$688.5**	$669.8	$631.7
Foreign	**1,151.7**	666.2	775.9
Income from equity affiliates	**174.8**	80.1	147.0
Total	**$2,015.0**	$1,416.1	$1,554.6

On 22 December 2017, the United States enacted the U.S. Tax Cuts and Jobs Act (“Tax Act” or "Tax reform") which significantly changed existing U.S. tax laws, including a reduction in the federal corporate income tax rate from 35% to 21%, a deemed repatriation tax on unremitted foreign earnings, as well as other changes. Our consolidated income statements for the twelve months ended 30 September 2018 reflect a discrete net tax expense of $180.6 and a $28.5 reduction in equity affiliate income for the impacts of the Tax Act. The $180.6 includes a $392.4 cost comprised of $322.1 for the deemed repatriation tax and $70.3 primarily for additional foreign taxes on the repatriation of foreign earnings. This cost is partially offset by a $211.8 benefit primarily from the re-measurement of our net U.S. deferred tax liabilities at the lower corporate tax rate.

The deemed repatriation tax includes a $56.2 non-recurring benefit related to the U.S. taxation of deemed foreign dividends in fiscal year 2018, the year of enactment of the Tax Act. This benefit may be eliminated by future legislation.

After applying tax credits, the balance of the deemed repatriation tax obligation is $203.2, which we intend to pay in installments over eight years. We have recorded $184.4 of this obligation on our consolidated balance sheets in noncurrent liabilities.

In December 2017, the Securities and Exchange Commission staff issued Staff Accounting Bulletin No. 118, which addresses how a company recognizes provisional estimates when a company does not have the necessary information available, prepared or analyzed in reasonable detail to complete its accounting for the effect of the changes in the Tax Act. We are reporting the $392.4 cost of deemed repatriation tax and foreign repatriation taxes and the $211.8 re-measurement of our net U.S. deferred tax liabilities provisionally based upon reasonable estimates as of 30 September 2018. The impacts are not yet finalized as they are dependent on factors and analysis not yet known or fully completed, including but not limited to, changes in our estimates of book to U.S. tax adjustments for the earnings and foreign taxes of foreign and domestic entities, as well as our ongoing analysis of the Tax Act. Estimates used in the provisional amounts include earnings, cash positions, foreign taxes and withholding taxes attributable to foreign subsidiaries as well as the anticipated reversal pattern of gross deferred balances. We are continuing to gather additional information and expect to complete our accounting by the first quarter of fiscal year 2019, within the prescribed one-year measurement period.

Due to the Company’s fiscal year, certain amounts cannot be finalized until the completion and filing of the

Company’s U.S. federal 2018 tax return, which is due in the fourth quarter of fiscal year 2019, and any changes to the tax positions reflected in those returns could result in an adjustment to the impact of the Tax Act. In addition to final calculations of the earnings and taxes of foreign entities that would impact the deemed repatriation tax, estimates that are timing-related may result in adjustments due to the reduction of the U.S. tax rate. Foreign audit settlements, as well as future regulatory guidance, could also significantly impact the deemed repatriation tax.

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We have historically asserted our intention to indefinitely reinvest foreign earnings in certain foreign subsidiaries. We have reevaluated our historic assertion as a result of enactment of the Tax Act and adjusted our position relative to the indefinitely reinvested earnings of various foreign subsidiaries. The impact of these changes is included in the $70.3 for additional foreign taxes on the repatriation of foreign earnings.

The Tax Act also enacted new provisions related to the taxation of foreign operations, known as Global Intangible Low Tax Income or ("GILTI"). We have elected as an accounting policy to account for GILTI as a period cost when incurred. This and various other provisions of the Tax Act do not become effective until fiscal year 2019 and did not impact our tax provision in fiscal year 2018. We have also elected as an accounting policy to record within income tax expense transaction gains and losses on foreign currency denominated withholding tax liabilities.

As a fiscal year-end taxpayer, certain provisions of the Tax Act become effective in our fiscal year 2018 while other provisions do not become effective until fiscal year 2019. The corporate tax rate reduction is effective as of 1 January 2018 and, accordingly, reduces our 2018 fiscal year U.S. federal statutory rate to a blended rate of approximately 24.5%. The 21% federal tax rate will apply to our fiscal year ended 30 September 2019 and each year thereafter.

The following table shows the components of the provision for income taxes:

	2018	2017	2016
Current Tax Provision			
Federal	**$305.1**	$62.8	$171.0
State	**17.7**	7.0	21.2
Foreign	**256.9**	229.1	178.6
	579.7	298.9	370.8
Deferred Tax Provision			
Federal	**(121.7)**	1.4	45.0
State	**12.5**	6.0	2.8
Foreign	**53.8**	(45.4)	14.0
	(55.4)	(38.0)	61.8
Income Tax Provision	**$524.3**	$260.9	$432.6

Total company income tax payments, net of refunds, were $372.0, $1,348.8, and $440.8 in fiscal years 2018, 2017, and 2016, respectively. Tax payments were higher in 2017 due to taxes related to the $2,870 gain on the sale of PMD.

The effective tax rate equals the income tax provision divided by income from continuing operations before taxes. A reconciliation of the differences between the United States federal statutory tax rate and the effective tax rate is as follows:

(Percent of income before taxes)	**2018**	2017	2016
U.S. federal statutory tax rate	**24.5 %**	35.0 %	35.0 %
State taxes, net of federal benefit	**1.0**	1.0	1.2
Income from equity affiliates	**(2.1)**	(2.0)	(3.3)
Foreign tax differentials	**(1.0)**	(7.9)	(6.6)
Tax on foreign repatriated earnings	**(.4)**	(2.2)	(3.1)
Domestic production activities	**(.4)**	(.8)	(.8)
Share-based compensation	**(1.0)**	(1.2)	—
Tax reform repatriation	**19.5**	—	—
Tax reform rate change and other	**(11.1)**	—	—
Tax restructuring benefit	**(1.8)**	—	—
Non-deductible goodwill impairment charge	**—**	3.6	—
Non-U.S. subsidiary tax election	**—**	(7.7)	—

Business separation costs	—	.2	4.2
Other	**(1.2)**	.4	1.2
Effective Tax Rate	**26.0 %**	18.4 %	27.8 %

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Foreign tax differentials represent the differences between foreign earnings subject to foreign tax rates lower than the U.S. federal statutory tax rate. Some of our foreign earnings are subject to local country tax rates that are below the U.S. federal statutory rate and include tax holidays and incentives. As a result of the reduction in the federal corporate income tax rates under the Tax Act our effective non-U.S. tax rate is now closer to our blended current year U.S. statutory rate of 24.5%.

Tax on foreign repatriated earnings includes benefits and costs related to U.S. and additional foreign taxation on the current and future repatriation of foreign earnings and a U.S. benefit for related foreign tax credits. As a result of the Tax Act, the impact on our effective rate from repatriations and credits has been significantly reduced. Due to the effective date of provisions under the Tax Act, certain benefits reported in fiscal year 2018 will not recur in fiscal year 2019.

The Tax Act repeals the domestic production activities deduction, effective for our fiscal 2019 tax year, and lowers the benefit taken in fiscal year 2018.

In fiscal year 2018, we recognized a tax benefit of $35.7, net of reserves for uncertain tax positions, and a corresponding decrease in net deferred tax liabilities resulting from the restructuring of several foreign subsidiaries.

During the first quarter of fiscal year 2017, we adopted new accounting guidance that requires excess tax benefits and deficiencies from share-based compensation to be recognized in the consolidated income statements rather than in additional paid-in capital on the consolidated balance sheets. As a result of applying this change prospectively, we recognized $21.5 and $17.6 of excess tax benefits in our provision for income taxes during fiscal year 2018 and 2017, respectively.

Primarily due to the impact of the Tax Act and the restructuring benefit, our effective tax rate was 26% for the twelve months ended 30 September 2018.

In 2017, the effective tax rate was impacted by a tax election made with respect to a Chilean holding company resulting in an income tax benefit of $111.4 on tax losses related to investments in Chile. The effective tax rate was also impacted by a goodwill impairment charge of $145.3 for which no tax benefits were available. See Note 10, Goodwill, for additional information regarding the impairment charge.

In 2016, the effective tax rate was impacted by tax costs of $51.8 incurred in anticipation of the tax-free spin-off of Versum, primarily for a dividend declared during the third quarter of 2016 to repatriate $443.8 from a subsidiary in South Korea to the U.S. Previously, most of these foreign earnings were considered to be indefinitely reinvested. In addition, a tax benefit was not available on a significant portion of the business separation costs. See Note 4, Materials Technologies Separation, for additional information.

The significant components of deferred tax assets and liabilities are as follows:

30 September	**2018**	2017
Gross Deferred Tax Assets		
Retirement benefits and compensation accruals	**$153.1**	$370.1
Tax loss carryforwards	**143.5**	64.5
Tax credits and other tax carryforwards	**17.1**	76.1
Reserves and accruals	**42.5**	88.2
Currency losses	**3.8**	20.7
Other	**45.4**	37.2
Valuation allowance	**(105.0)**	(107.7)
Deferred Tax Assets	**300.4**	549.1
Gross Deferred Tax Liabilities		
Plant and equipment	**811.8**	1,035.6
Unremitted earnings of foreign entities	**36.1**	20.9
Partnership and other investments	**16.3**	5.4
Intangible assets	**84.3**	81.9
Other	**5.6**	9.2
Deferred Tax Liabilities	**954.1**	1,153.0

Net Deferred Income Tax Liability	**$653.7**	$603.9

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Deferred tax assets and liabilities are included within the consolidated financial statements as follows:

	2018	2017
Deferred Tax Assets		
Other noncurrent assets	**$121.4**	$174.5
Deferred Tax Liabilities		
Deferred income taxes	**775.1**	778.4
Net Deferred Income Tax Liability	**$653.7**	$603.9

The various components of deferred tax assets and liabilities, including plant and equipment, retirement benefits and compensation accruals, and reserves and accruals were reduced by the re-measurement of our U.S. deferred tax accounts to the lower U.S. corporate tax rate. Tax loss carryforwards increased primarily due to the sale of plant and equipment related to our EfW business. The sale converted these assets into capital losses which are subject to a full valuation allowance. In addition, deferred tax liabilities related to plant and equipment also includes an increase due to the impact of the immediate expensing provision allowed for under the Tax Act. The balance of unremitted earnings of foreign entities and partnership and other investments were increased by additional foreign withholding tax liability recorded as a result of the Tax Act, net of tax payments. Retirement benefits and compensation accruals are also impacted significantly by the changes in plan assets and benefit obligations that have been recognized in other comprehensive income. See Note 16, Retirement Benefits, for additional information.

As of 30 September 2018, the Company had the following deferred tax assets for certain tax credits:

Jurisdiction	Gross Tax Asset	Expiration Period
U.S. State	$1.9	2019 - 2034
Foreign	21.6	2019 - 2030; Indefinite

At 30 September 2018, the Company had the following loss carryforwards:

Jurisdiction	Gross Loss Carryforward	Expiration Period
U.S. State Net Operating Loss	$324.9	2019 - 2034
Foreign Net Operating Loss	340.6	2019 - 2028; Indefinite
Foreign Capital Loss	281.9	Indefinite

In fiscal year 2018 we utilized the balance of our federal tax credit carryforward against the deemed repatriation tax. Of the $340.6 of foreign net operating loss carryforwards, $121.8 have indefinite carryforward periods. Of the $21.6 foreign tax credits, $16.4 have indefinite carryforward periods.

The valuation allowance as of 30 September 2018 of $105.0, primarily related to the tax benefit of foreign loss carryforwards of $56.0 as well as foreign capital losses of $47.9 that were generated from the loss recorded on the exit from the Energy-from-Waste business in 2016. If events warrant the reversal of the valuation allowance, it would result in a reduction of tax expense. We believe it is more likely than not that future earnings and reversal of deferred tax liabilities will be sufficient to utilize our deferred tax assets, net of existing valuation allowance, at 30 September 2018.

As a result of the Tax Act we recorded $322.1 of federal income tax from the deemed repatriation tax on approximately $5.8 billion of previously undistributed earnings from our foreign subsidiaries and corporate joint ventures. These earnings are now eligible to be repatriated to the U.S. with reduced U.S. tax impacts. However, such earnings may be subject to foreign withholding and other taxes. We record foreign and U.S. income taxes on the undistributed earnings of our foreign subsidiaries and corporate joint ventures unless those earnings are indefinitely reinvested. The cumulative undistributed earnings that are considered to be indefinitely reinvested in foreign subsidiaries and corporate joint ventures are included in retained earnings

on the consolidated balance sheets and amounted to $3.2 billion as of 30 September 2018. An estimated $420.4 in additional foreign withholding and other income taxes would be due if these earnings were remitted as dividends.

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A reconciliation of the beginning and ending amount of the unrecognized tax benefits is as follows:

Unrecognized Tax Benefits	**2018**	2017	2016
Balance at beginning of year	**$146.4**	$90.2	$83.8
Additions for tax positions of the current year	**26.4**	47.5	12.5
Additions for tax positions of prior years	**119.2**	16.1	2.9
Reductions for tax positions of prior years	**(41.3)**	(4.0)	—
Settlements	**(14.2)**	(2.0)	(5.6)
Statute of limitations expiration	**(2.6)**	(3.2)	(2.9)
Foreign currency translation	**(.3)**	1.8	(.5)
Balance at End of Year	**$233.6**	$146.4	$90.2

At 30 September 2018 and 2017, we had $233.6 and $146.4 of unrecognized tax benefits, excluding interest and penalties, of which $88.6 and $73.8, respectively, would impact the effective tax rate from continuing operations if recognized.

Interest and penalties related to unrecognized tax benefits are recorded as a component of income tax expense and totaled ($2.4), $3.7, and $1.8 in fiscal years 2018, 2017, and 2016, respectively. Our accrued balance for interest and penalties was $8.4 and $12.1 as of 30 September 2018 and 2017, respectively.

The additions for tax positions of prior years of $119.2 relates primarily to uncertain state tax filing positions taken related to the sale of PMD. Additions for tax positions of the current year of $26.4 included uncertain tax positions related to the restructuring of foreign subsidiaries and reserves for ongoing transfer pricing uncertainties.

On 17 April 2018, we received a final audit settlement agreement that resolved uncertainties related to unrecognized tax benefits of $43.1, including interest. This settlement primarily related to tax positions taken in conjunction with the disposition of our Homecare business in 2012. As a result, we recorded an income tax benefit of $25.6, including interest, in income from discontinued operations during 2018. The settlement also resulted in an income tax benefit of approximately $9.1, including interest, in continuing operations for the release of tax reserves on other matters. The reduction in prior year positions and settlement payments also reflect the settlement of U.S. federal tax audits for 2012 through 2014 reported in the first quarter of the year.

We are currently under examination in a number of tax jurisdictions, some of which may be resolved in the next twelve months. As a result, it is reasonably possible that a change in the unrecognized tax benefits may occur during the next twelve months. However, quantification of an estimated range cannot be made at this time.

We generally remain subject to examination in the following major tax jurisdictions for the years indicated below:

Major Tax Jurisdiction	**Open Tax Years**
North America	
United States – Federal	2015 - 2018
United States – All States	2011 - 2018
Canada	2014 - 2018
Europe	
France	2015 - 2018
Germany	2013 - 2018
Netherlands	2012 - 2018
Spain	2015 - 2018
United Kingdom	2014 - 2018
Asia	
China	2013 - 2018
South Korea	2010 - 2018

Taiwan	2013	- 2018
Latin America		
Chile	2015	- 2018

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23. SUPPLEMENTAL INFORMATION

Other Receivables and Current Assets **30 September**	**2018**	2017
Derivative instruments	**$61.1**	$93.9
Other receivables	**139.0**	188.0
Current capital lease receivables	**92.1**	93.3
Other	**3.6**	28.1
Other receivables and current assets	**$295.8**	$403.3

Other Noncurrent Assets **30 September**	**2018**	2017
Derivative instruments	**$85.0**	$133.9
Noncurrent customer receivable	**92.4**	62.6
Prepaid tax	**13.2**	5.1
Deferred tax assets	**121.4**	174.5
Pension benefits	**131.7**	18.4
Deposits	**—**	34.8
Other	**210.8**	212.5
Other noncurrent assets	**$654.5**	$641.8

Payables and Accrued Liabilities **30 September**	**2018**	2017
Trade creditors	**$594.6**	$659.5
Payables associated with Lu'An	**330.0**	—
Customer advances	**156.6**	438.9
Accrued payroll and employee benefits	**201.4**	187.1
Pension and postretirement benefits	**34.1**	22.6
Dividends payable	**241.5**	207.5
Outstanding payments in excess of certain cash balances	**9.1**	4.5
Accrued interest expense	**49.5**	42.2
Derivative instruments	**54.2**	95.9
Severance and other costs associated with cost reduction actions	**9.9**	41.5
Other	**136.9**	114.6
Payables and accrued liabilities	**$1,817.8**	$1,814.3

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Other Noncurrent Liabilities **30 September**	**2018**	2017
Pension benefits	**$417.2**	$703.8
Postretirement benefits	**47.0**	57.0
Other employee benefits	**94.4**	99.3
Noncurrent customer liability	**92.4**	62.6
Long-term accrued income taxes related to U.S. tax reform	**184.4**	—
Contingencies related to uncertain tax positions	**113.2**	130.6
Advance payments	**58.2**	39.0
Environmental liabilities	**64.6**	72.3
Derivative instruments	**39.9**	36.0
Asset retirement obligations	**189.5**	144.0
Obligation for future contribution to an equity affiliate	**94.4**	94.4
Obligations associated with EfW	**63.3**	65.3
Other	**78.4**	107.6
Other noncurrent liabilities	**$1,536.9**	$1,611.9

Other Income (Expense), Net **30 September**	**2018**	2017	2016
Technology and royalty income[A]	**$22.8**	$20.8	$19.0
Interest income[B]	**—**	1.5	6.1
Foreign exchange	**(3.9)**	4.3	(7.2)
Sale of assets and investments[C]	**6.9**	24.3	8.8
Contract settlements	**2.9**	14.3	12.6
Transition service agreements reimbursement[D]	**12.7**	38.4	—
Other	**8.8**	17.4	10.1
Other income (expense), net	**$50.2**	$121.0	$49.4

(A) Primarily includes related party activity with our equity affiliates.

(B) Beginning in the second quarter of fiscal year 2017, interest income associated with our cash and cash items and short-term investments is reflected on the consolidated income statements in "Other non-operating income (expense), net."

(C) Includes a gain of $12.2 resulting from the sale of a parcel of land during the fourth quarter of fiscal year 2017.

(D) Reflects reimbursement for costs in support of transition services agreements with Versum for EMD and with Evonik for PMD. Refer to Note 4, Materials Technologies Separation, for additional information.

Other Non-Operating Income (Expense), Net **30 September**	**2018**	2017	2016
Interest income[A]	**$46.3**	$29.8	$—
Pension settlement loss[B]	**(48.5)**	(10.5)	(5.1)
Other non-service pension benefit (costs)	**7.7**	(1.9)	(.3)
Other	**(.4)**	(.8)	—
Other non-operating income (expense), net	**$5.1**	$16.6	($5.4)

(A) Prior to the second quarter of fiscal year 2017, interest income associated with our cash and cash items and short-term investments was reflected on the consolidated income statements in "Other income (expense), net."

(B) Fiscal year 2018 includes a loss of $43.7 that primarily resulted from the transfer of certain pension payment obligations to an insurer through the purchase of an irrevocable, nonparticipating group annuity contract during the fourth quarter.

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Related Party Sales

We have related party sales to some of our equity affiliates and joint venture partners. Sales to related parties totaled approximately $340, $580, and $320 during fiscal years 2018, 2017, and 2016, respectively, and primarily related to Jazan sale of equipment activity. Agreements with related parties include terms that are consistent with those that we believe would have been negotiated at an arm's length with an independent party.

24. SUMMARY BY QUARTER (UNAUDITED)

These tables summarize the unaudited results of operations for each quarter of fiscal years 2018 and 2017:

2018	Q1	Q2	Q3	Q4	Total
Sales	$2,216.6	$2,155.7	$2,259.0	$2,298.9	$8,930.2
Gross profit	644.8	649.2	713.6	733.1	2,740.7
Operating income	460.7	455.4	515.8	533.7	1,965.6
Equity affiliates income	13.8 (A)	43.7	58.1	59.2 (A)	174.8 (A)
Income tax provision	291.8 (A)	56.2 (B)	107.1	69.2 (A)(B)	524.3 (A)(B)
Net income	161.7	423.6	487.9	459.7	1,532.9
Net income attributable to Air Products					
Income from continuing operations	155.6	416.4	430.7	452.9	1,455.6
Income (Loss) from discontinued operations	(1.0)	—	43.2 (C)	—	42.2 (C)
Net income attributable to Air Products	154.6	416.4	473.9	452.9	1,497.8
Basic Earnings Per Common Share Attributable to Air Products					
Income from continuing operations	.71	1.90	1.96	2.06	6.64
Income from discontinued operations	—	—	.20	—	.19
Net income attributable to Air Products	.71	1.90	2.16	2.06	6.83
Diluted Earnings Per Common Share Attributable to Air Products					
Income from continuing operations	.70	1.89	1.95	2.05	6.59
Income from discontinued operations	—	—	.20	—	.19
Net income attributable to Air Products	.70	1.89	2.15	2.05	6.78
Weighted Average Common Shares — Diluted (in millions)	220.4	220.8	220.9	220.9	220.8
Dividends declared per common share	.95	1.10	1.10	1.10	4.25
Market price per common share – High	164.78	175.17	170.29	171.66	
Market price per common share – Low	150.55	152.71	154.67	153.02	

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2017	Q1	Q2	Q3	Q4	Total
Sales	$1,882.5	$1,980.1	$2,121.9	$2,203.1	$8,187.6
Gross profit	565.8	576.3	635.9	658.1	2,436.1
Business separation costs[D]	32.5	—	—	—	32.5
Cost reduction and assets actions[E]	50.0	10.3	42.7	48.4	151.4
Goodwill and intangible asset impairment charge[F]	—	—	162.1	—	162.1
Gain on land sale	—	—	—	12.2	12.2
Operating income	328.3	395.6	258.7	457.4	1,440.0
Equity affiliates income (loss)	38.0	34.2	(36.9)[G]	44.8	80.1[G]
Income tax provision (benefit)	78.4	94.5	89.3	(1.3)[H]	260.9[H]
Net income	306.4	2,135.7[I]	104.1	475.0	3,021.2[I]
Net income attributable to Air Products					
Income from continuing operations	251.6	304.4	104.2	474.2	1,134.4
Income (Loss) from discontinued operations	48.2	1,825.6[I]	(2.3)	(5.5)	1,866.0[I]
Net income attributable to Air Products	299.8	2,130.0	101.9	468.7	3,000.4
Basic Earnings Per Common Share Attributable to Air Products					
Income from continuing operations	1.16	1.40	.48	2.17	5.20
Income (Loss) from discontinued operations	.22	8.38	(.01)	(.02)	8.56
Net income attributable to Air Products	1.38	9.78	.47	2.15	13.76
Diluted Earnings Per Common Share Attributable to Air Products					
Income from continuing operations	1.15	1.39	.47	2.15	5.16
Income (Loss) from discontinued operations	.22	8.31	(.01)	(.02)	8.49
Net income attributable to Air Products	1.37	9.70	.46	2.13	13.65
Weighted Average Common Shares — Diluted (in millions)	219.7	219.7	219.8	220.1	219.8
Dividends declared per common share	.86	.95	.95	.95	3.71
Market price per common share – High	150.45	149.46	147.66	152.26	
Market price per common share – Low	129.00	133.63	134.09	141.88	

[A] Includes the impacts of the Tax Act. For additional information, refer to Note 22, Income Taxes.

[B] Includes the impacts of the restructuring of several foreign subsidiaries. For additional information, refer to Note 22, Income Taxes.

[C] Primarily includes benefits resulting from the resolution of uncertain tax positions related to the disposition of our former European Homecare business and post-closing adjustments associated with the sale of PMD. For additional information, refer to Note 3, Discontinued Operations.

[D] For additional information, refer to Note 4, Materials Technologies Separation.

[E] For additional information, refer to Note 5, Cost Reduction and Asset Actions.

[F] For additional information, refer to Note 10, Goodwill, and Note 11, Intangible Assets.

[G] Includes the impact of an other-than-temporary impairment of an investment in an equity affiliate. For additional information, refer to Note 8, Summarized Financial Information of Equity Affiliates.

[H] Includes the impact of a tax election benefit related to a non-U.S. subsidiary. For additional information, see Note 22, Income Taxes.

[I] Includes the after-tax gain on the sale of PMD. For additional information, see Note 3, Discontinued Operations.

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25. BUSINESS SEGMENT AND GEOGRAPHIC INFORMATION

Our reporting segments reflect the manner in which our chief operating decision maker reviews results and allocates resources. Except in the Industrial Gases – EMEA and Corporate and other segments, each reporting segment meets the definition of an operating segment and does not include the aggregation of multiple operating segments. Our Industrial Gases – EMEA and Corporate and other segment each include the aggregation of two operating segments that meet the aggregation criteria under GAAP.

Our reporting segments are:

- Industrial Gases – Americas
- Industrial Gases – EMEA (Europe, Middle East, and Africa)
- Industrial Gases – Asia
- Industrial Gases – Global
- Corporate and other

Industrial Gases – Regional

The regional Industrial Gases segments (Americas, EMEA, and Asia) include the results of our regional industrial gas businesses, which produce and sell atmospheric gases such as oxygen, nitrogen, argon, and rare gases (primarily recovered by the cryogenic distillation of air), process gases such as hydrogen, helium, carbon dioxide, carbon monoxide, syngas (a mixture of hydrogen and carbon monoxide), and specialty gases, and equipment for the production or processing of gases, such as air separation units and non-cryogenic generators.

We supply gases to customers in many industries, including those in refining, chemical, gasification, metals, electronics, manufacturing, and food and beverage. We distribute gases to our customers through a variety of supply modes including liquid or gaseous bulk supply delivered by tanker or tube trailer and, for smaller customers, packaged gases delivered in cylinders and dewars or small on-sites (cryogenic or non-cryogenic generators). For large-volume customers, we construct an on-site plant adjacent to or near the customer's facility or deliver product from one of our pipelines. We are the world's largest provider of hydrogen, which is used by refiners to facilitate the conversion of heavy crude feedstock and lower the sulfur content of gasoline and diesel fuels.

Electricity is the largest cost component in the production of atmospheric gases, and natural gas is the principal raw material for hydrogen, carbon monoxide, and syngas production. We mitigate energy and natural gas price fluctuations contractually through pricing formulas, surcharges, cost pass-through, and tolling arrangements. The regional Industrial Gases segments also include our share of the results of several joint ventures accounted for by the equity method. The largest of these joint ventures operate in Mexico, Italy, South Africa, India, Saudi Arabia, and Thailand.

Each of the regional Industrial Gases segments competes against global industrial gas companies as well as regional competitors. Competition is based primarily on price, reliability of supply, and the development of industrial gas applications. We derive a competitive advantage in locations where we have pipeline networks, which enable us to provide reliable and economic supply of products to larger customers.

Industrial Gases – Global

The Industrial Gases – Global segment includes cryogenic and gas processing equipment for air separation. The equipment is sold worldwide to customers in a variety of industries, including chemical and petrochemical manufacturing, oil and gas recovery and processing, and steel and primary metals processing. The Industrial Gases – Global segment also includes centralized global costs associated with management of all the Industrial Gases segments. These costs include Industrial Gases global administrative costs, product development costs, and research and development costs. We compete with a large number of firms for all the offerings included in the Industrial Gases – Global segment. Competition in the equipment businesses is based primarily on technological performance, service, technical know-how, price, and performance guarantees.

Corporate and other

The Corporate and other segment includes our LNG equipment and helium storage and distribution sale of equipment businesses and corporate support functions that benefit all segments. Competition for the sale of equipment businesses is based primarily on technological performance, service, technical know-how, price, and performance guarantees.

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Corporate and other also includes income and expense that is not directly associated with the other segments, including foreign exchange gains and losses and stranded costs. Stranded costs result from functional support previously provided to the two divisions comprising the former Materials Technologies segment. The majority of these costs are reimbursed to Air Products pursuant to short-term transition services agreements under which Air Products provides transition services to Versum for EMD and to Evonik for PMD. The reimbursement for costs in support of the transition services has been reflected on the consolidated income statements within “Other income (expense), net.” All transition services were completed during fiscal year 2018. Refer to Note 4, Materials Technologies Separation, for additional information.
In addition to assets of the global businesses included in this segment, other assets include cash, deferred tax assets, and financial instruments.

Customers

We do not have a homogeneous customer base or end market, and no single customer accounts for more than 10% of our consolidated revenues.

Accounting Policies

The accounting policies of the segments are the same as those described in Note 1, Major Accounting Policies. We evaluate the performance of segments based upon reported segment operating income.

Business Segment

	Industrial Gases–Americas	Industrial Gases–EMEA	Industrial Gases–Asia	Industrial Gases–Global	Corporate and other	Segment Total
2018						
Sales	$3,758.8	$2,193.3	$2,458.0	$436.1	$84.0	$8,930.2
Operating income (loss)	927.9	445.8	689.9	53.9	(176.0)	1,941.5
Depreciation and amortization	485.3	198.6	265.8	8.1	12.9	970.7
Equity affiliates' income	82.0	61.1	58.3	1.9	—	203.3
Expenditures for long-lived assets	546.5	163.1	791.9	17.3	49.6	1,568.4
Investments in net assets of and advances to equity affiliates	312.1	503.3	445.6	16.2	—	1,277.2
Total assets	5,904.0	3,280.4	5,899.5	240.1	3,854.3	19,178.3
2017						
Sales	$3,637.0	$1,780.4	$1,964.7	$722.9	$82.6	$8,187.6
Operating income (loss)	946.1	395.5	532.6	71.1	(171.5)	1,773.8
Depreciation and amortization	464.4	177.1	203.2	8.9	12.2	865.8
Equity affiliates' income	58.1	47.1	53.5	.9	—	159.6
Expenditures for long-lived assets	427.2	143.2	337.8	25.6	105.9	1,039.7
Investments in net assets of and advances to equity affiliates	287.5	508.6	471.8	19.0	—	1,286.9
Total assets	5,840.8	3,276.1	4,412.1	279.6	4,648.4	18,457.0
2016						
Sales	$3,344.1	$1,704.4	$1,720.4	$498.8	$236.0	$7,503.7
Operating income (loss)	891.3	387.0	452.8	(21.5)	(89.4)	1,620.2
Depreciation and amortization	443.6	185.7	197.9	7.9	19.5	854.6
Equity affiliates' income	52.7	36.5	57.8	—	—	147.0
Expenditures for long-lived assets	406.6	159.5	313.3	6.0	22.3	907.7
Investments in net assets of and advances to equity affiliates	250.6	580.5	442.5	10.0	—	1,283.6
Total assets	5,896.7	3,178.6	4,232.7	367.6	2,384.5	16,060.1

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Below is a reconciliation of segment total operating income to consolidated operating income:

Operating Income	**2018**	2017	2016
Segment total	**$1,941.5**	$1,773.8	$1,620.2
Change in inventory valuation method	**24.1**	—	—
Business separation costs	**—**	(32.5)	(50.6)
Cost reduction and asset actions	**—**	(151.4)	(34.5)
Goodwill and intangible asset impairment charge	**—**	(162.1)	—
Gain on land sale	**—**	12.2	—
Consolidated Total	**$1,965.6**	$1,440.0	$1,535.1

Below is a reconciliation of segment total equity affiliates' income to consolidated equity affiliates' income:

Equity Affiliates' Income	**2018**	2017	2016
Segment total	**$203.3**	$159.6	$147.0
Equity method investment impairment charge	**—**	(79.5)	—
Tax reform repatriation - equity method investment	**(28.5)**	—	—
Consolidated Total	**$174.8**	$80.1	$147.0

Below is a reconciliation of segment total assets to consolidated total assets:

Total Assets	**2018**	2017	2016
Segment total	**$19,178.3**	$18,457.0	$16,060.1
Discontinued operations	**—**	10.2	1,968.5
Consolidated Total	**$19,178.3**	$18,467.2	$18,028.6

The sales information noted above relates to external customers only. All intersegment sales are eliminated in consolidation. The Industrial Gases – Global segment had intersegment sales of $254.3, $239.0, and $232.4 in fiscal years 2018, 2017, and 2016, respectively. These sales are generally transacted at market pricing.

We generally do not have intersegment sales from our regional industrial gases businesses. Equipment manufactured for our regional industrial gases segments are generally transferred at cost and are not reflected as an intersegment sale.

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Geographic Information

Sales to External Customers	**2018**	2017	2016
United States	**$3,149.6**	$2,886.8	$2,911.7
Europe, including Middle East	**2,292.5**	2,478.5	2,186.5
Asia, excluding China and India	**904.0**	849.6	721.4
China	**1,585.7**	1,143.4	1,020.4
Other[A]	**998.4**	829.3	663.7
Total	**$8,930.2**	$8,187.6	$7,503.7
Long-Lived Assets[B]	**2018**	2017	2016
United States	**$3,512.7**	$3,407.4	$3,411.4
Europe, including Middle East	**1,283.3**	1,279.0	1,292.5
Asia, excluding China and India	**899.8**	778.5	707.0
China	**3,066.6**	1,737.9	1,675.8
Other[A]	**1,161.3**	1,237.4	1,173.0
Total	**$9,923.7**	$8,440.2	$8,259.7

[A] Includes Canada, Latin America, and India.

[B] Long-lived assets include plant and equipment, net.

Geographic information is based on country of origin. Included in United States revenues are export sales to third party customers of $33.1 in fiscal year 2018, $64.2 in fiscal year 2017, and $134.9 in fiscal year 2016.

ITEM 9. CHANGES IN AND DISAGREEMENTS WITH ACCOUNTANTS ON ACCOUNTING AND FINANCIAL DISCLOSURE

Not applicable.

ITEM 9A. CONTROLS AND PROCEDURES

Disclosure Controls and Procedures

We maintain a comprehensive set of disclosure controls and procedures (as defined in Rules 13a-15(e) and 15d-15(e) under the Exchange Act). Under the supervision of the Chief Executive Officer and Chief Financial Officer, the Company's management conducted an evaluation of the effectiveness of the Company's disclosure controls and procedures as of 30 September 2018. Based on that evaluation, the Chief Executive Officer and Chief Financial Officer concluded that, as of 30 September 2018, the disclosure controls and procedures were effective.

Internal Control Over Financial Reporting

Our management is responsible for establishing and maintaining adequate internal control over financial reporting (as defined in Rules 13a-15(f) and 15d-15(f) under the Exchange Act). Management has evaluated the effectiveness of its internal control over financial reporting as of 30 September 2018 based on criteria established in Internal Control—Integrated Framework (2013) issued by the Committee of Sponsoring Organizations of the Treadway Commission (COSO). Based on that evaluation, management concluded that, as of 30 September 2018, the Company's internal control over financial reporting was effective. Management's Report on Internal Control over Financial Reporting is provided under Part II, Item 8, of this Form 10-K.

There was no change in the Company's internal control over financial reporting during the fourth quarter of fiscal year 2018 that has materially affected, or is reasonably likely to materially affect, the Company's internal control over financial reporting.

KPMG LLP, the Company's independent registered public accounting firm, has audited the Company's internal control over financial reporting as of 30 September 2018. The Report of the Independent Registered Public Accounting Firm is provided under Part II, Item 8, of this Form 10-K.

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ITEM 9B. OTHER INFORMATION

On 19 November 2018, the Management Development and Compensation Committee (the “Committee”) of the Board of Directors granted Dr. Samir Serhan, Executive Vice President, a deferred stock unit retention award of $1.5 million. This award will consist of restricted stock units (“RSUs”) with a 3 December 2018 grant date. The RSUs will vest in three equal installments beginning on 3 December 2019. The Committee took this action in recognition of Dr. Serhan’s expanded scope of responsibilities in the Company’s operations, and in particular the leadership role he will play in winning and executing our largest projects and building out and integrating our global gasification technologies.

PART III

ITEM 10. DIRECTORS, EXECUTIVE OFFICERS AND CORPORATE GOVERNANCE

The information required by this item relating to the Company’s directors and nominees is incorporated herein by reference to the section captioned “The Board of Directors” in the Proxy Statement for the Annual Meeting of Shareholders to be held on 24 January 2019. The information required by this item relating to the Company’s executive officers is set forth in Item 1 of Part I of this report.

The information required by this item relating to the Company’s Audit and Finance Committee and its Audit and Finance Committee Financial Expert is incorporated herein by reference to the sections captioned “Standing Committees Of The Board” and “Audit and Finance Committee” in the Proxy Statement for the Annual Meeting of Shareholders to be held on 24 January 2019.

The information required by this item relating to the Company’s procedures regarding the consideration of candidates recommended by shareholders and a procedure for submission of such candidates is incorporated herein by reference to the section captioned “Selection of Directors” in the Proxy Statement for the Annual Meeting of Shareholders to be held on 24 January 2019.

The information required by the item relating to Section 16(a) Beneficial Ownership Reporting Compliance is incorporated herein by reference to the section captioned “Section 16(a) Beneficial Ownership Reporting Compliance” in the Proxy Statement for the Annual Meeting of Shareholders to be held on24 January 2019.

The Company has adopted a Code of Conduct that applies to all employees, including the Chief Executive Officer, the Chief Financial Officer, and the Principal Accounting Officer. The Code of Conduct can be found at our website at www.airproducts.com/codeofconduct.

ITEM 11. EXECUTIVE COMPENSATION

The information required by this item is incorporated herein by reference to the sections captioned “Compensation of Executive Officers” and “Compensation of Directors” in the Proxy Statement for the Annual Meeting of Shareholders to be held on 24 January 2019.

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ITEM 12. SECURITY OWNERSHIP OF CERTAIN BENEFICIAL OWNERS AND MANAGEMENT AND RELATED STOCKHOLDER MATTERS

Securities Authorized for Issuance Under Equity Compensation Plans.

Equity Compensation Plan Information

The following table provides information as of 30 September 2018 about Company stock that may be issued upon the exercise of options, warrants, and rights granted to employees or members of the Board under the Company's existing equity compensation plans, including plans approved by shareholders and plans that have not been approved by shareholders in reliance on the NYSE's former treasury stock exception or other applicable exception to the Exchange's listing requirements.

Plan Category	Number of securities to be issued upon exercise of outstanding options, warrants, and rights		Weighted-average exercise price of outstanding options, warrants, and rights	Number of Securities remaining available for future issuance under equity compensation plans (excluding securities reflected in column (a))	
Equity compensation plans approved by security holders	3,181,790	(1)	$89.33	4,869,212	(2)
Equity compensation plans not approved by security holders	63,060	(3)	$—	—	
Total	3,244,850		$89.33	4,869,212	

(1) Represents Long-Term Incentive Plan outstanding stock options and deferred stock units that have been granted. Deferred stock units entitle the recipient to one share of Company common stock upon vesting, which is conditioned on continued employment during a deferral period and may also be conditioned on earn-out against certain performance targets. The amount presented assumes the maximum potential payout.

(2) Represents authorized shares that were available for future grants as of 30 September 2018. These shares may be used for options, deferred stock units, restricted stock, and other stock-based awards to officers, directors, and key employees. Full value awards such as restricted stock are limited to 20% of cumulative awards after 1 October 2001.

(3) This number represents deferred stock units issued under the Deferred Compensation Plan, which are purchased for the fair value of the underlying shares of stock with eligible deferred compensation.

The Deferred Compensation Plan was not approved by shareholders. It does not require shareholder approval because participants forego compensation equal to the full market value of any share units credited under the plans.

Deferred Compensation Plan—The Company's Deferred Compensation Plan is an unfunded employee retirement benefit plan available to certain of the Company's U.S.-based management and other highly compensated employees (and those of its subsidiaries) who receive awards under the Company's Annual Incentive Plan, which is the annual cash bonus plan for executives and key salaried employees of the Company and its subsidiaries. Because participants forego current compensation to "purchase" deferred stock units for full value under the Plan, it is not required to be approved by shareholders under the NYSE listing standards. Under the Plan, participants may defer a portion of base salary (elective deferrals) which cannot be contributed to the Company's Retirement Savings Plan, a 401(k) and profit-sharing plan offered to all salaried employees (RSP), because of tax limitations and earn matching contributions from the Company that they would have received if their elective deferrals had been contributed to the RSP (matching credits). In addition, participants in the Plan may defer all or a portion of their bonus awards under the Annual Incentive Plan (bonus deferrals) under the Deferred Compensation Plan. Finally, certain participants under the Plan who participate in the profit-sharing component of the RSP rather than the Company's salaried pension plans receive contribution credits under the Plan which are a percentage ranging from 4%-6%, based on their years of service, of their salary in excess of tax limitations and their bonus awards under the Annual Incentive Plan (contribution credits). The dollar amount of elective deferrals, matching credits, bonus deferrals, and contribution credits is initially credited to an unfunded account, which earns interest credits. Participants are periodically permitted while employed by the Company to irrevocably convert all or a portion of their interest-bearing account to deferred stock units in a Company stock account. Upon conversion, the Company stock account is credited with deferred stock units

based on the fair value of a share of Company stock on the date of crediting. Dividend equivalents corresponding to the number of units are credited quarterly to the interest-bearing account. Deferred stock units generally are paid after termination of employment in shares of Company stock.

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The Deferred Compensation Plan was formerly known as the Supplementary Savings Plan. The name was changed in 2006 when the deferred bonus program, previously administered under the Annual Incentive Plan, was merged into this Plan.

Certain information required by this item regarding the beneficial ownership of the Company's common stock is incorporated herein by reference to the sections captioned "Persons Owning More than 5% of Air Products Stock as of September 30, 2018" and "Air Products Stock Beneficially Owned by Officers and Directors" in the Proxy Statement for the Annual Meeting of Shareholders to be held on 24 January 2019.

ITEM 13. CERTAIN RELATIONSHIPS AND RELATED TRANSACTIONS, AND DIRECTOR INDEPENDENCE

The information required by this item is incorporated herein by reference to the sections captioned "Director Independence" and "Transactions with Related Persons" in the Proxy Statement for the Annual Meeting of Shareholders to be held on 24 January 2019.

ITEM 14. PRINCIPAL ACCOUNTANT FEES AND SERVICES

The information required by this item is incorporated herein by reference to the section captioned "Independent Registered Public Accountant" in the Proxy Statement for the Annual Meeting of Shareholders to be held on 24 January 2019.

PART IV

ITEM 15. EXHIBITS AND FINANCIAL STATEMENT SCHEDULES

(a) The following documents are filed as a part of this report:

(1) The Company's 2018 consolidated financial statements and the Report of the Independent Registered Public Accounting Firm are included in Part II, Item 8.

Report of Independent Registered Public Accounting Firm dated 20 November 2018	58
Consolidated Income Statements for the three fiscal years ended 30 September 2018	59
Consolidated Comprehensive Income Statements for the three fiscal years ended 30 September 2018	60
Consolidated Balance Sheets as of 30 September 2018 and 2017	61
Consolidated Statements of Cash Flows for the three fiscal years ended 30 September 2018	62
Consolidated Statements of Equity for the three fiscal years ended 30 September 2018	63

(2) Financial Statement Schedules—the following additional information should be read in conjunction with the consolidated financial statements in the Company's 2018 consolidated financial statements.

Schedule II Valuation and Qualifying Accounts for the three fiscal years ended 30 September 2018 132

All other schedules are omitted because the required matter or conditions are not present or because the information required by the Schedules is submitted as part of the consolidated financial statements and notes thereto.

(3) Exhibits—The exhibits filed as a part of this Annual Report on Form 10-K are listed in the Index to Exhibits located on page 126 of this Report.

ITEM 16. FORM 10-K SUMMARY

None

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INDEX TO EXHIBITS

Exhibit No.	Description
(2)	Plan of acquisition, reorganization, arrangement, liquidation or succession.
(3)	Articles of Incorporation and By-Laws.
3.1	Amended and Restated By-Laws of the Company. (Filed as Exhibit 3.1 to the Company's Form 8-K Report dated 21 November 2014.)*
3.2	Restated Certificate of Incorporation of the Company. (Filed as Exhibit 3.2 to the Company's Form 10-K Report for the fiscal year ended 30 September 1987.)*
3.3	Amendment to the Restated Certificate of Incorporation of the Company dated 25 January 1996. (Filed as Exhibit 3.3 to the Company's Form 10-K Report for the fiscal year ended 30 September 1996.)*
3.4	Amendment to the Restated Certificate of Incorporation of the Company dated 28 January 2014. (Filed as Exhibit 10.2 to the Company's Form 10-Q Report for the quarter ended 30 June 2014.)*
(4)	Instruments defining the rights of security holders, including indentures. Upon request of the Securities and Exchange Commission, the Company hereby undertakes to furnish copies of the instruments with respect to its long-term debt.
4.1	Indenture, dated as of January 18, 1985, between the Company and The Chase Manhattan Bank (National Association), as Trustee. (Filed as Exhibit 4(a) to the Company's Registration Statement No. 33-36974.)*
4.2	Indenture, dated as of January 10, 1995, between the Company and The Bank of New York Trust Company, N.A. (formerly Wachovia Bank, National Association and initially First Fidelity Bank Company, National Association), as Trustee. (Filed as Exhibit 4(a) to the Company's Registration Statement No. 33-57357.)*
(10)	Material Contracts
10.1	1990 Deferred Stock Plan of the Company, as amended and restated effective 1 October 1989. (Filed as Exhibit 10.1 to the Company's Form 10-K Report for the fiscal year ended 30 September 1989.)*†
10.2	Annual Incentive Plan as Amended and Restated effective 1 October 2008. (Filed as Exhibit 10.7 to the Company's Form 10-Q Report for the quarter ended 31 March 2009.)*†
10.3	Stock Incentive Program of the Company effective 1 October 1996. (Filed as Exhibit 10.21 to the Company's Form 10-K Report for the fiscal year ended 30 September 2002.)*†
10.4	Amended and Restated Deferred Compensation Program for Directors, effective 25 January 2017. (Filed as Exhibit 10.4 to the Company's Form 10-K Report for the fiscal year ended 30 September 2017.)*†

10.5	Amended and Restated Long-Term Incentive Plan of the Company effective 1 October 2014. (Filed as Exhibit 10.1 to the Company's Form 8-K filed on 23 September 2014.)†
10.5(a)	Form of Award Agreement under the Long-Term Incentive Plan of the Company, used for FY 2009 Awards. (Filed as Exhibit 10.1 to the Company's Form 10-Q Report for the quarter ended 31 December 2008.)*†
10.5(b)	Form of Award Agreement under the Long-Term Incentive Plan of the Company, used for FY2010 awards. (Filed as Exhibit 10.1 to the Company's Form 10-Q Report for the quarter ended 31 December 2009.)*†

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Exhibit No.	Description
10.5(c)	Form of Award Agreement under the Long-Term Incentive Plan of the Company, used for FY2011 awards. (Filed as Exhibit 10.1 to the Company's Form 10-Q Report for the quarter ended 31 December 2010.)*†
10.5(d)	Form of Award Agreement under the Long-Term Incentive Plan of the Company, used for FY2012 awards. (Filed as Exhibit 10.1 to the Company's Form 10-Q Report for the quarter ended 31 December 2011.)*†
10.5(e)	Form of Award Agreement under the Long-Term Incentive Plan of the Company, used for FY2013 awards. (Filed as Exhibit 10.1 to the Company's Form 10-Q Report for the quarter ended 31 December 2012.)*†
10.5(f)	Form of Award Agreement under the Long-Term Incentive Plan of the Company, used for FY2014 awards. (Filed as Exhibit 10.1 to the Company's Form 10-Q Report for the quarter ended 31 December 2013.)*†
10.5(g)	Form of Award Agreement under the Long-Term Incentive Plan of the Company, used for FY2015 awards. (Filed as Exhibit 10.1 to the Company's Form 10-Q Report for the quarter ended 31 December 2014.)*†
10.5(h)	Form of Award Agreement under the Long-Term Incentive Plan of the Company, used for FY2016 awards. (Filed as Exhibit 10.1 to the Company's Form 10-Q Report for the quarter ended 31 December 2015.)*†
10.5(i)	Form of Award Agreement under the Long-Term Incentive Plan of the Company, used for FY2017 awards. (Filed as Exhibit 10.1 and 10.2 to the Company's Form 10-Q Report for the quarter ended 31 December 2016.)*†
10.5(j)	Form of Award Agreement under the Long-Term Incentive Plan of the Company, used for FY2018 awards. (Filed as Exhibit 10.1 and 10.2 to the Company's Form 10-Q Report for the quarter ended 31 December 2017.)*†
10.6	Air Products and Chemicals, Inc. Retirement Savings Plan as amended and restated effective 1 November 2017 with provisions effective 1 January 2018. (Filed as Exhibit 10.4 to the Company's Form 10-Q Report for the quarter ended 31 December 2017.)*†
10.6(a)	Amendment No. 1 to the Air Products and Chemicals, Inc. Retirement Savings Plan as amended and restated effective 1 November 2017 with provisions effective 1 January 2018.†
10.7	Supplementary Pension Plan of Air Products and Chemicals, Inc. as Amended and Restated effective August 1, 2014. (Filed as Exhibit 10.10 to the Company's Form 10-K Report for the fiscal year ended 30 September 2014.)*†
10.7(a)	Amendment No. 1 dated as of 30 September 2015 to the Supplementary Pension Plan of Air Products and Chemicals, Inc. as Amended and Restated effective 1 August 2014. (Filed as Exhibit 10.10(a) to the Company's Form 10-K Report for the fiscal year ended 30 September 2015.)†

10.7(b)	Amendment No. 2 dated as of 30 September 2016 to the Supplementary Pension Plan of Air Products and Chemicals, Inc. as Amended and Restated effective 1 August 2014. (Filed as Exhibit 10.7(b) to the Company's Form 10-K Report for fiscal year ended 30 September 2016.)†
10.7(c)	Amendment No. 3 dated as of 26 July 2017 to the Supplementary Pension Plan of Air Products and Chemicals, Inc. as Amended and Restated effective 1 August 2017.(Filed as Exhibit 10.7(c) to the Company's Form 10-K Report for the fiscal year ended 30 September 2017.)*†

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Exhibit No.	Description
10.8	Deferred Compensation Plan as Amended and Restated effective 1 January 2018. (Filed as Exhibit 10.5 to the Company's Form 10-Q Report for the quarter ended 31 December 2017.)*†
10.9	Revolving Credit Facility dated as of 31 March 2017 for $2,500,000,000. (Filed as Exhibit 10.1 to the Company's Form 10-Q Report for the quarter ended 31 March 2017.)*
10.9(a)	Amendment and Appointment of Successor Administrative Agent dated 28 September 2018 to the Revolving Credit Agreement dated 31 March 2017
10.10	Air Products and Chemicals, Inc. Executive Separation Program as amended effective as of 20 July 2018.†
10.11	Form of Change in Control Severance Agreement for an Executive Officer. (filed as Exhibit 10.2 of the Company's Form 8-K Report dated 23 September 2014.)*†
10.12	Compensation Program for Non-Employee Directors effective 1 July 2017. (Filed as Exhibit 10.2 to the Company's Form 10-Q Report for the quarter ended 30 June 2017.)*†
10.13	Air Products and Chemicals, Inc. Corporate Executive Committee Retention Agreements effective as of 10 January 2014. (Filed as Exhibit 10.1 to the Company's Form 8-K Report dated 15 January 2014.)*†
10.14	Amended and Restated Employment Agreement dated 14 November 2017, between the Company and Seifollah Ghasemi. (Filed as Exhibit 10.1 to the Company's Form 8-K Report filed 14 November 2017.)*†
10.16	Senior Management Severance and Summary Plan Description effective as of 1 October 2017. (Filed as Exhibit 10.16 to the Company's Form 10-K Report for the fiscal year ended 30 September 2017)*†
16.1	Letter from KPMG LLP (Filed as Exhibit 16.1 to the Company's Form 8-K Report dated 26 July 2018).*
14	Code of Conduct revised on 17 May 2012. (Filed as Exhibit 14 to the Company's Form 8-K Report filed on 23 May 2012.)*
21	Subsidiaries of the registrant.
(23)	Consents of Experts and Counsel.
23.1	Consent of Independent Registered Public Accounting Firm.
24	Power of Attorney.
(31)	Rule 13a-14(a)/15d-14(a) Certifications.
31.1	Certification by the Principal Executive Officer pursuant to Rule 13a-14(a) or Rule 15d-14(a) of the Securities Exchange Act of 1934, as adopted pursuant to Section 302 of the

	Sarbanes-Oxley Act of 2002.
31.2	Certification by the Principal Financial Officer pursuant to Rule 13a-14(a) or Rule 15d-14(a) of the Securities Exchange Act of 1934, as adopted pursuant to Section 302 of the Sarbanes-Oxley Act of 2002.
(32)	Section 1350 Certifications.
32.1	Certification by the Principal Executive Officer and Principal Financial Officer pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002.††

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Exhibit No.	Description
99.1	Description of Common Stock (Filed as Exhibit 99.1 to the Company's Form 10-K Report for the fiscal year ended 30 September 2014.)*
101.INS	XBRL Instance Document. The XBRL Instance Document does not appear in the Interactive Data File because its XBRL tags are embedded within the Inline XBRL document.
101.SCH	XBRL Taxonomy Extension Schema
101.CAL	XBRL Taxonomy Extension Calculation Linkbase
101.LAB	XBRL Taxonomy Extension Label Linkbase
101.PRE	XBRL Taxonomy Extension Presentation Linkbase
101.DEF	XBRL Taxonomy Extension Definition Linkbase

* Previously filed as indicated and incorporated herein by reference. Exhibits incorporated by reference are located in SEC File No. 001-04534 unless otherwise indicated.

†Indicated management contract or compensatory arrangement.

†† The certification attached as Exhibit 32.1 that accompanies this Annual Report on Form 10-K, is not deemed filed with the Securities and Exchange Commission and is not to be incorporated by reference into any filing of Air Products and Chemicals, Inc. under the Securities Act of 1933, as amended, or the Securities Exchange Act of 1934, as amended, whether made before or after the date of this Form 10-K, irrespective of any general incorporation language contained in such filing.

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SIGNATURES

Pursuant to the requirements of Section 13 or 15(d) of the Securities Exchange Act of 1934, the registrant has duly caused this Report to be signed on its behalf by the undersigned, thereunto duly authorized.

AIR PRODUCTS AND CHEMICALS, INC.
(Registrant)

By: /s/ M. Scott Crocco
M. Scott Crocco
Executive Vice President and Chief Financial Officer
(Principal Financial Officer)

Date: 20 November 2018

Pursuant to the requirements of the Securities Exchange Act of 1934, this Report has been signed below by the following persons on behalf of the registrant and in the capacities and on the dates indicated.

Signature and Title	**Date**
/s/ Seifi Ghasemi (Seifi Ghasemi) Director, Chairman, President, and Chief Executive Officer (Principal Executive Officer)	20 November 2018
/s/ Russell A. Flugel (Russell A. Flugel) Vice President and Corporate Controller (Principal Accounting Officer)	20 November 2018
* (Susan K. Carter) Director	20 November 2018
* (Charles I. Cogut) Director	20 November 2018
* (Chad C. Deaton) Director	20 November 2018
* (David H. Y. Ho) Director	20 November 2018
* (Margaret G. McGlynn) Director	20 November 2018

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Signature and Title	Date
*	20 November 2018
(Edward L. Monser) Director	
*	20 November 2018
(Matthew H. Paull) Director	

* Sean D. Major, Executive Vice President, General Counsel and Secretary, by signing his name hereto, does sign this document on behalf of the above noted individuals, pursuant to a power of attorney duly executed by such individuals, which is filed with the Securities and Exchange Commission herewith.

/s/ Sean D. Major
Sean D. Major
Executive Vice President, General Counsel and Secretary

Date: 20 November 2018

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AIR PRODUCTS AND CHEMICALS, INC. AND SUBSIDIARIES

SCHEDULE II–VALUATION AND QUALIFYING ACCOUNTS

For the Years Ended 30 September 2018, 2017, and 2016

	Balance at Beginning of Period	Additions Charged to Expense	Additions Charged to Other Accounts	Other Changes[A]	Balance at End of Period
Year Ended 30 September 2018					
Allowance for doubtful accounts	$94	$17	$7	($27)	$91
Allowance for deferred tax assets	108	3	4	(10)	105
Year Ended 30 September 2017					
Allowance for doubtful accounts	$55	$7	$39	($7)	$94
Allowance for deferred tax assets[B]	165	6	7	(70)	108
Year Ended 30 September 2016					
Allowance for doubtful accounts	$48	$9	$13	($15)	$55
Allowance for deferred tax assets[C]	112	1	52	—	165

(A) Other changes related to allowance for doubtful accounts primarily includes write-offs of uncollectible trade receivables, net of recoveries. Other Changes also includes the impact of foreign currency translation adjustments.

(B) The decrease in the valuation allowance was primarily due to the utilization of federal and state loss carryforwards as a result of recognizing the gain on the sale of our PMD business. This benefit was recorded in discontinued operations. See Note 3, Discontinued Operations, for additional information.

(C) The increase in the valuation allowance was primarily due to the loss recorded on the exit from the Energy-from-Waste business. These costs were recorded in discontinued operations. See Note 3, Discontinued Operations, for additional information.