

Ingersoll-Rand plc
Form 10-K
February 12, 2019
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UNITED STATES SECURITIES AND EXCHANGE COMMISSION

Washington, D.C. 20549

FORM 10-K

(Mark One)

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

For the fiscal year ended December 31, 2018

or

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

For the transition period from _____ to _____

Commission File No. 001-34400

INGERSOLL-RAND PUBLIC LIMITED COMPANY

(Exact name of registrant as specified in its charter)

Ireland

(State or other jurisdiction of incorporation or organization)

170/175 Lakeview Dr.

Airside Business Park

Swords, Co. Dublin

Ireland

(Address of principal executive offices)

Registrant's telephone number, including area code: +(353) (0) 18707400

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

Title of each class	Name of each exchange on which registered
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Ordinary Shares,	New York Stock Exchange
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Par Value \$1.00 per Share

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

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

YES NO

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

Indicate by check mark whether the registrant (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding 12 months (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 NO

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

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

[]

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

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Large accelerated filer Accelerated filer
Non-accelerated filer Smaller reporting company
 Emerging growth company

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

Indicate by check mark whether the registrant is a shell company (as defined in Rule 12b-2 of the Act). YES

NO

The aggregate market value of ordinary shares held by nonaffiliates on June 30, 2018 was approximately \$21.9 billion based on the closing price of such stock on the New York Stock Exchange.

The number of ordinary shares outstanding as of February 1, 2019 was 242,168,631.

DOCUMENTS INCORPORATED BY REFERENCE

Portions of the registrant's proxy statement to be filed within 120 days of the close of the registrant's fiscal year in connection with the registrant's Annual General Meeting of Shareholders to be held June 6, 2019 are incorporated by reference into Part II and Part III of this Form 10-K.

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INGERSOLL-RAND PLC

Form 10-K

For the Fiscal Year Ended December 31, 2018

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CAUTIONARY STATEMENT FOR FORWARD LOOKING STATEMENTS

Certain statements in this report, other than purely historical information, are “forward-looking statements” within the meaning of the Private Securities Litigation Reform Act of 1995, Section 27A of the Securities Act of 1933 and Section 21E of the Securities Exchange Act of 1934. These forward-looking statements generally are identified by the words “believe,” “project,” “expect,” “anticipate,” “estimate,” “forecast,” “outlook,” “intend,” “strategy,” “plan,” “may,” “could,” “would,” “will be,” “will continue,” “will likely result,” or the negative thereof or variations thereon or similar terminology generally intended to identify forward-looking statements.

Forward-looking statements may relate to such matters as projections of revenue, margins, expenses, tax provisions, earnings, cash flows, benefit obligations, share or debt repurchases or other financial items; any statements of the plans, strategies and objectives of management for future operations, including those relating to any statements concerning expected development, performance or market share relating to our products and services; any statements regarding future economic conditions or our performance; any statements regarding pending investigations, claims or disputes; any statements of expectation or belief; and any statements of assumptions underlying any of the foregoing. These statements are based on currently available information and our current assumptions, expectations and projections about future events. While we believe that our assumptions, expectations and projections are reasonable in view of the currently available information, you are cautioned not to place undue reliance on our forward-looking statements. You are advised to review any further disclosures we make on related subjects in materials we file with or furnish to the SEC. Forward-looking statements speak only as of the date they are made and are not guarantees of future performance. They are subject to future events, risks and uncertainties - many of which are beyond our control - as well as potentially inaccurate assumptions, that could cause actual results to differ materially from our expectations and projections. We do not undertake to update any forward-looking statements.

Factors that might affect our forward-looking statements include, among other things:

- overall economic, political and business conditions in the markets in which we operate;
- the demand for our products and services;
- competitive factors in the industries in which we compete;
- changes in tax laws and requirements (including tax rate changes, new tax laws, new and/or revised tax law interpretations and any legislation that may limit or eliminate potential tax benefits resulting from our incorporation in a non-U.S. jurisdiction, such as Ireland);
- trade protection measures such as import or export restrictions and requirements, the imposition of tariffs and quotas or revocation or material modification of trade agreements;
- the outcome of any litigation, governmental investigations, claims or proceedings;
- the outcome of any income tax audits or settlements;
- interest rate fluctuations and other changes in borrowing costs;
- other capital market conditions, including availability of funding sources;
- currency exchange rate fluctuations, exchange controls and currency devaluations;
- availability of and fluctuations in the prices of key commodities;
- impairment of our goodwill, indefinite-lived intangible assets and/or our long-lived assets;
- climate change, changes in weather patterns, natural disasters and seasonal fluctuations;
- the impact of potential information technology or data security breaches; and
- the strategic acquisition or divestiture of businesses, product lines and joint ventures;

Some of the significant risks and uncertainties that could cause actual results to differ materially from our expectations and projections are described more fully in Part I, Item 1A “Risk Factors.” You should read that information in conjunction with “Management’s Discussion and Analysis of Financial Condition and Results of Operations” in Part II, Item 7 of this report and our Consolidated Financial Statements and related notes in Part II, Item 8 “Financial Statements and Supplementary Data” of this report. We note such information for investors as permitted by the Private Securities Litigation Reform Act of 1995.

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PART I

Item 1. BUSINESS

Overview

Ingersoll-Rand plc (Plc or Parent Company), a public limited company incorporated in Ireland in 2009, and its consolidated subsidiaries (collectively, we, our, the Company) is a diversified, global company that provides products, services and solutions to enhance the quality, energy efficiency and comfort of air in homes and buildings, transport and protect food and perishables and increase industrial productivity and efficiency. Our business segments consist of Climate and Industrial, both with strong brands and highly differentiated products within their respective markets. We generate revenue and cash primarily through the design, manufacture, sale and service of a diverse portfolio of industrial and commercial products that include well-recognized, premium brand names such as Ingersoll-Rand®, Trane®, Thermo King®, American Standard®, ARO®, and Club Car®.

To achieve our mission of being a world leader in creating comfortable, sustainable and efficient environments, we continue to focus on growth by increasing our recurring revenue stream from parts, services, controls, used equipment and rentals; and to continuously improve the efficiencies and capabilities of the products and services of our businesses. We also continue to focus on operational excellence strategies as a central theme to improving our earnings and cash flow.

Business Segments

Our business segments provide products, services and solutions used to increase the efficiency and productivity of both industrial and commercial operations and homes, as well as improve the health and comfort of people around the world.

Our business segments are as follows:

Climate

Our Climate segment delivers energy-efficient products and innovative energy services. It includes Trane® and American Standard® Heating & Air Conditioning which provide heating, ventilation and air conditioning (HVAC) systems, and commercial and residential building services, parts, support and controls; energy services and building automation through Trane Building Advantage and Nexia; and Thermo King® transport temperature control solutions. This segment had 2018 net revenues of \$12,343.8 million.

Industrial

Our Industrial segment delivers products and services that enhance energy efficiency, productivity and operations. It includes compressed air and gas systems and services, power tools, material handling systems, ARO® fluid management equipment, as well as Club Car® golf, utility and consumer low-speed vehicles. This segment had 2018 net revenues of \$3,324.4 million.

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Products and Services

Our principal products and services by business segment include the following:

Climate

Aftermarket and OEM parts and supplies	Ice energy storage solutions
Air conditioners	Indoor air quality
Air exchangers	Industrial refrigeration
Air handlers	Installation contracting
Airside and terminal devices	Large commercial unitary
Auxiliary power units	Light commercial unitary
Building management systems	Motor replacements
Bus and rail HVAC systems	Multi-pipe HVAC systems
Chillers	Package heating and cooling systems
Coils and condensers	Performance contracting
Container refrigeration systems and gensets	Rail refrigeration systems
Control systems	Refrigerant reclamation
Cryogenic refrigeration systems	Repair and maintenance services
Diesel-powered refrigeration systems	Rental services
Ductless systems	Self-powered truck refrigeration systems
Energy management services	Service agreements
Facility management services	Temporary heating and cooling systems
Furnaces	Thermostats/controls
Geothermal systems	Trailer refrigeration systems
Heat pumps	Transport heater products
Home automation	Unitary systems (light and large)
Humidifiers	Vehicle-powered truck refrigeration systems
Hybrid and non-diesel transport refrigeration solutions	Water source heat pumps

Industrial

Air treatment and air separation systems	Fluid power components
Aftermarket and OEM parts and supplies	Installation contracting
Aftermarket controls, parts, accessories and consumables	Power tools (air, cordless and electric)
Airends	Precision fastening systems
Blowers	Pumps (diaphragm and piston)
Compressors (centrifugal, reciprocating, and rotary)	Rental services
Dryers	Rough terrain (AWD) vehicles
Engine starting systems	Service agreements
Ergonomic material handling systems	Service break/fix
Filters	Utility and consumer low-speed vehicles
Fluid handling systems	Visage® mobile golf information systems
Golf vehicles	Winches (air, electric and hydraulic)

Hoists (air, electric and manual)
 These products are sold primarily under our name and under other names including American Standard, ARO, Club Car, Nexia, Thermo King and Trane.

Acquisitions and Equity Investments

In May 2018, we completed our investment of a 50% ownership interest in a joint venture with Mitsubishi Electric Corporation (Mitsubishi). The joint venture, reported within the Climate segment, focuses on marketing, selling and supporting variable refrigerant flow (VRF) and ductless heating and air conditioning systems through Trane, American Standard and Mitsubishi channels in the U.S. and select Latin American countries.

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In January 2018, we acquired 100% of the outstanding stock of ICS Group Holdings Limited (ICS Cool Energy). The acquired business, reported within the Climate segment, specializes in the temporary rental of energy efficient chillers for commercial and industrial buildings across Europe. It also sells, permanently installs and services high performance temperature control systems for all types of industrial processes.

During 2017, we acquired several businesses, including channel acquisitions, that complement existing products and services. Acquisitions within the Climate segment primarily consisted of independent dealers which support the ongoing strategy to expand our distribution network in North America. Other acquisitions within the segment strengthen our product portfolio. Acquisitions within the Industrial segment primarily consisted of a telematics business which builds upon our growing portfolio of connected assets. In addition, other acquisitions within the segment expand sales and service channels across the globe.

Competitive Conditions

Our products and services are sold in highly competitive markets throughout the world. Due to the diversity of these products and services and the variety of markets served, we encounter a wide variety of competitors that vary by product line and services. They include well-established regional or specialized competitors, as well as larger U.S. and non-U.S. corporations or divisions of larger companies.

The principal methods of competition in these markets relate to price, quality, delivery, service and support, technology and innovation. We believe that we are one of the leading manufacturers in the world of HVAC systems and services, air compression systems, transport temperature control products, power tools, and golf, utility and consumer low-speed vehicles.

Distribution

Our products are distributed by a number of methods, which we believe are appropriate to the type of product. U.S. sales are made through branch sales offices, distributors and dealers across the country. Non-U.S. sales are made through numerous subsidiary sales and service companies with a supporting chain of distributors throughout the world.

Operations by Geographic Area

Approximately 36% of our net revenues in 2018 were derived outside the U.S. and we sold products in more than 100 countries. Therefore, the attendant risks of manufacturing or selling in a particular country, such as currency devaluation, nationalization and establishment of common markets, may have an adverse impact on our non-U.S. operations.

Customers

We have no customer that accounted for more than 10% of our consolidated net revenues in 2018, 2017 or 2016. No material part of our business is dependent upon a single customer or a small group of customers; therefore, the loss of any one customer would not have a material adverse effect on our results of operations or cash flows.

Raw Materials

We manufacture many of the components included in our products, which requires us to employ a wide variety of commodities. Principal commodities, such as steel, copper and aluminum, are purchased from a large number of independent sources around the world. We believe that available sources of supply will generally be sufficient for the foreseeable future. There have been no commodity shortages which have had a material adverse effect on our businesses.

Working Capital

We manufacture products that must be readily available to meet our customers' rapid delivery requirements. Therefore, we maintain an adequate level of working capital to support our business needs and our customers' requirements. Such working capital requirements are not, however, in the opinion of management, materially different from those experienced by our major competitors. We believe our sales and payment terms are competitive in and appropriate for the markets in which we compete.

Seasonality

Demand for certain of our products and services is influenced by weather conditions. For instance, sales in our commercial and residential HVAC businesses historically tend to be seasonally higher in the second and third quarters of the year because this represents spring and summer in the U.S. and other northern hemisphere markets, which are

the peak seasons for sales of air conditioning systems and services. Therefore, results of any quarterly period may not be indicative of expected results for a full year and unusual weather patterns or events could negatively or positively affect certain segments of our business and impact overall results of operations.

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Research and Development

We engage in research and development activities in an effort to introduce new products, enhance existing product effectiveness, improve ease of use and reliability as well as expand the various applications for which our products may be appropriate. In addition, we continually evaluate developing technologies in areas that we believe will enhance our business for possible investment or acquisition. We anticipate that we will continue to make significant expenditures for research and development activities as we look to maintain and improve our competitive position.

Patents and Licenses

We own numerous patents and patent applications, and are licensed under others. Although in aggregate we consider our patents and licenses to be valuable to our operations, we do not believe that our business is materially dependent on a single patent or license or any group of them. In our opinion, engineering, production skills and experience are more responsible for our market position than our patents and/or licenses.

Backlog

Our approximate backlog of orders, believed to be firm, at December 31, was as follows:

In millions	2018	2017
Climate	\$2,914.4	\$1,972.4
Industrial	514.8	525.6
Total	\$3,429.2	\$2,498.0

These backlog figures are based on orders received. While the major portion of our products are built in advance of order and either shipped or assembled from stock, orders for specialized machinery or specific customer application are submitted with extensive lead times and are often subject to revision and deferral, and to a lesser extent cancellation or termination. We expect to ship a majority of the December 31, 2018 backlog during 2019.

Environmental Matters

We continue to be dedicated to environmental and sustainability programs to minimize the use of natural resources, and reduce the utilization and generation of hazardous materials from our manufacturing processes and to remediate identified environmental concerns. As to the latter, we are currently engaged in site investigations and remediation activities to address environmental cleanup from past operations at current and former manufacturing facilities.

We are sometimes a party to environmental lawsuits and claims and have received notices of potential violations of environmental laws and regulations from the Environmental Protection Agency and similar state authorities. We have also been identified as a potentially responsible party (PRP) for cleanup costs associated with off-site waste disposal at federal Superfund and state remediation sites. For all such sites, there are other PRPs and, in most instances, our involvement is minimal.

In estimating our liability, we have assumed that we will not bear the entire cost of remediation of any site to the exclusion of other PRPs who may be jointly and severally liable. The ability of other PRPs to participate has been taken into account, based on our understanding of the parties' financial condition and probable contributions on a per site basis. Additional lawsuits and claims involving environmental matters are likely to arise from time to time in the future.

For a further discussion of our potential environmental liabilities, see Note 20 to the Consolidated Financial Statements.

Asbestos-Related Matters

Certain of our wholly-owned subsidiaries and former companies are named as defendants in asbestos-related lawsuits in state and federal courts. In many of the lawsuits, a large number of other companies have also been named as defendants. The vast majority of those claims allege injury caused by exposure to asbestos contained in certain historical products, primarily pumps, boilers and railroad brake shoes. None of our existing or previously-owned businesses were a producer or manufacturer of asbestos.

See also the discussion under Part I, Item 3, "Legal Proceedings," and Part II, Item 7, "Management's Discussion and Analysis of Financial Condition and Results of Operations," "Contingent Liabilities," as well as further detail in Note 20 to the Consolidated Financial Statements.

Employees

As of December 31, 2018, we employed approximately 49,000 people throughout the world.

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Available Information

We file annual, quarterly, and current reports, proxy statements, and other documents with the SEC under the Securities Exchange Act of 1934.

This Annual Report on Form 10-K, as well as our quarterly reports on Form 10-Q, current reports on Form 8-K and any amendments to all of the foregoing reports, are made available free of charge on our Internet website (<http://www.ingersollrand.com>) as soon as reasonably practicable after such reports are electronically filed with or furnished to the SEC. The Board of Directors of the Company has also adopted and posted in the Investor Relations section of the Company's website our Corporate Governance Guidelines and charters for each of the Board's standing committees. The contents of the Company's website are not incorporated by reference in this report.

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Executive Officers of the Registrant

The following is a list of executive officers of the Company as of February 12, 2019.

Name and Age	Date of Service as an Executive Officer	Principal Occupation and Other Information for Past Five Years
Michael W. Lamach (55)	2/16/2004	Chairman of the Board (since June 2010) and Chief Executive Officer (since February 2010)
Susan K. Carter (60)	10/2/2013	Senior Vice President and Chief Financial Officer (since October 2013)
David S. Regnery (56)	9/5/2017	Executive Vice President (since September 2017); Vice President, President of Commercial HVAC, North America and EMEA (2013 to 2017)
Marcia J. Avedon (57)	2/7/2007	Senior Vice President, Human Resources, Communications and Corporate Affairs (since June 2013); Senior Vice President, Human Resources and Communications (2007 - 2013)
Paul A. Camuti (57)	8/1/2011	Senior Vice President, Innovation and Chief Technology Officer (since August 2011)
Maria C. Green (66)	11/2/2015	Senior Vice President and General Counsel (since November 2015); Senior Vice President, General Counsel and Secretary, Illinois Tool Works Inc. (a global manufacturer of a diversified range of industrial products and equipment), (2012-2015)
Keith A. Sultana (49)	10/12/2015	Senior Vice President, Global Operations and Integrated Supply Chain (since October 2015); Vice President, Global Procurement (January 2015 to October 2015); Vice President, Global Integrated Supply Chain (GISC) for Climate Solutions (May 2010 to December 2014)
Christopher J. Kuehn (46)	6/1/2015	Vice President and Chief Accounting Officer (since June 2015); Vice President, Corporate Controller and Chief Accounting Officer, Whirlpool Corporation (a global manufacturer and marketer of major home appliances), (2012-2015)

No family relationship exists between any of the above-listed executive officers of the Company. All officers are elected to hold office for one year or until their successors are elected and qualified.

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Item 1A. RISK FACTORS

Our business, financial condition, results of operations, and cash flows are subject to a number of risks that could cause the actual results and conditions to differ materially from those projected in forward-looking statements contained in this Annual Report on Form 10-K. The risks set forth below are those we consider most significant. We face other risks, however, that we do not currently perceive to be material which could cause actual results and conditions to differ materially from our expectations. You should evaluate all risks before you invest in our securities. If any of the risks actually occur, our business, financial condition, results of operations or cash flows could be adversely impacted. In that case, the trading price of our ordinary shares could decline, and you may lose all or part of your investment.

Our global operations subject us to economic risks.

Our global operations are dependent upon products manufactured, purchased and sold in the U.S. and internationally.

These activities are subject to risks that are inherent in operating globally, including:

• changes in local laws and regulations or imposition of currency restrictions and other restraints;

• limitation of ownership rights, including expropriation of assets by a local government, and limitation on the ability to repatriate earnings;

• sovereign debt crises and currency instability in developed and developing countries;

• trade protection measures such as import or export restrictions and requirements, the imposition of burdensome tariffs and quotas or revocation or material modification of trade agreements;

• difficulty in staffing and managing global operations;

• difficulty of enforcing agreements, collecting receivables and protecting assets through non-U.S. legal systems;

• national and international conflict, including war, civil disturbances and terrorist acts; and

• recessions, economic downturns, slowing economic growth and social and political instability.

These risks could increase our cost of doing business internationally, increase our counterparty risk, disrupt our operations, disrupt the ability of suppliers and customers to fulfill their obligations, limit our ability to sell products in certain markets and have a material adverse impact on our results of operations, financial condition, and cash flows.

We face significant competition in the markets that we serve and our growth is dependent, in part, on the development, commercialization and acceptance of new products and services.

The markets that we serve are highly competitive. We compete worldwide with a number of other manufacturers and distributors that produce and sell similar products. There has been consolidation and new entrants (including non-traditional competitors) within our industries and there may be future consolidation and new entrants which could result in increased competition and significantly alter the dynamics of the competitive landscape in which we operate.

Due to our global footprint we are competing worldwide with large companies and with smaller, local operators who may have customer, regulatory or economic advantages in the geographies in which they are located. In addition, some of our competitors may employ pricing and other strategies that are not traditional.

In addition, we must develop and commercialize new products and services in a rapidly changing technological and business environment in order to remain competitive in our current and future markets and in order to continue to grow our business. The development and commercialization of new products and services require a significant investment of resources and an anticipation of the impact of new technologies and the ability to compete with others who may have superior resources. We cannot provide any assurance that any new product or service will be successfully commercialized in a timely manner, if ever, or, if commercialized, will result in returns greater than our investment. Investment in a product or service could divert our attention and resources from other projects that become more commercially viable in the market. We also cannot provide any assurance that any new product or service will be accepted by our current and future markets. Failure to develop new products and services that are accepted by these markets could have a material adverse impact on our competitive position, results of operations, financial condition, and cash flows.

The capital and credit markets are important to our business.

Instability in U.S. and global capital and credit markets, including market disruptions, limited liquidity and interest rate volatility, or reductions in the credit ratings assigned to us by independent rating agencies could reduce our access to capital markets or increase the cost of funding our short and long term credit requirements. In particular, if we are

unable to access capital and credit markets on terms that are acceptable to us, we may not be able to make certain investments or fully execute our business plans and strategies.

Our suppliers and customers are also dependent upon the capital and credit markets. Limitations on the ability of customers, suppliers or financial counterparties to access credit at interest rates and on terms that are acceptable to them could lead to

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insolvencies of key suppliers and customers, limit or prevent customers from obtaining credit to finance purchases of our products and services and cause delays in the delivery of key products from suppliers.

Currency exchange rate fluctuations and other related risks may adversely affect our results.

We are exposed to a variety of market risks, including the effects of changes in currency exchange rates. See Part II Item 7A, "Quantitative and Qualitative Disclosure About Market Risk."

We have operations throughout the world that manufacture and sell products in various international markets. As a result, we are exposed to movements in exchange rates of various currencies against the U.S. dollar as well as against other currencies throughout the world.

Many of our non-U.S. operations have a functional currency other than the U.S. dollar, and their results are translated into U.S. dollars for reporting purposes. Therefore, our reported results will be higher or lower depending on the weakening or strengthening of the U.S. dollar against the respective foreign currency.

We use derivative instruments to hedge those material exposures that cannot be naturally offset. The instruments utilized are viewed as risk management tools, involve little complexity and are not used for trading or speculative purposes. To minimize the risk of counter party non-performance, derivative instrument agreements are made only through major financial institutions with significant experience in such derivative instruments.

We also face risks arising from the imposition of exchange controls and currency devaluations. Exchange controls may limit our ability to convert foreign currencies into U.S. dollars or to remit dividends and other payments by our foreign subsidiaries or businesses located in or conducted within a country imposing controls. Currency devaluations result in a diminished value of funds denominated in the currency of the country instituting the devaluation.

Material adverse legal judgments, fines, penalties or settlements could adversely affect our results of operations or financial condition.

We are currently and may in the future become involved in legal proceedings and disputes incidental to the operation of our business or the business operations of previously-owned entities. Our business may be adversely affected by the outcome of these proceedings and other contingencies (including, without limitation, contract claims or other commercial disputes, product liability, product defects and asbestos-related matters) that cannot be predicted with certainty. Moreover, any insurance or indemnification rights that we may have may be insufficient or unavailable to protect us against the total aggregate amount of losses sustained as a result of such proceedings and contingencies. As required by generally accepted accounting principles in the United States, we establish reserves based on our assessment of contingencies. Subsequent developments in legal proceedings and other events could affect our assessment and estimates of the loss contingency recorded as a reserve and we may be required to make additional material payments, which could have a material adverse impact on our liquidity, results of operations, financial condition, and cash flows.

Our reputation, ability to do business and results of operations could be impaired by improper conduct by any of our employees, agents or business partners.

We are subject to regulation under a wide variety of U.S. federal and state and non-U.S. laws, regulations and policies, including laws related to anti-corruption, anti-bribery, export and import compliance, anti-trust and money laundering, due to our global operations. We cannot provide assurance our internal controls will always protect us from the improper conduct of our employees, agents and business partners. Any violations of law or improper conduct could damage our reputation and, depending on the circumstances, subject us to, among other things, civil and criminal penalties, material fines, equitable remedies (including profit disgorgement and injunctions on future conduct), securities litigation and a general loss of investor confidence, any one of which could have a material adverse impact on our business prospects, financial condition, results of operations, cash flows, and the market value of our stock.

We may be subject to risks relating to our information technology systems.

We rely extensively on information technology systems, some of which are supported by third party vendors including cloud services, to manage and operate our business. We are also investing in new information technology systems that are designed to continue improving our operations. If these systems cease to function properly, if these systems experience security breaches or disruptions or if these systems do not provide the anticipated benefits, our ability to manage our operations could be impaired, which could have a material adverse impact on our results of operations, financial condition, and cash flows.

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Security breaches or disruptions of our technology systems, infrastructure or products could negatively impact our business and financial results.

Our information technology systems, networks and infrastructure and technology embedded in certain of our control products may be subject to cyber attacks and unauthorized security intrusions. It is possible for such vulnerabilities to remain undetected for an extended period. Like other large companies, certain of our information technology systems have been subject to computer viruses, malicious codes, unauthorized access, phishing efforts, denial-of-service attacks and other cyber attacks and we expect to be subject to similar attacks in the future. The methods used to obtain unauthorized access, disable or degrade service, or sabotage systems are constantly changing and evolving. Despite having instituted security policies and business continuity plans, and implementing and regularly reviewing and updating processes and procedures to protect against unauthorized access, the ever-evolving threats mean we must continually evaluate and adapt our systems and processes, and there is no guarantee that they will be adequate to safeguard against all data security breaches or misuses of data. Hardware, software or applications we develop or obtain from third parties may contain defects in design or manufacture or other problems that could unexpectedly result in security breaches or disruptions. Our systems, networks and certain of our control products may also be vulnerable to system damage, malicious attacks from hackers, employee errors or misconduct, viruses, power and utility outages, and other catastrophic events. Any of these incidents could cause significant harm to our business by negatively impacting our business operations, compromising the security of our proprietary information or the personally identifiable data relating to our customers, employees and business partners and exposing us to litigation or other legal actions against us or the imposition of penalties, fines, fees or liabilities. Such events could have a material adverse impact on our results of operations, financial condition and cash flows and could damage our reputation which could adversely affect our business. Our insurance coverage may not be adequate to cover all the costs related to a cybersecurity attack or disruptions resulting from such attacks. Customers are increasingly requiring cybersecurity protections and mandating cybersecurity standards in our products, and we may incur additional costs to comply with such demands. In addition, data privacy and protection laws are evolving and present increasing compliance challenges, which increase our costs, affect our competitiveness and can expose us to substantial fines or other penalties.

Commodity shortages and price increases could adversely affect our financial results.

We rely on suppliers to secure commodities, particularly steel and non-ferrous metals, required for the manufacture of our products. A disruption in deliveries from our suppliers or decreased availability of commodities could have an adverse effect on our ability to meet our commitments to customers or increase our operating costs. We believe that available sources of supply will generally be sufficient for our needs for the foreseeable future. Nonetheless, the unavailability of some commodities could have a material adverse impact on our results of operations and cash flows. Volatility in the prices of these commodities or the impact of inflationary increases could increase the costs of our products and services. We may not be able to pass on these costs to our customers and this could have a material adverse impact on our results of operations and cash flows. Conversely, in the event there is deflation, we may experience pressure from our customers to reduce prices. There can be no assurance that we would be able to reduce our costs (through negotiations with suppliers or other measures) to offset any such price concessions which could adversely impact results of operations and cash flows. While we may use financial derivatives or supplier price locks to hedge against this volatility, by using these instruments we may potentially forego the benefits that might result from favorable fluctuations in prices and could experience lower margins in periods of declining commodity prices. In addition, while hedging activity may minimize near-term volatility of the commodity prices, it would not protect us from long-term commodity price increases.

Some of our purchases are from sole or limited source suppliers for reasons of cost effectiveness, uniqueness of design, or product quality. If these suppliers encounter financial or operating difficulties, we might not be able to quickly establish or qualify replacement sources of supply.

We may be required to recognize impairment charges for our goodwill and other indefinite-lived intangible assets. At December 31, 2018, the net carrying value of our goodwill and other indefinite-lived intangible assets totaled \$6.0 billion and \$2.7 billion, respectively. In accordance with generally accepted accounting principles, we periodically assess these assets to determine if they are impaired. Significant negative industry or economic trends, disruptions to

our business, unexpected significant changes or planned changes in use of the assets, divestitures and sustained market capitalization declines may result in recognition of impairments to goodwill or other indefinite-lived assets. Any charges relating to such impairments could have a material adverse impact on our results of operations in the periods recognized.

Global climate change and related regulations could negatively affect our business.

Refrigerants are essential to many of our products and there is a growing awareness and concern regarding the global warming potential of such materials. As such, national, regional and international regulations and policies are being considered to curtail their use. As regulations reduce the use of the current class of widely used refrigerants, our next generation solutions are being adopted globally, with sales in 32 countries to date. Our climate commitment requires us to fully transition out of current refrigerants

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by 2030 without compromising safety or energy efficiency. Additionally, we committed to increase energy efficiency and reduce the greenhouse gas footprint of our operations by 35 percent by 2020, which we achieved in 2018, two years early. While we are committed to pursuing these sustainable solutions, there can be no assurance that our commitments will be successful, that our products will be accepted by the market, that proposed regulation or deregulation will not have a negative competitive impact or that economic returns will match the investment that we are making in new product development.

Concerns regarding global climate change have resulted in the Kigali amendment to the Montreal Protocol, pursuant to which countries have agreed to a scheduled phase down of certain high global warming potential refrigerants. Industrial countries may pass regulations that are even more restrictive than these international accords. Some countries, including the U.S., have not yet ratified the amendment and there could be lower customer demand for next generation products in these countries. There continues to be a lack of consistent climate legislation, which creates economic and regulatory uncertainty. In addition, the U.S. withdrawal from the Paris Accord could affect our competitiveness in certain markets. Such regulatory uncertainty extends to future incentives for energy efficient buildings and vehicles and costs of compliance, which may impact the demand for our products, obsolescence of our products and our results of operations.

Natural disasters or other unexpected events may disrupt our operations, adversely affect our results of operations and financial condition, and may not be fully covered by insurance.

The occurrence of one or more unexpected events, including hurricanes, fires, earthquakes, floods and other forms of severe weather in the U.S. or in other countries in which we operate or are located could adversely affect our operations and financial performance. Natural disasters, power outages or other unexpected events could result in physical damage to and complete or partial closure of one or more of our plants, temporary or long-term disruption of our operations by causing business interruptions or by impacting the availability and cost of materials needed for manufacturing. Existing insurance arrangements may not provide full protection for the costs that may arise from such events, particularly if such events are catastrophic in nature or occur in combination. The occurrence of any of these events could increase our insurance and other operating costs.

Some of the markets in which we operate are cyclical and seasonal and demand for our products and services could be adversely affected by downturns in these industries.

Demand for most of our products and services depends on the level of new capital investment and planned maintenance expenditures by our customers. The level of capital expenditures by our customers fluctuates based on planned expansions, new builds, repairs, commodity prices, general economic conditions, availability of credit, inflation, interest rates, market forecasts, tax and regulatory developments, trade policies, fiscal spending and sociopolitical factors among others.

Our commercial and residential HVAC businesses provide products and services to a wide range of markets, including significant sales to the commercial and residential construction markets. Weakness in either or both of these construction markets may negatively impact the demand for our products and services.

Demand for our commercial and residential HVAC business is also influenced by weather conditions. For instance, sales in our commercial and residential HVAC businesses historically tend to be seasonally higher in the second and third quarters of the year because, in the U.S. and other northern hemisphere markets, spring and summer are the peak seasons for sales of air conditioning systems and services. The results of any quarterly period may not be indicative of expected results for a full year and unusual weather patterns or events could negatively or positively affect our business and impact overall results of operations.

The business of many of our industrial customers, particularly oil and gas companies are to varying degrees cyclical and have experienced periodic downturns. During such economic downturns, customers in these industries historically have tended to delay major capital projects, maintenance projects and upgrades.

Decrease in the demand for our products and services could have a material adverse impact on our results of operations and cash flow.

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Our business strategy includes acquiring companies, product lines, plants and assets, entering into joint ventures and making investments that complement our existing businesses. We also occasionally divest businesses that we own. We may not identify acquisition or joint venture candidates at the same rate as the past. Acquisitions, dispositions, joint ventures and investments that we identify could be unsuccessful or consume significant resources, which could adversely affect our operating results.

We continue to analyze and evaluate the acquisition and divestiture of strategic businesses and product lines, technologies and capabilities, plants and assets, joint ventures and investments with the potential to strengthen our industry position, to enhance our existing set of product and services offerings, to increase productivity and efficiencies, to grow revenues, earnings and cash flow, to help us stay competitive or to reduce costs. There can be no assurance that we will identify or successfully complete transactions with suitable candidates in the future, that we will consummate these transactions at rates similar to the past or that completed transactions will be successful.

Strategic transactions may involve significant cash expenditures, debt incurrence, operating losses and expenses that could have a material adverse effect on our business, financial condition, results of operations and cash flows. Such transactions involve numerous other risks, including:

- diversion of management time and attention from daily operations;
- difficulties integrating acquired businesses, technologies and personnel into our business;
- difficulties in obtaining and verifying the financial statements and other business information of acquired businesses;
- inability to obtain required regulatory approvals and/or required financing on favorable terms;
- potential loss of key employees, key contractual relationships or key customers of either acquired businesses or our business;
- assumption of the liabilities and exposure to unforeseen or undisclosed liabilities of acquired businesses and exposure to regulatory sanctions;
- inheriting internal control deficiencies;
- dilution of interests of holders of our common shares through the issuance of equity securities or equity-linked securities; and
- in the case of joint ventures and other investments, interests that diverge from those of our partners without the ability to direct the management and operations of the joint venture or investment in the manner we believe most appropriate to achieve the expected value.

It may be difficult for us to complete transactions quickly without high costs and to integrate acquired operations efficiently into our business operations. Any acquisitions, divestitures, joint ventures or investments may ultimately harm our business, financial condition, results of operations and cash flows.

Our operations are subject to regulatory risks.

Our U.S. and non-U.S. operations are subject to a number of laws and regulations, including among others, laws related to the environment and health and safety. We have made, and will be required to continue to make, significant expenditures to comply with these laws and regulations. Any violations of applicable laws and regulations could lead to significant penalties, fines or other sanctions. Changes in current laws and regulations could require us to increase our compliance expenditures, cause us to significantly alter or discontinue offering existing products and services or cause us to develop new products and services. Altering current products and services or developing new products and services to comply with changes in the applicable laws and regulations could require significant research and development investments, increase the cost of providing the products and services and adversely affect the demand for our products and services. The U.S. federal government and various states and municipalities have enacted or may enact legislation intended to deny government contracts to U.S. companies that reincorporate outside of the U.S. or have reincorporated outside of the U.S. or may take other actions negatively impacting such companies. If we are unable to effectively respond to changes to applicable laws and regulations, interpretations of applicable laws and regulations, or comply with existing and future laws and regulations, our competitive position, results of operations, financial condition and cash flows could be materially adversely impacted.

Risks Relating to Our Operations and Corporate Structure

Our corporate structure has resulted from prior corporate reorganizations and related transactions. These various transactions exposed us and our shareholders to the risks described below. In addition, we cannot be assured that all of

the anticipated benefits of our operations and corporate structure will be realized.

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Changes in tax or other laws, regulations or treaties, including the enactment of the U.S. Tax Cuts and Jobs Act, changes in our status under U.S. or non-U.S. laws or adverse determinations by taxing or other governmental authorities could increase our tax burden or otherwise affect our financial condition or operating results, as well as subject our shareholders to additional taxes.

The realization of any tax benefit related to our operations and corporate structure could be impacted by changes in tax or other laws, treaties or regulations or the interpretation or enforcement thereof by the U.S. or non-U.S. tax or other governmental authorities. Enacted comprehensive tax reform legislation in December 2017 known as the Tax Cuts and Jobs Act (the Act) made broad and complex changes to the U.S. tax code. As part of the migration from a worldwide system of taxation to a modified territorial system for corporations, the Act imposed a transition tax on certain unrepatriated earnings of non-U.S. subsidiaries. We recorded certain charges and benefits in connection with the Act and have taken a charge in connection with the mandatory deemed repatriation of earnings of certain of our Non-U.S. subsidiaries, and we have recorded other charges and benefits, set forth in greater detail in Note 16 to the Consolidated Financial Statements. Any additional impacts from the Act will be determined as the U.S. Department of Treasury and/or the IRS continue to release proposed and final guidance on certain relevant provisions of the Act which should provide better clarity regarding the interpretation, interaction and application of these rules; the new law's substantial limitations on, and/or elimination of, certain tax deductions and the introduction of new taxing provisions, among other items, may increase our overall tax burden or otherwise negatively impact the Company. Moreover, our overall tax burden may also be adversely impacted by any tax law changes implemented by other countries.

Notwithstanding this change in U.S. tax law, we continue to monitor for other tax changes, U.S. and non-U.S. related. From time to time, proposals have been made and/or legislation has been introduced to change the tax laws, regulations or interpretations thereof of various jurisdictions or limit tax treaty benefits that if enacted or implemented could materially increase our tax burden and/or effective tax rate and could have a material adverse impact on our financial condition and results of operations. Moreover, the Organisation for Economic Co-operation and Development has released proposals to create an agreed set of international rules for fighting base erosion and profit shifting, such that tax laws in countries in which we do business could change on a prospective or retroactive basis, and any such changes could adversely impact us. Finally, the European Commission has been very active in investigating whether various tax regimes or private tax rulings provided by a country to particular taxpayers may constitute State Aid. We cannot predict the outcome of any of these potential changes or investigations in any of the jurisdictions, but if any of the above occurs and impacts us, this could materially increase our tax burden and/or effective tax rate and could have a material adverse impact on our financial condition and results of operations.

While we monitor proposals and other developments that would materially impact our tax burden and/or effective tax rate and investigate our options, we could still be subject to increased taxation on a going forward basis no matter what action we undertake if certain legislative proposals or regulatory changes are enacted, certain tax treaties are amended and/or our interpretation of applicable tax or other laws is challenged and determined to be incorrect. In particular, any changes and/or differing interpretations of applicable tax law that have the effect of disregarding the shareholders' decision to reorganize in Ireland, limiting our ability to take advantage of tax treaties between jurisdictions, modifying or eliminating the deductibility of various currently deductible payments, or increasing the tax burden of operating or being resident in a particular country, could subject us to increased taxation.

In addition, tax authorities periodically review income tax returns filed by us and can raise issues regarding our filing positions, timing and amount of income or deductions, and the allocation of income among the jurisdictions in which we operate. These examinations on their own, or any subsequent litigation related to the examinations, may result in additional taxes or penalties against us. If the ultimate result of these audits differ from our original or adjusted estimates, they could have a material impact on our tax provision.

Irish law differs from the laws in effect in the United States and may afford less protection to holders of our securities.

The United States currently does not have a treaty with Ireland providing for the reciprocal recognition and enforcement of judgments in civil and commercial matters. As such, there is some uncertainty as to whether the courts of Ireland would recognize or enforce judgments of U.S. courts obtained against us or our directors or officers based

on U.S. federal or state civil liability laws, including the civil liability provisions of the U.S. federal or state securities laws, or hear actions against us or those persons based on those laws.

As an Irish company, we are governed by the Irish Companies Act, which differs in some material respects from laws generally applicable to U.S. corporations and shareholders, including, among others, differences relating to interested director and officer transactions and shareholder lawsuits. Likewise, the duties of directors and officers of an Irish company generally are owed to the company only. Shareholders of Irish companies generally do not have a personal right of action against directors or officers of the company and may exercise such rights of action on behalf of the company only in limited circumstances. Accordingly, holders of our securities may have more difficulty protecting their interests than would holders of securities of a corporation incorporated in a jurisdiction of the United States.

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In addition, Irish law allows shareholders to authorize share capital which then can be issued by a board of directors without shareholder approval. Also, subject to specified exceptions, Irish law grants statutory pre-emptive rights to existing shareholders to subscribe for new issuances of shares for cash, but allows shareholders to authorize the waiver of the statutory pre-emptive rights with respect to any particular allotment of shares. Under Irish law, we must have authority from our shareholders to issue any shares, including shares that are part of the Company's authorized but unissued share capital. In addition, unless otherwise authorized by its shareholders, when an Irish company issues shares for cash to new shareholders, it is required first to offer those shares on the same or more favorable terms to existing shareholders on a pro-rata basis. If we are unable to obtain these authorizations from our shareholders, or are otherwise limited by the terms of our authorizations, our ability to issue shares or otherwise raise capital could be adversely affected.

Dividends received by our shareholders may be subject to Irish dividend withholding tax.

In certain circumstances, we are required to deduct Irish dividend withholding tax (currently at the rate of 20%) from dividends paid to our shareholders. In the majority of cases, shareholders resident in the United States will not be subject to Irish withholding tax, and shareholders resident in a number of other countries will not be subject to Irish withholding tax provided that they complete certain Irish dividend withholding tax forms. However, some shareholders may be subject to withholding tax, which could have an adverse impact on the price of our shares.

Dividends received by our shareholders could be subject to Irish income tax.

Dividends paid in respect of our shares will generally not be subject to Irish income tax where the beneficial owner of these dividends is exempt from dividend withholding tax, unless the beneficial owner of the dividend has some connection with Ireland other than his or her shareholding in Ingersoll-Rand plc.

Our shareholders who receive their dividends subject to Irish dividend withholding tax will generally have no further liability to Irish income tax on the dividends unless the beneficial owner of the dividend has some connection with Ireland other than his or her shareholding in Ingersoll-Rand plc.

Item 1B. UNRESOLVED STAFF COMMENTS

None.

Item 2. PROPERTIES

As of December 31, 2018, we owned or leased a total of approximately 32 million square feet of space worldwide. Manufacturing and assembly operations are conducted in 52 plants across the world. We also maintain various warehouses, offices and repair centers throughout the world. The majority of our plant facilities are owned by us with the remainder under long-term lease arrangements. We believe that our plants have been well maintained, are generally in good condition and are suitable for the conduct of our business.

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The locations by segment of our principal plant facilities at December 31, 2018 were as follows:

Climate

Americas	Europe and Middle East	Asia Pacific and India
Arecibo, Puerto Rico	Barcelona, Spain	Bangkok, Thailand
Charlotte, North Carolina	Bari, Italy	Penang, Malaysia
Clarksville, Tennessee	Charmes, France	Taicang, China
Columbia, South Carolina	Essen, Germany	Zhongshan, China
Curitiba, Brazil	Galway, Ireland	
Fairlawn, New Jersey	Golbey, France	
Fort Smith, Arkansas	King Abdullah Economic City, Saudi Arabia	
Grand Rapids, Michigan	Kolin, Czech Republic	
Hastings, Nebraska		
La Crosse, Wisconsin		
Lexington, Kentucky		
Lynn Haven, Florida		
Monterrey, Mexico		
Pueblo, Colorado		
Rushville, Indiana		
St. Paul, Minnesota		
Trenton, New Jersey		
Tyler, Texas		
Vidalia, Georgia		
Waco, Texas		

Industrial

Americas	Europe and Middle East	Asia Pacific and India
Augusta, Georgia	Fogliano Redipuglia, Italy	Changzhou, China
Buffalo, New York	Logatec, Slovenia	Guilin, China
Campbellsville, Kentucky	Oberhausen, Germany	Naroda, India
Dorval, Canada	Sin le Noble, France	Sahibabad, India
Kent, Washington	Vignate, Italy	Wujiang, China
Mocksville, North Carolina	Wasquehal, France	
Sarasota, Florida		
Southern Pines, North Carolina		
West Chester, Pennsylvania		

Item 3. LEGAL PROCEEDINGS

In the normal course of business, we are involved in a variety of lawsuits, claims and legal proceedings, including commercial and contract disputes, employment matters, product liability and product defect claims, asbestos-related claims, environmental liabilities, intellectual property disputes, and tax-related matters. In our opinion, pending legal matters are not expected to have a material adverse impact on our results of operations, financial condition, liquidity or cash flows.

Asbestos-Related Matters

Certain of our wholly-owned subsidiaries and former companies are named as defendants in asbestos-related lawsuits in state and federal courts. In virtually all of the suits, a large number of other companies have also been named as defendants. The vast majority of those claims allege injury caused by exposure to asbestos contained in certain historical products, primarily pumps, boilers and railroad brake shoes. None of our existing or previously-owned businesses were a producer or manufacturer of asbestos.

See also the discussion under Part II, Item 7, "Management's Discussion and Analysis of Financial Condition and Results of Operations," "Contingent Liabilities," and also Note 20 to the Consolidated Financial Statements.

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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

Information regarding the principal market for our ordinary shares and related shareholder matters is as follows: Our ordinary shares are traded on the New York Stock Exchange under the symbol IR. As of February 1, 2019, the approximate number of record holders of ordinary shares was 2,931.

Issuer Purchases of Equity Securities

The following table provides information with respect to purchases by us of our ordinary shares during the quarter ended December 31, 2018:

Period	Total number of shares purchased (000's) (a) (b)	Average price paid per share (a) (b)	Total number of shares purchased as part of program (000's) (a)	Approximate dollar value of shares still available to be purchased under the program (\$000's) (a)
October 1 - October 31	840.8	\$ 94.54	840.3	\$ 306,617
November 1 - November 30	2,542.6	100.88	2,542.6	\$ 50,118
December 1 - December 31	485.4	103.60	484.0	\$ —
Total	3,868.8	\$ 99.84	3,866.9	

(a) Share repurchases are made from time to time in accordance with management's capital allocation strategy, subject to market conditions and regulatory requirements. In February 2017, our Board of Directors authorized the repurchase of up to \$1.5 billion of our ordinary shares under a share repurchase program (the 2017 Authorization) upon completion of the prior authorized share repurchase program. Repurchases under the 2017 Authorization began in May 2017 and ended in December 2018, completing the program. In October 2018, our Board of Directors authorized the repurchase of up to \$1.5 billion of our ordinary shares upon completion of the 2017 Authorization. The authorized shares under the new share repurchase program are not included in the approximate dollar value of shares still available to be purchased in the table above.

(b) We may also reacquire shares outside of the repurchase program from time to time in connection with the surrender of shares to cover taxes on vesting of share based awards. We reacquired 456 shares in October and 1,425 shares in December in transactions outside the repurchase programs.

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Performance Graph

The following graph compares the cumulative total shareholder return on our ordinary shares with the cumulative total return on (i) the Standard & Poor's 500 Stock Index and (ii) the Standard & Poor's 500 Industrial Index for the five years ended December 31, 2018. The graph assumes an investment of \$100 in our ordinary shares, the Standard & Poor's 500 Stock Index and the Standard & Poor's 500 Industrial Index on December 31, 2013 and assumes the reinvestment of dividends.

Company/Index	2013	2014	2015	2016	2017	2018
Ingersoll Rand	100	105	93	129	156	163
S&P 500	100	114	115	129	157	150
S&P 500 Industrials Index	100	110	107	127	154	133

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Item 6. SELECTED FINANCIAL DATA

In millions, except per share amounts:

At and for the years ended December 31,	2018	2017	2016	2015	2014
Net revenues	\$15,668.2	\$14,197.6	\$13,508.9	\$13,300.7	\$12,891.4
Net earnings (loss) attributable to Ingersoll-Rand plc ordinary shareholders:					
Continuing operations	1,359.1	1,328.0	1,443.3	688.9	897.0
Discontinued operations	(21.5)	(25.4)	32.9	(24.3)	34.7
Total assets	17,914.9	18,173.3	17,397.4	16,717.6	17,274.6
Total debt	4,091.3	4,064.0	4,070.2	4,217.8	4,200.5
Total Ingersoll-Rand plc shareholders' equity	7,022.7	7,140.3	6,643.8	5,816.7	5,987.4
Earnings (loss) per share attributable to Ingersoll-Rand plc ordinary shareholders:					
Basic:					
Continuing operations	\$5.50	\$5.21	\$5.57	\$2.60	\$3.32
Discontinued operations	(0.09)	(0.10)	0.13	(0.09)	0.12
Diluted:					
Continuing operations	\$5.43	\$5.14	\$5.52	\$2.57	\$3.27
Discontinued operations	(0.08)	(0.09)	0.13	(0.09)	0.13
Dividends declared per ordinary share	\$1.96	\$1.70	\$1.36	\$1.16	\$1.00

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

The following Management's Discussion and Analysis of Financial Condition and Results of Operations contains forward-looking statements that involve risks and uncertainties. Our actual results may differ materially from the results discussed in the forward-looking statements. Factors that might cause a difference include, but are not limited to, those discussed under Item 1A. Risk Factors in this Annual Report on Form 10-K. The following section is qualified in its entirety by the more detailed information, including our financial statements and the notes thereto, which appears elsewhere in this Annual Report.

Overview

Organization

We are a diversified, global company that provides products, services and solutions to enhance the quality, energy efficiency and comfort of air in homes and buildings, transport and protect food and perishables and increase industrial productivity and efficiency. Our business segments consist of Climate and Industrial, both with strong brands and highly differentiated products within their respective markets. We generate revenue and cash primarily through the design, manufacture, sale and service of a diverse portfolio of industrial and commercial products that include well-recognized, premium brand names such as Ingersoll-Rand®, Trane®, Thermo King®, American Standard®, ARO®, and Club Car®.

To achieve our mission of being a world leader in creating comfortable, sustainable and efficient environments, we continue to focus on growth by increasing our recurring revenue stream from parts, service, controls, used equipment and rentals; and to continuously improve the efficiencies and capabilities of the products and services of our businesses. We also continue to focus on operational excellence strategies as a central theme to improving our earnings and cash flows.

Trends and Economic Events

We are a global corporation with worldwide operations. As a global business, our operations are affected by worldwide, regional and industry-specific economic factors, as well as political factors, wherever we operate or do business. Our geographic and industry diversity, and the breadth of our product and services portfolios, have helped mitigate the impact of any one industry or the economy of any single country on our consolidated operating results. Given the broad range of products manufactured and geographic markets served, management uses a variety of factors to predict the outlook for the Company. We monitor key competitors and customers in order to gauge relative performance and the outlook for the future. We regularly perform detailed evaluations of the different market segments we are serving to proactively detect trends and to adapt our strategies accordingly. In addition, we believe our order rates are indicative of future revenue and thus a key measure of anticipated performance. In those industry segments where we are a capital equipment provider, revenues depend on the capital expenditure budgets and spending patterns of our customers, who may delay or accelerate purchases in reaction to changes in their businesses and in the economy.

Current economic conditions are showing positive trends in each of the segments in which we participate. Heating, Ventilation, and Air Conditioning (HVAC) equipment replacement, services, controls and aftermarket continue to experience strong demand. In addition, Residential and Commercial markets have seen continued momentum in the United States, positively impacting the results of our HVAC businesses. Global Industrial markets remain largely supportive of continued growth in both equipment and services. While geopolitical uncertainty exists in markets such as Europe, Asia and Latin America, we are confident we will continue our strong performance globally. In 2019, we expect positive growth in both our Climate and Industrial segments, each benefiting from operational excellence initiatives, new product launches and continued productivity programs.

We believe we have a solid foundation of global brands that are highly differentiated in all of our major product lines. Our growing geographic and industry diversity coupled with our large installed product base provides growth opportunities within our service, parts and replacement revenue streams. In addition, we are investing substantial resources to innovate and develop new products and services which we expect will drive our future growth.

Significant Events

Acquisitions and Equity Investments

We continue to be active with strategic acquisitions and investments. During 2018, acquisitions and equity method investments, net of cash acquired totaled \$285.2 million. Related amounts in 2017 and 2016 were \$157.6 million and \$9.2 million, respectively.

In May 2018, we completed our investment of a 50% ownership interest in a joint venture with Mitsubishi Electric Corporation (Mitsubishi). The joint venture, reported within the Climate segment, focuses on marketing, selling and supporting variable refrigerant flow (VRF) and ductless heating and air conditioning systems through Trane, American Standard and Mitsubishi channels in the U.S. and select Latin American countries.

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In January 2018, we acquired 100% of the outstanding stock of ICS Group Holdings Limited (ICS Cool Energy). The acquired business, reported within the Climate segment, specializes in the temporary rental of energy efficient chillers for commercial and industrial buildings across Europe. It also sells, permanently installs and services high performance temperature control systems for all types of industrial processes.

During 2017, we acquired several businesses, including channel acquisitions, that complement existing products and services. Acquisitions within the Climate segment primarily consisted of independent dealers which support the ongoing strategy to expand our distribution network in North America. Other acquisitions within the segment strengthen our product portfolio. Acquisitions within the Industrial segment primarily consisted of a telematics business which builds upon our growing portfolio of connected assets. In addition, other acquisitions within the segment expand sales and service channels across the globe.

On February 6, 2019, we entered into a final, binding and irrevocable offer letter with Silver II GP Holdings S.C.A., an affiliate of BC Partners Advisors L.P. and The Carlyle Group (the Seller) pursuant to which we made a binding offer to acquire the precision flow systems management business (the Business) for approximately \$1.45 billion in cash, subject to working capital and certain other adjustments (the Acquisition). The Business is a manufacturer of precision flow control equipment including electric diaphragm pumps and controls that serve the global water, oil and gas, agriculture, industrial and specialty market segments. The offer is subject to completion of information and consultation processes with employee representative bodies of the Business in applicable jurisdictions. If the offer is accepted, completion of the Acquisition would be subject to customary closing conditions and expected to close mid-year 2019 subject to regulatory approvals. The results of the Business will be included in our consolidated financial statements as of the date of acquisition and reported within the Industrial segment.

Share Repurchase Program and Dividends

Share repurchases are made from time to time in accordance with management's capital allocation strategy, subject to market conditions and regulatory requirements. In February 2017, our Board of Directors authorized the repurchase of up to \$1.5 billion of our ordinary shares under a share repurchase program (the 2017 Authorization) upon completion of the prior authorized share repurchase program. Repurchases under the 2017 Authorization began in May 2017 and ended in December 2018, completing the program. In October 2018, our Board of Directors authorized the repurchase of up to \$1.5 billion of our ordinary shares upon completion of the 2017 Authorization. However, no material amounts were repurchased under this program during 2018.

In June 2018, we announced an increase in our quarterly share dividend from \$0.45 to \$0.53 per ordinary share. This reflects an 18% increase that began with our September 2018 payment and an 83% increase since the beginning of 2016.

Issuance and Redemption of Senior Notes

In February 2018, we issued \$1.15 billion principal amount of senior notes in three tranches through an indirect, wholly-owned subsidiary. The tranches consist of \$300 million aggregate principal amount of 2.900% senior notes due 2021, \$550 million aggregate principal amount of 3.750% senior notes due 2028 and \$300 million aggregate principal amount of 4.300% senior notes due 2048. In March 2018, we used the proceeds to fund the redemption of \$750 million aggregate principal amount of 6.875% senior notes due 2018 and \$350 million aggregate principal amount of 2.875% senior notes due 2019, with the remainder used for general corporate purposes.

Tax Cuts and Job Act

In December 2017, the U.S. enacted the Tax Cuts and Jobs Act (the Act) which made widespread changes to the Internal Revenue Code. The Act, among other things, reduced the U.S. federal corporate tax rate from 35% to 21%, requires companies to pay a transition tax on earnings of certain foreign subsidiaries that were previously not subject to U.S. tax and creates new income taxes on certain foreign sourced earnings. The SEC issued Staff Accounting Bulletin No. 118 (SAB 118) which provided guidance on accounting for the tax effects of the Act and allowed for adjustments to provisional amounts during a measurement period of up to one year. In accordance with SAB 118, we made reasonable estimates related to (1) the remeasurement of U.S. deferred tax balances for the reduction in the tax rate (2) the liability for the transition tax and (3) the taxes accrued relating to the change in permanent reinvestment assertion for unremitted earnings of certain foreign subsidiaries. As a result, we recognized a net provisional income tax benefit of \$21.0 million associated with these items in the fourth quarter of 2017. We completed the accounting for

the income tax effects of the Act during 2018 and recorded \$9.0 million of net measurement period adjustments as a component of Provision for income taxes during the year to increase the net provisional income tax benefit recorded as of December 31, 2017.

Sale of Hussmann Equity Investment

During 2011, we completed the sale of a controlling interest of our Hussmann refrigerated display case business (Hussmann) to a newly-formed affiliate of private equity firm Clayton Dubilier & Rice, LLC (CD&R). Per the terms of the agreement, CD&R's ownership interest in Hussmann at the acquisition date was 60% with the remaining 40% being retained by us. As a result, we accounted for our interest in Hussmann using the equity method of accounting.

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On December 21, 2015, we announced we would sell our remaining equity interest in Hussmann as part of a transaction in which Panasonic Corporation would acquire 100 percent of Hussmann's outstanding shares. The transaction was completed on April 1, 2016. We received net proceeds of \$422.5 million for our interest and recognized a gain of \$397.8 million on the sale.

Results of Operations

Our Climate segment delivers energy-efficient products and innovative energy services. It includes Trane® and American Standard® Heating & Air Conditioning which provide heating, ventilation and air conditioning (HVAC) systems, and commercial and residential building services, parts, support and controls; energy services and building automation through Trane Building Advantage and Nexia; and Thermo King® transport temperature control solutions. Our Industrial segment delivers products and services that enhance energy efficiency, productivity and operations. It includes compressed air and gas systems and services, power tools, material handling systems, ARO® fluid management equipment, as well as Club Car® golf, utility and consumer low-speed vehicles.

Segment operating income is the measure of profit and loss that our chief operating decision maker uses to evaluate the financial performance of the business and as the basis for performance reviews, compensation and resource allocation. For these reasons, we believe that Segment operating income represents the most relevant measure of segment profit and loss. We define Segment operating margin as Segment operating income as a percentage of Net revenues.

On January 1, 2018, we adopted Accounting Standards Update No. 2014-09, "Revenue from Contracts with Customers" (ASC 606), which created a comprehensive, five-step model for revenue recognition that requires a company to recognize revenue to depict the transfer of promised goods or services to a customer at an amount that reflects the consideration it expects to receive in exchange for those goods or services. We adopted this standard on January 1, 2018 using the modified retrospective approach and recorded a cumulative effect adjustment to increase Retained earnings by \$2.4 million. Related amounts did not materially impact Net revenues, Operating income or the Balance Sheet.

On January 1, 2017, we adopted Accounting Standards Update (ASU) No. 2016-09, "Compensation-Stock Compensation (Topic 718): Improvements to Employee Share-Based Payment Accounting" (ASU 2016-09) which simplified several aspects of the accounting for employee share-based payment transactions. The standard made several modifications to the accounting for forfeitures, employer tax withholding on share-based compensation and the financial statement presentation of excess tax benefits or deficiencies. In addition, ASU 2016-09 clarified the statement of cash flows presentation for certain components of share-based awards. We applied the cash flow presentation requirements retrospectively.

On January 1, 2017, we adopted ASU No. 2017-07, "Compensation-Retirement Benefits (Topic 715): Improving the Presentation of Net Periodic Pension Cost and Net Periodic Postretirement Benefit Cost" (ASU 2017-07) which required a company to present the service cost component of net periodic benefit cost in the same income statement line as other employee compensation costs with the remaining components of net periodic benefit cost presented separately from the service cost component and outside of any subtotal of operating income. We applied the presentation requirements retrospectively.

Year Ended December 31, 2018 Compared to the Year Ended December 31, 2017

Dollar amounts in millions	2018	2017	Period Change	2018 % of Revenues	2017 % of Revenues
Net revenues	\$15,668.2	\$14,197.6	\$1,470.6		
Cost of goods sold	(10,847.6)	(9,811.6)	(1,036.0)	69.2%	69.1%
Selling and administrative expenses	(2,903.2)	(2,720.7)	(182.5)	18.5%	19.2%
Operating income	1,917.4	1,665.3	252.1	12.2%	11.7%
Interest expense	(220.7)	(215.8)	(4.9)		
Other income/(expense), net	(36.4)	(31.6)	(4.8)		
Earnings before income taxes	1,660.3	1,417.9	242.4		
Provision for income taxes	(281.3)	(80.2)	(201.1)		
Earnings from continuing operations	1,379.0	1,337.7	41.3		

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Discontinued operations, net of tax	(21.5)	(25.4)	3.9
Net earnings	\$1,357.5		\$1,312.3		\$45.2
Net Revenues					

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Net revenues for the year ended December 31, 2018 increased by 10.4%, or \$1,470.6 million, compared with the same period of 2017. The components of the period change are as follows:

Volume/product mix	7.3 %
Acquisitions	1.1 %
Pricing	1.6 %
Currency translation	0.4 %
Total	10.4 %

The increase was primarily driven by higher volumes in both our Climate and Industrial segments. Improved pricing, along with incremental revenues from acquisitions, further contributed to the year-over-year increase. In addition, each segment benefited from favorable foreign currency exchange rate movements.

Our Revenues by segment are as follows:

Dollar amounts in millions	2018	2017	% change
Climate	\$12,343.8	\$11,167.5	10.5%
Industrial	3,324.4	3,030.1	9.7%
Total	\$15,668.2	\$14,197.6	

Climate

Net revenues for the year ended December 31, 2018 increased by 10.5% or \$1,176.3 million, compared with the same period of 2017. The components of the period change are as follows:

Volume/product mix	7.6 %
Acquisitions	1.1 %
Pricing	1.5 %
Currency translation	0.3 %
Total	10.5 %

Industrial

Net revenues for the year ended December 31, 2018 increased by 9.7% or \$294.3 million, compared with the same period of 2017. The components of the period change are as follows:

Volume/product mix	6.3 %
Acquisitions	0.9 %
Pricing	1.6 %
Currency translation	0.9 %
Total	9.7 %

Operating Income/Margin

Operating margin increased to 12.2% for the year ended December 31, 2018, compared with 11.7% for the same period of 2017. The increase was primarily driven by higher volumes and favorable product mix (0.9%) as well as pricing improvements in excess of material inflation (0.1%). These amounts were partially offset by investments and restructuring spending (0.5%).

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Our Operating income and Operating margin by segment are as follows:

Dollar amounts in millions	2018	2017	Period Change	2018	2017		
	Operating Income (Expense)	Operating Income (Expense)		Operating Margin	Operating Margin		
Climate	\$1,766.2	\$1,572.7	\$ 193.5	14.3 %	14.1 %		
Industrial	405.3	357.6	47.7	12.2 %	11.8 %		
Unallocated corporate expense	(254.1)	(265.0)	10.9	N/A	N/A		
Total	\$1,917.4	\$1,665.3	\$ 252.1	12.2 %	11.7 %		

Climate

Operating margin increased to 14.3% for the year ended December 31, 2018, compared with 14.1% for the same period of 2017. The increase was primarily driven by higher volumes and favorable product mix. Other inflation in excess of productivity benefits, investments and restructuring spending partially offset the benefits.

Industrial

Operating margin increased to 12.2% for the year ended December 31, 2018 compared with 11.8% for the same period of 2017. The increase was primarily driven by higher volumes and favorable product mix, productivity benefits in excess of other inflation and pricing improvements in excess of material inflation. These amounts were partially offset by investments and restructuring spending.

Unallocated Corporate Expense

Unallocated corporate expense for the year ended December 31, 2018 decreased by 4.1% or \$10.9 million, compared with the same period of 2017. Lower functional costs from productivity projects more than offset compensation and benefit charges related to variable compensation.

Interest Expense

Interest expense for the year ended December 31, 2018 increased by \$4.9 million compared with the same period of 2017. During 2018, we issued \$1.15 billion of senior notes and redeemed \$1.1 billion of senior notes. The increase primarily relates to the redemption of the senior notes in which we recognized \$15.4 million of premium expense and \$1.2 million of unamortized costs in Interest expense. This amount was partially offset by lower interest rates on the new senior notes issued during the period.

Other income/(expense), net

The components of Other income/(expense), net, for the years ended December 31 are as follows:

In millions	2018	2017	Period Change
Interest income	\$6.4	\$9.4	\$(3.0)
Exchange gain (loss)	(17.6)	(8.8)	(8.8)
Other components of net periodic benefit cost	(21.9)	(31.0)	9.1
Other activity, net	(3.3)	(1.2)	(2.1)
Other income/(expense), net	\$(36.4)	\$(31.6)	\$(4.8)

Other income /(expense), net includes the results from activities other than normal business operations such as interest income and foreign currency gains and losses on transactions that are denominated in a currency other than an entity's functional currency. In addition, we include the components of net periodic benefit cost for pension and post retirement obligations other than the service cost component. Other activity, net include costs associated with Trane U.S. Inc. (Trane) for the settlement and defense of asbestos-related claims, insurance settlements on asbestos-related matters and the revaluation of its liability for potential future claims.

Provision for Income Taxes

The 2018 effective tax rate was 16.9% which is lower than the U.S. Statutory rate of 21% primarily due to the measurement period adjustment related to the change in permanent reinvestment assertion on unremitted earnings of certain foreign subsidiaries, the deduction for Foreign Derived Intangible Income, the recognition of excess tax benefits from employee share based payments and a reduction in a valuation allowance for certain state net deferred tax assets. This decrease was partially offset by the measurement period adjustment related to a valuation allowance

on excess foreign tax credits, U.S. state and local income taxes

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and certain non-deductible employee expenses. In addition, the reduction was also driven by earnings in non-U.S. jurisdictions, which in aggregate, have a lower effective tax rate. Revenues from non-U.S. jurisdictions accounts for approximately 36% of our total revenues, such that a material portion of our pretax income was earned and taxed outside the U.S. at rates ranging from 0% to 38%. When comparing the results of multiple reporting periods, among other factors, the mix of earnings between U.S. and foreign jurisdictions can cause variability in our overall effective tax rate.

The 2017 effective tax rate was 5.7% which is lower than the U.S. Statutory rate of 35% primarily due to the remeasurement of our net U.S. deferred tax liabilities, the premium paid related to the early retirement of certain intercompany debt obligations, the recognition of a claim for refund related to previously paid interest and the recognition of excess tax benefits from employee shared based payments. In the aggregate, these items decreased the effective tax rate by 37.9%. This decrease was partially offset by the transition tax cost, a change in permanent reinvestment assertion on the unremitted earnings of certain foreign subsidiaries and a non-cash charge related to the establishment of a valuation allowance on certain net deferred tax assets in Brazil. In the aggregate these items increased the effective tax rate by 13.7%. In addition, the reduction was also driven by earnings in non-U.S. jurisdictions, which in aggregate, have a lower effective tax rate. Revenues from non-U.S. jurisdictions accounts for approximately 35% of our total revenues, such that a material portion of our pretax income was earned and taxed outside the U.S. at rates ranging from 0% to 38%. When comparing the results of multiple reporting periods, among other factors, the mix of earnings between U.S. and foreign jurisdictions can cause variability in our overall effective tax rate.

Discontinued Operations

The components of Discontinued operations, net of tax for the years ended December 31 are as follows:

In millions	2018	2017	Period Change
Pre-tax earnings (loss) from discontinued operations	\$(85.5)	\$(34.0)	\$(51.5)
Tax benefit (expense)	64.0	8.6	55.4
Discontinued operations, net of tax	\$(21.5)	\$(25.4)	\$3.9

Discontinued operations are retained costs from previously sold businesses including postretirement benefits, product liability and legal costs. In addition, we include costs associated with Ingersoll-Rand Company for the settlement and defense of asbestos-related claims, insurance settlements on asbestos-related matters and the revaluation of our liability for potential future claims. A portion of the tax benefit (expense) in each period represents adjustments for certain tax matters associated with the 2013 spin-off of our commercial and residential security business, now an independent public company operating under the name of Allegion plc (Allegion).

Year Ended December 31, 2017 Compared to the Year Ended December 31, 2016

Dollar amounts in millions	2017	2016	Period Change	2017 % of Revenues	2016 % of Revenues
Net revenues	\$14,197.6	\$13,508.9	\$688.7		
Cost of goods sold	(9,811.6)	(9,307.9)	(503.7)	69.1%	68.9%
Selling and administrative expenses	(2,720.7)	(2,597.8)	(122.9)	19.2%	19.2%
Operating income	1,665.3	1,603.2	62.1	11.7%	11.9%
Interest expense	(215.8)	(221.5)	5.7		
Other income/(expense), net	(31.6)	359.6	(391.2)		
Earnings before income taxes	1,417.9	1,741.3	(323.4)		
Provision for income taxes	(80.2)	(281.5)	201.3		
Earnings from continuing operations	1,337.7	1,459.8	(122.1)		
Discontinued operations, net of tax	(25.4)	32.9	(58.3)		
Net earnings	\$1,312.3	\$1,492.7	\$(180.4)		

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Net Revenues

Net revenues for the year ended December 31, 2017 increased by 5.1%, or \$688.7 million, compared with the same period of 2016. The components of the period change are as follows:

Volume/product mix	4.4%
Pricing	0.3%
Currency translation	0.4%
Total	5.1%

The increase was primarily driven by higher volumes in both our Climate and Industrial segments. Additionally, improved pricing and favorable foreign currency exchange rate movements further contributed to the year-over-year increase.

Our Revenues by segment are as follows:

Dollar amounts in millions	2017	2016	% change
Climate	\$11,167.5	\$10,545.0	5.9%
Industrial	3,030.1	2,963.9	2.2%
Total	\$14,197.6	\$13,508.9	

Climate

Net revenues for the year ended December 31, 2017 increased by 5.9% or \$622.5 million, compared with the same period of 2016. The components of the period change are as follows:

Volume/product mix	5.4%
Pricing	0.2%
Currency translation	0.3%
Total	5.9%

Industrial

Net revenues for the year ended December 31, 2017 increased by 2.2%, or \$66.2 million, compared with the same period of 2016. The components of the period change are as follows:

Volume/product mix	0.7%
Pricing	1.0%
Currency translation	0.5%
Total	2.2%

Operating Income/Margin

Operating margin decreased to 11.7% for the year ended December 31, 2017, compared with 11.9% for the same period of 2016. The decrease was primarily driven by material inflation in excess of pricing improvements (0.7%) investments and restructuring spending (0.7%). These amounts were partially offset by productivity benefits in excess of other inflation (0.6%) and higher volumes and favorable product mix (0.6%).

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Our Operating income and Operating margin by segment are as follows:

Dollar amounts in millions	2017	2016	Period Change	2017	2016		
	Operating Income (Expense)	Operating Income (Expense)		Operating Margin	Operating Margin		
Climate	\$1,572.7	\$1,537.5	\$35.2	14.1 %	14.6 %		
Industrial	357.6	300.3	57.3	11.8 %	10.1 %		
Unallocated corporate expense	(265.0)	(234.6)	\$(30.4)	N/A	N/A		
Total	\$1,665.3	\$1,603.2	\$62.1	11.7 %	11.9 %		

Climate

Operating margin decreased to 14.1% for the year ended December 31, 2017, compared with 14.6% for the same period of 2016. The decrease was primarily driven by material inflation in excess of pricing improvements, investments and restructuring spending. These amounts were partially offset by productivity benefits in excess of other inflation and higher volumes and favorable product mix.

Industrial

Operating margin increased to 11.8% for the year ended December 31, 2017, compared with 10.1% for the same period of 2016. The increase was primarily driven by higher volumes and favorable product mix. In addition, the segment benefited from productivity benefits in excess of other inflation, the non-recurrence of capitalized costs related to new product engineering and development that were reclassified to the income statement, pricing improvements in excess of material inflation and favorable foreign currency exchange rate movements. These amounts were partially offset by investments and restructuring spending.

Unallocated Corporate Expense

Unallocated corporate expense for the year ended December 31, 2017 increased by 13.0% or \$30.4 million, compared with the same period of 2016. The increase in expense primarily relates to costs associated with acquisition efforts, higher employee benefit costs and stock-based compensation as well as planned incubator investments in technologies that benefit our business.

Interest Expense

Interest expense for the year ended December 31, 2017 decreased by \$5.7 million compared with the same period of 2016. The decrease relates primarily to changes in short-term financing arrangements and other items.

Other income/(expense), net

The components of Other income/(expense), net, for the years ended December 31 are as follows:

In millions	2017	2016	Period Change
Interest income	\$9.4	\$8.0	\$1.4
Exchange gain (loss)	(8.8)	(2.0)	(6.8)
Other components of net periodic benefit cost	(31.0)	(30.1)	(0.9)
Income (loss) from equity investment	—	(0.8)	0.8
Gain on sale of Hussmann equity investment	—	397.8	(397.8)
Other activity, net	(1.2)	(13.3)	12.1
Other income/(expense), net	\$(31.6)	\$359.6	\$(391.2)

Other income/(expense), net includes the results from activities other than normal business operations such as interest income and foreign currency gains and losses on transactions that are denominated in a currency other than an entity's functional currency. In addition, we include the components of net periodic benefit cost for pension and post retirement obligations other than the service cost component. Other activity, net include costs associated with Trane for the settlement and defense of asbestos-related claims, insurance settlements on asbestos-related matters and the revaluation of its liability for potential future claims. Other activity, net for the year ended December 31, 2016 includes a charge of \$16.4 million for the settlement of a lawsuit originally filed by a customer in 2012. The lawsuit related to a commercial HVAC contract entered into in 2001, prior to our acquisition of Trane. The charge represents the settlement and related legal costs recognized during the fourth quarter of 2016.

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Provision for Income Taxes

The 2017 effective tax rate was 5.7% which is lower than the U.S. Statutory rate of 35% primarily due to the remeasurement of our net U.S. deferred tax liabilities, the premium paid related to the early retirement of certain intercompany debt obligations, the recognition of a claim for refund related to previously paid interest and the recognition of excess tax benefits from employee shared based payments. In the aggregate, these items decreased the effective tax rate by 37.9%. This decrease was partially offset by the transition tax cost, a change in permanent reinvestment assertion on the unremitted earnings of certain foreign subsidiaries and a non-cash charge related to the establishment of a valuation allowance on certain net deferred tax assets in Brazil. In the aggregate these items increased the effective tax rate by 13.7%. In addition, the reduction was also driven by earnings in non-U.S. jurisdictions, which in aggregate, have a lower effective tax rate. Revenues from non-U.S. jurisdictions accounts for approximately 35% of our total revenues, such that a material portion of our pretax income was earned and taxed outside the U.S. at rates ranging from 0% to 38%. When comparing the results of multiple reporting periods, among other factors, the mix of earnings between U.S. and foreign jurisdictions can cause variability in our overall effective tax rate.

The 2016 effective tax rate was 16.2% which is lower than the U.S. Statutory rate of 35% primarily due to the tax treatment of the Hussmann gain. The gain, which is not subject to tax under the relevant local tax laws, decreased the effective tax rate by 4.8%. In addition, the reduction was also driven by earnings in non-U.S. jurisdictions, which in aggregate, have a lower effective tax rate. Revenues from non-U.S. jurisdictions accounts for approximately 35% of our total revenues, such that a material portion of our pretax income was earned and taxed outside the U.S. at rates ranging from 0% to 38%. When comparing the results of multiple reporting periods, among other factors, the mix of earnings between U.S. and foreign jurisdictions can cause variability in our overall effective tax rate.

Discontinued Operations

The components of Discontinued operations, net of tax for the years ended December 31 are as follows:

In millions	2017	2016	Period Change
Pre-tax earnings (loss) from discontinued operations	\$(34.0)	\$28.1	\$(62.1)
Tax benefit (expense)	8.6	4.8	3.8
Discontinued operations, net of tax	\$(25.4)	\$32.9	\$(58.3)

Discontinued operations are retained costs from previously sold businesses including postretirement benefits, product liability and legal costs. In addition, we include costs associated with Ingersoll-Rand Company for the settlement and defense of asbestos-related claims, insurance settlements on asbestos-related matters and the revaluation of its liability for potential future claims. For the year ended December 31, 2016, ongoing costs were more than offset by asbestos-related settlements with various insurance carriers. A portion of the tax benefit (expense) in each period represents adjustments for certain tax matters associated with the 2013 spin-off of our commercial and residential security business, now an independent public company operating under the name of Allegion.

Liquidity and Capital Resources

We assess our liquidity in terms of our ability to generate cash to fund our operating, investing and financing activities. In doing so, we review and analyze our current cash on hand, the number of days our sales are outstanding, inventory turns, capital expenditure commitments and income tax payments. Our cash requirements primarily consist of the following:

- Funding of working capital
- Funding of capital expenditures
- Dividend payments
- Debt service requirements

Our primary sources of liquidity include cash balances on hand, cash flows from operations, proceeds from debt offerings, commercial paper, and borrowing availability under our existing credit facilities. We earn a significant amount of our operating income in jurisdictions where it is deemed to be permanently reinvested. Our most prominent

jurisdiction of operation is the U.S. We expect existing cash and cash equivalents available to the U.S. operations, the cash generated by our U.S. operations, our committed credit lines as well as our expected ability to access the capital and debt markets will be sufficient to fund our U.S. operating and capital needs for at least the next twelve months and thereafter for the foreseeable future. In addition, we expect existing non-U.S. cash and cash equivalents and the cash generated by our non-U.S. operations will be sufficient to fund our non-U.S. operating and capital needs for at least the next twelve months and thereafter for the foreseeable future.

As of December 31, 2018, we had \$903.4 million of cash and cash equivalents on hand, of which \$689.7 million was held by non-U.S. subsidiaries. Cash and cash equivalents held by our non-U.S. subsidiaries are generally available for use in our U.S. operations

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via intercompany loans, equity infusions or via distributions from direct or indirectly owned non-U.S. subsidiaries for which we do not assert permanent reinvestment. As a result of the Tax Cuts and Jobs Act in 2017, additional repatriation opportunities to access cash and cash equivalents held by non-U.S. subsidiaries have been created. In general, repatriation of cash to the U.S. can be completed with no significant incremental U.S. tax. However, to the extent that we repatriate funds from non-U.S. subsidiaries for which we assert permanent reinvestment to fund our U.S. operations, we would be required to accrue and pay applicable non-U.S. taxes. As of December 31, 2018, we currently have no plans to repatriate funds from subsidiaries for which we assert permanent reinvestment.

Share repurchases are made from time to time in accordance with management's capital allocation strategy, subject to market conditions and regulatory requirements. In February 2017, our Board of Directors authorized the repurchase of up to \$1.5 billion of our ordinary shares under a share repurchase program (the 2017 Authorization) upon completion of the prior authorized share repurchase program. Repurchases under the 2017 Authorization began in May 2017 and ended in December 2018, completing the program. In October 2018, our Board of Directors authorized the repurchase of up to \$1.5 billion of our ordinary shares upon completion of the 2017 Authorization. However, no material amounts were repurchased under this program during 2018. In June 2018, we announced an increase in our quarterly share dividend from \$0.45 to \$0.53 per ordinary share. This reflects an 18% increase that began with our September 2018 payment and an 83% increase since the beginning of 2016. We continue to be active with acquisitions and joint venture activity. Since the beginning of 2017, we entered into a joint venture and acquired several businesses, including channel acquisitions, that complement existing products and services further growing our product portfolio. In addition, we incur ongoing costs associated with restructuring initiatives intended to result in improved operating performance, profitability and working capital levels. Actions associated with these initiatives may include workforce reductions, improving manufacturing productivity, realignment of management structures and rationalizing certain assets. We expect that our available cash flow, committed credit lines and access to the capital markets will be sufficient to fund share repurchases, dividends, ongoing restructuring actions, acquisitions and joint venture activity.

Liquidity

The following table contains several key measures of our financial condition and liquidity at the periods ended December 31:

In millions	2018	2017	2016	
Cash and cash equivalents	\$903.4	\$1,549.4	\$1,714.7	
Short-term borrowings and current maturities of long-term debt ⁽¹⁾	350.6	1,107.0	360.8	
Long-term debt ⁽¹⁾	3,740.7	2,957.0	3,709.4	
Total debt	4,091.3	4,064.0	4,070.2	
Total Ingersoll-Rand plc shareholders' equity	7,022.7	7,140.3	6,643.8	
Total equity	7,064.8	7,206.9	6,718.3	
Debt-to-total capital ratio	36.7	% 36.1	% 37.7	%

(1) During the first quarter of 2018, the Company redeemed its 6.875% senior notes due 2018 and its 2.875% senior notes due 2019. In addition, the Company issued \$1.15 billion principal amount of senior notes during February 2018.

Debt and Credit Facilities

Our short-term obligations primarily consists of current maturities of long-term debt. In addition, we have outstanding \$343.0 million of fixed rate debentures that contain a put feature that the holders may exercise on each anniversary of the issuance date. If exercised, we are obligated to repay in whole or in part, at the holder's option, the outstanding principal amount (plus accrued and unpaid interest) of the debentures held by the holder. We also maintain a commercial paper program which is used for general corporate purposes. Under the program, the maximum aggregate amount of unsecured commercial paper notes available to be issued, on a private placement basis, is \$2.0 billion as of December 31, 2018. We had no commercial paper outstanding at December 31, 2018 and December 31, 2017. See Note 7 to the Consolidated Financial Statements for additional information regarding the terms of our short-term obligations.

Our long-term obligations primarily consist of long-term debt with final maturity dates ranging between 2020 and 2048. In addition, we maintain two 5-year, \$1.0 billion revolving credit facilities. Each senior unsecured credit facility, one of which matures in March 2021 and the other in April 2023, provides support for our commercial paper

program and can be used for working capital and other general corporate purposes. Total commitments of \$2.0 billion were unused at December 31, 2018 and December 31, 2017. See Note 7 and Note 21 to the Consolidated Financial Statements for additional information regarding the terms of our long-term obligations and their related guarantees.

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Pension Plans

Our investment objective in managing defined benefit plan assets is to ensure that all present and future benefit obligations are met as they come due. We seek to achieve this goal while trying to mitigate volatility in plan funded status, contribution and expense by better matching the characteristics of the plan assets to that of the plan liabilities. Our approach to asset allocation is to increase fixed income assets as the plan's funded status improves. We monitor plan funded status and asset allocation regularly in addition to investment manager performance. In addition, we monitor the impact of market conditions on our defined benefit plans on a regular basis. None of our defined benefit pension plans have experienced a significant impact on their liquidity due to the volatility in the markets. See Note 10 to the Consolidated Financial Statements for additional information regarding pensions.

Cash Flows

The following table reflects the major categories of cash flows for the years ended December 31, respectively. For additional details, please see the Consolidated Statements of Cash Flows in the Consolidated Financial Statements.

In millions	2018	2017	2016
Net cash provided by (used in) continuing operating activities	\$1,474.5	\$1,561.6	\$1,433.0
Net cash provided by (used in) investing activities	(629.4)	(374.7)	240.1
Net cash provided by (used in) financing activities	(1,378.8)	(1,432.5)	(726.9)

Operating Activities

Net cash provided by continuing operating activities for the year ended December 31, 2018 was \$1,474.5 million, of which net income provided \$1,662.0 million after adjusting for non-cash transactions. Changes in other assets and liabilities used \$187.5 million. Improvements in accounts payable were offset by higher accounts receivable and inventory balances. Net cash provided by continuing operating activities for the year ended December 31, 2017 was \$1,561.6 million, of which net income provided \$1,642.1 million after adjusting for non-cash transactions. Changes in other assets and liabilities used \$80.5 million. Improvements in accounts payable were offset by higher accounts receivable and inventory balances. Net cash provided by continuing operating activities for the year ended December 31, 2016 was \$1,433.0 million, of which net income provided \$1,449.8 million after adjusting for non-cash transactions. Changes in other assets and liabilities used \$16.8 million. Improvements in accounts payable were offset by higher accounts receivable balances.

Investing Activities

Cash flows from investing activities represents inflows and outflows regarding the purchase and sale of assets. Primary activities associated with these items include capital expenditures, proceeds from the sale of property, plant and equipment, acquisitions, investments in joint ventures and divestitures. During the year ended December 31, 2018, net cash used in investing activities from continuing operations was \$629.4 million. The primary driver of the usage is attributable to the acquisition of several businesses and the investment of a 50% ownership interest in a joint venture with Mitsubishi. The total outflow, net of cash acquired, was \$285.2 million. Other outflows included capital expenditures which totaled \$365.6 million. Net cash used in investing activities from continuing operations for the year ended December 31, 2017 was \$374.7 million. The primary driver of the outflow is attributable to capital expenditures of \$221.3 million. In addition, we acquired several businesses that complement existing products and services. Cash paid for acquisitions, net of cash acquired, was \$157.6 million during the year. During the year ended December 31, 2016, net cash provided by investing activities from continuing operations was \$240.1 million. The primary driver of the inflow is attributable to the proceeds of \$422.5 million received from the sale of our Hussmann equity interest. This amount was partially offset by capital expenditures during the year.

Financing Activities

Cash flows from financing activities represent inflows and outflows that account for external activities affecting equity and debt. Primary activities associated with these actions include paying dividends to shareholders, repurchasing our own shares, issuing our stock and debt transactions. During the year ended December 31, 2018, net cash used in financing activities from continuing operations was \$1,378.8 million. Primary drivers of the cash outflow related to the repurchase of 9.7 million ordinary shares totaling \$900.2 million and \$479.5 million of dividends paid to ordinary shareholders. In addition, we issued \$1.15 billion of senior notes which was predominately offset by the redemption of \$1.1 billion of senior notes. During the year ended December 31, 2017, net cash used in financing

activities from continuing operations was \$1,432.5 million. Primary drivers of the cash outflow related to the repurchase of 11.8 million ordinary shares totaling \$1,016.9 million and \$430.1 million of dividends paid to ordinary shareholders. Net cash used in financing activities from continuing operations for the year ended December 31, 2016 was \$726.9 million. Primary drivers of the cash outflow related to the repurchase of 4.9 million ordinary shares totaling \$250.1 million and \$348.6 million of dividends paid to ordinary shareholders. In addition, we repaid our outstanding commercial paper balance during the year.

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Discontinued Operations

Cash flows from discontinued operations primarily represent ongoing costs associated with postretirement benefits, product liability and legal costs from previously sold businesses. Net cash used in discontinued operating activities during the year ended December 31, 2018 was \$66.7 million and primarily related to ongoing costs. Net cash used in discontinued operating activities for the year ended December 31, 2017 was \$38.1 million. Ongoing costs were partially offset by asbestos-related settlements reached with various insurance carriers during the year. Net cash provided by discontinued operating activities during the year ended December 31, 2016 was \$88.9 million and included asbestos-related settlements reached with various insurance carriers during the year as well as cash proceeds on the sale of property related to a previously sold business. These amounts more than offset ongoing costs.

Capital Resources

Based on historical performance and current expectations, we believe our cash and cash equivalents balance, the cash generated from our operations, our committed credit lines and our expected ability to access capital markets will satisfy our working capital needs, capital expenditures, dividends, share repurchases, upcoming debt maturities, and other liquidity requirements associated with our operations for the foreseeable future.

Capital expenditures were \$365.6 million, \$221.3 million and \$182.7 million for the years ended December 31, 2018, 2017 and 2016, respectively. Our investments continue to improve manufacturing productivity, reduce costs, provide environmental enhancements, upgrade information technology infrastructure and security and advanced technologies for existing facilities. The capital expenditure program for 2019 is estimated to be approximately \$300 million, including amounts approved in prior periods. Many of these projects are subject to review and cancellation at our option without incurring substantial charges.

For financial market risk impacting the Company, see Item 7A. "Quantitative and Qualitative Disclosure About Market Risk."

Capitalization

In addition to cash on hand and operating cash flow, we maintain significant credit availability under our Commercial Paper Program. Our ability to borrow at a cost-effective rate under the Commercial Paper Program is contingent upon maintaining an investment-grade credit rating. As of December 31, 2018, our credit ratings were as follows:

	Short-term	Long-term
Moody's	P-2	Baa2
Standard and Poor's	A-2	BBB

The credit ratings set forth above are not a recommendation to buy, sell or hold securities and may be subject to revision or withdrawal by the assigning rating organization. Each rating should be evaluated independently of any other rating.

Our public debt does not contain financial covenants and our revolving credit lines have a debt-to-total capital covenant of 65%. As of December 31, 2018, our debt-to-total capital ratio was 36.7% and significantly beneath this limit.

Contractual Obligations

The following table summarizes our contractual cash obligations by required payment period:

In millions	Less than 1 year	1 - 3 years	3 - 5 years	More than 5 years	Total
Short-term debt	\$—	\$—	\$—	\$—	\$—
Long-term debt	350.6	(a) 740.2	715.0	2,314.7	\$4,120.5
Interest payments on long-term debt	186.5	355.1	298.6	1,394.0	2,234.2
Purchase obligations	946.0	—	—	—	946.0
Operating leases	197.1	259.4	110.6	42.7	609.8
Total contractual cash obligations	\$1,680.2	\$1,354.7	\$1,124.2	\$3,751.4	\$7,910.5

(a) Includes \$343.0 million of debt redeemable at the option of the holder. The scheduled maturities of these bonds range between 2027 and 2028.

Future expected obligations under our pension and postretirement benefit plans, income taxes, environmental, asbestos-related, and product liability matters have not been included in the contractual cash obligations table above.

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Pensions

At December 31, 2018, we had a net unfunded liability of \$698.4 million, which consists of noncurrent pension assets of \$49.9 million and current and non-current pension benefit liabilities of \$748.3 million. It is our objective to contribute to the pension plans to ensure adequate funds are available in the plans to make benefit payments to plan participants and beneficiaries when required. We currently project that we will contribute approximately \$104 million to our plans worldwide in 2019. The timing and amounts of future contributions are dependent upon the funding status of the plan, which is expected to vary as a result of changes in interest rates, returns on underlying assets, and other factors. Therefore, pension contributions have been excluded from the preceding table. See Note 10 to the Consolidated Financial Statements for additional information regarding pensions.

Postretirement Benefits Other than Pensions

At December 31, 2018, we had postretirement benefit obligations of \$442.7 million. We fund postretirement benefit costs principally on a pay-as-you-go basis as medical costs are incurred by covered retiree populations. Benefit payments, which are net of expected plan participant contributions and Medicare Part D subsidy, are expected to be approximately \$46 million in 2019. Because benefit payments are not required to be funded in advance, and the timing and amounts of future payments are dependent on the cost of benefits for retirees covered by the plan, they have been excluded from the preceding table. See Note 10 to the Consolidated Financial Statements for additional information regarding postretirement benefits other than pensions.

Income Taxes

At December 31, 2018, we have total unrecognized tax benefits for uncertain tax positions of \$83.0 million and \$20.7 million of related accrued interest and penalties, net of tax. The liability has been excluded from the preceding table as we are unable to reasonably estimate the amount and period in which these liabilities might be paid. See Note 16 to the Consolidated Financial Statements for additional information regarding income taxes, including unrecognized tax benefits.

Contingent Liabilities

We are involved in various litigation, claims and administrative proceedings, including those related to environmental, asbestos-related, and product liability matters. We believe that these liabilities are subject to the uncertainties inherent in estimating future costs for contingent liabilities, and will likely be resolved over an extended period of time. Because the timing and amounts of potential future cash flows are uncertain, they have been excluded from the preceding table. See Note 20 to the Consolidated Financial Statements for additional information regarding contingent liabilities.

Critical Accounting Policies

Management's Discussion and Analysis of Financial Condition and Results of Operations are based upon our Consolidated Financial Statements, which have been prepared in accordance with accounting principles generally accepted in the United States (GAAP). The preparation of financial statements in conformity with those accounting principles requires management to use judgment in making estimates and assumptions based on the relevant information available at the end of each period. These estimates and assumptions have a significant effect on reported amounts of assets and liabilities, revenue and expenses as well as the disclosure of contingent assets and liabilities because they result primarily from the need to make estimates and assumptions on matters that are inherently uncertain. Actual results may differ from these estimates. If updated information or actual amounts are different from previous estimates, the revisions are included in our results for the period in which they become known.

The following is a summary of certain accounting estimates and assumptions made by management that we consider critical.

▲ Allowance for doubtful accounts – We maintain an allowance for doubtful accounts receivable which represents our best estimate of probable loss inherent in our accounts receivable portfolio. This estimate is based upon our two step policy that results in the total recorded allowance for doubtful accounts. The first step is to record a portfolio reserve based on the aging of the outstanding accounts receivable portfolio and our historical experience with our end markets, customer base and products. The second step is to create a specific reserve for significant accounts as to which the customer's ability to satisfy their financial obligation to us is in doubt due to circumstances such as bankruptcy, deteriorating operating results or financial position. In these circumstances, management uses its

judgment to record an allowance based on the best estimate of probable loss, factoring in such considerations as the market value of collateral, if applicable. Actual results could differ from those estimates. These estimates and assumptions are reviewed periodically, and the effects of changes, if any, are reflected in the statement of operations in the period that they are determined.

Goodwill and indefinite-lived intangible assets – We have significant goodwill and indefinite-lived intangible assets on our balance sheet related to acquisitions. These assets are tested and reviewed annually during the fourth quarter for impairment or when there is a significant change in events or circumstances that indicate that the fair value of an asset is more likely than not less than the carrying amount of the asset.

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Impairment of goodwill is assessed at the reporting unit level and begins with a qualitative assessment to determine if it is more likely than not that the fair value of each reporting unit is less than its carrying amount as a basis for determining whether it is necessary to perform the goodwill impairment test under ASC 350, "Intangibles-Goodwill and Other," (ASC 350). For those reporting units that bypass or fail the qualitative assessment, the test compares the carrying amount of the reporting unit to its estimated fair value. If the estimated fair value of a reporting unit exceeds its carrying amount, goodwill of the reporting unit is not impaired. To the extent that the carrying value of the reporting unit exceeds its estimated fair value, an impairment loss would be recognized for the amount by which the reporting unit's carrying amount exceeds its fair value, not to exceed the carrying amount of goodwill in that reporting unit.

As quoted market prices are not available for our reporting units, the calculation of their estimated fair value is determined using three valuation techniques: a discounted cash flow model (an income approach), a market-adjusted multiple of earnings and revenues (a market approach), and a similar transactions method (also a market approach). The discounted cash flow approach relies on our estimates of future cash flows and explicitly addresses factors such as timing, growth and margins, with due consideration given to forecasting risk. The earnings and revenue multiple approach reflects the market's expectations for future growth and risk, with adjustments to account for differences between the guideline publicly traded companies and the subject reporting units. The similar transactions method considers prices paid in transactions that have recently occurred in our industry or in related industries. These valuation techniques are weighted 50%, 40% and 10%, respectively.

Impairment of other intangible assets with indefinite useful lives is first assessed using a qualitative assessment to determine whether it is more likely than not that an indefinite-lived intangible asset is impaired. This assessment is used as a basis for determining whether it is necessary to calculate the fair value of an indefinite-lived intangible asset. For those indefinite-lived assets where it is required, a fair value is determined on a relief from royalty methodology (income approach) which is based on the implied royalty paid, at an appropriate discount rate, to license the use of an asset rather than owning the asset. The present value of the after-tax cost savings (i.e. royalty relief) indicates the estimated fair value of the asset. Any excess of the carrying value over the estimated fair value would be recognized as an impairment loss equal to that excess.

The determination of the estimated fair value and the implied fair value of goodwill and other indefinite-lived intangible assets requires us to make assumptions about estimated cash flows, including profit margins, long-term forecasts, discount rates and terminal growth rates. We developed these assumptions based on the market and geographic risks unique to each reporting unit. For our annual impairment testing performed during the fourth quarter of 2018, we calculated the fair value for each of the reporting units and indefinite-lived intangibles. Based on the results of these calculations and further outlined below, we determined that the fair value of the reporting units and indefinite-lived intangible assets exceeded their respective carrying values. The estimates of fair value are based on the best information available as of the date of the assessment, which primarily incorporates management assumptions about expected future cash flows.

Goodwill - Under the income approach, we assumed a forecasted cash flow period of five years with discount rates ranging from 11.0% to 14.0% and terminal growth rates ranging from 3.0% to 4.5%. Under the guideline public company method, we used an adjusted multiple ranging from 6.5 to 13.5 of projected earnings before interest, taxes, depreciation and amortization (EBITDA) based on the market information of comparable companies. Additionally, we compared the estimated aggregate fair value of our reporting units to our overall market capitalization. For all reporting units except one in Latin America, the excess of the estimated fair value over carrying value (expressed as a percentage of carrying value) was a minimum of 75%. A significant increase in the discount rate, decrease in the long-term growth rate, or substantial reductions in our end markets and volume assumptions could have a negative impact on the estimated fair value of these reporting units. The one reporting unit with a percentage of carrying value less than 75% exceeded its carrying value by 1.1%. The reporting unit, reported within the Climate segment, has approximately \$190 million of goodwill at the testing date. With all other assumptions and trends remaining constant for each independent variable, a 0.5% increase in the discount rate combined with a 0.5% decrease in the long-term growth rate would result in an approximate \$15 million impairment for this reporting unit.

Other Indefinite-lived intangible assets - In testing our other indefinite-lived intangible assets for impairment, we assumed forecasted revenues for a period of five years with discount rates ranging from 11.0% to 15.5%, terminal growth rates of 3.0%, and royalty rates ranging from 0.5% to 4.5%. For all tradenames, the excess of the estimated fair value over carrying value (expressed as a percentage of carrying value) was a minimum of 74%, with the exception of one. The tradename, reported within our Climate segment, had an excess of the estimated fair value over carrying value of approximately 19% (9% in 2017) and an approximate carrying value of \$15 million at December 31, 2018. A significant increase in the discount rate, decrease in the long-term growth rate, decrease in the royalty rate or substantial reductions in our end markets and volume assumptions could have a negative impact on the estimated fair values of any of our tradenames. In addition, the Company has three recently acquired tradenames now subject to our annual impairment test. Combined, these tradenames have a carrying value of approximately \$14 million, each with an estimated fair value over carrying value of under 10%

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as expected. Due to their recent valuation upon acquisition, small variations in our estimates and assumptions could impact their fair value.

Long-lived assets and finite-lived intangibles – Long-lived assets and finite-lived intangibles are reviewed for impairment whenever events or changes in business circumstances indicate that the carrying amount of an asset may not be fully recoverable. Assets are grouped with other assets and liabilities at the lowest level for which identifiable cash flows can be generated. Impairment in the carrying value of an asset would be recognized whenever anticipated future undiscounted cash flows from an asset are less than its carrying value. The impairment is measured as the amount by which the carrying value exceeds the fair value of the asset as determined by an estimate of discounted cash flows. Changes in business conditions could potentially require future adjustments to these valuations.

Loss contingencies – Liabilities are recorded for various contingencies arising in the normal course of business, including litigation and administrative proceedings, environmental and asbestos matters and product liability, product warranty, worker's compensation and other claims. We have recorded reserves in the financial statements related to these matters, which are developed using input derived from actuarial estimates and historical and anticipated experience data depending on the nature of the reserve, and in certain instances with consultation of legal counsel, internal and external consultants and engineers. Subject to the uncertainties inherent in estimating future costs for these types of liabilities, we believe our estimated reserves are reasonable and do not believe the final determination of the liabilities with respect to these matters would have a material effect on our financial condition, results of operations, liquidity or cash flows for any year.

Asbestos matters – Certain of our wholly-owned subsidiaries and former companies are named as defendants in asbestos-related lawsuits in state and federal courts. We record a liability for our actual and anticipated future claims as well as an asset for anticipated insurance settlements. Asbestos-related defense costs are excluded from the asbestos claims liability and are recorded separately as services are incurred. None of our existing or previously-owned businesses were a producer or manufacturer of asbestos. We record certain income and expenses associated with our asbestos liabilities and corresponding insurance recoveries within Discontinued operations, net of tax, as they relate to previously divested businesses, except for amounts associated with Trane's asbestos liabilities and corresponding insurance recoveries which are recorded within continuing operations. See Note 20 to the Consolidated Financial Statements for further information regarding asbestos-related matters.

Revenue recognition – Revenue is recognized when control of a good or service promised in a contract (i.e., performance obligation) is transferred to a customer. Control is obtained when a customer has the ability to direct the use of and obtain substantially all of the remaining benefits from that good or service. A majority of our revenues are recognized at a point-in-time as control is transferred at a distinct point in time per the terms of a contract. However, a portion of our revenues are recognized over time as the customer simultaneously receives control as we perform work under a contract. We adopted ASC 606 on January 1, 2018 using the modified retrospective approach. Refer to Note 2, "Summary of Significant Accounting Policies" and Note 11, "Revenue" for additional information related to the adoption of ASC 606.

The transaction price allocated to performance obligations reflects our expectations about the consideration we will be entitled to receive from a customer. To determine the transaction price, variable and noncash consideration are assessed as well as whether a significant financing component exists. Our contracts with customers, dealers and distributors include several forms of sales incentive programs (variable consideration) which are estimated and included in the transaction price. They include, but are not limited to, discounts, coupons, and rebates where the customer does not have to provide any additional requirements to receive the discount. We record an accrual (contra receivable) and a sales deduction for our best estimate determined using the expected value method. In addition, sales returns and customer disputes involving a question of quantity or price are also accounted for as variable consideration. All other incentives or incentive programs where the customer is required to reach a certain sales level, remain a customer for a certain period of time, provide a rebate form or is subject to additional requirements are accounted for as a reduction of revenue and establishment of a liability for our best estimate determined using the expected value method. We consider historical data in determining our best estimates of variable consideration. These estimates are reviewed regularly for appropriateness, considering also whether the estimates should be constrained in order to avoid a significant reversal of revenue recognition in a future period. If updated information or actual

amounts are different from previous estimates of variable consideration, the revisions are included in the results for the period in which they become known through a cumulative effect adjustment to revenue.

We enter into sales arrangements that contain multiple goods and services, such as equipment, installation and extended warranties. For these arrangements, each good or service is evaluated to determine whether it represents a distinct performance obligation. The total transaction price is then allocated to the distinct performance obligations based on their relative standalone selling price at the inception of the arrangement. If available, we utilize observable prices for goods or services sold separately to similar customers in similar circumstances to determine its relative standalone selling price. Otherwise, list prices are used if they are determined to be representative of standalone selling prices. If neither of these items are available at contract inception, judgment may be required and we will estimate standalone selling price based on our best estimate. We recognize revenue for delivered goods or services when the delivered good or service is distinct,

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control of the good or service has transferred to the customer, and only customary refund or return rights related to the goods or services exist.

Income taxes – Deferred tax assets and liabilities are determined based on temporary differences between financial reporting and tax bases of assets and liabilities, applying enacted tax rates expected to be in effect for the year in which the differences are expected to reverse. We recognize future tax benefits, such as net operating losses and tax credits, to the extent that realizing these benefits is considered in our judgment to be more likely than not. We regularly review the recoverability of our deferred tax assets considering our historic profitability, projected future taxable income, timing of the reversals of existing temporary differences and the feasibility of our tax planning strategies. Where appropriate, we record a valuation allowance with respect to a future tax benefit.

The provision for income taxes involves a significant amount of management judgment regarding interpretation of relevant facts and laws in the jurisdictions in which we operate. Future changes in applicable laws, projected levels of taxable income, and tax planning could change the effective tax rate and tax balances recorded by us. In addition, tax authorities periodically review income tax returns filed by us and can raise issues regarding our filing positions, timing and amount of income or deductions, and the allocation of income among the jurisdictions in which we operate. A significant period of time may elapse between the filing of an income tax return and the ultimate resolution of an issue raised by a revenue authority with respect to that return. We believe that we have adequately provided for any reasonably foreseeable resolution of these matters. We will adjust our estimate if significant events so dictate. To the extent that the ultimate results differ from our original or adjusted estimates, the effect will be recorded in the provision for income taxes in the period that the matter is finally resolved.

Employee benefit plans – We provide a range of benefits to eligible employees and retirees, including pensions, postretirement and postemployment benefits. Determining the cost associated with such benefits is dependent on various actuarial assumptions including discount rates, expected return on plan assets, compensation increases, mortality, turnover rates and healthcare cost trend rates. Actuarial valuations are performed to determine expense in accordance with GAAP. Actual results may differ from the actuarial assumptions and are generally accumulated and amortized into earnings over future periods. We review our actuarial assumptions at each measurement date and make modifications to the assumptions based on current rates and trends, if appropriate. The discount rate, the rate of compensation increase and the expected long-term rates of return on plan assets are determined as of each measurement date.

The rate of compensation increase is dependent on expected future compensation levels. The expected long-term rate of return on plan assets reflects the average rate of returns expected on the funds invested or to be invested to provide for the benefits included in the projected benefit obligation. The expected long-term rate of return on plan assets is based on what is achievable given the plan's investment policy, the types of assets held and the target asset allocation. The expected long-term rate of return is determined as of each measurement date. We believe that the assumptions utilized in recording our obligations under our plans are reasonable based on input from our actuaries, outside investment advisors and information as to assumptions used by plan sponsors.

Changes in any of the assumptions can have an impact on the net periodic pension cost or postretirement benefit cost. Estimated sensitivities to the expected 2019 net periodic pension cost of a 0.25% rate decline in the two basic assumptions are as follows: the decline in the discount rate would increase expense by approximately \$7.2 million and the decline in the estimated return on assets would increase expense by approximately \$6.7 million. A 0.25% rate decrease in the discount rate for postretirement benefits would increase expected 2019 net periodic postretirement benefit cost by \$0.7 million and a 1.0% increase in the healthcare cost trend rate would increase the service and interest cost by approximately \$0.4 million.

Recent Accounting Pronouncements

See Note 2 to the Consolidated Financial Statements for a discussion of recent accounting pronouncements.

Item 7A. QUANTITATIVE AND QUALITATIVE DISCLOSURE ABOUT MARKET RISK

We are exposed to fluctuations in currency exchange rates, interest rates and commodity prices which could impact our results of operations and financial condition.

Foreign Currency Exposures

We have operations throughout the world that manufacture and sell products in various international markets. As a result, we are exposed to movements in exchange rates of various currencies against the U.S. dollar as well as against other currencies throughout the world.

Many of our non-U.S. operations have a functional currency other than the U.S. dollar, and their results are translated into U.S. dollars for reporting purposes. Therefore, our reported results will be higher or lower depending on the weakening or strengthening of the U.S. dollar against the respective foreign currency. Our largest concentration of revenues from non-U.S. operations as of

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December 31, 2018 are in Euros and Chinese Yuan. A hypothetical 10% unfavorable change in the average exchange rate used to translate Net revenues for the year ended December 31, 2018 from either Euros or Chinese Yuan-based operations into U.S. dollars would not have a material impact on our financial statements.

We use derivative instruments to hedge those material exposures that cannot be naturally offset. The instruments utilized are viewed as risk management tools, primarily involve little complexity and are not used for trading or speculative purposes. To minimize the risk of counter party non-performance, derivative instrument agreements are made only through major financial institutions with significant experience in such derivative instruments.

We evaluate our exposure to changes in currency exchange rates on our foreign currency derivatives using a sensitivity analysis. The sensitivity analysis is a measurement of the potential loss in fair value based on a percentage change in exchange rates. Based on the firmly committed currency derivative instruments in place at December 31, 2018, a hypothetical change in fair value of those derivative instruments assuming a 10% adverse change in exchange rates would result in an unrealized loss of approximately \$17.6 million, as compared with \$58.3 million at December 31, 2017. These amounts, when realized, would be offset by changes in the fair value of the underlying transactions.

Commodity Price Exposures

We are exposed to volatility in the prices of commodities used in some of our products and we use fixed price contracts to manage this exposure. We do not have committed commodity derivative instruments in place at December 31, 2018.

Interest Rate Exposure

Our debt portfolio mainly consists of fixed-rate instruments, and therefore any fluctuation in market interest rates is not expected to have a material effect on our results of operations.

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Item 8. FINANCIAL STATEMENTS AND SUPPLEMENTARY DATA

The following Consolidated Financial Statements and Financial Statement Schedules and the report thereon of (a) PricewaterhouseCoopers LLP dated February 12, 2019, are presented under Item 16 of this Annual Report on Form 10-K.

Consolidated Financial Statements:

Report of independent registered public accounting firm

Consolidated Statements of comprehensive income for the years ended December 31, 2018, 2017 and 2016

Consolidated balance sheets at December 31, 2018 and 2017

For the years ended December 31, 2018, 2017 and 2016:

Consolidated statements of equity

Consolidated statements of cash flows

Notes to Consolidated Financial Statements

Financial Statement Schedule:

Schedule II – Valuation and Qualifying Accounts for the years ended December 31, 2018, 2017 and 2016

(b) The unaudited selected quarterly financial data for the two years ended December 31, is as follows:

In millions, except per share amounts	2018			
	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
Net revenues	\$3,384.5	\$4,357.7	\$4,030.9	\$3,895.1
Cost of goods sold	(2,420.2)	(2,964.1)	(2,718.3)	(2,745.0)
Operating income	243.4	640.3	587.0	446.7
Net earnings	124.1	452.6	519.4	261.4
Net earnings attributable to Ingersoll-Rand plc	120.4	448.1	515.1	254.0
Earnings per share attributable to Ingersoll-Rand plc ordinary shareholders:				
Basic	\$0.48	\$1.81	\$2.09	\$1.04
Diluted	\$0.48	\$1.79	\$2.06	\$1.03
	2017			
	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
Net revenues	\$3,000.6	\$3,908.4	\$3,670.5	\$3,618.1
Cost of goods sold	(2,126.1)	(2,653.1)	(2,489.9)	(2,542.5)
Operating income	215.0	557.6	506.1	386.6
Net earnings	121.1	362.2	371.9	457.1
Net earnings attributable to Ingersoll-Rand plc	117.1	358.6	367.0	459.9
Earnings per share attributable to Ingersoll-Rand plc ordinary shareholders:				
Basic	\$0.45	\$1.40	\$1.45	\$1.84
Diluted	\$0.45	\$1.38	\$1.43	\$1.81

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Item 9. CHANGES IN AND DISAGREEMENTS WITH ACCOUNTANTS ON ACCOUNTING AND FINANCIAL DISCLOSURE

None.

Item 9A. CONTROLS AND PROCEDURES

(a) Evaluation of Disclosure Controls and Procedures

The Company's management, including its Chief Executive Officer and Chief Financial Officer, have conducted an evaluation of the effectiveness of the Company's disclosure controls and procedures (as such term is defined in Rules 13a-15(e) and 15d-15(e) under the Securities Exchange Act of 1934, as amended (the Exchange Act)), as of the end of the period covered by this Annual Report on Form 10-K. Based on that evaluation, the Chief Executive Officer and Chief Financial Officer concluded as of December 31, 2018, that the Company's disclosure controls and procedures were effective in ensuring that information required to be disclosed by the Company in reports that it files or submits under the Exchange Act has been recorded, processed, summarized and reported, within the time periods specified in the Commission's rules and forms, and that such information has been accumulated and communicated to the Company's management including its Chief Executive Officer and Chief Financial Officer, as appropriate, to allow timely decisions regarding required disclosure.

(b) Management's Report on Internal Control Over Financial Reporting

The Company's management is responsible for establishing and maintaining adequate internal control over financial reporting as such term is defined under Exchange Act Rules 13a-15(f) and 15d-15(f). Internal control over financial reporting is a process designed by, or under the supervision of, the Chief Executive Officer and Chief Financial Officer and effected by the Company's Board of Directors 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.

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 and procedures may deteriorate.

Management has assessed the effectiveness of internal control over financial reporting as of December 31, 2018. In making its assessment, management has utilized the criteria set forth by the Committee of Sponsoring Organizations (COSO) of the Treadway Commission in Internal Control - Integrated Framework (2013). Management concluded that based on its assessment, the Company's internal control over financial reporting was effective as of December 31, 2018.

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

(c) Changes in Internal Control Over Financial Reporting

There were no changes in internal control over financial reporting (as defined by Rules 13a-15(f) and 15d-15(f) under the Exchange Act) that occurred during the quarter ended December 31, 2018 that have materially affected, or are reasonably likely to materially affect, the Company's internal control over financial reporting.

Item 9B. OTHER INFORMATION

On February 6, 2019, the Board of Directors of Ingersoll-Rand plc terminated the Company's Senior Executive Performance Plan effective immediately.

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PART III

Item 10. DIRECTORS, EXECUTIVE OFFICERS AND CORPORATE GOVERNANCE

The information regarding our executive officers is included in Part I under the caption “Executive Officers of Registrant.”

The other information required by this item is incorporated herein by reference to the information contained under the headings “Item 1. Election of Directors”, “Section 16(a) Beneficial Ownership Reporting Compliance” and “Corporate Governance” in our definitive proxy statement for the 2019 annual general meeting of shareholders (2019 Proxy Statement).

Item 11. EXECUTIVE COMPENSATION

The other information required by this item is incorporated herein by reference to the information contained under the headings “Compensation Discussion and Analysis,” “Compensation of Directors,” “Executive Compensation,” “Compensation Committee Report” and “Compensation Committee Interlocks and Insider Participation” in our 2019 Proxy Statement.

Item 12. SECURITY OWNERSHIP OF CERTAIN BENEFICIAL OWNERS AND MANAGEMENT AND RELATED

STOCKHOLDER MATTERS

The other information required by this item is incorporated herein by reference to the information contained under the headings “Security Ownership of Certain Beneficial Owners and Management” and “Equity Compensation Plan Information” of our 2019 Proxy Statement.

Item 13. CERTAIN RELATIONSHIPS AND RELATED TRANSACTIONS, AND DIRECTOR INDEPENDENCE

The other information required by this item is incorporated herein by reference to the information contained under the headings “Corporate Governance” and “Certain Relationships and Related Person Transactions” of our 2019 Proxy Statement.

Item 14. PRINCIPAL ACCOUNTANT FEES AND SERVICES

The information required by this item is incorporated herein by reference to the information contained under the caption “Fees of the Independent Auditors” in our 2019 Proxy Statement.

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PART IV

Item 15. EXHIBITS AND FINANCIAL STATEMENT SCHEDULES

(a) 1. and 2. Financial statements and financial statement schedule
See Item 8.

3. Exhibits
The exhibits listed on the accompanying index to exhibits are filed as part of this Annual Report on Form 10-K.

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INGERSOLL-RAND PLC

INDEX TO EXHIBITS

(Item 15(a))

Description

Pursuant to the rules and regulations of the Securities and Exchange Commission (“SEC”), Ingersoll-Rand plc (the “Company”) has filed certain agreements as exhibits to this Annual Report on Form 10-K. These agreements may contain representations and warranties by the parties. These representations and warranties have been made solely for the benefit of the other party or parties to such agreements and (i) may have been qualified by disclosures made to such other party or parties, (ii) were made only as of the date of such agreements or such other date(s) as may be specified in such agreements and are subject to more recent developments, which may not be fully reflected in our public disclosure, (iii) may reflect the allocation of risk among the parties to such agreements and (iv) may apply materiality standards different from what may be viewed as material to investors. Accordingly, these representations and warranties may not describe our actual state of affairs at the date hereof and should not be relied upon.

On July 1, 2009, Ingersoll-Rand Company Limited, a Bermuda company, completed a reorganization to change the jurisdiction of incorporation of the parent company from Bermuda to Ireland. As a result, Ingersoll-Rand plc replaced Ingersoll-Rand Company Limited as the ultimate parent company effective July 1, 2009. All references related to the Company prior to July 1, 2009 relate to Ingersoll-Rand Company Limited.

(a) Exhibits

Exhibit No.	Description	Method of Filing
2.1	<u>Separation and Distribution Agreement between Ingersoll-Rand plc and Allegion plc, dated November 29, 2013.</u>	Incorporated by reference to Exhibit 3.1 to the Company’s Form 8-K (File No. 001-34400) filed with the SEC on December 2, 2013.
3.1	<u>Constitution of the Company, as amended and restated on June 2, 2016</u>	Incorporated by reference to Exhibit 3.1 to the Company’s Form 8-K (File No. 001-34400) filed with the SEC on June 7, 2016.
	The Company and its subsidiaries are parties to several long-term debt instruments under which, in each case, the total amount of securities authorized does not exceed 10% of the total assets of the Company and its subsidiaries on a consolidated basis.	Pursuant to paragraph 4 (iii)(A) of Item 601 (b) of Regulation S-K, the Company agrees to furnish

a copy of such instruments to the Securities and Exchange Commission upon request.

4.1

Indenture, dated as of June 20, 2013, by and among Ingersoll-Rand Global Holding Company Limited, as issuer, Ingersoll-Rand plc, Ingersoll-Rand Company Limited and Ingersoll-Rand International Holding Limited, as guarantors and The Bank of New York Mellon, as Trustee.

Incorporated by reference to Exhibit 4.1 to the Company's Form 8-K (File No. 001-34400) filed with the SEC on June 26, 2013.

4.2

First Supplemental Indenture, dated as of June 20, 2013, by and among Ingersoll-Rand Global Holding Company Limited, as issuer, Ingersoll-Rand plc, Ingersoll-Rand Company Limited and Ingersoll-Rand International Holding Limited, as guarantors and The Bank of New York Mellon, as Trustee, relating to the 2.875% Senior Notes due 2019.

Incorporated by reference to Exhibit 4.2 to the Company's Form 8-K (File No. 001-34400) filed with the SEC on June 26, 2013.

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Exhibit No.	Description	Method of Filing
4.3	<u>Second Supplemental Indenture, dated as of June 20, 2013, by and among Ingersoll-Rand Global Holding Company Limited, as issuer, Ingersoll-Rand plc, Ingersoll-Rand Company Limited and Ingersoll-Rand International Holding Limited, as guarantors and The Bank of New York Mellon, as Trustee, relating to the 4.250% Senior Notes due 2023.</u>	Incorporated by reference to Exhibit 4.3 to the Company's Form 8-K (File No. 001-34400) filed with the SEC on June 26, 2013.
4.4	<u>Third Supplemental Indenture, dated as of June 20, 2013, by and among Ingersoll-Rand Global Holding Company Limited, as issuer, Ingersoll-Rand plc, Ingersoll-Rand Company Limited and Ingersoll-Rand International Holding Limited, as guarantors and The Bank of New York Mellon, as Trustee, relating to the 5.750% Senior Notes due 2043.</u>	Incorporated by reference to Exhibit 4.4 to the Company's Form 8-K (File No. 001-34400) filed with the SEC on June 26, 2013.
4.5	<u>Fourth Supplemental Indenture, dated as of November 20, 2013, among Ingersoll-Rand Global Holding Company Limited, a Bermuda company, Ingersoll-Rand Company Limited, a Bermuda company, Ingersoll-Rand International Holding Limited, a Bermuda company, Ingersoll-Rand plc, an Irish public limited company, Ingersoll-Rand Company, a New Jersey corporation, and The Bank of New York Mellon, as Trustee, to the Indenture dated as of June 20, 2013.</u>	Incorporated by reference to Exhibit 4.1 to the Company's Form 8-K (File No. 001-34400) filed with the SEC on November 26, 2013.
4.6	<u>Fifth Supplemental Indenture, dated as of October 28, 2014, by and among Ingersoll-Rand Global Holding Company Limited, as issuer, Ingersoll-Rand Company, as co-obligor, Ingersoll-Rand plc, Ingersoll-Rand Company Limited, Ingersoll-Rand International Holding Limited, Ingersoll-Rand Luxembourg Finance S.A., as guarantors, and The Bank of New York Mellon, as Trustee, to an Indenture, dated as of June 20, 2013.</u>	Incorporated by reference to Exhibit 4.5 to the Company's Form 8-K (File No. 001-34400) filed with the SEC on October 29, 2014.

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Exhibit No.	Description	Method of Filing
4.7	<u>Sixth Supplemental Indenture, dated as of December 18, 2015, by and among Ingersoll-Rand Global Holding Company Limited, as issuer, Ingersoll-Rand Company, as co-obligor, Ingersoll-Rand plc, Ingersoll-Rand International Holding Limited, Ingersoll-Rand Luxembourg Finance S.A., and Ingersoll-Rand Lux International Holding Company S.à.r.l. as guarantors, and The Bank of New York Mellon, as Trustee, to an Indenture, dated as of June 20, 2013.</u>	Incorporated by reference to Exhibit 4.21 to the Company's Form 10-K for the fiscal year ended 2015 (File No. 001-34400) filed with the SEC on February 12, 2016.
4.8	<u>Seventh Supplemental Indenture, dated as of April 5, 2016, by and among Ingersoll-Rand Global Holding company Limited, as issuer, Ingersoll-Rand Company, as co-obligor, Ingersoll-Rand plc, Ingersoll-Rand International Holding Limited, Ingersoll-Rand Luxembourg Finance S.A., Ingersoll-Rand Lux International Holding Company S.à r.l., and Ingersoll-Rand Irish Holdings Unlimited Company, as guarantors, and The Bank of New York Mellon, as Trustee, to an indenture, dated as of June 20, 2013.</u>	Incorporated by reference to Exhibit 4.19 to the Company's Form 10-K for the fiscal year ended 2016 (File No. 001-34400) filed with the SEC on February 13, 2017.
4.9	<u>Indenture, dated as of October 28, 2014, by and among Ingersoll-Rand Luxembourg Finance S.A., as issuer, and Ingersoll-Rand plc, Ingersoll-Rand Company Limited, Ingersoll-Rand International Holding Limited, Ingersoll-Rand Company and Ingersoll-Rand Global Holding Company Limited, as guarantors, and The Bank of New York Mellon, as Trustee.</u>	Incorporated by reference to Exhibit 4.1 to the Company's Form 8-K (File No. 001-34400) filed with the SEC on October 29, 2014
4.10	<u>First Supplemental Indenture, dated as of October 28, 2014, by and among Ingersoll-Rand Luxembourg Finance S.A., as issuer, and Ingersoll-Rand plc, Ingersoll-Rand Company Limited, Ingersoll-Rand International Holding Limited, Ingersoll-Rand Company and Ingersoll-Rand Global Holding Company Limited, as guarantors, and The Bank of New York Mellon, as Trustee, relating to the 2.625% Senior Notes due 2020.</u>	Incorporated by reference to Exhibit 4.2 to the Company's Form 8-K (File No. 001-34400) filed with the SEC on October 29, 2014.

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Exhibit No.	Description	Method of Filing
4.11	<u>Second Supplemental Indenture, dated as of October 28, 2014, by and among Ingersoll-Rand Luxembourg Finance S.A., as issuer, and Ingersoll-Rand plc, Ingersoll-Rand Company Limited, Ingersoll-Rand International Holding Limited, Ingersoll-Rand Company and Ingersoll-Rand Global Holding Company Limited, as guarantors, and The Bank of New York Mellon, as Trustee, relating to the 3.550% Senior Notes due 2024.</u>	Incorporated by reference to Exhibit 4.3 to the Company's Form 8-K (File No. 001-34400) filed with the SEC on October 29, 2014.
4.12	<u>Third Supplemental Indenture, dated as of October 28, 2014, by and among Ingersoll-Rand Luxembourg Finance S.A., as issuer, and Ingersoll-Rand plc, Ingersoll-Rand Company Limited, Ingersoll-Rand International Holding Limited, Ingersoll-Rand Company and Ingersoll-Rand Global Holding Company Limited, as guarantors, and The Bank of New York Mellon, as Trustee, relating to the 4.650% Senior Notes due 2044.</u>	Incorporated by reference to Exhibit 4.3 to the Company's Form 8-K (File No. 001-34400) filed with the SEC on October 29, 2014.
4.13	<u>Fourth Supplemental Indenture, dated as of December 18, 2015, by and among Ingersoll-Rand Luxembourg Finance S.A., as issuer, and Ingersoll-Rand plc, Ingersoll-Rand International Holding Limited, Ingersoll-Rand Company, Ingersoll-Rand Global Holding Company Limited, and Ingersoll-Rand Lux International Holding Company S.à.r.l. as guarantors, and The Bank of New York Mellon, as Trustee.</u>	Incorporated by reference to Exhibit 4.27 to the Company's Form 10-K for the fiscal year ended 2015 (File No. 001-34400) filed with the SEC on February 12, 2016.
4.14	<u>Fifth Supplemental Indenture, dated as of April 5, 2016, by and among Ingersoll-Rand Luxembourg Finance S.A., as Issuer, and Ingersoll-Rand plc, Ingersoll-Rand Company Limited, Ingersoll-Rand Company, Ingersoll-Rand International Holding Limited, Ingersoll-Rand Lux International Holding Company S.à r.l., Ingersoll-Rand Irish Holdings Unlimited Company, as guarantors, and The Bank of New York Mellon, as Trustee.</u>	Incorporated by reference to Exhibit 4.25 to the Company's Form 10-K for the fiscal year ended 2016 (File No. 001-34400) filed with the SEC on February 13, 2017.

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Exhibit No.	Description	Method of Filing
4.15	<u>Indenture, dated as of February 21, 2018, by and among Ingersoll-Rand Global Holding Company Limited, as issuer, Ingersoll-Rand plc, Ingersoll-Rand Luxembourg Finance S.A., Ingersoll-Rand Lux International Holding Company S.à r.l., Ingersoll-Rand Irish Holdings Unlimited Company and Ingersoll-Rand Company, as guarantors, and Wells Fargo Bank, National Association, as Trustee.</u>	Incorporated by reference to Exhibit 4.1 to the Company's Form 8-K (File No. 001-34400) filed with the SEC on February 26, 2018.
4.16	<u>First Supplemental Indenture, dated as of February 21, 2018, by and among Ingersoll-Rand Global Holding Company Limited, as issuer, Ingersoll-Rand plc, Ingersoll-Rand Luxembourg Finance S.A., Ingersoll-Rand Lux International Holding Company S.à r.l., Ingersoll-Rand Irish Holdings Unlimited Company and Ingersoll-Rand Company, as guarantors, and Wells Fargo Bank, National Association, as Trustee, relating to the 2.900% Senior Notes due 2021.</u>	Incorporated by reference to Exhibit 4.2 to the Company's Form 8-K (File No. 001-34400) filed with the SEC on February 26, 2018.
4.17	<u>Second Supplemental Indenture, dated as of February 21, 2018, by and among Ingersoll-Rand Global Holding Company Limited, as issuer, Ingersoll-Rand plc, Ingersoll-Rand Luxembourg Finance S.A., Ingersoll-Rand Lux International Holding Company S.à r.l., Ingersoll-Rand Irish Holdings Unlimited Company and Ingersoll-Rand Company, as guarantors, and Wells Fargo Bank, National Association, as Trustee, relating to the 3.750% Senior Notes due 2028.</u>	Incorporated by reference to Exhibit 4.4 to the Company's Form 8-K (File No. 001-34400) filed with the SEC on February 26, 2018.
4.18	<u>Third Supplemental Indenture, dated as of February 21, 2018, by and among Ingersoll-Rand Global Holding Company Limited, as issuer, Ingersoll-Rand plc, Ingersoll-Rand Luxembourg Finance S.A., Ingersoll-Rand Lux International Holding Company S.à r.l., Ingersoll-Rand Irish Holdings Unlimited Company and Ingersoll-Rand Company, as guarantors, and Wells Fargo Bank, National Association, as Trustee, relating to the 4.300% Senior Notes due 2048.</u>	Incorporated by reference to Exhibit 4.6 to the Company's Form 8-K (File No. 001-34400) filed with the SEC on February 26, 2018.
4.26	<u>Form of Ordinary Share Certificate of Ingersoll-Rand plc.</u>	Incorporated by reference to Exhibit 4.6 to the Company's Form S-3 (File No. 333-161334) filed with the SEC on August 13, 2009.
10.1*	<u>Form of Global Stock Option Award Agreement (June 2018).</u>	Incorporated by reference to Exhibit 10.1 to the Company's Form 8-K (File No. 001-34400) filed with the SEC on June 12, 2018.

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Exhibit No.	Description	Method of Filing
10.2*	<u>Form of Global Restricted Stock Unit Award Agreement (June 2018).</u>	Incorporated by reference to Exhibit 10.2 to the Company's Form 8-K (File No. 001-34400) filed with the SEC on June 12, 2018.
10.3*	<u>Form of Global Performance Stock Unit Award Agreement (June 2018).</u>	Incorporated by reference to Exhibit 10.3 to the Company's Form 8-K (File No. 001-34400) filed with the SEC on June 12, 2018.
10.4	<u>Credit Agreement dated March 15, 2016 among Ingersoll-Rand Global Holding Company Limited, Ingersoll-Rand plc, Ingersoll-Rand Luxembourg Finance S.A., Ingersoll-Rand Lux International Holding Company S.à r.l., Ingersoll-Rand International Holding Limited, Ingersoll-Rand Company, JPMorgan Chase Bank, N.A., as Administrative Agent, Citibank, N.A., as Syndication Agent, Bank of America, N.A., BNP Paribas, Deutsche Bank Securities, Inc., Goldman Sachs Bank USA, Mizuho Bank, Ltd., and The Bank of Tokyo-Mitsubishi UFJ, Ltd. as Documentation Agents, and JPMorgan Chase Bank, N.A. and Citigroup Global Markets Inc., as joint lead arrangers and joint bookrunners, and certain lending institutions from time to time parties thereto.</u>	Incorporated by reference to Exhibit 10.1 to the Company's Form 8-K (File No. 001-34400) filed with the SEC on March 17, 2016.
10.5	<u>Supplemental Guarantee dated as of April 5, 2016 made by Ingersoll-Rand Irish Holdings Unlimited Company in favor of JPMorgan Chase Bank, N.A., as Administrative Agent for the Banks that are parties to the Credit Agreement dated as of March 15, 2016.</u>	Incorporated by reference to Exhibit 10.8 to the Company's Form 10-K for the fiscal year ended 2017 (File No. 001-34400)

filed with the
SEC on
February 13,
2017.

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Exhibit No.	Description	Method of Filing
10.6	<u>Credit Agreement dated April 17, 2018 among Ingersoll-Rand Global Holding Company Limited, Ingersoll-Rand plc, Ingersoll-Rand Luxembourg Finance S.A., Ingersoll-Rand Lux International Holding Company S.à r.l., Ingersoll-Rand Irish Holdings Unlimited Company, Ingersoll-Rand Company, JPMorgan Chase Bank, N.A., as Administrative Agent, Citibank, N.A., as Syndication Agent, Bank of America, N.A., BNP Paribas, Deutsche Bank Securities Inc., Goldman Sachs Bank USA, Mizuho Bank, Ltd., and MUFG Bank Ltd. as Documentation Agents, and JPMorgan Chase Bank, N.A. and Citigroup Global Markets Inc., as joint lead arrangers and joint bookrunners, and certain lending institutions from time to time parties thereto.</u>	Incorporated by reference to Exhibit 10.1 to the Company's Form 8-K (File No. 001-34400) filed with the SEC on April 19, 2018.
10.7	<u>Deed Poll Indemnity of Ingersoll-Rand plc, an Irish public limited company, as to the directors, secretary and officers and senior executives of Ingersoll-Rand plc and the directors and officers of Ingersoll-Rand plc's subsidiaries.</u>	Incorporated by reference to Exhibit 10.5 to the Company's Form 8-K (File No. 001-34400) filed with the SEC on July 1, 2009.
10.8	<u>Tax Sharing Agreement, dated as of July 16, 2007, by and among American Standard Companies Inc. and certain of its subsidiaries and WABCO Holdings Inc. and certain of its subsidiaries.</u>	Incorporated by reference to Exhibit 10.1 to Trane Inc.'s Form 8-K (File No. 001-11415) filed with the SEC on July 20, 2007.
10.9	<u>Tax Matters Agreement between Ingersoll-Rand plc and Allegion plc, dated November 30, 2013.</u>	Incorporated by reference to Exhibit 10.2 to the Company's Form 8-K (File No. 001-34400) filed with the SEC on December 2, 2013.
10.10*	<u>Ingersoll-Rand plc Incentive Stock Plan of 2013.</u>	Incorporated by reference to Exhibit 4.5 to the Company's

Form S-8 (File No. 333-189446) filed with the SEC on June 19, 2013.

10.11* Ingersoll-Rand plc Incentive Stock Plan of 2018.

Incorporated by reference to Exhibit 4.3 to the Company's Form S-8 (File No. 333-225575) filed with the SEC on June 12, 2018.

10.12* IR Executive Deferred Compensation Plan (as amended and restated effective January 1, 2017).

Incorporated by reference to Exhibit 10.1 to the Company's Form 10-Q for the quarter ended June 30, 2017 (File No. 001-34400) filed with the SEC on July 26, 2017.

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Exhibit No.	Description	Method of Filing
10.13*	<u>IR Executive Deferred Compensation Plan II (as amended and restated effective January 1, 2017).</u>	Incorporated by reference to Exhibit 10.2 to the Company's Form 10-Q for the quarter ended June 30, 2017 (File No. 001-34400) filed with the SEC on July 26, 2017.
10.14*	<u>First Amendment to IR Executive Deferred Compensation Plan II (dated December 22, 2009).</u>	Incorporated by reference to Exhibit 10.19 to the Company's Form 10-K for the fiscal year ended 2011 (File No. 001-34400) filed with the SEC on February 21, 2012.
10.15*	<u>Second Amendment to IR Executive Deferred Compensation Plan II (dated December 23, 2010).</u>	Incorporated by reference to Exhibit 10.20 to the Company's Form 10-K for the fiscal year ended 2011 (File No. 001-16831) filed with the SEC on February 21, 2012.
10.16*	<u>IR-plc Director Deferred Compensation and Stock Award Plan (as amended and restated effective July 1, 2009).</u>	Incorporated by reference to Exhibit 10.11 to the Company's Form 8-K (File No. 001-34400) filed with the SEC on July 1, 2009.
10.17*	<u>IR-plc Director Deferred Compensation and Stock Award Plan II (as amended and restated effective July 1, 2009).</u>	Incorporated by reference to Exhibit 10.12 to the Company's Form 8-K (File No. 001-34400) filed with the SEC on July 1, 2009.
10.18*	<u>Ingersoll-Rand Company Supplemental Employee Savings Plan (amended and restated effective October 1, 2012).</u>	Incorporated by reference to exhibit 10.23 to the Company's Form 10-K for the fiscal year ended 2012 (File No. 001-34400) filed with the SEC on February 14, 2013.
10.19*	<u>Amendment to the Ingersoll-Rand Company Supplemental Employee Savings Plan dated April 6, 2017.</u>	Incorporated by reference to Exhibit 10.21 to the Company's Form 10-K (File No. 001-34400) filed with the SEC on February 12, 2018.
10.20*	<u>Ingersoll-Rand Company Supplemental Employee Savings Plan II (effective January 1, 2005 and amended and restated through October 1, 2012).</u>	Incorporated by reference to exhibit 10.24 to the Company's Form 10-K for the fiscal year ended 2012 (File No. 001-34400) filed with the SEC on February 14, 2013.
10.21*	<u>Amendment to the Ingersoll-Rand Company Supplemental Employee Savings Plan II dated April 6, 2017.</u>	Incorporated by reference to Exhibit 10.23 to the Company's Form 10-K (File No. 001-34400) filed with the SEC on February 12, 2018.
10.22*	<u>Trane Inc. Deferred Compensation Plan (as amended and restated as of July 1, 2009, except where otherwise stated).</u>	Incorporated by reference to Exhibit 10.19 to the Company's Form 8-K (File No. 001-34400) filed with the SEC on July 1, 2009.
10.23*	<u>Amendment to Trane Inc. Deferred Compensation Plan dated April 6, 2017.</u>	Incorporated by reference to Exhibit 10.25 to the Company's Form 10-K (File No. 001-34400) filed with

the SEC on February 12, 2018.

10.24* Ingersoll-Rand Company Supplemental Pension Plan (Amended and Restated Effective January 1, 2005).

Incorporated by reference to Exhibit 10.28 to the Company's Form 10-K for the fiscal year ended 2008 (File No. 001-16831) filed with the SEC on March 2, 2009.

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Exhibit No.	Description	Method of Filing
10.25*	<u>First Amendment to the Ingersoll-Rand Company Supplemental Pension Plan, dated as of July 1, 2009.</u>	Incorporated by reference to Exhibit 10.21 to the Company's Form 8-K (File No. 001-34400) filed with the SEC on July 1, 2009.
10.26*	<u>Ingersoll-Rand Company Elected Officers Supplemental Plan (Effective January 1, 2005 and Amended and Restated effective October 1, 2012).</u>	Incorporated by reference to exhibit 10.32 to the Company's Form 10-K for the fiscal year ended 2012 (File No. 001-34400) filed with the SEC on February 14, 2013.
10.27*	<u>Ingersoll-Rand Company Key Management Supplemental Program (Effective January 1, 2005 and Amended and Restated effective October 1, 2012).</u>	Filed herewith.
10.28*	<u>First Amendment to the Ingersoll Rand Company Key Management Supplemental Program, dated as of June 15, 2015.</u>	Filed herewith.
10.29*	<u>Description of Annual Incentive Matrix Program.</u>	Incorporated by reference to Exhibit 10.30 to the Company's Form 10-K (File No. 001-34400) filed with the SEC on February 12, 2018.
10.30*	<u>Form of Tier 1 Change in Control Agreement (Officers before May 19, 2009).</u>	Incorporated by reference to Exhibit 99.1 to the Company's Form 8-K (File No. 001-16831) filed with the SEC on December 4, 2006.
10.31*	<u>Form of Tier 2 Change in Control Agreement (Officers before May 19, 2009).</u>	Incorporated by reference to Exhibit 99.2 to the Company's Form 8-K (File No. 001-16831) filed with the SEC on December 4, 2006.
10.32*	<u>Form of Tier 1 Change in Control Agreement (New Officers on or after May 19, 2009).</u>	Incorporated by reference to Exhibit 10.32 to the Company's Form 10-Q for the period ended June 30, 2009 (File No. 001-34400) filed with the SEC on August 6, 2009.
10.33*	<u>Form of Tier 2 Change in Control Agreement (New Officers on or after May 19, 2009).</u>	Incorporated by reference to Exhibit 10.33 to the Company's Form 10-Q for the period ended June 30, 2009 (File No. 001-34400) filed with the SEC on August 6, 2009.
10.34*	<u>Amended and Restated Major Restructuring Severance Plan (as amended and restated effective December 31, 2014).</u>	Incorporated by reference to Exhibit 10.35 to the Company's Form 10-K for the fiscal year ended 2014 (File No. 001-34400) filed with the SEC on February 13, 2015.
10.35*		

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Michael W. Lamach Letter, dated December 24, 2003.

Incorporated by reference to Exhibit 10.35 to the Company's Form 10-K for the fiscal year ended 2003 (File No. 001-16831) filed with the SEC on February 27, 2004.

10.36* Michael W. Lamach Letter, dated June 4, 2008.

Incorporated by reference to Exhibit 10.2 to the Company's Form 8-K (File No. 001-16831) filed with the SEC on June 10, 2008.

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Exhibit No.	Description	Method of Filing
10.37*	<u>Michael W. Lamach Letter, dated February 4, 2009.</u>	Incorporated by reference to Exhibit 10.43 to the Company's Form 10-K for the fiscal year ended 2008 (File No. 001-16831) filed with the SEC on March 2, 2009.
10.38*	<u>Michael W. Lamach Letter, dated February 3, 2010.</u>	Incorporated by reference to Exhibit 10.1 to the Company's Form 8-K (File No. 001-34400) filed with the SEC on February 5, 2010.
10.39*	<u>Michael W. Lamach Letter, dated December 23, 2012.</u>	Incorporated by reference to exhibit 10.48 to the Company's Form 10-K for the fiscal year ended 2012 (File No. 001-34400) filed with the SEC on February 14, 2013.
10.40*	<u>Marcia J. Avedon Letter, dated January 8, 2007.</u>	Incorporated by reference to Exhibit 10.45 to the Company's Form 10-K for the fiscal year ended December 31, 2006 (File No. 001-16831) filed with the SEC on March 1, 2007.
10.41*	<u>Marcia J. Avedon Letter, dated December 20, 2012.</u>	Incorporated by reference to exhibit 10.53 to the Company's Form 10-K for the fiscal year ended 2012 (File No. 001-34400) filed with the SEC on February 14, 2013.
10.42*	<u>Susan K. Carter Letter, dated as of August 19, 2013.</u>	Incorporated by reference to Exhibit 10.1 to the Company's Form 8-K (File No. 001-34400) filed with the SEC on October 2, 2013.
10.43*	<u>Maria Green Letter, dated as of September 22, 2015.</u>	Filed herewith.
10.44*	<u>Dave Regnery Letter, dated as of September 1, 2017.</u>	Filed herewith.
10.45*	<u>Employee Matters Agreement between Ingersoll-Rand plc and Allegion plc, dated November 30, 2013.</u>	Incorporated by reference to Exhibit 10.1 to the Company's Form 8-K (File No. 001-34400) filed with the SEC on December 2, 2013.
21	<u>List of Subsidiaries of Ingersoll-Rand plc.</u>	Filed herewith.
23.1	<u>Consent of Independent Registered Public Accounting Firm.</u>	Filed herewith.
31.1	<u>Certification of Chief Executive Officer Pursuant to Rule 13a-14(a) or Rule 15d-14(a), as Adopted Pursuant to Section 302 of the Sarbanes-Oxley Act of 2002.</u>	Filed herewith.

31.2 Certification of Chief Financial Officer Pursuant to Rule 13a-14(a) or Rule 15d-14(a), as Adopted Pursuant to Section 302 of the Sarbanes-Oxley Act of 2002. Filed herewith.

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Exhibit No.	Description	Method of Filing
32	<u>Certifications of Chief Executive Officer and Chief Financial Officer Pursuant to Rule 13a-14(b) or Rule 15d-14(b) and 18 U.S.C. Section 1350, as Adopted Pursuant to Section 906 of the Sarbanes-Oxley Act of 2002.</u>	Furnished herewith.
101	The following materials from the Company’s Annual Report on Form 10-K for the year ended December 31, 2018, formatted in XBRL (Extensible Business Reporting Language): (i) the Consolidated Statements of Comprehensive Income, (ii) the Consolidated Balance Sheets, (iii) the Consolidated Statements of Equity, (iv) the Consolidated Statements of Cash Flows, and (v) Notes to Consolidated Financial Statements.	Furnished herewith.
	* Management contract or compensatory plan or arrangement.	

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Item 16. FORM 10-K SUMMARY

Not applicable.

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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.

INGERSOLL-RAND PLC

(Registrant)

By: /s/ Michael W. Lamach
Michael W. Lamach
Chairman of the Board and Chief Executive Officer

Date: February 12, 2019

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Pursuant to the requirement of the Securities Exchange Act of 1934, this report has been signed by the following persons on behalf of the registrant and in the capacities and on the dates indicated.

Signature	Title	Date
/s/ Michael W. Lamach (Michael W. Lamach)	Chairman of the Board and Chief Executive Officer (Principal Executive Officer)	February 12, 2019
/s/ Susan K. Carter (Susan K. Carter)	Senior Vice President and Chief Financial Officer (Principal Financial Officer)	February 12, 2019
/s/ Christopher J. Kuehn (Christopher J. Kuehn)	Vice President and Chief Accounting Officer (Principal Accounting Officer)	February 12, 2019
/s/ Kirk E. Arnold (Kirk E. Arnold)	Director	February 12, 2019
/s/ Ann C. Berzin (Ann C. Berzin)	Director	February 12, 2019
/s/ John Bruton (John Bruton)	Director	February 12, 2019
/s/ Jared L. Cohon (Jared L. Cohon)	Director	February 12, 2019
/s/ Gary D. Forsee (Gary D. Forsee)	Director	February 12, 2019
/s/ Linda P. Hudson (Linda P. Hudson)	Director	February 12, 2019
/s/ Myles P. Lee (Myles P. Lee)	Director	February 12, 2019
/s/ Karen B. Peetz (Karen B. Peetz)	Director	February 12, 2019

/s/ John P. Surma (John P. Surma)	Director	February 12, 2019
/s/ Richard J. Swift (Richard J. Swift)	Director	February 12, 2019
/s/ Tony L. White (Tony L. White)	Director	February 12, 2019

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INGERSOLL-RAND PLC

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Report of Independent Registered Public Accounting Firm

To the Shareholders and Board of Directors of Ingersoll-Rand plc

Opinions on the Financial Statements and Internal Control over Financial Reporting

We have audited the accompanying consolidated balance sheets of Ingersoll-Rand plc and its subsidiaries (the “Company”) as of December 31, 2018 and 2017, and the related consolidated statements of comprehensive income, of equity and of cash flows for each of the three years in the period ended December 31, 2018, including the related notes and schedule of valuation and qualifying accounts for each of the three years in the period ended December 31, 2018 appearing under Item 16 (collectively referred to as the “consolidated financial statements”). We also have audited the Company's internal control over financial reporting as of December 31, 2018, based on criteria established in Internal Control - Integrated Framework (2013) issued by the Committee of Sponsoring Organizations of the Treadway Commission (COSO).

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

Basis for Opinions

The Company's management is responsible for these consolidated financial statements, for maintaining effective internal control over financial reporting, and for its assessment of the effectiveness of internal control over financial reporting, included in Management's Report on Internal Control over Financial Reporting appearing under Item 9A. Our responsibility is to express opinions on the Company's consolidated financial statements and on the Company's internal control over financial reporting based on our audits. We are a public accounting firm registered with the Public Company Accounting Oversight Board (United States) (PCAOB) and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

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

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

Definition and Limitations of Internal Control over Financial Reporting

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

prevention or timely detection of unauthorized acquisition, use, or disposition of the company's assets that could have a material effect on the financial statements.

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

/s/ PricewaterhouseCoopers LLP

Charlotte, North Carolina

February 12, 2019

We have served as the Company's auditor since at least 1906. We have not been able to determine the specific year we began serving as auditor of the Company.

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Ingersoll-Rand plc

Consolidated Statements of Comprehensive Income

In millions, except per share amounts

For the years ended December 31,

	2018	2017	2016
Net revenues	\$15,668.2	\$14,197.6	\$13,508.9
Cost of goods sold	(10,847.6)	(9,811.6)	(9,307.9)
Selling and administrative expenses	(2,903.2)	(2,720.7)	(2,597.8)
Operating income	1,917.4	1,665.3	1,603.2
Interest expense	(220.7)	(215.8)	(221.5)
Other income/(expense), net	(36.4)	(31.6)	359.6
Earnings before income taxes	1,660.3	1,417.9	1,741.3
Provision for income taxes	(281.3)	(80.2)	(281.5)
Earnings from continuing operations	1,379.0	1,337.7	1,459.8
Discontinued operations, net of tax	(21.5)	(25.4)	32.9
Net earnings	1,357.5	1,312.3	1,492.7
Less: Net earnings attributable to noncontrolling interests	(19.9)	(9.7)	(16.5)
Net earnings attributable to Ingersoll-Rand plc	\$1,337.6	\$1,302.6	\$1,476.2
Amounts attributable to Ingersoll-Rand plc ordinary shareholders:			
Continuing operations	\$1,359.1	\$1,328.0	\$1,443.3
Discontinued operations	(21.5)	(25.4)	32.9
Net earnings	\$1,337.6	\$1,302.6	\$1,476.2
Earnings (loss) per share attributable to Ingersoll-Rand plc ordinary shareholders:			
Basic:			
Continuing operations	\$5.50	\$5.21	\$5.57
Discontinued operations	(0.09)	(0.10)	0.13
Net earnings	\$5.41	\$5.11	\$5.70
Diluted:			
Continuing operations	\$5.43	\$5.14	\$5.52
Discontinued operations	(0.08)	(0.09)	0.13
Net earnings	\$5.35	\$5.05	\$5.65

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Ingersoll-Rand plc

Consolidated Statements of Comprehensive Income (continued)

In millions, except per share amounts

For the years ended December 31,

	2018	2017	2016
Net earnings	\$1,357.5	\$1,312.3	\$1,492.7
Other comprehensive income (loss):			
Currency translation	(230.6)	450.3	(233.8)
Cash flow hedges			
Unrealized net gains (losses) arising during period	1.2	(1.8)	2.2
Net gains (losses) reclassified into earnings	0.9	3.6	(4.8)
Tax (expense) benefit	(0.1)	—	0.4
Total cash flow hedges, net of tax	2.0	1.8	(2.2)
Pension and OPEB adjustments:			
Prior service costs for the period	(16.0)	(3.8)	(6.2)
Net actuarial gains (losses) for the period	12.8	39.6	23.6
Amortization reclassified into earnings	50.7	52.1	57.5
Settlements/curtailments reclassified to earnings	2.5	7.7	2.1
Currency translation and other	7.5	(15.4)	22.5
Tax (expense) benefit	(17.2)	(20.1)	(23.5)
Total pension and OPEB adjustments, net of tax	40.3	60.1	76.0
Other comprehensive income (loss), net of tax	(188.3)	512.2	(160.0)
Comprehensive income, net of tax	\$1,169.2	\$1,824.5	\$1,332.7
Less: Comprehensive income attributable to noncontrolling interests	(16.9)	(10.2)	(26.1)
Comprehensive income attributable to Ingersoll-Rand plc	\$1,152.3	\$1,814.3	\$1,306.6

See accompanying notes to Consolidated Financial Statements.

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Ingersoll-Rand plc
 Consolidated Balance Sheets
 In millions, except share amounts

December 31,	2018	2017
ASSETS		
Current assets:		
Cash and cash equivalents	\$903.4	\$1,549.4
Accounts and notes receivable, net	2,679.2	2,477.4
Inventories, net	1,677.8	1,555.4
Other current assets	471.6	536.9
Total current assets	5,732.0	6,119.1
Property, plant and equipment, net	1,730.8	1,551.3
Goodwill	5,959.5	5,935.7
Intangible assets, net	3,634.7	3,742.9
Other noncurrent assets	857.9	824.3
Total assets	\$17,914.9	\$18,173.3
LIABILITIES AND EQUITY		
Current liabilities:		
Accounts payable	\$1,705.3	\$1,556.1
Accrued compensation and benefits	531.6	509.7
Accrued expenses and other current liabilities	1,728.2	1,655.2
Short-term borrowings and current maturities of long-term debt	350.6	1,107.0
Total current liabilities	4,315.7	4,828.0
Long-term debt	3,740.7	2,957.0
Postemployment and other benefit liabilities	1,192.9	1,285.3
Deferred and noncurrent income taxes	538.4	757.5
Other noncurrent liabilities	1,062.4	1,138.6
Total liabilities	10,850.1	10,966.4
Equity:		
Ingersoll-Rand plc shareholders' equity		
Ordinary shares, \$1 par value (266,405,347 and 273,980,824 shares issued at December 31, 2018 and 2017, respectively)	266.4	274.0
Ordinary shares held in treasury, at cost (24,500,054 and 24,501,667 shares at December 31, 2018 and 2017, respectively)	(1,719.4)	(1,719.4)
Capital in excess of par value	—	461.3
Retained earnings	9,439.8	8,903.2
Accumulated other comprehensive loss	(964.1)	(778.8)
Total Ingersoll-Rand plc shareholders' equity	7,022.7	7,140.3
Noncontrolling interest	42.1	66.6
Total equity	7,064.8	7,206.9
Total liabilities and equity	\$17,914.9	\$18,173.3
See accompanying notes to Consolidated Financial Statements.		

Ingersoll-Rand plc
Consolidated Statements of Equity

In millions, except per share amounts	Total equity	Ingersoll-Rand plc shareholders' equity				Retained earnings	Accumulated other comprehensive income (loss)	Noncontrolling Interest
		Ordinary shares Amount	Ordinary shares Shares	Ordinary shares held in treasury, at cost	Capital in excess of par value			
Balance at December 31, 2015	\$5,879.2	\$269.0	269.0	\$(452.6)	\$223.3	\$6,897.9	\$(1,120.9)	\$ 62.5
Net earnings	1,492.7	—	—	—	—	1,476.2	—	16.5
Other comprehensive income (loss)	(160.0)	—	—	—	—	—	(169.6)	9.6
Shares issued under incentive stock plans	60.4	2.7	2.7	—	57.7	—	—	—
Repurchase of ordinary shares	(250.1)	—	—	(250.1)	—	—	—	—
Share-based compensation	61.6	—	—	—	66.0	(4.4)	—	—
Dividends declared to noncontrolling interest	(14.1)	—	—	—	—	—	—	(14.1)
Cash dividends declared (\$1.36 per share)	(351.0)	—	—	—	—	(351.0)	—	—
Other	(0.4)	—	—	—	(0.5)	0.1	—	—
Balance at December 31, 2016	\$6,718.3	\$271.7	271.7	\$(702.7)	\$346.5	\$8,018.8	\$(1,290.5)	\$ 74.5
Net earnings	1,312.3	—	—	—	—	1,302.6	—	9.7
Other comprehensive income (loss)	512.2	—	—	—	—	—	511.7	0.5
Shares issued under incentive stock plans	51.2	2.3	2.3	—	48.9	—	—	—
Repurchase of ordinary shares	(1,016.9)	—	—	(1,016.9)	—	—	—	—
Share-based compensation	67.9	—	—	—	70.8	(2.9)	—	—
Dividends declared to noncontrolling interest	(15.8)	—	—	—	—	—	—	(15.8)
Adoption of ASU 2016-09 (See Note 2)	15.1	—	—	—	—	15.1	—	—
Acquisition/divestiture of noncontrolling interest	(7.3)	—	—	—	(5.0)	—	—	(2.3)
Cash dividends declared (\$1.70 per share)	(430.2)	—	—	—	—	(430.2)	—	—
Other	0.1	—	—	0.2	0.1	(0.2)	—	—
Balance at December 31, 2017	\$7,206.9	\$274.0	274.0	\$(1,719.4)	\$461.3	\$8,903.2	\$(778.8)	\$ 66.6
Net earnings	1,357.5	—	—	—	—	1,337.6	—	19.9
Other comprehensive income (loss)	(188.3)	—	—	—	—	—	(185.3)	(3.0)
Shares issued under incentive stock plans	43.1	2.1	2.1	—	41.0	—	—	—
Repurchase of ordinary shares	(900.2)	(9.7)	(9.7)	—	(581.2)	(309.3)	—	—
Share-based compensation	74.7	—	—	—	78.8	(4.1)	—	—
Dividends declared to noncontrolling interest	(41.4)	—	—	—	—	—	—	(41.4)
Adoption of ASU 2014-09 (See Note 2)	2.4	—	—	—	—	2.4	—	—

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Adoption of ASU 2016-16 (See Note 2)	(9.1)	—	—	—	—	(9.1)	—	—
Cash dividends declared (\$1.96 per share)	(480.8)	—	—	—	—	(480.8)	—	—
Other	—	—	—	—	0.1	(0.1)	—	—
Balance at December 31, 2018	\$7,064.8	\$266.4	266.4	\$(1,719.4)	\$—	\$9,439.8	\$(964.1)	\$ 42.1

See accompanying notes to Consolidated Financial Statements.

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Ingersoll-Rand plc
Consolidated Statements of Cash Flows
In millions

For the years ended December 31,	2018	2017	2016
Cash flows from operating activities:			
Net earnings	\$1,357.5	\$1,312.3	\$1,492.7
Discontinued operations, net of tax	21.5	25.4	(32.9)
Adjustments for non-cash transactions:			
Asset impairment	—	8.4	—
Depreciation and amortization	361.5	353.3	352.2
Gain on sale of Hussmann equity investment	—	—	(397.8)
Gain on sale of joint venture	—	(1.5)	—
Other non-cash items, net	(78.5)	(55.8)	35.6
Changes in other assets and liabilities			
Accounts and notes receivable	(236.0)	(156.7)	(101.3)
Inventories	(169.9)	(112.4)	26.8
Other current and noncurrent assets	35.3	(206.8)	(24.5)
Accounts payable	120.7	167.2	103.6
Other current and noncurrent liabilities	62.4	228.2	(21.4)
Net cash provided by (used in) continuing operating activities	1,474.5	1,561.6	1,433.0
Net cash provided by (used in) discontinued operating activities	(66.7)	(38.1)	88.9
Net cash provided by (used in) operating activities	1,407.8	1,523.5	1,521.9
Cash flows from investing activities:			
Capital expenditures	(365.6)	(221.3)	(182.7)
Acquisitions and equity method investments, net of cash acquired	(285.2)	(157.6)	(9.2)
Proceeds from sale of property, plant and equipment	22.1	1.5	9.5
Proceeds from sale of Hussmann equity investment	—	—	422.5
Other investing activities, net	(0.7)	2.7	—
Net cash provided by (used in) investing activities	(629.4)	(374.7)	240.1
Cash flows from financing activities:			
Short-term borrowings (payments), net	(6.4)	(4.0)	(150.7)
Proceeds from long-term debt	1,147.0	—	—
Payments of long-term debt	(1,123.0)	(7.7)	—
Net proceeds (repayments) of debt	17.6	(11.7)	(150.7)
Debt issuance costs	(12.0)	(0.2)	(2.1)
Dividends paid to ordinary shareholders	(479.5)	(430.1)	(348.6)
Dividends paid to noncontrolling interests	(41.4)	(15.8)	(14.1)
Acquisition of noncontrolling interest	—	(6.8)	—
Proceeds from shares issued under incentive plans	68.9	76.7	62.9
Repurchase of ordinary shares	(900.2)	(1,016.9)	(250.1)
Other financing activities, net	(32.2)	(27.7)	(24.2)
Net cash provided by (used in) financing activities	(1,378.8)	(1,432.5)	(726.9)
Effect of exchange rate changes on cash and cash equivalents	(45.6)	118.4	(57.2)
Net increase (decrease) in cash and cash equivalents	(646.0)	(165.3)	977.9
Cash and cash equivalents – beginning of period	1,549.4	1,714.7	736.8
Cash and cash equivalents – end of period	\$903.4	\$1,549.4	\$1,714.7
Cash paid during the year for:			
Interest	\$200.6	\$210.0	\$209.3

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Income taxes, net of refunds	\$375.4	\$286.7	\$334.3
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See accompanying notes to Consolidated Financial Statements.

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NOTES TO CONSOLIDATED FINANCIAL STATEMENTS

NOTE 1. DESCRIPTION OF COMPANY

Ingersoll-Rand plc (Plc or Parent Company), a public limited company incorporated in Ireland in 2009, and its consolidated subsidiaries (collectively, we, our, the Company) is a diversified, global company that provides products, services and solutions to enhance the quality, energy efficiency and comfort of air in homes and buildings, transport and protect food and perishables and increase industrial productivity and efficiency. The Company's business segments consist of Climate and Industrial, both with strong brands and highly differentiated products within their respective markets. The Company generates revenue and cash primarily through the design, manufacture, sale and service of a diverse portfolio of industrial and commercial products that include well-recognized, premium brand names such as Ingersoll-Rand®, Trane®, Thermo King®, American Standard®, ARO®, and Club Car®.

NOTE 2. SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES

A summary of significant accounting policies used in the preparation of the accompanying Consolidated Financial Statements follows:

Basis of Presentation: The accompanying Consolidated Financial Statements reflect the consolidated operations of the Company and have been prepared in accordance with U.S. Generally Accepted Accounting Principles (GAAP) as defined by the Financial Accounting Standards Board (FASB) within the FASB Accounting Standards Codification (ASC). Intercompany accounts and transactions have been eliminated. The assets, liabilities, results of operations and cash flows of all discontinued operations have been separately reported as discontinued operations for all periods presented. Certain reclassifications of amounts reported in prior periods have been made to conform with the current period presentation. The Company has revised its supplemental cash flow information in prior years to properly reflect cash paid during the year for interest.

The Consolidated Financial Statements include all majority-owned subsidiaries of the Company. A noncontrolling interest in a subsidiary is considered an ownership interest in a majority-owned subsidiary that is not attributable to the parent. The Company includes Noncontrolling interest as a component of Total equity in the Consolidated Balance Sheet and the Net earnings attributable to noncontrolling interests are presented as an adjustment from Net earnings used to arrive at Net earnings attributable to Ingersoll-Rand plc in the Consolidated Statement of Comprehensive Income. Partially-owned equity affiliates represent 20-50% ownership interests in investments where the Company demonstrates significant influence, but does not have a controlling financial interest. Partially-owned equity affiliates are accounted for under the equity method.

Use of Estimates: The preparation of financial statements in conformity with GAAP requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities and the disclosures of contingent assets and liabilities at the date of the financial statements as well as the reported amounts of revenues and expenses during the reporting period. Estimates are based on several factors including the facts and circumstances available at the time the estimates are made, historical experience, risk of loss, general economic conditions and trends, and the assessment of the probable future outcome. Actual results could differ from those estimates. Estimates and assumptions are reviewed periodically, and the effects of changes, if any, are reflected in the statement of operations in the period that they are determined.

Currency Translation: Assets and liabilities of non-U.S. subsidiaries, where the functional currency is not the U.S. dollar, have been translated at year-end exchange rates, and income and expense accounts have been translated using average exchange rates throughout the year. Adjustments resulting from the process of translating an entity's financial statements into the U.S. dollar have been recorded in the equity section of the Consolidated Balance Sheet within Accumulated other comprehensive income (loss). Transactions that are denominated in a currency other than an entity's functional currency are subject to changes in exchange rates with the resulting gains and losses recorded within Net earnings.

Cash and Cash Equivalents: Cash and cash equivalents include cash on hand, demand deposits and all highly liquid investments with original maturities at the time of purchase of three months or less. The Company maintains amounts on deposit at various financial institutions, which may at times exceed federally insured limits. However, management periodically evaluates the credit-worthiness of those institutions and has not experienced any losses on such deposits.

Allowance for Doubtful Accounts: The Company maintains an allowance for doubtful accounts receivable which represents the best estimate of probable loss inherent in the Company's accounts receivable portfolio. This estimate is based upon a two-step policy that results in the total recorded allowance for doubtful accounts. The first step is to record a portfolio reserve based on the aging of the outstanding accounts receivable portfolio and the Company's historical experience with the Company's end markets, customer base and products. The second step is to create a specific reserve for significant accounts as to which the customer's ability to satisfy their financial obligation to the Company is in doubt due to circumstances such as bankruptcy, deteriorating operating results or financial position. In these circumstances, management uses its judgment to record an allowance based on the best estimate of probable loss, factoring in such considerations as the market value of collateral, if applicable. Actual results could differ from those estimates. These estimates and assumptions are reviewed periodically, and the effects of changes, if any, are

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reflected in the Consolidated Statement of Comprehensive Income in the period that they are determined. The Company reserved \$32.7 million and \$26.9 million for doubtful accounts as of December 31, 2018 and 2017, respectively.

Inventories: Depending on the business, U.S. inventories are stated at the lower of cost or market using the last-in, first-out (LIFO) method or the lower of cost or market using the first-in, first-out (FIFO) method. Non-U.S. inventories are primarily stated at the lower of cost or market using the FIFO method. At December 31, 2018 and 2017, approximately 56% and 51%, respectively, of all inventory utilized the LIFO method.

Property, Plant and Equipment: Property, plant and equipment are stated at cost, less accumulated depreciation. Assets placed in service are recorded at cost and depreciated using the straight-line method over the estimated useful life of the asset except for leasehold improvements, which are depreciated over the shorter of their economic useful life or their lease term. The range of useful lives used to depreciate property, plant and equipment is as follows:

Buildings 10 to 50 years

Machinery and equipment 2 to 12 years

Software 2 to 7 years

Major expenditures for replacements and significant improvements that increase asset values and extend useful lives are also capitalized. Capitalized costs are amortized over their estimated useful lives using the straight-line method.

Repairs and maintenance expenditures that do not extend the useful life of the asset are charged to expense as incurred. The carrying amounts of assets that are sold or retired and the related accumulated depreciation are removed from the accounts in the year of disposal, and any resulting gain or loss is reflected within current earnings.

Per ASC 360, "Property, Plant, and Equipment," (ASC 360) the Company assesses the recoverability of the carrying value of its property, plant and equipment whenever events or changes in circumstances indicate that the carrying amount of the asset group may not be recoverable. Recoverability is measured by a comparison of the carrying amount of an asset group to the future net undiscounted cash flows expected to be generated by the asset group. If the undiscounted cash flows are less than the carrying amount of the asset group, an impairment loss is recognized for the amount by which the carrying value of the asset group exceeds the fair value of the asset group.

Goodwill and Intangible Assets: The Company records as goodwill the excess of the purchase price over the fair value of the net assets acquired in a business combination. In accordance with ASC 350, "Intangibles-Goodwill and Other," (ASC 350) goodwill and other indefinite-lived intangible assets are tested and reviewed annually for impairment during the fourth quarter or whenever there is a significant change in events or circumstances that indicate that the fair value of the asset is more likely than not less than the carrying amount of the asset.

Impairment of goodwill is assessed at the reporting unit level and begins with an optional qualitative assessment to determine if it is more likely than not that the fair value of each reporting unit is less than its carrying amount as a basis for determining whether it is necessary to perform the goodwill impairment test under ASC 350. For those reporting units that bypass or fail the qualitative assessment, the test compares the carrying amount of the reporting unit to its estimated fair value. If the estimated fair value of a reporting unit exceeds its carrying amount, goodwill of the reporting unit is not impaired. To the extent that the carrying value of the reporting unit exceeds its estimated fair value, an impairment loss will be recognized for the amount by which the reporting unit's carrying amount exceeds its fair value, not to exceed the carrying amount of goodwill in that reporting unit.

Intangible assets such as patents, customer-related intangible assets and other intangible assets with finite useful lives are amortized on a straight-line basis over their estimated economic lives. The weighted-average useful lives approximate the following:

Customer relationships 20 years

Completed technology/patents 10 years

Other 20 years

The Company assesses the recoverability of the carrying value of its intangible assets with finite useful lives whenever events or changes in circumstances indicate that the carrying amount of the asset group may not be recoverable.

Recoverability is measured by a comparison of the carrying amount of an asset group to the future net undiscounted cash flows expected to be generated by the asset group. If the undiscounted cash flows are less than the carrying amount of the asset group, an impairment loss is recognized for the amount by which the carrying value of the asset

group exceeds the fair value of the asset group.

Employee Benefit Plans: The Company provides a range of benefits, including pensions, postretirement and postemployment benefits to eligible current and former employees. Determining the cost associated with such benefits is dependent on various actuarial assumptions, including discount rates, expected return on plan assets, compensation increases, mortality, turnover rates, and healthcare cost trend rates. Actuaries perform the required calculations to determine expense in accordance with GAAP. Actual results may differ from the actuarial assumptions and are generally accumulated into Accumulated other comprehensive income

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(loss) and amortized into Net earnings over future periods. The Company reviews its actuarial assumptions at each measurement date and makes modifications to the assumptions based on current rates and trends, if appropriate.

Loss Contingencies: Liabilities are recorded for various contingencies arising in the normal course of business, including litigation and administrative proceedings, environmental matters, product liability, product warranty, worker's compensation and other claims. The Company has recorded reserves in the financial statements related to these matters, which are developed using input derived from actuarial estimates and historical and anticipated experience data depending on the nature of the reserve, and in certain instances with consultation of legal counsel, internal and external consultants and engineers. Subject to the uncertainties inherent in estimating future costs for these types of liabilities, the Company believes its estimated reserves are reasonable and does not believe the final determination of the liabilities with respect to these matters would have a material effect on the financial condition, results of operations, liquidity or cash flows of the Company for any year.

Environmental Costs: The Company is subject to laws and regulations relating to protecting the environment. Environmental expenditures relating to current operations are expensed or capitalized as appropriate. Expenditures relating to existing conditions caused by past operations, which do not contribute to current or future revenues, are expensed. Liabilities for remediation costs are recorded when they are probable and can be reasonably estimated, generally no later than the completion of feasibility studies or the Company's commitment to a plan of action. The assessment of this liability, which is calculated based on existing technology, does not reflect any offset for possible recoveries from insurance companies, and is not discounted.

Asbestos Matters: Certain of the Company's wholly-owned subsidiaries and former companies are named as defendants in asbestos-related lawsuits in state and federal courts. The Company records a liability for actual and anticipated future claims as well as an asset for anticipated insurance settlements. Asbestos-related defense costs are excluded from the asbestos claims liability and are recorded separately as services are incurred. None of the Company's existing or previously-owned businesses were a producer or manufacturer of asbestos. The Company records certain income and expenses associated with asbestos liabilities and corresponding insurance recoveries within discontinued operations, net of tax, as they relate to previously divested businesses, except for amounts associated with Trane U.S. Inc.'s asbestos liabilities and corresponding insurance recoveries which are recorded within continuing operations.

Product Warranties: Standard product warranty accruals are recorded at the time of sale and are estimated based upon product warranty terms and historical experience. The Company assesses the adequacy of its liabilities and will make adjustments as necessary based on known or anticipated warranty claims, or as new information becomes available. The Company's extended warranty liability represents the deferred revenue associated with its extended warranty contracts and is amortized into Revenue on a straight-line basis over the life of the contract, unless another method is more representative of the costs incurred. The Company assesses the adequacy of its liability by evaluating the expected costs under its existing contracts to ensure these expected costs do not exceed the extended warranty liability.

Income Taxes: Deferred tax assets and liabilities are determined based on temporary differences between financial reporting and tax bases of assets and liabilities, applying enacted tax rates expected to be in effect for the year in which the differences are expected to reverse. The Company recognizes future tax benefits, such as net operating losses and tax credits, to the extent that realizing these benefits is considered in its judgment to be more likely than not. The Company regularly reviews the recoverability of its deferred tax assets considering its historic profitability, projected future taxable income, timing of the reversals of existing temporary differences and the feasibility of its tax planning strategies. Where appropriate, the Company records a valuation allowance with respect to a future tax benefit.

Revenue Recognition: Revenue is recognized when control of a good or service promised in a contract (i.e., performance obligation) is transferred to a customer. Control is obtained when a customer has the ability to direct the use of and obtain substantially all of the remaining benefits from that good or service. A majority of the Company's revenues are recognized at a point-in-time as control is transferred at a distinct point in time per the terms of a contract. However, a portion of the Company's revenues are recognized over time as the customer simultaneously receives control as the Company performs work under a contract. See Note 11 to the Consolidated Financial

Statements for additional information regarding revenue recognition.

Research and Development Costs: The Company conducts research and development activities for the purpose of developing and improving new products and services. These expenditures are expensed when incurred. For the years ended December 31, 2018, 2017 and 2016, these expenditures amounted to \$228.7 million, \$210.8 million and \$207.9 million, respectively.

Recent Accounting Pronouncements

The FASB ASC is the sole source of authoritative GAAP other than the Securities and Exchange Commission (SEC) issued rules and regulations that apply only to SEC registrants. The FASB issues an Accounting Standards Update (ASU) to communicate changes to the codification. The Company considers the applicability and impact of all ASU's. ASU's not listed below were assessed and determined to be either not applicable or are not expected to have a material impact on the consolidated financial statements.

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Recently Adopted Accounting Pronouncements

In August 2017, the FASB issued ASU 2017-12, "Derivatives and hedging (Topic 815): Targeted improvements to accounting for hedging activities" (ASU 2017-12). This standard more closely aligns the results of cash flow and fair value hedge accounting with risk management activities through changes to both the designation and measurement guidance for qualifying hedging relationships and the presentation of hedge results in the financial statements. This standard also addresses specific limitations in current GAAP by expanding hedge accounting for both nonfinancial and financial risk components and by refining the measurement of hedge results to better reflect an entity's hedging strategies. Additionally, by aligning the timing of recognition of hedge results with the earnings effect of the hedged item for cash flow and net investment hedges, and by including the earnings effect of the hedging instrument in the same income statement line item in which the earnings effect of the hedged item is presented, the results of an entity's hedging program and the cost of executing that program will be more visible to users of financial statements. ASU 2017-12 is effective for annual reporting periods beginning after December 15, 2018 with early adoption permitted. The Company adopted this standard on October 1, 2018 with no material impact to the financial statements.

In October 2016, the FASB issued ASU 2016-16, "Income Taxes (Topic 740): Intra-Entity Transfers of Assets Other Than Inventory" (ASU 2016-16) which removed the prohibition in Topic 740 against the immediate recognition of the current and deferred income tax effects of intra-entity transfers of assets other than inventory. As a result, the income tax consequences of an intra-entity transfer of assets other than inventory will be recognized in the current period income statement rather than being deferred until the assets leave the consolidated group. The Company applied ASU 2016-16 on a modified retrospective basis through a cumulative-effect adjustment which reduced Retained earnings by \$9.1 million as of January 1, 2018.

In May 2014, the FASB issued ASU No. 2014-09, "Revenue from Contracts with Customers" (ASC 606), which created a comprehensive, five-step model for revenue recognition that requires a company to recognize revenue to depict the transfer of promised goods or services to a customer at an amount that reflects the consideration it expects to receive in exchange for those goods or services. Under ASC 606, a company will be required to use more judgment and make more estimates when considering contract terms as well as relevant facts and circumstances when identifying performance obligations, estimating the amount of variable consideration in the transaction price and allocating the transaction price to each separate performance obligation. The Company adopted this standard on January 1, 2018 using the modified retrospective approach and recorded a cumulative effect adjustment to increase Retained earnings by \$2.4 million with related amounts not materially impacting the Balance Sheet. Refer to Note 11, "Revenue," for a further discussion on the adoption of ASC 606.

In March 2017, the FASB issued ASU 2017-07, "Compensation-Retirement Benefits (Topic 715): Improving the Presentation of Net Periodic Pension Cost and Net Periodic Postretirement Benefit Cost" (ASU 2017-07) which changes the way employers that sponsor defined benefit pension and/or postretirement benefit plans reflect net periodic benefit costs in the income statement. Under the previous standard, the multiple components of net periodic benefit costs are aggregated and reported within the operating section of the income statement or capitalized into assets when appropriate. The new standard requires a company to present the service cost component of net periodic benefit cost in the same income statement line as other employee compensation costs with the remaining components of net periodic benefit cost presented separately from the service cost component and outside of any subtotal of operating income, if one is presented. In addition, only the service cost component will be eligible for capitalization in assets. The Company adopted this standard on January 1, 2017 applying the presentation requirements retrospectively.

In March 2016, the FASB issued ASU No. 2016-09, "Compensation-Stock Compensation (Topic 718): Improvements to Employee Share-Based Payment Accounting" (ASU 2016-09) which simplifies several aspects of the accounting for employee share-based payment transactions. The standard makes several modifications to the accounting for forfeitures, employer tax withholding on share-based compensation and the financial statement presentation of excess tax benefits or deficiencies. In addition, ASU 2016-09 clarifies the statement of cash flows presentation for certain components of share-based awards. The Company adopted this standard on January 1, 2017 and prospectively presented any excess tax benefits or deficiencies in the income statement as a component of Provision for income taxes rather than in the Equity section of the Balance Sheet. As part of the adoption, the Company reclassified \$15.1 million of excess tax benefits previously unrecognized on a modified retrospective basis through a cumulative-effect

adjustment to increase Retained earnings as of January 1, 2017. In addition, the statement of cash flows for the twelve months ended December 31, 2016 was retrospectively adjusted to present \$21.7 million of excess tax benefits as an operating activity rather than a financing activity.

Recently Issued Accounting Pronouncements

In August 2018, the FASB issued ASU 2018-15, "Customer's Accounting for Implementation Costs Incurred in a Cloud Computing Arrangement that is a Service Contract" (ASU 2018-15), which aligns the requirements for capitalizing implementation costs in a cloud-computing arrangement service contract with the requirements for capitalizing implementation costs incurred to develop or obtain internal-use software. In addition, the guidance also clarifies the presentation requirements for reporting such costs in the financial statements. ASU 2018-15 is effective for annual reporting periods beginning after December 15, 2019 with early adoption permitted. The Company is currently assessing the impact of the ASU on its financial statements.

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In February 2018, the FASB issued ASU 2018-02, "Reclassification of Certain Tax Effects from Accumulated Other Comprehensive Income" (ASU 2018-02), which allows companies to reclassify stranded tax effects in Accumulated other comprehensive income (loss) that have been caused by the Tax Cuts and Jobs Act of 2017 (the Act) to Retained earnings for each period in which the effect of the change in the U.S. federal corporate income tax rate is recorded. ASU 2018-02 is effective for annual reporting periods beginning after December 15, 2018 with early adoption permitted. However, the FASB has made the reclassification optional. As a result, the Company assessed the impact of the ASU on its financial statements and will not exercise the option to reclassify the stranded tax effects caused by the Act.

In February 2016, the FASB issued ASU 2016-02, "Leases" (ASU 2016-02), which requires the lease rights and obligations arising from lease contracts, including existing and new arrangements, to be recognized as assets and liabilities on the balance sheet. The standard also requires additional disclosures by lessees and contains targeted changes to accounting by lessors. ASU 2016-02 is effective for annual periods beginning after December 15, 2018, including interim periods within those annual periods, with early adoption permitted. The FASB allows the option to adopt the standard using a modified retrospective approach through a cumulative-effect adjustment to retained earnings applied either to the beginning of the earliest period presented or the beginning of the period of adoption. The Company will adopt the new guidance effective January 1, 2019 using a modified retrospective approach through a cumulative-effect adjustment to retained earnings as of the beginning of the period of adoption. The Company expects the estimated right-of-use asset and related lease liability recognized on the Balance Sheet to approximate \$500 million. However, the Company does not expect the adoption to have a material impact to its Statement of Cash Flows or Statement of Comprehensive Income.

NOTE 3. INVENTORIES

Depending on the business, U.S. inventories are stated at the lower of cost or market using the last-in, first-out (LIFO) method or the lower of cost or market using the first-in, first-out (FIFO) method. Non-U.S. inventories are primarily stated at the lower of cost or market using the FIFO method.

At December 31, the major classes of inventory were as follows:

In millions	2018	2017
Raw materials	\$550.5	\$502.8
Work-in-process	182.0	180.5
Finished goods	1,028.8	941.0
	1,761.3	1,624.3
LIFO reserve	(83.5)	(68.9)
Total	\$1,677.8	\$1,555.4

The Company performs periodic assessments to determine the existence of obsolete, slow-moving and non-saleable inventories and records necessary provisions to reduce such inventories to net realizable value. Reserve balances, primarily related to obsolete and slow-moving inventories, were \$119.9 million and \$120.3 million at December 31, 2018 and December 31, 2017, respectively.

NOTE 4. PROPERTY, PLANT AND EQUIPMENT

At December 31, the major classes of property, plant and equipment were as follows:

In millions	2018	2017
Land	\$53.2	\$52.0
Buildings	870.7	770.1
Machinery and equipment	2,079.9	2,019.5
Software	831.4	822.7
	3,835.2	3,664.3
Accumulated depreciation	(2,104.4)	(2,113.0)
Total	\$1,730.8	\$1,551.3

Depreciation expense for the years ended December 31, 2018, 2017 and 2016 was \$217.4 million, \$217.3 million and \$216.7 million, which include amounts for software amortization of \$25.7 million, \$28.6 million and \$35.9 million, respectively.

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NOTE 5. GOODWILL

The Company records as goodwill the excess of the purchase price over the fair value of the net assets acquired in a business combination. Measurement period adjustments may be recorded once a final valuation has been performed. Goodwill is tested and reviewed annually for impairment during the fourth quarter or whenever there is a significant change in events or circumstances that indicate that the fair value of the asset may be less than the carrying amount of the asset.

The changes in the carrying amount of Goodwill are as follows:

In millions	Climate	Industrial	Total
Net balance as of December 31, 2016	\$4,879.1	\$ 779.3	\$5,658.4
Acquisitions ⁽¹⁾	26.3	60.5	86.8
Currency translation	159.7	30.8	190.5
Net balance as of December 31, 2017	5,065.1	870.6	5,935.7
Acquisitions ⁽¹⁾	118.1	1.8	119.9
Currency translation	(84.0)	(12.1)	(96.1)
Net balance as of December 31, 2018	5,099.2	860.3	5,959.5

(1) Refer to Note 17, "Acquisitions and Divestitures" for more information regarding acquisitions.

The net goodwill balances at December 31, 2018, 2017 and 2016 include \$2,496.0 million of accumulated impairment. The accumulated impairment relates entirely to a charge in the fourth quarter of 2008 associated with the Climate segment.

The Company performed its annual goodwill impairment test during the fourth quarter of 2018 and determined that the estimated fair value of each reporting unit exceeded their respective carrying value. As a result, no impairment charges were recorded during the year. However, the Climate Latin America reporting unit is at risk of impairment as its estimated fair value exceeded its carrying value by 1.1%. The reporting unit has approximately \$190 million of goodwill as of December 31, 2018. A significant increase in the discount rate, decrease in the long-term growth rate, or substantial reductions in end markets and volume assumptions could have a negative impact on its estimated fair value. With all other assumptions and trends remaining constant for each independent variable, a 0.5% increase in the discount rate combined with a 0.5% decrease in the long-term growth rate would result in an approximate \$15 million impairment for this reporting unit.

NOTE 6. INTANGIBLE ASSETS

Indefinite-lived intangible assets are tested and reviewed annually for impairment during the fourth quarter or whenever there is a significant change in events or circumstances that indicate that the fair value of the asset may be less than the carrying amount of the asset. All other intangible assets with finite useful lives are being amortized on a straight-line basis over their estimated useful lives.

The following table sets forth the gross amount and related accumulated amortization of the Company's intangible assets at December 31:

In millions	2018			2017		
	Gross carrying amount	Accumulated amortization	Net carrying amount	Gross carrying amount	Accumulated amortization	Net carrying amount
Completed technologies/patents	\$206.6	\$(182.0)	\$24.6	\$209.4	\$(177.3)	\$32.1
Customer relationships	2,086.8	(1,176.3)	910.5	2,068.9	(1,056.9)	1,012.0
Other	84.5	(54.4)	30.1	93.9	(52.7)	41.2
Total finite-lived intangible assets	\$2,377.9	\$(1,412.7)	\$965.2	\$2,372.2	\$(1,286.9)	\$1,085.3
Trademarks (indefinite-lived)	2,669.5	—	2,669.5	2,657.6	—	2,657.6
Total	\$5,047.4	\$(1,412.7)	\$3,634.7	\$5,029.8	\$(1,286.9)	\$3,742.9

Intangible asset amortization expense for 2018, 2017 and 2016 was \$139.3 million, \$132.0 million and \$132.0 million, respectively. Future estimated amortization expense on existing intangible assets in each of the next five years amounts to approximately \$139 million for 2019, \$137 million for 2020, \$137 million for 2021, \$137 million for 2022, and \$135 million for 2023.

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NOTE 7. DEBT AND CREDIT FACILITIES

At December 31, Short-term borrowings and current maturities of long-term debt consisted of the following:

In millions	2018	2017
Debtures with put feature	\$343.0	\$343.0
6.875% Senior notes due 2018 ⁽¹⁾	—	749.6
Other current maturities of long-term debt	7.6	7.7
Short-term borrowings	—	6.7
Total	\$350.6	\$1,107.0

(1) During the first quarter of 2018, the Company redeemed its 6.875% Senior notes due 2018.

The Company's short-term obligations primarily consist of current maturities of long-term debt. Other obligations relate to short-term lines of credit used to fund working capital requirements in certain non U.S. countries. The weighted-average interest rate for Short-term borrowings and current maturities of long-term debt at December 31, 2018 and 2017 was 6.3% and 6.7%, respectively.

Commercial Paper Program

The Company uses borrowings under its commercial paper program for general corporate purposes. The maximum aggregate amount of unsecured commercial paper notes available to be issued, on a private placement basis, under the commercial paper program is \$2.0 billion as of December 31, 2018. Under the commercial paper program, the Company may issue notes from time to time through Ingersoll-Rand Global Holding Company Limited or Ingersoll-Rand Luxembourg Finance S.A. Each of Ingersoll-Rand plc, Ingersoll-Rand Irish Holdings Unlimited Company, Ingersoll-Rand Lux International Holding Company S.à.r.l., Ingersoll-Rand Global Holding Company Limited and Ingersoll-Rand Company provided irrevocable and unconditional guarantees for any notes issued under the commercial paper program. The Company had no outstanding balance under its commercial paper program as of December 31, 2018 and December 31, 2017.

Debtures with Put Feature

At December 31, 2018 and December 31, 2017, the Company had \$343.0 million of fixed rate debtures outstanding which contain a put feature that the holders may exercise on each anniversary of the issuance date. If exercised, the Company is obligated to repay in whole or in part, at the holder's option, the outstanding principal amount of the debtures plus accrued interest. If these options are not exercised, the final contractual maturity dates would range between 2027 and 2028. Holders of these debtures had the option to exercise the put feature on each of the outstanding debtures in 2018, subject to the notice requirement. No material exercises were made.

At December 31, long-term debt excluding current maturities consisted of:

In millions	2018	2017
2.875% Senior notes due 2019 ⁽¹⁾	\$—	\$349.4
2.625% Senior notes due 2020	299.4	298.9
2.900% Senior notes due 2021	298.3	—
9.000% Debtures due 2021	124.9	124.9
4.250% Senior notes due 2023	697.1	696.5
7.200% Debtures due 2019-2025	44.8	52.3
3.550% Senior notes due 2024	495.9	495.2
6.480% Debtures due 2025	149.7	149.7
3.750% Senior notes due 2028	544.5	—
5.750% Senior notes due 2043	494.3	494.0
4.650% Senior notes due 2044	295.8	295.6
4.300% Senior notes due 2048	295.9	—
Other loans and notes, at end-of-year average interest rates of 7.0% in 2018 and 5.71% in 2017, maturing in various amounts to 2023	0.1	0.5
Total	\$3,740.7	\$2,957.0

(1) During the first quarter of 2018, the Company redeemed its 2.875% Senior notes due 2019.

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Scheduled maturities of long-term debt, including current maturities, as of December 31, 2018 are as follows:

In millions

2019	\$350.6
2020	307.0
2021	430.7
2022	7.5
2023	704.6
Thereafter	2,290.9
Total	\$4,091.3

Issuance and Redemption of Senior Notes

In February 2018, the Company issued \$1.15 billion principal amount of senior notes in three tranches through an indirect, wholly-owned subsidiary. The tranches consist of \$300 million aggregate principal amount of 2.900% senior notes due 2021, \$550 million aggregate principal amount of 3.750% senior notes due 2028 and \$300 million aggregate principal amount of 4.300% senior notes due 2048. The notes are fully and unconditionally guaranteed by each of Ingersoll Rand plc, Ingersoll-Rand Irish Holdings Unlimited Company, Ingersoll-Rand Lux International Holding Company S.à.r.l, Ingersoll-Rand Company and Ingersoll-Rand Luxembourg Finance S.A. The Company has the option to redeem the notes in whole or in part at any time, prior to their stated maturity date at redemption prices set forth in the indenture agreement. The notes are subject to certain customary covenants, however, none of these covenants are considered restrictive to the Company's operations. In March 2018, the Company used the proceeds to fund the redemption of \$750 million aggregate principal amount of 6.875% senior notes due 2018 and \$350 million aggregate principal amount of 2.875% senior notes due 2019, with the remainder used for general corporate purposes. As a result of the early redemption, the Company recognized \$15.4 million of premium expense and \$1.2 million of unamortized costs in Interest expense in 2018.

Other Credit Facilities

The Company maintains two 5-year, \$1.0 billion revolving credit facilities (the Facilities) through its wholly-owned subsidiaries, Ingersoll-Rand Global Holding Company Limited and Ingersoll-Rand Luxembourg Finance S.A. (collectively, the Borrowers). Each senior unsecured credit facility provides support for the Company's commercial paper program and can be used for working capital and other general corporate purposes. Ingersoll-Rand plc, Ingersoll-Rand Irish Holdings Unlimited Company, Ingersoll-Rand Lux International Holding Company S.à.r.l. and Ingersoll-Rand Company each provide irrevocable and unconditional guarantees for these Facilities. In addition, each Borrower will guarantee the obligations under the Facilities of the other Borrower. Total commitments of \$2.0 billion were unused at December 31, 2018 and December 31, 2017. On April 17, 2018, the Company entered into a new 5-year, \$1.0 billion senior unsecured credit facility and terminated its 5-year, \$1.0 billion facility set to expire in March 2019. As a result, the current maturity dates of the Facilities are March 2021 and April 2023.

Fair Value of Debt

The carrying value of the Company's short-term borrowings is a reasonable estimate of fair value due to the short-term nature of the instruments. The fair value of the Company's debt instruments at December 31, 2018 and December 31, 2017 was \$4,244.0 million and \$4,462.2 million, respectively. The Company measures the fair value of its long-term debt instruments for disclosure purposes based upon observable market prices quoted on public exchanges for similar assets. These fair value inputs are considered Level 2 within the fair value hierarchy. The methodologies used by the Company to determine the fair value of its long-term debt instruments at December 31, 2018 are the same as those used at December 31, 2017.

Guarantees

Along with Ingersoll-Rand plc, certain of the Company's 100% directly or indirectly owned subsidiaries have fully and unconditionally guaranteed, on a joint and several basis, public debt issued by other 100% directly or indirectly owned subsidiaries. Refer to Note 21 for the Company's current guarantor structure.

NOTE 8. FINANCIAL INSTRUMENTS

In the normal course of business, the Company is exposed to certain risks arising from business operations and economic factors. These fluctuations can increase the cost of financing, investing and operating the business. The

Company may use various financial instruments, including derivative instruments, to manage the risks associated with interest rate, commodity price and foreign currency exposures. These financial instruments are not used for trading or speculative purposes. The Company recognizes all derivatives on the Consolidated Balance Sheet at their fair value as either assets or liabilities.

On the date a derivative contract is entered into, the Company designates the derivative instrument as a cash flow hedge of a forecasted transaction or as an undesignated derivative. The Company formally documents its hedge relationships, including identification of the derivative instruments and the hedged items, as well as its risk management objectives and strategies for

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undertaking the hedge transaction. This process includes linking derivative instruments that are designated as hedges to specific assets, liabilities or forecasted transactions.

The Company assesses at inception and at least quarterly thereafter, whether the derivatives used in cash flow hedging transactions are highly effective in offsetting the changes in the cash flows of the hedged item. To the extent the derivative is deemed to be a highly effective hedge, the fair market value changes of the instrument are recorded to Accumulated other comprehensive income (AOCI). If the hedging relationship ceases to be highly effective, or it becomes probable that a forecasted transaction is no longer expected to occur, the hedging relationship will be undesignated and any future gains and losses on the derivative instrument will be recorded in Net earnings.

The fair values of derivative instruments included within the Consolidated Balance Sheet as of December 31 were as follows:

In millions	Derivative assets		Derivative liabilities	
	2018	2017	2018	2017
Derivatives designated as hedges:				
Currency derivatives	\$1.3	\$—	\$0.7	\$1.3
Derivatives not designated as hedges:				
Currency derivatives	0.9	7.2	0.6	1.2
Total derivatives	\$2.2	\$7.2	\$1.3	\$2.5

Asset and liability derivatives included in the table above are recorded within Other current assets and Accrued expenses and other current liabilities, respectively.

Currency Hedging Instruments

The notional amount of the Company's currency derivatives was \$0.6 billion and \$0.7 billion at December 31, 2018 and 2017, respectively. At December 31, 2018 and 2017, a net gain of \$0.5 million and a net loss of \$1.2 million, net of tax, respectively, was included in AOCI related to the fair value of the Company's currency derivatives designated as accounting hedges. The amount expected to be reclassified into Net earnings over the next twelve months is a gain of \$0.5 million. The actual amounts that will be reclassified to Net earnings may vary from this amount as a result of changes in market conditions. Gains and losses associated with the Company's currency derivatives not designated as hedges are recorded in Net earnings as changes in fair value occur. At December 31, 2018, the maximum term of the Company's currency derivatives was approximately 12 months, except for currency derivatives in place related to a certain long-term contract.

Other Derivative Instruments

Prior to 2005, the Company utilized forward-starting interest rate swaps and interest rate locks to manage interest rate exposure in periods prior to the anticipated issuance of certain fixed-rate debt. These instruments were designated as cash flow hedges and had a notional amount of \$1.3 billion. Consequently, when the contracts were settled upon the issuance of the underlying debt, any realized gains or losses in the fair values of the instruments were deferred into AOCI. These deferred gains or losses are subsequently recognized in Interest expense over the term of the related notes. The net unrecognized gain in AOCI was \$6.7 million and \$6.6 million at December 31, 2018 and at December 31, 2017. The deferred gain at December 31, 2018 will be amortized over the term of notes with maturities ranging from 2018 to 2044. The amount expected to be amortized over the next twelve months is a net gain of \$0.7 million. The Company has no forward-starting interest rate swaps or interest rate lock contracts outstanding at December 31, 2018 or 2017.

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The following table represents the amounts associated with derivatives designated as hedges affecting Net earnings and AOCI for the years ended December 31:

In millions	Amount of gain (loss) recognized in AOCI			Location of gain (loss) reclassified from AOCI and recognized into Net earnings	Amount of gain (loss) reclassified from AOCI and recognized into Net earnings		
	2018	2017	2016		2018	2017	2016
Currency derivatives designated as hedges	\$ 1.2	\$ (1.8)	\$ 2.2	Cost of goods sold	\$ (0.8)	\$ (3.1)	\$ 5.3
Interest rate swaps & locks	—	—	—	Interest expense	(0.1)	(0.5)	(0.5)
Total	\$ 1.2	\$ (1.8)	\$ 2.2		\$ (0.9)	\$ (3.6)	\$ 4.8

The following table represents the amounts associated with derivatives not designated as hedges affecting Net earnings for the years ended December 31:

In millions	Location of gain (loss) recognized in Net earnings	Amount of gain (loss) recognized in Net earnings		
		2018	2017	2016
Currency derivatives	Other income/(expense), net	\$(29.6)	\$58.0	\$(39.2)
Total		\$(29.6)	\$58.0	\$(39.2)

The gains and losses associated with the Company's undesignated currency derivatives are materially offset in Other income/(expense), net by changes in the fair value of the underlying transactions.

The following table presents the effects of the Company's designated financial instruments on the associated financial statement line item within the Consolidated Statement of Comprehensive Income where the financial instrument are recorded:

In millions	Classification and amount of gain (loss) recognized in income on cash flow hedging relationships	
	2018	2017
Total amounts presented in the Consolidated Statements of Comprehensive Income	\$ (10,847.6)	\$ (220.7)
Gain (loss) on cash flow hedging relationships		
Currency derivatives:		
Amount of gain (loss) reclassified from AOCI and recognized into Net earnings	\$ (0.8)	\$ —
Amount excluded from effectiveness testing recognized in net earnings based on changes in fair value and amortization	\$ (0.1)	\$ —
Interest rate swaps & locks:		
Amount of gain (loss) reclassified from AOCI and recognized into Net earnings	\$ —	\$ (0.1)

Concentration of Credit Risk

The counterparties to the Company's forward contracts consist of a number of investment grade major international financial institutions. The Company could be exposed to losses in the event of nonperformance by the counterparties. However, the credit ratings and the concentration of risk in these financial institutions are monitored on a continuous basis and present no significant credit risk to the Company.

NOTE 9. FAIR VALUE MEASUREMENTS

ASC 820, "Fair Value Measurement," (ASC 820) defines fair value as the price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date. ASC 820

also establishes a three-level fair value hierarchy that prioritizes information used in developing assumptions when pricing an asset or liability as follows:

• Level 1: Observable inputs such as quoted prices in active markets;

• Level 2: Inputs, other than quoted prices in active markets, that are observable either directly or indirectly; and

• Level 3: Unobservable inputs where there is little or no market data, which requires the reporting entity to develop its own assumptions.

ASC 820 requires the use of observable market data, when available, in making fair value measurements. When inputs used to measure fair value fall within different levels of the hierarchy, the level within which the fair value measurement is categorized is based on the lowest level input that is significant to the fair value measurement.

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The following table presents the Company's fair value hierarchy for those assets and liabilities measured at fair value on a recurring basis as of December 31, 2018:

In Millions	Fair Value	Fair value measurements		
		Level 1	Level 2	Level 3

Assets:

Derivative instruments	\$ 2.2	\$ —	\$ 2.2	\$ —
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Liabilities:

Derivative instruments	\$ 1.3	\$ —	\$ 1.3	\$ —
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The following table presents the Company's fair value hierarchy for those assets and liabilities measured at fair value on a recurring basis as of December 31, 2017:

In Millions	Fair Value	Fair value measurements		
		Level 1	Level 2	Level 3

Assets:

Derivative instruments	\$ 7.2	\$ —	\$ 7.2	\$ —
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Liabilities:

Derivative instruments	\$ 2.5	\$ —	\$ 2.5	\$ —
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Derivative instruments include forward foreign currency contracts and instruments related to non-functional currency balance sheet exposures. The fair value of the derivative instruments are determined based on a pricing model that uses spot rates and forward prices from actively quoted currency markets that are readily accessible and observable. The carrying values of cash and cash equivalents, accounts receivable and accounts payable are a reasonable estimate of their fair value due to the short-term nature of these instruments. These methodologies used by the Company to determine the fair value of its financial assets and liabilities at December 31, 2018 are the same as those used at December 31, 2017. There have been no transfers between levels of the fair value hierarchy.

NOTE 10. PENSIONS AND POSTRETIREMENT BENEFITS OTHER THAN PENSIONS

The Company sponsors several U.S. defined benefit and defined contribution plans covering substantially all of the Company's U.S. employees. Additionally, the Company has many non-U.S. defined benefit and defined contribution plans covering eligible non-U.S. employees. Postretirement benefits other than pensions (OPEB) provide healthcare benefits, and in some instances, life insurance benefits for certain eligible employees.

Pension Plans

The noncontributory defined benefit pension plans covering non-collectively bargained U.S. employees provide benefits on a final average pay formula while plans for most collectively bargained U.S. employees provide benefits on a flat dollar benefit formula or a percentage of pay formula. The non-U.S. pension plans generally provide benefits based on earnings and years of service. The Company also maintains additional other supplemental plans for officers and other key or highly compensated employees.

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The following table details information regarding the Company's pension plans at December 31:

In millions	2018	2017
Change in benefit obligations:		
Benefit obligation at beginning of year	\$3,742.2	\$3,531.9
Service cost	75.0	70.8
Interest cost	109.7	109.0
Employee contributions	1.1	1.1
Amendments	16.1	3.8
Actuarial (gains) losses	(224.8)	175.8
Benefits paid	(218.9)	(194.8)
Currency translation	(34.8)	69.6
Curtailments, settlements and special termination benefits	(4.6)	(13.1)
Other, including expenses paid	4.3	(11.9)
Benefit obligation at end of year	\$3,465.3	\$3,742.2
Change in plan assets:		
Fair value at beginning of year	\$3,063.1	\$2,797.1
Actual return on assets	(125.9)	326.9
Company contributions	86.9	101.4
Employee contributions	1.1	1.1
Benefits paid	(218.9)	(194.8)
Currency translation	(32.8)	59.0
Settlements	(9.8)	(13.5)
Other, including expenses paid	3.2	(14.1)
Fair value of assets end of year	\$2,766.9	\$3,063.1
Net unfunded liability	\$(698.4)	\$(679.1)
Amounts included in the balance sheet:		
Other noncurrent assets	\$49.9	\$61.7
Accrued compensation and benefits	(25.9)	(15.3)
Postemployment and other benefit liabilities	(722.4)	(725.5)
Net amount recognized	\$(698.4)	\$(679.1)

It is the Company's objective to contribute to the pension plans to ensure adequate funds, and no less than required by law, are available in the plans to make benefit payments to plan participants and beneficiaries when required.

However, certain plans are not or cannot be funded due to either legal, accounting, or tax requirements in certain jurisdictions. As of December 31, 2018, approximately seven percent of the Company's projected benefit obligation relates to plans that cannot be funded.

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The pretax amounts recognized in Accumulated other comprehensive income (loss) are as follows:

In millions	Prior service benefit (cost)	Net actuarial gains (losses)	Total
December 31, 2017	\$(20.2)	\$(833.5)	\$(853.7)
Current year changes recorded to AOCI	(16.0)	(47.6)	(63.6)
Amortization reclassified to earnings	4.2	51.3	55.5
Settlements/curtailments reclassified to earnings ⁽¹⁾	0.2	2.3	2.5
Currency translation and other	0.6	6.9	7.5
December 31, 2018	\$(31.2)	\$(820.6)	\$(851.8)

(1) Includes \$0.2 million recorded in restructuring charges.

Weighted-average assumptions used to determine the benefit obligation at December 31 are as follows:

	2018	2017
Discount rate:		
U.S. plans	4.21%	3.54%
Non-U.S. plans	2.47%	2.29%
Rate of compensation increase:		
U.S. plans	4.00%	4.00%
Non-U.S. plans	4.00%	4.00%

The accumulated benefit obligation for all defined benefit pension plans was \$3,364.6 million and \$3,626.7 million at December 31, 2018 and 2017, respectively. The projected benefit obligation, accumulated benefit obligation, and fair value of plan assets for pension plans with accumulated benefit obligations more than plan assets were \$3,075.2 million, \$2,992.0 million and \$2,330.4 million, respectively, as of December 31, 2018, and \$3,291.4 million, \$3,194.7 million and \$2,554.0 million, respectively, as of December 31, 2017.

Pension benefit payments are expected to be paid as follows:

In millions	
2019	\$ 232.2
2020	220.7
2021	219.6
2022	226.3
2023	229.1
2024 — 2028	125.4

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The components of the Company's net periodic pension benefit costs for the years ended December 31 include the following:

In millions	2018	2017	2016
Service cost	\$75.0	\$70.8	\$72.1
Interest cost	109.7	109.0	110.2
Expected return on plan assets	(146.6)	(141.7)	(146.1)
Net amortization of:			
Prior service costs (benefits)	4.2	3.8	4.7
Plan net actuarial (gains) losses	51.3	56.8	61.6
Net periodic pension benefit cost	93.6	98.7	102.5
Net curtailment, settlement, and special termination benefits (gains) losses	2.3	5.6	2.1
Net periodic pension benefit cost after net curtailment and settlement (gains) losses	\$95.9	\$104.3	\$104.6
Amounts recorded in continuing operations:			
Operating income	\$72.7	\$68.2	\$69.3
Other income/(expense), net	14.6	25.4	25.5
Amounts recorded in discontinued operations	8.6	10.7	9.8
Total	\$95.9	\$104.3	\$104.6

Net periodic pension benefit cost for 2019 is projected to be approximately \$113 million. The amounts expected to be recognized in net periodic pension benefit cost during 2019 for prior service cost and plan net actuarial losses are approximately \$5 million and \$54 million, respectively.

Weighted-average assumptions used to determine net periodic pension cost for the years ended December 31 are as follows:

	2018	2017	2016
Discount rate:			
U.S. plans			
Service cost	3.70%	4.18%	4.25%
Interest cost	3.24%	3.36%	3.29%
Non-U.S. plans			
Service cost	2.52%	2.66%	3.05%
Interest cost	2.46%	2.50%	3.18%
Rate of compensation increase:			
U.S. plans	4.00%	4.00%	4.00%
Non-U.S. plans	4.00%	4.00%	4.00%
Expected return on plan assets:			
U.S. plans	5.50%	5.50%	5.75%
Non-U.S. plans	3.25%	3.25%	3.75%

The expected long-term rate of return on plan assets reflects the average rate of returns expected on the funds invested or to be invested to provide for the benefits included in the projected benefit obligation. The expected long-term rate of return on plan assets is based on what is achievable given the plan's investment policy, the types of assets held and target asset allocations. The expected long-term rate of return is determined as of the measurement date. The Company reviews each plan and its historical returns and target asset allocations to determine the appropriate expected long-term rate of return on plan assets to be used.

The Company's objective in managing its defined benefit plan assets is to ensure that all present and future benefit obligations are met as they come due. It seeks to achieve this goal while trying to mitigate volatility in plan funded status, contribution, and expense by better matching the characteristics of the plan assets to that of the plan liabilities. The Company utilizes a dynamic approach to asset allocation whereby a plan's allocation to fixed income assets increases as the plan's funded status improves. The Company monitors plan funded status and asset allocation regularly in addition to investment manager performance.

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The fair values of the Company's pension plan assets at December 31, 2018 by asset category are as follows:

In millions	Fair value measurements			Net asset value	Total fair value
	Level 1	Level 2	Level 3		
Cash and cash equivalents	\$4.0	\$26.8	\$—	\$—	\$30.8
Equity investments:					
Registered mutual funds – equity specialty	—	—	—	51.1	51.1
Commingled funds – equity specialty	—	—	—	520.7	520.7
	—	—	—	571.8	571.8
Fixed income investments:					
U.S. government and agency obligations	—	476.2	—	—	476.2
Corporate and non-U.S. bonds ^(a)	—	1,225.8	—	—	1,225.8
Asset-backed and mortgage-backed securities	—	67.3	—	—	67.3
Registered mutual funds – fixed income specialty	—	—	—	135.1	135.1
Commingled funds – fixed income specialty	—	—	—	117.7	117.7
Other fixed income ^(b)	—	—	24.8	—	24.8
	—	1,769.3	24.8	252.8	2,046.9
Derivatives	—	(0.4)	—	—	(0.4)
Real estate ^(c)	—	—	4.1	—	4.1
Other ^(d)	—	—	101.6	—	101.6
Total assets at fair value	\$4.0	\$1,795.7	\$130.5	\$824.6	\$2,754.8
Receivables and payables, net					12.1
Net assets available for benefits					\$2,766.9

The fair values of the Company's pension plan assets at December 31, 2017 by asset category are as follows:

In millions	Fair value measurements			Net asset value	Total fair value
	Level 1	Level 2	Level 3		
Cash and cash equivalents	\$4.8	\$35.4	\$—	\$—	\$40.2
Equity investments:					
Registered mutual funds – equity specialty	—	—	—	77.6	77.6
Commingled funds – equity specialty	—	—	—	674.7	674.7
	—	—	—	752.3	752.3
Fixed income investments:					
U.S. government and agency obligations	—	517.5	—	—	517.5
Corporate and non-U.S. bonds ^(a)	—	1,336.8	—	—	1,336.8
Asset-backed and mortgage-backed securities	—	69.0	—	—	69.0
Registered mutual funds – fixed income specialty	—	—	—	111.0	111.0
Commingled funds – fixed income specialty	—	—	—	131.8	131.8
Other fixed income ^(b)	—	—	26.3	—	26.3
	—	1,923.3	26.3	242.8	2,192.4
Derivatives	—	(0.3)	—	—	(0.3)
Real estate ^(c)	—	—	4.9	—	4.9
Other ^(d)	—	—	79.0	—	79.0
Total assets at fair value	\$4.8	\$1,958.4	\$110.2	\$995.1	\$3,068.5
Receivables and payables, net					(5.4)
Net assets available for benefits					\$3,063.1

(a) This class includes state and municipal bonds.

(b) This class includes group annuity and guaranteed interest contracts.

(c) This class includes a private equity fund that invests in real estate.

(d) This investment comprises the Company's non-significant, non-US pension plan assets. It primarily includes insurance contracts.

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Cash equivalents are valued using a market approach with inputs including quoted market prices for either identical or similar instruments. Fixed income securities are valued through a market approach with inputs including, but not limited to, benchmark yields, reported trades, broker quotes and issuer spreads. Commingled funds are valued at their daily net asset value (NAV) per share or the equivalent. NAV per share or the equivalent is used for fair value purposes as a practical expedient. NAVs are calculated by the investment manager or sponsor of the fund. Private real estate fund values are reported by the fund manager and are based on valuation or appraisal of the underlying investments. Refer to Note 9, "Fair Value Measurements" for additional information related to the fair value hierarchy defined by ASC 820. There have been no significant transfers between levels of the fair value hierarchy.

The Company made required and discretionary contributions to its pension plans of \$86.9 million in 2018, \$101.4 million in 2017, and \$56.4 million in 2016 and currently projects that it will contribute approximately \$104 million to its plans worldwide in 2019. The Company's policy allows it to fund an amount, which could be in excess of or less than the pension cost expensed, subject to the limitations imposed by current tax regulations. However, the Company anticipates funding the plans in 2019 in accordance with contributions required by funding regulations or the laws of each jurisdiction.

Most of the Company's U.S. employees are covered by defined contribution plans. Employer contributions are determined based on criteria specific to the individual plans and amounted to approximately \$131.9 million, \$118.7 million, and \$108.3 million in 2018, 2017 and 2016, respectively. The Company's contributions relating to non-U.S. defined contribution plans and other non-U.S. benefit plans were \$52.0 million, \$47.7 million and \$39.9 million in 2018, 2017 and 2016, respectively.

Multiemployer Pension Plans

The Company also participates in a number of multiemployer defined benefit pension plans related to collectively bargained U.S. employees of Trane. The Company's contributions, and the administration of the fixed retirement payments, are determined by the terms of the related collective-bargaining agreements. These multiemployer plans pose different risks to the Company than single-employer plans, including:

1. The Company's contributions to multiemployer plans may be used to provide benefits to all participating employees of the program, including employees of other employers.
2. In the event that another participating employer ceases contributions to a plan, the Company may be responsible for any unfunded obligations along with the remaining participating employers.
3. If the Company chooses to withdraw from any of the multiemployer plans, the Company may be required to pay a withdrawal liability, based on the underfunded status of the plan.

As of December 31, 2018, the Company does not participate in any plans that are individually significant, nor is the Company an individually significant participant to any of these plans. Total contributions to multiemployer plans for the years ended December 31 were as follows:

In millions	2018	2017	2016
Total contributions	\$9.8	\$9.0	\$7.7

Contributions to these plans may increase in the event that any of these plans are underfunded.

Postretirement Benefits Other Than Pensions

The Company sponsors several postretirement plans that provide for healthcare benefits, and in some instances, life insurance benefits that cover certain eligible employees. These plans are unfunded and have no plan assets, but are instead funded by the Company on a pay-as-you-go basis in the form of direct benefit payments. Generally, postretirement health benefits are contributory with contributions adjusted annually. Life insurance plans for retirees are primarily noncontributory.

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The following table details changes in the Company's postretirement plan benefit obligations for the years ended December 31:

In millions	2018	2017
Benefit obligation at beginning of year	\$528.0	\$578.6
Service cost	2.8	3.1
Interest cost	14.4	15.7
Plan participants' contributions	9.1	9.8
Actuarial (gains) losses	(60.4)	(30.2)
Benefits paid, net of Medicare Part D subsidy ⁽¹⁾	(50.2)	(55.4)
Special termination benefits recorded in restructuring	—	5.9
Other	(1.0)	0.5
Benefit obligations at end of year	\$442.7	\$528.0

(1) Amounts are net of Medicare Part D subsidy of \$0.9 million and \$1.1 million in 2018 and 2017, respectively

The benefit plan obligations are reflected in the Consolidated Balance Sheets as follows:

In millions	December 31, December 31,	
	2018	2017
Accrued compensation and benefits	\$ (45.1)	\$ (48.5)
Postemployment and other benefit liabilities	(397.6)	(479.5)
Total	\$ (442.7)	\$ (528.0)

The pre-tax amounts recognized in Accumulated other comprehensive income (loss) were as follows:

In millions	Prior	Net	Total
	service benefit (cost)	actuarial gains (losses)	
Balance at December 31, 2017	\$ 4.1	\$ 31.0	\$35.1
Gain (loss) in current period	—	60.4	60.4
Amortization reclassified to earnings	(3.8)	(1.0)	(4.8)
Balance at December 31, 2018	\$ 0.3	\$ 90.4	\$90.7

The components of net periodic postretirement benefit (income) cost for the years ended December 31 were as follows:

In millions	2018	2017	2016
Service cost	\$2.8	\$3.1	\$3.7
Interest cost	14.4	15.7	17.5
Net amortization of:			
Prior service costs (benefits)	(3.8)	(8.6)	(8.9)
Net actuarial (gains) losses	(1.0)	0.1	0.1
Net periodic postretirement benefit cost	\$12.4	\$10.3	\$12.4
Amounts recorded in continuing operations:			
Operating income	\$2.8	\$3.1	\$3.7
Other income/(expense), net	7.3	5.6	4.6
Amounts recorded in discontinued operations	2.3	1.6	4.1
Total	\$12.4	\$10.3	\$12.4

Postretirement cost for 2019 is projected to be approximately \$11 million. The amount expected to be recognized in net periodic postretirement benefits cost in 2019 for prior service gains and net actuarial gains are approximately \$1 million and \$7 million, respectively.

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Weighted-average assumptions used to determine net periodic benefit cost for the years ended December 31 are as follows:

	2018	2017	2016
Discount rate:			
Benefit obligations at December 31	4.05 %	3.38 %	3.73 %
Net periodic benefit cost			
Service cost	3.47 %	3.82 %	3.97 %
Interest cost	2.94 %	2.99 %	2.99 %
Assumed health-care cost trend rates at December 31:			
Current year medical inflation	6.45 %	6.85 %	7.25 %
Ultimate inflation rate	5.00 %	5.00 %	5.00 %
Year that the rate reaches the ultimate trend rate	2023	2023	2023

A 1% change in the assumed medical trend rate would have the following effects as of and for the year ended December 31, 2018:

In millions	1%	1%
	Increase	Decrease
Effect on total of service and interest cost components of current year benefit cost	\$ 0.4	\$ (0.4)
Effect on benefit obligation at year-end	12.2	(11.0)

Benefit payments for postretirement benefits, which are net of expected plan participant contributions and Medicare Part D subsidy, are expected to be paid as follows:

In millions	
2019	\$45.9
2020	45.0
2021	43.0
2022	40.9
2023	38.4
2024 — 2027	58.5

NOTE 11. REVENUE

The Company recognizes revenue when control of a good or service promised in a contract (i.e., performance obligation) is transferred to a customer. Control is obtained when a customer has the ability to direct the use of and obtain substantially all of the remaining benefits from that good or service. A majority of the Company's revenues are recognized at a point-in-time as control is transferred at a distinct point in time per the terms of a contract. However, a portion of the Company's revenues are recognized over time as the customer simultaneously receives control as the Company performs work under a contract.

Performance Obligations

A performance obligation is a distinct good, service or a bundle of goods and services promised in a contract. The Company identifies performance obligations at the inception of a contract and allocates the transaction price to individual performance obligations to faithfully depict the Company's performance in transferring control of the promised goods or services to the customer.

The following are the primary performance obligations identified by the Company:

Equipment and parts. The Company principally generates revenue from the sale of equipment and parts to customers and recognizes revenue at a point in time when control transfers to the customer. Transfer of control is generally determined based on the shipping terms of the contract. However, certain transactions within the Industrial segment include contracts to design, deliver and build highly engineered or customized equipment which have no alternative use for the Company in the event the customer cancels the contract. In addition, the Company has the right to payment for performance completed to date. As a result, revenues related to these contracts are recognized over time with progress towards completion measured using an input method as the basis to recognize revenue and an estimated profit. To-date efforts for work performed corresponds with and faithfully depicts transfer of control to the customer.

Contracting and Installation. The Company enters into various construction-type contracts to design, deliver and build integrated solutions to meet customer specifications. These transactions, primarily included within the Climate segment, provide services that range from the development and installation of new HVAC systems to the design and integration of critical building systems

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to optimize energy efficiency and overall performance. These contracts have a typical term of less than one year and are considered a single performance obligation as multiple combined goods and services promised in the contract represent a single output delivered to the customer. Revenues associated with contracting and installation contracts are recognized over time with progress towards completion measured using an input method as the basis to recognize revenue and an estimated profit. To-date efforts for work performed corresponds with and faithfully depicts transfer of control to the customer.

Services and Maintenance. The Company provides various levels of preventative and/or repair and maintenance type service agreements for its customers. The typical length of a contract is 12 months but can be as long as 60 months. Revenues associated with these performance obligations are primarily recognized over time on a straight-line basis over the life of the contract as the customer simultaneously receives and consumes the benefit provided by the Company. However, if historical evidence indicates that the cost of providing these services on a straight-line basis is not appropriate, revenue is recognized over the contract period in proportion to the costs expected to be incurred while performing the service. Certain repair services do not meet the definition of over time revenue recognition as the Company does not transfer control to the customer until the service is completed. As a result, revenue related to these services is recognized at a point in time.

Extended warranties. The Company enters into various warranty contracts with customers related to its products. A standard warranty generally warrants that a product is free from defects in workmanship and materials under normal use and conditions for a certain period of time. The Company's standard warranty is not considered a distinct performance obligation as it does not provide services to customers beyond assurance that the covered product is free of initial defects. An extended warranty provides a customer with additional time that the Company is liable for covered incidents associated with its products. Extended warranties are purchased separately and can last up to five years. As a result, they are considered separate performance obligations for the Company. Revenue associated with these performance obligations are primarily recognized over time on a straight-line basis over the life of the contract as the customer simultaneously receives and consumes the benefit provided by the Company. However, if historical evidence indicates that the cost of providing these services on a straight-line basis is not appropriate, revenue is recognized over the contract period in proportion to the costs expected to be incurred while performing the service. Refer to Note 20, "Commitments and Contingencies," for more information related to product warranties.

The transaction price allocated to performance obligations reflects the Company's expectations about the consideration it will be entitled to receive from a customer. To determine the transaction price, variable and noncash consideration are assessed as well as whether a significant financing component exists. The Company's contracts with customers, dealers and distributors include several forms of sales incentive programs (variable consideration) which are estimated and included in the transaction price. They include, but are not limited to, discounts, coupons, and rebates where the customer does not have to provide any additional requirements to receive the discount. The Company records an accrual (contra receivable) and a sales deduction for its best estimate determined using the expected value method. In addition, sales returns and customer disputes involving a question of quantity or price are also accounted for as variable consideration. All other incentives or incentive programs where the customer is required to reach a certain sales level, remain a customer for a certain period of time, provide a rebate form or is subject to additional requirements are accounted for as a reduction of revenue and establishment of a liability for its best estimate determined using the expected value method. The Company considers historical data in determining its best estimates of variable consideration. These estimates are reviewed regularly for appropriateness, considering also whether the estimates should be constrained in order to avoid a significant reversal of revenue recognition in a future period. If updated information or actual amounts are different from previous estimates of variable consideration, the revisions are included in the results for the period in which they become known through a cumulative effect adjustment to revenue. The Company has performance guarantees related to energy savings contracts that are provided under the maintenance portion of contracting and installation agreements extending from 2019-2047. These performance guarantees represent variable consideration and are estimated as part of the overall transaction price. The Company has not recognized any significant adjustments to the transaction price due to variable consideration.

The Company enters into sales arrangements that contain multiple goods and services, such as equipment, installation and extended warranties. For these arrangements, each good or service is evaluated to determine whether it represents

a distinct performance obligation. The total transaction price is then allocated to the distinct performance obligations based on their relative standalone selling price at the inception of the arrangement. If available, the Company utilizes observable prices for goods or services sold separately to similar customers in similar circumstances to determine its relative standalone selling price. Otherwise, list prices are used if they are determined to be representative of standalone selling prices. If neither of these items are available at contract inception, judgment may be required and the Company will estimate standalone selling price based on its best estimate. The Company recognizes revenue for delivered goods or services when the delivered good or service is distinct, control of the good or service has transferred to the customer, and only customary refund or return rights related to the goods or services exist. The Company excludes from revenues taxes it collects from a customer that are assessed by a government authority. Excluding noncurrent contract liabilities, unsatisfied (or partially unsatisfied) performance obligations as of the end of the reporting period are expected to be recognized as revenue within the next 12 months.

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Disaggregated Revenue

A summary of Net revenues by destination for the year ended at December 31 is as follows:

In millions	2018
Climate	
United States	\$8,285.4
Non-U.S.	4,058.4
Total Climate	\$12,343.8
Industrial	
United States	\$1,763.6
Non-U.S.	1,560.8
Total Industrial	\$3,324.4

A summary of Net revenues by major type of good or service for the year ended at December 31 is as follows:

In millions	2018
Climate	
Equipment	\$8,425.6
Services and parts	3,918.2
Total Climate	\$12,343.8
Industrial	
Equipment	\$2,023.3
Services and parts	1,301.1
Total Industrial	\$3,324.4

Revenue from goods and services transferred to customers at a point in time accounted for approximately 84% of the Company's revenue for the year ended December 31, 2018.

Contract Balances

The opening and closing balances of contract assets and contract liabilities arising from contracts with customers for the period ended December 31, 2018 and December 31, 2017 were as follows:

In millions	2018	2017
Contract assets	\$210.9	\$166.0
Contract liabilities	846.2	814.2

The timing of revenue recognition, billings and cash collections results in accounts receivable, contract assets, and customer advances and deposits (contract liabilities) on the Consolidated Balance Sheet. In general, the Company receives payments from customers based on a billing schedule established in its contracts. Contract assets relate to the conditional right to consideration for any completed performance under the contract when costs are incurred in excess of billings under the percentage-of-completion methodology. Accounts receivable are recorded when the right to consideration becomes unconditional. Contract liabilities relate to payments received in advance of performance under the contract or when the Company has a right to consideration that is unconditional before it transfers a good or service to the customer. Contract liabilities are recognized as revenue as (or when) the Company performs under the contract. During the year ended December 31, 2018, changes in contract asset and liability balances were not materially impacted by any other factors.

During the year ended December 31, 2018, approximately 55% of the contract liability balance at the beginning of the period was recognized as revenue. The remaining 45% is expected to be recognized as revenue during 2019 or thereafter.

ASC 606 adoption impact

Under ASC 606, the majority of the Company's revenue continues to be recognized on a similar basis as previous accounting standards. However, certain highly engineered products sold to customers within the Industrial segment for which revenue was previously recognized at a point in time meet the criteria of a performance obligation satisfied over time. These contracts consist

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of equipment that is highly engineered or customized to meet the customer's requirements. In the event the customer cancels the contract, the Company will have no alternative use for the equipment as well as the right to payment for performance completed to date. This change results in accelerated recognition of revenue and increases the balance of contract assets compared to the previous revenue recognition standard.

The Company adopted ASC 606 on January 1, 2018 using the modified retrospective approach with a cumulative effect adjustment to increase Retained earnings by \$2.4 million. As a result, the Company applied ASC 606 only to contracts that were not completed as of January 1, 2018. Comparative information has not been restated and continues to be reported under the accounting standards in effect for those periods presented. The Company elected to reflect the aggregate effect of all contract modifications that occurred before the beginning of the earliest period presented in determining the transaction price, identifying the satisfied and unsatisfied performance obligations and allocating the transaction price to the satisfied and unsatisfied performance obligations for the modified contract at transition. The effects of this relief are immaterial.

The following table summarizes the impact of adopting ASC 606 on the Company's Consolidated Statements of Comprehensive Income:

In millions	Year Ended December 31, 2018		
	As Reported	Balances Without Adoption of ASC 606	Effect of Change Higher/(Lower)
Net revenues	\$15,668.2	\$15,651.0	\$ 17.2
Cost of goods sold	(10,847.6)	(10,831.7)	15.9
Selling and administrative expenses	(2,903.2)	(2,903.2)	—
Operating income	1,917.4	1,916.1	1.3
Interest expense	(220.7)	(220.7)	—
Other income/(expense), net	(36.4)	(36.4)	—
Earnings before income taxes	1,660.3	1,659.0	1.3
Provision for income taxes	(281.3)	(281.0)	0.3
Earnings from continuing operations	\$1,379.0	\$1,378.0	\$ 1.0

The following table summarizes the impact of adopting ASC 606 on the Company's Balance Sheet:
December 31, 2018

In millions	Balances		
	As Reported	Without Adoption of ASC 606	Effect of Change Higher/(Lower)
Assets			
Accounts and notes receivable, net	\$2,679.2	\$2,681.2	\$ (2.0)
Inventories, net	1,677.8	1,693.7	(15.9)
Other current assets	471.6	454.2	17.4
Other noncurrent assets	857.9	857.9	—
Liabilities			
Accrued expenses and other current liabilities	\$1,728.2	\$1,729.7	\$ (1.5)
Deferred and noncurrent income taxes	538.4	538.4	—
Other noncurrent liabilities	1,062.4	1,062.4	—
Equity			
Retained earnings	\$9,439.8	\$9,438.8	\$ 1.0

NOTE 12. EQUITY

The authorized share capital of Ingersoll Rand plc is 1,185,040,000 shares, consisting of (1) 1,175,000,000 ordinary shares, par value \$1.00 per share, (2) 40,000 ordinary shares, par value EUR 1.00 and (3) 10,000,000 preference shares, par value \$0.001 per share. There were no preference shares or Euro-denominated ordinary shares outstanding at December 31, 2018 or 2017.

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The changes in ordinary shares and treasury shares for the year ended December 31, 2018 are as follows:

In millions	Ordinary shares issued	Ordinary shares held in treasury
December 31, 2017	274.0	24.5
Shares issued under incentive plans	2.1	—
Repurchase of ordinary shares	(9.7)	—
December 31, 2018	266.4	24.5

Share repurchases are made from time to time in accordance with management's capital allocation strategy, subject to market conditions and regulatory requirements. Shares acquired and canceled upon repurchase are accounted for as a reduction of Ordinary Shares and Capital in excess of par value, or Retained earnings to the extent Capital in excess of par value is exhausted. Shares acquired and held in treasury are presented separately on the balance sheet as a reduction to Equity and recognized at cost. In February 2017, the Company's Board of Directors authorized the repurchase of up to \$1.5 billion of its ordinary shares under a share repurchase program (2017 Authorization) upon completion of the prior authorized share repurchase program. Repurchases under the 2017 Authorization, which began in May 2017, totaled approximately \$600 million at December 31, 2017 and were held in Treasury. The remaining \$900 million of ordinary shares were repurchased and canceled during 2018. In October 2018, the Company's Board of Directors authorized the repurchase of up to \$1.5 billion of its ordinary shares upon completion of the 2017 Authorization. However, no material amounts were repurchased under this program during 2018.

Other Comprehensive Income (Loss)

The changes in Accumulated other comprehensive income (loss) are as follows:

In millions	Derivative Instruments	Pension and OPEB Items	Foreign Currency Translation	Total
December 31, 2016	\$ 2.9	\$(554.4)	\$(739.0)	\$(1,290.5)
Other comprehensive income (loss) attributable to Ingersoll-Rand plc	1.8	60.1	449.8	511.7
December 31, 2017	\$ 4.7	\$(494.3)	\$(289.2)	\$(778.8)
Other comprehensive income (loss) attributable to Ingersoll-Rand plc	2.0	40.3	(227.6)	(185.3)
December 31, 2018	\$ 6.7	\$(454.0)	\$(516.8)	\$(964.1)

The amounts of Other comprehensive income (loss) attributable to noncontrolling interests for 2018, 2017 and 2016 were \$(3.0) million, \$0.5 million and \$9.6 million, respectively, related to currency translation.

NOTE 13. SHARE-BASED COMPENSATION

The Company accounts for stock-based compensation plans in accordance with ASC 718, "Compensation - Stock Compensation" (ASC 718), which requires a fair-value based method for measuring the value of stock-based compensation. Fair value is measured once at the date of grant and is not adjusted for subsequent changes. The Company's share-based compensation plans include programs for stock options, restricted stock units (RSUs), performance share units (PSUs), and deferred compensation. Under the Company's incentive stock plan, the total number of ordinary shares authorized by the shareholders is 23.0 million, of which 22.9 million remains available as of December 31, 2018 for future incentive awards.

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Compensation Expense

Share-based compensation expense related to continuing operations is included in Selling and administrative expenses. The following table summarizes the expenses recognized:

In millions	2018	2017	2016
Stock options	\$23.5	\$19.5	\$18.1
RSUs	30.4	26.4	26.3
PSUs	23.0	23.0	19.9
Deferred compensation	3.4	3.1	3.2
Other	0.5	1.6	2.1
Pre-tax expense	80.8	73.6	69.6
Tax benefit	19.6	28.2	26.6
After-tax expense	\$61.2	\$45.4	\$43.0
Amounts recorded in continuing operations	\$61.2	\$45.4	\$43.0
Amounts recorded in discontinued operations	—	—	—
Total	\$61.2	\$45.4	\$43.0

Grants issued during the year ended December 31 were as follows:

	2018		2017		2016	
	Number Granted	Weighted-average fair value per award	Number Granted	Weighted-average fair value per award	Number Granted	Weighted-average fair value per award
Stock options	1,541,025	\$ 15.51	1,518,335	\$ 13.46	1,958,476	\$ 9.42
RSUs	327,411	\$ 90.07	372,443	\$ 81.09	486,401	\$ 51.28
Performance shares ⁽¹⁾	363,342	\$ 106.31	419,404	\$ 93.68	597,088	\$ 53.82

(1) The number of performance shares represents the maximum award level.

Stock Options / RSUs

Eligible participants may receive (i) stock options, (ii) RSUs or (iii) a combination of both stock options and RSUs.

The fair value of each of the Company's stock option and RSU awards is expensed on a straight-line basis over the required service period, which is generally the 3-year vesting period. However, for stock options and RSUs granted to retirement eligible employees, the Company recognizes expense for the fair value at the grant date.

The average fair value of the stock options granted is determined using the Black Scholes option pricing model. The following assumptions were used during the year ended December 31:

	2018	2017	2016
Dividend yield	2.00 %	2.00 %	2.55 %
Volatility	21.64 %	22.46 %	28.60 %
Risk-free rate of return	2.48 %	1.80 %	1.12 %
Expected life in years	4.8	4.8	4.8

A description of the significant assumptions used to estimate the fair value of the stock option awards is as follows:

• **Volatility** - The expected volatility is based on a weighted average of the Company's implied volatility and the most recent historical volatility of the Company's stock commensurate with the expected life.

• **Risk-free rate of return** - The Company applies a yield curve of continuous risk-free rates based upon the published US Treasury spot rates on the grant date.

• **Expected life** - The expected life of the Company's stock option awards represents the weighted-average of the actual period since the grant date for all exercised or canceled options and an expected period for all outstanding options.

• **Dividend yield** - The Company determines the dividend yield based upon the expected quarterly dividend payments as of the grant date and the current fair market value of the Company's stock.

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Forfeiture Rate - The Company analyzes historical data of forfeited options to develop a reasonable expectation of the number of options to forfeit prior to vesting per year. This expected forfeiture rate is applied to the Company's ongoing compensation expense; however, all expense is adjusted to reflect actual vestings and forfeitures.

Changes in options outstanding under the plans for the years 2018, 2017 and 2016 are as follows:

	Shares subject to option	Weighted- average exercise price	Aggregate intrinsic value (millions)	Weighted- average remaining life (years)
December 31, 2015	6,836,029	\$ 43.46		
Granted	1,958,476	50.04		
Exercised	(1,854,058)	33.71		
Cancelled	(93,552)	56.22		
December 31, 2016	6,846,895	47.81		
Granted	1,518,335	80.27		
Exercised	(1,789,615)	42.79		
Cancelled	(220,733)	61.91		
December 31, 2017	6,354,882	56.49		
Granted	1,541,025	89.71		
Exercised	(1,515,955)	45.44		
Cancelled	(94,601)	79.53		
Outstanding December 31, 2018	6,285,351	\$ 66.95	\$ 152.8	6.7
Exercisable December 31, 2018	3,262,865	\$ 55.76	\$ 115.7	5.3

The following table summarizes information concerning currently outstanding and exercisable options:

Range of exercise price	Options outstanding			Options exercisable		
	Number outstanding December 31, 2018	Weighted- average remaining life (years)	Weighted- average exercise price	Number outstanding December 31, 2018	Weighted- average remaining life (years)	Weighted- average exercise price
\$10.01 —\$20.00	34,551	0.1	\$ 13.49	34,551	0.1	\$ 13.49
20.01 —30.00	78,051	1.7	24.95	78,051	1.7	24.95
30.01 —40.00	265,557	2.7	34.41	265,557	2.7	34.41
40.01 —50.00	1,764,942	6.0	47.97	1,189,081	5.6	46.98
50.01 —60.00	586,455	4.9	59.57	572,668	4.9	59.69
60.01 —70.00	743,796	5.7	67.04	743,796	5.7	67.04
70.01 —80.00	14,031	8.0	75.67	—	—	—
80.01 —90.00	1,440,841	7.8	80.75	375,001	7.6	80.31
90.01 —100.00	1,340,727	8.9	90.07	4,160	2.3	90.07
100.01 —110.00	16,400	9.9	101.21	—	—	—
\$13.49 —\$101.21	6,285,351	6.7	\$ 66.95	3,262,865	5.3	\$ 55.76

At December 31, 2018, there was \$11.5 million of total unrecognized compensation cost from stock option arrangements granted under the plan, which is primarily related to unvested shares of non-retirement eligible employees. The aggregate intrinsic value of options exercised during the year ended December 31, 2018 and 2017 was \$74.1 million and \$72.7 million, respectively. Generally, stock options expire ten years from their date of grant.

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The following table summarizes RSU activity for the years 2018, 2017 and 2016:

	RSUs	Weighted- average grant date fair value
Outstanding and unvested at December 31, 2015	922,611	\$ 58.14
Granted	486,401	51.28
Vested	(545,437)	53.84
Cancelled	(27,826)	58.19
Outstanding and unvested at December 31, 2016	835,749	\$ 56.95
Granted	372,443	81.09
Vested	(370,397)	58.56
Cancelled	(34,096)	63.79
Outstanding and unvested at December 31, 2017	803,699	\$ 67.09
Granted	327,411	90.07
Vested	(389,285)	64.88
Cancelled	(20,186)	77.95
Outstanding and unvested at December 31, 2018	721,639	\$ 78.40

At December 31, 2018, there was \$16.8 million of total unrecognized compensation cost from RSU arrangements granted under the plan, which is related to unvested shares of non-retirement eligible employees.

Performance Shares

The Company has a Performance Share Program (PSP) for key employees. The program provides awards in the form of PSUs based on performance against pre-established objectives. The annual target award level is expressed as a number of the Company's ordinary shares based on the fair market value of the Company's stock on the date of grant. All PSUs are settled in the form of ordinary shares.

Beginning with the 2018 grant year, PSU awards are earned based 50% upon a performance condition, measured by relative Cash Flow Return on Invested Capital (CROIC) growth to the industrial group of companies in the S&P 500 Index over a 3-year performance period, and 50% upon a market condition, measured by the Company's relative total shareholder return (TSR) as compared to the TSR of the industrial group of companies in the S&P 500 Index over a 3-year performance period. The fair value of the market condition is estimated using a Monte Carlo Simulation approach in a risk-neutral framework based upon historical volatility, risk-free rates and correlation matrix. Awards granted prior to 2018 were earned based 50% upon a performance condition, measured by relative earnings-per-share (EPS) growth to the industrial group of companies in the S&P 500 Index over a 3-year performance period, and 50% upon a market condition measured by the Company's relative TSR as compared to the TSR of the industrial group of companies in the S&P Index over a 3-year performance period.

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The following table summarizes PSU activity for the maximum number of shares that may be issued for the years 2018, 2017 and 2016:

	PSUs	Weighted-average grant date fair value
Outstanding and unvested at December 31, 2015	1,448,232	\$ 63.18
Granted	597,088	53.82
Vested	(462,035)	46.81
Forfeited	(159,489)	56.25
Outstanding and unvested at December 31, 2016	1,423,796	\$ 65.34
Granted	419,404	93.68
Vested	(353,834)	65.35
Forfeited	(124,830)	73.40
Outstanding and unvested at December 31, 2017	1,364,536	\$ 73.31
Granted	363,342	106.31
Vested	(309,306)	76.00
Forfeited	(172,408)	90.89
Outstanding and unvested at December 31, 2018	1,246,164	\$ 79.83

At December 31, 2018, there was \$18.6 million of total unrecognized compensation cost from PSU arrangements based on current performance, which is related to unvested shares. This compensation will be recognized over the required service period, which is generally the three-year vesting period.

Deferred Compensation

The Company allows key employees to defer a portion of their eligible compensation into a number of investment choices, including its ordinary share equivalents. Any amounts invested in ordinary share equivalents will be settled in ordinary shares of the Company at the time of distribution.

NOTE 14. RESTRUCTURING ACTIVITIES

The Company incurs costs associated with restructuring initiatives intended to result in improved operating performance, profitability and working capital levels. Actions associated with these initiatives include workforce reduction, improving manufacturing productivity, realignment of management structures and rationalizing certain assets. Restructuring charges recorded during the years ended December 31 were as follows:

In millions	2018	2017	2016
Climate	\$34.1	\$42.3	\$6.2
Industrial	49.9	14.5	20.5
Corporate and Other	9.4	4.9	8.8
Total	\$93.4	\$61.7	\$35.5
Cost of goods sold	\$72.3	\$46.8	\$9.8
Selling and administrative expenses	21.1	14.9	25.7
Total	\$93.4	\$61.7	\$35.5

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The changes in the restructuring reserve were as follows:

In millions	Climate	Industrial	Corporate and Other	Total
December 31, 2016	\$ 3.4	\$ 4.3	\$ 0.6	\$ 8.3
Additions, net of reversals ⁽¹⁾	25.6	14.5	4.9	45.0
Cash paid/Other	(21.6)	(12.7)	(3.0)	(37.3)
December 31, 2017	7.4	6.1	2.5	16.0
Additions, net of reversals ⁽²⁾	16.3	49.9	9.4	75.6
Cash paid/Other	(4.8)	(26.1)	(9.3)	(40.2)
December 31, 2018	\$ 18.9	\$ 29.9	\$ 2.6	\$ 51.4

(1) Excludes the non-cash costs of asset rationalizations (\$8.4 million) and pension-related impacts (\$8.3 million).

(2) Excludes the non-cash costs of asset rationalizations (\$12.3 million) and pension-related impacts (\$5.5 million).

Current restructuring actions include general workforce reductions as well as the closure and consolidation of certain manufacturing facilities in an effort to improve the Company's cost structure. Amounts recognized primarily relate to severance and exit costs. However, the Company does include costs that are directly attributable to the restructuring activity but do not fall into the severance, exit or disposal categories. During the year ended December 31, 2018, costs associated with announced restructuring actions primarily included the following:

- the plan to close a Non-U.S. manufacturing facility within the Industrial segment and relocate production to other U.S. and Non-U.S. facilities; and
- the plan to close two U.S. manufacturing facilities within the Climate segment and relocate production to another existing U.S. facility.

As of December 31, 2018, the Company had \$51.4 million accrued for costs associated with its ongoing restructuring actions, of which a majority is expected to be paid within one year. These actions primarily relate to workforce reduction benefits.

NOTE 15. OTHER INCOME/(EXPENSE), NET

The components of Other income/(expense), net for the years ended December 31, 2018, 2017 and 2016 are as follows:

In millions	2018	2017	2016
Interest income	\$6.4	\$9.4	\$8.0
Exchange gain (loss)	(17.6)	(8.8)	(2.0)
Other components of net periodic benefit cost	(21.9)	(31.0)	(30.1)
Income (loss) from equity investment	—	—	(0.8)
Gain on sale of Hussmann equity investment	—	—	397.8
Other activity, net	(3.3)	(1.2)	(13.3)
Other income/(expense), net	\$(36.4)	\$(31.6)	\$359.6

Other income /(expense), net includes the results from activities other than normal business operations such as interest income and foreign currency gains and losses on transactions that are denominated in a currency other than an entity's functional currency. In addition, the Company includes the components of net periodic benefit cost for pension and post retirement obligations other than the service cost component. Other activity, net include costs associated with Trane U.S. Inc. (Trane) for the settlement and defense of asbestos-related claims, insurance settlements on asbestos-related matters and the revaluation of its liability for potential future claims. Refer to Note 20, "Commitments and Contingencies," for more information regarding asbestos-related matters. In addition, other activity, net for the year ended December 31, 2016 includes \$16.4 million for the settlement of a lawsuit originally filed by a customer in 2012. The lawsuit related to a commercial HVAC contract entered into in 2001, prior to our acquisition of Trane. The charge represents the settlement and related legal costs recognized during 2016.

Sale of Hussmann Equity Investment

During 2011, the Company completed the sale of a controlling interest of its Hussmann refrigerated display case business (Hussmann) to a newly-formed affiliate of private equity firm Clayton Dubilier & Rice, LLC (CD&R). Per the terms of the agreement, CD&R's ownership interest in Hussmann at the acquisition date was 60% with the

remaining 40% being retained by the Company. As a result, the Company accounted for its interest in Hussmann using the equity method of accounting.

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On December 21, 2015, the Company announced it would sell its remaining equity interest in Hussmann as part of a transaction in which Panasonic Corporation would acquire 100 percent of Hussmann's outstanding shares. The transaction was completed on April 1, 2016. The Company received net proceeds of \$422.5 million, for its interest and recognized a gain of \$397.8 million on the sale.

NOTE 16. INCOME TAXES

In December 2017, the U.S. enacted the Tax Cuts and Jobs Act (the "Act") which makes widespread changes to the Internal Revenue Code. The Act, among other things, reduced the U.S. federal corporate tax rate from 35% to 21%, requires companies to pay a transition tax on earnings of certain foreign subsidiaries that were previously not subject to U.S. tax and creates new income taxes on certain foreign sourced earnings.

The SEC issued Staff Accounting Bulletin No. 118 (SAB 118) which provides guidance on accounting for the tax effects of the Act and allows for adjustments to provisional amounts during a measurement period of up to one year. In accordance with SAB 118, the Company has made reasonable estimates related to (1) the remeasurement of U.S. deferred tax balances for the reduction in the tax rate (2) the liability for the transition tax and (3) the taxes accrued relating to the change in permanent reinvestment assertion for unremitted earnings of certain foreign subsidiaries. As a result, the Company recognized a net provisional income tax benefit of \$21.0 million associated with these items in 2017.

During 2018, the Company recognized measurement period adjustments for (1) the remeasurement of U.S. deferred tax balances for the reduction in the tax rate, (2) the liability for the transition tax and (3) the taxes accrued relating to the change in permanent reinvestment assertion for unremitted earnings of certain foreign subsidiaries. In determining the measurement period adjustments, the Company assessed regulatory guidance that was issued to determine the impact on the provisional estimates recognized in 2017. In addition, the Company gathered information and performed additional analysis on these estimates, including, but not limited to, the amount of earnings and profits subject to the transition tax, the calculation of foreign tax credits, the local tax treatment of future distributions of unremitted earnings and in regard to the remeasurement of U.S. deferred taxes, the filing of its 2017 federal and state income tax returns. Measurement period adjustments were reported as a component of Provision for income taxes in the reporting period the amounts were determined. As of December 31, 2018, the Company finalized its provisional accounting under SAB 118.

A reconciliation of the provisional amounts reported to the final tax effect of the Act is as follows:

In millions	2017 Provisional Amounts Reported	2018 Measurement Period Adjustments	Final Tax Effects of the Act
Remeasurement of deferred tax balances	\$ (300.6)	\$ 4.8	\$ (295.8)
Transition tax	160.7	24.6	185.3
Change in permanent reinvestment assertion	118.9	(38.4)	80.5
Income tax benefit, net	\$ (21.0)	\$ (9.0)	\$ (30.0)

Current and deferred provision for income taxes

Earnings before income taxes for the years ended December 31 were taxed within the following jurisdictions:

In millions	2018	2017	2016
United States ⁽¹⁾	\$971.6	\$(17.6)	\$419.8
Non-U.S.	688.7	1,435.5	1,321.5
Total	\$1,660.3	\$1,417.9	\$1,741.3

(1) Amount reported in 2017 includes the impact of a premium paid of approximately \$520 million related to the early retirement of certain intercompany debt obligations

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The components of the Provision for income taxes for the years ended December 31 were as follows:

In millions	2018	2017	2016
Current tax expense (benefit):			
United States	\$231.9	\$102.2	\$179.6
Non-U.S.	193.2	95.4	135.7
Total:	425.1	197.6	315.3
Deferred tax expense (benefit):			
United States	(83.2)	(234.7)	(6.7)
Non-U.S.	(60.6)	117.3	(27.1)
Total:	(143.8)	(117.4)	(33.8)
Total tax expense (benefit):			
United States	148.7	(132.5)	172.9
Non-U.S.	132.6	212.7	108.6
Total	\$281.3	\$80.2	\$281.5

The Provision for income taxes differs from the amount of income taxes determined by applying the applicable U.S. statutory income tax rate to pretax income, as a result of the following differences:

	Percent of pretax income		
	2018	2017	2016
Statutory U.S. rate	21.0 %	35.0 %	35.0 %
Increase (decrease) in rates resulting from:			
Non-U.S. tax rate differential ^(a)	(1.8)	(28.8)	(14.7)
Tax on U.S. subsidiaries on non-U.S. earnings ^(d)	0.7	0.8	0.9
State and local income taxes ^(b)	0.1	1.2	1.4
Valuation allowances ^(c)	0.7	2.8	0.1
Change in permanent reinvestment assertion ^{(d), (f)}	(2.3)	8.4	—
Transition tax ^(f)	1.5	11.3	—
Remeasurement of deferred tax balances ^(f)	0.3	(21.2)	—
Stock based compensation	(0.9)	(1.7)	—
Foreign derived intangible income	(1.1)	—	—
Reserves for uncertain tax positions	(0.8)	(0.9)	0.1
Husmann gain ^(e)	—	—	(5.7)
Provision to return and other true-up adjustments	(0.7)	(1.7)	(0.6)
Other adjustments	0.2	0.5	(0.3)
Effective tax rate	16.9 %	5.7 %	16.2 %

^(a) Amount reported in 2017 includes the impact of a premium paid of approximately \$520 million related to the early retirement of certain intercompany debt obligations

^(b) Net of changes in state valuation allowances

^(c) Primarily federal and non-U.S., excludes state valuation allowances

^(d) Net of foreign tax credits

^(e) Gain from sale of Husmann equity investment

^(f) Provisional amounts reported under SAB 118 were finalized in 2018

Tax incentives, in the form of tax holidays, have been granted to the Company in certain jurisdictions to encourage industrial development. The expiration of these tax holidays varies by country. The tax holidays are conditional on the Company meeting certain employment and investment thresholds. The most significant tax holidays relate to the Company's qualifying locations in China, Puerto Rico, Panama and Singapore. The benefit for the tax holidays for the years ended December 31, 2018, 2017 and 2016 was \$25.4 million, \$19.7 million and \$23.3 million, respectively.

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Deferred tax assets and liabilities

A summary of the deferred tax accounts at December 31 are as follows:

In millions	2018	2017
Deferred tax assets:		
Inventory and accounts receivable	\$20.3	\$17.4
Fixed assets and intangibles	39.2	10.4
Postemployment and other benefit liabilities	386.1	396.5
Product liability	95.1	95.4
Other reserves and accruals	153.9	134.8
Net operating losses and credit carryforwards	589.9	589.0
Other	28.6	22.7
Gross deferred tax assets	1,313.1	1,266.2
Less: deferred tax valuation allowances	(332.2)	(344.6)
Deferred tax assets net of valuation allowances	\$980.9	\$921.6
Deferred tax liabilities:		
Inventory and accounts receivable	\$(18.6)	\$(24.1)
Fixed assets and intangibles	(1,220.9)	(1,237.4)
Postemployment and other benefit liabilities	(9.7)	(9.6)
Other reserves and accruals	(11.8)	(1.5)
Product liability	(1.2)	(1.4)
Undistributed earnings of foreign subsidiaries	(39.5)	(137.7)
Other	(10.6)	(11.1)
Gross deferred tax liabilities	(1,312.3)	(1,422.8)
Net deferred tax assets (liabilities)	\$(331.4)	\$(501.2)

At December 31, 2018, no deferred taxes have been provided for earnings of certain of the Company's subsidiaries, since these earnings have been, and under current plans will continue to be permanently reinvested in these subsidiaries. These earnings amount to approximately \$3.2 billion which if distributed would result in additional taxes, which may be payable upon distribution, of approximately \$400.0 million.

At December 31, 2018, the Company had the following operating loss and tax credit carryforwards available to offset taxable income in prior and future years:

In millions	Amount	Expiration Period
U.S. Federal net operating loss carryforwards	\$ 680.2	2020-2036
U.S. Federal credit carryforwards	127.9	2022-Unlimited
U.S. State net operating loss carryforwards	3,317.0	2019-Unlimited
U.S. State credit carryforwards	30.4	2019-Unlimited
Non-U.S. net operating loss carryforwards	752.9	2019-Unlimited
Non-U.S. credit carryforwards	7.1	Unlimited

The U.S. state net operating loss carryforwards were incurred in various jurisdictions. The non-U.S. net operating loss carryforwards were incurred in various jurisdictions, predominantly in Belgium, Brazil, China, India, Luxembourg, Spain, and the United Kingdom.

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Activity associated with the Company's valuation allowance is as follows:

In millions	2018	2017	2016
Beginning balance	\$344.6	\$184.5	\$213.1
Increase to valuation allowance	54.9	176.5	19.4
Decrease to valuation allowance	(55.1)	(19.1)	(43.5)
Write off against valuation allowance	(4.6)	—	—
Accumulated other comprehensive income (loss)	(7.6)	2.7	(4.5)
Ending balance	\$332.2	\$344.6	\$184.5

During 2018, the Company recorded a net addition to the valuation allowance related to excess foreign tax credits in the amount of \$17.3 million. In addition, the Company recorded a \$35 million reduction in a valuation allowance for certain state net deferred tax assets. The reduction in certain state net deferred tax assets is primarily the result of revised projections of future state taxable income during the carryforward period.

During 2017, the Company recorded a valuation allowance of approximately \$30 million on certain net deferred tax assets in Brazil that were no longer expected to be realized. In addition, the Company recorded a valuation allowance of approximately \$100 million related to excess foreign tax credits generated as a result of the Act.

Unrecognized tax benefits

The Company has total unrecognized tax benefits of \$83.0 million and \$120.5 million as of December 31, 2018, and December 31, 2017, respectively. The amount of unrecognized tax benefits that, if recognized, would affect the continuing operations effective tax rate are \$60.8 million as of December 31, 2018. A reconciliation of the beginning and ending amount of unrecognized tax benefits is as follows:

In millions	2018	2017	2016
Beginning balance	\$120.5	\$107.1	\$174.9
Additions based on tax positions related to the current year	3.4	6.2	5.9
Additions based on tax positions related to prior years	23.5	16.8	29.1
Reductions based on tax positions related to prior years	(47.2)	(8.6)	(37.6)
Reductions related to settlements with tax authorities	(14.2)	(4.8)	(60.9)
Reductions related to lapses of statute of limitations	(0.9)	(1.3)	(2.8)
Translation (gain) loss	(2.1)	5.1	(1.5)
Ending balance	\$83.0	\$120.5	\$107.1

The Company records interest and penalties associated with the uncertain tax positions within its Provision for income taxes. The Company had reserves associated with interest and penalties, net of tax, of \$20.7 million and \$35.0 million at December 31, 2018 and December 31, 2017, respectively. For the year ended December 31, 2018 and December 31, 2017, the Company recognized a \$13.4 million tax benefit and a \$1.9 million tax expense, respectively, in interest and penalties, net of tax in continuing operations related to these uncertain tax positions.

The total amount of unrecognized tax benefits relating to the Company's tax positions is subject to change based on future events including, but not limited to, the settlements of ongoing audits and/or the expiration of applicable statutes of limitations. Although the outcomes and timing of such events are highly uncertain, it is reasonably possible that the balance of gross unrecognized tax benefits, excluding interest and penalties, could potentially be reduced by up to approximately \$4 million during the next 12 months.

The provision for income taxes involves a significant amount of management judgment regarding interpretation of relevant facts and laws in the jurisdictions in which the Company operates. Future changes in applicable laws, projected levels of taxable income and tax planning could change the effective tax rate and tax balances recorded by the Company. In addition, tax authorities periodically review income tax returns filed by the Company and can raise issues regarding its filing positions, timing and amount of income or deductions, and the allocation of income among the jurisdictions in which the Company operates. A significant period of time may elapse between the filing of an income tax return and the ultimate resolution of an issue raised by a revenue authority with respect to that return. In the normal course of business the Company is subject to examination by taxing authorities throughout the world, including such major jurisdictions as Brazil, Canada, China, France, Germany, Ireland, Italy, Mexico, Spain, the Netherlands, the United Kingdom and the United States. These examinations on their own, or any subsequent

litigation related to the examinations, may result in additional taxes or penalties against the Company. If the ultimate result of these audits differ from

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original or adjusted estimates, they could have a material impact on the Company's tax provision. In general, the examination of the Company's material tax returns are complete or effectively settled for the years prior to 2008, with certain matters prior to 2008 being resolved through appeals and litigation and also unilateral procedures as provided for under double tax treaties.

NOTE 17. ACQUISITIONS AND DIVESTITURES**Acquisitions and Equity Method Investments**

During 2018, the Company acquired several businesses and entered into a joint venture. The aggregate cash paid, net of cash acquired, totaled \$285.2 million and was funded through cash on hand. Acquisitions are recorded using the acquisition method of accounting in accordance with ASC 805 "Business Combinations." As a result, the aggregate price has been allocated to assets acquired and liabilities assumed based on the estimate of fair market value of such assets and liabilities at the date of acquisition. Ownership interests in a joint venture are accounted for under the equity method when the Company does not have a controlling financial interest and reported within Other noncurrent assets on the Balance Sheet.

Primary activity during 2018 relates to the acquisition of ICS Group Holdings Limited in January 2018. The business, reported within the Climate segment, specializes in the temporary rental of energy efficient chillers for commercial and industrial buildings across Europe. In addition, the Company continues to acquire independent dealers to expand its distribution network. Intangible assets associated with these acquisitions totaled \$45.2 million and primarily relate to trademarks and customer relationships. The excess purchase price over the estimated fair value of net assets acquired was recognized as goodwill and totaled \$119.9 million.

In addition, the Company completed its investment of a 50% ownership interest in a joint venture with Mitsubishi Electric Corporation (Mitsubishi) in May 2018. The joint venture, reported within the Climate segment, will focus on marketing, selling and supporting variable refrigerant flow (VRF) and ductless heating and air conditioning systems through Trane, American Standard and Mitsubishi channels in the U.S. and select Latin American countries. Ongoing results since the date of investment are accounted for under the equity method and are not considered material to the Company's results of operations.

During 2017, the Company acquired several businesses, including channel acquisitions, that complement existing products and services. The aggregate cash paid, net of cash acquired, totaled \$157.6 million and was funded through cash on hand. These acquisitions were recorded using the acquisition method of accounting in accordance with the accounting guidance for business acquisitions. As a result, the aggregate price has been allocated to assets acquired and liabilities assumed based on the estimate of fair market value of such assets and liabilities at the date of acquisition.

Divestitures

The Company has retained costs from previously sold businesses that primarily include expenses related to postretirement benefits, product liability and legal costs. In addition, the Company includes amounts related to the 2013 spin-off of our commercial and residential security business, now an independent public company operating under the name of Allegion plc (Allegion). The components of Discontinued operations, net of tax for the years ended December 31 are as follows:

In millions	2018	2017	2016
Pre-tax earnings (loss) from discontinued operations	\$(85.5)	\$(34.0)	\$28.1
Tax benefit (expense)	64.0	8.6	4.8
Discontinued operations, net of tax	\$(21.5)	\$(25.4)	\$32.9

Pre-tax earnings (loss) from discontinued operations includes costs associated with Ingersoll Rand Company for the settlement and defense of asbestos-related claims, insurance settlements on asbestos-related matters and the revaluation of its liability for potential future claims. Refer to Note 20, "Commitments and Contingencies," for more information related to asbestos. A portion of the tax benefit (expense) in each period represent adjustments for certain tax matters associated with Allegion.

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NOTE 18. EARNINGS PER SHARE (EPS)

Basic EPS is calculated by dividing Net earnings attributable to Ingersoll-Rand plc by the weighted-average number of ordinary shares outstanding for the applicable period. Diluted EPS is calculated after adjusting the denominator of the basic EPS calculation for the effect of all potentially dilutive ordinary shares, which in the Company's case, includes shares issuable under share-based compensation plans. The following table summarizes the weighted-average number of ordinary shares outstanding for basic and diluted earnings per share calculations:

In millions	2018	2017	2016
Weighted-average number of basic shares outstanding	247.2	254.9	259.2
Shares issuable under incentive stock plans	2.9	3.2	2.5
Weighted-average number of diluted shares outstanding	250.1	258.1	261.7
Anti-dilutive shares	1.5	1.6	1.2

NOTE 19. BUSINESS SEGMENT INFORMATION

The accounting policies of the operating segments are the same as those described in the summary of significant accounting policies except that the operating segments' results are prepared on a management basis that is consistent with the manner in which the Company prepares financial information for internal review and decision making. The Company largely evaluates performance based on Segment operating income and Segment operating margins.

Intercompany sales between segments are considered immaterial.

The Company's Climate segment delivers energy-efficient products and innovative energy services. It includes Trane® and American Standard® Heating & Air Conditioning which provide heating, ventilation and air conditioning (HVAC) systems, and commercial and residential building services, parts, support and controls; energy services and building automation through Trane Building Advantage and Nexia; and Thermo King® transport temperature control solutions.

The Company's Industrial segment delivers products and services that enhance energy efficiency, productivity and operations. It includes compressed air and gas systems and services, power tools, material handling systems, ARO® fluid management equipment, as well as Club Car® golf, utility and rough terrain vehicles.

Segment operating income is the measure of profit and loss that the Company's chief operating decision maker uses to evaluate the financial performance of the business and as the basis for performance reviews, compensation and resource allocation. For these reasons, the Company believes that Segment operating income represents the most relevant measure of segment profit and loss.

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A summary of operations by reportable segments for the years ended December 31 were as follows:

Dollar amounts in millions	2018	2017	2016	
Climate				
Net revenues	\$12,343.8	\$11,167.5	\$10,545.0	
Segment operating income	1,766.2	1,572.7	1,537.5	
Segment operating income as a percentage of revenues	14.3	% 14.1	% 14.6	%
Depreciation and amortization	252.0	247.6	225.2	
Capital expenditures	217.3	103.8	78.2	
Industrial				
Net revenues	3,324.4	3,030.1	2,963.9	
Segment operating income	405.3	357.6	300.3	
Segment operating income as a percentage of revenues	12.2	% 11.8	% 10.1	%
Depreciation and amortization	79.2	77.3	67.2	
Capital expenditures	80.9	57.4	36.3	
Total net revenues	\$15,668.2	\$14,197.6	\$13,508.9	

Reconciliation to Operating Income

Segment operating income from reportable segments	2,171.5	1,930.3	1,837.8	
Unallocated corporate expense	(254.1)	(265.0)	(234.6)	
Total operating income	\$1,917.4	\$1,665.3	\$1,603.2	
Total operating income as a percentage of revenues	12.2	% 11.7	% 11.9	%
Depreciation and Amortization				
Depreciation and amortization from reportable segments	331.2	324.9	292.4	
Unallocated depreciation and amortization	30.3	28.4	59.8	
Total depreciation and amortization	\$361.5	\$353.3	\$352.2	
Capital Expenditures				
Capital expenditures from reportable segments	298.2	161.2	114.5	
Corporate capital expenditures	67.4	60.1	68.2	
Total capital expenditures	\$365.6	\$221.3	\$182.7	

At December 31, summary of long-lived assets by geographic area were as follows:

In millions	2018	2017 ⁽¹⁾
United States	\$1,914.7	\$1,878.1
Non-U.S.	781.3	758.5
Total	\$2,696.0	\$2,636.6

(1) In the Company's Annual Report on Form 10-K for the year ended December 31, 2017, the amounts disclosed for long-lived assets by geographic area at December 31, 2017 were inadvertently misstated. Management determined the disclosure error was not material to the 2017 financial statements. The revised amounts have been included in table above.

NOTE 20. COMMITMENTS AND CONTINGENCIES

The Company is involved in various litigations, claims and administrative proceedings, including those related to environmental, asbestos, and product liability matters. In accordance with ASC 450, "Contingencies" (ASC 450), the Company records accruals for loss contingencies when it is both probable that a liability will be incurred and the amount of the loss can be reasonably estimated. Amounts recorded for identified contingent liabilities are estimates, which are reviewed periodically and adjusted to reflect additional information when it becomes available. Subject to the uncertainties inherent in estimating future costs for contingent liabilities, except as expressly set forth in this note, management believes that any liability which may result from these legal matters would not have a material adverse effect on the financial condition, results of operations, liquidity or cash flows of the Company.

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Environmental Matters

The Company continues to be dedicated to environmental and sustainability programs to minimize the use of natural resources, and reduce the utilization and generation of hazardous materials from our manufacturing processes and to remediate identified environmental concerns. As to the latter, the Company is currently engaged in site investigations and remediation activities to address environmental cleanup from past operations at current and former manufacturing facilities.

The Company is sometimes a party to environmental lawsuits and claims and has received notices of potential violations of environmental laws and regulations from the Environmental Protection Agency and similar state authorities. It has also been identified as a potentially responsible party (PRP) for cleanup costs associated with off-site waste disposal at federal Superfund and state remediation sites. For all such sites, there are other PRPs and, in most instances, the Company's involvement is minimal.

In estimating its liability, the Company has assumed it will not bear the entire cost of remediation of any site to the exclusion of other PRPs who may be jointly and severally liable. The ability of other PRPs to participate has been taken into account, based on the Company's understanding of the parties' financial condition and probable contributions on a per site basis. Additional lawsuits and claims involving environmental matters are likely to arise from time to time in the future.

As of December 31, 2018 and 2017, the Company has recorded reserves for environmental matters of \$41.2 million and \$41.9 million, respectively. Of these amounts \$36.1 million and \$36.8 million, respectively, relate to remediation of sites previously disposed by the Company.

Asbestos-Related Matters

Certain wholly-owned subsidiaries and former companies of ours are named as defendants in asbestos-related lawsuits in state and federal courts. In virtually all of the suits, a large number of other companies have also been named as defendants. The vast majority of those claims have been filed against either Ingersoll-Rand Company or Trane U.S. Inc. (Trane) and generally allege injury caused by exposure to asbestos contained in certain historical products sold by Ingersoll-Rand Company or Trane, primarily pumps, boilers and railroad brake shoes. None of our existing or previously-owned businesses were a producer or manufacturer of asbestos.

The Company engages an outside expert to perform a detailed analysis and project an estimated range of the Company's total liability for pending and unasserted future asbestos-related claims. In accordance with ASC 450, the Company records the liability at the low end of the range as it believes that no amount within the range is a better estimate than any other amount. Asbestos-related defense costs are excluded from the liability and are recorded separately as services are incurred. The methodology used to prepare estimates relies upon and includes the following factors, among others:

- the outside expert's interpretation of a widely accepted forecast of the population likely to have been occupationally exposed to asbestos;
- epidemiological studies estimating the number of people likely to develop asbestos-related diseases such as mesothelioma and lung cancer;
- the Company's historical experience with the filing of non-malignancy claims and claims alleging other types of malignant diseases filed against the Company relative to the number of lung cancer claims filed against the Company;
- the outside expert's analysis of the number of people likely to file an asbestos-related personal injury claim against the Company based on such epidemiological and historical data and the Company's claims history;
- an analysis of the Company's pending cases, by type of disease claimed and by year filed;
- an analysis of the Company's history to determine the average settlement and resolution value of claims, by type of disease claimed;
- an adjustment for inflation in the future average settlement value of claims, at a 2.5% annual inflation rate, adjusted downward to 1.0% to take account of the declining value of claims resulting from the aging of the claimant population; and
- an analysis of the period over which the Company has and is likely to resolve asbestos-related claims against it in the future (currently projected through 2053).

At December 31, 2018, over 75 percent of the open and active claims against the Company are non-malignant or unspecified disease claims. In addition, the Company has a number of claims which have been placed on inactive or deferred dockets and expected to have little or no settlement value against the Company.

The Company's liability for asbestos-related matters and the asset for probable asbestos-related insurance recoveries are included in the following balance sheet accounts:

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In millions	December 31, December 31,	
	2018	2017
Accrued expenses and other current liabilities	\$ 63.3	\$ 48.2
Other noncurrent liabilities	548.3	556.6
Total asbestos-related liabilities	\$ 611.6	\$ 604.8

Other current assets	\$ 69.2	\$ 56.1
Other noncurrent assets	199.0	210.3
Total asset for probable asbestos-related insurance recoveries	\$ 268.2	\$ 266.4

The Company's asbestos insurance receivable related to Ingersoll-Rand Company and Trane was \$141.7 million and \$126.5 million at December 31, 2018, and \$138.5 million and \$127.9 million at December 31, 2017, respectively. The receivable attributable to Trane for probable insurance recoveries as of December 31, 2018 is entirely supported by settlement agreements between Trane and the respective insurance carriers. Most of these settlement agreements constitute "coverage-in-place" arrangements, in which the insurer signatories agree to reimburse Trane for specified portions of its costs for asbestos bodily injury claims and Trane agrees to certain claims-handling protocols and grants to the insurer signatories certain releases and indemnifications.

The costs associated with the settlement and defense of asbestos-related claims, insurance settlements on asbestos-related matters and the revaluation of the Company's liability for potential future claims are included in the income statement within continuing operations or discontinued operations depending on the business to which they relate. Income and expenses associated with Ingersoll-Rand Company's asbestos-related matters are recorded within discontinued operations as they relate to previously divested businesses, primarily Ingersoll-Dresser Pump, which was sold by the Company in 2000. Income and expenses associated with Trane's asbestos-related matters are recorded within Other income/(expense), net as part of continuing operations.

The income (expense) associated with these transactions for the years ended December 31, were as follows:

In millions	2018	2017	2016
Continuing operations	\$(10.4)	\$(3.1)	\$2.7
Discontinued operations	(56.5)	(11.9)	46.3
Total	\$(66.9)	\$(15.0)	\$49.0

During the year ended December 31, 2018, the Company's valuation model was updated to address a change in potential future claims. The adjustment, which increased the asbestos-related liability for both Ingersoll-Rand Company and Trane, was partially offset by asbestos-related receivables from insurance carriers. During the year ended December 31, 2017, the Company recorded an adjustment to update its liability for potential future claims. This amount was partially offset by asbestos-related settlements reached with various insurance carriers. Amounts recorded during the year ended December 31, 2016 included asbestos-related settlements with various insurance carriers. In 2012 and 2013, Ingersoll-Rand Company filed actions in the Superior Court of New Jersey, Middlesex County, seeking a declaratory judgment and other relief regarding the Company's rights to defense and indemnity for asbestos claims. The defendants were several dozen solvent insurance companies, including companies that had been paying a portion of Ingersoll-Rand Company's asbestos claim defense and indemnity costs. The responding defendants generally challenged the Company's right to recovery, and raised various coverage defenses. Since filing the actions, Ingersoll Rand Company has settled with approximately two-thirds of the insurer defendants, and has dismissed one of the actions in its entirety.

The Company continually monitors the status of pending litigation that could impact the allocation of asbestos claims against the Company's various insurance policies. The Company has concluded that its Ingersoll-Rand Company insurance receivable is probable of recovery because of the following factors:

- Ingersoll-Rand Company has reached favorable settlements regarding asbestos coverage claims for the majority of its recorded asbestos-related insurance receivable;

- a review of other companies in circumstances comparable to Ingersoll-Rand Company, including Trane, and the success of other companies in recovering under their insurance policies, including Trane's favorable settlement discussed above;

the Company's confidence in its right to recovery under the terms of its policies and pursuant to applicable law; and the Company's history of receiving payments under the Ingersoll-Rand Company insurance program, including under policies that had been the subject of prior litigation.

The amounts recorded by the Company for asbestos-related liabilities and insurance-related assets are based on currently available information. The Company's actual liabilities or insurance recoveries could be significantly higher or lower than those recorded

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if assumptions used in the calculations vary significantly from actual results. Key variables in these assumptions include the number and type of new claims to be filed each year, the average cost of resolution of each such new claim, the resolution of coverage issues with insurance carriers, and the solvency risk with respect to the Company's insurance carriers. Furthermore, predictions with respect to these variables are subject to greater uncertainty as the projection period lengthens. Other factors that may affect the Company's liability include uncertainties surrounding the litigation process from jurisdiction to jurisdiction and from case to case, reforms that may be made by state and federal courts, and the passage of state or federal tort reform legislation.

The aggregate amount of the stated limits in insurance policies available to the Company for asbestos-related claims acquired, over many years and from many different carriers, is substantial. However, limitations in that coverage, primarily due to the considerations described above, are expected to result in the projected total liability to claimants substantially exceeding the probable insurance recovery.

Warranty Liability

Standard product warranty accruals are recorded at the time of sale and are estimated based upon product warranty terms and historical experience. The Company assesses the adequacy of its liabilities and will make adjustments as necessary based on known or anticipated warranty claims, or as new information becomes available.

The changes in the standard product warranty liability for the year ended December 31, were as follows:

In millions	2018	2017
Balance at beginning of period	\$270.5	\$261.6
Reductions for payments	(159.0)	(140.5)
Accruals for warranties issued during the current period	158.2	141.9
Changes to accruals related to preexisting warranties	11.5	2.2
Translation	(2.3)	5.3
Balance at end of period	\$278.9	\$270.5

Standard product warranty liabilities are classified as Accrued expenses and other current liabilities, or Other noncurrent liabilities based on their expected term. The Company's total current standard product warranty reserve at December 31, 2018 and December 31, 2017 was \$149.5 million and \$144.5 million, respectively.

The Company's extended warranty liability represents the deferred revenue associated with its extended warranty contracts and is amortized into Net revenues on a straight-line basis over the life of the contract, unless another method is more representative of the costs incurred. The Company assesses the adequacy of its liability by evaluating the expected costs under its existing contracts to ensure these expected costs do not exceed the extended warranty liability.

The changes in the extended warranty liability for the year ended December 31, were as follows:

In millions	2018	2017
Balance at beginning of period	\$293.0	\$295.9
Amortization of deferred revenue for the period	(115.0)	(107.2)
Additions for extended warranties issued during the period	116.1	100.8
Changes to accruals related to preexisting warranties	(0.5)	1.3
Translation	(1.4)	2.2
Balance at end of period	\$292.2	\$293.0

The extended warranty liability is classified as Accrued expenses and other current liabilities or Other noncurrent liabilities based on the timing of when the deferred revenue is expected to be amortized into Net revenues. The Company's total current extended warranty liability at December 31, 2018 and December 31, 2017 was \$103.1 million and \$100.0 million, respectively. For the years ended December 31, 2018 and 2017, the Company incurred costs of \$63.2 million and \$60.7 million, respectively, related to extended warranties.

Other Commitments and Contingencies

Certain office and warehouse facilities, transportation vehicles and data processing equipment are leased by the Company. Total rental expense was \$261.3 million in 2018, \$241.8 million in 2017 and \$230.4 million in 2016. Minimum lease payments required under non-cancelable operating leases with terms in excess of one year for the next five years amounts to approximately: \$197 million in 2019, \$152 million in 2020, \$107 million in 2021, \$68 million

in 2022, and \$42 million in 2023.

Refer to Note 16 for a discussion of income tax-related contingencies.

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NOTE 21. GUARANTOR FINANCIAL INFORMATION

Ingersoll-Rand plc (Plc or Parent Company) and certain of its 100% directly or indirectly owned subsidiaries provide guarantees of public debt issued by other 100% directly or indirectly owned subsidiaries. The following condensed consolidating financial information is provided so that separate financial statements of these subsidiary issuer and guarantors are not required to be filed with the U.S. Securities and Exchange Commission.

The following table shows the Company's guarantor relationships as of December 31, 2018:

Parent, issuer or guarantors	Notes issued	Notes guaranteed ⁽¹⁾
Ingersoll-Rand plc (Plc)	None	All registered notes and debentures
Ingersoll-Rand Irish Holdings Unlimited Company (Irish Holdings)	None	All notes issued by Global Holding and Lux Finance
Ingersoll-Rand Lux International Holding Company S.a.r.l. (Lux International)	None	All notes issued by Global Holding and Lux Finance
	2.900% Senior notes due 2021	
	4.250% Senior notes due 2023	
Ingersoll-Rand Global Holding Company Limited (Global Holding)	3.750% Senior notes due 2028	All notes issued by Lux Finance
	5.750% Senior notes due 2043	
	4.300% Senior notes due 2048	
	9.000% Debentures due 2021	
Ingersoll-Rand Company (New Jersey)	7.200% Debentures due 2019-2025	All notes issued by Global Holding and Lux Finance
	6.480% Debentures due 2025	
	Puttable debentures due 2027-2028	
Ingersoll-Rand Luxembourg Finance S.A. (Lux Finance)	2.625% Notes due 2020	All notes and debentures issued by Global Holding and New Jersey
	3.550% Notes due 2024	
	4.650% Notes due 2044	

(1) All subsidiary issuers and guarantors provide irrevocable guarantees of borrowings, if any, made under revolving credit facilities

Each subsidiary debt issuer and guarantor is owned 100% directly or indirectly by the Parent Company. Each guarantee is full and unconditional, and provided on a joint and several basis. There are no significant restrictions of the Parent Company, or any guarantor, to obtain funds from its subsidiaries, such as provisions in debt agreements that prohibit dividend payments, loans or advances to the parent by a subsidiary.

Basis of presentation

The following Condensed Consolidating Financial Statements present the financial position, results of operations and cash flows of each issuer or guarantor on a legal entity basis. The financial information for all periods has been presented based on the Company's legal entity ownerships and guarantees outstanding at December 31, 2018. Assets and liabilities are attributed to each issuer and guarantor generally based on legal entity ownership. Investments in subsidiaries of the Parent Company, subsidiary guarantors and issuers represent the proportionate share of their subsidiaries' net assets. Certain adjustments are needed to consolidate the Parent Company and its subsidiaries, including the elimination of investments in subsidiaries and related activity that occurs between entities in different columns. These adjustments are presented in the Consolidating Adjustments column. This basis of presentation is intended to comply with the specific reporting requirements for subsidiary issuers and guarantors, and is not intended

to present the Company's financial position or results of operations or cash flows for any other purpose.

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For the year ended December 31, 2018

In millions	Plc	Irish Holdings	Lux International	Global Holding	New Jersey	Lux Finance	Other Subsidiaries	Consolidating Adjustments	Consolidated
Net revenues	\$—	\$—	\$—	\$—	\$1,414.5	\$—	\$14,658.2	\$(404.5)	\$15,668.2
Cost of goods sold	—	—	—	—	(1,044.0)	—	(10,208.1)	404.5	(10,847.6)
Selling and administrative expenses	(39.5)	—	(0.4)	(0.3)	(391.5)	(0.3)	(2,471.2)	—	(2,903.2)
Operating income (loss)	(39.5)	—	(0.4)	(0.3)	(21.0)	(0.3)	1,978.9	—	1,917.4
Equity earnings (loss) in subsidiaries, net of tax	1,460.8	1,458.6	1,183.7	1,190.7	1,074.3	195.6	—	(6,563.7)	—
Interest expense	—	—	0.4	(130.3)	(46.8)	(43.0)	(1.0)	—	(220.7)
Intercompany interest and fees	(92.7)	—	41.1	(196.5)	122.8	(11.2)	136.5	—	—
Other income/(expense), net	—	—	(48.8)	0.7	(17.3)	0.1	28.9	—	(36.4)
Earnings (loss) before income taxes	1,328.6	1,458.6	1,176.0	864.3	1,112.0	141.2	2,143.3	(6,563.7)	1,660.3
Benefit (provision) for income taxes	9.0	—	—	86.2	98.5	—	(475.0)	—	(281.3)
Earnings (loss) from continuing operations	1,337.6	1,458.6	1,176.0	950.5	1,210.5	141.2	1,668.3	(6,563.7)	1,379.0
Gain (loss) from discontinued operations, net of tax	—	—	—	—	(20.1)	—	(1.4)	—	(21.5)
Net earnings (loss)	1,337.6	1,458.6	1,176.0	950.5	1,190.4	141.2	1,666.9	(6,563.7)	1,357.5
Less: Net earnings attributable to noncontrolling interests	—	—	—	—	—	—	(19.9)	—	(19.9)
Net earnings attributable to Ingersoll-Rand plc	\$1,337.6	\$1,458.6	\$1,176.0	\$950.5	\$1,190.4	\$141.2	\$1,647.0	\$(6,563.7)	\$1,337.6
Other comprehensive income (loss), net of tax	(185.3)	(184.7)	(173.7)	(85.7)	(85.7)	(83.5)	(256.2)	869.5	(185.3)
Comprehensive income	\$1,152.3	\$1,273.9	\$1,002.3	\$864.8	\$1,104.7	\$57.7	\$1,390.8	\$(5,694.2)	\$1,152.3

attributable to
Ingersoll-Rand plc

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Table of ContentsCondensed Consolidating Statement of Comprehensive Income
For the year ended December 31, 2017

In millions	Plc	Irish Holdings	Lux International	Global Holding	New Jersey	Lux Finance	Other Subsidiaries	Consolidating Adjustments	Consolidated
Net revenues	\$—	\$—	\$—	\$—	\$1,336.6	\$—	\$13,216.7	\$(355.7)	\$14,197.6
Cost of goods sold	—	—	—	—	(957.9)	—	(9,209.4)	355.7	(9,811.6)
Selling and administrative expenses	(15.6)	—	(0.1)	(1.2)	(401.7)	(0.2)	(2,301.9)	—	(2,720.7)
Operating income (loss)	(15.6)	—	(0.1)	(1.2)	(23.0)	(0.2)	1,705.4	—	1,665.3
Equity earnings (loss) in subsidiaries, net of tax	1,349.2	1,334.7	982.3	565.3	1,212.5	107.9	—	(5,551.9)	—
Interest expense	—	—	—	(127.0)	(47.2)	(41.0)	(0.6)	—	(215.8)
Intercompany interest and fees	(33.1)	—	253.0	(493.9)	(500.9)	(8.2)	783.1	—	—
Other income/(expense), net	—	—	0.1	—	(5.8)	—	(25.9)	—	(31.6)
Earnings (loss) before income taxes	1,300.5	1,334.7	1,235.3	(56.8)	635.6	58.5	2,462.0	(5,551.9)	1,417.9
Benefit (provision) for income taxes	2.1	—	—	247.2	(42.4)	—	(287.1)	—	(80.2)
Earnings (loss) from continuing operations	1,302.6	1,334.7	1,235.3	190.4	593.2	58.5	2,174.9	(5,551.9)	1,337.7
Gain (loss) from discontinued operations, net of tax	—	—	—	—	(27.9)	—	2.5	—	(25.4)
Net earnings (loss)	1,302.6	1,334.7	1,235.3	190.4	565.3	58.5	2,177.4	(5,551.9)	1,312.3
Less: Net earnings attributable to noncontrolling interests	—	—	—	—	—	—	(9.7)	—	(9.7)
Net earnings attributable to Ingersoll-Rand plc	\$1,302.6	\$1,334.7	\$1,235.3	\$190.4	\$565.3	\$58.5	\$2,167.7	\$(5,551.9)	\$1,302.6
Other comprehensive income (loss), net of tax	511.7	510.3	472.5	369.3	368.8	102.1	499.0	(2,322.0)	511.7
Comprehensive income attributable	\$1,814.3	\$1,845.0	\$1,707.8	\$559.7	\$934.1	\$160.6	\$2,666.7	\$(7,873.9)	\$1,814.3

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Table of ContentsCondensed Consolidating Statement of Comprehensive Income
For the year ended December 31, 2016

In millions	Plc	Irish Holdings	Lux International	Global Holding	New Jersey	Lux Finance	Other Subsidiaries	Consolidating Adjustments	Consolidated
Net revenues	\$—	\$—	\$—	\$—	\$1,327.2	\$—	\$12,533.9	\$(352.2)	\$13,508.9
Cost of goods sold	—	—	—	—	(982.2)	—	(8,677.9)	352.2	(9,307.9)
Selling and administrative expenses	(16.9)	—	(0.2)	(0.1)	(352.5)	(0.5)	(2,227.6)	—	(2,597.8)
Operating income (loss)	(16.9)	—	(0.2)	(0.1)	(7.5)	(0.5)	1,628.4	—	1,603.2
Equity earnings (loss) in subsidiaries, net of tax	1,559.7	1,544.0	1,463.4	609.4	808.7	1,521.1	—	(7,506.3)	—
Interest expense	—	—	—	(127.0)	(47.9)	(42.6)	(4.0)	—	(221.5)
Intercompany interest and fees	(69.2)	—	(46.4)	(164.5)	(277.2)	(6.8)	564.1	—	—
Other income/(expense), net	0.9	—	—	—	(13.8)	—	372.5	—	359.6
Earnings (loss) before income taxes	1,474.5	1,544.0	1,416.8	317.8	462.3	1,471.2	2,561.0	(7,506.3)	1,741.3
Benefit (provision) for income taxes	1.7	—	3.0	115.6	117.3	—	(519.1)	—	(281.5)
Earnings (loss) from continuing operations	1,476.2	1,544.0	1,419.8	433.4	579.6	1,471.2	2,041.9	(7,506.3)	1,459.8
Gain (loss) from discontinued operations, net of tax	—	—	—	—	30.4	—	2.5	—	32.9
Net earnings (loss)	1,476.2	1,544.0	1,419.8	433.4	610.0	1,471.2	2,044.4	(7,506.3)	1,492.7
Less: Net earnings attributable to noncontrolling interests	—	—	—	—	—	—	(16.5)	—	(16.5)
Net earnings attributable to Ingersoll-Rand plc	\$1,476.2	\$1,544.0	\$1,419.8	\$433.4	\$610.0	\$1,471.2	\$2,027.9	\$(7,506.3)	\$1,476.2
Other comprehensive income (loss), net of tax	(169.6)	(168.5)	(166.8)	(161.1)	(161.5)	5.0	33.3	619.6	(169.6)
Comprehensive income	\$1,306.6	\$1,375.5	\$1,253.0	\$272.3	\$448.5	\$1,476.2	\$2,061.2	\$(6,886.7)	\$1,306.6

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Table of ContentsCondensed Consolidating Balance Sheet
December 31, 2018

In millions	Plc	Irish Holdings	Lux International	Global Holding	New Jersey	Lux Finance	Other Subsidiaries	Consolidating Adjustments	Consolidated
ASSETS									
Current assets:									
Cash and cash equivalents	\$—	\$0.1	\$0.2	\$—	\$363.5	\$—	\$539.6	\$—	\$903.4
Accounts and notes receivable, net	—	—	0.1	—	183.4	—	2,495.7	—	2,679.2
Inventories, net	—	—	—	—	146.6	—	1,531.2	—	1,677.8
Other current assets	0.2	—	7.8	—	101.0	—	363.4	(0.8)	471.6
Intercompany receivables	59.5	—	3.9	—	3,851.0	0.1	3,838.0	(7,752.5)	—
Total current assets	59.7	0.1	12.0	—	4,645.5	0.1	8,767.9	(7,753.3)	5,732.0
Property, plant and equipment, net	—	—	0.1	—	314.6	—	1,416.1	—	1,730.8
Goodwill and other intangible assets, net	—	—	—	—	432.1	—	9,162.1	—	9,594.2
Other noncurrent assets	—	—	8.0	180.0	498.1	—	610.6	(438.8)	857.9
Investments in consolidated subsidiaries	9,308.9	9,267.8	3,935.4	11,743.2	9,923.2	1,264.2	—	(45,442.7)	—
Intercompany notes receivable	—	—	—	—	—	—	2,249.7	(2,249.7)	—
Total assets	\$9,368.6	\$9,267.9	\$3,955.5	\$11,923.2	\$15,813.5	\$1,264.3	\$22,206.4	\$(55,884.5)	\$17,914.9
LIABILITIES AND EQUITY									
Current liabilities:									
Accounts payable and accrued expenses	\$11.3	\$—	\$0.1	\$41.7	\$599.6	\$6.9	\$3,306.3	\$(0.8)	\$3,965.1
Short-term borrowings and current maturities of long-term debt	—	—	—	—	350.4	—	0.2	—	350.6
Intercompany payables	2,334.6	—	132.9	3,518.7	1,700.9	0.2	65.2	(7,752.5)	—

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Total current liabilities	2,345.9	—	133.0	3,560.4	2,650.9	7.1	3,371.7	(7,753.3)	4,315.7
Long-term debt	—	—	—	2,330.0	319.5	1,091.0	0.2	—	3,740.7
Other noncurrent liabilities	—	—	—	5.5	1,100.5	—	2,126.5	(438.8)	2,793.7
Intercompany notes payable	—	—	—	2,249.7	—	—	—	(2,249.7)	—
Total liabilities	2,345.9	—	133.0	8,145.6	4,070.9	1,098.1	5,498.4	(10,441.8)	10,850.1
Equity:									
Total equity	7,022.7	9,267.9	3,822.5	3,777.6	11,742.6	166.2	16,708.0	(45,442.7)	7,064.8
Total liabilities and equity	\$9,368.6	\$9,267.9	\$3,955.5	\$11,923.2	\$15,813.5	\$1,264.3	\$22,206.4	\$(55,884.5)	\$17,914.9

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Table of ContentsCondensed Consolidating Balance Sheet
December 31, 2017

In millions	Plc	Irish Holdings	Lux International	Global Holding	New Jersey	Lux Finance	Other Subsidiaries	Consolidating Adjustments	Consolidated
ASSETS									
Current assets:									
Cash and cash equivalents	\$—	\$—	\$0.6	\$—	\$359.3	\$—	\$1,189.5	\$—	\$1,549.4
Accounts and notes receivable, net	—	—	—	—	166.5	—	2,310.9	—	2,477.4
Inventories, net	—	—	—	—	168.5	—	1,386.9	—	1,555.4
Other current assets	0.2	—	5.7	112.6	76.2	—	342.2	—	536.9
Intercompany receivables	1,819.1	9,912.2	2,036.8	—	1,849.9	—	5,014.8	(20,632.8)	—
Total current assets	1,819.3	9,912.2	2,043.1	112.6	2,620.4	—	10,244.3	(20,632.8)	6,119.1
Property, plant and equipment, net	—	—	—	—	310.6	—	1,240.7	—	1,551.3
Goodwill and other intangible assets, net	—	—	—	—	436.0	—	9,242.6	—	9,678.6
Other noncurrent assets	—	—	—	185.4	471.1	—	550.8	(383.0)	824.3
Investments in consolidated subsidiaries	7,318.1	1,684.2	2,953.9	10,480.3	10,923.7	1,150.9	—	(34,511.1)	—
Total assets	\$9,137.4	\$11,596.4	\$4,997.0	\$10,778.3	\$14,761.8	\$1,150.9	\$21,278.4	\$(55,526.9)	\$18,173.3
LIABILITIES AND EQUITY									
Current liabilities:									
Accounts payable and accrued expenses	\$8.5	\$—	\$0.2	\$27.3	\$572.3	\$6.9	\$3,105.8	\$—	\$3,721.0
Short-term borrowings and current maturities of long-term debt	—	—	—	749.6	350.4	—	7.0	—	1,107.0
	1,988.3	—	9,316.7	5,481.1	1,790.0	523.3	1,533.4	(20,632.8)	—

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Intercompany payables									
Total current liabilities	1,996.8	—	9,316.9	6,258.0	2,712.7	530.2	4,646.2	(20,632.8)	4,828.0
Long-term debt	—	—	—	1,539.9	326.8	1,089.7	0.6	—	2,957.0
Other noncurrent liabilities	0.3	—	—	92.4	1,251.8	—	2,219.9	(383.0)	3,181.4
Total liabilities	1,997.1	—	9,316.9	7,890.3	4,291.3	1,619.9	6,866.7	(21,015.8)	10,966.4
Equity:									
Total equity	7,140.3	11,596.4	(4,319.9)	2,888.0	10,470.5	(469.0)	14,411.7	(34,511.1)	7,206.9
Total liabilities and equity	\$9,137.4	\$11,596.4	\$4,997.0	\$10,778.3	\$14,761.8	\$1,150.9	\$21,278.4	\$(55,526.9)	\$18,173.3

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Table of ContentsCondensed Consolidating Statement of Cash Flows
For the year ended December 31, 2018

In millions	Plc	Irish Holdings	Lux International	Global Holding	New Jersey	Lux Finance	Other Subsidiaries	Consolidating Adjustments	Consolidated
CASH FLOWS FROM OPERATING ACTIVITIES:									
Net cash provided by (used in) continuing operating activities	\$ 78.8	\$ (2.7)	\$ 31.5	\$(217.6)	\$1,544.4	\$(52.0)	\$ 92.1	\$ —	\$ 1,474.5
Net cash provided by (used in) discontinued operating activities	—	—	—	—	(65.3)	—	(1.4)	—	(66.7)
Net cash provided by (used in) operating activities	78.8	(2.7)	31.5	(217.6)	1,479.1	(52.0)	90.7	—	1,407.8
CASH FLOWS FROM INVESTING ACTIVITIES:									
Capital expenditures	—	—	—	—	(87.7)	—	(277.9)	—	(365.6)
Acquisitions and equity method investments, net of cash acquired	—	—	—	—	—	—	(285.2)	—	(285.2)
Proceeds from sale of property, plant and equipment	—	—	—	—	9.0	—	13.1	—	22.1
Other investing activities, net	—	—	(7.9)	—	3.0	—	4.2	—	(0.7)
Intercompany investing activities, net	1,058.7	(481.2)	545.4	9.5	287.1	—	2,641.1	(4,060.6)	—
Net cash provided by (used in) investing activities	1,058.7	(481.2)	537.5	9.5	211.4	—	2,095.3	(4,060.6)	(629.4)
CASH FLOWS FROM FINANCING ACTIVITIES:									
Net proceeds (repayments) of debt	—	—	—	31.6	(7.5)	—	(6.5)	—	17.6
Debt issuance costs	—	—	—	(12.0)	—	—	—	—	(12.0)
Dividends paid to ordinary shareholders	(479.5)	—	—	—	—	—	—	—	(479.5)
Dividends paid to noncontrolling interests	—	—	—	—	—	—	(41.4)	—	(41.4)
Proceeds from shares issued under incentive plans	68.9	—	—	—	—	—	—	—	68.9
Repurchase of ordinary shares	(900.2)	—	—	—	—	—	—	—	(900.2)
Other financing activities, net	(25.8)	—	—	—	(1.5)	—	(4.9)	—	(32.2)

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Intercompany financing activities, net	199.1	484.0	(569.4)	188.5	(1,677.3)	52.0	(2,737.5)	4,060.6	—
Net cash provided by (used in) financing activities	(1,137.5)	484.0	(569.4)	208.1	(1,686.3)	52.0	(2,790.3)	4,060.6	(1,378.8)
Effect of exchange rate changes on cash and cash equivalents	—	—	—	—	—	—	(45.6)	—	(45.6)
Net increase (decrease) in cash and cash equivalents	—	0.1	(0.4)	—	4.2	—	(649.9)	—	(646.0)
Cash and cash equivalents - beginning of period	—	—	0.6	—	359.3	—	1,189.5	—	1,549.4
Cash and cash equivalents - end of period	\$—	\$ 0.1	\$ 0.2	\$—	\$363.5	\$—	\$ 539.6	\$ —	\$ 903.4

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Table of ContentsCondensed Consolidating Statement of Cash Flows
For the year ended December 31, 2017

In millions	Plc	Irish Holding	Lux International	Global Holding	New Jersey	Lux Finance	Other Subsidiaries	Consolidating Adjustments	Consolidated
CASH FLOWS FROM OPERATING ACTIVITIES:									
Net cash provided by (used in) continuing operating activities	\$ 83.8	\$ —	\$ (42.8)	\$ (284.9)	\$ 438.4	\$ (48.0)	\$ 1,415.1	\$ —	\$ 1,561.6
Net cash provided by (used in) discontinued operating activities	—	—	—	—	(36.9)	—	(1.2)	—	(38.1)
Net cash provided by (used in) operating activities	83.8	—	(42.8)	(284.9)	401.5	(48.0)	1,413.9	—	1,523.5
CASH FLOWS FROM INVESTING ACTIVITIES:									
Capital expenditures	—	—	—	—	(74.2)	—	(147.1)	—	(221.3)
Acquisitions and equity method investments, net of cash acquired	—	—	—	—	(2.7)	—	(154.9)	—	(157.6)
Proceeds from sale of property, plant and equipment	—	—	—	—	—	—	1.5	—	1.5
Other investing activities, net	—	—	—	—	—	—	2.7	—	2.7
Intercompany investing activities, net	285.1	285.2	2,050.2	270.1	4,899.4	11.7	6,788.3	(14,590.0)	—
Net cash provided by (used in) investing activities	285.1	285.2	2,050.2	270.1	4,822.5	11.7	6,490.5	(14,590.0)	(374.7)
CASH FLOWS FROM FINANCING ACTIVITIES:									
Net proceeds (repayments) of debt	—	—	—	—	(7.5)	—	(4.2)	—	(11.7)
Debt issuance costs	—	—	—	(0.2)	—	—	—	—	(0.2)
Dividends paid to ordinary shareholders	(430.1)	—	—	—	—	—	—	—	(430.1)
Dividends paid to noncontrolling interests	—	—	—	—	—	—	(15.8)	—	(15.8)
Acquisition of noncontrolling interest	—	—	—	—	—	—	(6.8)	—	(6.8)
Proceeds from shares issued under incentive plans	76.7	—	—	—	—	—	—	—	76.7
Repurchase of ordinary shares	(1,016.9)	—	—	—	—	—	—	—	(1,016.9)
Other financing activities, net	(25.4)	—	—	—	(1.7)	—	(0.6)	—	(27.7)
Intercompany financing activities, net	1,026.8	(285.2)	(2,006.8)	15.0	(5,490.1)	36.3	(7,886.0)	14,590.0	—
Net cash provided by (used in) financing activities	(368.9)	(285.2)	(2,006.8)	14.8	(5,499.3)	36.3	(7,913.4)	14,590.0	(1,432.5)

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Effect of exchange rate changes on cash and cash equivalents	—	—	—	—	—	—	118.4	—	118.4
Net increase (decrease) in cash and cash equivalents	—	—	0.6	—	(275.3)	—	109.4	—	(165.3)
Cash and cash equivalents – beginning of period	—	—	—	—	634.6	—	1,080.1	—	1,714.7
Cash and cash equivalents – end of period	\$—	\$ —	\$ 0.6	\$—	\$359.3	\$—	\$ 1,189.5	\$ —	\$ 1,549.4

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Table of ContentsCondensed Consolidating Statement of Cash Flows
For the year ended December 31, 2016

In millions	Plc	Irish Holding	Lux International	Global Holding	New Jersey	Lux Finance	Other Subsidiaries	Consolidating Adjustments	Consolidated
CASH FLOWS FROM OPERATING ACTIVITIES:									
Net cash provided by (used in) continuing operating activities	\$(80.4)	\$ —	\$(42.0)	\$(276.6)	\$823.4	\$(47.3)	\$1,055.9	\$ —	\$1,433.0
Net cash provided by (used in) discontinued operating activities	—	—	—	—	86.4	—	2.5	—	88.9
Net cash provided by (used in) operating activities	(80.4)	—	(42.0)	(276.6)	909.8	(47.3)	1,058.4	—	1,521.9
CASH FLOWS FROM INVESTING ACTIVITIES:									
Capital expenditures	—	—	—	—	(73.7)	—	(109.0)	—	(182.7)
Acquisitions and equity method investments, net of cash acquired	—	—	—	—	(9.2)	—	—	—	(9.2)
Proceeds from sale of property, plant and equipment	—	—	—	—	—	—	9.5	—	9.5
Proceeds from sale of Hussmann equity investment	—	—	—	—	—	—	422.5	—	422.5
Intercompany investing activities, net	(90.1)	(19,465.7)	181.4	(172.9)	65.8	336.1	(2,226.8)	15,372.2	—
Net cash provided by (used in) investing activities	(90.1)	(19,465.7)	181.4	(172.9)	(17.1)	336.1	(1,903.8)	15,372.2	240.1
CASH FLOWS FROM FINANCING ACTIVITIES:									
Net proceeds (repayments) of debt	—	—	—	—	(7.7)	(143.0)	—	—	(150.7)
Debt issuance costs	—	—	—	(2.1)	—	—	—	—	(2.1)
Dividends paid to ordinary shareholders	(348.6)	—	—	—	—	—	—	—	(348.6)
Dividends paid to noncontrolling interests	—	—	—	—	—	—	(14.1)	—	(14.1)
Proceeds from shares issued under incentive plans	62.9	—	—	—	—	—	—	—	62.9
Repurchase of ordinary shares	(250.1)	—	—	—	—	—	—	—	(250.1)
Other financing activities, net	(24.2)	—	—	—	—	—	—	—	(24.2)
Intercompany financing activities, net	730.5	19,465.7	(6,139.4)	440.2	(250.4)	(145.9)	1,271.5	(15,372.2)	—
Net cash provided by (used in) financing activities	170.5	19,465.7	(6,139.4)	438.1	(258.1)	(288.9)	1,257.4	(15,372.2)	(726.9)

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Effect of exchange rate changes on cash and cash equivalents	—	—	—	—	—	—	(57.2)	—	(57.2)
Net increase (decrease) in cash and cash equivalents	—	—	—	(11.4)	634.6	(0.1)	354.8	—	977.9
Cash and cash equivalents – beginning of period	—	—	—	11.4	—	0.1	725.3	—	736.8
Cash and cash equivalents – end of period	\$—	\$—	\$—	\$—	\$634.6	\$—	\$1,080.1	\$—	\$1,714.7

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NOTE 22. SUBSEQUENT EVENTS

On February 6, 2019, the Company entered into a final, binding and irrevocable offer letter with Silver II GP Holdings S.C.A., an affiliate of BC Partners Advisors L.P. and The Carlyle Group (the Seller) pursuant to which the Company made a binding offer to acquire the precision flow systems management business (the Business) for approximately \$1.45 billion in cash, subject to working capital and certain other adjustments (the Acquisition). The Business is a manufacturer of precision flow control equipment including electric diaphragm pumps and controls that serve the global water, oil and gas, agriculture, industrial and specialty market segments. The offer is subject to completion of information and consultation processes with employee representative bodies of the Business in applicable jurisdictions. If the offer is accepted, completion of the Acquisition would be subject to customary closing conditions and expected to close mid-year 2019 subject to regulatory approvals. The results of the Business will be included in the Company's consolidated financial statements as of the date of acquisition and reported within the Industrial segment.

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SCHEDULE II
 INGERSOLL-RAND PLC
 VALUATION AND QUALIFYING ACCOUNTS
 FOR THE YEARS ENDED December 31, 2018, 2017 AND 2016
 (Amounts in millions)

Allowances for Doubtful Accounts:

Balance December 31, 2015	\$28.3
Additions charged to costs and expenses	7.9
Deductions ^(a)	(9.5)
Business acquisitions and divestitures, net	—
Currency translation	(0.7)
 Balance December 31, 2016	 26.0
Additions charged to costs and expenses	9.7
Deductions ^(a)	(9.7)
Business acquisitions and divestitures, net	—
Currency translation	1.3
 Balance December 31, 2017	 26.9
Additions charged to costs and expenses	15.3
Deductions ^(a)	(9.1)
Business acquisitions and divestitures, net	0.5
Currency translation	(0.9)
Balance December 31, 2018	\$32.7

(a)“Deductions” include accounts and advances written off, less recoveries.